On the Road with the RCA

BY

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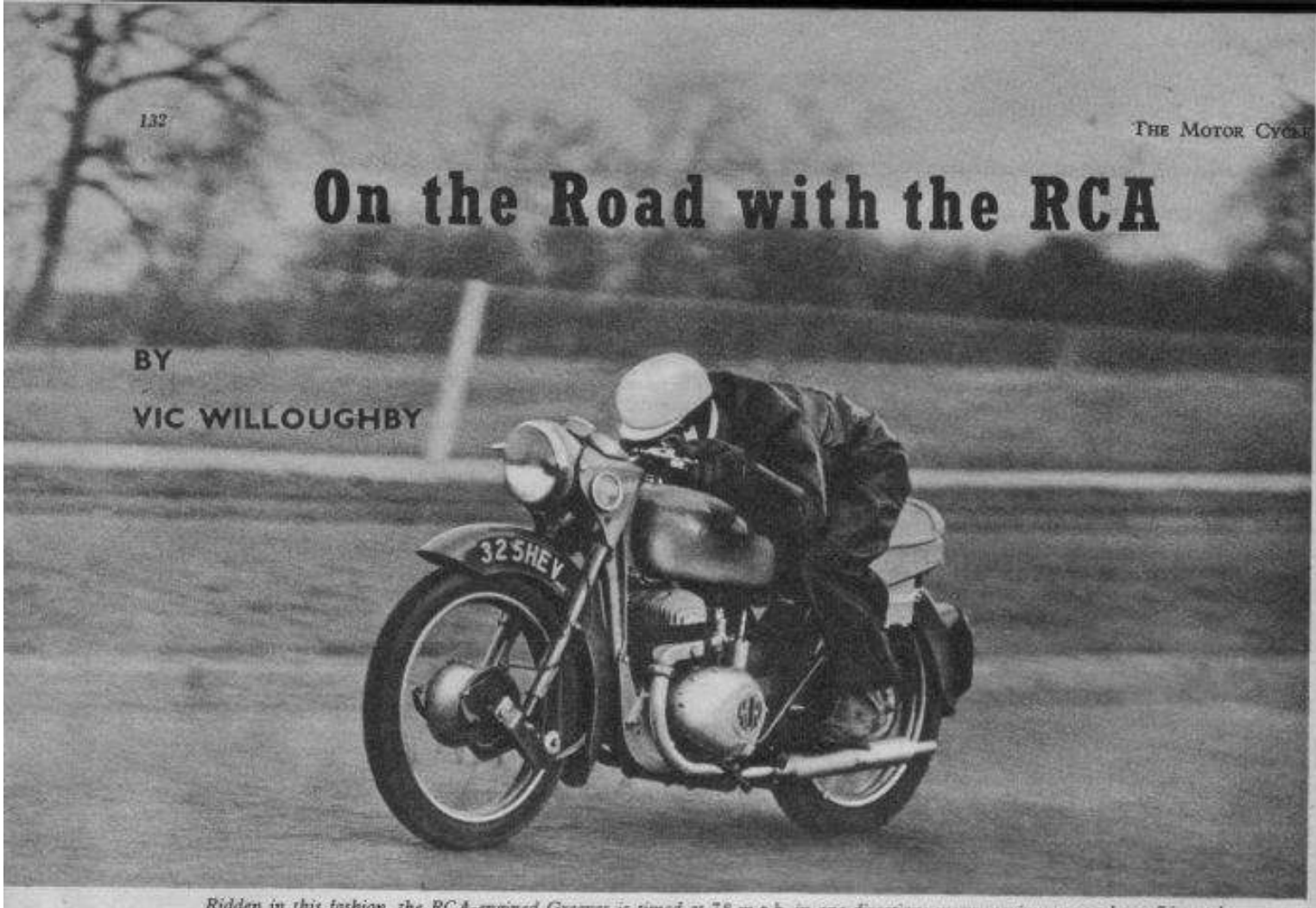


Ridden in this fashion, the RCA-engined Greeves is timed at 78 m.p.h. in one direction; mean maximum speed was 76 m.p.h.

Impressive Performance from the New 349 c.c. Twin Two-stroke Designed by Peter Hogan

A THREE-FIFTY roadster which tops 75 m.p.h. (not by speedometer but against the watch in opposite directions) is reckoned to be a pretty sprightly job. In the same category a machine which gobbles up the standing quarter-mile in 19s and crosses the finish line at 69 m.p.h. is judged to be smart on the getaway. In the context of that level of performance, fuel consumption rates of 110 m.p.g. at 30 m.p.h. and 100 m.p.g. at 40 m.p.h. are extremely economical. I have recently been riding a machine powered by a prototype 349 c.c. RCA twin-cylinder two-stroke engine. A measure of its performance is given by the figures quoted, yet its most compelling charm was the versatility which comes from very high torque spread over an uncommonly wide range of engine speeds. In riding terms that means lusty acceleration, especially from low engine speeds, effortless hill-climbing and lightning response to throttle opening.

