C.P. No. 80
13,254
A.R.C. Technical Report

MINISTRY OF SUPPLY

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Calculated Pressure Distributions for the R.A.E. 100-104 Aerofoil Sections

By

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LONDON: HIS MAJESTY'S STATIONERY OFFICE

1952

Price 3s. 6d. net.

C.P. No.80
Technical Note No. Aero.2039

March, 1950

ROYAL AIRCRAFT ESTABLISHMENT

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(with Addendum)

1 Introduction

The aerofoil sections now referred to as 'R.A.E. 100-104' were introduced in 1945 in a note of limited circulation[1] where they were merely referred to as 'Section A-E'. The ordinates have now been calculated at closer intervals and the pressure distributions have been calculated at the N.P.L. using tables already available there.

2 Derivation of aerofoils

The aerofoils are derived by assuming that the first order pressure distribution consists of a flat part from the leading edge to a point $x = X_1$, where x is the distance measured along the chord* from the leading edge, and a sloping line from $x = X_1$ to the trailing edge $x = 1$. Values of $X_1 = 0, 0.3, 0.4, 0.5, 0.6$ are chosen to give a range of positions of the maximum thickness. These values of X_1 correspond to the aerofoil sections, R.A.E. 100, 101, 102, 103, 104 respectively. The slope of the pressure over the rear part of the aerofoils is chosen to give a close approximation to a wedge-shaped trailing edge part and this is then replaced by an actual wedge.** For thin aerofoils there appears to be much to be said for having a wedge-shaped trailing edge. Convexity towards the trailing edge is objectionable on aerodynamic, and concavity on structural grounds.

The sections tabulated all have a maximum thickness of 10%, but they can be scaled up and down and it is not intended to restrict the titles to aerofoils of this thickness. It is proposed to refer to aerofoils scaled up to a larger thickness or down to a smaller one also as R.A.E. 100-104.

The constants used for the calculation are given in the appendix.

*The chord is of unit length.

**Exactly stated, the trailing edge pressure is chosen so that the aerofoil has a point of inflection along its contour such that the tangent at this point passes through the trailing edge. Behind the point of inflection the aerofoil is then replaced by this tangent. The original unmodified shapes have a rounded trailing edge, but the difference is quite small. As the actual pressure distribution near the trailing edge will in any case be affected by the thickening boundary-layer, the (theoretical) pressure distributions given in this paper were calculated for the original unmodified shapes.

3 Ordinates

The positions of maximum thickness, leading edge radius and trailing edge angles are given in Table I. The co-ordinates are given in Table II, and the shapes are given in Fig. 1.

4 Velocity and pressure distributions

The velocity and pressure distributions calculated by the Goldstein Approximation III to satisfy the Joukowski condition at the trailing edge are given in Table III, and the pressure distributions in Fig. 2. The theoretical lift curve slope used in the calculations was about 6.8 per radian; the values used are given in Table 1.

The effect of variation in thickness over the range 6-13% and of lift coefficient over the range 0-0.4 may be roughly estimated by scaling the contributions to the excess velocity distribution due to thickness and lift separately. This is preferable to scaling up the pressures

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REFERENCES

No.	Author	Title etc.
1	Squire	Tables of aerofoil sections for high speed aircraft. R.A.E. Aero Memo. No.27 (1945) Unclassified
2	Goldstein and Richards	Approximate two-dimensional aerofoil theory Part III. Approximate designs of symmetrical aerofoils for specified pressure distributions. Current Paper No.70. October, 1942.

APPENDIX

Method of calculation

For aerofoils with a roof-top pressure distribution to the first order (Goldstein Approximation I) the shape is given by

$$y \;=\; a\, f_0(x) + b\, f_1(x) + c\, f_2(x)$$

where a, b, c, are the values of the excess velocity at the leading edge, the position of the change of slope ($x = X_1$) and the trailing edge respectively.

For the present series of aerofoils a = b so that

$$y \;=\; a\,(f_0(x) + f_1(x)) + c\, f_2(x)$$

The functions $f_0(x)$ $f_1(x)$ $f_2(x)$ have been tabulated by Goldstein and Richards[2]. The values of a and c are chosen to satisfy the trailing edge condition referred to in para.2 and to give the specified aerofoil thickness of 10%.

The following values of a and c were obtained.

Aerofoil	R.A.E.100	101	102	103	104
X_1	0	0.3	0.4	0.5	0.6
a	0.214049	0.147860	0.134822	0.125357	0.117920
c	-0.049396	-0.051899	-0.055681	-0.062678	-0.072757

Aerofoil R.A.E. 100 has the simple equation

$$100\, y = 14.8188\sqrt{x(1-x)}\;\left(1 - \frac{8}{9}x\right)$$

for $0 \leqslant x \leqslant 0.75$ and

$$100\, y = 8.55564\,(1 - x)$$

for $0.75 \leqslant x \leqslant 1.0.$

The aerofoils become straight lines behind the following stations:-

Aerofoil	R.A.E. 100	101	102	103	104
Station	x = 0.750	0.760	0.771	0.787	0.813

TABLE I

Aerofoil characteristics t/c = 0.10

Aerofoil	R.A.E. 100	R.A.E. 101	R.A.E. 102	R.A.E. 103	R.A.E. 104
Denoted in Ref. 1 as Section	A	B	C	D	E
Position of maximum thickness	0.270	0.310	0.356	0.390	0.419
100 x leading edge radius	1.0980	0.7634	0.6860	0.6329	0.5927
Trailing edge angle (deg.)	9.785	10.22	10.91	11.97	13.58
Theoretical lift curve slope	6.822	6.793	6.791	6.795	6.805

N.B. The leading edge radius of an aerofoil which is scaled up in thickness is proportional to the square of the thickness.

