Note 44

Auto Union racing engines, 1934 – 1937

	A	B	C	D	E	F	G
1	PISTON ENGINE PERFORMANCE	11 January 2009 AUTO UNION 1934-1937					
2	ENGINE IDENTITY						
3	PEP Serial No.						
4	Data Source Ref. File DASO	4,468	4,30,276, 382	4,30,276, 382	4,30,276, 381,382	4,30,276, 382,711	4,30,276, 382,711
5	YEAR	1934	1934	1935	1935.5	1936	1937
6	Make	MERC.	A UNION	A UNION	A UNION	A UNION	A UNION
7	Model	M25A	A	B	*B/C*	C	R
8	Swept Volume Litres	3.4	4.4	4.9	5.6	6	6.3
9	Induction System	PC/Press	PC	PC	PC	PC	PC
10	Class	RR	RR	RR	RR	RR	RR
11	GEOMETRY						
12	Configuration	IL8	45V16	45V16	45V16	45V16	45V16
13	No. of Cylinders CN	8	16	16	16	16	16
14	No.Cyls/Intake CNI	8	16	16	16	16	16
15	In. & Ex. Configuration	RSC/CF	RSC/CF	RSC/CF	RSC/CF	RSC/CF	RSC/CF
16	Comb. Ch'b'r/Piston Config'n	PR/LH	H/F	H/MH	H/MH	H/MH	H/MH
17	Compression Ratio R	7.5	7	8.95		9.2	9.2
18	BORE B mm	78	68	72.5	72.5	75	77
19	STROKE S "	88	75	75	85	85	85
20	Valve Opening/Return System	DOHC	SOHC/PR	SOHC/PR	SOHC/PR	SOHC/PR	SOHC/PR
21	Valve No./Cyl.-In. VNI	2	1	1	1	1	1
22	" " " -Ex. VNE	2	1	1	1	1	1
23	Valve Incl. Angle VIA Deg	60	90	90	90	90	90
24	Inlet Valve Dia. IVD mm	34	*39*	*39*	39	*39*	*39*
25	Inlet Valve Lift IVL "	8.5	*10*	*10*	10	*10*	*10*
26	Inlet Tract Length LIN "						
27	Timing-In. Open IVO Deg	25					
28	" " Close IVC "	45					
29	" Ex Open EVO "	50					
30	" " Close EVC "	20					
31	In. Open Duration IOD "	250	*260*	*260*	*260*	*260*	*260*
32	Ex. " " EOD "	250	*40*	*40*	*40*	*40*	*40*
33	In.-Ex. Overlap OL "	45					
34	Main Journal Dia. MJ mm	63	62	62	70	70	70
35	Crank Pin Dia. CP "	53	58	58	68	68	68
36	Gudgeon Pin Dia. GP "	22	22	22	22	22	22
37	Con. Rod Length CRL "	161	164	164	168	168	168
38	Piston Height PH "	94					
39	Piston Skirt Length PSL "	74					
40	Equiv. PSL - EPSL "	74					
41	INFLOW CONDITIONS						
42	Fuel Type	A/WW	P/B?	?	?	A	A
43	Fuel Adj. to Petrol AA	1	1	1	1	1	1
44	Press. @ In. Valve IVP ATA	1.66	1.6	1.75		1.95	1.94
45	Manifold Density Ratio = MDR	1.66	*1.36*	*1.63*		*1.7*	*1.7*
46	CODE						
47	Induction Code	B	B	B	B	B	B
48	PERFORMANCE						
49	Peak (Rated) Power PP HP	349	295	375		520	545
50	Crank RPM @ PP NP	5800	4500	4800		5000	5000
51	Peak Torque TP LbFt		380	477		627	650
52	Crank RPM @ TP NT					2500	
53	GEOMETRIC ANALYSIS						
54	B/S	0.886	0.907	0.967	0.853	0.882	0.906
55	PA SqCm	382.27	581.07	660.52	660.52	706.86	745.06
56	V/CN cc per cylinder	420.5	272.4	309.6	350.9	375.5	395.8
57	V cc	3364.0	4358.0	4953.9	5614.4	6008.3	6333.0
58	IVA SqCm	145.3	191.1	191.1	191.1	191.1	191.1
59	IVA/PA	0.380	0.329	0.289	0.289	0.270	0.257
60	IVL/IVD	0.25	0.256	0.256	0.256	0.256	0.256
61	ISA SqCm	145.3	196.0	196.0	196.0	196.0	196.0
62	ISA/PA	0.380	0.337	0.297	0.297	0.277	0.263
63	MJ/S %	71.6	82.7	82.7	82.4	82.4	82.4
64	CP/S %	60.2	77.3	77.3	80.0	80.0	80.0
65	GP/S %	25.0	29.3	29.3	25.9	25.9	25.9
66	CRL/S	1.83	2.19	2.19	1.98	1.98	1.98
67	B/PH	0.83					
68	100/Smm	1.136	1.333	1.333	1.176	1.176	1.176
69	R*VIA	450.0	630.0	805.5		828.0	828.0
70	PERFORMANCE ANALYSIS						
71	PP/V=SP HP/Litre	103.7	67.7	75.7		86.5	86.1
72	F= (NP-NT)/NP %						
73	MPSP = 2*S*NP m/s	17.01	11.25	12.00		14.17	14.17
74	BMPP Bar	16.01	13.46	14.11		15.49	15.40
75	MPST m/s					7.08	
76	BMTP Bar		14.86	16.41		17.78	17.49
77	RA =0.63/(1-1/R^O.4)	1.138	1.165	1.079		1.071	1.071
78	PPA = PP*RA/AA HP	397.3	343.6	404.6		556.7	583.4
79	BMPA= BMPP*RA/AA Bar	18.22	15.68	15.23		16.58	16.49
80	BMPA/MDR `Adj.Bar	10.98	11.53	9.34		9.75	9.70
81	TPA = TP*RA/AA Lb.Ft		442.6	514.6		671.2	695.9
82	BMTA =BMTP*RA/AA Bar		17.30	17.70		19.03	18.72
83	PPA/PA HP/SqCm	1.04	0.59	0.61		0.79	0.78
84	(PPA/PA)/MDR Adj.HP/SqCm	0.63	0.43	0.38		0.46	0.46
85	(PPA/PA)*(B/S)/ MDR	0.555	0.394	0.363		0.409	0.417
86	PPA/V HP/Litre	118.1	78.8	81.7		92.7	92.1
87	(PPA/ V)/ MDR) Adj.HP/Litre	71.1	58.0	50.1		54.5	54.2
88	PPA/IVA HP/SqCm	2.73	1.80	2.12		2.91	3.05