Designed by Peter Hogan on the basis of long experience in developing two-strokes for roadster and racing purposes, the engine was described and illustrated in *The Motor Cycle* for 24 October 1957; at that time it had just completed bench tests. To recapitulate: bore and stroke measurements are 63 and 56mm respectively; the relatively short stroke permits the use of small crankcases and, hence, a high primary compression ratio. Spacing of the bore centres 4in apart in the one-piece, cast-iron cylinder block results in a finned air passage nearly 1in wide between the cylinders; this lowers the temperature in what might otherwise be an undercooled region.

Further aids to cooling are the positioning of the exhaust ports at the extremities of the block, where they are well out in the air stream, and the use of the shortest possible ports to minimize the amount of heat fed back into the block. A light-alloy adaptor to take the exhaust pipe is bolted to each port. Another advantage of the exhaust-port positioning is that regions of local heat in the cylinders are diametrically opposed so that asymmetrical distortion of the walls is prevented; hence piston-skirt clearances as small as 0.002in can be successfully employed.

Formed between the cylinders, the inlet tracts open tangentially into the lower ends of the bores and the swirl thus imparted to the charge assists in separating the oil from the petrol. Mixture ratio is 25 to 1. At 2.13 to 1 the ratio of connecting-rod length to stroke is high and this ensures the maximum period of inlet-port opening for a given timing. The transfer ports are situated in the front and rear cylinder walls. The cylinder heads are separate light-alloy castings with central sparking plugs and a combustion-chamber form similar to that of the Hogan High-torque heads once marketed for B.S.A. Bantams. Crowns of the low-expansion Specialloid pistons are of shallow dome shape. Compression ratio is 8 to 1.

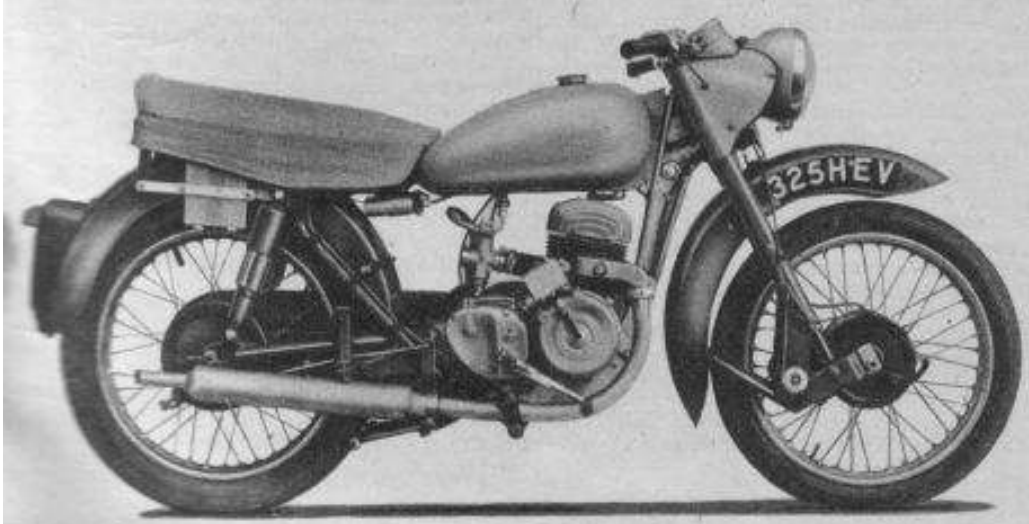
An unusual feature of the crankcase is that it is split across the middle of the main-bearing housings at 90 degrees to the cylinder axes. Six studs and nuts clamp the two halves together. All internal surfaces of the case are machined, thus permitting close running clearances for the two flywheel discs in each crank chamber—a further aid to high primary compression. The balance holes in the flywheels are plugged with cork and the right, left and middle portions of the crankshaft are integral with three of the discs. The assembly is pressed together and supported in five ball-bearings in addition to that in the Siba Dynastart which is driven by the right-hand end of the shaft. Spring-loaded, synthetic-rubber seals prevent gas leakage past the crankshaft bearings. Fully floating bushes are used in the connecting-rod small ends and a double row of rollers in each big end. Ignition is by two 12-volt coils.

For its initial bench tests the engine was fitted with a single Zenith carburettor of 25mm choke and an air filter, but when I collected the Greeves in which the engine was housed for road test there were two stub-mounted Amal type 6 carburettors, fed

by a common float chamber, and no air filter. This was the layout adopted when the engine was tested earlier in a Berkeley light car with surprisingly good results.

