

performance report

# **BSA SPITFIRE HORNET**

BY PHIL ENGELDRUM

**B**IRMINGHAM Small Arms Company is best known for small bore rifles and big bore motorcycles.

This month we tested the wildest BSA of them all—the Spitfire Hornet. This 650 cc (40 cubic inch) scrambler has enough beef to handle any type of terrain. The engine-transmission unit is supported on a double down-tube frame, which is strong enough to support a bouncing elephant. The front forks are controlled by oil and springs. The steering damper is adjustable.

Riding position is quite comfortable and the foot pegs and shift lever are adjustable so that the machine can be tailored to your specifications. Clutch and brake levers have ball ends for ultra-smooth operation.

An 8,000 rpm Smiths tach keeps track of the revs. While the engine will wind above 8,000, little is gained above 7,400.

The gas tank is a lightweight fiberglass unit which holds two gallons.

Front and rear fenders are plated with top grade chrome.

The brakes are superb; they feature the world famous Gold Star racing units. The brake hubs are not full width and look old fashioned to some. Looks aside, the black painted binders spell STOP in big, bold letters. Another advantage of using the Gold Star brake assembly is that the wheels can be quickly changed without playing with brake and chain adjustment. A wheel can be changed about as fast as you can pry off a hubcap.

An energy transfer ignition system fires the big twin to life. The bike does not come with lights, but they can be readily fitted if necessary.

Electrical energy for ignition and lighting (if desired) is provided by an alternator. It has six stator windings of which four are used for ignition and the remaining two for the lights. The only thing we could find wrong with this system is that accurate ignition timing is absolutely essential for peak power. If the points open for close too soon, you can loose a few thousand rpm. All would be lost, if timing was hard to set!

The engine is quite easy to start using either popular methods. There are those who think only of giving the starter lever a kick. However, many scramble riders (probably for crowd appeal) engage a gear, run along side the machine and pop the clutch. This run and bump procedure allows them to leap on like Roy Rogers and take right off.

The motorcycle world is rent asunder by a great debate on the type of bearings a motorcycle should have. One cycle magazine (which shall remain nameless) con-





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tends that the "bushing" used on the BSA crankshaft is not up to the ball bearing assembly used on the crankshaft of a very competitive machine. (In case you didn't guess, the competitive machine is a Triumph.)

One of the things that make this debate more interesting is the fact that BSA and Triumph are owned by Birmingham Small Arms. It's just like the Oldsmobile and Pontiac setup at GM. BSA went to a completely new engine when they unitized the engine and transmission. This allowed them to enjoy such modern benefits as a short stroke, superior lubrication system and modern automotive bearings. The bore on the Hornet and other BSA 40 cube twins is 75 mm, the stroke is 74 mm. The Triumph bore is 71 mm and the stroke is 82 mm. This came about in an interesting way.

Triumph updated their engine and gearbox and unitized it, but still retained the dimensions of its old style engine. As the old style engine used a ball bearing, it didn't pay to retool for the automotive type.

Let's clear the air about this "bushing" jazz. Quite often in England the term bushing and bearing are used interchangeably. Here on the other side of the pond, we think of a bearing as having oil fed to it under pressure. The shaft rides on the oil film and not actually on the precision insert. An automotive-type bearing must be pressure fed for it to be any good, and is superior to a ball bearing in the following instances. 1. Oil can be directed through it to other engine parts without losing a lot of pressure. 2. It runs more quietly than a ball or roller bearing. 3. It will give longer life as it can absorb small particles of dirt (which are found in all internal combustion machines) better than a ball bearing. 4. It has a larger load area and puts less stress on the crankshaft. 5. It gives more rigidity to the assembly and prevents vibration (common in ball bearing assemblies).

By the way, the bearing used is not an "el cheapo", but is a Vandervell VP23, copper lead bearing such as used on BRM's and other exotic Grand Prix machines.

Vandervell's American associate is the Cleveland Graphite Bronze Company. Their line of Clevite bearings were the only ones able to stand up in the '58 NASCAR model Pontiacs and other big cube drag and stock racing machines.

