

QCX
Avro
CF105
P-WT-
98
c.2

CF-105

P/Wind Tunnel/98

N.A.F. LOW SPEED WIND TUNNEL TESTS

UNCLASSIFIED

JUL 11 1956

FINAL CORRECTED PLOTS.

CONFIDENTIAL

April 1956

FILE IN VAULT

NRC - CISTI
J. H. PARKIN
BRANCH

MAY 11 1995

ANNEXE
J. H. PARKIN
CNRC - ICIST

UNCLASSIFIED

Classification cancelled/changed to.....
by authority of..... (date).....
Signature *[Handwritten Signature]* Rank *[Handwritten Rank]*

UNCLASSIFIED



A. V. ROE CANADA LIMITED
MALTON - ONTARIO

UNCLASSIFIED

TECHNICAL DEPARTMENT (Aircraft)

AIRCRAFT: CF-105

REPORT NO. P/WIND TUNNEL/98

FILE NO.

NO. OF SHEETS

TITLE:

N.A.E. LOW SPEED WIND TUNNEL TESTS

JANUARY 1956

FINAL CORRECTED PLOTS

PREPARED BY Stability and Control Group DATE April '56

CHECKED BY J. Clark DATE April '56

SUPERVISED BY *H. M. Kowalski* DATE June '56

APPROVED BY *J. Chamberlain* DATE June '56

| ISSUE NO. | REVISION NO. | REVISED BY | APPROVED BY | DATE | REMARKS |
|-----------|--------------|------------|-------------|------|---------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

UNCLASSIFIED



AVRO AIRCRAFT LIMITED
MALTON ONTARIO

TECHNICAL DEPARTMENT

REPORT NO. P/WIND TUNNEL/98

SHEET NO. i

| | | | |
|--------------------|------------------|-------------|------|
| AIRCRAFT CF-105 | N.A.E. LOW SPEED | PREPARED BY | DATE |
| | | CHECKED BY | DATE |

UNCLASSIFIED

CONFIDENTIAL

TEST PERIOD I

PURPOSE

The tests in test period I were performed to determine the effect of ground on the low speed longitudinal characteristics, and the elevator effectiveness. A large proportion of the test period was used to determine strut tare and interference corrections for the three point support system.

CONFIGURATION

The model configuration used for these tests was as follows:

- B₂ - area rule body.
- V₁ - fin with separate rudder.
- W₁ - 3 $\frac{1}{2}$ % cambered wing.
- E₁₀ - 10% extended leading edge outboard of wing transport joint.
- N₅ - 5% deep notch at wing transport joint.
- D₈₋₄ - 8° leading edge droop inboard of notch, 4° droop outboard of notch.

The ground board was located .3 b/2, .4 b/2 and .7 b/2 from a point .097 below the MAC measured at .277

UNCLASSIFIED

CONFIDENTIAL



AVRO AIRCRAFT LIMITED
MALTON ONTARIO

TECHNICAL DEPARTMENT

REPORT No. P/WIND TUNNEL/98

SHEET No. ii

AIRCRAFT

CF-105

.07 SCALE MODEL

PREPARED BY

DATE

CHECKED BY

DATE

CONFIDENTIAL
UNCLASSIFIED

CONTROL DEFLECTION

Elevator: 10, 5, 2.5, 0, -2.5, -5, -10, -15, -20, -25, -30
Aileron : none
Rudder : none

SPEED RANGE

Mach number = .21
Reynolds number = 3.1×10^6

FINAL CORRECTED PLOTS

The curves presented in this report were based on data obtained in Runs 1 to 54. The plots included are listed in the index by section number and sheet number.

Corrections have been applied to account for strut tare and interference effects, wall and blockage effects. The data were reduced to .287 on the MAC, and .287, .317 and .357 at 8 inches above the fuselage datum which corresponds to the mean vertical C.G. position on the full scale aircraft.

CONFIDENTIAL
UNCLASSIFIED

INDEX

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1956)

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | | | | | | | | |
|------------------|------------------------|--------------------------------------------|---|---|---|---|---|---|---|---|----|-----------------------------------|----|----|----|----|-----------|----|----|----|----|
| | | U | | | | | | | | | | | | | | | | | | | |
| RUN No | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| SHEET No | | 1 | | | | | | | | | | 2 | | | | | 3 | | | | |
| δ_e° | | +10° +5 +2.5 0 -2.5 -5 -10 -15 -20 -25 -30 | | | | | | | | | | 0 -2.5 -5 -10 -20 -30 -30 -20° -1 | | | | | | | | | |
| SECTION | α° NOMINAL | -6° TO 35 | | | | | | | | | | -4 TO +10 | | | | | -6 TO +30 | | | | |
| | GROUND BOARD | ∞ | | | | | | | | | | 3 | | | | | 7 | | | | |
| | PLOT | | | | | | | | | | | | | | | | | | | | |
| 1 | C_L vs α | [Grid with diagonal lines] | | | | | | | | | | | | | | | | | | | |
| 2 | C_D vs C_L | | | | | | | | | | | | | | | | | | | | |
| 3 | C_M vs C_L | | | | | | | | | | | | | | | | | | | | |
| 4 | C_M vs α | | | | | | | | | | | | | | | | | | | | |
| 5 | C_M vs C_L | | | | | | | | | | | | | | | | | | | | |
| 6 | C_M vs α | | | | | | | | | | | | | | | | | | | | |
| 7 | C_M vs C_L | | | | | | | | | | | | | | | | | | | | |
| 8 | C_M vs α | | | | | | | | | | | | | | | | | | | | |
| 9 | C_M vs C_L | | | | | | | | | | | | | | | | | | | | |
| 10 | C_M vs α | | | | | | | | | | | | | | | | | | | | |

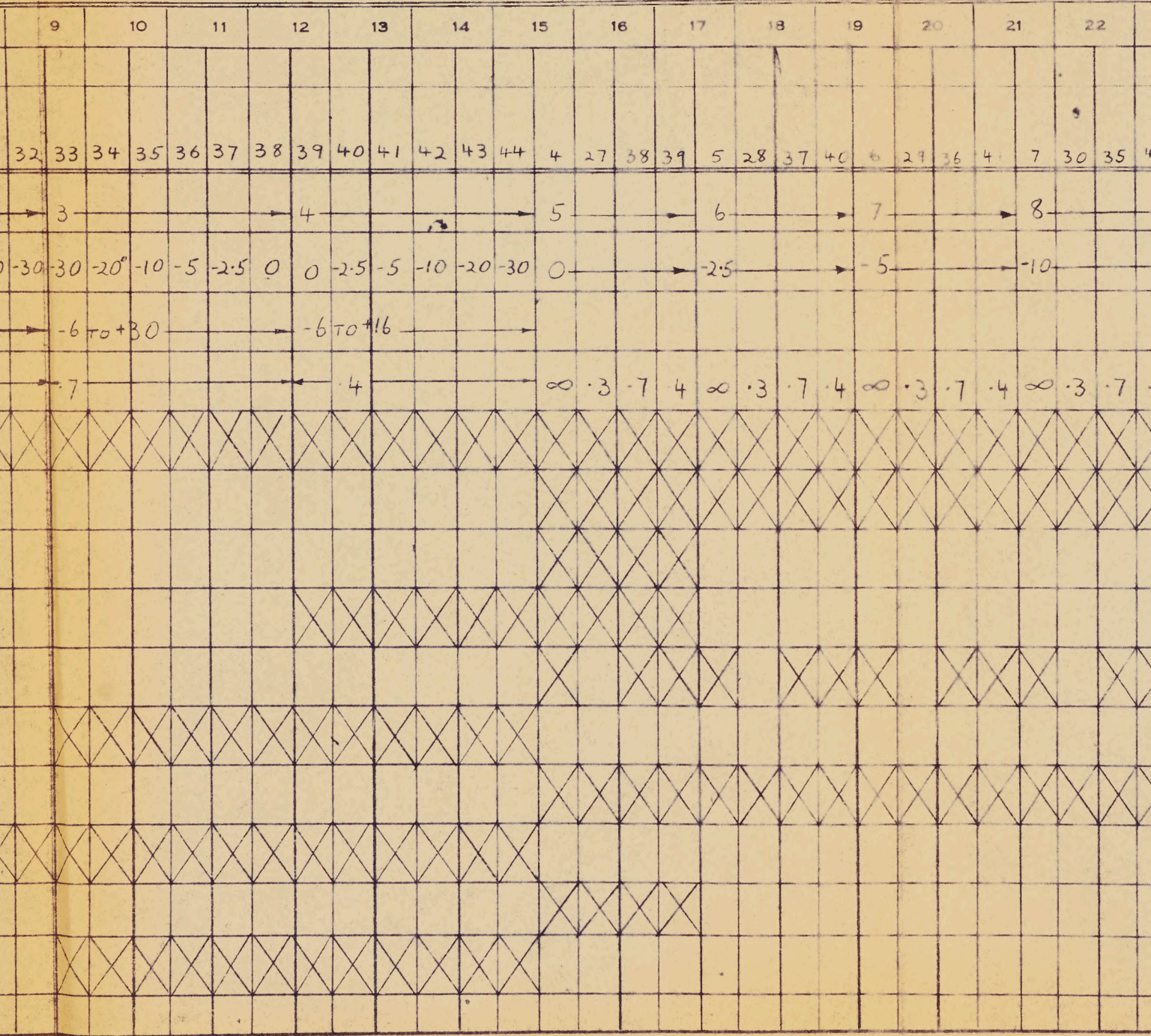
156)

C. G. POSITION
CASE HORIZONTAL VERTICAL

| | | |
|---|-----|----------------|
| 1 | .28 | M. A. C. |
| 2 | .28 | 8" ABOVE F. D. |
| 3 | .31 | 8" ABOVE F. D. |
| 4 | .33 | 8" ABOVE F. D. |
| 5 | .35 | 8" ABOVE F. D. |

AVRO AIRCRAFT
MALTON, ONT.
ENGINEERING D

| | |
|----------------|----|
| AIRCRAFT | .0 |
| WEIGHT | .0 |
| C. G. POSITION | .5 |



ION
 VERTICAL
 M. A. C.
 8" ABOVE F.D.
 8" ABOVE F.D.
 8" ABOVE F.D.
 8" ABOVE F.D.

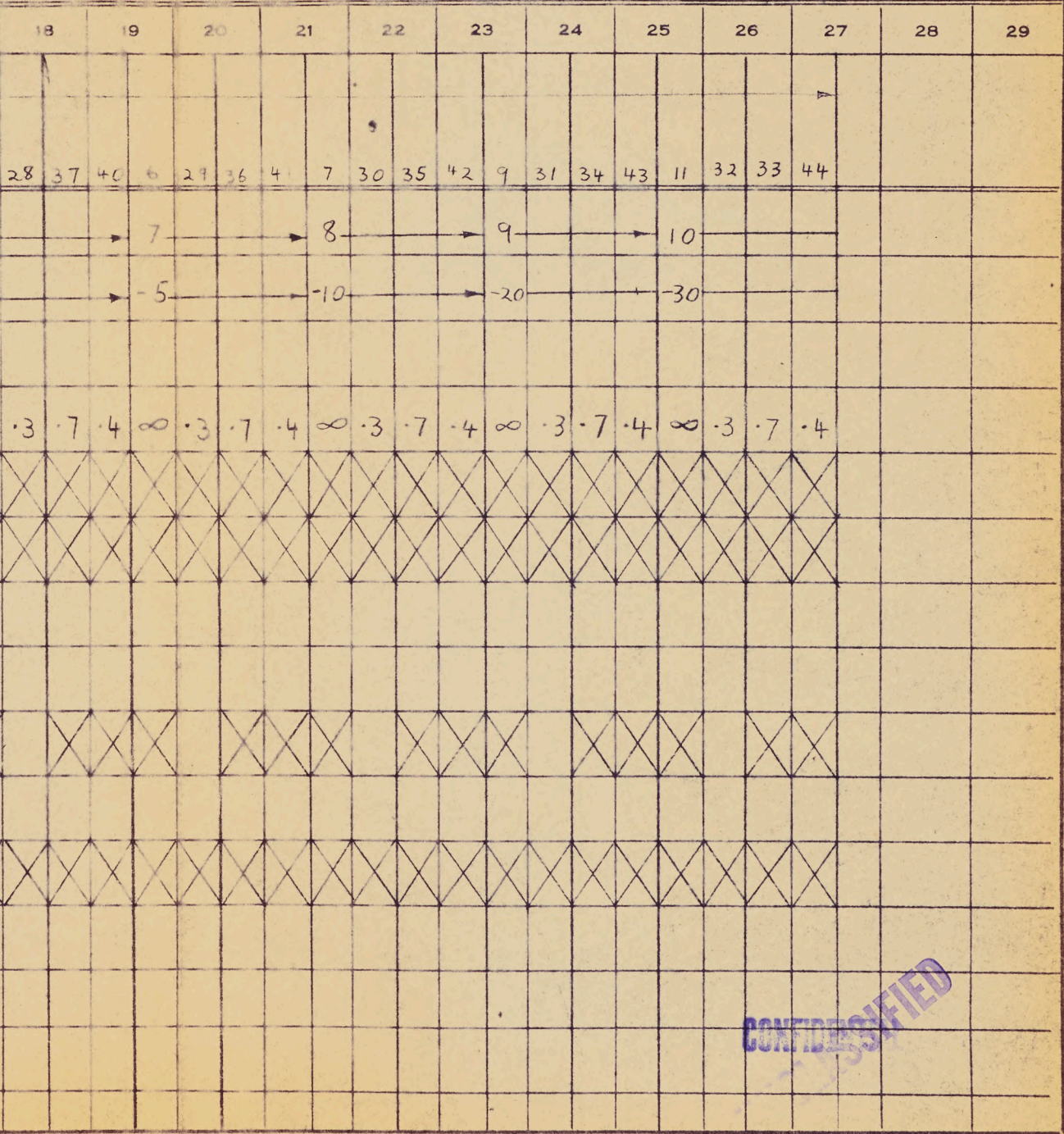
AVRO AIRCRAFT LIMITED

MALTON, ONTARIO
 ENGINEERING DIVISION

REPORT NO. P/WT/98
 SHEET iii
 DATE APRIL 1956
 PREPARED BY E. R. Fish

AIRCRAFT C-105
 WEIGHT 07 MODEL
 G POSITION SEE LEFT

CONFIDENTIAL
 UNCLASSIFIED



CONFIDENTIAL

C 105

CAL W/T TESTS JUNE 55 (COMPARISON OF TUNNELS)

HIGH REYNOLD'S NO HIGH α

CL VS α MACH .50

CONFIGURATION B₂ Y W E₁ NS D₈:4'

RUNS 630-635

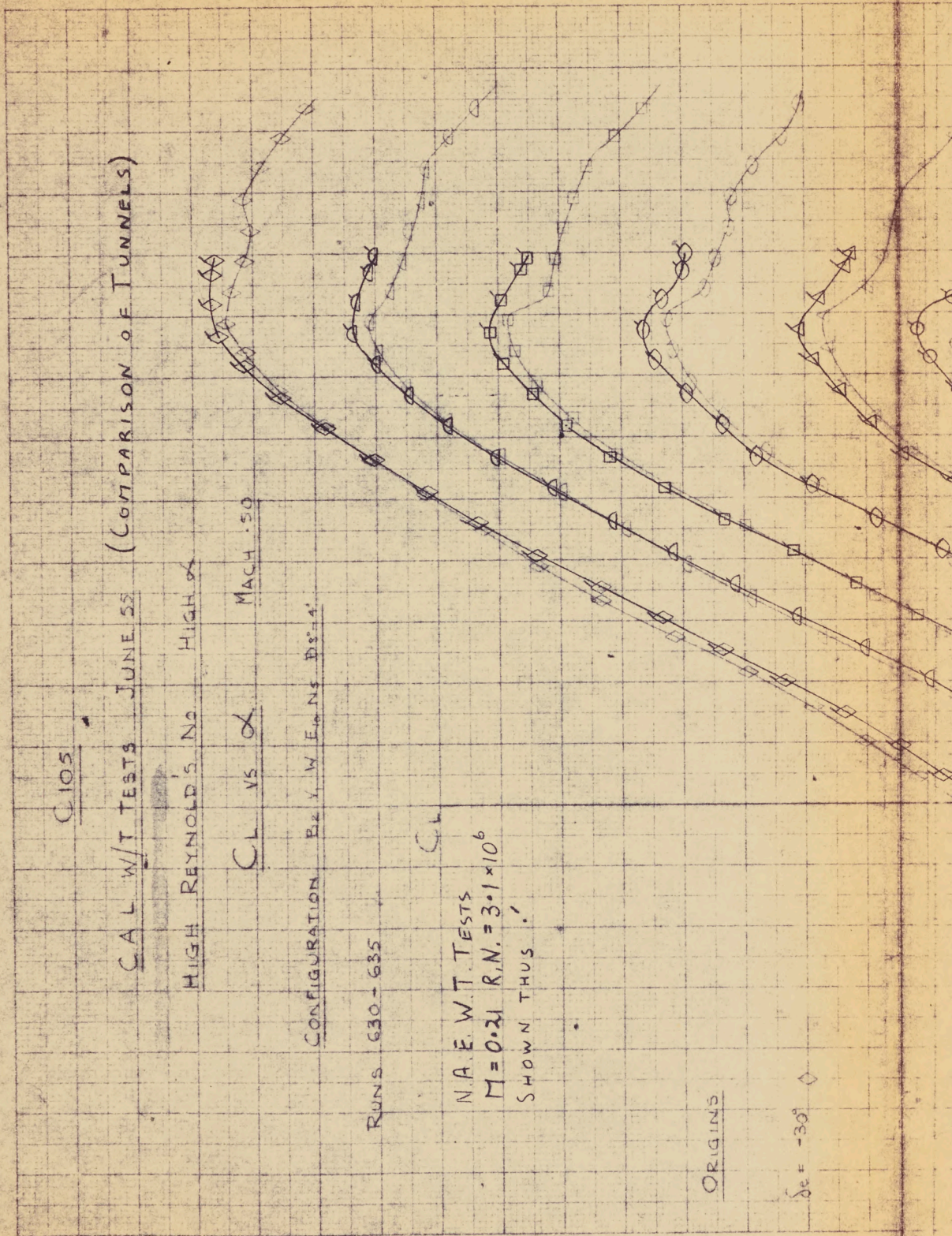
N.A.E. W.T. TESTS

M = 0.21 R.N. = 3.01×10^6

SHOWN THUS

ORIGINS

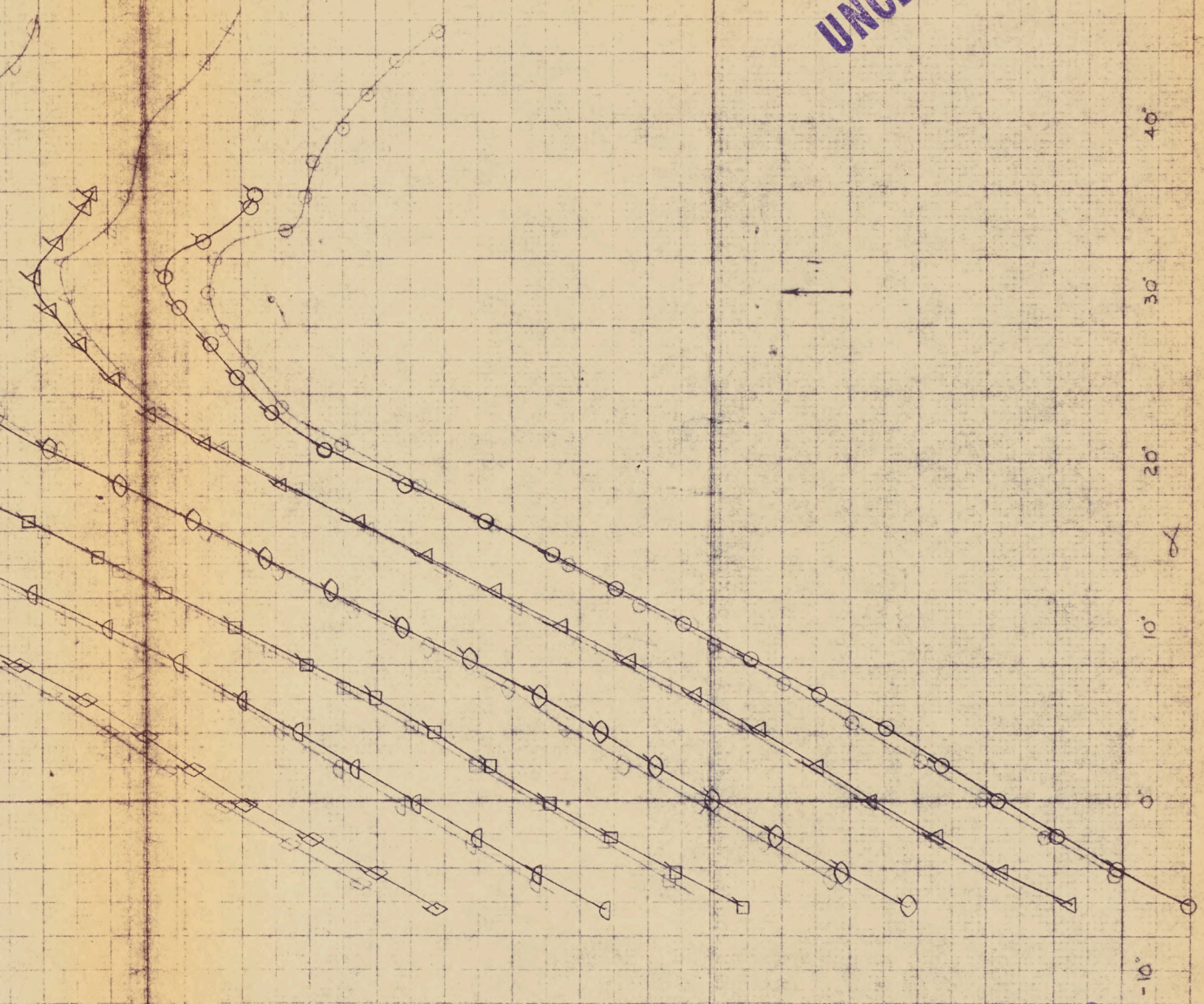
$\delta_e = -30^\circ$



CONFIDENTIAL
UNCLASSIFIED

P/MT 80
98

1-1A
5



$\delta_e = -30$

$\delta_e = -20$

$\delta_e = -10$

$\delta_e = -5$

$\delta_e = 0$

$\delta_e = 10$

UNCLASSIFIED

C-105

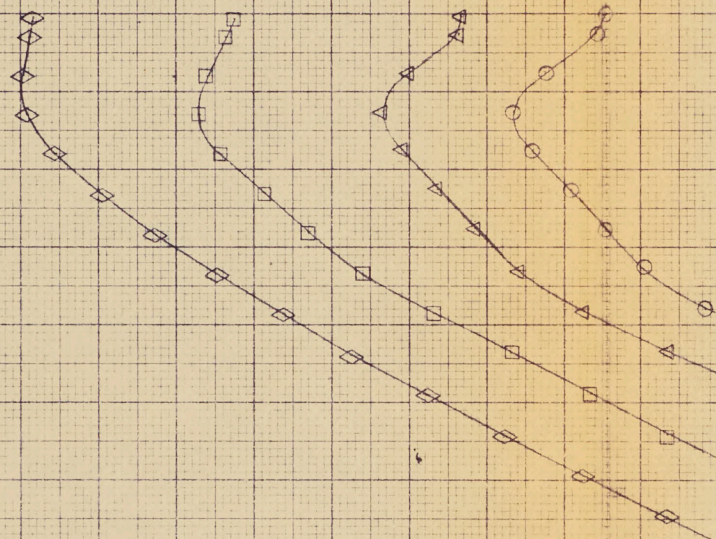
N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1956)