TABLE II

Co-ordinates of R.A.E. 100-104 t/c = 0.10

	x	100 y				
		R.A.E. 100	R.A.E. 101	R.A.E. 102	R.A.E. 103	R.A.E. 104
	0	0	0	0	0	0
	0.001	0.4680	0.3905	0.3701	0.3556	0.3441
	0.002	0.6609	0.5518	0.5231	0.5025	0.4863
	0.003	0.8083	0.6753	0.6402	0.6151	0.5953
	0.004	0.9320	0.7792	0.7388	0.7098	0.6870
	0.005	1.0406	0.8705	0.8254	0.7931	0.7676
	0.006	1.1383	0.9529	0.9036	0.8682	0.8404
	0.007	1.2278	1.0285	0.9753	0.9372	0.9072
	0.0075	1.2700	1.0642	1.0092	0.9698	0.9387
	0.008	1.3107	1.0987	1.0420	1.0013	0.9692
	0.009	1.3883	1.1644	1.1044	1.0614	1.0274
1 475	0.01	1.4613	1.2265	1.1634	1.1181	1.0824
	0.012	1.5963	1.3416	1.2727	1.2232	1.1842
	0.0125	1.6281	1.3687	1.2985	1.2480	1.2083
	0.014	1.7194	1.4469	1.3727	1.3195	1.2776
1 759	0.016	1.8329	1.5445	1.4655	1.4088	1.3642
	0.018	1.9387	1.6357	1.5523	1.4924	1.4452
1 962	0.02	2.0377	1.7215	1.6340	1.5711	1.5215
2 185	0.025	2.2622	1.9174	1.8205	1.7509	1.6960
2 335	0.03	2.4605	2.0924	1.9873	1.9118	1.8522
	0.035	2.6387	2.2513	2.1390	2.0582	1.9945
	0.04	2.8006	2.3974	2.2786	2.1931	2.1256
3 04	0.05	3.0861	2.6595	2.5293	2.4357	2.3617
	0.06	3.3316	2.8898	2.7506	2.6503	2.5709
3 55	0.07	3.5457	3.0959	2.9491	2.8432	2.7592
	0.075	3.6429	3.1913	3.0412	2.9328	2.8468
3 77	0.08	3.7344	3.2822	3.1291	3.0185	2.9307
	0.09	3.9016	3.4519	3.2937	3.1792	3.0881
	0.1	4.0505	3.6073	3.4450	3.3273	3.2336
	0.12	4.3019	3.8820	3.7142	3.5921	3.4945
4 77	0.14	4.5020	4.1162	3.9463	3.8221	3.7222
	0.15	4.5859	4.2202	4.0505	3.9258	3.8254
5 02	0.16	4.6600	4.3163	4.1475	4.0230	3.9224
	0.18	4.7823	4.4867	4.3219	4.1992	4.0992
5 45	0.2	4.8737	4.6304	4.4727	4.3536	4.2556
	0.22	4.9382	4.7496	4.6021	4.4884	4.3936
	0.24	4.9787	4.8455	4.7117	4.6052	4.5149
5 81	0.25	4.9908	4.8851	4.7595	4.6574	4.5697
	0.26	4.9978	4.9190	4.8027	4.7055	4.6208
	0.28	4.9976	4.9700	4.8761	4.7900	4.7124
6 06	0.3	4.9799	4.9969	4.9323	4.8597	4.7905
	0.32	4.9464	4.9956	4.9718	4.9151	4.8556
	0.34	4.8983	4.9724	4.9943	4.9565	4.9082
6 20	0.35	4.8691	4.9536	4.9992	4.9720	4.9300
	0.36	4.8369	4.9307	4.9997	4.9841	4.9488
	0.38	4.7633	4.8728	4.9869	4.9982	4.9775
6.24	0.4	4.6785	4.8005	4.9534	4.9985	4.9946
	0.42	4.5834	4.7153	4.8942	4.9848	5.0000
	0.44	4.4789	4.6183	4.8154	4.9565	4.9937
[illegible]	0.45	4.4234	4.5657	4.7699	4.9367	4.9862
	0.46	4.3657	4.5106	4.7207	4.9128	4.9756
	0.48	4.2447	4.3932	4.6124	4.8523	4.9454

TABLE II (Contd.)

	x	100 y					
		R.A.E. 100	R.A.E. 101	R.A.E. 102	R.A.E. 103	R.A.E. 104	
5.95	0.5	4.1163	4.2670	4.4920	4.7715	4.9027	1.56
	0.52	3.9814	4.1329	4.3608	4.6644	4.8468	
	0.54	3.8405	3.9915	4.2201	4.5380	4.7769	
5.57	0.55	3.7680	3.9183	4.1465	4.4689	4.7363	1.491
	0.56	3.6943	3.8436	4.0709	4.3965	4.6917	
	0.58	3.5432	3.6899	3.9142	4.2423	4.5892	
5.09	0.6	3.3879	3.5310	3.7507	4.0773	4.4650	7.9
	0.62	3.2288	3.3676	3.5813	3.9030	4.3113	
	0.64	3.0665	3.2003	3.4058	3.7206	4.1370	
4.53	0.65	2.9843	3.1154	3.3179	3.6267	4.0438	
	0.66	2.9015	3.0297	3.2279	3.5313	3.9473	
	0.68	2.7343	2.8563	3.0454	3.3362	3.7452	
3.915	0.7	2.5654	2.6807	2.8598	3.1364	3.5331	1.413
	0.72	2.3953	2.5034	2.6720	2.9326	3.3123	
	0.74	2.2245	2.3251	2.4825	2.7260	3.0861	
3.275	0.75	2.1339	2.2357	2.3873	2.6218	2.9708	1.19
	0.76	2.0533	2.1463	2.2920	2.5173	2.6545	
	0.78	1.8822	1.9674	2.1011	2.3074	2.6195	
2.618	0.8	1.7111	1.7886	1.9101	2.0975	2.3819	953
	0.82	1.5400	1.6097	1.7191	1.8877	2.1437	
	0.84	1.3689	1.4309	1.5281	1.6780	1.9055	
	0.85	1.2833	1.3414	1.4326	1.5731	1.7864	
	0.86	1.1978	1.2520	1.3371	1.4682	1.6673	
	0.88	1.0267	1.0731	1.1461	1.2585	1.4292	
	0.9	0.8556	0.8943	0.9551	1.0487	1.1910	
	0.92	0.6844	0.7154	0.7641	0.8390	0.9528	
	0.925	0.6417	0.6707	0.7163	0.7865	0.8932	
	0.94	0.5133	0.5366	0.5730	0.6292	0.7146	
	0.95	0.4278	0.4471	0.4775	0.5244	0.5955	
	0.96	0.3422	0.3577	0.3820	0.4195	0.4764	
	0.975	0.2139	0.2236	0.2388	0.2622	0.2977	
	0.98	0.1711	0.1789	0.1910	0.2097	0.2382	
	0.9875	0.1069	0.1118	0.1194	0.1311	0.1489	
	1.0	0	0	0	0	0	

TABLE III

Velocity and pressure distribution R.A.E. 100

q = Local velocity
U = Free stream velocity

C_L	0		0.2 Upper		0.2 Lower		0.4 Upper		0.4 Lower		0.8 Upper		0.8 Lower	
x	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p
0	0	1.000	0.458	0.790	0.458	0.790	0.916	0.161	0.916	0.161	1.832	-2.355	1.832	-2.355
0.005	0.851	0.276	1.183	-0.399	0.519	0.731	1.514	-1.291	0.186	0.966	2.173	-3.723	0.483	0.767
0.0075	0.936	0.123	1.232	-0.519	0.640	0.591	1.528	-1.334	0.342	0.883	2.116	-3.475	0.255	0.935
0.0125	1.026	-0.053	1.277	-0.630	0.775	0.400	1.526	-1.330	0.523	0.727	2.023	-3.092	0.016	1.000
0.025	1.112	-0.236	1.302	-0.695	0.920	0.153	1.492	-1.225	0.728	0.470	1.868	-2.489	0.340	0.884
0.05	1.158	-0.341	1.296	-0.681	1.019	0.038	1.434	-1.056	0.878	0.228	1.706	-1.909	0.595	0.646
0.075	1.170	-0.370	1.283	-0.646	1.057	-0.117	1.394	-0.944	0.942	0.112	1.614	-1.606	0.710	0.496
0.1	1.173	-0.376	1.269	-0.611	1.076	-0.157	1.364	-0.862	0.978	0.044	1.552	-1.408	0.778	0.395
0.15	1.168	-0.364	1.244	0.548	1.091	0.191	1.319	-0.740	1.013	-0.027	1.466	-1.149	0.854	0.270
0.2	1.158	-0.342	1.222	-0.492	1.094	-0.197	1.284	-0.648	1.029	-0.059	1.405	-0.974	0.896	0.198
0.25	1.147	-0.315	1.201	-0.442	1.092	-0.191	1.254	-0.572	1.036	-0.072	1.357	-0.841	0.920	0.153
0.3	1.134	-0.286	1.181	-0.395	1.086	-0.179	1.227	-0.506	1.037	-0.075	1.316	-0.733	0.936	0.124
0.35	1.120	-0.256	1.162	0.350	1.078	0.162	1.202	-0.446	1.035	-0.071	1.280	-0.640	0.945	0.107
0.4	1.107	-0.226	1.144	-0.309	1.069	-0.144	1.180	-0.392	1.031	-0.062	1.248	-0.559	0.951	0.096
0.45	1.093	-0.196	1.126	-0.268	1.060	-0.123	1.158	-0.341	1.025	-0.051	1.219	-0.485	0.953	0.092
0.5	1.080	-0.166	1.109	-0.230	1.050	-0.102	1.137	-0.293	1.019	-0.038	1.191	-0.418	0.954	0.090
0.55	1.066	-0.137	1.092	-0.193	1.039	-0.080	1.117	-0.248	1.011	-0.023	1.165	-0.357	0.953	0.092
0.6	1.053	-0.108	1.076	-0.157	1.029	-0.058	1.098	-0.205	1.004	-0.007	1.140	-0.299	0.951	0.096
0.65	1.039	-0.080	1.060	-0.123	1.018	-0.036	1.079	-0.164	0.995	0.009	1.116	-0.244	0.948	0.101
0.7	1.026	-0.052	1.044	-0.089	1.007	-0.013	1.061	-0.125	0.987	0.026	1.092	-0.193	0.945	0.107
0.75	1.012	-0.024	1.028	-0.056	0.996	0.009	1.042	-0.087	0.978	0.043	1.069	-0.143	0.941	0.115
0.8	0.999	0.002	1.012	-0.025	0.985	0.030	1.025	-0.050	0.970	0.059	1.047	-0.096	0.937	0.122
0.85	0.986	0.028	0.997	0.007	0.974	0.052	1.007	-0.013	0.961	0.076	1.024	-0.049	0.934	0.129
0.9	0.972	0.054	0.981	0.038	0.963	0.072	0.988	0.023	0.953	0.092	1.001	-0.002	0.930	0.135
0.95	0.959	0.080	0.965	0.069	0.953	0.092	0.970	0.060	0.946	0.106	0.977	+0.046	0.928	0.138

