C-105 P/WIND TUNNEL/20

DERIVATIVES AND ZERO VALUES

ANALYZED VOLUME I

LONGITUDINAL STABILITY AND CONTROL

Copy No. 1 June 1954.

UNCLASSIFIED

National Research Council Canada
C.I.S.T.I.
Aeronautical and Mechanical Engineering Library

Conseil national de recherches Canada
I.C.I.S.T.
Bibliotèque d'aéronautique et de génie mécanique

TO
A

DATE
Dec. 7, 1992

Report no.: QCX - AVRO - CF105- P-WT-20 V.1

has been ☐ downgraded to : _____

☒ de-classified

by (Name): ~~Michel W. Drapeau~~

(Dept.): A/DND Coordinator, Access to Information

Date: Dec. 7, 1992

R-Auger
Signature

UNCLASSIFIED

A. V ROE CANADA LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT (Aircraft)

AIRCRAFT: C-105

REPORT No P/W.T./20

FILE No:

No. OF SHEETS:

TITLE:

DERIVATIVES AND ZERO VALVES

VOLUME I

LONGITUDINAL STABILITY AND CONTROL

Classification ~~cancelled / changed to~~ confirmed as: UNCLASSSIFIED
By authority of: DRDA 7/DARFT 5-8/DAS Eng 6-4-5
Date: 5 Nov 1992
Signature: B. Aubrey
Unit / Rank / Appointment: DSIS 3, Secretary CRAD HQ DRP

PREPARED BY DATE June 54

CHECKED BY DATE

SUPERVISED BY DATE

APPROVED BY DATE

ISSUE No.	REVISION No.	REVISED BY	APPROVED BY	DATE	REMARKS

FORM 1316A

INDEX

INDEX

AIRCRAFT C-105 COMPONENT A.U.W.

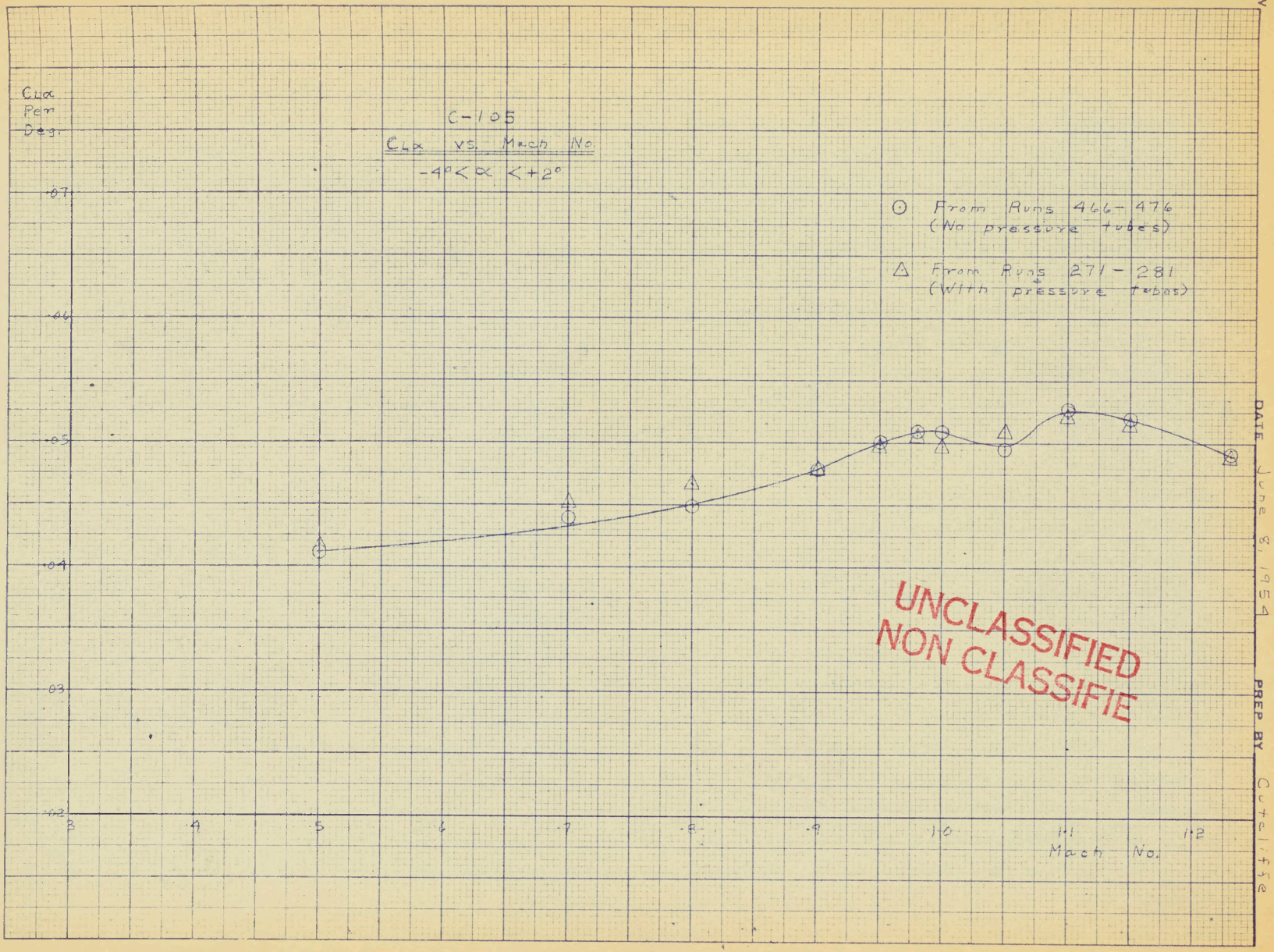
SHEET NO. 1111. REPORT NO. P/W. T. 120

DATE June 8, 1954 PREP. BY Cutcliffe

C-105

$C_{l\alpha}$ vs. Mach No.

$-4° < \alpha < +2°$



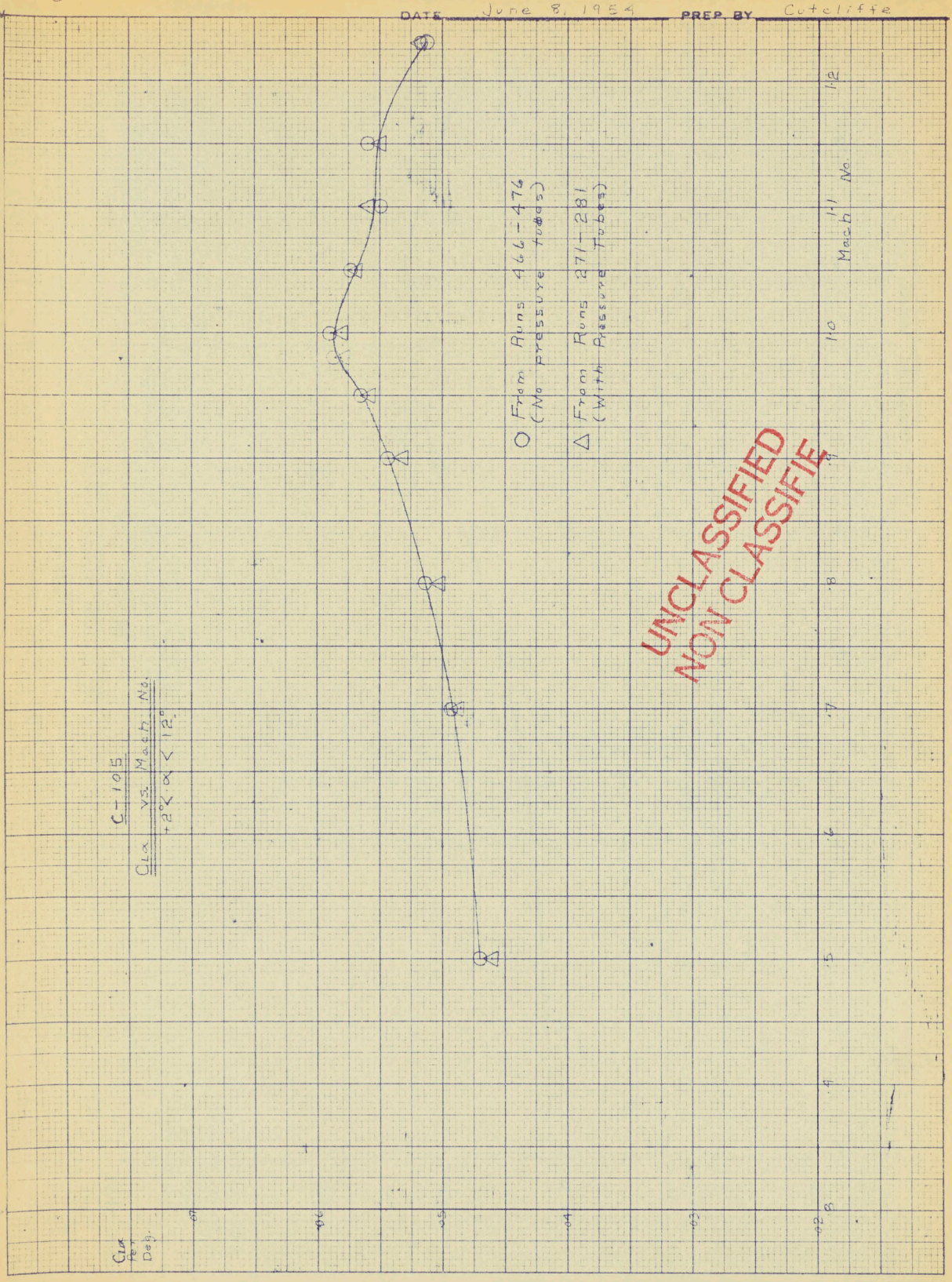
FORM 1746

AIRCRAFT C-105 COMPONENT

A. U. W.

SHEET No. 111.2 REPORT No. P/W.T.1

DATE June 8, 1954 PREP. BY Cutcliffe



FORM 1746

AIRCRAFT A.U.W.

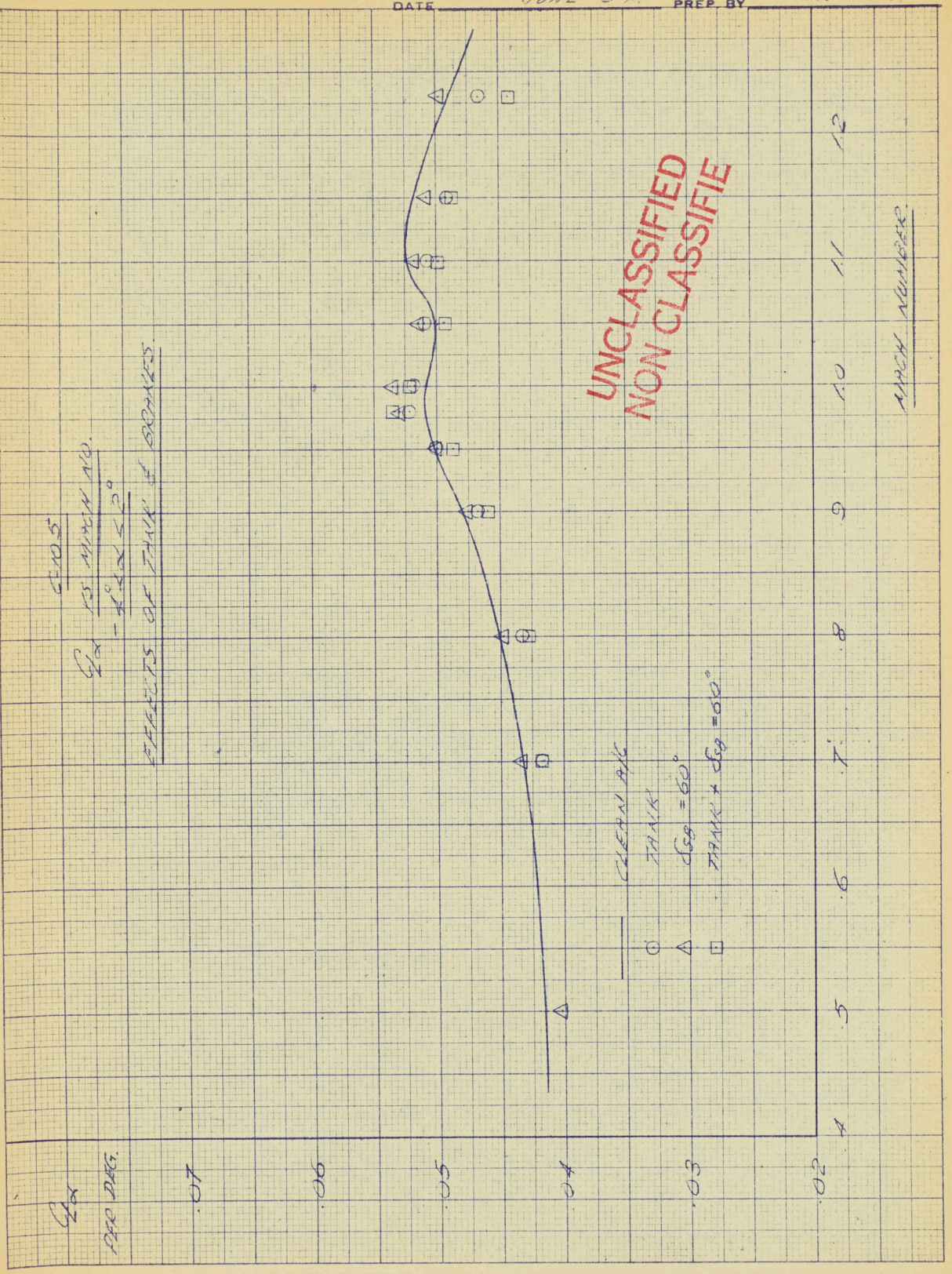
COMPONENT

SHEET No. 1.12.1.

REPORT No. P/W.T./20

DATE JUNE 54.

PREP. BY CLARK



UNCLASSIFIED
NON CLASSIFIE

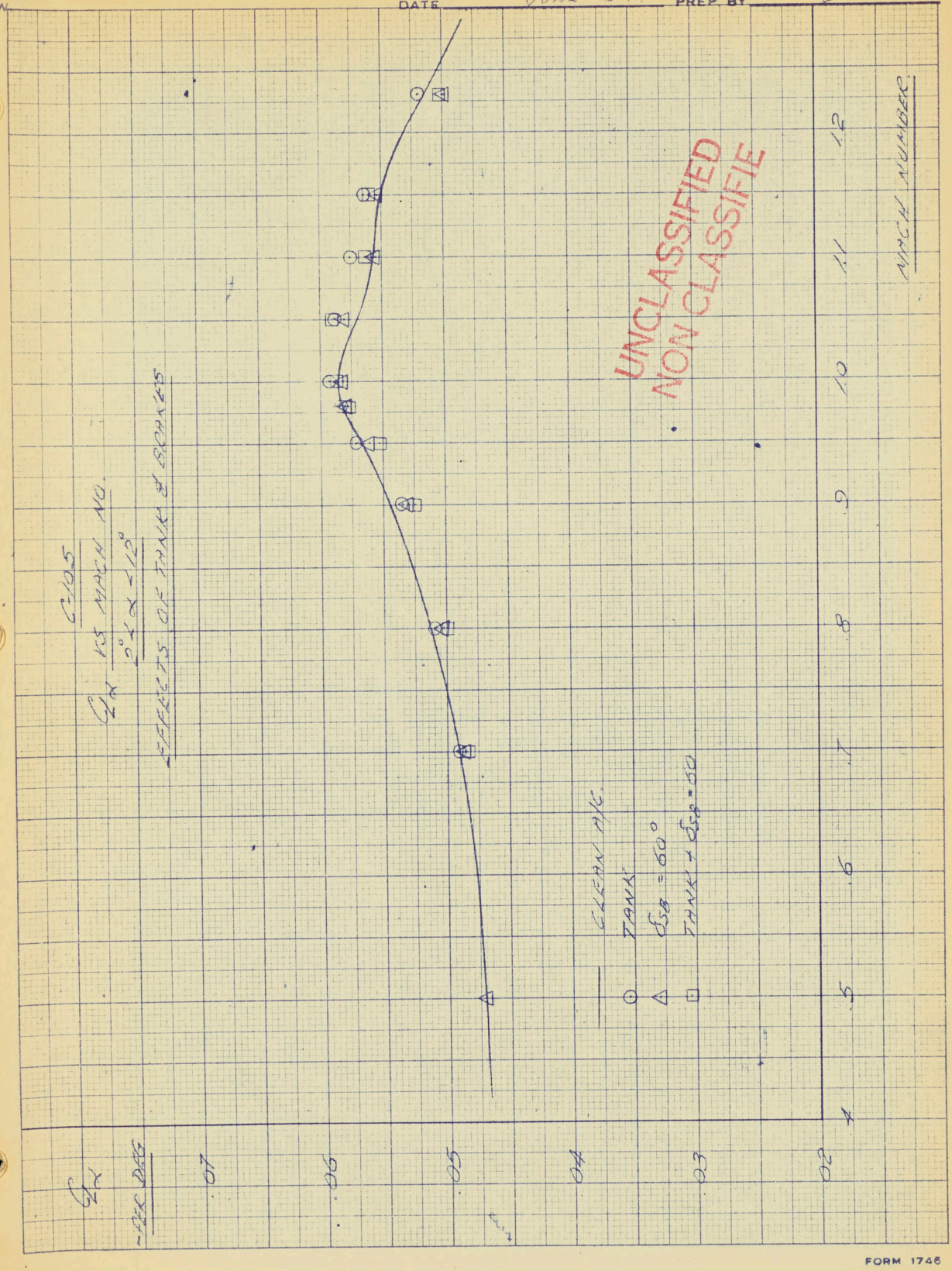
FORM 1746

AIRCRAFT
A.U.W.

COMPONENT

SHEET No. 1.1.2.2. REPORT No. P/W.T/20

DATE JUNE 54. PREP BY E.H.H.



FORM 1746

AIRCRAFT
A.U.W.

COMPONENT

SHEET No. 1.1.3.1.

REPORT No. R/M.T/20

DATE JUNE 54.

PREP. BY CLARK.

CLEAN

$R_n = 4.0$

MACH NUMBER

C_{L_α}

C_{m_α}

CLOS

C_{L_α} AT MACH NO.

C_{m_α} AT $-4° \pm 2°$

ANGLE OF STABILITY

UNCLASSIFIED
NON CLASSIFIE

FORM 1746

AIRCRAFT
A.U.W.

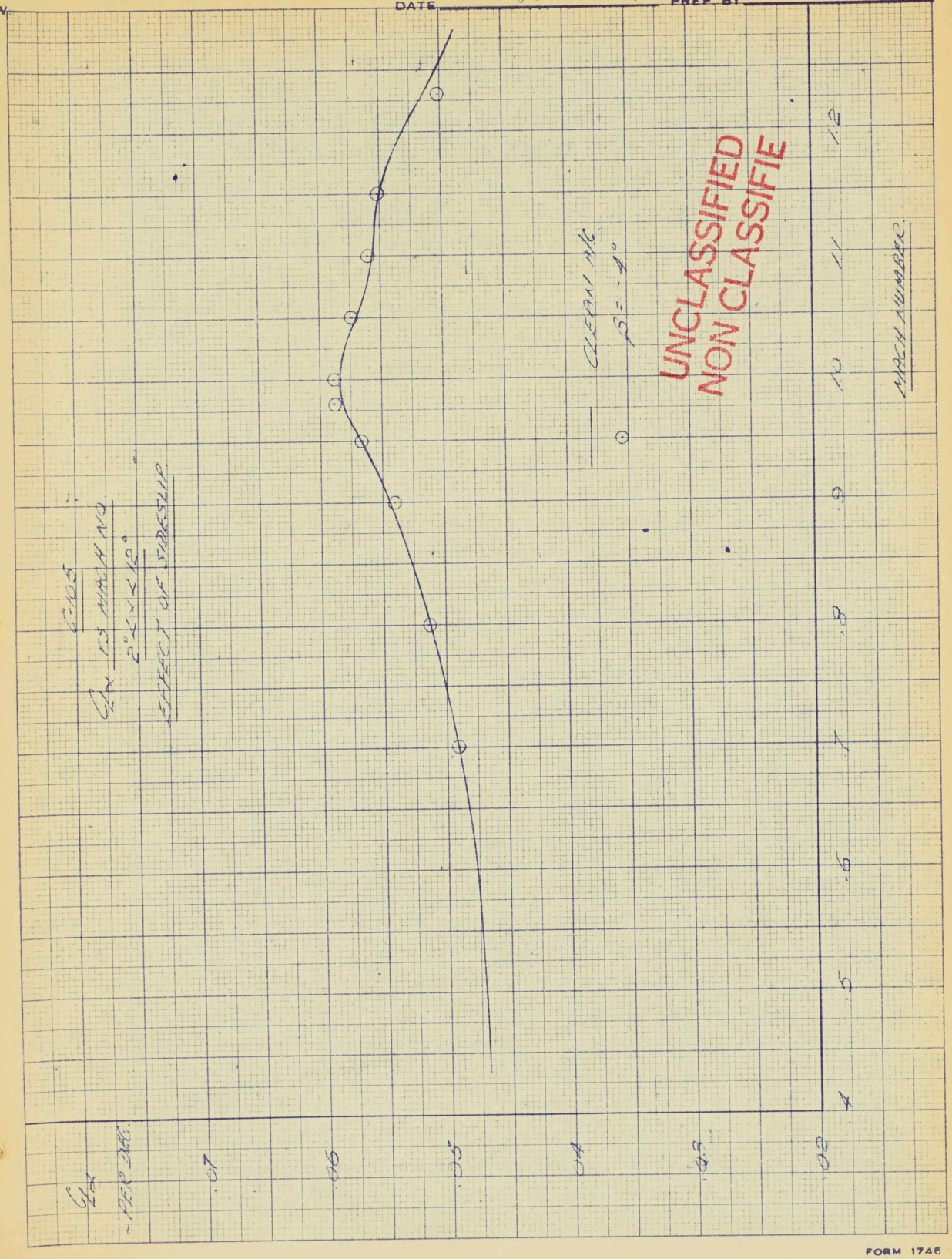
COMPONENT

SHEET No. 1.1.3.2.

REPORT No. R/W.T 120

DATE JUNE 54.

PREP. BY CLARK.



P/W.T.170

1.2.1.1

APRIL 21/54 J. Kwiatkowski

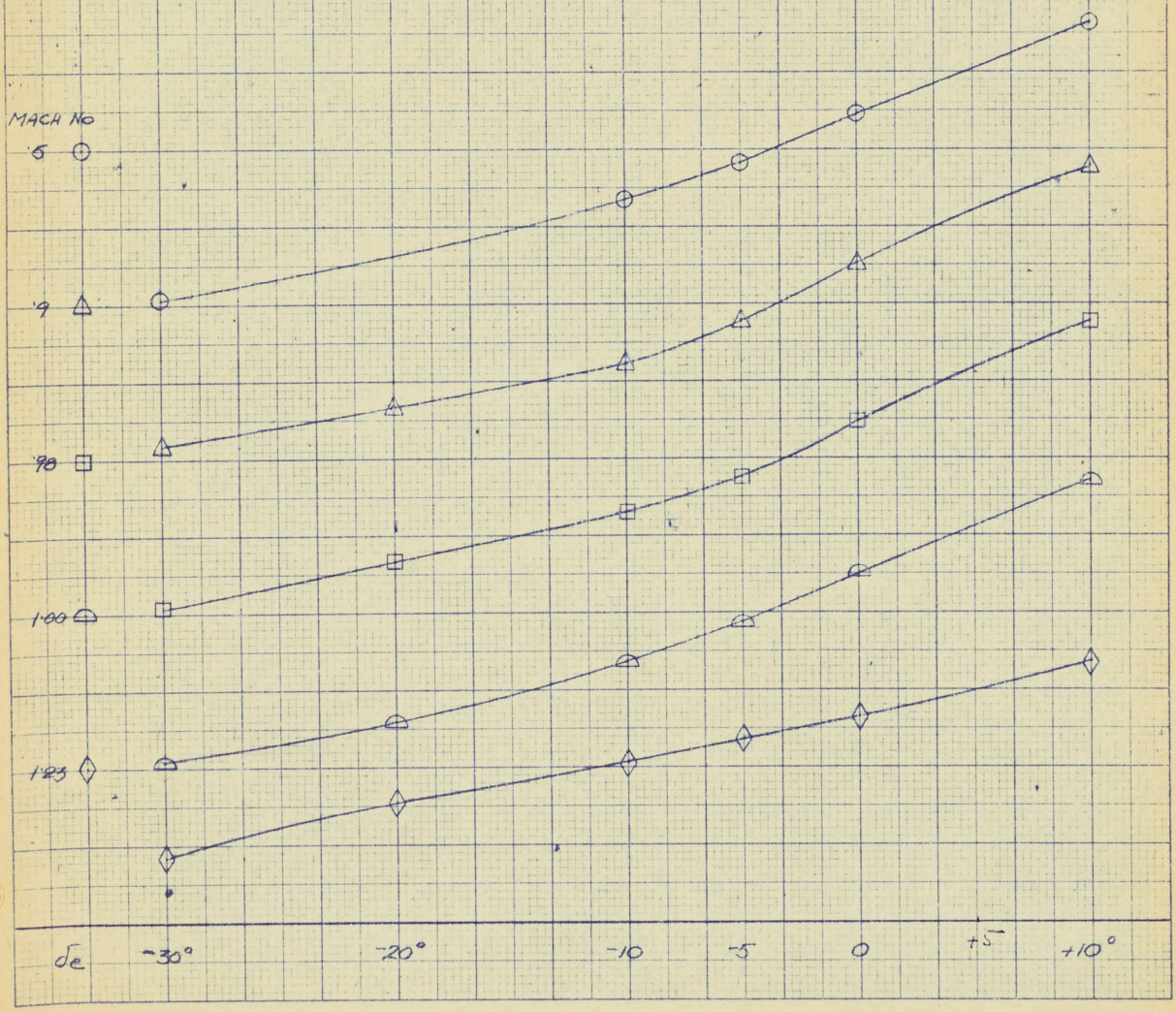
C 105

CORNELL W.T. TESTS APR 54

C_L vs δ

CONF. $B_2 C_2 H_3 V_2 R_3$

$\alpha = 2°$



AIRCRAFT C105 COMPONENT

A.U.W.

SHEET No. 121.4. REPORT No. P/H.T./20.

