

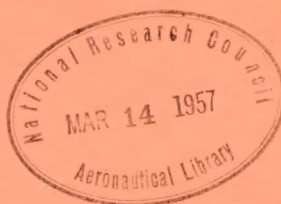
QCX
Avro
C-105
P/AD/39

QC
Avro
CF105
P-AD-39

ANALYZED

Classification cancelled / Changed to UNCLASS
C-105 By authority of AVRS P/Aero Data/39
Date: ELASTIC LATERAL DERIVATIVES
Signature: (EXTRACT) P. Bully
Unit / Rank / Appointment: AVRS
Oct. 1954

ANALYZED



45129

15784918



A. V. ROE CANADA LIMITED

MALTON - ONTARIO

TECHNICAL DEPARTMENT (Aircraft)

AIRCRAFT: C 105

REPORT No. P/AERO DATA/39

FILE No.

No. OF SHEETS:

TITLE:

PRELIMINARY EXTRACT FROM WIND
TUNNEL AND STABILITY REPORTS
ELASTIC LATERAL DERIVATIVES

ISSUE 2

Classification cancelled / Changed to UNCLASS
By authority of AVRS
Date 27 Sept 56
Signature [Signature]
Unit / Rank / Appointment AVRS

CONFIDENTIAL

PREPARED BY S. Kwiatkowski DATE Oct. 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/AERO DATA/39

SHEET NO. 1

AIRCRAFT:

C 105

PREPARED BY

DATE

S. Kwiatkowski

Nov. 1954

CHECKED BY

DATE

INDEX

I. Introduction		<u>Sheet</u> 2
II. Radii of gyration		3
III. <u>Aerodynamic Derivatives</u>		
<u>Approach Conditions</u>	W = 51000 c.g. = .31 $\bar{c}$	
at angles of attack	0(= 6°, 8°, 10°, 12°, 14°, 16°, .	4
<u>Subsonic Level Flight</u>	W = 47000 lb. c.g. = .31 $\bar{c}$	
<u>Mach No.</u>	<u>Altitude</u>	
.5	S.L. 10000, 20000.	5
.7	S.L. 10000, 20000, 30000, 40000.	5
.8	S.L. 10000, 20000, 30000, 40000.	5
.9	S.L. 10000, 20000, 30000, 40000.	6
<u>Supersonic Level Flight</u>	W = 47000 lb. c.g. = .31 $\bar{c}$	
<u>Mach No.</u>	<u>Altitude</u>	
1.2, 1.5, 2.0	30000 ft.	6
1.2, 1.5, 2.0	60000 ft.	6
IV <u>Yawing Moment vs Sideslip Angle</u>		
Approach Conditions		7
M = .5		8
M = .7		9
M = .9		10

TECHNICAL DEPARTMENT (Aircraft)

REPORT NO. P/AERO DATA/39

SHEET NO. 2

AIRCRAFT:

C 105

PREPARED BY

DATE

S. kwiatkowski

Nov. 1954

CHECKED BY

DATE

INTRODUCTION

This report contains preliminary aerodynamic data necessary for investigation of lateral stability for several selected flight conditions. Final derivatives, in graphical form are not yet available pending further wind tunnel testing and aeroelastic calculations.

Aerodynamic derivatives quoted in this report include preliminary elasticities of the ailerons and vertical tail and also corrections for approved but not yet tested changes in configuration (increase of vertical tail area by 15% and modification of the front portion of the fuselage). Approach conditions in addition include corrections due to extension of the front under carriage (c_{np}), but ground effects are not included.

Since most of the lateral derivatives is strongly affected by aeroplane angle of attack, trimmed level flight has been assumed at each speed and altitude. In order to obtain correct forward speed for each angle of attack for approach conditions power effects and non-linearities of longitudinal derivatives at high angles of attack have been taken into account.

Derivatives which are affected by c.g. position are taken for aft. c.g. limit (.31 $\bar{c}$).

Max. weight of 51000 lb. has been assumed for approach conditions and combat weight of 47000 lb. for all other conditions. Radii of gyration (about principal axes) are:-

	W = 51000 lb.	W = 47000 lb.
Roll $K_{x_0}^2$	= 32.01 sq. ft.	39.82 sq. ft.
Yaw $k_{z_0}^2$	= 241.38 sq. ft.	253.69 sq. ft.
Pitch $k_{y_0}^2$	= 207.22 sq. ft.	219.04 sq. ft.
γ_0	= 2.16°	2.16°

γ_0 - Angle between principal axis and aircraft datum.

Radii of gyration and products of inertia in wind axes are listed on sheet 3 for each flight condition.

