

QC
Auro
C-105
P/WT/31

QCX
Auro
CF105
P-WT-31

FILE IN VAULT

C-105

~~SECRET~~ UNCLASSIFIED

P/Wind Tunnel/2

UNCLASSIFIED

C.A.L. WIND TUNNEL

JUNE 1954

ANALYZED

COMPARISON WITH ESTIMATES

~~UNCLASSIFIED / NON CLASSIFIÉ~~
~~SECRET~~
UNCLASSIFIED

ANALYZED



National Research Council
Canada

C.I.S.T.I.

Aeronautical and
Mechanical

Engineering Library

Conseil national de recherches
Canada

I.C.I.S.T.

Bibliothèque
d'aéronautique

et de génie mécanique

TO
A

DATE

Report no.: QCX - AVRO - CF105 - P-WT-31

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



45118

12417355



UNCLASSIFIED / NON CLASSIFIÉ

UNCLASSIFIED

A. V. ROE CANADA LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT (Aircraft)

AIRCRAFT: C 105

REPORT NO. P/WT/31

FILE NO

NO OF SHEETS: _____

TITLE:

LONGITUDINAL AND LATERAL STABILITY DERIVATIVESEXTRAPOLATED TO M = 2.0

Comparison of theoretical estimates with C.A.L.

Wind Tunnel Tests.

JUNE 1954Classification cancelled / changed to: UNCLASSIFIEDBy authority of: DRDA 7/DARFT 5-8/DAS Eng 6-4-5Date: 5 Nov 1992Signature: B. AubreyUnit / Rank / Appointment: OSIS 3, Secretary CRAD HQ DRPPREPARED BY S. KwiatkowskiDATE Sept. 1954

CHECKED BY

DATE

SUPERVISED BY

DATE

APPROVED BY

DATE

ISSUE NO	REVISION NO	REVISED BY	APPROVED BY	DATE	REMARKS

AIRCRAFT C105
A U W

COMPONENT

SHEET No. 1.1.

REPORT No P/H.T/31

DATE July 54

PREP BY K. A. H. S. A. L.

UNCLASSIFIED / NON CLASSIFIÉ

C.O.5
C.A.L. WIND TUNNEL TESTS JUNE 54
C_L vs MACH NO
SEALD GAPS RUNS 684-700 B₂ C₃ H₃ K₂ R₅ S
RUNS 834-840 B₂ C₃ H₃ K₂ R₅

C_L
PER
DEG.

○ ○
△

2° < α < 12°

1° < α ≤ 2°

B₂ C₃ H₃ K₂ R₅
APRIL TEST

JUNE TEST

20
MARCH NO

18

16

14

12

10

8

6

4

2

FORM 1746

UNCLASSIFIED / NON CLASSIFIED

C105
C.A.L. WIND TUNNEL TESTS JUNE 54

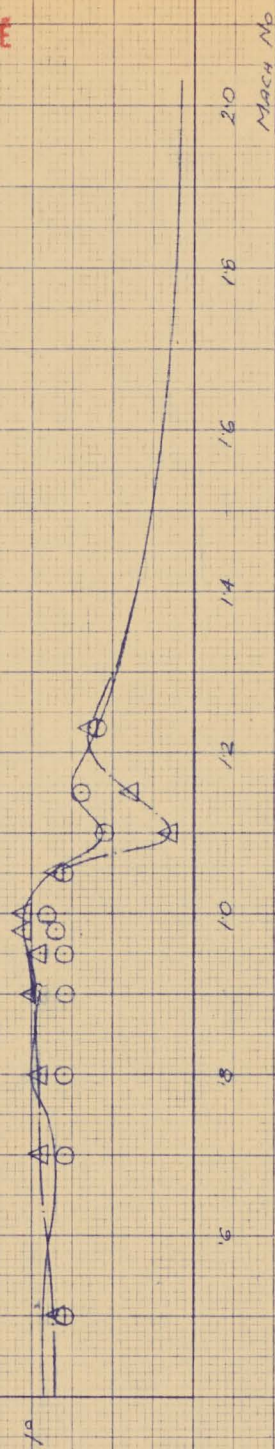
α_0 VS MACH No

① RUNS 689-700
② - 1 - 831 - 840
APRIL TEST
SEALED GAPS
B₂ C₃ W₃ V₂ R₃ S
B₂ C₃ W₃ V₂ R₃
B₂ C₂ W₃ V₂ R₃

α_0

2°

1°



20

18

16

14

12

10

8

6

Mach No

UNCLASSIFIED / NON CLASSIFIÉ

C105
C.A.L. WIND TUNNEL TESTS JUNE 52

AERODYNAMIC CENTRE

APRIL TEST

JUNE TEST

RUNS 780, 781, 851 - BAD

RUNS 684 - 700 SEALED GAPS

 $B_2 C_2 A_3 V_2 R_3$ $B_2 C_3 A_3 V_2 R_3$ $B_2 C_3 A_3 V_2 R_3 S$

Q.C.
% MAC

60

50

40

30

20

10

6

8

10

12

14

16

18

20

MACH No.

C105
S.A.L. WIND TUNNEL TESTS

JUNE 57

C_M vs MACH No

$B_2 C_2 W_3 R_3$

$B_2 C_3 W_3 R_3$

$B_2 C_3 W_3 R_3 S_2$

APRIL TEST ; ALL CONTROL SURFACES OPEN

JUNE TEST ; MODIFIED INTAKES & CANOPY ; ONE WING SEALED

JUNE TEST ; -- ; BOTH WINGS & RUDDER SEALED

UNCLASSIFIED / NON CLASSIFIED

C_M

0.3

0.2

0.1

0

4

6

8

10

12

14

16

18

20

MACH No

$C_{\alpha\beta}$ per Deg.

