

QCK
Avro
CF105
P-WT-30
ANALYSIS

P/WT/30

~~SECRET~~ *P/WT/30*
C-15
C.A.I. WIND TUNNEL TESTS *Avro*
Date SERIES III *25/56*
JUNE 1954
Signature *[Signature]*
DERIVATIVES AND ZERO VALUES
Unit / Rank / Appointment



~~SECRET~~

Temple

A V ROE CANADA LIMITED
MALTON ONTARIO

TECHNICAL DEPARTMENT (Aircraft)

AIRCRAFT C 105.

REPORT NO. P/WT/30

FILE NO.

Classification cancelled / Changed to UNCLASS

NO OF SHEETS _____

By authority of AVS

Date 27 Sept 54

TITLE

Signature P. Kelly

ANALYZED

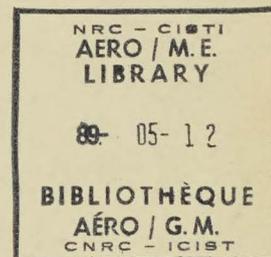
Unit / Rank / Appointment AVS 5

C.A.L. WIND TUNNEL TESTS

SERIES 111

JUNE 54

DERIVATIVES & ZERO VALVES



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 |
|----------|-------------|------------|-------------|------|---------|
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FORM 1316A

158674-62

TECHNICAL DEPARTMENT (Aircraft)

REPORT NO. P/WIND TUNNEL/30

SHEET NO. 1

AIRCRAFT

C-105

PREPARED BY

DATE

S. Kalatowski

Oct. 1954

CHECKED BY

DATE

INDEX

LONGITUDINAL STABILITY

SECTION

1. Lift

| | | |
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| | 2. Effect of sealing gaps | 1.2.2 |

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| | 3. Miscellaneous effects | 3.3.3 |

* Includes sealing, canopies 2, 3 and off, dorsal fin and faired intakes.

TECHNICAL DEPARTMENT (Aircraft)

REPORT NO. F/WIND TUNNEL/30

SHEET NO. 2

AIRCRAFT

C-105

PREPARED BY

DATE

S. Kwiatkowski

Oct. 1954

CHECKED BY

DATE

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| | 2. Effect of β | 6.3.2 |

TECHNICAL DEPARTMENT (Aircraft)

REPORT NO. F/WIND TUNNEL/30

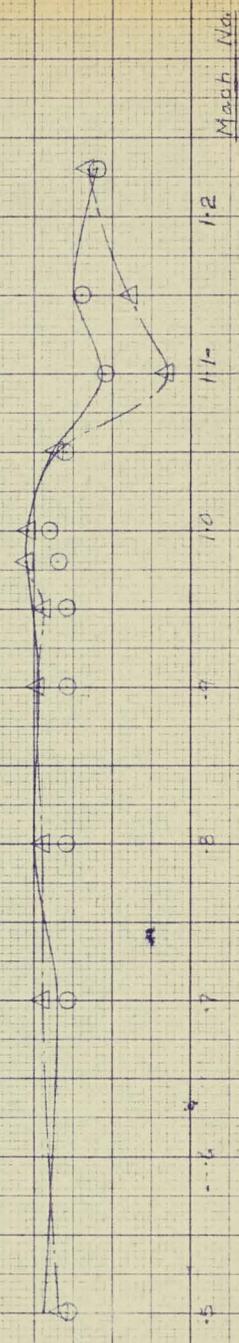
SHEET NO. 3

| | | | |
|----------|-------|----------------|-----------|
| AIRCRAFT | C-105 | PREPARED BY | DATE |
| | | S. Kwiatkowski | Oct. 1954 |
| | | CHECKED BY | DATE |

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C-105
C.A.I. Wind Tunnel Tests June 1954
OK vs Mach No.
Runs 689-700 Sealed Goals \circ B_2 C_3 W_3 R_3 S_3
Runs 831-840 Δ B_2 C_3 N_3 V_3 R_3
April Test Δ B_2 C_2 N_3 V_3 R_3

α_0
2°
1°



Mach No.

AIRCRAFT
A. U. W.

