

QC
Avro
C-105
P/WT/21

QC
Avro
CF105
P-WT-21

(27)

FILE IN VAULT

C-105

P/Wind Tunnel/21

UNCLASSIFIED
STABILITY DERIVATIVES

C.A.L. WIND TUNNEL

ANALYZED

APRIL 1954

COMPARISON WITH ESTIMATES



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

Conseil national de recherches
Canada
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ANALYZED

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DATE

Report no.: QCX - AVRO - CF105 - P-WT-21
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



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UNCLASSIFIED

A. V. ROE CANADA LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT (Aircraft)

AIRCRAFT: C-105

REPORT No. P/WIND TUNNEL/21

FILE NO:

NO. OF SHEETS: _____

TITLE:

Confirmed as
Classification ~~cancelled~~ / changed to: UNCLASSIFIED
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

LONGITUDINAL AND LATERAL STABILITY DERIVATIVES

Extrapolated to $M=2.0$

Comparison of Theoretical Estimates *with* C.A.L. Wind Tunnel Tests

April 1954.

PREPARED BY S. Kwiatkowski DATE May 1954.

CHECKED BY DATE

SUPERVISED BY DATE

APPROVED BY DATE

ISSUE No	REVISION No	REVISED BY	APPROVED BY	DATE	REMARKS

TECHNICAL DEPARTMENT (Aircraft)

REPORT NO. P/WIND TUNNEL/21

SHEET NO. 1

AIRCRAFT:

C-105

PREPARED BY

DATE

S. Kwiatkowski

May 1954.

CHECKED BY

DATE

INDEX

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I. Longitudinal Stability and Control

1.1 Lift

$C_{L\alpha}$ $-2^\circ < \alpha < +2^\circ$ 1.1.1

$C_{L\alpha}$ $+2^\circ < \alpha < 12^\circ$ 1.1.2

α_0 1.1.3

1.2 Pitching Moment

Aerodynamic Centre 1.2.1

C_{M_0} 1.2.2

1.3 Elevators

$C_{L\delta}$ 1.3.1

$C_{M\delta}$ at const. α 1.3.2

$C_{M\delta}$ at const. C_L 1.3.3

Elevator c.p. 1.3.4

C_{h_0} 1.3.5

$C_{h\alpha}$ 1.3.6.

$C_{h\delta}$ 1.3.7

II. Lateral Stability and Control

2.1 Aileron Derivatives

$C_{n\delta_a}$ 2.1.1

$C_{l\delta_a}$ 2.1.2

$C_{y\delta_a}$ 2.1.3

TECHNICAL DEPARTMENT (Aircraft)

REPORT NO. P/Wind Tunnel/21

SHEET NO. 11

AIRCRAFT:

C-105

PREPARED BY

DATE

S. Kwiatkowski

May 1954.

