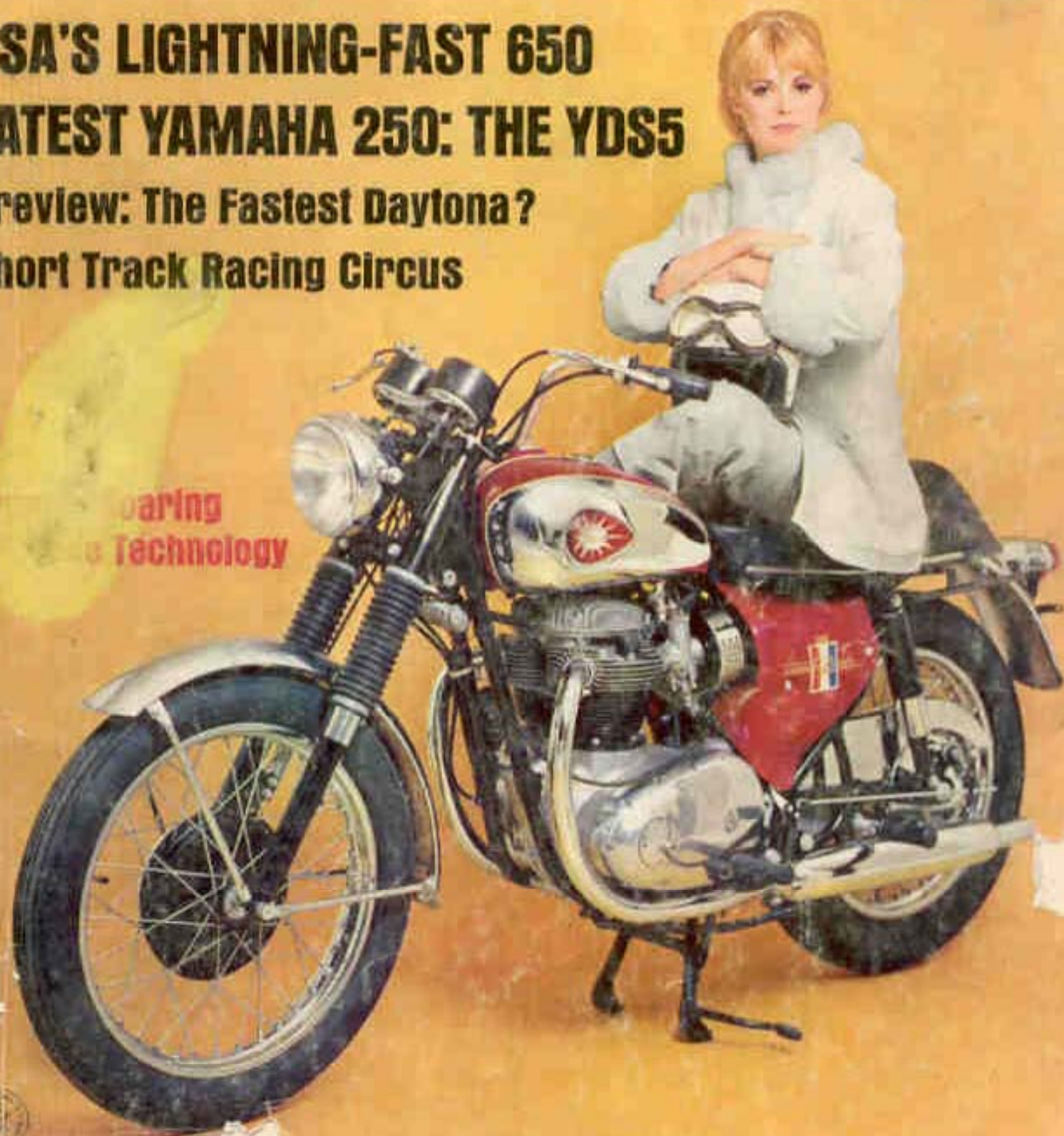


Cycle

MARCH 1967 • 50 CENTS

BSA'S LIGHTNING-FAST 650
LATEST YAMAHA 250: THE YDS5
Preview: The Fastest Daytona?
Short Track Racing Circus