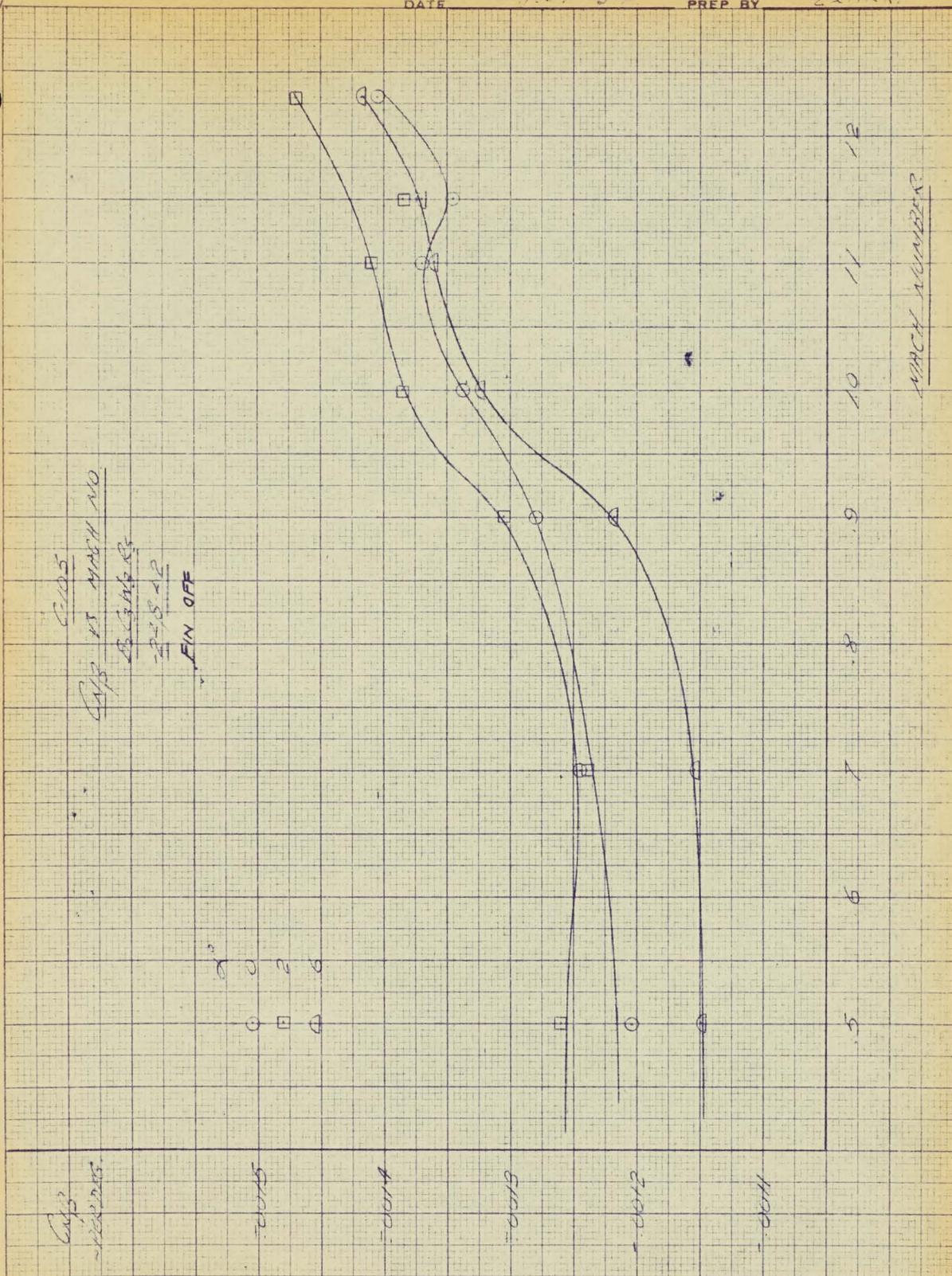
COMPONENT

SHEET NO. 3.1.2.1

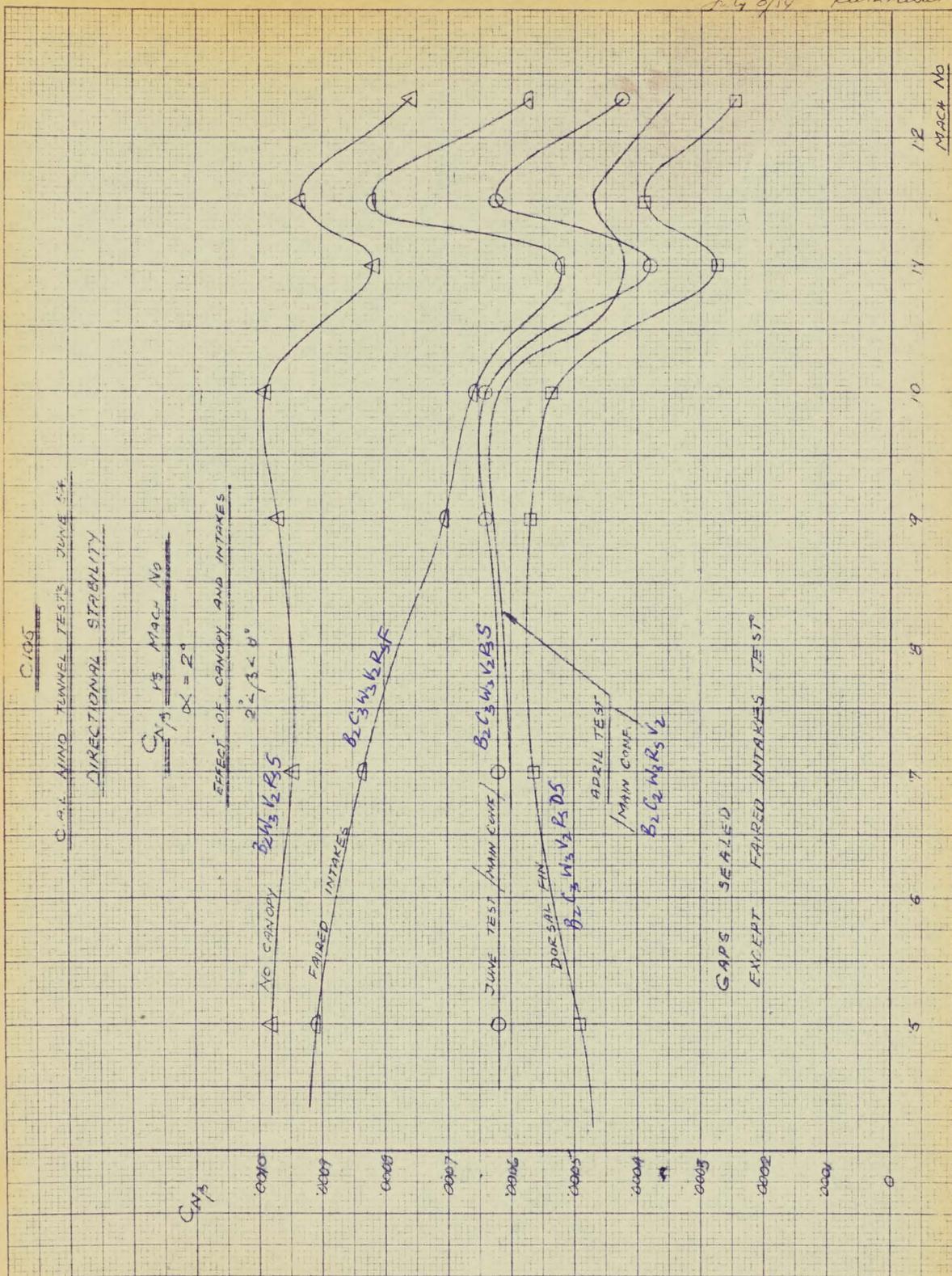
REPORT NO. P/W.T/30

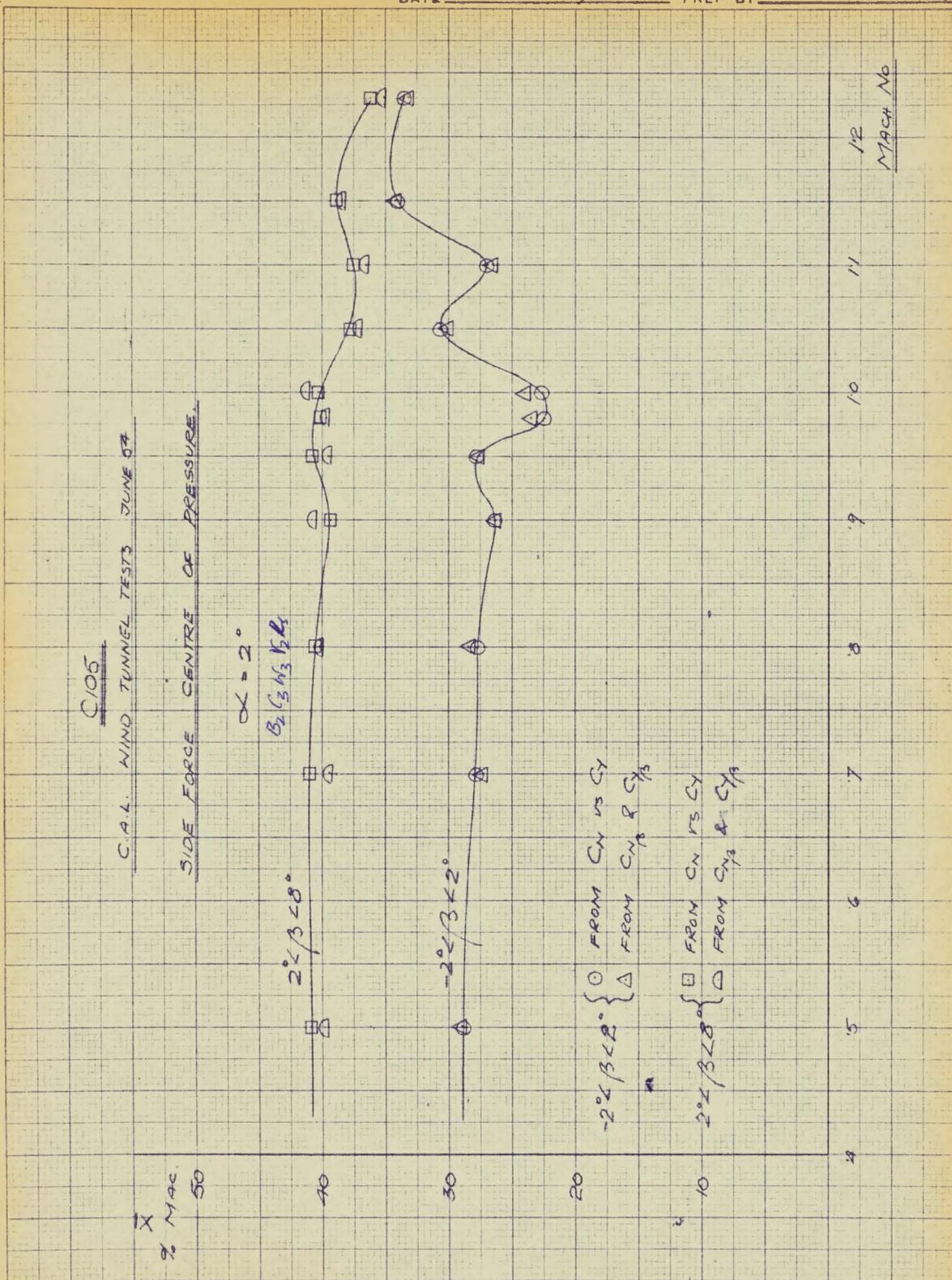
DATE JUL 54

PREP BY CLARK



July 8/74 Kuntzsch





C-105
C.A.L. WIND TUNNEL TESTS JUNE '54

CAP vs. M

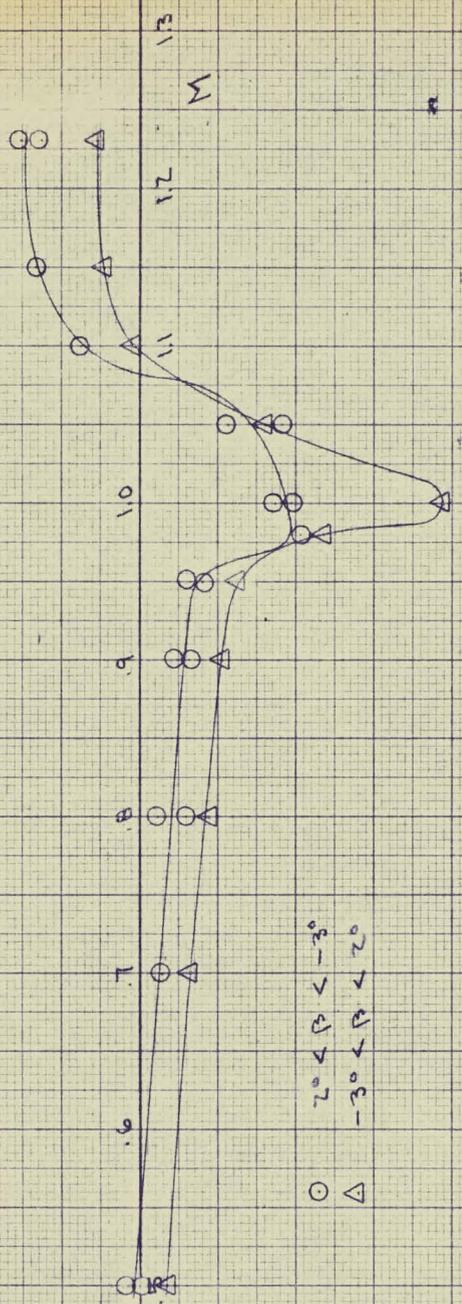
$\alpha = 0^\circ$

TAIL ON

B₂ C₂ W₂ V₂ R

CAP
PER DEGREE

-0.0006
-0.0004
-0.0002
0
.0002
.0004
.0006
.0008
.0010



○ 2° < P < -3°
△ -3° < P < 2°

C-105
C.A.I.L WIND TUNNEL TESTS JUNE '54

CLP vs. M

$\alpha = 2^\circ$

TRAIL ON

B₂C₃N₃K₂R₂

CLP

PER DEGREE

-0.0010

-0.0008

-0.0006

-0.0004

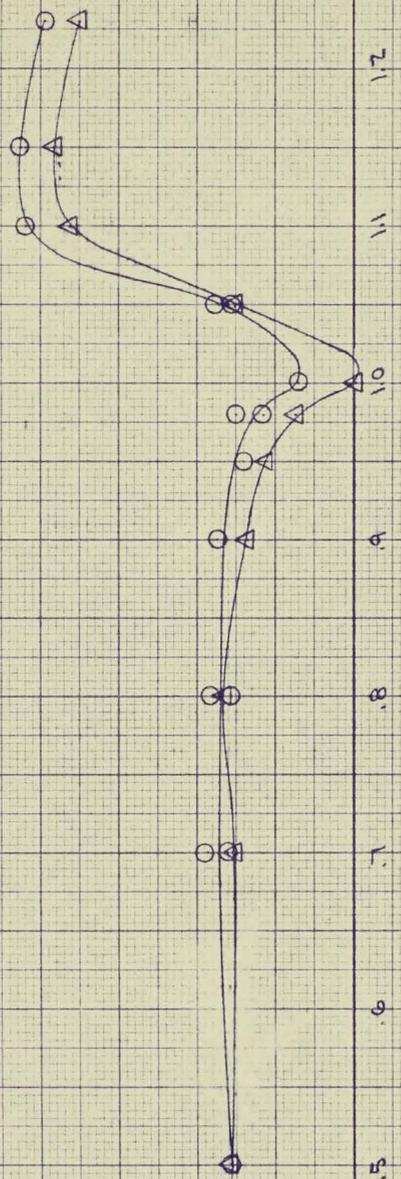
-0.0002

0

.0002

.0004

.5 .6 .7 .8 .9 1.0 1.1 1.2 1.3
M



○ $3^\circ < \beta < 3^\circ$
 △ $-3^\circ < \beta < 3^\circ$

C-105

Comparisons ~ C_{lp} vs Mach No.

CAL W-T Tests

C_{lp} per degree.

$\alpha = 0$

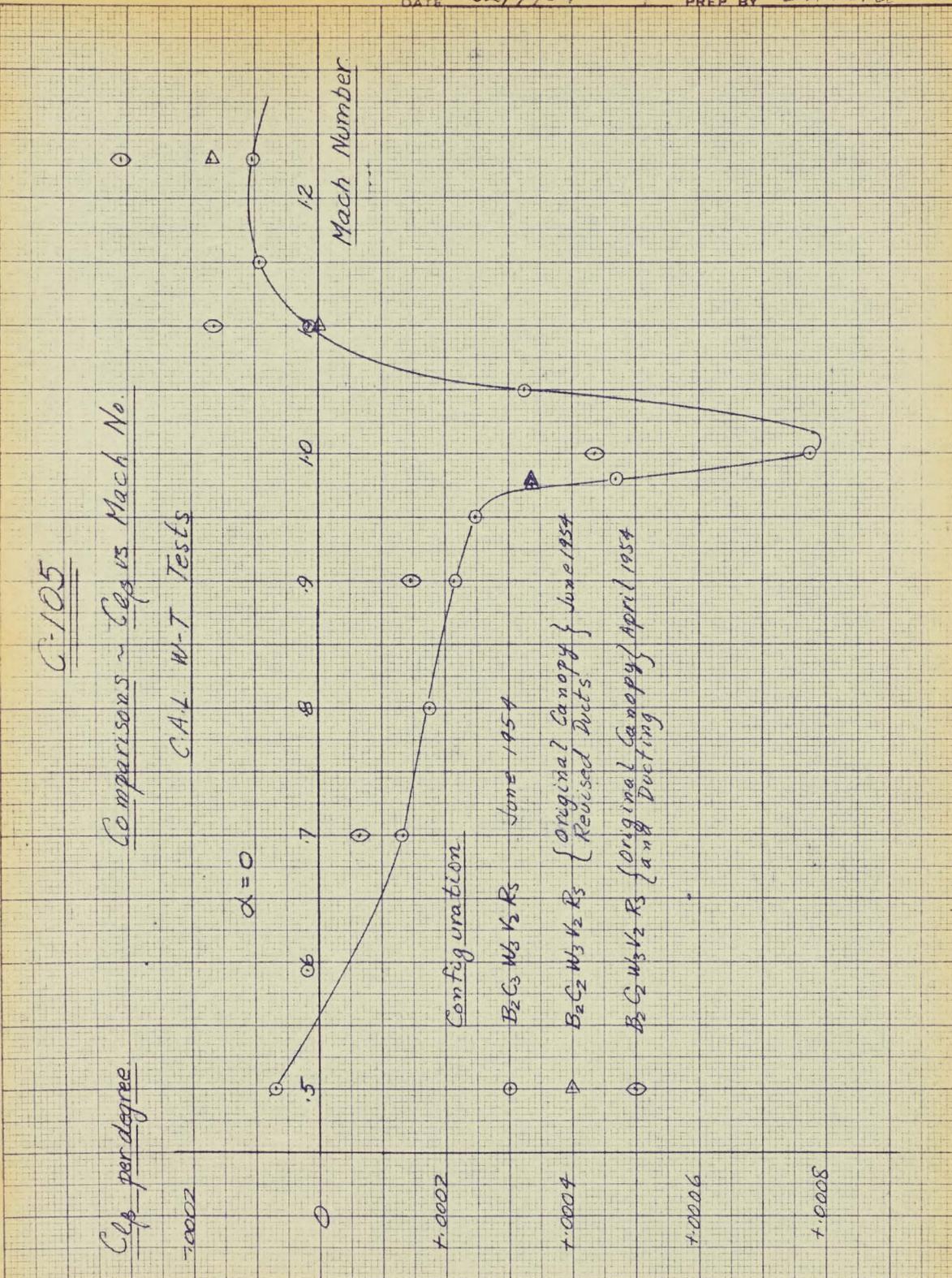
Mach Number

Configuration

June 1954

Original Canopy }
Revised Ducts } June 1954

Original Canopy }
and Ducting } April 1954



C-105
C_{yβ} vs Mach Number

$\alpha = 2^\circ$

Effect of Configuration
Changes in C_{yβ}

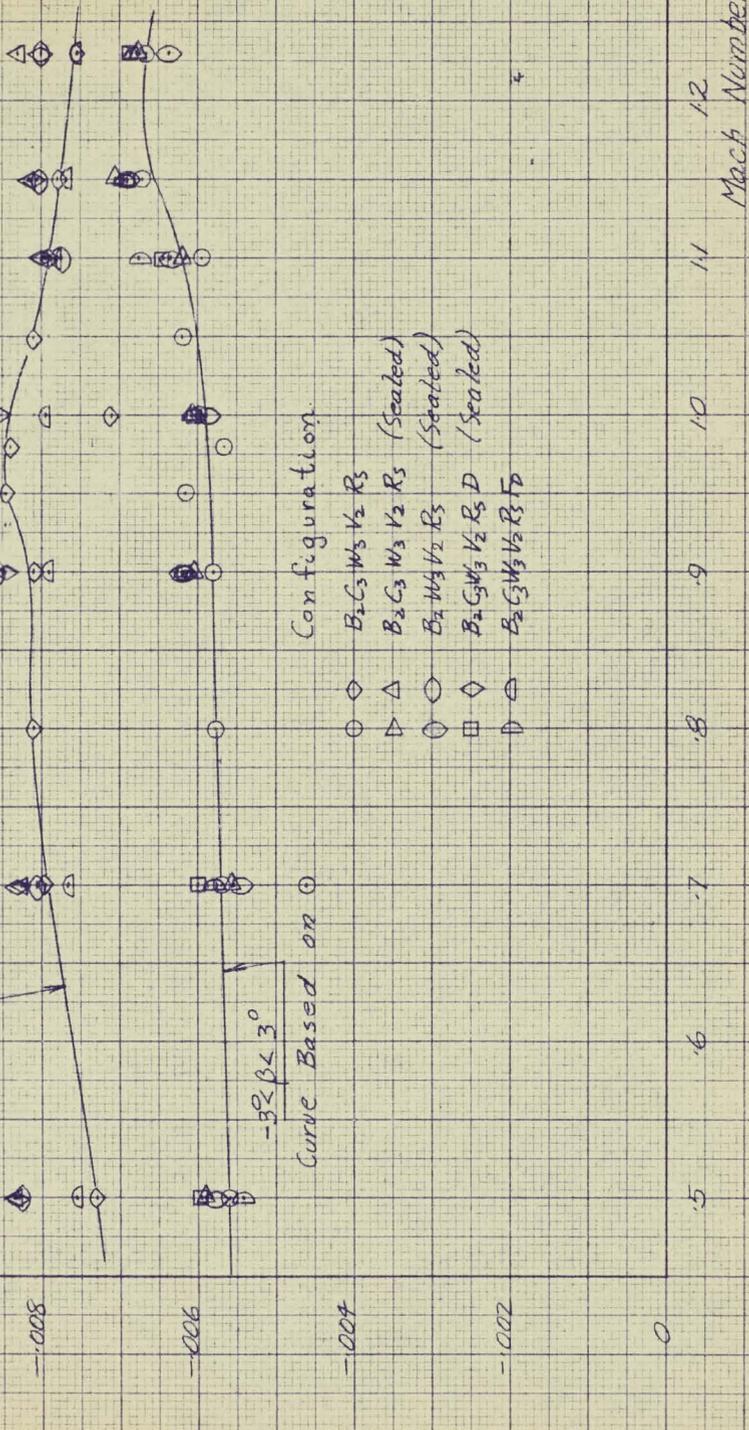
C_{yβ}
per degree

1β > 3°
Curve Based on ◊

-β < 3°
Curve Based on ○

Configuration

- ◊ B₂C₃W₃V₂R₃
- △ B₂C₃W₃V₂R₅ (Sealed)
- B₂W₃V₂R₃ (Sealed)
- ◊ B₂C₃W₃V₂R₃D (Sealed)
- △ B₂C₃W₃V₂R₃F_D