It is quite plain that both types of bearings have their place. BSA uses a roller bearing on the output side because it can't be lubricated as well and the transmission had been originally designed for it. Since it works fine why change it?

OK, you Triumph and BSA owners, now you can stop talking bearings and bushing and go out and do some racing!

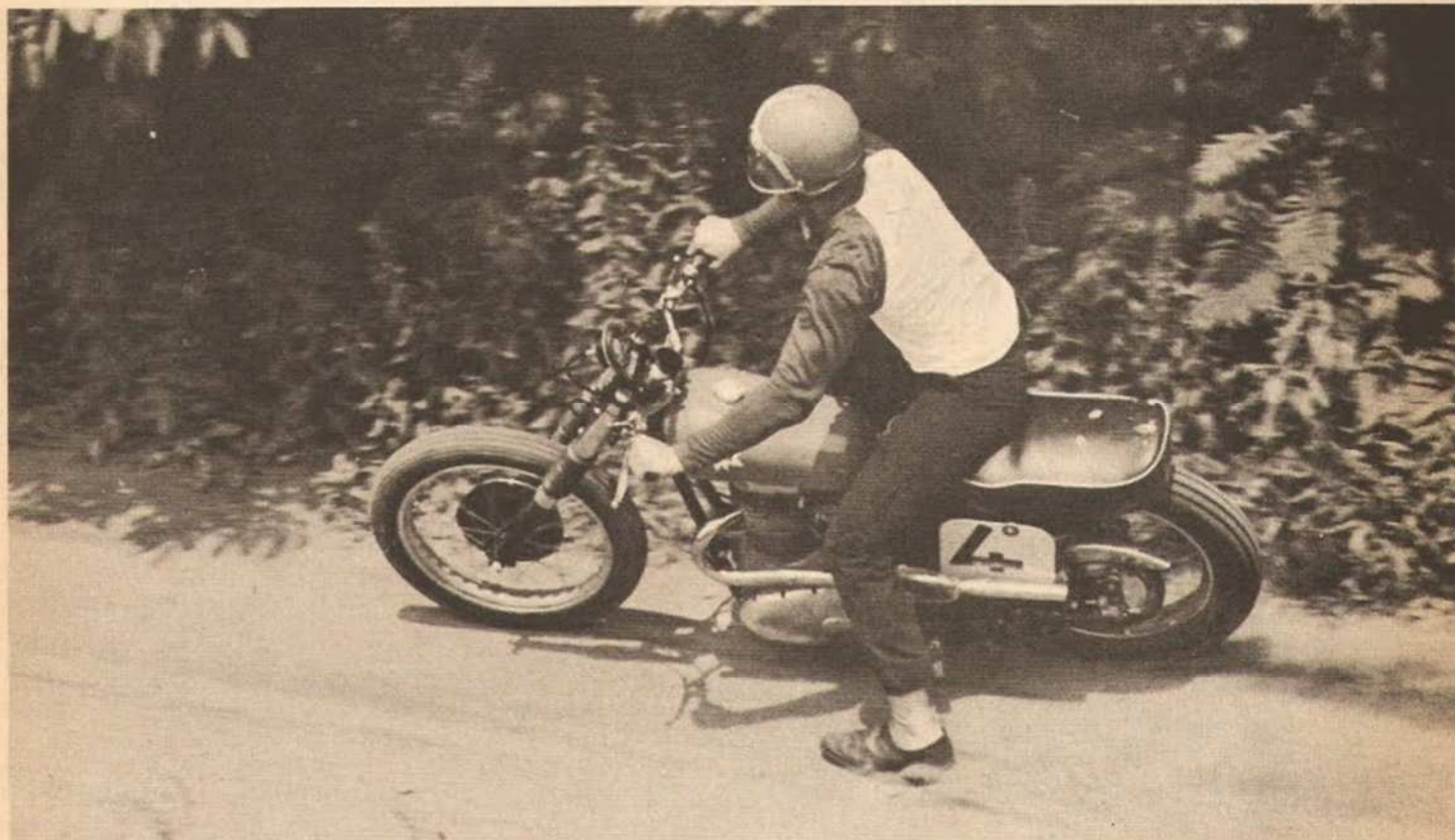
The engine is of the unit design and thus provides a highly accurate primary chain alignment and also reduces the weight of the old fashioned two-unit system.