C-105
C_{np} vs Mach No.
Fin Off

 $B_2C_3N_3R_3$

Exp. $-10^\circ < \beta < 10^\circ$ $B_2C_3W_3R_s$

Calculated $\delta_e = 0^\circ$

 $8-3^{\circ}$ [illegible]

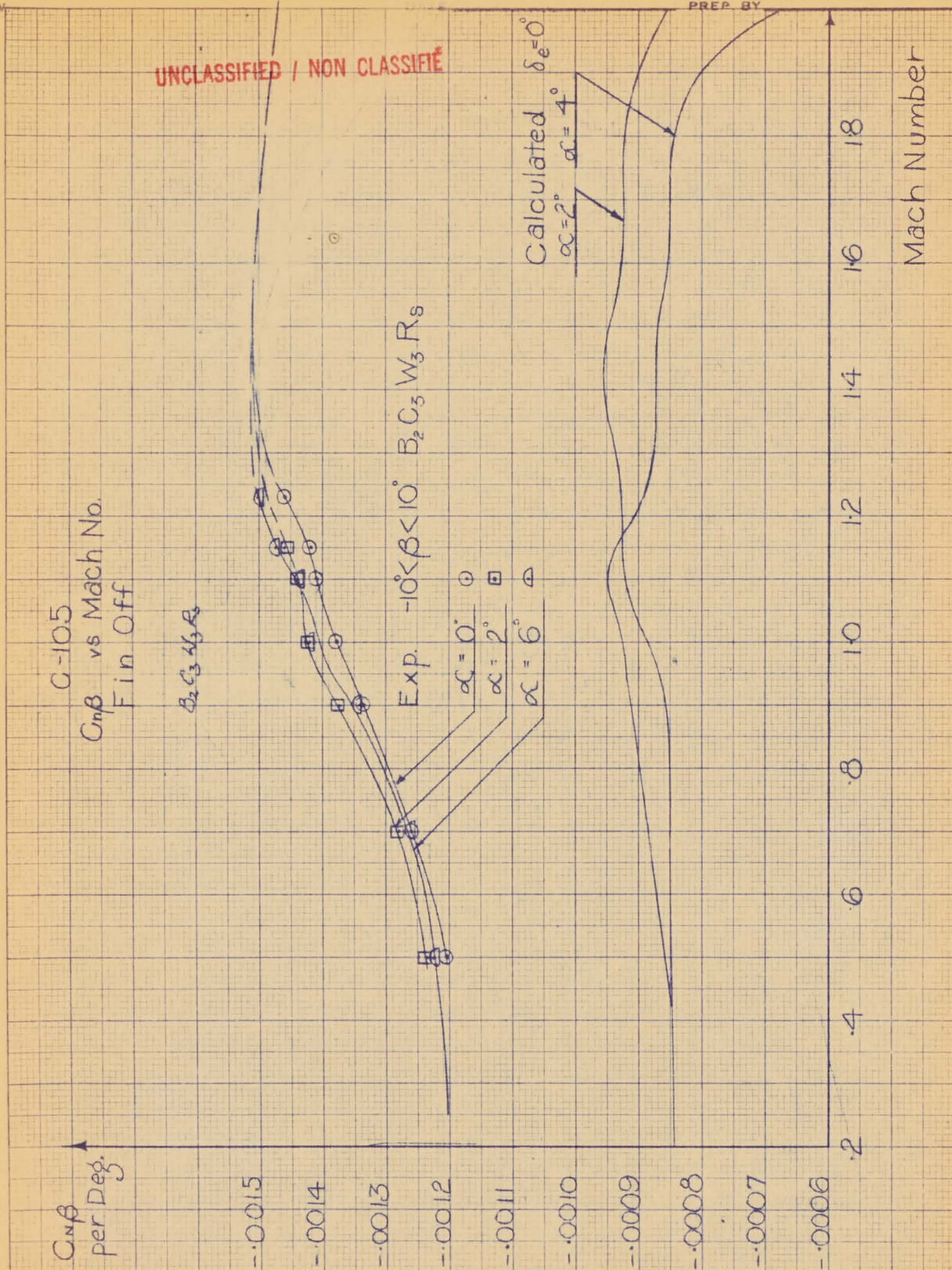
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Mach Number

UNCLASSIFIED / NON CLASSIFIÉ



UNCLASSIFIED / NON CLASSIFIED

C105
C_{np} vs Mach No.
Fin Off

B₂S₃4₃R₃

Exp. $-2^\circ < \beta < 2^\circ$ B₂C₃W₃R₃

$\alpha = 0^\circ$
 $\alpha = 2^\circ$
 $\alpha = 6^\circ$

Calculated $\delta_e = 0^\circ$
 $\alpha = 2^\circ$ $\alpha = 4^\circ$

C_{np}
per
Degree

-0.0015
-0.0014
-0.0013
-0.0012
-0.0011
-0.0010
-0.0009
-0.0008
-0.0007
-0.0006

0.2

0.4

0.6

0.8

1.0

1.2

1.4

1.6

1.8

Mach Number

PREP BY

C105.

UNCLASSIFIED / NON CLASSIFIÉ

3.2.1

P/N.T./31

Ref. 15A.

Kunathowski

C105
CAL. HIND. TUNNEL TESTS JUNE 5A
B2C3 H3 K3 R3
C105 15 M.

