

No. 1 AIRCRAFT PERFORMANCE UNIT

LAVERTON.

ATTITUDE TRIALS - PART II

SPITFIRE HF. MK. VIII.

Detail No: 521/A/169
 R.A.A.F. H/O File No: 5/502/17
 No. 1 A.P.U. File No: 4/6/58

SUMMARY:

The following table gives the angle of attack of the aircraft datum for various Indicated Air Speeds and gross weights, in level flight and in a 20° dive.

GROSS WT. (lbs)	6500	7000	7500	8000	8500
A.S.I. (K.P.A.)	LEVEL FLIGHT				
200	0°35'	0°50'	1°00'	1°10'	1°30'
220	0°05'	0°15'	0°25'	0°35'	0°55'
240	0°20'	-0°10'	0°00'	0°10'	0°15'
260	-0°40'	-0°30'	-0°20'	-0°15'	-0°05'
280	-0°55'	-0°45'	-0°35'	-0°30'	-0°20'
300	-1°05'	-1°00'	-0°50'	-0°45'	-0°35'
320	-1°15'	-1°10'	-1°05'	-1°00'	-0°55'
	20° DIVE				
200	0°30'	0°35'	0°50'	1°00'	1°10'
220	0°00'	0°10'	0°15'	0°30'	0°35'
240	-0°30'	-0°15'	-0°10'	0°00'	0°10'
260	-0°45'	-0°35'	-0°30'	-0°20'	-0°10'
280	-1°00'	-0°40'	-0°45'	-0°35'	-0°30'
300	-1°10'	-1°05'	-1°00'	-0°55'	-0°50'
320	-1°20'	-1°15'	-1°10'	-1°05'	-1°00'

1. INTRODUCTION.

Attitude trials on a number of aircraft are required by Para. 7 (D. Arm), for harmonization purposes. This report covers Position Error measurements, and Attitude Trials on a Spitfire HF. Mk. VIII.

2. CONDITION OF AIRCRAFT RELEVANT TO TRIALS.

2.1 Aircraft.

Type - Spitfire Mk. VIII

Australian Identification No.	-	A58-601
Wing Area (Gross)	-	248.5 Sq. ft.
Aerials	-	From mast to fin.
Guns	-	2 x 20 mm. Hispano guns in wings (sealed) 4 H.G. ports (sealed)
Exhaust Stubs	-	Multi ejector type
Bomb Racks	-	Nil.
Paint	-	The aircraft was painted in the blue-grey camouflage flat finish.

A photograph of the aircraft is attached to this Report. It differs from the Spitfire F Mk.VIII at present in service in the R.A.A.F., only in having a high altitude Merlin instead of the Merlin 66 medium altitude engine.

2.2 Airscrew.

Type	-	Rotol V.P.
Description	-	4 bladed wooden airscrew
Diameter	-	10' 9 $\frac{1}{2}$ " (mean)
Pitch Range	-	35°

2.3 Engine.

Type	-	Rolls Royce Merlin - 70
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2.4 Weight.

The aircraft was weighed at No. 1 Aircraft Depot, Leighton, and was flown at a take-off weight of approximately 7800 lbs.

3. TESTS CARRIED OUT.

3.1 Position Error Trials.

The position error of the aircraft was determined by the tower aneroid method.

3.2 Attitude Trials.

4 sets of attitude trials were taken, using a liquid damped pendulum clinometer observed by the pilot. The trials proved very difficult to carry out accurately, as the aircraft is rather unstable, and a steady flight path is difficult to maintain.

4. RESULTS OF TRIALS.

4.1 Position Error Measurements.

The position error correction is shown in Figs. 1 and 2. Fig. 1 gives the P.E.C. as a correction to the A.S.I. at 7700 lbs., and Fig. 2 the correction to the apparent lift coefficient to give the true lift coefficient. Details of the pitot head are shown in Fig. 3.

4.2 Attitude Trials.

The results of these trials are shown in the standard lift coefficient - attitude form in Fig. 4. The attitude at various indicated Air Speeds has been calculated as a function of gross weight and is given in Fig. 5. for steady level flight, and in Fig. 6 for a steady 20° dive.

5. FURTHER DEVELOPMENTS.

No further developments are contemplated at present.

ATTACHMENTS.

Graphs - Figs. 1 to 6
1 Photograph.

