

JANUARY 1958

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ARROW 2

PERIODIC PERFORMANCE REPORT

'NUMBER 13'

ANALYZED



AVRO AIRCRAFT LIMITED

X-13

JANUARY 1958

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ANALYZED

ARROW 2
PERIODIC PERFORMANCE REPORT
NUMBER 13

Classification cancelled/changed to.....
by authority of..... (date).....
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Issued to R.C.A.F.
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Recommended for Approval by *[Signature]*
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Approved by *[Signature]*
Chief of Technical Design
Approved for Issue by *[Signature]*
Arrow Project Engineering Manager

8783670

PERFORMANCE

APPENDIX I

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LIST OF CONTENTS

	Sheet
Introduction	1
	Fig.
Aircraft weight vs operational weight empty.	1
Fuel used for 200 and 300 N.M. missions vs operational weight empty.	2
Overload mission range vs operational weight empty.	3
Time from unstick to $M = 1.5$ at 50,000 ft. vs operational weight empty.	4
Power limited "g" vs operational weight empty.	5
Operational ceiling vs operational weight empty.	6
	Sheet
Appendix I	I-1
	Fig.
Max level speed.	I-1
Combat ceiling.	I-2
Available steady 'g's.	I-3
Turn radius.	I-4
Rate of turn.	I-5
Take-off distance.	I-6
Take-off time and fuel A/B unlit.	I-7
Take-off time and fuel A/B lit.	I-8
Acceleration time, distance and fuel, from unstick to 527 kts., A/B unlit.	I-9
Acceleration time, distance and fuel, from unstick to $M = .92$ A/B unlit.	I-10
Acceleration time, distance and fuel, from unstick to $M = .92$ A/B lit.	I-11
Acceleration time from $M = .92$ to $M = 1.50$ A/B lit.	I-12
Acceleration fuel from $M = .92$ to $M = 1.50$ A/B lit.	I-13
Acceleration distance from $M = .92$ to $M = 1.50$ A/B lit.	I-14
Acceleration time from $M = .92$ to $M = 2.0$ A/B lit.	I-15
Acceleration fuel from $M = .92$ to $M = 2.0$ A/B lit.	I-16
Acceleration distance from $M = .92$ to $M = 2.0$ A/B lit.	I-17
Rate of climb at 527 kts. A/B unlit.	I-18
Time to height at 527 kts. A/B unlit.	I-19
Fuel to height at 527 kts. A/B unlit.	I-20
Distance to height at 527 kts A/B unlit.	I-21
Rate of climb at $M = .92$ A/B lit.	I-22
Time to height at $M = .92$ A/B lit.	I-23
Fuel to height at $M = .92$ A/B lit.	I-24
Distance to height at $M = .92$ A/B lit.	I-25

PART OF DRAWING

APPENDIX I

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LIST OF CONTENTS CONT'D.

	Fig.
Rate of climb at $M = 1.5$ A/B lit.	I-26
Time to height at $M = 1.5$ A/B lit.	I-27
Fuel to height at $M = 1.5$ A/B lit.	I-28
Distance to height at $M = 1.5$ A/B lit.	I-29
Rate of climb at $M = 2.0$ A/B lit.	I-30
Time to height at $M = 2.0$ A/B lit.	I-31
Fuel to height at $M = 2.0$ A/B lit.	I-32
Distance to height at $M = 2.0$ A/B lit.	I-33
Nautical air miles per pound at $M = .92$	I-34
Nautical air miles per pound at $M = 1.5$ at 50,000 ft.	I-35
Nautical air miles per pound at $M = 2.0$ at 50,000 ft.	I-36
Loiter fuel flow.	I-37
Descent speed and fuel flow.	I-38
Landing distance without parabrake	I-39
Loiter at sea level and taxi fuel consumption	I-40

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APPENDIX I

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PERIODIC PERFORMANCE REPORT NO. 13INTRODUCTION

There is no new input to the performance data of Periodic Performance Report No. 12, other than weight changes. Furthermore it is not anticipated that any changes of input data will be made until such time that Flight Test Data becomes available, either to confirm the present estimate or indicate what changes are necessary.

This report therefore departs from the form of previous reports. The primary purpose of this report being to show the effect of change in O.W.E. on the pertinent performance characteristics.

The O.W.E. is defined as the aircraft weight including armament less usable fuel, and the Combat Weight as the O.W.E. plus half fuel for the 200 N.M. high speed mission. The relevant mission profiles are given Periodic Performance Report No. 12.

4° up aileron was used above 45,000 ft. and the I.C.A.O. Standard Atmosphere was assumed.

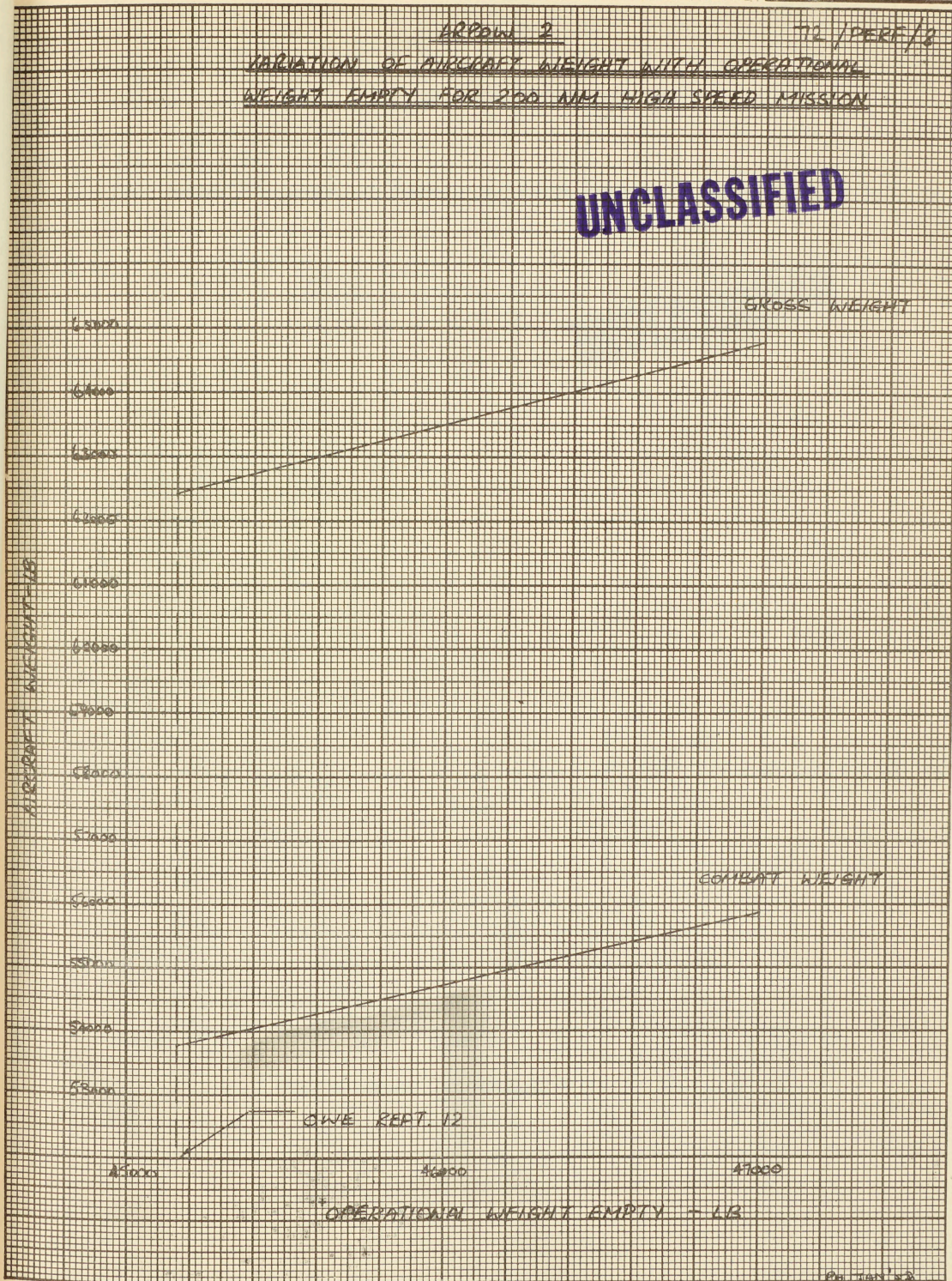
Due to an arithmetical error in the Overload Range Mission as given in Performance Report No. 12, a small discrepancy is present between this and the data given in this report, resulting in an increase in range of 26 N.M. at the O.W.E. of Report No. 12.

ARPA 2

72 / PERE / 8

VARIATION OF AIRCRAFT WEIGHT WITH OPERATIONAL WEIGHT EMPTY FOR 200 NM HIGH SPEED MISSION

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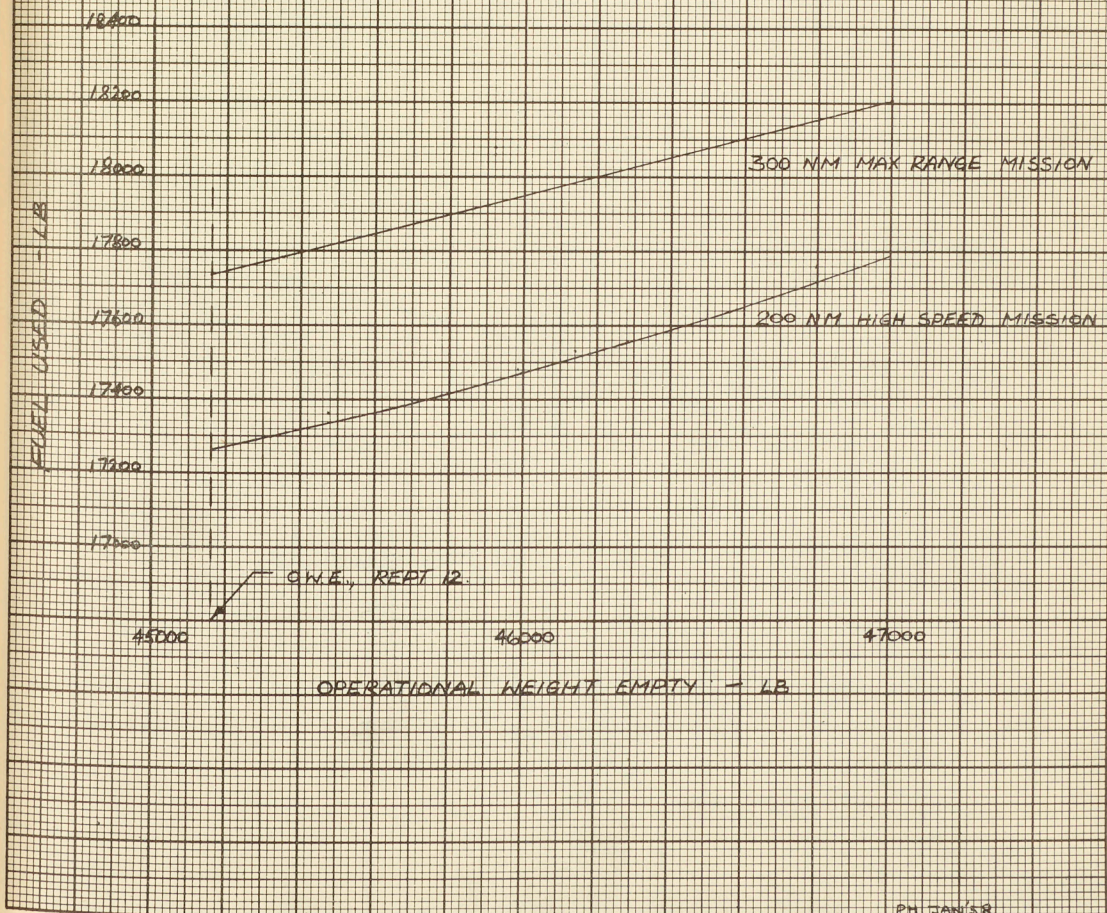
Fig. 1

ARROW 2

FUEL FOR 200 AND 300 NM MISSION AS DEFINED IN AIR 7-4

SEE DETAILED MISSION PROFILE IN PERF REPT 12 FOR OWE = 45161 LB.

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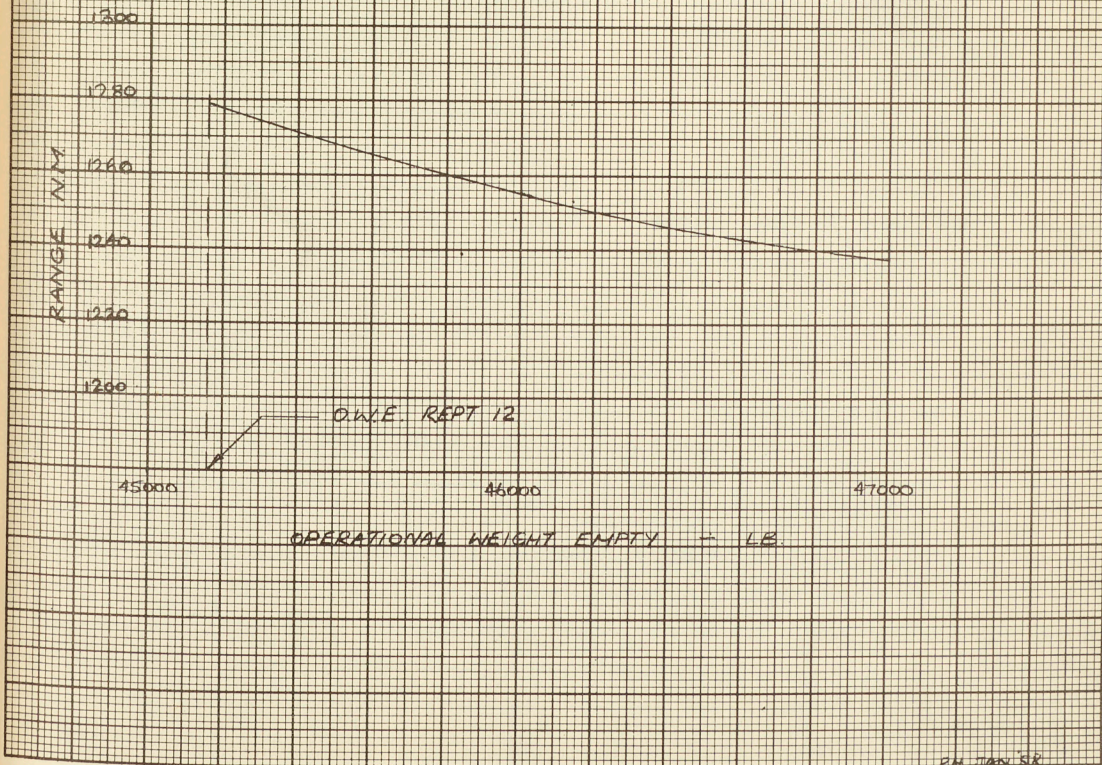
Fig. 2

ARROW 2

OVERLOAD MISSION

SEE DETAILED MISSION PROFILE IN PERF. REPT. 12 FOR O.W.E. = 45,61 LB.

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Fig. 3

APPENDIX I

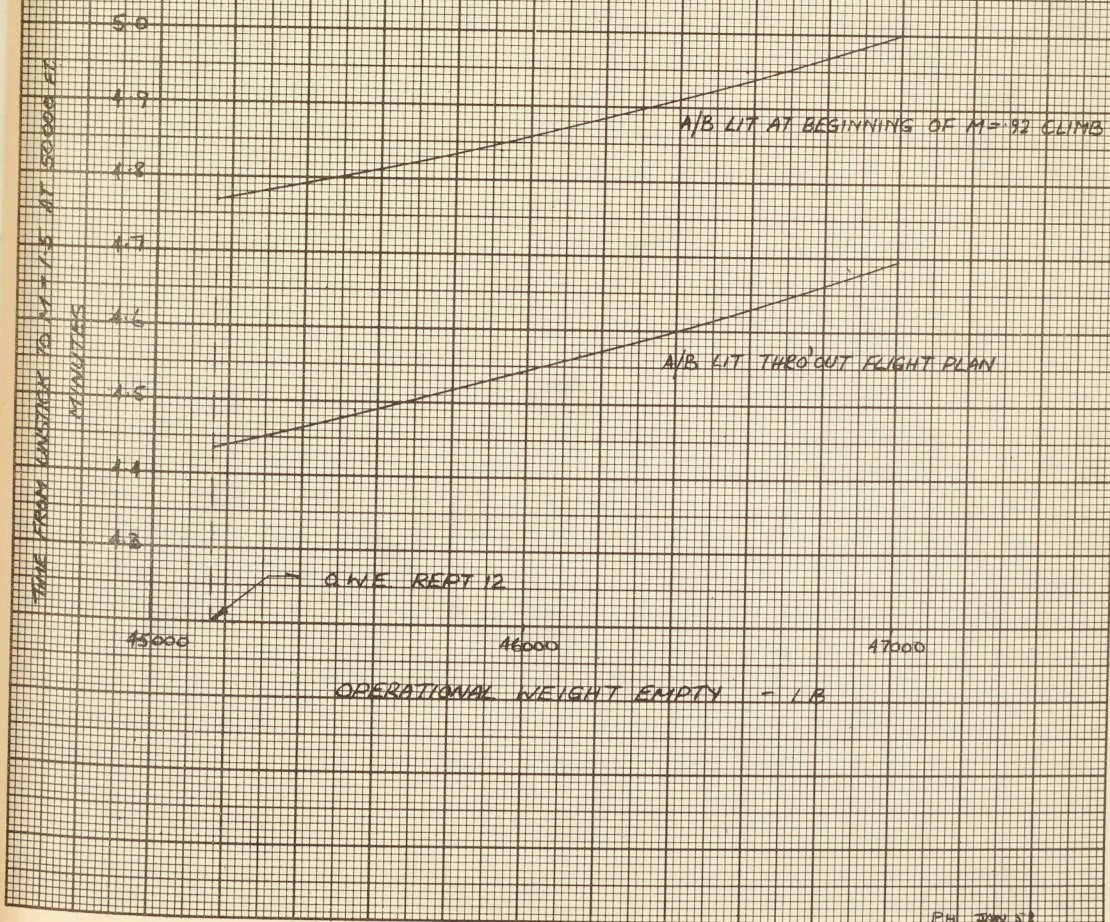
12/PERF/2

ARROW 2

TIME TO HEIGHT FROM UNSTICK TO M=1.5 AT 50,000 FT

FUEL LOAD AS FOR 200 NM HIGH SPEED MISSION

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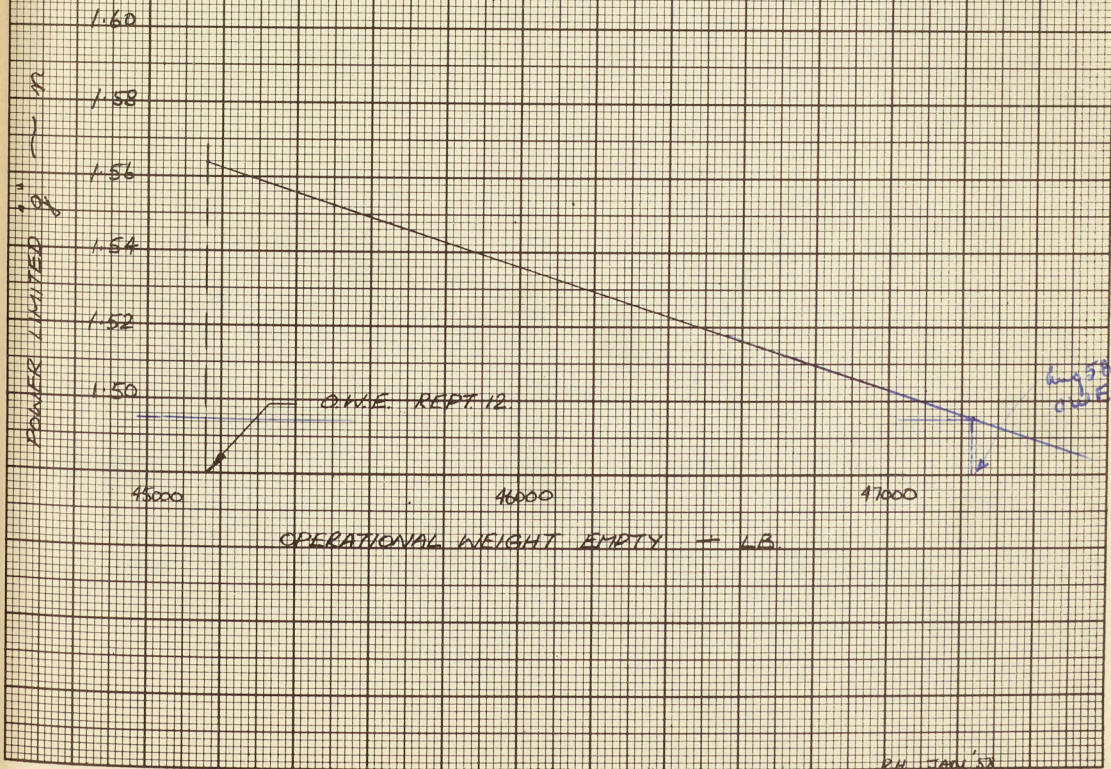
Fig. 4

72/PERF/8

ARROW 2

POWER LIMITED g AT $M = 1.5$, 50,000 FT.