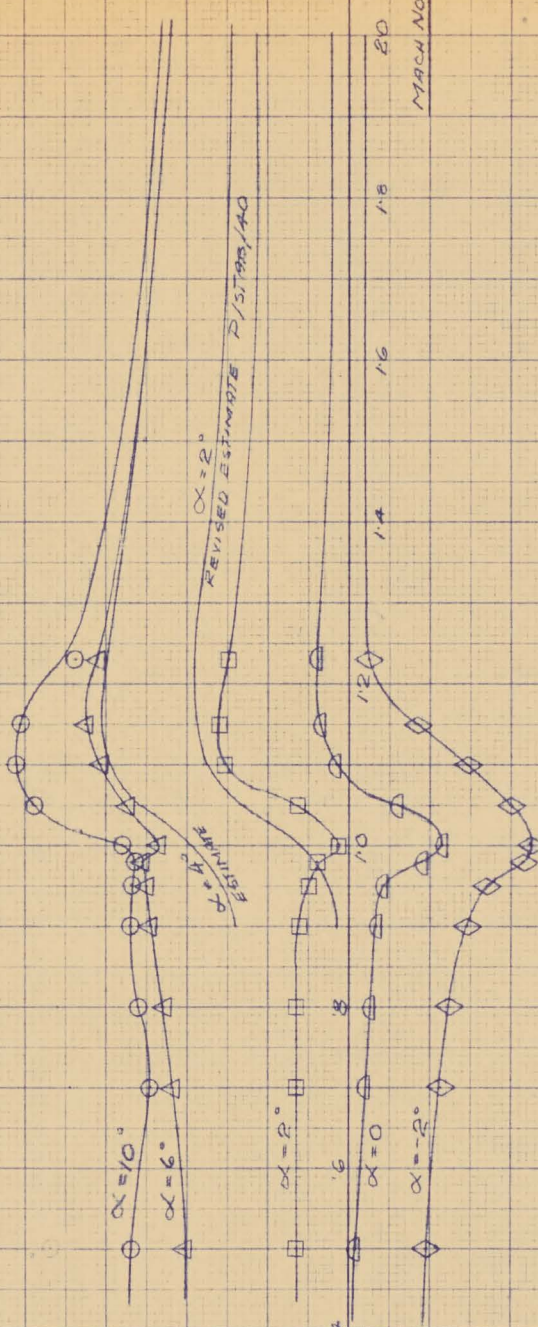
C_{L3}
PER DEG.
-00030

-00020

-00010

0

+00010



UNCLASSIFIED / NON CLASSIFIED

C105
C.A.L. KIND TUNNEL TESTS JAN 54

B. G. H. H. H.

Cy 13 Mach No.

Cy 13
PER DEG

1/31 > 3°

3° < 1/31

○ 3° < 1/31 < 3° } AVERAGE VALUES 2° < α < 10°
△ 1/31 > 3°

ESTIMATE
P/STAB/40

20
MACH NO

18

16

14

12

10

8

6

4

0

-008

-006

004

-002

UNCLASSIFIED / NON CLASSIFIÉ

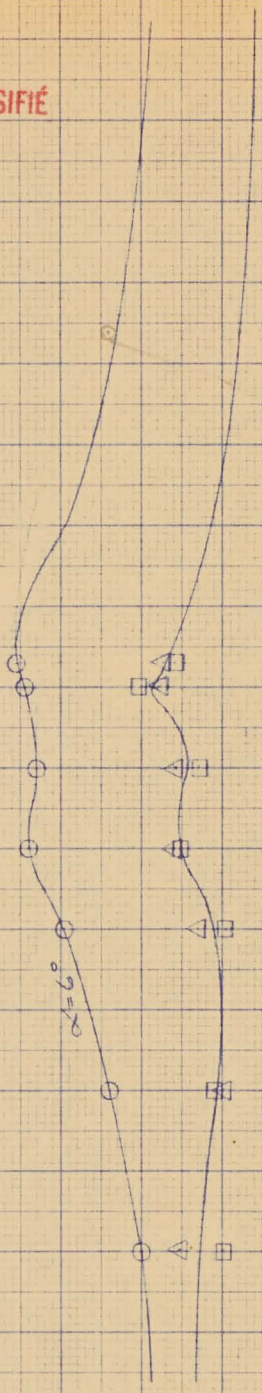
C105
C. 94. WIND TUNNEL TESTS JUNE 54
CY₃ TAIL OFF VS MACH No
B₂ C₃ A₃ R₃

CY₃
PER DES
TAIL OFF
-003

-002

-001

$\Delta \alpha = 2^\circ$
 $\square \alpha = 0$



EV
MACH No.

18

16

14

12

10

8

6

4

UNCLASSIFIED / NON CLASSIFIED

C-105
C.A.L. Wind Tunnel Tests, June 1954
Rudder Effectiveness vs. Mach No.