**Comparing
Technology**





CYCLE ROAD TEST

BSA 650 LIGHTNING

With superfast acceleration through four long gears, the big, big Beeza never runs out of go—
It's proven again: nothing can displace displacement

Our British cousins, until quite recently, could ride at just about any speed that suited them—England had no speed-limit except in built-up areas. Out in the country, on those lovely, winding (dangerous) roads, motorist and motorcyclist were allowed to decide for themselves how fast they should travel. We will not comment on the wisdom of this; it is mentioned simply to explain, in part, how the big-displacement English motorcycles came to be what they are. Basically, these bikes were made for the man who wanted to get from village-A to village-B as rapidly as possible. And, even

though one can no longer, legally, run flat-out on England's roads, that country's sporting motorcycles are still made for sustained high-speed cruising.

That fact is abundantly obvious in the BSA (Birmingham Small Arms) "Lightning" model A65-2L. This bike's 40 cubic inch engine does not have to turn very fast to deliver quite a useful amount of power, and it packs a whacking tall overall drive ratio. With the standard 4.87:1 ratio, the BSA's engine cranks-off only 4400 rpm at 70 mph. That, and the relatively short stroke, yields a piston speed of 2140 feet per minute. Any en-

gine with the BSA's sturdy construction will run virtually forever at that level of stress. Indeed, most authorities offer the opinion that, with modern bearings, an engine is quite reliable up to at least 3000/ft min. In the BSA, that piston speed is equivalent to 6200 rpm, or a sustained 100 mph. Laws and law-enforcement being what they are here in America, you will not break the BSA by cruising too fast.

But that was not entirely true last year, when a lot of BSAs expired in untidy fashion. Pistons collapsed, valves jammed and spark-plugs fried themselves into oblivion. Not on all of the BSAs; many of them ran, and ran, and ran without giving their owners a bit of trouble. The rest just about drove BSA's engineers and their owners right out of their respective minds.

For some reason, a lot of the BSA engines were suffering from serious overheating. The effects of this caused piston and piston-ring failures, and on occasion

the high temperatures would bring about a lubrication failure in the valve guides, which made the valves stick open and get themselves clouted by the pistons. None of the standard measures applied. Changes in mixture had little effect; neither did a reduction in compression

After much agony and effort, it was discovered that the problem was caused by a kind of wandering-spark effect from the ignition. At medium and high engine speeds, a totally unexpected and unwanted spark would occur in advance of the normal spark. Unwanted or not, that

early spark would ignite the mixture. To all practical purposes, it was just as though the ignition timing had been advanced about 20-degrees. And it had the same effect as too much ignition advance: a drop in power output, and a drastic rise in heat being transferred into the cylinder and cylinderhead.

We can tell you about the loss of power because the first BSA Lightning given us for testing had the affliction just described. At the time, it was obvious that something was wrong, but precisely *what* was not clear. So we asked for

another bike, and in the time between tests the trouble was found and a cure developed. The cure consists of fitting a slightly different contact-breaker cam, ground to give a change in "dwell."

The improvement in performance was remarkable. The rather ragged full-throttle running and general lack of crispness was gone, and instead of flattening-out at about 83 mph in the quarter-mile run, the bike would get up to a bit over 90 mph. Any bike that will get up to 90 mph in the "quarter" and cover the distance in 14.5-seconds is ob-



viously a strong runner. The fact that the BSA will do it carrying a curb weight of 406-pounds and an overall drive ratio that amounts to an overdrive is nothing short of remarkable.

No horsepower figures are quoted by the BSA organization here in America, but the factory says the Lightning has 53 bhp—and we would guess that the power peak is at about 6500 rpm. Perhaps we should say that *maximum* power is at 6500 rpm; there is nothing "peaky" about the power curve. The engine pulls very strongly at low speeds, and the power does not begin to fade noticeably until the engine gets up past 7500 rpm. Valve-crash occurs at approximately 8000 rpm, which may be taken as proof that the designation "full-race" applied to the camshaft in BSA's sales literature is reasonably correct. Only a camshaft having lift-curves carefully designed for high-speed running would keep the BSA engine's beefy valve-gear under control up to 8000 rpm.