C_L vs α

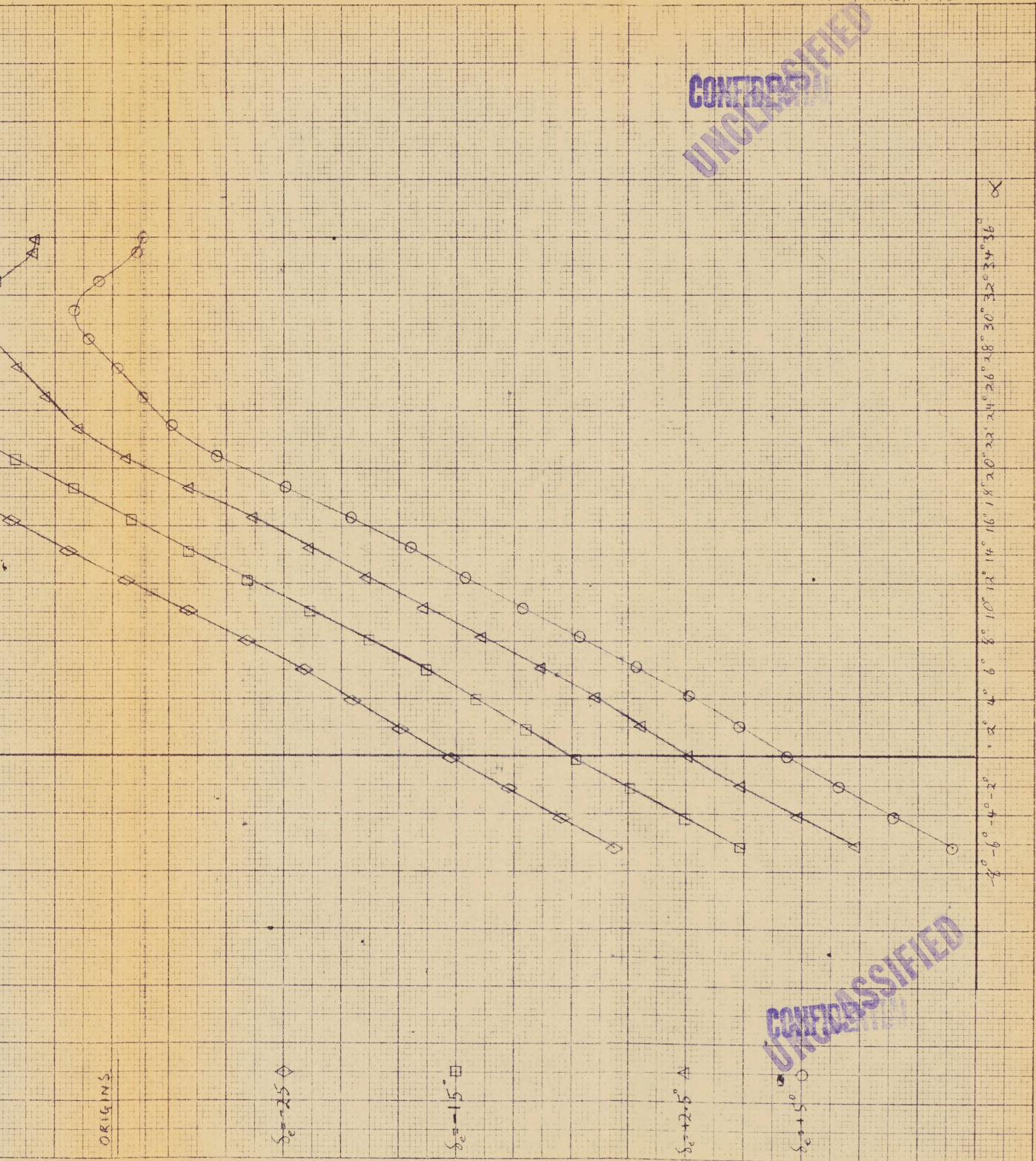
C_L

α

ORIGINS



CONFIDENTIAL
UNCLASSIFIED



CONFIDENTIAL
UNCLASSIFIED

C_L

C-105

C_L vs α + dc

NRC WT TESTS

NO GROUND BOARD

1.0

0

0

4

2

0

2

4

6

8

20°

16°

14°

12°

10°

8°

6°

4°

2°

0°

-2°

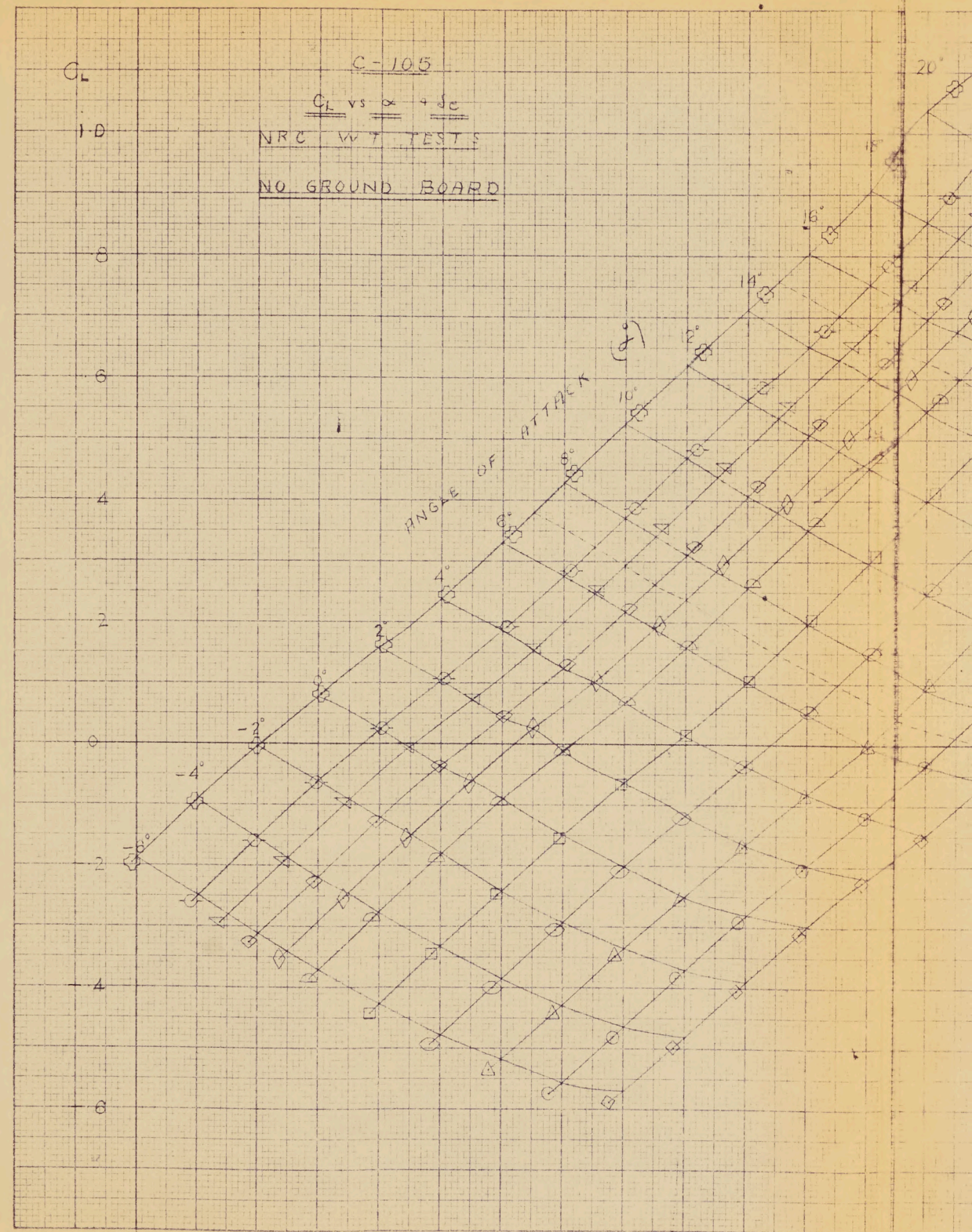
-4°

-6°

-8°

-10°

-12°

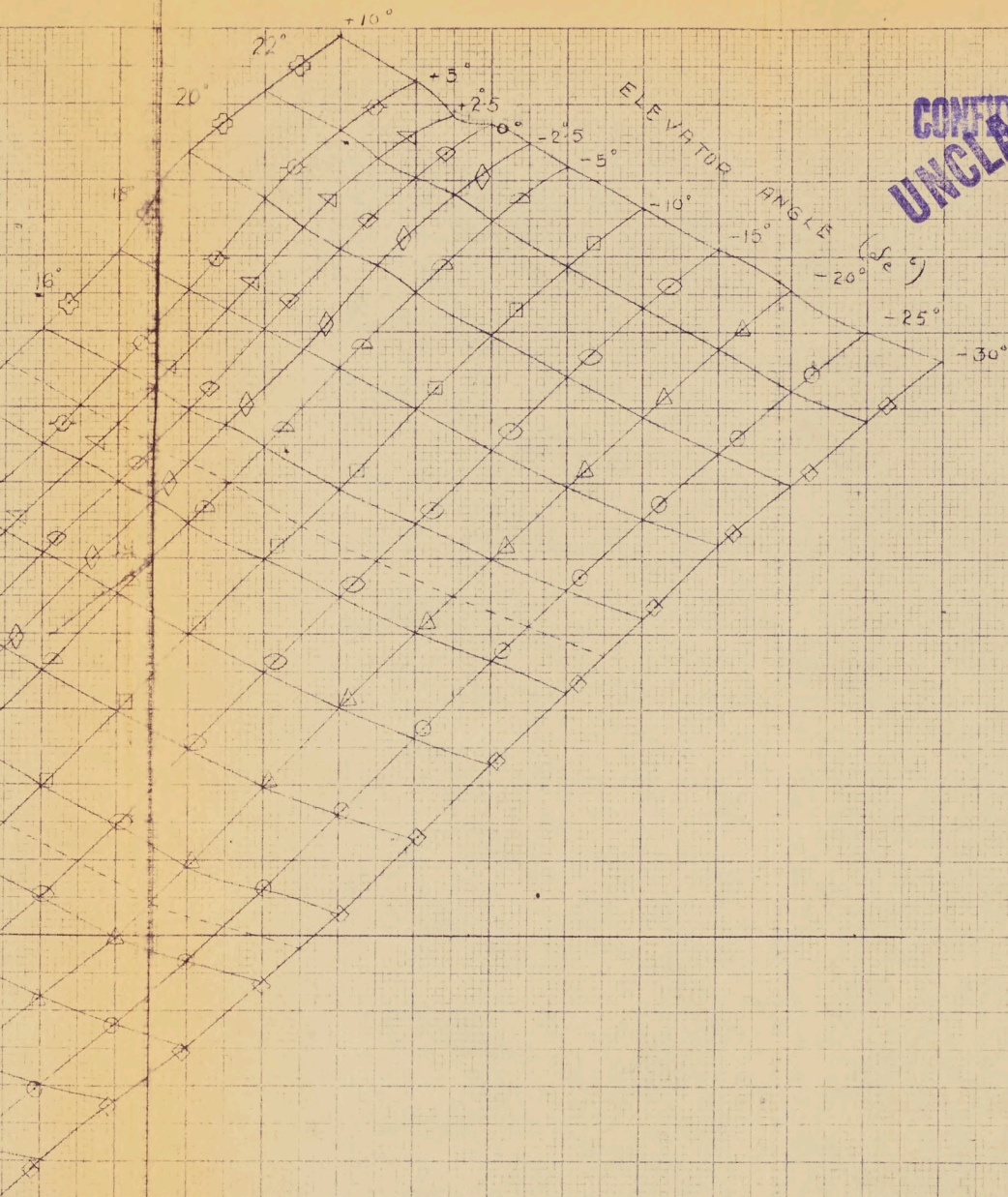


10 X 10 TO THE 1/2 INCH 359-11L
KUFFEL & ESSER CO. MADE IN U.S.A.

P/W/T/98

YBR mar 56

1.1c



CONFIDENTIAL
UNCLASSIFIED

CONFIDENTIAL
UNCLASSIFIED

CL

C-105

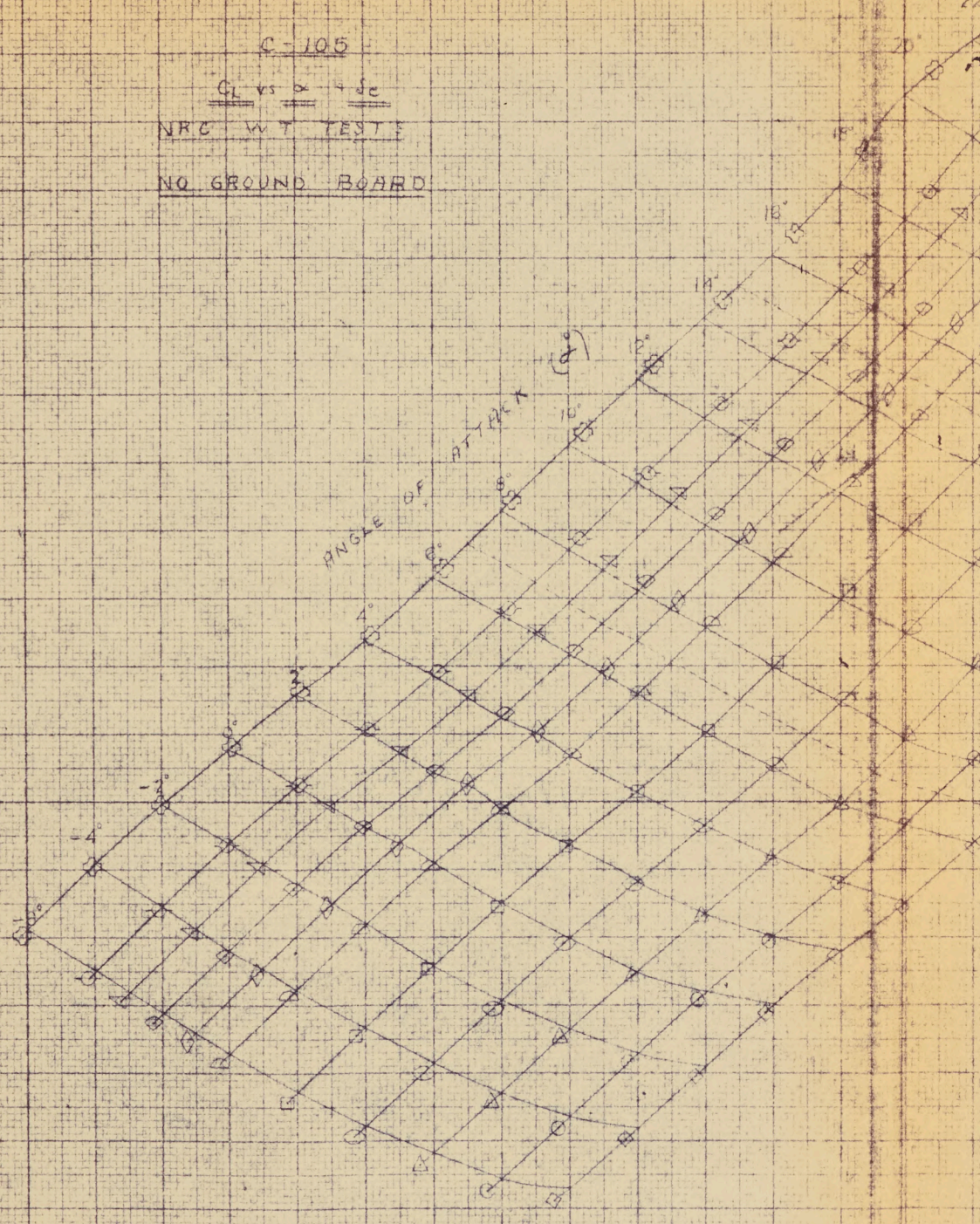
CL vs α + δ_c

NRE WY TESTS

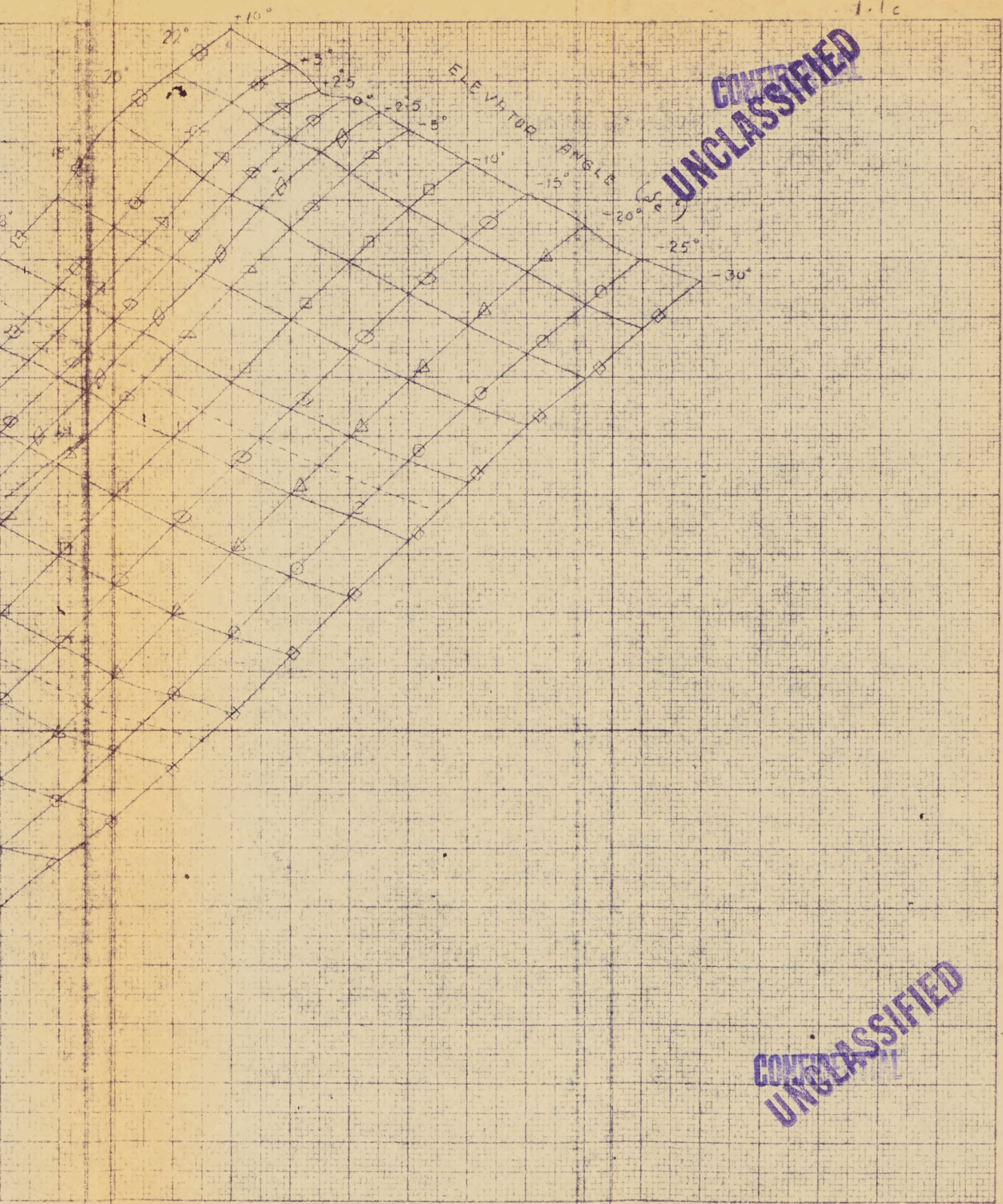
NO GROUND BOARD

10
8
6
4
2
0
-2
-4
-6

ANGLE OF ATTACK (α)



K&E 10 X 10 TO THE 1/2 INCH 359-11L MADE IN U.S.A. KEUFFEL & ESSER CO.



CONFIDENTIAL
UNCLASSIFIED

CONFIDENTIAL
UNCLASSIFIED

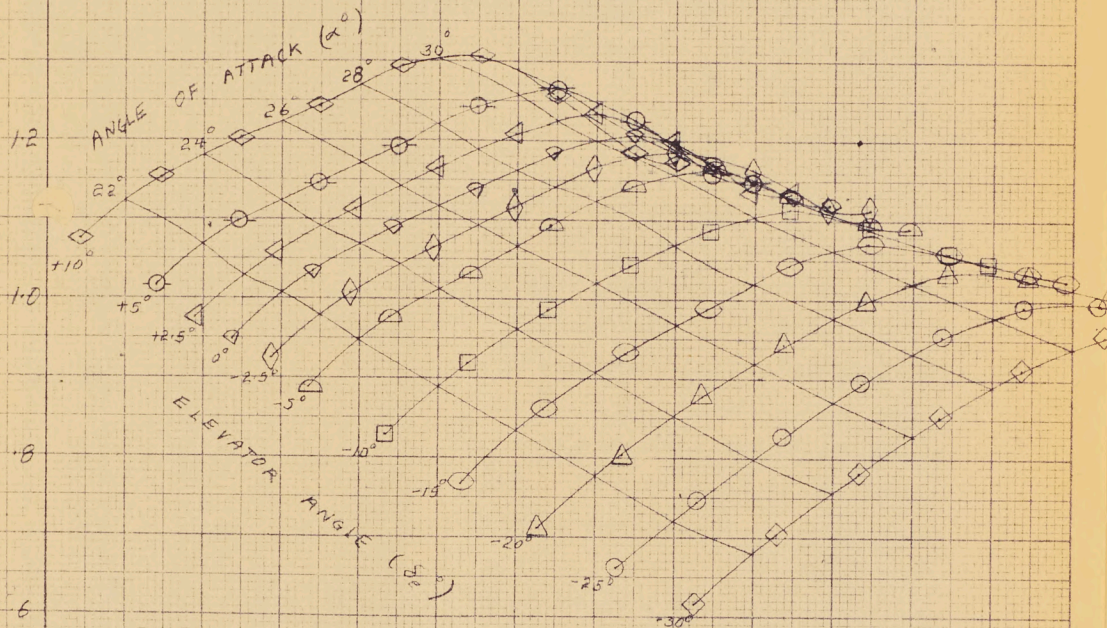
C-105

C_L VS $\alpha + \delta_e$

N.R.C. W.T. TESTS

NO GROUND BOARD

C_L 1.4



CONFIDENTIAL
UNCLASSIFIED

CONFIDENTIAL
UNCLASSIFIED

P/WT/98

1.2

E. R. F. M. May 1957

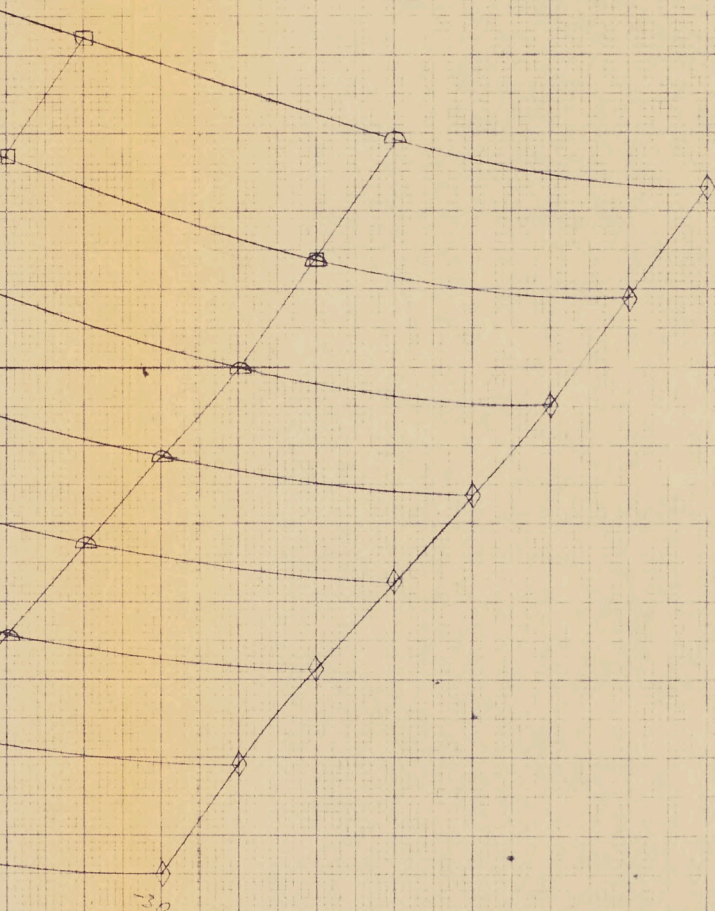
C-105

NAE LOW SPEED W/T TESTS

C_L vs α AND δ_c

GROUND BOARD = $-3 \frac{1}{2}$

CONFIDENTIAL
UNCLASSIFIED



CONFIDENTIAL
UNCLASSIFIED

CL

1.3

1.2

1.0

.8

.6

.4

.2

0

-.2

-.4

-.6

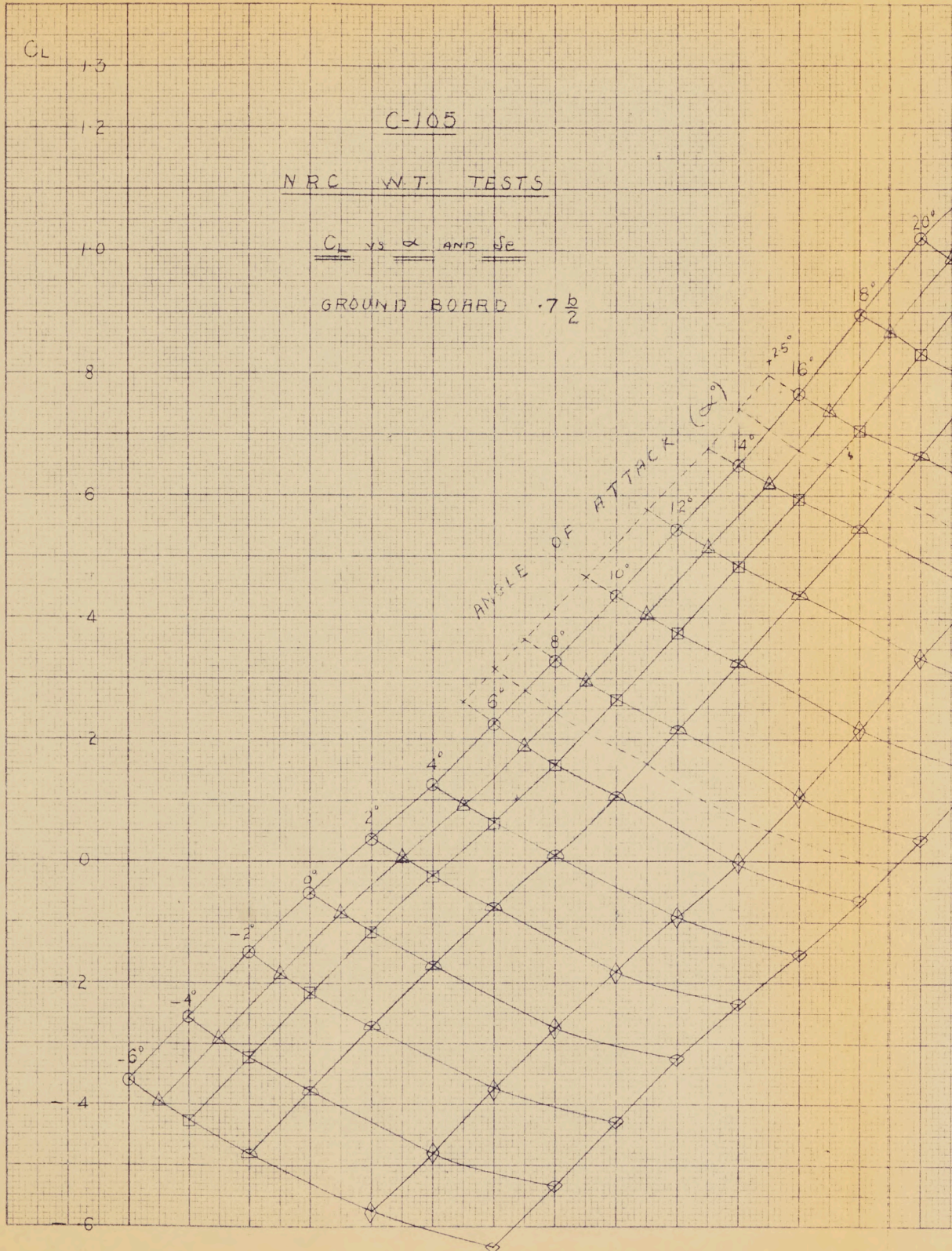
C-105

NRC W.T. TESTS

CL vs α AND SE

GROUND BOARD $.7 \frac{b}{2}$

ANGLE OF ATTACK (α°)



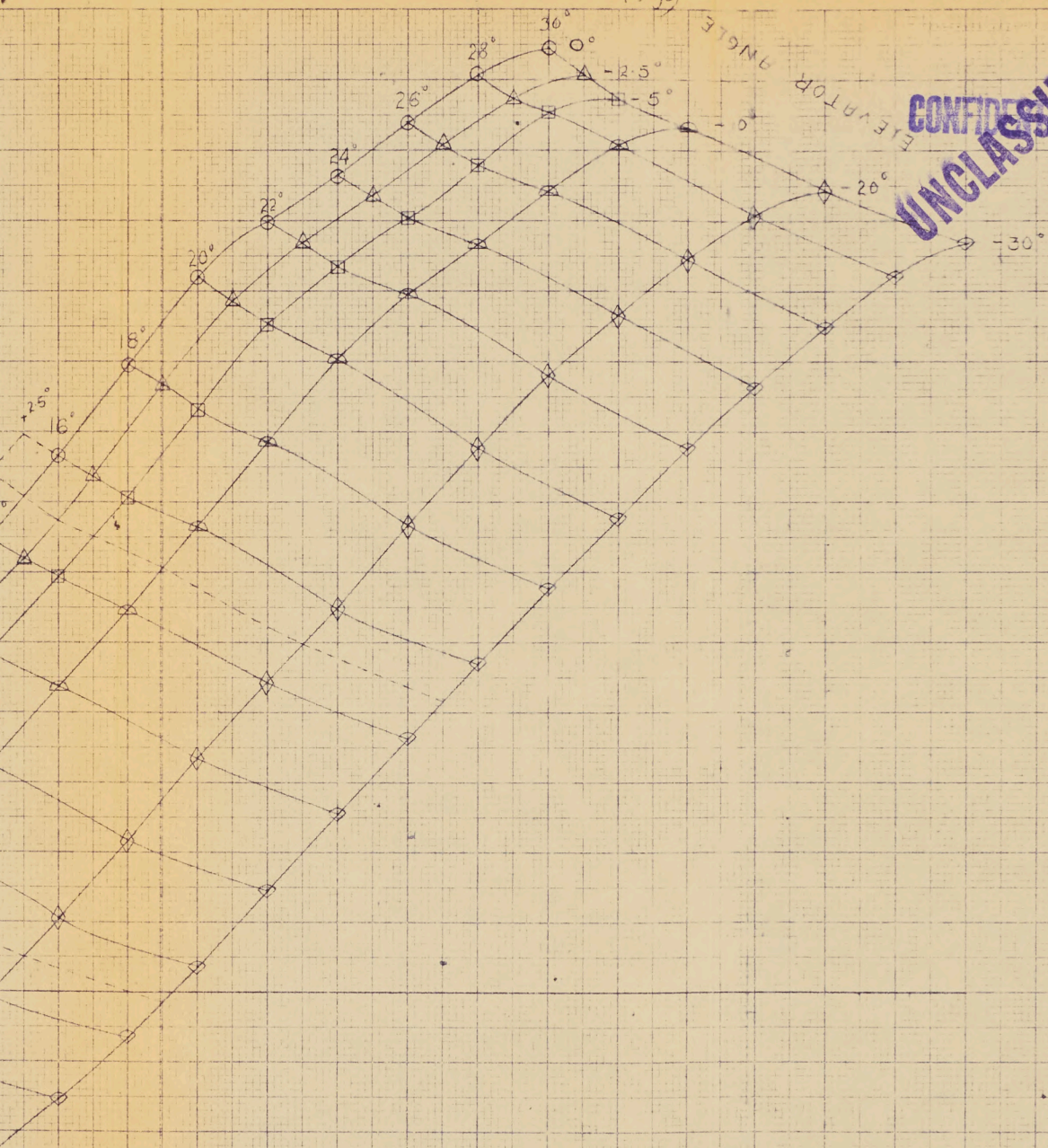
10 X 10 TO THE 1/2 INCH KEUFFEL & ESSER CO. MADE IN U.S.A.

4B2H Mar/56

P/W/T/48

1.3

(100)

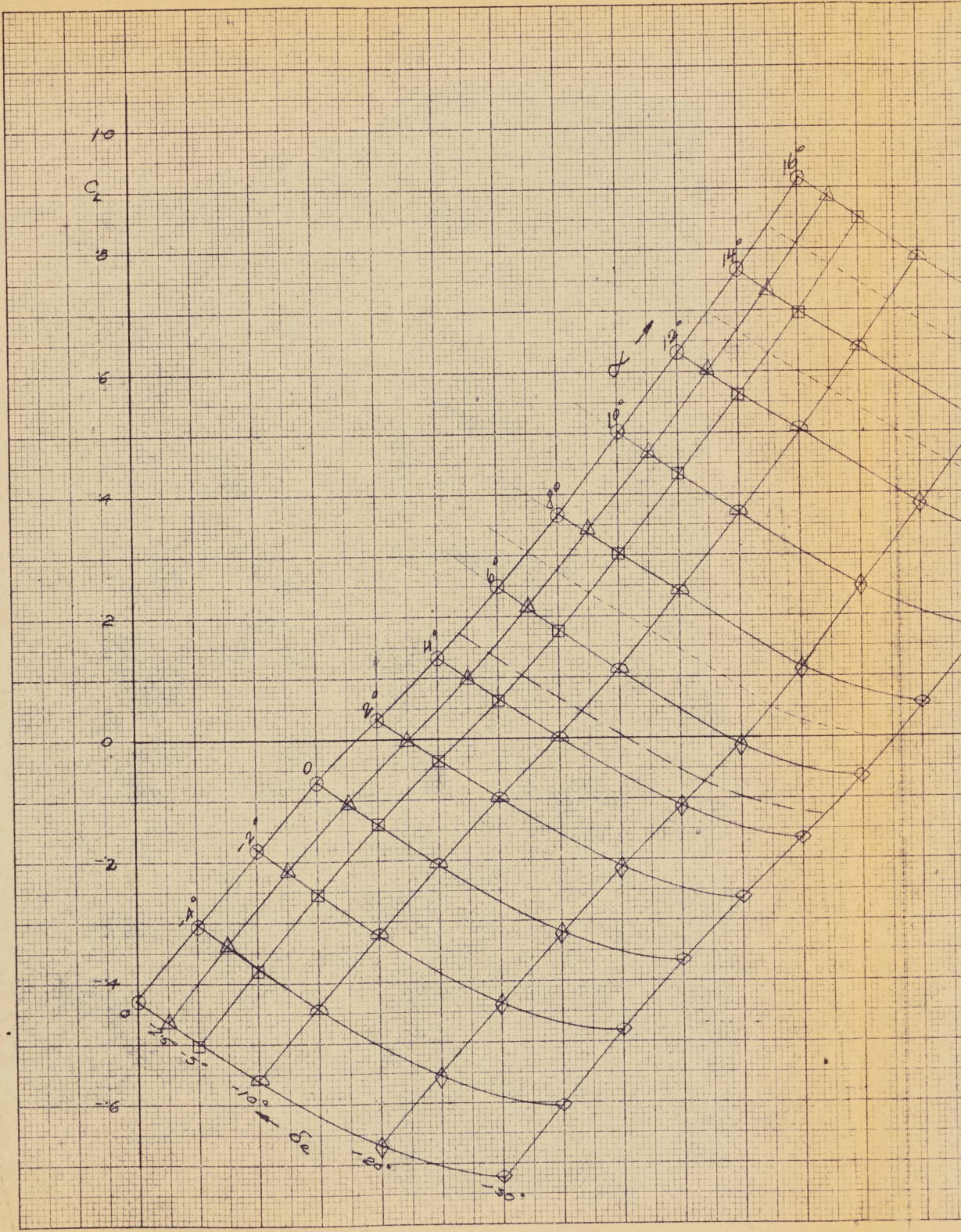


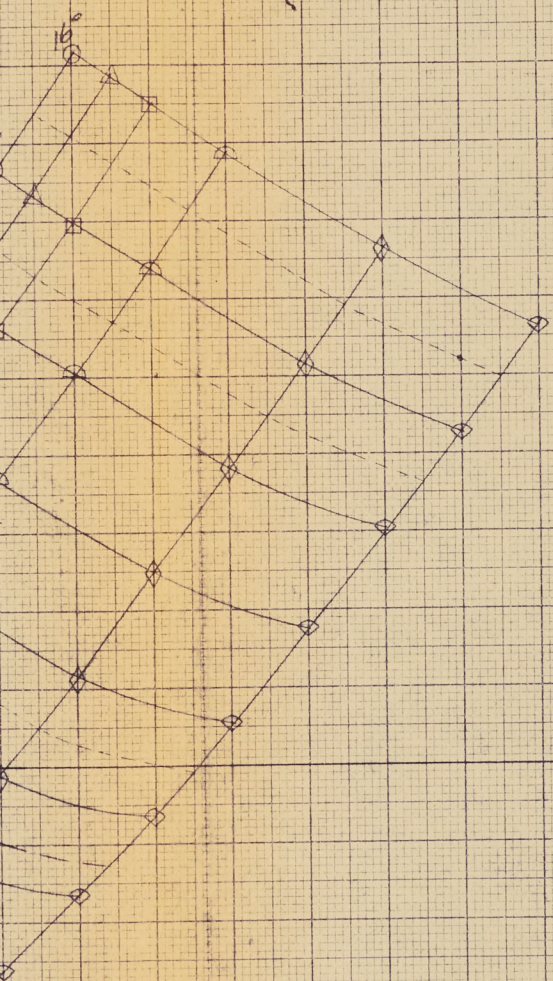
FEVATOR ANGLE

CONFIDENTIAL
UNCLASSIFIED

CONFIDENTIAL
UNCLASSIFIED

K&L 10 X 10 TO THE 1/4 INCH 359-111L
NEUFEL & ESSER CO. NEWELL, S. A.





