

## APPENDIX A TO CHAPTER IX.—AEROFOIL DATA FOR AIRSCREW DESIGN

(i) When the lift and drag coefficients of aerofoils used in airscrew design are determined from wind tunnel tests, the data must be corrected to infinite aspect ratio (rectangular wing). For any particular value of the lift coefficient, the corrections to be applied to the angle of incidence and the drag coefficient respectively are indicated in the following equations :—

$$\alpha = \alpha' - \frac{a_0 - a}{aa_0} k_L$$

$$k_D = k'_D - \frac{2}{\pi A} N k_L^2$$

where  $\alpha$  and  $k_D$  refer to infinite aspect ratio and  $\alpha'$  and  $k'_D$  to the finite aerofoil used in the wind tunnel tests of aspect ratio  $A$ .

$N$  = factor for induced drag,

$a$  = the slope of the lift curve for a rectangular aerofoil of aspect ratio  $A$

and  $a_0$  = the slope of the lift curve in two-dimensional flow.

The values of  $\frac{a}{a_0}$  and  $N$  can be obtained from Table 3 of R. & M. 866 and  $a_0$  can be assumed to equal 3.0 approximately.

(ii) Wind tunnel tests are usually made on monoplane aerofoils of aspect ratio 6, and the appropriate corrections applied at a definite value of the lift coefficient are expressed in the following equations :—

$$\alpha \text{ (degrees)} = \alpha' - 7.15 k_L \quad \dots \quad (1)$$

$$k_D = k'_D - 0.112 k_L^2 \quad \dots \quad (2)$$

(iii) The following reports give wind tunnel data for a number of sections commonly employed :—

Reports and Memoranda Nos. 152, 322, 362 and 829.

The characteristics of the aerofoils of the four reports mentioned above, corrected to infinite aspect ratio (rectangular wing) by formulæ (1) and (2), are given in the curves of the accompanying diagrams, figs. 1 to 8 inclusive, which will be used to obtain values of  $k_L$  and  $\gamma$  (where  $\gamma = \cot^{-1} \frac{k_L}{k_D}$ ) for various values of angle of incidence  $\alpha$ .

THE FIGURES AGAINST THE CURVES ARE THE  
TOTAL MAXIMUM THICKNESS/CHORD RATIOS.