Several substantial improvements have been made in the BSA's electrical and ignition system. One of these that will be much appreciated is a huge, finned heat-sink to hold the Zener-diode that serves as a voltage regulator. The Zener diode does an excellent job, but under some conditions it produces heat at a fantastic rate. For that reason, the diode is always mounted in a metal "heat-sink" which drains heat away from the diode and prevents it from reaching the temperature at which the diode fails. The simple aluminum plate employed for this purpose last year was inadequate to the demands made upon it, and BSA dealers did a brisk business in replacement diodes. The new die-cast aluminum heat-sink offers a much larger mass of metal into which heat from the diode may flow, and its copious finning gives the heat an opportunity to transfer into the surrounding air.

The BSA is fitted with an alternator, to supply the electrical system, and this is mounted right inside the primary-drive casing. Mechanically, that is most convenient, but in the past the stator (which contains all of the windings) has suffered from the effects of heat and the particles of metal worn from the chain and sprockets that float around in the oil supply. To improve reliability, the stator is now encapsulated—which is to say, the windings and core are completely covered by a hard plastic coating.

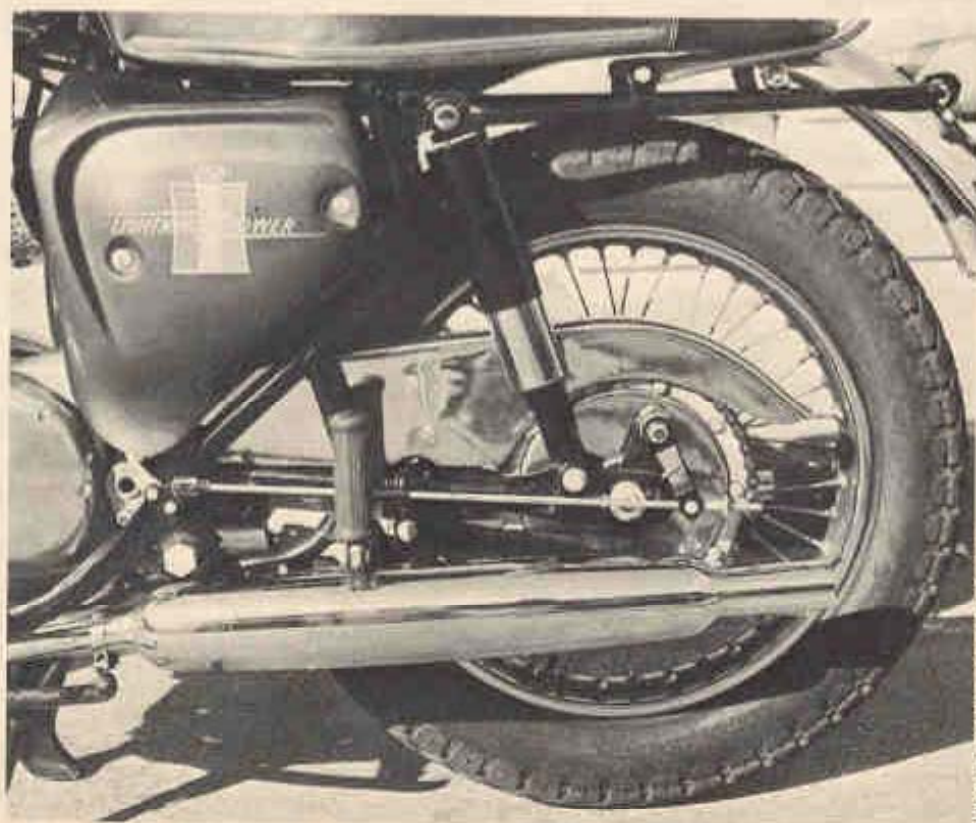
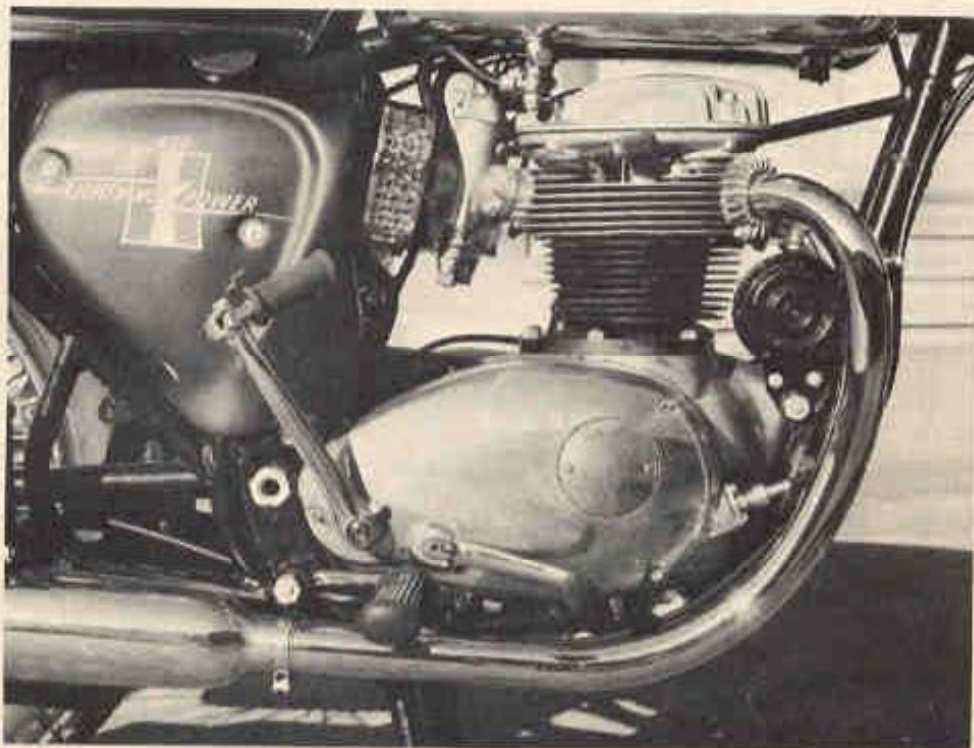
Mostly for the benefit of those who wish to run a "batteryless" electrical system, the alternator's rotor is now marked for ignition timing with a "strobe" light. To set the ignition, you remove a cover on the primary casing. Inside, there is a small "pointer" and with the engine running and the strobe light in operation, the pointer should align with the rotor's

