

# THE ENFIELD CYCLE COMPANY LIMITED

FROM Mr. J.J. Booker

TO Mr. R.E. Thomas

4th February, 1963.

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## DEVELOPMENT MINUTES

Herewith please find Minutes of Development Meeting held on Wednesday, 30th January, 1963.

In paragraph one dealing with 'Outboard Motor', it should be noted that it was hoped to obtain a power curve within 10 to 14 days of receipt of the piston.

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(J.J. Booker)

Mr. Baker said that he would ensure that the engine was assembled ready for the arrival of the piston as far as possible.

*Nylonics Engineering*

Propellers : Regarding propeller design, owing to the lack of specific knowledge on the subject, this would have to be carried out on a 'trial and error' basis. The advice from Messrs. Worthen-Blake is that a 12" propeller is required, but it is considered that to improve the looks of the motor, a smaller diameter propeller is desirable, and tests should be tried.

Mr. Seviour had obtained an 8" diameter, two-bladed, Evinrude propeller for which a shaft was being produced. It was intended that this should be run with a 2 : 1 gear ratio. Mr. Bromley is at the moment redesigning the gearcase and having a set of 2 : 1 gears produced.

All castings have been approved with the exception of the transmission tube casting and bevel gear case casting.

Once having obtained a power curve of the engine on the bench, with the engine installed in a boat it should be possible to decide on the type and size of propeller which permits the engine to run at its optimum speed.

Mr. Booker emphasized that it was necessary to obtain an estimated basis as soon as possible.

CYCLE COMPANY LIMITED

MINUTES OF THE MOTORCYCLE AND INDUSTRIAL  
ENGINES DEVELOPMENT MEETING HELD ON  
WEDNESDAY, 30TH JANUARY, 1963, AT 2.15 P.M.

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Present : Mr. J.J. Booker - Chairman  
Mr. H.T. Seviour  
Mr. G.H. Baker  
Mr. R.A. Wilson-Jones  
Mr. R.E. Thomas  
Mr. G. Bromley

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INDUSTRIAL ENGINES

1. Outboard Motor

Mr. Bromley reported that apart from the piston, it should be possible to assemble a unit for Bench Test. Delivery of the piston was still 14 days but it was being endeavoured to speed this up. In the meantime, the engine would be assembled ready for running except for the piston, and it was hoped that within 10 to 14 days it should be possible to obtain a power curve. Mr. Baker said that he would ensure that the engine was assembled ready for the arrival of the piston as far as possible.

*Nylonic Engineering*

Propellers : Regarding propeller design, owing to the lack of specific knowledge on the subject, this would have to be carried out on a 'trial and error' basis. The advice from Messrs. Wortham-Blake is that a 12" propeller is required, but it is considered that to improve the looks of the motor, a smaller diameter propeller is desirable, and tests should be tried.

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All castings have been approved with the exception of the transmission tube casting and bevel gear case casting.

Once having obtained a power curve of the engine on the bench, with the engine installed in a boat it should be possible to decide on the type and size of propeller which permits the engine to run at its optimum speed.

Mr. Booker emphasised that it was necessary to obtain an estimated

1. Outboard Motor (Cont.)

production cost to determine the feasibility of the whole project. It was emphasized that the engine unit would be in direct competition with the "Seagull" and unless it was competitive in price with this product, there would be little use in proceeding. It was generally agreed that two or three costs should be arrived at, i.e. on the basis of gravity die castings and low pressure die castings in quantities of 1,000 and 5,000, and also, as an exploratory estimate, costs using pressure die castings where ever possible.

Mr. Baker was to study the drawings and give an approximate cost of the machining of the various parts, basing his estimate on quantities of 1,000 and 5,000.

Mr. Seviour would let the Cost Office have quotations of castings already received and Mr. Baker would be supplied with a set of prints so that he could investigate his side.

Mr. Hughes, Cost Office, has been asked to prepare estimated costs as soon as possible.

2. New Range of Air Cooled Diesel Engines

It has been agreed that Mr. Seviour should acquire a Petter P.J.1. single cylinder air cooled diesel engine so that it be compared in all ways with our own products and also so that use be made of design points we found of value.

There was some further discussion about the merits of direct and indirect injection and Mr. Bromley was of the opinion that it would be well worth while carrying out an experiment with a suitable arrangement of head and piston to compare both types of injection on the same engine, although the design of the engine with direct injection was to be of the prime urgency. Mr. Bromley also reported that owing to having concentrated on the outboard engine, he had been unable to proceed much further with the design of the new range. He estimated that he would be able to devote more time to diesel engines in 7 to 10 days.

3. Experimental Valve Tappets and Cast Iron Cylinder Barrels

It was reported that tests on both these had been completed with satisfactory results. Mr. Bromley requested that to be absolutely sure of the cylinder barrel, another 100 hours should be run at full load. This test should be completed within 2/3 weeks.