CHECKED BY

DATE

2.2 Aileron Hinge Moments

C_{h_0} $-5^\circ < \alpha < +6^\circ$ 2.2.1

C_{h_0} $+6^\circ < \alpha < +12^\circ$ 2.2.2

$C_{h\alpha}$ $-5 < \alpha < +6^\circ$ 2.2.3

$C_{h\alpha}$ $+6^\circ < \alpha < +12^\circ$ 2.2.4

$C_{h\delta}$ 2.2.5

III. Directional Stability and Control

3.1 Sideslip Derivatives

$C_{y\beta}$ fin on 3.1.1

$C_{y\beta}$ fin off 3.1.2

3.2 Vertical Tail

$a_1(V)$ 3.2.1

a.c. (V) 3.2.2

η a.c. (V) 3.2.3

3.3 Rudder

$a_2(V)$ 3.3.1

c.p. (V) 3.3.2

η c.p. (V) 3.3.3

$C_{l\delta_r}$ 3.3.4

$C_{h\beta}$ 3.3.5

$C_{h\delta_r}$ 3.3.6

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C105

α_0 VS MACH No

α_0

12°

10°

○ RUNS 466-476 NO PRESSURE TUBES
△ RUNS 271-281 WITH PRESSURE TUBES

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3 1/2 %

3 %

20

18

16

14

12

10

8

6

4

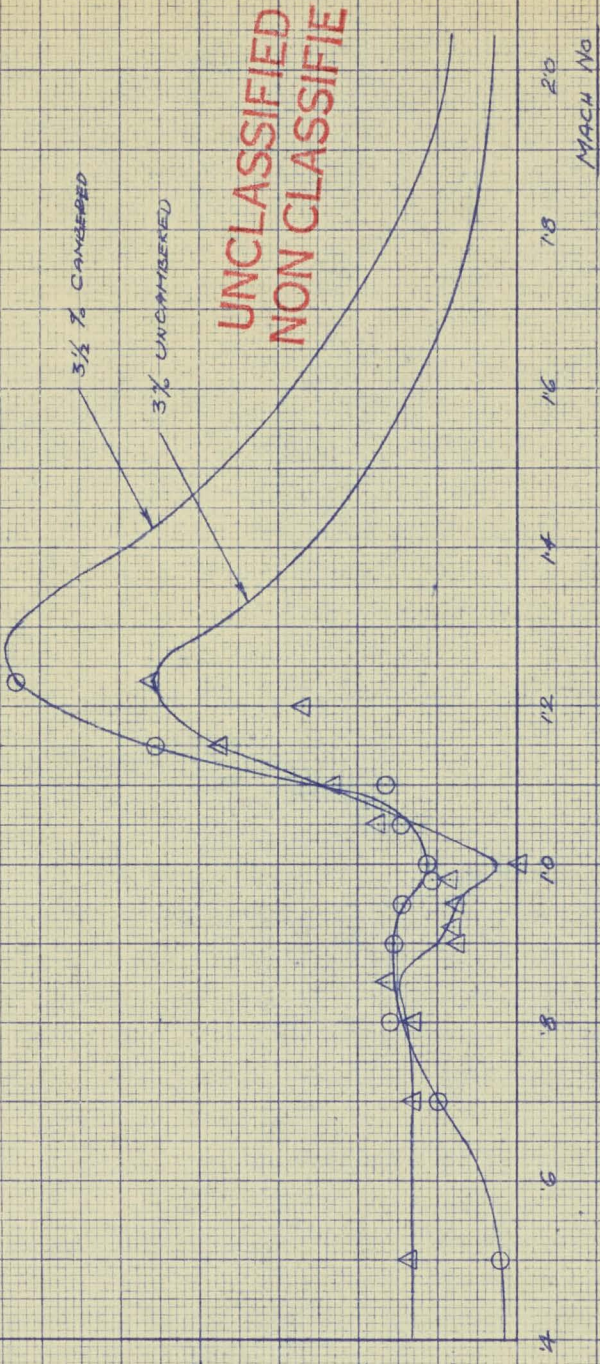
MACH No

P/H.T./21 1.3.5.
APRIL 25/54 J. Kriakowski

C105

Ch. 15 MACH No

Ch. 15 EL. 08



AIRCRAFT
A. U. W.

COMPONENT

SHEET No. 2.1.1.

REPORT No. P/w.T./21

DATE Aug 31, 1954

PREP BY L. Cutcliffe

C-105
C.A.L. Wind Tunnel Tests, April 1954
CNBA vs Mach No.
 $-10^\circ < \delta A < +10^\circ$

CNBA
At 20° incl.

Estimate from
P/5tab 6/23

0.006

0.004

0.002

0

-0.002

-0.004

Mach No.