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Fig. 5



APPENDIX I

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APPENDIX I

The following are working performance curves of the Arrow 2, given in as general a form as possible, to enable the user to calculate additional mission profiles.

ARROW 2

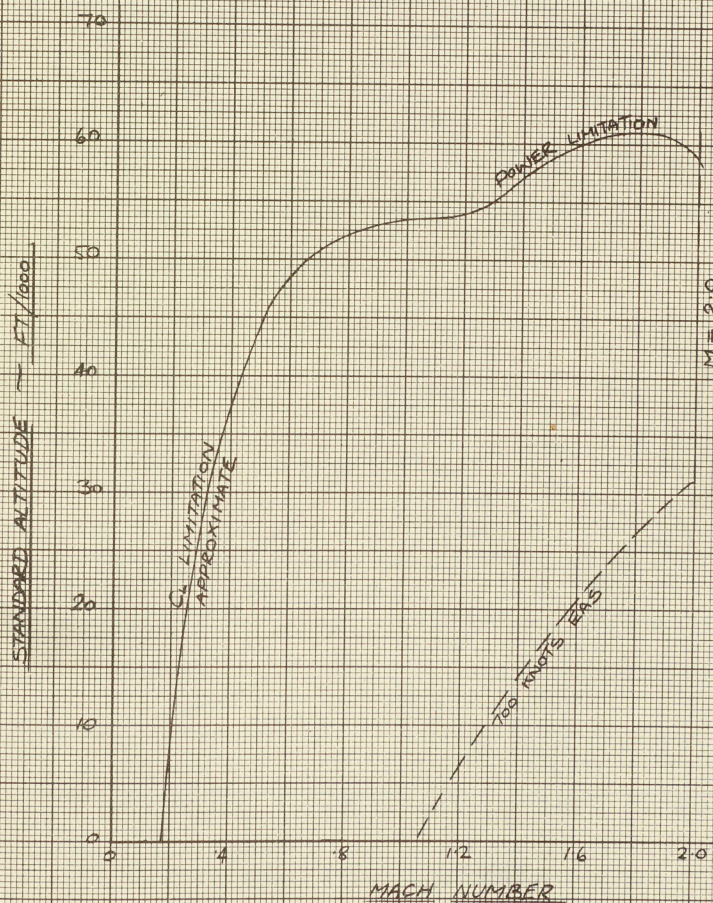
10/PERF/4

MAX LEVEL SPEED

AT COMBAT WEIGHT 53796 LB.

