MINUTES OF DIESEL & MOTORCYCLE
DEVELOPMENT MEETING, HELD AT 2.15 P.M.
ON 15TH MAY, 1963.

Present : Mr. J. J. Booker (Chairman)
Mr. G. H. Baker
Mr. R. A. Wilson-Jones
Mr. R. E. Thomas
Mr. G. L. Bromley

Copies to : Mr. L. H. Davenport
Major V. T. Mountford
Mr. C. Greenwood

INDUSTRIAL ENGINES

1. OUTBORRD

After having tested the Evinrude type impeller, and having found the volume of water circulated by this very satisfactory, it was decided to discontinue tests with the Seagull type and incorporate a rubber eccentric impeller in the design. This entails a complete redesign of the transmission tube, gear casing and the lower end of the transmission shaft. A propeller similar to the Evinrude has been designed to suit.

At the same time it was decided to improve on the method of cylinder and head holding down by the addition of a further two bolts, because during tests, water had leaked from both the head and crankcase joints.

Improvements were also made to the cooling water outlet by substituting a cored hole in place of an external pipe. The redesigned transmission tube is of greater fore and aft section which it is felt will give an added margin of safety. It must be remembered that this casing is to transmit the whole of the thrust. In view of the short time the engine has been running, it has not been able to finalise the balance. Although the engine seemed to vibrate when being run on the test bed, a check has shown that the balance factor is nearer to what we would consider to be correct than the Seagull, although it appears obvious that a final decision on balance must be deferred until the unit can be mounted in a boat and tested under normal conditions. In order to reduce the apparent height when the engine is mounted in the boat, the transum clamp bracket has been moved up relative to the power head. An adjustable friction pivot for the tilt has been incorporated in the new design.

All drawings have been completed and enquiries for quotations for castings have been made, by the Buying Office. Mr. Bromley will let Mr. Baker have the drawings of the modified components so that machining may commence as soon as possible after receipt of sample castings.

In the new gear case castings provision has been made for the inclusion of a forward-neutral-reverse mechanism should this be considered desirable at some future date.

2. NEW RANGE OF AIR COOLED DIESEL ENGINES

As this has been the subject of a special meeting and further meetings are to be held to deal with this matter, it will not be included in the general Development Meeting for the time being.

The Petter P.C.2. engine has been extensively tested and is now dismantled. The results of these tests will be the subject of a separate report by Mr. Wilson-Jones, which he will make available by the 23rd May.

3. Cast Iron Cylinder Barrels

Mr. Bromley reported that the engine fitted with cast iron cylinder barrels has now completed 85 hours. Thermo couple tests on the base and tip of the fin have shown that there is no appreciable difference in heat transference from the cylinder barrel.

The saving in cost on castings alone is approximately 12/6 per barrel. It is unlikely that the machining cost of a cast iron barrel would exceed that of a bi-metal barrel. In fact, as a result of not having to machine stud clearance in the case of the cast iron barrel, it is possible that a slight saving might result. It would appear therefore that one immediate way of effecting a saving in cost of the production of an engine would be the adoption of cast iron cylinder barrels providing that an increase in weight would not effect the saleability of the engine.

4. EXPERIMENTAL VALVE TAPPETS

The redesigned tappets are still awaited and Mr. Baker has promised to expedite the manufacture of these in the Tool Room.

5. VALVE SPRINGS

An opportunity is still awaited to re-run the test incorporating the single valve springs. The delay has been due to the facts that most of the experimental staff have been involved in testing and dismantling the Petter engine, and that the brake has been out of action whilst the motor was being removed for use on the production beds. A motor is still awaited for the experimental brake.

6. EXCESSIVE OIL CONSUMPTION ON 85 TWINS

Better heat resisting valve stem oil seals have been obtained by Mr. Bromley. Supplies of these together with pistons incorporating slotted scraper rings have been sent to our customers Messrs. Wales & Edwards who are carrying out tests in the field. They have promised to co-operate with us and report on the results obtained.

It would appear from our own tests that the improvement in oil consumption is worth while and the possibility of the incorporation of slotted scraper rings and possibly also of valve stem oil seals should be

6. EXCESSIVE OIL CONSUMPTION ON 85 TWINS (CONT.)

considered in future design.

The question of radial pressure of piston rings is being reviewed at Mr. Greenwood's request, and Mr. Wilson-Jones is in touch with Brico and Wellworthy.

7. CRANKSHAFT FAILURES

Strengthened Crankshaft

Mr. Bromley reports that he has all the components necessary to carry out tests except the crankshaft and fly wheel. Mr. Baker reports that these will be produced when the next batch of crankshafts and fly-wheels are going through in production. Although most crankshaft failures have occurred at the taper end and seem to be initiated in the key way, a shaft has recently been returned to the Works which has failed at the other end of the driving shaft, i.e. the fracture has occurred against the crank web. Mr. Wilson-Jones has taken up this matter with G.K.N. and awaits their report.

