



ENGINEERING
RESEARCH &
APPLICATION Ltd

REPORT ON FUEL CONSUMPTION
AND POWER TESTING
FOR PETROLON U.K. LIMITED



— MATRA GROUP —

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REPORT ON: FUEL CONSUMPTION AND POWER TESTING

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INTRODUCTION

E.R.A. Limited were approached and agreed to undertake, on a purely commercial basis, a series of tests for Petrolon U.K. Limited. It was explained by Petrolon U.K. Limited that they had developed a friction modifier that would reduce frictional losses and therefore improve fuel consumption and power.

Tests were agreed on a "back to back" basis, these tests are described on page 3 of this report under sub heading Test Procedure. Petrolon were to be responsible for the vehicle outside E.R.A. premises, it was, therefore, necessary to conduct Check Tests to carry out Engine analysis against Manufacturing tolerances (See Check Test Procedure Page 3).

The first series of Tests were carried out on the 16th April, 1986. Prior to the test the vehicle was checked and found to be within manufacturers specified parameters. Oil levels were visually observed but complete investigation of lubricating fluids was not undertaken. It was agreed that Petrolon U.K. Limited would introduce the friction modifier [REDACTED] to Engine, Gearbox and Back Axle and after driving the vehicle for 1000 miles the said vehicle would be returned and the second series of tests were undertaken after first checking engine "set up" and conducting the tests under as near to identical conditions as is possible.

CONCLUSIONS

1. At a steady 90 K.P.H. on the chassis dynamometer there was an improvement in fuel consumption of 5.15% or 2.29 m.p.g. between Test 1 and Test 2.

This difference is more than would be expected due to experimental error and indicates a genuine improvement.

2. At a steady 120 K.P.H. on the chassis dynamometer there was an improvement in fuel consumption of 11.32% or 4.28 m.p.g., between Test 1 and Test 2.

This difference is considerably more than would be expected due to experimental error, and indicates a substantial improvement.

3. Urban cycle testing, to E.E.C. procedures, showed a 7.0% improvement for Test 2 compared with Test 1, once again indicating a substantial gain.

4. Rear wheel power was checked in both Test 1 and Test 2 vehicle "as received" conditions.

A substantial increase in power in favour of Test 2 was obtained throughout the operating range of the engine.

5. A series of "Run Down" tests were undertaken clearly indicating that the Test 2 "as received" condition exhibited much less friction resistance from the power train than in test 1.

6. The vehicle had accumulated 1000 miles more between the two tests, Test 1 being at 33,000 and Test 2 at approximately 34,000 miles.

COMMENTS

It is our opinion that the improvement in fuel consumption and power between Test 1 and Test 2 were genuine and taking into account experimental error represented a considerable improvement.

The test results supplied, are those achieved having checked the vehicle at E.R.A., and setting up to manufacturer's basic specifications were necessary.

The difference in fuel consumption and power between the two tests is what could be expected if the Friction Modifier did in fact reduce friction in the power train.

Based on the results obtained, the frictional losses were reduced between the two tests.

We have been assured that the only difference between the two tests was the addition of the Friction Modifier [REDACTED]. This being the case, the conclusions given in our report are valid.

Finally, the tests undertaken were purely associated with measuring fuel consumption and power under exact laboratory controlled conditions, no other opinions concerning possible detrimental effects of the friction modifier were asked for or given.

Reported By: A. Braddon

A. Braddon

Approved By: J. Senior

J. Senior

TEST PROCEDURES AND EQUIPMENT

The following checks were carried out on the vehicle after receiving it from Petrolon U.K. Limited on both occasions.

1. Ignition Timing
2. Dwell Angle
3. Sparking Plugs and Ignition Lead Condition.
4. Idle Speed and Carbon Monoxide Level.
5. Oil
6. Water
7. Tyre Pressures

Temperature probes were fitted to water system (top hose), engine oil (via dipstick), gearbox (through drain plug) and rear axle (through filler plug).

Test Procedure

1. The vehicle was placed on emission dyno and set up to E.C.E. load table (2500 lbs, 1.7 K @ 50 K.p.h.). It was then linked to E.R.A. fuel consumption rig and run until temperatures had stabilised at required speeds. Fuel consumption tests were then carried out under E.C.E. guidelines until an acceptable consistency was achieved (Consumption at 90, 120 and urban).
2. Coast downs: The dyno was motored for one hour through its DC motor after which the vehicle was refitted and its oil and water temperature stabilised, after which coast down tests between 70 and 20 m.p.h. in fourth gear were carried out with the results being traced on a time/speed basis.
3. Power Test: Vehicle was soaked in dyno area and then run until engine oil and water temperature was stabilised. Power test was then carried out in third gear at full throttle. N.B. It was found that gearbox and rear axle oil could not be stabilised due to excessive changes in engine oil and water temperatures over short periods of time due to larger amounts of load incurred during power tests.

However, this was the same for both tests, therefore, the results obtained are comparable.

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CUSTOMER: PETROLON U.K. LIMITED

SUMMARY OF TEST RESULTS

VEHICLE: FORD CAPRI 2.0L

STANDARD (TEST NO. 1)

██████████ (TEST NO. 2)

DATE: 16.4.86

DATE: 21.4.86

A.	<u>Fuel Consumption</u>	<u>Average</u>	<u>Average</u>
1.	Steady State 90 K.P.H. (56.25 M.P.H.)	44.48 M.P.G.	46.77 M.P.G.
2.	Steady State 120 K.P.H. (75.0 M.P.H.)	37.82 M.P.G.	42.10 M.P.G.
3.	<u>Urban Cycle</u> (E.C.E. Procedure)	23.70 M.P.G.	25.36 M.P.G.

B. Power Curve (Rear Wheels) (3rd Gear)

<u>Engine R.P.M.</u>	<u>Test No. 1</u>	<u>Test No. 2</u>
1500	15.80 Kw	17.60 Kw
2000	21.00 Kw	24.60 Kw
2500	28.10 Kw	31.50 Kw
3000	32.20 Kw	38.30 Kw
3500	39.20 Kw	44.40 Kw
4000	44.90 Kw	49.80 Kw
4500	47.70 Kw	53.60 Kw
5000	49.40 Kw	53.60 Kw
5500	48.30 Kw	53.00 Kw

C. Run Downs 70 to 20 M.P.H. in 4th Gear
(Five Tests Run On Each Occasion)

	<u>Test No. 1</u>	<u>Test No. 2</u>
	45.73 Secs.	47.9 Secs.
	46.52 Secs.	48.3 Secs.
	46.95 Secs.	48.7 Secs.
	46.52 Secs.	49.0 Secs.
	46.98 Secs.	49.4 Secs.
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Average	46.54 Secs.	48.66 Secs.
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