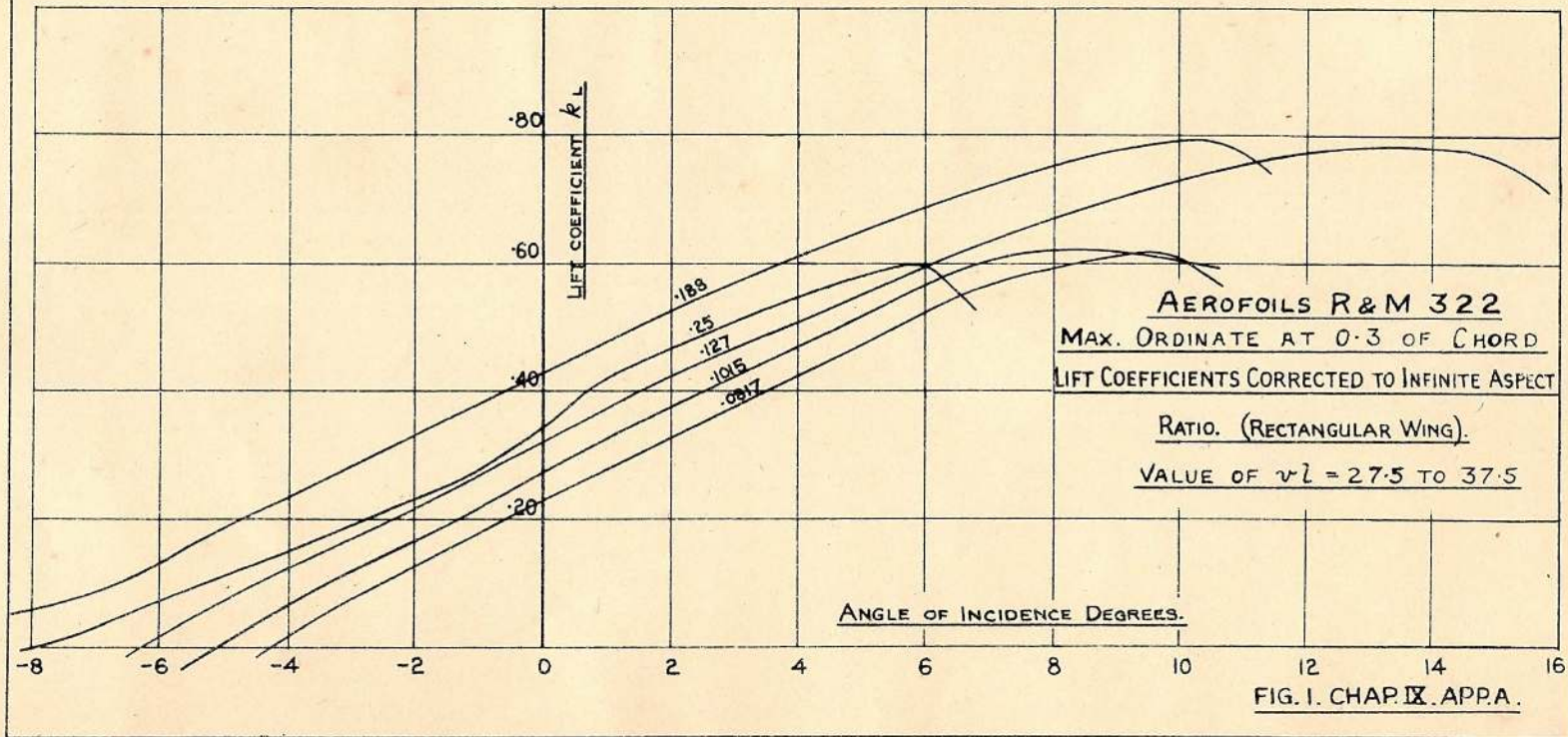
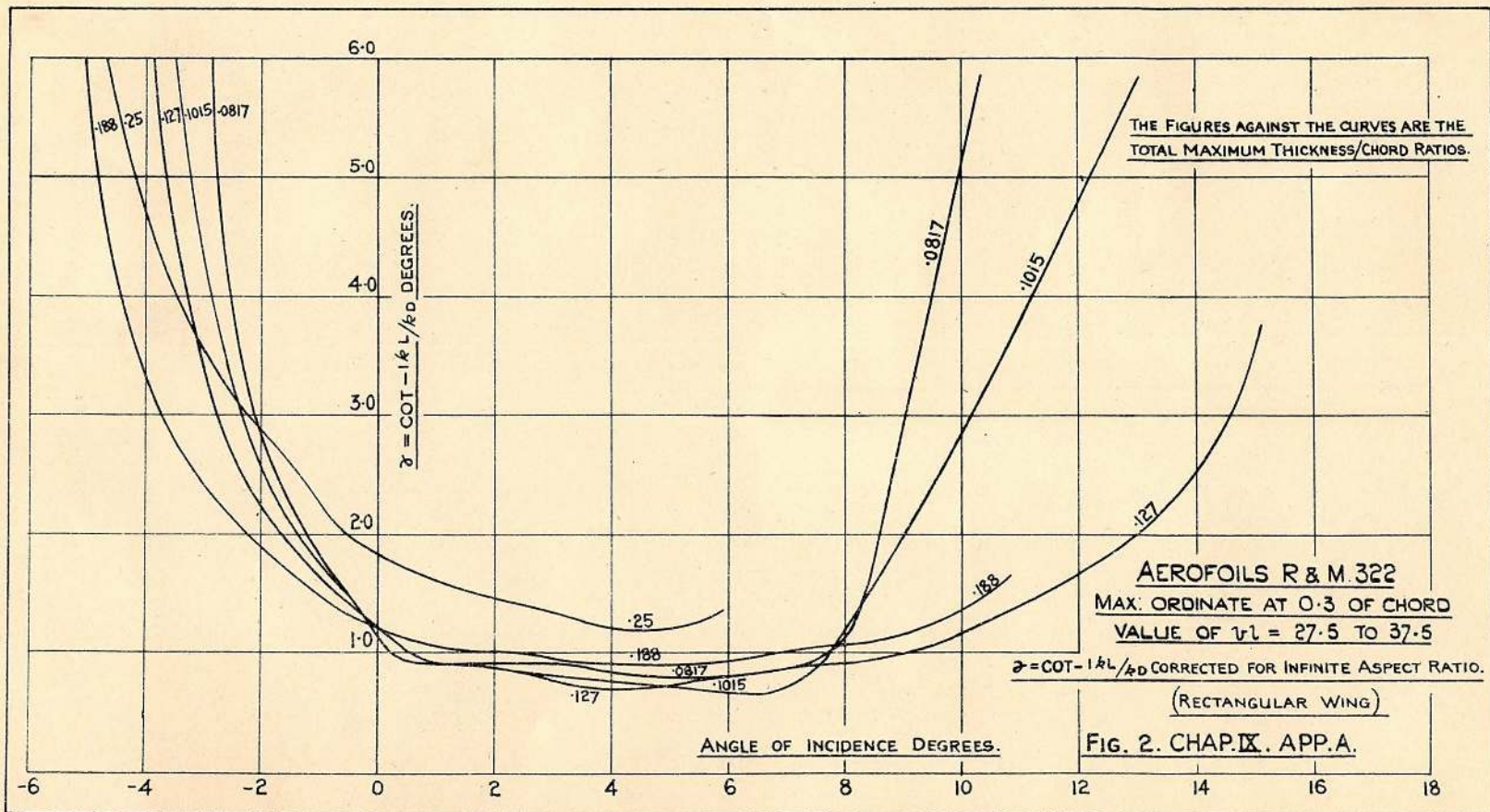