8. REAR BEARING HOUSING FAILURE

Redesigned Housing

Mr. Baker reports that the jigs are complete and the next production batch of housings will be to the revised drawings.

MOTORCYCLE ENGINES

9. 750 cc Engine

5-speed gearbox - After approximately 4,000 miles the layshaft broke mid-way between the two bearings about half way along the shaft. Mr. Wilson-Jones has been in touch with Messrs. Albions and the parts have been returned to them for examination. It would appear that from the tests conducted so far this gearbox is not capable of standing up to the output of the 750 cc engine, and it would be necessary to modify it considerably before it could be considered fit to be put on the market.

Automatic Advance and Retard - Satisfactory results were eventually obtained with this unit, utilising the two weak springs. It would appear that after use, the magneto freed off sufficiently to enable this arrangement to work satisfactorily. Quotations have been sent to Messrs. Lucas for the parts they require us to manufacture, but it is unlikely that auto-advance will be adopted until the commencement of the 1964 Season.

10. Single Carburettor on 750 cc Engines

Frequent requests have been made by our Agent in Los Angeles for an Interceptor fitted with a single carburettor. Westwood have supplied

10. Single Carburettor on 750 cc Engines (Cont.)

us with two dummy heads and a manifold which were built on to an engine and put in a frame to make sure that there was clearance for the carburettor and controls. This was satisfactory. However, the only cylinder head castings which can be machined to take the new single carburettor manifold are the new die castings which were to be supplied to Westwood by Frys Foundry. Mr. Young reports that he has not yet had a single casting which has beenusable. It is unfortunate, therefore, that we have not been able to carry out tests on an Interceptor engine fitted with a single carburettor. It would appear that if suitable castings are available later on, this modification can be introduced with the automatic advance and retard at the start of the 1964 Season.

11. Connecting Rod Bolts

We have received a quantity of high fatigue bolts from America and these are being fitted to Interceptor engines for the U.S.A. market. In view of the strike at the Unbrako works we have sent for a further 100 of these bolts which are on the way. Messrs. G.K.N. are proceeding with testson American bolts, standard Unbrako bolts, and boltsof their own manufacture and have recently been supplied with a connecting rod complete in order to enable them to carryout tests. In view of the wonderful co-operation we have received from G.K.N., the purchase of bolts of this make in the future from them should be seriously considered. Mr. Thomas reports that he already is pursuing this line of policy as necessary, when scheduling.

The rods having the extra metal allowed outside the bolts, which has been suggested will minimise the bending of the bolts when the big end eye flexes, are still awaited from Westwood.

12. 350 Bullet

The measures taken by Mr. Baker to ensure alignment of assembly coupled with the fact that the bearings are now fitted into a cold crank-case appear to have achieved the desired results. The engines are now going through test quite satisfactorily.

13. 175 cc Model

Overhead Rocker Gear - Consideration was first given to the condition of the cam shaft and cam followers. These were brought to the meeting for examination. They had completed 47 hours mostly at 7,000 r.pm. on the bench and a further 3,500 miles on the road. The condition of the exhaust cam follower was not perfect. Wear had taken place on the cam shaft spindles. Mr. Thomas suggested the substitution of sintered bronze bushes for the cam shaft by caro bronze bushes. The engine will be re-assembled with this type of bush.

After some discussion it was agreed that the cam shaft and rockers

13. 175 cc Model (Cont.)

with the new geometry without any facing on the cam followers was reasonably satisfactory for production. It is considered that a ground cam and accurately finished followers would be an improvement over the experimental ones.

It was also decided that efforts should continue to find a satisfactory cheap method of facing the cam followers with some hard metal such as nickel-chrome-boron. Mr. Wilson-Jones has already been in touch with one Company, Union Carbide Ltd., of Warwick. It is very necessary to obtain cheaper quotations in view of the prices received from M.E.I. and Dowding & Mills, who quoted 3/- and 4/- per rocker respectively for hard facing the rocker without grinding.

A satisfactory primary tensioner appears to have been produced from nylon 31. The experimental tensioner is machined from a solid piece of nylon and Mr. Thomas has obtained quotations for a moulded tensioner.