TABLE III (Contd.)

Velocity and pressure distribution R.A.E. 101

C_L	0		0.2 Upper		0.2 Lower		0.4 Upper		0.4 Lower		0.8 Upper		0.8 Lower	
x	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p
0	0	1.000	0.267	0.929	0.267	0.929	0.533	0.716	0.533	0.716	1.066	-0.137	1.066	-0.137
0.005	0.872	0.240	1.221	-0.491	0.522	0.728	1.570	-1.464	0.171	0.971	2.264	-4.128	0.533	0.716
0.0075	0.942	0.113	1.250	-0.562	0.633	0.599	1.557	-1.423	0.324	0.895	2.168	-3.701	0.298	0.911
0.0125	1.012	-0.025	1.268	-0.608	0.756	0.428	1.523	-1.318	0.499	0.751	2.029	-3.118	0.018	1.000
0.025	1.078	-0.161	1.268	-0.609	0.886	0.215	1.458	-1.127	0.693	0.519	1.835	-2.368	0.305	0.907
0.05	1.115	-0.243	1.252	-0.569	0.976	0.046	1.389	-0.930	0.837	0.299	1.659	-1.753	0.555	0.692
0.075	1.128	-0.273	1.240	-0.538	1.015	-0.031	1.351	-0.825	0.901	0.187	1.570	-1.465	0.671	0.550
0.1	1.135	-0.288	1.231	-0.516	1.038	-0.078	1.326	-0.759	0.940	0.116	1.513	-1.290	0.741	0.451
0.15	1.142	-0.304	1.218	-0.484	1.064	-0.133	1.294	-0.673	0.986	0.027	1.441	-1.078	0.826	0.317
0.2	1.145	-0.312	1.209	-0.463	1.080	-0.167	1.272	-0.619	1.014	-0.028	1.396	-0.948	0.879	0.227
0.25	1.147	-0.316	1.203	-0.446	1.091	-0.190	1.257	-0.580	1.034	-0.068	1.363	-0.857	0.916	0.161
0.3	1.148	-0.319	1.197	-0.433	1.099	-0.207	1.245	-0.549	1.048	-0.099	1.337	-0.788	0.944	0.109
0.35	1.134	-0.286	1.176	-0.384	1.090	-0.188	1.218	-0.484	1.046	-0.093	1.299	-0.686	0.953	0.091
0.4	1.119	-0.252	1.157	-0.338	1.080	-0.167	1.193	-0.424	1.041	-0.083	1.264	-0.598	0.958	0.081
0.45	1.104	-0.219	1.138	-0.294	1.070	-0.144	1.170	-0.369	1.034	-0.070	1.232	-0.518	0.961	0.077
0.5	1.089	-0.186	1.119	-0.252	1.058	-0.120	1.148	-0.317	1.027	-0.054	1.202	-0.446	0.960	0.077
0.55	1.074	-0.154	1.101	-0.212	1.047	-0.096	1.126	-0.268	1.018	-0.037	1.174	-0.379	0.959	0.081
0.6	1.059	-0.122	1.083	-0.173	1.035	-0.071	1.106	-0.222	1.010	-0.019	1.148	-0.318	0.956	0.086
0.65	1.045	-0.091	1.065	-0.135	1.023	-0.046	1.085	-0.178	1.000	-0.001	1.122	-0.259	0.952	0.093
0.7	1.030	-0.061	1.048	-0.099	1.011	-0.022	1.066	-0.135	0.991	0.018	1.097	-0.204	0.948	0.101
0.75	1.015	-0.031	1.031	-0.063	0.999	0.003	1.046	-0.094	0.981	0.037	1.073	-0.152	0.944	0.110
0.8	1.001	-0.002	1.014	-0.029	0.987	0.026	1.027	-0.054	0.972	0.056	1.049	-0.101	0.939	0.119
0.85	0.986	0.027	0.998	0.005	0.975	0.050	1.008	-0.015	0.962	0.075	1.025	-0.051	0.934	0.128
0.9	0.972	0.054	0.981	0.038	0.963	0.073	0.989	0.023	0.953	0.092	1.001	-0.003	0.930	0.135
0.95	0.958	0.082	0.964	0.071	0.952	0.095	0.968	0.062	0.944	0.108	0.976	+0.048	0.927	0.140

TABLE III (Contd.)