C105

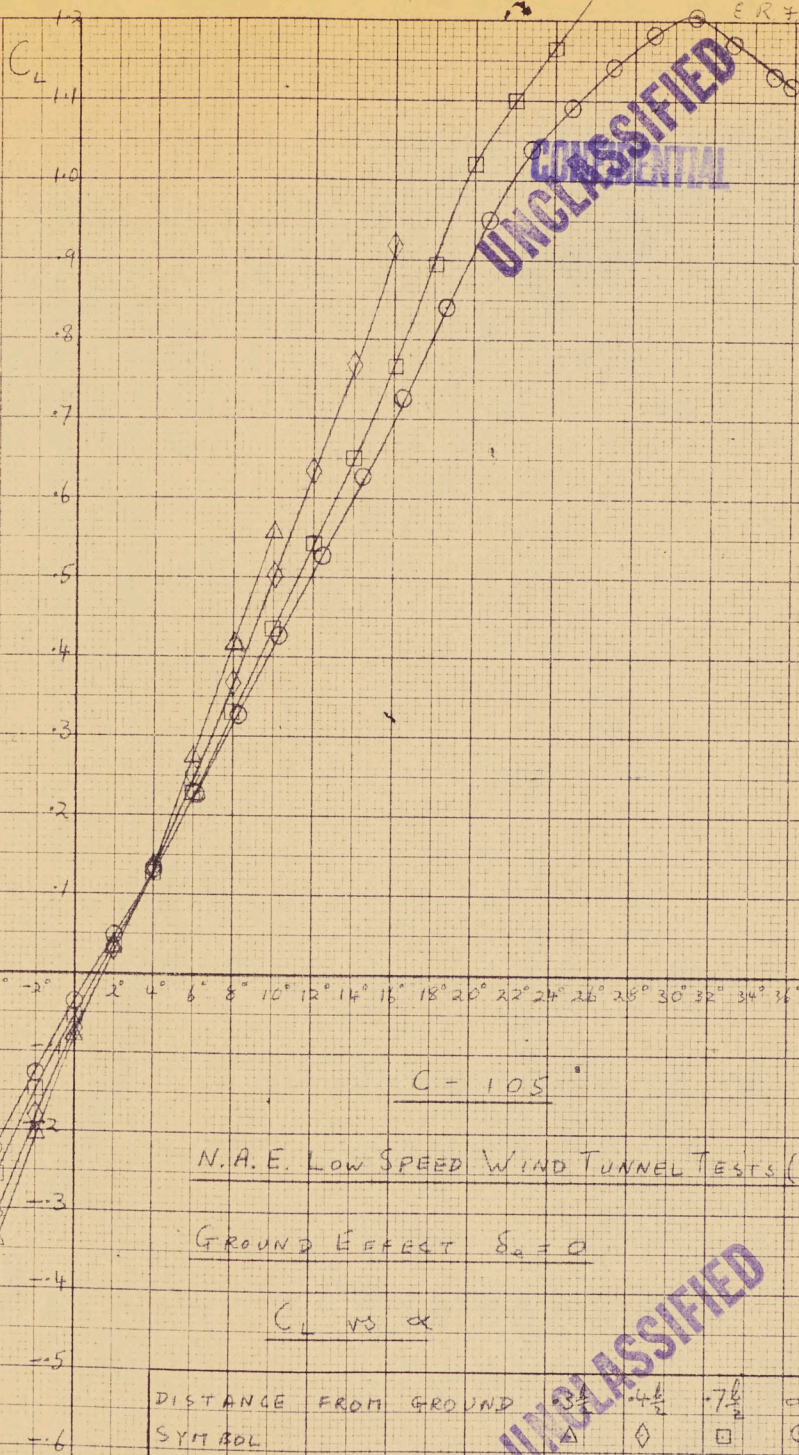
NRC H.T. TESTS

C₁ 13 X 2 5

GROUND BOARD 4 1/2

UNCLASSIFIED
CONFIDENTIAL

UNCLASSIFIED
CONFIDENTIAL



UNCLASSIFIED

UNCLASSIFIED

10X10 TO THE 1/8 INCH KEUFFEL & ESSER CO. 359-12

C-105
 N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1956)
 GROUND EFFECT $\delta_0 = 0$
 C_L VS α

C-105

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1956)

GROUND EFFECT $\delta_g = -2.5^\circ$

C_L vs α

C_L

1.04

1.03

1.02

1.01

1.00

.9

.8

.7

.6

.5

.4

.3

.2

.1

0

-.1

-.2

-.3

-.4

DISTANCE FROM GROUND

$3\frac{1}{2}$

$4\frac{1}{2}$

$7\frac{1}{2}$

∞

SYMBOL

Δ

\diamond

\square

\circ

$-10^\circ -8^\circ -6^\circ -4^\circ -2^\circ$ $2^\circ 4^\circ 6^\circ 8^\circ 10^\circ 12^\circ 14^\circ 16^\circ 18^\circ 20^\circ 22^\circ 24^\circ 26^\circ 28^\circ 30^\circ 32^\circ 34^\circ 36^\circ \alpha$

UNCLASSIFIED

P/WT/98

1-7

E.R.F. MARCH 1956

C_L
1.3

1.2
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1

-8° -6° -4° -2° 4° 6° 8° 10° 12° 14° 16° 18° 20° 22° 24° 26° 28° 30° 32° 34° 36° α

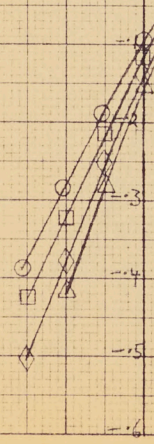
C-105

NAE LOW SPEED WIND TUNNEL TESTS (JAN 1956)

GROUND EFFECT $\delta_g = -5^\circ$

C_L vs α

| | | | | |
|----------------------|----------------|----------------|----------------|----------|
| DISTANCE FROM GROUND | $3\frac{1}{2}$ | $4\frac{1}{2}$ | $7\frac{1}{2}$ | ∞ |
| SYMBOL | Δ | \diamond | \square | \circ |

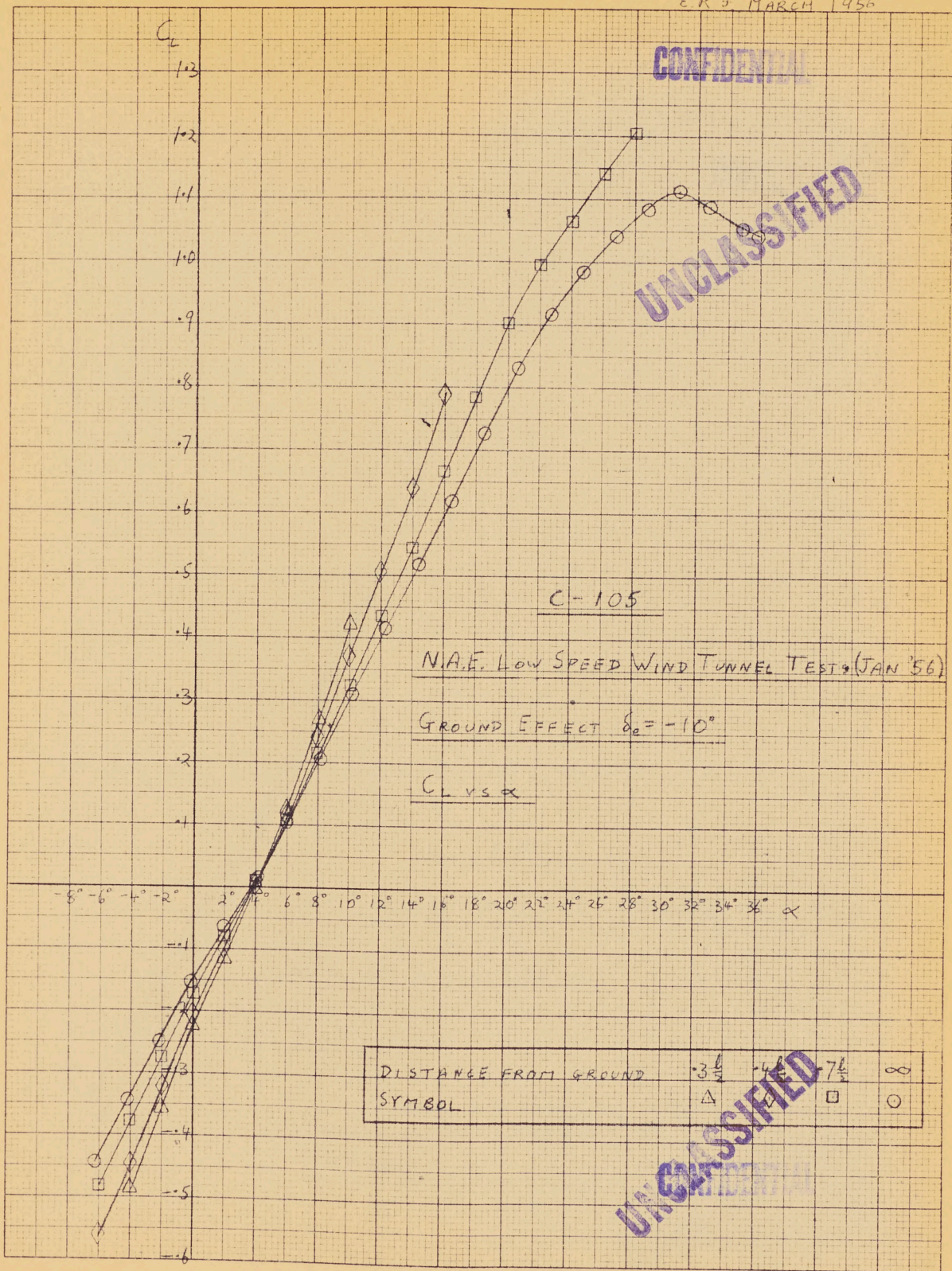


UNCLASSIFIED
CONFIDENTIAL

359-12
10 X 10 TO THE 1/2 INCH
NEUFEL & ESSER CO.
K&E

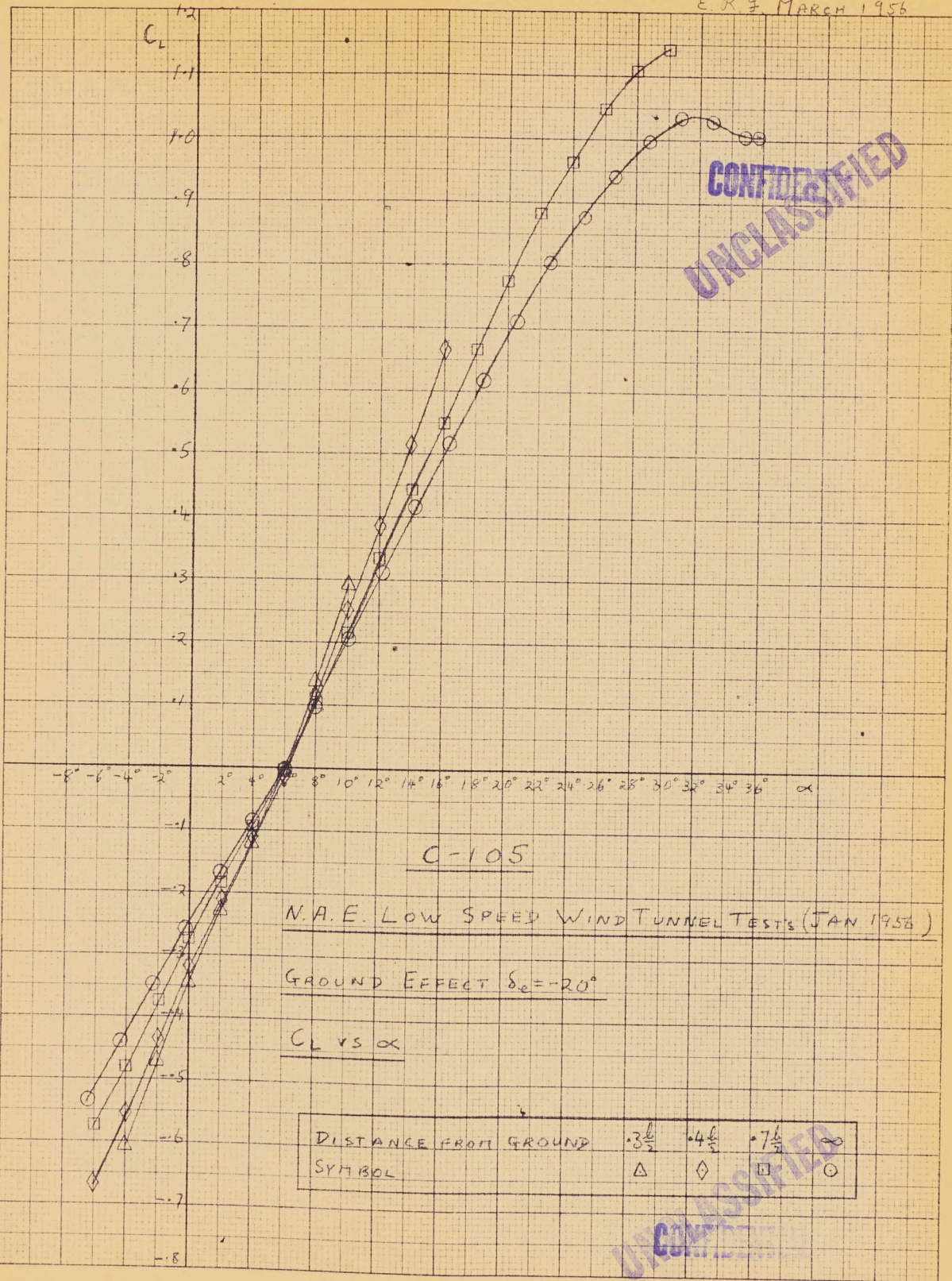
CONFIDENTIAL

UNCLASSIFIED



UNCLASSIFIED

$\delta_0 = -10^\circ$



C-105

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1956)

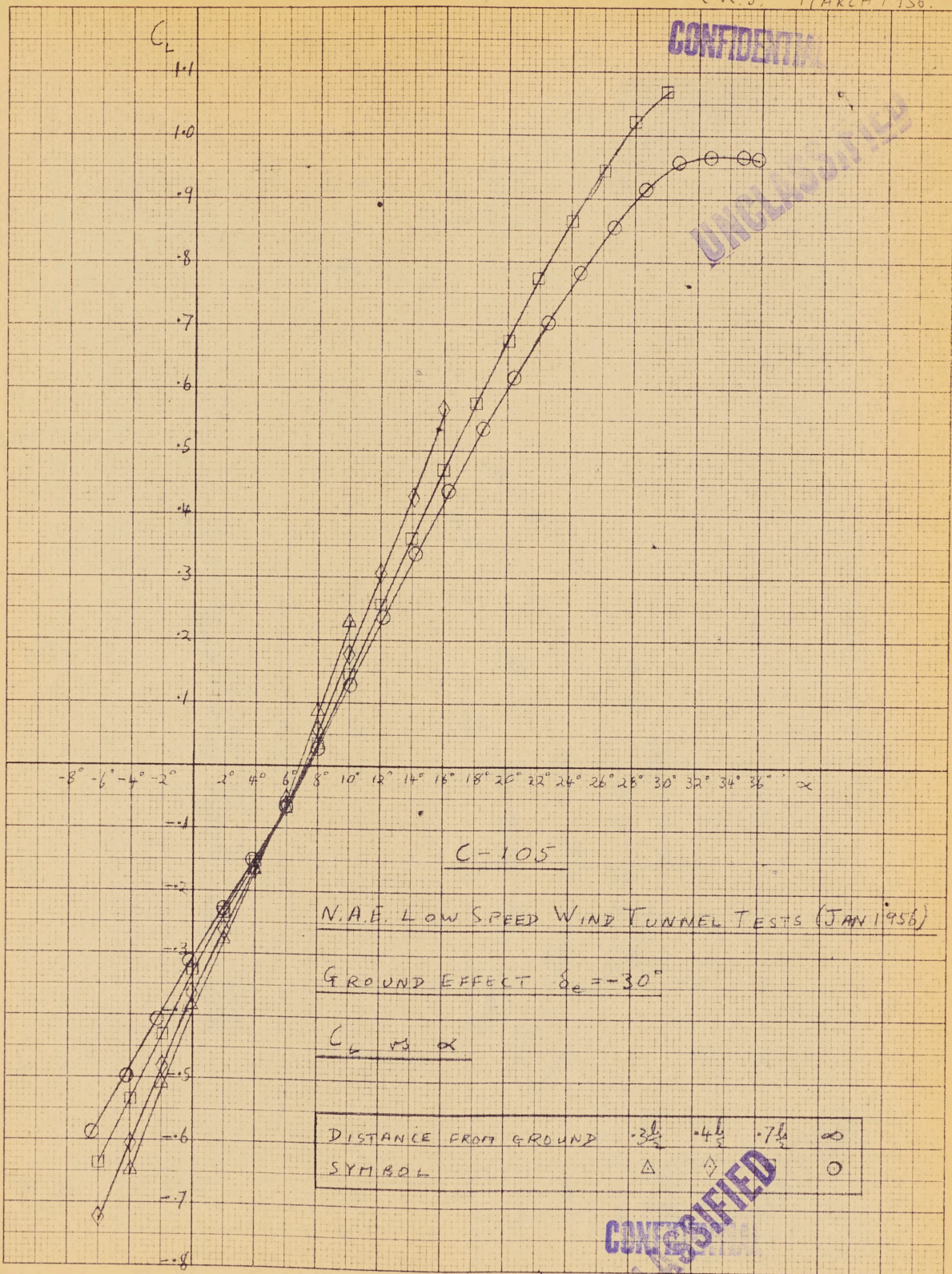
GROUND EFFECT $\delta_c = -20^\circ$

C_L VS α

| | | | | |
|----------------------|----------------|----------------|----------------|----------|
| DISTANCE FROM GROUND | $3\frac{1}{2}$ | $4\frac{1}{2}$ | $7\frac{1}{2}$ | ∞ |
| SYMBOL | Δ | \diamond | \square | \circ |

CONFIDENTIAL

UNCLASSIFIED



CONFIDENTIAL

C.A.L. WIND TUNNEL TESTS (JUNE 1955) (COMPARISON OF TUNNELS)
 $C_{105} \sim C_{014}$ AT VARIOUS δ_e

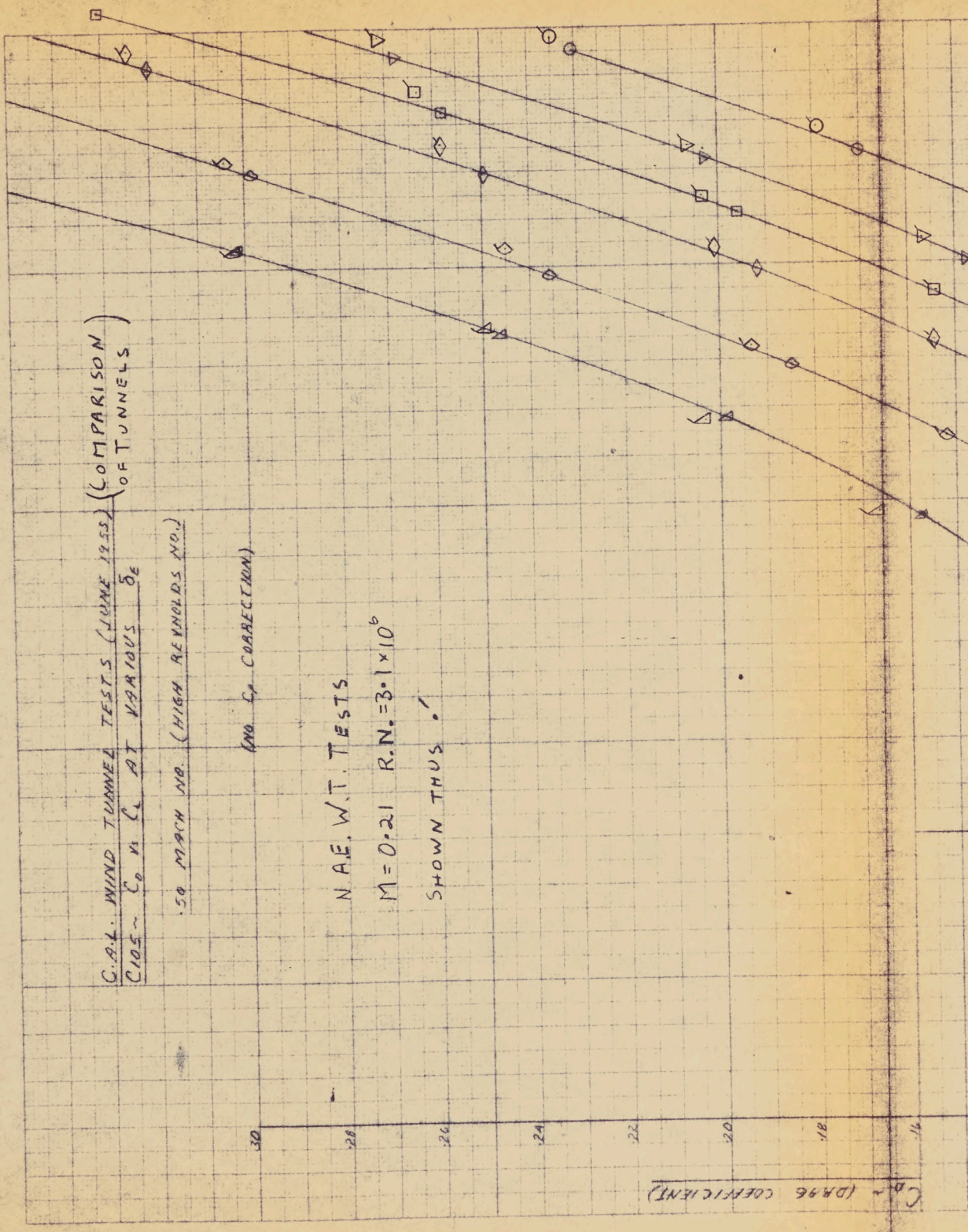
.50 MACH NO. (HIGH REYNOLDS NO.)

(NO C_p CORRECTION)

N.A.E. W.T. TESTS

$M = 0.21$ R.N. $= 3.1 \times 10^6$

SHOWN THUS !



C_D (DRAG COEFFICIENT)

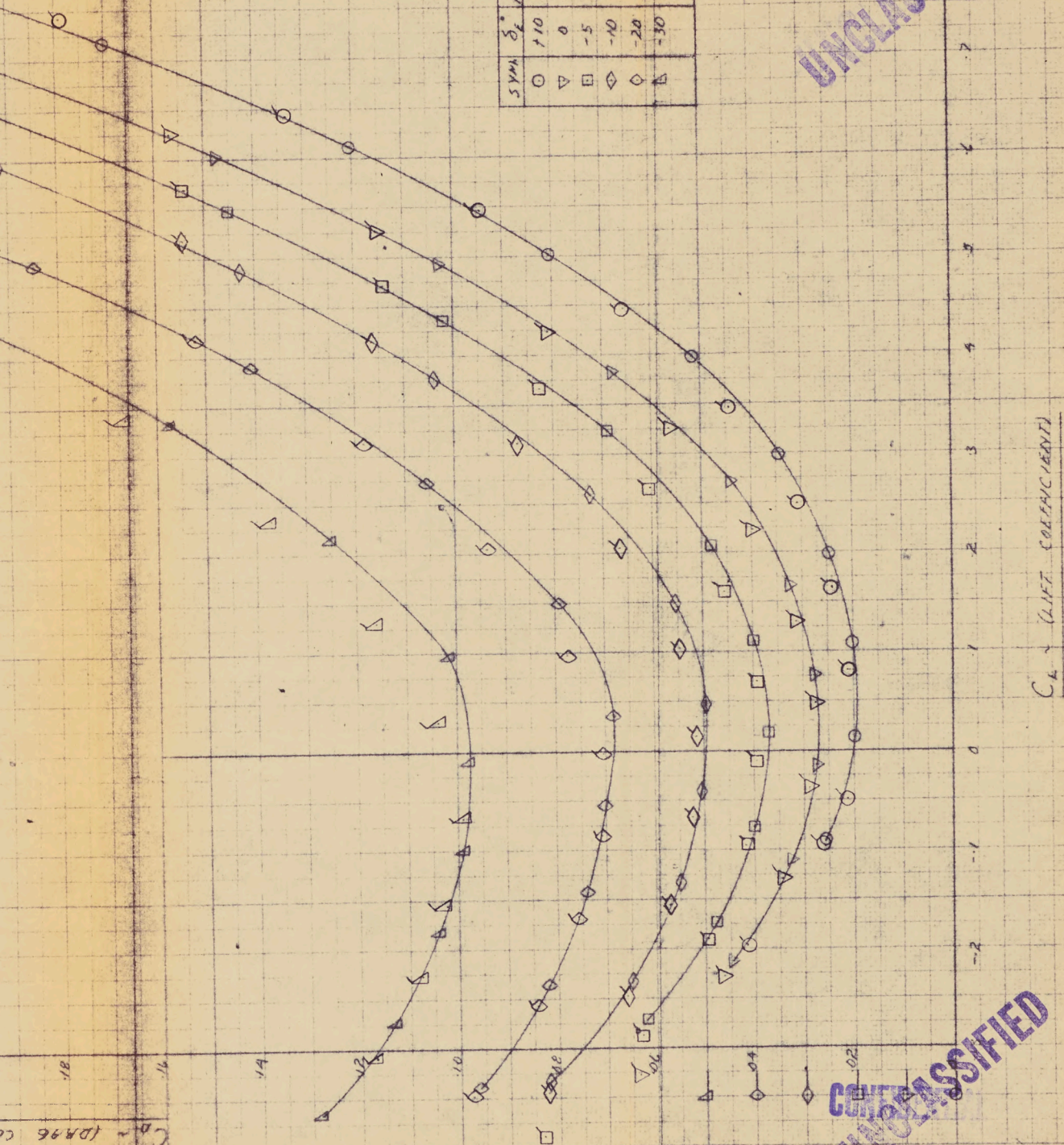
.30
.28
.26
.24
.22
.20
.18
.16

SHT. ~ 2.1

P/WIND TUNNEL/82 2.1
R. SKULSKY 98

CONFIDENTIAL
UNCLASSIFIED

| SYMBOL | δ_e | RUN |
|--------|------------|-----|
| ○ | +10 | 630 |
| ▽ | 0 | 631 |
| □ | -5 | 632 |
| ◇ | -10 | 633 |
| ◇ | -20 | 634 |
| △ | -30 | 635 |



C_L - (LIFT COEFFICIENT)

C_D - (DRAG COEFFICIENT)

CONFIDENTIAL
UNCLASSIFIED

C-105

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1956)

C_D

C_D VS C_L AND δE

(RUN #1 to #11)

($M=0.21$)

32

30

28

26

24

22

20

18

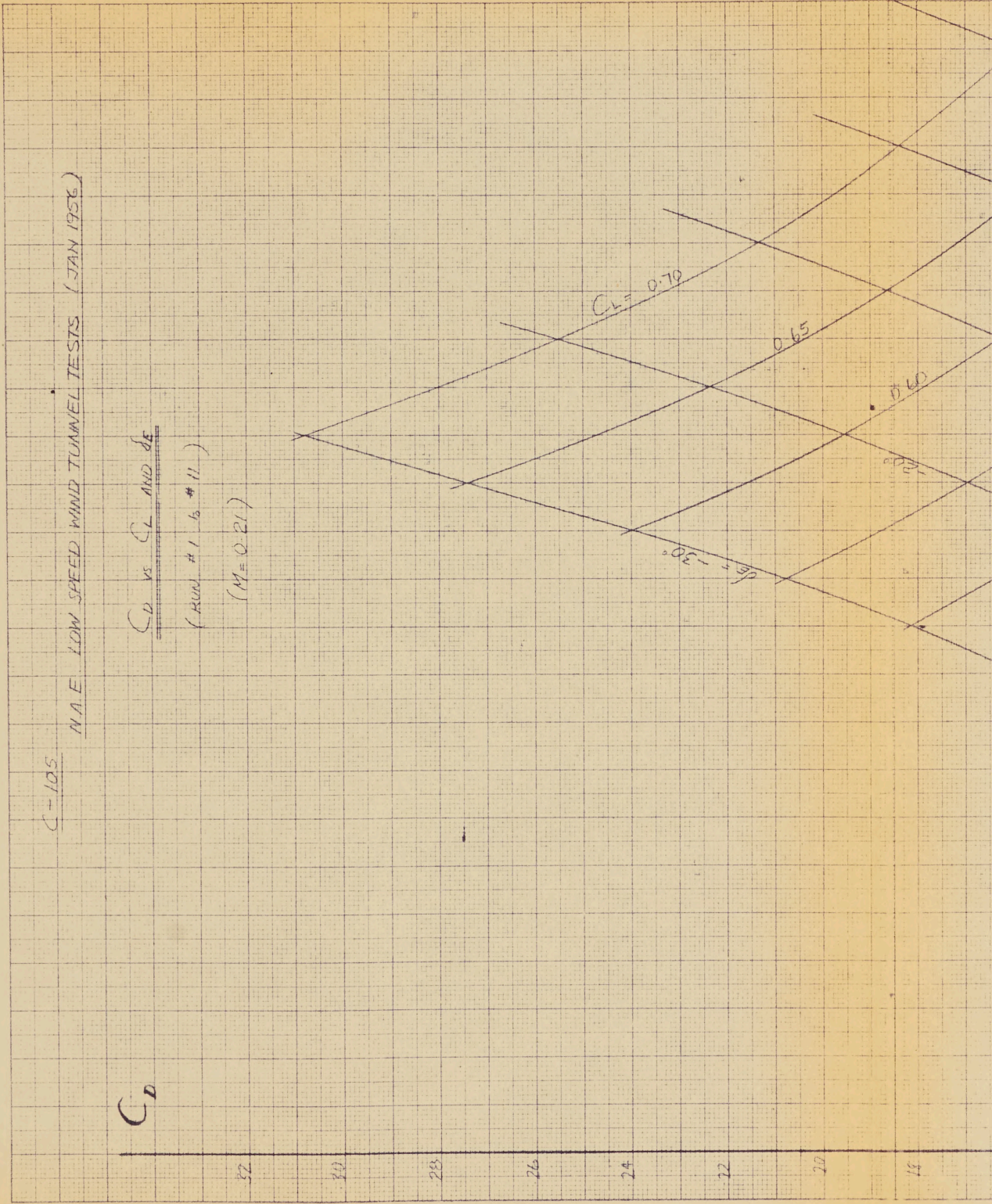
$C_L = 0.70$

0.65

0.60

$\delta E = -30^\circ$

0.55



$C = 105$

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1956)

