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Summary.—Reasons for Inquiry.—The investigation was undertaken to provide data relating to C_L, C_D and C_m at high values of Reynolds number on wings of triangular plan form, delta wings.

Range of Investigation.—C_L, C_D and C_m were measured over a range of R from $0 \cdot 5 \times 10^6$ to 8 or 9×10^6 and a range of incidence from zero to above the stall.

The models tested comprised

(*a*) Delta 1 (Fig. 1), whose plan form was a right-angled isosceles triangle of span 4 ft approx. and aspect ratio 3·87. The span was twice shortened by removing sections from the tips, giving aspect ratios of 3·04 and 2·38.

The model of aspect ratio 3·04 was also tested with a straight flap and with a body. This model was also tested in a modified form with the leading-edge radius increased from 0·0069*c* to 0·018*c* by decreasing the local chord *c* by 1·5 per cent.

(*b*) Delta 2 of equilateral triangular plan form, side 3 ft and aspect ratio 2·31. This model was also tested with a flap (60 deg) and with a body, the former being tried in two positions (i) near the trailing edge and (ii) 10 in. forward of the trailing edge.

(*c*) Delta 3, a conventional swept-back arrow-head wing of aspect ratio 3·07. No tests with body were carried out on this model, but a straight flap perpendicular to the centre-line and a 'V' flap with arms parallel to the trailing edge were tried. The section of the three original models was 10 per cent thick, with the maximum thickness at 0·35 of the chord from the leading-edge.

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Results.—The figures in brackets refer to the modified Delta 1 model.

Wing	Delta 1				Delta 2		Delta 3
Aspect ratio	3·87	3·04	3·04 with body	2·38	2·31	2·31 with body	3·07
$C_{L\max}$ at high R	0·89 (0·91)	0·88 (0·88)	0·85	0·92 (0·92)	1·13	1·08	0·95
ditto with flap	—	1·19 (1·21)	1·12	—	aft 1·03 forward 0·75	aft 0·98 forward 0·70	st. 1·03 'V' 0·98
$dC_L/d\alpha$	3·2 (3·25)	3·0 (3·05)	3·0	2·6	2·4	2·3	2·9
Centre of pressure from trailing edge in terms of mean chord	0·874 (0·884)	0·828 (0·831)	0·837	0·813 (0·825)	0·839	0·844	0·526*

Scale effect on $C_{L\max}$ is small, especially on the original models. The values of $C_{L\max}$ are somewhat higher on Delta 1 after modification, particularly at $R = 5 \times 10^6$. Beyond $R = 5 \times 10^6$, $C_{L\max}$ decreases again until it is equal or even less than the original at $R = 10^7$. Two $C_{L\max}$ vs. R curves were obtained with the shortest model (aspect ratio 2·42).

Scale effect is also small on $dC_L/d\alpha$ and c.p. and the results are in good agreement with similar tests on the original Delta 1 (aspect ratio 3·04) carried out at the Royal Aircraft Establishment at $R = 1\cdot5 \times 10^6$ to 2×10^6. $C_{L\max}$ is also in agreement. On the modified model of Delta 1, $dC_L/d\alpha$ is greater and dC_m/dC_L numerically less than on the standard model.

$\Delta C_{L\max}$ due to flap is negative on Delta 2 and, except at high values of R, on Delta 3.

$C_{D\min}$ on the three original models tends to the same value, about 0·0067, at high R. Increasing the nose radius causes an increase of about 0·0005 on the two models of aspect ratios 3·92 and 3·09.

C_{Di}/C_L^2 approximates to $1\cdot1/\pi A$ on the original wings at high R. On the modified Delta 1 it is smaller and nearer to $1/\pi A$, but greater at low values of R giving a more marked scale effect.

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1. *Introduction.*—The experiments considered in the present report form part of an investigation into the characteristics at high values of Reynolds number, of swept-back wings, particularly swept-back wings of triangular plan form, commonly known as Delta wings. The work was carried out in conjunction with the Royal Aircraft Establishment where the wings were made. Also some experiments had already been carried out on one model at a low value of R by Hills, Lock and Ross[1], at the Royal Aircraft Establishment (1947).

When experiments in the Compressed Air Tunnel were under consideration, preliminary tests were carried out on three flat models of equilateral triangular plan form in order to examine the size of model suitable for test in the tunnel and to determine any corrections that might have to be applied[2]. The sides of the three models were 26, 36 and 47·8 in. It was found that, after the usual wind-tunnel corrections had been applied, C_L on the three models agreed if the values obtained on the 36-in. and 47·8-in. models were multiplied by 1·01 and 1·05 respectively.

* From trailing-edge centre-section.

The models included in the present programme consisted of three wings, the overall dimensions of which were determined after considering the results of the above preliminary tests. The plan forms were.

(*a*) a right-angled isosceles triangle, span 4 ft

(*b*) an equilateral triangle, side 3 ft

(*c*) a conventional swept-back wing, span 4 ft.

These models will be referred to as Delta 1, 2 and 3 (or $\Delta 1$, 2 and 3 in the plotted results) respectively. Fuselages (bodies of revolution) and flaps were provided with each wing model.

A modified form of Delta 1 was also tested. In this model the local chord of the original model was reduced by 1·5 per cent at the leading edge, thus increasing the leading-edge radius. The results of the experiments on this model will be considered separately, section 8, etc., so as to avoid confusing the effects of changes in plan form with the effect of altering the profile.

2. *Models*.—Before giving a detailed description of the models and the range of experiments, it may be advisable to comment at some length on the material of which the models were made and the finish applied to it.

One of the difficulties associated with Compressed Air Tunnel tests on wooden models arises out of the definite tendency of the varnish to blister or to become rough after repeatedly filling the tunnel with compressed air and exhausting.

A small piece of teak was treated with ' Phenoglaze ' finish at the Royal Aircraft Establishment and subjected to prolonged test in the Compressed Air Tunnel. No sign of blistering or roughening was observed and it was with considerable confidence that the decision was taken to make the models of teak similarly treated. Unfortunately expectations were not fully realised. The model Delta 1 wing stood up to Compressed Air Tunnel conditions admirably and the surface showed no signs of deterioration. A few blisters appeared in due course on Delta 2 but by great good fortune they were situated along the centre of the wing where they were covered by the fuselage in the test following that during which they appeared.

Delta 3 was extremely troublesome. A large number of blisters of varying sizes appeared during the first test. The Royal Aircraft Establishment suggested that this was due to the adverse temperature conditions under which the finish was applied during the 1947 fuel crisis. It is probable, however, that this is not the explanation as the model was stripped at the National Physical Laboratory and re-polished under ideal conditions. Incidentally, though the Phenoglaze almost peeled off the wood of the model, it was difficult to remove from the Tufnol trailing edge on which there was no trace of blistering. The second application was no more successful but another attempt was made after consultation with experts from the firm supplying the finish. The third attempt was an improvement but fell far below the Delta 1 standard. The first test on the model when smooth was repeated later after the blisters had appeared and the results agreed ; accordingly it it suggested that the deterioration of the surface was not enough to vitiate the results. It is felt that the difference in the behaviour of the three models must have been due to a difference in the quality of the wood of which they were made. Moreover mahogany models treated with not more than normal care have, so far, shown *no* signs of surface deterioration after repeated tests in the Compressed Air Tunnel and it would therefore appear that teak is unreliable and is to be avoided for Compressed Air Tunnel models.

3. The basic wing section of all the models was symmetrical and was 10 per cent thick, with the maximum thickness at 35 per cent of the chord from the leading edge.

The generating curve of the fuselage had a maximum ordinate (semi-diameter) of 7·5 per cent of the length and it was situated at 35 per cent of the length from the nose.

In all cases the inclination of the flaps was 60 deg to the wing surface.

With a fuselage in position a section was removed from the centre of the flap to accommodate the body.

Ordinates of the wing and fuselage are given in Table 1 and the complete models are shown in Figs. 1, 2 and 3.

As has been stated, Delta 1 was a right-angled isosceles triangle, the nominal length of the base being 48 in. As the tips had been slightly rounded off, the actual span was 47·16 in. Provision had been made for modifying the wing tips by successively removing sections 3·43 and 3 in. long from each end of the wing. The square ends were faired with beading of semi-circular cross-section thus adding 0·34 in. to the span in one case and 0·64 in. in the other to the span in each case.

The flap used on this model was placed parallel to the trailing edge at a distance (measured along the surface) equal to the flap chord, 3·6 in. (*see* Fig. 1).

In the case of the equilateral triangular wing Delta 2, two positions of the flap were tried, the flap being parallel to the trailing edge in both cases. In the aft position the flap hinge was at a distance equal to the flap chord from the trailing edge, *viz.*, 4·68 in. With the flap in the forward position this distance was increased to 10 in. Again a suitable section was removed for test with the fuselage (*see* Fig. 2).

The swept-back wing Delta 3, was also tested with the flap in two positions but no tests with fuselage were carried out on it. In one case the flap was straight and at a distance equal to the flap chord, 4·16 in. from the apex of the trailing edge 'V.' In the other, the flap was of 'V' form, the arms of the 'V' being parallel to the 'V' formed by the trailing edge and with the outboard ends in the same position as the outboard ends of the straight flap (*see* Fig. 3).

Table 2 gives details of areas, chords and other characteristics of the models.

4. *Range of Experiments.*—The usual measurements of C_L, C_D and C_m were made over a range of incidence from zero to beyond the stall and a range of Reynolds number from about $0 \cdot 6 \times 10^6$ to 8 or 9×10^6. The results have been reduced on the basis of the appropriate area and mean chord in each case and C_m has been specified with respect to the axis through the mean quarter-chord point as defined and given in Table 2. The table also shows the cases in which flaps and fuselages were tested. No tests were carried out on Delta 3 with the body attached. There were two main reasons for this ; in the first place, the effect of the fuselage on Delta 1 and 2 had been found to be small and secondly, the condition of the surface of the wing model had deteriorated. A further attempt at polishing it in order to carry out the tests with body did not appear justified in view of the smallness of the body effect (*see* section 2).

5. *Presentation of Results.*—It should be made clear that no corrections apart from the usual tunnel corrections have been applied to the results. In other words the corrections mentioned in section 1 arising out of the preliminary work described in Ref. 1 have not been applied. They would in any case be small, the estimated amounts being an increase of not more than 1 per cent in C_L in the case of Delta 1 and 2 and possibly 2·5 per cent in the case of Delta 3.

The results at the highest value of R used are given in tabulated form in Tables 3, 5 and 6 and plotted in Figs. 5, 7 and 9. The scale effect on the main characteristics of the wings has been plotted in Figs. 6, 8 and 10. Scale effect is on the whole small and hence for reasons of economy tabulated results at the remaining values of R have been omitted* as it is felt that in general the information contained in Figs. 6, 8 and 10 should suffice.

* These results are available and any one particularly interested in them should apply to the Superintendent, Aerodynamics Division, National Physical Laboratory.

The following is a list of the plotted results on the original models.

Fig. 4 C_L against α on Delta 1 at $R = 2 \times 10^6$ for comparison with results obtained at the Royal Aircraft Establishment.[1]

Fig. 5 C_L against α at the highest values of R—all cases.

Fig. 6 $C_{L\max}$ and $dC_L/d\alpha$ at $\alpha = 0$ against R—all cases.

Fig. 7 C_D against $C_L{}^2$ at the highest values of R.

Fig. 8 $C_{D\min}$ and induced-drag coefficients at $C_L = 0$ against R.

Fig. 9 C_m against C_L at the highest values of R.

Fig. 10 dC_m/dC_L at $C_L = 0$ against R.

Fig. 11 C_L against α at $R = 1 \cdot 5 \times 10^6$ on Delta 2 without flap and with flap in the forward position (*a*) on the lower surface and (*b*) on the upper surface.

