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HEAD OFFICE AND WORKS

REDDITCH

WORCS. ENGLAND

30th June, 1961

Major F.W. Smith,
Major V.T. Mountford
Mr. V.L. Young
Mr. J.J. Booker
Mr. G.H. Baker
Mr. R.E. Thomas
File

Report of Development Work in Progress June, 1961

(Sub-section Nos. Refer to Minutes of Meeting Held on June 2nd 1961)

1. Pressed Steel Fork Head for Leading Link Fork

The sample pressing has been approved and tools are in the process of being made. The malleable iron casting for the ball head clip has been received and is being machined.

2. Bottom Link Forks

Sample springs $\frac{1}{4}$ " and $\frac{1}{2}$ " longer have been received and tested on the 'Ride and Handling' and 'Pave' circuits at the M.I.R.A. Proving Ground. The original setting of the damper was used with these springs.

Mr. C.N. Rogers and I were in agreement that the longer springs give a better ride over the 'rippled' concrete section of the 'Ride and Handling Course'. With these springs 'bottoming' occurred only once or twice on the first leg of the 'Pave' with Mr. Rogers riding, and about five times when I rode the machine. No 'topping' occurred on the rebound.

It was decided to specify the longest springs (9 $\frac{1}{8}$ " free length) to allow for a little initial setting.

Stronger springs, 65 lbs/in were also tried but were considered to

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2. Bottom Link Forks (Cont)

give rather too hard a ride.

3. Lubrication of 700 cc Engines

The engine with the crankcase modified by opening the camshaft tunnels to the crankcase has been further modified to allow more oil to reach the inlet cam which was tending to run dry. A further 30 - 40 hours have been run on the test bench. The engine has been stripped and the cams are in perfect condition.

This engine is now being fitted to a 5-speed gear box and built into a machine for further testing on the road or at M.I.R.A.

Mr. Thomas has completed a design for a bracket to support the rear half of the chain case.

4. Slencing

Sample steel sheets with plunged holes both larger and smaller than our own standard ones have been ordered. These will have to be produced specially for us. Delivery promise is 7 weeks from the present.

The long awaited report on the Subjective Tests carried out at M.I.R.A. last November has now been received. The results are given in a manner which is not too easy to follow being in the form of a series of graphs (31 in all) showing the Mean Subjective Rating against Sound Level for different classes of vehicle and different groups of observers. The Mean Subjective Rating represents the average judgment of up to 57 observers and the graphs give no indication of the "scatter" of the readings due to variations in the opinions of the observers. This, however, was apparently considerable.

It was also found that the meter has short-comings particularly in relation to motor cycles. Some machines gave consistently high subjective ratings in relation to their meter readings and others consistently low ratings. There is, however, no evidence in support of our claim that the meter is prejudicial to twins as compared with singles. The demarcation line between "acceptable" and "noisy" is the same, 82.5 dB(A), for all classes of motor cycle, single or twin, two-stroke or four-stroke. This compares with 79.5 dB(A) for cars and 80.5 dB(A) for diesel engined lorries so that either the meter tends to give higher readings for the sort of noise made by a motor cycle, as compared with a car, giving the same subjective rating, or else the average observer will

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4. Silencing (Cont)

tolerate more noise from a motor cycle than he will from a car.

The Report concludes that to allow for the variations in the opinions of the observers, 12 dB(A) must be subtracted from the figures quoted above if all observers are to be satisfied that the machine is 'just acceptable'. On the other hand to cover the short-coming of the meter in respect of motor cycles, it is necessary to increase the figure of 82.5 dB to 89.5 dB if all machines considered 'just acceptable' by approximately half the observers are to be accepted by the meter. Thus the 'acceptance level' for motor cycles may be said to range from 70.5 dB(A) to 89.5 dB(A) which is so wide as to cast serious doubts on whether a compulsory noise test with this type of meter can fulfill its purpose.