δ_r Outside $\pm 10^\circ$

$\beta = 0^\circ$

$CG = .31\bar{2}$

$B_2 C_3 \frac{1}{2} R_3$

$C_N \delta_r$

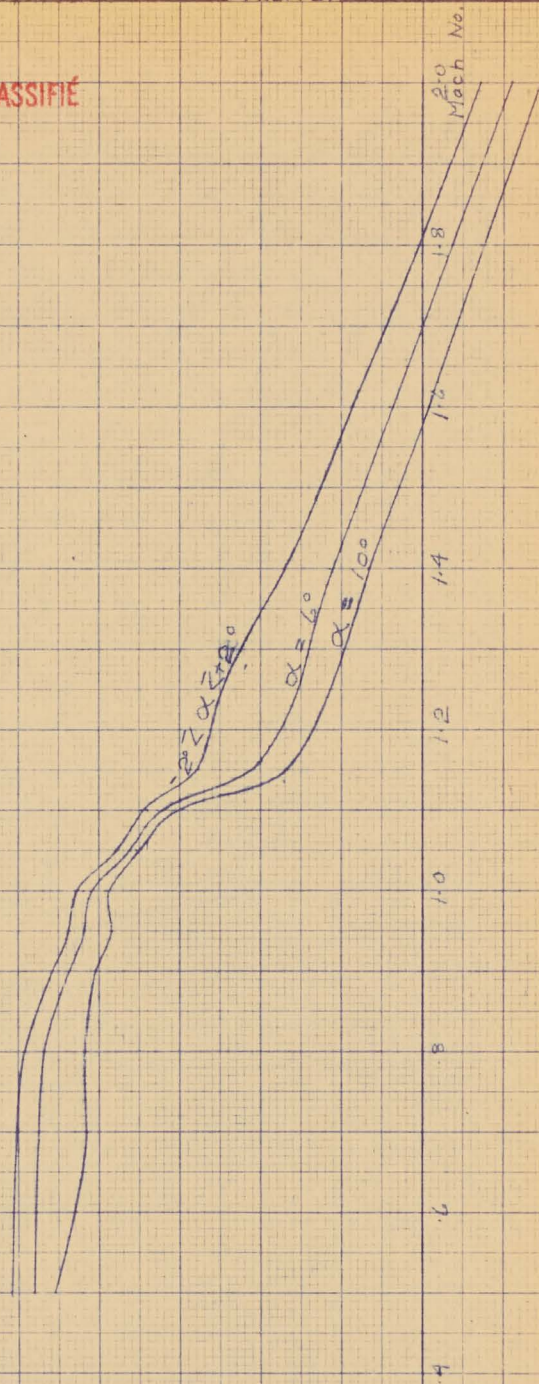
1.0007

1.0006

1.0005

1.0004

1.0003



C-105
C.A.L. Wind Tunnel Tests, June 1954
Rudder Effectiveness vs. Mach No.

$-10^\circ \leq \delta r \leq +10^\circ$

$\beta = 0^\circ$

C.G. = 31%

B₂ C₃ 43 1/2 R₃

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C_{DBr}

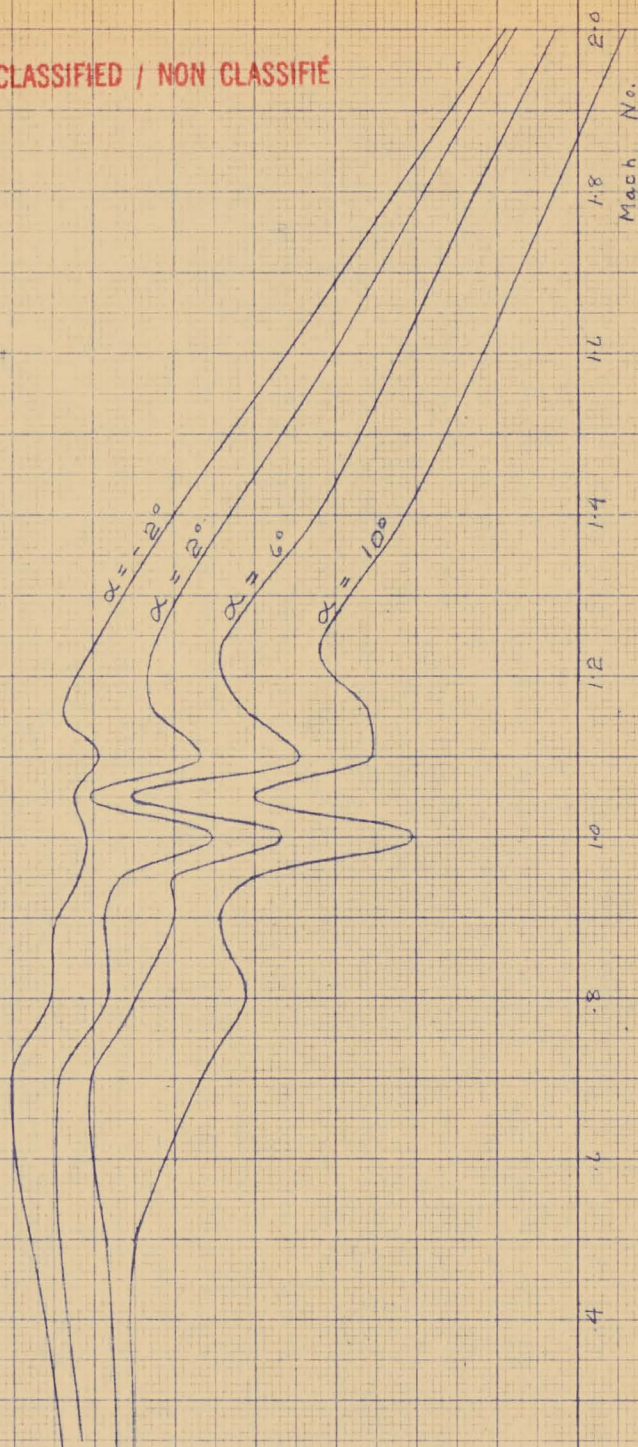
-0.007

-0.006

-0.005

-0.004

-0.003



Mach No.
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4

AIRCRAFT C105
A. U. W.

COMPONENT

SHEET No. 4. P. 20.

REPORT No. P/4.7/31.

