

Mini-Ton-Bomb



OVER 100 m.p.h. BY DOWNTON-CONVERTED 1,088 c.c. AUSTIN SEVEN COOPER

AND whatever you do," were Daniel Richmond's parting words, "don't waste money on super premium petrol. It doesn't need it." This sounded something of an affectation for an engine with an iron cylinder head and compression ratio of 9.4 to 1. So did the claimed top speed of "not far short of 100 m.p.h." That a mean maximum of 103.5 m.p.h. was recorded on normal premium fuel is only a part of this story.

When 860MW was first driven by several members of *The Autocar's* staff a few weeks ago, it had standard cylinder bores and a compression ratio of 11.5 to 1.

Subsequently Mr. Richmond decided that the engine must be happy to run satisfactorily on French petrol, and that its compression should therefore be reduced. To make this possible without losing power the cylinder bores were enlarged from 62.4 to 65mm diameter, increasing the capacity by 91 c.c. to 1,088 c.c. A direct result of this is a marked gain in torque, but the chief object of the conversion as a whole has been to provide outstanding tractability and top gear acceleration over a very wide engine speed range, rather than the ultimate in top speed.

Lightning Acceleration

The success with which this has been achieved can be gauged from the remarkable performance figures. For instance, the elapsed time while accelerating in top gear varies by only 0.6sec between any of the four 20 m.p.h. increments (shown in the performance data panel) up to 70 m.p.h. In this gear it is 2.6sec quicker than the standard Austin Cooper from 20 to 40 m.p.h., and between 50 and 70 m.p.h. the difference is 7.3sec. From a standing start

the results are even more startling, for 60 m.p.h. is reached in just over half the time (9.6sec as compared with 18.0) and 80 m.p.h. in a third—17.3 instead of 50.6. This figure to 80 is considerably quicker than can be achieved by any of the B.M.C.'s production sports cars, and, by way of comparison, it betters the twin-carburettor, Coventry Climax-powered Lotus Elite (as tested in May, 1960) by over a second.

A Crypton electronic rev counter is fitted, and we were advised to use 7,200-7,500 r.p.m. as a useful maximum engine speed during acceleration testing, although about 7,800 r.p.m. could be reached in first and second gears. The highest speed reached in third, 86 m.p.h., is slightly above the mean top gear maximum of the standard product.

There will undoubtedly be those who disapprove of such performance from a very small car, and it must be conceded that this is not one for the inexperienced tyro. Yet in terms of speed, as distinct from acceleration, it has quite a few equals among family saloons, and its handling could put some of these to shame. During the maximum speed runs, admittedly in almost still conditions, it proved extraordinarily stable directionally and behaved just as well as many a powerful sports car. Torque reactions on the front drive shafts—familiar with any front-drive car—give it a slight tendency to veer left on overrun and right on drive, the changeover from one to the other being naturally more marked than with less powerful versions.

Modified cam plates for the rear wheel suspension rubbers on this car have reduced the understeer inevitable with so much power available at the front wheels, but some discretion with the throttle pedal must be used on wet roads. However, as all who have driven the B.M.C. miniatures will know, one has only to release the throttle to

I drove this car - fantastic.

check this instantly. The standard Austin Cooper braking system with discs for the front wheels functions excellently from very high speeds, but is less sensitive and powerful than the all-drum system at lower speeds.

Very wisely, the Downton car is not betrayed by a rowdy exhaust note. In town it can potter about quietly, and throws no tantrums such as oiling plugs when kept waiting in traffic jams. During our November tests it ran so cool, despite a two-bladed fan, that it was found necessary to blank off part of the radiator core. Only when it is driven hard and up to high revs is there much noise. At around 60-65 m.p.h. in top there is some body drumming, which passes above or below this speed; and at around 6,000 r.p.m. in any gear there is some vibration—not acute, and probably a slight crankshaft period—which is also not evident elsewhere in the wide speed range. This is emphasized by some chatter at the gear lever. On this car, during full-throttle acceleration in first gear, it was necessary to hold the gear lever in place to prevent it jumping out of engagement.

Driven Hard 28.1 m.p.g.

It goes almost without saying that those of *The Autocar's* test staff who tried the car drove it hard to see for themselves how it went and handled; in view of this the overall average fuel consumption of 28.1 m.p.g. is very reasonable. Constant speed consumption figures were taken to give a direct comparison with the standard car; although these are broadly representative, it should be added that in certain speed ranges there was some float-chamber flooding, since rectified, which caused rich-mixture "hunting," particularly at 70 and 80 m.p.h.

How is this almost phenomenal power range achieved? Naturally the designer would be loath to reveal all his secrets, but the broad outline of the conversion follows.