DATE May 6/57 PREP BY Kwakkenbush

C105

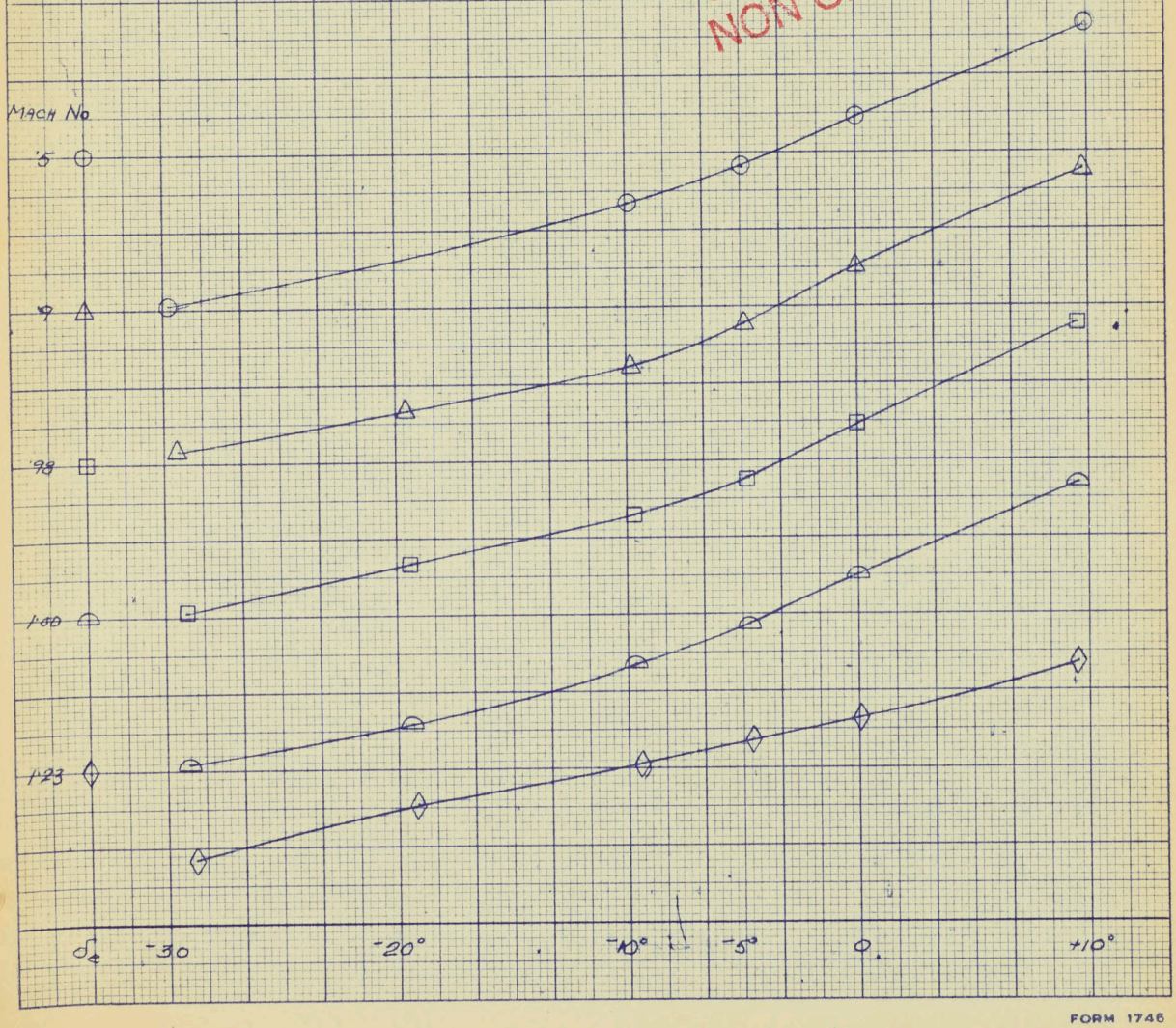
CORNELL W.T. TESTS APR. 57.

C_L vs δ_e

CONF. $B_2 C_2 W_3 V_3 R_3$

$\alpha = 2°$

WITH HINGE MOMENT CORRECTION.



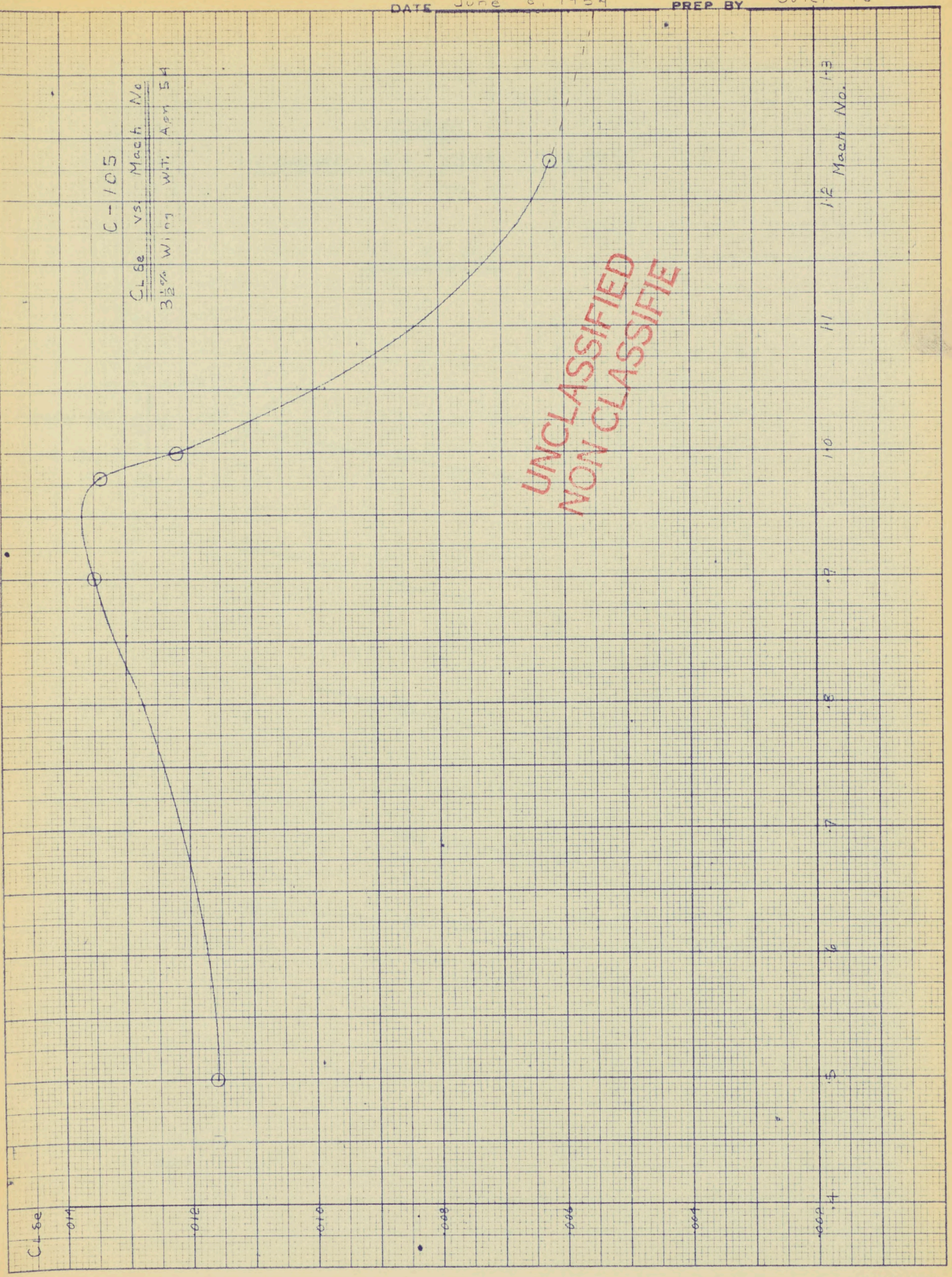
FORM 1746

AIRCRAFT C-105 COMPONENT

A. U. W.

SHEET No. 1215. REPORT No. P/W.T. 120

DATE June 8, 1954 PREP BY Cutcliffe



FORM 1746

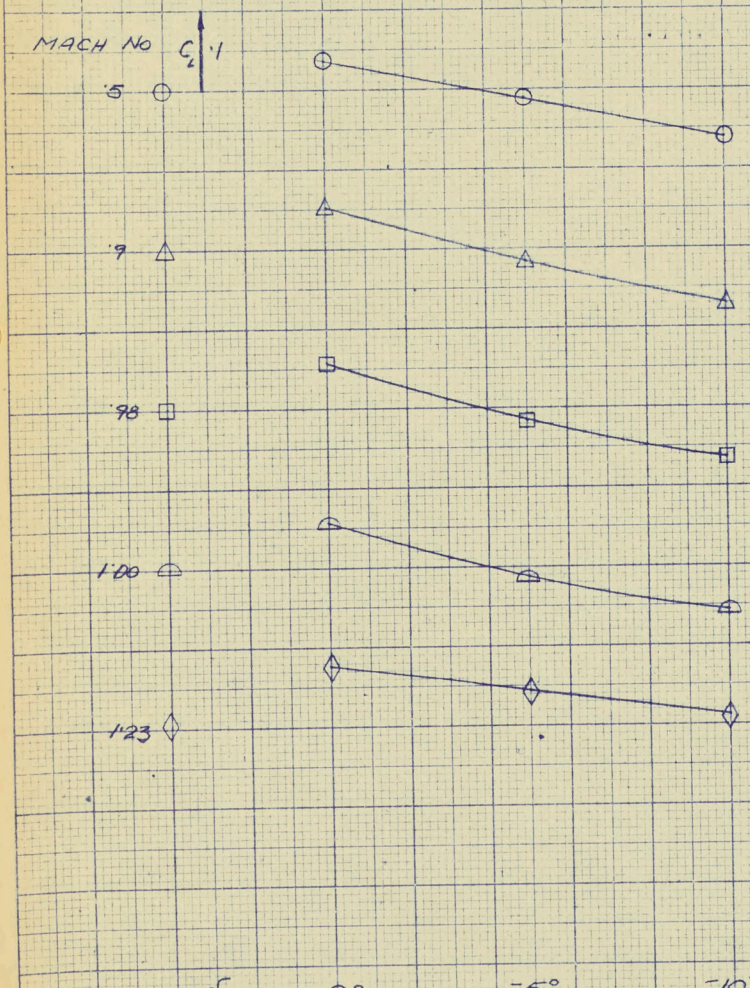
1.2.2.1 APRIL 30/54 P/H.T./20
S. Kurakowski

C105

CORNELL H.T. TESTS APR 54.

$\delta_B = 20°$

C_L vs δ_e



1.222.

P/H.T./20

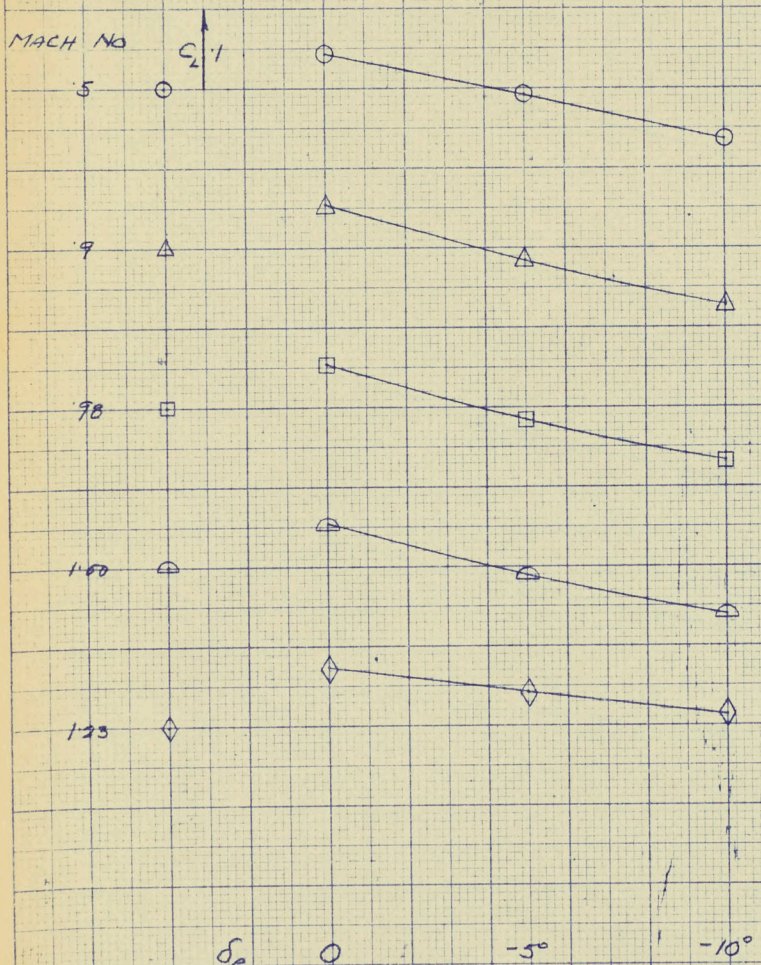
APRIL/30 54 S. Kriakhouli

C105

CORNELL W.T. TESTS APR. 54.

$\delta_s = 40°$

C_L vs δ_e



1.2.2.3. P/W.T./20

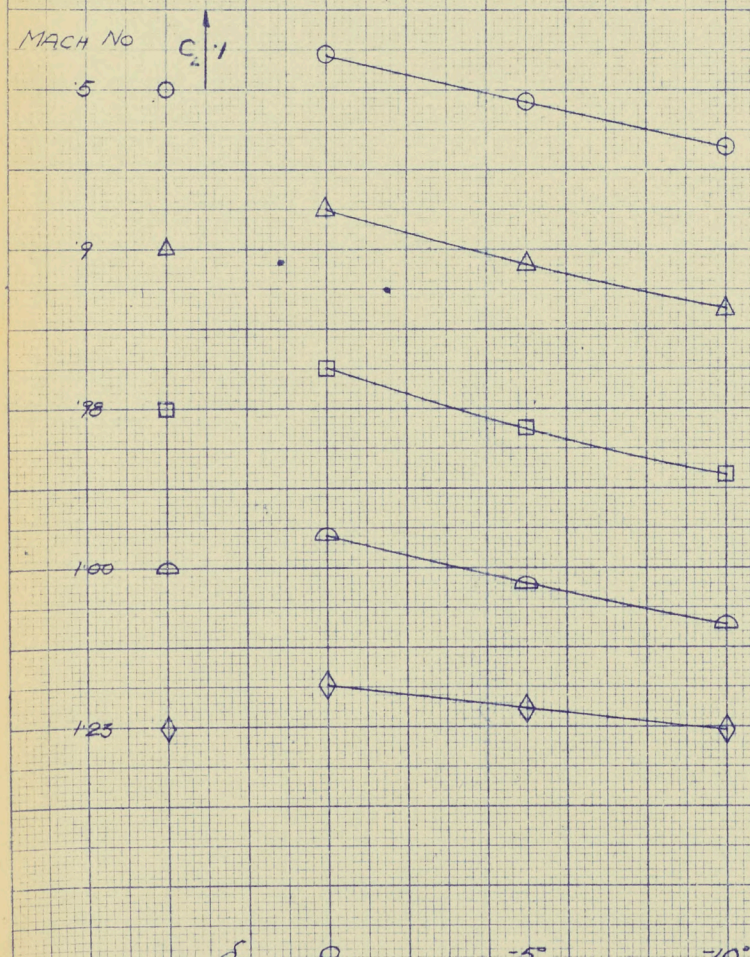
April 30/54 J. Kwiatkowski

C105

CORNELL W.T. TESTS APR 54.

$\delta_B = 60°$

C_L vs δ_e



1.2.2.4.

P/W.T./20

April/54 J. Kinchcombe

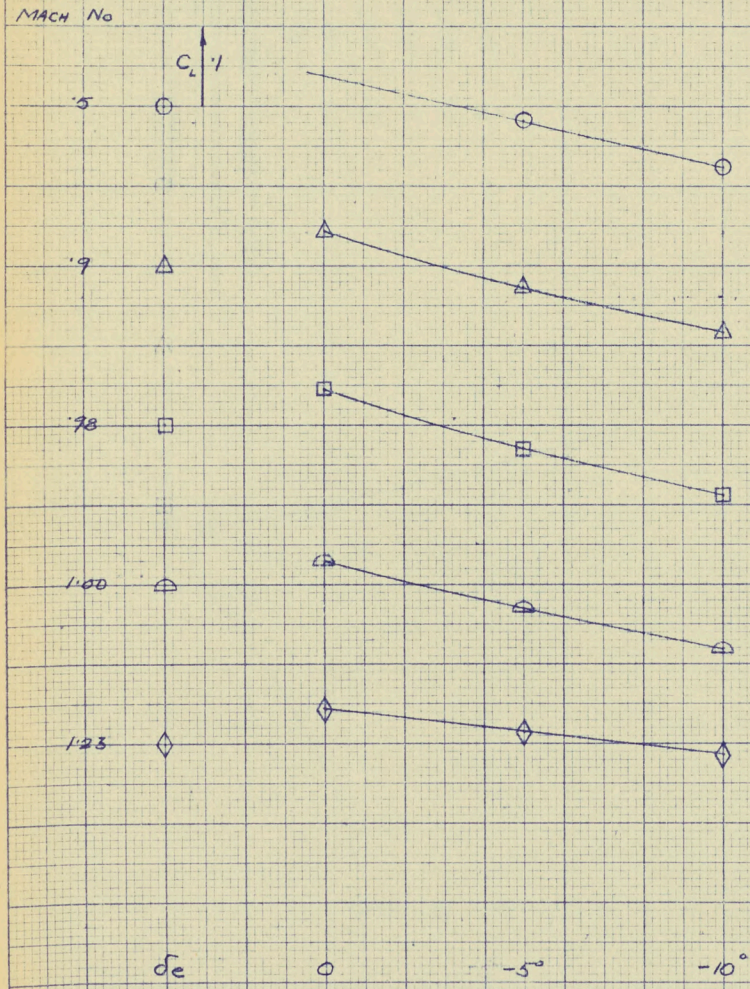
C105

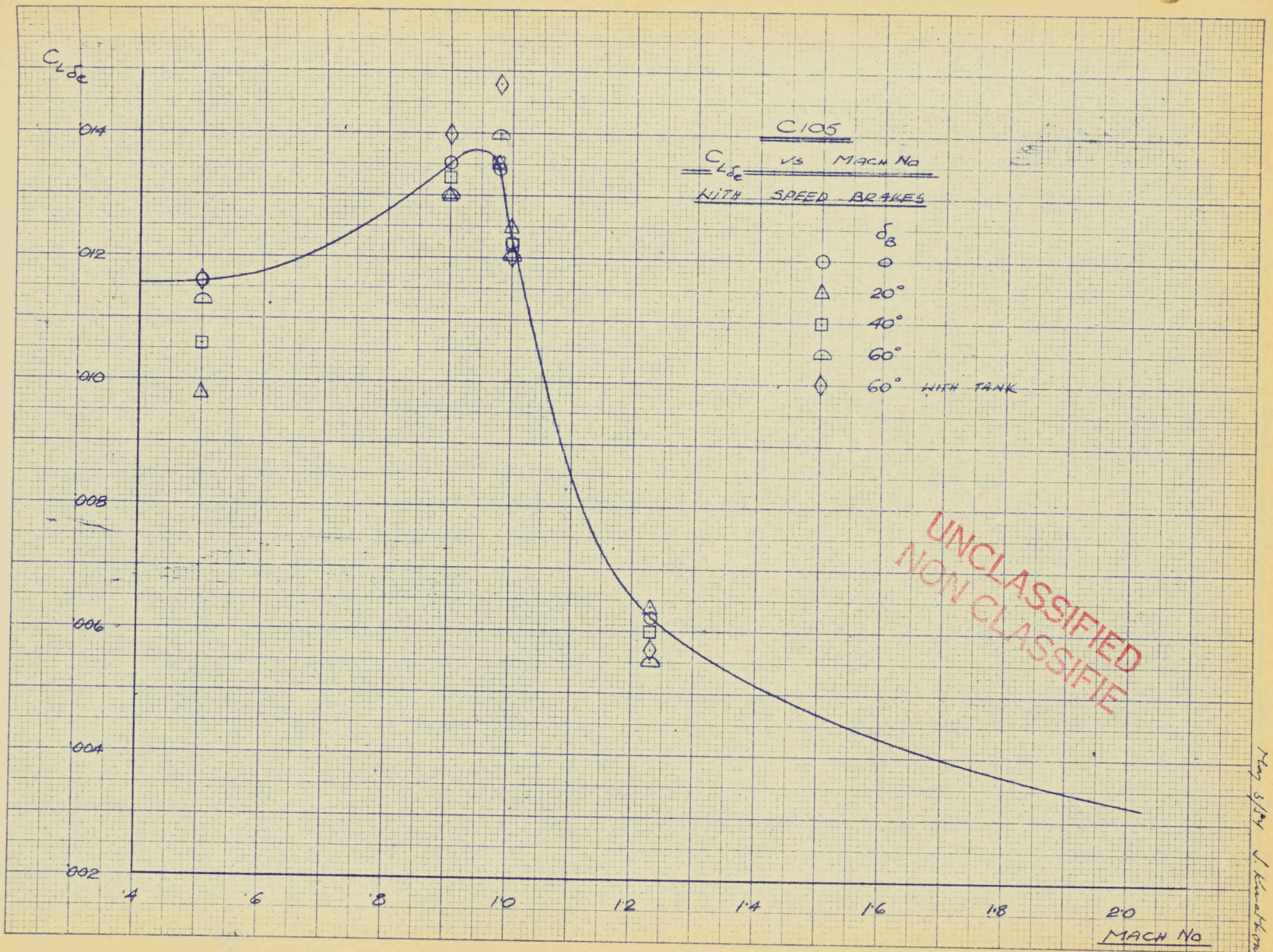
CORNELL W.T. TESTS APR. 54.

$\delta_B = 60°$

WITH TANK.

C_L vs δ_e





1.22.5.

P/W.T./20.

May 3/54 J. Kinnaktomoka.

AIRCRAFT C105 COMPONENT SHEET No. Y.23.1. REPORT No. P/W.T./20.

A.U.W. DATE MAY 12/59 PREP. BY J. Kwiatkowski

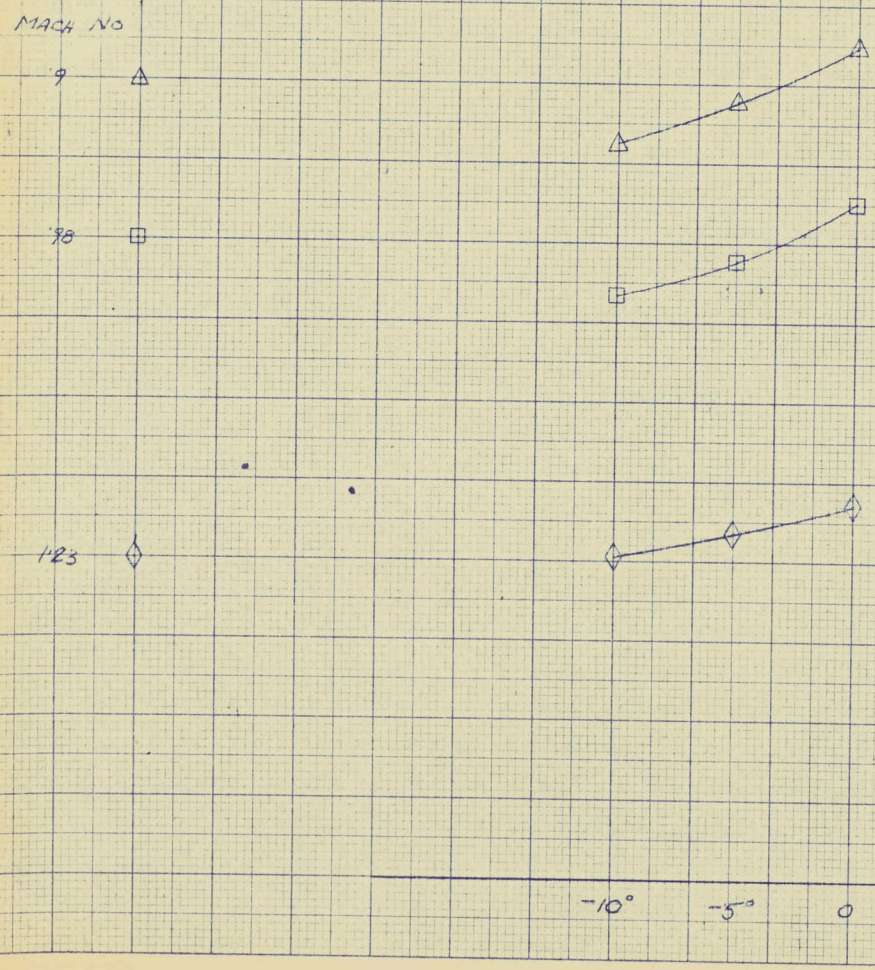
C105

CORNELL W.T. TESTS APR 59

C_L vs δ_e

CONE BODY

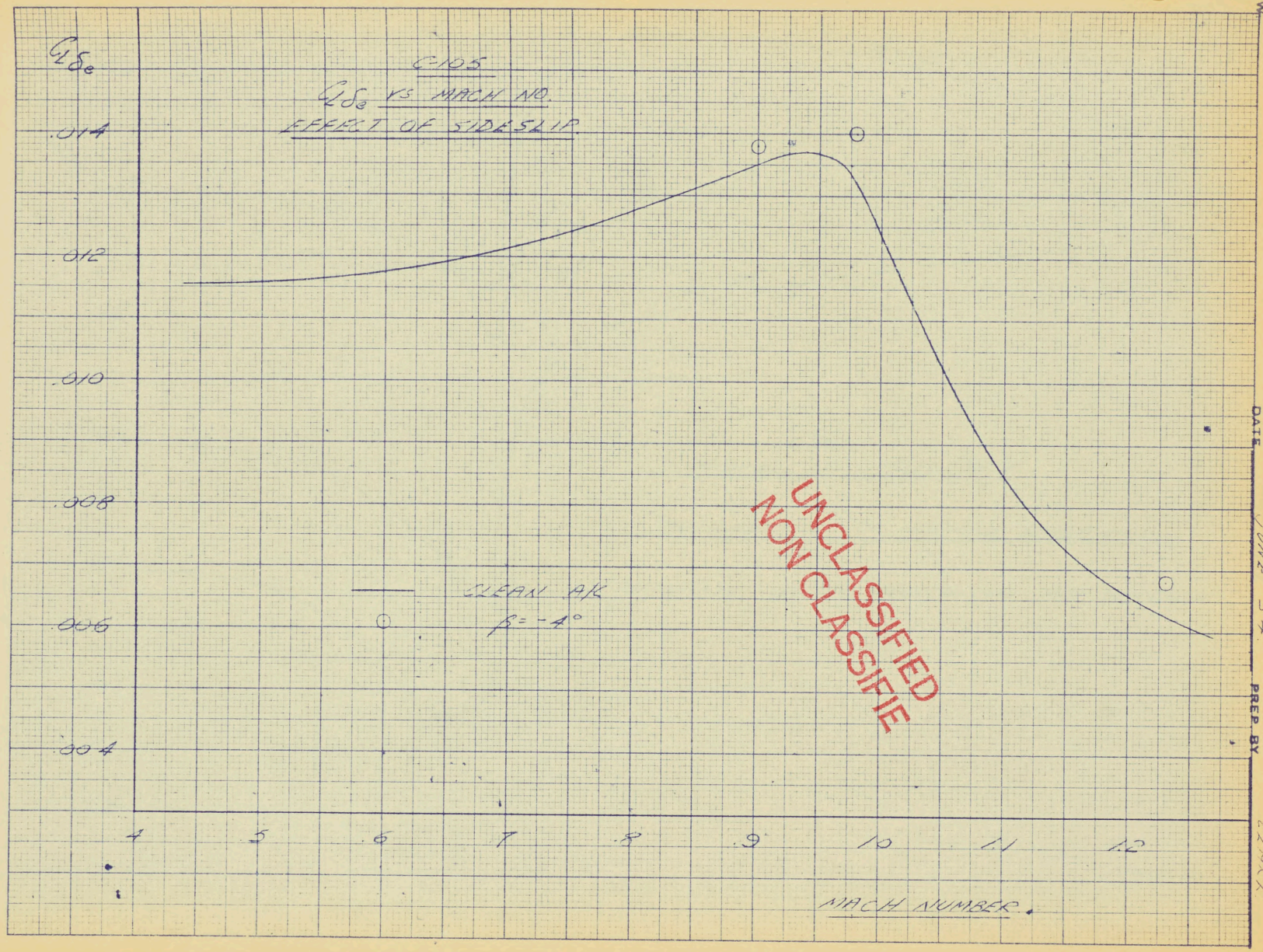
β 3° -4°



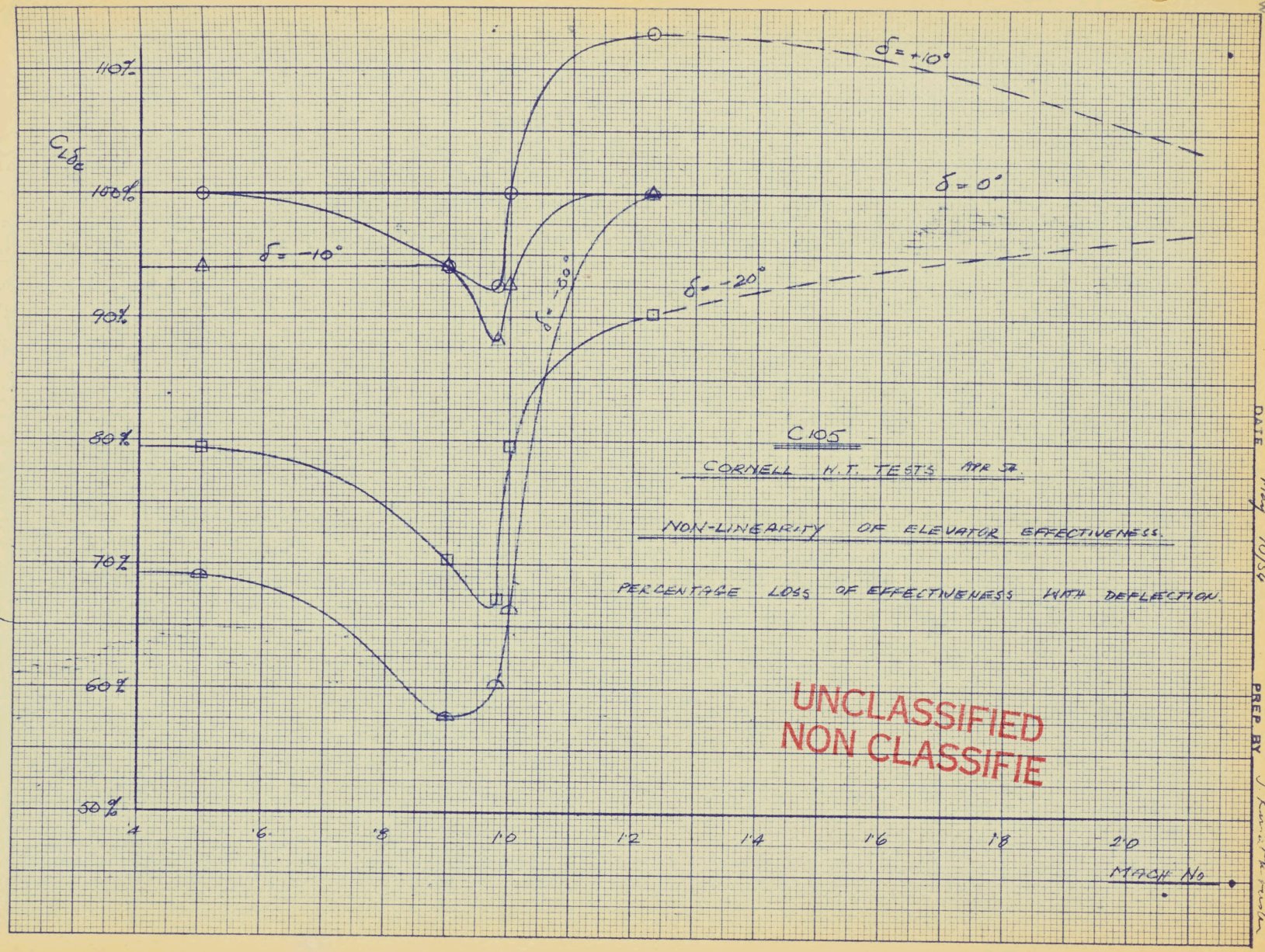
FORM 1746

AIRCRAFT A.U.W. COMPONENT SHEET NO. REPORT NO. 12,332.