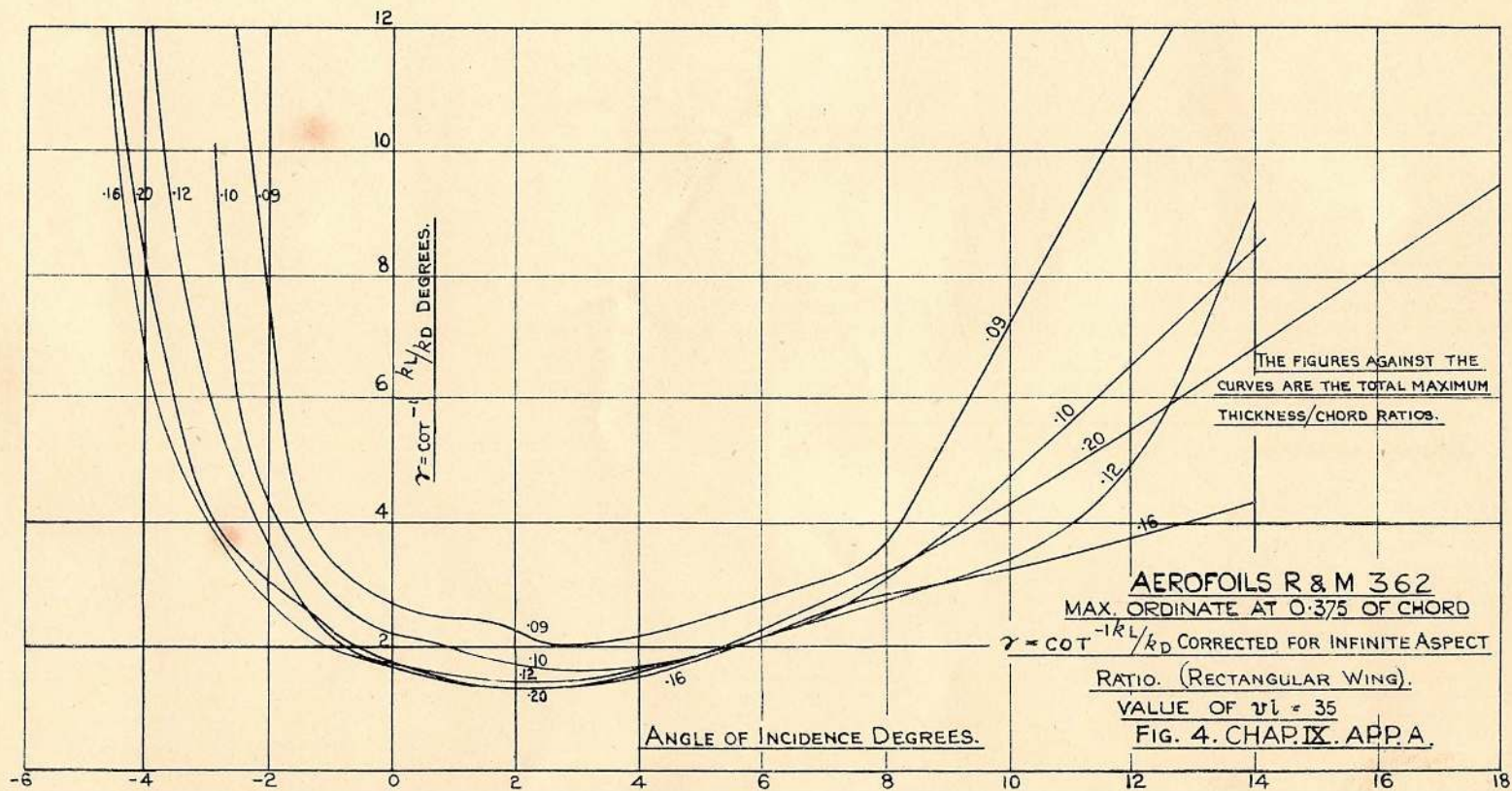