MAX THRUST A/B LIT

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Fig. I-1

Fig. I-1

AERON 2

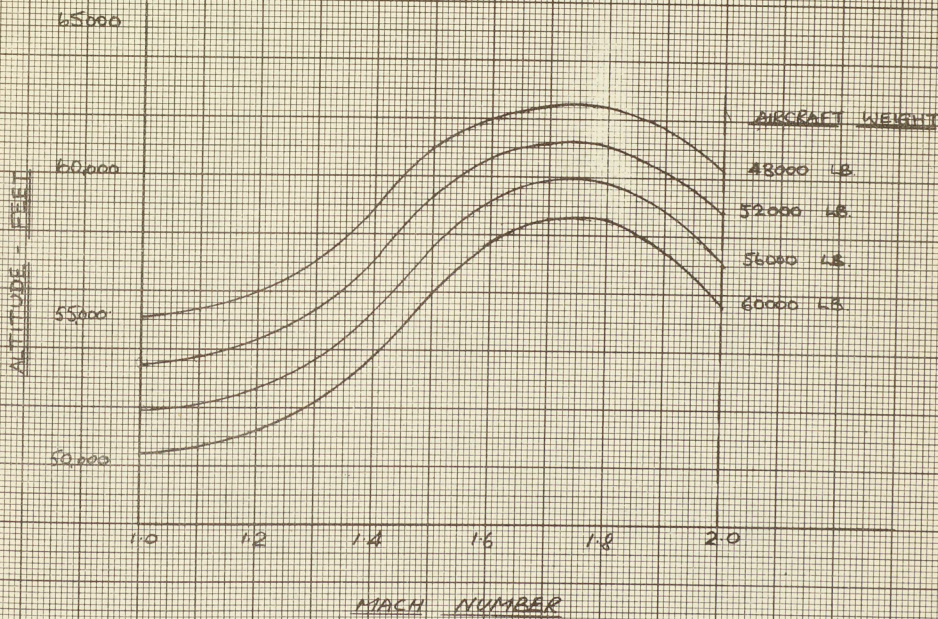
71/PERF/4

COMBAT CEILING

500 FT/MIN ROC

MAX. THRUST A/B LIT

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Fig. I-2

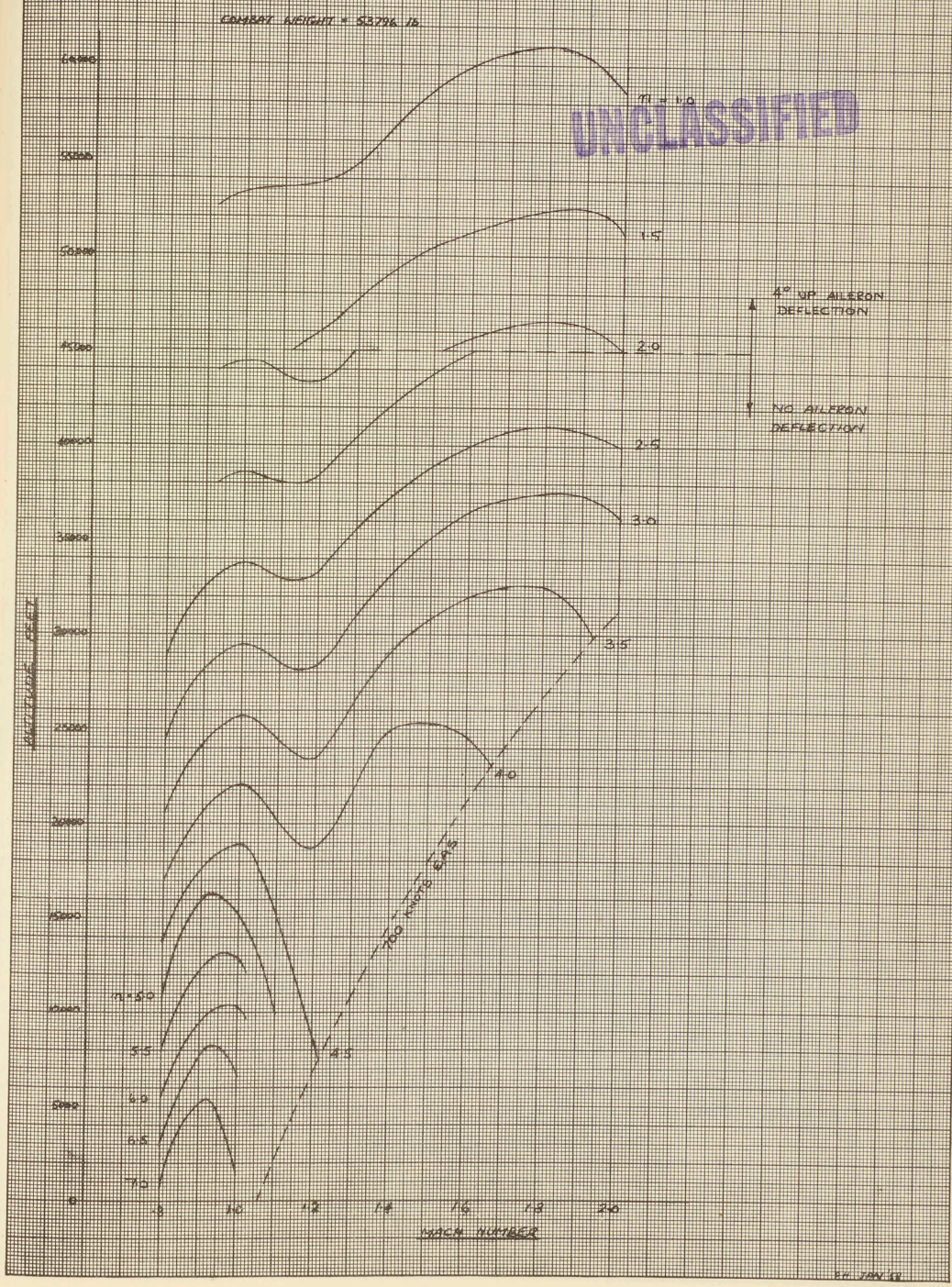
72/PERF/A

ARROW 2 MANOEUVRABILITY

AVAILABLE STEADY G'S AT COMBAT WEIGHT

MAX THRUST A/B LIT

COMBAT WEIGHT = 52796 LB



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Fig. I-3

ARROW 2

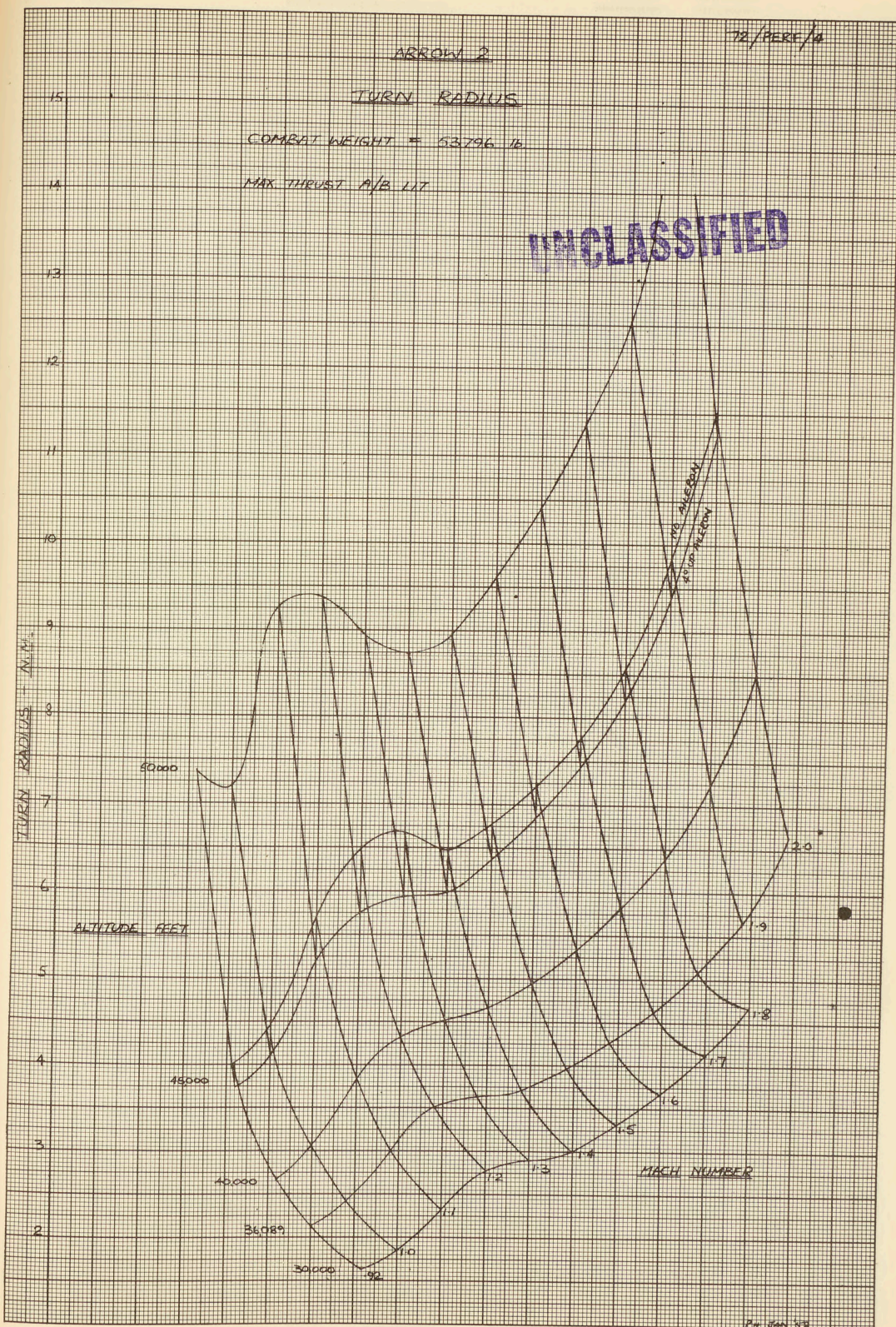
72/PERC/10

TURN RADIUS

COMBAT WEIGHT = 53796 LB

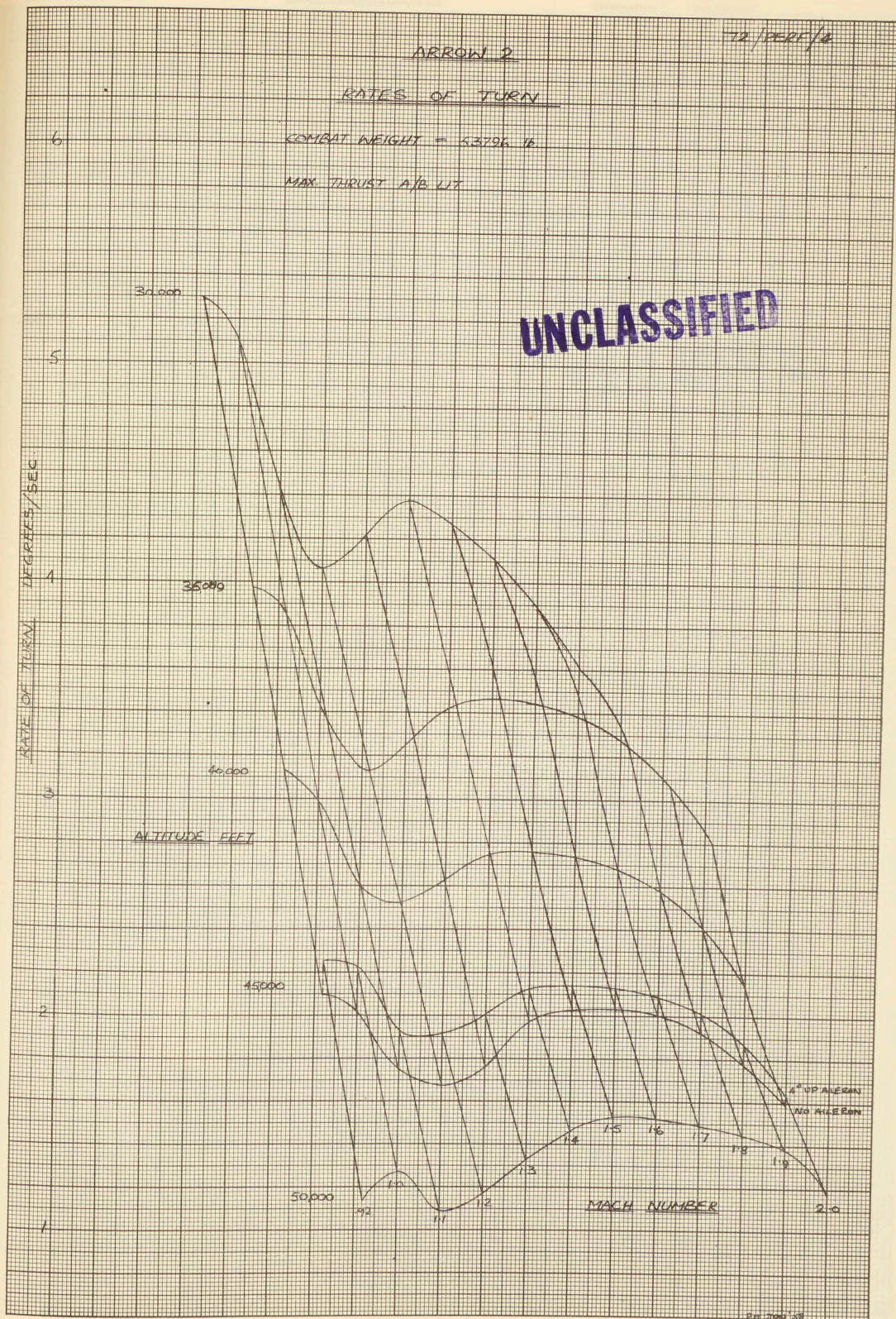
MAX THRUST A/B 117

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Fig. I-4



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Fig. I-5

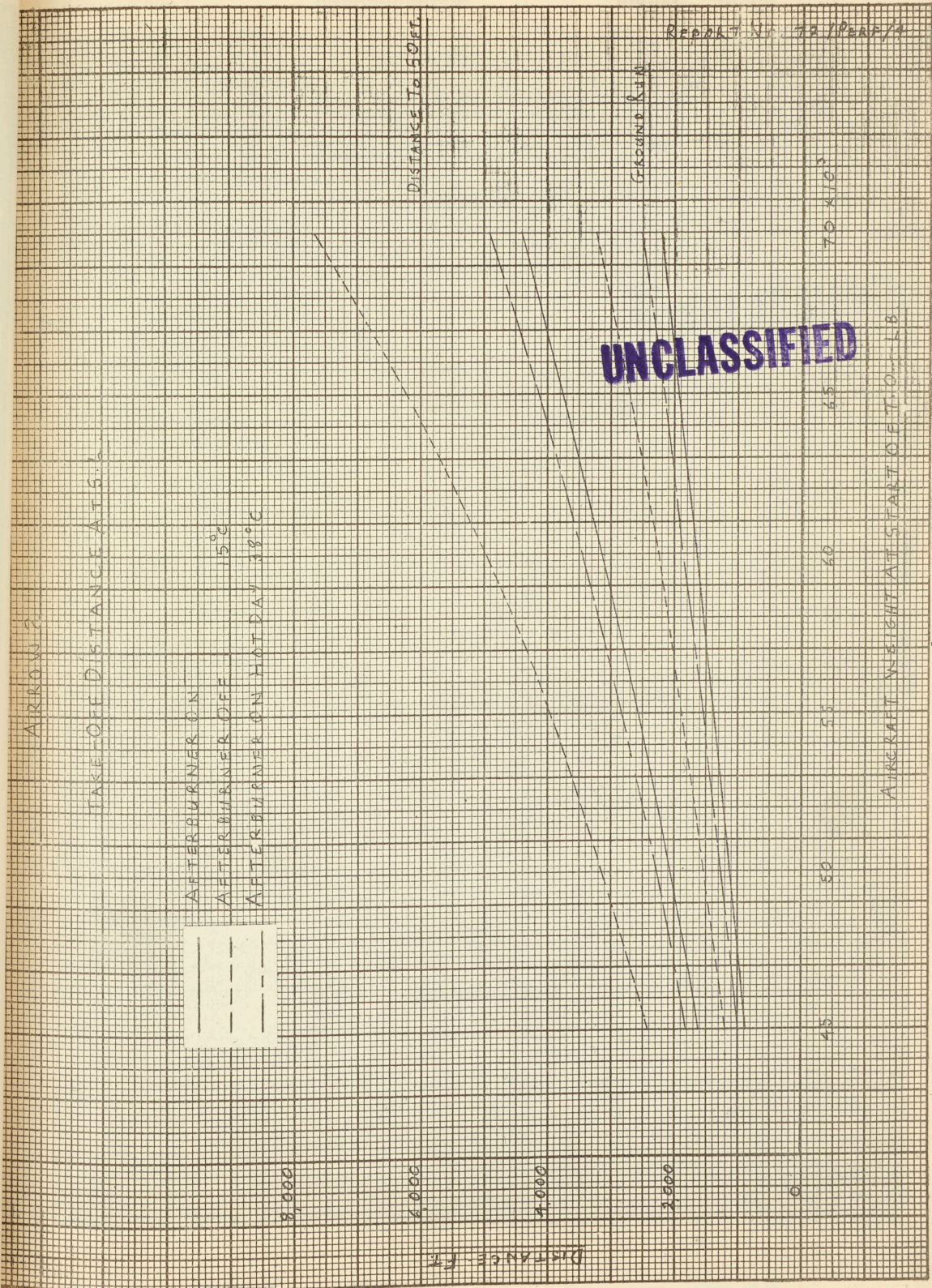


Fig. I-6

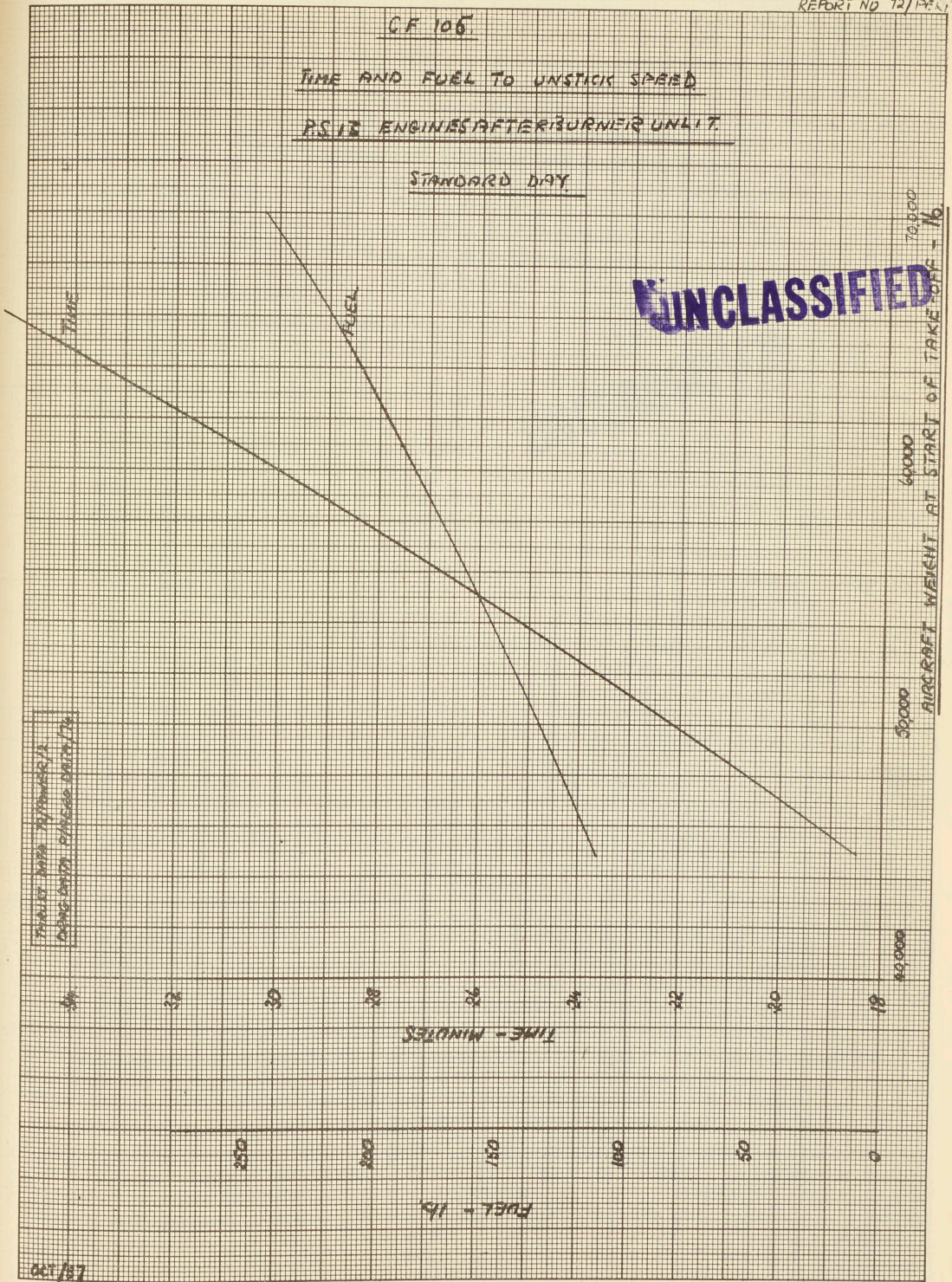
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CF 105

TIME AND FUEL TO UNSTICK SPEED

PS 12 ENGINES AFTER BURNER UNLIT

STANDARD DAY

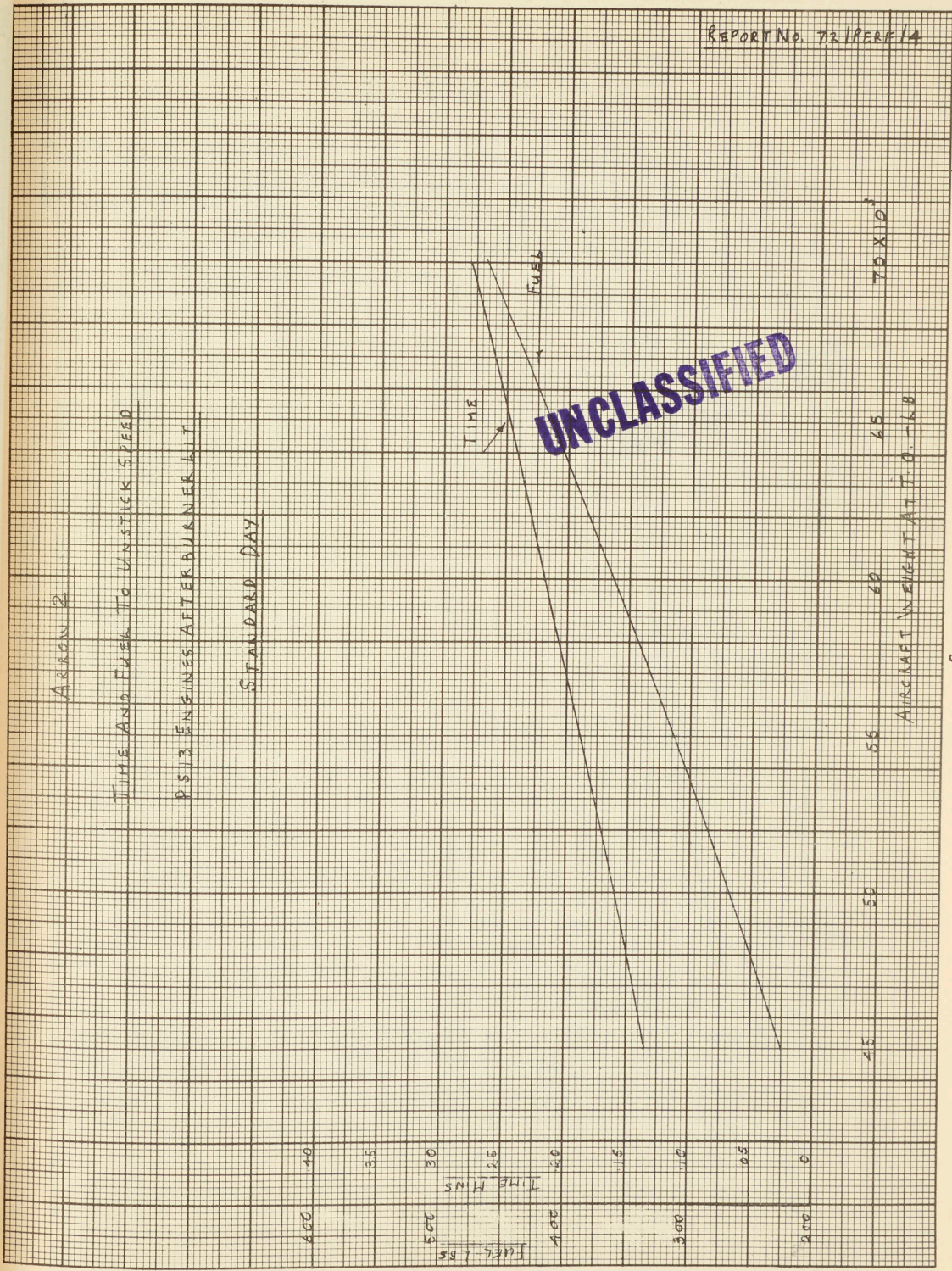


THREAT DATA APPROXIMATE
BASED ON THE PROCEEDING DATA

LS/100

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Fig. I-7



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Fig. I-8

ARROW 7 MAX. RPM. 810 UNALI
TIME FUEL AND DISTANCE TO RECOVER
FROM UNSETTLE TO 500 KNOTS AT SEA LEVEL

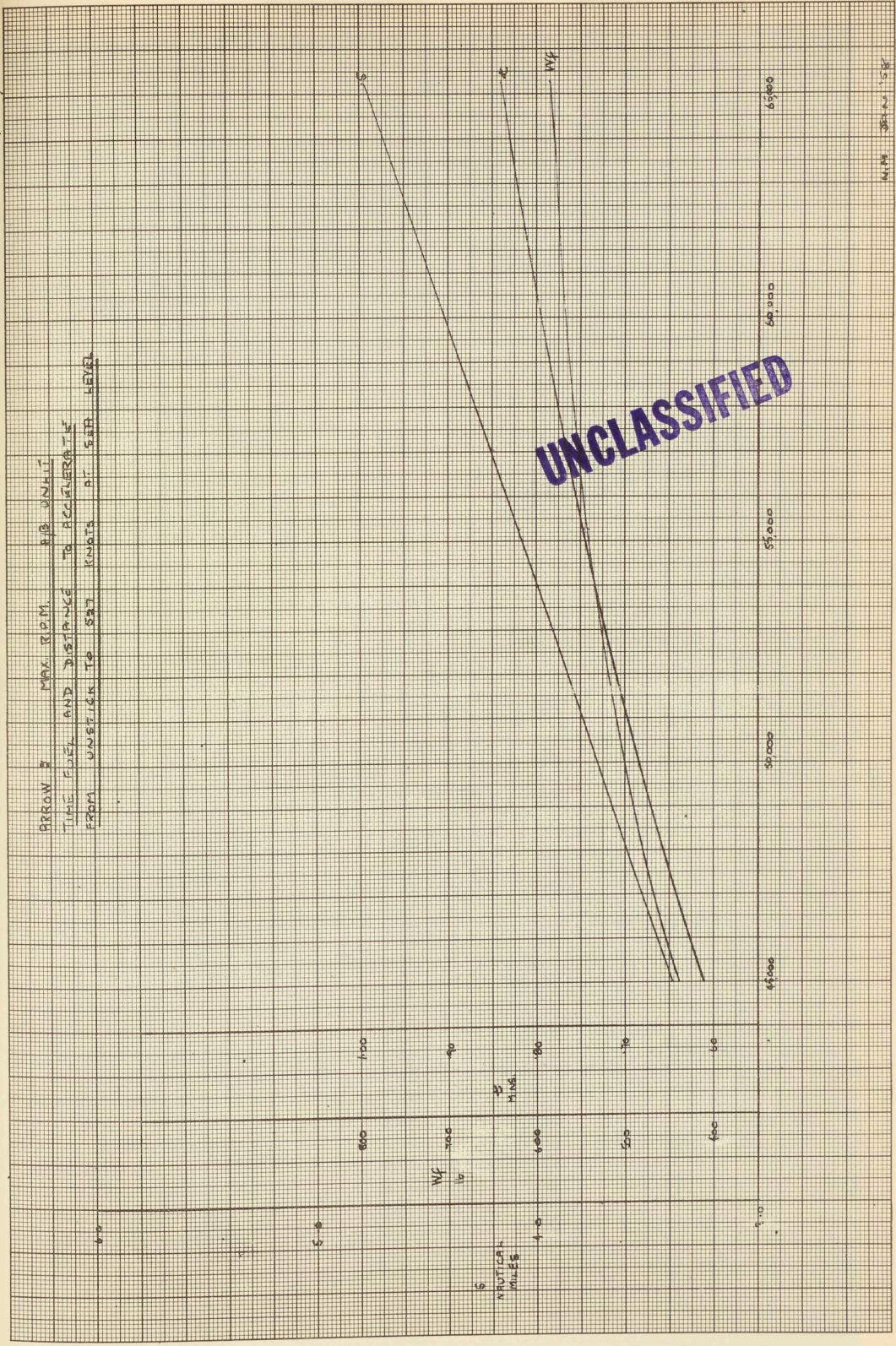


Fig. I-9

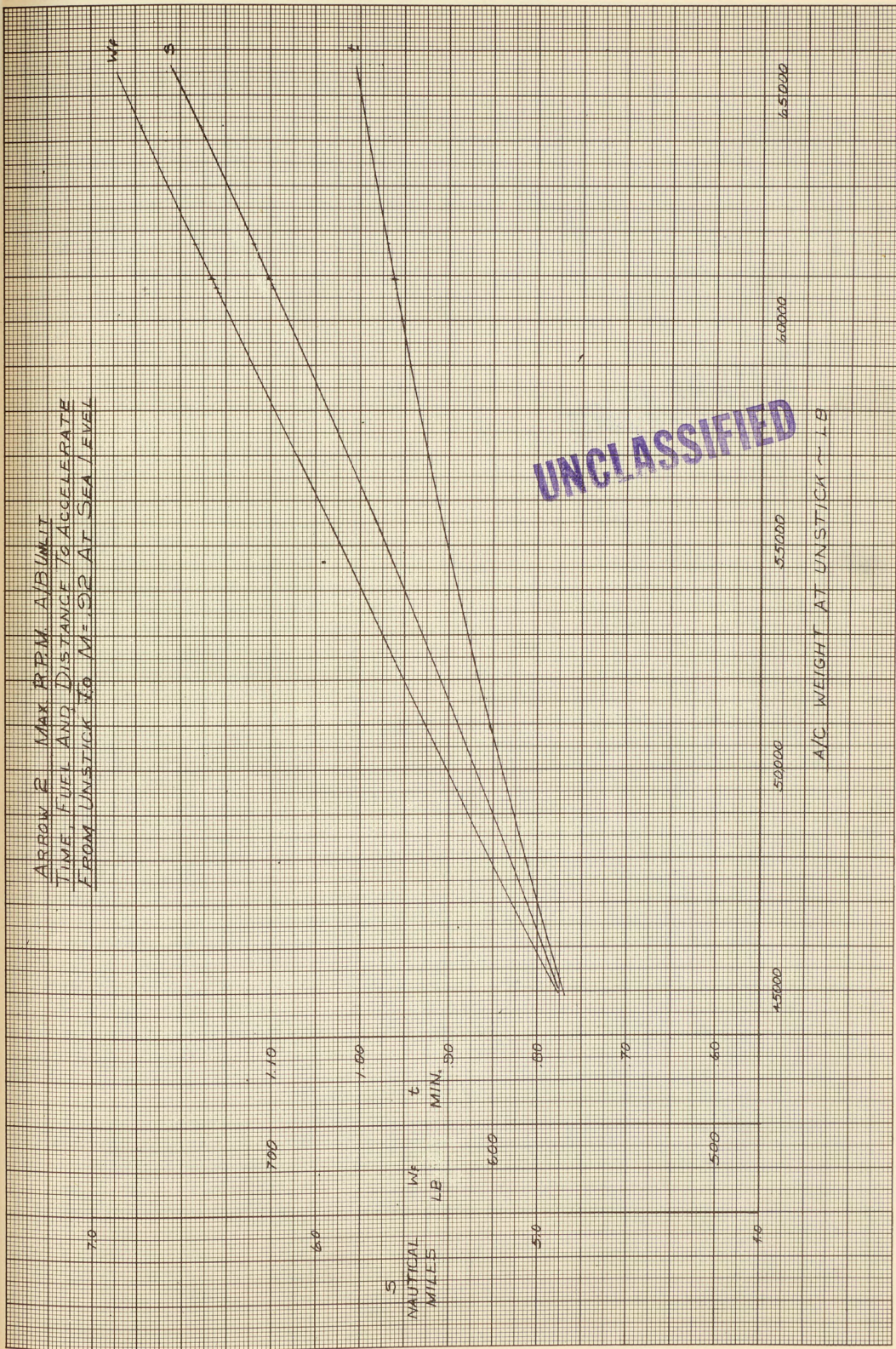
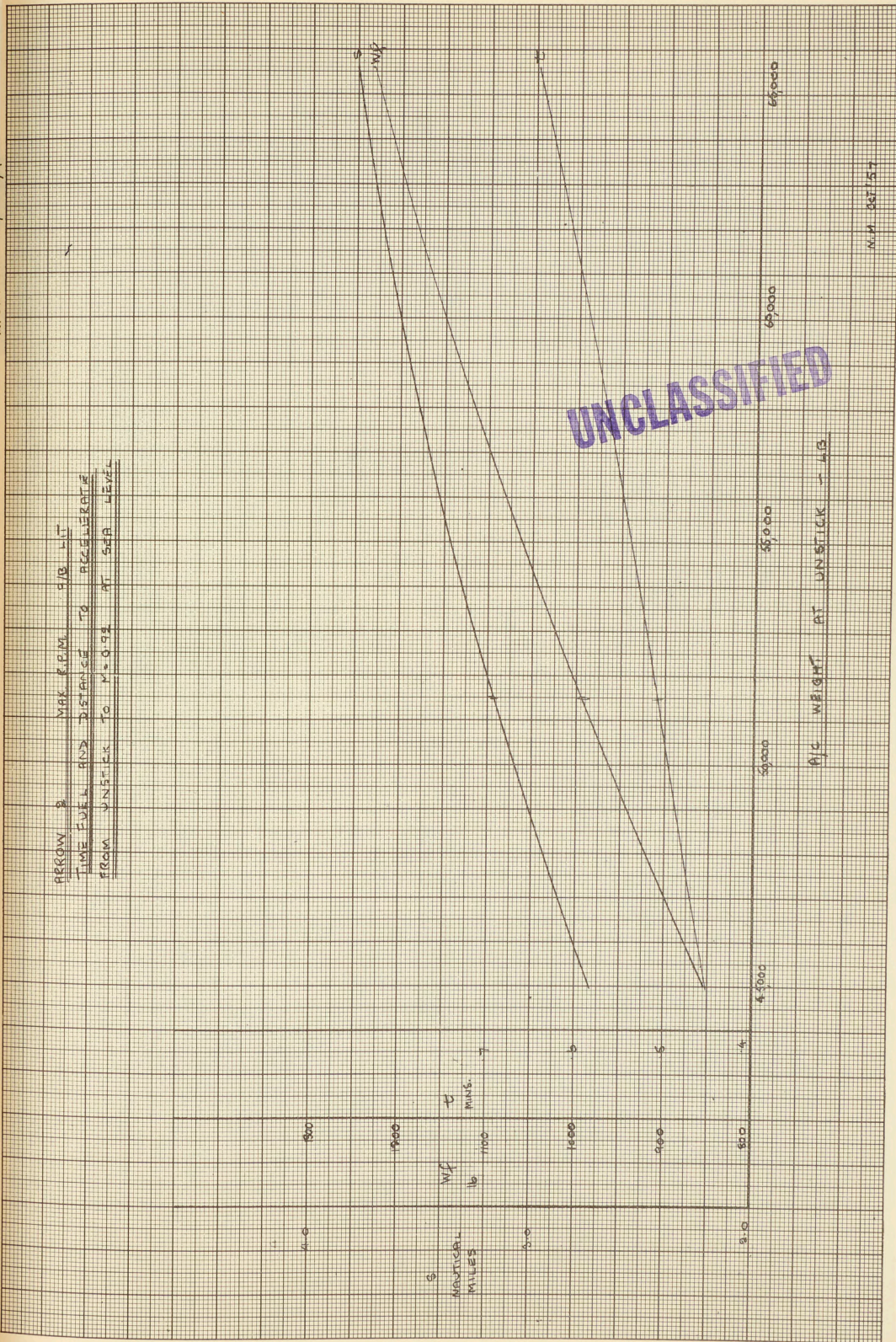