DATE Sept 1972

PREP. BY K. A. Housh

UNCLASSIFIED / NON CLASSIFIÉ

C105
C.A.L. WIND TUNNEL TESTS JUNE 57

RUDDER EFFECTIVENESS IS MACH NO

$\beta = -3^\circ$
 $C_{Dr} < 10\%$ C.G. = .28 $\bar{c}$
 $B_2 C_3 N_3 1/2 R_3$

 C_{Dr}

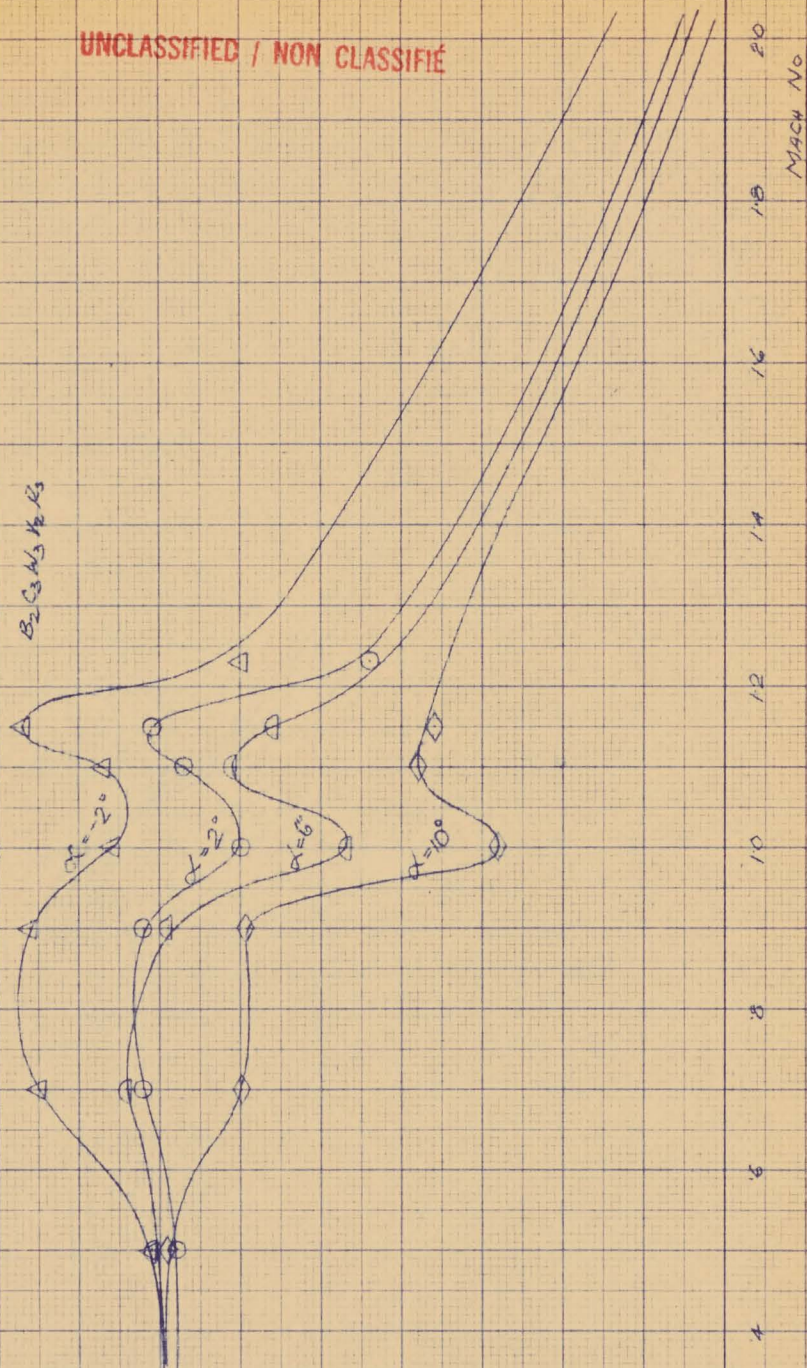
-0.007

-0.006

-0.005

-0.004

-0.003



UNCLASSIFIED / NON CLASSIFIÉ

C105
CAL HIND TUNNEL TESTS JUNE 57

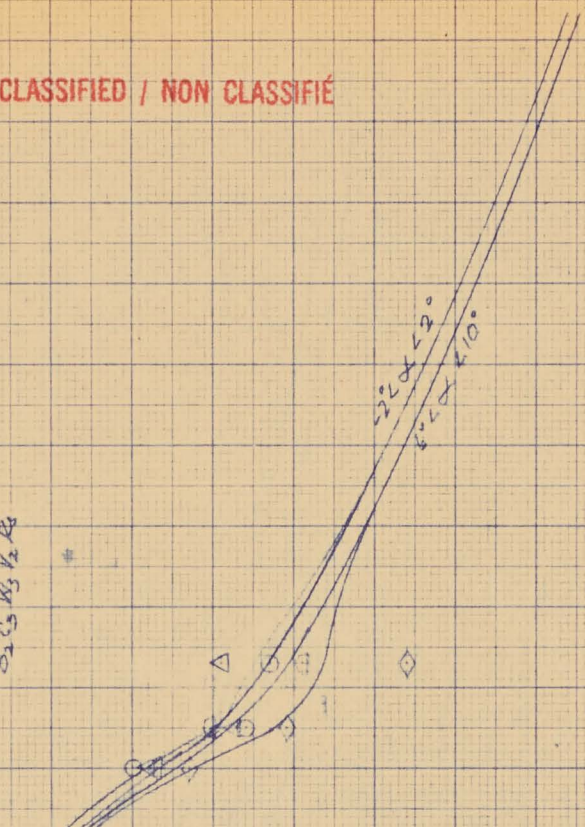
RUDDER EFFECTIVENESS VS MARK NO

$\beta = 3^\circ$
 $\alpha_0 > 10^\circ$
C.G. = 28 E
 $\beta_2 \approx 1/2 \beta$

C105

$\alpha = 2^\circ$
 $\alpha = 4^\circ$
 $\alpha = 6^\circ$
 $\alpha = 10^\circ$

-0.000
-0.000
-0.000
-0.000
-0.000



MARK NO

FORM 12 REUFFE & SONS CO.
1000 10th Ave. S. St. Louis 14, Mo.

