



1 Telegrams  
CYCLES, REDDITCH

1 Telephone  
REDDITCH 4222 (9 Lines)

Manufacturers  
of

**Royal**

**Enfield**

BICYCLES and  
MOTOR CYCLES

**THE ENFIELD CYCLE COMPANY LIMITED**

Your Ref.

Our Ref.

RAW-J/PDE

HEAD OFFICE AND WORKS

REDDITCH

WORCS. ENGLAND

4th December, 1963.

Major V. T. Mountford  
Mr. J. J. Booker  
Mr. T. C. Greenwood  
Mr. R. E. Thomas

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Broken Connecting Rod in Works  
"Interceptor"

As you know one connecting rod in this machine broke after 16,000 miles running (equivalent to 52 million revolutions in top gear). Both big end bolts had broken, also the bearing cap at approximately the "6 o'clock" position and the neck of the rod about 3 in. above the crank pin centre.

I took all the broken parts to Mr. J. V. Scanlan of High Duty Alloys and having seen them under his binocular microscopes I am satisfied that the first part to fail was one of the big end bolts. Examination of the fracture on the portion which screws into the connecting rod (which was practically unmarked in the general smash up which followed) shows distinct indications of a fatigue failure.

Failure of the first bolt would leave the bearing cap held by one end only and this probably failed after a few revolutions followed almost simultaneously by failure of the second bolt, which also showed signs of a fatigue crack. The upper end of the connecting rod would then be free to drop down and was trapped between the crank pin and the cylinder skirt causing the fracture of the neck of the rod.

Examination of a section of the screw thread cut from the bolt which broke second showed a minute radial crack at the crest of each thread. This is thought to be caused by the thread rolling process and not to be harmful, though a similar crack at the root of the thread would be fatal. There was, however, no sign of this.

- 1 -

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CUSTOMERS MOTOR CYCLES, CYCLES OR PARTS THEREOF ARE RECEIVED AND HELD BY US ENTIRELY AT OWNER'S RISK AND WE ACCEPT NO RESPONSIBILITY FOR LOSS OR DAMAGE TO THEM ARISING FROM FIRE, THEFT, BURGLARY OR ANY OTHER CAUSE.

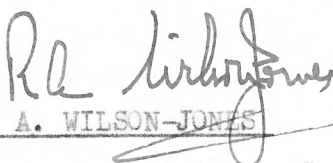
4th December, 1963.

Mr. Scanlan strongly recommends the use of waisted bolts and showed me the bolts out of a small connecting rod from a refrigerator motor. This has a smaller thread diameter and a coarser pitch than our bolts but the whole length of the shank, except for a short portion in the middle for location purposes, is reduced to a diameter apparently well below the core diameter of the thread. This gives a bolt with a frightening appearance, the reduced portions of the shank looking like stout wire, but apparently no trouble is experienced with these in service.

I also saw under the binocular microscope a big end stud from a car with experimental aluminium alloy connecting rods, one or more of which had broken due, it was suspected, to stud failure. This stud, which came from an unbroken rod and was slightly waisted, showed a large fatigue crack in the root of one thread. I suggested, and Mr. Scanlan agrees, that bolts in aluminium rods might be more liable to fatigue failure than in steel rods. This is so not only on account of the greater flexing of the big end eye with aluminium rods, which puts bending load on the bolts, but also because of the differential thermal expansion between the material of the rod and the bolt which puts an additional tensile stress on the bolt when the engine is hot. This introduces an additional fatigue cycle which is large although slow, perhaps only 2 or 3 cycles per day or, say, 1,000 per year. While this would not normally be thought to cause fatigue failure it must be remembered that a similar slow cycle was the cause of the failures of the Comet I airplanes.

This same differential expansion causes an objectionable increase in bearing clearance as the engine warms up and I would suggest that we should seriously consider using steel connecting rods, at any rate in our 250 cc engines.

At a recent meeting of the Birmingham Centre of the A.D. of the I. Mech E., our Mr. C. A. E. Booker asked the new Chairman, Mr. S.H. Grylls, Chief Engineer of the car division of Rolls Royce Ltd., if they had ever considered using aluminium alloy rods in their engines. The answer was "no on account of the finite fatigue life of high strength aluminium alloys and the fact that theoretically it is possible to make a lighter rod in steel than in aluminium". While this may be at the cost of machining the rod all over the extra weight of a properly designed steel rod cannot be very great and most of this is rotating weight which can be balanced.