C_D

C_D VS C_L AND A_f

(RUN # 1 to # 11)

32

30

28

26

24

22

20

18

16

$C_L = 0.70$

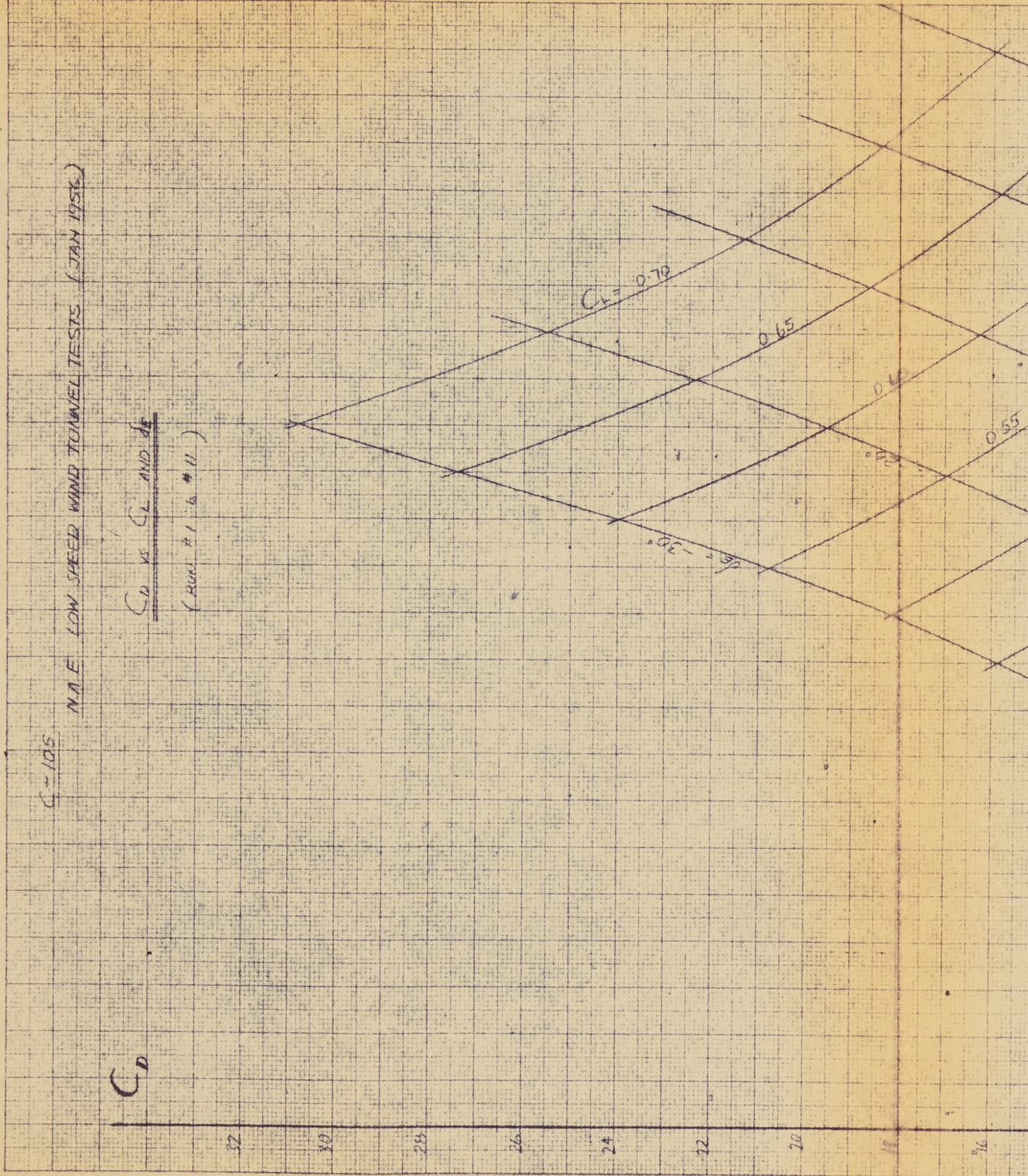
0.65

0.60

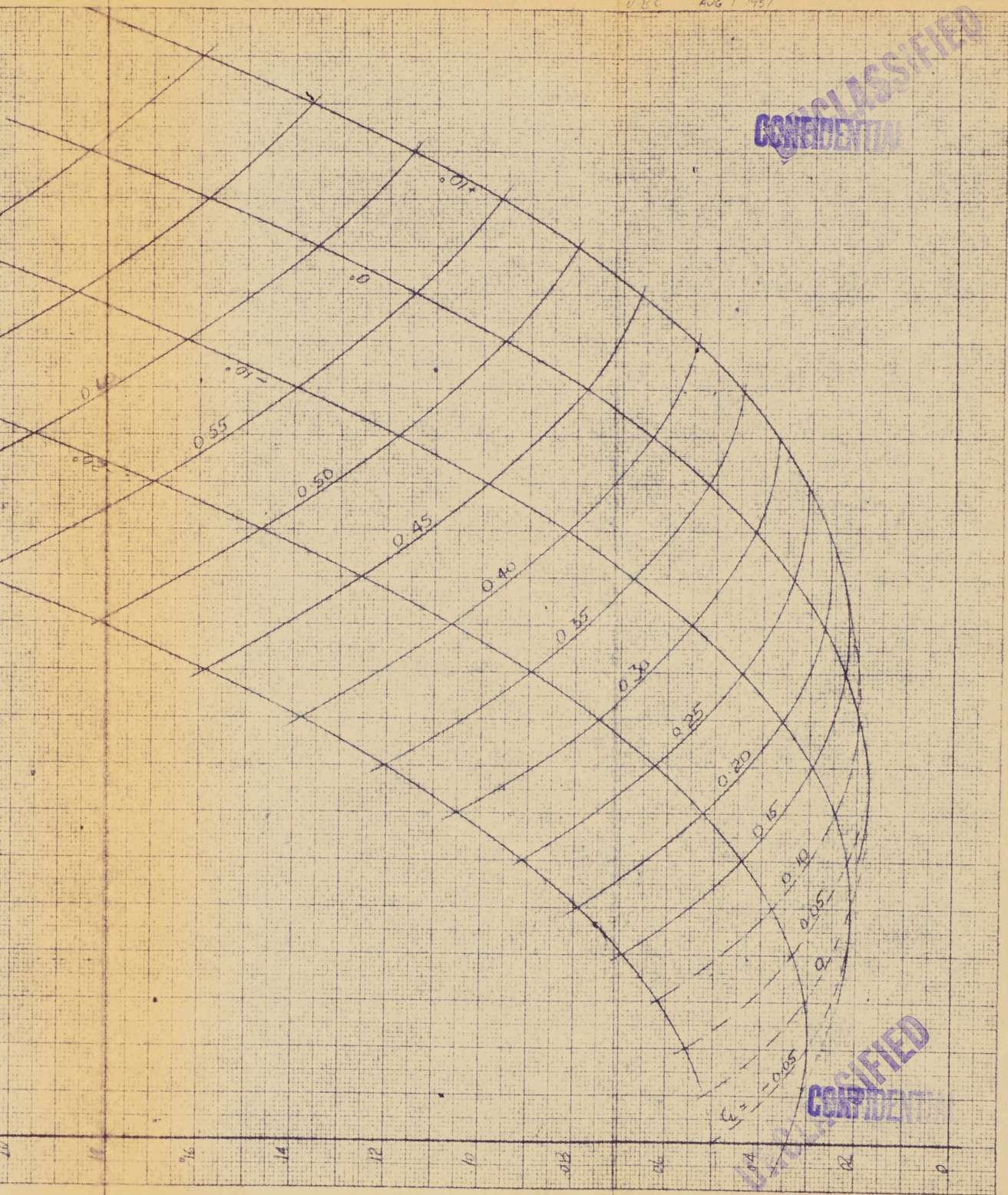
0.55

0.50 - 0.50

0.45



U.R.C. AUG 1 1957



CONFIDENTIAL

CONFIDENTIAL

P/W.T./98 2-5
L.L.V. MAY 4, 1956

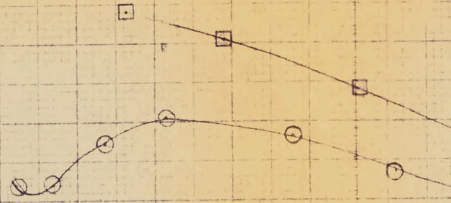
C - 10.5

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN. 1956)

GROUND EFFECT $S_c = 0$

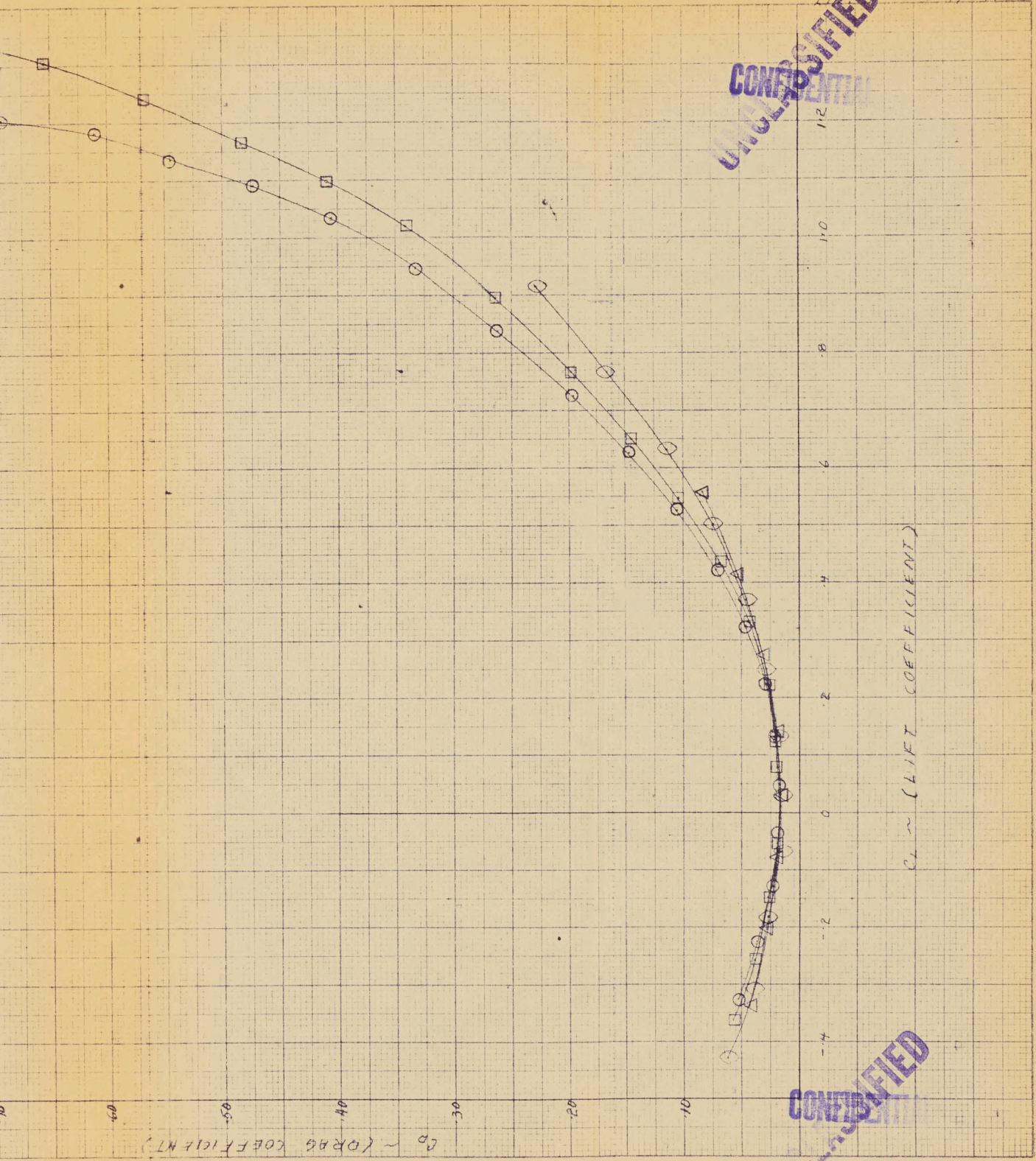
G_D IS C_L

| | | | | |
|--------------------|---|----|----|----|
| RUN NO. | 4 | 27 | 38 | 39 |
| SYMBOL | ○ | △ | □ | ○ |
| DISTANCE FROM GRD. | ∞ | .3 | .7 | .4 |



(CONT.)

CONFIDENTIAL
UNCLASSIFIED



C_L ~ (LIFT COEFFICIENT)

C_D ~ (DRAG COEFFICIENT)

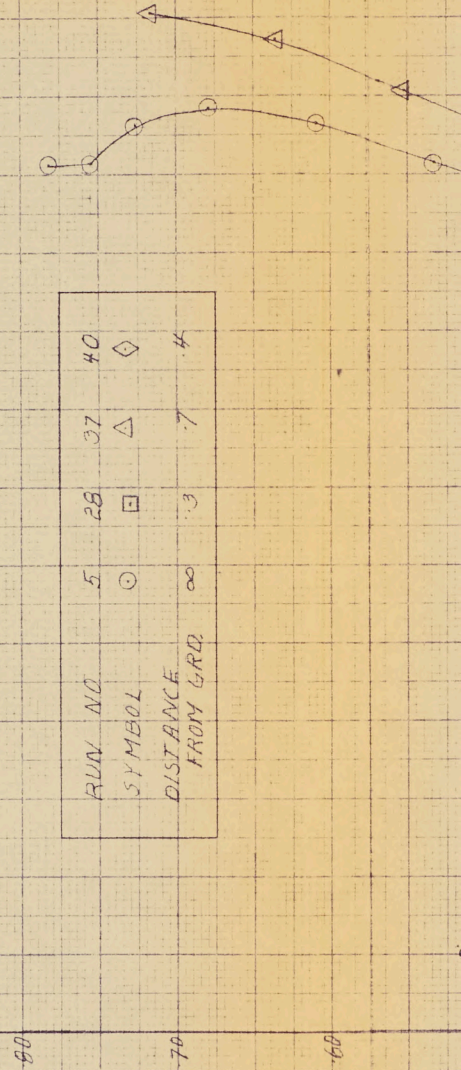
CONFIDENTIAL
UNCLASSIFIED

C-105

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN. 1956)

GROUND EFFECT $\delta_g = -2.5$

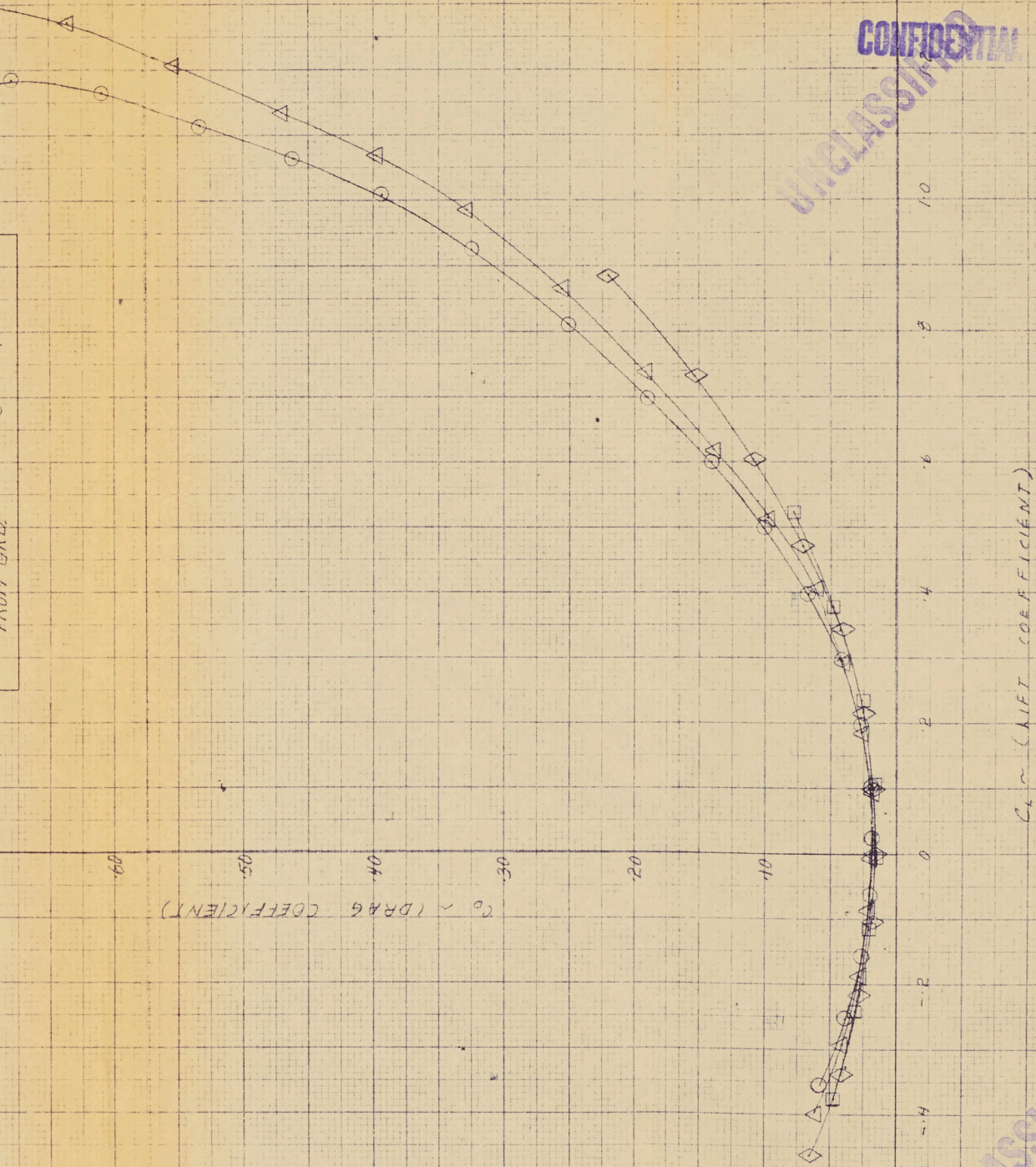
C.D. VS C.L.



| RUN NO. | 5 | 28 | 07 | 40 |
|-------------------|---|----|----|----|
| SYMBOL | ○ | □ | △ | ◇ |
| DISTANCE FROM GRD | ∞ | 3 | 7 | 4 |

CONFIDENTIAL

UNCLASSIFIED



C_L (LIFT COEFFICIENT)

CONFIDENTIAL

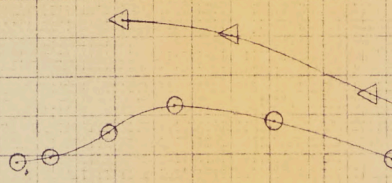
C - 105

NAE. LOW SPEED WIND TUNNEL TESTS (JAN 1956)

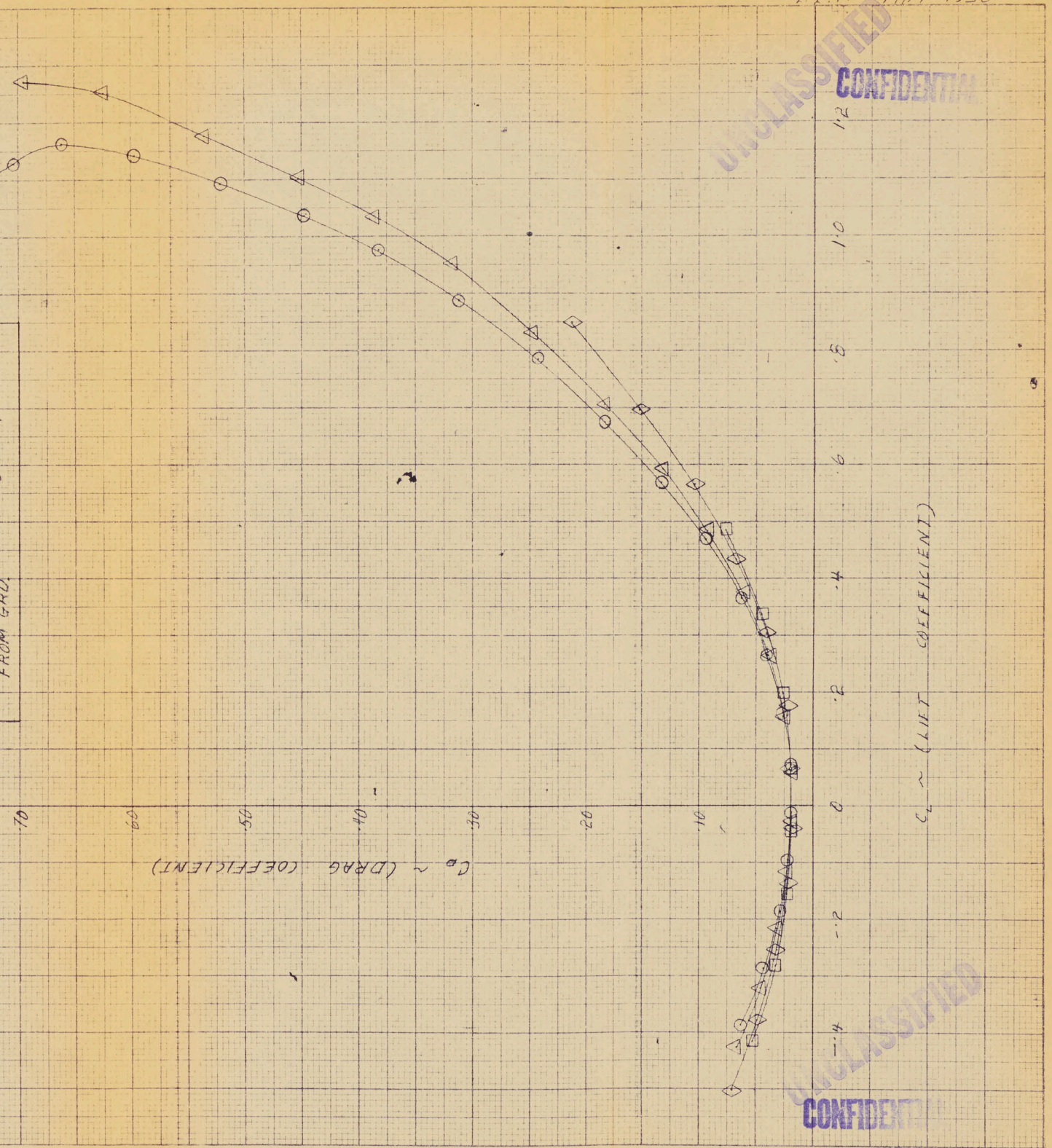
GROUND EFFECT $\delta_g = -5$

C_D VS C_L

| | | | | |
|--------------------|---|----|----|----|
| RUN NO. | 6 | 29 | 36 | 41 |
| SYMBOL | ○ | □ | △ | ◇ |
| DISTANCE FROM GRD. | ∞ | 3 | .7 | .4 |



(LIFT)



UNCLASSIFIED
CONFIDENTIAL

UNCLASSIFIED
CONFIDENTIAL

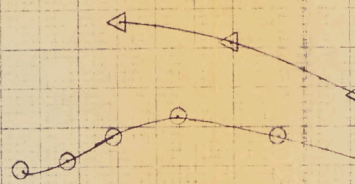
C - 105

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN. 1956)

GROUND EFFECT $\delta_g = -10^\circ$

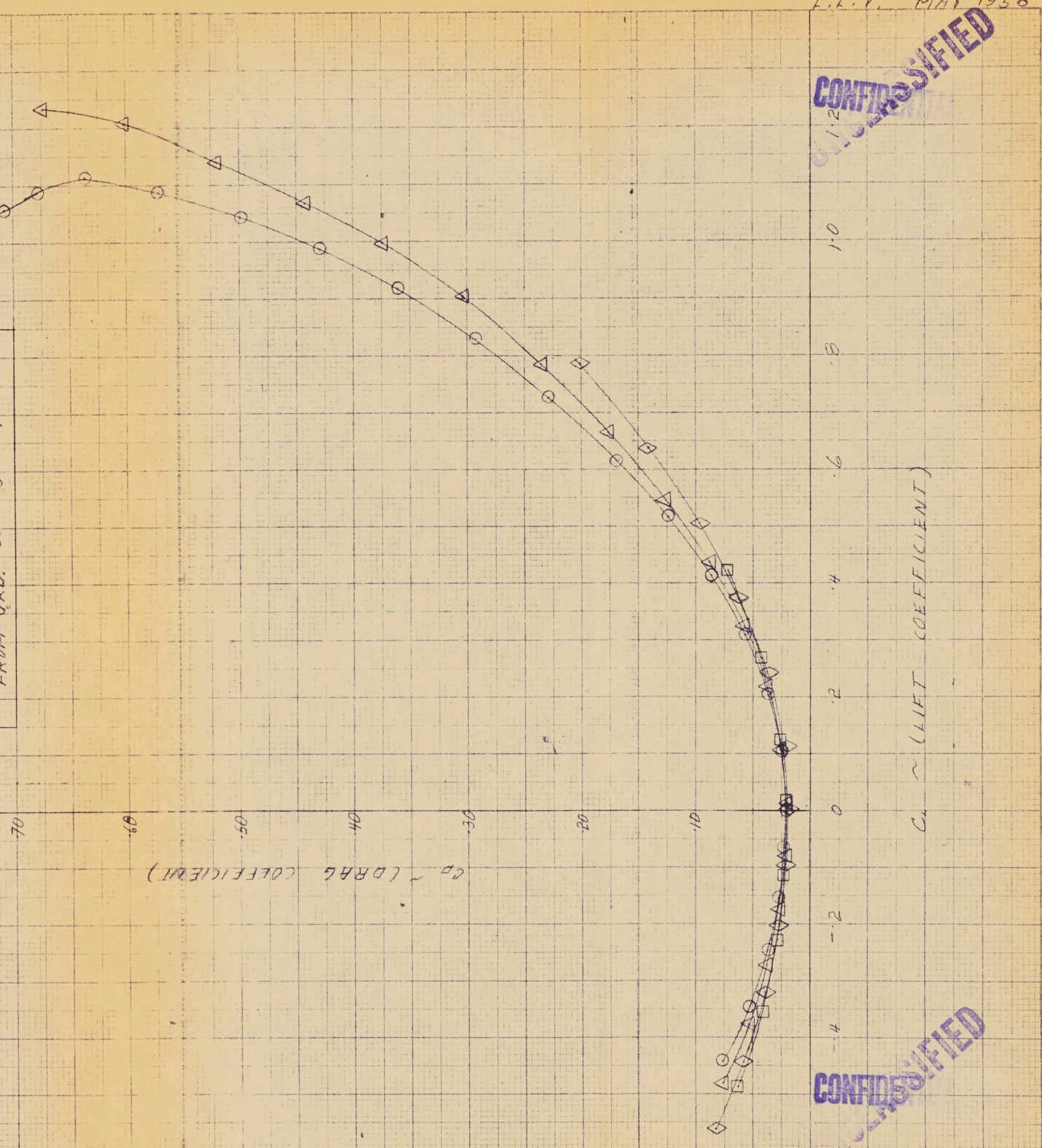
C_p vs C_L

| RUN NO. | 7 | 30 | 35 | 42 |
|--------------------|---|----|----|----|
| SYMBOL | ○ | □ | △ | ◇ |
| DISTANCE FROM GRD. | ∞ | .3 | .7 | .4 |



(REV)

CONFIDENTIAL



CONFIDENTIAL

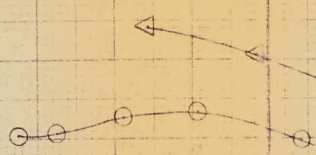
C-105

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN. 1956)

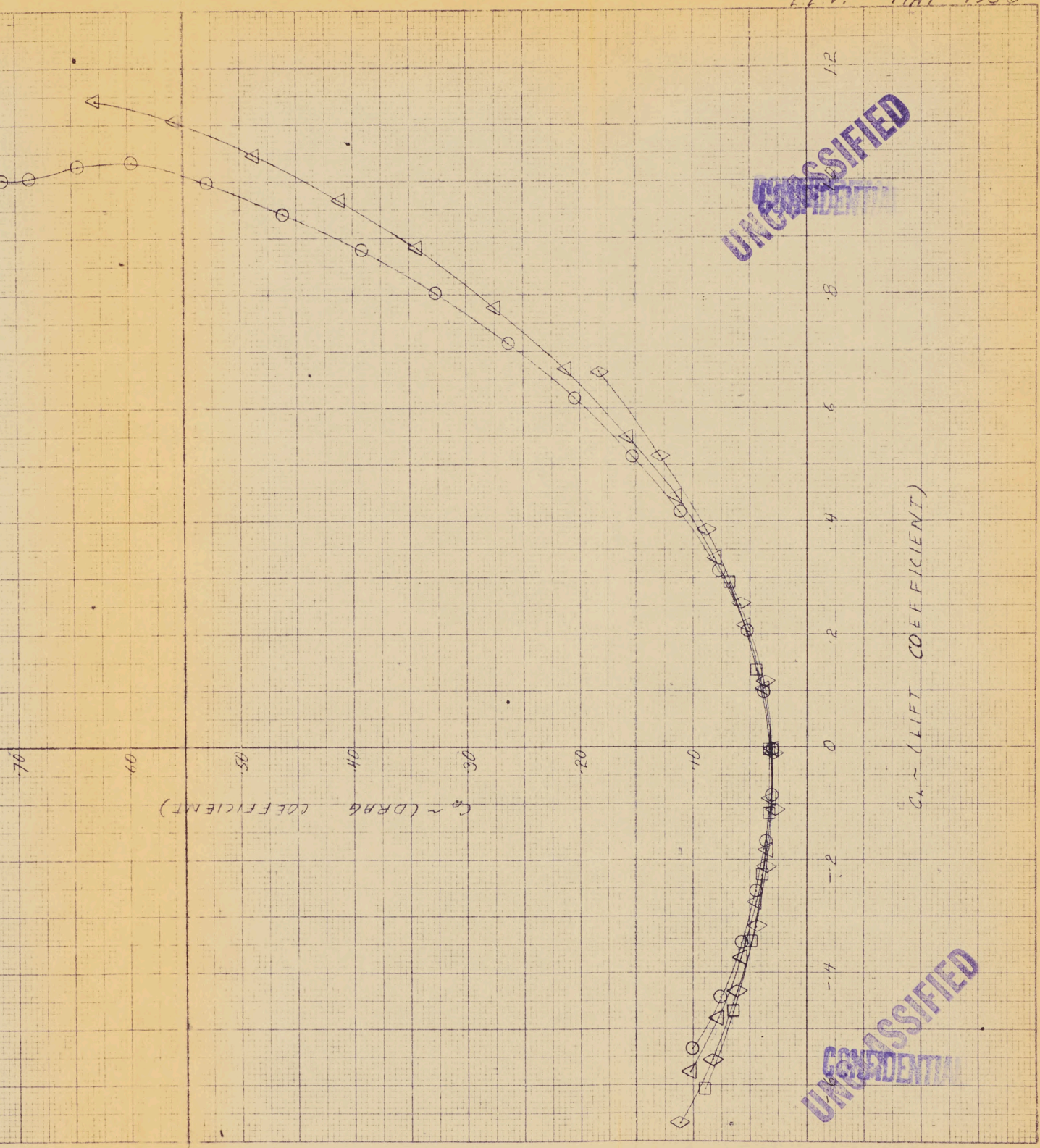
GROUND EFFECT $\delta_e = -20^\circ$

C_D VS C_L

| RUN NO | 31 | 34 | 43 |
|--------------------|----|----|----|
| SYMBOL | ○ | △ | ◇ |
| DISTANCE FROM GRD. | .3 | .7 | .4 |



(E.M.T.)



