

RAH-J/WY.

3rd. February, 1961.

To:- Major F. W. Smith,
Major V. T. Mountford,
Mr. V. L. Young,
Mr. J. J. Booker,
Mr. C. H. Baker,
Mr. R. E. Thomas. ✓

Report on Development Work in Progress.

12th - 31st January 1961.

1. Silencing.

Mr. Baker reports that the modifications to the 3-piece silencer to prevent rotation of the end and loss of the nut are now in production. Silencers with these latest modifications will now be fitted to all machines on mileage work.

Mr. Thomas has not yet had time to investigate the design of a larger silencer made of two pressings.

At a recent meeting of the Car Manufacturers Group Research Committee at M.I.R.A. Dr. Fogg stressed the lack of fundamental knowledge of the principles of silencing engine exhausts and the need for basic research into this problem.

Mr. V. L. Young has met Professor Richards of University College, Southampton who has ideas on this subject. Mr. Young suggests that Mr. Wilson-Jones should meet Professor Richards to discuss the matter.

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The result of the recent noise tests run at M.I.R.A. for the Ministry of Transport have now been published. These show that in general the revised test procedure now used shows a somewhat lower reading than was obtained previously. The average reduction is between 2 and 2½ dB. The greatest reduction is 8 dB (Lambretta Scooter) and the next greatest 5 dB (Morton 249 c.c. Jubilee). In four instances the figures by the revised method were higher than by the original method - in one case (B.S.A. 175 c.c. Super Bantam) as much as 3½ dB higher. We have of course no knowledge as to how far these differences are due to the change in procedure and how far to alterations in silencer design, as some twelve months elapsed between the original tests and the most recent ones.

There seems however little justification for a comment by the Ministry that it "would not be unreasonable" to ask manufacturers to work to figures 5 dB lower than those originally suggested. This would bring the figures down to 90 dB as the maximum acceptable, 85 dB as "a more appropriate maximum" and 80 dB as a long term policy. The 90 dB figure would exclude every motorcycle so far tested of over 250 c.c. capacity, while the 80 dB figure would exclude every machine tested except the L.E. Velocette (73½ dB) the Lambretta 175 c.c. Scooter (79½ dB) and four machines under 50 c.c. (73 to 79 dB).

The results of the subjective/objective tests carried out at M.I.R.A. have not yet been published.

2. Heavy Gauge Undamped Forks.

These have been fitted to the prototype Super Sports 250 but in view of the fact that this machine has the new type rear mudguard, which Mr. Booker thinks should not be exposed to possible night by our competitors before being subjected to Pave testing the forks will be transferred to the machine which has been used for this purpose for testing frames. Actually the standard frame which has already survived 500 Pave miles will be used as this was virtually undamaged in the road accident in which it was involved.

3. The experimental heavy gauge fork has not yet been fitted to the Works Super Meteor box sidcar outfit.

4. No further development to report as yet.

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Report on Development Work in Progress.

5. The Constellation engine with modified plates has been installed in a machine and is now ready for tests at M.I.R.A.
6. Mr. Becker to report the result of his reminder to Mr. Young re. Major Mountfords memo of 13th October.
7. (a) The Cross piston and Y alloy barrel on a 250 c.c. machine have not yet been changed for the Hyper-eutectic piston and LM4 barrel.
(b) The report from Messrs. Hepworth & Grandage on the No.2. sample chromium plated piston from the Ionic Plating Co. has been received and its findings communicated to Ionic. Although Messrs. Hepworths had indicated verbally that this piston was not such a good job as No.1. sample the written report indicates that in many respects it is superior.

The general thickness of plate is much closer to the .001" asked for but, whereas on No.1. sample the deposit was thickest towards the bottom end of the skirt, on No.2. it is thickest at the top end. In other words the faults of the first piston have been over-corrected. There was some build up on the edges of the "W" slots but Ionic can prevent this now that they have been told that the thickness of plate at these points can be less than .001". Messrs. Hepworths were critical of some unevenness in the deposit immediately above the gudgeon pin bore but this is unimportant since this part of the piston should not take any bearing load and the irregularities were all small areas of deposit thinner than .001"

Messrs. Hepworth & Grandage's report to some extent confused the issue by including measurements and "shape" curves after plating with the gudgeon pin fitted as well as removed. There is a considerable difference in the shape of the piston when the pin is fitted but the pin must cease to affect the shape as soon as the piston gets warm. In any case no corresponding measurements were taken with the pin fitted before plating.

- (c) Both Messrs. Hepworth & Grandage and Messrs. Ionic Plating Co. have been consulted about plating cylinder bores as an alternative to plating piston skirts.

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Report on Development Work in Progress.