  
R. A. WILSON-JONES

R. A. Wilson-Jones

Mr. L. R. Davenport  
Major V. T. Mountford  
Mr. J. J. Booker  
Mr. H. Birks  
✓ Mr. R. Thomas

18th October, 1963.

Cost of Scrapping Existing Stocks of Kick  
Starter Axles W.39215

Albion Engineering have 250 finished axles for which they  
want 11/-d each - total value £ 2137 : 10 : 0d.

Our Own stock excluding axles already fitted to engines  
or issued for assembly, 87 at 13/6d each - total value £54 : 13 : 6d

Grand total value £192 : 3 : 6d

*Raw*

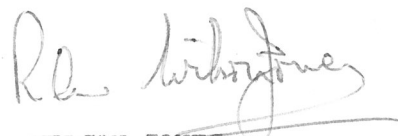
THE ENFIELD CYCLE COMPANY LIMITED

From R. A. WILSON-JONES

To MR. R. E. THOMAS  
Drawing Office.

6th November, 1963.

Mr. C. A. E. Booker has drawn my attention to the fact that 350 Bullet machines are being supplied with the same tail lamp bulbs as 250 cc machines. According to the Regulations any motor cycle of more than 250 cc capacity must be fitted with a 6W bulb. Will you please therefore see that the 350 schedule calls for this.



R. A. WILSON-JONES

THE ENFIELD CYCLE COMPANY LIMITED

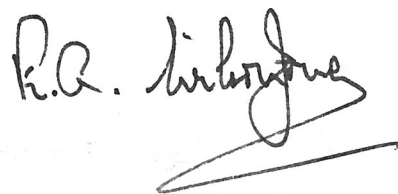
From R. A. Wilson-Jones

To Mr. R. E. Thomas,  
Copy Mr. J. J. Booker.

27th September, 1963.

Mr. C. A. E. Booker reports several complaints of clutch drag on 250 cc machines fitted with clutches with plain D.U. bearings. Apparently this has been cured by fitting circlips to prevent excessive movement of the clutch sprocket.

Will you please let me know the feasibility of fitting a circlip both on the four plate and 5 plate clutches.





Telegram  
CYCLES, REDDITCH

Telephone  
REDDITCH 4222 (9 Lines)

Manufacturers

of

**Royal**

**Enfield**

BICYCLES and  
MOTOR CYCLES

**THE ENFIELD CYCLE COMPANY LIMITED**

Your Ref.

Our Ref. **JJB/JJH**

HEAD OFFICE AND WORKS

REDDITCH

WORCS. ENGLAND

14th March, 1963.

~~Major V.T. Mountford.~~  
~~Mr. R. Thomas.~~  
~~Mr. R.A. Wilson-Jones.~~

I attach hereto a copy of a memo received from Mr. V.L. Young of Westwood, relating to our recent discussions on experiments with "Interceptor" big end assemblies.

I also attach a copy of a note received from Mr. S. Viles, with whom I had some discussion over the telephone regarding the possibility of increasing the amount of metal on the big end joint face outside the bolt. The intention of this is to give more support on the face which may prevent distortion of the big end eye under inertia load, with the consequent bending load being applied to the big end bolts.

In my own opinion, this would specifically reduce the bending load if it does in fact exist.

We should, in the near future, have some results from the tests which are to be carried out at High Duty Alloys with a view to ascertaining what distortion of the big end eye does in fact take place.

**J.J. BOOKER.**  
**MANAGER**

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Telegrams CYCLES PHONE  
BRADFORD-ON-AVON TROWBRIDGE

Telephone  
BRADFORD-ON-AVON 2145 7-8

HEAD OFFICE & WORKS  
REDDITCH WORCS.

Our Ref  
Your Ref

UPPER WESTWOOD,  
NR BRADFORD-ON-AVON,  
WILTS.

CONN ROD BOLTS.

REPORT OF MEETING WITH MESSRS J. J. BOOKER, R. A. WILSON-JONES  
AND MR. WEEMS OF G.K.N. AT REDDITCH ON THURSDAY 7th MARCH.

Owing to difference of opinion between ourselves and Messrs Booker and Wilson-Jones as to the torque which could be safely applied to conn rod bolts, R. Shuttleworth and myself accompanied Mr. Young to Redditch, taking our torque wrench (previously checked for accuracy) and a selection of bolts which had failed at 35 ft lbs torque, also some new bolts and conn rods for test. We also took the rod which had failed thro' broken bolts and which we had cut thro' for tests to determine degree of stretch under load.