It was generally agreed that the adoption of the new solid tappet would be advantageous and should be introduced on a 'no scrap, no delay' basis as soon as possible.

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4. Valve Springs

Mr. Bromley reported that he hoped that the test using only the outer spring would be started during the next day or two. It was agreed that some consideration should be given to the possibility of dispensing with the inner spring altogether on these engines.

5. Excessive Oil Consumption on 85 Twin.

The preliminary tests with the seals fitted to both valve guides appeared very promising. However, to be certain that there is an appreciable improvement and to ensure that no ill effects to the valves and guides will result from the fitting of the seals, a further test of 50 hours should be run under maximum load conditions. This test could be incorporated with the one using experimental valve tappets and cast iron cylinder barrels, and particular note should be made of any indication of shortage of oil to either valve stem or guide. Should the tests prove conclusively that there is an improvement and that there is no ill effect, the fitting of seals should be recommended for introduction as soon as possible.

Expander-Type Rings : Tests with a piston having Duoflex rings have been run and from the point of view of consumption, the results were extremely satisfactory. It will be necessary, however, to run a very long test to ascertain the wear taking place. It was therefore suggested that tests utilising slotted scraper rings, with drain holes drilled in the piston at the top side only, should be carried out.

Mr. Seviour has indicated that the somewhat excessive oil consumption on engines fitted by Wales & Edwards vehicles might be having an adverse effect on further orders, so that the matter must be treated as urgent.

6. Crankshaft Failures

Mr. Bromley submitted a drawing of a new crankshaft with increased diameter outside the bearing; a feather key and an oil seal as used on the 350 cc can be fitted in the existing bearing housing by means of an adapter. An assembly on these lines should be produced as soon as possible and put on test.

7. Rear Bearing Housing Failure

It appeared that the failures of the bearing housings could be attributed to fretting of the movement of the housing in the crankcase, causing impacting of the stud hole on the stud. It was therefore suggested that two of the studs were made into dowels. This would mean two holes being finished under-size giving a clearance of .002" - .004" on their respective studs. Mr. Bromley would supply Mr. Baker with the necessary drawing.

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## MOTORCYCLE ENGINES

### 8. 750 cc Engine

**Oversize Pistons :** Bench tests having proved satisfactory, in so far as no trouble was encountered with distortion or failure of the reduced spigot, it has been decided that it is safe to supply pistons .020" oversize. Mr. Spencer has been notified accordingly, so that he may obtain supplies.

**5-Speed Gearbox :** This still had not been run owing to adverse weather conditions.

**Automatic Advance :** Messrs. Lucas have undertaken to supply us with drawings of the necessary parts to enable an automatic advance/retard to be fitted to a K2F magneto. It is possible that we shall have to make the parts owing to their inability to cope with small quantities. These drawings are still awaited.

**Clutch :** It has apparently been agreed that for future orders of clutches on 750 cc machines the new type will be supplied. There is no doubt that the clutch would be an advantage.

### 9. Silencing

The silencer which was made up to Mr. Booker's suggestions did not, as previously reported, increase the power, but resulted in a slight power loss, although from the point of view of noise, it appears to be a considerable improvement over the existing type of silencer. An opportunity is still being awaited to test this with the Dawes Sound Level Meter. It is not possible to use this instrument at below freezing point or with a relative humidity of above 85%. As soon as conditions permit, a series of tests will be run with standard silencers and variations of the silencer having the louvred type of baffles.

Mr. Haynes of M.I.R.A. has been in touch with Mr. Wilson-Jones and would like us to carry out some power tests on a silencer which they have devised. Very good results are claimed for this silencer. At the moment a 250 cc engine is on the No. 1 test bed and could be utilised for this purpose.

### 10. 350 Bullet

After a considerable amount of experimenting whilst machines have been in production, it has been found that the fitment of a sintered bronze bearing, having an outer groove connecting with a drilled hole in the crankcase and also a through hole communicating with a groove on the outside of the crankshaft distance sleeve, has proved satisfactory. It has been found necessary, however, to hand-reamer the bush after piloting into the ball bearing to ensure alignment.

*0/0 sleeve reduced  
by 1/2 thou. giving  
Running fit .0032  
.002  
Bore of sleeve increased  
by 3 teeth giving fit on shaft 0 to 1 thou clearance  
previously possible to get 3/10 interference*

10. 350 Bullet (Cont.)

In view of the fact that it was found, when the engines were stripped, that several pistons had seized, it was decided to increase the cylinder bore size by .0005" immediately. This will be done on all engines which are in the process of being rebuilt.

Messrs. Albions are to produce us two layshafts in EN.36 for immediate test in our machines. Mr. Hill of Albions considers that even if they are made out of bar, there will be considerable improvement in strength over the existing EN.24 material. These are being awaited from Albions, and one will be fitted to the 350 cc experimental road machine.