UNCLASSIFIED

UNCLASSIFIED

C-105

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN. 1956)

GROUND EFFECT $\delta_g = -30$

C_o VS C_t

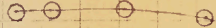
| RUN NO. | 11 | 32 | 33 | 44 |
|--------------------|----|----|----|----|
| SYMBOL | ○ | □ | △ | ◇ |
| DISTANCE FROM GRD. | ∞ | .3 | .7 | .4 |

80

70

60

(INVERT)

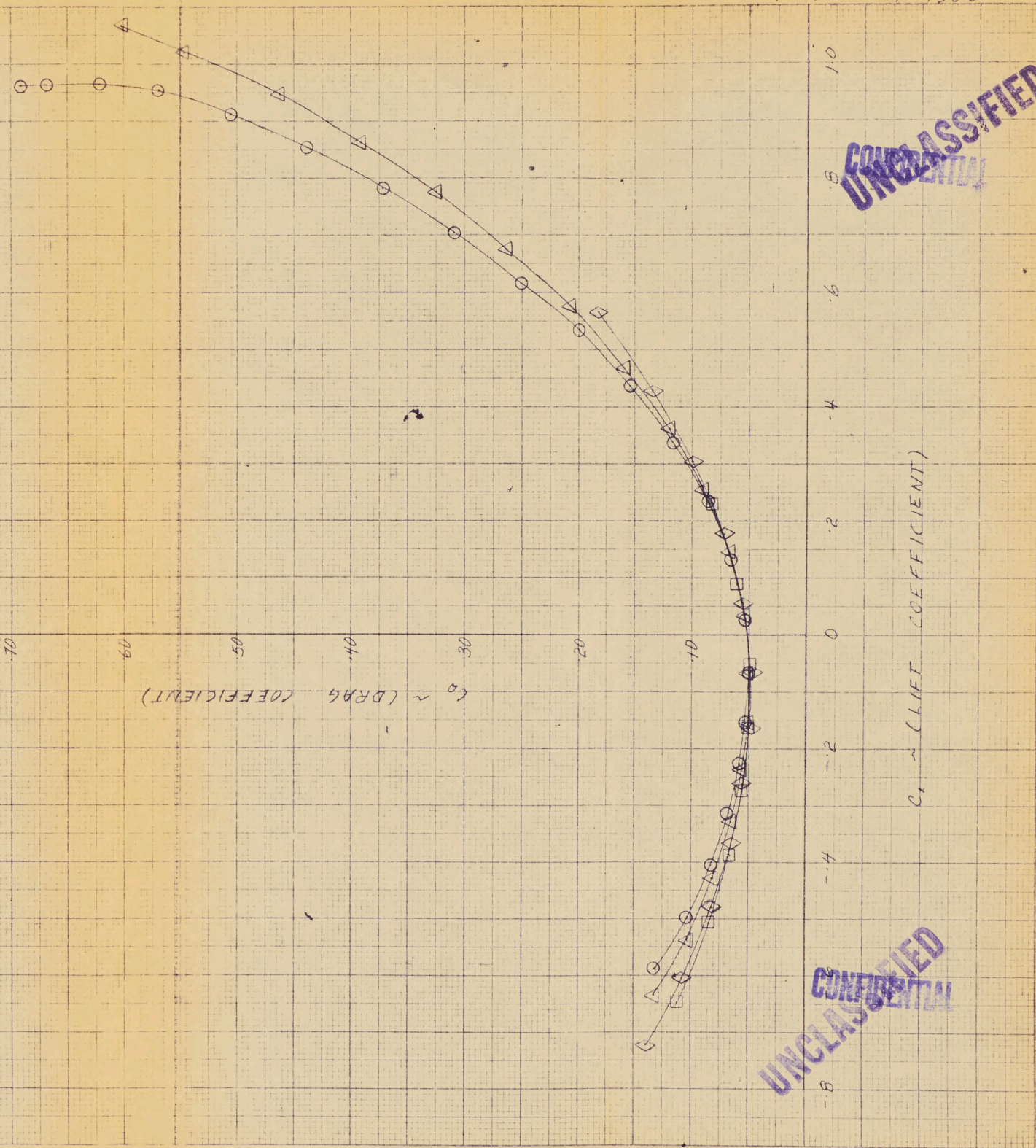


P/W 128

2-10

L.L.V.

MAY 1956



UNCLASSIFIED

UNCLASSIFIED

C102 (COMPARISON OF TUNNELS)

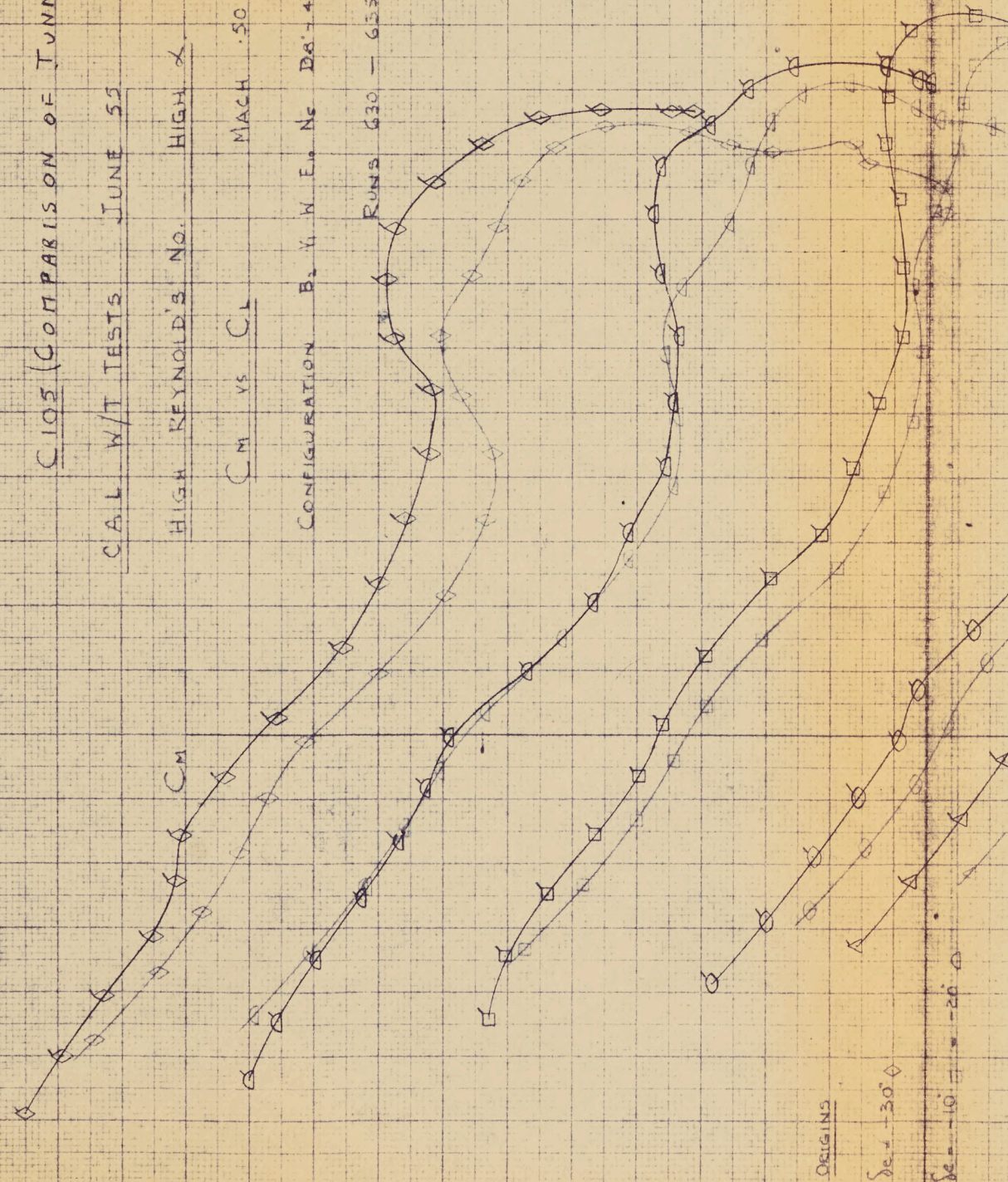
CAL W/T TESTS JUNE 55

HIGH REYNOLD'S NO. HIGH α

CM VS CL MACH .50

CONFIGURATION B. V. W. E. No. D81-4

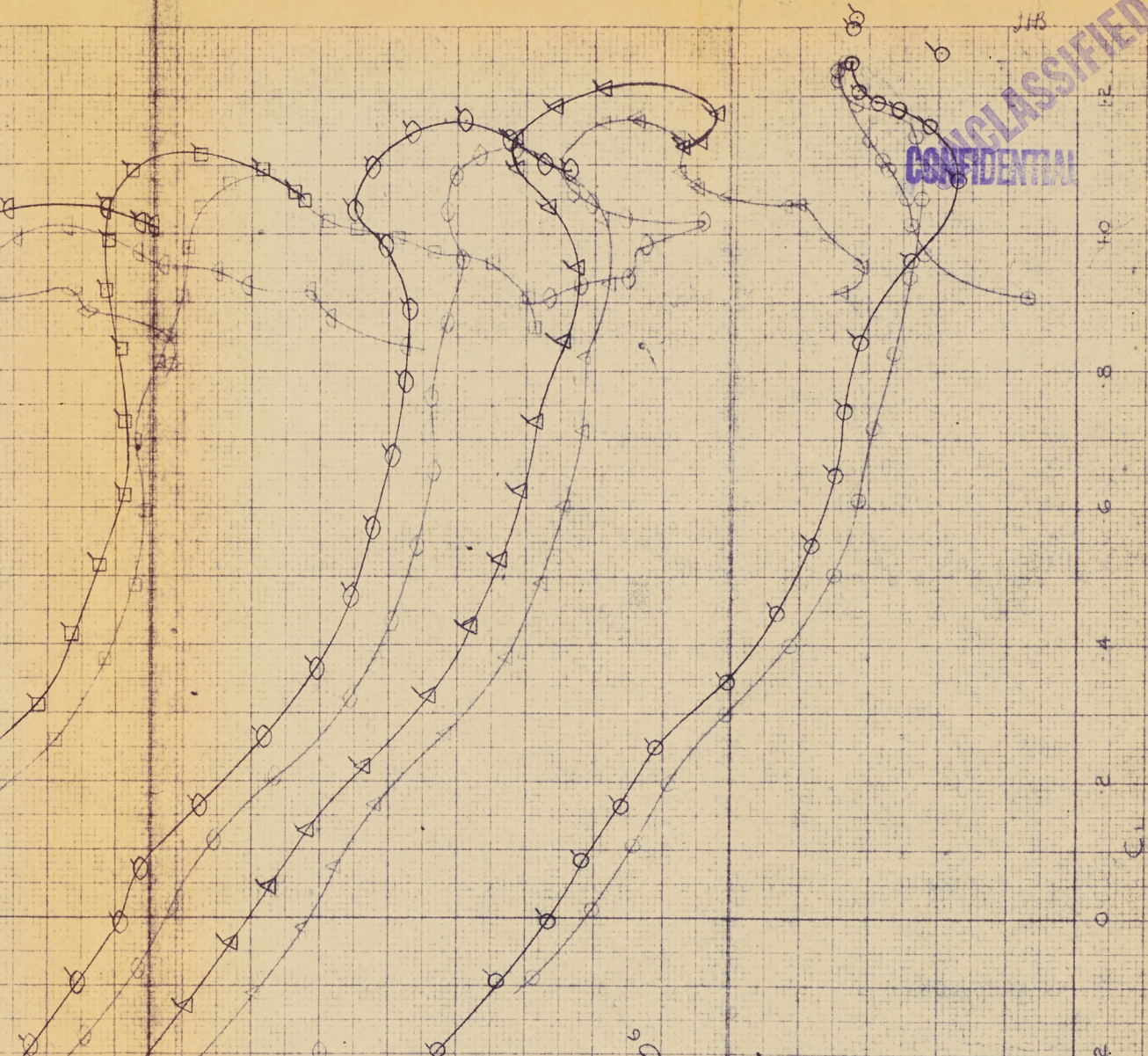
RUNS 630 - 655



ORIGINS

Se = -30°

Se = -10°



ORIGINS

$\delta e = -30^\circ$

$\delta e = -10^\circ$

$\delta e = 10^\circ$

N.A.E. W.T. TESTS

$M = 0.21$ R.N. $= 3.01 \times 10^6$
SHOWN THUS!

6.4 @ -282 ON M, A, G.

UNCLASSIFIED
CONFIDENTIAL

UNCLASSIFIED
CONFIDENTIAL

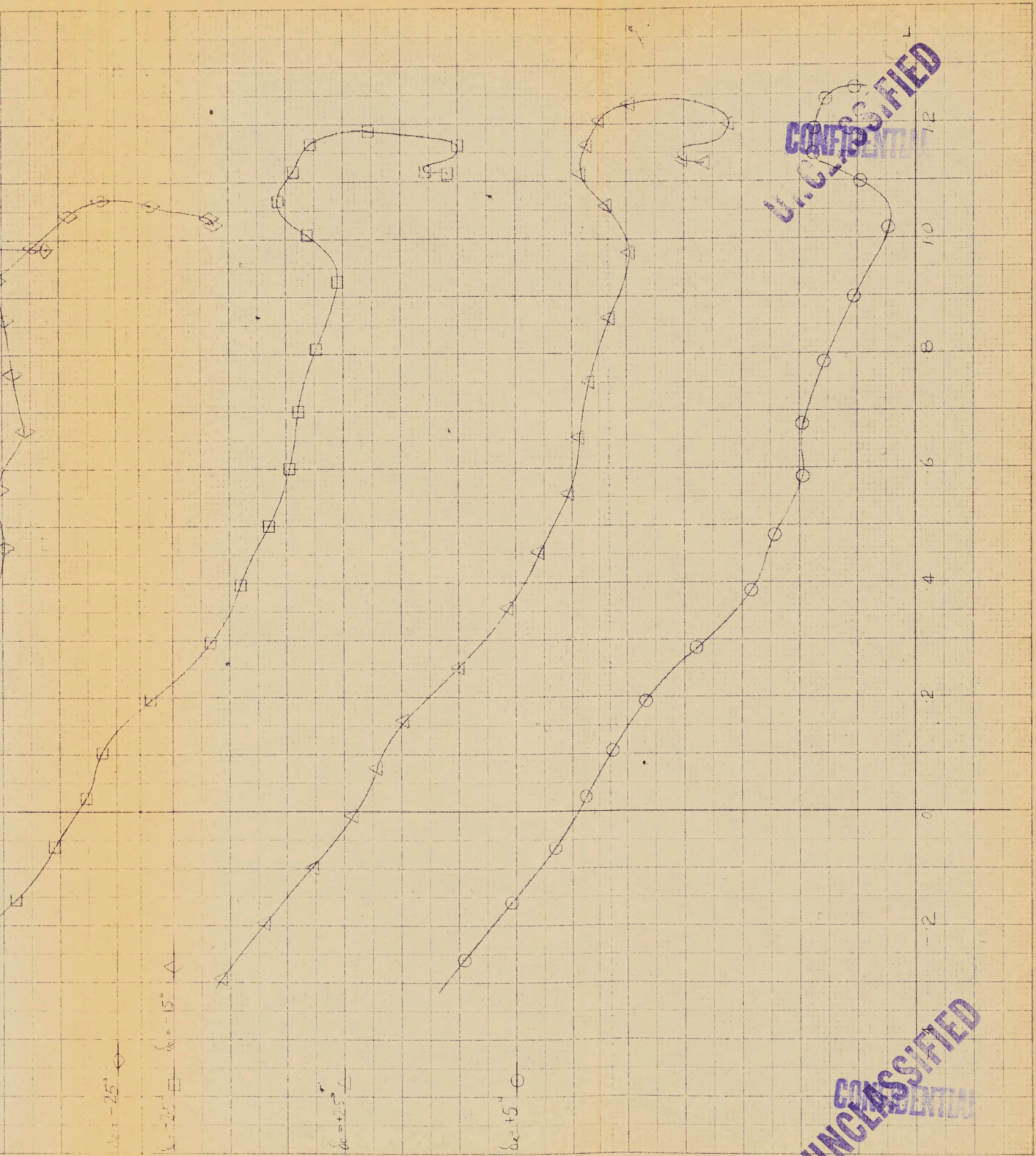
10 X 10 TO THE 1/2 INCH
KEUFFEL & ESSER CO. NEW YORK, N.Y.

MAR 56 0.56



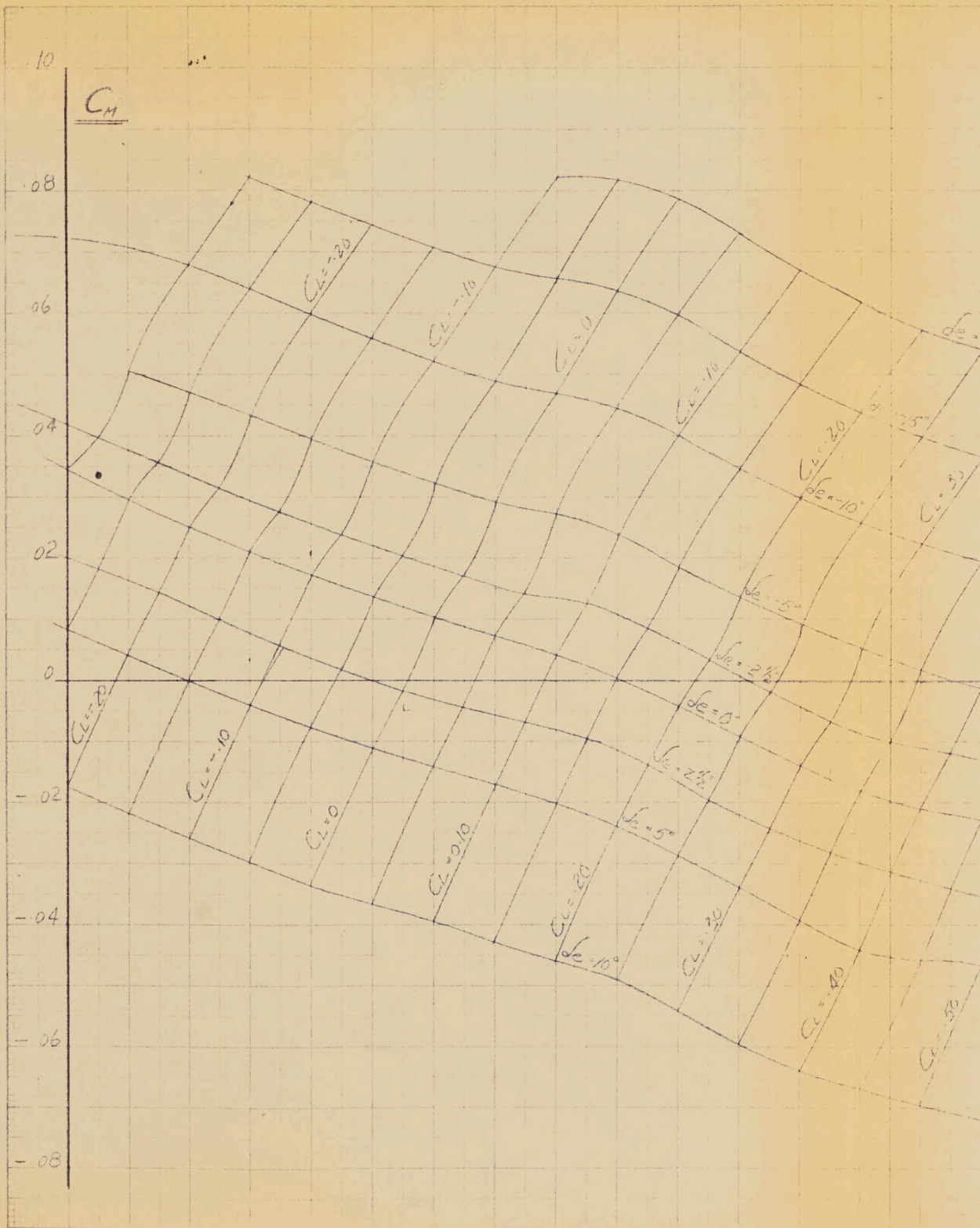
$\alpha = 25^\circ$ (Diamond)

$\alpha = 15^\circ$ (Square)



UNCLASSIFIED

MOORE 10 X 10 TO THE INCH 359-11L
FEDERAL BUREAU OF INVESTIGATION
WASHINGTON, D. C.



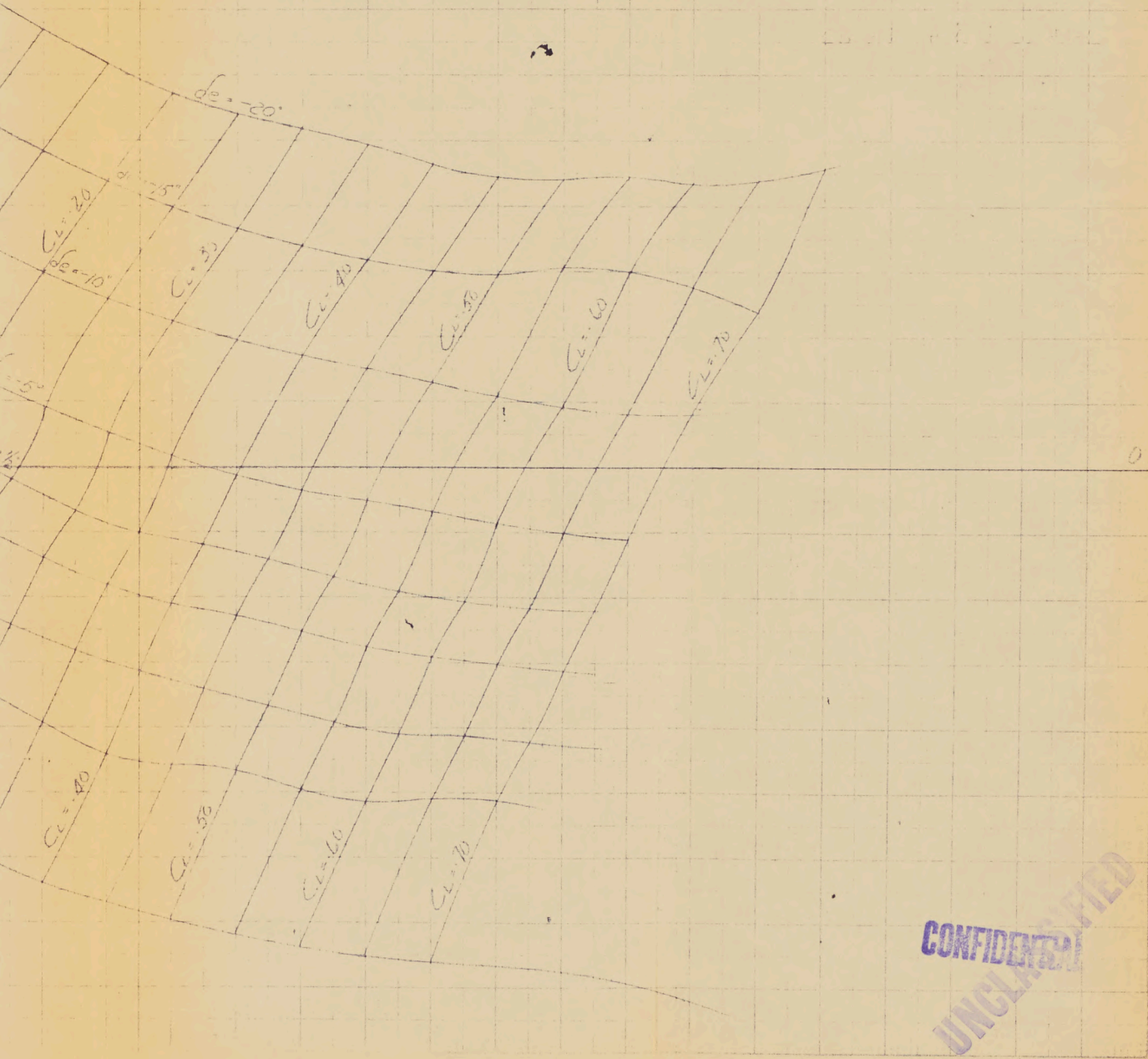
J. CROSLBY July 157 PLWT/107
11/1/56

C-105

CONFIDENTIAL
UNCLASSIFIED

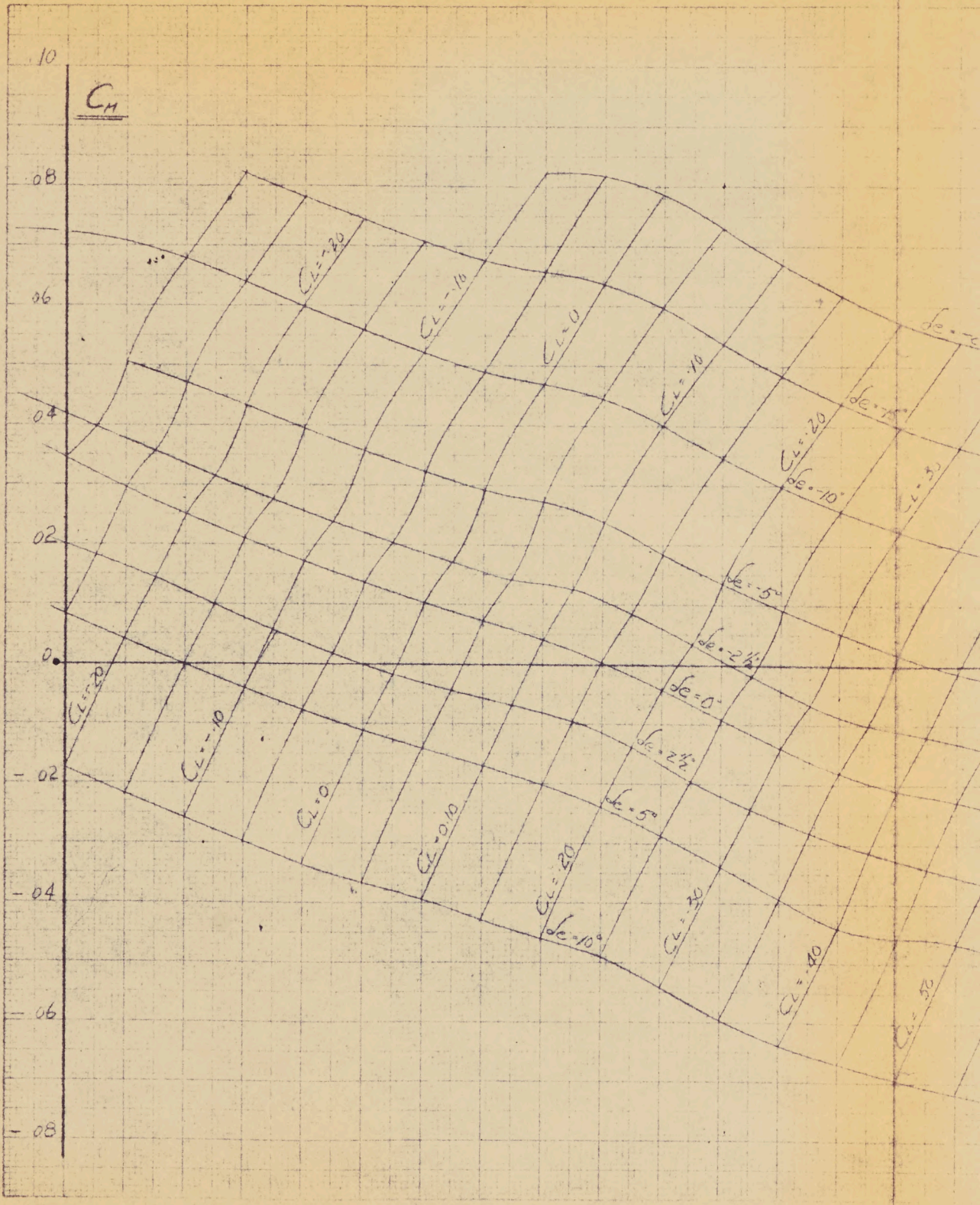
N.A.E. LOW SPEED W.T. TESTS
(11/1/56)

C_{M} VS C_L & δ



CONFIDENTIAL
UNCLASSIFIED

10 X 10 TO THE 1/4 INCH 359-11L
KEUFFLER & ESSER CO. CHICAGO, ILL.



J. Crowley JUL 1957 PW 1109

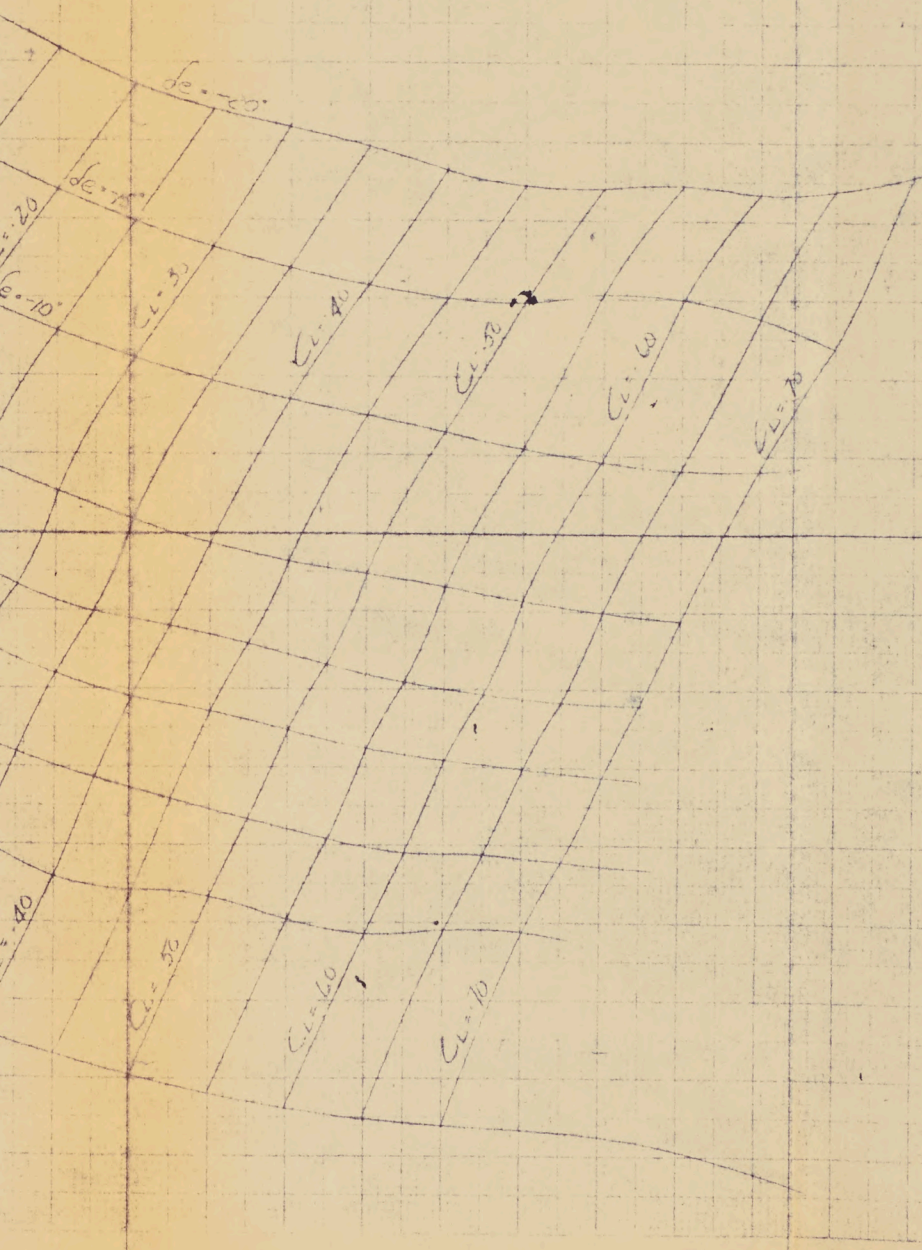
C-105

CONFIDENTIAL
UNCLASSIFIED

N.A.E. LOW SPEED W/T TESTS
(JAN. 1956)