The crankshaft is forged from manganese steel and the central flywheel is bolted on. A gear-type oil pump supplies pressure lubrication to the main bearings and then to the connecting rod bearings.

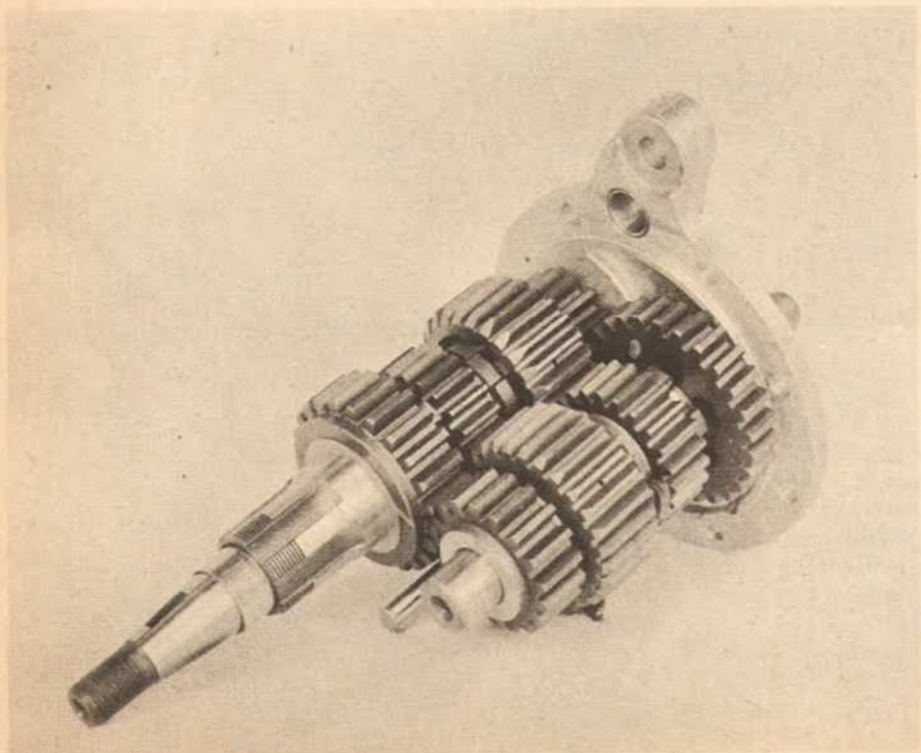
The connecting rods are forged aluminum, (Duralumin) and feature precision insert bearings. The hollow single camshaft is located at the rear of the engine and is driven by a train of three gears. The middle gear in this train also drives the points and automatic spark



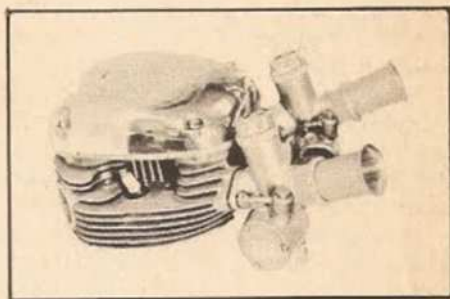
◀ Wally Brown pulls a wheelie coming out of the chute during the acceleration trials. Best 0-60 mph time—5.8 seconds.



Wally wheels the hot Spitfire Hornet through some real tight turns on the special scrambles course. Bike really turns on!



A variety of gear ratios are available for competition. Chrome-nickel cogs are used.



Large capacity cylinder head sports dual 1 $\frac{1}{8}$ -inch Amal Monobloc carburetors.



Wild assortment of BSA racing machines decorate the importer's showroom.

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advance unit. Lightweight tappets with wear-resistant contact faces operate the overhead valves by means of solid, lightweight, Duralumin push rods. Pushrods have case hardened end cups; rocker arms are mounted on spindles on the head. The twin cylinders have extra-rigid barrels with a cast-in tunnel for the pushrods.