The first thing which transpired was that Mr. Weems, after examining the failed rod, and seeing the test figures we had obtained from it, came round towards our view, that the torque figure of 27lbs/ft which we used was ample, in fact may be too high, and that a figure of 22-23lbs/ft was quite safe. He also was of the opinion that the fracture of the bolts started at the top of the free threads on the inside, probably due to slight flexing under load, and therefore bolts with ground, polished and vapour blasted waists would probably be an advantage in that a point for flexing without so great a tendency to fracture would be provided.

On discussion the higher figure of 35 lbs/ft which Redditch had obtained, but which we found impracticable, we did prove their torque wrenches incorrect, but also that the batch of bolts they have in stock will give this figure without passing the elastic limit, whereas ours our doubtful. All the bolts are supposed to be equal in strength, it would appear that the Unbrako screws are not made to the close tolerance as regards strength that we had been lead to expect and this may be a contributory factor in the failures in the U.S.A.



Telegram: CYCLES. PHONE.  
BRADFORD-ON-AVON - TROWBRIDGE

Telephone:  
BRADFORD-ON-AVON 2165-7-8

HEAD OFFICE & WORKS  
REDDITCH. WORCS.

Our Ref.

Your Ref.

UPPER WESTWOOD,  
NR. BRADFORD-ON-AVON,  
WILTS.

- 2 -

Messrs Bocker and Wilson-Jones are pursuing the matter further, meanwhile we are preparing 12 bolts to the enclosed drawing, made from the standard bolts, of which, we shall retain 6 and send 6 to Redditch for testing.

We are waiting for information from Redditch about future engines. They may decide to use High Fatigue bolts, make a change over to 8" bolts - (this would mean reduction of the crankpin to the 'Crusader' size and use of 'Crusader Shells) and in any case, they have to fix a torque figure.

We have been asked not to assemble any U.S.A. engines until this matter is decided.

? Drawing of Bolt sent from America to Major Mountford was of the old type - broken bolts received were latest type.

Sgd. J. A. B. Lovekin.

HEAD OFFICE & WORKS  
REDDITCH, WORCS.

Our Ref.  
Your Ref.

UPPER WESTWOOD,  
NR. BRADFORD-ON-AVON,  
WILTS.

13th March, 1963.

L. H. Davenport, Esq.,  
V. T. Mountford, Esq.

750cc Twin Engine Connecting Rod.

It would be quite practicable to leave the rod wider at the joint face as suggested, the increase in width amounting to about .135"

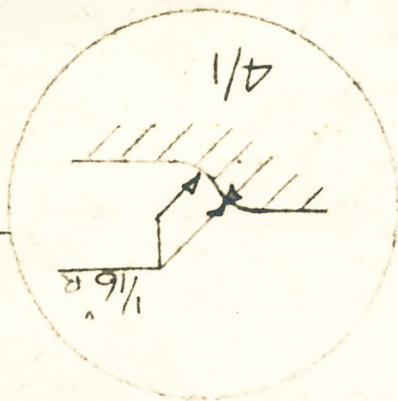
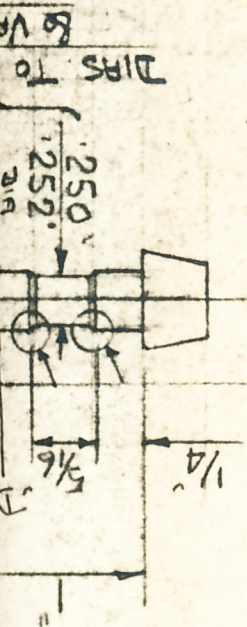
Nine Jigs and Fixtures would require the location altered, this would cost approximately £100. A milling fixture for the angle on side of rod would be required at a cost of approximately £40.

The shape of the rod would be as shown on sketch.

S. G. Viles.

THE

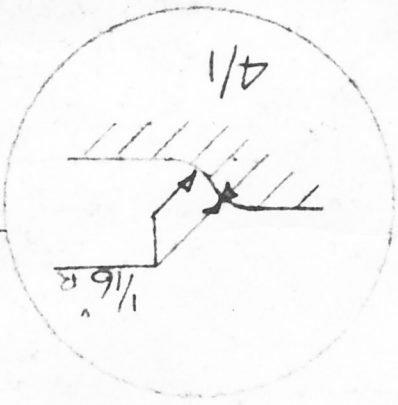
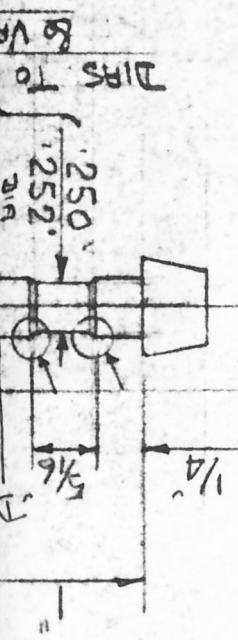
EXPERIMENTAL CONN. ROD BOLTS