6. *Discussion of Results.*—(*a*) *Lift.*—The comparison with tests in the Royal Aircraft Establishment No. 2, $11\frac{1}{2}$-ft $\times$ $8\frac{1}{2}$-ft Wind Tunnel (Fig. 4) shows that the agreement between the results on Delta 1 at $R = 2 \times 10^6$ is good. The slope of the Royal Aircraft Establishment lift curves is very slightly higher, and $C_{L\max}$ is higher, in the case of the model of aspect ratio 3, than in the Compressed Air Tunnel. $C_{L\max}$ as obtained at the Royal Aircraft Establishment is lower in the case of the other two aspect ratios. The stalling angle is also in satisfactory agreement.

With regard to $C_{L\max}$ (Fig. 6) scale effect is not very pronounced. There is a gradual increase with R up to $R = 7 \times 10^6$ when the curve flattens out or even shows a decrease particularly in the case of Delta 3.

Adding the body to Delta 1 (*see* also Fig. 5) causes a decrease of about $0 \cdot 05$ in $C_{L\max}$. In the case of Delta 2 also, $C_{L\max}$ decreases when the body is added but the variation with R is somewhat different. Thus $C_{L\max}$ falls at first as R increases and then rises rather more steeply. Similar results were obtained when the body was added to the wing plus flap.

The increment in C_L when the flap is added to Delta 1 is less when the body is attached to the wing than for the wing alone. This is probably due in part to the removal of a section of the flap in order to accommodate the body.

Varying the aspect ratio of Delta 1 by successively cutting off sections of the wing at the tips, does not appreciably alter $C_{L\max}$ (Fig. 5). The intermediate wing aspect ratio $3 \cdot 04$ appears to have a lower value than the other two, the curves for which cross at $R = 3 \times 10^6$, the wing of aspect ratio $2 \cdot 38$ having the largest $C_{L\max}$ at the high value of R. Comparing this latter wing with Delta 2 of similar aspect ratio $C_{L\max}$ is appreciably greater on Delta 2. Delta 3, with the same aspect ratio as the intermediate Delta 1, has a greater $C_{L\max}$.

But when flaps are added to Delta 2 the somewhat surprising result of a negative $\Delta C_{L\max}$ due to flaps is obtained throughout the R range. The same is true except at the highest values of R on Delta 3. Placing the flap in the aft position on Delta 2 has a less detrimental effect than placing it forward, and the negative effect of the straight flap is less than that of the V flap on Delta 3. These two results are not inconsistent as the V flap is on the average further forward than the straight flap.

Having obtained a negative $\Delta C_{L\max}$ on Delta 2, it was thought that a test of academic interest would be one with the flap placed on the upper surface of the wing. The result at $R = 1 \cdot 5 \times 10^6$ is shown in Fig. 11.

Referring to the other curves of Fig. 6, $dC_L/d\alpha$ at $\alpha = 0$ changes very gradually with R, but decreases consistently on Delta 1 as the aspect ratio decreases. On Delta 2 and Delta 3, $dC_L/d\alpha$ is less than on Delta 1 with the same aspect ratio.

To conclude these comments on C_L, the fact might be mentioned that the flat models of R. & M. 2518[2] yielded a somewhat higher $C_{L\max}$ than Delta 2 ($R = 1\cdot2$ to 2×10^6) with $dC_L/d\alpha$ at $\alpha = 0$ and the stalling angle was approximately the same in both cases.

(*b*) *Drag*.—The minimum-drag coefficients in the Compressed Air Tunnel of all three wings tend to the same value of 0·0066 to 0·0068 at $R = 8 \times 10^6$ (Fig. 8). The addition of the body causes an increase of 0·0015 to 0·0020. At low values of C_L, C_D on Delta 1 increases as the aspect ratio decreases (Fig. 7) but the curves C_D against $C_L{}^2$ cross as C_L increases.

The induced-drag coefficients obtained from the slopes of the curves of Fig. 7 and similar curves at other values of R, are shown plotted against R in Fig. 8. The curves show an appreciable scale effect. At the higher values of R, $C_{Di}/C_L{}^2$ exceeds $1/\pi A$ by about 8 per cent ; at the low values of R the percentage excess is about 25 per cent. These percentages are mean values of all the cases.

The drag coefficient of Delta 1 and Delta 2 with flap is appreciably less when the body is attached to the wing (Figs. 7 and 8). This is probably due, as in the case of $C_{L\max}$, to the removal of a part of the flap in order to accommodate the body which only increases C_D by about 0·002 — a small fraction of the drag increase due to flap.

(*c*) *Moments*.—C_m about the quarter-chord axis as given in Table 2, is plotted against C_L at the highest value of R in Fig. 9, and dC_m/dC_L at $C_L = 0$ is plotted against R in Fig. 10. Scale effect is, on the whole, small, but there does appear to be a consistent difference between the scale effect on the purely triangular models (Delta 1 — aspect ratio 3·87, and Delta 2) and that on the wings with straight tips.

In (*a*), Fig. 9, it will be seen that the magnitude of C_m increases appreciably as the aspect ratio increases and the addition of the body causes a small forward movement of the centre of pressure. C_m on Delta 3 is approximately the same as on Delta 1 of the same aspect ratio ; on the other hand C_m on Delta 2 is considerably greater in magnitude than on Delta 1 of the same aspect ratio.

The following table gives the position of the c.p. at small incidence.

Wing	Delta 1				Delta 2		Delta 3
Aspect ratio	3·87	3·04	3·04 with body	2·38	2·31	2·31 with body	3·07
$\bar{c}$ mean chord ft	1·016	1·135	1·135	1·251	1·299	1·299	1·32
$C_0/\bar{c}$ C_0 = chord of centre-section	1·97	1·763	1·763	1·598	2	2	1·614
Quarter-chord axis/$\bar{c}$ from leading-edge apex	0·985	0·866	0·866	0·752	1	1	1·01
$\dfrac{dC_m}{dC_L}$ $R = 1\cdot6 \times 10^6$ $R = 8 \times 10^6$	−0·108 −0·111	−0·063 −0·069	−0·051 −0·060	−0·023 −0·033	−0·156 −0·161	−0·147 −0·153	−0·061 −0·078
C.P. from leading edge apex in terms of $\bar{c}$ $R = 1\cdot6 \times 10^6$ $R = 8 \times 10^6$	1·093 1·096	0·929 0·935	0·917 0·926	0·775 0·785	1·156 1·161	1·147 1·153	1·071 1·088
C.P. from trailing edge in terms of $\bar{c}$ $R = 1\cdot6 \times 10^6$ $R = 8 \times 10^6$	0·877 0·874	0·834 0·828	0·846 0·837	0·823 0·813	0·844 0·839	0·853 0·844	0·543 0·526

The effect of the flaps on the triangular wings Delta 1 and 2 is seen in (b) Fig. 9. Adding the flap to Delta 1 of the aspect ratio 3·04 moves the curve roughly parallel to itself corresponding to a backward movement of the c.p. The same occurs in the case of Delta 2 with the flap in the aft position. Adding the flap to the latter in the forward position does not have much effect below the stall.

In the case of Delta 3 (*see* (c), Fig. 9) the straight flap does not greatly affect C_m; the 'V' flap on the other hand causes a diminution in the value of C_m corresponding to a forward movement of the c.p.

7. The experiments on the three models on the whole yielded somewhat disappointing results, particularly with regard to the scale effect on $C_{L\max}$ and the effect of flaps. It was for this reason that it was decided to alter the section of Delta 1 and to repeat, on the modified model, some of the experiments already described. The effect of this change will now be considered.

8. As has been stated in section 1, the modification consisted of a reduction of 1·5 per cent in the length of the local chord at the leading edge with an associated increase in the leading-edge radius from 0·0069*c* to 0·018*c*. The change in the section extended only as far as 0·05*c* from the old leading edge (*i.e.*, as far as 0·035*c* from the new leading edge). Tabulated ordinates in terms of the original chord, are included in Table 1 with the ordinates of the original section.

The form of the modified nose was determined at the Royal Aircraft Establishment and corresponds to the nose of a section designed by Thwaites (H.S. A1). The modification was carried out at the Royal Aircraft Establishment.

As in the earlier case, three different aspect ratios were considered ; they were obtained by successively removing the same two sections from each wing tip. The three values of the aspect ratio were 3·92, 3·09 and 2·42.

The effect of the same flap as before, was considered on the intermediate wing (aspect ratio 3·09) but no body was fitted to the modified model.

The ranges of incidence and of Reynolds number were approximately those defined in section 4. The general remarks at the beginning of section 5 also apply.

9. *Results.*—Values of C_L, C_D and C_m are given in Table 4 for the two highest values in each case (*see* footnote, section 5). The following is a list of the plotted results :—

Fig. 12 C_L against α at two values of R (2×10^6 approx. and the highest)

Fig. 13 (a) $C_{L\max}$ against R.

(b) $dC_L/d\alpha$ at $\alpha = 0$ against R.

Fig. 14 (a) C_m against R.

(b) dC_m/dC_L at $C_L = 0$ against R.

Fig. 15 (a) C_D against C_L^2 at stated values of R.

(b) $C_{D\min}$ against R.

(c) C_{Di}/C_L^2 at $C_L = 0$ against R.

The values aspect ratio in these figures are means of the values for the original and modified models.

10. *Discussion.—Lift.*—Figs. 13a and 13b show that increasing the nose radius increases the lift slope and $C_{L\max}$; the former over the entire range of R. The increase in $C_{L\max}$ is most marked at $R = 5 \times 10^6$ after which $C_{L\max}$ decreases again in a very pronounced manner, particularly when

the aspect ratio is 2·42. In this case two curves $C_{L\max}$ against R were obtained. This fall in $C_{L\max}$ with increasing R at high value of R in the Compressed Air Tunnel seems to be characteristic of bluff-nose sections. Rounding off the leading edge of the circular-back sections with flat under-surface had a similar effect after a certain degree of roundness had been exceeded (R. & M. 2301[3], 1948). The double curve obtained at aspect ratio 2·42 is a characteristic which appears to be associated with a rapidly falling $C_{L\max}$; it may possibly be due to the flow near the stall being more critical than usual and more liable to be upset by turbulence in the Compressed Air Tunnel.

$\Delta C_{L\max}$ due to flap is approximately the same on both the original and modified wings and the increase in $dC_L/d\alpha$ due to the modification is roughly the same with the three different aspect ratios at all the values of R considered.

Drag.—The minimum drag (Fig. 15b) at $R = 10^7$ is almost unchanged after the modification when aspect ratio = 2·42, but increases on the other two models. The slope of the C_D vs. C_L^2 curve is slightly less at high values of R, giving an induced drag coefficient of a somewhat lower value, approximately $1/\pi A$, where A is the aspect ratio. On the other hand, at low values of R, C_{Di}/C_L^2 is greater than before and the scale effect on the induced drag coefficient is thus appreciably more marked (Fig. 15).

Moment.—The change in C_m due to the modification is shown in Figs. 14a and 14b. dC_m/dC_L at $\alpha = 0$ shows a slight decrease numerically over the entire range of R used; the actual distance of the c.p. from the trailing edge is hardly altered.

11. *Conclusions.*—In conclusion it may be stated that increasing the radius of the leading edge has not yielded an improved $C_{L\max}$ vs. R curve; what improvement there is in the actual value of $C_{L\max}$ at about $R = 5 \times 10^6$, has been lost owing to the adverse scale effect beyond that value of R. Finally, although the induced drag coefficient on the modified Delta 1 model is somewhat less than on the original wing, the minimum-drag coefficient is greater.

REFERENCES

No.	*Author*	*Title, etc.*
1	R. Hills, R. C. Lock and J. G. Ross ..	Interim note on wind-tunnel tests on a model delta wing. A.R.C. 10,535. February, 1947.
2	R. Jones and C. J. W. Miles	Tests on three equilateral triangular plates in the Compressed Air Tunnel. R. & M. 2518. September, 1946.
3	D. H. Williams, A. F. Brown and C. J. W. Miles	Tests on four circular-back aerofoils in the Compressed Air Tunnel. R. & M. 2301. June, 1946.