Fig. I-10

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ARROW B MAX. G.P.M. 910 LIT
TIME FUEL AND DISTANCE TO RECELERATE
FROM UNSTICK TO $M = 0.92$ AT SEA LEVEL



A/C WEIGHT AT UNSTICK - A/B

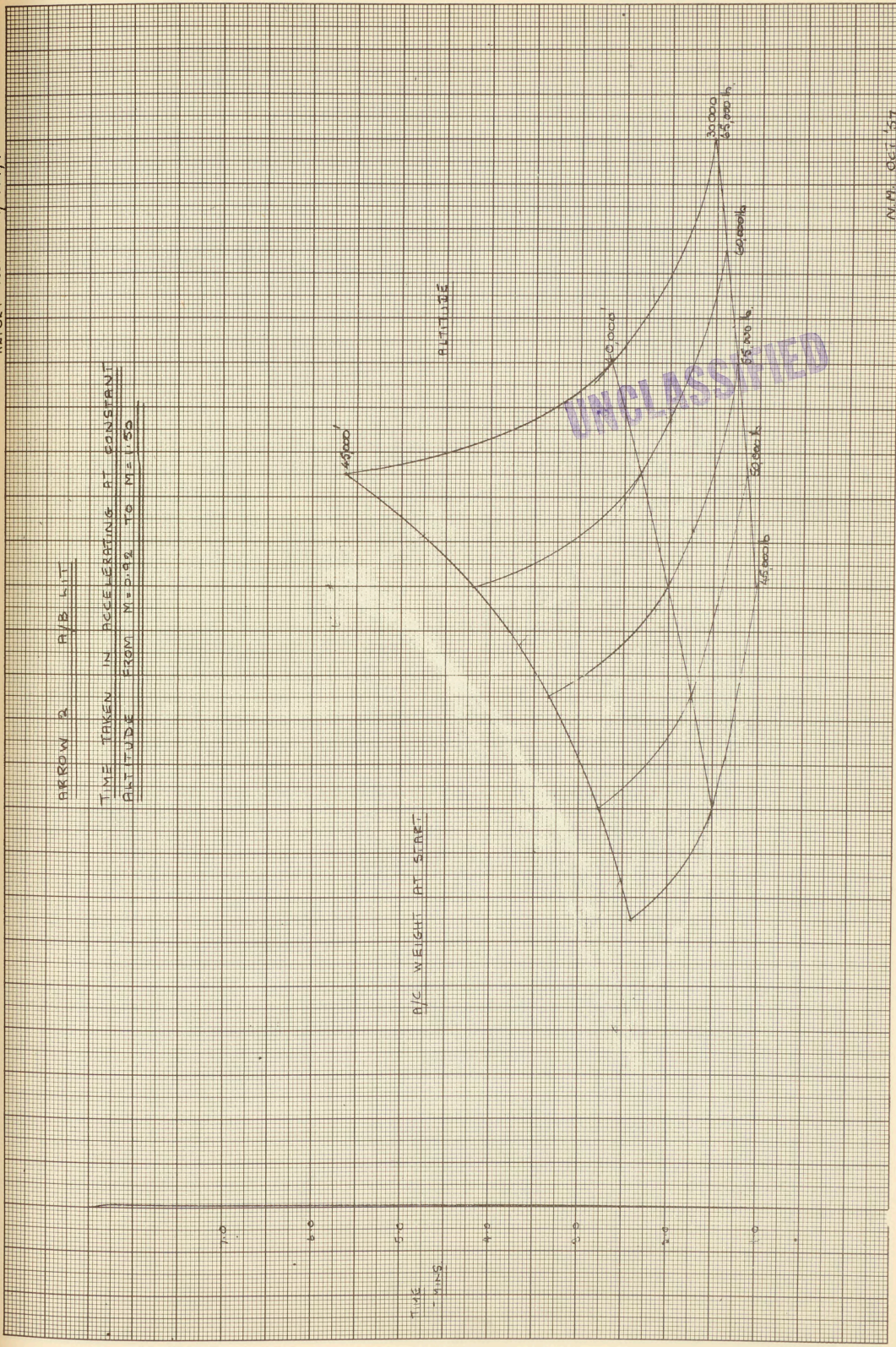
11/11 887 157

SECRET

Fig. I-11

ARROW & R/B 611

TIME TAKEN IN ACCELERATING AT CONSTANT ALTITUDE FROM $M=0.92$ TO $M=1.50$



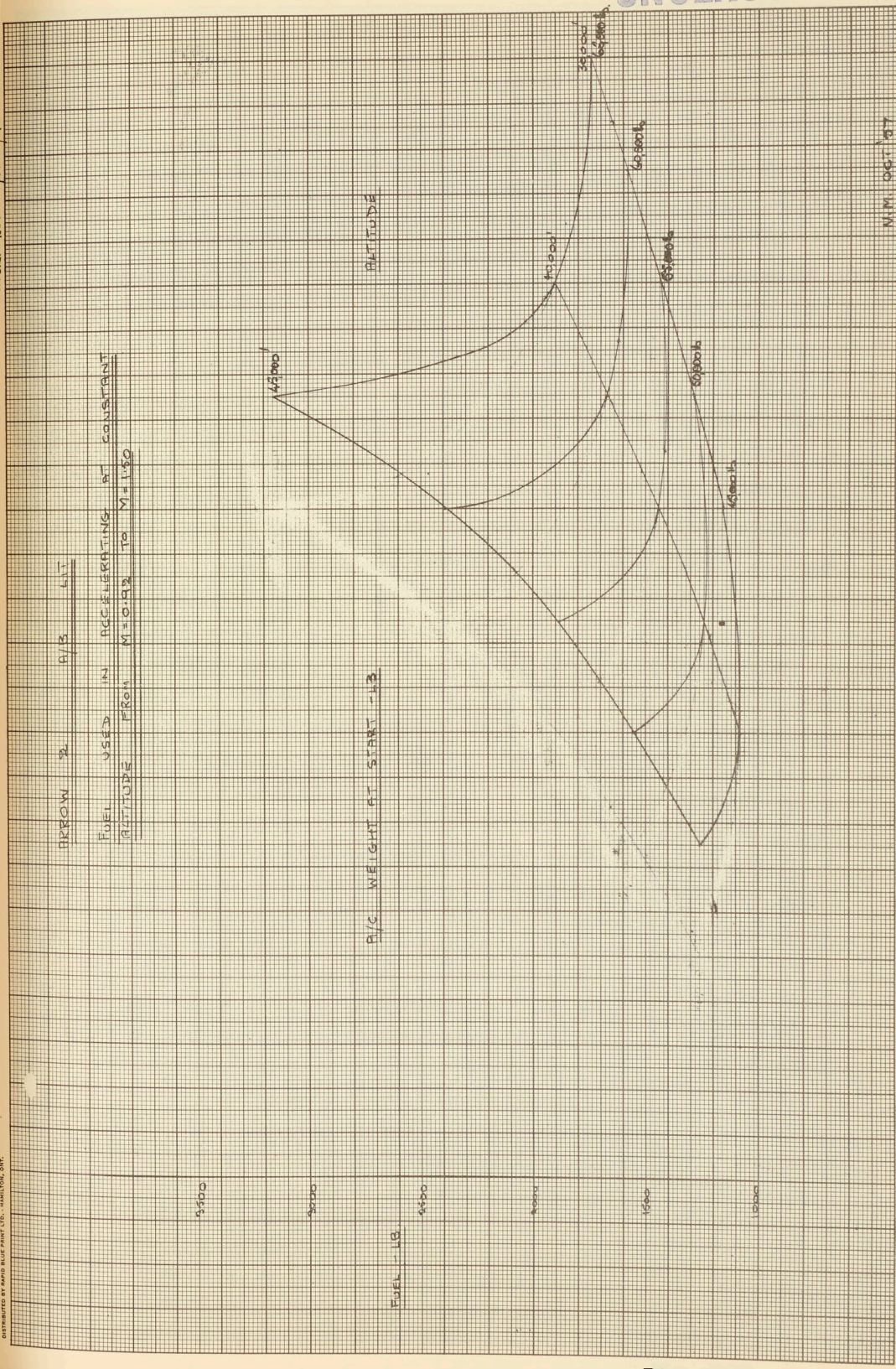
12/1000/7

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Fig. I-12

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ARROW 2. P/B LIT
 FUEL USED IN ACCELERATING AT CONSTANT ALTITUDE FROM M=0.92 TO M=1.50

P/C WEIGHT AT START - LB.

M.P. OCT 1971

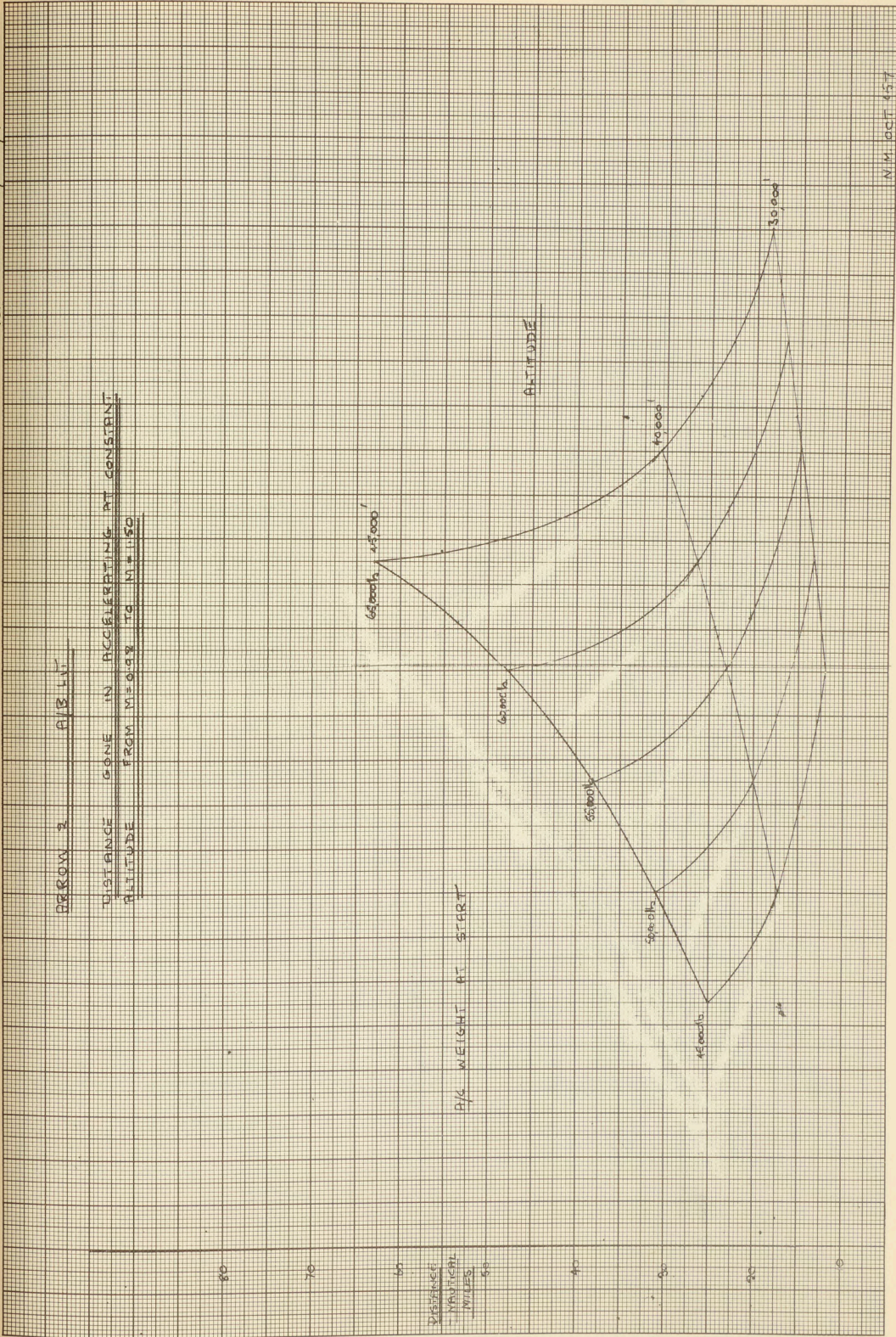
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Fig. I-13

