Note 73

Cosworth SCA v. Repco 740

These two engines had similar cylinder head/piston designs, with the combustion chamber formed in the piston top mostly by the valve clearance pockets (the SCA also had a pocket just under the sparking plug). Heads were flat with two 'vertica1' valves operated by SOHC. The same-side inlet and exhaust porting was also similar with the inlets at 40° or 45° to the cylinder axis (ie 50^0 to 45° downdraught). The SCA was designed for F2 in 1963, was raced on carburettors in 1964 and port fuel injection in 1965. The comparison with the 1967 Repco 740, also fuel-injected on petrol, is as follows:-

		1965 Cosworth SCA	1967 Repco 740	
Data sources		63,583	37,842,844	
Configuration		IL4	90V8	
B/S	mm	80.97 / 48.41	88.9 / 60.325	
		= 1.673	= 1.474	
V	cc	997	2996	
R		12.5	11	
IVA/PA		0.207	0.216	Note A
CRL/S		2.85	2.65	Note B
PP	HP	140	300	
@NP		10,250	8,000	
PP/V	HP/L	140.4	110.2	Notes C and D
BMPP	Bar	12.26	12.32	Note E
@MPSP	m/s	16.54	16.09	
MGVP	m/s	79.90	74.49	

Notes

A. It is *presumed* that valve sizes in the 740 were the same as the Repco 620. A 'big-valve' engine was tried but was unsuccessful (846) for unknown reasons. The space occupied by the valves, relative to that available, was:-

(IVD + EVD/B	84.7%	85.7%

B. It is *presumed* that the 740 CRL was the same as the 620.

C. As BMPP and MPSP were very similar it follows that the 27% advantage in PP/V to the SCA was basically because 1/S was 25% greater, as explained in the main text.

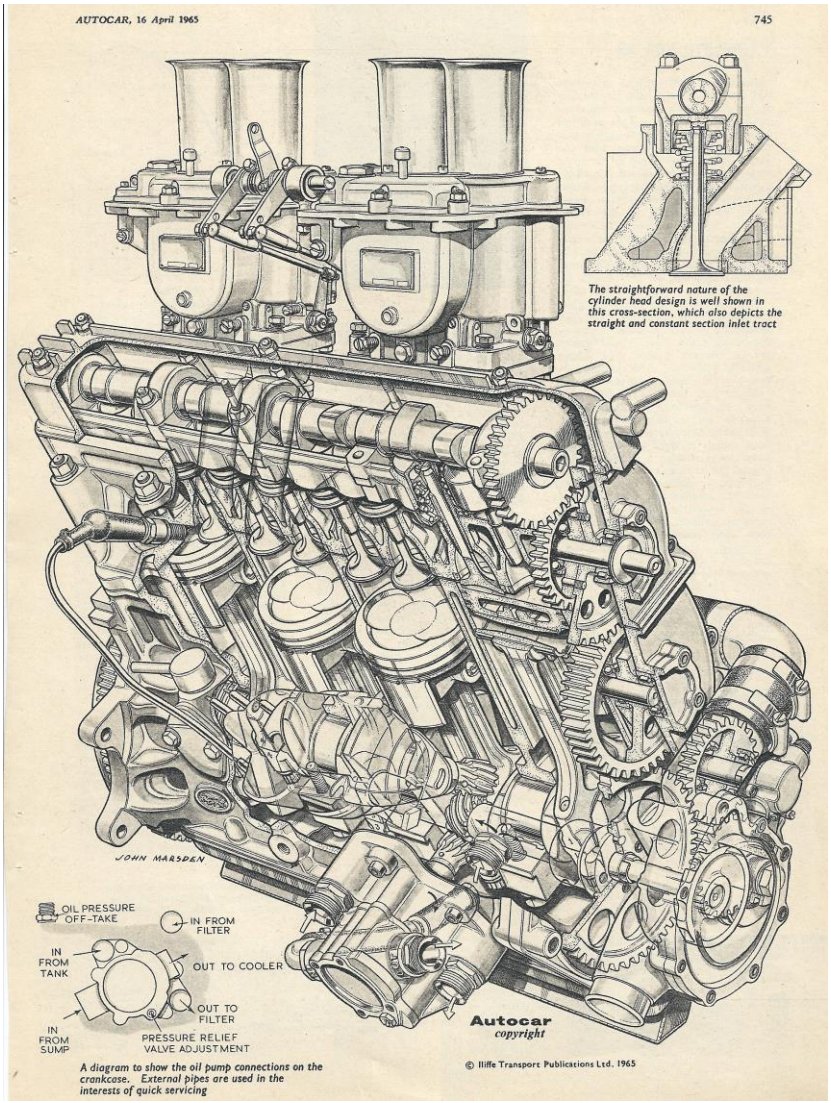
D. Ref (884), p.67, quotes from Judd's correspondence with Repco that he had learnt in October 1966 that Cosworth applied a humidity correction to test bed power as well as the usual pressure and temperature corrections. It was estimated that the 140 HP quoted for the SCA would be about 123 without that humidity adjustment. This author feels that, if Cosworth applied a humidity correction (which undoubtedly is a factor in output), then it was justified. See P.S. at foot of P.2 (3 February 2020).

The concern which Repco were then showing over their PP/V v the SCA seems to have overlooked the 1/S factor shown above.

E. Duckworth was dissatisfied with the slow burning in the SCA, which required an ignition advance of 49° BTDC (60). Perhaps this was due to the 'chamber-in-piston'

design, which also meant increased mass and greater heat rejection that had to pass via the rings and under-crown oil splash. However, Tony Rudd had found in his BRM F2 IL4 1.0L engine, apparently after 1966, that shortening the con rods by 0.5" to reduce CRL/S from 1.91 to 1.7 (-11%) had raised power from 128 HP to 136 (+6%) (40). He deduced that faster burning had more than offset increased piston friction. It is possible that the extreme CRL/S of the SCA had affected its performance.

The 1964 type SCA engine with 2 x Weber 40DCM2 carburetters is illustrated below. This was rated at 122 HP @ 9,000 RPM (63).



DASO 63

Note the "Bowl-in-crown" combustion chamber.
The cam shape reflects the then-standard Cosworth racing-engine timing of:-
Inlet opens 58^0 BTDC; closes 82^0 ABDC:
Exhaust opens 82^0 BBDC; closes 58^0 ATDC.
Inlet Open Duration (IOD) = Exhaust Open Duration (EOD) = 320^0:
Overlap (OL) = 116^0.

The engine was installed with the inlet tracts vertical.

P.S. A later review of humidity effect on piston engine power indicates that there was something very wrong with an estimate of a 14% difference in power on the SCA. See Note 2B at P.5. The 140 HP claimed was probably correct.