TABLE 1

Ordinates of Wing Section in Terms of Chord

Distance from leading edge	Height above chord × 100	Distance from leading edge	Height above chord × 100
0	0	0·40	4·96
0·005	0·825	0·45	4·77
0·0075	1·008	0·50	4·49
0·0125	1·300	0·55	4·15
0·025	1·821	0·60	3·75
0·050	2·53	0·65	3·32
0·075	3·04	0·70	2·86
0·100	$3{\cdot}44_5$	0·75	2·39
0·15	4·05	0·80	1·92
0·20	$4{\cdot}47_5$	0·85	$1{\cdot}43_5$
0·25	4·76	0·90	0·95
0·30	$4{\cdot}93_5$	0·95	0·48
0·35	5·00	1·0	0
		Nose radius = 0·0069 × chord	

Ordinates of the Modified Section near the Leading Edge in Terms of the Chord of the Original Section

Distance from original leading-edge position	Height above chord × 100
0·015	0
0·02	1·24
0·0225	1·48
0·0275	1·80
0·040	2·27
0·050	2·53

Nose radius 0·018 chord

Beyond 0·050*c* from the original leading-edge position, the two sections are identical.

Ordinates of Body Generator in Terms of Length

Distance from forward end	Radius of section × 100	Distance from forward end	Radius of section × 100
0	0	0·55	6·57
0·025	2·72	0·60	6·10
0·05	3·77	0·65	5·55
0·10	5·15	0·70	4·94
0·15	6·17	0·75	4·26
0·20	6·73	0·80	3·51
0·25	7·16	0·85	2·69
0·30	7·41	0·90	1·81
0·35	7·50	0·95	0·90
0·40	7·44	0·975	0·46
0·45	7·25	1·00	0
0·50	6·95	Nose Radius = 0·20 × length	

TABLE 2

Dimensions and Details of Models

Dimensions in brackets refer to the modified Delta 1 wing.

Wing	Delta 1			Delta 2	Delta 3
Span (ft)	3·93	3·446	2·971	3	4·05
Area (sq ft)	3·99 (3·93)	3·925 (3·865)	3·73 (3·675)	3·897	5·345
Aspect ratio	3·87 (3·925)	3·04 (3·09)	2·38 (2·42)	2·31	3·07
Mean chord (ft)	1·016 (1·001)	1·135 (1·118)	1·251 (1·232)	1·299	1·32
Chord centre-section (ft)	2 (1·97)	2 (1·97)	2 (1·97)	2·598	2·133
Chord at tips (ft)	0	0·286 (0·282)	0·536 (0·527)	0	0·533
Quarter-chord from leading-edge apex (ft)* ..	1 (0·985)	0·983 (0·967)	0·94 (0·931)	1·299	1·333

Flap

Wing	Delta 1 Aspect ratio 3·04 (3·09)	Delta 2	Delta 3
Length (without body) (ft)	2	1·5	2 straight 2·143 'V'
Length (with body) (ft)	1·533	1·15 aft position 1·067 for'd position	
Chord (ft)	0·3	0·39	0·346
Angle to wing surface	60 deg	60 deg	60 deg
Distance from tailing edge (ft)	0·3	0·39 aft position 0·833 for'd position	*see* Fig. 3

* The quarter-chord point is defined as the integral over the span, of the product of the local chord and the distance of the local quarter-chord from a given datum divided by the plan area of the wing. In these cases, the datum is the line through the leading-edge apex, perpendicular to the centre-line of the wing.

TABLE 2—*continued*

Fuselage

Wing	Delta 1 Aspect ratio 3·04 (3·09)	Delta 2	Delta 3
Length (ft)	3·75	3·75	not tested with body
Max. diameter (ft)	0·562	0·562	
Forward end from leading-edge wing (apex) (ft)	0·612 (0·642)	0·517	

The 24-in. straight flap on Delta 3 was perpendicular to the centre-line of the wing and the hinge was 4·15-in. forward of the apex of the trailing edge.

The 25·72-in. 'V' flap consisted of two lengths 12·86-in. parallel to the trailing edge with the outboard ends in the same positions as the ends of the straight flap (*see* Fig. 3).

Delta 1, aspect ratio 3·87 and 2·38, were not tested with body or flaps.

Delta 3 was not tested with body.

Angle at the leading-edge apex of Delta 3, 79·6 deg.

Angle at the trailing-edge apex of Delta 3, 136·5 deg. Sweepback of leading-edge, 50·2 deg.

TABLE 3

Delta 1—Right-Angle at Leading Edge. Aspect Ratio 3·04

Wing alone — $P = 24{\cdot}7$ Atm $\rho V^2 = 136{\cdot}6$; $V = 49{\cdot}1$ ft/sec $R = 8{\cdot}27 \times 10^6$

α (deg)	C_L	C_D	C_m
−0·65	−0·035	0·0065	+0·0033
+0·6	+0·029	0·0065	−0·0011
1·8$_5$	0·092	0·0070	−0·0055
3·0$_5$	0·158	0·0095	−0·0100
5·5	0·287	0·0152	−0·0190
9·1	0·482	0·0327	−0·0340
12·7	0·672	0·0577	−0·0490
15·1$_5$	0·790	0·0897	−0·0609
17·6$_5$	0·852	0·156$_5$	−0·0639
18·9$_5$	0·868	0·191	−0·0664
20·2	0·878	0·229	−0·0721
21·5$_5$	0·878	0·271	−0·0784
22·8$_5$	0·865	0·306	−0·0870
24·1$_5$	0·840	0·337	−0·0993
25·4$_5$	0·820	0·364	−0·1113
26·7$_5$	0·794	0·384	−0·1180

Wing and body — $P = 24{\cdot}9$ Atm $\rho V^2 = 136{\cdot}6$; $V = 48{\cdot}45$ ft/sec $R = 8{\cdot}48 \times 10^6$

α (deg)	C_L	C_D	C_m
−0·6$_5$	−0·037	0·0089	+0·0028
+0·6	+0·028	0·0086$_5$	−0·0008
1·8$_5$	0·093	0·0092	−0·0045
3·0$_5$	0·157	0·0104	−0·0085
5·5	0·286	0·0173	−0·0171
9·1	0·478	0·0338	−0·0302
12·6$_5$	0·670	0·0601	−0·0451
15·0$_5$	0·790	0·0932	−0·0556
16·3	0·818	0·1312	−0·0556
17·6	0·847	0·162$_5$	−0·0568
18·9	0·852	0·200	−0·0606
20·2	0·838	0·239	−0·0651
21·5$_5$	0·828	0·279	−0·0695
22·9	0·770	0·311	−0·0787

Wing and flap — $P = 24{\cdot}8$ Atm $\rho V^2 = 76{\cdot}8$; $V = 36{\cdot}5$ ft/sec $R = 6{\cdot}29 \times 10^6$

α (deg)	C_L	C_D	C_m
−5·05$_5$	0·241	0·138	−0·128
−1·38$_5$	0·423	0·153	−0·142
+2·3$_5$	0·602	0·172	−0·156
6·1	0·775	0·201	−0·172
9·6$_5$	0·951	0·238	−0·189
13·3	1·102	0·315	−0·211
14·5$_5$	1·147	0·345	−0·217
15·8	1·178	0·385	−0·222
17·1	1·194	0·422	−0·227
18·4	1·173	0·458	−0·229
19·7$_5$	1·128	0·490	−0·232
21·1	1·090	0·528	−0·240
22·5	1·008	0·541	−0·249

Wing, body and flap — $P = 24{\cdot}8$ Atm $\rho V^2 = 76{\cdot}8$; $V = 36{\cdot}4$ ft/sec $R = 6{\cdot}32 \times 10^6$

α (deg)	C_L	C_D	C_m
−3·7	0·245	0·103$_5$	−0·120
−1·2$_5$	0·367	0·114	−0·127
+2·4$_5$	0·545	0·131$_5$	−0·140
6·2	0·724	0·158	−0·153
9·7$_5$	0·899	0·190	−0·167
13·4	1·062	0·265	−0·189
14·6$_5$	1·100	0·301	−0·195
15·9	1·120	0·339	−0·193
17·2$_5$	1·118	0·380	−0·194
18·6	1·070	0·421	−0·193
19·9$_5$	1·004	0·452	−0·197

Wing area .. .. 3·925 sq ft
Mean chord .. .. 1·135 ft
Quarter-chord from leading-edge apex .. 0·983 ft

Wing and flap:
Length of flap .. .. .. 24 in.
Flap chord .. .. .. 3·6 in.
Distance from trailing edge .. 3·6 in.

Wing, body and flap:
Length of flap .. .. .. 18·64 in.
Flap chord .. .. .. 3·6 in.
Distance from trailing edge .. 3·6 in.

TABLE 3—*continued*

Delta 1—Right-Angle at Leading Edge

Aspect ratio 2·38 Wing alone				Aspect ratio 3·87 Wing alone			
$P = 24$ Atm $\rho V^2 = 136\cdot7$ $V = 49\cdot8$ ft/sec $R = 8\cdot96 \times 10^6$				$P = 24\cdot8$ Atm $\rho V^2 = 136\cdot7$ $V = 49\cdot0$ ft/sec $R = 7\cdot41 \times 10^6$			
α (deg)	C_L	C_D	C_m	α (deg)	C_L	C_D	C_m
−0·7	$-0\cdot031_5$	0·0072	+0·0015	$-0\cdot6_5$	−0·037	0·0074	+0·0045
$+0\cdot6_5$	+0·026	0·0068	−0·0003	+0·6	+0·032	0·0065	−0·0030
$1\cdot8_5$	$0\cdot084_5$	0·0074	−0·0018	1·8	0·100	0·0078	−0·0107
3·1	0·141	0·0092	−0·0039	3·0	0·167	0·0094	−0·0177
5·6	0·262	0·0160	−0·0085	5·4	0·305	0·0149	−0·0339
$9\cdot2_5$	0·436	0·0338	−0·0180	$8\cdot9_5$	0·503	0·0299	−0·0544
$12\cdot8_5$	0·611	0·0613	−0·0299	12·5	0·682	0·0669	−0·0661
15·3	0·727	0·0855	−0·0394	$14\cdot9_5$	0·777	0·106	−0·0684
17·8	0·845	$0\cdot114_5$	−0·0502	17·8	0·854	$0\cdot160_5$	−0·0689
19·0	0·900	0·131	−0·0539	18·7	0·891	0·203	−0·0790
$20\cdot2_5$	0·961	0·150	−0·0627	20·0	0·891	0·232	−0·0795
21·6	0·887	0·182	−0·0864	$21\cdot3_5$	0·887	0·274	−0·088
22·9	0·867	0·304	−0·0916	22·6	0·875	0·308	−0·098
25·5	0·819	0·359	−0·1107	$23\cdot9_5$	0·843	0·342	−0·122

Wing area	3·73 sq ft	Wing area	3·99 sq ft
Mean chord	1·251 ft	Mean chord	1·016 ft
Quarter-chord from leading-edge apex..	0·94 ft	Quarter-chord from leading-edge apex ..	1 ft