Velocity and pressure distribution R.A.E. 102

C_L	0		0.2 Upper		0.2 Lower		0.4 Upper		0.4 Lower		0.8 Upper		0.8 Lower	
x	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p
0	0	1.000	0.559	0.688	0.559	0.688	1.118	-0.250	1.118	-0.250	2.236	-4.001	2.236	-4.001
0.005	0.880	0.225	1.235	-0.525	0.524	0.725	1.589	-1.526	0.168	0.972	2.296	-4.270	0.548	0.700
0.0075	0.947	0.104	1.258	-0.583	0.635	0.597	1.568	-1.460	0.322	0.897	2.187	-3.783	0.307	0.906
0.0125	1.012	-0.024	1.269	-0.611	0.754	0.431	1.525	-1.327	0.495	0.755	2.035	-3.141	0.025	0.999
0.025	1.071	-0.147	1.262	-0.592	0.879	0.227	1.452	-1.108	0.686	0.529	1.829	-2.346	0.298	0.911
0.05	1.105	-0.220	1.242	-0.542	0.966	0.066	1.378	-0.899	0.827	0.315	1.648	-1.715	0.546	0.702
0.075	1.117	-0.247	1.228	-0.509	1.004	-0.009	1.339	-0.793	0.891	0.206	1.557	-1.425	0.661	0.563
0.1	1.123	-0.261	1.219	-0.485	1.026	-0.053	1.313	-0.724	0.929	0.138	1.500	-1.249	0.730	0.466
0.15	1.129	-0.274	1.205	-0.452	1.052	-0.106	1.280	-0.639	0.974	0.052	1.427	-1.037	0.815	0.336
0.2	1.132	-0.281	1.196	-0.430	1.067	-0.138	1.258	-0.584	1.001	-0.002	1.381	-0.908	0.866	0.249
0.25	1.134	-0.285	1.189	-0.413	1.078	-0.161	1.243	-0.545	1.020	-0.041	1.349	-0.819	0.903	0.184
0.3	1.135	-0.287	1.183	-0.400	1.085	-0.177	1.231	-0.515	1.035	-0.070	1.323	-0.750	0.931	0.134
0.35	1.135	-0.289	1.178	-0.389	1.091	-0.191	1.221	-0.490	1.046	-0.095	1.302	-0.695	0.953	0.092
0.4	1.136	-0.290	1.174	-0.379	1.096	-0.202	1.212	-0.469	1.056	-0.115	1.284	-0.649	0.972	0.056
0.45	1.119	-0.252	1.153	-0.330	1.084	-0.175	1.186	-0.407	1.048	-0.098	1.250	-0.562	0.973	0.054
0.5	1.102	-0.215	1.132	-0.282	1.071	-0.147	1.162	-0.350	1.039	-0.079	1.217	-0.482	0.971	0.056
0.55	1.085	-0.178	1.112	-0.237	1.058	-0.119	1.138	-0.295	1.029	-0.059	1.187	-0.409	0.968	0.062
0.6	1.069	-0.142	1.093	-0.194	1.044	-0.090	1.115	-0.244	1.018	-0.037	1.158	-0.342	0.964	0.070
0.65	1.052	-0.107	1.073	-0.152	1.030	-0.062	1.093	-0.195	1.008	-0.015	1.131	-0.278	0.959	0.080
0.7	1.036	-0.073	1.054	-0.112	1.017	-0.034	1.072	-0.149	0.997	+0.007	1.104	-0.219	0.954	0.090
0.75	1.020	-0.040	1.035	-0.072	1.003	-0.006	1.050	-0.103	0.985	0.029	1.078	-0.161	0.947	0.102
0.8	1.003	-0.007	1.017	-0.034	0.989	+0.022	1.029	-0.060	0.974	0.051	1.052	-0.106	0.941	0.115
0.85	0.988	+0.025	0.998	+0.003	0.976	0.048	1.009	-0.017	0.963	0.073	1.026	-0.053	0.935	0.126
0.9	0.972	0.056	0.980	0.040	0.962	0.074	0.988	+0.025	0.952	0.094	1.000	-0.001	0.929	0.137
0.95	0.956	0.087	0.966	0.076	0.949	0.099	0.966	0.067	0.942	0.113	0.973	+0.053	0.925	0.145

TABLE III (Contd.)

Velocity and pressure distribution R...I

C_L	0		0.2 Upper		0.2 Lower		0.4 Upper		(
x	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p	q/
0	0	1.000	0.579	0.665	0.579	0.665	1.158	-0.342	1.
0.005	0.886	0.215	1.245	-0.550	0.526	0.723	1.603	-1.570	0.
0.0075	0.949	0.099	1.263	-0.595	0.635	0.597	1.576	-1.483	0.
0.0125	1.011	-0.023	1.269	-0.611	0.752	0.434	1.526	-1.330	0.
0.025	1.066	-0.137	1.257	-0.581	0.874	0.235	1.447	-1.094	0.
0.05	1.097	-0.204	1.234	-0.523	0.960	0.079	1.370	-0.878	0.
0.075	1.108	-0.228	1.220	-0.487	0.996	0.008	1.330	-0.768	0.
0.1	1.114	-0.241	1.209	-0.463	1.018	-0.036	1.304	-0.700	0.
0.15	1.119	-0.253	1.195	-0.429	1.042	-0.086	1.270	-0.613	0.
0.2	1.122	-0.260	1.186	-0.407	1.058	-0.119	1.249	-0.559	0.
0.25	1.124	-0.263	1.179	-0.390	1.068	-0.140	1.233	-0.520	1.
0.3	1.125	-0.265	1.173	-0.376	1.075	-0.156	1.221	-0.490	1.
0.35	1.125	-0.267	1.168	-0.365	1.081	-0.169	1.210	-0.465	1.
0.4	1.126	-0.267	1.164	-0.355	1.086	-0.180	1.202	-0.444	1.
0.45	1.126	-0.268	1.160	-0.347	1.090	-0.189	1.194	-0.426	1.
0.5	1.126	-0.268	1.157	-0.339	1.094	-0.197	1.187	-0.410	1.
0.55	1.106	-0.223	1.133	-0.284	1.077	-0.161	1.160	-0.345	1.
0.6	1.086	-0.179	1.110	-0.232	1.061	-0.125	1.133	-0.284	1.
0.65	1.066	-0.137	1.087	-0.182	1.044	-0.090	1.108	-0.227	1.
0.7	1.047	-0.095	1.065	-0.134	1.027	-0.055	1.083	-0.172	1.
0.75	1.027	-0.055	1.043	-0.088	1.010	-0.021	1.058	-0.120	0.
0.8	1.008	-0.016	1.021	-0.043	0.994	+0.013	1.034	-0.069	0.
0.85	0.989	+0.022	1.000	0	0.977	0.045	1.010	-0.020	0.
0.9	0.970	0.059	0.979	0.042	0.961	0.077	0.986	+0.027	0.
0.95	0.951	0.096	0.957	0.085	0.945	0.108	0.961	0.076	0.

TABLE III (Contd.)