CONFIDENTIAL

RADII OF GYRATION IN WIND AXES

	1	2	3	4	5	6	7	8	
		$W = 51000 \text{ lb.}$						$W = 40000 \text{ lb.}$	
		Approach Conditions						Subsonic	
Altitude	α	k_x^2	k_z^2	k_{xz}			Altitude	Mach. No.	k_y^2
		sq.ft	sq.ft	sq.ft					
	S.L.	6°	39.92	240.50	-13.54		S.L.	.5	39
	S.L.	8°	41.10	239.27	-20.50		10000	.5	40
	S.L.	10°	42.77	237.60	-27.34		20000	.5	40
	S.L.	12°	44.92	235.47	-34.03				
	S.L.	14°	47.53	232.88	-40.64		S.L.	.7	39
	S.L.	16°	50.59	229.80	-47.01		10000	.7	39
							20000	.7	39
							30000	.7	40
							40000	.7	41
							S.L.	.8	39
							10000	.8	39
							20000	.8	39
							30000	.8	40
							40000	.8	40

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - C 105

WEIGHT - as shown

C. G. POSITION - .31 c

REPORT NO. - P/AERO DATA/39

SHEET - 3

DATE - Nov. 9 1954

PREPARED BY - S. Kwiatkowski

9	10	11	12	13	14	15	16	17	18	19
47000 lb.	Level Flight				W = 47000 lb.					
k_x^2 sq.ft	k_z^2 sq.ft	k_{xz} sq.ft		Altitude	Mach No.	k_x^2 sq.ft	k_z^2 sq.ft	k_{xz} sq.ft		
39.86	253.65	-3.14		S.L.	.9	39.87	253.65	+3.21		
40.04	253.48	-6.86		10000	.9	39.84	253.69	+1.80		
40.78	252.70	-14.27		20000	.9	39.82	253.69	- .56		
				30000	.9	39.86	253.60	-3.29		
39.82	253.69	+ .81		40000	.9	40.11	253.39	-7.98		
39.84	253.69	-1.67								
39.92	253.56	-4.73			W = 47000 lb.					
					Supersonic Level Flight					
40.39	253.13	-10.95		30000	1.2	39.84	253.69	+2.01		
41.47	252.02	-18.74		30000	1.5	39.92	253.56	+4.71		
				30000	2.0	39.97	253.12	+6.76		
39.84	253.69	+1.97								
39.82	253.69	+ .30		60000	1.2	41.05	252.50	-16.15		
39.85	253.65	-2.65		60000	1.5	40.25	253.26	-9.56		
40.00	253.52	-6.18		60000	2.0	39.88	253.65	-3.51		
40.50	253.01	-12.06								

TECHNICAL DEPT. (AIRFRAME)

C. G. POSITION - 31c

PREPARED BY - S. Kwiatkowski

[illegible]

A.

LATERAL STABILITY DERIVATIVESELASTIC

All derivatives per RADIAN

	1	2	3	4	5	6	7	8	9	10
Altitude	Mach No.	α Trim	C_L		C_{Y_β}	C_{Y_r}	C_{Y_p}	$C_{Y_{\delta_r}}$	$C_{Y_{\delta_a}}$	C_{l_β}
S.L.	✓.9	1.30°	.0319		-.457	.085	-.013	.0464	.0095	-.0062
10000	.9	1.68°	.0464		-.475	.092	+.004	.0574	.0133	-.0140
20000	.9	2.31°	.0694		-.493	.098	+.026	.0656	.0166	-.0222
30000	.9	3.10°	.108		-.508	.105	+.051	.0743	.0182	-.0316
40000	.9	4.30°	.172		-.497	.167	+.071	.0847	.0171	-.0492
30000	1.2	1.60°	.060		-.438	.179	.013	.0424	.0069	-.0350
1490 30000 ✓	1.5	.90°	.039		-.49 -.364	+.31 .098	.019 .016		.0269	-.016 -.0178
30000	2.0	.35°	.022		-.289	.074	.005	.0149	0	-.0115
60000	1.2	6.50°	.253		-.480	.112	.122	.0636	.0029	-.0934
1456 60000 ✓	1.5	4.70°	.162		-.409	.116	.127	.0521	.0046	-.0647
60000	2.0	3.10°	.091		-.50 -.415	.28 .099	.015 .046		.0361	-.024 -.0390

