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HEAD OFFICE AND WORKS
REDDITCH
WORCS. ENGLAND

5th June, 1962

Mr. P. Taylor
Major V.T Mountford
Mr. V.L. Young
Mr. J.J. Booker
Mr. G.H. Baker
✓ Mr. E.E. Thomas
File

REPORT OF DEVELOPMENT WORK IN PROGRESS MAY, 1962

(Sub-section Nos. 1 - 16 refer to Minutes of the Meeting held on Friday, 11th May 1962. Mileages are at 4th June, 1962)

1. Spindle Mounted Front Mudguard

A revised design of this has been tested for a total of 2,141 miles including 60 laps at high speed on the No. 2 Circuit at the M.I.R.A. Proving Ground and 30 laps on the Pavé. No trouble has been experienced with this but it should be pointed out that the aluminium fitting which supports the stays on the right-hand side of the mudguard has been cut from solid out of a piece of RR.56 forged aluminium this being the only suitable piece available. This will obviously be stronger than the aluminium castings which will be used for production. Castings for this component have now been received and one is being fitted to the machine for further tests.

2. 750 cc Engine

This has been run for a distance of 700 miles on the road with the 5-speed gearbox. Having ridden the machine personally I can vouch for the fact that this is a much pleasanter vehicle

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2. 750 cc Engine

to ride than the average Constellation. It appears to be only idling at 70 m.p.h., the general performance seems higher and its vibration is less.

The 5-speed gearbox is now beginning to show signs of leakage. This has always been the trouble with this gearbox in which only a single oil thrower is fitted on the mainshaft whereas two such throwers, one each side of the ball bearing in the gearbox cover, are used on 4-speed boxes. The 5-speed box has now been removed for examination and a 4-speed box has been fitted so that comparative tests can be run at M.I.R.A. against the standard Constellation.

3. New Heavyweight Frame

Although this project has now been deferred the frame is built and is at the moment with Mr. E. Birch for inspection. It is understood that it is dimensionally incorrect in some respects.

4. Silencing

Tests have been run on a Crusader Super-5, the experimental 350 Crusader and the Constellation machine fitted with various types of silencers using the Dawes meter. These tests have been run both at a suitable point in the Works and also at the M.I.R.A. proving grounds where M.I.R.A.'s latest meter was used for comparison. A separate report is being prepared giving details of the results but in general it can be said that the Dawes meter at the works gives reasonably close agreement with the M.I.R.A. meter at M.I.R.A. On the average of 20 runs with different machines and silencers the Dawes meter at the works gives a reading 1.5 dB(A) lower than the M.I.R.A. meter at M.I.R.A. but there is naturally a certain amount of scatter in the results, the biggest difference being 2.9 dB(A) lower and the smallest difference 0.6 dB(A) lower. These figures are for the Dawes meter held in a horizontal position so that the sound waves pass tangentially across the microphone as called for in the instructions sent with the meter.

When the meter was held in this position at M.I.R.A., however, it was found to give appreciably lower results, the average reading over 20 tests being 4.16 dB(A) lower than the M.I.R.A. meter with a maximum of 5.5 dB(A) lower and a minimum of 2.5 dB(A) lower. When held vertically with the microphone facing the source of noise the results were in much closer agreement with the M.I.R.A. meter. On one solitary test the Dawes meter gave a reading of 0.25 dB(A) higher

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4. Silencing

than the M.I.R.A. meter; on several occasions it gave identical readings. The biggest discrepancy under test conditions between the meters was 2.75 dB(A) which was recorded on three occasions. The mean of all the runs with the Dawes meter held vertically showed the Dawes meter reading 1.18 dB(A) lower than the M.I.R.A. meter. This is considered to be quite satisfactory.

All the above tests were carried out as nearly as possible in accordance with the proposed B.S. regulations for noise testing. The conditions at the Works, however, were very far from ideal as it is impossible to get away from buildings and in fact the machine was running alongside a single storey building about 7 feet from the track of the machine. By subtracting the average difference between the M.I.R.A. and Dawes meter readings at M.I.R.A. for any particular combination of machine and silencer from the average difference between the readings of the M.I.R.A. meter at M.I.R.A. and the Dawes meter at the Works for the same machine and silencer one can estimate the effect of the surroundings at the Works. By doing this it was found that on average the noise level at the Works is 2.7 dB(A) higher than it is at M.I.R.A. thus partially offsetting the 4.16 dB(A) error for the Dawes meter when held horizontally. If, therefore, the Dawes meter were held vertically at the Works one would expect to obtain readings on average 1.5 dB(A) higher than for the M.I.R.A. meter at M.I.R.A.

