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REPORT OF TESTS ON THE FIRST PRODUCTION 750 CC TWIN CYLINDER ENGINE

Method of Test

This engine was mounted on the test bench coupled to a Heenan and Froude DPX2 dynamometer and after some three hours preliminary running at light loads and speeds was run-in according to the following schedule :

3 hrs.	at	3,000	r.p.m.,	approx.	24	lbs.	spring balance reading
2 "	"	3,500	"	"	33	"	" " "
1½ "	"	4,000	"	"	43	"	" " "
1 "	"	4,500	"	"	55	"	" " "
30 mins.	"	5,000	"	"	64	"	" " "
20 mins.	"	5,500	"	"	72	"	" " "
10 "	"	6,000	"	"	85	"	" " "

The 10 minutes run at 6,000 r.p.m. was at full throttle which corresponds to 108 m.p.h. in top gear. The loads for the other speeds are approximately equivalent to level road running conditions.

At the end of each run the contents of the sump were drained and measured and then returned to the engine via the drive side shaft after removal of the breather unit. The amount of oil used during each run was also measured. During the run a measurement was taken of the

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pressure or suction existing in the crank case and rocker box at each speed.

At the conclusion of the running in, a normal full power test was run up to 6,000 r.p.m.

Results.

These are shown graphically on the accompanying sheets, which show also for comparison the power curves which we normally publish for the 692 cc Constellation engine.

The following table shows the crank case and rocker box pressures, sump contents and oil consumption at each speed during the running in:-

r.p.m.	m.p.h.	Crank-case pressure	R/box pressure	Duration	Sump Content	Oil Used	Consumption pints/100 miles
3,000	54	2"P	2"P	3 hrs.	90 cc	100cc	.109
3,500	63	⅛ ½P	1½P	2 hrs.	85 cc	66cc	.092
4,000	72	1½P	1½P	1½ "	85 cc	272cc	.445
4,500	81	½P	½P	1 "	115 cc	143cc	.311
5,000	90	½P	0	30 mins.	80 cc	200cc	.781
5,500	99	1"S	2"S	20 "	100 cc	280cc	1.495
6,000	108	0	½P	10 "	105 cc	275cc	2.68

Condition of Engine when Stripped

It was found that both pistons and barrels were heavily scored, the drive side piston being scored over most of the rear and left-hand side, while the timing side piston was scored over most of the front and right-hand side. The drive big end was definitely too tight.

The connecting rods were checked for bend and twist but were found

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to be within the normal limits. Mr. Lovekin, who was visiting the works at the time took the crankcase back to Westwood with him for checking but reported that, apart from the timing side roller bearing outer race being loose in the case, no fault could be found.

The pistons were standard Hepworth & Grandage Constellation pistons, .040" oversize, which had been lightened by counter-boring inside the skirts up to the gudgeon pin bosses. The most probable reason for the heavy scoring of the pistons is that the piston skirts have been made too thin and have distorted under load. It is also possible that they were permanently distorted by the counter-boring operation. Also the amount of oil reaching the piston skirts might have been restricted owing to the tight fit of the big ends, particularly the drive side one, and the fact that a single start pump worm was used in conjunction with a 5/16" diameter feed pump, this arrangement giving theoretically only 78% of the rate of feed given by a ¼" diameter feed pump with a two start worm.

Discussion

The oil comsumption can be considered to be very good up to 3,600 r.p.m. (about 66 m.p.h.) and reasonable up to 4,600 r.p.m. (about 83 m.p.h.). Above this speed it is excessive but since we have no knowledge as to when the scoring of the pistons, skirts and cylinder bores occurred, it is not possible to say how much of the excessive consumption is due to the condition of the cylinders and pistons. It is note-worthy that the contents of the sump remain virtuall y constant at all speeds thus indicating satisfactorycollection of oil into the sump and that the scavenge pump is doing its job.

In view of the condition of the pistons and cylinders the power curve is very satisfactory and to all appearances would have reached at least 55 b.h.p. if the test had been taken up to 6,500 or 7,000 r.p.m. The b.m.e.p. and torque curves are much better than the standard Constellation at around 4,500 r.p.m. (80 m.p.h.) although the maximum b.m.e.p. is slightly less than that obtained from the standard Constellation engine in which everything was sacrificed to obtain maximum power at high r.p.m.

Further Tests

A similar engine was run for approximately 200 miles on the road and the pistons examined. Both pistons were scored but the score marks were central towards the top of the thrust faces. These were shown to Mr.D.Smallwood of Hepworth & Grandage Ltd. who expressed the opinion that slightly more piston clearance should be given.

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Further Tests (Cont)

This is actually in line with our experience with the Constellation engine which was given .001" more clearance than the Super Meteor. Owing to the difficulty in producing otherwise identical cylinders differing by .001" in bore, it was decided at Westwood to make all cylinders .0005" larger than the standard Super Meteor size. The cylinders and pistons for the 750 cc engine are .040" oversize so that they actually have .0005" less clearance than was intended for the Constellation.

The second road test was run with some .040" oversize pistons supplied by Messrs. Hepworth & Grandage which had been lightened by shortening the skirts instead of counter-boring them. These pistons did not seize.

The bench test is now being repeated using the shorter pistons in cylinder barrels opened out .0005" and with ¼" diameter feed pumps with a double start worm.

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