A. L. KENNEDY, Ed.  
J. H. DEARBORN, Ed.  
REVISION WORK  
HAND DRAFT WORK

EXPERIMENTAL CONN. ROD BOLTS

THE



W. L. KORNBLITH, Inc.  
L. H. Davidson, Inc.  
RESEARCH WORKS  
RESEARCH WORKS

THE ENFIELD CYCLE COMPANY LIMITED

From

Mr. R.A. Wilson-Jones

To

Mr. J.J. Booker

21st February, 1963.

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ESTIMATED PERFORMANCE OF 175 CC MOTORCYCLE

Herewith please find power curves from the 175 cc engine. I have marked on this two curves for the estimated power required in top gear calculated from the usual formula :

$$P = \frac{1.47}{550} VR$$

where P = BHP required, V = speed in m.p.h., R = total drag in lbs., which is known to be obtainable from the formula  $R = A + BV^2$  where A is the "rolling resistance" depending on weight, road surface, tyres wheel bearings, etc., and for pneumatic tyres on good roads may be taken as 40 lb. per ton of laden weight.

$BV^2$  is the aerodynamic drag. B is a constant depending on the frontal area and the degree of stream-lining. Experience has shown that for our larger machines B = .014 gives good correlation between bench test results and speeds obtained at M.I.R.A. with the rider flat on the tank. For the Crusader range I usually use .0135 and for the Prince .013.

The accompanying graph shows that the power curve is rather erratic. The calculated "power required" curve using B equal to .013 and the gear ratio employed on the prototype machine crosses the "power available" curve at about 63/64 m.p.h.

It is unlikely therefore that this machine in its present form will exceed (or even reach) 65 m.p.h. By dropping the top gear to 8.5 : 1 the "power required" curve crosses the "power available" curve almost at its peak giving a probable maximum speed of about 67 m.p.h. at the expense of a very fussy high revving machine (6,400 r.p.m. at 50 m.p.h.)

It is obvious therefore that we should endeavour to improve the performance of the engine. The curves show that with the present gear ratio we want 13 BHP at 7,500 r.p.m. to achieve 70 m.p.h. which should be our lowest acceptable target. This means stepping up the BMEP at this speed from 109 to 130 p.s.i. - a considerable increase but not, I would think, an impossible one.

The present power curve suggests that the engine is over valved or that the valve opening periods are too long (Probably due to the absence of push rod whip). The easiest thing to try is new cams with, say, 10° shorter opening

/Cont...

Mr. J.J. Booker

21st February, 1963.

period and perhaps slightly less lift (so as to keep the valve accelerations to their present figure). The higher compression pistons now available may help but will not by themselves produce the required extra BMEP.

For comparison I include also a sheet showing the power curves for a "Crusader sports" engine with two "power required" curves calculated for the standard gear ratio using alternatively the figures .0135 and .013 for constant B. You will see that these give estimated speeds of 74 and 75 m.p.h. respectively which agree very well with the figures we obtain from Batch Tests at M.I.R.A. thus proving the reliability of this method.

The only doubt I have is the accuracy of the power curves. That for the Crusader Sports was taken using a single chain from the engine sprocket to the sprocket on the shaft coupled to the dynamometer. Our usual figure of 10% was added to the recorded figures to allow for transmission losses.

The curve for the 175 cc engine was taken driving through the gear box in top gear and using two chains. 15% was guessed as being a reasonable figure to add in these circumstances, but this may be too high or too low.

However, 5% either way is only about  $\frac{1}{2}$  BHP at the speed we are concerned with. This corresponds to less than an error of + 1 m.p.h.

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

THE ENFIELD CYCLE COMPANY LIMITED

FROM Mr. R.A. Wilson-Jones

To Mr. R.E. Thomas

13th March, 1963.

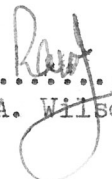
196

Herewith please find latest drawings from Hepworth & Grandage for service pistons for 1962 Model Constellation and 350 Bullet engines.

These drawings show the pistons made from the die which was altered to produce the latest piston of 9 : 1 compression ratio and the form of the piston crown is the same as with the new Crusader piston.