Velocity and pressure distribution R.A.E. 104

C_L	0		0.2 Upper		0.2 Lower		0.4 Upper		0.4 Lower		0.8 Upper		0.8 Lower	
x	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p	q/U	C_p
0	0	1.000	0.596	0.645	0.596	0.645	1.192	-0.420	1.192	-0.420	2.383	-4.680	2.383	-4.680
0.005	0.890	0.207	1.252	-0.568	0.528	0.722	1.613	-1.603	0.164	0.973	2.333	-4.444	0.565	0.681
0.0075	0.951	0.095	1.266	-0.604	0.635	0.596	1.581	-1.499	0.318	0.899	2.207	-3.871	0.318	0.899
0.0125	1.010	-0.021	1.269	-0.610	0.751	0.436	1.526	-1.330	0.491	0.759	2.039	-3.157	0.032	0.999
0.025	1.062	-0.129	1.253	-0.571	0.871	0.242	1.443	-1.083	0.678	0.540	1.820	-2.313	0.290	0.916
0.05	1.091	-0.191	1.228	-0.508	0.954	0.090	1.364	-0.860	0.815	0.335	1.632	-1.664	0.536	0.713
0.075	1.102	-0.214	1.213	-0.470	0.990	0.020	1.323	-0.749	0.877	0.231	1.540	-1.371	0.648	0.580
0.1	1.107	-0.225	1.202	-0.445	1.011	-0.022	1.296	-0.680	0.914	0.165	1.482	-1.195	0.717	0.486
0.15	1.112	-0.237	1.188	-0.410	1.035	-0.072	1.262	-0.593	0.958	0.082	1.409	-0.984	0.800	0.360
0.2	1.115	-0.243	1.178	-0.388	1.050	-0.103	1.241	-0.539	0.985	0.030	1.363	-0.857	0.851	0.276
0.25	1.116	-0.246	1.171	-0.371	1.060	-0.124	1.225	-0.501	1.004	-0.007	1.330	-0.769	0.887	0.214
0.3	1.117	-0.248	1.165	-0.358	1.068	-0.140	1.213	-0.471	1.018	-0.035	1.305	-0.702	0.914	0.164
0.35	1.118	-0.249	1.161	-0.347	1.074	-0.153	1.203	-0.446	1.029	-0.058	1.284	-0.648	0.936	0.124
0.4	1.118	-0.250	1.157	-0.338	1.079	-0.163	1.194	-0.426	1.038	-0.078	1.266	-0.604	0.954	0.089
0.45	1.118	-0.250	1.153	-0.329	1.082	-0.172	1.186	-0.408	1.046	-0.094	1.251	-0.564	0.970	0.059
0.5	1.118	-0.250	1.149	-0.321	1.086	-0.180	1.180	-0.391	1.053	-0.109	1.237	-0.530	0.984	0.032
0.55	1.118	-0.250	1.146	-0.314	1.089	-0.186	1.173	-0.376	1.059	-0.122	1.224	-0.499	0.996	0.007
0.6	1.118	-0.249	1.143	-0.306	1.092	-0.192	1.167	-0.362	1.065	-0.134	1.212	-0.470	1.008	-0.015
0.65	1.092	-0.193	1.114	-0.241	1.070	-0.144	1.135	-0.288	1.046	-0.094	1.174	-0.378	0.995	0.009
0.7	1.067	-0.139	1.086	-0.179	1.047	-0.097	1.104	-0.219	1.026	-0.054	1.137	-0.293	0.982	0.035
0.75	1.042	-0.086	1.058	-0.120	1.025	-0.051	1.074	-0.152	1.007	-0.014	1.101	-0.213	0.968	0.062
0.8	1.018	-0.035	1.031	-0.063	1.003	-0.006	1.044	-0.089	0.988	+0.024	1.066	-0.137	0.954	0.089
0.85	0.993	+0.014	1.004	-0.008	0.981	+0.037	1.014	-0.029	0.969	0.062	1.032	-0.065	0.941	0.115
0.9	0.969	0.060	0.978	+0.044	0.960	0.078	0.985	+0.029	0.950	0.097	0.998	+0.004	0.927	0.140
0.95	0.945	0.106	0.951	0.096	0.939	0.118	0.956	0.087	0.932	0.132	0.962	0.074	0.915	0.163

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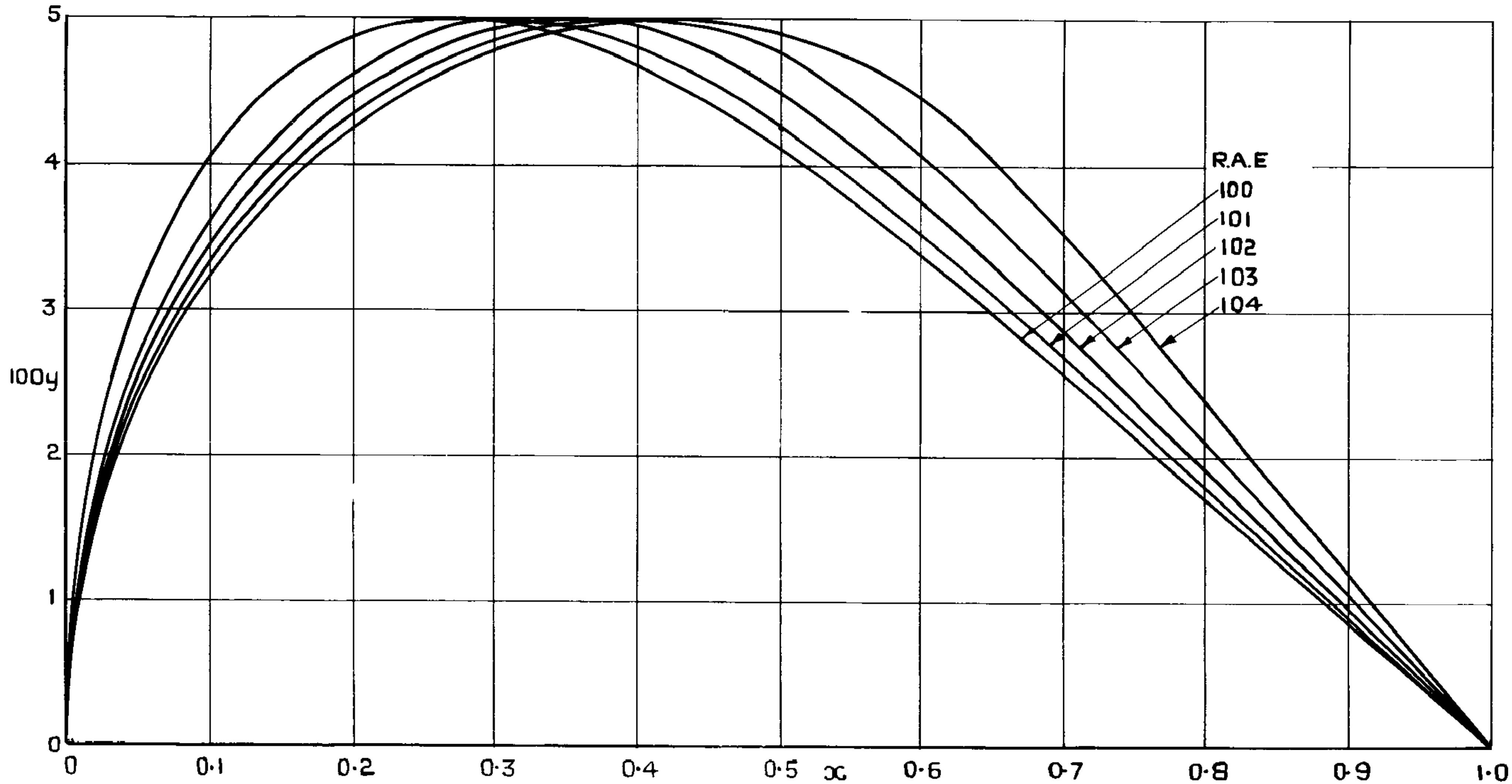
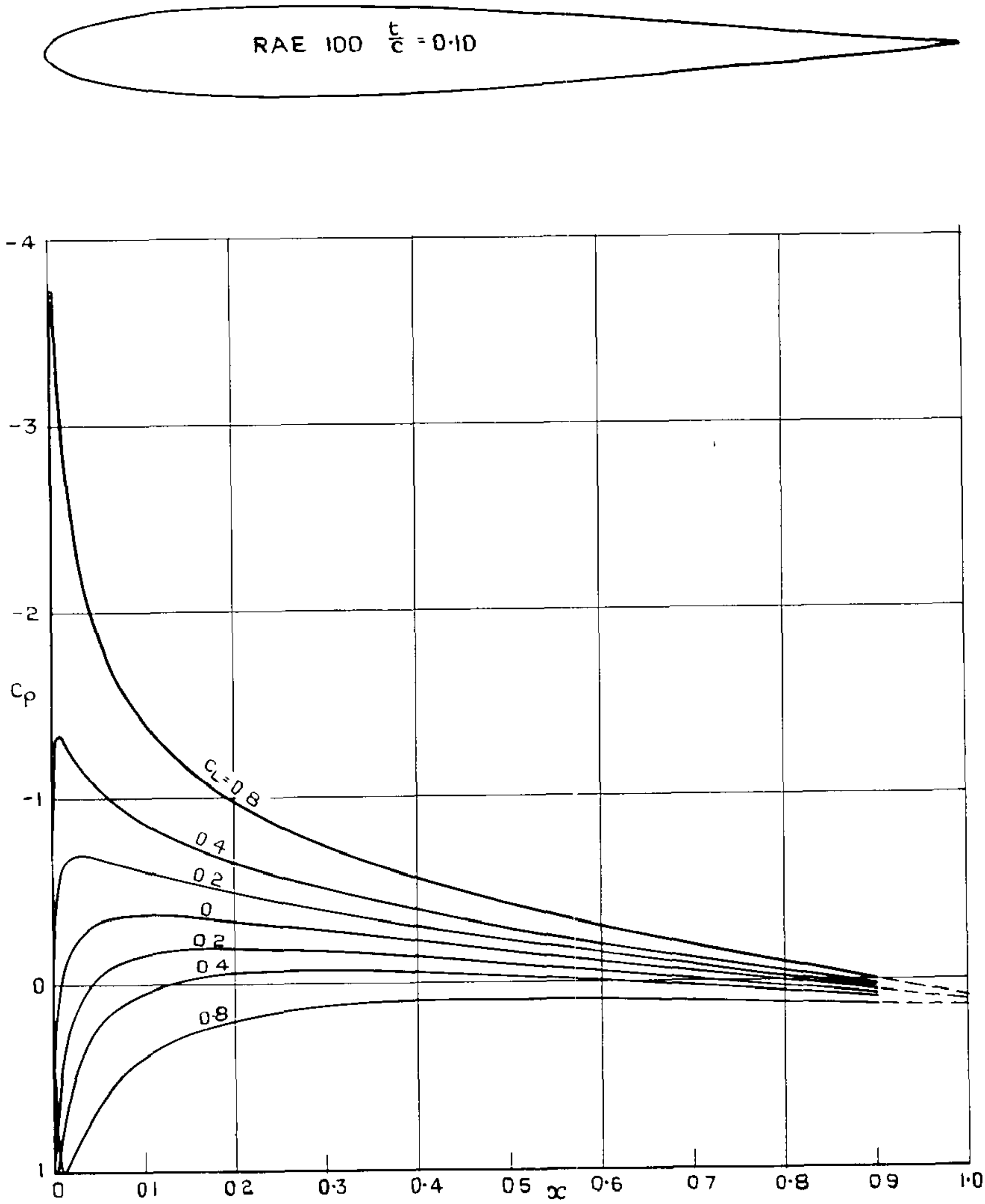