DATE June 54 PREP. BY



FORM 1746



C105

CORNELL W.T. TESTS TYPE 32

NON-LINEARITY OF ELEVATOR EFFECTIVENESS.

PERCENTAGE LOSS OF EFFECTIVENESS WITH DEFLECTION.

AIRCRAFT C105 COMPONENT SHEET No. 1.2.4.1.

A.U.W. DATE May 10/32 REPORT No. D.W.T./20.

PREP. BY J. Kenneth Munk

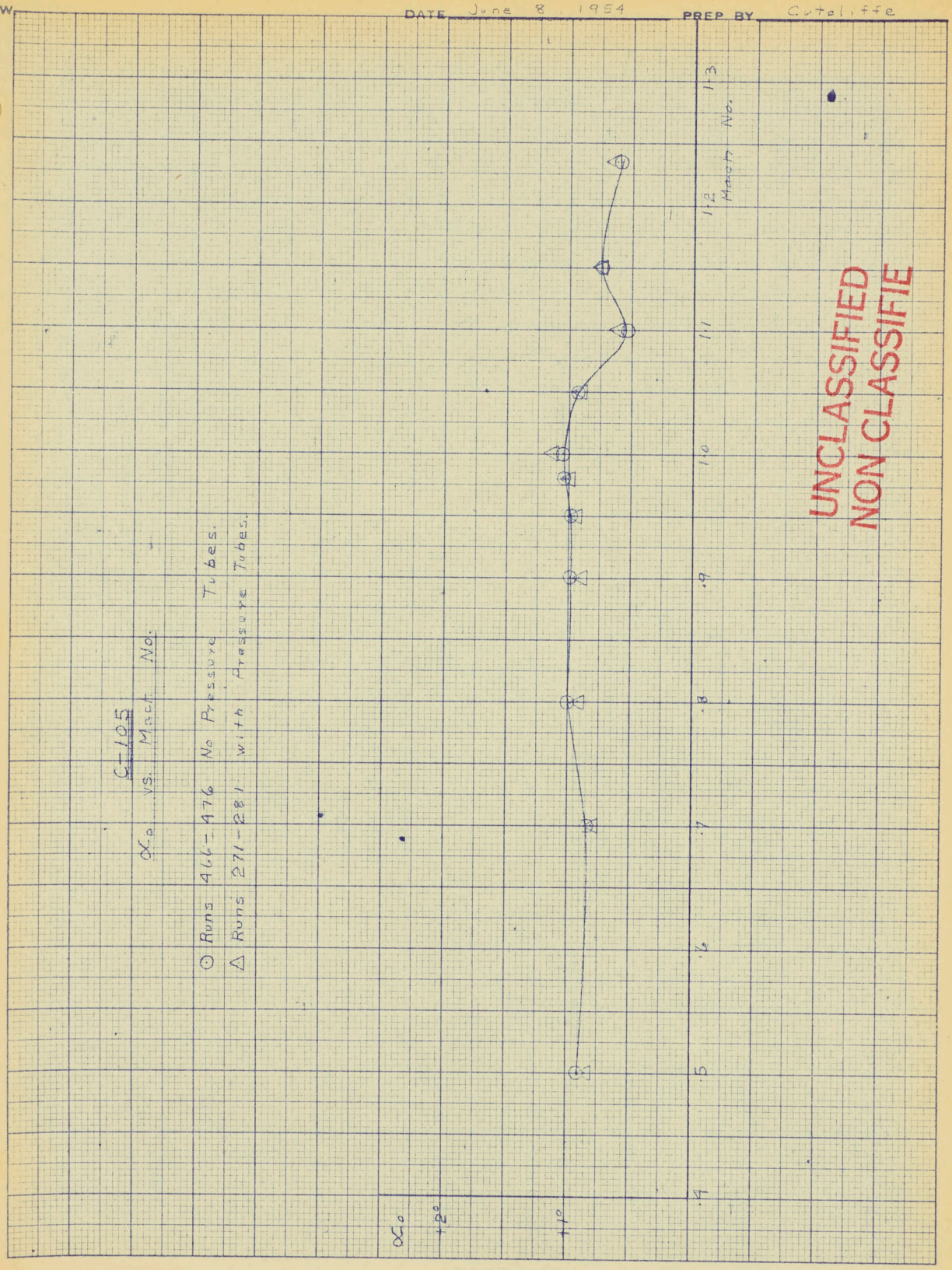
FORM 1746

AIRCRAFT C-105 COMPONENT

A. U. W.

SHEET No. 1.3.1.1 REPORT No. P/W.T. 120

DATE June 8, 1954 PREP BY Cutcliffe

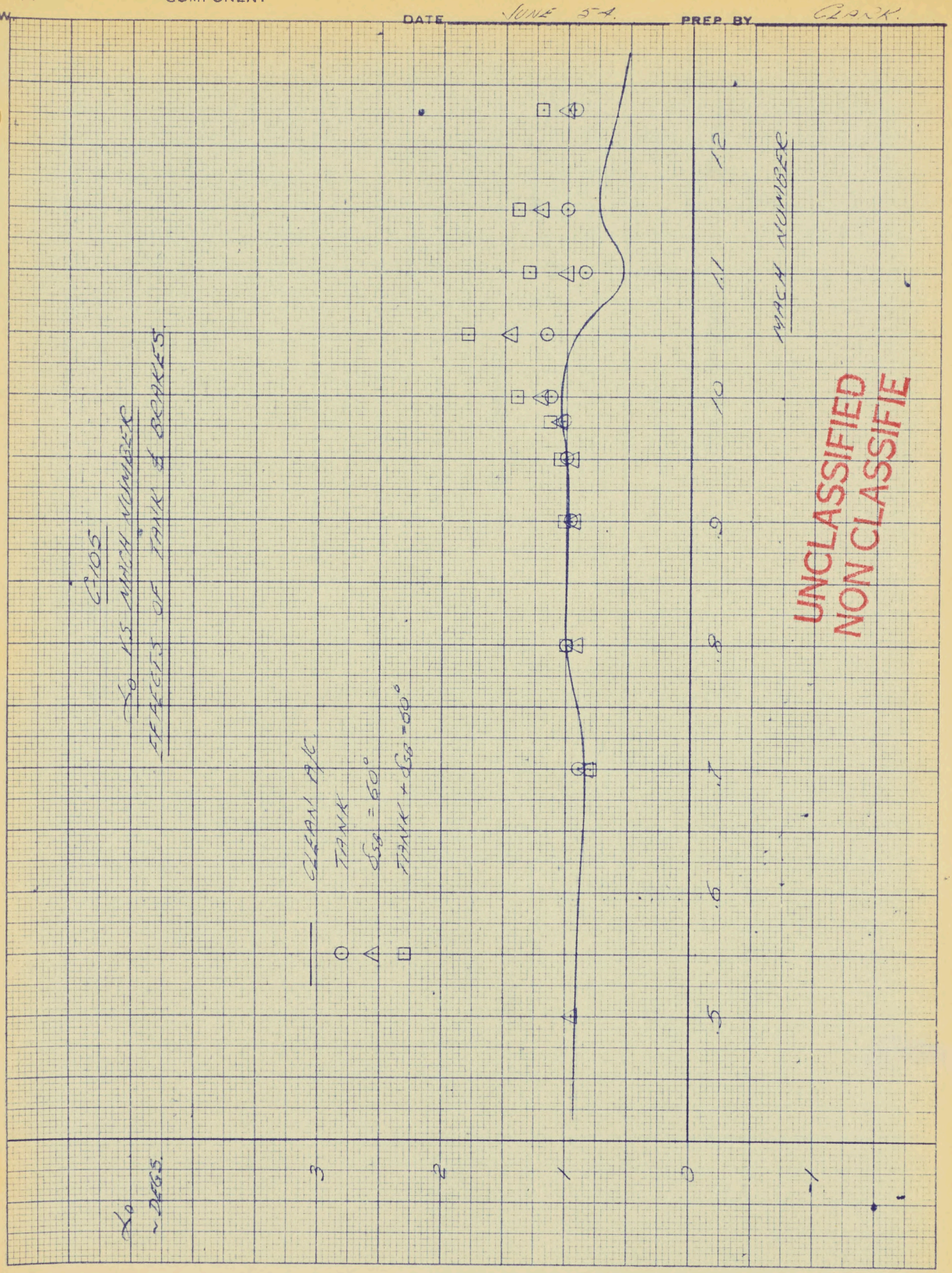


AIRCRAFT
A. U. W.

COMPONENT

SHEET No. 1.3.2.1. REPORT No. 9/W.T/20

DATE JUNE 54. PREP. BY G.A.R.K.



FORM 1746

AIRCRAFT A.U.W. COMPONENT SHEET NO. 1.3.5.1.

DATE JUNE 54. REPORT NO. BWF-120

PREP BY E. PARKS.

C-105

C_{l_0} VS MACH NO

EFFECT OF SIDESLIP

C_{l_0} - DEGS.

3

2

1

0

-1

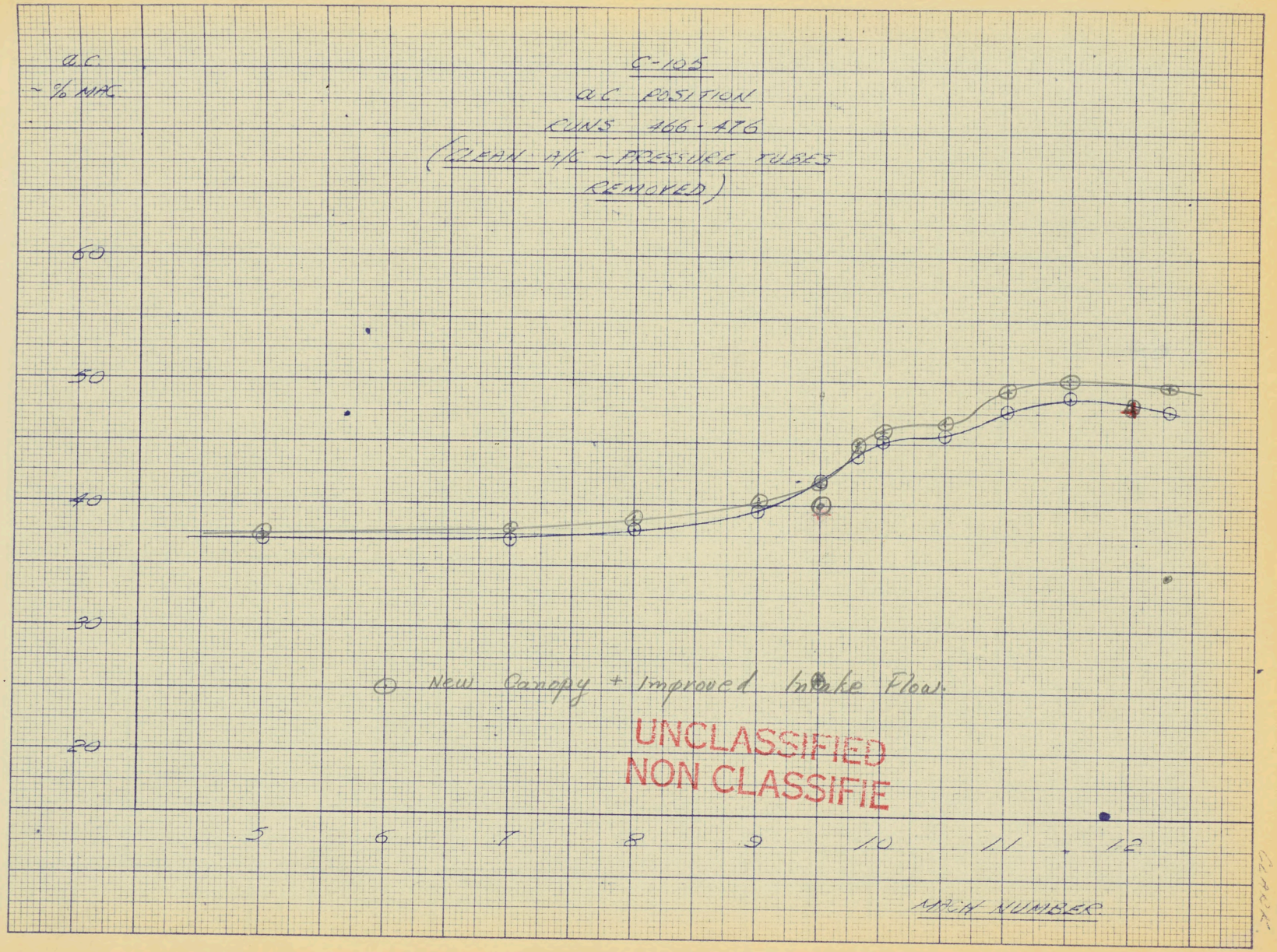
CLEAN A/C

$\beta = -4°$

.5 .6 .7 .8 .9 1.0 1.1 1.2

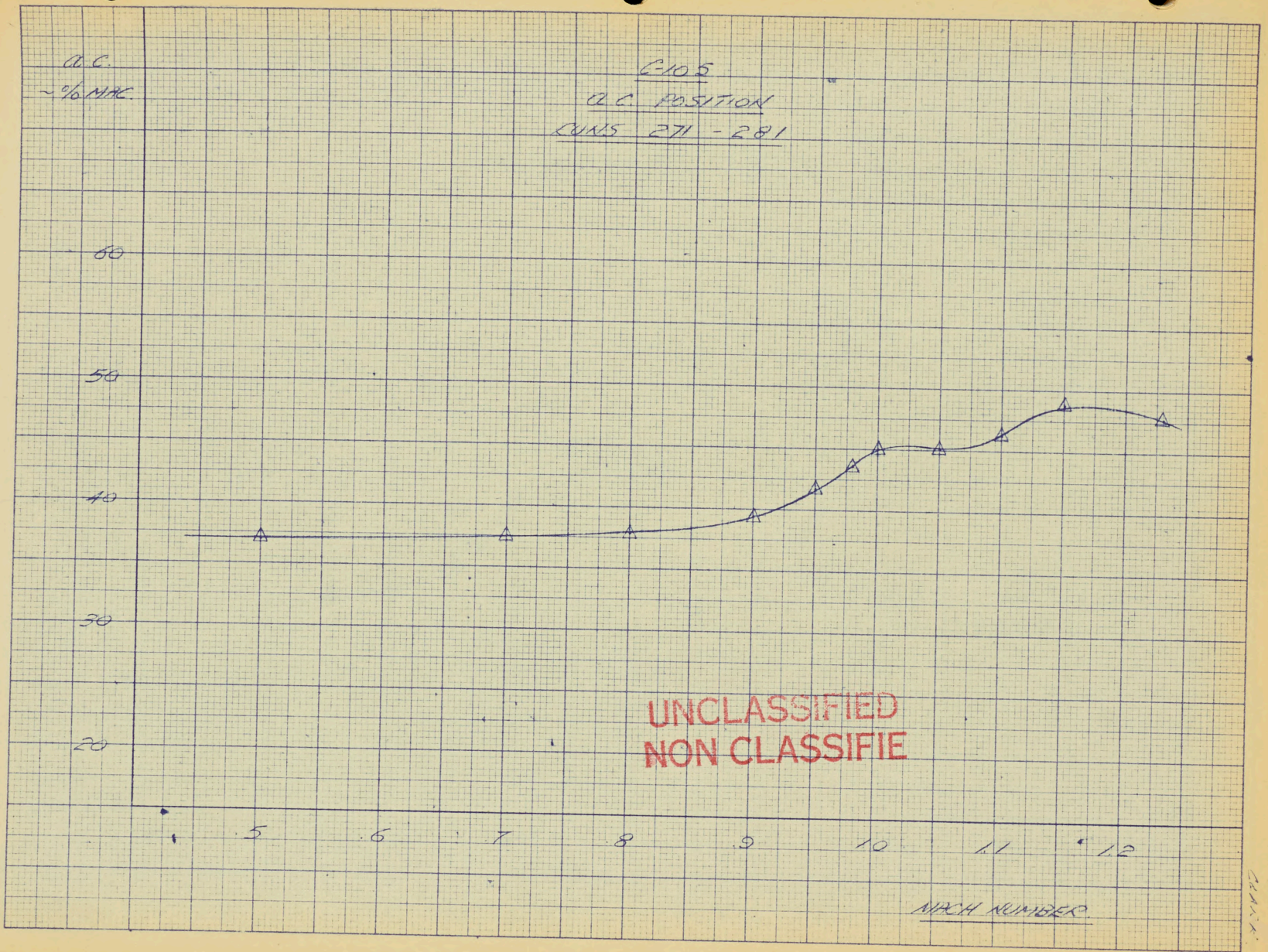
MACH NUMBER

FORM 1746



2111

P/N 7150
CLARK



AIRCRAFT
A.U.W.

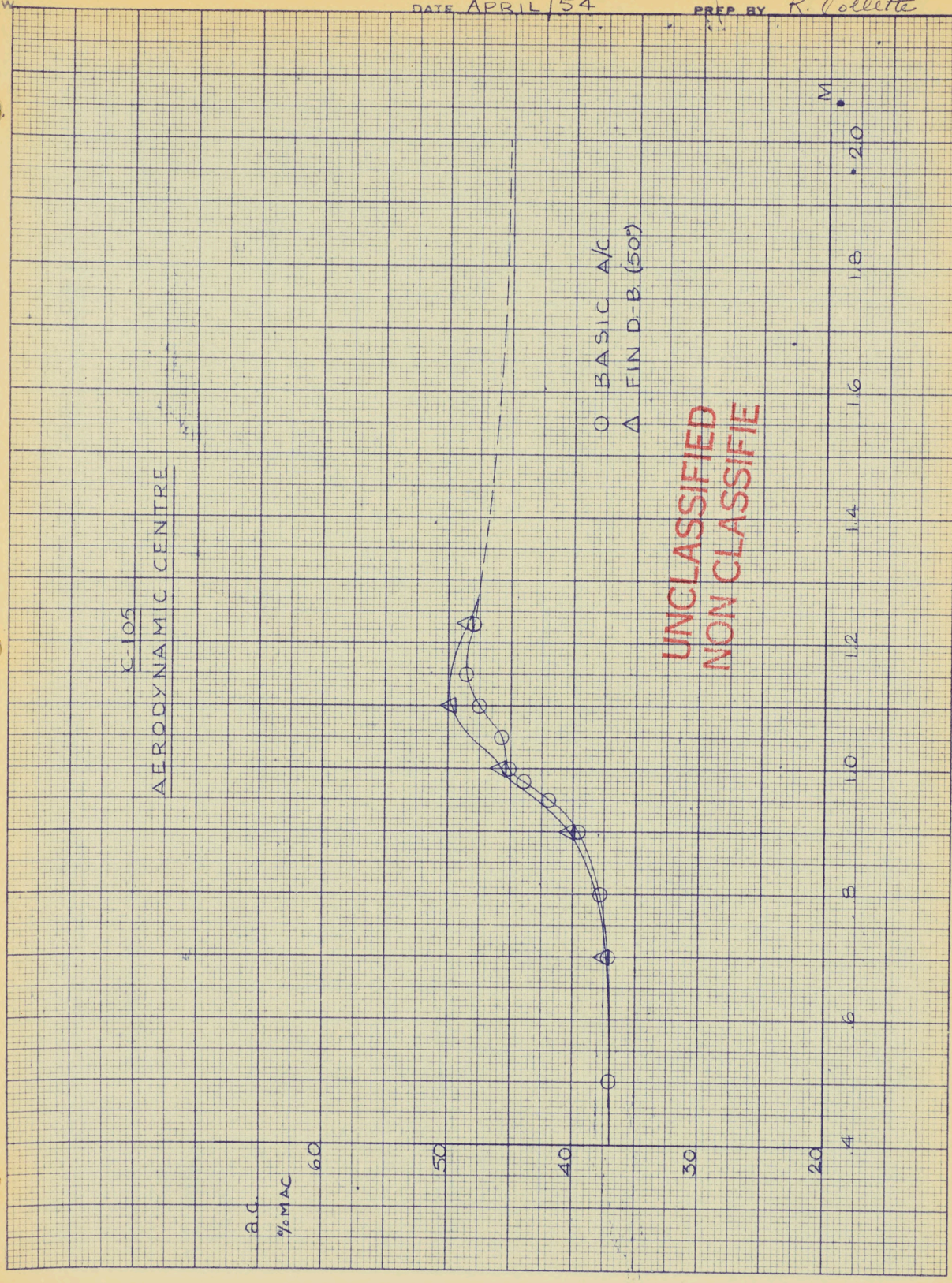
COMPONENT

SHEET No. 2121.