P/W.T./31

4.2.2.

Sept./54

SDManned

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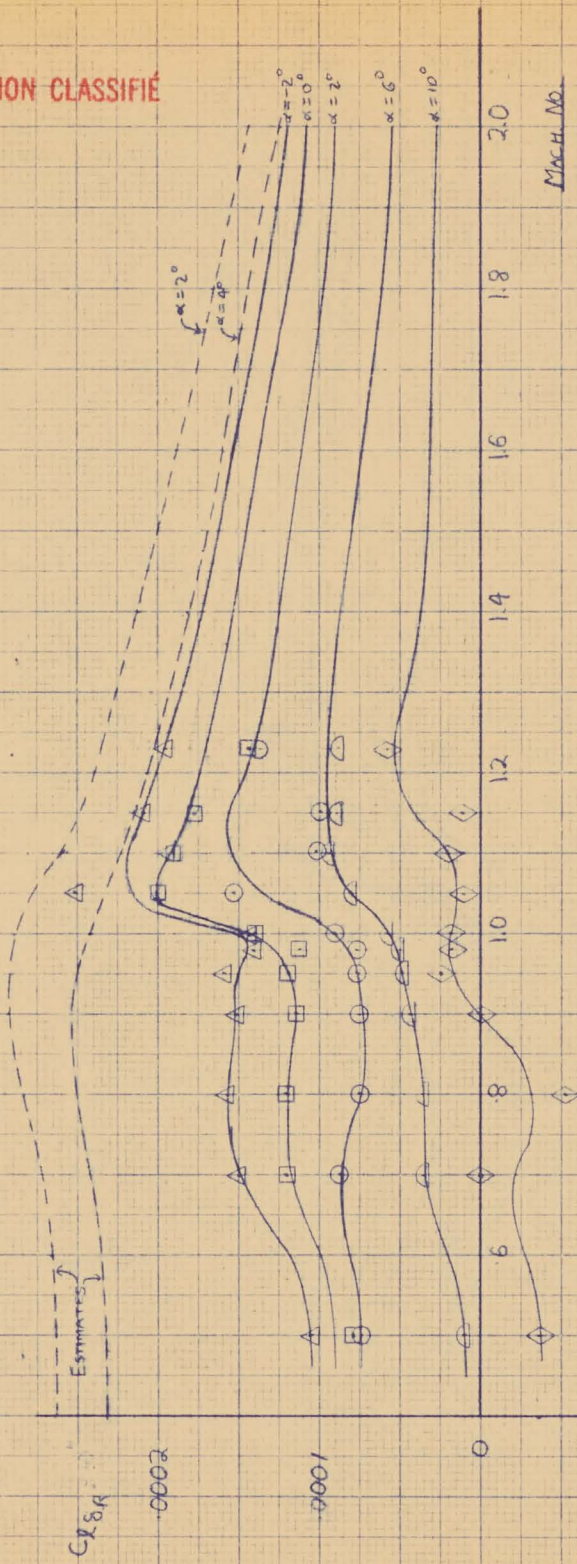
C-105

CAL. WIND TUNNEL TESTS JUNE 1954

C18R VS MACH No

$\delta R < 10^4$ $\beta = 0$

B_2, C_3, V_3, K_3



Mach No

C-105
CAL Wind Tunnel Tests, June 1954

Cy Br vs. Mach No
Cont B₂C₃W₃V₂Rs

$\bar{C}_R$ INSIDE $\pm 10^\circ$
 $\beta = 0$

B₂C₃N₃K₂R₃

UNCLASSIFIED / NON CLASSIFIÉ

α
O-2°
△ 0°
○ 2°
□ 6°
◇ 10°

Cy Br
per degree

0.03

0.02

0.01

0

Estimate P. 1.2.6/39

$\alpha = 2^\circ$
 $\alpha < \alpha_{LE}$
 $\alpha = 10^\circ$

1.8
Mach No.

1.6

1.4

1.2

1.0

0.8

0.6

0.4

0.2

0

2.0

1.8

1.6

1.4

1.2

1.0

0.8

0.6

0.4

0.2

0

AIRCRAFT C105
A. U. W.

COMPONENT

SHEET NO. 4.32.

REPORT NO. P/H.T./31.

DATE Sept 1954

PREP BY K. Mathews

UNCLASSIFIED / NON CLASSIFIED

C105
C.A.L. WIND TUNNEL TESTS JUNE 54

C105 17. MACH NO

$d_f < 110^\circ$

$\beta = 3^\circ$

$B_0 C_3 N_3 K R_2$

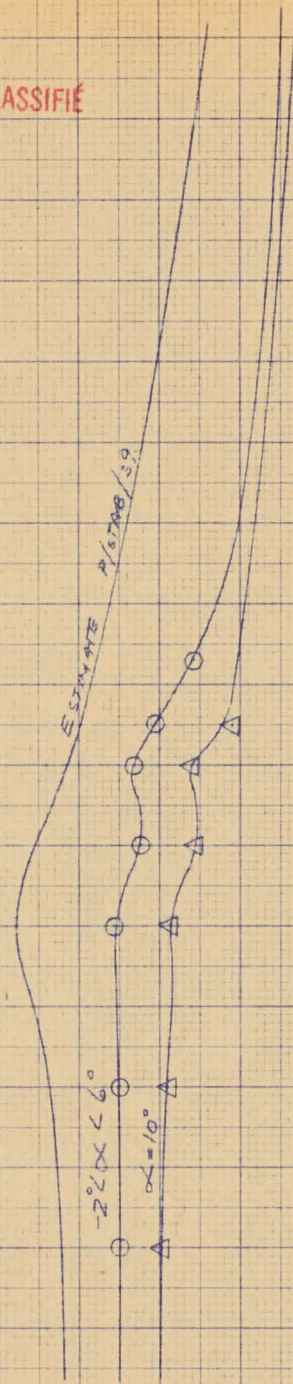
C_{Y02}
PER DEG

003

002

001

0



MACH NO

UNCLASSIFIED / NON CLASSIFIED

C-105
C.A.L. Wind Tunnel Tests, June 1954
- $B_2 C_2 W_2 V_2 R_2$
- $-2^\circ < \beta < 2^\circ$

Q.C. VERICAL Tail

α
 $\Delta -2^\circ$
 $\circ 0^\circ$
 $\square 2^\circ$
 $\triangle 6^\circ$
 $\diamond 10^\circ$

Q.C.
W.M.A.C.