The estimated compression ratios of these pistons when fitted are  $8\frac{1}{4}$  : 1 for the Constellation and  $7\frac{1}{2}$  : 1 for the 350 Bullet, compared with  $8\frac{1}{2}$  and  $7\frac{3}{4}$  : 1 for the old type pistons which had slightly higher domes.

Will you please bring our drawings up to date and let me have a print of the piston for the Constellation engine to send to Westwood.

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

W45788

W45375.

**THE ENFIELD CYCLE COMPANY LIMITED**

FROM.....Mr. R.A. Wilson-Jones.....

TO.....Mr. C.A.E. Booker  
Mr. R.E. Thomas,.....

.....25th October, 1961.....19

Herewith please find a copy of a schedule of wheel rims for our machines, 1950 to 1962, which has been compiled at the request of the Dunlop Rubber Company Ltd., and which may be of interest to you.

This schedule is believed to be complete so far as models sold in this country are concerned. It also contains some rims (information concerning which was specifically asked for by Dunlop) which were used only on machines for U.S.A. There are other rim sizes used on machines sold in the U.S.A. which are not included in this schedule.

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

ENFIELD CYCLE CO. LTD.

SCHEDULE OF WHEEL RIMS, 1950 - 1962

<u>Code No.</u>	<u>Rim Size</u>	<u>Enfield Part No.</u>	<u>Dunlop Drawing No.</u>	<u>Model and Date</u>
MB.4	WM0-19 L/V	W.45811	RE.051	2-Stroke 'Prince'. Front. Late 1960/61/62 Rear. Rear.
MB.20	WM2-19	W.29433	RE.031	'Model G'. Front. 1950/1/2/3/4 '350 Bullet'. Front. 1950/1/2/3/4/5 '350 Bullet'. Rear. 1950/1 'Model J2'. Front. 1950/1/2/3/4 '500 Bullet'. Front. 1953/4/5 '500 Twin'. Front. 1950/1/2/3/4
MB.20	WM2-19	W.29436	RE.031	'Model G' Rear. 1950/1/2/3/4 '350 Bullet'. Rear. 1952/3/4/5 '350 Bullet'. Rear (Fixed). 1956/7 '350 Clipper'. Rear. 1958/9 'Model J2' Rear. 1950/1/2/3/4 '500 Bullet'. Rear. 1953/4/5 '500 Bullet' Rear (Fixed) 1956/7/8 '500 Twin'. Rear. 1950/1/2/3/4/5/6 'Meteor 700'. Rear. 1953/4/5 'Super Meteor'. Rear (Fixed). 1956/7
MB.21	WM3-18	W.40635	RE.043	Indian 'Trailblazer'. 1955/6/7/8

Code No.

Rim Size

Enfield Part No.

Dunlop Drawing No.

Model and Date

MB.4 WMO-19 I/W W.45811 RE.051 2-Stroke 'Prince'. Front. Late 1960/61/62 Rear. Rear.

MB.20 WMO-19 W.29433 RE.031 Model G1. Front. 1950/1/24/34

350 Bullet. Front. 1950/1/23/45  
350 Bullet. Rear. 1950/1

Model J2. Front. 1950/1/23/4

500 Bullet. Front. 1953/4/5

500 Twin. Front. 1950/1/23/4

MB.20 WMO-19 W.29436 RE.031 Model G. Rear. 1950/1/23/4

350 Bullet. Rear. 1952/3/4/5

350 Bullet. Rear (Fixed). 1956/7

350 Clipper. Rear. 1958/9

Model J2. Rear. 1950/1/23/4

500 Bullet. Rear. 1953/4/5

500 Bullet. Rear (Fixed) 1956/7/8

500 Twin. Rear. 1950/1/23/4/5/6

Meteor 700. Rear. 1953/4/5

Super Meteor. Rear (Fixed). 1956/7

MB.21

WMO-18

W.40635

RE.043

Indian Trailblazer. 1955/6/7/8

Enfield Constellation. 1960/1/2 (Rear)

'Galaxy'. 1960/1/2 ( " )

'Interceptor'. 1960/1/2 ( " )

'Fury'. 1960/1/2 ( " )

W.45638  
(as W.40635  
+ 2 holes for  
security bolts)

The above for U.S.A. market only.