mark. That is the correct timing with the ignition's automatic-advance mechanism working at full-advance.

Handling has also received attention. Doug Hele, who is the resident wizard for BSA and the Birmingham firm's sister-company, Triumph, holds impressive credentials (results) as an expert on handling. Hele is responsible for the superb double-damped forks now used on the BSA (and the Triumph twins) and he has cured that slight "hunting" effect that was once a characteristic of the big BSA. A touch more "rake" in the steer-

ing, and a change in the front wheel did the trick. The front wheel is laced to bring the tire over under the bike's center of gravity, which is slightly offset with regard to the chassis centerline.

With these changes, and the latest Dunlop tires, the BSA Lightning handles marvelously well. It runs straight as a string, hands-off, and you can pull it right over until things start to drag without a trace of wiggling. Mr. Hele gets credit for the bike's impressive stability and accuracy of steering, but Dunlop deserves a pat on the head for the BSA's



PHOTOGRAPHY: DAVID GOOLEY

secure grip on the road. On pavement dry or wet, it is possible to take great liberties with acceleration away from turns, or braking, or cornering, or any of the maneuvers that ask a lot of the tires' ability to stick.

Styling changes for 1967 are confined to the fuel tank and headlight mounting. The upper fork covers, which have blades extending forward to carry the headlight nacelle, are now chromium-plated. A more rounded, graceful shape has been given to the fuel tank, and it has larger chromed flashes along its sides. The familiar "flip-top" BSA filler cap is retained, as is the single-bolt hold-down mounting.