C105

C.A.L. H.T. TESTS JUNE 52

$B_2 C_3 W_3 V_2 R_3$

C_N vs α

$M = .50$

C_N

.005

-5°

5°

10°

20°

α

30°

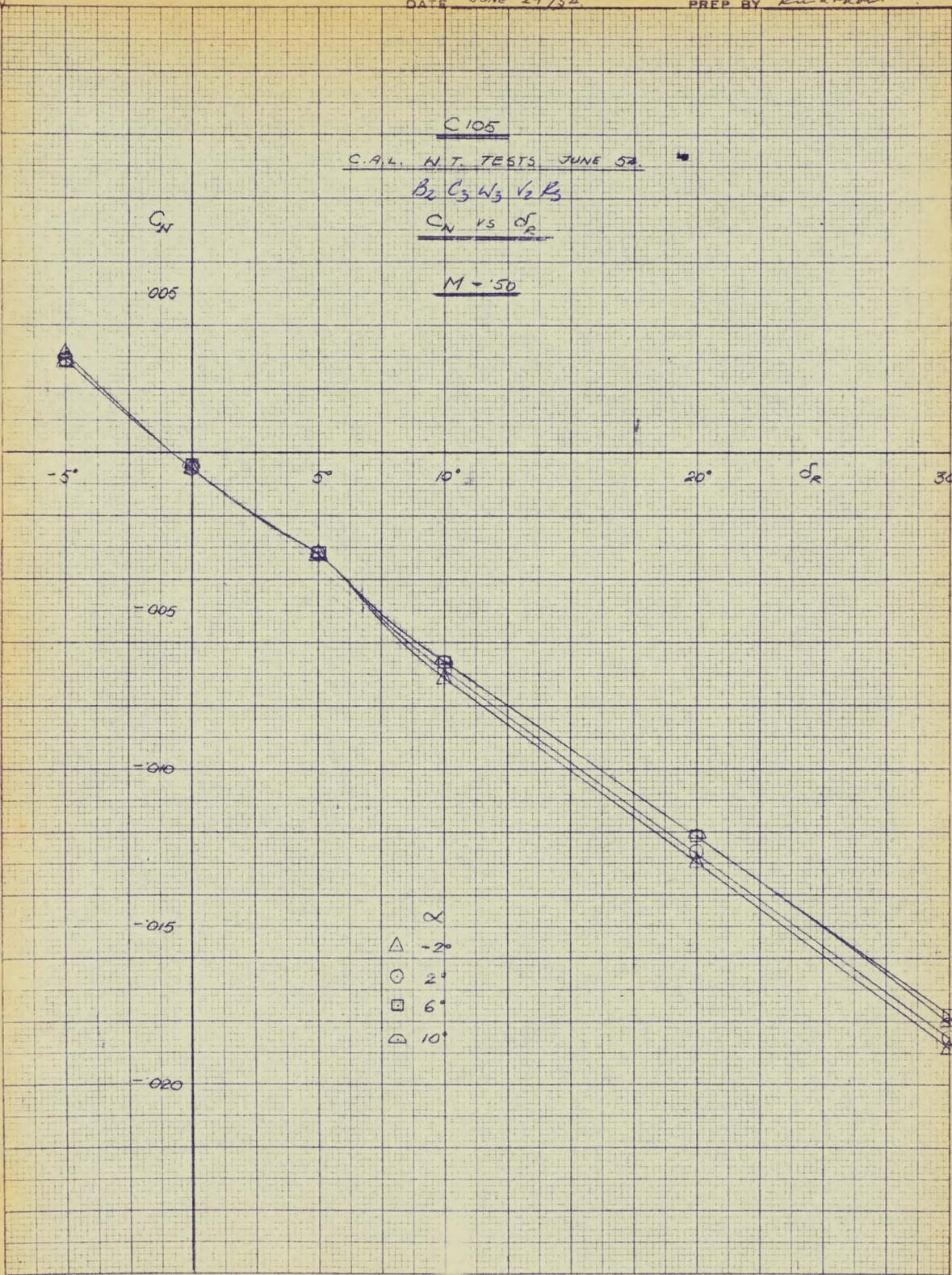
-.005

-.010

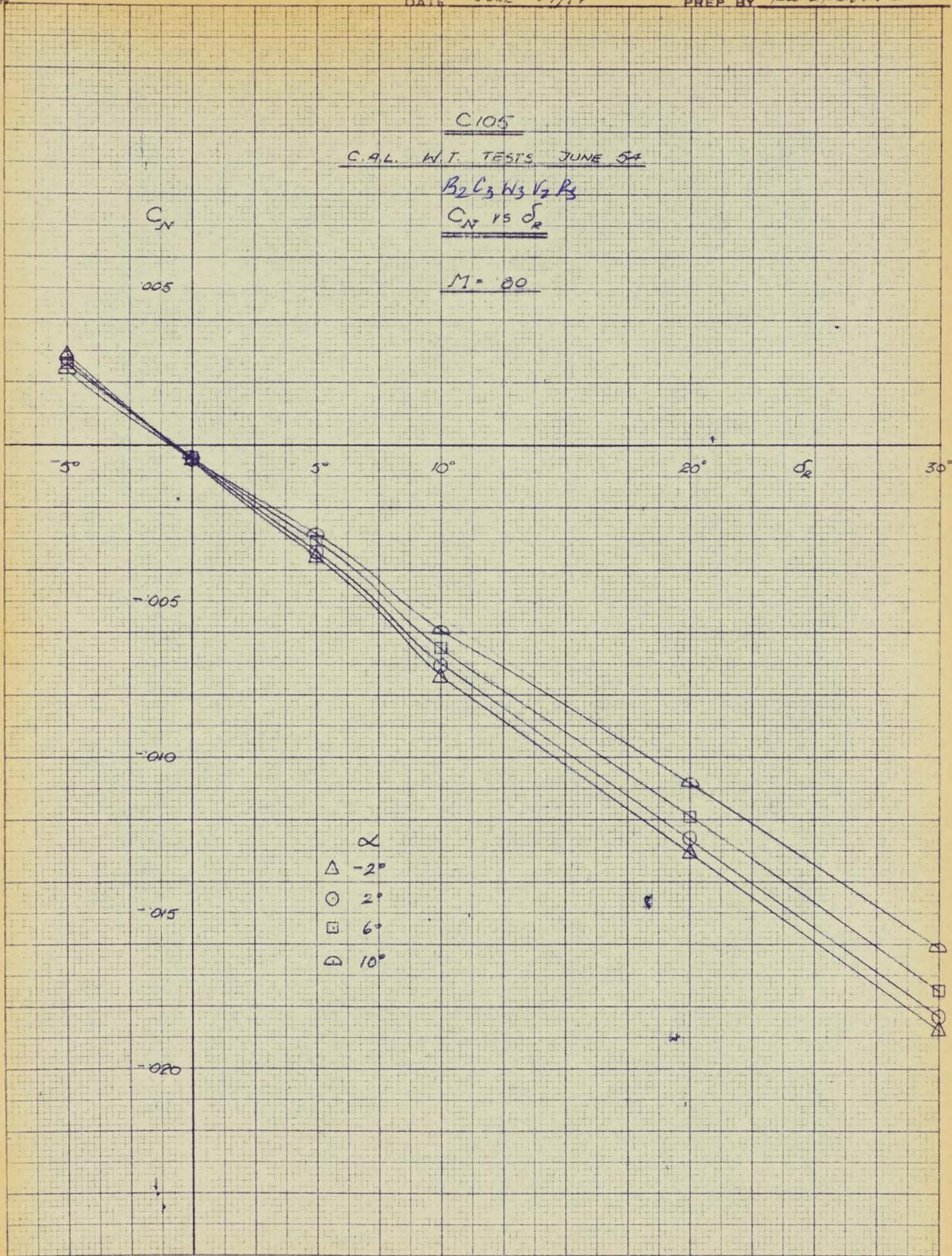
-.015

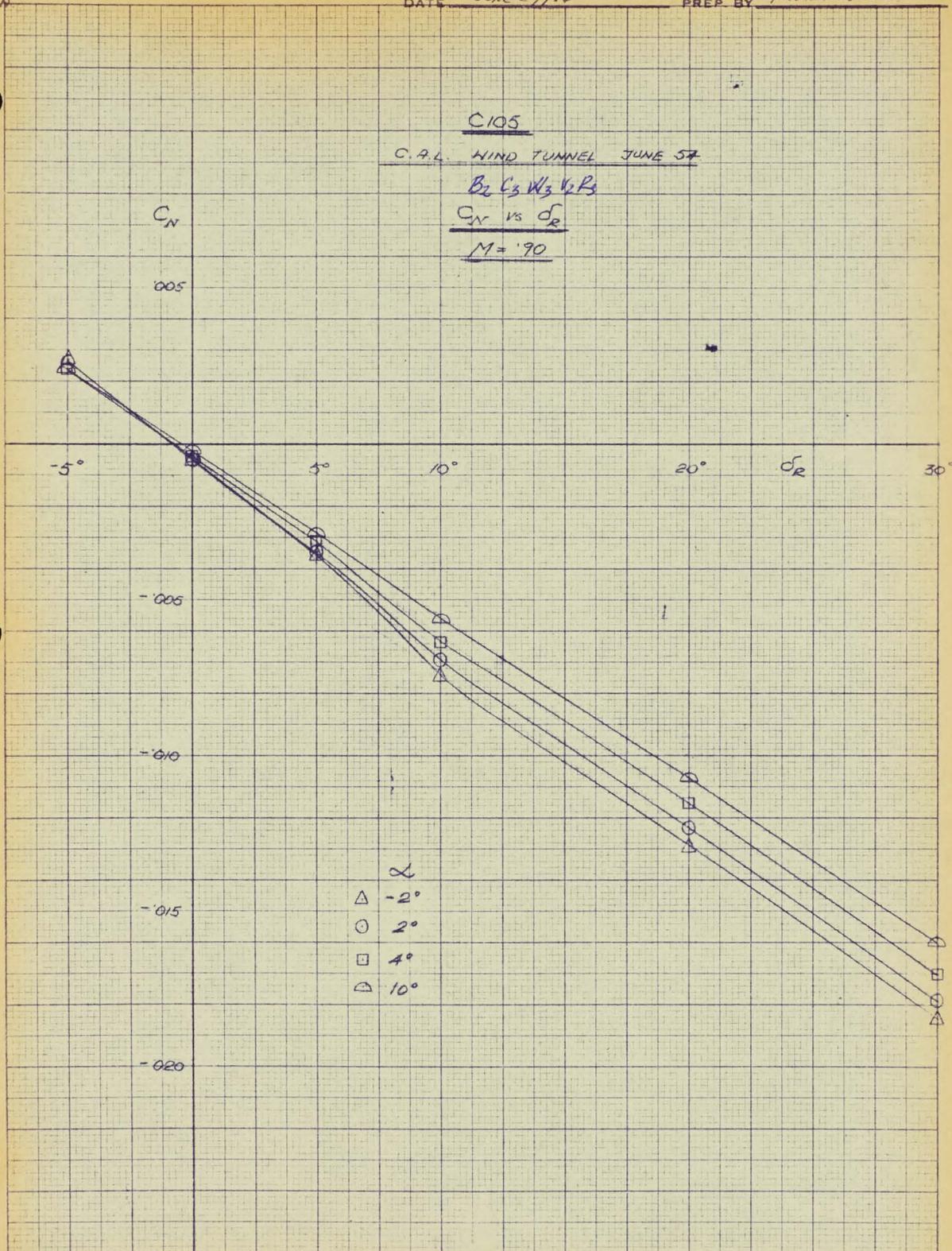
-.020

- α
- Δ -2°
- \circ 2°
- \square 6°
- \triangle 10°

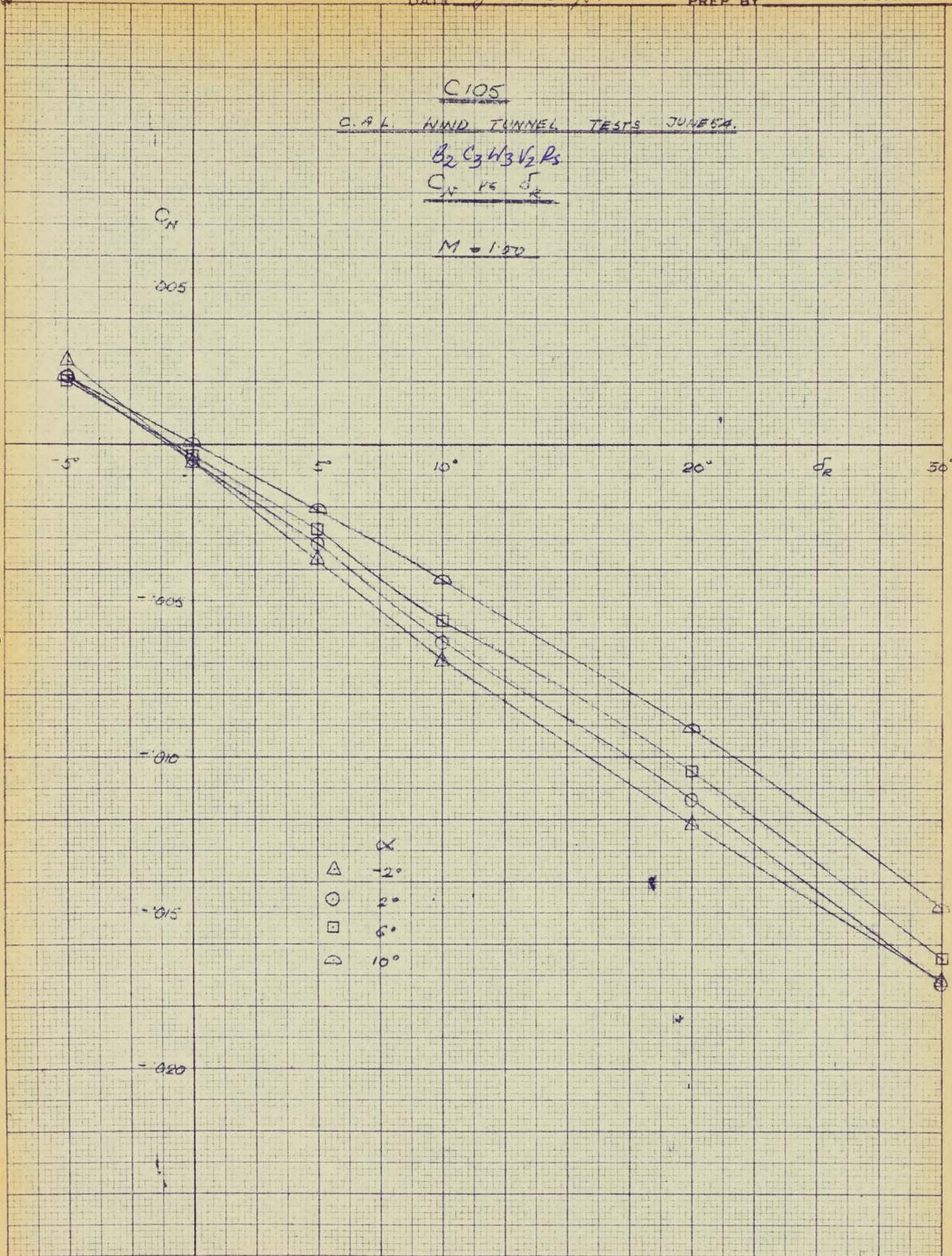


GRAPH - REPRODUCED BY PERIODICALLY
RE-10 TO 100% INCHES AND LINES ACCORDING
MADE IN U.S.A.





MODEL - AIRCRAFT & ENGINE CO.
 10 - 10 1/2 BUCKINGHAM PALACE GARDENS
 MADE IN U.S.A.