<u>Case No.</u>	<u>Rim Size</u>	<u>Enfield Part No.</u>	<u>Dunlop Drawing No.</u>	<u>Model and Date</u>
MB.22	WM2-19	W.37639	RE.043	'350 Clipper'. Front. 1958/9
				'350 Bullet'. Front. 1956/7/8
				'350 Bullet'. Rear Q.D. 1956/7/8
				'500 Bullet'. Front. 1956/7/8/9/60/61/62
				'500 Bullet'. Rear. (Q.D.) 1956/7/8/9/60/61/62
				'500 Twin'. Front. 1955/6/7/8
				'500 Twin'. Rear. (Q.D.) 1957/8
				'Meteor 700'. Front. 1953/4/5
				'Super Meteor'. Front. 1956/7/8/9/60/61/62
				'Super Meteor'. Rear(Q.D.) 1956/7/8/9/60/61/62
	WM2-19	W.42961 (as W.37639 but 1 security bolt hole)		'Constellation' Front. 1958/9/60/61/62
	WM2-19	W.42766 (as W.37639 but 2 security bolt holes)		'Constellation'. Rear 1958/9/60/61/62
MB.83	WM2-17	W.40414	RE.043	(late) '250 Clipper'. Front. 1958/59/60/61/62
				'Crusader 250' Front. 1957/58/59/60/61/62
				'Crusader 250' Rear.(Q.D.) 1957/58/59/60/61/62
				'Crusader Sports'. Front. 1959/60/61/62
				'Crusader Sports'. Rear (Q.D) 1959/60/61/62
				'Crusader Super 5'. Front. 1962
				" " Rear.(QD)1962
				'350 Clipper'. Front. 1960/61/62

MB.83	VM2-17	V.40414	RE.043	'250 Clipper'. Front. 1958/59/60/61/62 (late) 'Crusader 250'. Front. 1957/58/59/60/61/62 'Crusader 250'. Front. 1957/58/59/60/61/62 'Crusader Sports'. Front. 1959/60/61/62 'Crusader Sports'. Rear (q.d.) 1959/60/61/62 'Crusader Super 5'. Front. 1962 " " Rear.(q.d)1962 '350 Clipper'. Front. 1960/61/62 " " Rear (q.d.) 1960/61/62 '350 Bullet'. Front. 1959/60/61/62 " " Rear (q.d.) 1959/60/61/62 'Meteor Minor'. Front. 1958/59/60/61/62 'Meteor Minor De Luxe'. Rear (q.d.) 1958/59/60/61/62 'Meteor Minor Sports'. Rear (q.d.) 1960
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MB.22	VM2-19	V.37639	RE.043	'350 Clipper'. Front. 1958/9 '350 Bullet'. Front. 1956/7/8 '350 Bullet'. Rear q.d. 1956/7/8 '500 Bullet'. Front. 1956/7/8/9/60/61/62 '500 Bullet'. Rear (q.d.) 1956/7/8/9/60/61/62 '500 Twin'. Front. 1955/6/7/8 '500 Twin'. Rear. (q.d.) 1957/8 'Meteor 700'. Front. 1953/4/5 'Super Meteor'. Front. 1956/7/8/9/60/61/62 'Super Meteor'. Rear(q.d.) 1956/7/8/9/60/61/62 'Constellation'. Front. 1958/9/60/61/62 'Constellation'. Rear 1958/9/60/61/62
	VM2-19	V.42961		(as V.37639 but 1 security bolt hole)
	VM2-19	V.42766		(as V.37639 but 2 security bolt holes)

<u>Code No.</u>	<u>Rim Size</u>	<u>Enfield Part No.</u>	<u>Dunlop Drawing No.</u>	<u>Model and Date</u>
MB.85	WM0-19	WM.44177	RE.043	'Ensign'(for Enfield India Only) 1958/9, suitable as replacement for W.26949 (extra light weight) which was fitted to :-  'RE' Front. 1950/1/2/3/4/5  'RE' Rear 1950/1/2/3/4/5  'Ensign'. Front 1955/6/7/8  'Ensign' Rear 1955/6/7/8  'Prince' Front 1959/60 (early)  'Prince' Rear 1959/60 (early)
MB.89	WM2-17	WM.44112	RE.031	'250 Clipper'. Rear. 1958(late) 59/60/61/62  'Meteor Minor Standard', Rear. 1958/9  'Meteor Minor Sports' Rear. 1961/62
MB.101	WM3-18	W.46526	RE.031	'250 Trials'. Rear. 1962
MB.106	WM2-18	W.41093	RE.031	G.de.Luxe ) Front. 1955/6/7 350 Clipper) Rear. 1955/6/7
				FRONT. 1954/4/5