REPORT No. P/W.T./20

DATE APRIL/54

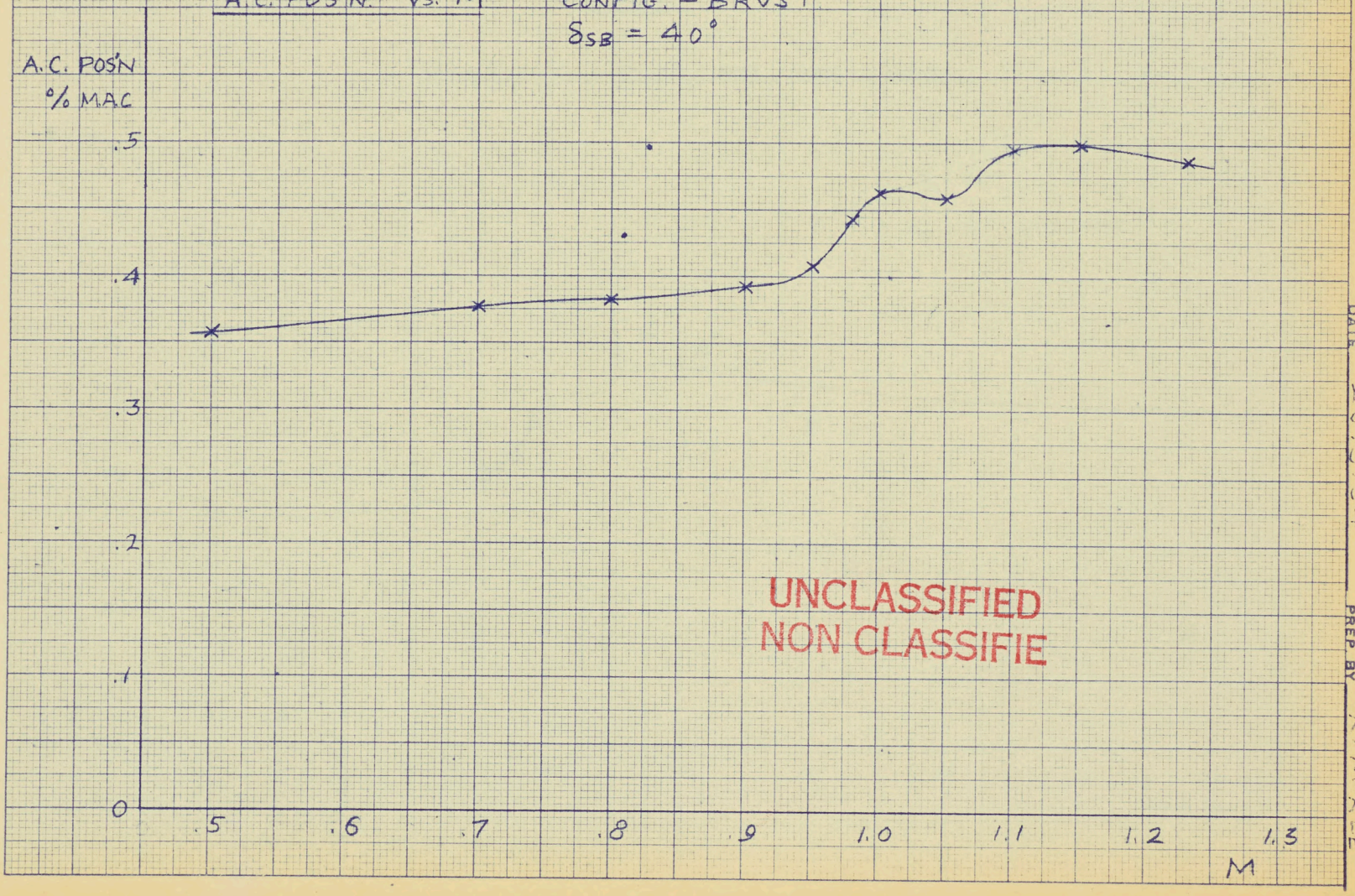
PREP BY R. Collette



FORM 1746

C105 C.A.L. WIND TUNNEL TESTS APRIL 1954

A.C. POS'N. VS. M CONFIG. – BRVST $\delta_{SB} = 40°$

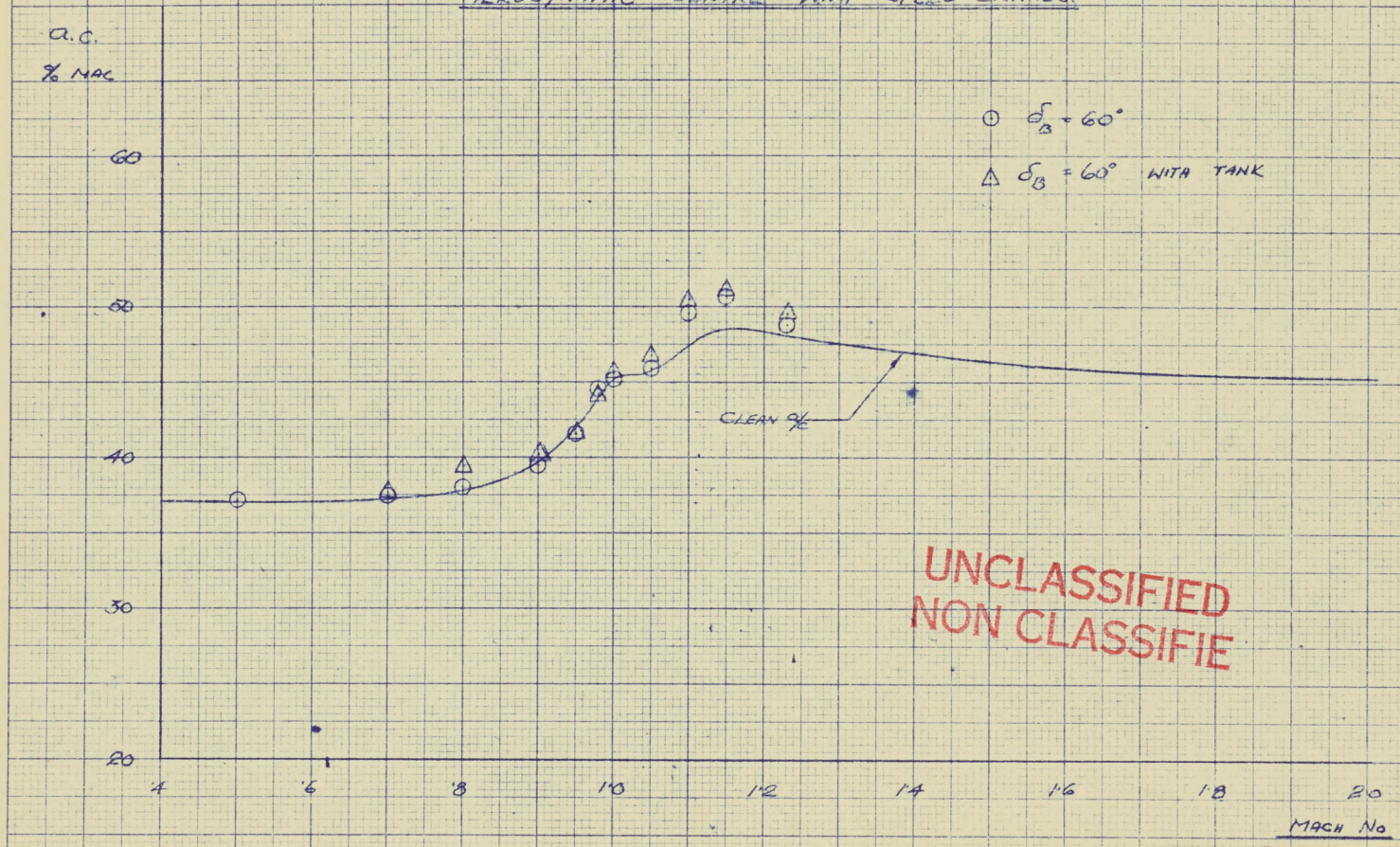


AIRCRAFT C105 COMPONENT A.C. VS M SHEET NO. 21/22
A.U.W. DATE 28/5/54 REPORT NO. P/WT/20
PREP. BY R. MCKEE

FORM 1746

C105

AERODYNAMIC CENTRE WITH SPEED BRAKES.



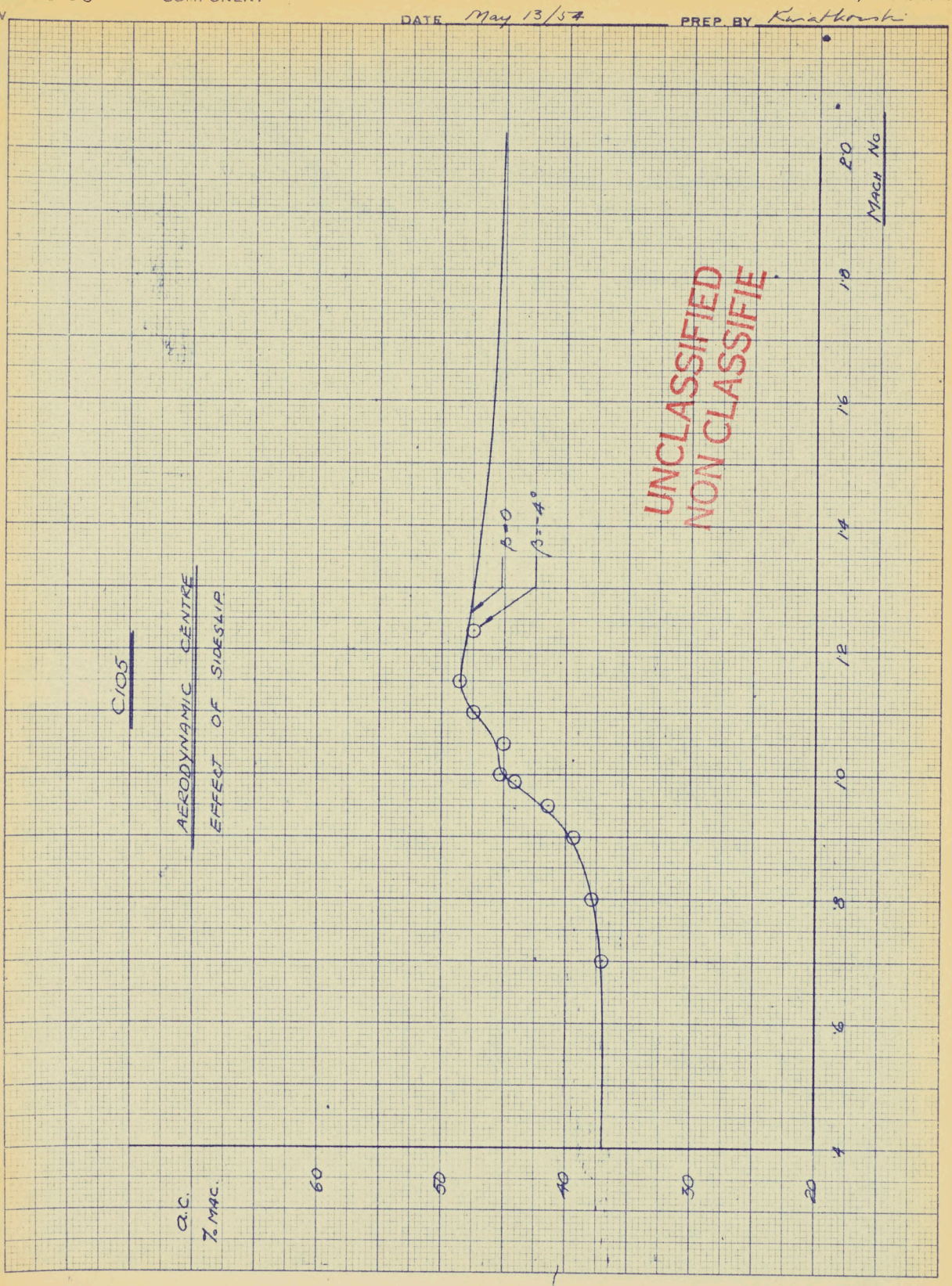
AIRCRAFT C105 COMPONENT SHEET No. 2.1.3.1. REPORT No. P/W.T./20

A.U.W. DATE May 13/57 PREP. BY Kwiatkowski

C105

AERODYNAMIC CENTRE

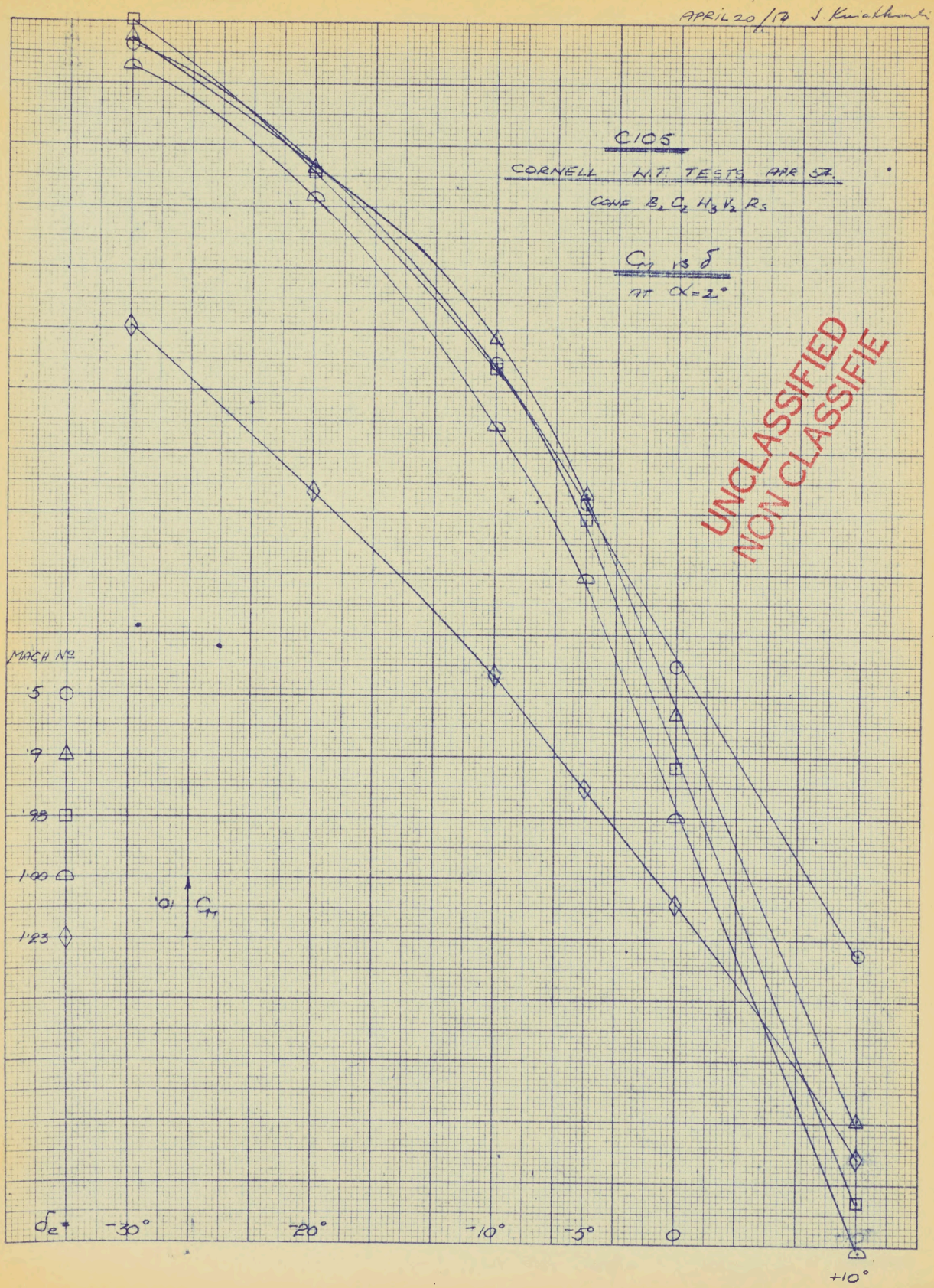
EFFECT OF SIDESLIP



FORM 1746

221.1. P/W.T./20

APRIL 20/17 J. Kwiatkowski



AIRCRAFT A U W-1 COMPONENT SHEET No. 2.2.1.2.

DATE JUNE 54. PREP. BY CRAIG REPORT No. UM-7120

$C_{m_{\delta_e}}$ (CONST α) - PER DEG.

C-105

$C_{m_{\delta_e}}$ @ CONST α VS MACH NO.

-.010

-.008

-.006

-.004

-.002

0

.4 .5 .6 .7 .8 .9 1.0 1.1 1.2

MACH NUMBER

FORM 1746

2221. P/H.T./20

May 3/54 J Kurath

C105

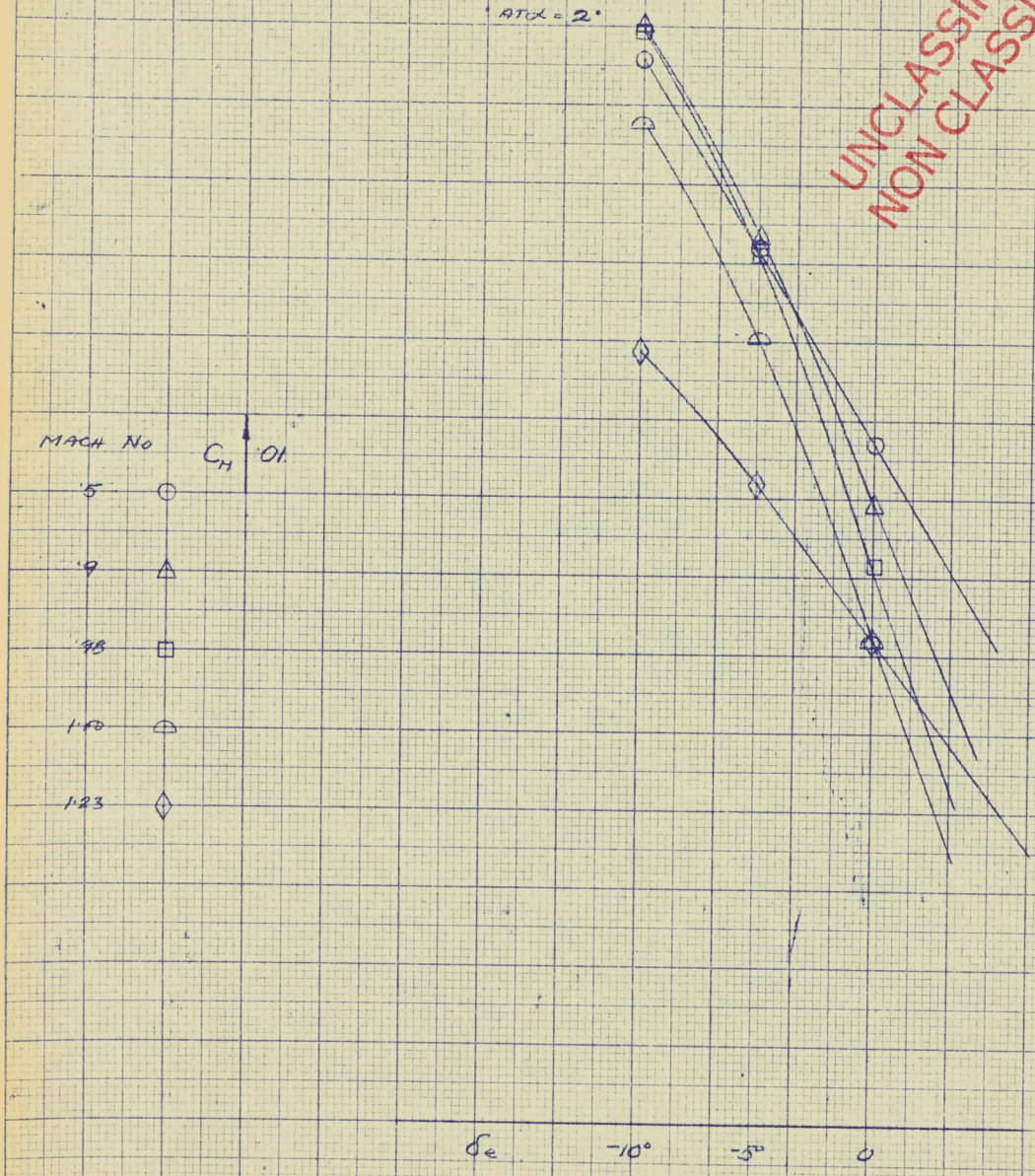
CORNELL H.T. TESTS APR 54

CONF BRS

$\delta_B = 60°$

C_M vs δ

AT $\alpha = 2°$



2222. P/W.T./20

May 5/54 J. Kwiatkowski

C105

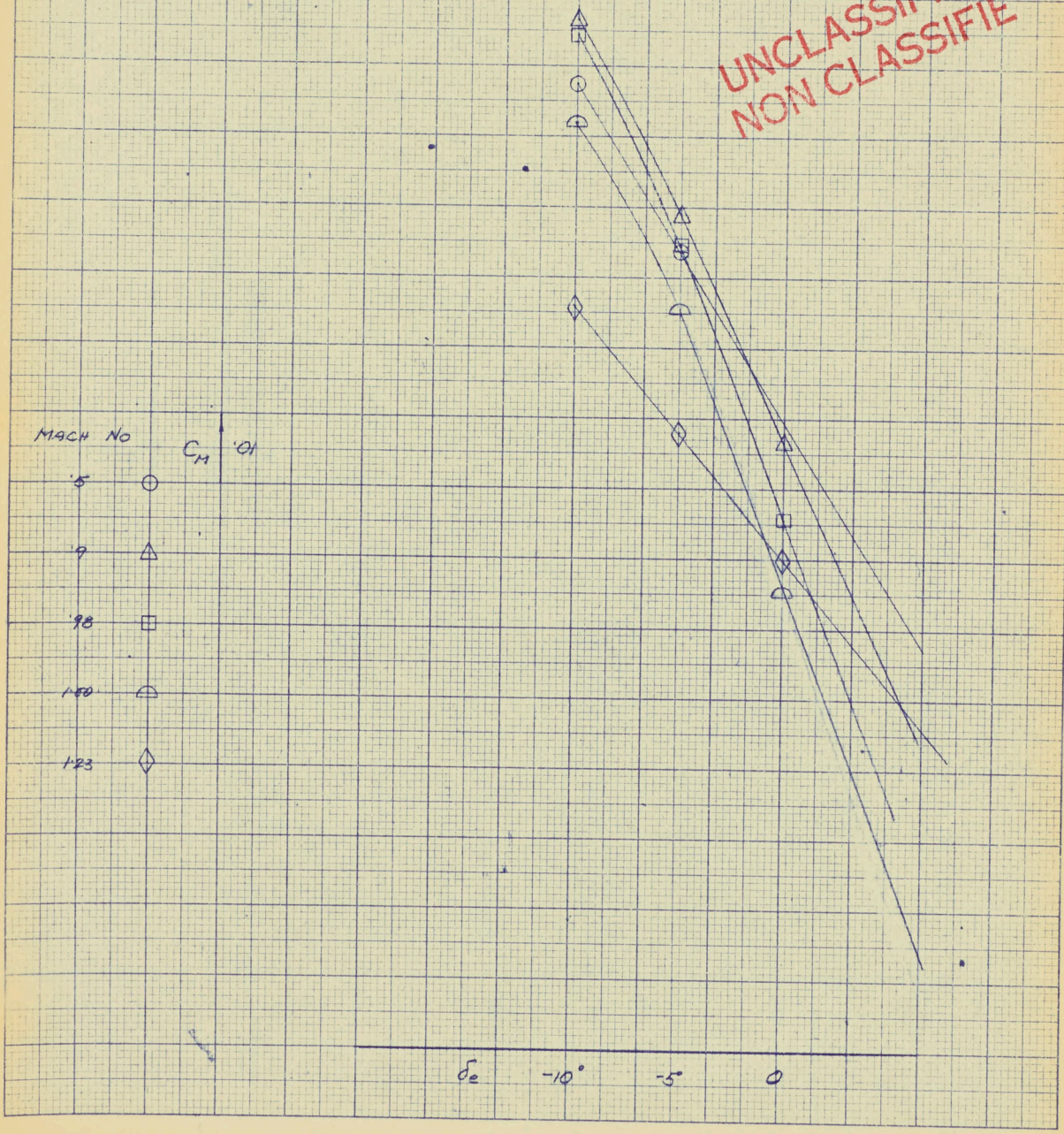
CORNELL W.T. TESTS APR. 54

CONF BRST.

$\delta_B = 60°$

C_M vs δ

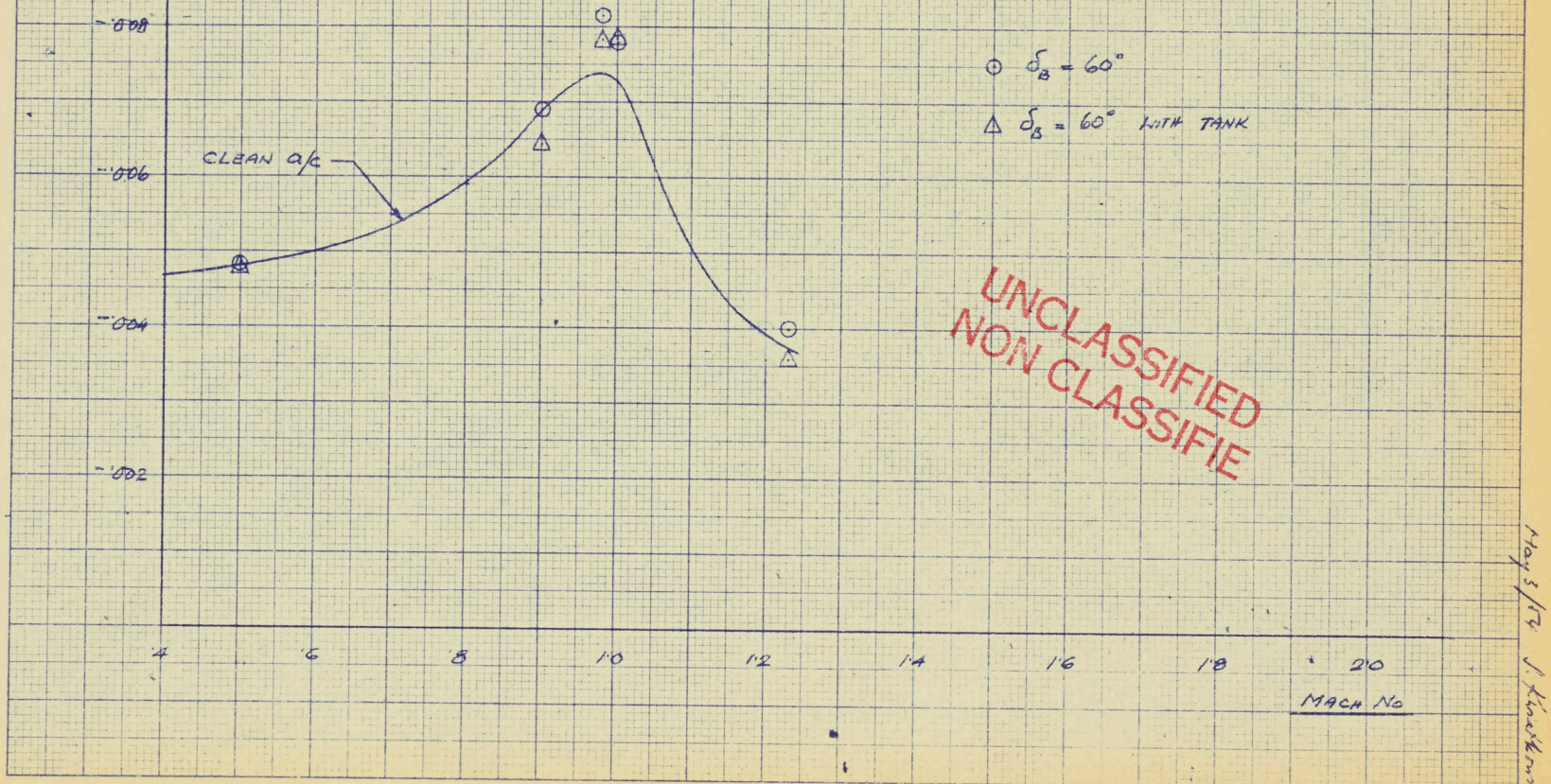
AT $\alpha = 2°$



C105

C_{m_δ} AT CONST. α VS MACH NO

WITH SPEED BRAKES



2.2.2.3.

PLNT/20

May 5/17 J. Kinnaman

2.3.1.1. P/W.T./30

APRIL 20/54 I. Kroeburch

C 105

CORNELL W.T. TESTS APR 54

CONF $B_2 C_2 H_3 V_2 R_3$

C_M VS δ

AT $C_L = .1$

MACH NO ○ .5
△ .9
□ .98
◇ 1.00
◇ 1.23

.01 C_M

$\delta°$ -30° -20° -10° -5° 0 +10°

AIRCRAFT
A. U. W.

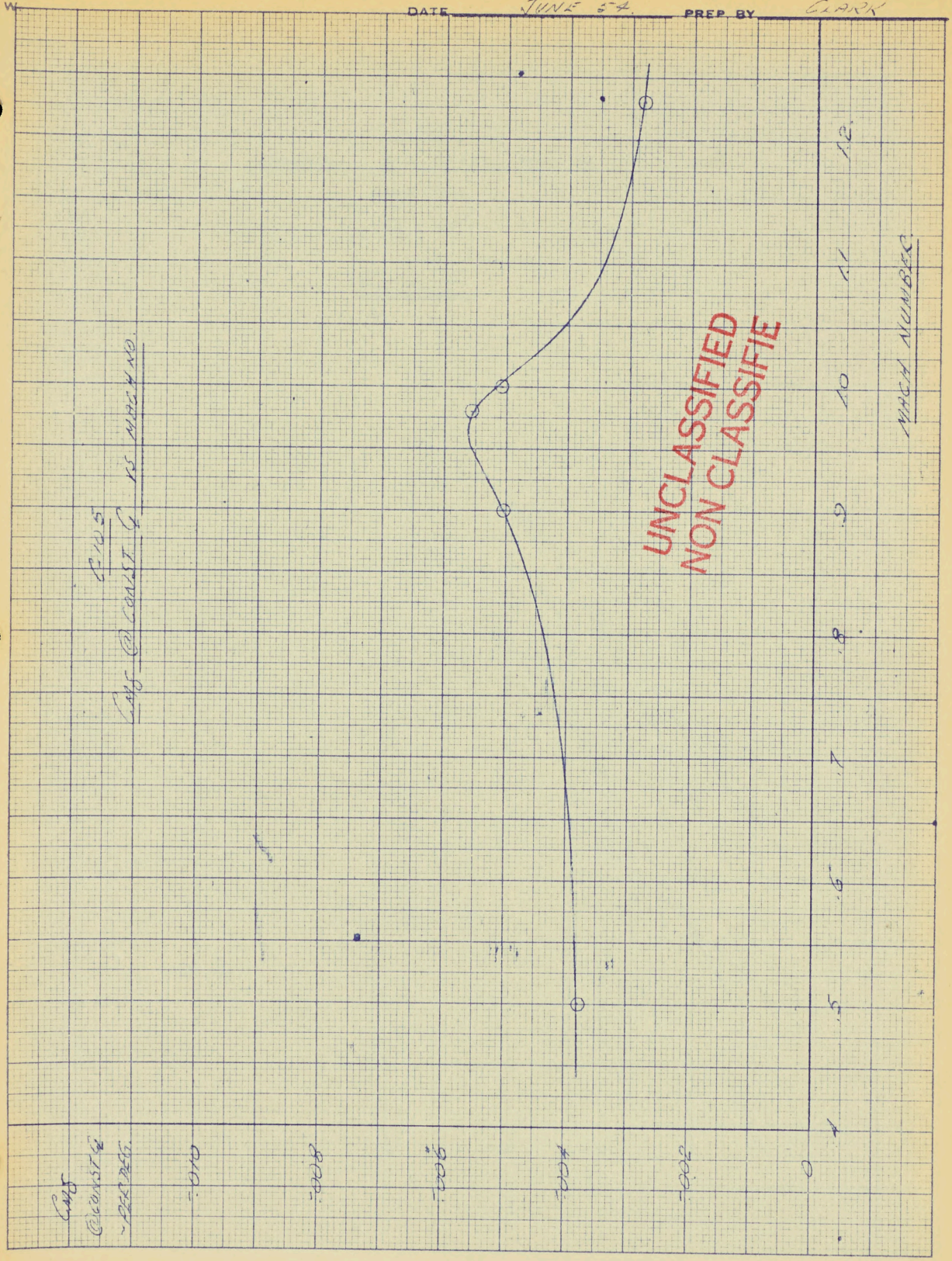
COMPONENT

SHEET No. 23.1.2

REPORT No. SM-T-120

DATE JUNE 54.