The heads are of the splayed or dual-port design. Twin Amal monobloc carbs sit on the head. Barrel size is 1½ inches. They mount a felt-type air filter (I would prefer a paper one instead). The compression ratio of the hemispherical head engine is a realistic 9 to 1.

This ratio was chosen to give the most power with the greatest reliability. For long races and rough scrambles, this ratio seems to be better than the higher ones which are more prone to overheating and piston seizure.

Intake valves are 1.475 inches and the exhausts are 1.412 inches.

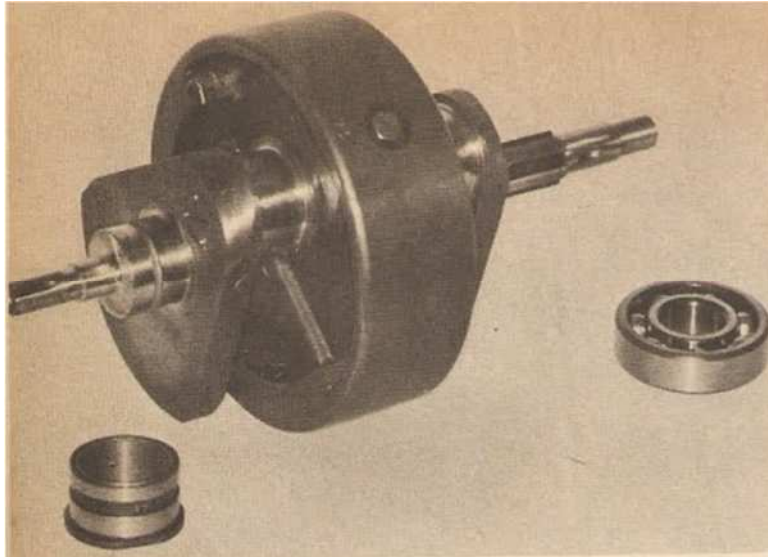
Intakes are silicon-chrome steel with hardened ends; exhausts are nickel-chrome steel with stellite faces. The cam timing is quite sporty and has the following specifications: 10-51, IC-68, EO-78, EC-37. By these specifications you can see that this is no cam for pulling your mother-in-law around in a side car!

With a little effort, we were able to get this baby to haul through the quarter in 12.9 seconds and 106 mph. This was with a cheater sprocket ratio of 6.17 and a special recapped slick. Ace rider Wally Brown had some bad times as he tried to keep the front wheel on the ground.

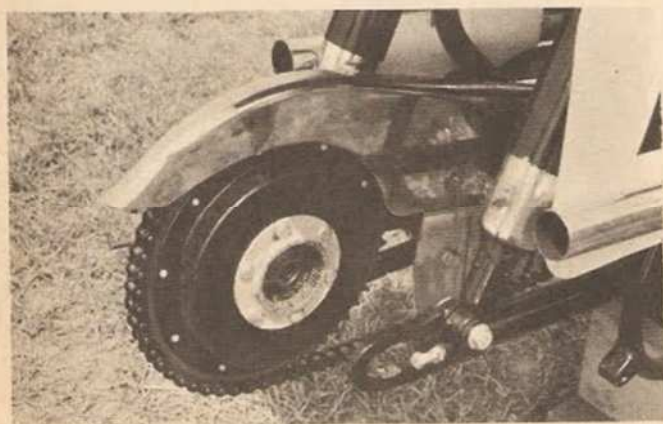
The bike was not built as a drag machine and with a little super tuning the times could be bettered.

On the scrambles track the bike came on like a bear. The value of the quick change wheel was proven to us when we switched from the slick to a road tire and then to a knobby for the woods. Man, do those knobby tires smoke when you let out that clutch! The clutch has multi discs of friction facing and special iron alloy plates. It really grabs!