REPORT NO. 13/1000/1

PROVA 3 A/B LIT

DISTANCE GONE IN ACCELERATING AT CONSTANT
ALTITUDE FROM M=0.98 TO M=1.50



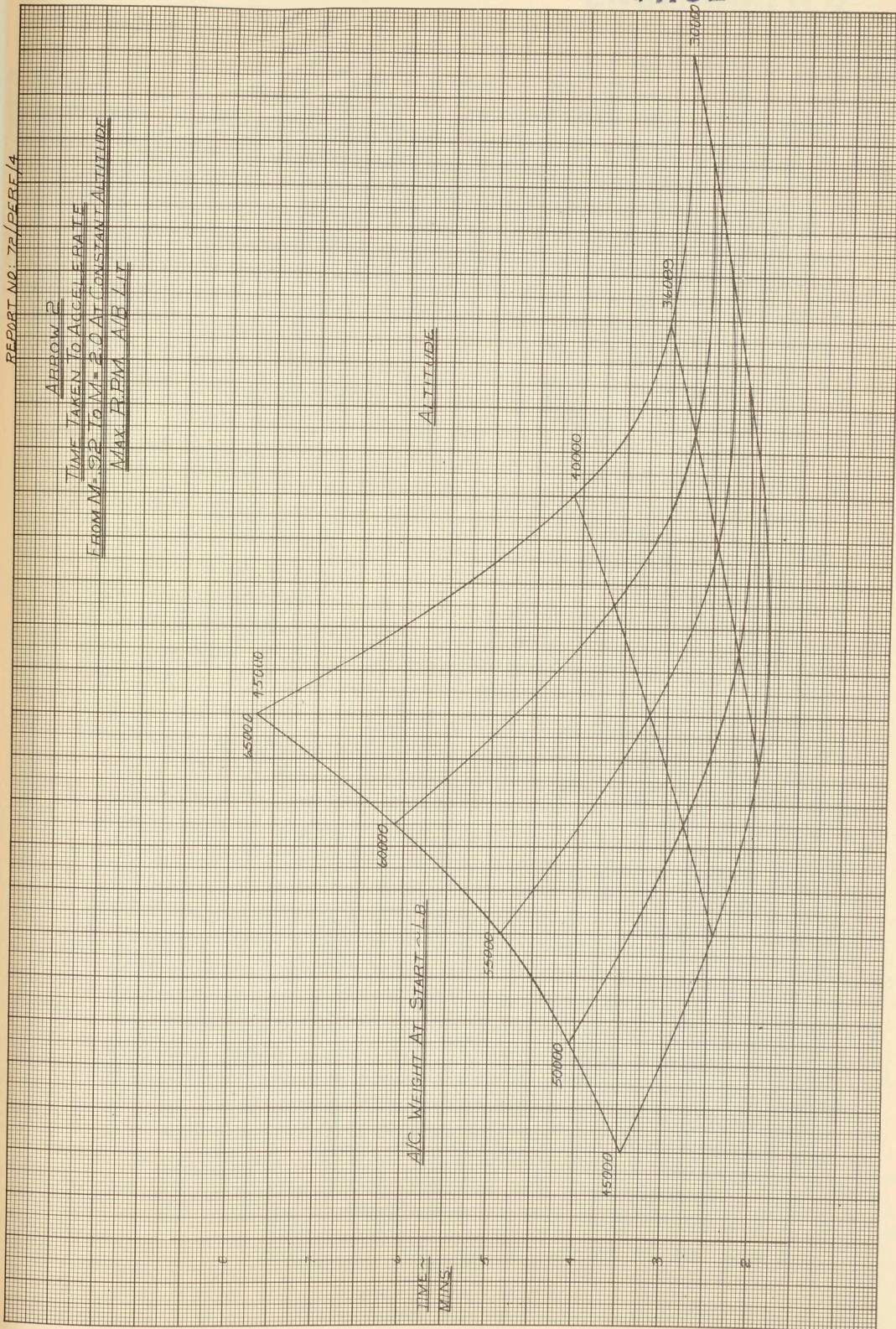
N. W. OCT. 45.7

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Fig. I-14

REPORT NO. 72/PERF/4

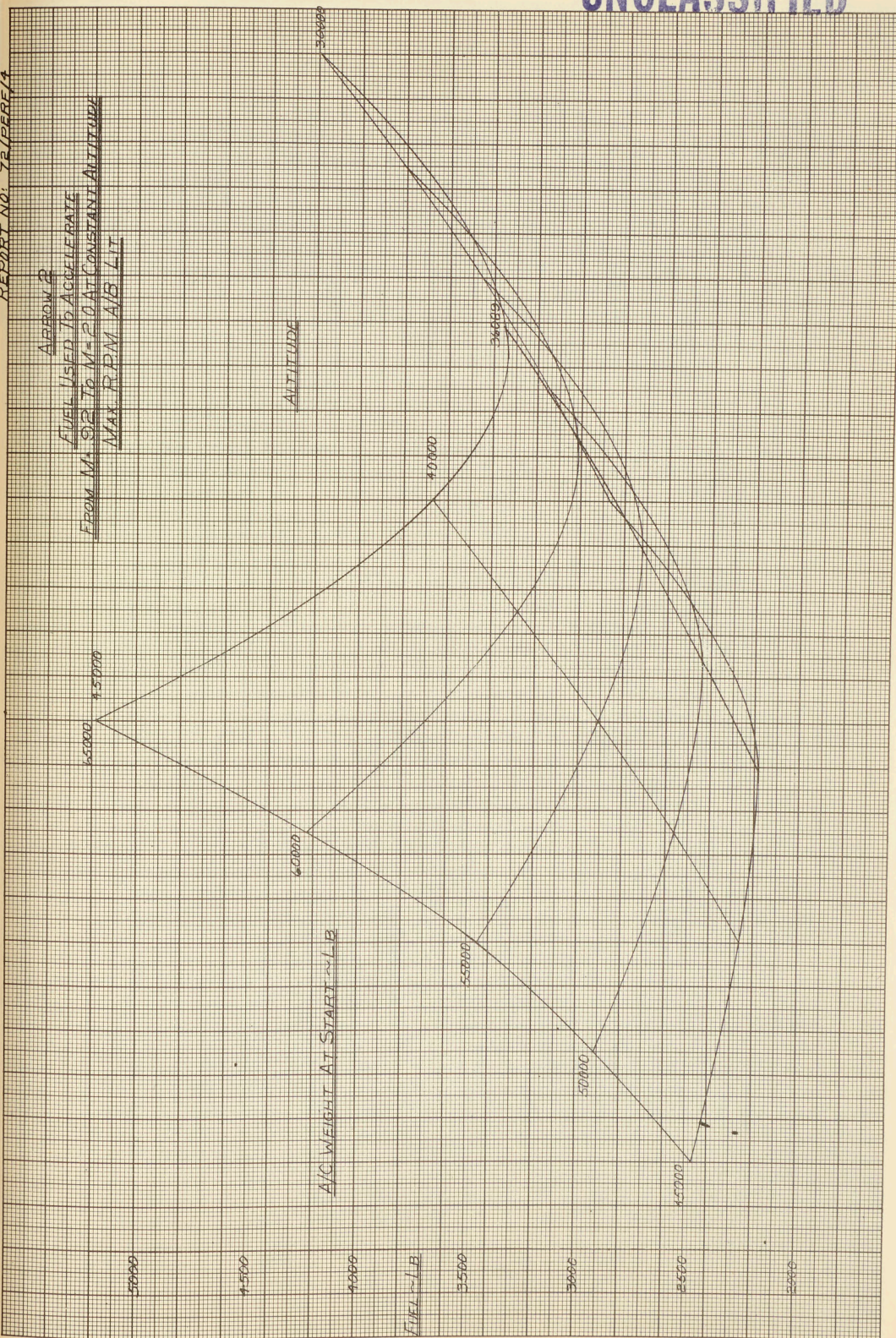
ARROW P
TIME TAKEN TO ACCELERATE
FROM M.S.P. TO M = P.0 AT CONSTANT ALTITUDE
MAX. RPM A/B L/T



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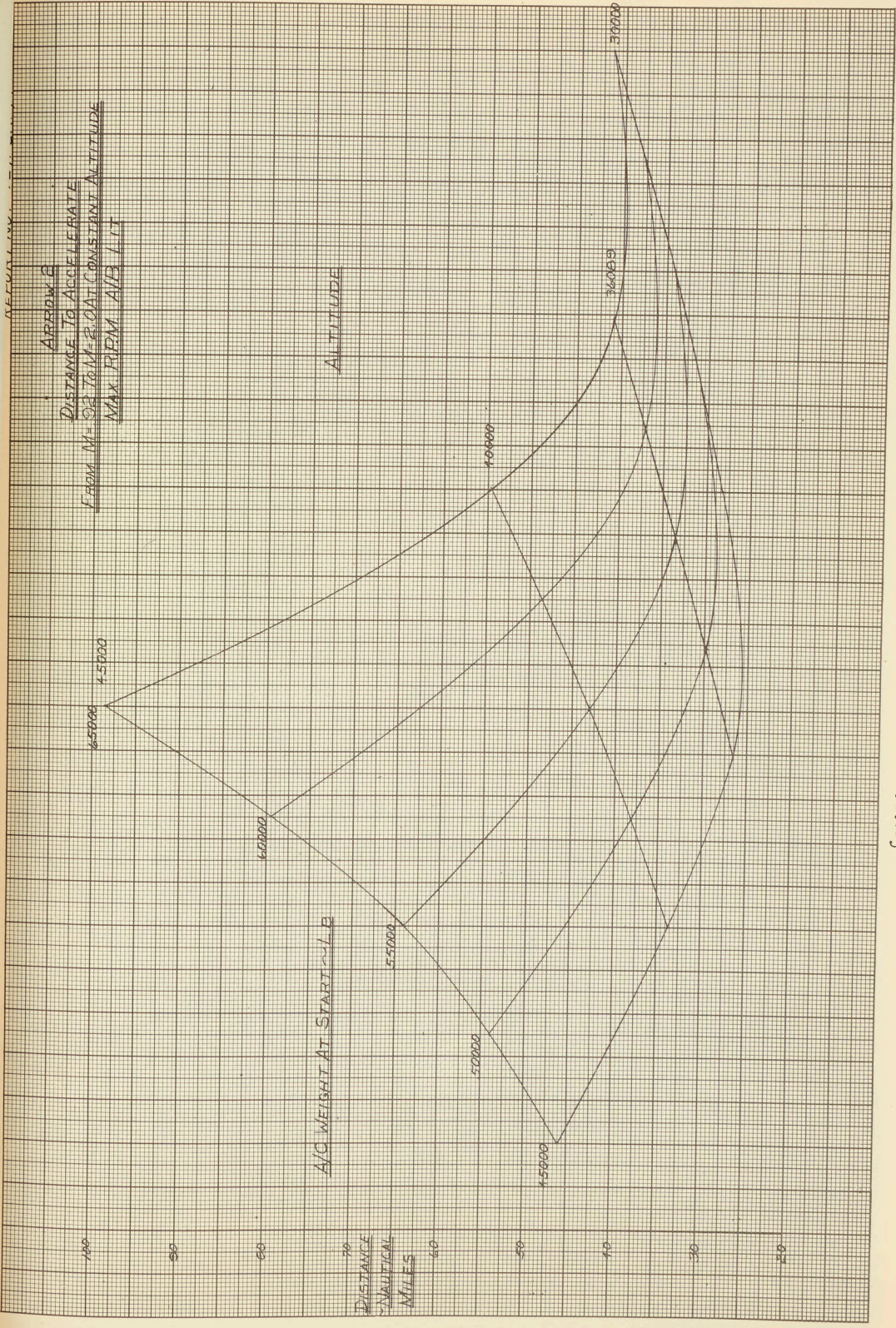
Fig. I-15

REPORT NO. 72/PREF-1



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Fig. I-16



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Fig. I-17

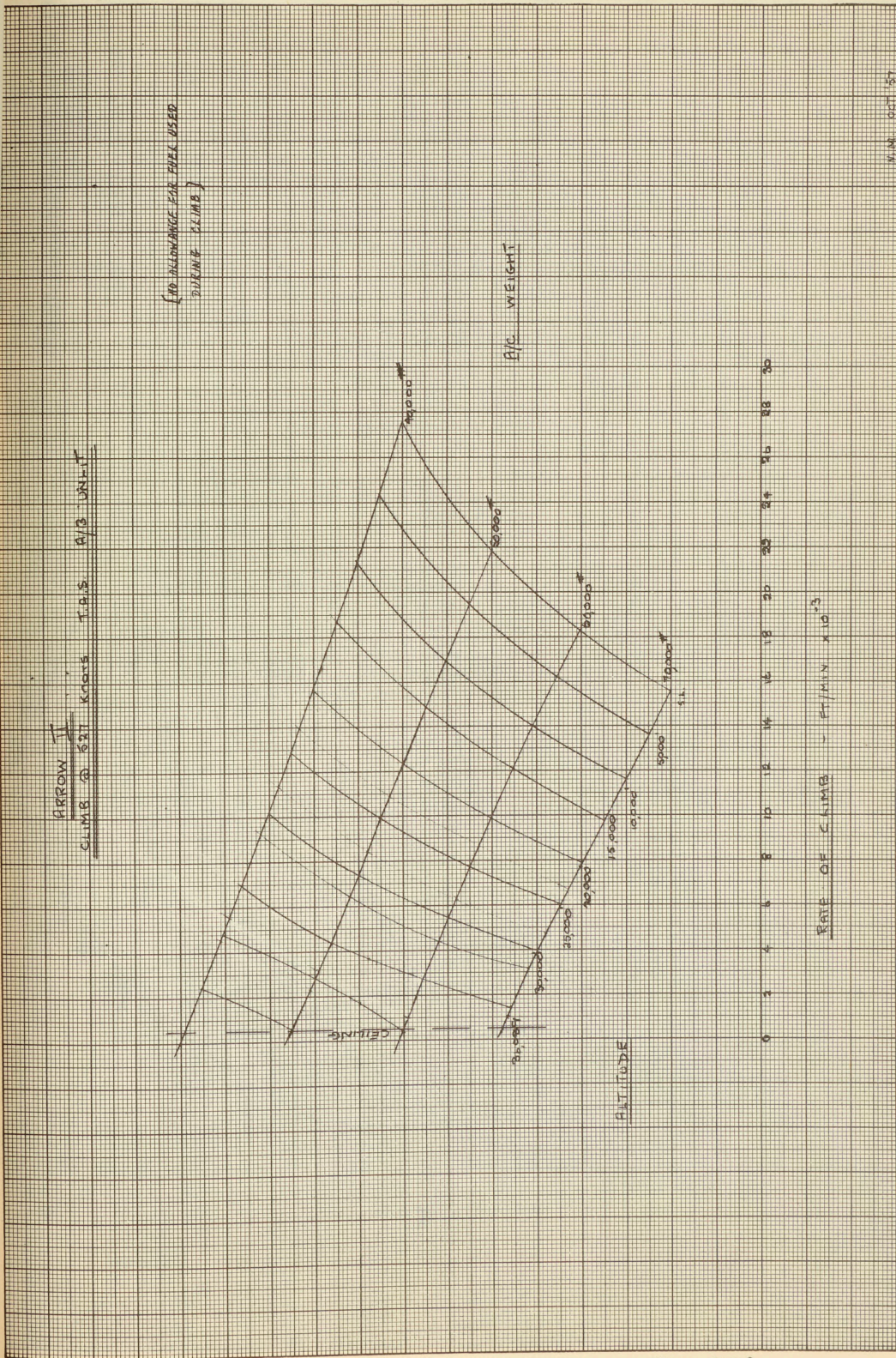


Fig. I-18

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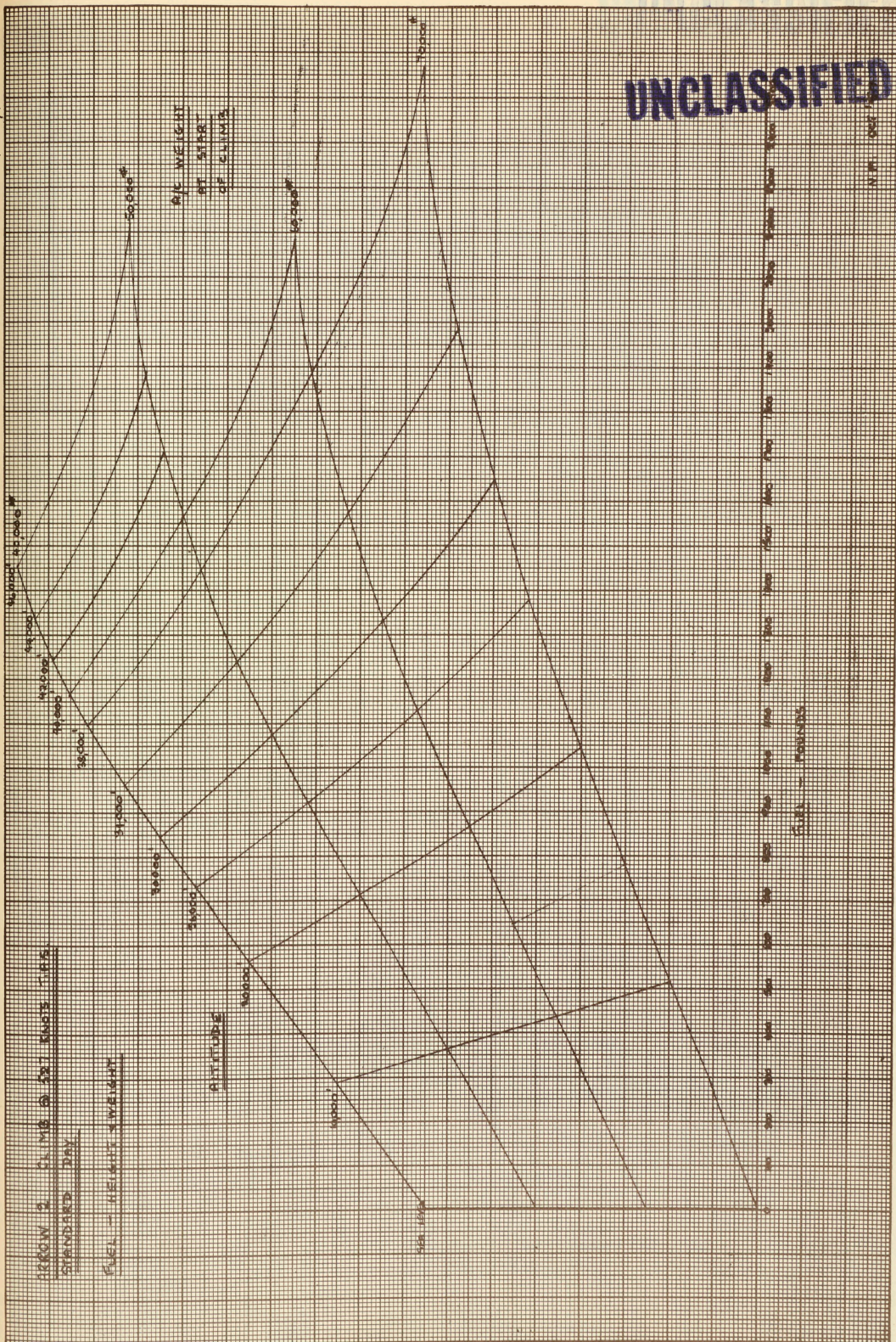
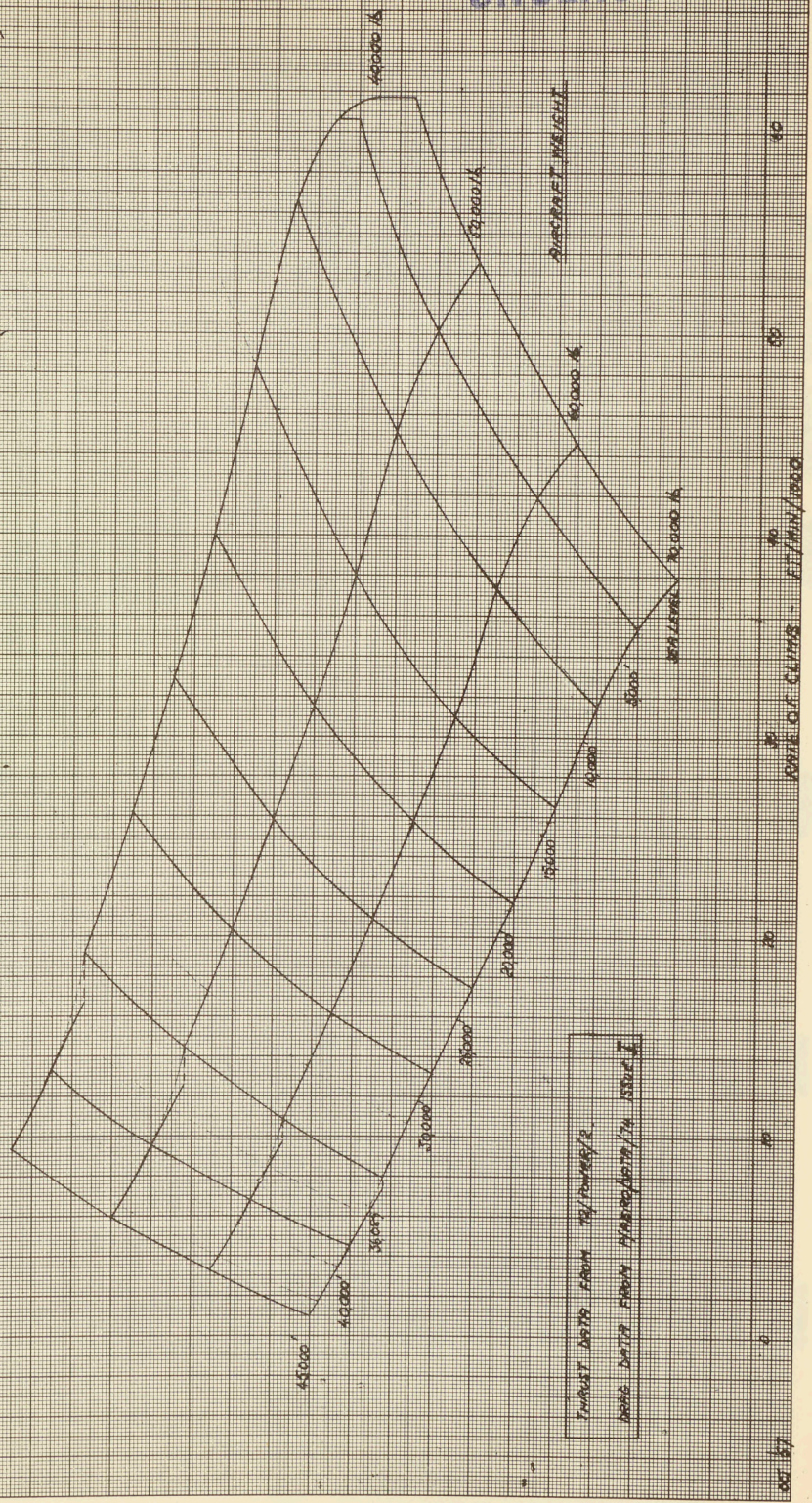


Fig. I-20

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C.F. 106
RATE OF CLIMB AT CONSTANT MACH NUMBER OF 0.92
P8-13 ENGINES WITH MAXIMUM AFTERBURNER

(NO ALLOWANCE FOR FUEL USED DURING CLIMB)