C105

C.A.L. N.T. TESTS JUNE 57

B₂ L₃ H₃ V₂ L₃
C_N vs α

M = 105

C_N

005

0°

5°

10

20°

α

30°

-005

-010

-015

-020

α

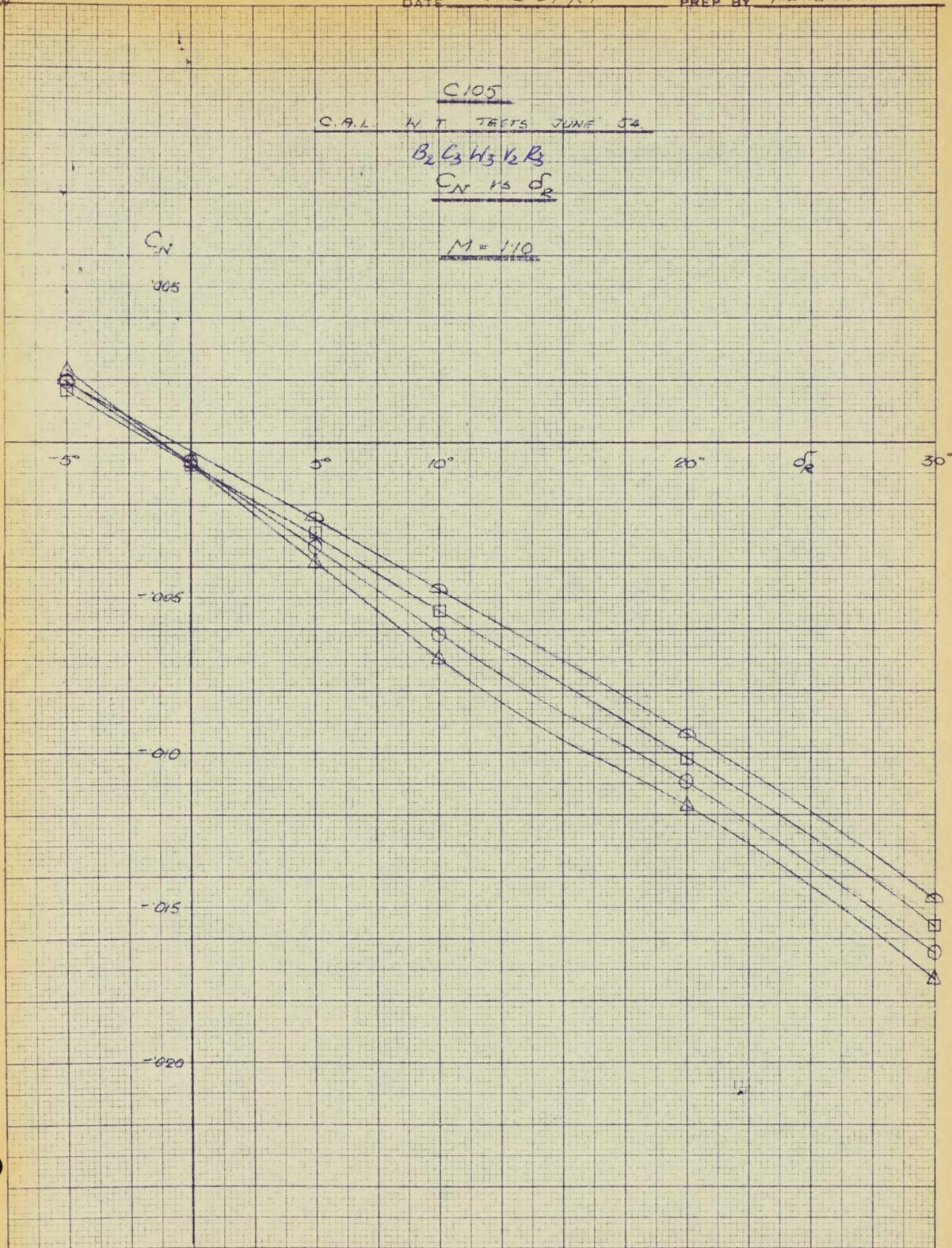
△ -2°

○ 2°

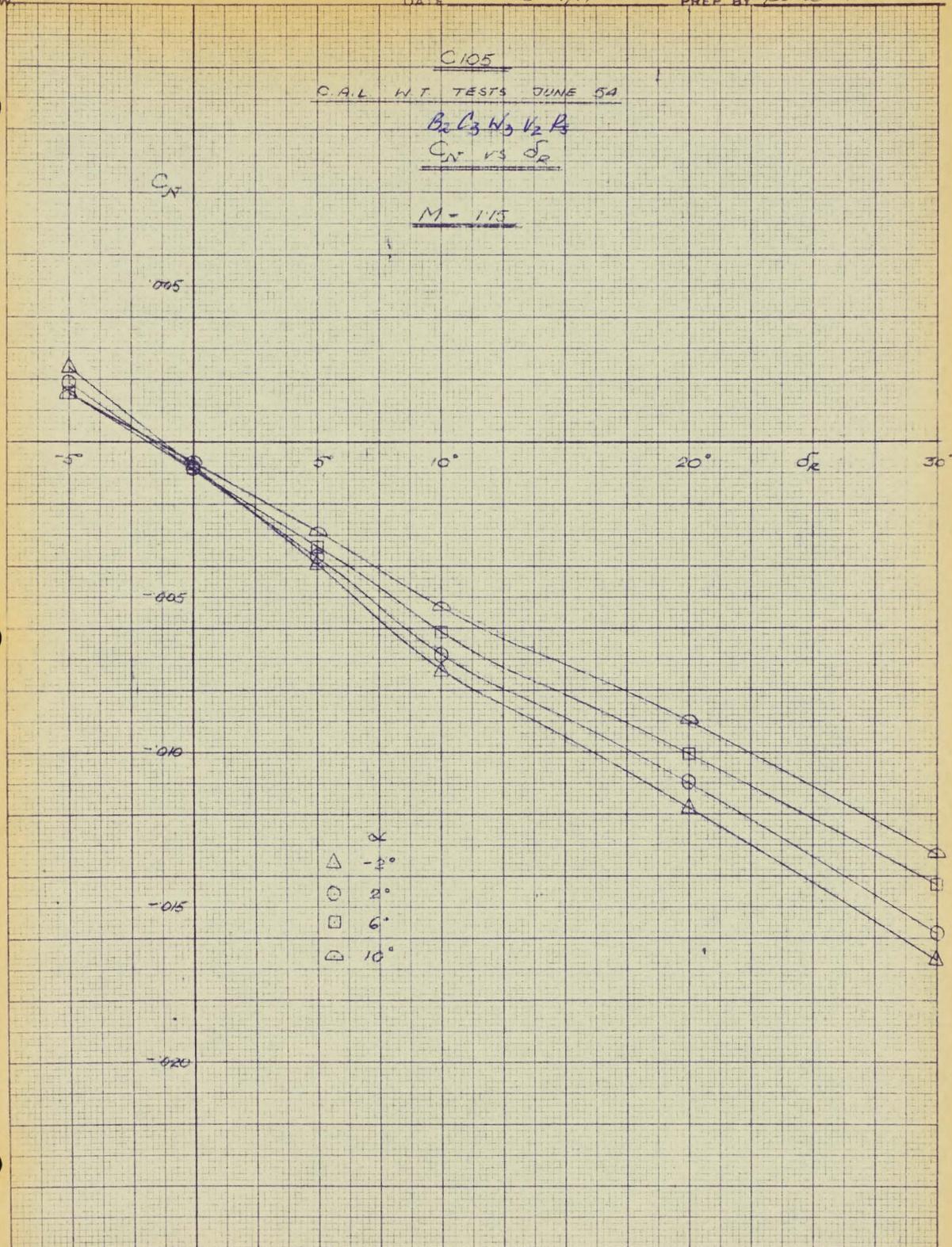
□ 6°

◇ 10°

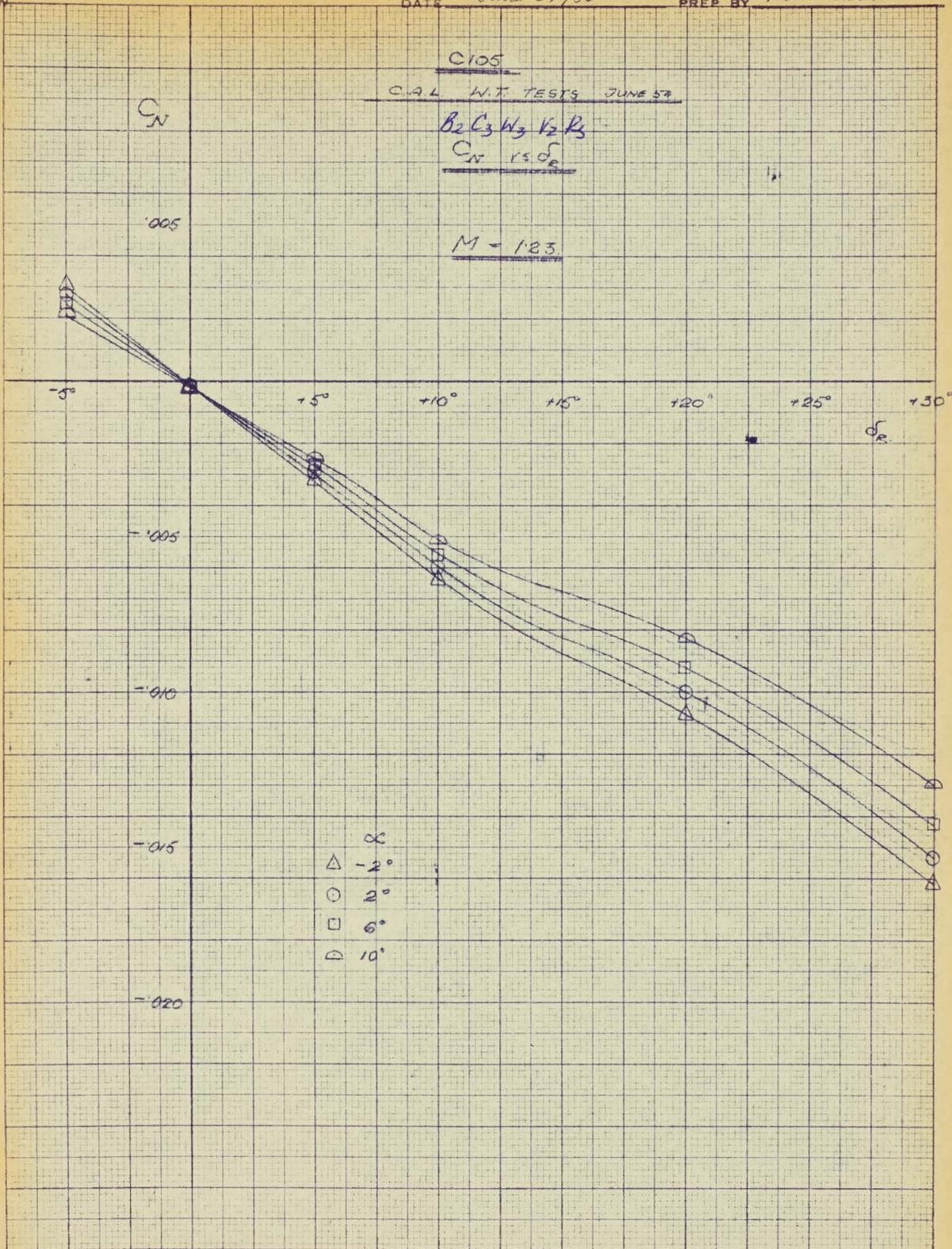
25112 PLATE, 8 EGGER CO
10 - 10 TO THE 2 inch, STRIP, ALUMINUM
MADE IN U.S.A.



10-55812-10 (REVISED) 8/25/54
 10-55812-10 (REVISED) 8/25/54
 10-55812-10 (REVISED) 8/25/54



139-15 (REVISED) AIRCRAFT
 DIVISION, NATIONAL BUREAU OF STANDARDS
 WASHINGTON, D. C. 20540



35912 - KRUPP & ESSEL CO
10 - 10 TO THE 31 AND 310 LINES RECORDED
MADE IN U.S.A.

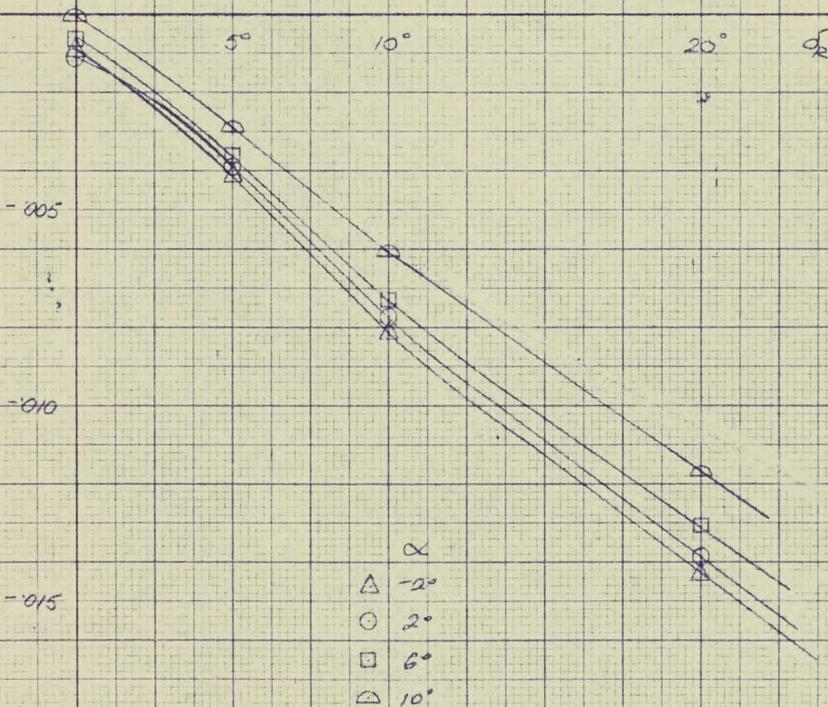
C105
C.A.L. WIND TUNNEL TESTS JUNE 54

$B_2 C_3 W_3 V_2 R_5$

$C_{N_1} = 1.5 \frac{F}{R}$
 $\beta = -3^\circ$

$M = .70$

C_N



1. Scale of graph is 1:1
2. Scale of graph is 1:1
3. Scale of graph is 1:1

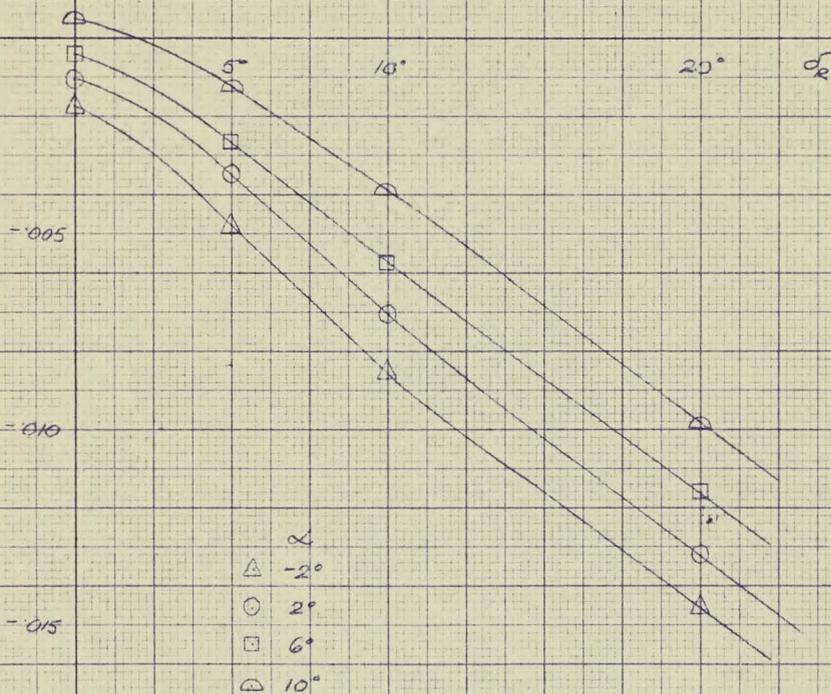
C105

C.A.L. WIND TUNNEL TESTS JUNE 57

$B_2 C_3 W_3 V_2 R_5$
 C_N vs α
 $\beta = -3^\circ$

$M = 1.00$

C_N



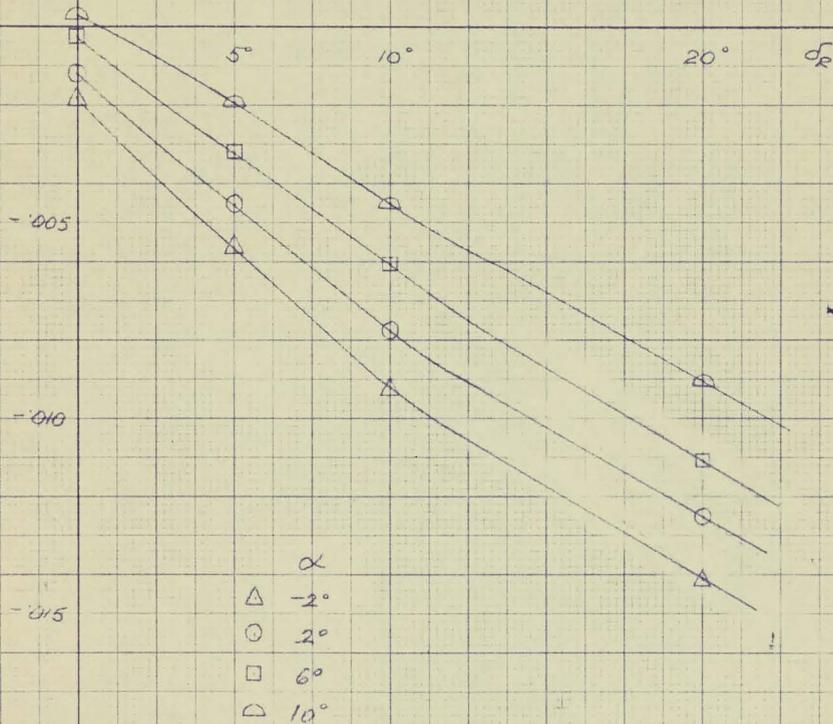
48915 - REVISION 1 & 2
 10 - 10.10 inches high
 MADE IN U.S.A.

C 105
C.A.L. W.T. TESTS JUNE 57.

$B_2 C_3 W_3 V_2 R_2$
 $C_N R \sigma_R$
 $\beta = -3^\circ$

M = 1.15

C_N



C105
C.A.L. W.T. TESTS JUNE 57

$B_x C_3 W_3 V_3 R_3$

C_N vs σ_R

$\beta = -3^\circ$

$M = 1.23$

C_N

-005

-010

-015

5°

10°

20°

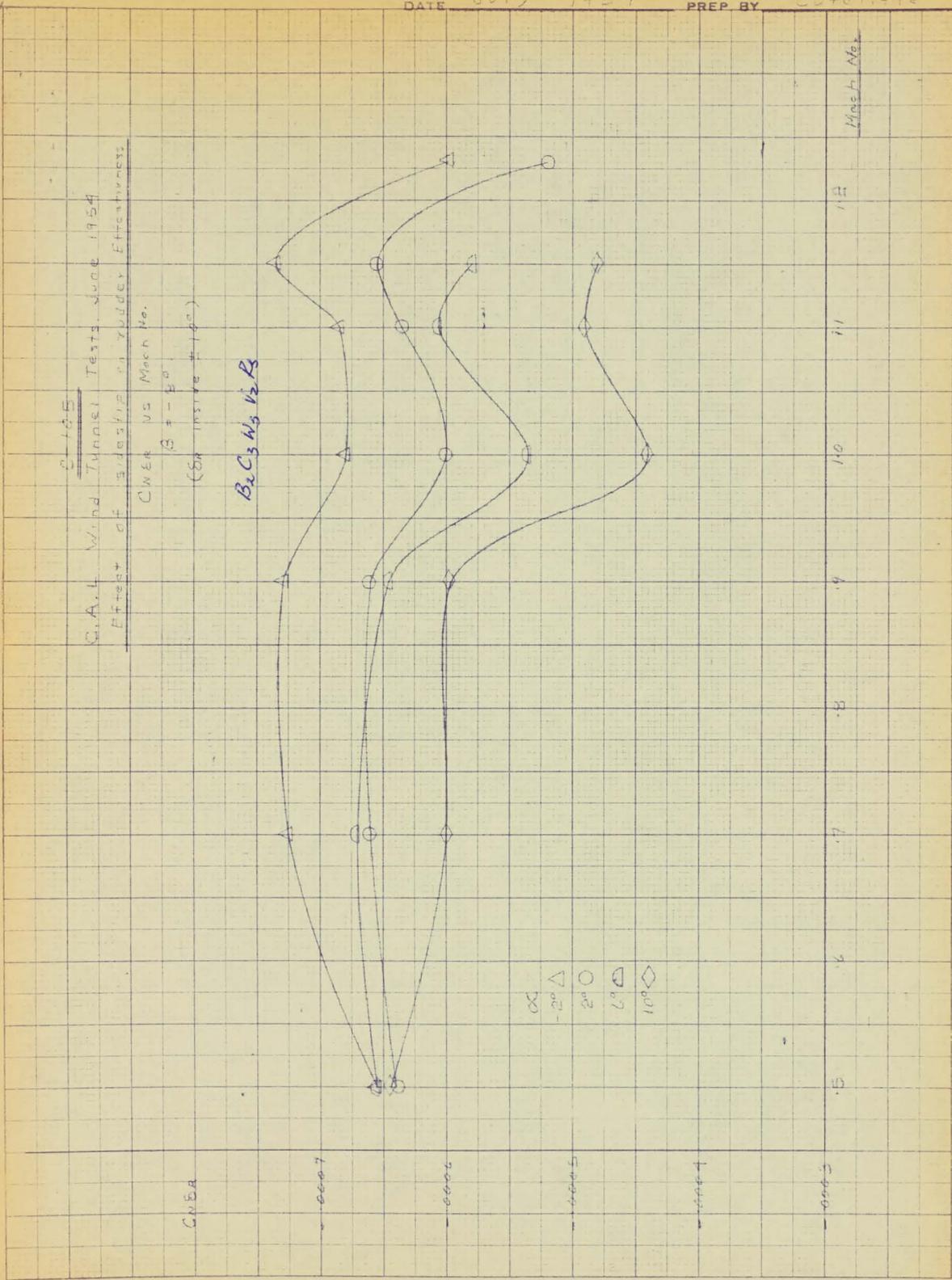
σ_R

- | | |
|-------------|------------|
| Δ | α |
| \circ | -2° |
| \square | 2° |
| \triangle | 6° |
| \diamond | 10° |