70

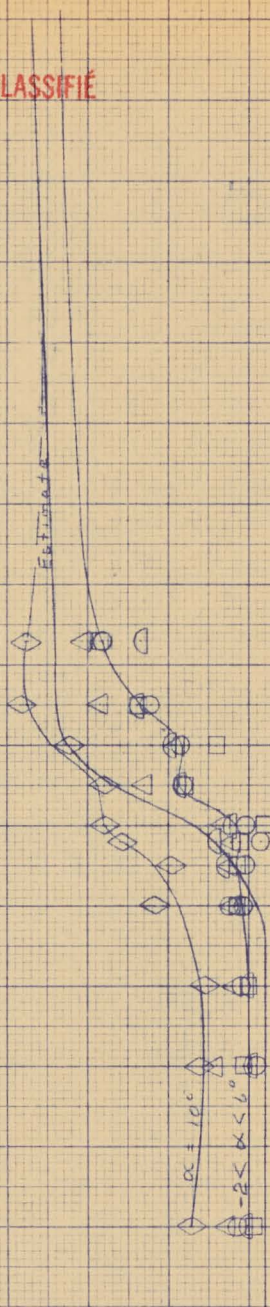
60

50

40

30

20



2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
4
Mach No.

UNCLASSIFIED / NON CLASSIFIED

C-105
C.A.L. Wind Tunnel Tests June 1954
Vertical Tail a.c. vs Mach No.
B₂C₃W₃V₃R₅
B>1201

α
 $\Delta -2^\circ$
 $\bigcirc 0^\circ$
 $\square 2^\circ$
 $\diamond 4^\circ$
 $\diamond 10^\circ$

a.c.
%MAC(1)

70

60

50

40

30

20

Estimate

4

6

8

1.0

1.2

1.4

1.6

1.8

2.0

Mach No.

UNCLASSIFIED / NON CLASSIFIÉ

C105
VERTICAL TAIL SPANWISE Q.C. POSITION
-2° < 3.42°
B₂ C₃ A₃ V₃ R₃

AIR TUNNEL

$\alpha = 10^\circ$
 $-2^\circ < \alpha < 6^\circ$

ESTIMATE

20
MACH No

18

16

14

12

10

8

6

4

70
% SPAN

60

50

40

30

20

UNCLASSIFIED / NON CLASSIFIÉ

C105
VERTICAL TAIL SPANNWISE Q.C. POSITION
B₂ C₃ M₃ V₂ R
-0.45 < 8°

Pac
% SPAN

60

50

40

30

20

10

0

18

16

14

12

10

8

6

4

2

20
MACH No

ESTIMATE

α
-2° 0 2° 6° 10°
△ ○ □ ◇

C-105
C.A.L. Wind Tunnel Tests, June 1954
Chordwise C_p - Rudder Load
(ER inside $\pm 10^\circ$)

C_p
 C_{MAC}

10

9

8

7

6

5

$\beta = 0^\circ$
B-343K R

$\alpha = 10^\circ$

$\alpha = 6^\circ$

$\alpha = 2^\circ$

$\alpha = 0^\circ$
 $\alpha = -2^\circ$

ESTIMATE

UNCLASSIFIED / NON CLASSIFIÉ

20

Mach No.

1.8

1.6

1.4

1.2

1.0

.8

.6

.4

C-105
C.A.L. Wind Tunnel Tests, June 1954
Chordwise c.p. - Rudder load
(8R outside $\pm 10^\circ$)

$\beta = 0^\circ$

$B_2 C_3 K_3 K_2 R_3$

ESTIMATE

α
 $\Delta -2^\circ$
 $\square 0^\circ$
 $\circ 2^\circ$
 $\triangle 6^\circ$
 $\diamond 10^\circ$

C.P.
MAC.

UNCLASSIFIED / NON CLASSIFIED

Mach No.

2.0

1.8

1.6

1.4

1.2

1.0

0.8

0.6

0.4

0.2

C-105
C.A.L. Wind Tunnel Tests, June 1954

Chordwise C.P. - Rudder load
(5R outside $\pm 10^\circ$)

$\beta = -3^\circ$

$B_2 C_3 N_3 \frac{1}{2} L$

α
 $\Delta -2^\circ$
 $\square 0^\circ$
 $\circ 2^\circ$
 $\triangle 6^\circ$
 $\diamond 10^\circ$

C.P.
% M.A.C.