TABLE 4

Modified Delta 1. *Aspect Ratio* 3·09

Wing alone								Wing and flap							
$P = 11\cdot84$ Atm $\rho V^2 = 123\cdot8$ $V = 67\cdot0$ ft/sec $R = 5\cdot47 \times 10^6$				$P = 24\cdot0$ Atm $\rho V^2 = 215$ $V = 62\cdot6$ ft/sec $R = 9\cdot99 \times 10^6$				$P = 18\cdot9$ Atm $\rho V^2 = 77\cdot1$ $V = 42\cdot05$ ft/sec $R = 5\cdot39 \times 10^6$				$P = 24\cdot1$ Atm $\rho V^2 = 215$ $V = 62\cdot3$ ft/sec $R = 10\cdot05 \times 10^6$			
α (deg)	C_L	C_D	C_m	α (deg)	C_L	C_D	C_m	α (deg)	C_L	C_D	C_m	α (deg)	C_L	C_D	C_m
−0·8	−0·049	0·0074	+0·0033	−0·8	−0·042	0·0074	+0·0027	−4·0	0·302	0·144	−0·133	−3·9$_5$	0·280	0·144	−0·129
+0·4	+0·015	0·0071	−0·0004	+5·2$_5$	+0·276	0·0147	−0·0175	−0·3$_5$	0·485	0·160	−0·148	+6·9$_5$	0·818	0·213	−0·171
1·6	0·081	0·0077	−0·0042	11·2$_5$	0·600	0·0461	−0·0391	+3·3$_5$	0·670	0·187	−0·160	14·3	1·123	0·356	−0·206
2·8	0·146	0·0088	−0·0082	17·45	0·860	0·1365	−0·0581	7·0	0·848	0·215	−0·174	15·5$_5$	1·160	0·410	−0·211
5·2$_5$	0·277	0·0167	−0·0170	18·7	0·865	0·168	−0·0595	10·6	1·014	0·250	−0·188	16·8$_5$	1·171	0·450	−0·216
7·6$_5$	0·412	0·0246	−0·0256	20·0	0·877	0·216	−0·0686	14·2$_5$	1·170	0·313	−0·201	18·1$_5$	1·165	0·490	−0·222
12·4$_5$	0·674	0·0571	−0·0446	21·3	0·879	0·271	−0·0784	15·5	1·207	0·353	−0·211	+19·4$_5$	1·154	0·520	−0·230
17·4$_5$	0·903	0·129	−0·0639	22·6	0·876	0·307	−0·0895	17·0$_5$	1·248	0·396	−0·221				
18·7	0·932	0·157	−0·0650	+24·0	+0·846	0·337	−0·092	18·0$_5$	1·256	0·432	−0·227				
19·8$_5$	0·948	0·189	−0·0645					19·4	1·215	0·472	−0·231				
21·3	0·954	0·223	−0·0692					+20·8	1·169	0·483	−0·242				
22·5$_5$	0·962	0·270	−0·0801												
23·9	0·949	0·310	−0·1024												
+25·3$_5$	+0·895	0·345	−0·1089												

Wing area	3·865 sq ft		Length of flap	24 in.
Mean chord	1·118 ft		Flap chord	3·6 in.
Quarter-chord from leading-edge apex ..	0·967 ft		Distance from trailing edge	3·6 in.

TABLE 4—*continued*

Modified Delta 1

Aspect ratio 2·42 Wing alone								Aspect ratio 3·92 Wing alone							
$P = 18\cdot4$ Atm $\rho V^2 = 77\cdot0$ $V = 42\cdot3$ ft/sec $R = 5\cdot94 \times 10^6$				$P = 24\cdot8$ Atm $\rho V^2 = 214\cdot5$ $V = 61\cdot2$ ft/sec $R = 11\cdot32 \times 10^6$				$P = 21\cdot2$ Atm $\rho V^2 = 111$ $V = 48\cdot1$ ft/sec $R = 5\cdot98 \times 10^6$				$P = 21\cdot2$ Atm $\rho V^2 = 215$ $V = 66\cdot7$ ft/sec $R = 8\cdot37 \times 10^6$			
α (deg)	C_L	C_D	C_m	α (deg)	C_L	C_D	C_m	α (deg)	C_L	C_D	C_m	α (deg)	C_L	C_D	C_m
$-0\cdot8_5$	−0·044	0·0081	+0·0011	$-0\cdot8_5$	−0·050	0·0076	+0·0011	−0·8	−0·55	0·0076	+0·0050	−0·8	−0·043	0·0085	+0·0043
+0·3	+0·014	0·0075	−0·0001	+0·4	+0·014	0·0072	+0·0005	+0·4	+0·014	0·0073	−0·0007	+0·4	+0·017	0·0073	−0·0015
$1\cdot6_5$	0·071	0·0083	−0·0010	$1\cdot6_5$	0·072	0·0072	−0·0006	$1\cdot5_5$	0·087	0·0085	−0·0083	$1\cdot5_5$	0·092	0·0087	−0·0091
2·9	0·129	0·0094	−0·0022	2·9	0·131	0·0097	−0·0019	$2\cdot7_5$	0·156	0·0094	−0·0153	2·7	0·163	0·0094	−0·0157
5·3	0·244	0·0154	−0·0058	5·3	0·251	0·0150	−0·0049	$6\cdot3_5$	0·367	0·0180	−0·0365	$6\cdot2_5$	0·380	0·0182	−0·0372
$7\cdot7_5$	0·361	0·0251	−0·0101	$7\cdot7_5$	0·369	0·0257	−0·0094	10·0	0·572	0·0360	−0·0549	$9\cdot8_5$	0·586	0·0359	−0·0551
$10\cdot2_5$	0·478	0·0398	−0·0155	10·2	0·487	0·0400	−0·0146	13·5	0·750	0·0655	−0·0646	$13\cdot3_5$	0·782	0·0756	−0·0635
12·6	0·602	0·0581	−0·0216	12·6	0·606	0·0580	−0·0207	17·3	0·883	0·126	−0·0613	$15\cdot8_5$	0·839	0·109	−0·0638
$15\cdot0_5$	0·727	0·0826	−0·0288	$15\cdot0_5$	0·728	0·0820	−0·0290	$18\cdot5_5$	0·932	0·161	−0·0669	17·2	0·878	0·152	−0·0675
16·3	0·785	0·0958	−0·0328	16·3	0·788	0·0965	−0·0329	19·8	0·948	0·200	−0·0712	18·4	0·893	0·194	−0·0726
17·6	0·838	$0\cdot109_5$	−0·0371	$17\cdot5_5$	0·842	0·116	−0·0384	21·1	0·965	0·243	−0·0787	$19\cdot6_5$	0·905	0·254	−0·0792
18·8	0·900	0·126	−0·0412	18·8	0·882	0·135	−0·0524	$22\cdot3_5$	0·943	0·282	−0·0849	21·0	0·895	0·295	−0·0925
$20\cdot1_5$	0·953	0·143	−0·0457	20·1	0·917	0·166	−0·0602	+23·7	+0·922	0·327	−0·0983	$22\cdot2_5$	0·910	0·330	−0·102
$21\cdot3_5$	1·005	0·159	−0·0508	+21·4	+0·885	0·251	0·0792					$+23\cdot5_5$	+0·883	0·377	−0·112
$22\cdot5_5$	1·062	0·181	−0·0578												
$+24\cdot0_5$	+0·926	0·241	−0·0919												

Aspect ratio 2·42:

Wing area .. .. 3·675 sq ft
Mean chord .. .. 1·232 ft
Quarter-chord from leading-edge apex .. .. 0·931 ft

Aspect ratio 3·92:

Wing area .. .. 3·93 sq ft
Mean chord .. .. 1·001 ft
Quarter-chord from leading-edge apex .. .. 0·985 ft

TABLE 5

Delta 2—Equilateral Triangle

Aspect ratio 2·31 Wing alone				Wing and flap in forward position				Wing and flap in aft position			
$P = 24{\cdot}8$ Atm $\rho V^2 = 136{\cdot}4$ $V = 49{\cdot}2$ ft/sec $R = 9{\cdot}28 \times 10^6$				$P = 23{\cdot}7$ Atm $\rho V^2 = 76{\cdot}8$ $V = 37$ ft/sec $R = 7{\cdot}00 \times 10^6$				$P = 25$ Atm $\rho V^2 = 76{\cdot}8$ $V = 36{\cdot}8$ ft/sec $R = 7{\cdot}06 \times 10^6$			
α (deg)	C_L	C_D	C_m	α (deg)	C_L	C_D	C_m	α (deg)	C_L	C_D	C_m
−0·8	−0·040	0·0074	0·0068	−6·0	0·112	0·125	−0·0168	−6·2	0·143$_5$	0·109	−0·128$_5$
0·4$_5$	0·013	0·0068	−0·0018	−2·3$_5$	0·217	0·127	−0·0322	−2·6	0·290	0·126	−0·151$_5$
1·7	0·065	0·0073	−0·0102	1·3$_5$	0·352	0·134$_5$	−0·0504	1·1$_5$	0·433	0·150	−0·175$_5$
2·9	0·117	0·0088	−0·0188	5·1	0·468	0·152$_5$	−0·0674	4·8$_5$	0·568	0·177	−0·199
5·3$_5$	0·220$_5$	0·0131	−0·0354	8·9	0·575	0·175$_5$	−0·0828	8·5$_5$	0·691	0·213	−0·221$_5$
9·1	0·375	0·0284	−0·0612	12·6$_5$	0·662	0·206	−0·0908	12·3	0·823	0·267	−0·245
12·7$_5$	0·524	0·0559	−0·0851	16·5$_5$	0·734	0·277	−0·0904	16·1$_5$	0·944	0·342	−0·269
16·5$_5$	0·668	0·105$_5$	−0·1131	17·8	0·750	0·308	−0·0911	19·9$_5$	1·009	0·436	−0·277
19·0$_5$	0·766	0·157$_5$	−0·1355	19·1$_5$	0·756	0·339	−0·0870	21·3$_5$	1·024	0·475	−0·276
21·7	0·856	0·218	−0·155	20·4$_5$	0·744	0·364	−0·0725	22·7	1·023	0·512	−0·270
24·1$_5$	0·924	0·295	−0·169	21·8	0·746	0·398	−0·0726	24·0	1·018	0·549	−0·264
26·7$_5$	1·015	0·399	−0·192$_5$	23·2	0·733	0·425	−0·0723	25·3	1·013	0·586	−0·252
28·0$_5$	1·070	0·451	−0·204	24·5	0·712	0·454	−0·0723	26·7	1·011	0·624	−0·264
29·4	1·098	0·502	−0·213	27·2$_5$	0·647	0·492	−0·0716	28·1	0·992	0·653	−0·268
30·8	1·122	0·556	−0·223	29·1	0·602	0·525	−0·0750				
32·2$_5$	1·132	0·599	−0·228								
33·6	1·129	0·659	−0·234$_5$								

Wing area .. .. 3·897 sq ft
Mean chord .. .. 1·299 ft
Quarter-chord from leading-edge apex .. 1·299 ft

Flap length .. .. .. 18 in.
Flap chord .. .. .. 4·68 in.
Distance from trailing edge .. 10 in.

Flap length .. .. .. 18 in.
Flap chord .. .. .. 4·68 in.
Distance from trailing edge .. 4·68 in.

TABLE 5—*continued*

Delta 2—Equilateral Triangle

Aspect ratio 2·31 Wing and Body				Wing, body and flap in forward position				Wing, body and flap in aft position			
P = 24·7 Atm ρV^2 = 76·8 V = 37·2 ft/sec R = 6·88 × 10^6				P = 24·7 Atm ρV^2 = 76·8 V = 36·9 ft/sec R = 7·03 × 10^6				P = 24·6 Atm ρV^2 = 76·8 V = 37·2 ft/sec R = 6·93 × 10^6			
α (deg)	C_L	C_D	C_m	α (deg)	C_L	C_D	C_m	α (deg)	C_L	C_D	C_m
−0·8	−0·026	0·0082	+0·0051	−5·9$_5$	0·034	0·012	0·0057	−6·1$_5$	0·082	0·0985	−0·0985
+0·4$_5$	+0·010	0·0081	−0·0013	−2·3$_5$	0·157	0·110	−0·0141	−2·5	0·233	0·103$_5$	−0·125$_5$
1·7	0·067	0·0092	−0·0093	+1·4$_5$	0·292	0·113$_5$	−0·0346	+1·2	0·384	0·117$_5$	−0·152$_5$
2·9	0·119	0·0104	−0·0171	5·1$_5$	0·415	0·123	−0·0517	4·8	0·526	0·139$_5$	−0·176
5·3$_5$	0·222	0·0155	−0·0327	7·6$_5$	0·497	0·135	−0·0630	8·6$_5$	0·658	0·169$_5$	−0·197$_5$
9·1	0·373	0·0302	−0·0563	10·2	0·573	0·150$_5$	−0·0722	12·3$_5$	0·787	0·217	−0·220
12·8	0·528	0·0605	−0·0820	12·6$_5$	0·641	0·174$_5$	−0·0786	16·1$_5$	0·912	0·291	−0·247
16·5	0·672	0·112	−0·108	13·9$_5$	0·666	0·191	−0·0783	18·7$_5$	0·965	0·352	−0·252
19·1	0·766	0·166	−0·128	15·2	0·682	0·215	−0·0742	21·4	0·989	0·438	−0·247
21·6	0·850	0·230	−0·146	16·5	0·700	0·246	−0·0695	22·8	0·978	0·467	−0·236
24·2	0·925	0·319	−0·163	17·8	0·703	0·269	−0·0625	24·2	0·985	0·504	−0·235
25·6	0·952	0·364	−0·170	19·2	0·682	0·293	−0·0508	25·4	0·992	0·546	−0·235
26·9	0·984	0·407	−0·174	20·6	0·682	0·320	−0·0406	26·8	0·985	0·578	−0·233
28·2	1·010	0·458	−0·184	22·0	0·667	0·341	−0·0312	28·1	1·004	0·621	−0·239
29·5	1·038	0·505	−0·193	23·3	0·667	0·376	−0·0311	29·6	0·974	0·643	−0·234
30·8$_5$	1·070	0·557	−0·201					31·0	0·930	0·663	−0·238
32·3$_5$	1·078	0·598	−0·200					32·5	0·859	0·664	−0·226
33·8	1·058	0·626	−0·194								
35·3$_5$	1·038	0·655	−0·191								

Wing area .. .. 3·897 sq ft
Mean chord .. .. 1·299 ft
Quarter-chord from leading-edge apex .. 1·299 ft

Flap length .. .. .. 12·8 in.
Flap chord .. .. .. 4·68 in.
Distance from trailing edge .. 10 in.