Certain items of equipment and weather conditions during my test were against the engine. In the first place the Albion gear box gave more widely spaced ratios than desirable. Overall ratios were: bottom, 17.85 to 1; second, 9.93 to 1; third, 7.46 to 1 and top, 5.74 to 1. There is little doubt that closer ratios would have been beneficial for standing-start acceleration. Secondly, the dual-seat had a steep upward slope from front to rear so that sliding back to adopt a crouch raised the seating position appreciably. Thirdly, an old pair of hack silencers was used and did not prove very suitable. Not only was the exhaust note tinny when the engine was firing erratically (which amounted to little more than idling conditions for two-stroking on light load was good) but the silencers cost 3 b.h.p.—a loss which could well be reduced with experiment. Finally, the usual road-test locations were under ice and snow so I had to compromise with a quarter-mile having shorter approaches.

Predominant trait of the RCA engine is its wide spread of high torque. Acceleration is smooth and brisk from idling speed upward. Below: Two Amal carburettors and a 12-volt Siba Dynastart are fitted



Since the carburettors had no air slides flooding was necessary to provide a rich mixture for starting. The 90-watt reversible Dynastart used in the Berkeley car had been replaced by a 60-watt single-direction unit which occasionally jibbed momentarily at compression. But intermittent pressure on the starter button usually spun the engine which then fired readily. Once the engine was warm, idling was of average two-stroke standard.

But there was little else that was average about the RCA unit. It had the widest spread of torque I have experienced in a two-stroke twin. Hogan told me he had compromised in favour of bottom-end pulling power for the car and could shift the torque farther up the engine-speed scale if required. For my part, I found the low-speed punch really delightful and did not feel that the top end lacked anything for a three-fifty roadster. After all, the fastest timed one-way speed was 78 m.p.h. in spite of a fresh cross wind. Nevertheless, the possibility of pepping up the top end at the expense of the bottom augurs well for those who are interested in super-sports performance and delight in making extensive use of the gear box.

Saloon-car technique could be used without the least protest from the power unit. In other words, upward gear changes could be made after covering only a few yards in the lower gears and top was frequently notched at 25 m.p.h. From 20 m.p.h. upward the lower three gears could be ignored without the feeling that one was riding abnormally. The opposite technique came just as easily to the RCA. When upward changes were made at 26, 46 and 62 m.p.h. (which correspond to the power peak of 6,000 r.p.m. in bottom, second and third gears) the engine howled up the scale in exhilarating fashion.

Perhaps the engine's remarkable torque is best illustrated by the top-gear acceleration figures obtained from 20 to 40 m.p.h. and from 30 to 50 m.p.h. The times were 8s and 7.4s respectively and were taken from steady, not rising, initial speeds. The first figure is identical with that returned on road test by a well-known overhead-valve three-fifty of sporting performance, is 1.2s better than that for a touring o.h.v. three-fifty and 3.8s better than a flat twin of the same capacity. A popular 500 c.c. o.h.v. vertical twin only betters the figure by 0.4s and a lusty five-hundred single by 0.6s.

The 30-to-50 m.p.h. figure is even more praiseworthy. It is 1.1s better than that for the sporting o.h.v. three-fifty, 2.4s better than that recorded by the touring o.h.v. single of similar capacity and 4s less than the figure obtained with the 350 c.c. flat twin. In fact, matched against the five-hundreds, the RCA's 7.4s is equalled by the twin and beats the time for the single by 0.4s. To compare acceleration figures in the indirect gears is a more arbitrary affair because of the greater difference in gear ratios. Nevertheless in second and third gears the RCA shows up even better. Incidentally its 69 m.p.h. at the end of a standing quarter-mile is identical with the speed of the sporting three-fifty and the 500 c.c. single, while the 19s to cover the distance is only 0.2s longer than the time taken by the three-fifty and 0.4s longer than that for the five-hundred.

So smooth, surging and unhesitant was response to the throttle that I marked the twistgrip for further tests. The saloon-car technique and a steady 30 m.p.h. in top gear both required less than one-eighth throttle; a full eighth gave 38 to 40 m.p.h. on a level road. Use of one-quarter throttle resulted in a speed of about 50 m.p.h. while on half-throttle the model hummed along at 65 m.p.h. Sitting bolt upright I obtained a mean speedometer reading of 72 m.p.h. on full throttle (speedo flattery was about 3 per cent). As to hill climbing, the impressive feature was how well the Greeves maintained its speed on a small fixed throttle setting or accelerated in almost level-road fashion when the throttle was opened.

Yes, I thoroughly enjoyed my experience with this versatile and tireless engine. Production units will be available from the end of March. Makers are R. Christoforides and Associates, Ltd., 59-61, Palermo Road, Harlesden, London, N.W.10.