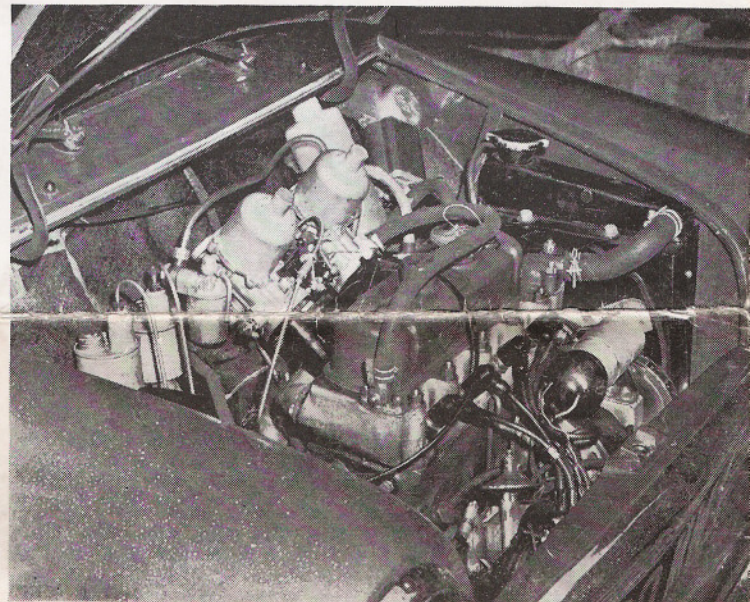
First, the cylinder head. Combustion chamber and port shapes are modified and larger, lightweight inlet and exhaust valves are fitted, the seating profiles being probably unique to Downton-worked cars. They have proved very successful and long-lasting in the firm's competition engines over a number of years. Entirely new inlet and exhaust manifolds are fitted, similar to those employed for Downton conversions to the 850 c.c. ADO 15 engine but adapted to the Cooper type, and with revised induction pipe length and taper. The exhaust manifold is claimed to be a major

factor in enabling the unit to run on relatively low-grade fuel and to produce its power over so wide a range.

Two H4 S.U. carburettors are fitted as these have been found to give better overall results than a 40mm double choke Weber. The camshaft is reprofiled from a standard shaft, and an interesting feature is that, in place of the standard single springs, unusually weak double springs are fitted—yet the point of valve bounce is never reached. Much work is devoted to lightening the rockers. As already mentioned, the cylinder block is bored out to 65mm; the reciprocating parts are carefully balanced, and the crankshaft-flywheel-clutch unit is also dynamically balanced.

This is strictly not a competition unit. For the ultimate in power the compression ratio would be raised to 11.5 to 1, and a more ambitious valve timing would be used—with consequent reduction in low-speed flexibility. It really is quite remarkable that so much can be done with what is, after all, a stolid little engine produced in huge quantities for ordinary folk. Indeed, one must hand a large bouquet to the B.M.C.'s engineering department as well as to the wizards at Downton.

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From the outside the engine looks much as usual at first sight, apart from a green Downton label on the rocker cover. Here the upswep inlet manifold is seen, but not the three-branch exhaust

PERFORMANCE DATA and PRICES

Figures in brackets are for the Austin Seven Cooper tested in *The Autocar* of 20 October.

ACCELERATION TIMES (mean):

Speed range, Gear Ratios and Time in Sec.

m.p.h.	3-77 to 1	5-11 to 1	7-21 to 1	12-05 to 1
10-30	—	6.8 (8.6)	4.6 (5.4)	2.7(—)
20-40	9.9 (12.5)	6.5 (8.4)	4.0 (5.3)	—
30-50	10.6 (12.6)	5.7 (7.7)	3.5 (—)	—
40-60	9.5 (13.3)	5.9 (9.4)	4.6 (—)	—
50-70	9.4 (16.7)	6.2 (—)	—	—
60-80	11.0 (—)	7.8 (—)	—	—
70-90	15.6 (—)	—	—	—

From rest through gears to:

m.p.h.	3-3 sec.	(5.4) sec.
30	4.9	(8.4)
40	6.8	(12.6)
50	9.6	(18.0)
60	12.9	(27.5)
70	17.3	(50.6)
90	26.5	(—)

Standing quarter mile 17.3 sec. (20.9).

Downton Engineering Ltd., Headland Works, Downton, Salisbury, Wilts. Tel: Downton 351.

MAXIMUM SPEEDS ON GEARS:

	m.p.h.	k.p.h.
Top (mean)	103.5 (84.7)	166.6 (136.2)
(best)	105.0 (87.4)	170.7 (140.1)
3rd	86 (70)	138 (113)
2nd	61 (46)	98 (74)
1st	37 (28)	60 (45)

FUEL CONSUMPTION (at steady speeds in top gear):

m.p.h.	Top m.p.g.	(60-6)
30	52.7	(52.6)
40	50.0	(49.7)
50	41.7	(46.0)
60	36.7	(35.6)
70	33.3	(27.4)
80	29.8	(—)
90	25.8	(—)

Overall fuel consumption for 597 miles 28.1 m.p.g. 10.0 litres per 100 km. (37.0 m.p.g., 7.6 litres per 100 km)

CURRENT PRICES

	£	s
Cylinder head on exchange	40	0
Camshaft	9	0
Inlet manifold	5	10
Exhaust manifold	10	10
Carburettors complete	21	10
Balancing crankshaft, rods, etc.	10	10
Boring cylinders and new pistons	16	0
Labour	40	0

Total 153 0