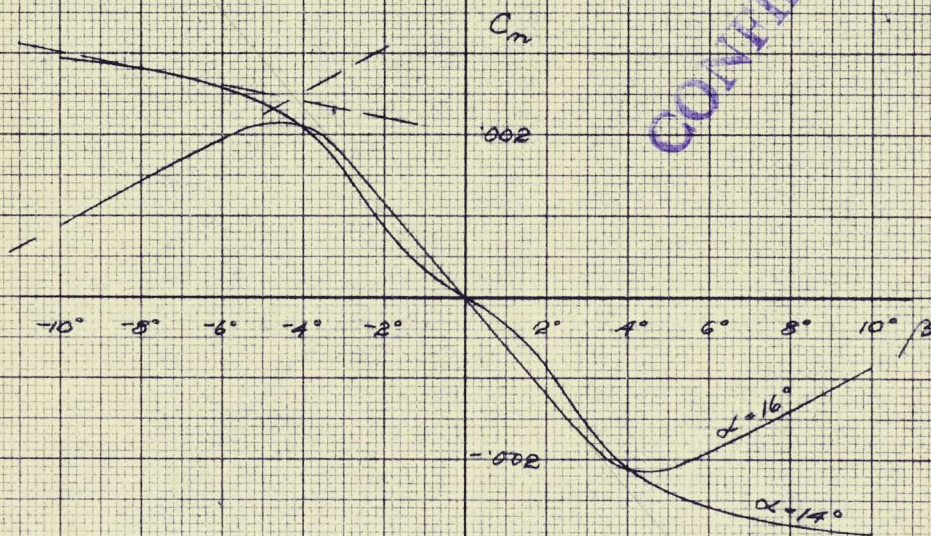
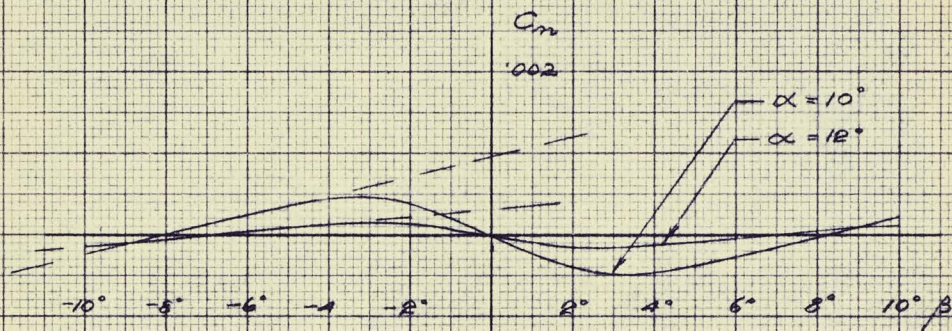
C105

APPROACH CONDITIONS

C_m vs β

ELASTIC A/C

1/2 DOWN



CONFIDENTIAL

AIRCRAFT C105
A. U. W.

COMPONENT

SHEET No. 9.

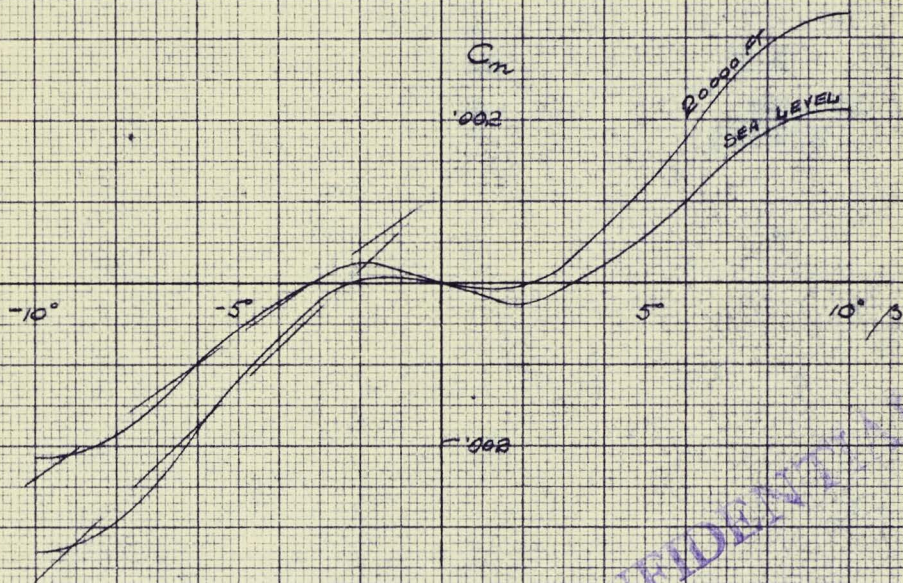
REPORT No. P/AERO DATA/39

DATE NOV 5 / 57.