Part No.	W.M. No.	Model and Date
MB.85	WM.4417	RE.043 Ensign (for Enfield India Only) 1958/9, suitable as replacement for W.26949 (extra light weight) which was fitted to :- RE Front. 1950/1/2/3/4/5 RE Rear. 1950/1/2/3/4/5 Ensign Front 1955/6/7/8 Ensign Rear 1955/6/7/8 Prince Front 1959/60 (early) Prince Rear 1959/60 (early)
MB.89	WM.4412	RE.031 '250 Clipper'. Rear. 1958(late) 59/60/61/62 'Meteor Minor Standard', Rear. 1958/9 'Meteor Minor Sports' Rear. 1961/62
MB.101	WM.46526	RE.031 '250 Trials'. Rear. 1962
MB.106	WM.41093	RE.031 G.de.Luxe ) Front. 1955/6/7 350 Clipper ) Rear. 1955/6/7
WM3-19	W.44566	'350 Trials' Rear. 1959/60/61
WM1-21	W.40674	'350 Trials. Front 1959/60/61 (250 Trials. Front 1962
WM1-19	W.37385	Model S Front. 1951/2/3 " " Rear. 1951/2/3 Model SF Front 1953 " " Rear. 1953 '250 Clipper' Front. 1954/5/6/7/8(early) " " Rear 1954/5/6/7/8(early)

Model and Date

No. Drawing

Part No.

W.M. No.

**THE ENFIELD CYCLE COMPANY LIMITED**

**FROM**..... Mr. R.A. Wilson-Jones.....  
..... Chief Engineer.....

**TO**..... Mr. R.E. Thomas.....  
..... Drawing Office.....

..... 1st March, ..... 1961.

Herewith please find a copy of a memo I am sending to Major Mountford in connection with Mr. Lovekin's modification to the pump driving shafts on twins. You will note that I consider that it would be a good thing to make a similar modification on the pump shafts on 350 and 500 c.c. singles especially in view of the fact that these shafts may be subject to considerable end load due to the pressure in the secondary side of the feed pump exceeding that in the secondary side of the scavenge pump.

*R.A. Wilson-Jones*

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February 28th

61.

Damage to Oil Pump Driving Gears.

The information given in Mr. Lovekin's letter of 27th February puts fresh light on this problem. Lengthways movement of the pump spindle is prevented by a flange at the forward end which deals with the rearward thrust which occurs in normal running. The eccentric pin at the front end is extended so as to allow only limited movement in a forward direction before it contacts the underside of the pump cover. The object of this is to prevent damage to the gears (and /or the feed pump driving peg coming out of the plunger) in event of the engine running backwards when starting up or shutting down with the clutch lifted or the gear in neutral.

Mr. Lovekin now suggests that the pump spindle has moved forwards on closing the throttle suddenly when the engine is running at high speed. This I find hard to believe since it would mean that the engine slowed down more rapidly than the pump driving shaft, which seems unlikely in view of the very small inertia of the shaft as compared with the engine and whatever may be coupled to it.

It seems much more likely that the damage to the inside of the pump covers has occurred when the engine has at some time run backwards for a short period. Other possible causes of the pump shaft moving forward are end thrust due to malalignment of the pump driving pegs or excessive pressure in the secondary side of the feed pump at the rear end of the shaft. This could be caused by incorrectly drilled oil ways or, while the engine is cool, by a blocked release valve on the feed to the rockers.

Whatever the cause, the groove and screw now added will, if correctly fitted, prevent contact between the driving peg and the underside of the pump cover but, in view of the very small contact area provided (at most a line contact  $1/16$ in long) I find it surprising that this will stand up to conditions which cause trouble with the present arrangement. It is, therefore, a mistake to have shortened the scavenge pump driving pin by  $5/32$ in as has been done. This should be restored to its original length to act as a second line of defence and to enable the new shaft to be fitted in timing covers without the extra screw hole. The possibility of doing this is implied by

the use of the old part No. which in any case should now be given a new suffix "B" since it is not desirable that the old shaft should be used as a service replacement for the new one.

I think it even less probable that the pump spindle will over run the engine in a Single than in a Twin but the other possible causes of forward movement of the shaft remain. In fact there is more chance of excess pressure in the secondary side of the feed pump since this is used to feed oil to the big end.

I agree entirely with Mr. Lovekins "contributory causes" to which I would add the practice of knocking the timing cover on without turning the crankshaft when assembling the engine.

During the past 8 or 10 years there have been perhaps half-a-dozen "G" or Bullet engines which have persistently stripped their pump gears and which have been cured only by changing the timing side crankcase after every thing else has failed including fitting complete new timing covers. Until to-day I thought that this indicated some build up of tolerances which caused incorrect meshing of the gears. Mr. C.A.E. Booker has however now advised me of two cases where the trouble was traced to incorrect drilling of oilways blocking the delivery from the scavenge pump. This could not cause the shaft to move endways but could, of course, overload the gears.

