



Manufacturers

of

Royal

Enfield

BICYCLES and
MOTOR CYCLES

Telegrams
CYCLES, PHONE, REDDITCH

Telephone
REDDITCH 121 (9 Lines)

THE ENFIELD CYCLE COMPANY LIMITED

Your Ref.

Our Ref.

HEAD OFFICE AND WORKS
REDDITCH
WORCS. ENGLAND

From- Mr. Wilson-Jones.

to:- Major F.W. Smith.
Major V.T. Mountford.
Mr. V.L. Young.
Mr. J.J. Docker.
✓ Mr. R.E. Thomas.
Mr. G.H. Baker
File

10th April, 1961

Report of Tests on "750 Twin" Machine

A complete machine with an engine of 750 cc capacity has been received from Westwood. This extra capacity is obtained by increasing the bore to 71 mm (.040 in oversize) and the stroke to 93 mm.

As received the performance was most disappointing. Not only did the machine show no signs of being any faster than a standard Constellation but vibration was noticeably worse than an average 1960 or 1961 Constellation. This was not unexpected since the pistons were made from standard castings machined .040 in oversize. The extra weight of these together with the increased stroke increases the inertia forces even supposing that the standard balance factor has been achieved.

What was surprising was that acceleration in top seemed much worse than standard. On one occasion the machine failed to respond to opening the throttle from about 50-55 m.p.h. and its speed up Hopwood Hill on full bore with the ^{writer} on board was about 55 m.p.h. which is the speed normally reached by 350 Bullet.

Examination showed that the compression ratio was 10.1, while perhaps to make up for this, the ignition was timed at $9/32$ in advance (28° on the 93 mm stroke) instead of the normal $8/32$ in (21° on the 90 mm stroke). The engine showed no signs of "pinking" in spite of its high compression ratio. The timing was therefore advanced to $1/2$ in (38° on the 93 mm stroke) to

Report of Tests on "750 Twin" Machine

Cont...

allow the best timing to be found with the manual control and the gear box final drive sprocket was changed from 20 to 21 teeth since the only theoretical advantage of the larger capacity engine is to allow it to run in higher gear.

The machine was then taken to the timing straight at the 21/21 ratio. Proving Ground and the engine speed was measured. This was quite disappointing being 75.0 m.p.h. one way, 77.75 m.p.h. return. For comparison the 6-cylinder machine with 20-tooth pistons and a 2-speed box, which also had a 21 tooth final drive sprocket was run. This machine, which is generally considered to be better for a 6-cylinder machine, showed speeds of 85.00 m.p.h. one way, 83.07 m.p.h. in spite of being over geared.

The 750 cc machine was also tried for speed after overhauling in top gear from 40 m.p.h. over half the length of the straight. The results were even worse, the speeds obtained being 75.00 m.p.h. one way, 77.03 m.p.h. return. The 600 cc machine was not tried for comparison but usually a 6-cylinder machine will run a mean speed of 80 m.p.h. or more under these conditions.

While clearly something is wrong with this engine test, apart from the fact that the two 1 1/2 inch carburetors are fitted with jets of the size (30) usually used in the standard 1 1/2 inch bore instruments, the only fault so far discovered is that apparently nothing has been done to match up the bore to the 1.00 inch diameter cylinder bore with the result that one of the pistons has been fitting slightly. According to tests run in comparison with the 600 cc machine, the current jet size when two 1 1/2 inch bore carburetors are fitted to a 6-cylinder machine is 30.

The very high compression ratio is due to the fact that standard length or intake valves have been used with only a packing plate thick enough to allow for the valves to be by bringing the top of the piston up to the top of the bore at 21/21. No allowance has been made for the use of cross gaskets nor for the extra swept volume. As a result the actual swept volume is considerably reduced to 45 cc (initially measured at 45.5 cc) with a swept volume of 50 cc, giving a compression ratio of 10 to 1. To return this to 12 to 1 the volume must be increased to 60 cc requiring an additional .005 inch packing.

A better way would be to use the 2 1/2 to 2 3/4 Super intake pistons which with the present packing beneath the barrels and cross gaskets will give a ratio of 12 to 1 with a better shaped combustion chamber and an engine near enough

Factories
of
Royal

Report of Test on "70 1/2" Engine Test---

to standard height to enable the standard load steady to be used.

Whatever is done to this engine it seems very unlikely that it will give appreciably more power or speed than the standard 6/2 or Constellation while on the other all the troubles, to which the 6/2 as engine (which after all is a blown up version of the original long stroke 6/6 as test) is liable, are likely to be accentuated. These include:-

Vibration - Heavier pistons and longer stroke

Excess cooling of cylinders - Thinner walls or less air space between bars.

Over oiling at high speeds - Tendency of big end 1) on heavier cranks

Failure of big end caps - Greater inertial loads due to heavier pistons and/or bolts. - and longer strokes.

Clutch and gear troubles - Heavier torque at gear box.