Also in the area of styling changes, more or less, is the new valve-cover. Last year, this cover was smooth and polished; now, it has a great lot of cooling fins. With contact between the cover

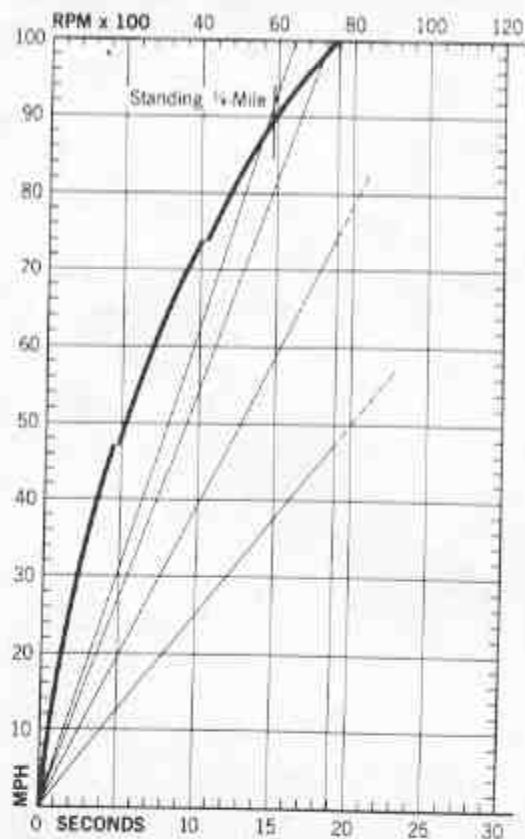
and the cylinderhead restricted to a narrow peripheral line, and a gasket interposed between them, it is doubtful that the cover finning will do anything beyond cooling the oil-splashed up against it.

More rubber has been placed between vibration and the main instruments. The new speedometer and tachometer have rubber cushioning between their cases and inner workings. As a result, the dials no longer turn into a blur; they can be read, without difficulty, even when the engine is really buzzing. Presumably, this will not only make them more useful, but will keep them working instead of disintegrating—as is too often the case in motorcycles generally.

Above all, the BSA Lightning is a pleasant machine to ride. It starts easily, hot or cold, and is not at all fussy about slogging around in traffic. Like all large-displacement motorcycles, it will give

you a spirited ride without being pumped along with its shift-lever. Rider-comfort is present in large amounts, because the relative positions of handlebars, seat, foot-pegs and controls is right. Right, at least, for touring behind a windshield; the seating position is a trifle vertical for sustained 70 mph speeds without anything to take the air-blast.

One need only look at the cover of this magazine to see that the BSA Lightning scores very high in terms of appearance. Seemingly, the makers have either chromed or polished nearly everything. And what has not been chromed or polished has been enameled with great care. With that, and the improved reliability and performance BSA dealers in America will surely become insufferably smug before the summer is over. It looks like a vintage year for the Birmingham Bombers. Ⓜ



Price, suggested retail	\$1350.00 East Coast POE
Tire, front	3.25 in. x 19 in.
rear	4.00 in. x 18 in.
Brakes, front	Single leading shoe, 8 in. x 1.625 in.
rear	Single leading shoe, 7 in. x 1.125 in.
Brake swept area	66.23 in.
Specific brake loading	8.95 lb/sq. in.
Engine type	Four stroke twin
Bore and stroke	2.95 in. x 2.91 in., 75mm x 74mm
Piston displacement	39.91 cu. in., 654cc
Compression ratio	9:1
Carburetion	(2) 29.4mm, AMAL
Air filtration	(2) gauze and wire mesh
Ignition	Battery/dual coil
Bhp @ rpm	Not specified
Mph/1000 rpm, top gear	15.9
Fuel capacity	3 gal.
Oil capacity	5 pints
Lighting	Alternator, 115 watts
Battery	12v, 10 ah
Gear ratios, overall	(1) 12.12, (2) 7.79, (3) 5.58, (4) 4.87
Wheelbase	56 in.
Seat height	32 in.
Ground clearance	8 in.
Curb weight	406 lbs.
Test weight	581 lbs.
Instrument	Speedometer/odometer, tachometer, ammeter
0-60 mph	6.91 seconds
Standing start 1/4 mile	14.5 seconds—91 mph
Top Speed	104 mph