These various readings are being analysed with the object of finding out whether there is any particular pattern in the results but so far no such pattern appears to emerge.

The highest noise level recorded with the M.I.R.A. meter at M.I.R.A. was 98 dB(A) from the right hand side of the Crusader Super-5 machine fitted with the current pattern silencer. The new packed silencer known as No. 2 gave a maximum reading of 95 dB(A) on the right hand side of the same machine. The lowest reading obtained with the M.I.R.A. meter at M.I.R.A. was 91 dB(A) from the left hand side of the experimental 350 cc machine fitted with either the No. 2 or the N.S.U. silencer. The N.S.U. silencer gave 92 dB(A) on the left hand side of the Crusader Super-5 as compared with 94 dB(A) with the No. 2 silencer on the same machine. It was noted that with the N.S.U. silencer fitted mechanical noise appeared to predominate. It is quite probable, therefore, that with this silencer the exhaust noise was lower than 91 dB(A). It seems obvious, therefore, that if we are to achieve noise levels lower than 90 dB(A) attention will have to be paid to mechanical noise as well as to devising a silencer as effective as the N.S.U. It will be remembered, however, that the N.S.U.

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4. Silencing

silencer does take more power than our No. 2 which would seem to be a reasonable compromise for the present.

At the conclusion of the M.I.R.A. test a few runs were made working to the recently issued French regulations which are likely to be accepted as international regulations. The speed from which the machine is accelerated is always 50Km.p.h. in the French regulations and the gear is always second in a 4-speed machine and third in a 5-speed. According to the draft British regulations the speed is always such that the engine is running at three-quarters of the speed at which the manufacturer claims maximum b.h.p. and the gear ratio is the one which gives a road speed as close as possible to 50 Km.p.h. with the exception that first gear on a machine with four or more gears is not used for the test. This means that in the case of all machines tested the engine speed at the commencement of the test is lower than that under British regulations and in the case of the Super-5 third gear is used instead of second. With our No.2 silencer fitted the use of the French regulations results in a reduction in noise level of about 4 dB(A) on the Crusader Super-5. With the experimental 350 Crusader, however, the difference is less than 1 dB(A). No comparison can be made between the two sets of regulations with the Constellation machine because different silencers were used. With the standard silencers and the English regulations this machine gave a mean of 95.2 dB(A) from the left and 96.8 dB(A) from the right hand side. With the No. 2 silencer and the French regulations these figures were reduced to 91 dB(A) and 91.25 dB(A) respectively. The maximum noise level permitted by the French regulations is 86 dB(A).

5. Crusader 350 cc

As recorded in the Development Report for April, this has been re-built with a modified crankpin and driving side steady bush. At the same time a new big end floating bush, timing chain and exhaust valve were fitted. This re-build was carried out at a total of 15520 miles during the whole of which time the same primary chain has been in use. To date, 1776 miles have been run since the last re-build giving a total mileage on the machine of 17296 miles.

Messrs. Automotive Engineering recently sent two sample production pistons with a request that we should check the clearance on the lands, this being larger in diameter on our standard Hepworth & Grandage pistons which they considered give excessive clearance. One of these pistons was fitted at 16623 miles and is running satisfactorily. When the piston was fitted, however, the cylinder barrel was measured and showed .005" wear at the top end of the barrel. Since this obviously

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5. Crusader 350 cc

does not give a fair check on the land clearance, I have asked Mr. Baker to have a new barrel machined to run with this piston. Messrs. Automotive are holding the remainder of the first 100 pistons at the turning stage awaiting our report.

The malleable iron clutch with Glacier 'DU' bearing and J.17 friction faces is still performing satisfactorily.

6. 175 cc Engine

Mr. Thomas reports that the design of this engine is now complete including all detailed drawings. He is working on the layout of the complete machine.

7. Scooter

The trouble with electrical system was found to be due to the brushes being completely worn out. This was reported to Messrs. Siba Electric who sent replacement brushes but requested the return of the complete engine unit to enable them to discover the reason for this exceptionally heavy rate of wear. They also considered that the commutator segments must be severely worn as indeed proved to be the case. The complete engine unit has been removed and delivered to Messrs. Siba Electric by Mr. C.N. Rogers. The commutator was damaged when the engine was originally built by using fan securing pins of too great a length. The commutator was, however, refaced by Messrs. Siba Electric in an endeavour to correct this damage which, however, seems to have been only partially successful. The whole of the commutator was covered with petrol vapour which seems to have come from blow-back from the carburettor. Mr. Yate of Siba informed me on the telephone that oil on the commutator will always cause rapid brush wear. At the same time, from the nature of the wear on the brushes he thinks that the generator must have been assembled with the rotor too far away axially from the stator so that the brushes have come out of their guides. We are now awaiting a report from Siba Electric on this unit.