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SPECIAL DUTIES AND PERFORMANCE FLIGHT

521/A/169

CHECKED BY RL

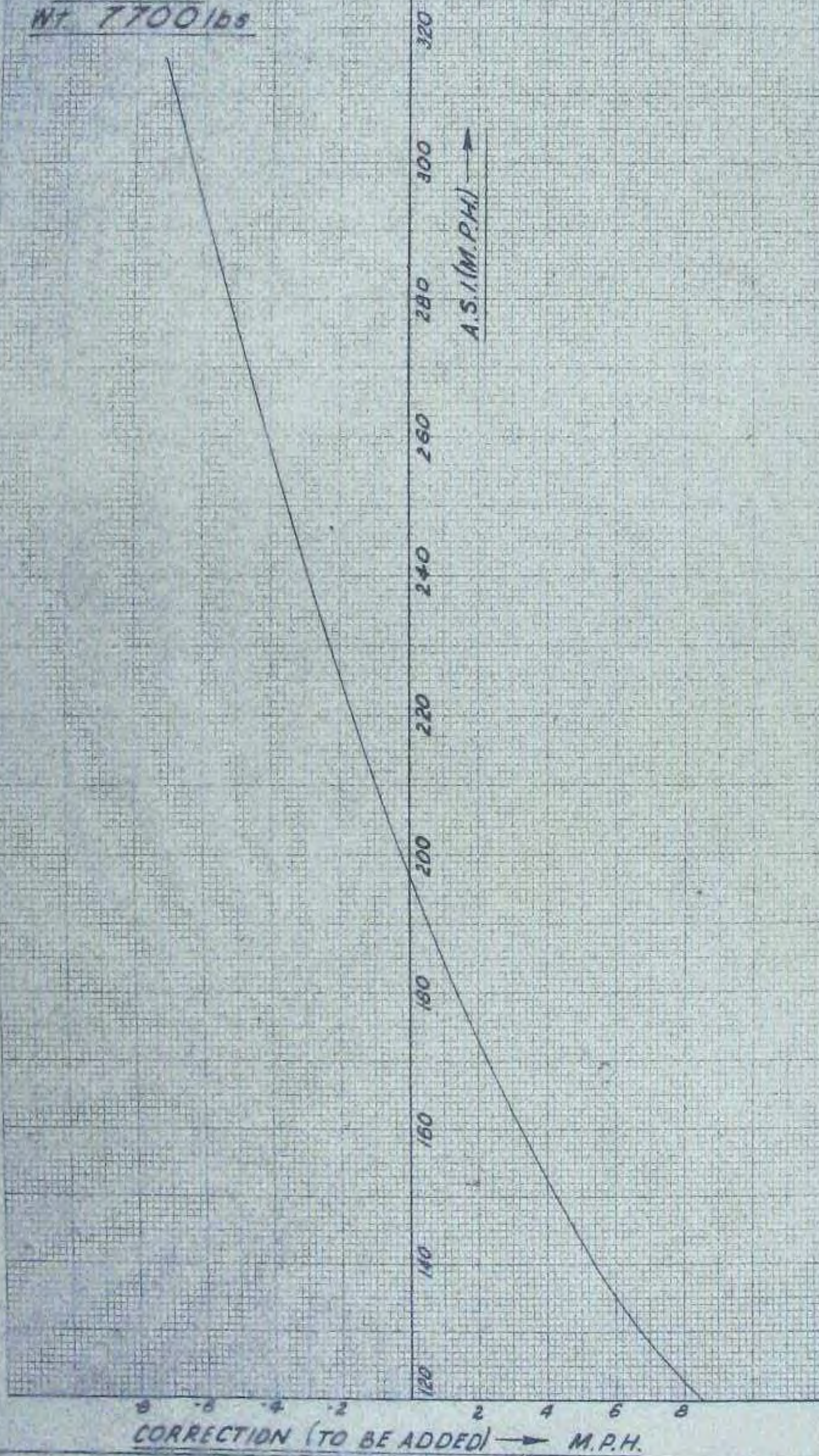
ATTITUDE TRIALS II

DATE 10-1-45

POSITION ERROR CORRECTION

SPITFIRE H.F. Mk VIII
A58-601
WT. 7700 lbs

FIG. 1.