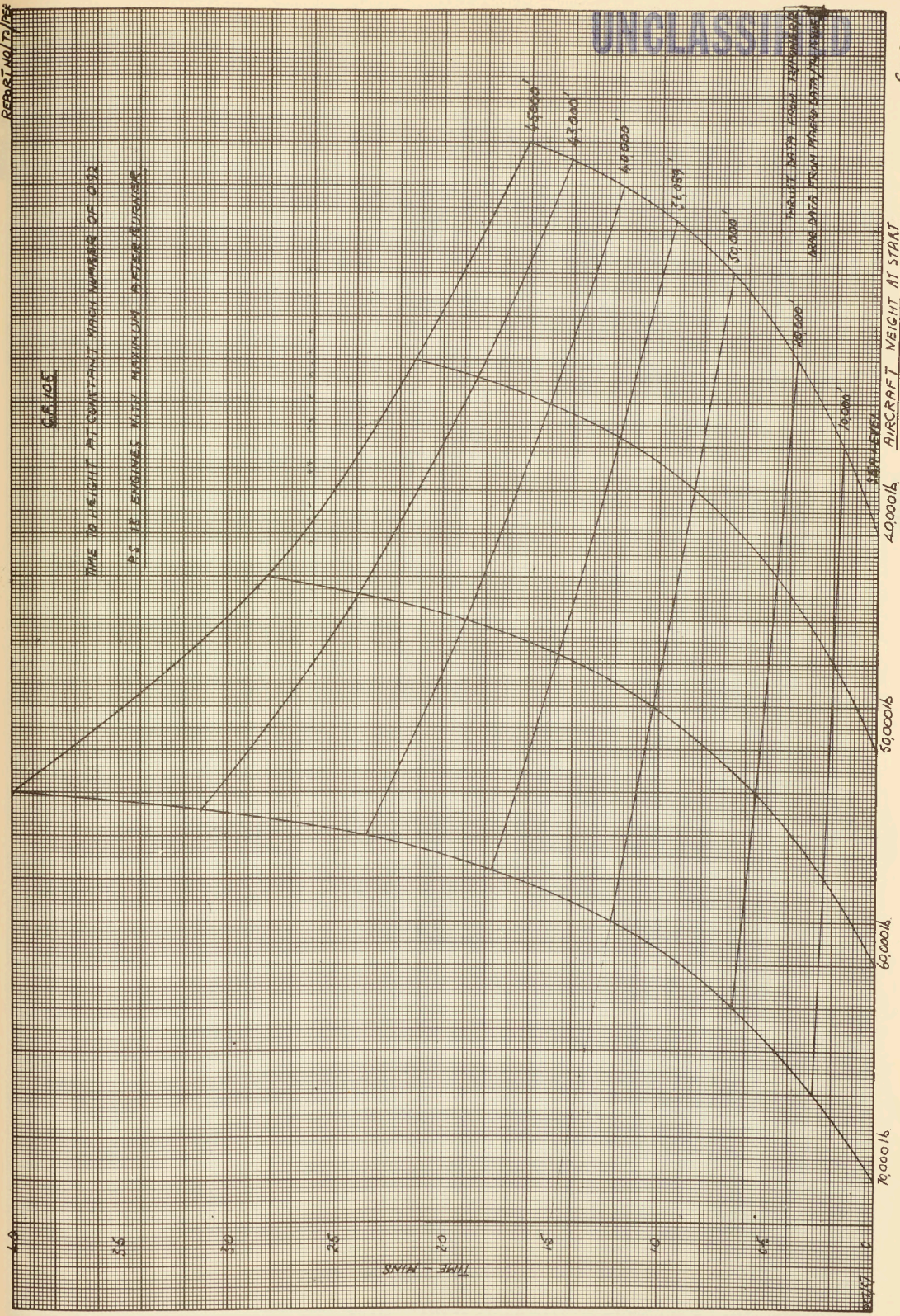
THRUST DATA FROM T4/T4M5/R2
NOTE DATA FROM 4/19/50/174 ISSUE I

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Fig. I-22

REF ID: A66717

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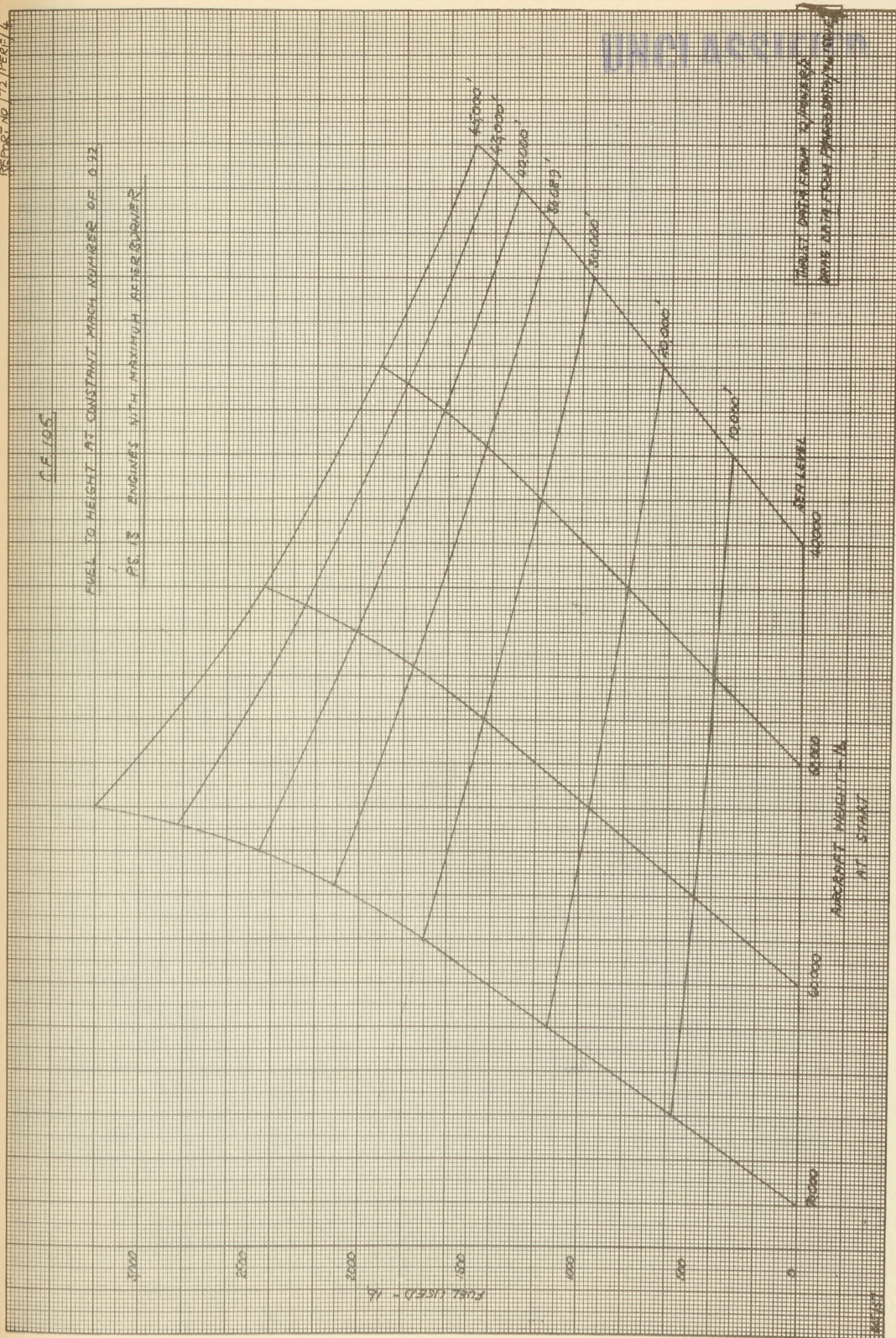
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Fig. I-23

CE 105

FUEL TO HEIGHT AT CONSTANT MACH NUMBER OF 0.92

PS IS ENGINES WITH MAXIMUM AFTERBURNER



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TABLET DATA FROM 70-1000000
BASE DATA FROM 70-1000000

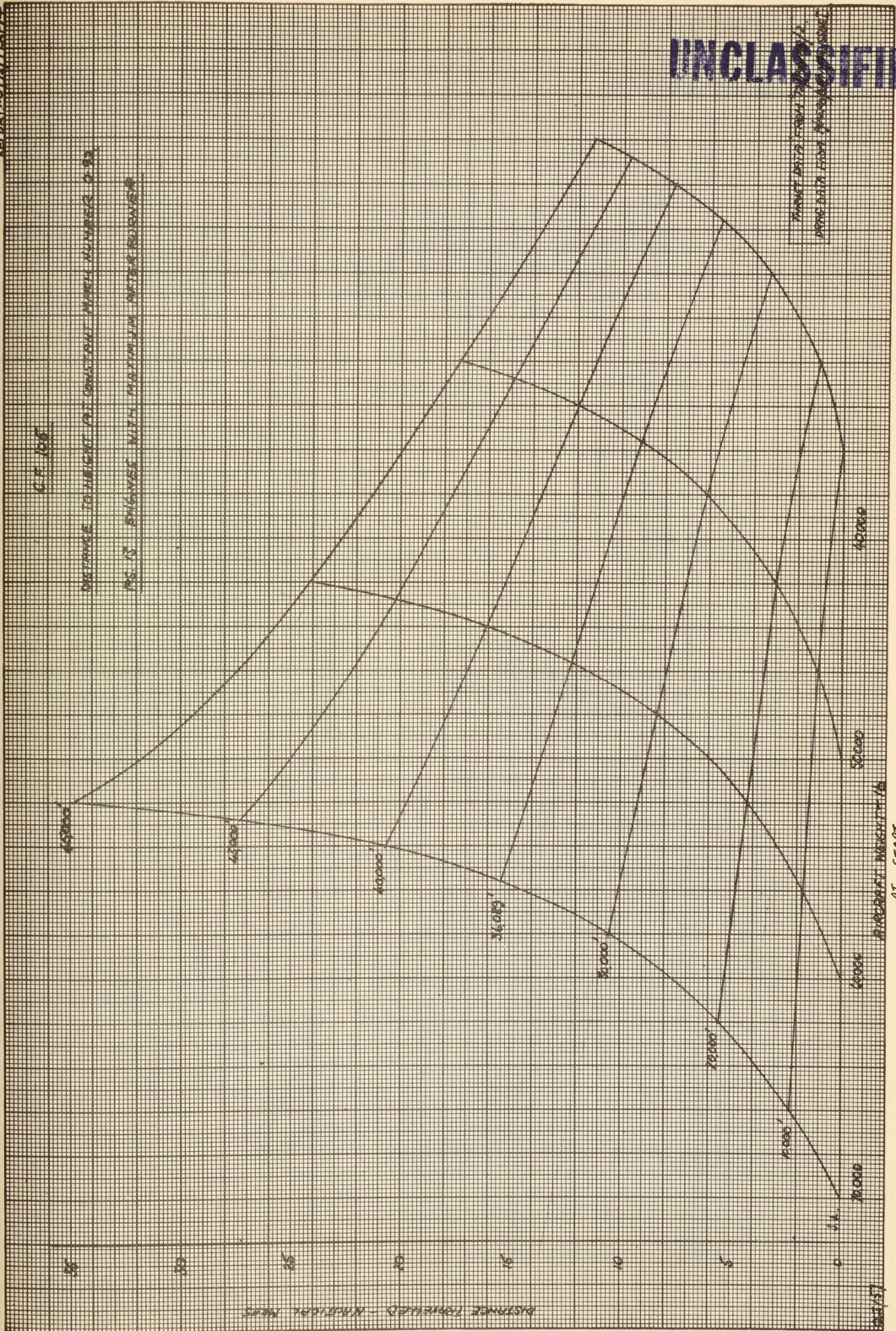
SEA LEVEL
40000

ARBITRARY HEIGHT - ft
AT START

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Fig. I-24

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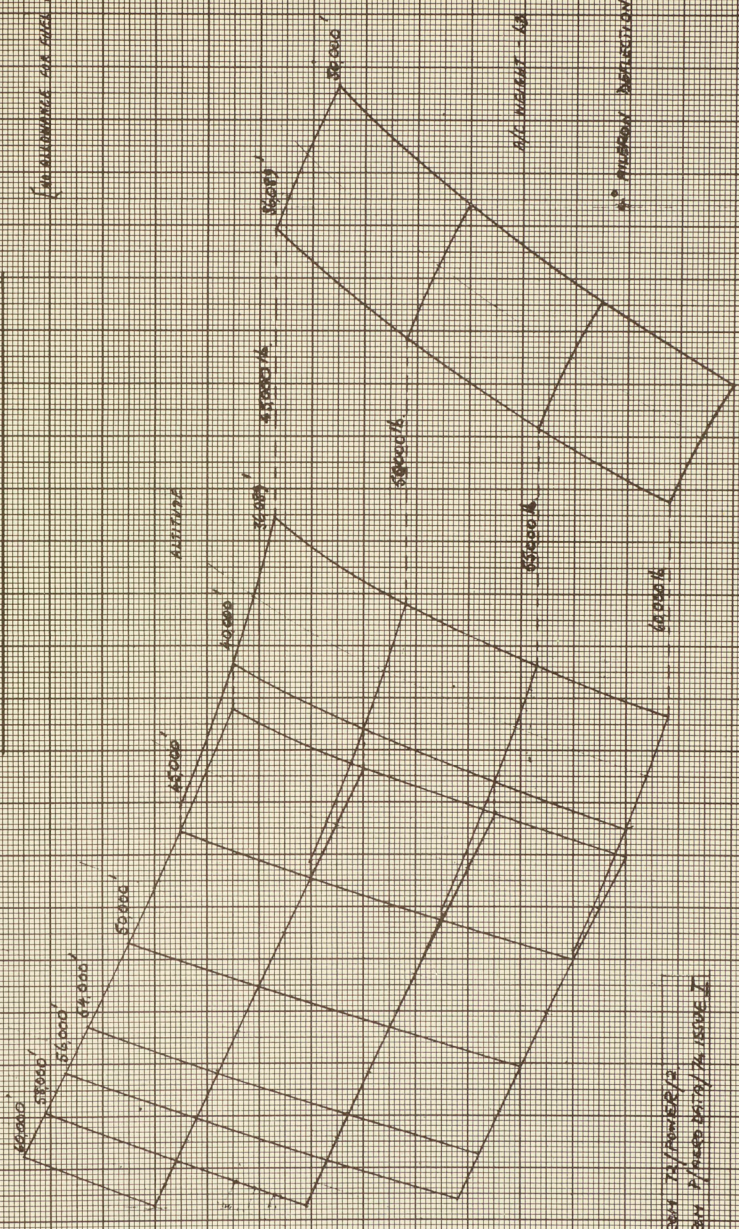
Fig. I-25

CR 105

RATE OF CLIMB AT CONSTANT MACH NUMBER OF 1.5

F-15 AIRCRAFT WITH MAXIMUM AFTERBURNER

(NO. MINIMUM AIR FUEL USED DURING CLIMB)



THRUST DATA FROM IS/PAPER/12
DURING DATA FROM PAPER/12/1/1/ISSUE I

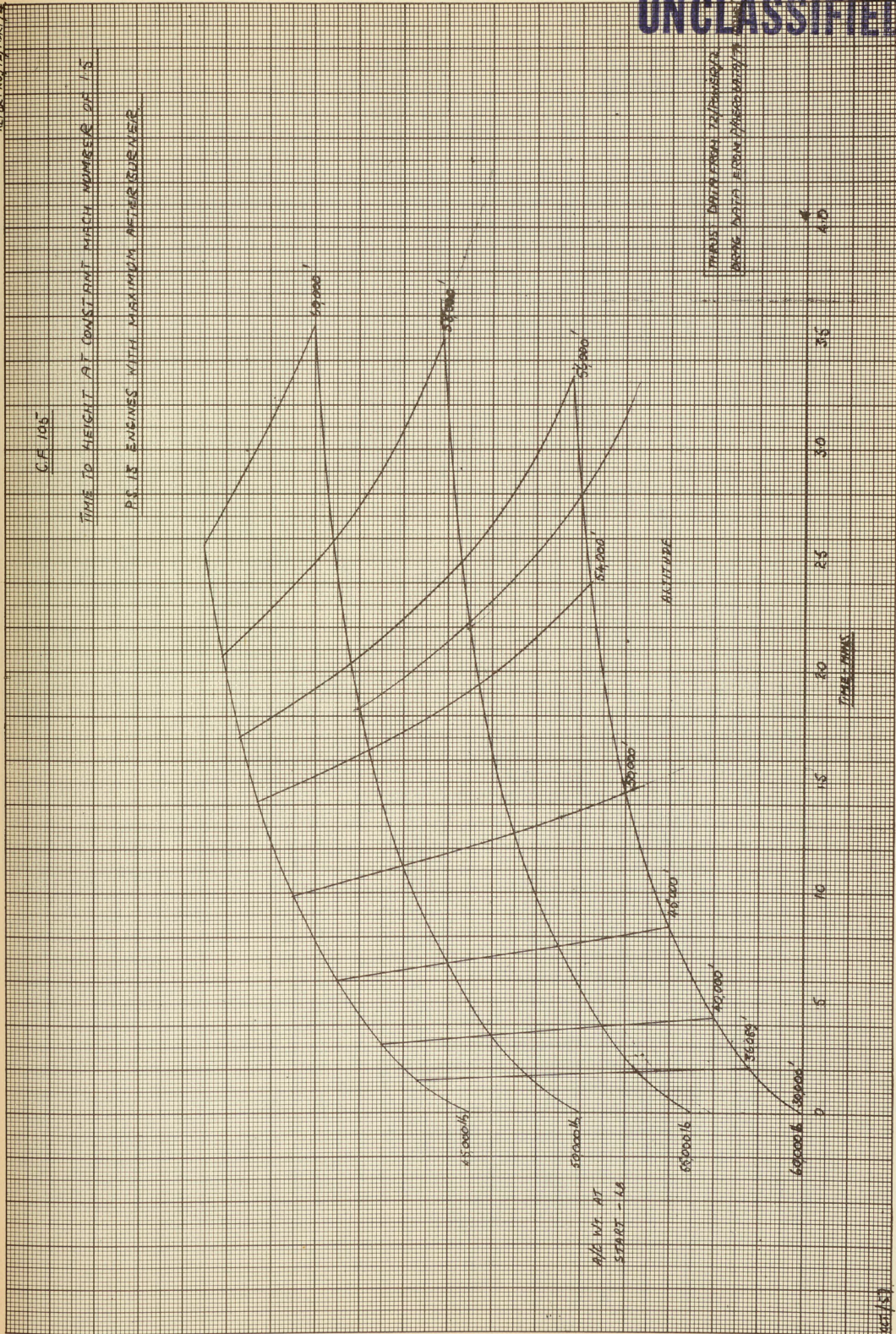
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Fig. I-26