Flap length .. .. .. 13·8 in.
Flap chord .. .. .. 4·68 in.
Distance from trailing edge .. 4·68 in.

TABLE 6

Delta 3—Swept-back wing

Aspect ratio 3·07 Wing alone				Wing and 'V' flap				Wing and Straight flap			
$P = 24\cdot7$ Atm $\rho V^2 = 136\cdot5$ $V = 49\cdot3$ ft/sec $R = 9\cdot48 \times 10^6$				$P = 24\cdot8$ Atm $\rho V^2 = 76\cdot8$ $V = 37\cdot0$ ft/sec $R = 7\cdot08 \times 10^6$				$P = 24\cdot5$ Atm $\rho V^2 = 76\cdot8$ $V = 37\cdot2$ ft/sec $R = 7\cdot05 \times 10^6$			
α (deg)	C_L	C_D	C_m	α (deg)	C_L	C_D	C_m	α (deg)	C_L	C_D	C_m
$-0\cdot3_5$	−0·025	0·0062	+0·0021	−4·4	0·125	0·109	+0·012	$-4\cdot5_5$	0·145	0·120	
$+0\cdot8_5$	+0·035	0·0070	−0·0015	$-2\cdot0_5$	0·241	0·108	+0·006	−2·1	0·262	$0\cdot118_5$	−0·0209
2·1	0·095	0·0079	−0·0059	+0·4	0·343	0·107	−0·006	+0·3	0·366	0·126	−0·0294
3·3	0·155	0·0093	−0·0109	$2\cdot8_5$	0·448	0·113	−0·017	2·7	0·469	$0\cdot129_5$	−0·0355
$5\cdot6_5$	0·274	0·0152	−0·0198	5·2	0·549	$0\cdot120_5$	−0·025	5·1	0·579	0·147	−0·0445
9·1	0·454	0·0288	−0·0346	7·6	0·654	$0\cdot132_5$	−0·036	7·5	0·685	0·158	−0·0526
$12\cdot6_5$	0·627	0·0503	−0·0503	$10\cdot0_5$	0·748	0·143	−0·044	$9\cdot9_5$	0·780	0·173	−0·0626
$15\cdot0_5$	0·732	0·0673	−0·0604	12·5	0·851	0·161	−0·053	12·4	0·870	0·188	−0·0724
$17\cdot4_5$	0·841	$0\cdot111_5$	−0·0738	13·7	0·917	0·185	−0·059	13·6	0·930	0·207	−0·0783
$19\cdot9_5$	0·893	0·204	−0·0693	14·9	0·979	0·202	−0·065	14·8	0·974	0·212	−0·0833
21·3	0·915	0·254	−0·0629	16·4	0·885	0·278	−0·034	$16\cdot0_5$	1·025	0·228	−0·0939
22·6	0·930	0·299	−0·0603	$17\cdot8_5$	0·847	0·296	−0·023	$17\cdot6_5$	0·922	0·351	−0·0530
23·9	0·925	0·345	−0·0611	$19\cdot2_5$	0·814	0·335	−0·009	$18\cdot9_5$	0·922	0·393	−0·0429
$25\cdot2_5$	0·927	0·381	−0·0637	$20\cdot5_5$	0·792	0·364	−0·008	20·3	0·883	0·406	−0·0422
$+26\cdot5_5$	+0·908	0·410	−0·0706	$+23\cdot2_5$	0·727	0·457	−0·015	21·6	0·872	0·441	−0·0492
								+24·5	0·774	0·464	−0·0584

Wing area .. .. 5·345 ft
Mean chord .. .. 1·32 ft
Quarter-chord from leading-edge apex .. 1·333 ft

Flap length .. .. .. 25·72 in.
Flap chord .. .. .. 4·15 in.
Parallel to trailing edges

Flap length .. .. .. 24 in.
Flap chord .. .. .. 4·15 in.
Distance from trailing edge centre-section .. .. 4·15 in.

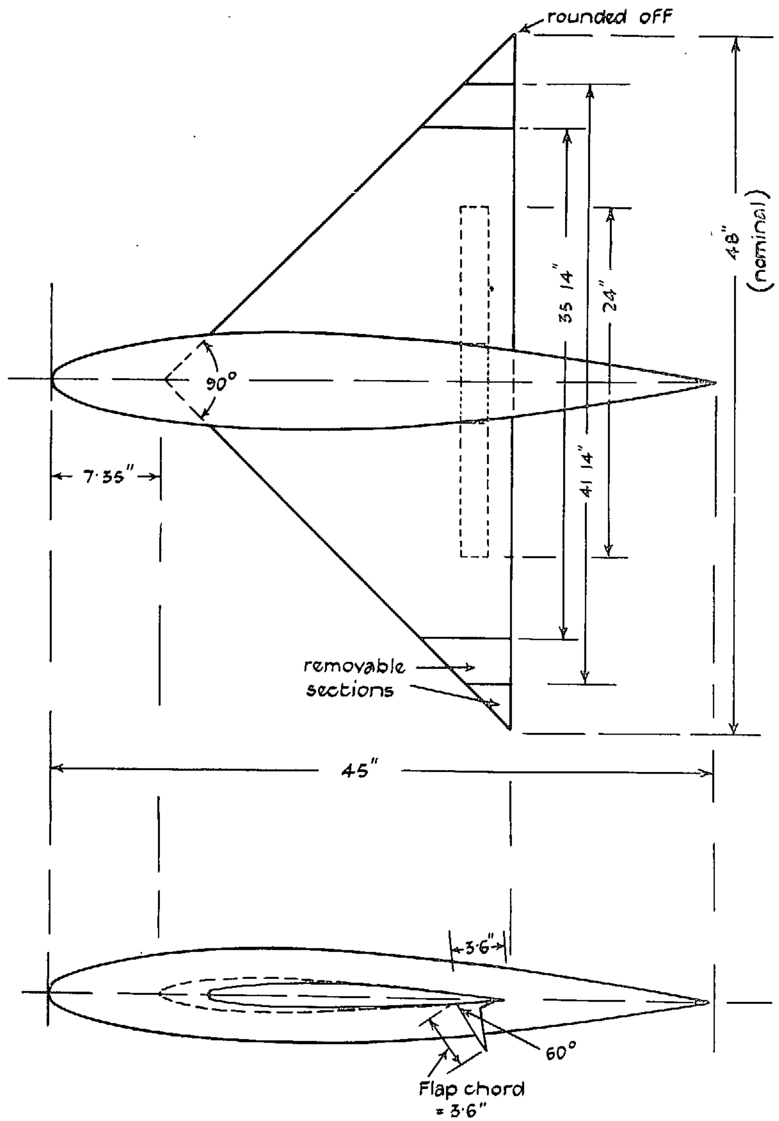

FIG. 1. Arrangement of original Delta 1 model.

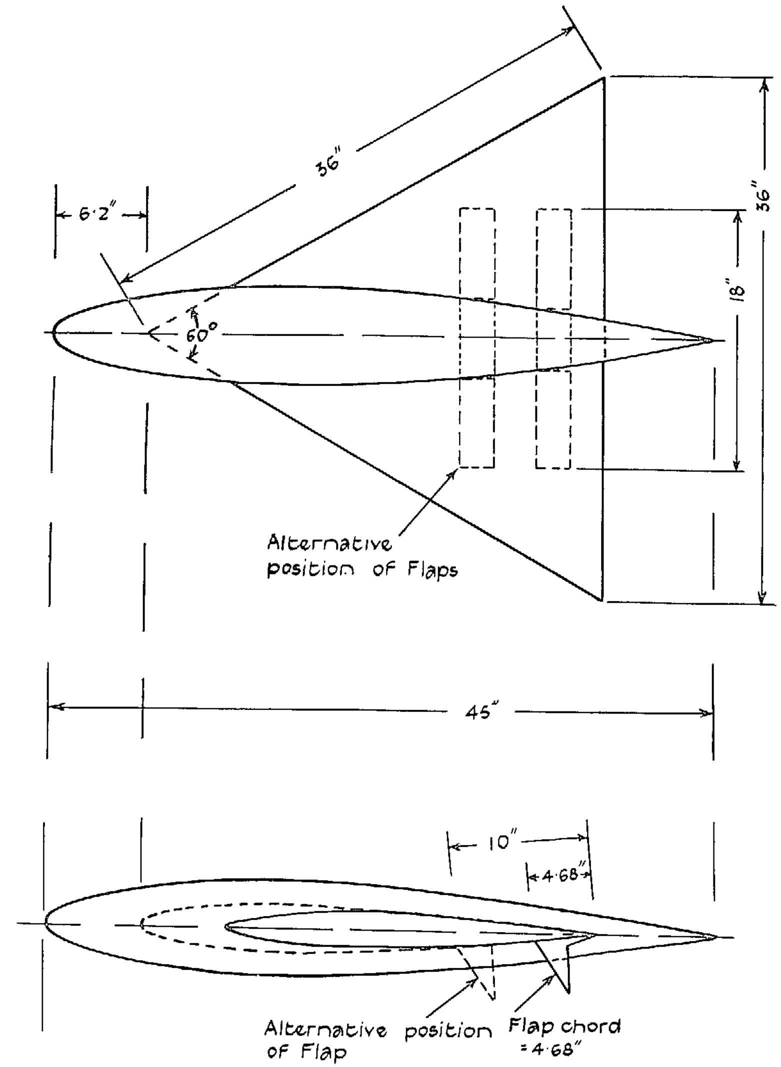

FIG. 2. Arrangement of Delta 2 model.