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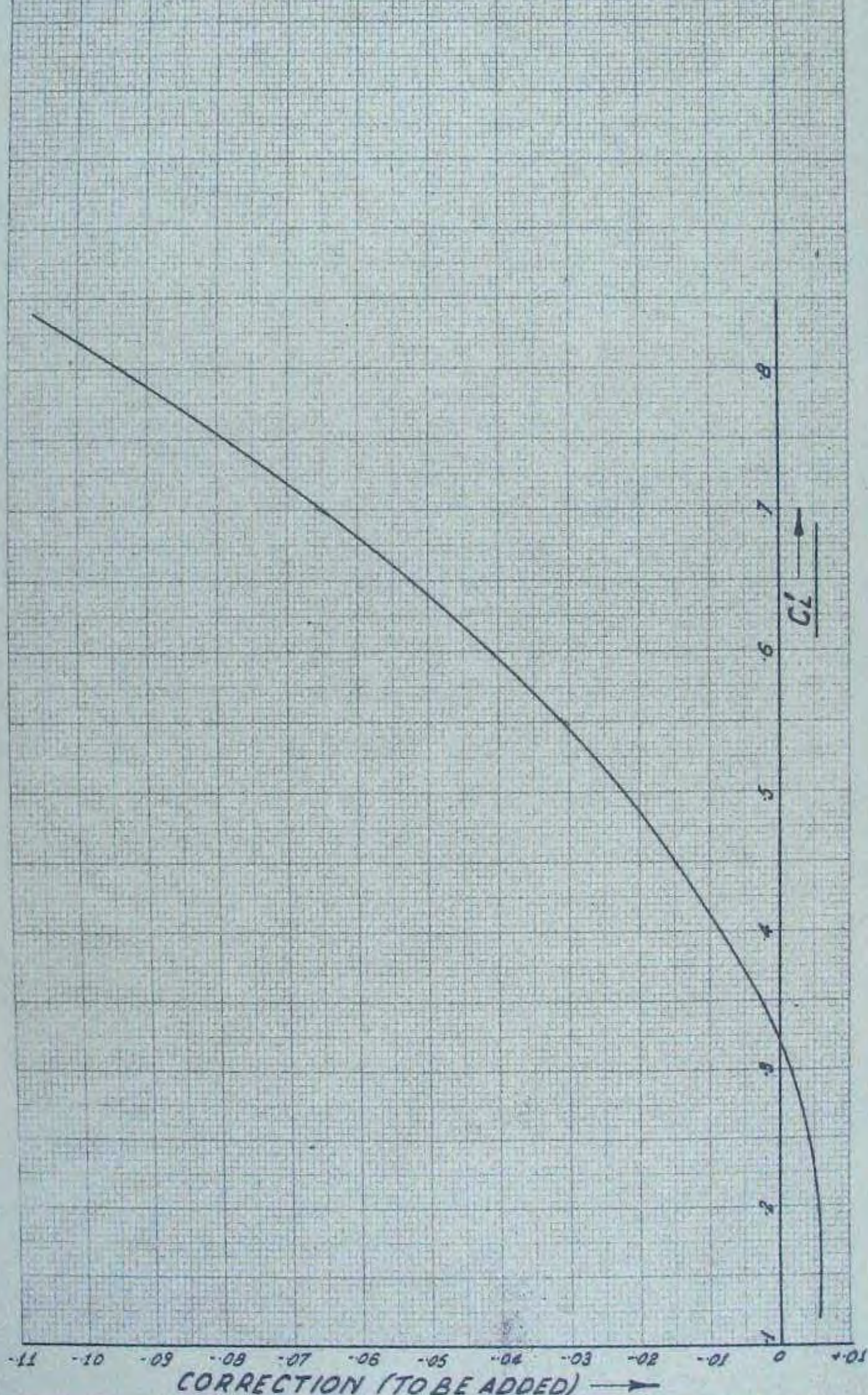
POSITION ERROR CORRECTION

SPITFIRE H.F. Mk VIII

FIG. 2.