C-105
S.A.L. Wind Tunnel Tests, June 1954
Effect of sideslip on rudder effectiveness

CWER vs Mach No.
 $\beta = -30^\circ$
(δ_R inside $\pm 10^\circ$)

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



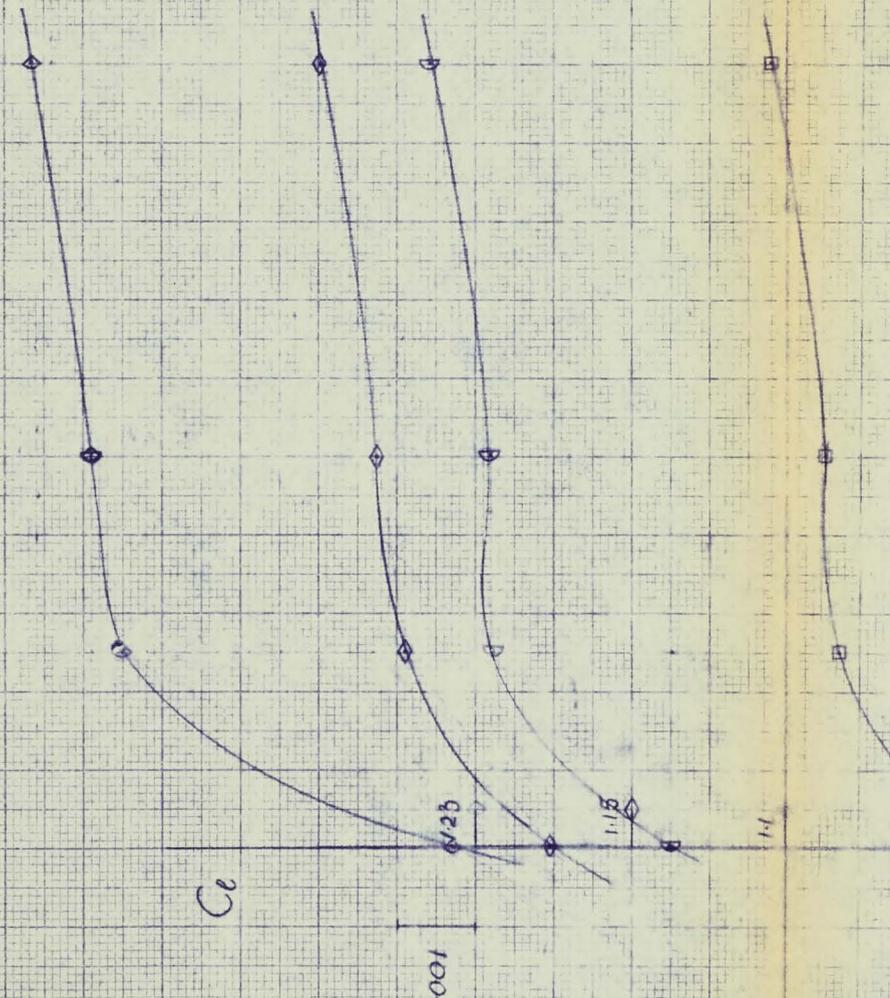
Mach No.

C105
C.A.L. WIND TUNNEL TESTS, JUNE 1954.

Ce vs σ_r

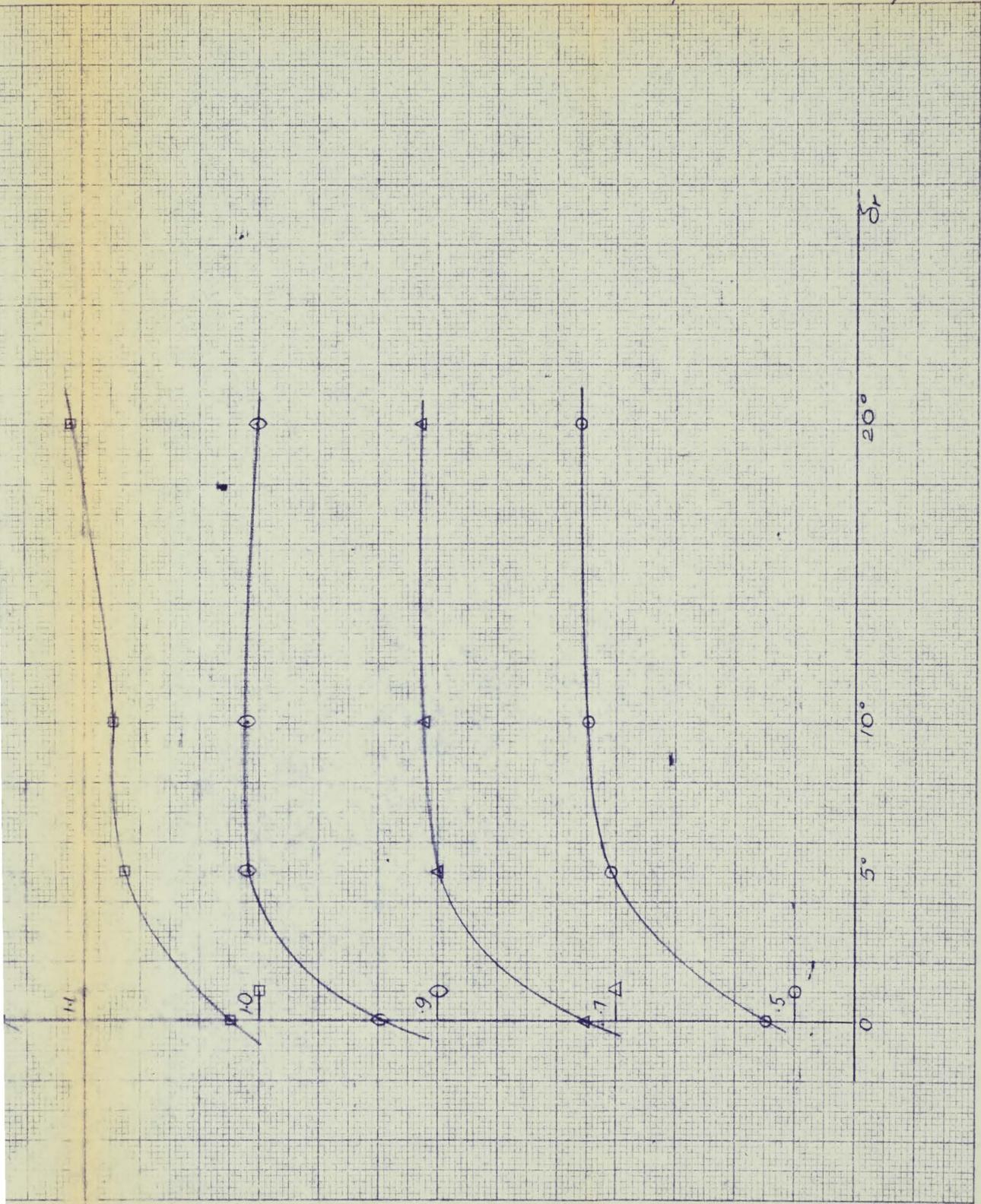
$\alpha = 6^\circ, \beta = -3^\circ$

B_2, C_3, k_3, k_2, R_3



Sheet H. Q. 2. H.
Oct. 1954

P/WT/30
J. Papis.



C-105

C_{YR} vs Mach Number

C.A.L. Wind Tunnel Tests

June 1954

Config. $B_2 C_3 k_3 \frac{1}{2} R_3$

$\beta = 0$

- $\alpha = -2^\circ$
- ▷ $\alpha = 0^\circ$
- $\alpha = 2^\circ$
- $\alpha = 6^\circ$
- ▷ $\alpha = 10^\circ$

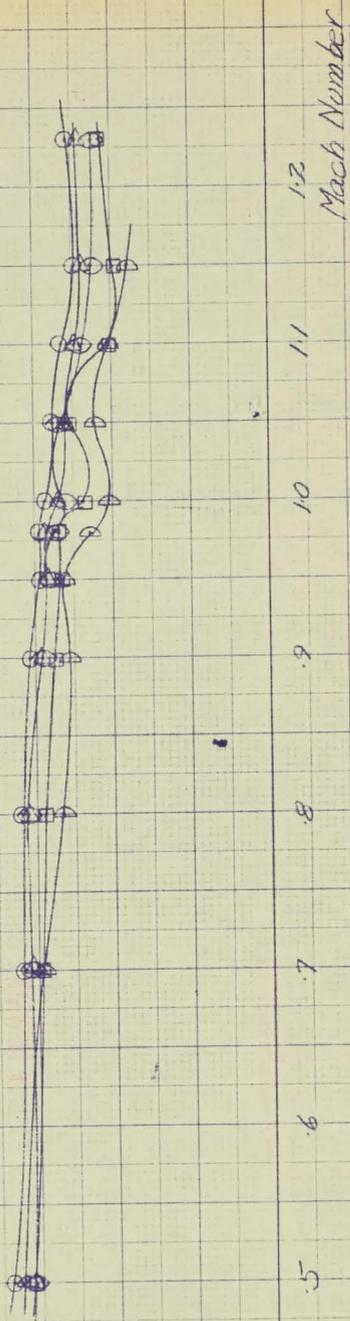
C_{YR}
per degree

.003

.002

.001

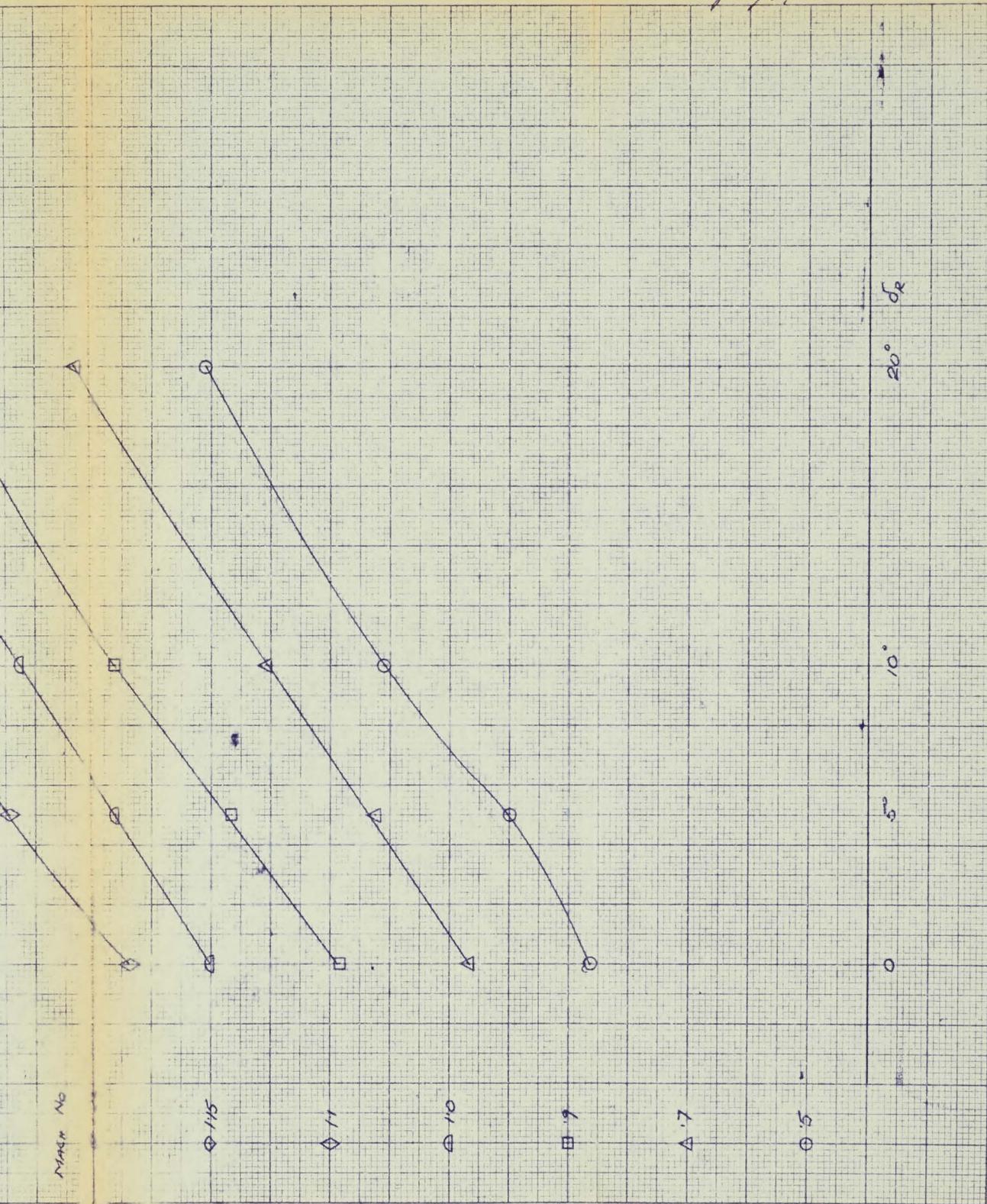
0



Mach Number

P/WT/30 43.2.2.