C_M VS C_L

C_G AT 285 in MRL



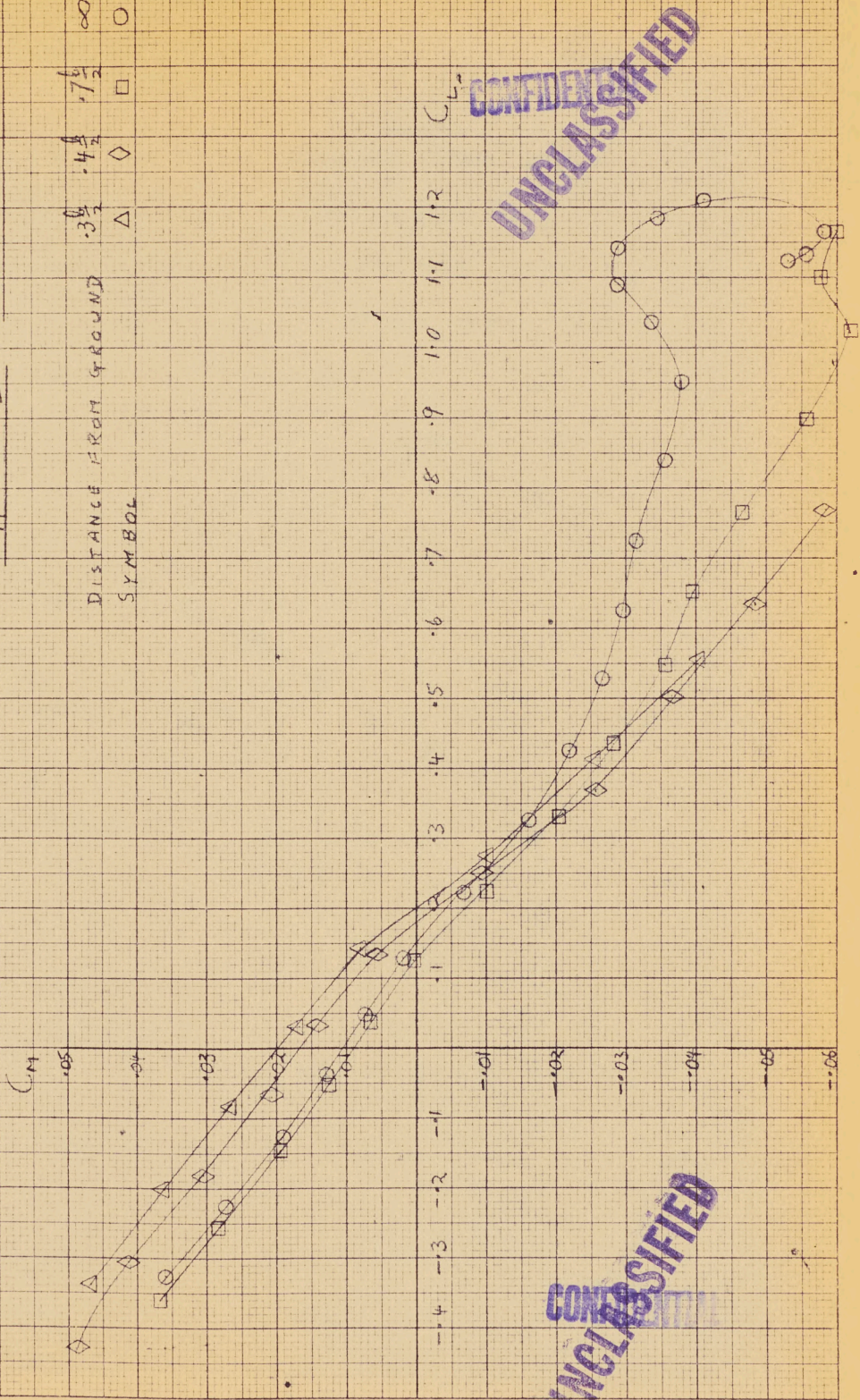
UNCLASSIFIED
CONFIDENTIAL

C-105
N.A.E. LOW SPEED W.T. TESTS (DEC 1955)

GROUND EFFECT $\delta_g = 0$

C.M. VS C.L. C.G. @ .28 Z ON M.A.C.

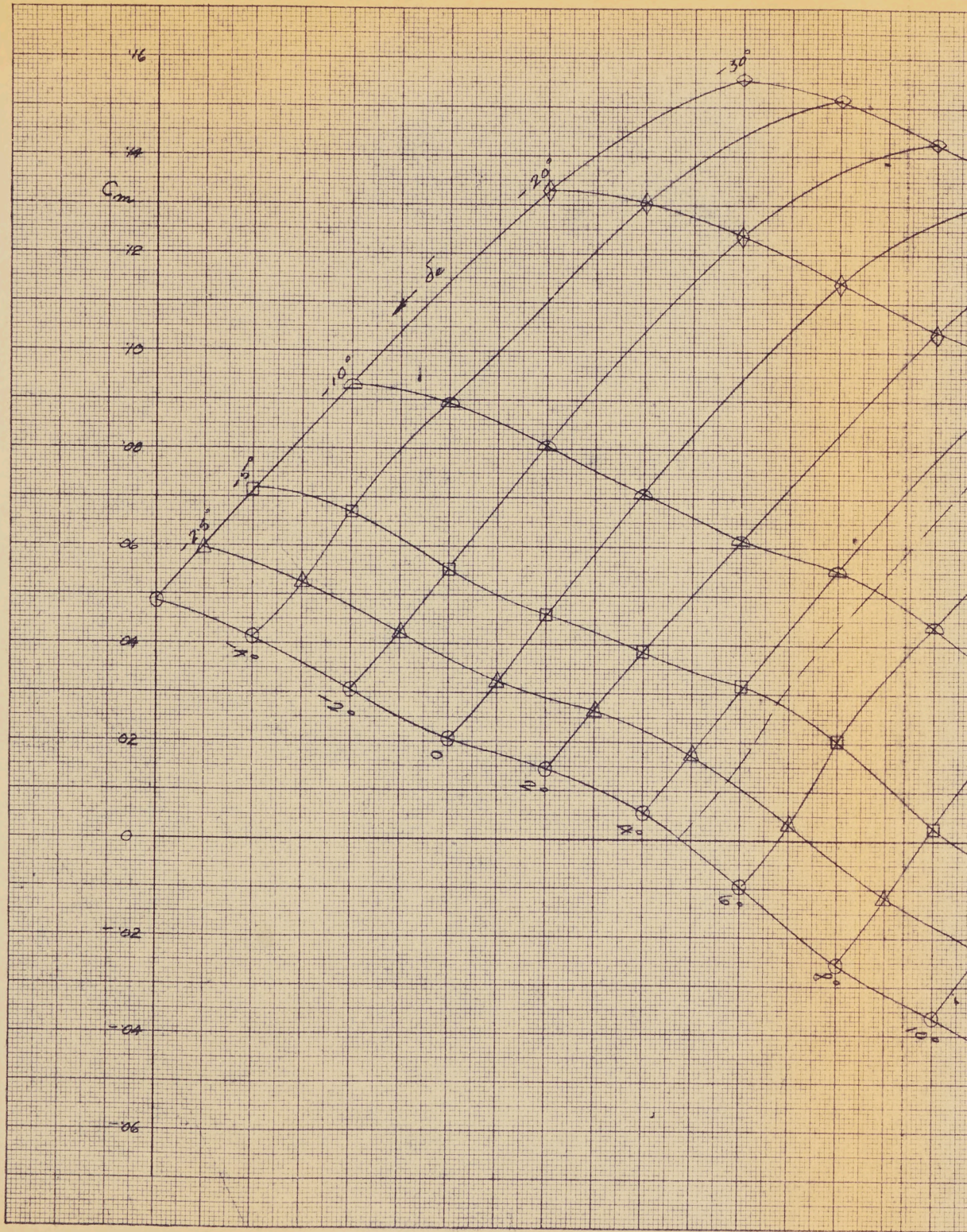
DISTANCE FROM GROUND
SYMBOL
 Δ $\cdot 3 \frac{1}{2}$ $\cdot 4 \frac{1}{2}$ $\cdot 7 \frac{1}{2}$ ∞
 \diamond \square \circ



UNCLASSIFIED

UNCLASSIFIED

350-14L KEUFFEL & ESSER CO.
 Millimeters, 6 mm. lines accented on lines heavy.
 MADE IN U.S.A.



CONFIDENTIAL
UNCLASSIFIED

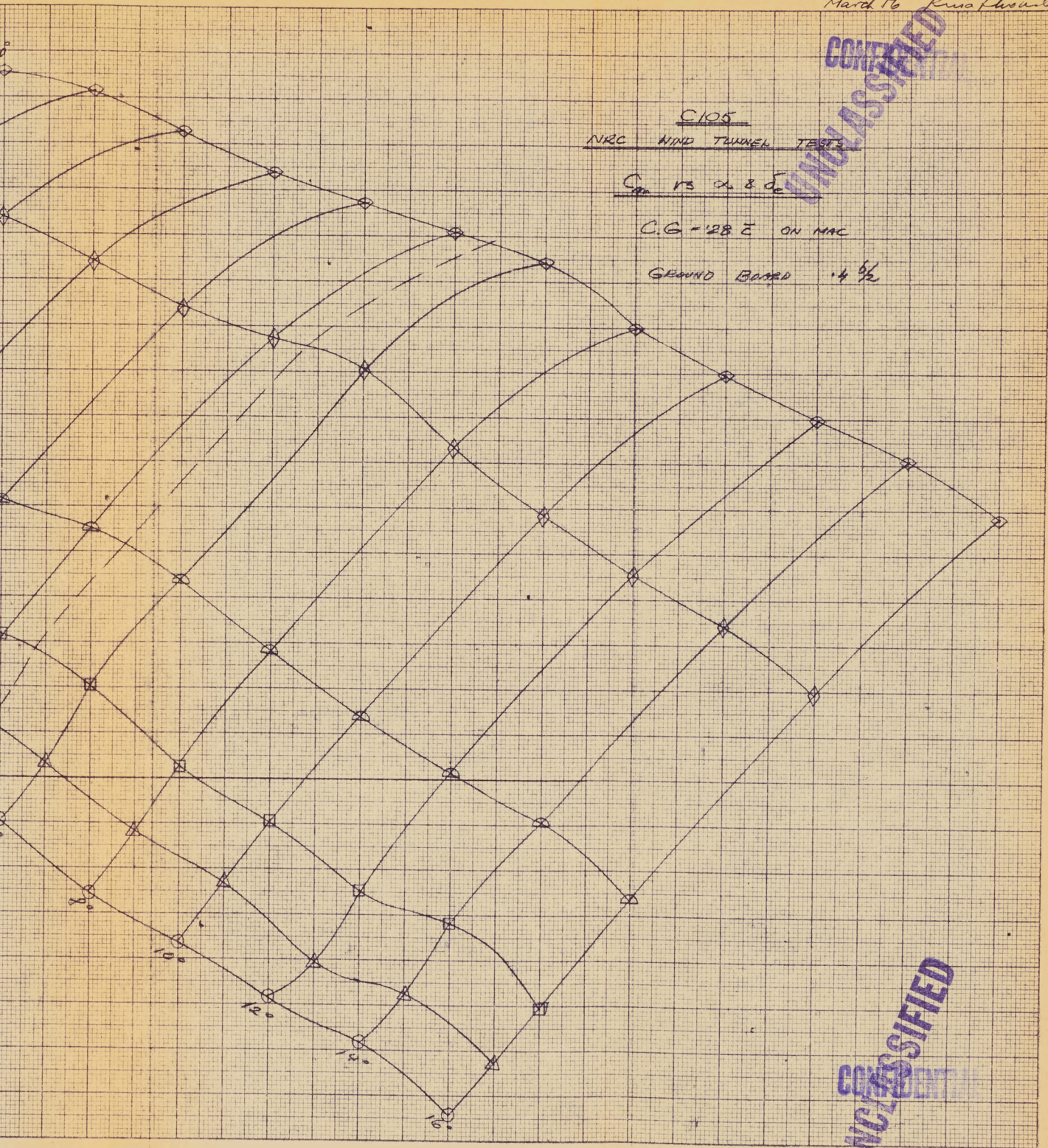
C105

NRC WIND TUNNEL TESTS

C_p vs α & σ_c

C.G. = 28% ON MAC

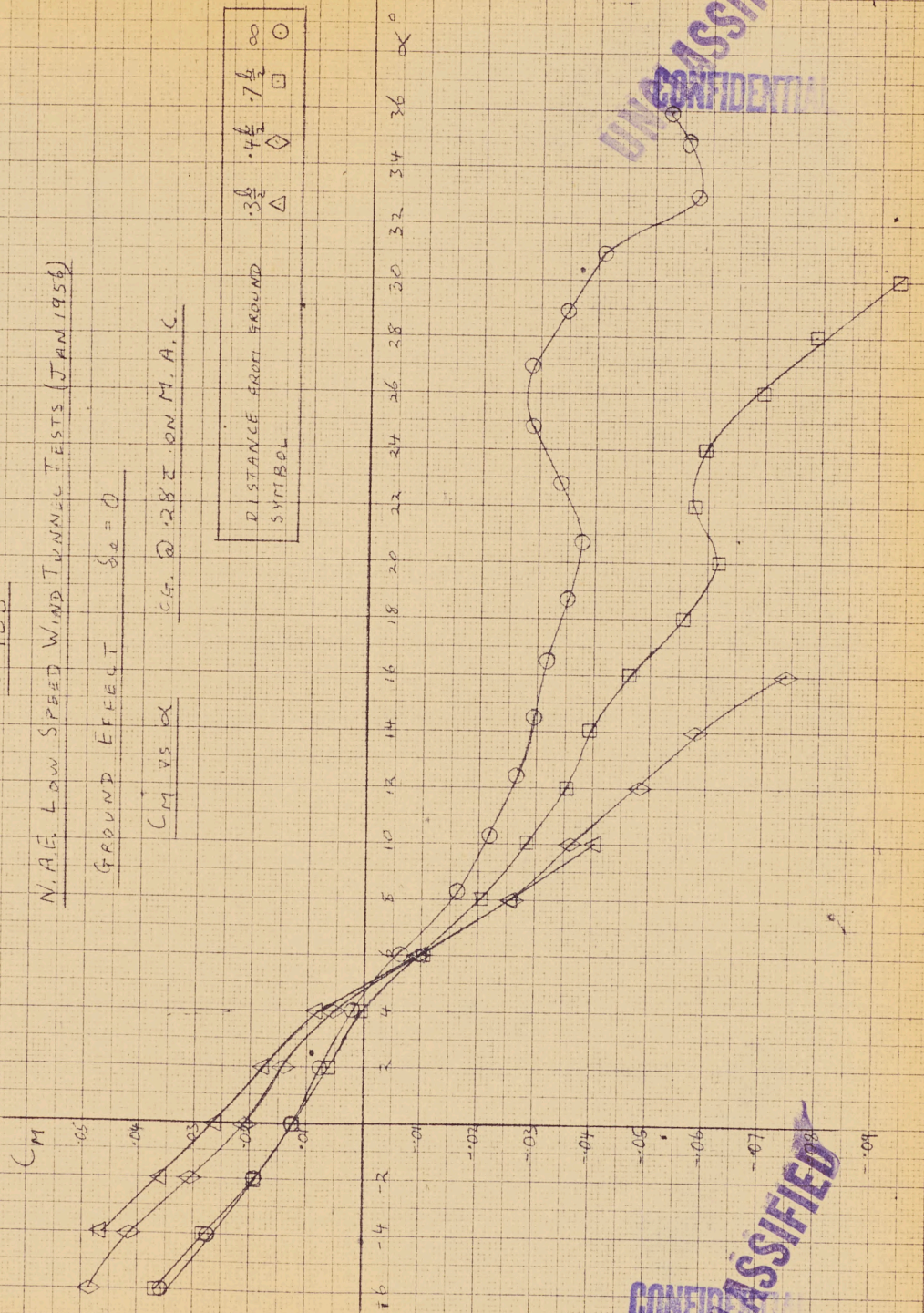
GROUND BOARD 1/4 $\frac{b}{c}$



UNCLASSIFIED

C-105
N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1956)
GROUND EFFECT $S_g = 0$
C.M. VS α C.F. @ 28% ON M.A.C.

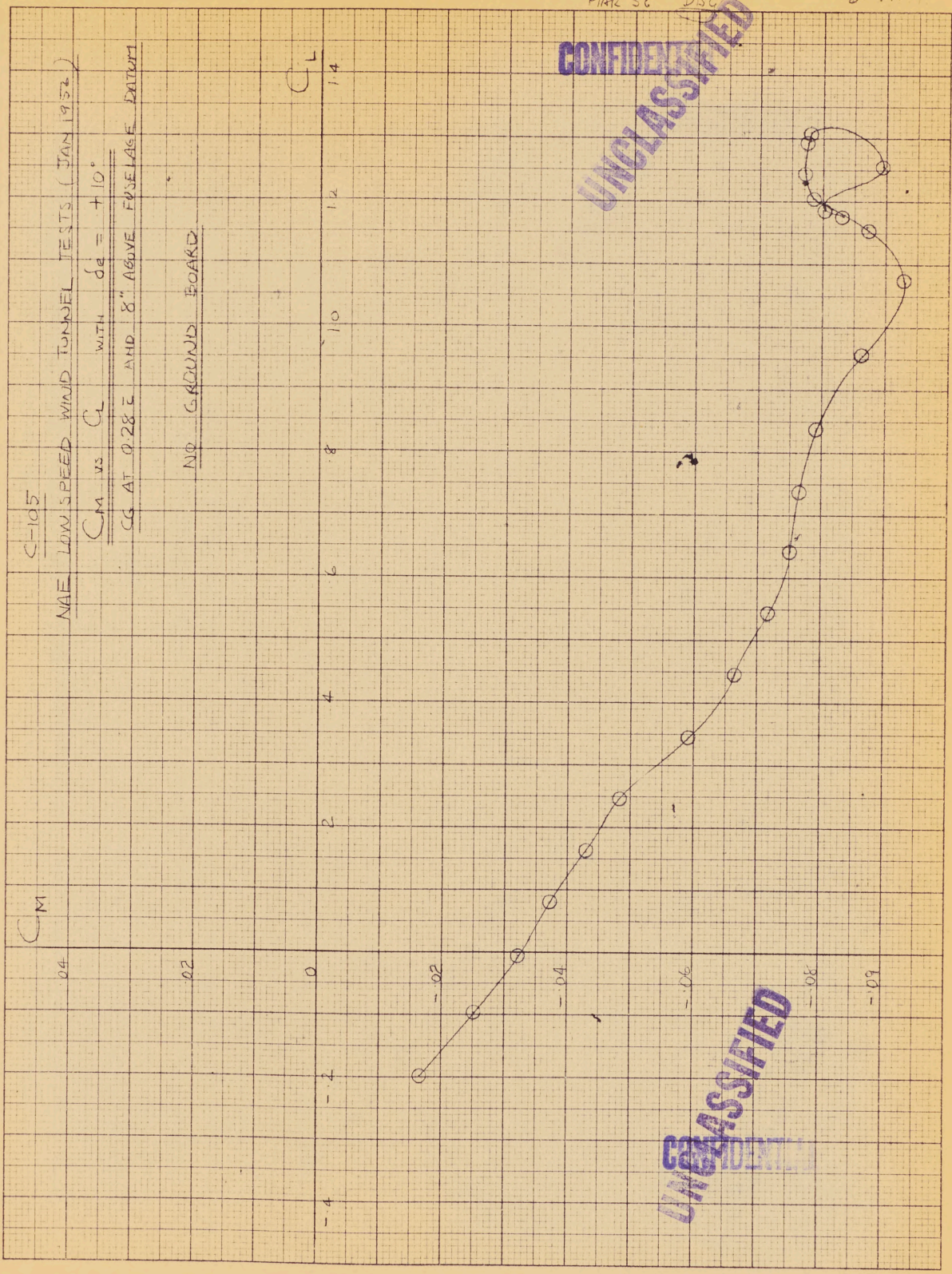
| DISTANCE FROM FLOOR | SYMBOL |
|---------------------|------------|
| $.3 \frac{1}{2}$ | Δ |
| $.4 \frac{1}{2}$ | \diamond |
| $.7 \frac{1}{2}$ | \square |
| 1.0 | \circ |



UNCLASSIFIED
CONFIDENTIAL

CONFIDENTIAL
UNCLASSIFIED

C-105
NAE LOW SPEED WIND TUNNEL TESTS (JAN 1952)
C_M vs C_L WITH $\alpha_e = +10^\circ$
CG AT 0.28 L AND 8" ABOVE FUSELAGE DATUM
NO GROUND BOARD

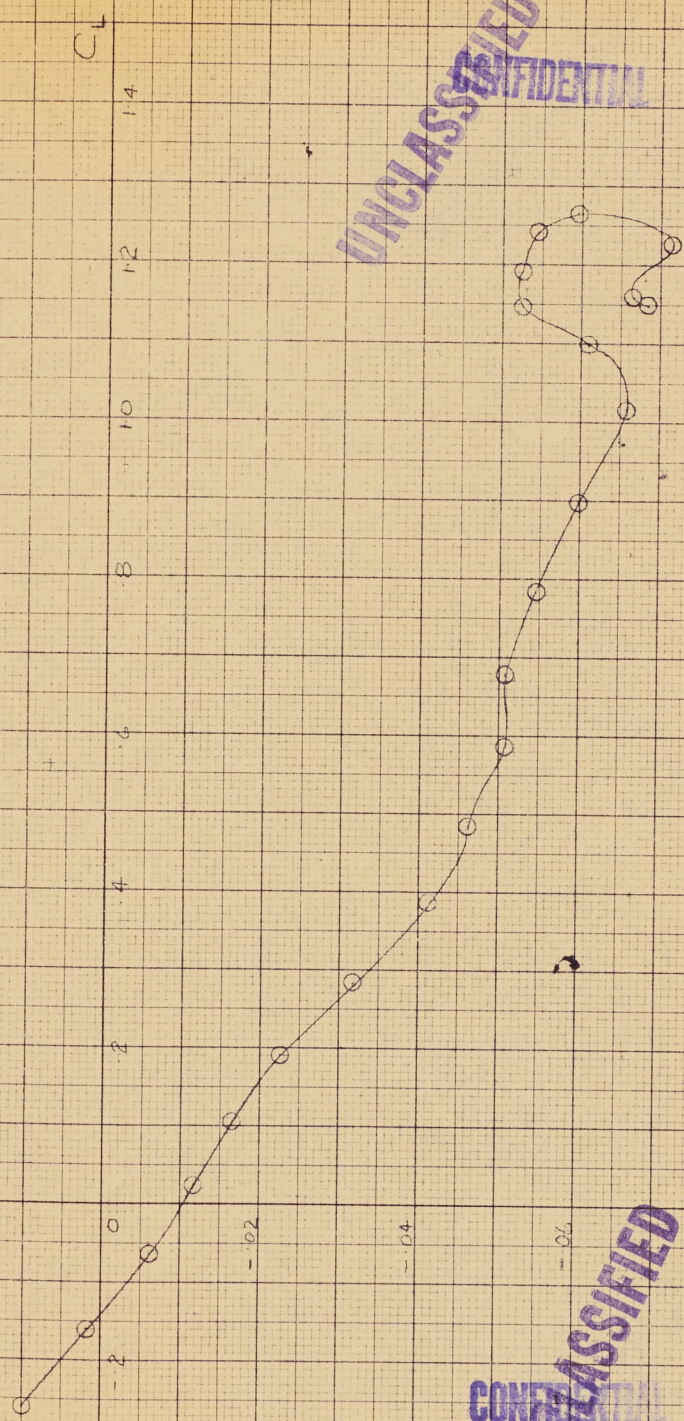


MAR 52 DBC 5.1A

CONFIDENTIAL
UNCLASSIFIED

UNCLASSIFIED

C-105
NAE LOW SPEED WIND TUNNEL TESTS (JAN 1952)
 C_M vs C_L WITH $\delta_e = +5^\circ$
NO GROUND BOARD
CG AT 0.28 L AND 8" ABOVE FUSELAGE DATUM



MAR 56 DTIC 5-18

UNCLASSIFIED
CONFIDENTIAL

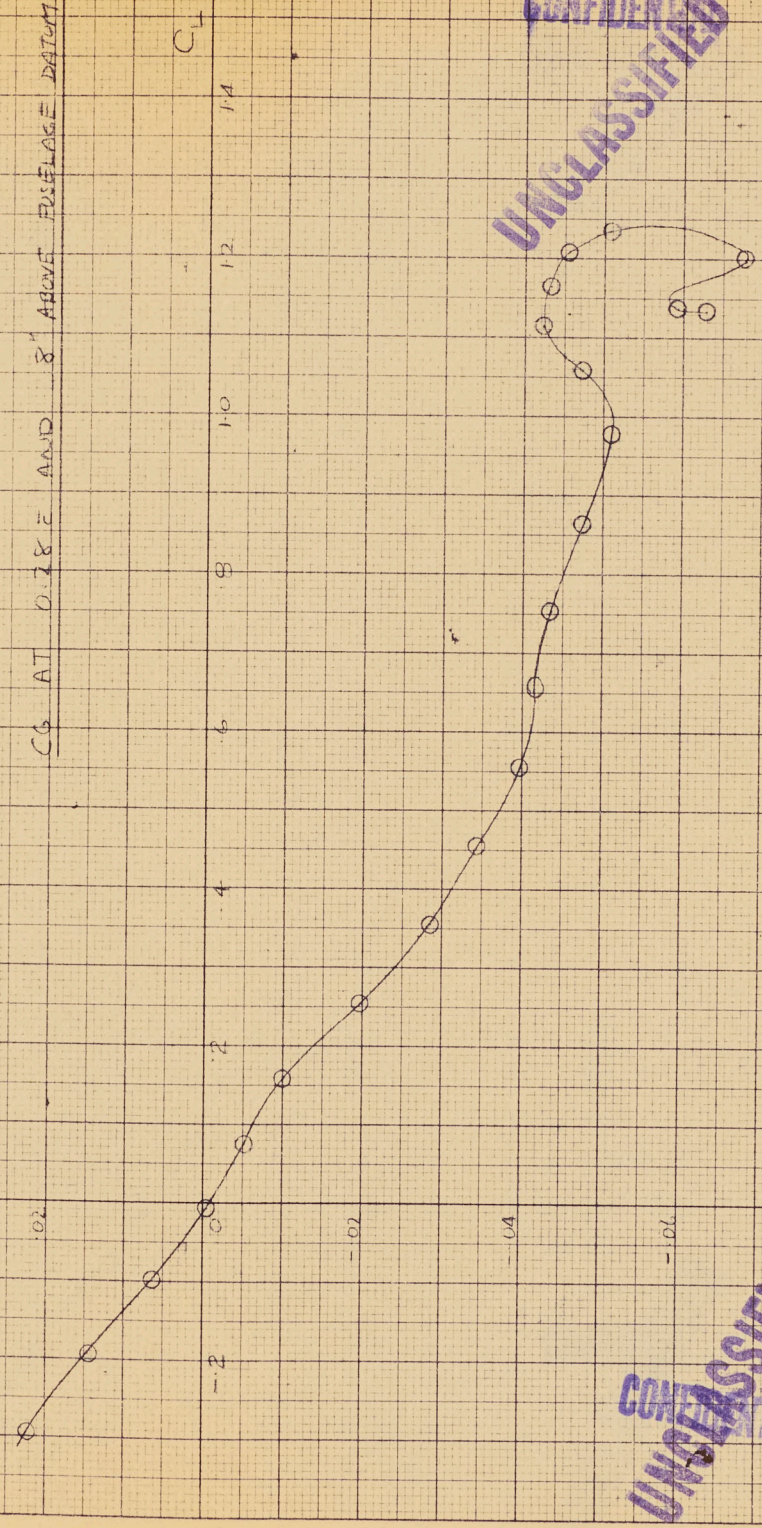
UNCLASSIFIED
CONFIDENTIAL

C-105
N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1956)

C_M vs C_L WITH $\alpha = +25^\circ$

NO GROUND BOARD

C_D AT 0.18 ϵ AND 8" ABOVE FUSELAGE DATUM



MAR 56 D.B.G. 5.1c

CONFIDENTIAL
UNCLASSIFIED

CONFIDENTIAL
UNCLASSIFIED

MAR '52 DEC

P/NT/98

5-1D

C-105
NAE LOW SPEED WIND TUNNEL TESTS (JAN 1953)