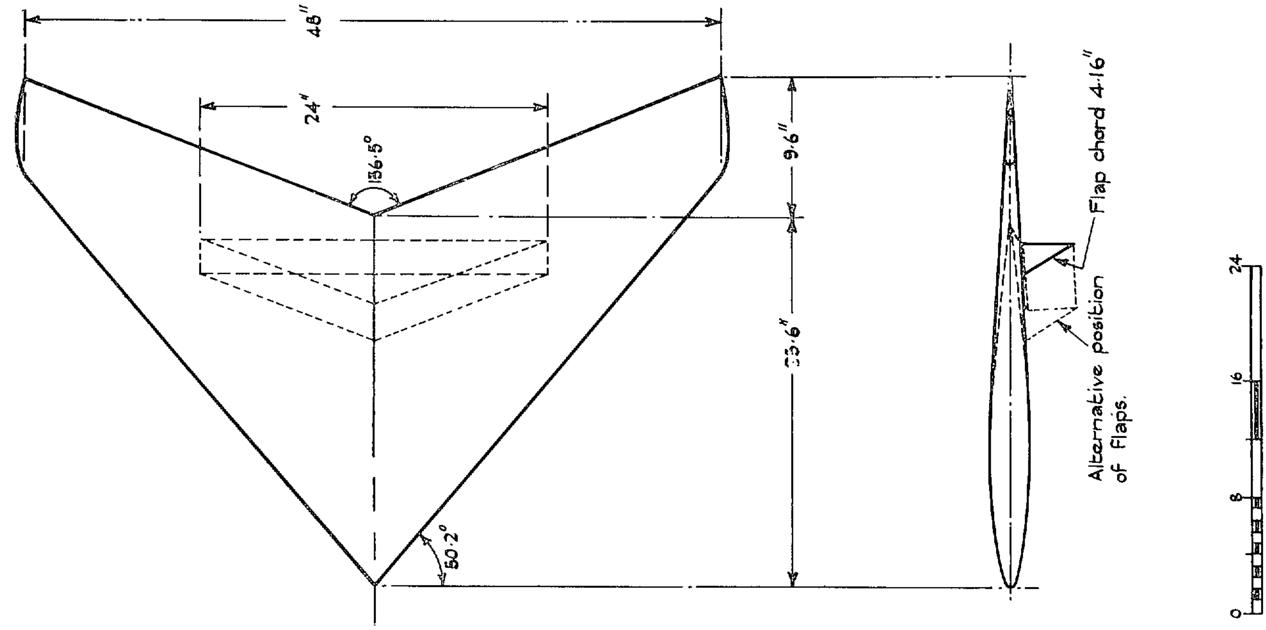

FIG. 3. Arrangement of Delta 3 model.

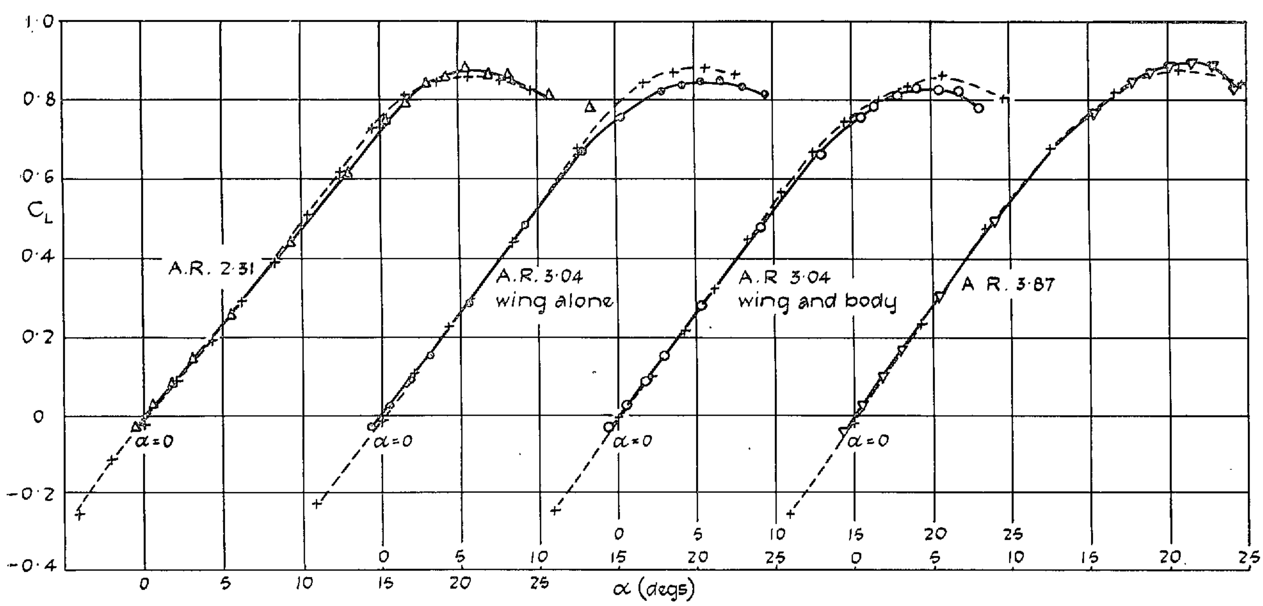

FIG. 4. C_L on Delta 1. Comparison with R.A.E. results (plotted — — — + — — —). $R = 2 \times 10^6$ approx.

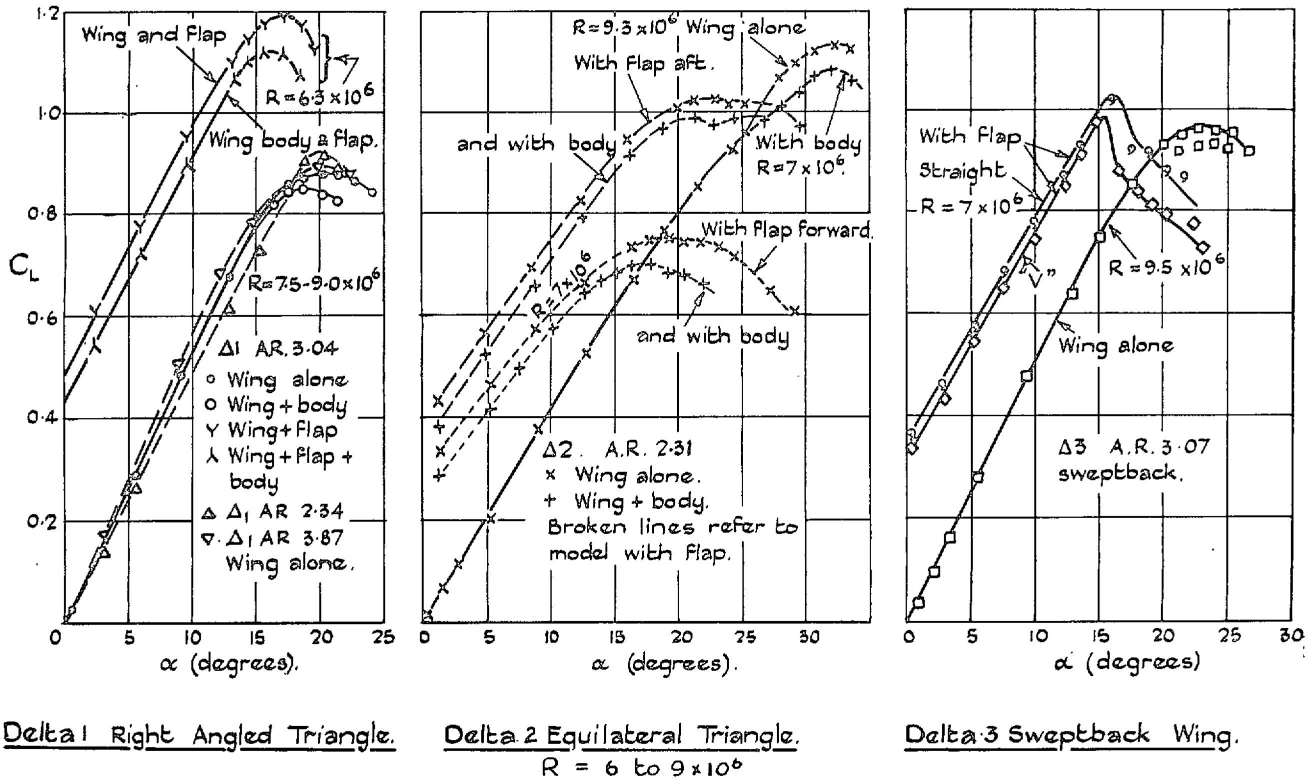

FIG. 5. C_L vs. α curves on original Delta 1 and on Delta 2 and Delta 3 models.

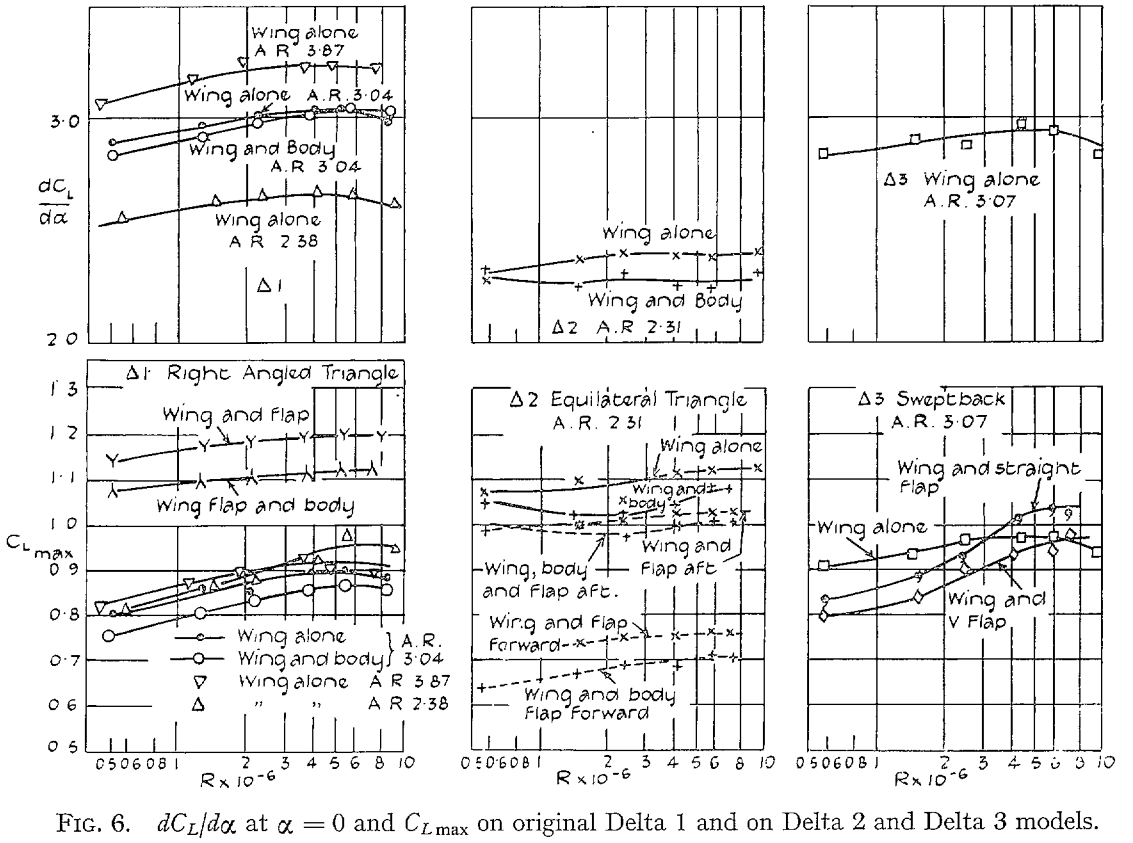

FIG. 6. $dC_L/d\alpha$ at $\alpha = 0$ and $C_{L\,max}$ on original Delta 1 and on Delta 2 and Delta 3 models.