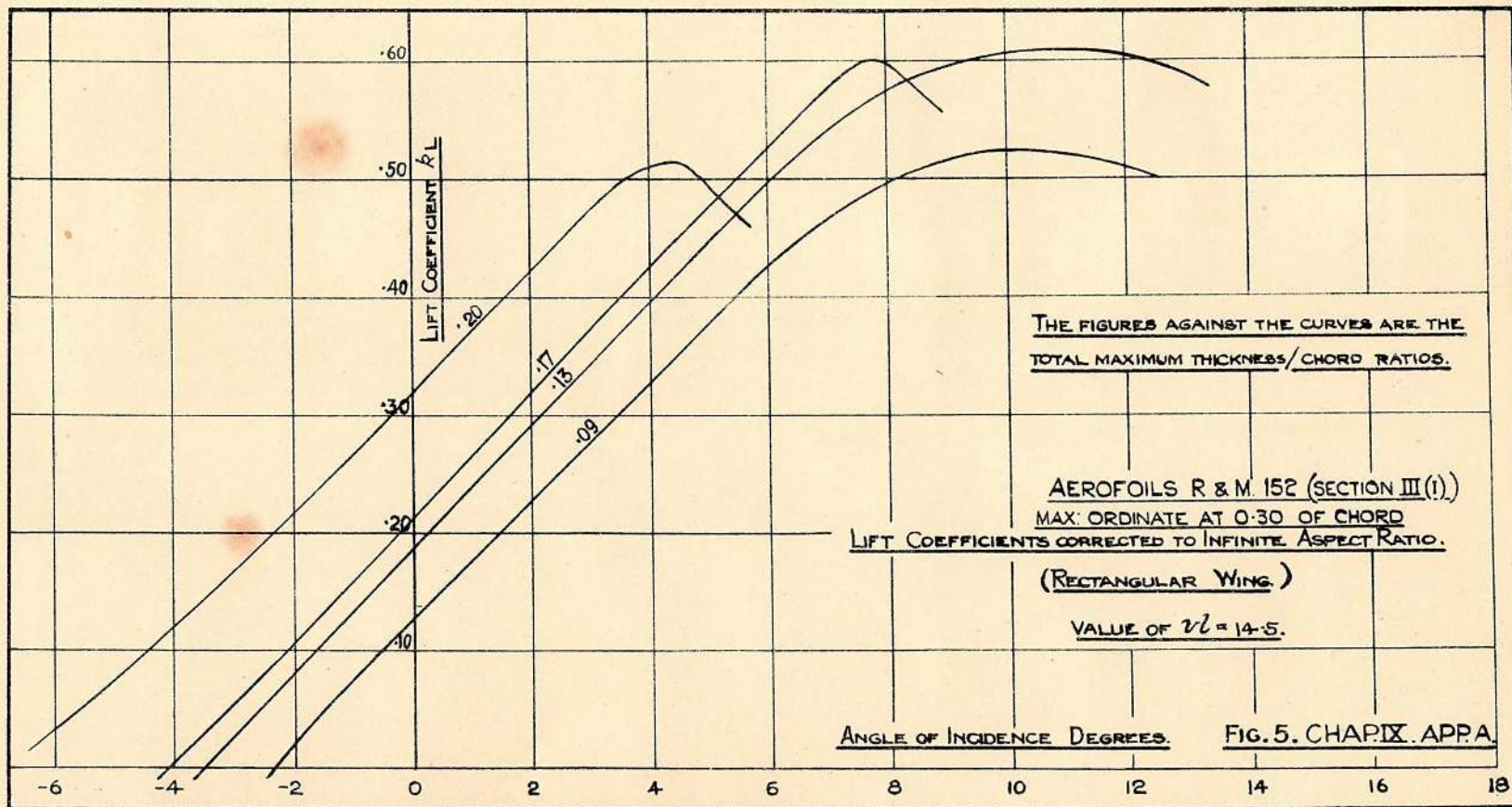
FIG. I. CHAP. IX. APPA.