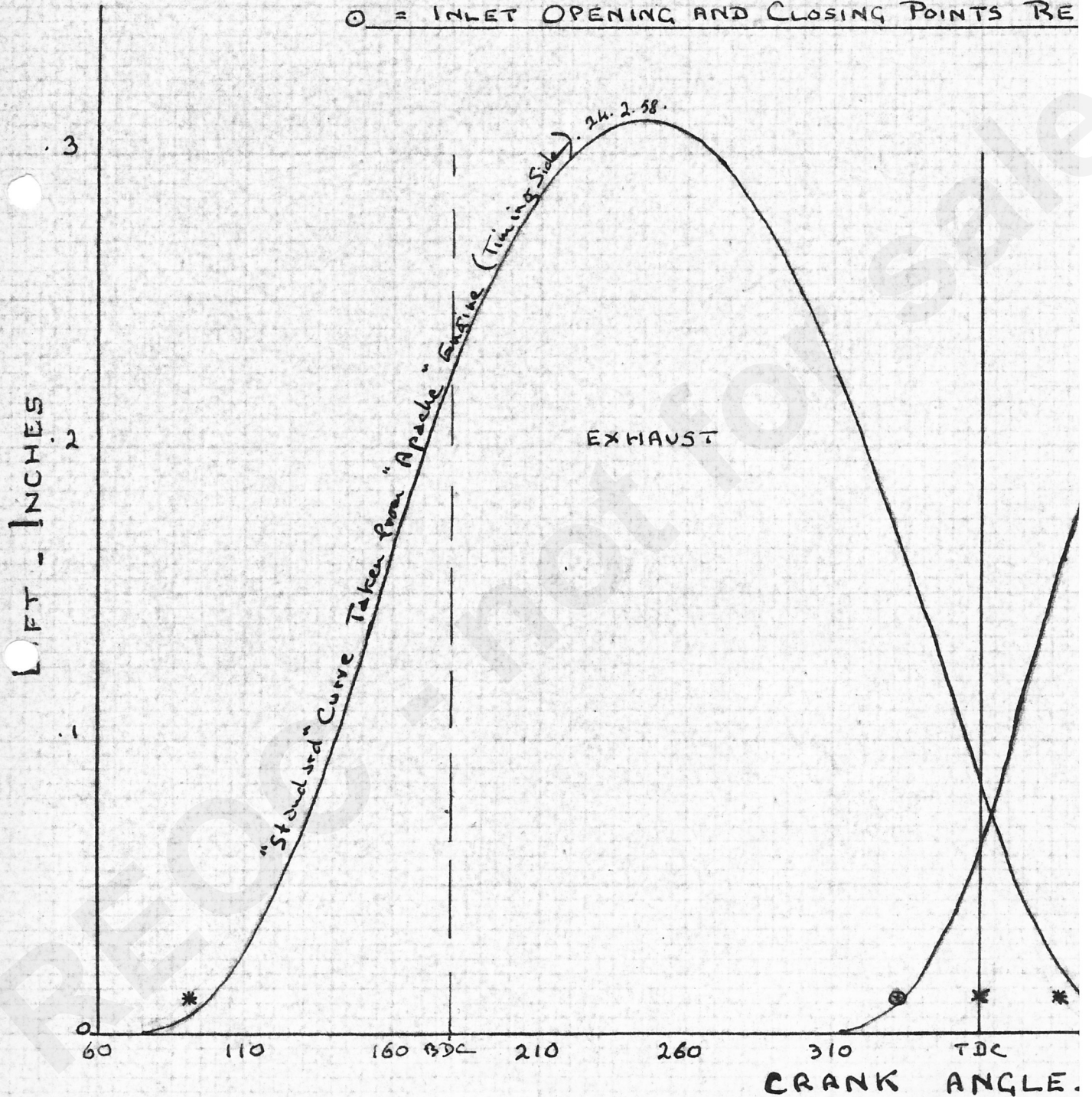
The only practical advantage of the larger capacity engine is that it should be able to pull a slightly higher gear two revs using engine R.p.m. at any given road speed. As, however, the extra capacity is only 6.3% the most that can be expected is the ability to use a 32 V final drive sprocket giving a top gear ratio of 4.22 to 1 instead of the standard 4.41 to 1.

Further examination of the engine has shown that the inlet camshaft was set one tooth (30°) late which of course accounts for the extremely bad results obtained. This late timing appears to be due to an incorrect layover in the inlet camshaft. As required, the marks on the two cam sprockets were in line when the pistons were at T.D.C. but the mark on the crankshaft sprocket had been given about 1/2 tooth beyond the 6° position. When the opening and closing points of the valves were checked the inlet was found to be about one tooth (30°) early as is shown on the accompanying graph. The engine has now been modified with inlet camshaft set one tooth later and will be retested.

Re. *W. H. Jones*

TAPPET LIFT CURVES FOR STANDARD "CONS
OPENING AND CLOSING POINTS FROM 73

* = EXHAUST OPENING AND CLOSING POINTS
X = INLET OPENING AND CLOSING POINTS AS
O = INLET OPENING AND CLOSING POINTS RE



D. REDDITCH.

CONSTELLATION ENGINE WITH
M 736 ENGINE MARKED.

ENTS AT .012in. CLEARANCE
S AS RECEIVED.
S RESET.