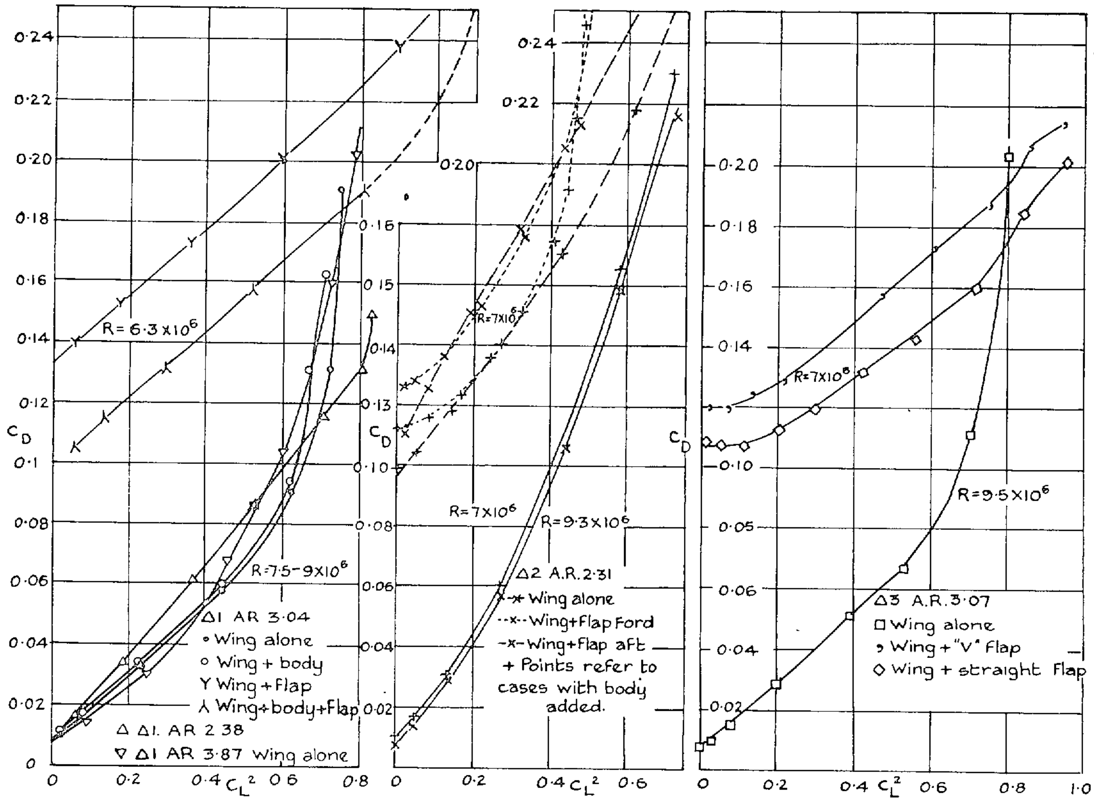

FIG. 7. C_D vs. $C_L{}^2$ on original Delta 1 and on Delta 2 and Delta 3 models.

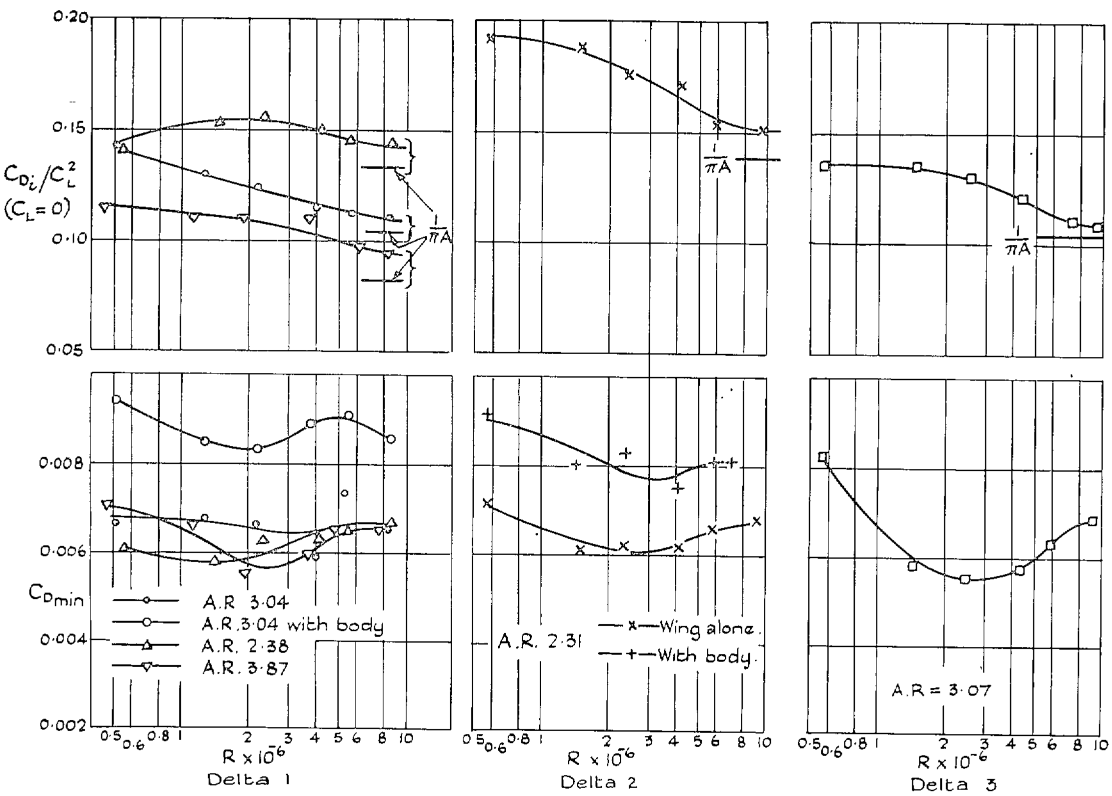

FIG. 8. $C_{D\,i}/C_L{}^2$ and $C_{D\,\min}$ on original Delta 1 and on Delta 2 and Delta 3 models.

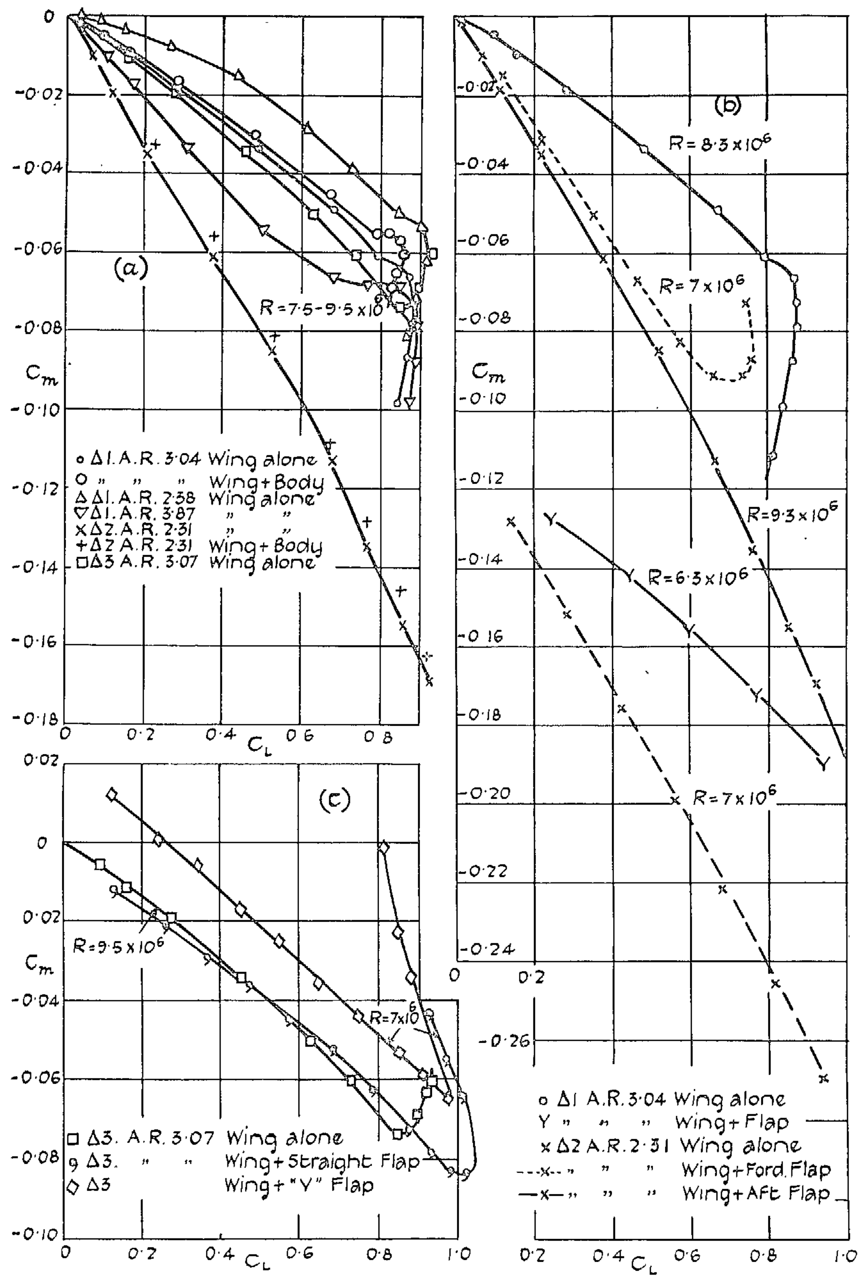

FIG. 9. C_m vs. C_L on original Delta 1 and on Delta 2 and Delta 3 models.

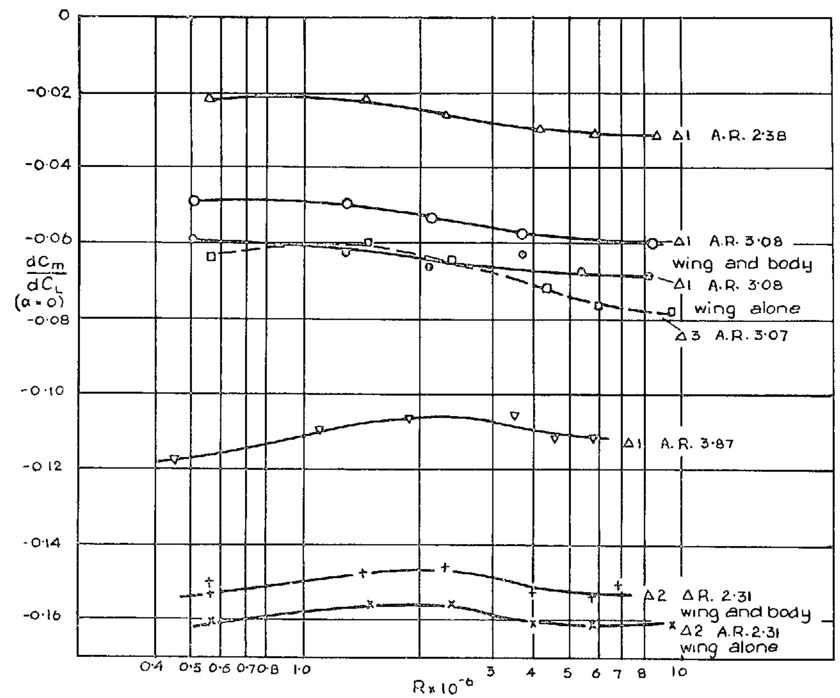

FIG. 10. dC_m/dC_L on original Delta 1 and on Delta 2 and Delta 3 models.

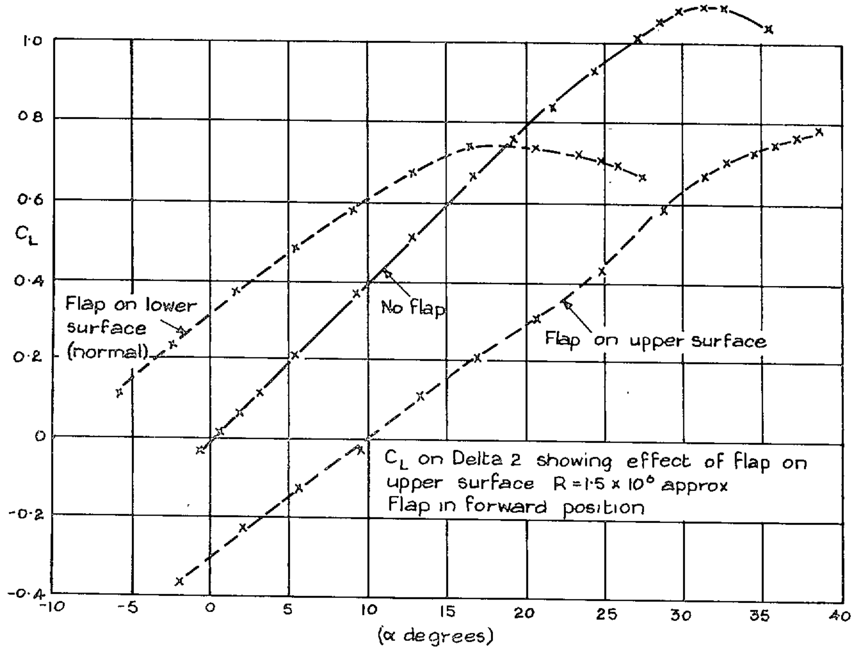

FIG. 11. C_L on Delta 2 model. Effect of flap on either surface.