REF ID: A67127

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THROUGH DATA FROM 72/2000000/1
BEING DATA FROM DISCREPANCY

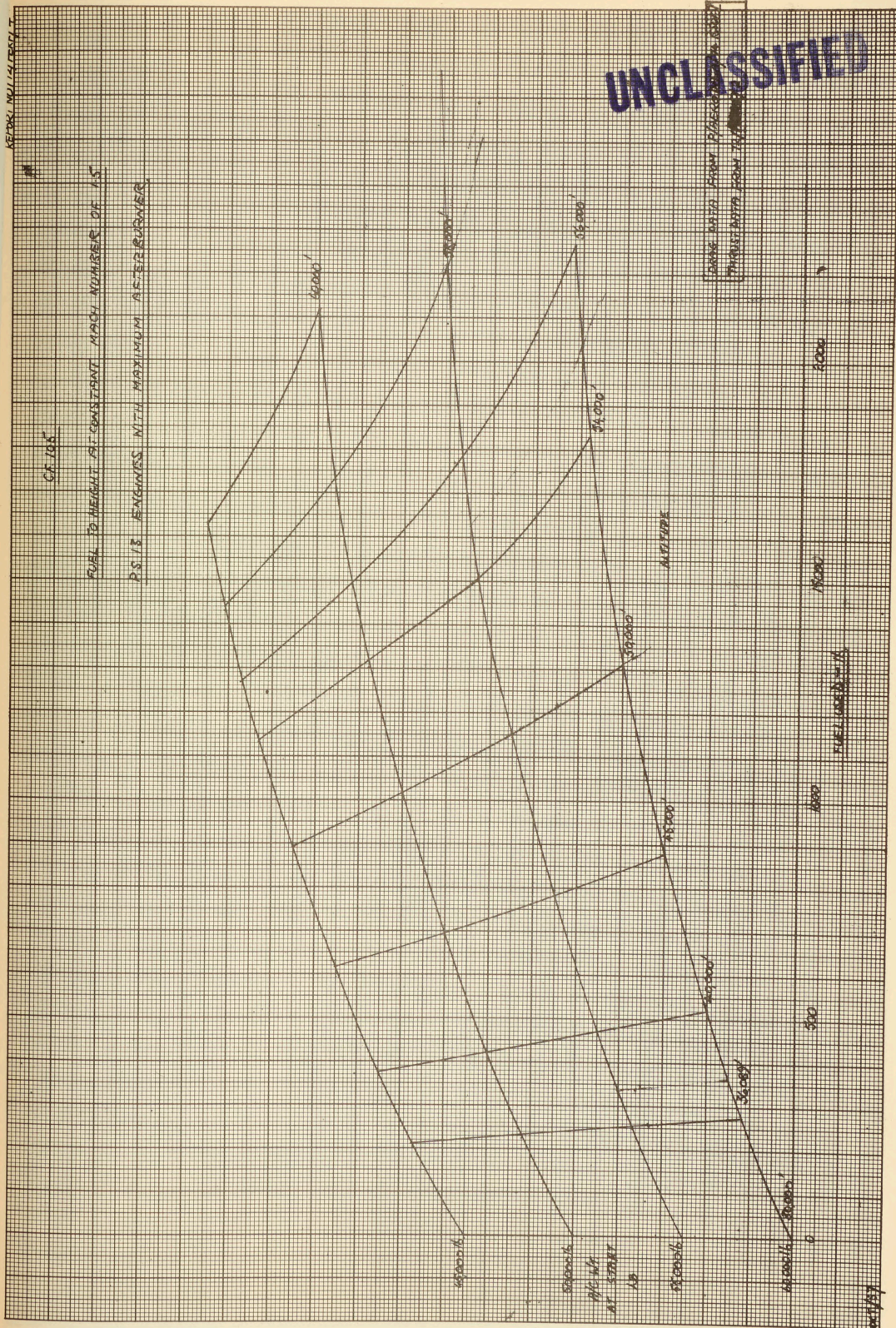
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Fig. I-27

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FUEL TO HEIGHT AT CONSTANT HIGH NUMBER OF RPM
P.S.T. ENGINES WITH MAXIMUM AFTERBURNER



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Fig. I-28

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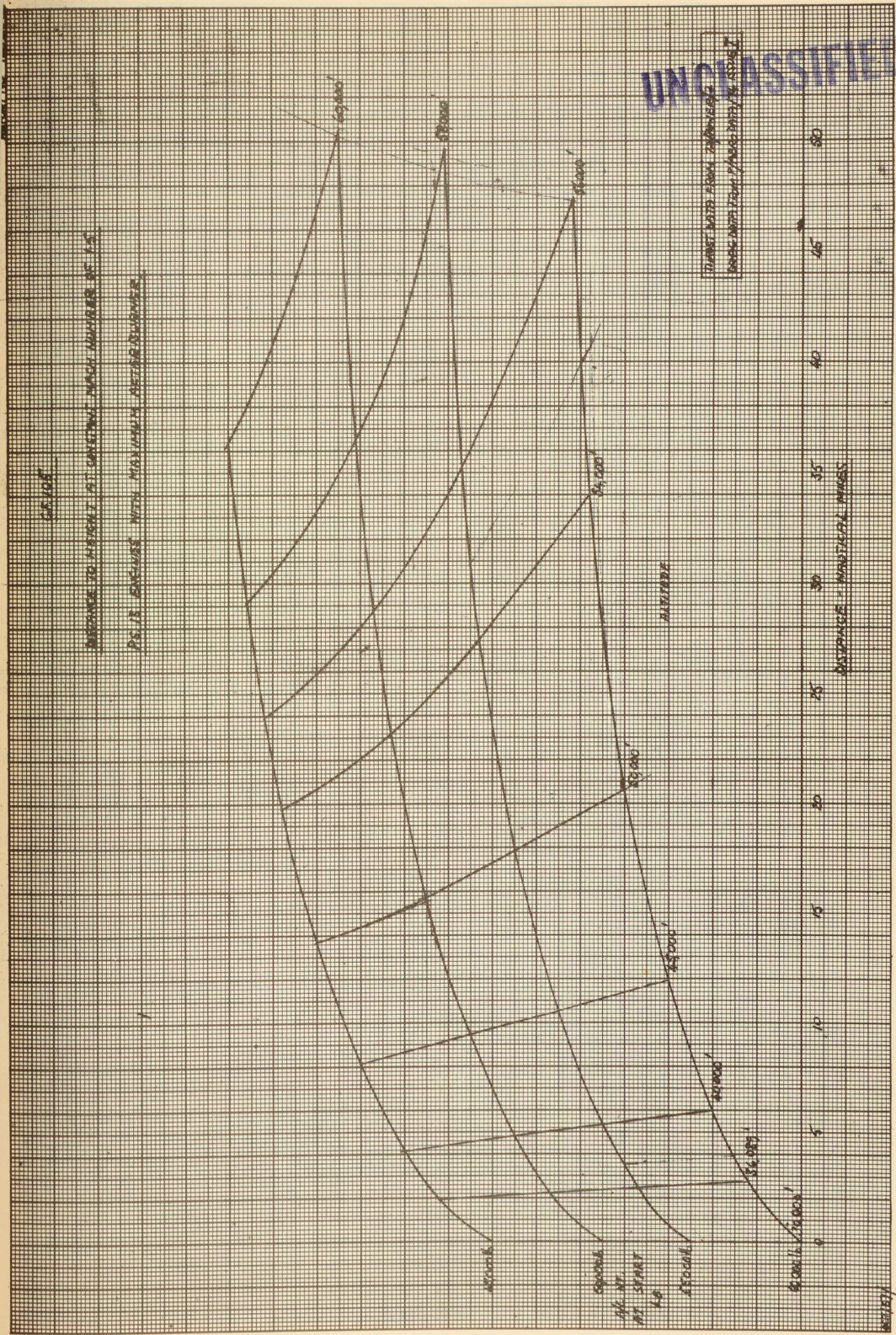


Fig. I-29

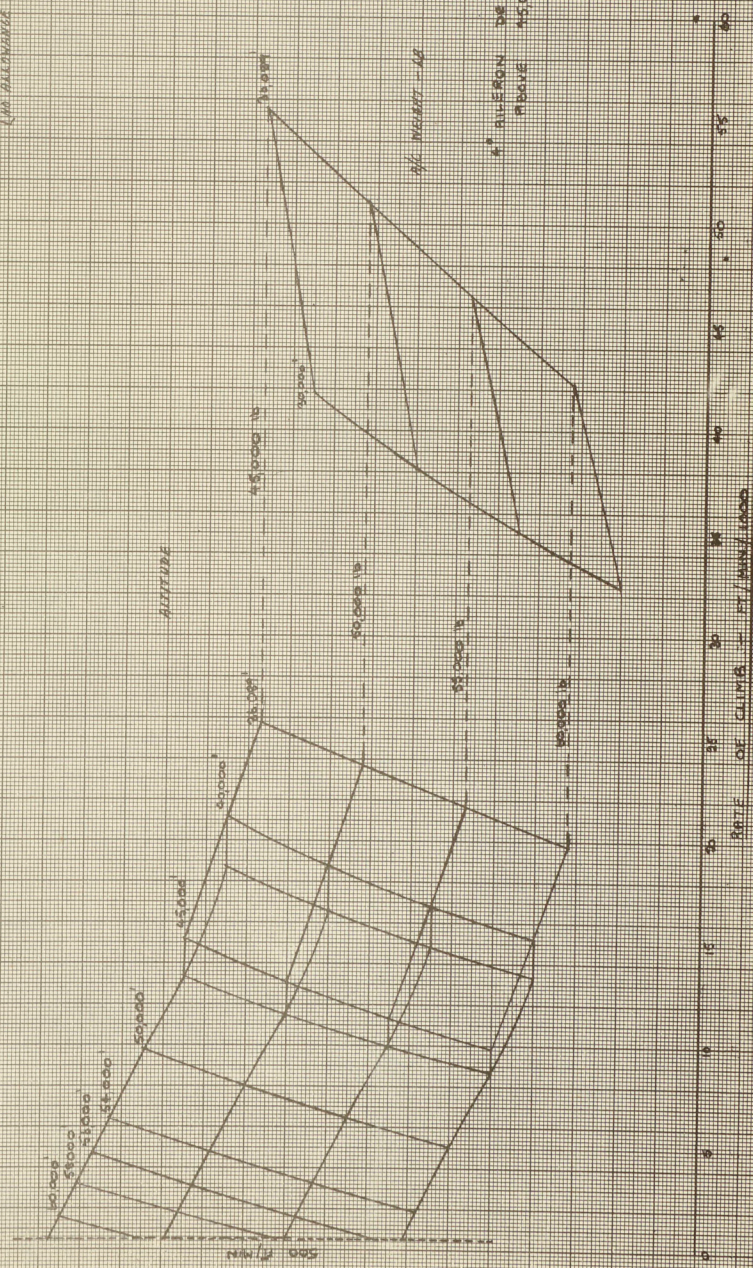
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APPENDIX 2

RATE OF CLIMB AT CONSTANT MACH NO. OF 0.0

P.5.13 ENGINES WITH MAX. PERFORMANCE

(NO. AIRFRAME FOR EACH USED VARIOUS CLIMB)



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PL. IN. ENG. 1157

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Fig. I-30

ARTHUR P.

TIME TO VULNERABILITY AT A CONSTANT ALTITUDE

NUMBER OF A.C.

ALL'S BEHAVIORS WITH AIRCRAFT AT A CONSTANT ALTITUDE

Values listed in parentheses are from data from reconnaissance in course.

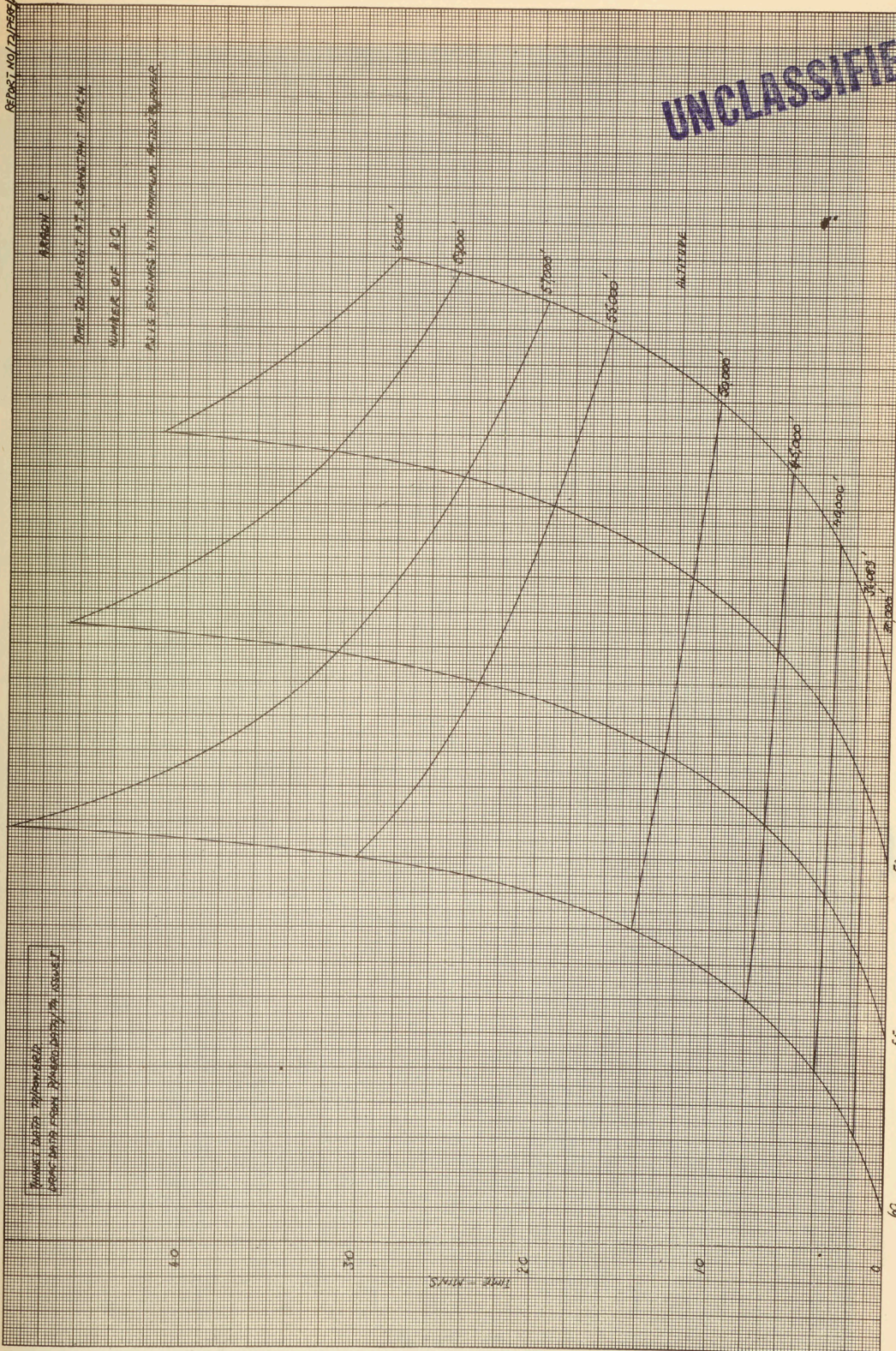
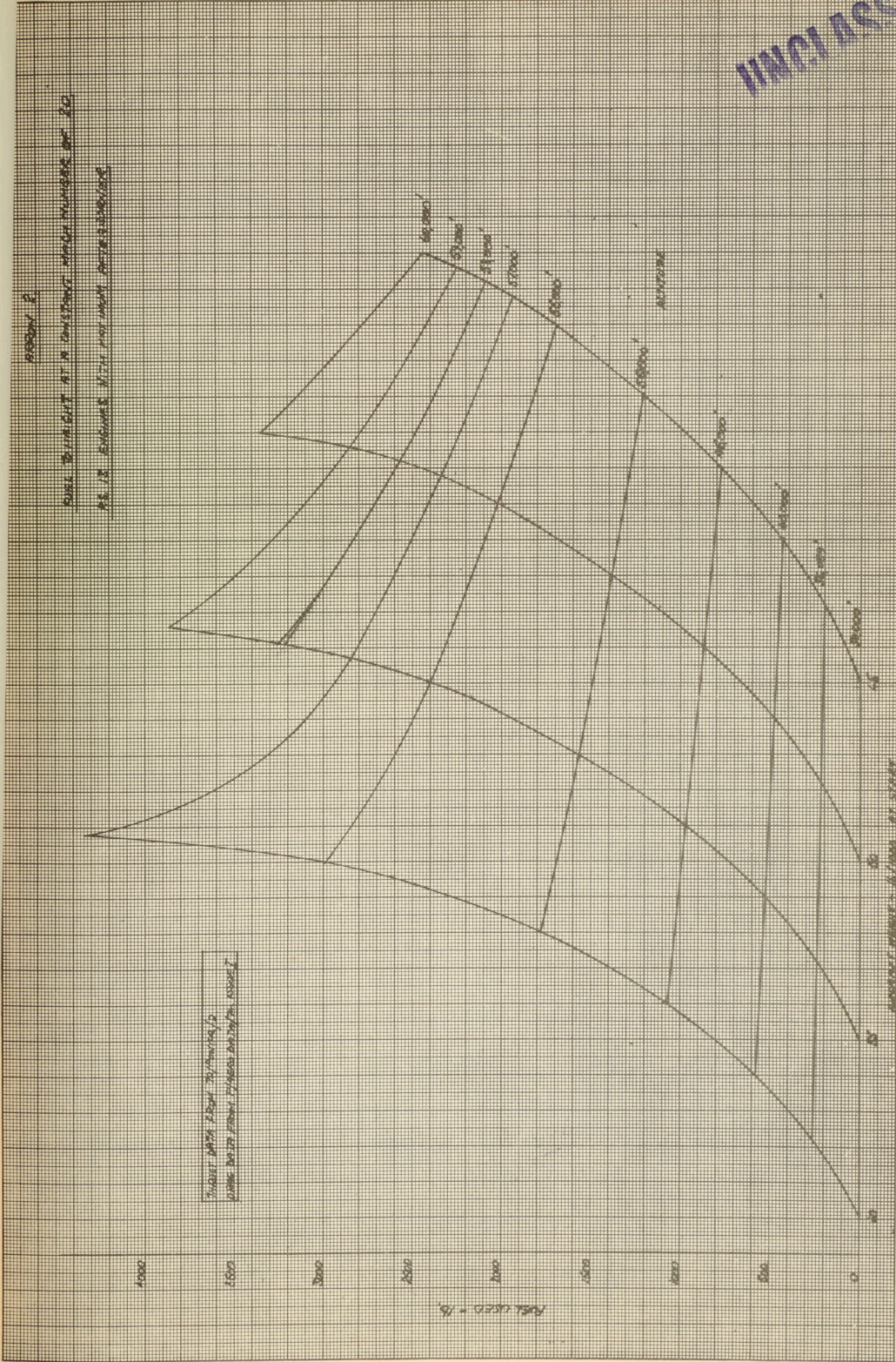


Fig. I-31

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FIGURE 1
RELATIONSHIP BETWEEN WEIGHT AND PERFORMANCE
FOR 12 ENGINES WITH VARYING PERFORMANCE