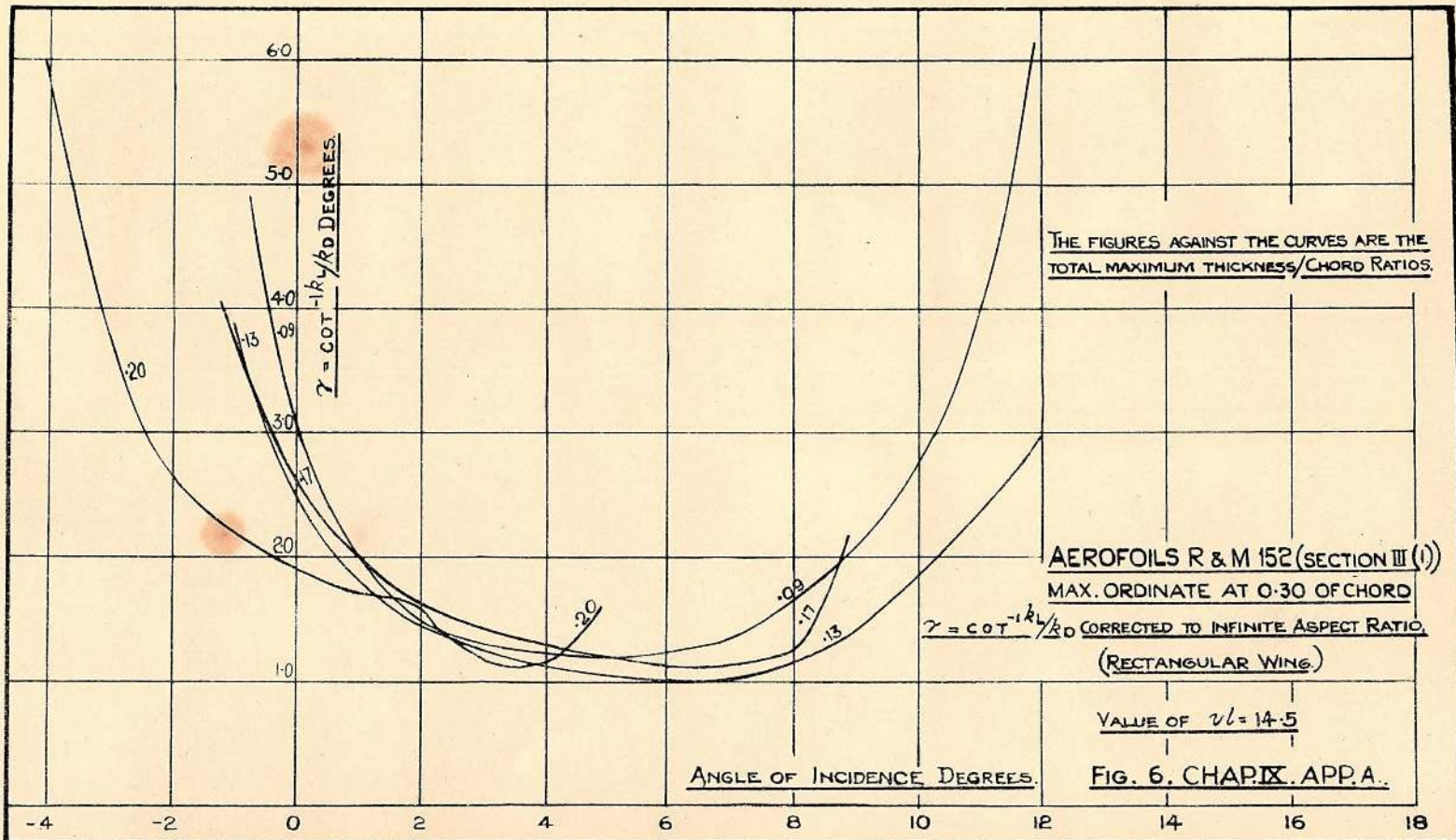


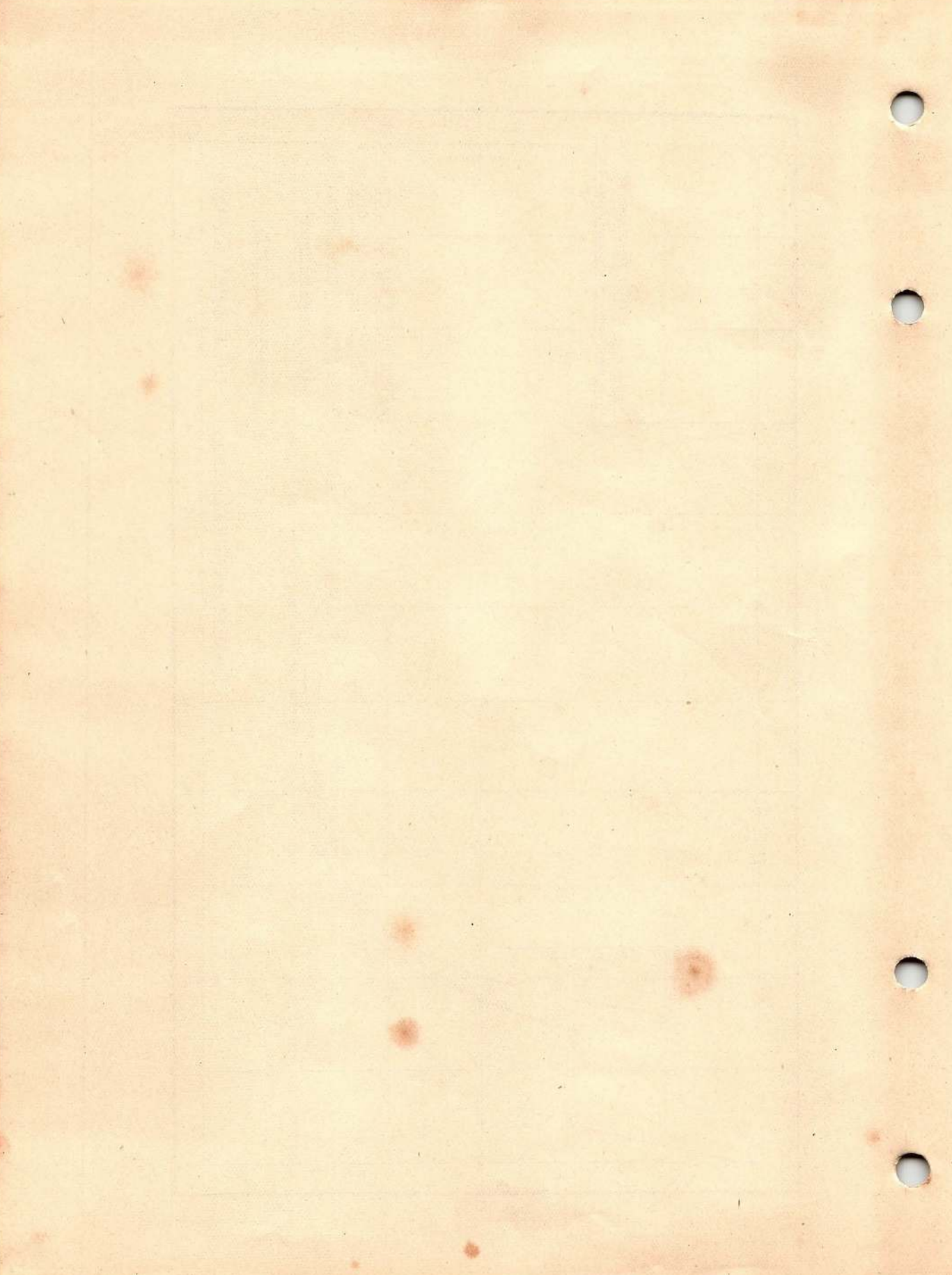