With regard to the overhead cam shaft chain tensioner, this has failed as a result of the top end attachment breaking in the bend. Mr. Thomas is considering an alternative method of attachment at the top as it appears that the flexing which takes place is concentrated round the very sharp bend where the spring steel tensioner is bolted at the top. In view of the uncertainty about the assembly being correct, it has been decided to have another tensioner with the hard rubber fitted, care being taken to ensure that when the attachment is made, the tensioner is falling into its natural curve. After 5,000 miles the machine became noisy and it was feared at first that the crankshaft had broken. On dismantling, however, it was found that the probable cause of the trouble was that the gearbox main shaft bearing had come loose in its housing; the counter shaft sprocket nut was loose, allowing the sprocket to chatter on the splines and also the timing side ball bearing was loose in its housing. On checking up it was found that one of the crankcases was oversize in the bearing housings when completed in the Toolroom. It is not therefore considered necessary to take action regarding the loosening of the bearings. The counter shaft sprocket fit is a different matter and some action should be taken both on the 175 and on 250's to ensure that more thread enters the counter shaft sprocket nut and also revision of the method of locking the nut is to be considered as there have been instances where the grub screw has come out of the sprocket. Mr. Thomas already has suggestions as to how these latter two troubles may be dealt with.

Carburettors - It was reported that the Amal stub fitting type had not given such good results on the road but this might be due to the fact that the choke size was too big and it was necessary to champher down to get a reasonable fitting. Mr. Thomas is to approach Messrs. Amals with a view to getting a carb of 27/32" of this type. It is also suggested that we approach Zenith Carburettors with a view to getting a similar sized carburettor from them.

13. 175 cc Model (Cont.)

It would appear that subject to the costs being favourable, the engine, speaking from the technical point of view, is in a fit state to be put into production, once the camshaft chain tensioner trouble has been solved.

14. Batch Tests

As a result of batch tests on the 350 cc machine, the carburettor settings have now been clarified and 180 main jet decided on. Messrs. Amals are adjusting our stocks.

In view of the new clutch recently introduced on the Interceptor, a batch test on one of these should be undertaken as soon as possible.

15. Over-oiling on 250 cc Machines

Tests are being run at the moment with a deeper sump and reduced diameter fly wheels and also on one engine on which a copper pipe has been led from the suction hole to the rear of the well. It is considered possible that with the rotation of the fly wheels tending to throw the oil to the back of the sump, the return pump may not be able to pick up the oil from where it is thrown. Despite the previous test carried out with dual plunger pumps and gear pumps, very little head-way has been made in eliminating the over-oiling troubles.

Tests on all suggestions will be carried out as the matter is of extreme urgency. Mr. Wilson-Jones suggested the clearance between the scraper and the fly wheel should be investigated. This is being done.

? Gear Box Sleeve Nut - longer & longer shaft?

16. Lucas Self Starter

As soon as an opportunity presents itself in the Experimental Department, the Lucas Self Starter will be fitted to a machine and the test completed.

17. Shorter Brake Linings

Road Tests are continuing.

18. 75 cc Machine

A dummy engine has been received from Messrs. Villiers but the frame is not yet complete. Certain parts of the frame have been completed but owing to Mr. Thomas and Mr. Humphries having been engaged on other projects, some detail work still remains to be completed in the Drawing Office. It now appears probable that Mr. Humphries will be able to devote more time to this.

In view of the fact that the engine is a dummy and it is not likely that Messrs. Villiers will be in production with this engine for some

18. 75 cc Machine (Cont.)

considerable time, it does not appear likely that we shall be in a position to market this machine fitted with a Villiers engine in the near future. Messrs. Villiers promised that a working prototype engine will be available soon, but at the moment this has not been received.

Mr. Thomas reports that the fibre glass main section for this machine will be delivered within the next two weeks. Received by Inspection 31/5/63

19. Nodular Iron Clutch Centres

Tests on these are proceeding on a 250 and 350 machine. Mileages covered are :-

250 cc - 3,000 miles
350 cc - 586 miles.

No trouble has yet been encountered.

20. Small Diameter Valve Stems on 250's

The parts promised by Mr. Thomas have just been completed and are now ready for test.

21. Continental Tank,

The machine fitted with the modified and embellished tank is in the Motor Shop awaiting inspection by Major Mountford.

22. Morse Chains

Fifty Morse chains have been received and instructions will be gifen to the Stores as to their issue so that they are fitted to machines delivered on the home market. In this way, the Service Department will be able to keep a check on the performance and life of the chains.

23. Guy Rope Cleaning and Greasing Appliance.

Arrangement drawings have been completed and quotations have been sent to Sir William Holcroft and Partners who are consultants for the Post Office.

24. Manual Hoist.

Detail drawings of the parts for this winch are proceeding.

25. 21-4N Valves

The exhaust valve in this material without a Stellite tip has been fitted to the prototype 350 cc new Bullet. This has run only 964 miles owing to the nedd to concentrate on the 175 cc machine. During this period it has not been necessary to adjust the tappets.