Sept / 54 Kinathambur



MARCH NO

115

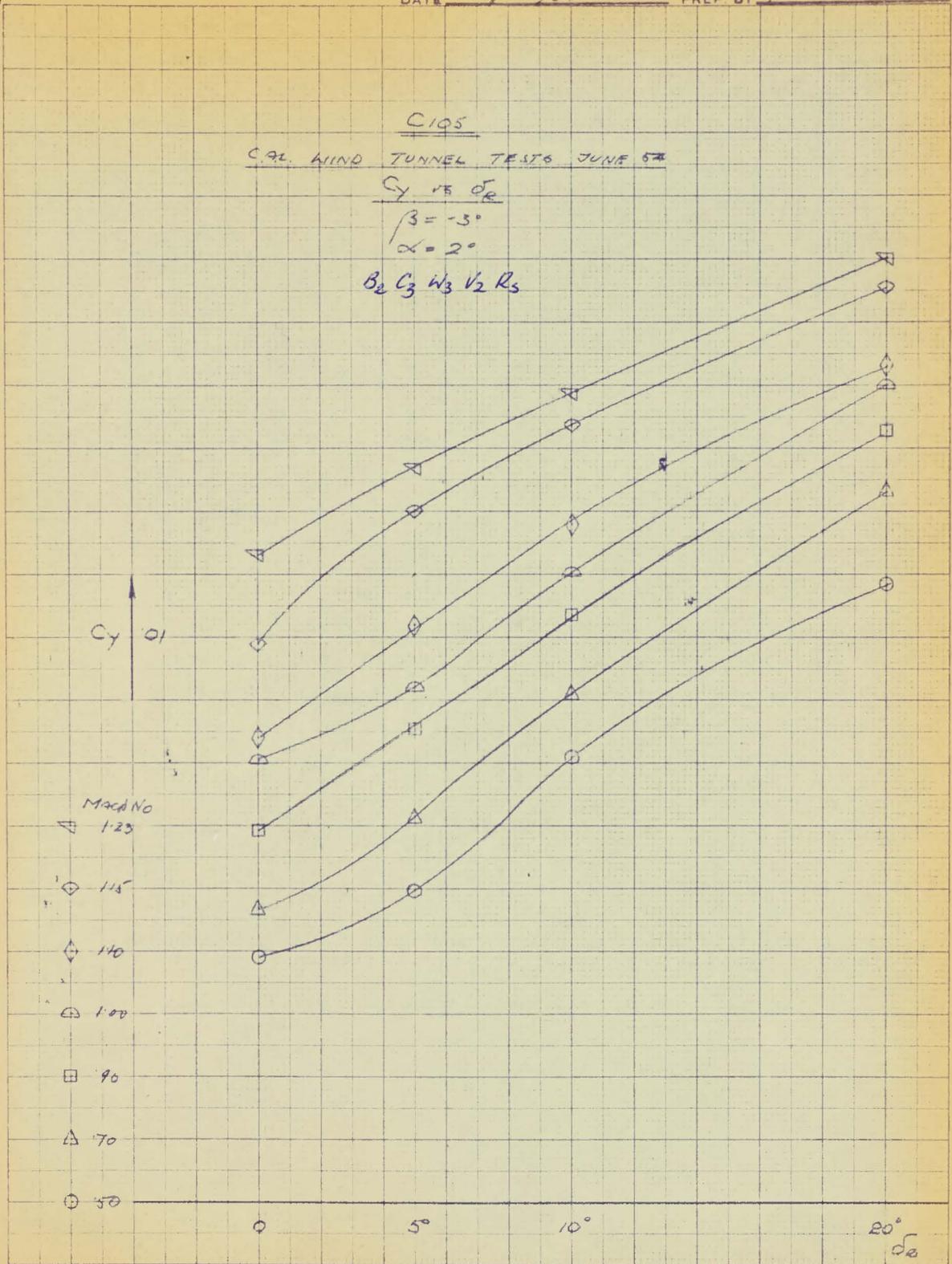
11

10

9

7

5



NACA REPORT NUMBER 35912

AIRCRAFT
A. U. W.

G105

COMPONENT

SHEET No. A 3.27
DATE Sept 1947

REPORT No. P/H.T./30.
PREP BY Kunakrasak

16 X 10 TO THE
457111, 457112, 457113

C105
 $C_{Y_{D_e}}$ vs MACH No
 $\beta = -3^\circ$
 B_2, C_3, W_3, V_3, R_3

α
○ -2°
△ 0
◇ 2°
□ 6°
D 10

$C_{Y_{D_e}}$
PER DEG

0005

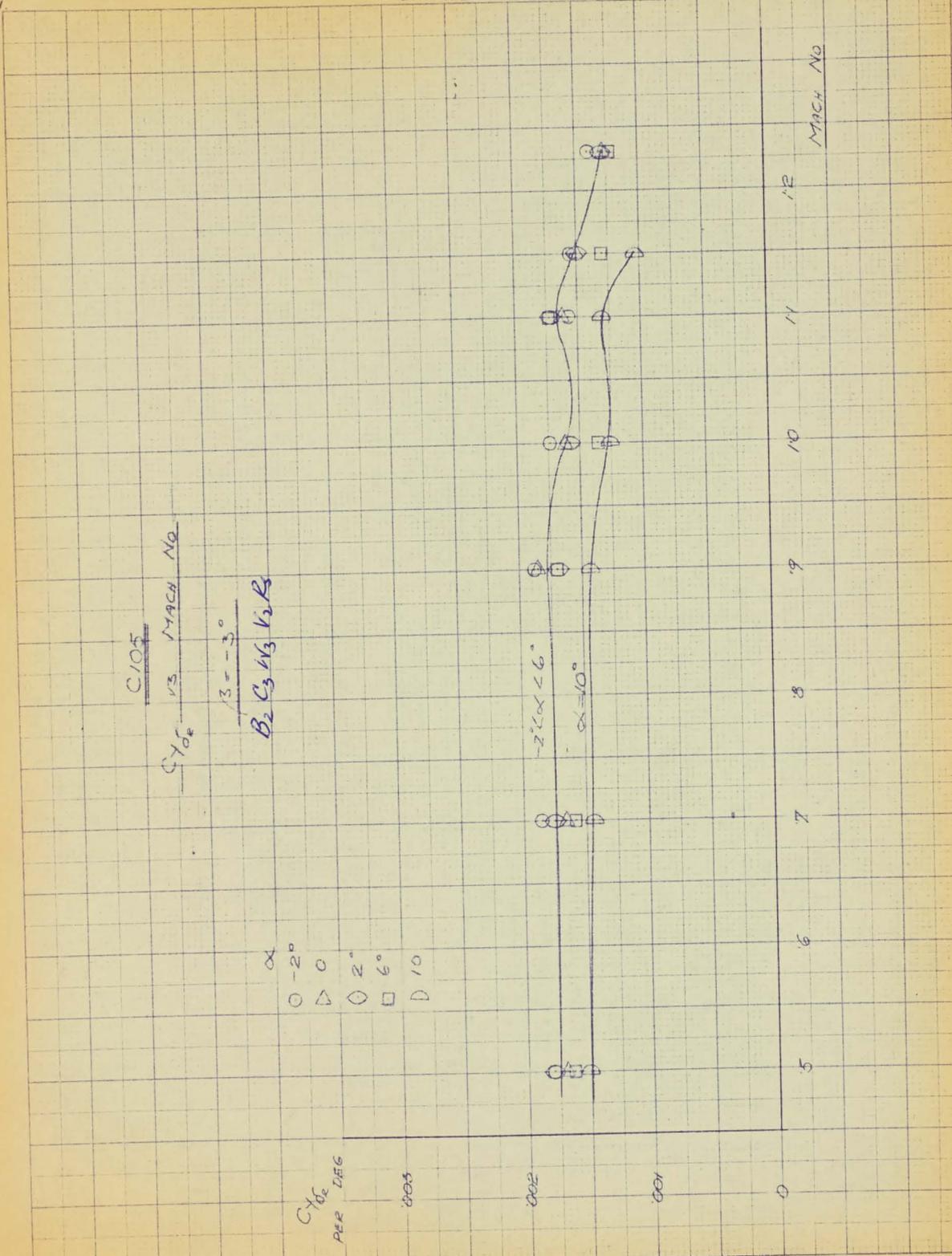
0002

0001

0

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

MACH No
12
11
10
9
8
7
6
5
0



AIRCRAFT
A U W

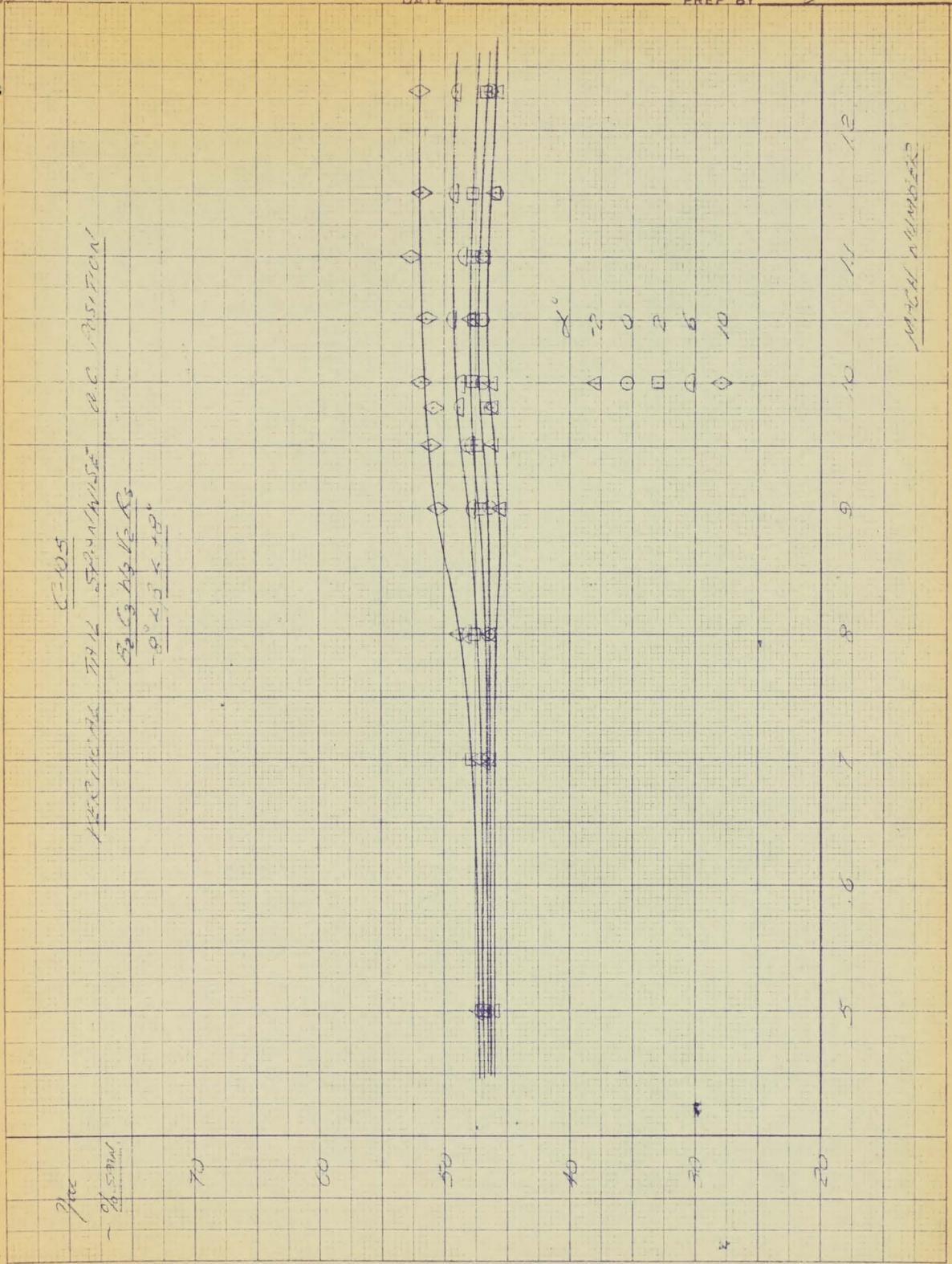
COMPONENT

SHEET No. 5313
DATE JULY 52

REPORT No P/H.T./30
PREP BY MARK

C-105
VERTICAL TAIL SPANWISE REC POSITION
32.5 INCHES
-8° 45' ± 18"

Free
- 0.5 INCH



FORM 17, 10-64 (REV. 8-1963) GPO
10-7-10 TO THE 24 AND 250 LINES ACCEPTED
WASH. D. C.

C105

P/W.T. 130

Sept 4/32, Kuntzhausen

5.3 2.2

K&E 10 X 10 TO THE INCH 359-12
KUPFFEL & ENGER CO. MADE IN U.S.A.

C105

CAL. WIND TUNNEL TESTS JUNE 57

η ac (%) vs. Mach No
COMPARISONS

- CONF B₂C₃R V F - FANED INTAKES α = 2°
- CONF B₂C₂V - OLD CANOPY - α = 0°

η ac (%)
% SPAN

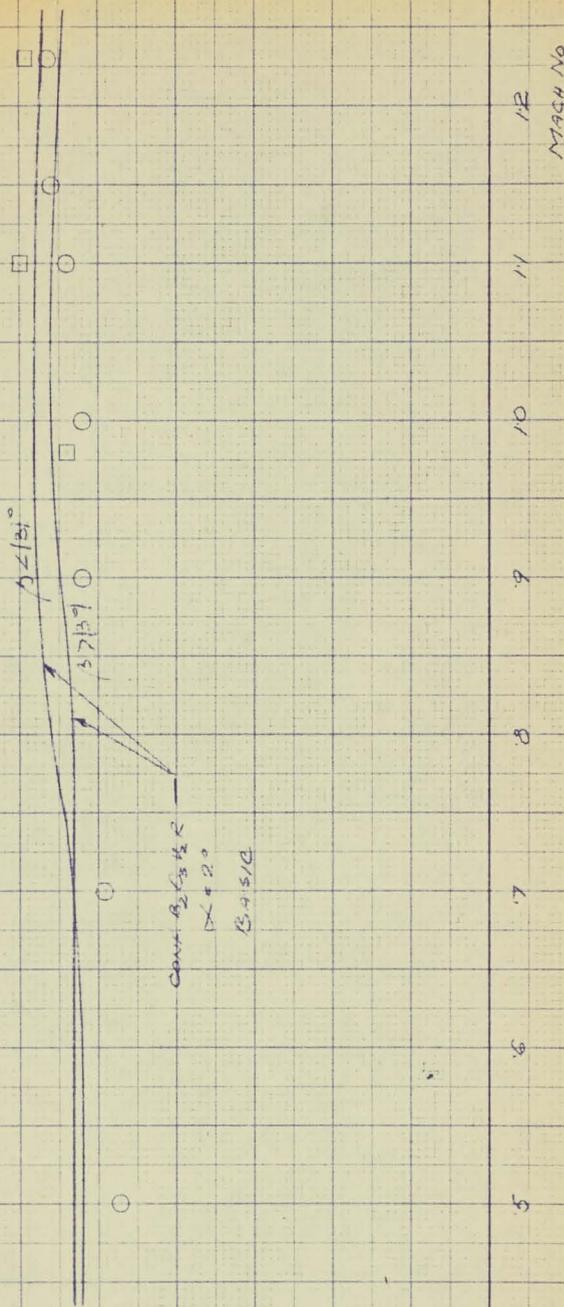
60

50

40

30

20



C105

Sept 1/53, Kueckhauw P/W.T. /30
5.3 2.2

K&E 10 X 10 TO THE 1/2 INCH 359-12
KEUFEL & EDGER CO. 4515 N. 13th St.

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

70.5 (u) P. MACH No
COMP. 4 RIGANS

- CONF B₂ C₃ R V F - FARED INTAKES $\alpha = 2^\circ$
- CONF B₂ C₂ V - OLD CANOPY - $\alpha = 0^\circ$

η a.c. (%)
% SPAN

60

50

40

30

20

5

6

7

8

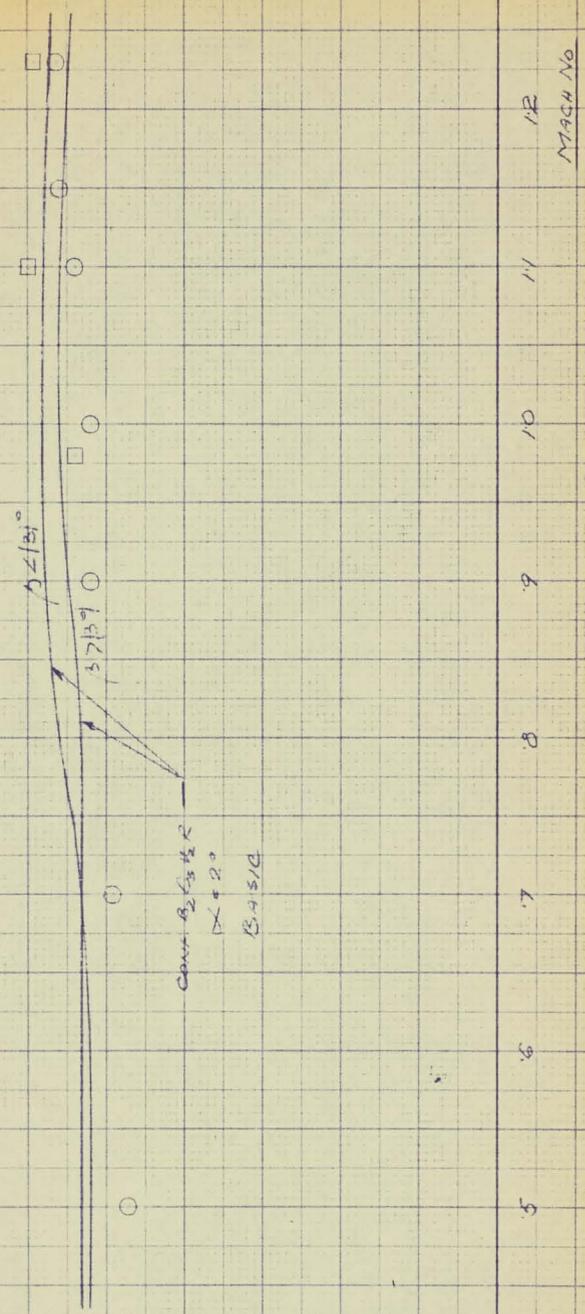
9

10

11

12

MACH No



July 24 Kuraflow hi.