Both agree that a grinding or honing operation would be necessary after plating cylinder bores also that a radial thickness of plate of the order of .003" (after grinding) is necessary. In consequence of the greater area to be covered the greater thickness of plate required and the need for grinding or honing the cost must be considerable more than plating a piston assuming that this can be done successfully without the need for subsequent grinding.

Messrs. Hepworth & Grandage have given an estimated price of £2 to £2.5.0d. for a cylinder the size of that on our Crusader engine but admit that they obviously have not got the right technique as they are plating service replacement cylinders for N.S.U. engines and cannot get near the price charged by the Germans in a country where tariff costs are the same for the Germans as for us, e.g. Scandinavia.

Messrs. Ionic Plating Co. have been asked for an approximate price both for plating pistons and cylinder barrels.

8. It is too early to report on the effect of slotting the interleaving plates in Albion clutches.
9. We are still awaiting estimates for the cost in production quantities of the Nylon filter element and brass filter housing for the oil strainer on the 250 c.c. engines. There is a difference of opinion among suppliers as to whether the filter housing should be a casting or a pressing.
10. No comment.
11. Removal of the slow entry ramps from the exhaust cam of the 250 c.c. engine can do no harm assuming that it does not make the engine too noisy. Time alone will show whether it prevents head cracking and/or valve burning. We ought to be running a 250 c.c. machine on the road with a cast iron head, the new cams and an uncoated exhaust valve.

Increasing the tappet clearance has practically the same effect as removal of the ramps.

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Report on Development Work in Progress.

The instruction book calls for .006" cold clearance in the exhaust rocker but does not distinguish clearly between the clearances for C.I. and aluminium heads, only between Crusader Sports and the other models.

12. Two more batch test machines will be tested next week.

13. Pave Testing.

The second Reynolds frame broke after 70 laps (105 miles). This compares with 177 miles for the first Reynolds frame and 500 miles (unbroken) for our standard frame.

It appears that for some reason best known to himself the designer of the second Reynolds frame did not increase the gauge of the down tube at the point where it had broken but instead increased the diameter of the tank tube and the gauge of the top tube, thus concentrating stress on the short portion of the down tube between the tank tube and head tube where failure is most likely to occur.

A revised specification has now been given to Major Mountford which though not so strong as our standard frame should outlast either of the previous Reynold frames.

14. Nylon Roller Cage.

Some further sample cages have been received from the Nylonic Engineering Co. These have the two rows of slots staggered but do not have the .020" radius at the bottom of each slot which has been asked for to give extra strength. This radius can be incorporated when the tool is finally hardened and ground. The samples have been approved by Mr. Birch and Nylonic have been asked to finish the tools with the .020" radius and submit final samples.

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Report on Development Work in Progress.
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15. 5-Speed box. keeping the standard 64 mm. stroke and reducing the bore to 62 mm. a much better proportioned engine will be obtained with a better shaped combustion chamber and more power low down - particularly important. No comment except that if this can be made fool proof so much the better. If a gear can be "gone through" the most careful and experienced rider is liable to do so when making a hurried change in an emergency - just when its consequences are likely to be most serious. This of course applies equally to the 4-speed box.

16. Prince Clutch operating drum.

Enfield India have been notified of the modifications to this.

17. Scooter. No comment.

The first power unit is not yet installed on the test bench but the Millwrights are working on the job.

NOTE. Paragraph numbers in the above report refer to those in the Minutes of the Motorcycles Development Meeting held on 18th January

18. Loading Link Forks.

These have been fitted to a 250 c.c. machine. They should be tested on the Pave but there is some risk in doing so while the malleable iron links are fitted. The possibility of making a pair of fabricated steel links is being considered.

19. 350 c.c. engine based on Crusader.

No comment.

20. 198 c.c. engine based on Crusader.

A 198 c.c. engine with 70 mm. bore X 51 mm. stroke is likely to have undesirably high revving characteristics and produce very little power low down particularly if Crusader valves and cams are used. It will require at least a new crankshaft casting and either a longer connecting rod or a shorter cylinder barrel.

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Report on Development Work in Progress.

By keeping the standard 64½ mm. stroke and reducing the bore to 62½ mm. a much better proportioned engine will be obtained with a better shaped combustion chamber and more power low down - particularly important in a small capacity engine. This will mean a new cylinder head casting and a new cylinder and piston - possibly a little more expensive to produce the first prototypes but lighter and therefore cheaper to produce in the long run as well as being a nicer engine and therefore likely to be more popular.

21. No comment.
22. The report on head joints has been submitted.
23. No comment.

NOTE. Paragraph numbers in the above report refer to those in the Minutes of the Motorcycle Development Meeting held on 18th January 1961.

R.A. Turbott