PREP. BY CLARK



FORM 1746

2.3.2.1.

P/W.T./20.

May 3/54 J. Kwiatkowski.

C105

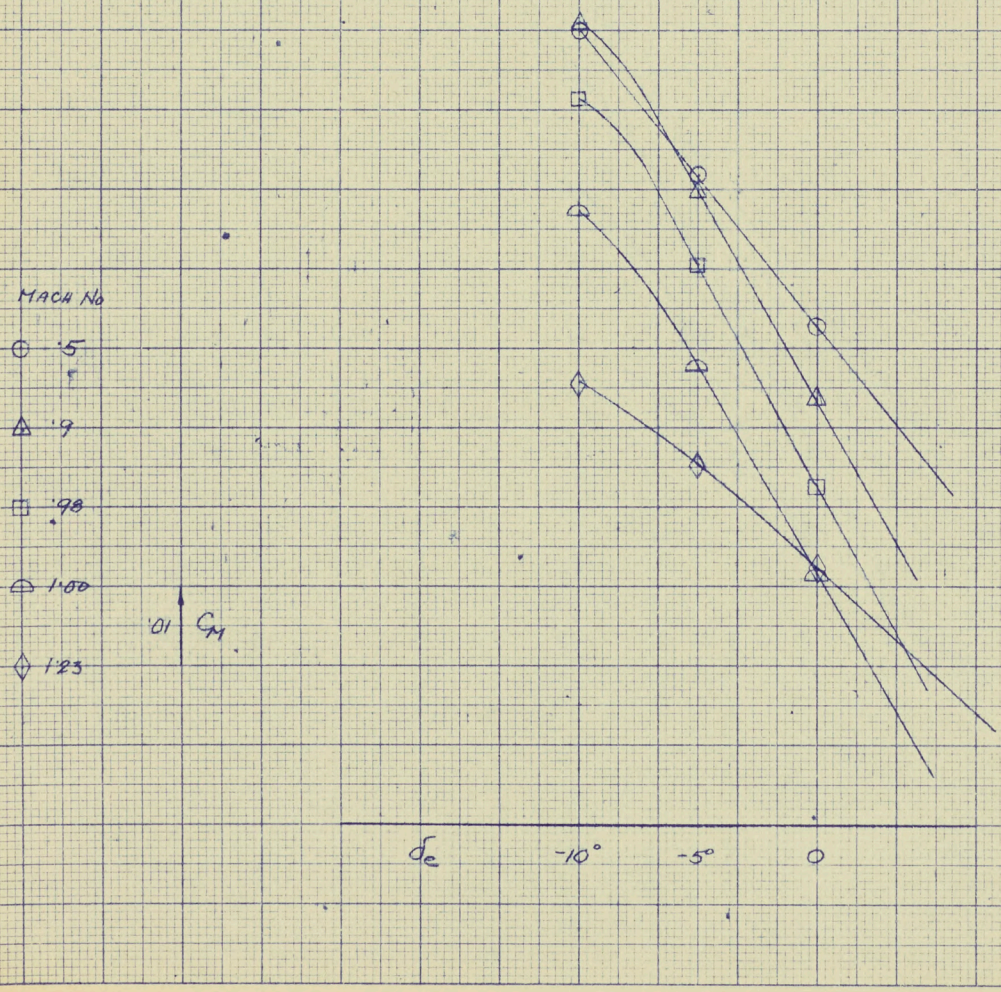
CORNELL W.T. TESTS APP. 37

CONF BRS

$\delta_B = 60°$

C_M vs δ

AT $C_L = 1$



2.3.2.2.

P/W.T./20

May 5/54 J. Kwiatkowski

C105

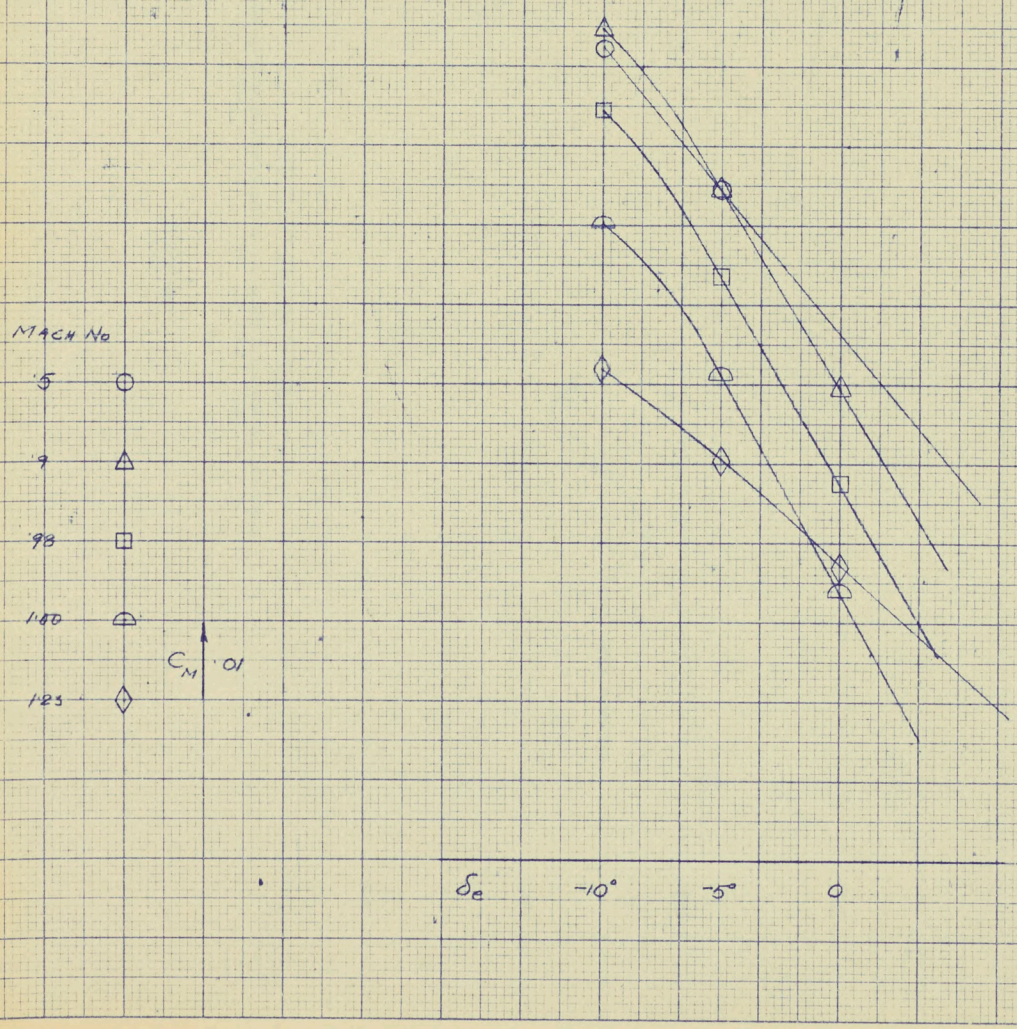
CORNELL W.T TESTS APR 54

CONE BRET

$\delta_4 = 60°$

C_M vs δ_e

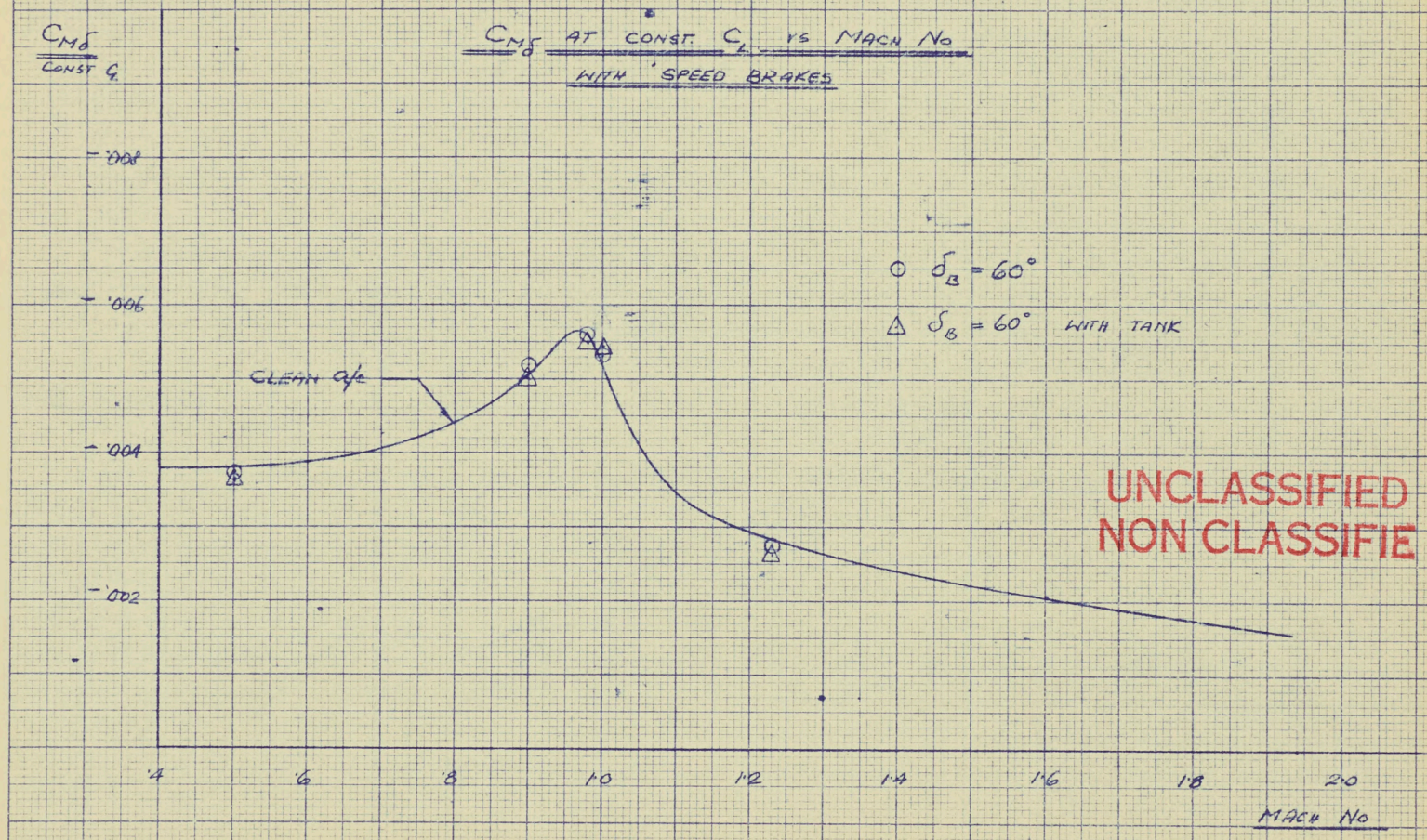
at $\zeta_2 = 1$



C105

C_{M_δ} AT CONST. C_L VS MACH No

WITH SPEED BRAKES



2.3.2.3.

P/A.T./20

May 3/54 J. Kinnaird

AIRCRAFT C105 COMPONENT SHEET No. 2.33.1. REPORT No. P/H.T./20.

A.U.W. DATE May 12/54 PREP BY Kwiatkowski

C105

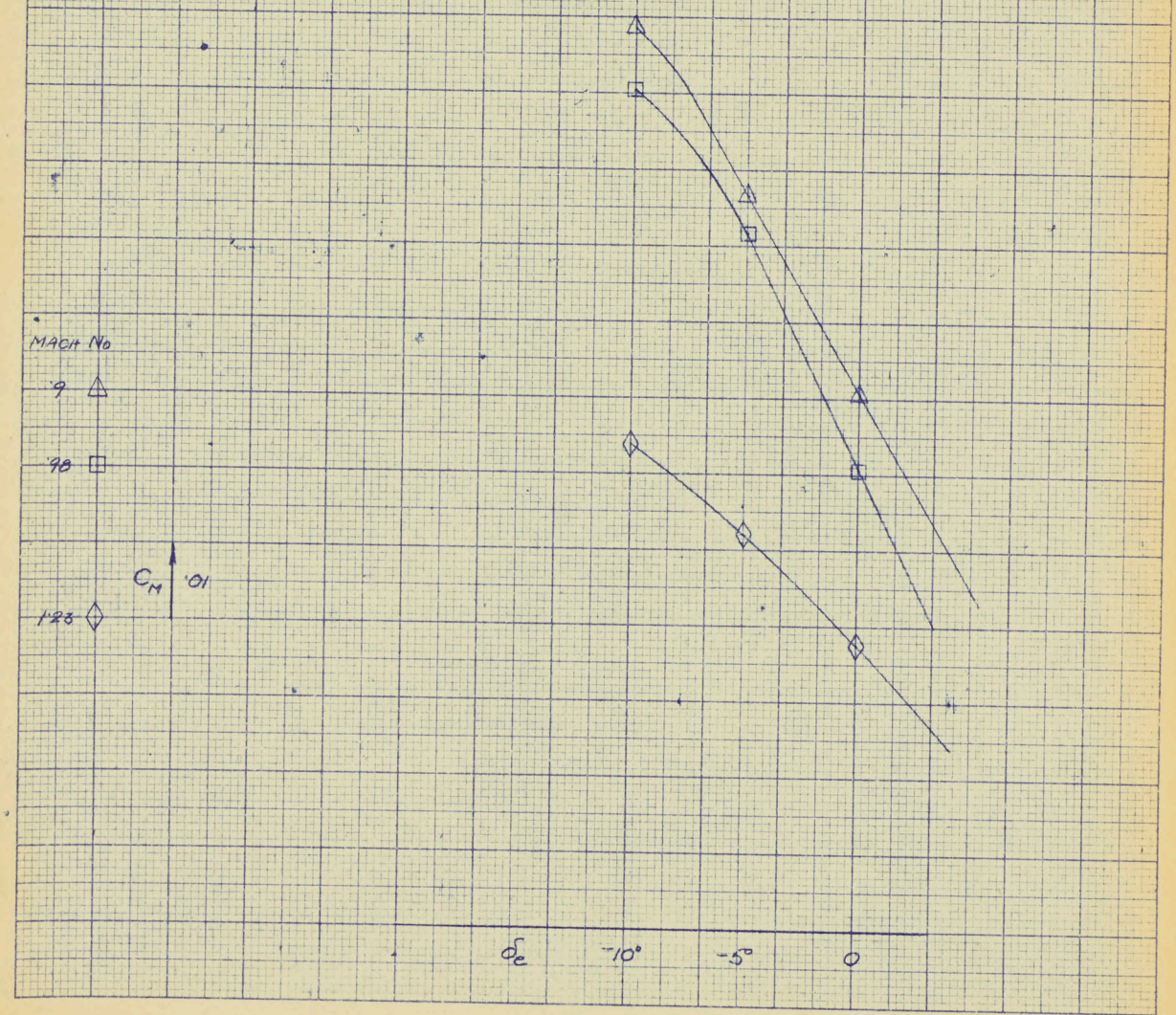
CORNELL N.T. TESTS APR 54

CONF BRV

$\beta = -4°$

C_M vs δ_e

AT $C_L = .1$

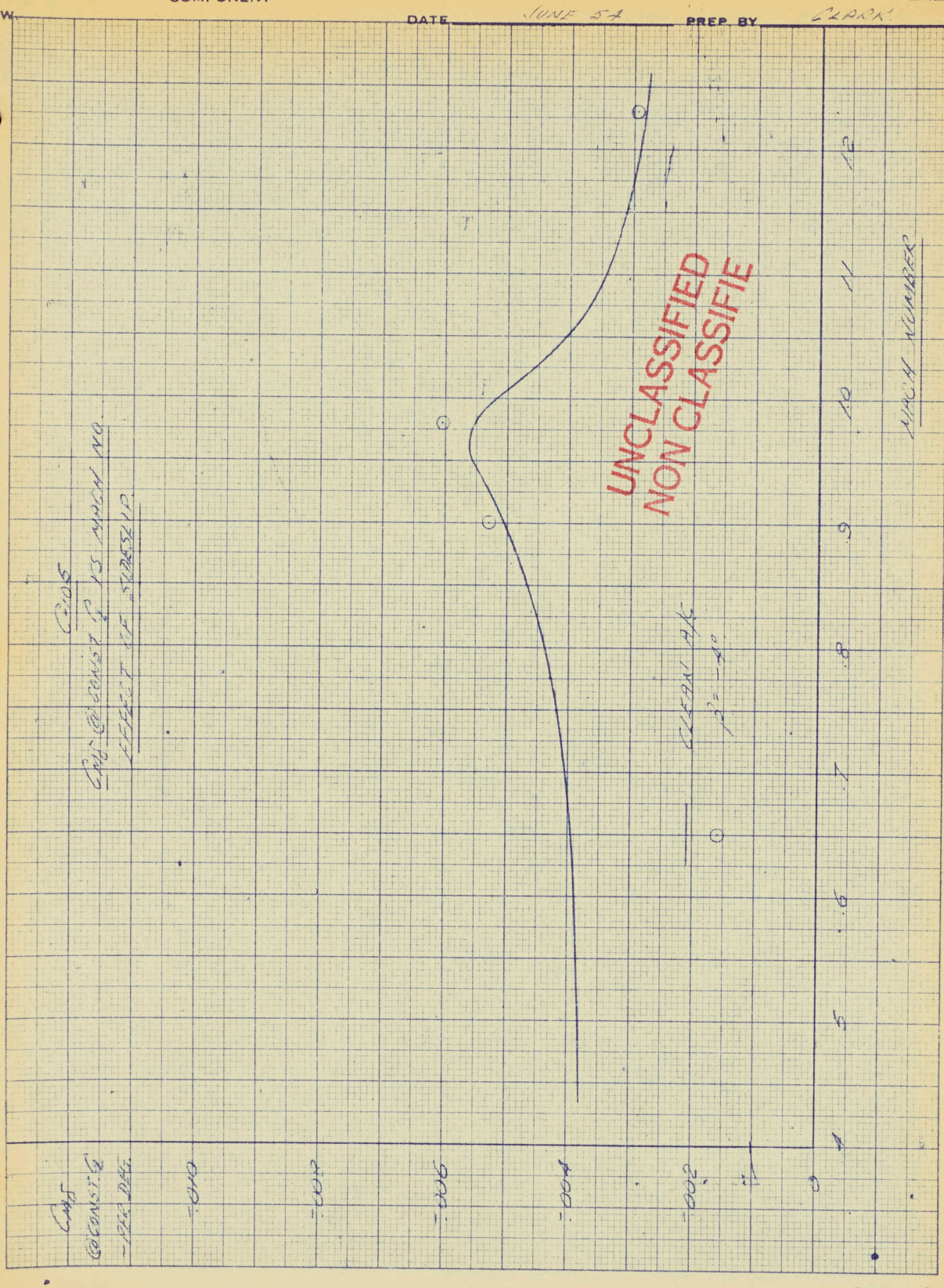


AIRCRAFT
A.U.W.

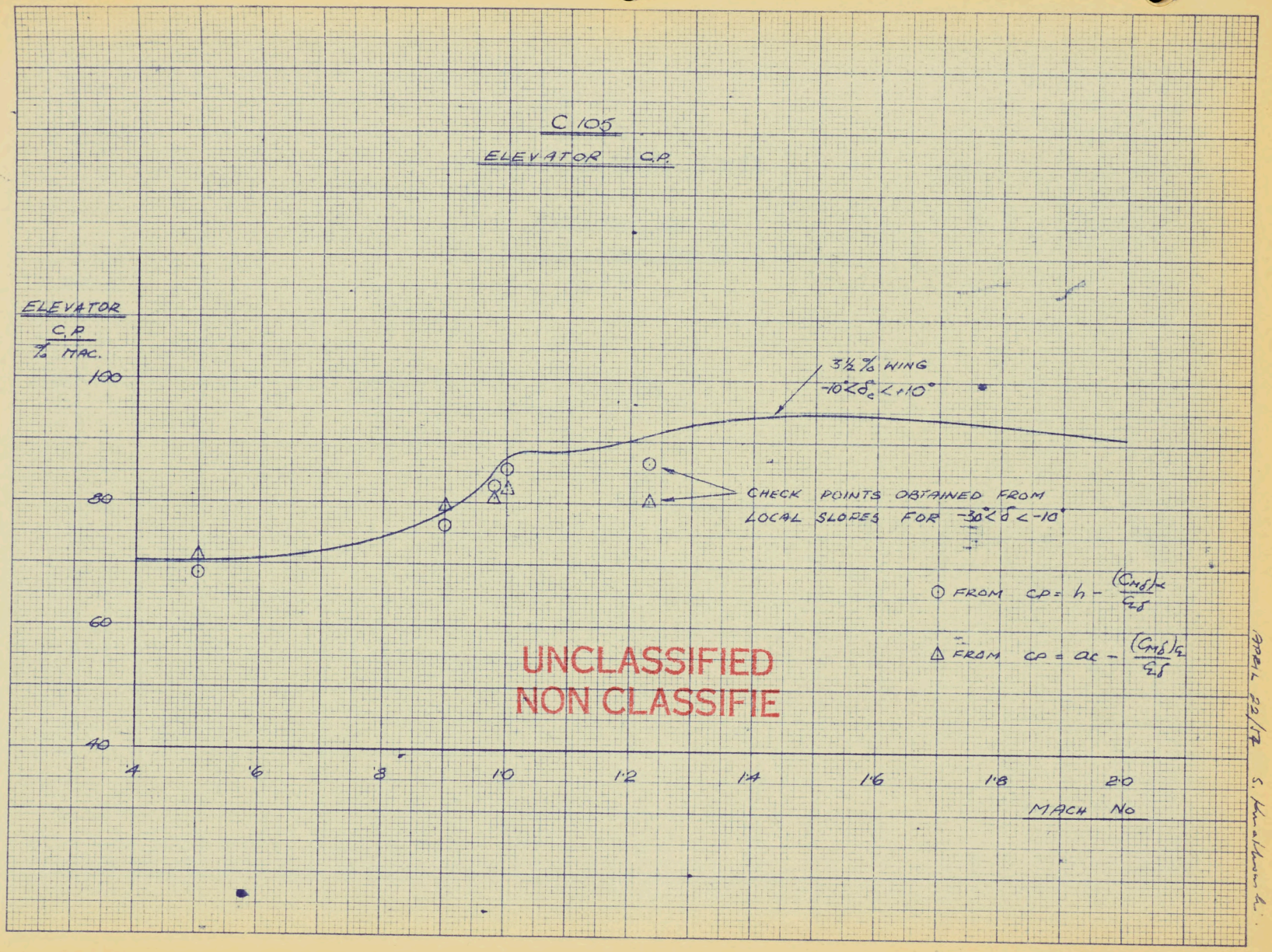
COMPONENT

SHEET No. 2332 REPORT No. P/NT/120

DATE JUNE 54 PREP. BY CLARK



FORM 1746



2.4.1.3. P/W.T/20 APRIL 22/57 S. Hamilton A.

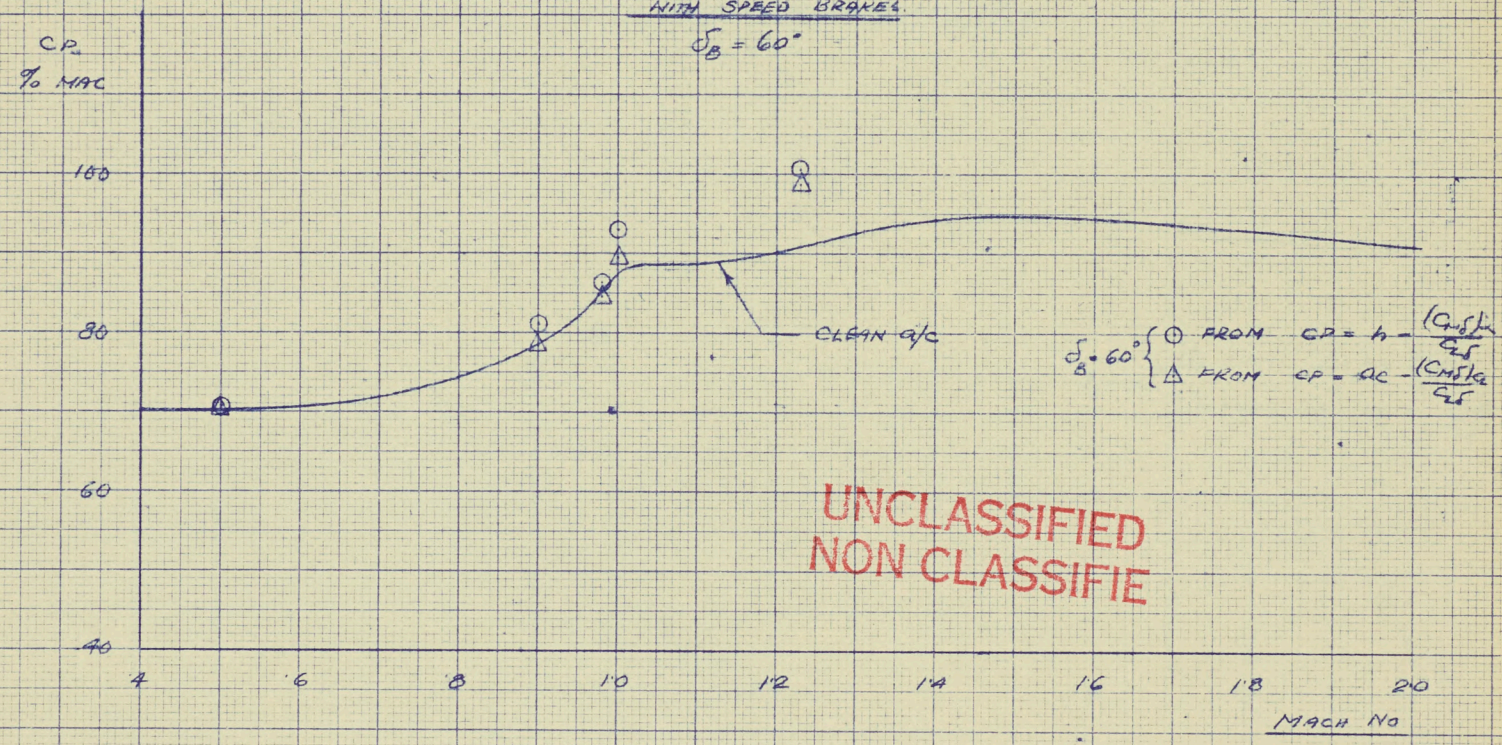
C105

CORNELL W.T. TESTS APR 57

ELEVATOR CP

WITH SPEED BRAKES

$\delta_B = 60°$



2422. P/W.T/30 May 3/57 J. Kuhlenkamp

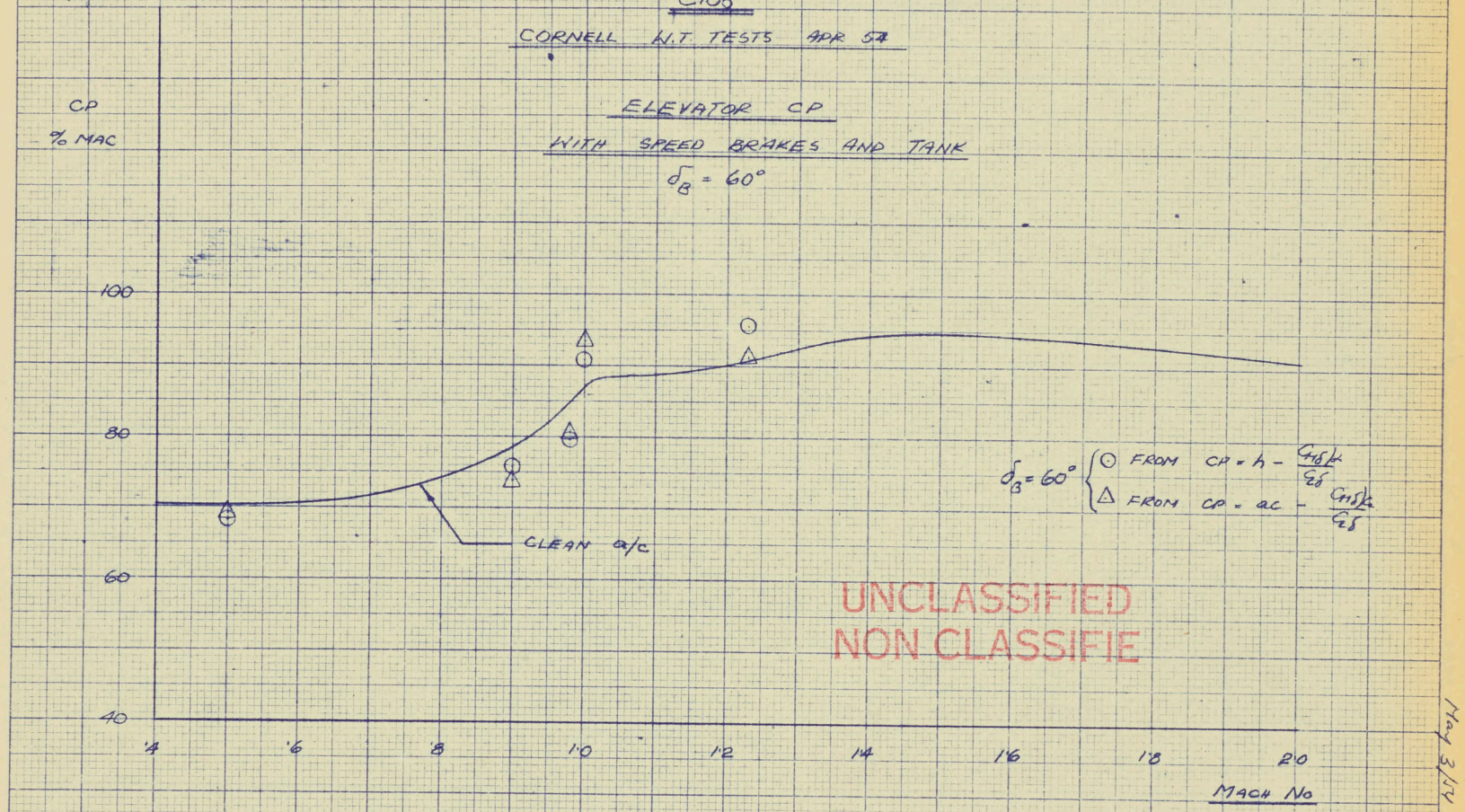
C105

CORNELL W.T. TESTS APR 54

ELEVATOR CP

WITH SPEED BRAKES AND TANK

$\delta_B = 60°$



2.1.2.4.