I think Mr. Lovekin's modification is sound and that it should be adopted on Bullets as well as Twins subject to the scavenge pump driving pin being left its full length.

Copies to:  
✓ Mr. J.A.B. Lovekin.  
Mr. R. Thomas.  
File.

R.C. Whyte



Telegrams: CYCLES, PHONE,  
BRADFORD-ON-AVON - TROWBRIDGE

Telephone:  
BRADFORD-ON-AVON 2166-7-8

# THE ENFIELD CYCLE COMPANY LIMITED

## FACTORY No.2

UPPER WESTWOOD,  
NR. BRADFORD-ON-AVON,  
WILTS.

HEAD OFFICE & WORKS  
REDDITCH, WORCS.

Our Ref.: L/VH.  
Your Ref.:

27th February, 1961.

R.A. Wilson-Jones, Esq.,  
Enfield Cycle Co. Ltd.,  
REDDITCH,  
Worcs.

Copy to:- R. Thomas, Esq. ✓

Dear Mr. Wilson-Jones,

I am enclosing a print of each of the following:-

- TIMING COVER - W46127/A.
- OIL PUMP
- SPINDLE - W38623/A.
- LOCATING
- SCREW - W46142.

Where engines have been working under exaggerated conditions, such as on the Polland Hovercraft, and during races, we have had trouble with oil pump spindles falling ~~out~~<sup>THR</sup> stripped gear teeth.

From the damage on the oil pump covers, it became apparent that the impact between the cover and the spindle on rapid shut-down was sufficient to cause the eccentric pin to bed into the cap, and lock the spindle, bending the pin and fracturing the teeth. A contributory cause was possibly the method adapted on assembly, where the spindle was turned by means of a screwdriver levering against the teeth to rotate the spindle. There was a tendency to tap the teeth, using the screwdriver as a drift in case of tightness. To overcome this we have modified the Timing Cover and Spindle by machining a groove in the spindle, and locating it with a screw in the Timing Cover.

We have also made a small fixture to enable the spindle to be rotated with a meshing gear on assembly, and thus reproduce working conditions.

Modified Timing Covers and Spindles have been fitted to the Polland engines and have proved satisfactory, therefore it has been decided to change over to this system on all engines as soon as practical. We shall inform the service department when that time comes.

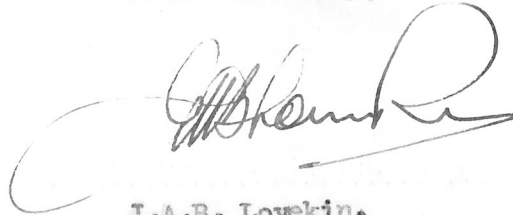
Continued.....

R.A. Wilson-Jones, Esq. Redditch.

27th Feb. 1961.

Regarding the 'Tropical' conditions for engine test, the temperature should be 125°F, we had 85° in error. I have accordingly reduced the HP to 23 from 25.

Yours sincerely,

A handwritten signature in dark ink, appearing to read 'J.A.B. Lovekin', with a long horizontal flourish extending to the left.

J.A.B. Lovekin.

Encs.

**THE ENFIELD CYCLE COMPANY LIMITED.**

FROM..... Mr. R. A. Wilson-Jones.

TO..... Mr. R. G. Thomas.

.....12th February,.....195

Will you please have the driving pegs on the Oil pump timing shaft used on 350 Clipper, 350 Bullet and 500 Bullet etc. modified, so that the peg driving the scavenge pump leads the one driving the feed pump by 90°.

*R.A. Wilson-Jones*

c. c. Mr. R. Thomas.  
D.O.

JDH/OM.  
RAW-J/YEC.

Dct: 12/6/59.  
15th June, 1959.

J. D. Harper Esq.,  
Messrs. John Harper & Co. Ltd.,  
Albion Works,  
WILLEMSHALL,  
Staffs.

Dear Sir,

Thank you for your letter of the 11th June.  
We note that the latest modification suggested for Pattern  
No. 5094 for Crankshafts for our 250 Single Cylinder  
engines, should in your opinion, give sound castings.

We shall be glad if you will make these  
modifications immediately with the minimum possible delay  
in the supply of castings.

Yours faithfully,  
THE ENFIELD CYCLE COMPANY LIMITED.

  
Chief Engineer.