C_M vs C_L WITH $\delta_s = -15^\circ$

NO GROUND BOARD

CG AT 0.222 AND 8" ABOVE EVIPLAGE DCTUM

C_M

.10

.08

.06

.04

.02

0

-2

-4

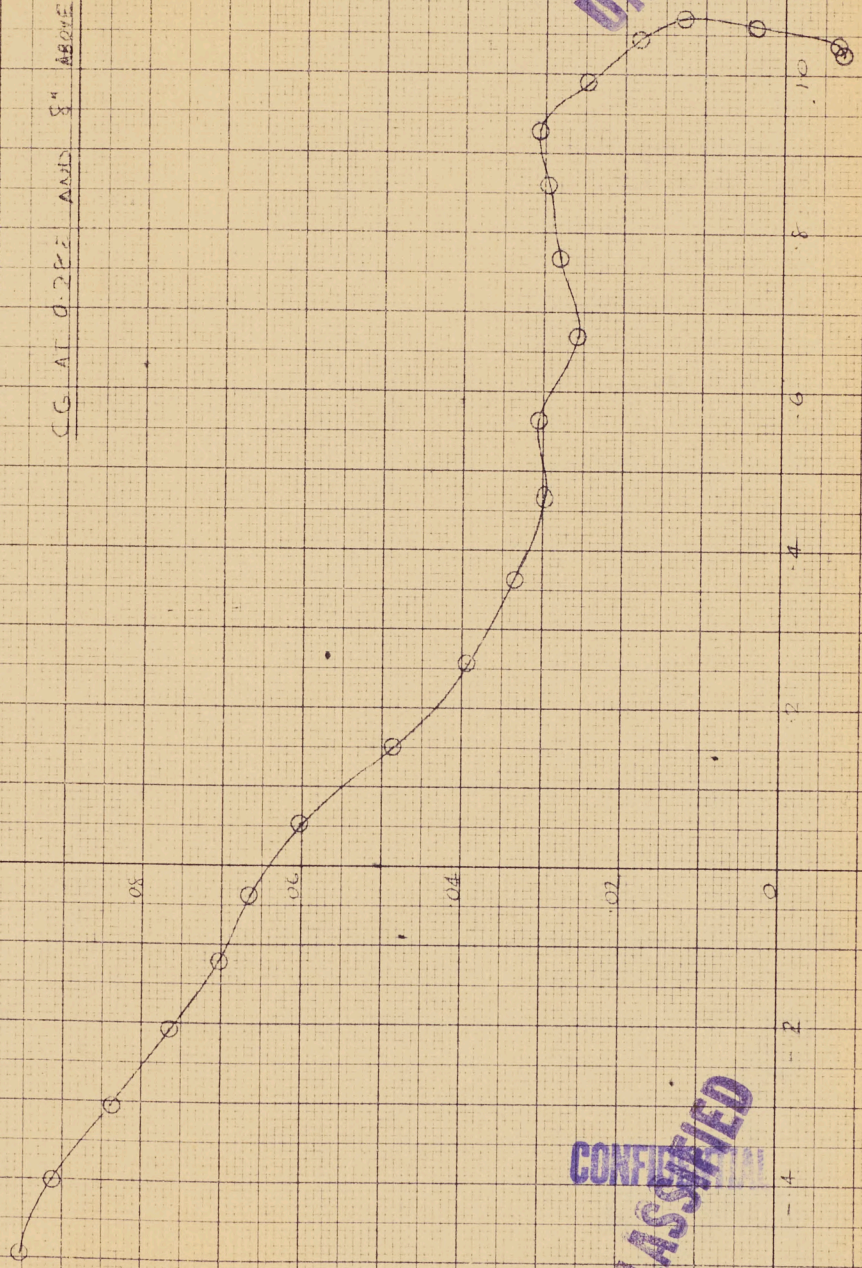
.4

.6

.8

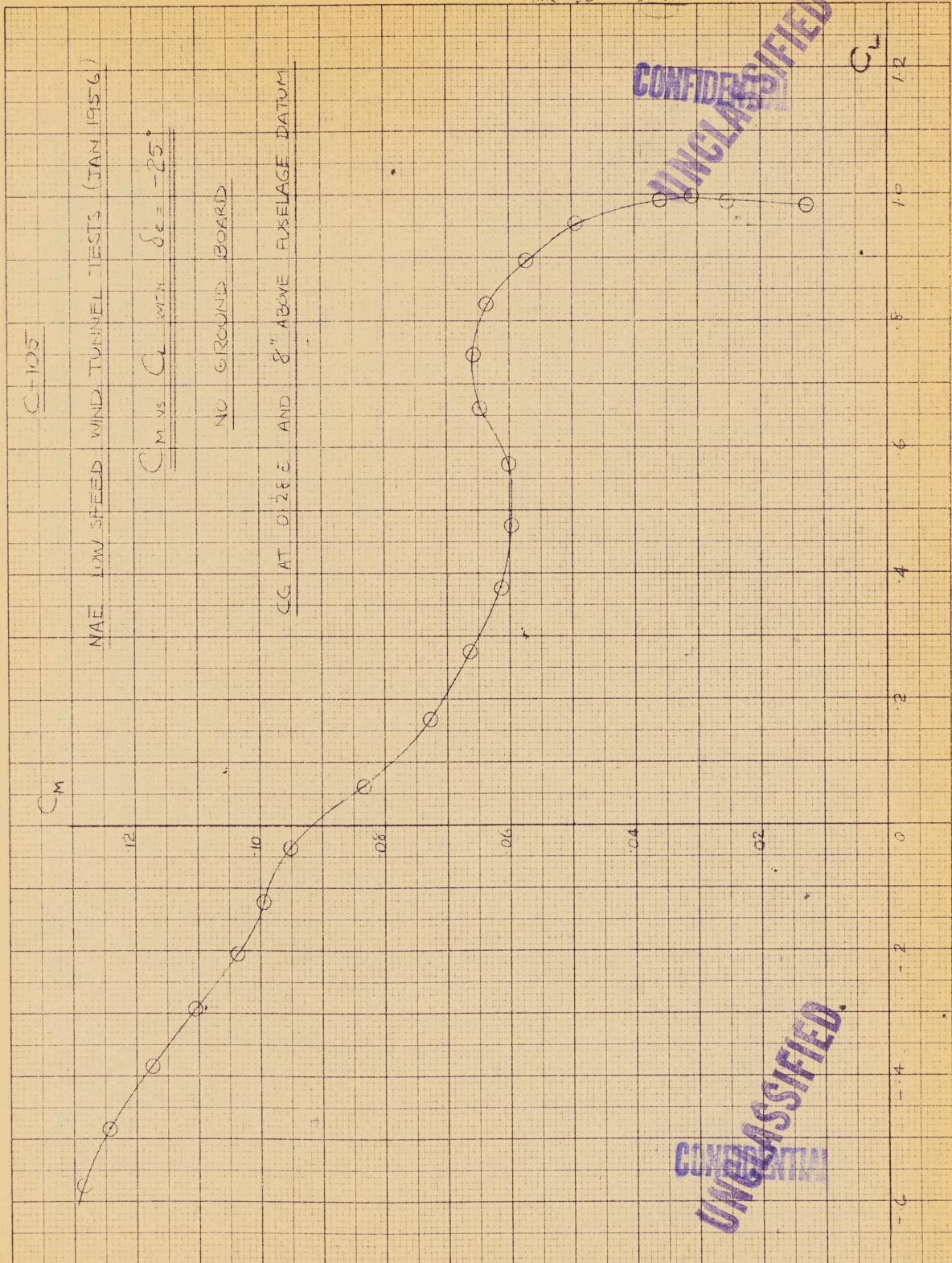
1.0

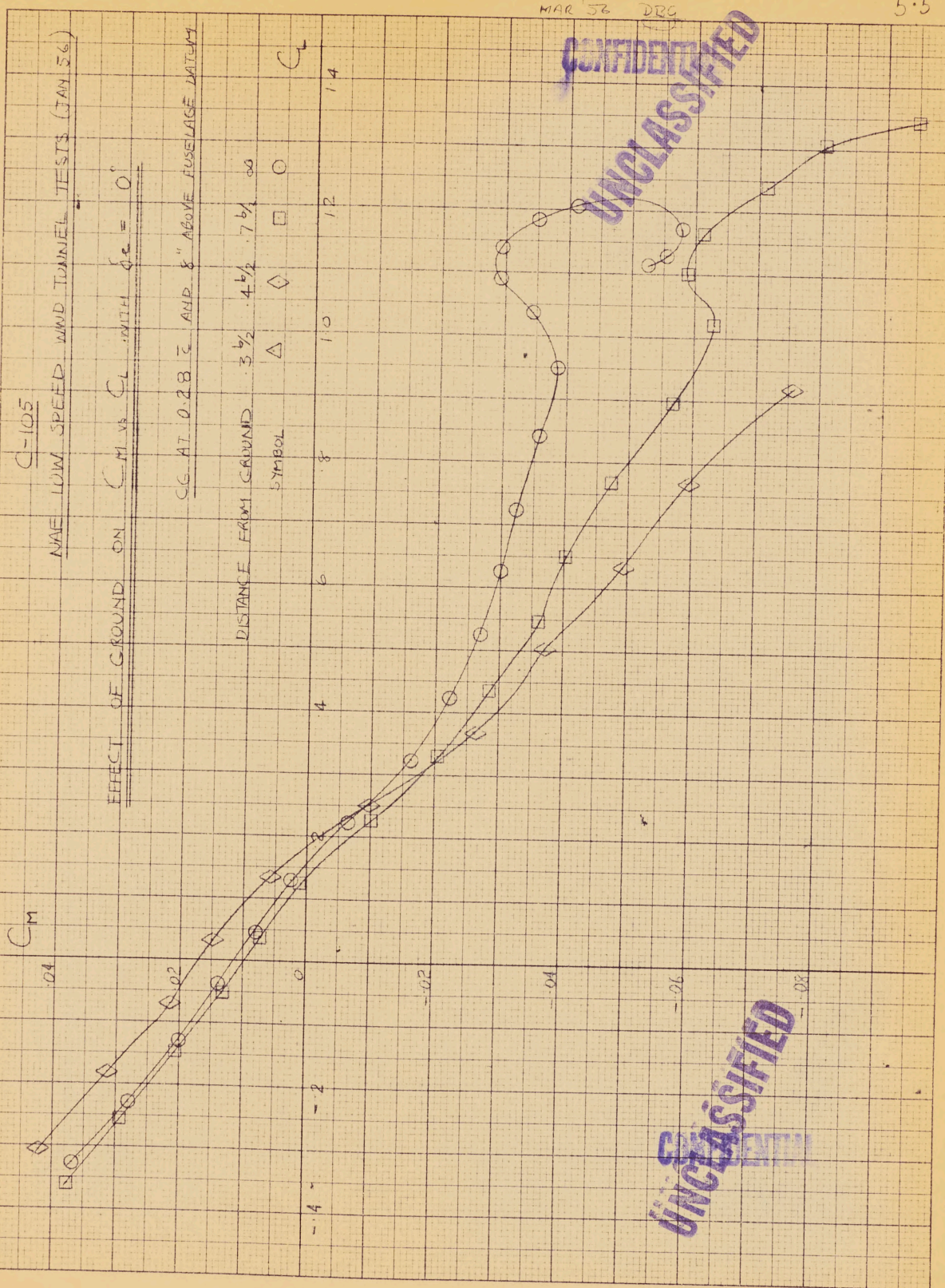
1.2



CONFIDENTIAL
UNCLASSIFIED

CONFIDENTIAL
UNCLASSIFIED





MAR 56 DRG

P/WT/98

5.5

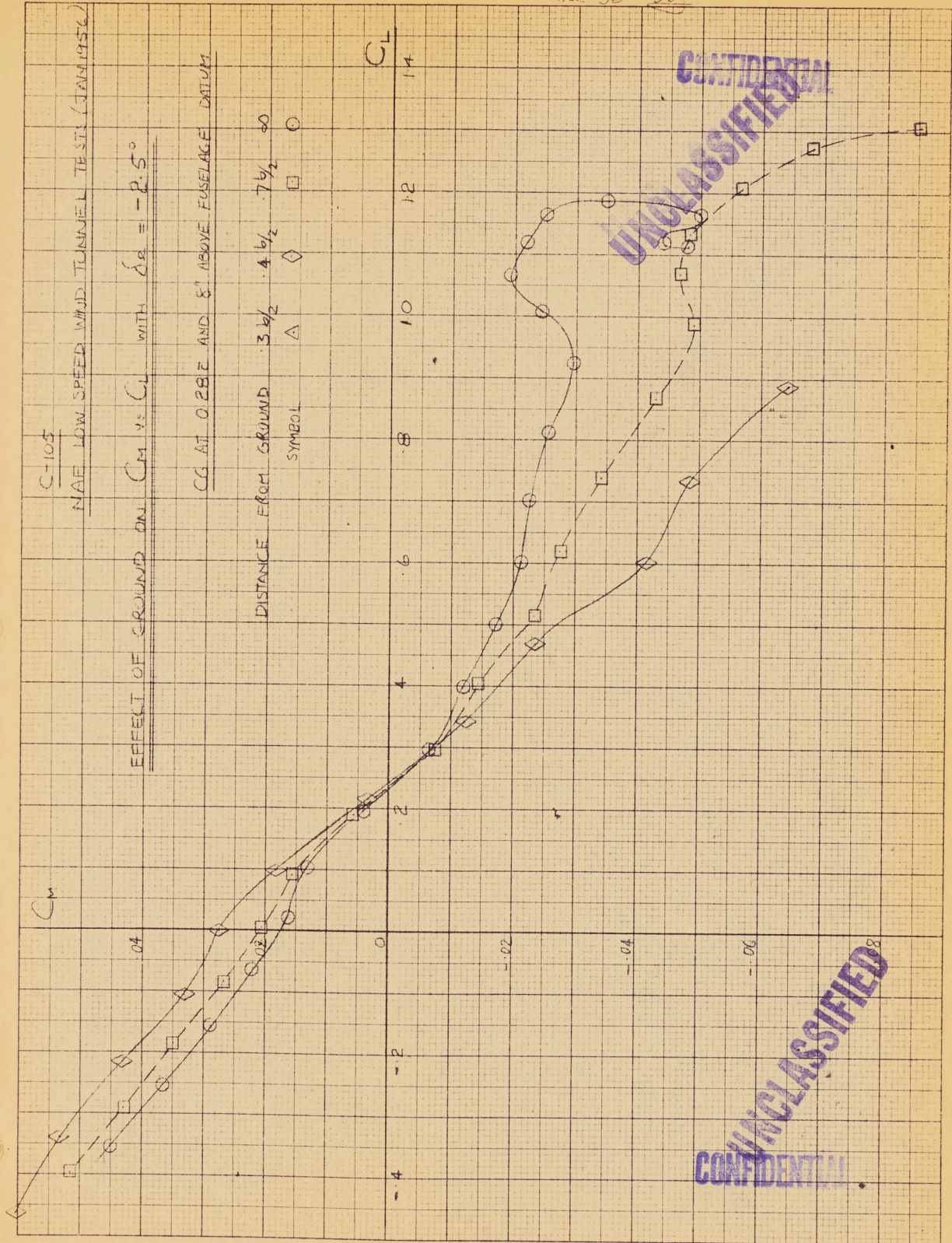
CONFIDENTIAL
UNCLASSIFIED

UNCLASSIFIED

MAR '56 DBG

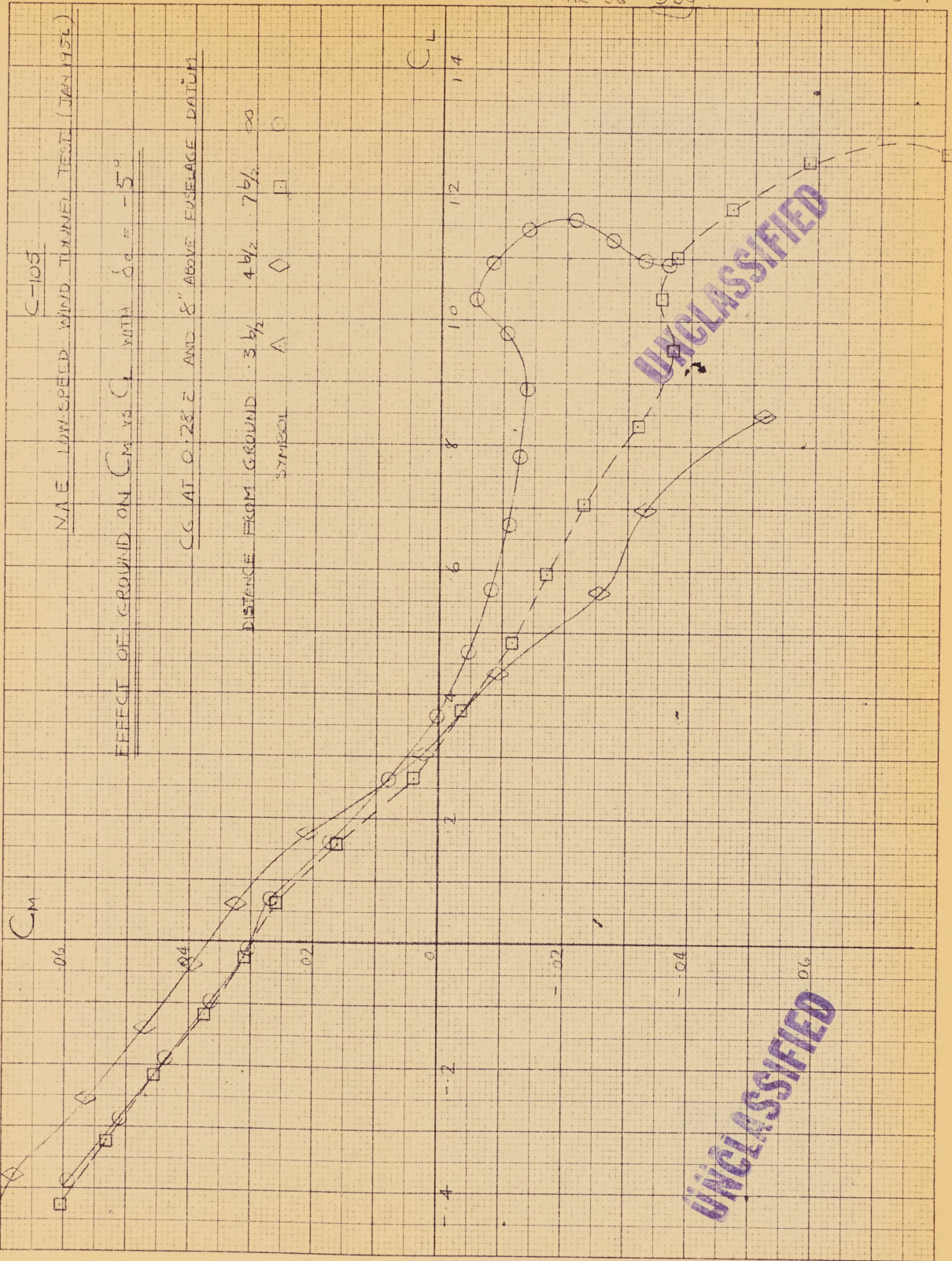
P/WT/98

5.6



CONFIDENTIAL
UNCLASSIFIED

UNCLASSIFIED
CONFIDENTIAL



MAR 56 DBG

P/WT/98

5-7

UNCLASSIFIED

UNCLASSIFIED

C-105 NAE LOW-SPEED W/T TESTS (JAN 58)

EFFECT OF GROUND ON C_m vs C_l WITH $\delta_e = -10^\circ$

CG AT 0.28 \bar{c} AND 8" ABOVE FUSELAGE DATUM

DISTANCE FROM GROUND 3 1/2 4 1/2 7 1/2 ∞

SYMBOL

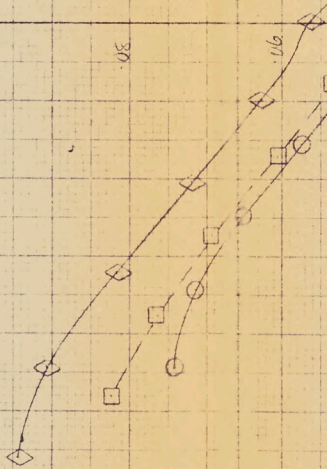
\diamond \square \circ

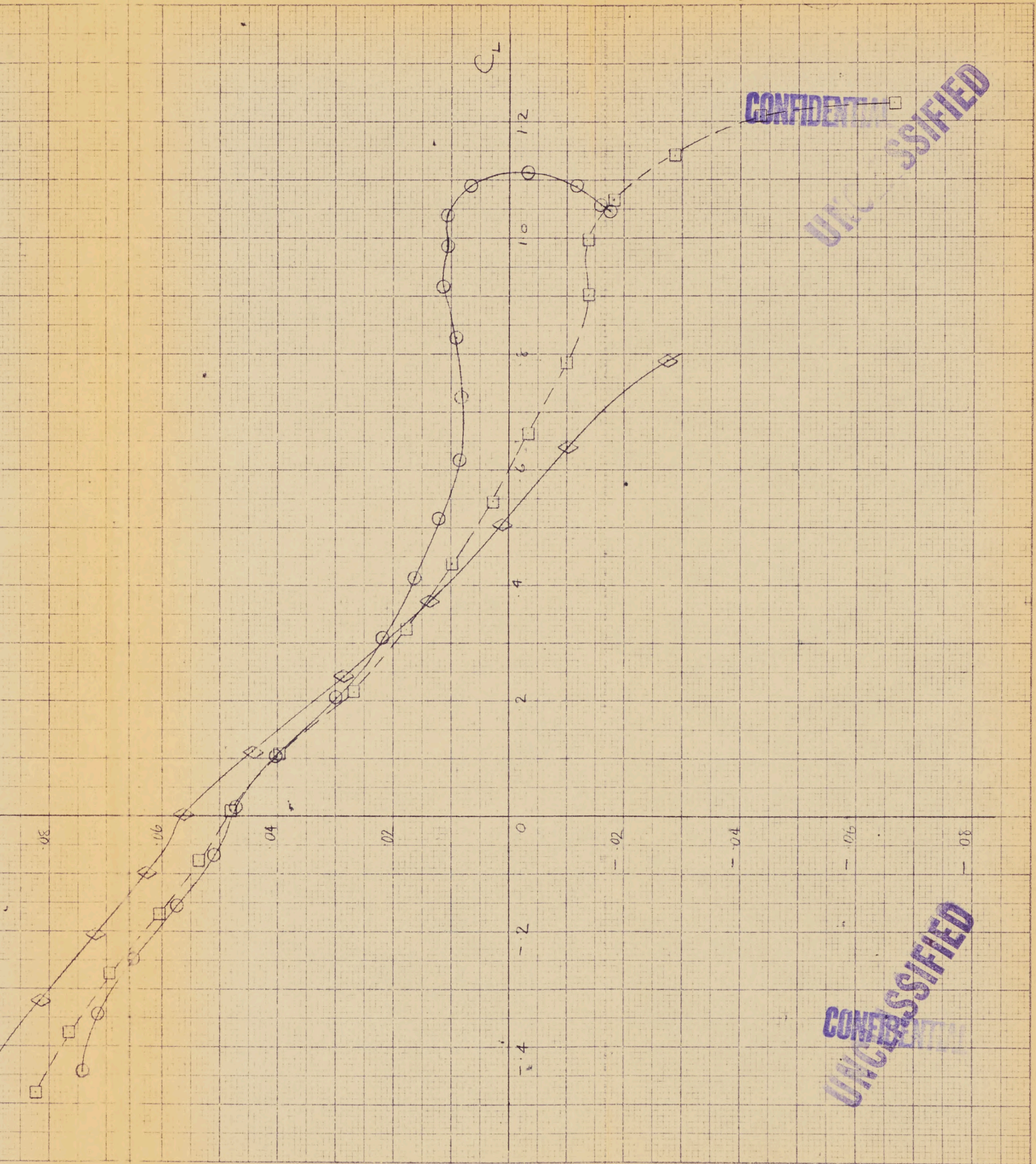
C_m

0

30

60





C-105

NAE. LOW-SPEED WIND TUNNEL TESTS (JAN 56)

EFFECT OF GROUND ON C_M VS C_L WITH $\delta_e = -20^\circ$

CG AT 0.28 \bar{c} AND 8" ABOVE FUSELAGE DATUM

DISTANCE FROM GROUND $3\frac{1}{2}$ $4\frac{1}{2}$ $7\frac{1}{2}$ ∞
 SYMBOL Δ \square \circ

C_M

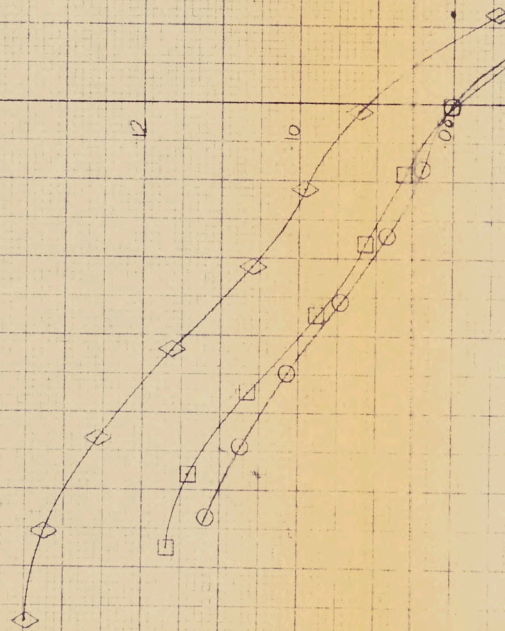
.16

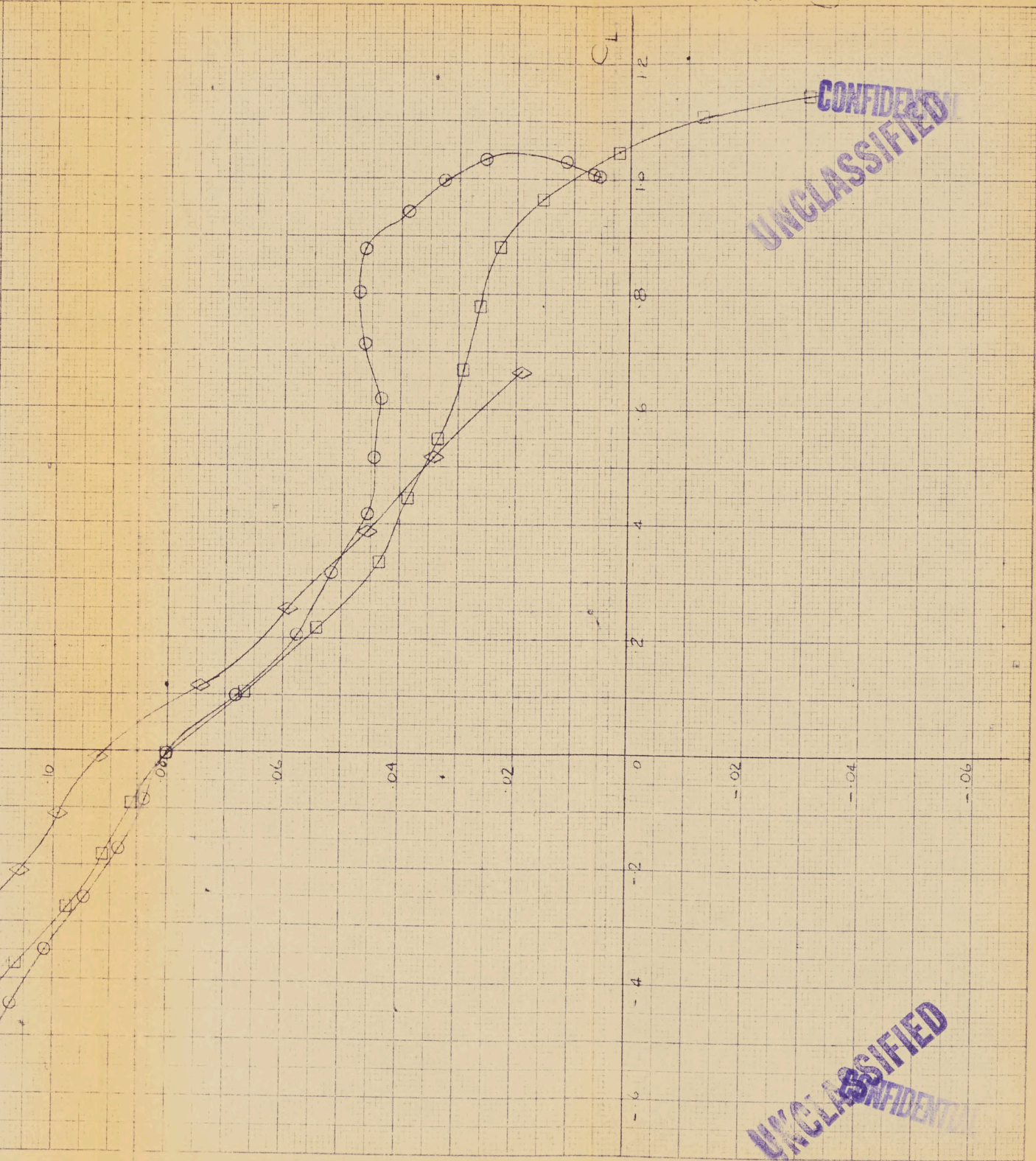
.14

.12

.10

.08





CONFIDENTIAL
UNCLASSIFIED

UNCLASSIFIED
CONFIDENTIAL

C-105

NAE LOW SPEED WIND TUNNEL TESTS (JAN 1958)

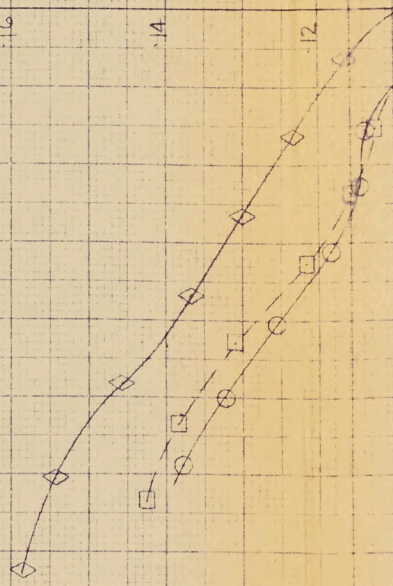
EFFECT OF GROUND ON C_M 'S WITH $\delta = -30^\circ$