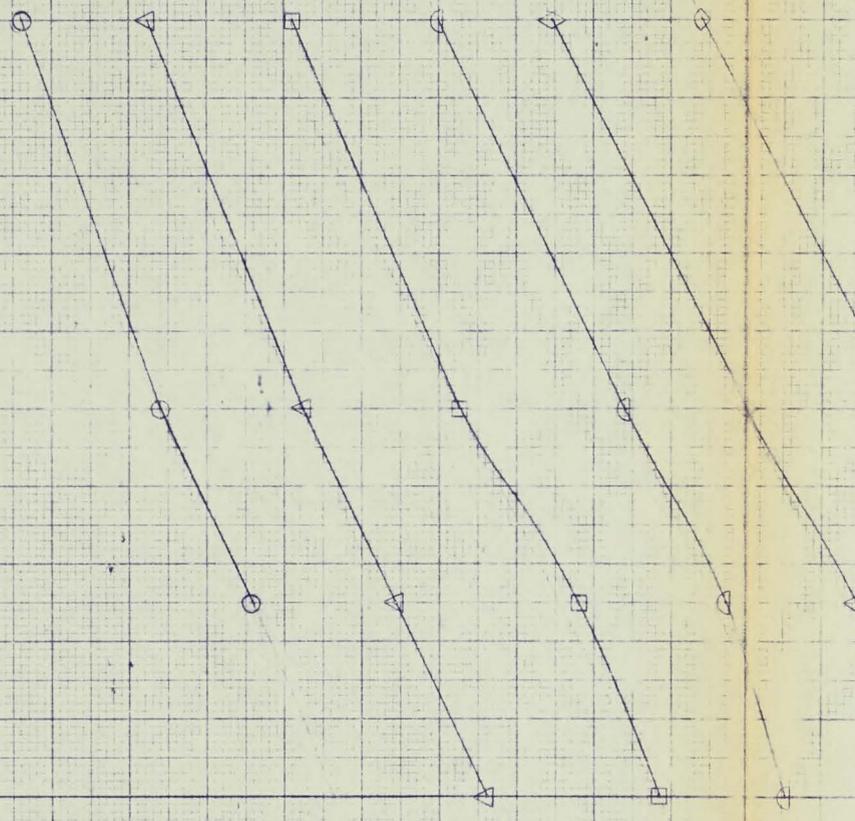
C105

C.A.L. MIND TUNNEL TESTS TOWNE STA.