11. 175 cc Model

The engine on the bench has now completed approximately 40 hours of running with no serious mechanical trouble other than the early failures of rockers and cams and a tendency for the camshaft chain tensioner to slack off. Approximately 21 hours of general running were carried out initially. During this stage, which consisted of running in and several snap power readings, it was found that there was a tendency for oil to leak from the breather hole at the rear end of the gearbox housing. The position of the breather hole was moved and a steel sleeve screwed in, over which a large diameter flexible pipe was fitted. After a little experimenting, it was found that by extending the steel sleeve further into the gearbox housing, the amount of oil being blown out of the breather was negligible at all speeds up to 9,000 r.p.m. During this 21 hours period a pair of rockers having Stellite pads brazed on was tried, but after a short period the brazing failed on the inlet rocker and the pad became detached. In view of the fact that the engine would reach speeds in excess of 9,500 r.p.m. it was decided that the use of weaker valve springs would be worth trying. Therefore a pair of outer valve springs, .135" diameter wire against the original .144" diameter wire, were obtained and fitted. This gave a poundage of 84 against 94 with the valve seated. At the same time, a pair of rockers with Stellite No. 1 welded on cam followers were fitted. A further 8 hours 20 minutes were run with the above parts at speeds varying from 4,000 to 9,000 r.p.m. During this period a full power curve was taken and a horse power of 11.8 at 8,500 r.p.m. was recorded. As the engine would still exceed 9,250 r.p.m., it was decided to reduce further still the valve spring pressure by fitting lighter inner valve springs. These were made from .110" wire against .116" originally. This has reduced the seated poundage to 78. A further oil consumption and endurance test of 11 1/2 hrs. at speeds between 3,000 and 9,000 r.p.m. was then carried out. The engine has completed this and the condition of the cam followers and cams is satisfactory. Further power tests are now to be carried out with different sized carburettors and the engine will then under-go a prolonged endurance and oil consumption test. The inlet rocker having a roller follower and an exhaust rocker having the cam follower face

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11. 175 cc Model (Cont.)

sprayed with Nickel-Chrome, will be tested during this period.

It is necessary that as soon as possible an estimate of the time of completion of development is made and also estimated production costs of the machines assuming it is satisfactory performance-wise. Costs are to be based on quantities of 1,000 and 5,000, using gravity die castings and low pressure die castings. Mr. Thomas will supply Mr. Baker with the necessary drawings to enable him to make an estimate of the production costs. Mr. Thomas will supply the Cost Office with quotations of castings, crankshafts, and all other bought out parts.

It is hoped that the machine fitted with the 175 cc engine will be on the road this week. This will give us an idea of the performance.

12. Batch Tests

As soon as weather conditions permit, it is intended to run tests on an Interceptor.

13. Over Oiling on 250 cc machines

The twin disc type pump with the release valve appears to be the most promising because the gear pump did not prime itself satisfactorily and at the first opportunity further tests will be run in an endeavour to solve this problem.

14. Siba Starter

This is not a practical proposition and tests should be discontinued. Mr. Thomas, however, considered that we should complete our tests with the Lucas geared starter. It is understood that the parts are available and as soon as an opportunity presents itself, these are to be fitted to one of the 250 cc machines in the experimental Department.

15. Shorter Brake Linings.

Tests with shorter brake linings are being continued on the Super-5 machine. Mr. Booker is of the opinion that the finish of the brake drums should be maintained at a high standard.

16. 75 cc Machine

We have now two alternative types of engine: i.e. the Villiers 4-speed, or the Ducati 3-speed 48 cc unit. From the cost point of view it appears that the Ducati, even though it has to be shipped from Italy, would be cheaper than the estimated cost of the Villiers unit. Further, the Ducati is available immediately should we require it whilst the Villiers engine is still in its early development stage. The Ducati gear is operated by a left-hand twist grip of the type used on most scooters whilst the Villiers unit is of the normal right hand side foot operation. Opinions are being obtained as far as possible

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*Drawings Body Completed.  
Frame & Swingarm  
Parts made.  
Rims & Tyres here  
Wheels to be built.  
Mould for Suspension  
being made in Tool Room  
Forks etc drawn.  
Centre Section Support & Petrol Tank etc to be drawn*



16. 75 cc Machine (Cont)

of the public's reaction to a left hand handle bar operated gear. A decision is to be made as to the merits of the two units. The machine which Mr. Thomas has designed is to accommodate the Villiers unit and he will finish the design on these lines.

17. Further Points for Future Discussion

On test 350 250

Nodular iron Clutch Centres

Larger Registration Number Plates

● Small Diameter Valve Stems on 250's

Leading Link Front Forks - 'BU' Bearings in main pivot

Continental tank, embellishment for raised centre rib.

Pollard Bearings?

Sample Tank requested.

Also information on alternative quick-action

filter-caps which do stand so high as the present one.

*J. J. Booker*  
.....  
(J.J. Booker)

~~Straining Winch~~ Manual Hoist

Wire rope ~~cleaner~~ & greaser.

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