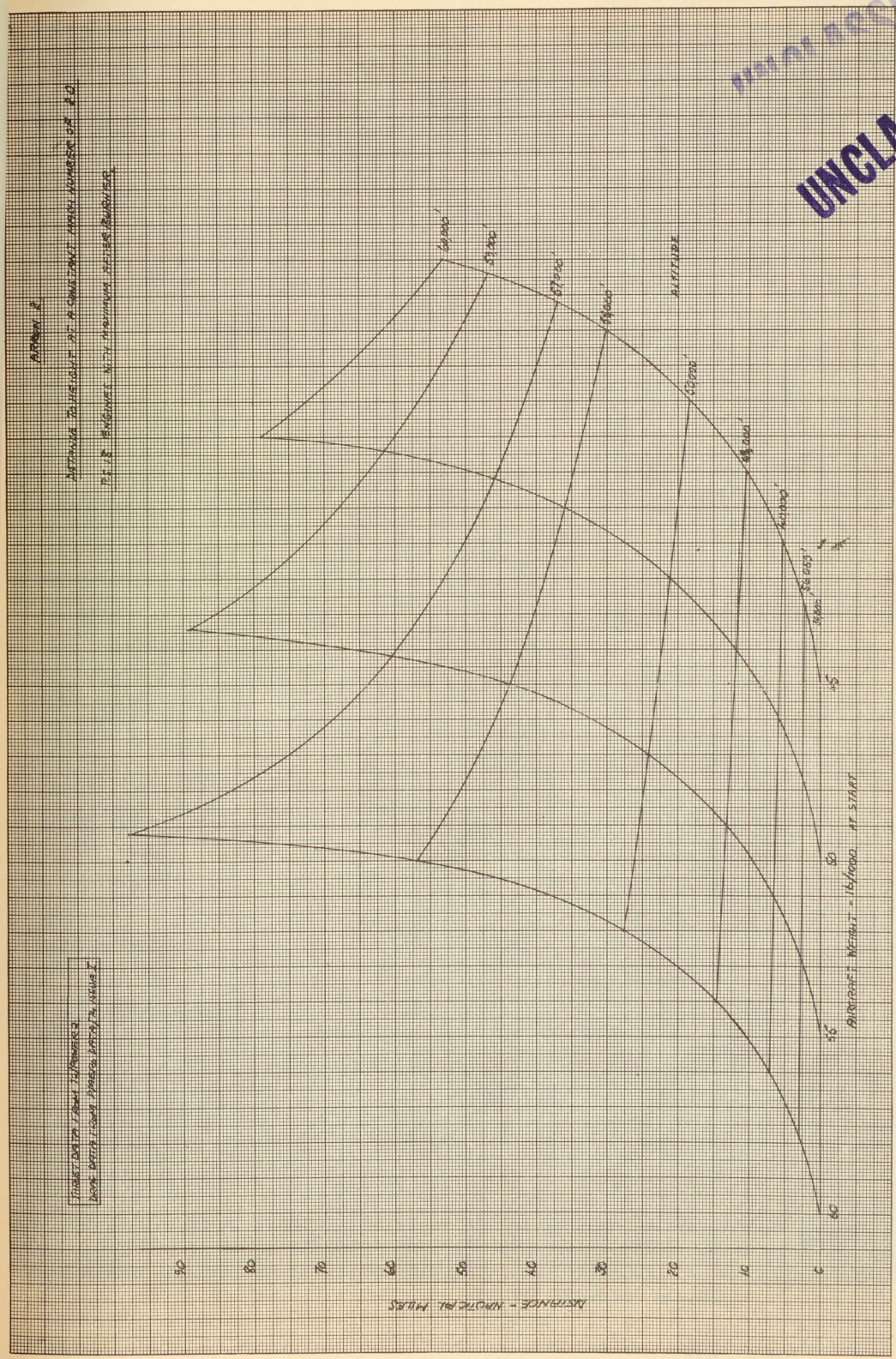
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Fig. I-32

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ATTACH 2
 DISTANCE TO VISIBILITY AT A GIVEN ALTITUDE AND NUMBER OF R.O.
 TO BE OBSERVED WITH MAXIMUM AIRCRAFT DIMENSIONS

THICKNESS OF LAYER TO BE OBSERVED
 DOES NOT EXCEED APPROXIMATELY 100 FT.



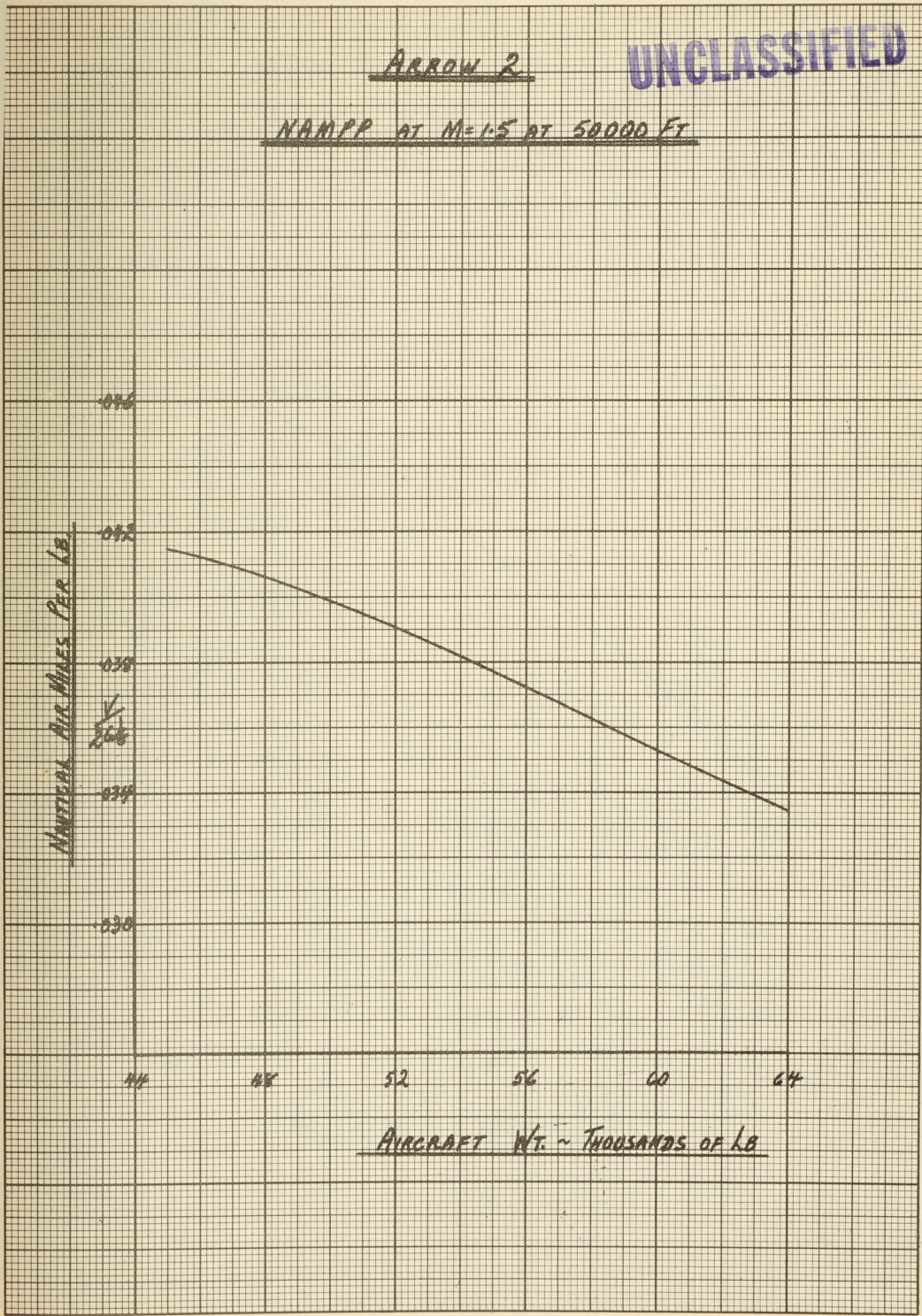
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Fig. I-33

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NAMP AT $M=1.5$ AT 50000 FT



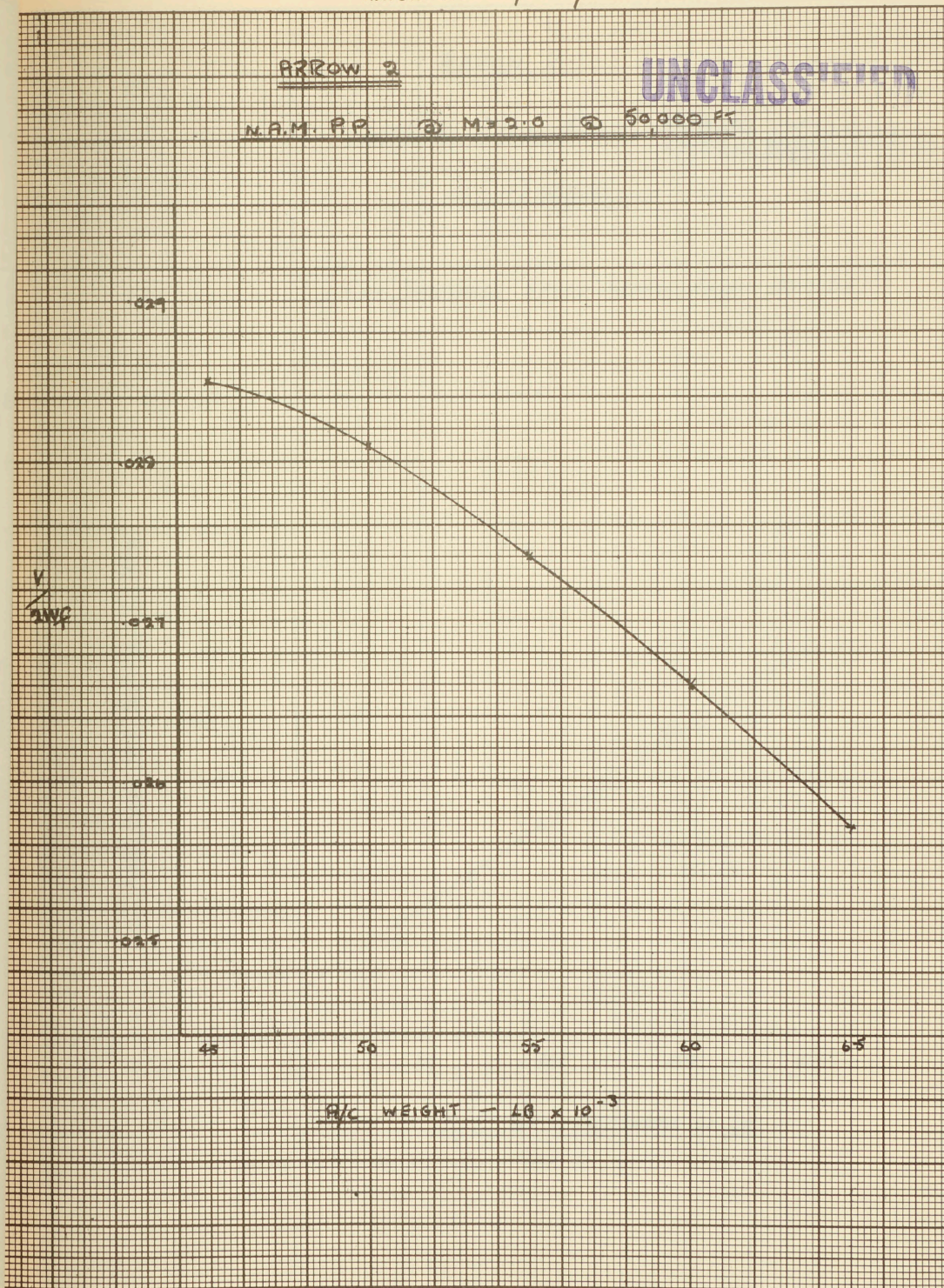
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Fig. I-35

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N.A.M. P.P. @ M=2.0 @ 50000 FT



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Fig. I-36

ARROW 2

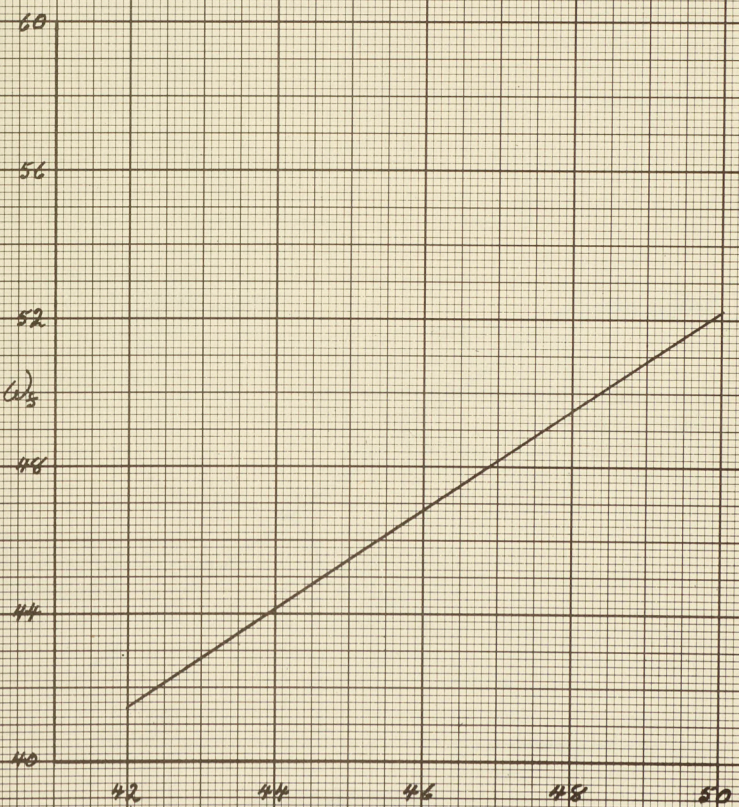
LOITER FUEL FLOW

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H₀ = 42000 Ft

{ MAX ENDURANCE SPEED APPROX. CONST. M = 0.88 }

FUEL FLOW PER ENGINE - LB/MIN



A/C Wt. - THOUSANDS OF LB.

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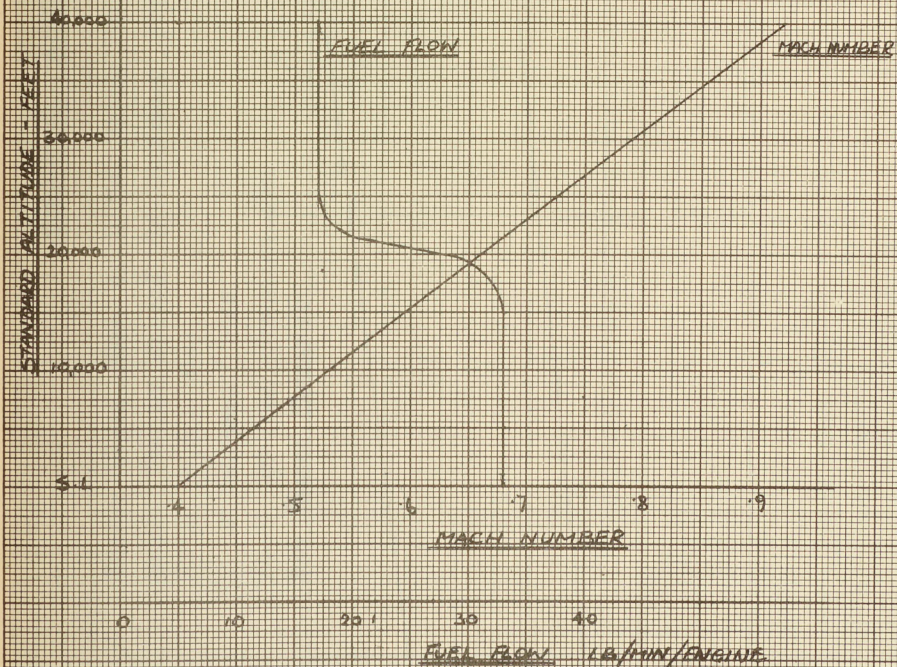
Fig. I-37

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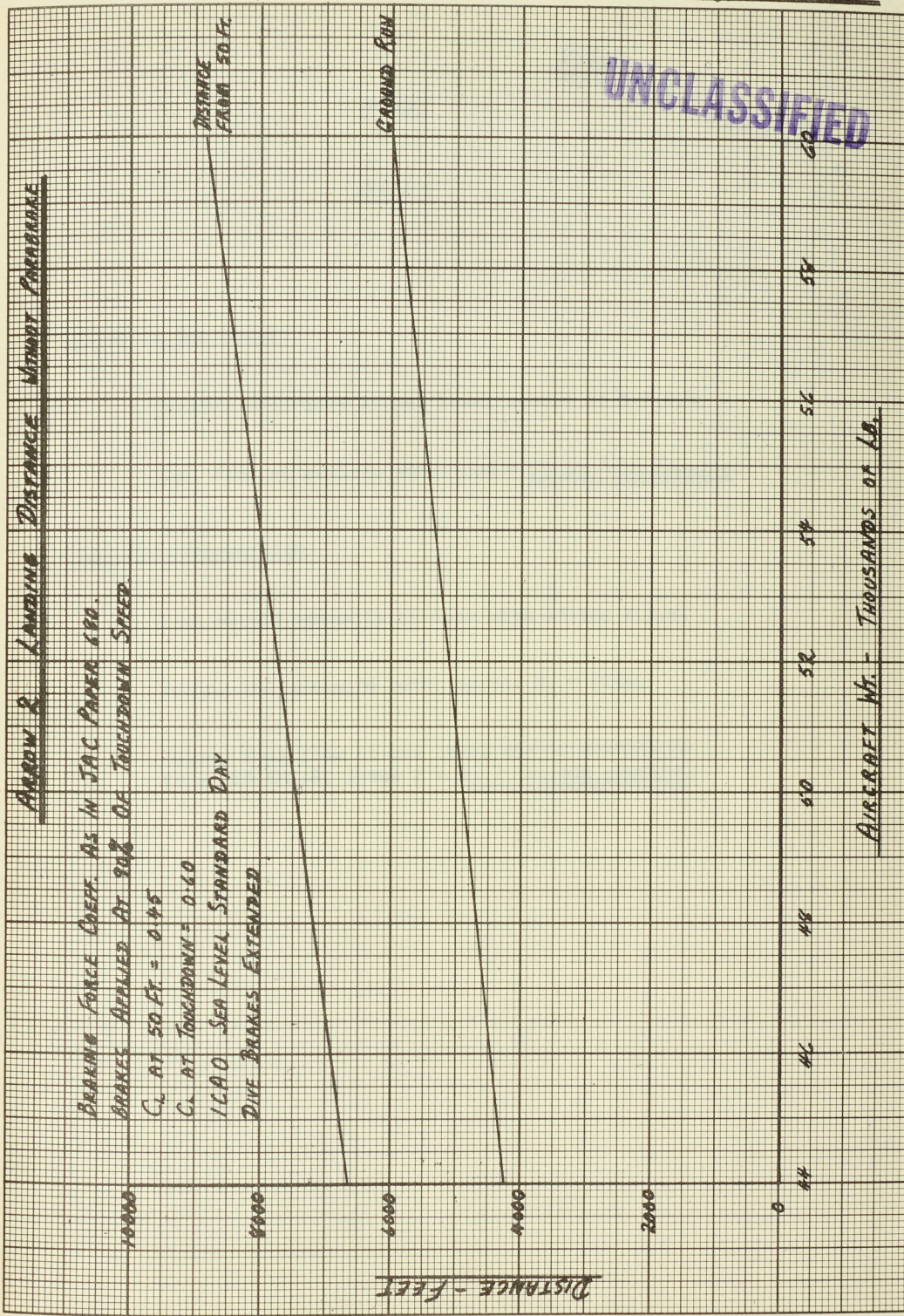
DESCENT SPEED AND FUEL FLOW

IDLING THRUST



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Fig. I-38



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Fig. I-39

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ARROW 2

Loiter at Sea Level

Maximum endurance at sea level occurs at $M \approx 0.4$.

Fuel flow at maximum endurance = 70 lb./min./engine.

Taxi fuel consumption

Taxi should normally be done with idling r.p.m.

Idling low pressure rotor speed, $N_L = 2150$.

Idling fuel flow at sea level static conditions
from AVR-EMS-8, Issue 2 = 33.3 lb./min./engine.