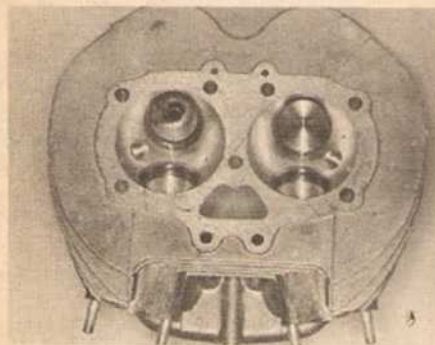
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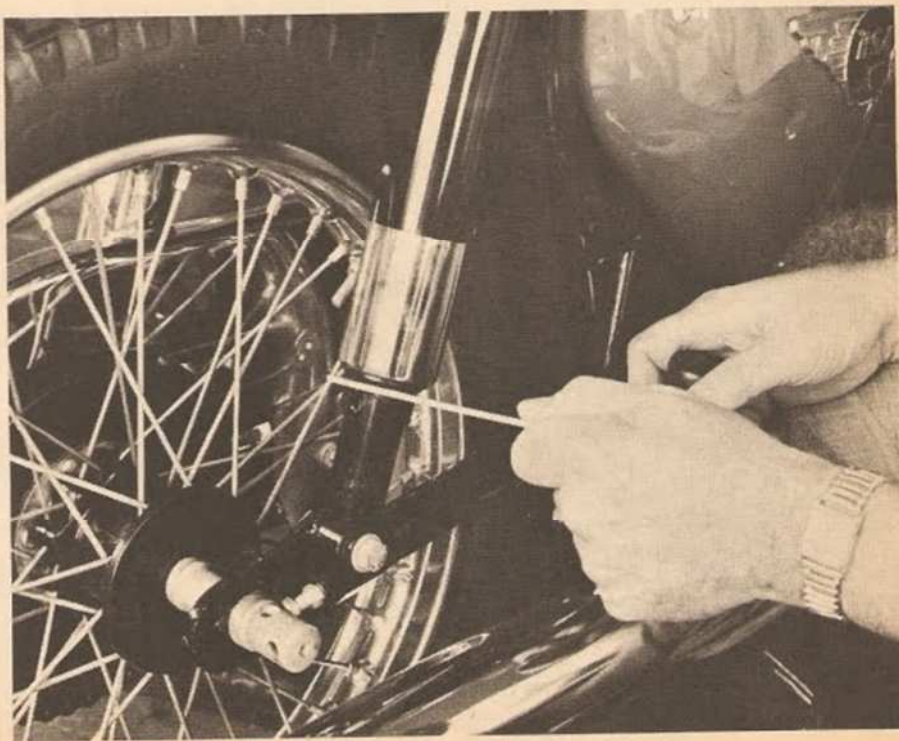
Rugged crankshaft assembly has special precision bearing insert. Transmission uses Hoffman roller bearing.



It is not necessary to change chain or brake adjustment when changing a wheel. Quick-change hub is a must for racing.



Dual intake head features large valves, dual springs, hemispherical-shaped combustion chambers and a 9-1 compression ratio. Rear shocks can be adjusted for driver's weight and type of racing.



## BSA SPITFIRE, continued

Speed shifts were difficult at first, but Wally reversed the shift lever and worked it with his heel. This *crash box* must have teeth like a dragon, as it took all of the abuse we heaped on it without a grumble.

While BSA does not advertise the power rating of its bikes, a source close to the factory insures us that it will put out at least 56 hp with open pipes. The power comes on very strong over 4,000 rpm and pulls to

7,500. We were able to get 0-60 times of 5.8 seconds; 0-80 8.6 seconds!

Even though the Spitfire Hornet is a new bike, it has racked up some impressive wins. Besides winning the Michigan State TT Scrambles and the Moto-Cross Championships, a Hornet won the 650 main at the National Championships TT Scrambles at Butler, Pa. On the short AMA dirt tracks, the Hornet is a consistent top contender.

The most famous BSA of them all, The Gold Star, was reputed to be blazingly fast. While it dominated the European races, it is no match for the Hornet at top end. The Hornet will run, 100 percent stock from the showroom, faster than the Gold Star would run with streamlined racing fairings. You can take that as proof of progress! The Hornet is good for over 125 mph.

At one drag strip we took the machine to a young hot rodder came over to check it out. He seemed impressed and gave it a very close inspection. The only thing that puzzled him was the BSA. He asked one of the cyclists who was dragging the machine what the BSA stood for. The answer — "Best Scrambler Around." You know, he just might be right!