A58-601

CORRECTION TO C_L' BASED ON A.S.I. TO GIVE TRUE LIFT COEFFICIENT



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ATTITUDE TRIALS II

DATE **11-1-45**

ATTITUDE - LIFT COEFFICIENT CURVE

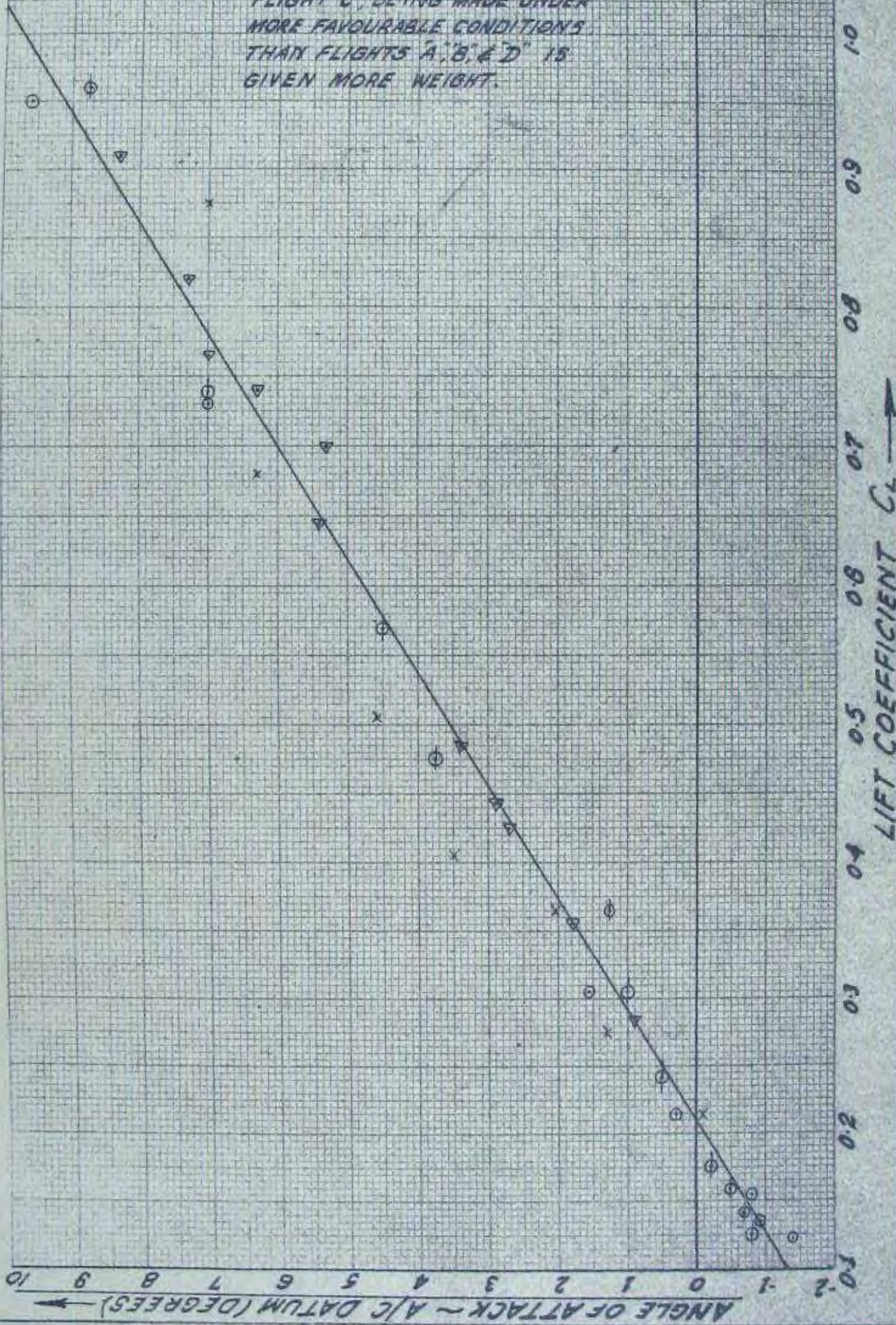
SPITFIRE H.F. Mk VIII

FIG. 4.

A58-801

- x FLIGHT "A"
- o FLIGHT "B"
- Δ FLIGHT "C"
- ⊙ FLIGHT "D"

FLIGHT "C", BEING MADE UNDER MORE FAVOURABLE CONDITIONS THAN FLIGHTS "A", "B", & "D" IS GIVEN MORE WEIGHT.