ESTIMATE

UNCLASSIFIED / NON CLASSIFIÉ

2.0
Mach No

1.8

1.6

1.4

1.2

1.0

.8

.6

.4

1.0

.9

.8

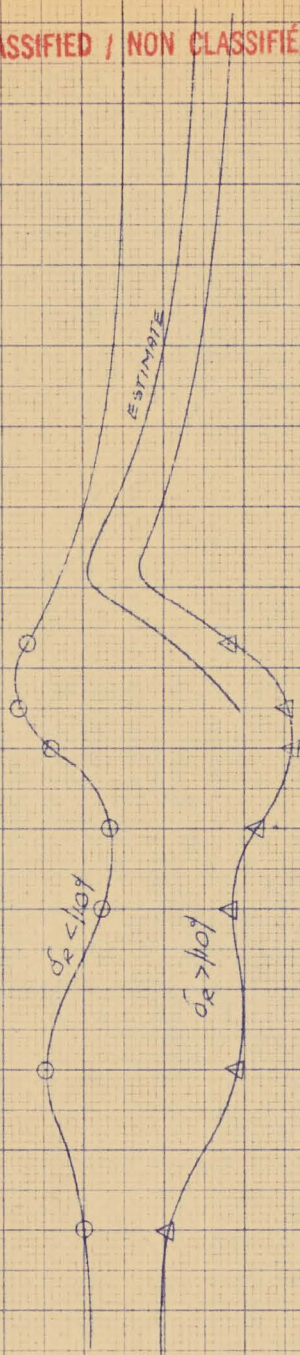
.7

.6

.5

UNCLASSIFIED / NON CLASSIFIÉ

C105
C.A.L. WIND TUNNEL TESTS JUNE 54
SPANWISE CP - RUDDER LOAD
 $\beta > 3^\circ$
 B_1, B_2, B_3, B_4



σ_R AVERAGE $-2^\circ < \alpha < 10^\circ$

UNCLASSIFIED / NON CLASSIFIÉ

C105
C.A.L. WIND TUNNEL TESTS JUNE 54Ch₀ K₃ MARCH NO
EL.B₂ C₃ K₃ R₄APRIL TEST B₂ C₂ K₃ R₄JUNE TEST B₂ C₃ K₃ R₄B₂
MARCH NOCh₀ EL.

08

06

04

02

0

-02

10

12

14

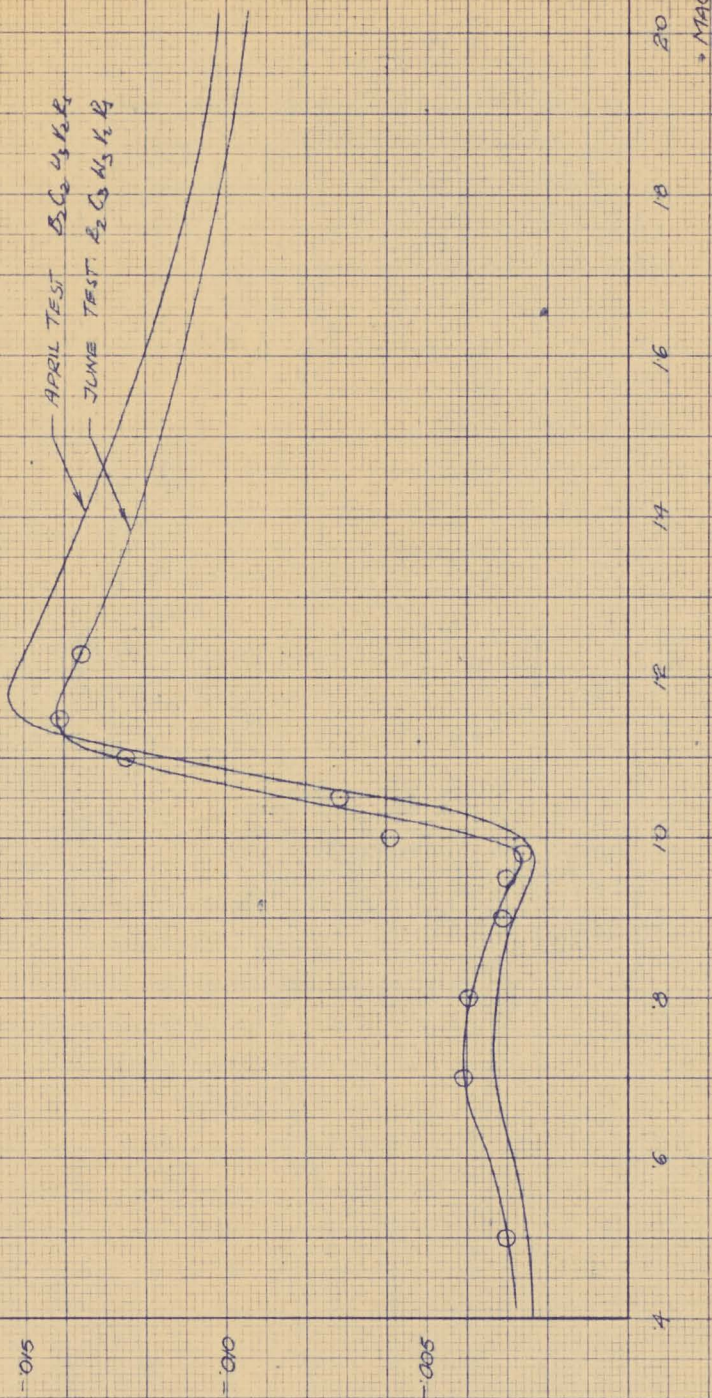
16

18

20

UNCLASSIFIED / NON CLASSIFIED

C105
C.A.L. WIND TUNNEL TESTS JUNE 54
Chose vs MACH No.
B₂ C₃ H₃ K₂ R₂



C 105

DATE	TIME	TESTS	END
CAL	KIND	TUNNEL	JUNE 53

$B_2C_2H_2$

Chen vs Mac. 4 No

$$\beta < 6^\circ \text{ for } -2^\circ \leq \alpha < 6^\circ$$

3620 for 10

UNCLASSIFIED / NON CLASSIFIÉ

P/WT/31

7.3.

Болыс. Р. Куратков