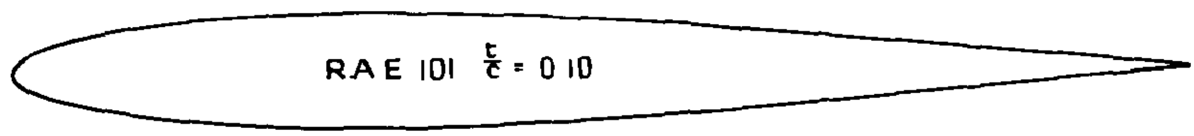
FIG.1 SECTION SHAPES.

FIG. 1

FIG. 2 a



RAE 100 $\frac{t}{c}$ = 0·10
-4
-3
-2
C_p
-1
0
1
C_L = 0·8
0·4
0·2
0
0·2
0·4
0·8
0
0·1
0·2
0·3
0·4
0·5
x
0·6
0·7
0·8
0·9
1·0



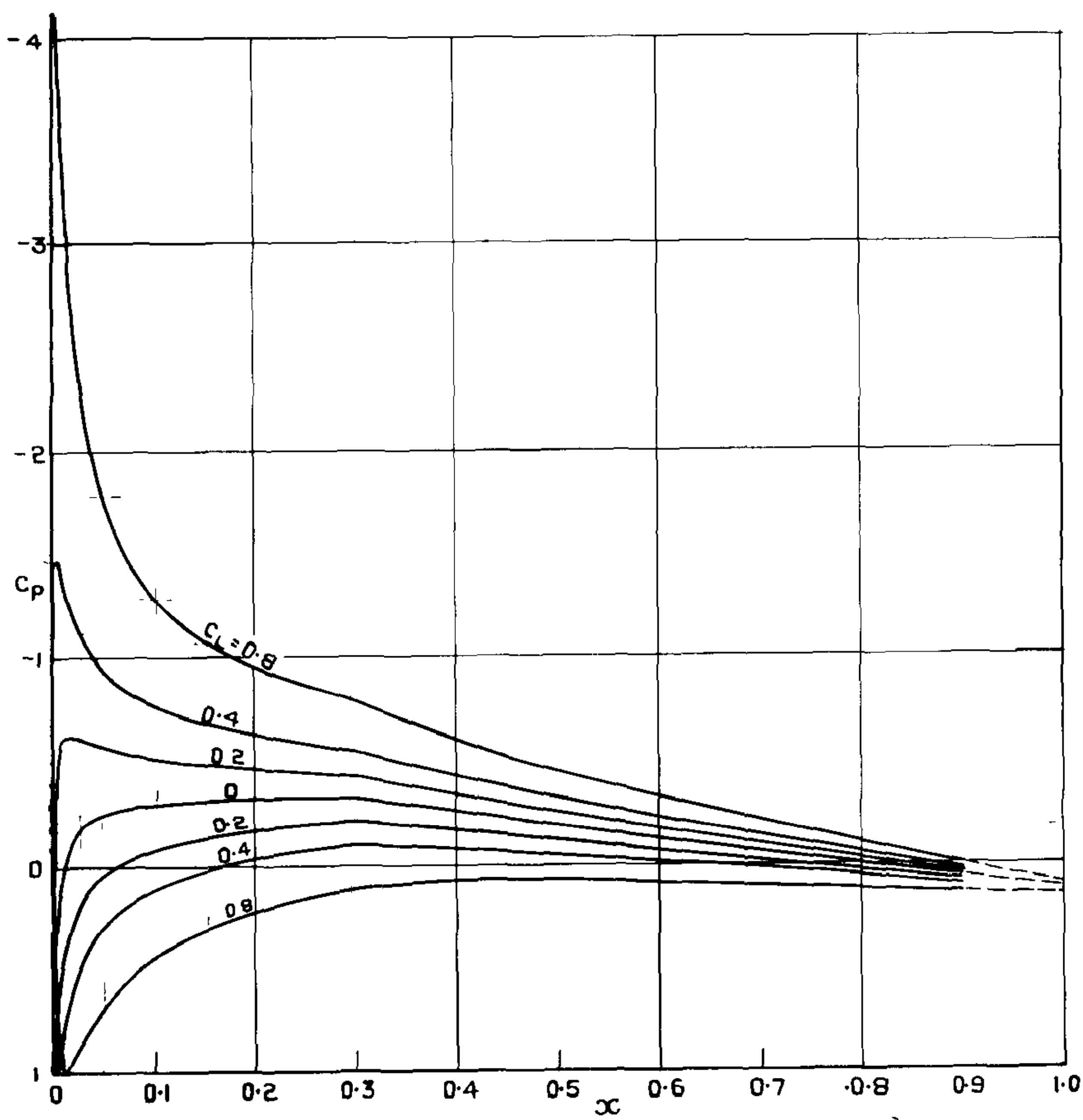


FIG. 2 b PRESSURE DISTRIBUTION R.A.E. 101

FIG. 2 c

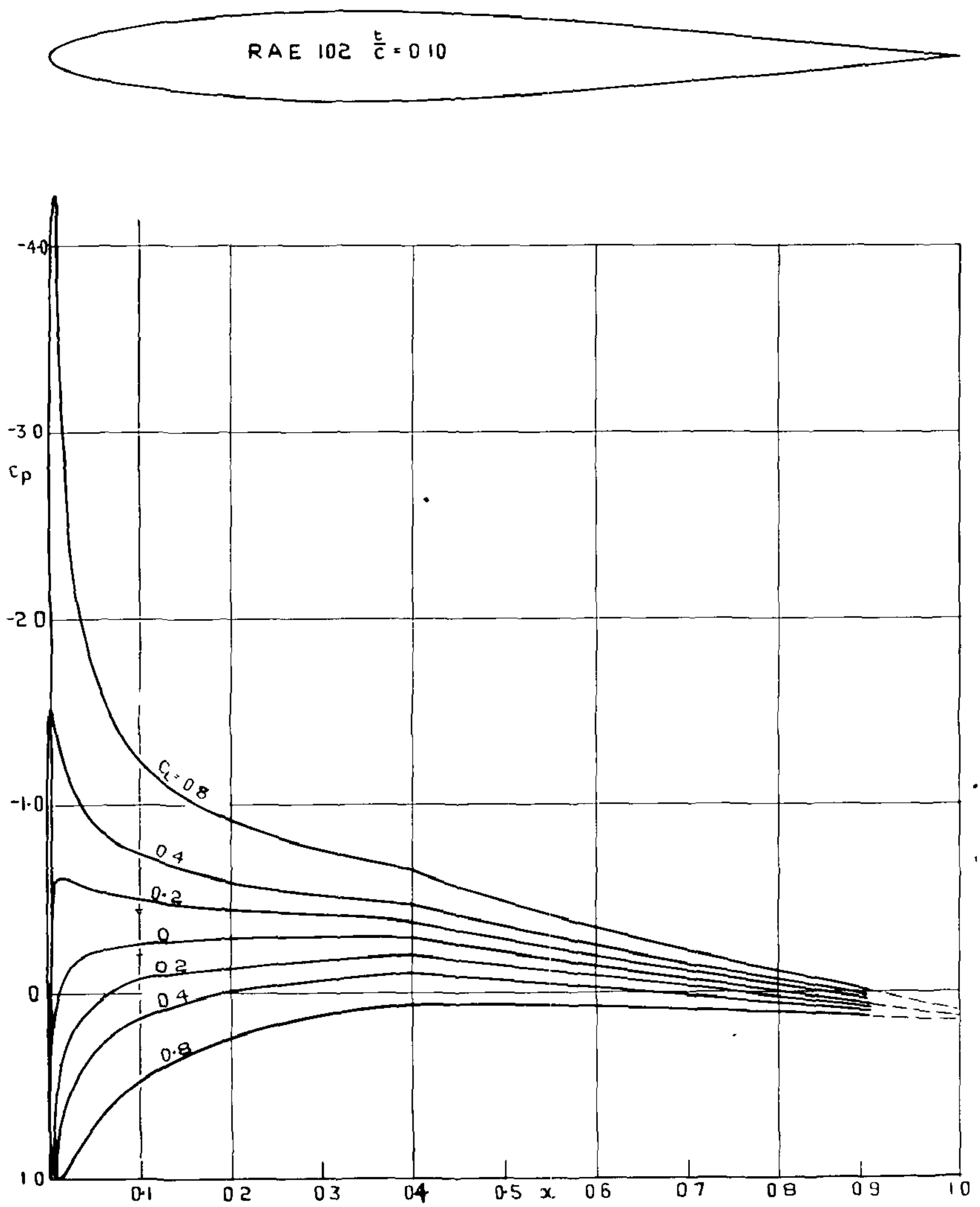


FIG. 2 c PRESSURE DISTRIBUTION R.A.E. 102

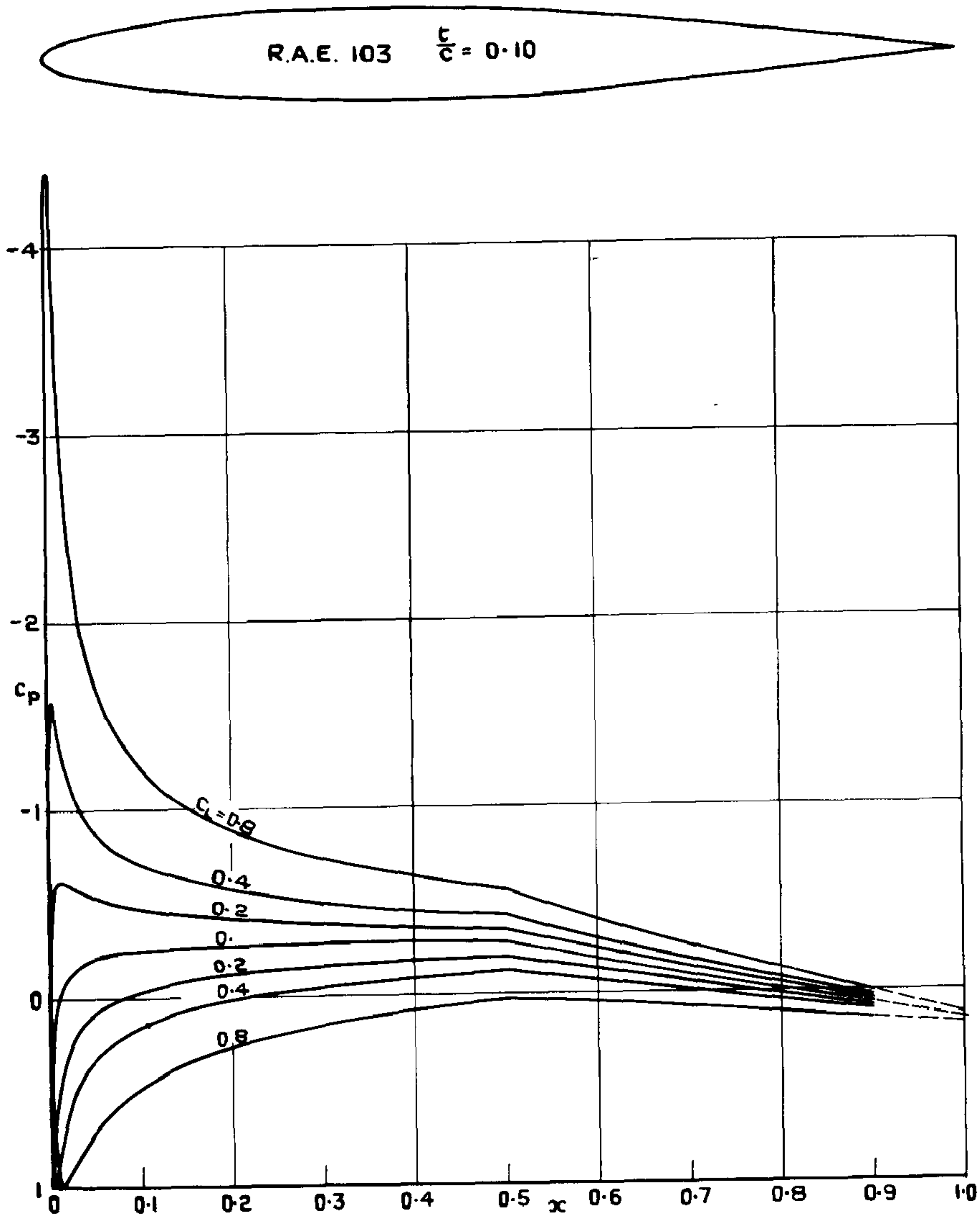