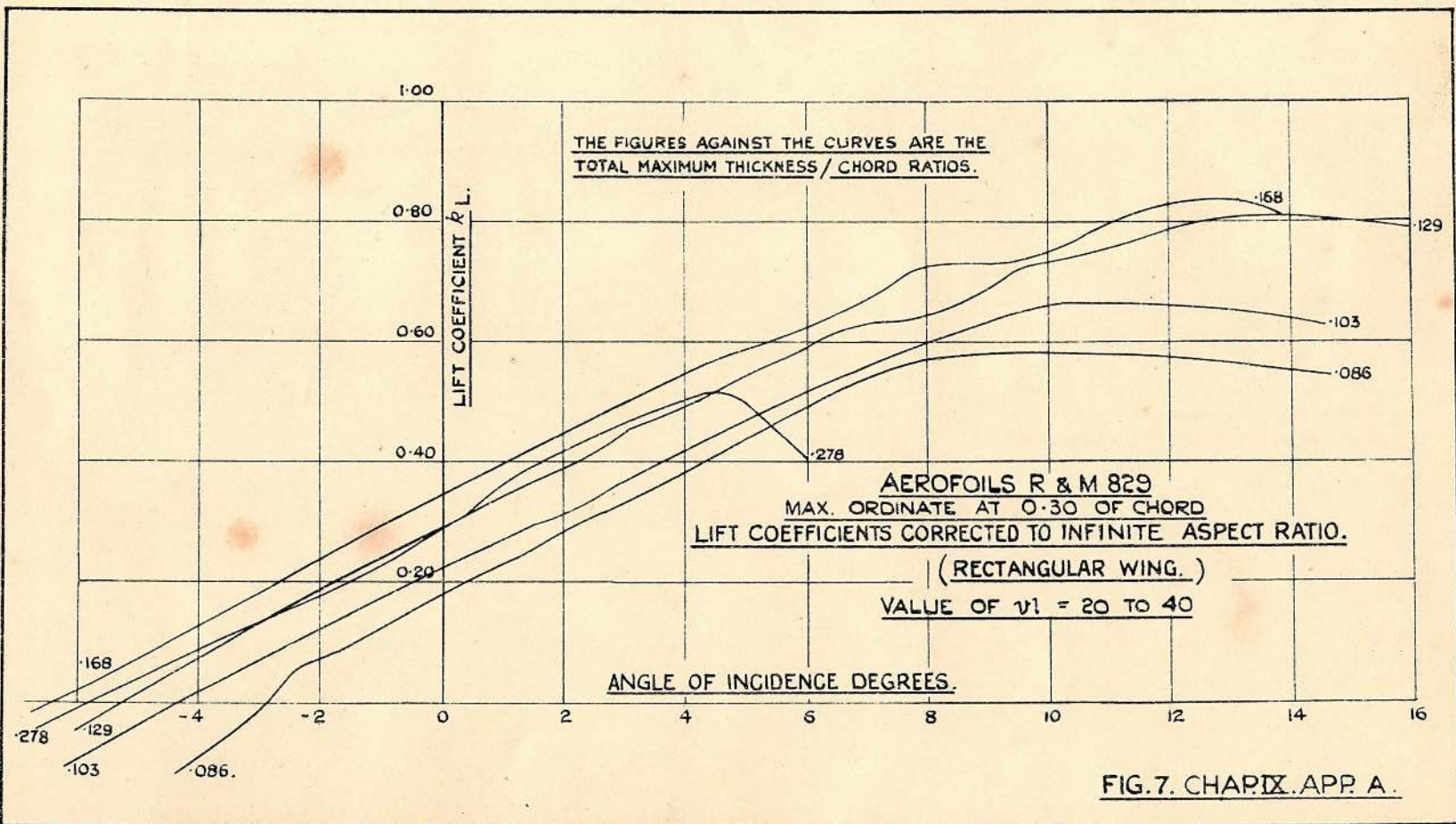


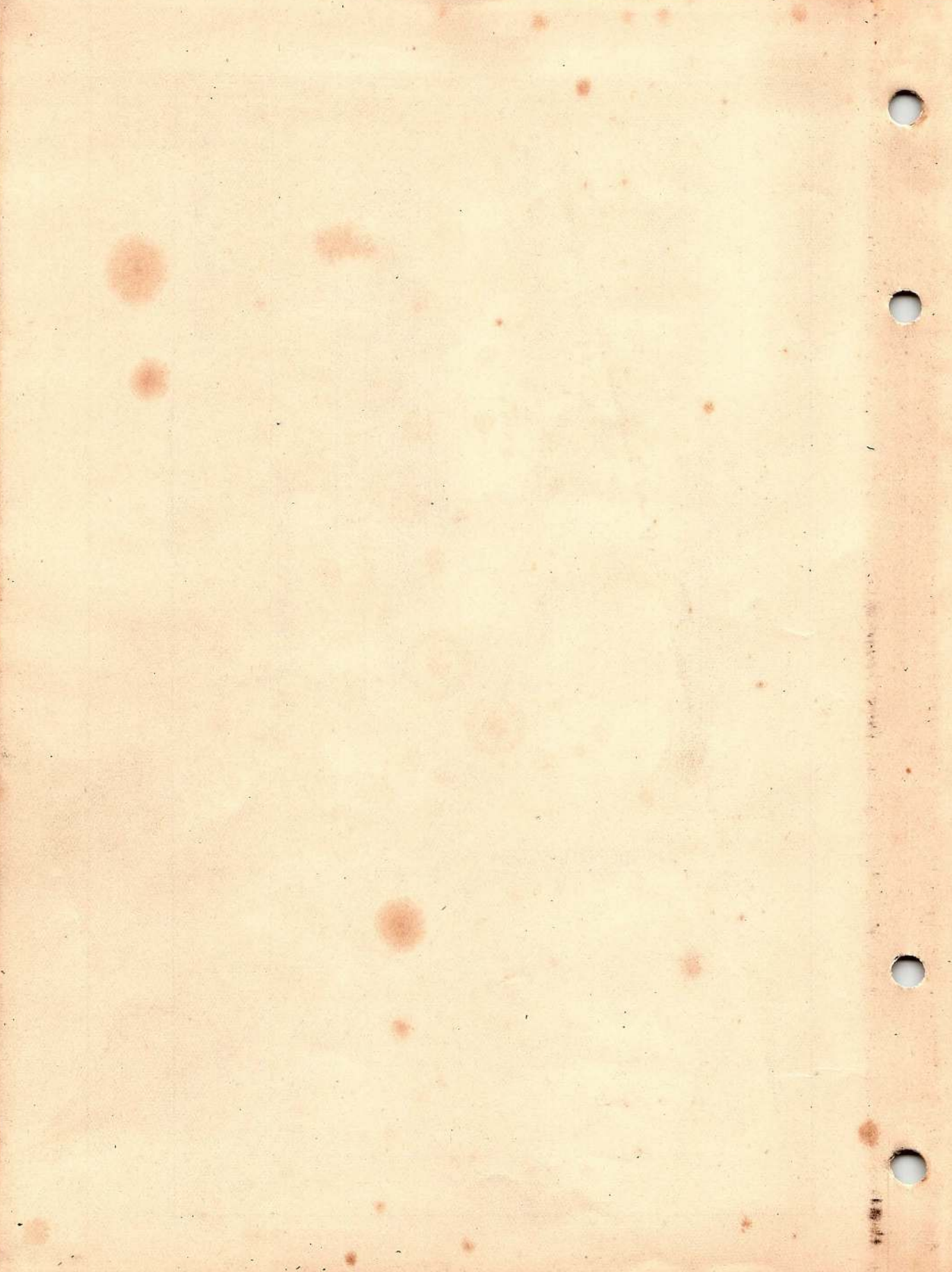