P/W.T./20

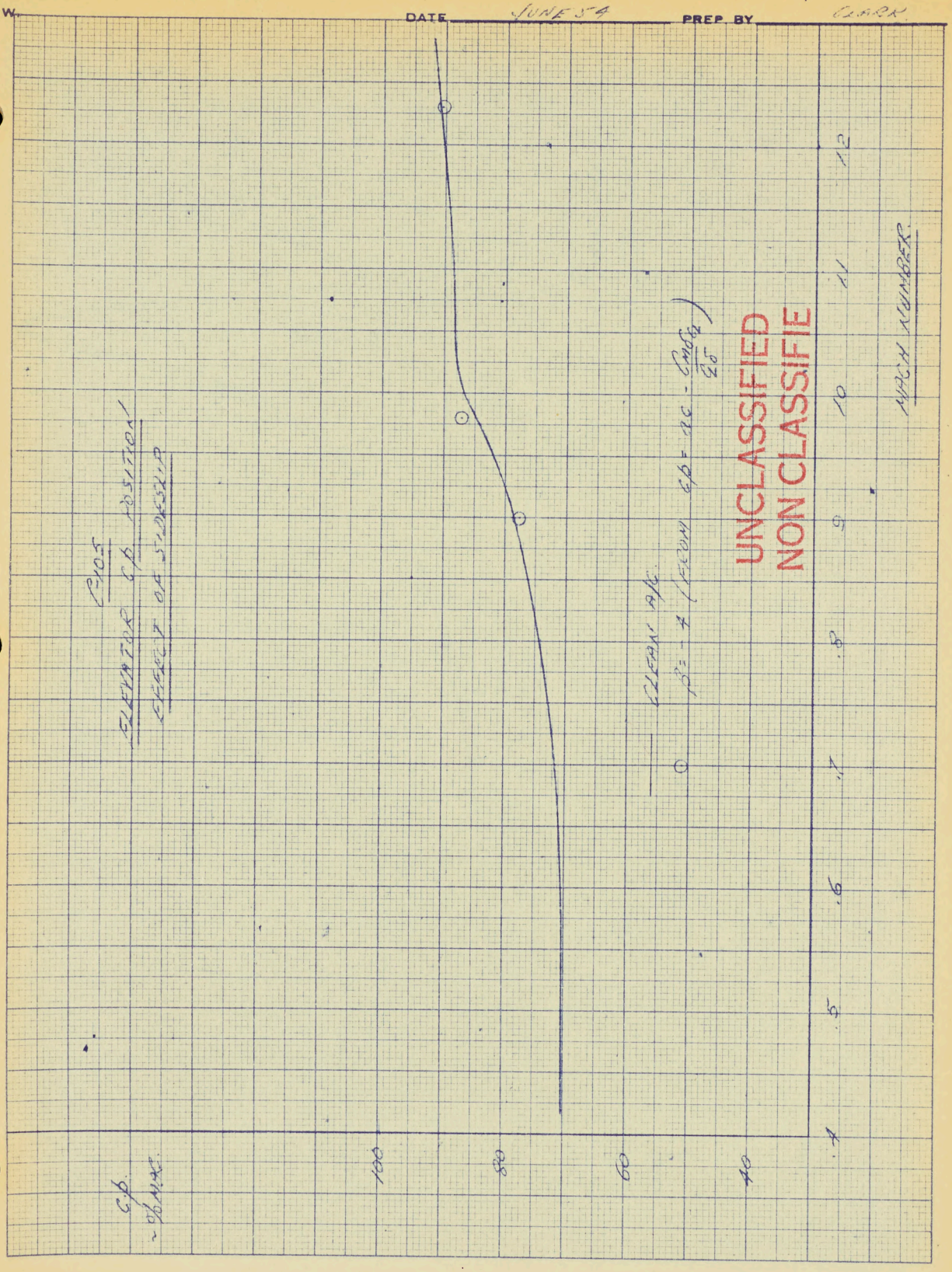
May 3/54 J. Kinakkad

AIRCRAFT
A. U. W.

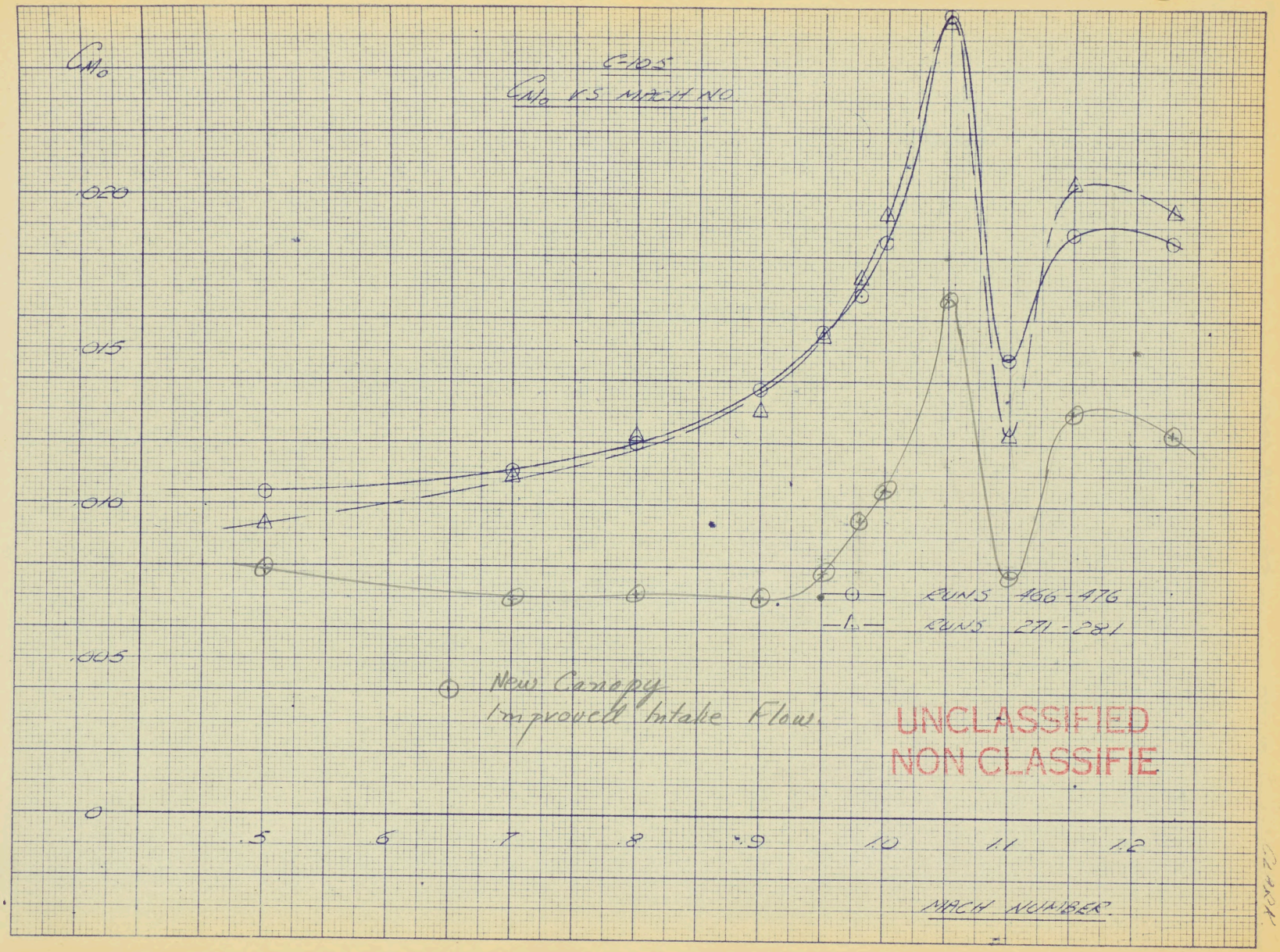
COMPONENT

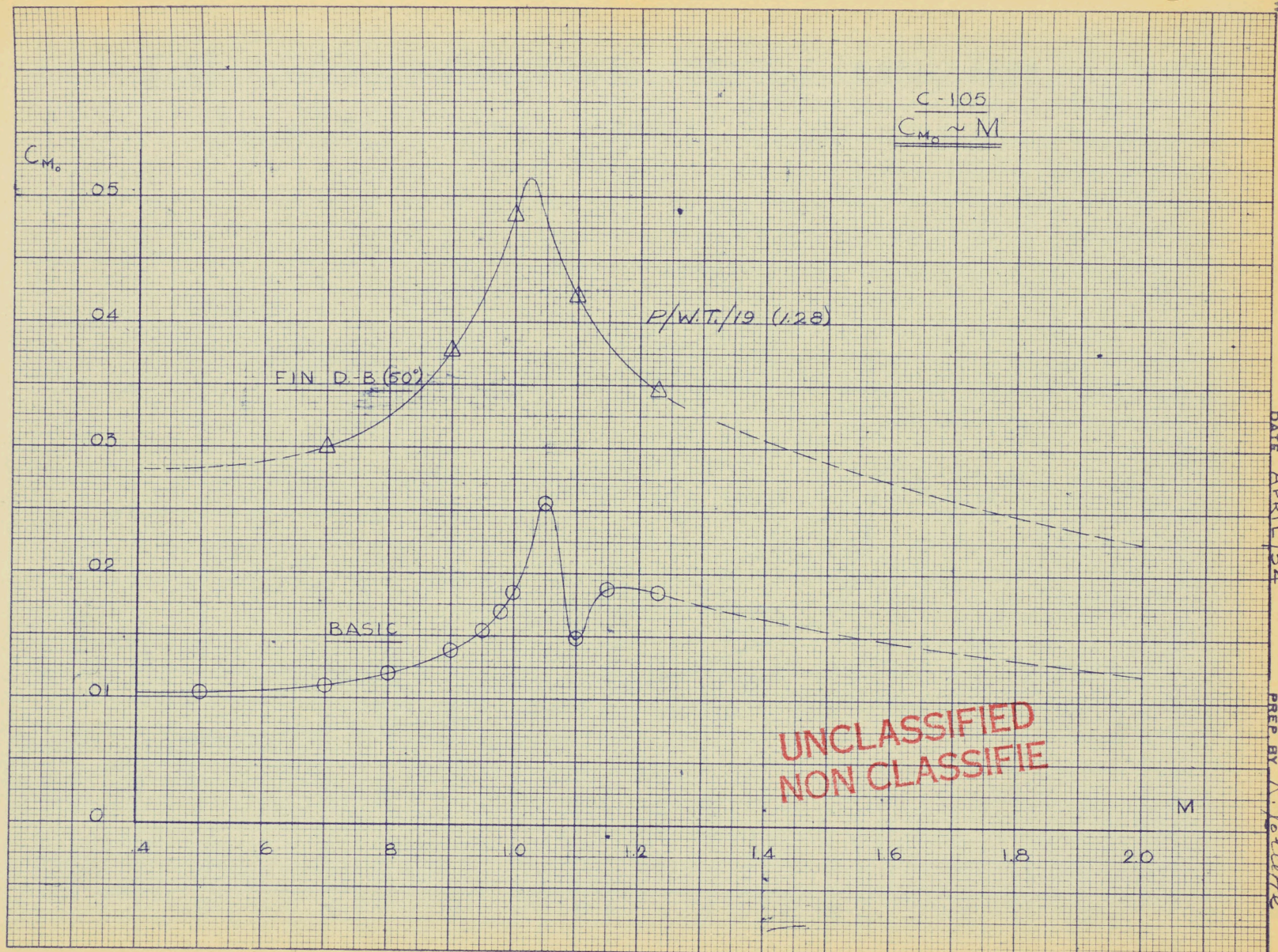
SHEET No. 2432 REPORT No. P/W-T-120

DATE JUNE 54 PREP. BY CLARK



FORM 1746





AIRCRAFT C-105 COMPONENT A U W.

SHEET NO. 2.5.21. REPORT NO. P/W.T./20

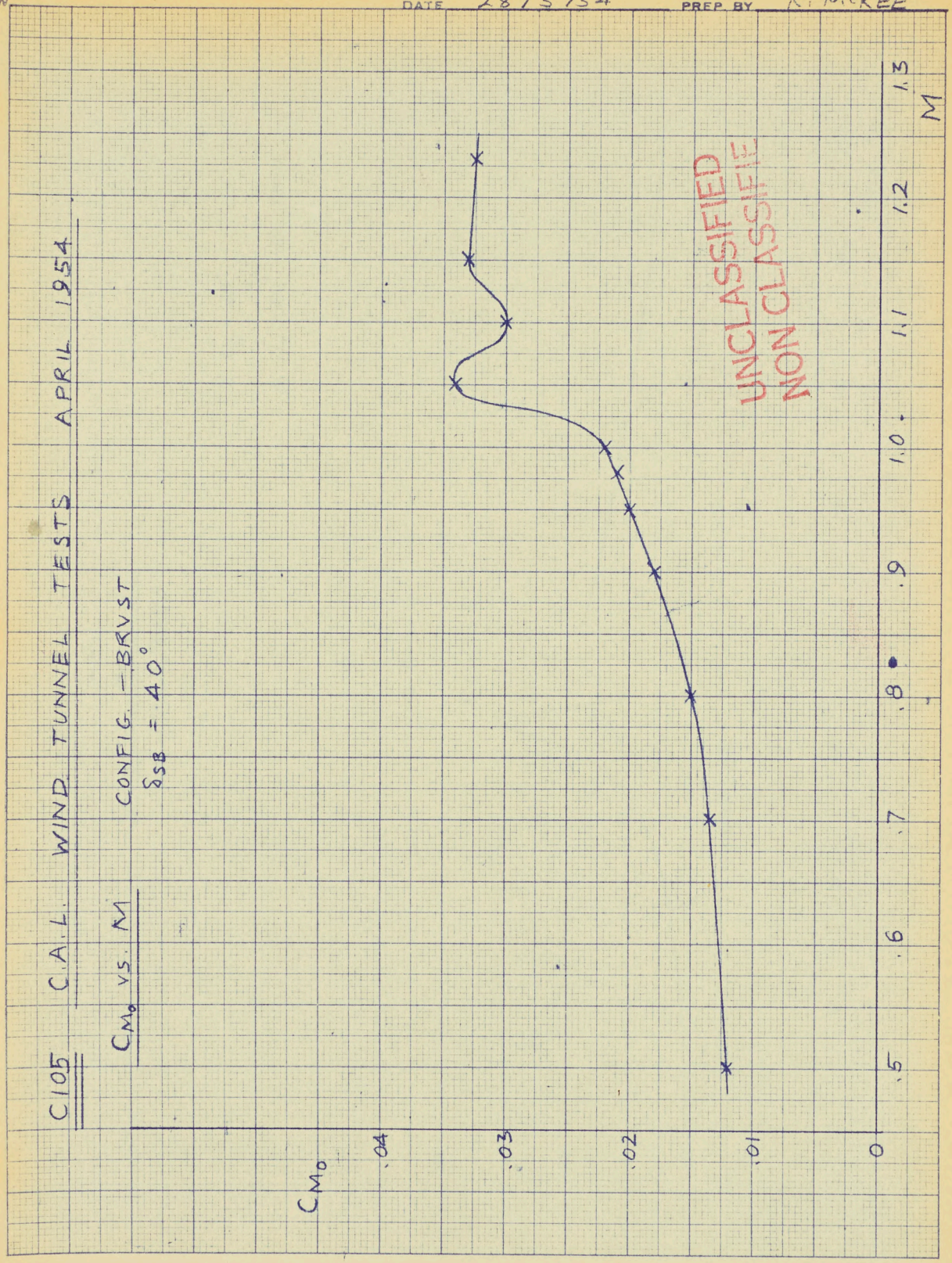
DATE APRIL/54 PREP BY R. Collette

FORM 1746

AIRCRAFT C 105 COMPONENT C_{M_0} vs M SHEET No. 2522. REPORT No. P/WT/20
A. U. W. DATE 28/5/54 PREP. BY R. MCKEE

C105 C.A.L. WIND TUNNEL TESTS APRIL 1954

C_{M_0} VS. M CONFIG. — BRVST
$\delta_{SB} = 40°$



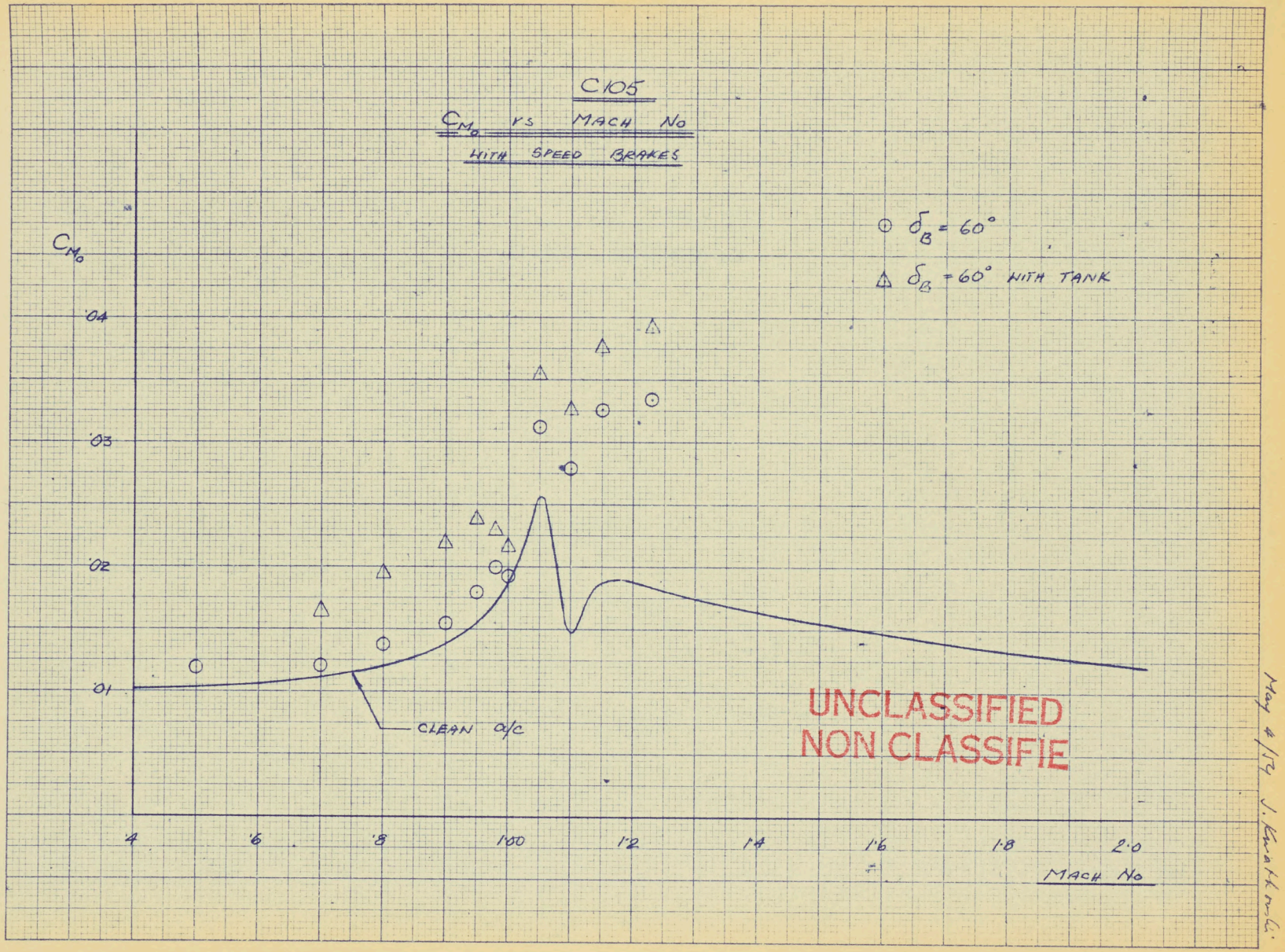
UNCLASSIFIED
NON CLASSIFIE

FORM 1746

C105

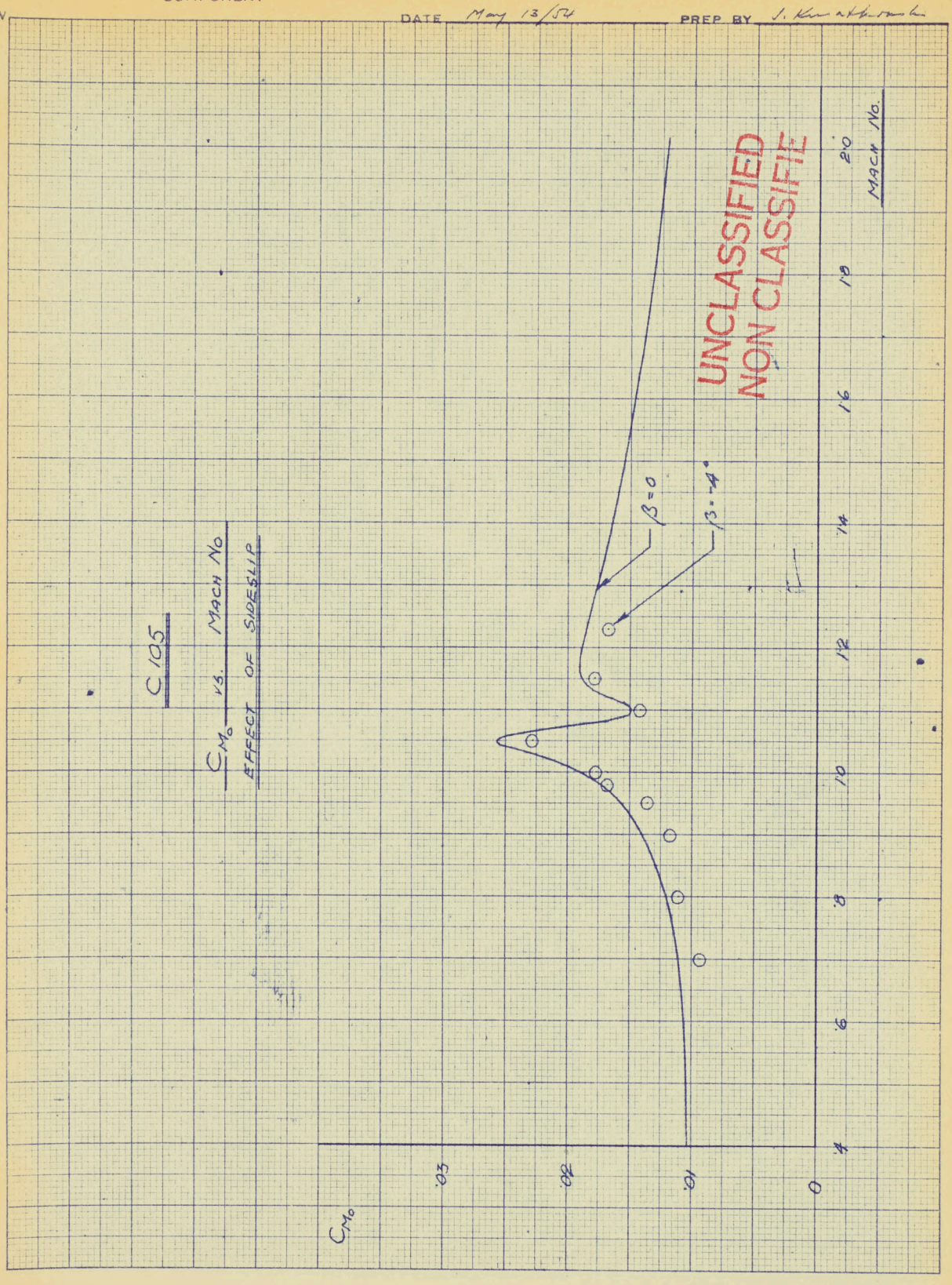
C_{M_0} VS MACH NO

WITH SPEED BRAKES



AIRCRAFT C105 COMPONENT SHEET No. 25.3.1. REPORT No. P/4.T./20.