$$\frac{C_{14} \text{ RS } \sqrt{8}}{\sqrt{3-30}}$$

$$\alpha = 6^\circ$$

B₂ C₃ W₃ K₃ R₃



MACH NO

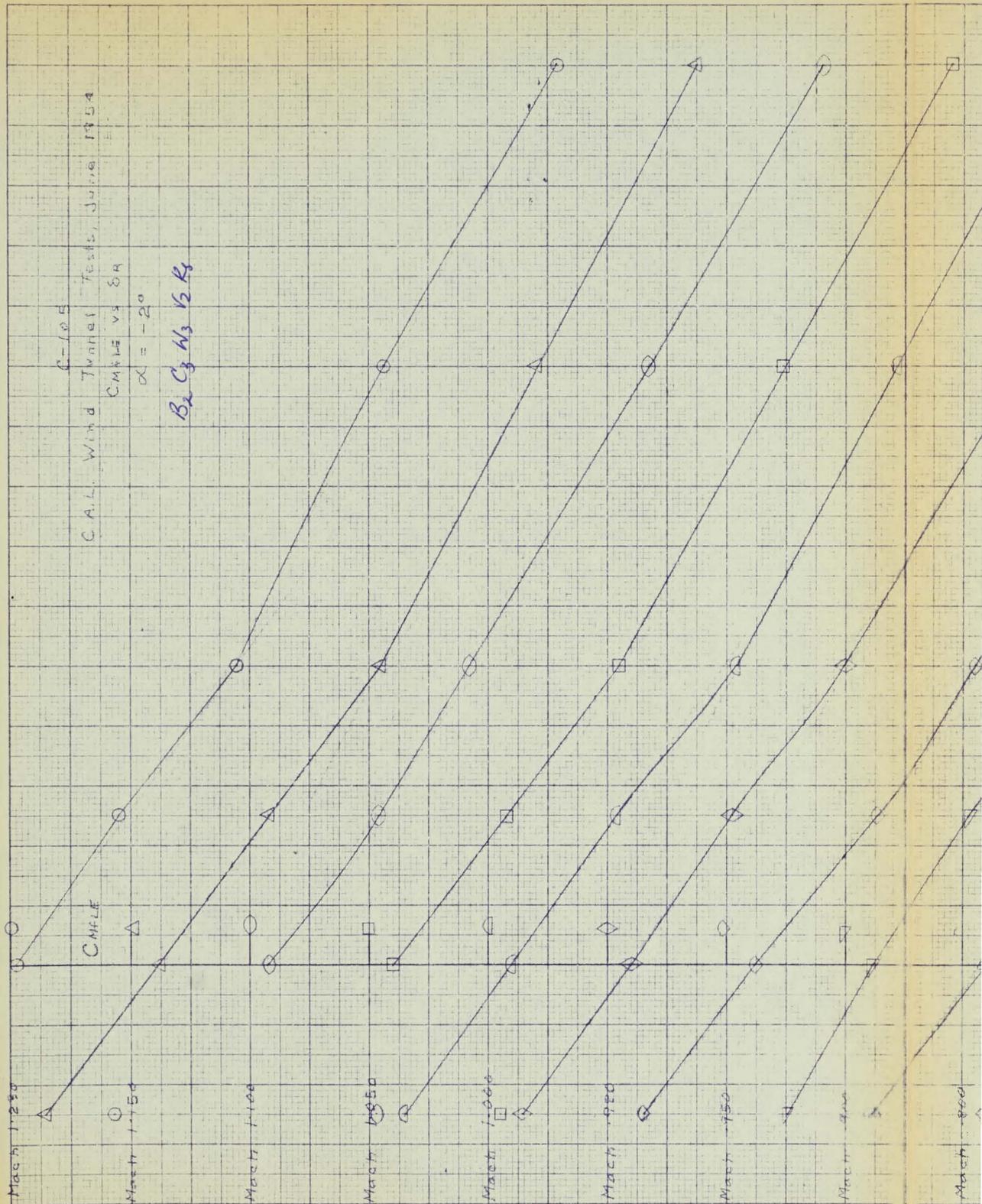
1.25 ○

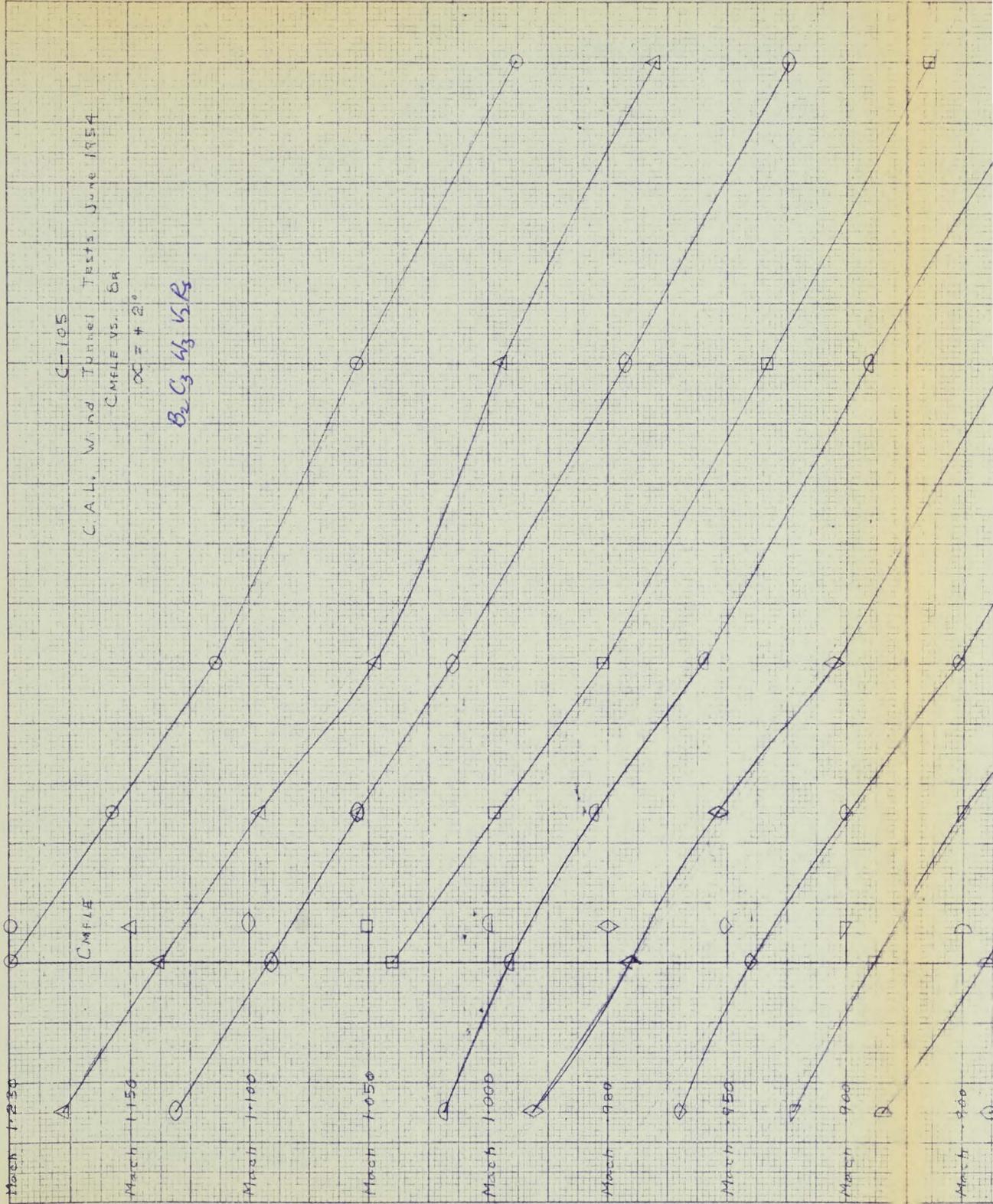
1.5 △

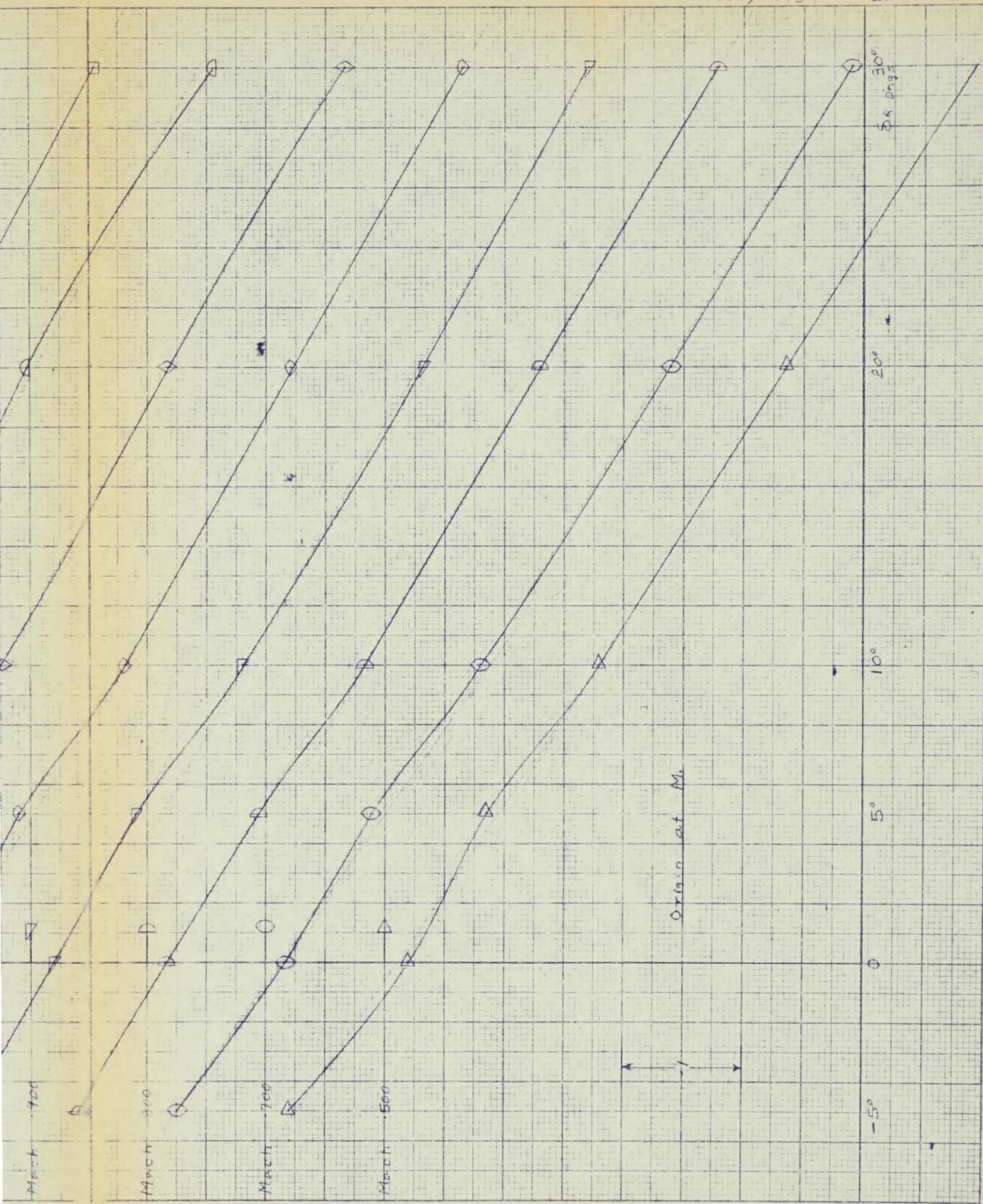
1.75 □

C-105
C.A.L. Wind Tunnel Tests, June 1954
CMFLC vs δR
 $\alpha = -20$

B₂ C₂ W₃ V₂ K₃







C-105
Wind Tunnel Tests, June 1954
Chordwise C.P. - Rudder Lead

B_1 Inside = 10°

$B_1 = -30$

B_2, C_3, W_3, V_3, B_3

C-105

α
 Δ -2°
 \square 0°
 \circ 2°
 \ominus 6°
 \diamond 10°

C.P.
% MAC

1.2

1.1

1.0

.9

.8

.7

.6

.5

.5

.6

.7

.8

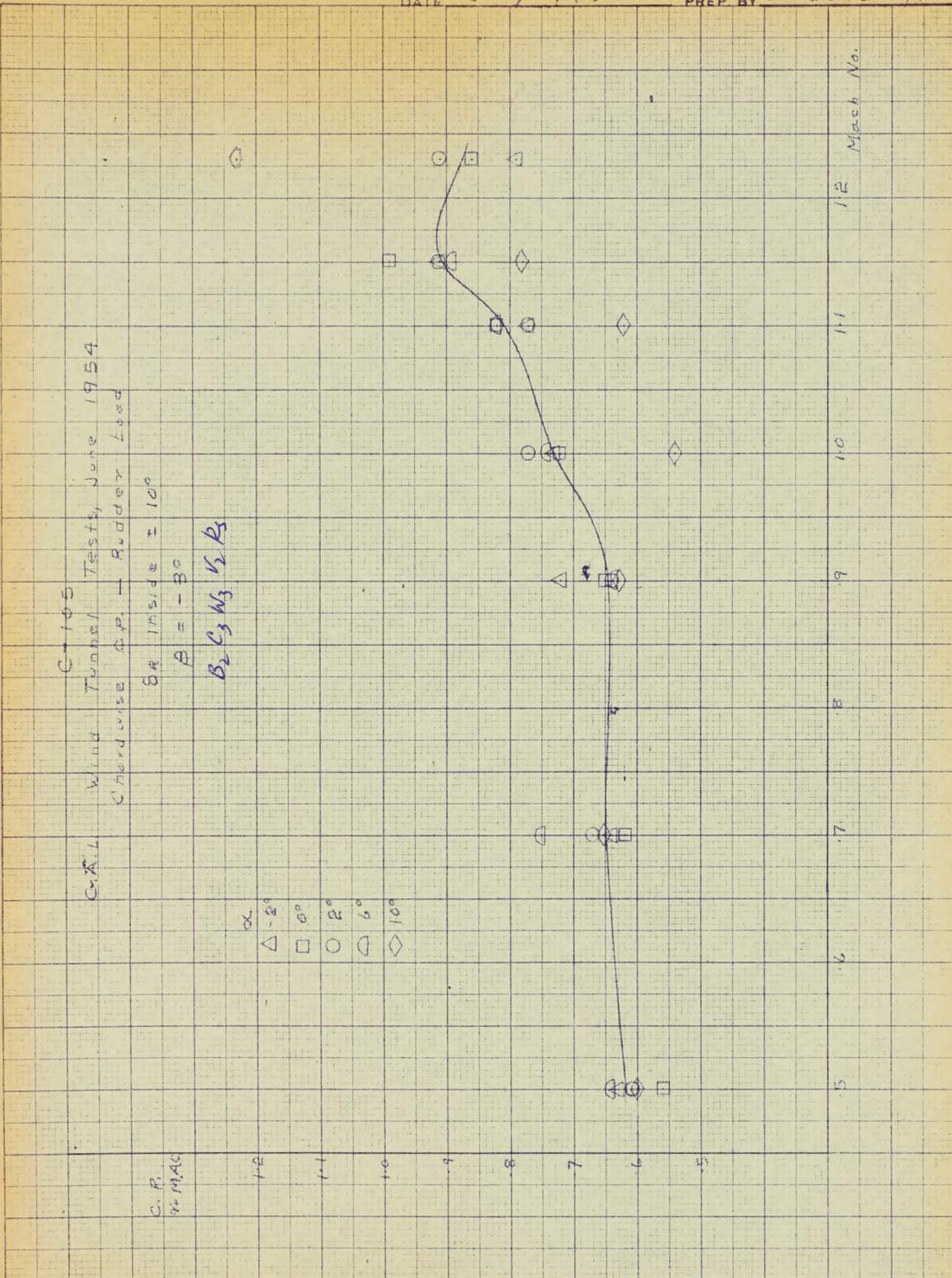
.9

1.0

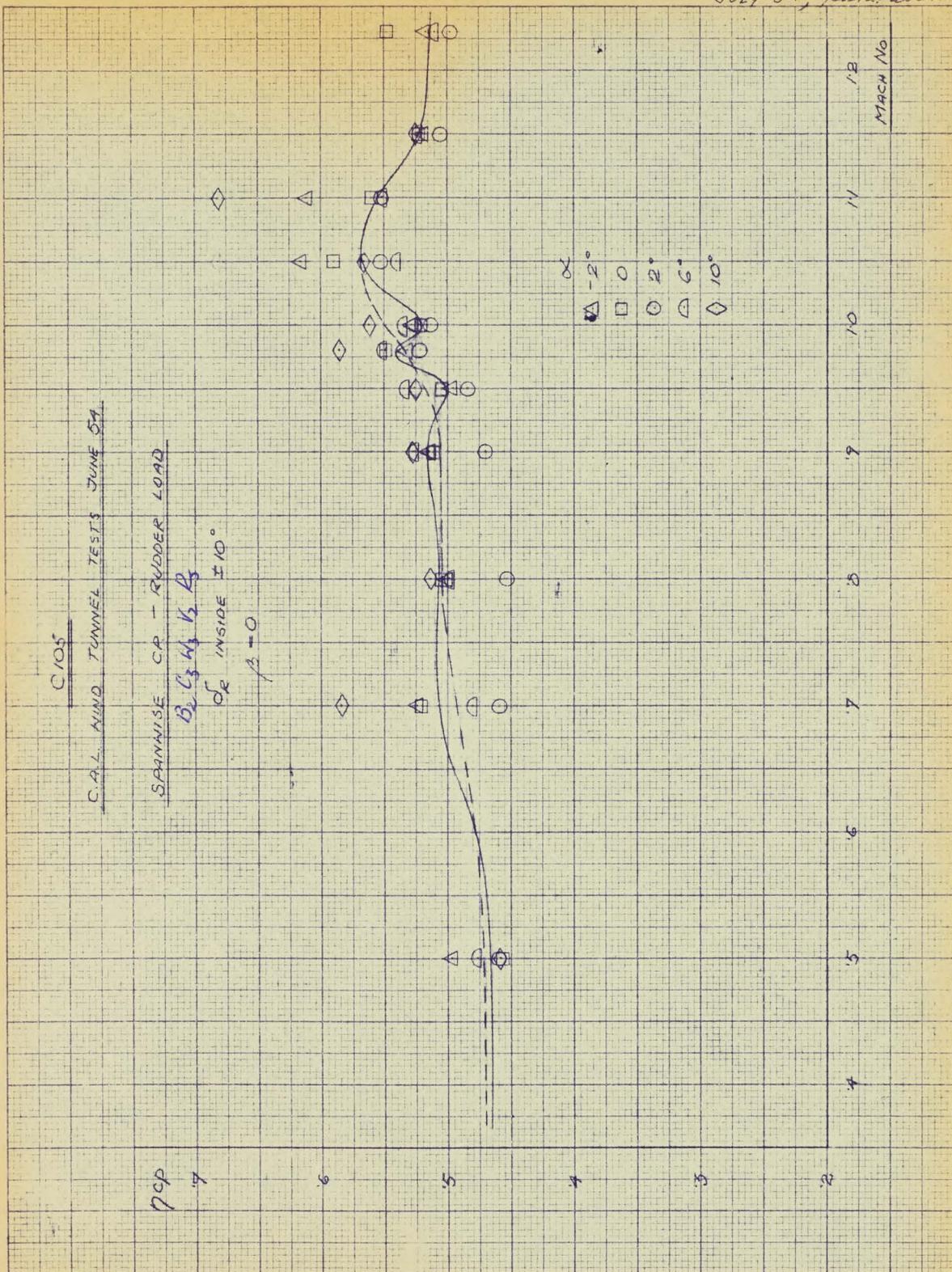
1.1

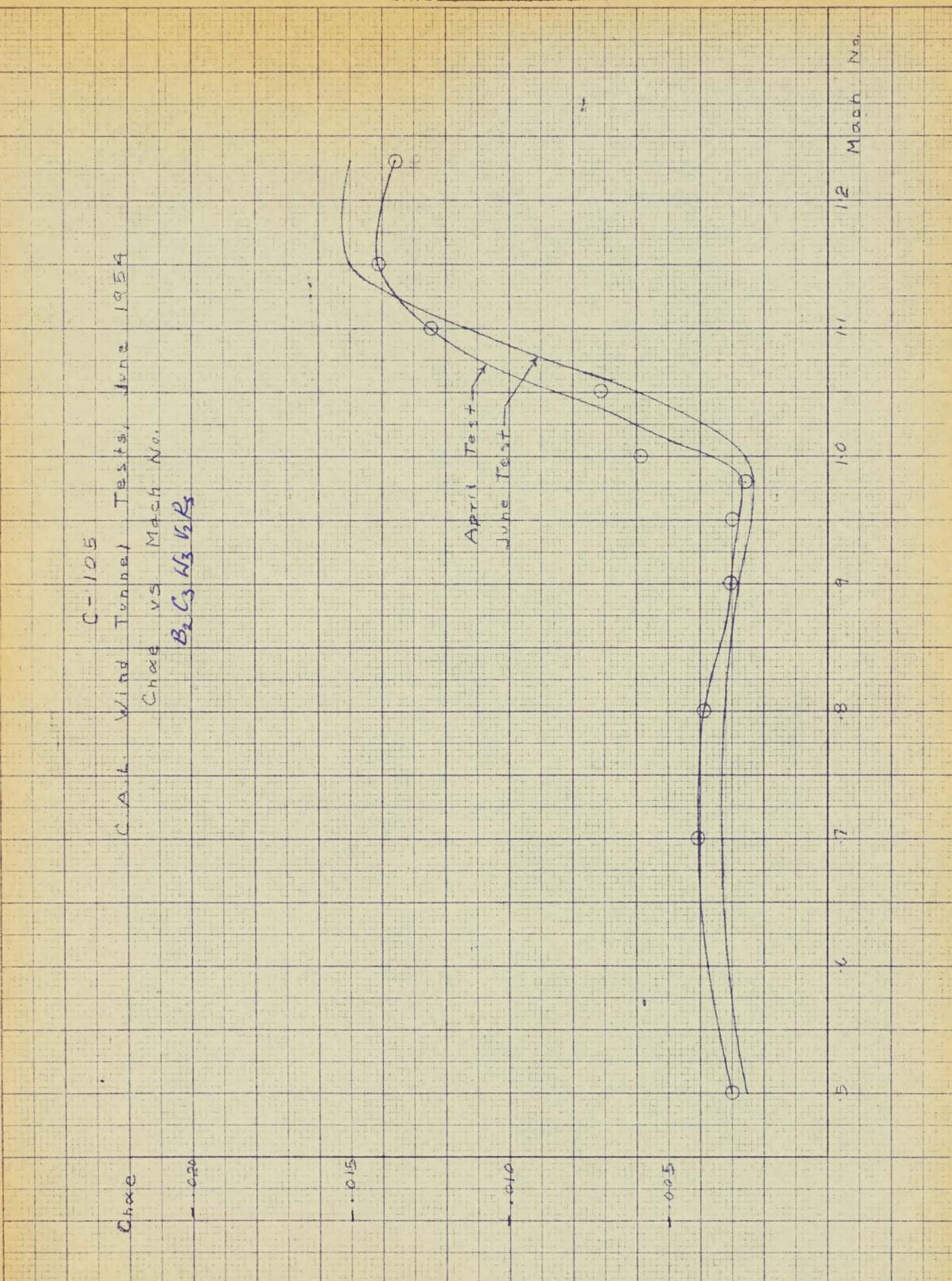
1.2

Mach No.



63.18 P/W.T./30
 July 54, Kusaflovsk





Oct/54

Kunelshovsk

C/O F
C.I.A.L. HIND TUNNEL TESTS JUNE 54

ELEVATOR HINGE MOMENT DUE TO SIDESHIP

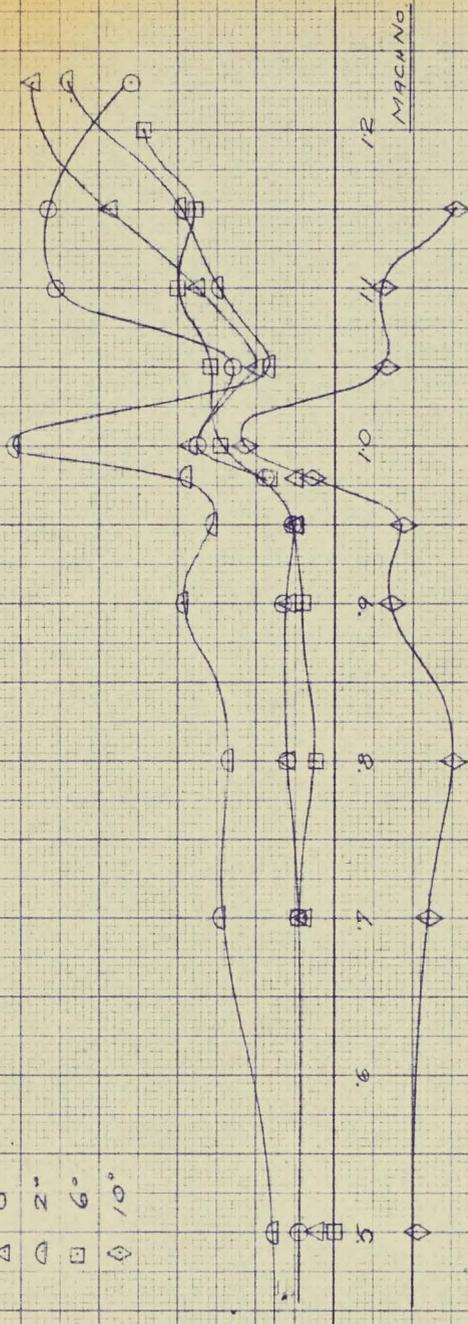
$\beta < 6^\circ$ for $\alpha = 2.5^\circ$ & 6°

$\beta < 12^\circ$ for $\alpha = 10^\circ$

B₀ C₁ H₂ K₂ R₂

- α
- \ominus -2°
- \triangle 0
- \cup 2°
- \square 6°
- \diamond 10°

- Che β
- PER DEG
- 008
- 006
- 004
- 002
- +002
- +004



C-105

C.A.L. Wind Tunnel Tests

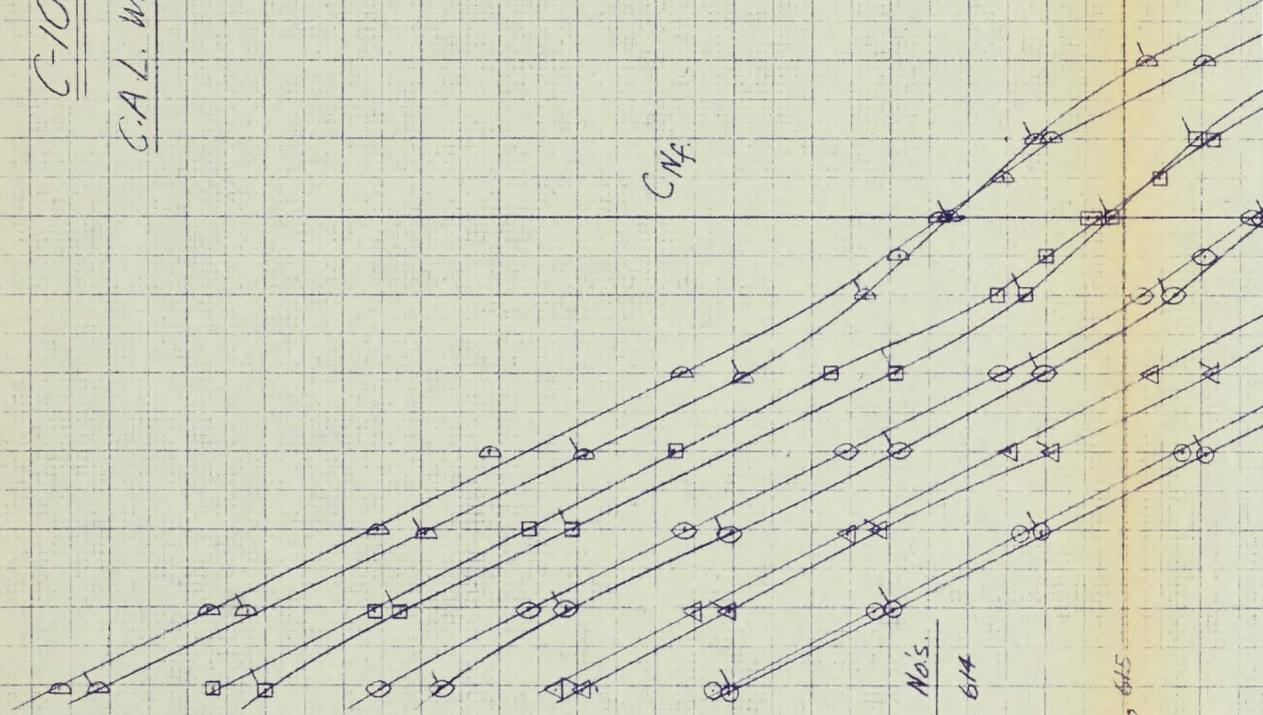
1954

C_{M4} vs β

$\alpha = 2^\circ$

$\delta_r = 0$

C_{M4}



Mach No. Run No's.
0.98 Δ, ∇ 716, 614

0.95 \square, \boxtimes 717, 615