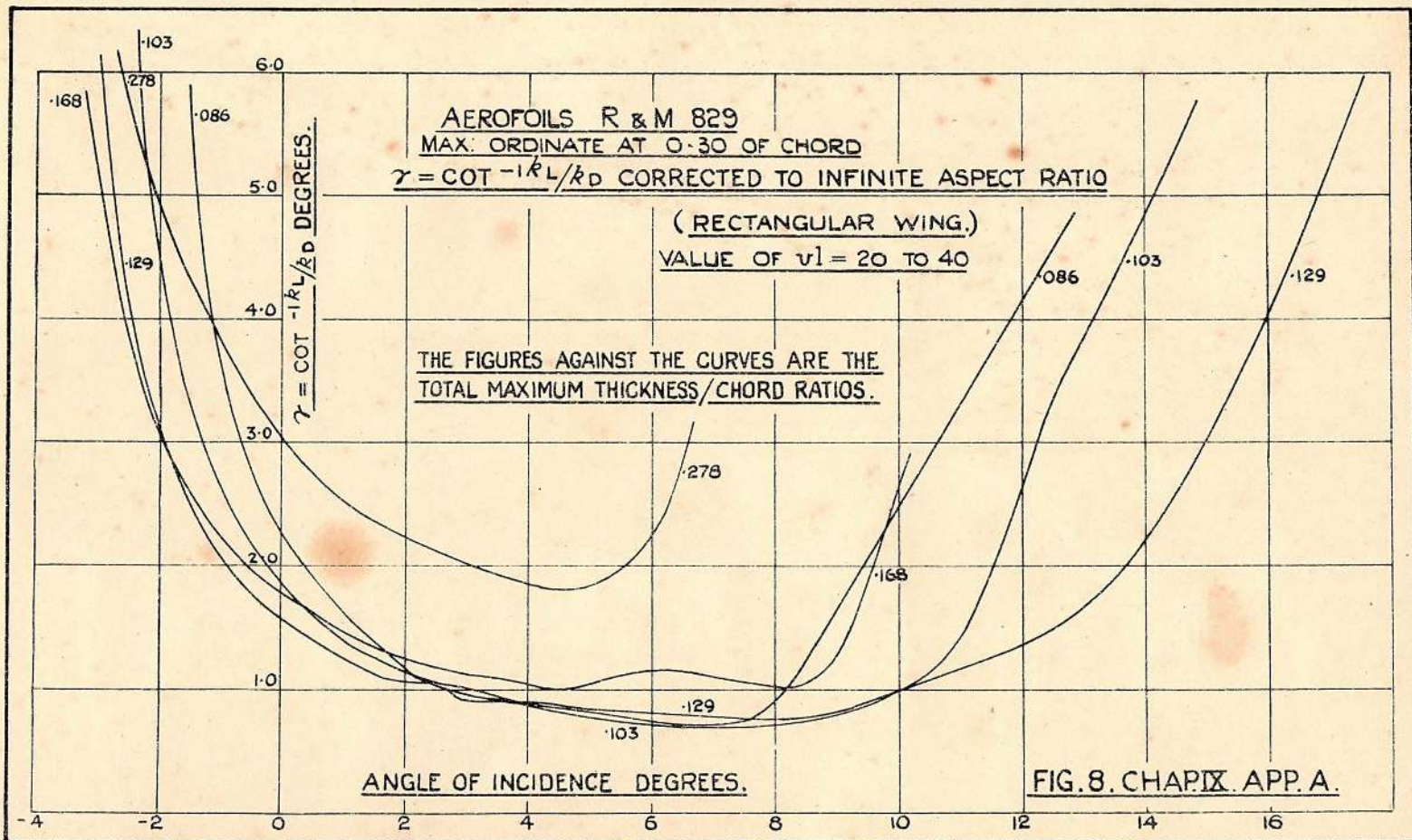


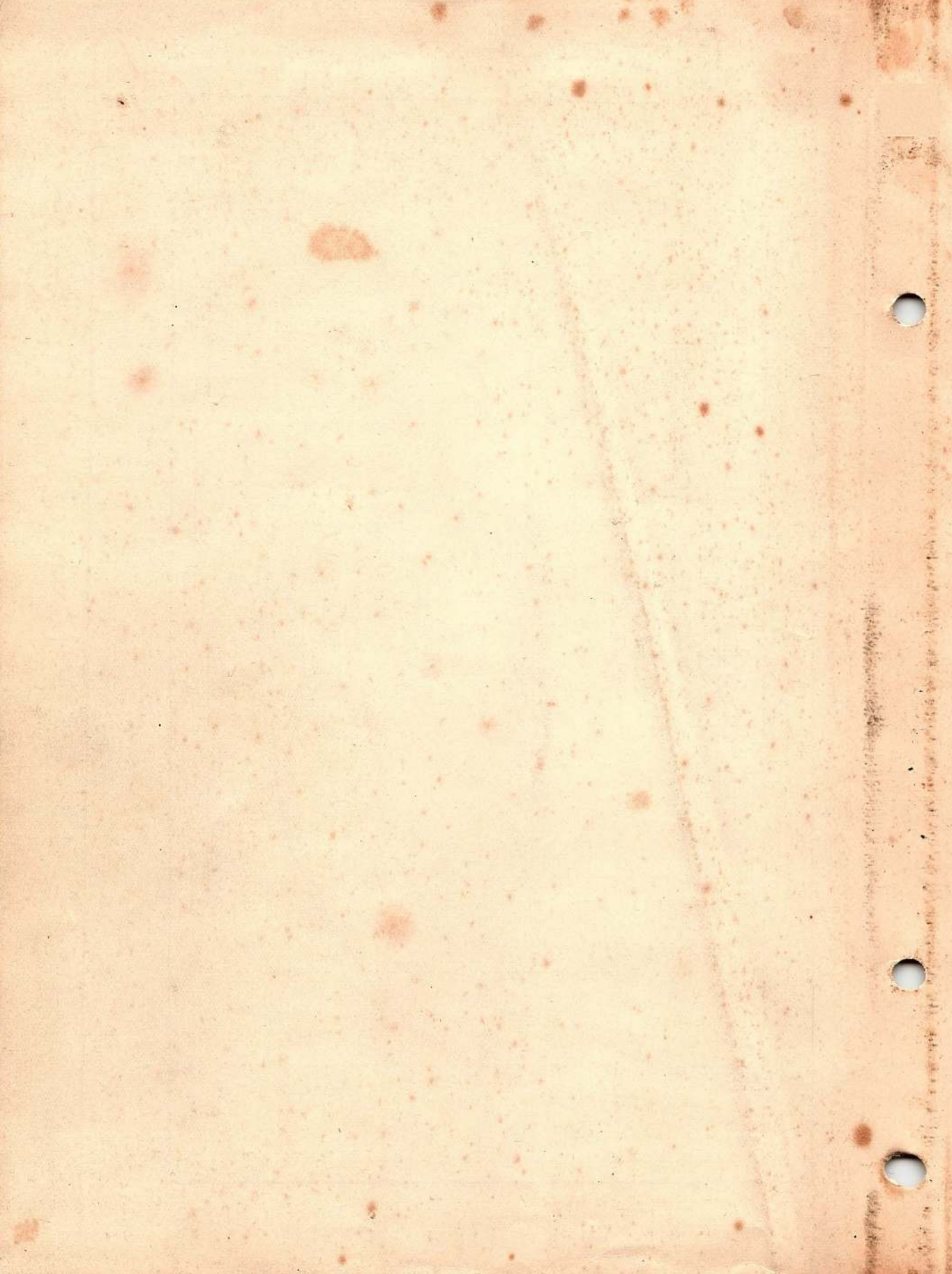












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