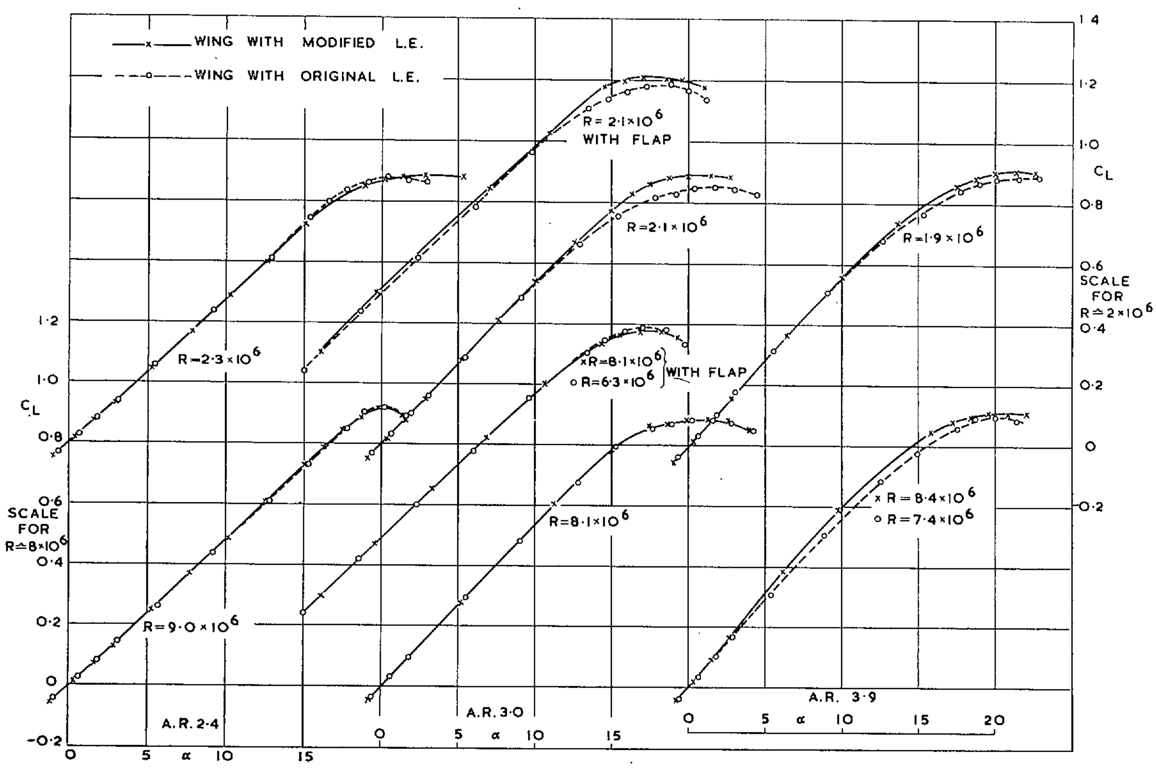

FIG. 12. C_L vs. α on original and modified Delta 1 model.

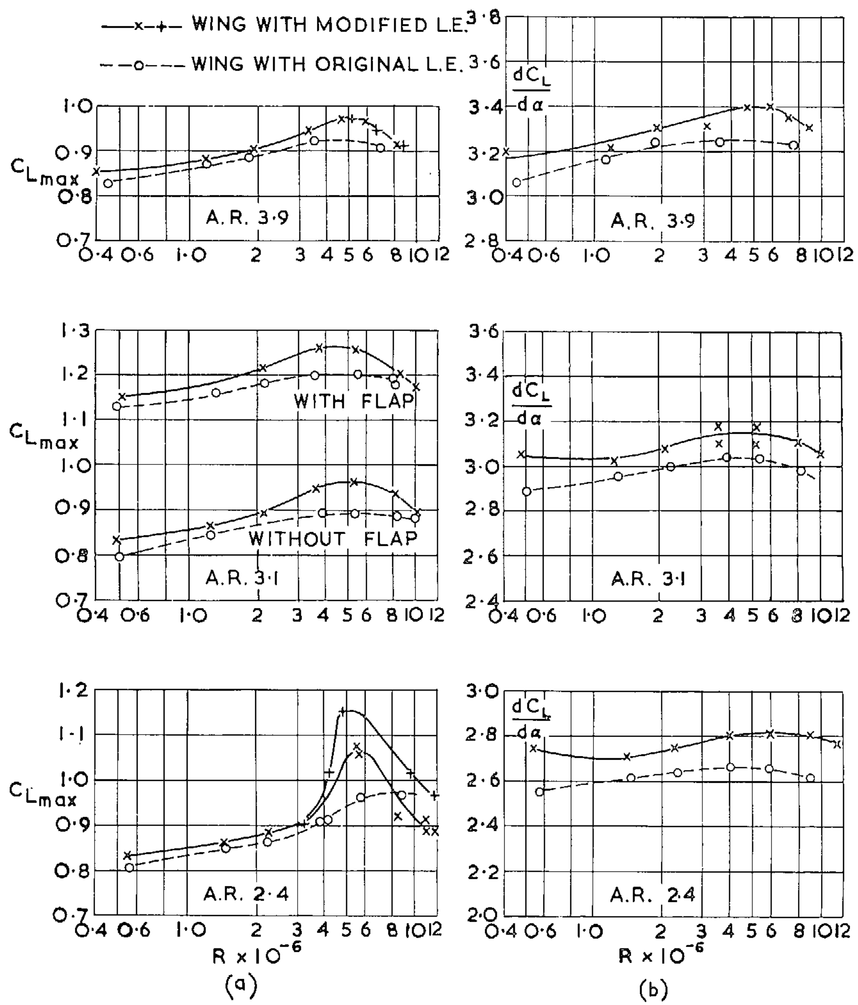

FIG. 13. $C_{L\,max}$ and $dC_L/d\alpha$ at $\alpha = 0$ on original and modified Delta 1 model.

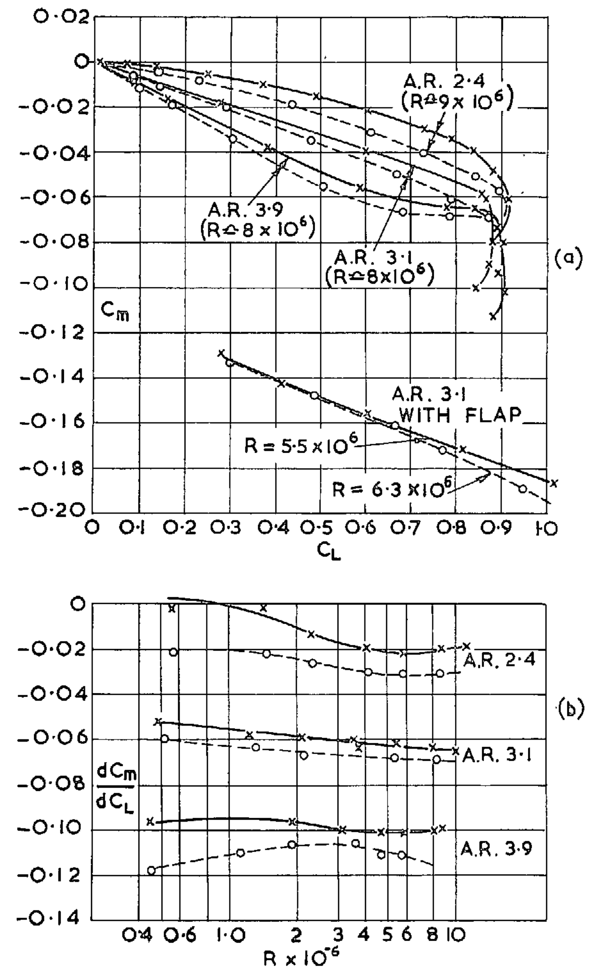

FIG. 14. C_m and dC_m/dC_L at $C_L = 0$ on original and modified Delta 1 model.

J4311 Wt18/9296 K9 11/54 D&Co. 34/263

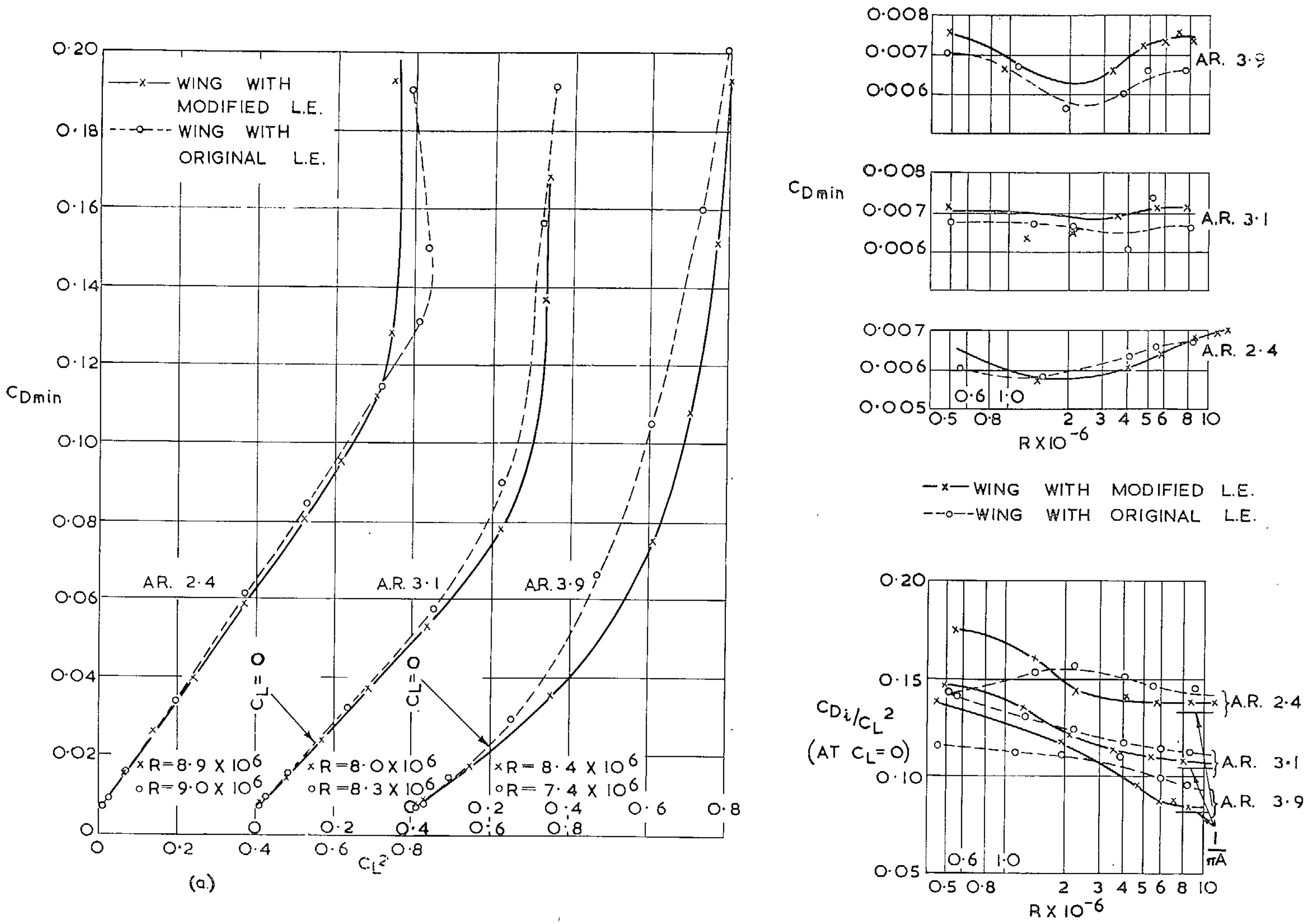

FIG. 15. Drag on original and modified Delta 1 model.

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