A.U.W. DATE May 13/54 PREP BY J. Kinnaird-Lumsden



FORM 1746

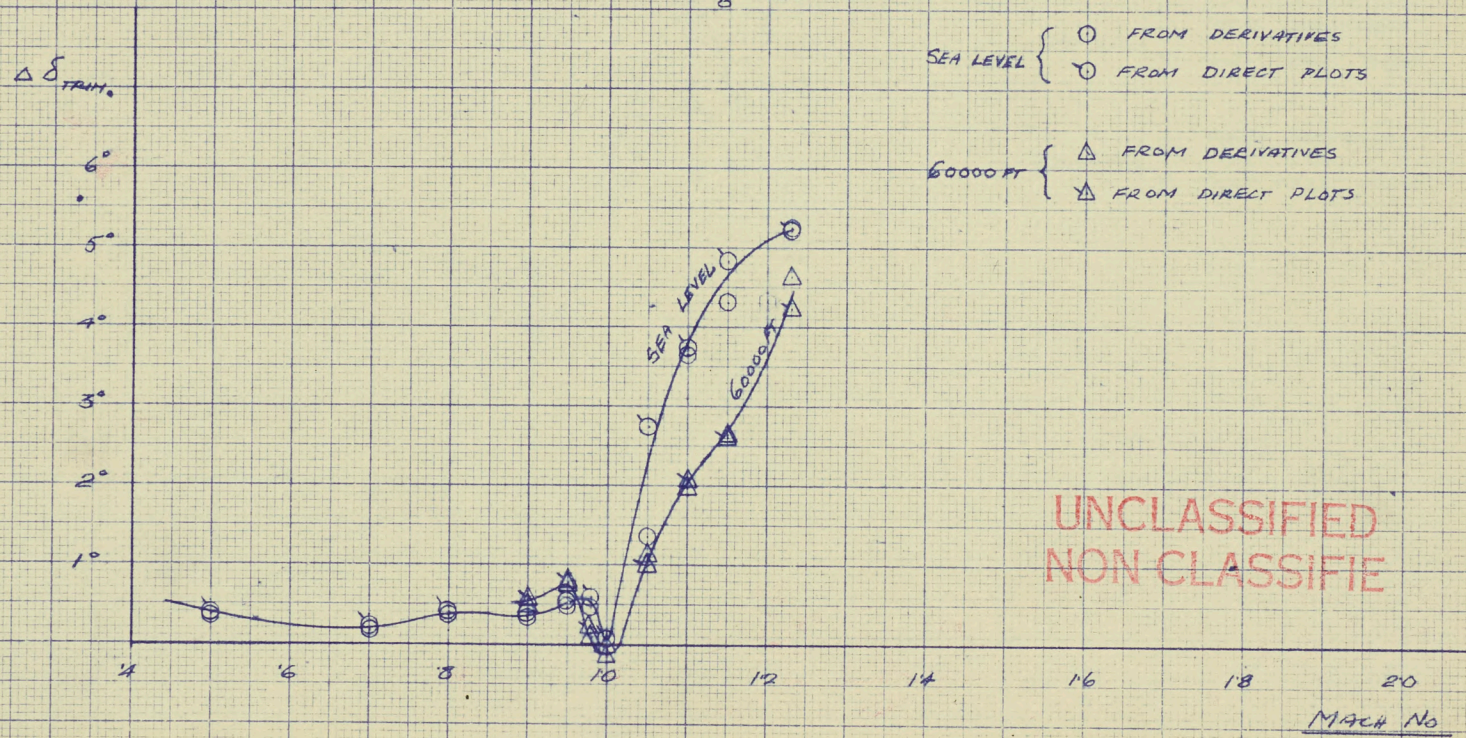
C105

$\Delta \delta_{TRIM}$ SPEED BRAKES

C.G. = 28 $\bar{E}$

W = 47000 lb

$\delta_B = 60°$



25.1.5. PART 1/20 May 6/74 V. Kuakkank

AIRCRAFT C105 COMPONENT SHEET No. 2622. REPORT No P/W.T. 120

A.U.W. DATE May 6/54. PREP. BY Kuethe

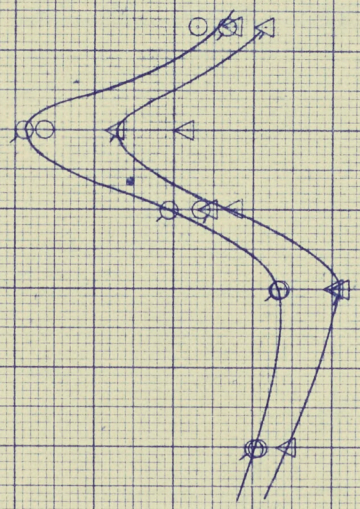
C105

Δ Strim FIN SPEED BRAKES.

C.G. = 28%

W = 47000 LB

δ_{FB} = 50°



○ FROM DERIVATIVES
SEA LEVEL
① FROM DIRECT PLOTS

△ FROM DERIVATIVES
60000 FT
△ FROM DIRECT PLOTS

$\Delta \delta_{TRIM}$

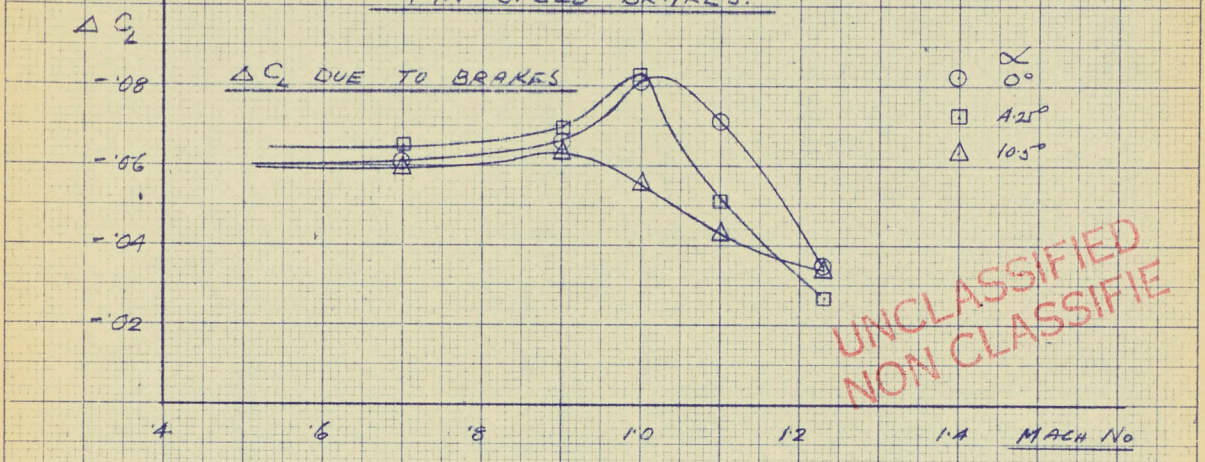
MACH NO

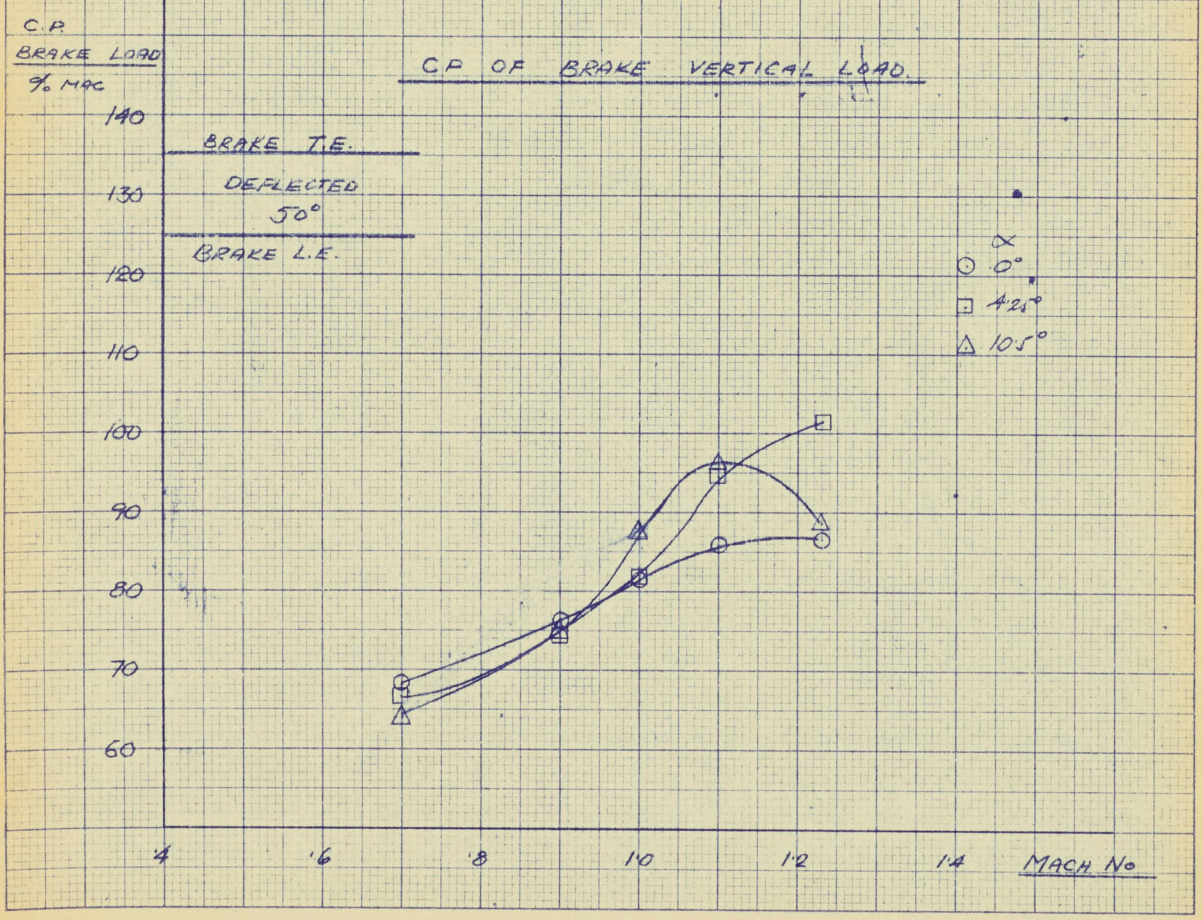
UNCLASSIFIED
NON CLASSIFIE

FORM 1746

AIRCRAFT C105 COMPONENT SHEET No. 26.28. REPORT No. R/W.T./20
A.U.W. DATE May 11/57 PREP. BY Kwakkenbush

C105
FIN SPEED BRAKES.





FORM 1746

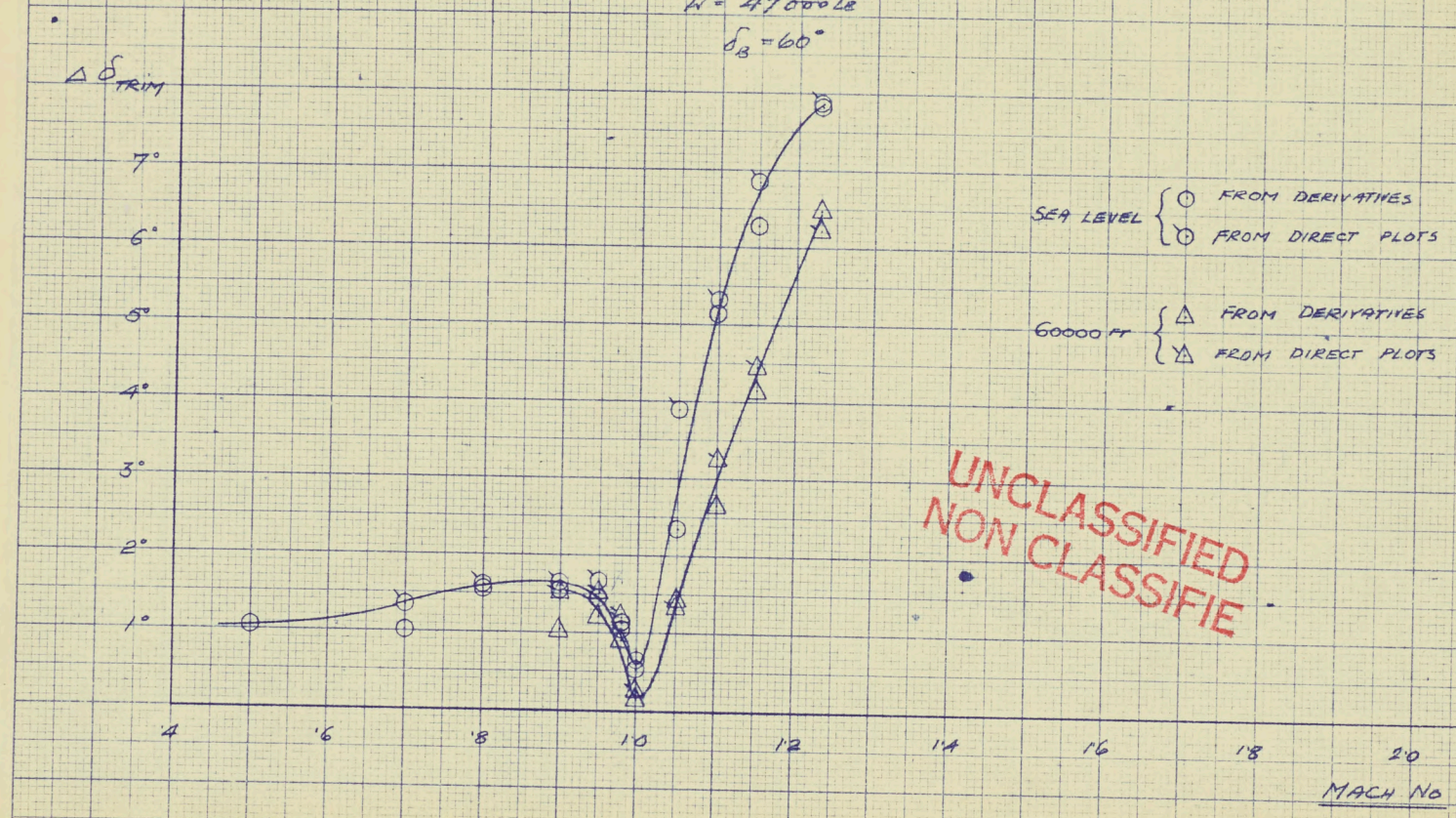
C105

$\Delta\delta_{TRIM}$ SPEED BRAKES AND TANK

C.G. = .28 $\bar{c}$

W = 47000 Lb

$\delta_B = 60°$



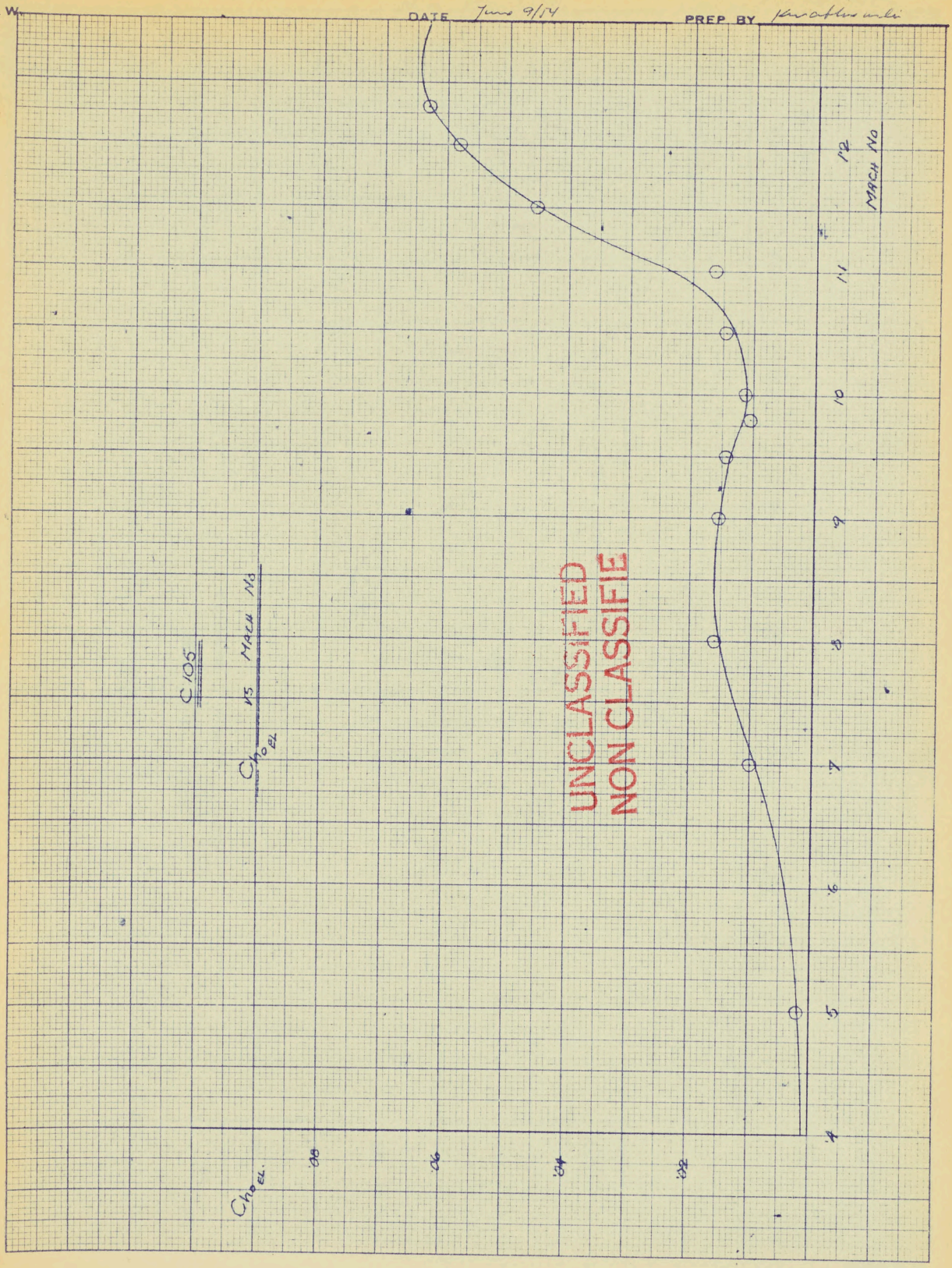
2.6.33.

P/A.T/20

May 6/54 J. Kwiatkowski

AIRCRAFT C105 COMPONENT SHEET No. 3.1.1. REPORT No. P/W.T. 120

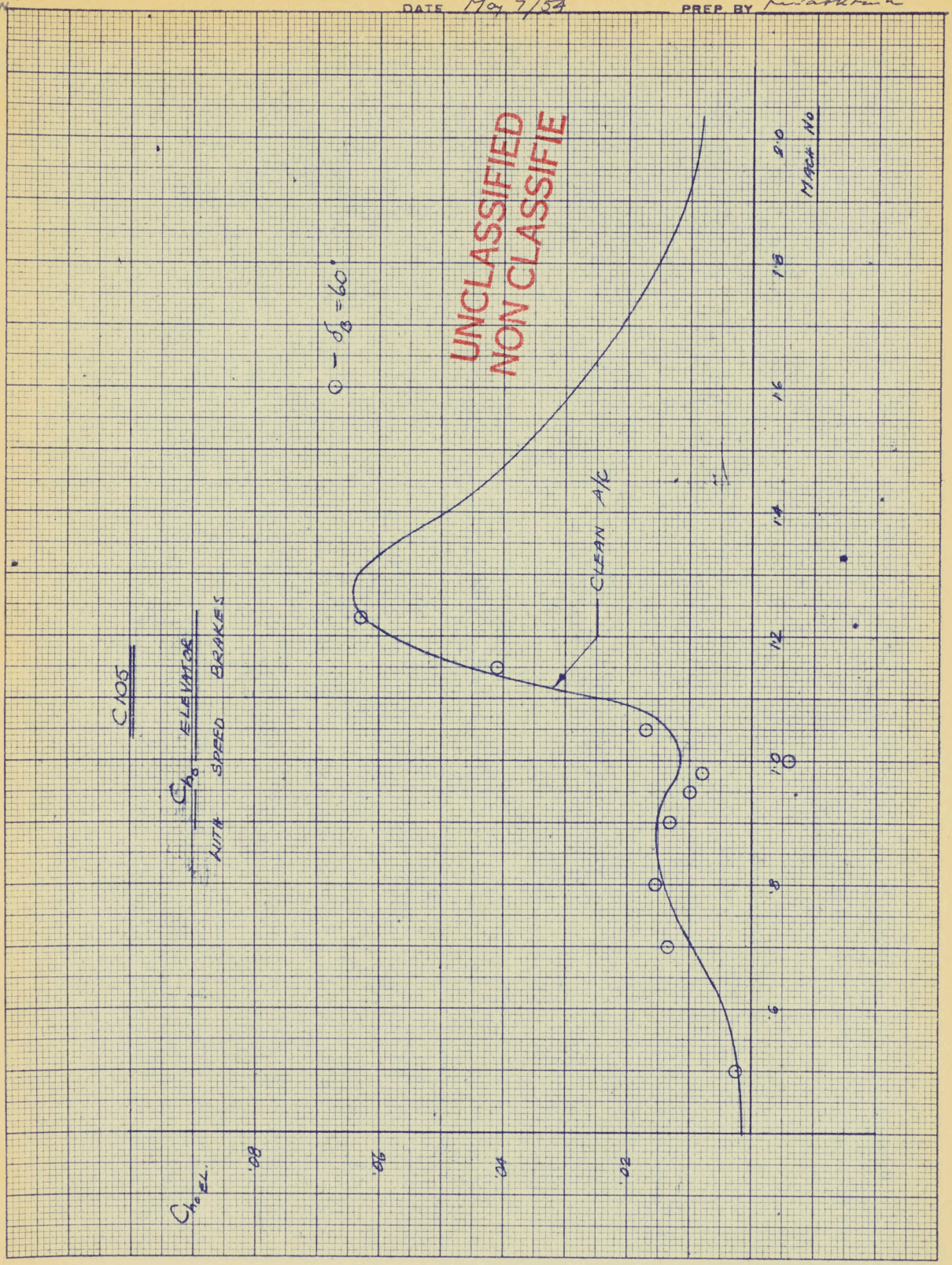
A. U. W. DATE June 9/14 PREP BY [illegible]



FORM 1746

AIRCRAFT C105 COMPONENT SHEET No. 31.21. REPORT No P/H.T./20.

A.U.W. DATE May 7/54 PREP. BY Kwiatkowski



FORM 1746

AIRCRAFT C/05 COMPONENT

A.U.W.

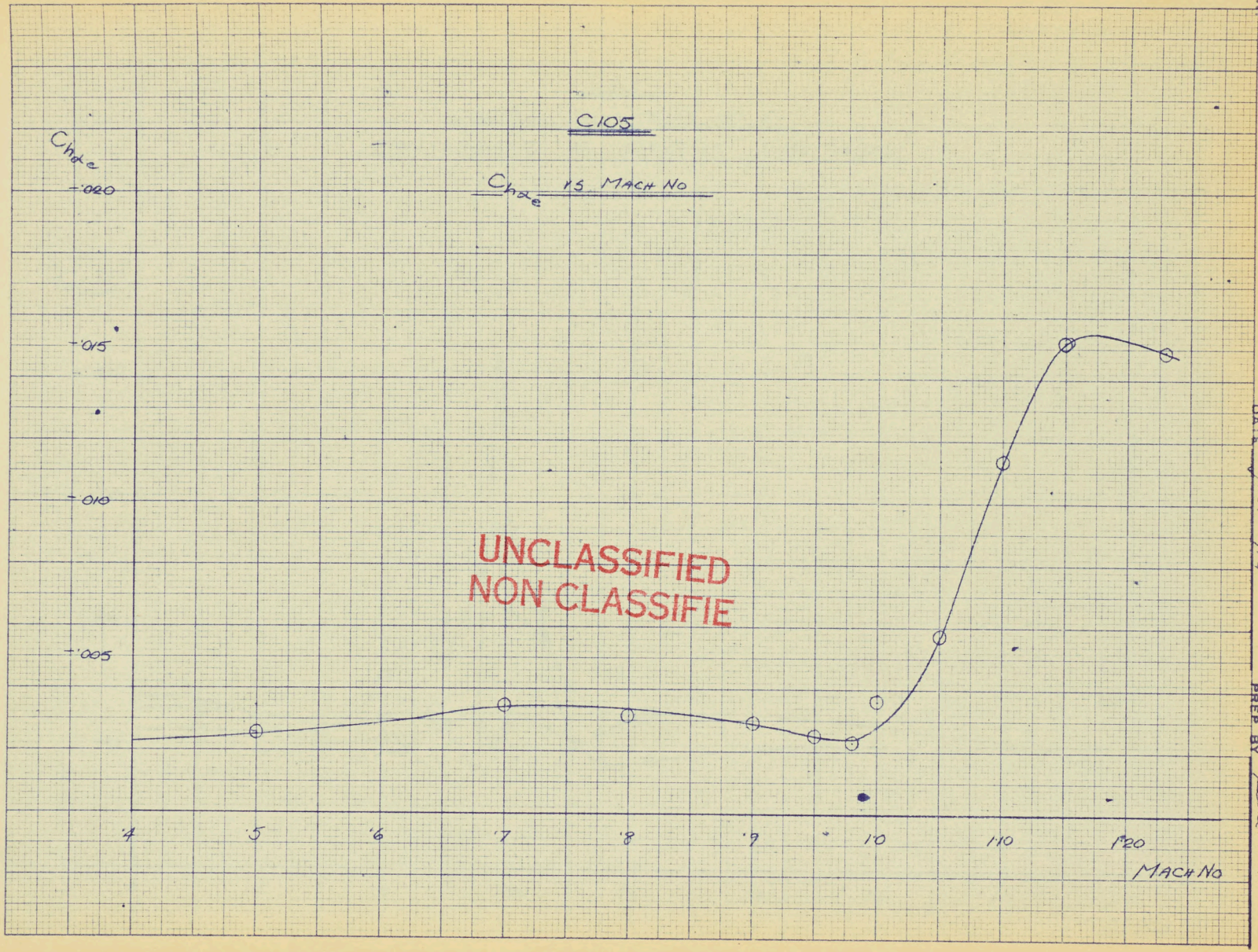
SHEET NO. 3.2.1.1.