2.0

1.8

1.6

1.4

1.2

1.0

0.8

0.6

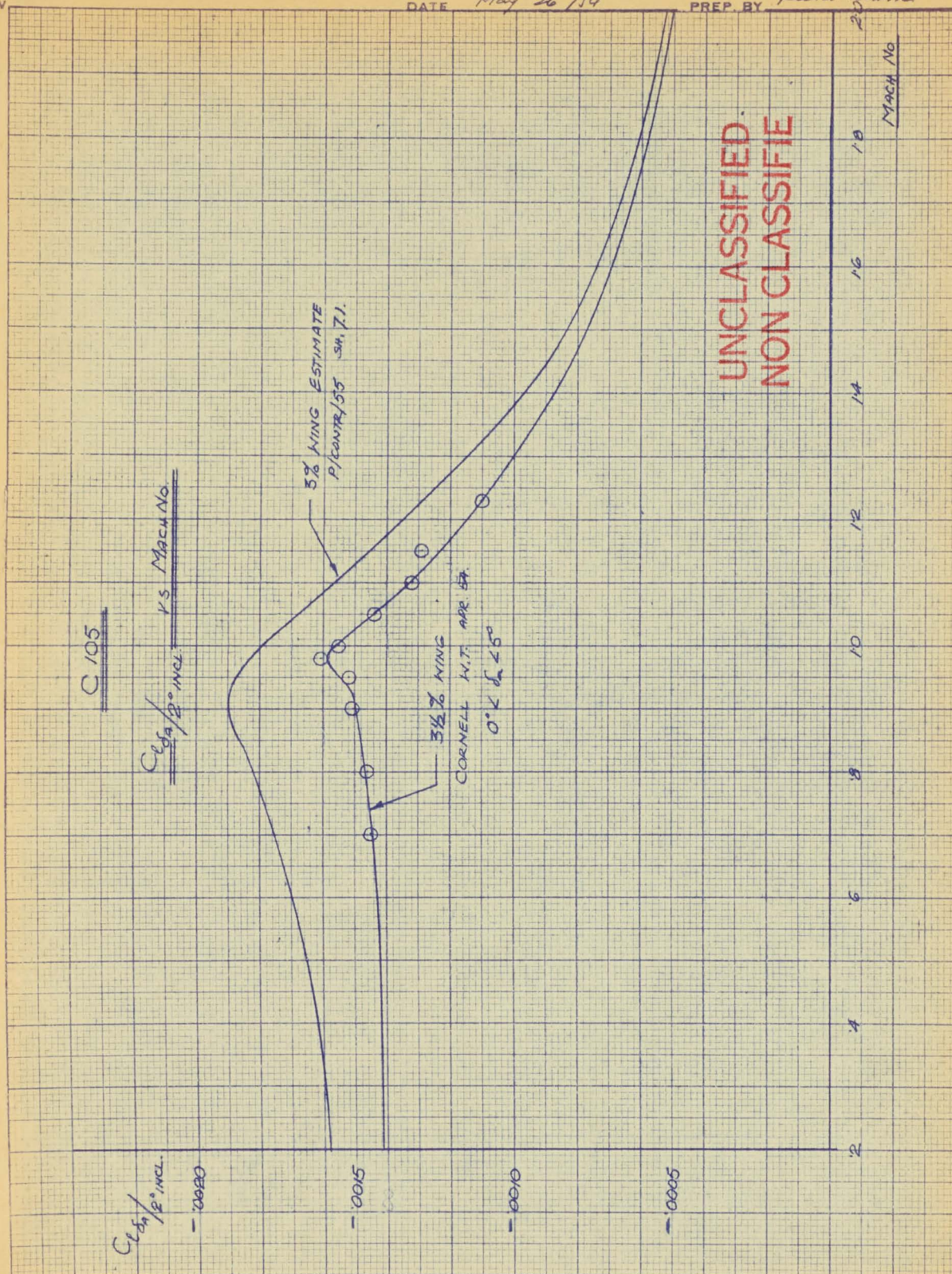
0.4

0.2

0

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FORM 1746



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C105
C.A.L. WIND TUNNEL TESTS
APRIL 04

CY₁₀ 18 MARCH NO

$-10^\circ < \delta < +10^\circ$

CY₁₀
PER 2° INCL.

0000

0000

0000

0000

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July 12/54 Kuriathonchi

20
MARCH NO

C-105

$[C_{ho}]_0$ vs Mach Number

$0^\circ < \alpha < 12^\circ$

Estimate Based on C.A.L. W-T Tests.