Note 44 continued

	A	B	C	D	E	F	G
5	YEAR	1934	1934	1935	1935.5	1936	1937
6	Make	MERC.	A UNION	A UNION	A UNION	A UNION	A UNION
7	Model	M25A	A	B	*B/C*	C	R
89							
90	PPA/ISA " "	2.73	1.75	2.06		2.84	2.98
91	MGVP = MPSP*PA/IVA m/s	44.77	34.20	41.47		52.39	55.22
92	MSVP = MPSP*PA/ISA "	44.77	33.35	40.43		51.08	53.84
93	BNP = B*NP "	7.54	5.10	5.80		6.25	6.42
94	MVS = IVL*NP/(83.333*IOD) "	2.37	2.08	2.22		2.31	2.31
95	MPD @ nom'l (CRL/S)=2 g	2068.2	1061.0	1207.2		1484.6	1484.6
96	MPD @ actual CRL g						
97	MOD. MPSP (MMPSP) m/s						
98	(NPx(MPSP)^2)/10^5	16.79	5.70	6.91		10.03	10.03
99	KF1 for FPMEP	0.75	0.75	0.75	0.75	0.75	0.75
100	KF2 for FPMEP*10^7	9	9	9	9	9	9
101	EIMPA Bar	20.79	17.15	16.71		18.35	18.26
102	Estd. Mech. Effy. EEM %	87.6	91.4	91.1		90.4	90.3
103	EIMPA/MDR Bar	12.53	12.61	10.25		10.80	10.74
104	EIMPA/(MDR*(MPSP)^0.5)= **SPPA**	3.04	3.76	2.96		2.87	2.85
105							
106	**SPPB**	2.54	3.29	2.65		2.58	2.57
107	**SPPB** -f(CRL/S)=**SPPC**	2.58	3.05	2.40		2.49	2.48
108	**Delta from 3*(B/PH)^1/3 %**	-8.4					
109							
110	EBMTA	19.06	16.57	16.13		17.44	17.35
111	**Delta EBMTA Act from Est %**						
112							
113							
114	**SPEED CORRn FACTOR - SCF**	159.89	159.29	164.24		152.71	148.42
115	NP Repeat - RPM	5800	4500	4800		5000	5000
116	GS = Actual NP/SCF	36.3	28.3	29.2		32.7	33.7
117	KS = 47.4 or 38.6	38.6	38.6	38.6	38.6	38.6	38.6
118	**Delta Actual from KSxSCF %**	-6.0%	-26.8%	-24.3%		-15.2%	-12.7%
119							
120							
121	WEIGHT - W - kg	203				245	
122	**PP/W - HP/kg**	1.72				2.12	
123	RFW - Litres adj.	5.37	7.63	8.13	10.45	10.81	11.10
124							
125							