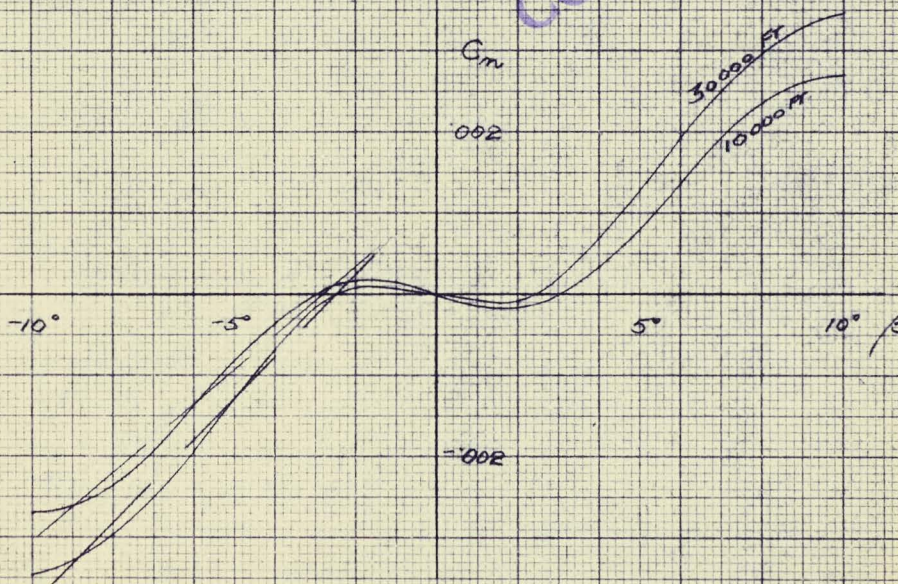
PREP. BY *for all the*

C105
LEVEL FLIGHT M=7

C_m vs β
Elastic A/c



CONFIDENTIAL



10 X 10 TO THE 1/2 INCH 359.12
KUFFEL & ESSER CO. MADE IN U.S.A.

AIRCRAFT C105
A. U. W.

COMPONENT

SHEET No. 10

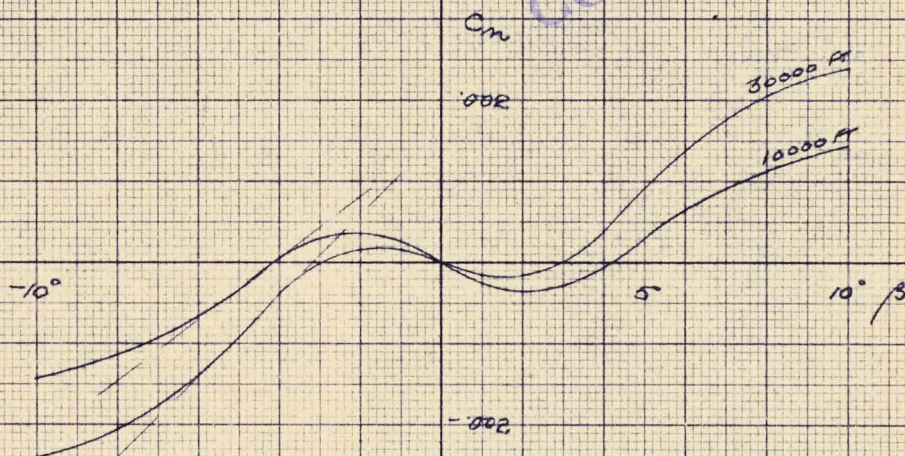
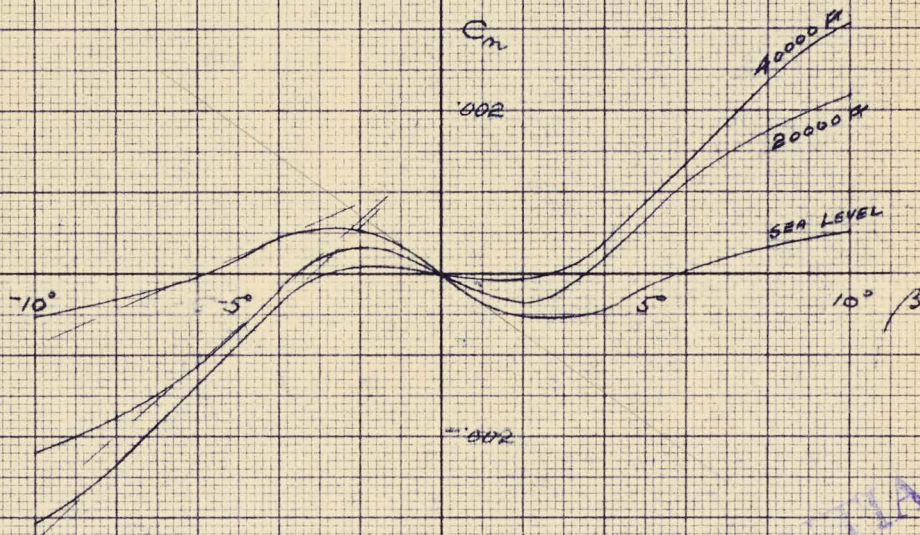
REPORT No. P/AERO DATA/39

DATE Nov 17/3

PREP. BY K. A. Thompson

C105
LEVEL FLIGHT $M=9$

C_m vs. β
ELASTIC q/c



CONFIDENTIAL