DATE June 9/54 REPORT NO. P/N.T./20

PREP BY Kuehbach

C105

$C_{h_{\delta e}}$ VS MACH NO



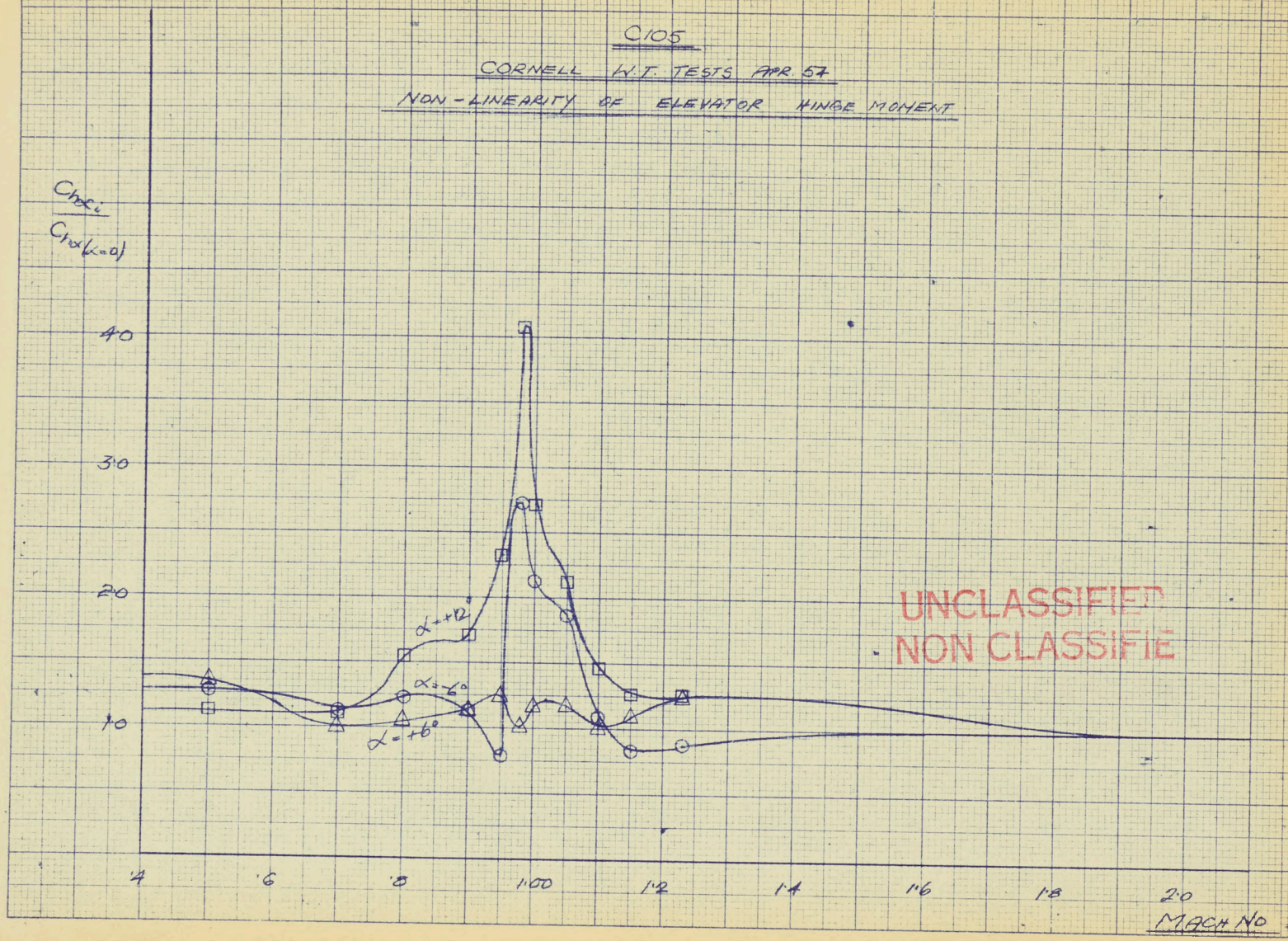
FORM 1746

AIRCRAFT C/105 COMPONENT
A.U.W.
DATE May 10/57 SHEET NO. 322.1
REPORT NO. D.H.T./20
PREP BY J. Kinkaid

C105

CORNELL W.T. TESTS APR. 57

NON-LINEARITY OF ELEVATOR HINGE MOMENT



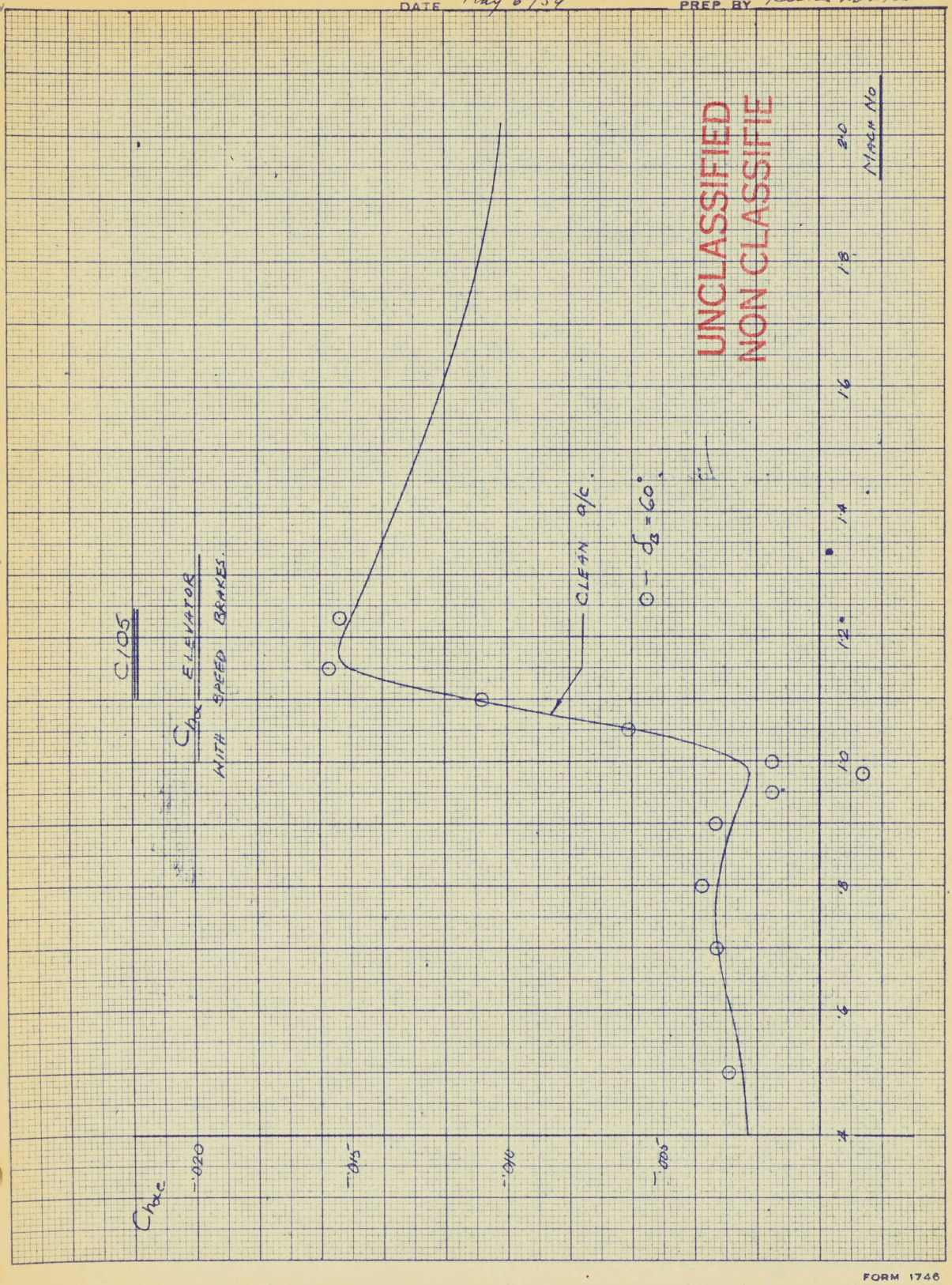
FORM 1746

AIRCRAFT C105 COMPONENT

A.U.W.

SHEET No. 3231 REPORT No. P/W.T./20.

DATE May 6/54 PREP BY Kwiatkowski



FORM 1746

3.3.1.1.

P/W.T./20
APRIL 23/54 J. Kmak Hawke.

C105
CORNELL W.T. TESTS APR. 54

C_{h_e} vs δ
CONF. $B_2 C_2 W_3 V_2 R_5$
$\alpha = 0$

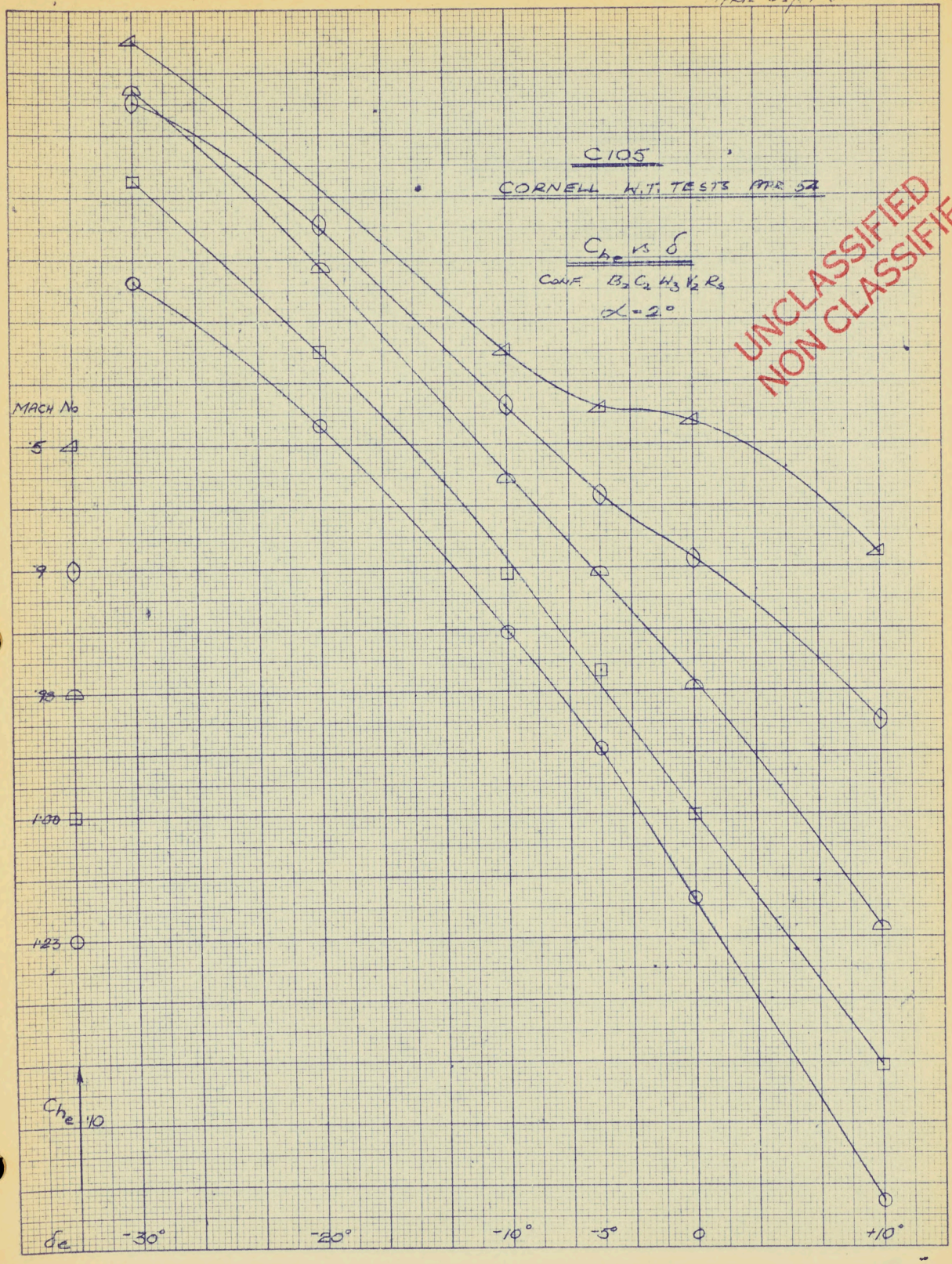
MACH NO
.5
.9
.98
1.50
1.23

C_{h_e} .10

δ_e -30° -20° -10° -5° 0 10°

3.3.1.2. P/H.T./20

April 23/54 J. Kurathowski



3.2.1.3. P/H.T./20

APRIL 23/54 J. Kwiatkowski

C105

CORNELL H.T. TESTS APR 54

C_{h_α} vs δ

CONE $B_2 C_2 N_3 V_2 R_3$

$\alpha = 4°$

MACH No

.5

.9

.98

1.00

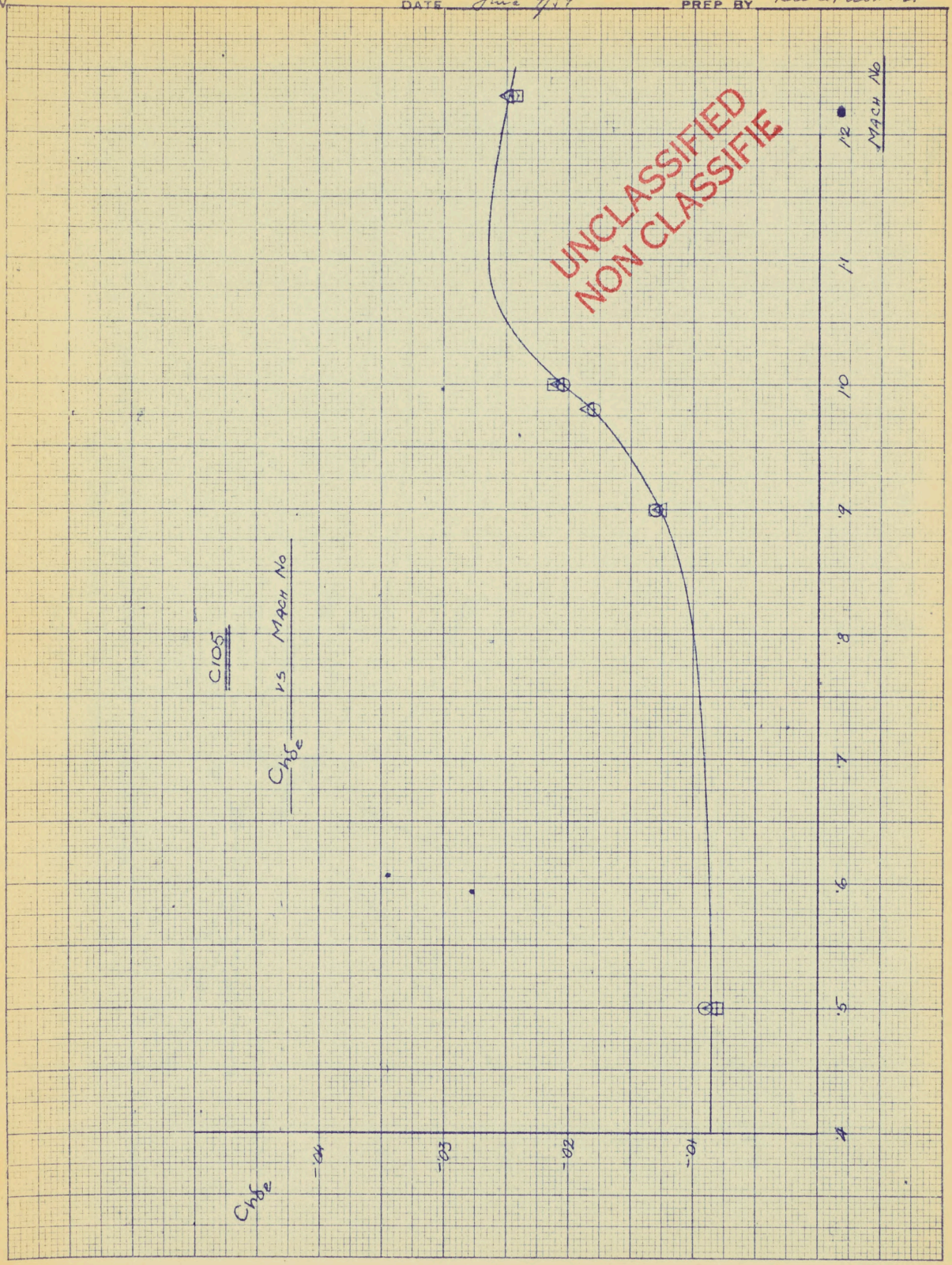
1.23

C_{h_α} -.10

δ_e -30° -20° -10° -5° 0 +10°

AIRCRAFT C/05 COMPONENT SHEET NO. 33.14 REPORT NO P/W.T./20

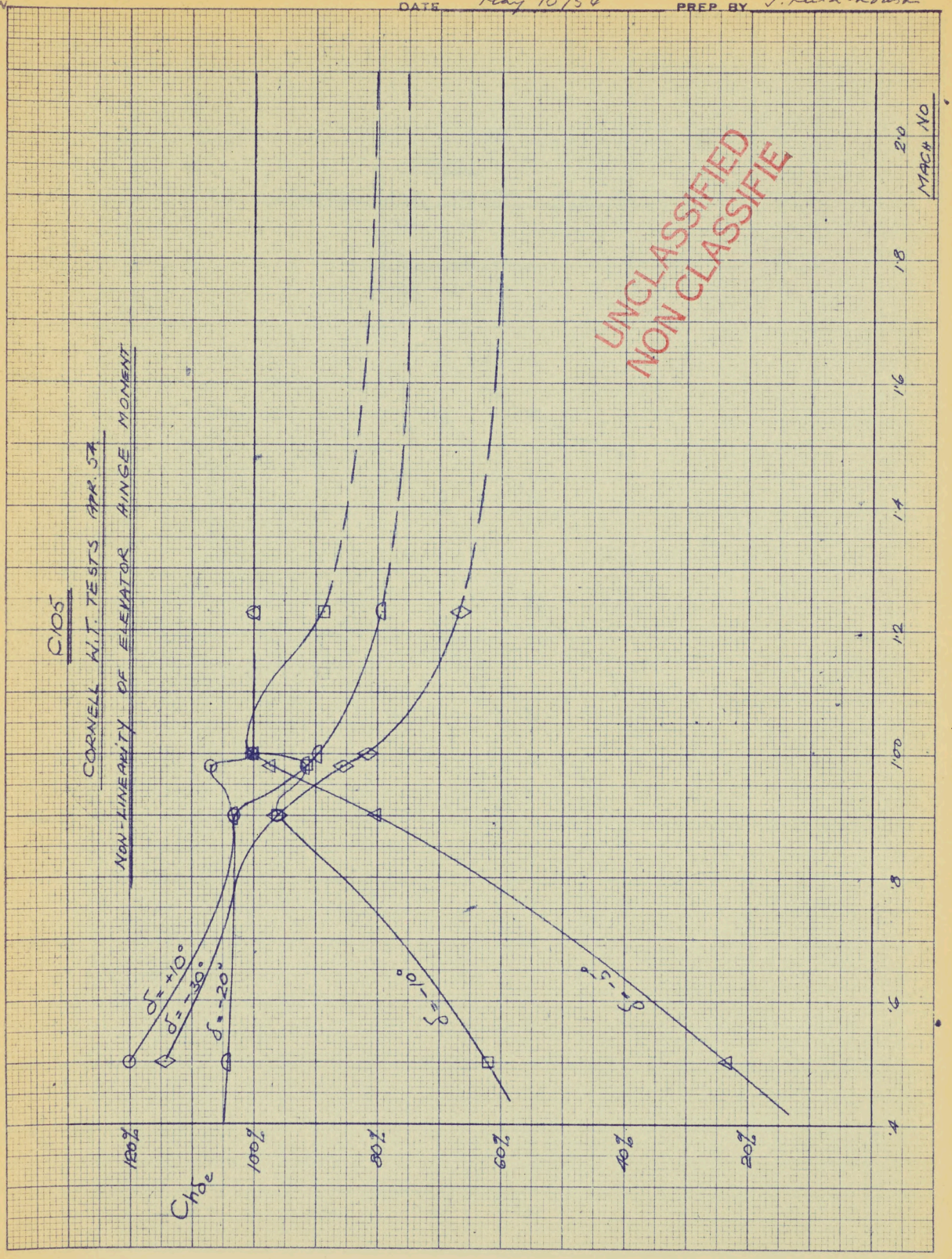
A. U. W. DATE June 9/54 PREP. BY Kwiatkowski



FORM 1746

AIRCRAFT C105 COMPONENT SHEET NO. 3.3.2.1. REPORT NO. P/W.T./20.

A.U.W. DATE May 10/54 PREP. BY J. Kwiatkowski



FORM 1746

AIRCRAFT C105 COMPONENT SHEET No. 3331. REPORT No. P/W.T. 120

A.U.W. DATE May 7/57 PREP BY Kuriakhorski

C-105

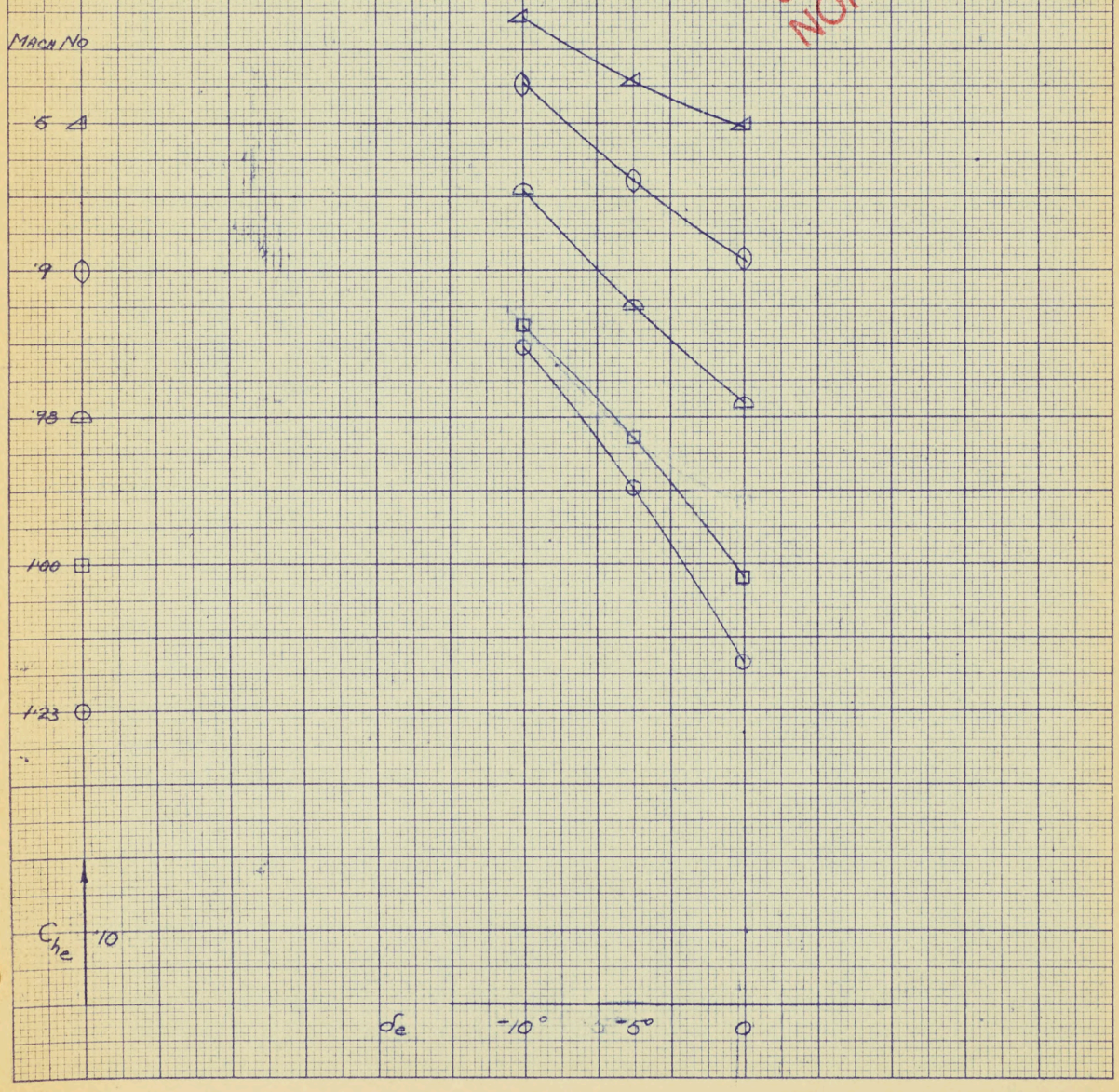
CORNELL W.T. TESTS APR. 54.

CONF BRS

C_{h_e} vs δ_e

$\alpha = 2°$

$\delta_s = 60°$

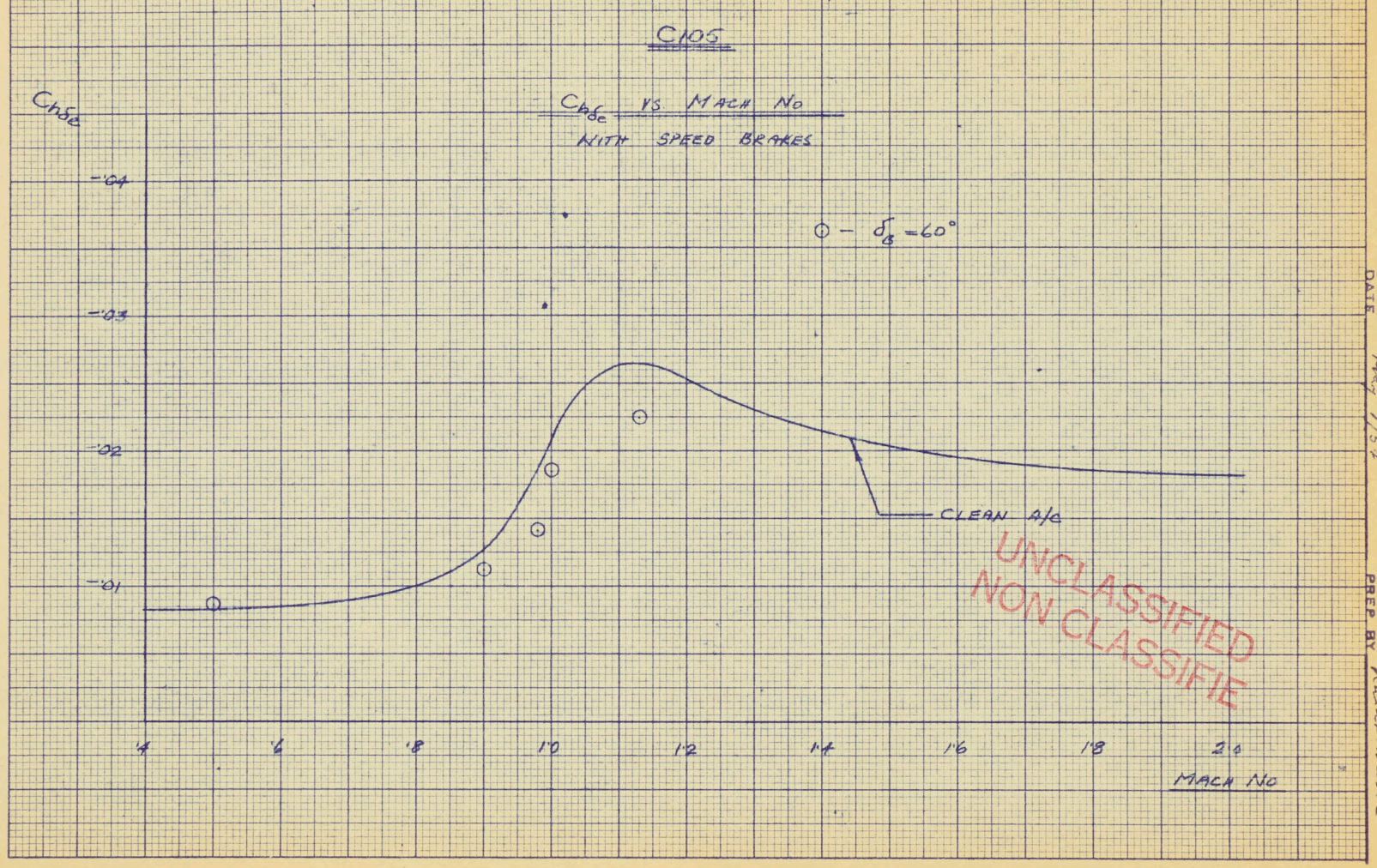


FORM 1746

AIRCRAFT C105 COMPONENT SHEET No. 3.3.3.2.
A.U.W. DATE May 7/57 REPORT No P.N.T./20.
PREP BY Kinnaird

C105

$C_{n\delta_e}$ VS MACH No
WITH SPEED BRAKES



FORM 1745