8. Batch Tests

No batch tests have been run during the past month but arrangements have been made for a new Constellation machine to be batch tested for comparison with the 750 cc machine.

9. Sparkign Plugs on Sports 250 cc Machines

The schedules have been altered to show 3 HN plugs instead of 2 HN on Crusader Sports and Super-5 machines.

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10. Over-oiling on 250 cc Engines

Another engine has been modified by filling up the drain hole from the breather cavity, drilling two holes towards the sides of the cavity and welding up the portion of case which baffles the entry to the breather cavity. These alterations have produced somewhat erratic and uncertain results on this engine. At times the engine behaves normally and other times it over-oils.

None of the pump discs with the centre recess connected to the feel hole have yet been fitted.

11. Sports Airflow

A sample Sports Airflow fairing has been received from Messrs. Dewey Waters and approved.

12. Siba Self Starter

The Crusader 250 fitted with a Siba Self Starter has continued to function satisfactorily so far as the electrical side is concerned. About 10 days ago, however, the engine developed a peculiar form of vibration and noise at certain speed and loads. Examination showed that the generator rotor was hitting the inside of the aluminium cover over it. More clearance was given by fettling the inside of the cover. This gave some improvement but did not cure the trouble completely. Finally the engine developed an appalling noise suggesting that the whole dynamometer was becoming chewed up. Examination showed that the end of the stud securing the rotor to the crankshaft extension sleeve had broken off and was trapped with its nut between the recess in the outside face of the rotor and the inside of the aluminium cover. When the rotor was withdrawn from its taper on the crankshaft extension sleeve it was found that the rotor poles had been fouling the stator poles. Further examination showed that the taper end of the crankshaft extension sleeve was severely cracked, the cracks obviously having started at the keyway.

There seems no doubt that as these cracks developed the rotor was allowed to whip thus causing it to foul first the aluminium cover and later the stator poles thus causing the vibration and noise originally complained of. This whipping eventually caused the fracture of the centre stud which was only made of mild steel.

Further examination showed that the crankshaft extension sleeve was too hard. This is made of EN.24 and the drawing called for this to be heat treated to give a hardness of Rockwell C.35. Actually the Rockwell hardness figure is C.41.

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12. Siba Self Starter

A new crankshaft extension sleeve left in a softer and tougher condition is being made. This is being fitted with a screw thread for extraction purposes. A new centre stud is being made in 40 ton material.

13. Molybdenum Pistons

These are still waiting for a new light alloy cylinder barrel in which they can be run.

14. Miller Lighting Set

The machine on which the Miller components were fitted has now been returned from Messrs. Dewey Waters and converted to standard for loan to the Enfield Owners Club for an event at Thruxton. The Miller components have covered a total of 1361 miles running. When the Generator was removed it was noted that the varnish on the coils appeared to have run. This does not seem to have affected the performance in any way but Messrs. H. Millers are being notified of the occurrence.

15. With reference to the proposed Lucas 12 volt lighting equipment, it is worth noting that the 250 machine fitted with the Siba Starter has a 12v. 45 watt bulb fitted in our standard casquette. This gives a very much better light than the standard 6v. 30 watt bulb.

As an alternative to the Lucas Constant Mesh Starter the new Siba instrument is worth considering. This is intended to be belt or chain driven from the engine and like the existing Siba Starter it provides D.C. current as well as starting torque. It remains permanently engaged with the crankshaft and can be run up to 10,000 r.p.m. so that for a moderate speed engine it can be geared at 2 : 1.

16. Malleable Iron Clutch Drums

The malleable iron clutch drum fitted to Mr. P. Fletcher's Trials machine has been examined. The drum itself and the J.17 facings and the Glacier 'DU' bearing are all in excellent condition.

17. Some sample Morse Chains have been fitted to the front and rear drives of a Crusader Super-5 and a Constellation machine. These chains are considerably cheaper than Renolds but previous experience with them on the Berkley car has indicated that they may have a tendency to shed their rollers.

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(R.A. Wilson-Jones)