A further report from M.I.R.A. discusses the results of noise tests carried out at the Proving Ground during the past two years, (not including the subjective tests). This covers tests on 30 cars, 18 commercial vehicles and 27 two-wheelers. From this I have arrived at the fact that a compulsory noise test with a limit of 85 dB(A) would require modifications to reduce the noise level from 67% of the two-wheelers tested, 95% of the air-cooled motor cycles and 100% of the motor cycles over 240 cc. Such a test would have very serious repercussions and in many instances the noise level would have to be reduced by more than 10 dB(A) which, if it could be done at all, could only be at the expense of a considerable increase in size and weight of the exhaust silencer, the fitting of an air intake silencer and modification of the valve gear thus adding so much to the cost and weight of the machine and detracting so much from its performance as to make it virtually unsaleable.

A compulsory test with a limit of 90 dB(A) would affect 41% of all the two-wheelers tested, 58% of the air-cooled motor cycles and 73% of the motor cycles over 240 cc. Such a limit would therefore give a considerable degree of protection to the public by requiring some degree of noise reduction from the noisier machines on the road today while at the same time the reduction required would in most cases be around 5 dB(A) which is within the reasonable bounds of possibility without much power loss.

90 dB(A) is as it happens just below the demarcation line between the ratings 'noisy' and 'excessively noisy' in the Subjective tests. It might well be argued that elimination of the 'excessively noisy' machines

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4. Silencing (Cont..)

is a worth while object and indeed that any vehicle which is not deemed 'excessively noisy' should in fact be 'acceptable'.

It is appreciated that the percentage figures quoted above refer to machines tested at M.I.R.A. not to all machines in use today. Many people, however, would require little convincing that the noisier machines are among the most popular so that the percentage of all machines rejected by a noise that at any given level would probably be greater than the figures quoted.

I feel therefore that there is a good case for fixing the proposed compulsory noise level at not less than 90 dB(A) and that every possible effort should be made to resist the fixing of a lower level for machines over 240 cc capacity.

5. Pistons for 250 cc Super Sports

No further comment except to make it quite clear that the Constellation pistons at Westwood cannot be modified for use on the Crusader Super Sports - they do not give a high enough compression ratio. The heading of this paragraph is therefore possibly misleading. Also the last sentence should have the word 'Clipper' deleted the first time it appears so as to read "This could be used on either Crusader or Crusader Sports, and eventually on the 250 cc Clipper when this model is fitted with an aluminium head".

6. Five Speed Gear Boxes

No further comment.

7. 350 cc Crusader

This machine has now been run a distance of 2,342 miles. The new clutch has been sent to the Cork Manufacturing Company to have friction facings of J.17 material bonded on. It is promised for return by the end of June. A spare set of plates has been sent to the Armstrong Cork Company for facing with an alternative material.

Owing to my absence on holiday the enquiries to alternative piston manufacturers was overlooked and these have only just gone out.

At 1788 miles a failure of the exhaust valve occurred due to burning. There is no obvious reason for this except that the engine is fitted with standard Crusader cams which give a slow opening. The cams fitted

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7. 350 cc Crusader(Cont)

were, however, of the latest type with the quietening ramp removed from the exhaust opening side. If further burning occurs this could no doubt be overcome by using sports cams or by fitting a valve faced with 'Brightray' or made of Nimonic 80.

The machine has been retested at the M.I.R.A. Proving Ground because it was found that when originally tested the packing piece between the carburettor and the cylinder head was of too small a bore. When timed to the best advantage (32° on advance) a mean speed of 86.50 was obtained with a maximum one way speed at 91.59 m.p.h.

8. 250 cc Frame

The frame with 'B' quality side tubes is built and awaiting an opportunity to build it into a machine for Pavé testing. Mr. Thomas estimates that this, if satisfactory, will save 5/- to 7/- per machine.

9. 175 cc Engine.

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Mr. Thomas has made considerable progress with a layout for a push rod operated engine.

10. Siba Self Starter

A short to earth developed on the main lead to the starter. This is a heavy lead which did not fuse with the result that such a heavy current was passed that the two Lucas SC7E police type batteries were completely destroyed, the polystyrene cases being distorted severely apparently by internal pressure, possibly due to the acid having boiled.

This points to the need for heavy insulation and adequate grommets etc., where these heavy cables are contact with metal parts of the machine.