$[C_{ho}]_0$

60

40

20

0

Wind Tunnel

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0.2

0.4

0.6

0.8

1.0

1.2

1.4

1.6

1.8

2.0

Mach Number

C-105

C_{yp} vs Mach Number (Tail on)

C.A.L. W-T Tests

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

C_{yp}
per degree

-0.0080

-0.0060

-0.0040

-0.0020

0

2

4

6

8

10

12

14

16

18

20

Estimate P/Stab/40

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NON CLASSIFIED

Mach Number

AIRCRAFT
A. U. W.

COMPONENT

SHEET No. 3.2.2.1

REPORT No. P/WT/21

DATE JULY 1954

PREP BY P. S. W. J. W. J.

C-105

C.A.L. WIND TUNNEL TESTS APRIL '54

CHORDWISE O.C. VS MACH NO.

SIDESLIP RANGE $-10^\circ < \beta < -3^\circ$

O.C. POSITION
FRACTION M.A.C.

α°
-2
0
2
6

ESTIMATE

UNCLASSIFIED
NON CLASSIFIED

1.8 2.0
MACH NO.

1.6

1.4

1.2

1.0

.8

.6

.4

0

.8

.7

.6

.5

.4

.3

.2

.1

AIRCRAFT
A. U. W.

COMPONENT

SHEET No. 3.2.3

REPORT No. P/WT/21

DATE JULY 1954

PREP BY W. E. Wood

C.A.L. WIND TUNNEL TESTS

SPANWISE Q.C. VS MACH NO.

Q.C. POSITION

FRACTION SPAN

α
-2
0
2
6

⊙
△
□
,

.8

.7

.6

.5

.4

.3

.2

.1

0

.4

.6

.8

1.0

1.2

1.4

1.6

1.8

2.0

MACH NO.

UNCLASSIFIED
NON CLASSIFIED

C-105

C.A.L. WIND TUNNEL TESTS APRIL '54

$\alpha_z(v)$ VS MACH NO.

$\delta_r = 5^\circ$

$\alpha_z(v)$
PER DEG.

α°
-2
0
2
6

.03

.02

.01

0

ESTIMATE

.4

.6

.8

1.0

1.2

1.4

1.6

1.8

2.0

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AIRCRAFT
A. U. W.

COMPONENT

SHEET NO. 3.3.1-3

REPORT NO. P/WT/21

DATE JULY 1954

PREP BY J. Stewart

C-105

C.A.L. WIND TUNNEL TESTS APRIL '54

$\alpha_2(V)$ VS. MACH NO.

$\delta_r = 15^\circ$

$\alpha_2(V)$
PER DEG

δ
-2 0 2 6
○ △ □ ♢

.03

.02

.01

0

20

18

16

14

12

10

8

6

4

MACH NO.

UNCLASSIFIED
NON CLASSIFIED

AIRCRAFT
A. U. W.

COMPONENT

SHEET No. 3.3.3

DATE JULY 1957

REPORT No. P/NT/21

PREP BY J. B. Stewart

C-105

S.A.L. WIND TUNNEL TESTS APRIL '54.

SPANWISE C.P. VS. MACH NO.

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

$\eta_{c.p.}$

.6

.5

.4

.3

.4

.6

.8

1.0

1.2

1.4

1.6

1.8

2.0

MACH NO.

ESTIMATE

δ°
5
10
15
20

UNCLASSIFIED
NON CLASSIFIED

AIRCRAFT
A. U. W.

COMPONENT

SHEET No. 3.3.5.2
DATE JULY 1954

REPORT No. P/WT/21
PREP BY Stewart

C-105

CAL WIND TUNNEL TESTS APRIL '54

$C_{H\beta}$ VS MACH NO.

$\beta > 3^\circ$

$C_{H\beta}$

PER DEG.

α°
-2
0
2
6

-0.016

-0.012

-0.008

-0.004

.2

.4

.6

.8

1.0

1.2

1.4

1.6

1.8

2.0

MACH NO.

ESTIMATE

UNCLASSIFIED
NON CLASSIFIE