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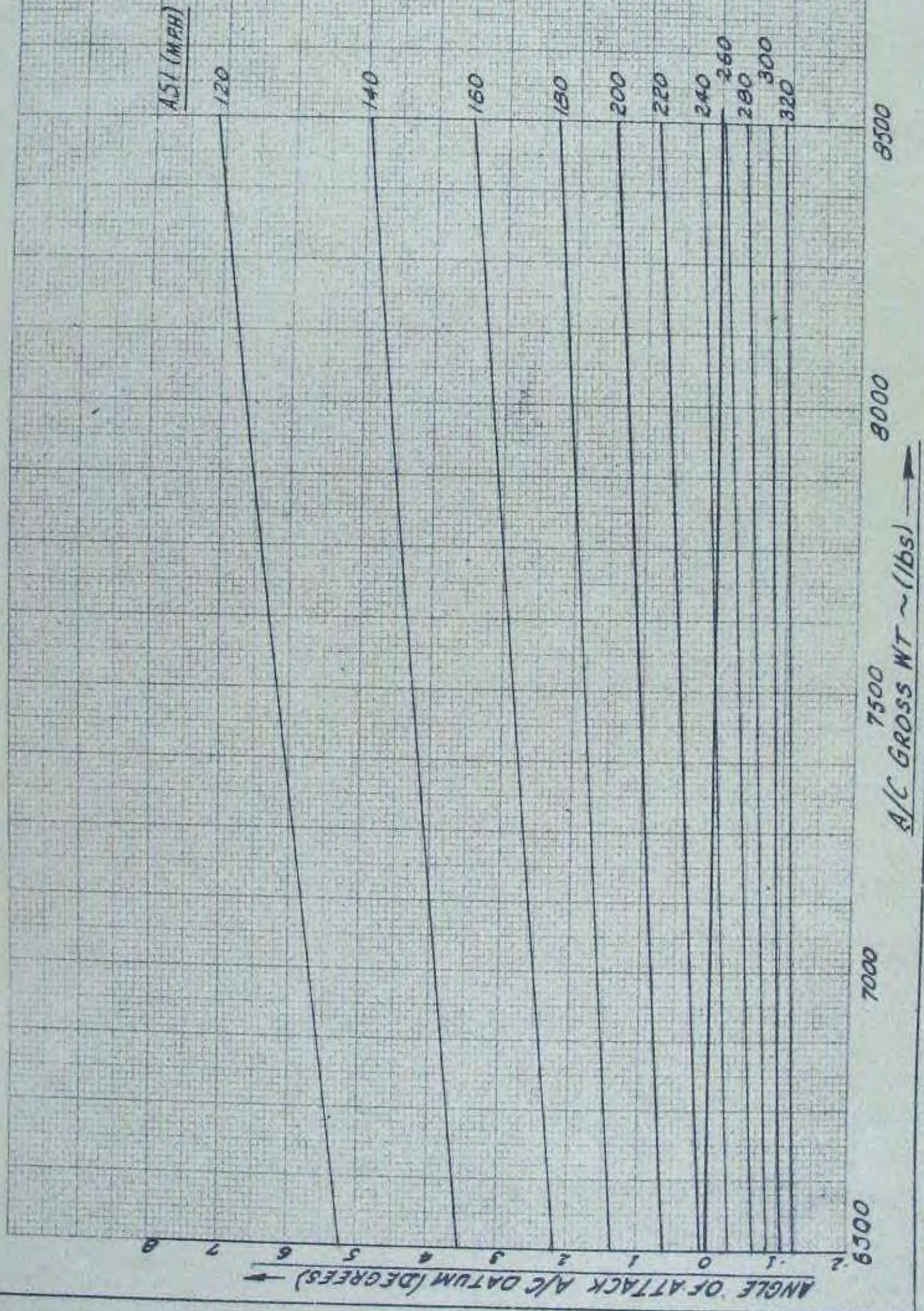
ATTITUDE IN LEVEL FLIGHT

SPITFIRE H.F. Mk VIII

FIG. 5

A58-601

LINES OF CONSTANT A.S.I.



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SPECIAL DUTIES AND PERFORMANCE FLIGHT

521/A 1169

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DATE **11-1-45**

ATTITUDE IN 20° DIVE

SPITFIRE H.F. MK VIII
A58-601

$$C_L = \frac{W \cos \theta}{\frac{1}{2} \rho_0 S V^2}$$

FIG. 6.

θ = Angle of dive

LINES OF CONSTANT A.S.I.