The machine has been re-wired (by Lucas) and two new batteries fitted. It continues to start the engine - but only just.

11. Oil Filter on 250 cc Machines.

Mr. Thomas reports that he has been unable to obtain any firm promise for delivery before mid August.

12. Chrome Plated Cylinder Bores

The two sample cylinders were not received from Monochrome until the middle of the month. The chrome plate had shown up the porous nature of the castings and Monochrome were dissatisfied with the finish. In my

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12. Chrome Plated Cylinder Bores(Cont..)

opinion, however, this porous finish is ideal provided the pores do not allow the passage of oil through the castings.

Mr. Birch reported that barrel "A" (which had $3\frac{1}{2}$ - 4 thou. thickness of deposit) was seriously undersize at each end of the bore and in fact a standard piston would not enter it. This has been returned to Monochrome for relapping.

Barrel "B" (which has $2\frac{1}{2}$ thou. thickness of deposit) was just on the low limit at the extreme ends of the bore and within limits everywhere else. A standard piston from the stores was initially an easy push fit at the ends of the barrel but after standing in the barrel for a few minutes, to equalize the temperatures, would fall in or out by its own weight. This barrel has been built into the machine fitted with the leading link fork, using a new standard pistons with a standard scraper ring and two unplated compression rings. (Chrome plated rings must not be used with a chrome plated barrel). The machine has been run 178 miles to date since fitting the barrel. It has given no trouble, is quiet, does not smoke and is free from oil leaks either from joints or through the walls of the barrel.

The further two barrels have now been received from Mr. Baker and were sent, on 20th June, to Metco Ltd., for the bores to be sprayed with molybdenum and molybdenum plus steel. There is no news of these to date.

13. Slotted Clutch Plates

Mr. C.A.E. Booker has not received any reports from customers or dealers to whom these have been supplied where clutch drag has been complained of.

14. The Scooter

The components for the modified gear change are made and are now being fitted.

The tubes for the second frame are ready but the frame is only now being built.

Two new rear suspension units with harder rubber have been received. One of these is being fitted to the first machine at the same time as the new gear control parts.

15. New Fork Head Clip

No Comment.

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16. Cross Cylinders and Pistons

Nothing to report.

17. Batch Tests

As was agreed no new tests have been run. The petrol consumption runs of the last pair of tests were re-run after unscrewing the pilot air bleed screws as far as was consistent with a good tick over and clean pick-up. The figures obtained were 74.03 m.p.g. for the Meteor Minor Sports and 73.92 m.p.g. for the Crusader Sports. (Previous figures 46 m.p.g. and 65.67 m.p.g. respectively). The figure for the Meteor Minor Sports is satisfactory. The Crusader Sports figure is the lowest so far recorded but was not considered bad enough to justify holding back the machine any longer.

18. Nylon Roller Cages

Messrs. Nylonic Engineering Co. have been approached regarding the 10 faulty cages that were found in the first batch of production moulding. They were asked if they could tighten up their inspection so as to relieve us of the necessity of submitting future deliveries to 100% viewing. Their reply was that 100% visual inspection is given both by the machine operator and in the Finishing Department when the "sprue" is cut away.

Nylonic were also asked about the possibility of altering the degree of stagger between the two rows of slots with a view to reducing stress concentration across the centre web in the vicinity of the corners of the slots. This can be done on future production batches without incurring any tooling charges.

19. Nylon Idler Gears

In order to learn something of the properties of Nylon as a material for gears, a pair of idler gears for the 350 Bullet have been cut from Nylon rod. These run direct on to the spindle without bushes. These have now been run for a distance of 436 miles. They were examined after about 350 miles and were found to be in satisfactory condition.

The idea is of course that these gears (or other similar lightly loaded ones, since the 350 Bullet may now be regarded as almost obsolescent) might ultimately be moulded in Nylon thus cutting out all machining and hardening operations and presumably saving money. There is some doubt if sufficiently accurate mouldings can be made but even gears machined from Nylon rod might well be cheaper than case hardened steel gears with sintered bronze bushes.

.....*R.A. Wilson-Jones*.....
R.A. Wilson-Jones.