FIG. 2 d PRESSURE DISTRIBUTION R.A.E. 103

FIG. 2 e

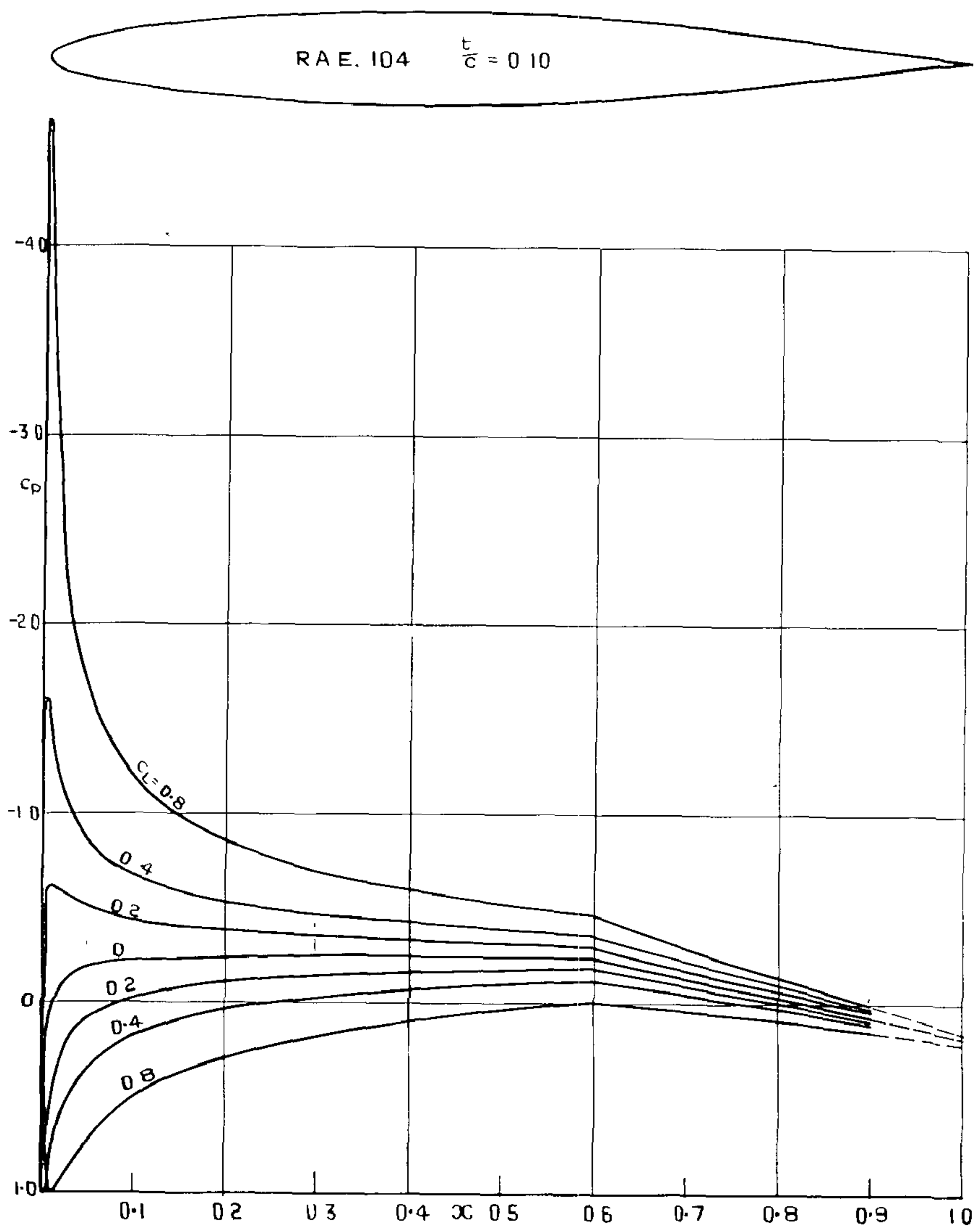


FIG. 2 e PRESSURE DISTRIBUTION RAE 104

C.P. 80
Technical Note No. Aero.2039

March, 1950

ROYAL AIRCRAFT ESTABLISHMENT

Calculated pressure distributions for
the R.A.E. 100-104 aerofoil sections

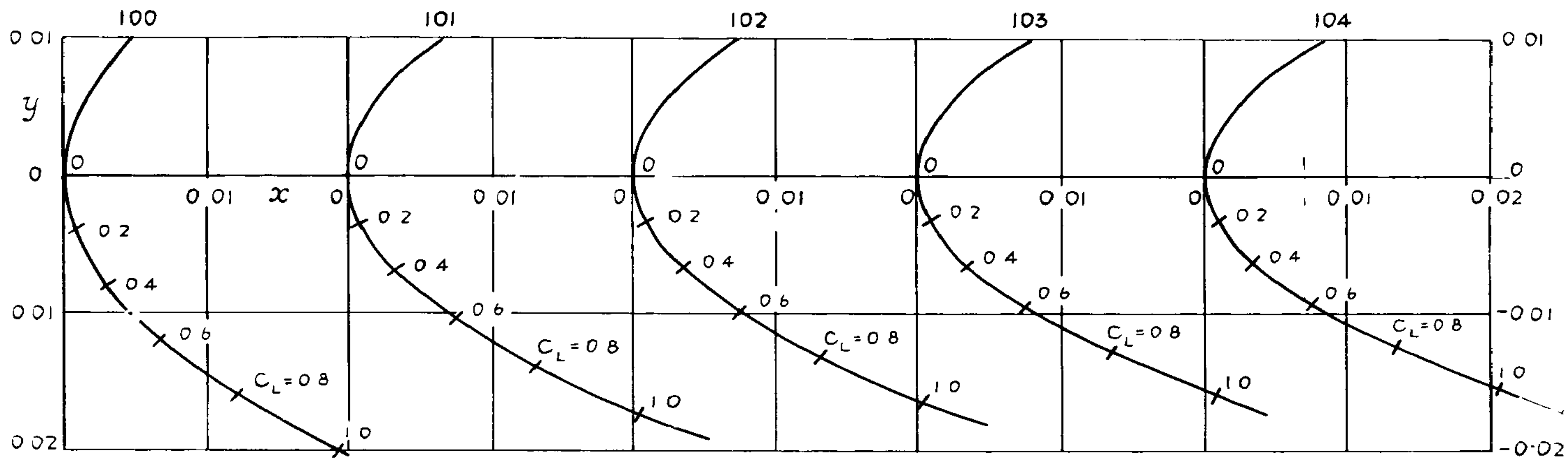
by

R.C. Pankhurst
and
H.B. Squire

(Aerodynamics Division N.P.L.)

ADDENDUM

The accompanying Table gives the velocity distributions over the nose of each aerofoil at more closely spaced ordinates for $C_L = 0$ to 1.0. The positions of the stagnation points are indicated on the Figure; this information is required for the installation of de-icing equipment.



Aerofoil Sections RAE 100-104, $t/c = 0{\cdot}10$

Stagnation Points for $C_L = 0$ to $C_L = 1{\cdot}0$

C.P. No. 80
13,254
A.R.C. Technical Report

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