CG AT 0.28Z AND 8" ABOVE FUSELAGE DATUM

DISTANCE ABOVE GROUND SYMBOL Δ \diamond \square \circ ∞

C_M

.18
 .16
 .14
 .12

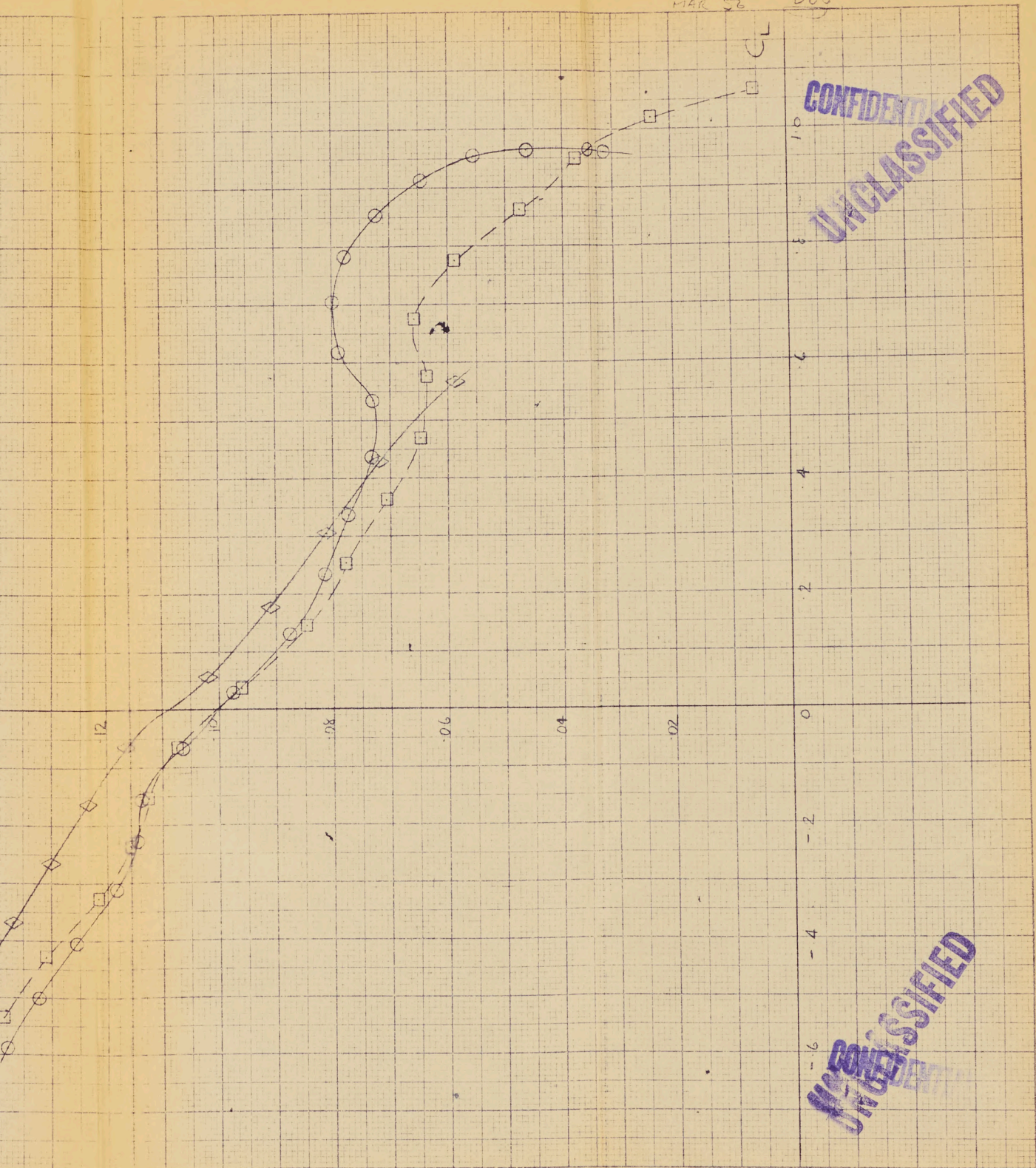


M/NT 198

5-10

MAR 76

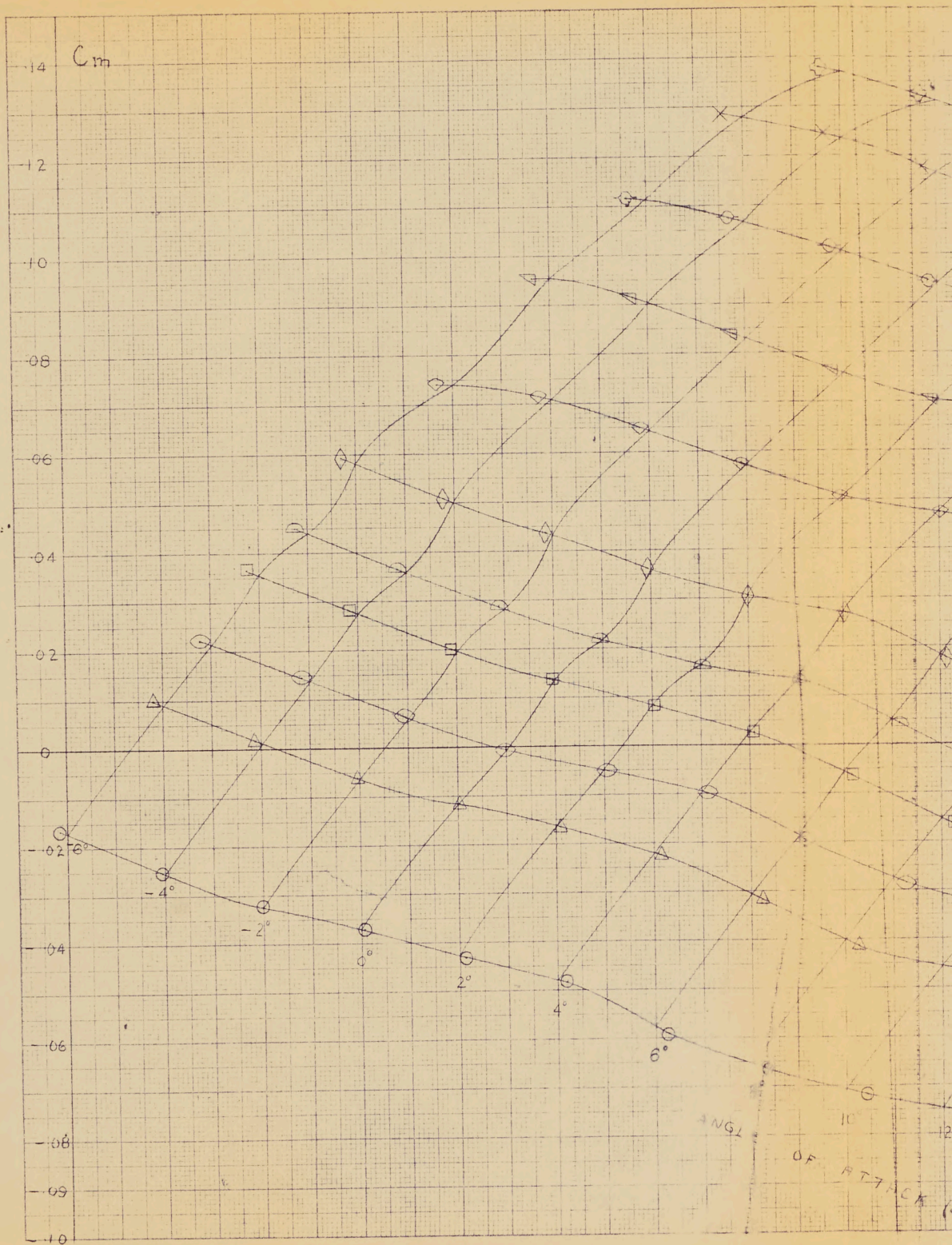
DBG



CONFIDENTIAL
UNCLASSIFIED

UNCLASSIFIED

10 X 10 TO THE CM. 359-14L
KAUFFEL & ESSER CO. TABLE 1, 2, 3, 4



YBH Mar/56

P/WT/98

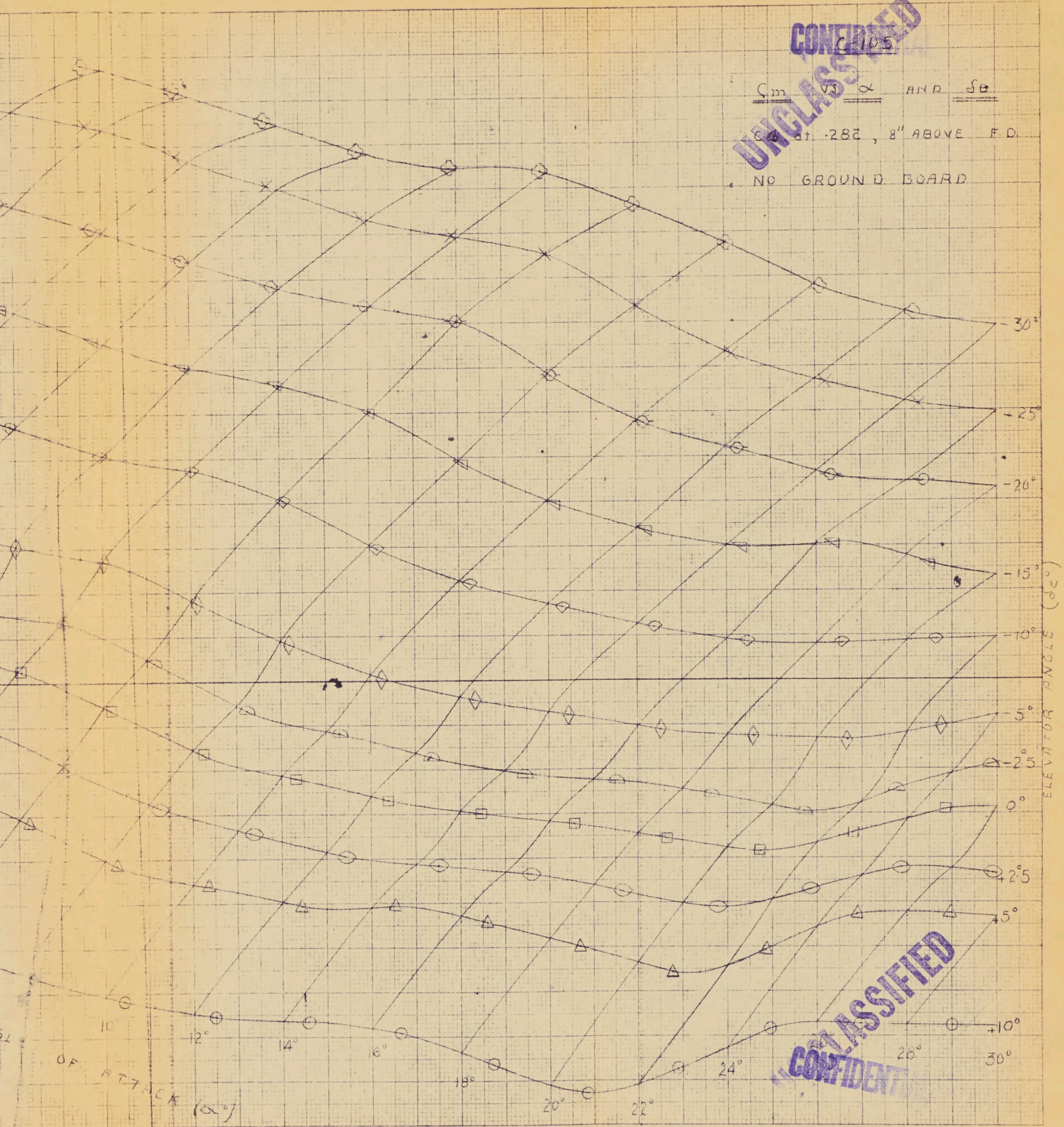
6.1

CONFIDENTIAL

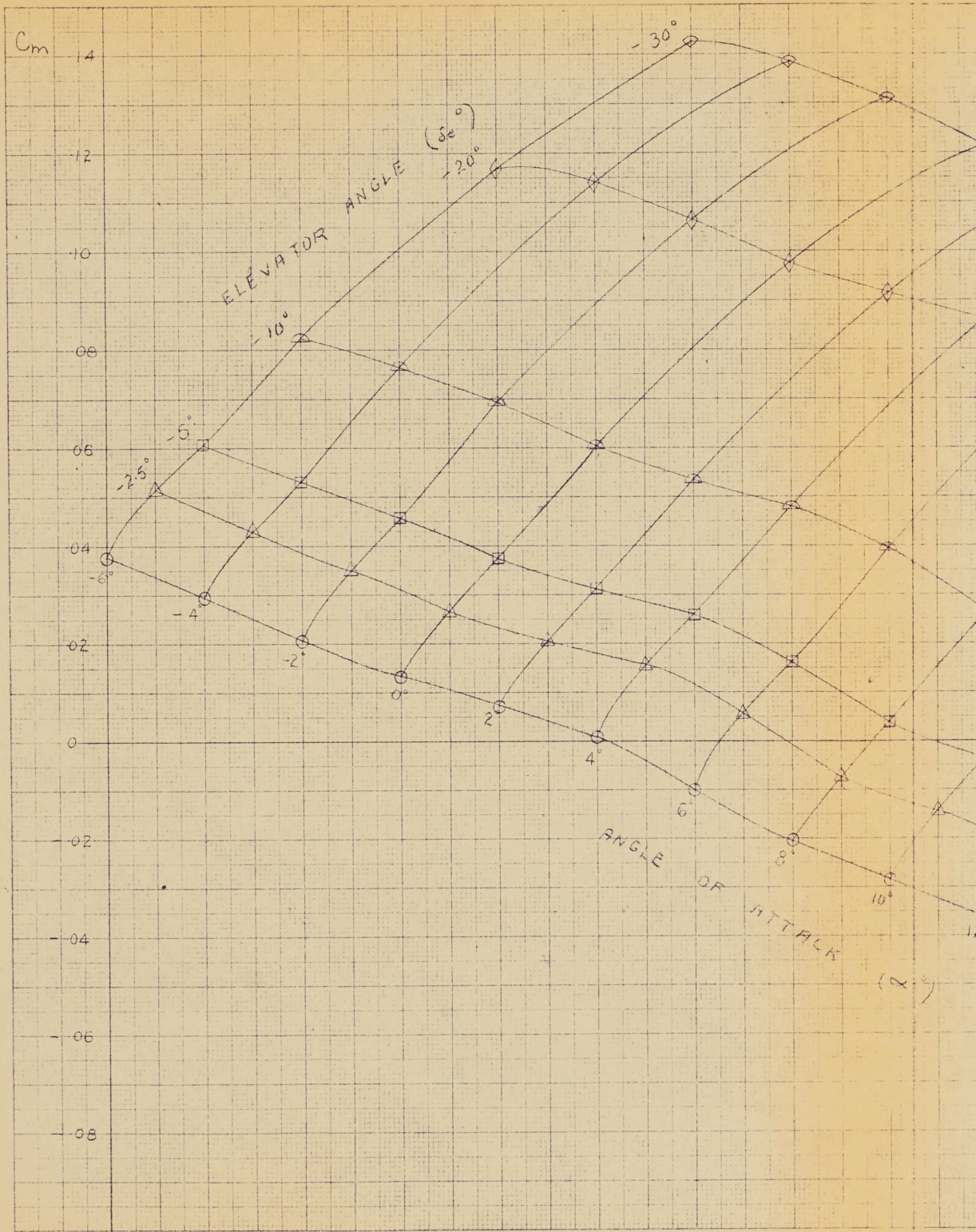
Cm vs α AND δ

CG at .282, 8" ABOVE F.D.

NO GROUND BOARD



359-14L
10 X 10 TO THE CM.
KEUFFEL & ESSER CO.



P/WT/98

YB# Max/56

6-3

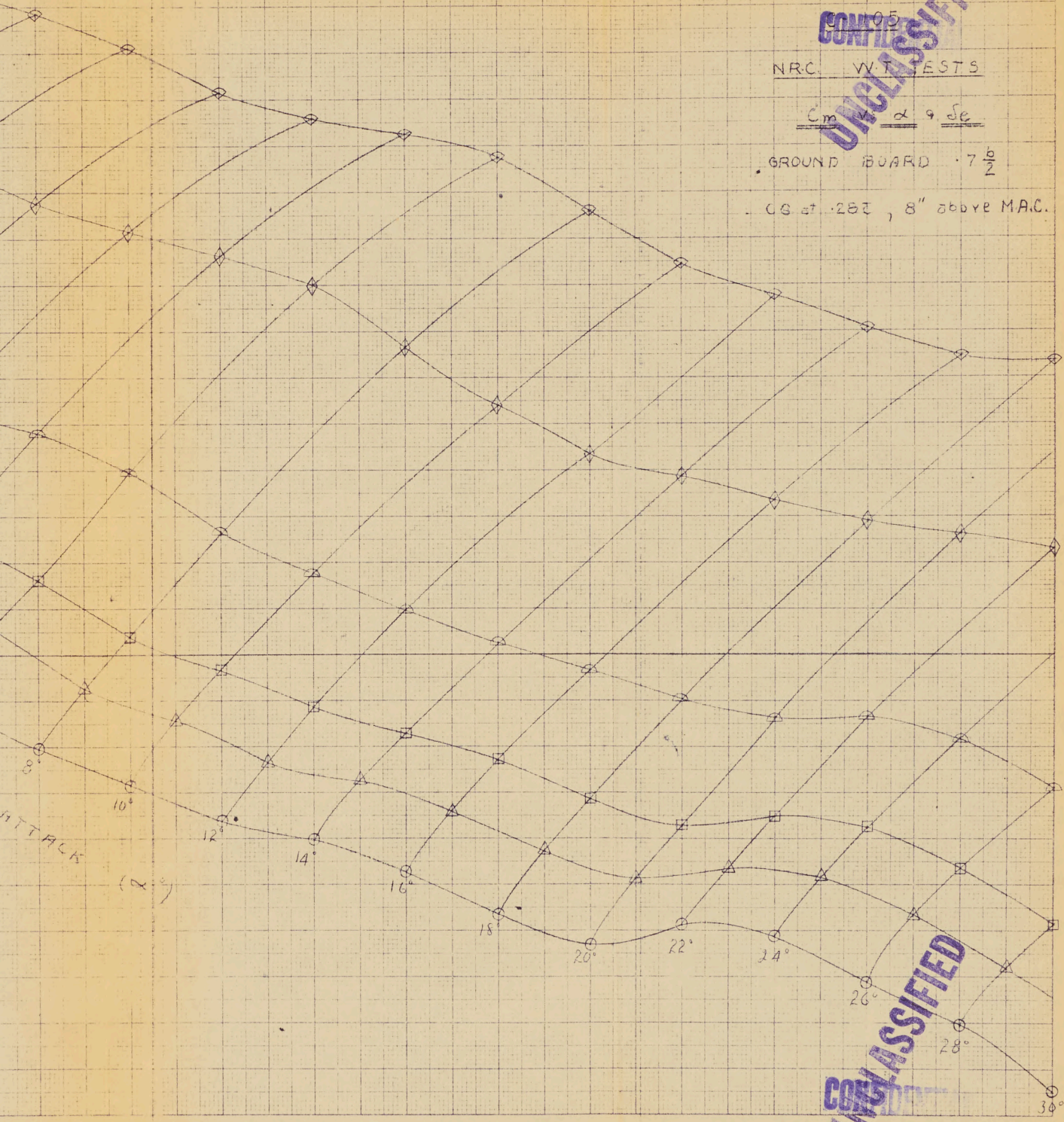
CONFIDENTIAL
UNCLASSIFIED

NRC WT TESTS

Cm α 9.56

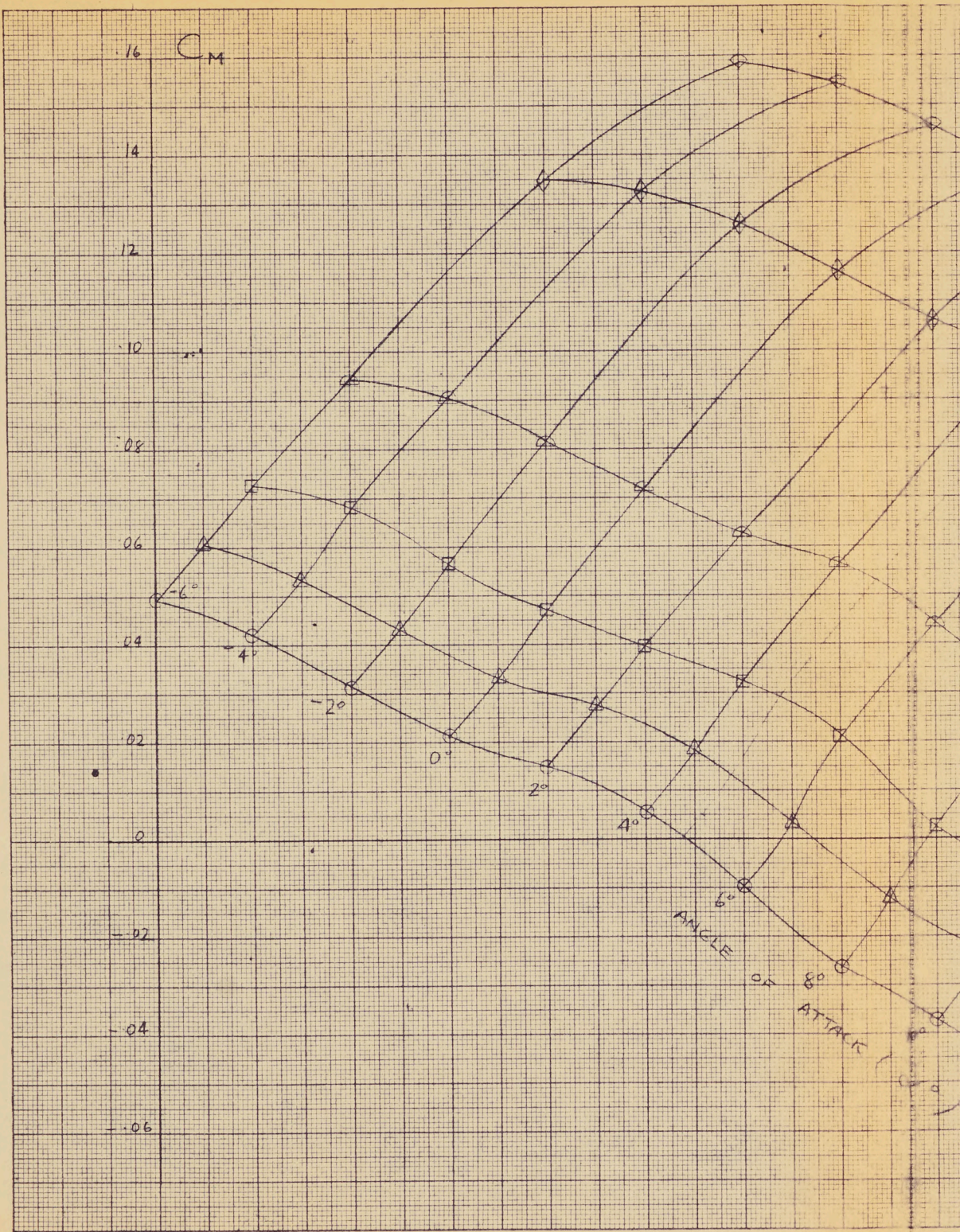
GROUND BOARD $7 \frac{5}{2}$

CS at .28T, 8" above M.A.C.



CONFIDENTIAL
UNCLASSIFIED

359-14L KEUFFEL & ESSER CO.
lines spaced 5 mm. lines accented, cm. lines heavy.
MADE IN U.S.A.



MAR 16 1952

U.S.C.

CONFIDENTIAL

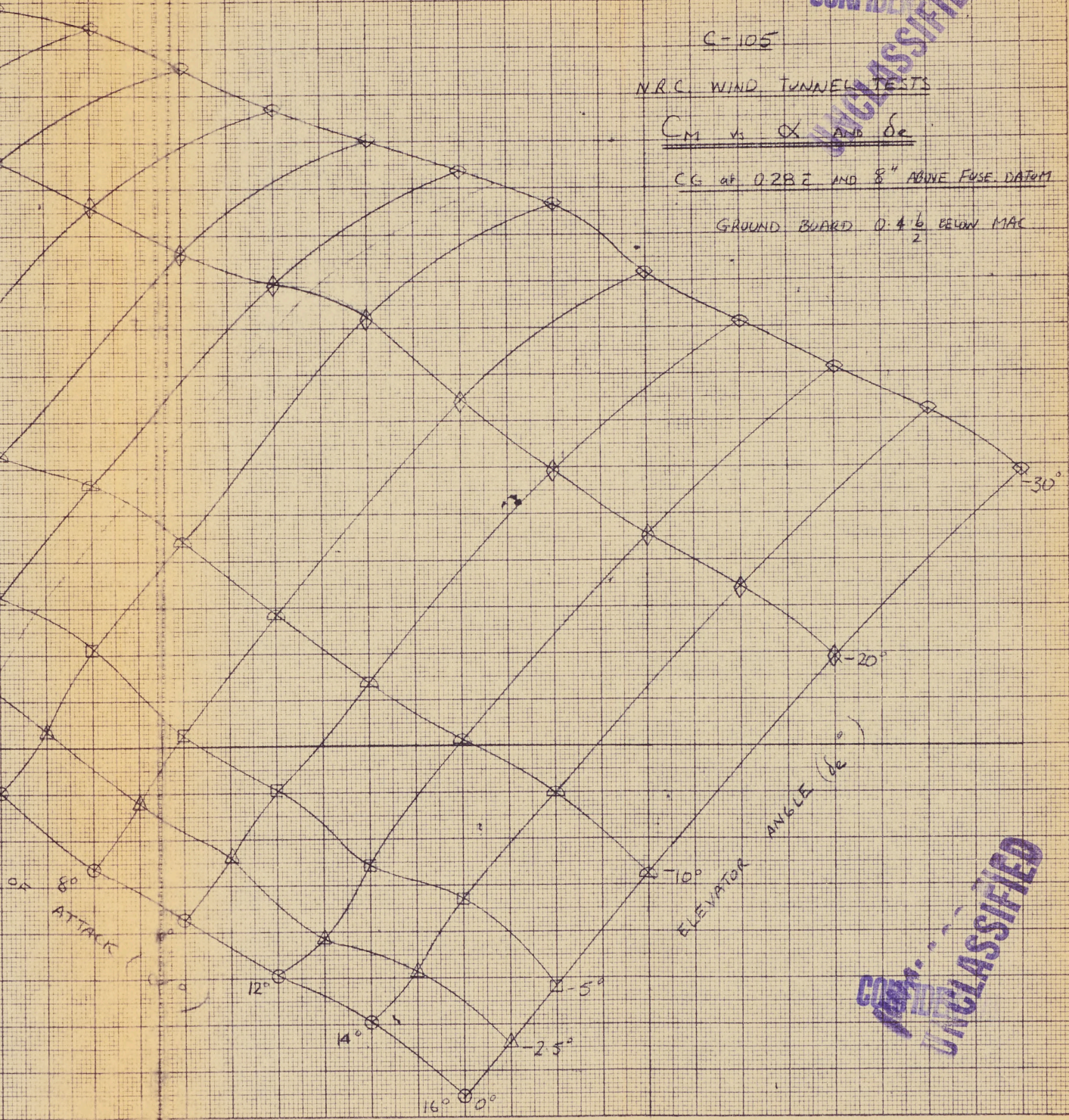
C-105

N.R.C. WIND TUNNEL TESTS

C_M vs α AND δ_e

CG OF 0.28Z AND 8" ABOVE FUSE DATUM

GROUND BOARD 0.4 $\frac{1}{2}$ BELOW MAC



CONFIDENTIAL

P/WT/48 7.5
 ERY MARCH 1956

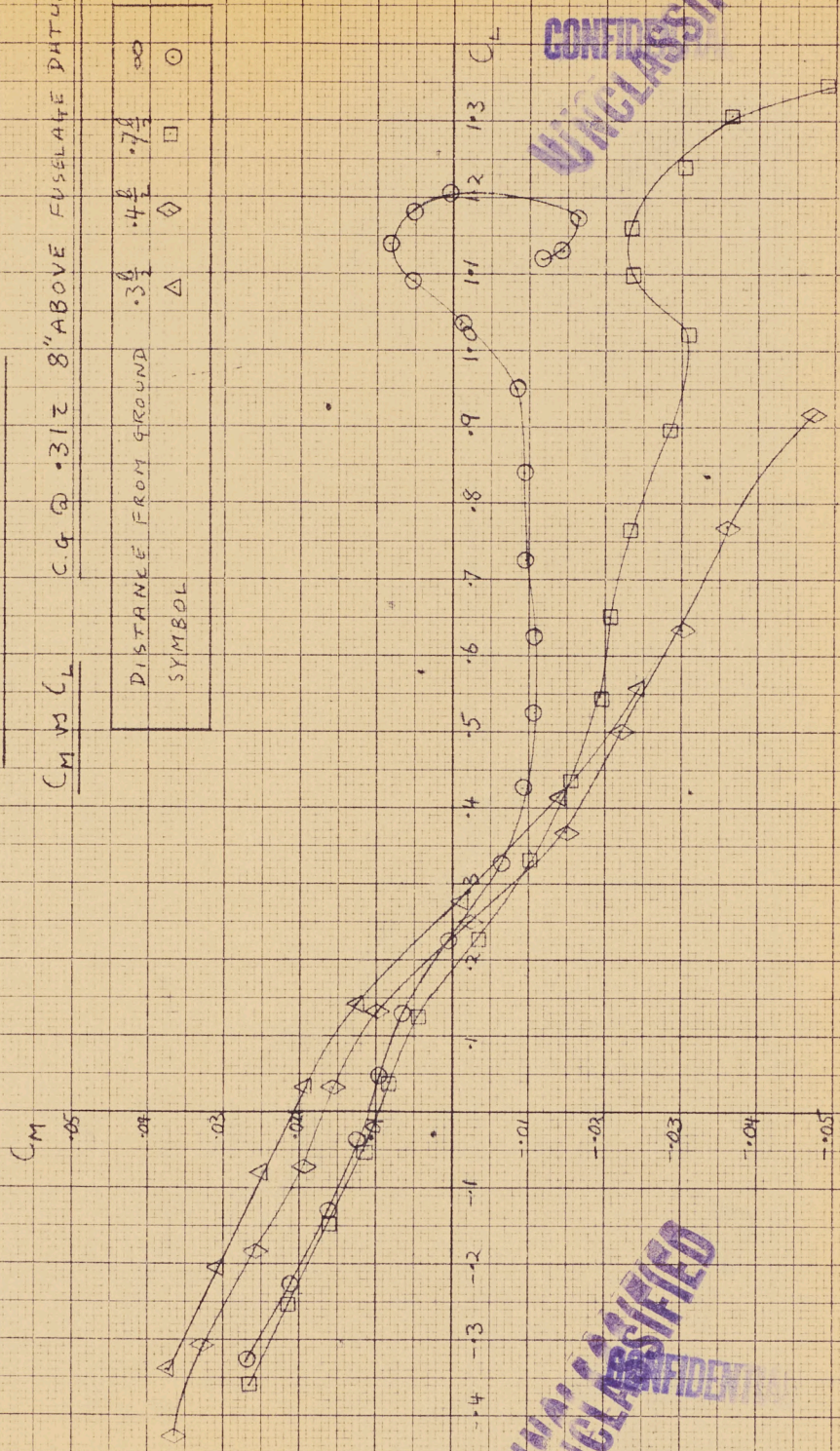
C-105

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1956)

GROUND EFFECT $\delta_E = 0$

C.M. VS C.L. C.G. @ .312 8" ABOVE FUSELAGE DATUM

| DISTANCE FROM GROUND | SYMBOL |
|----------------------|------------|
| .30 | Δ |
| .40 | \diamond |
| .70 | \square |
| ∞ | \circ |



UNCLASSIFIED

UNCLASSIFIED

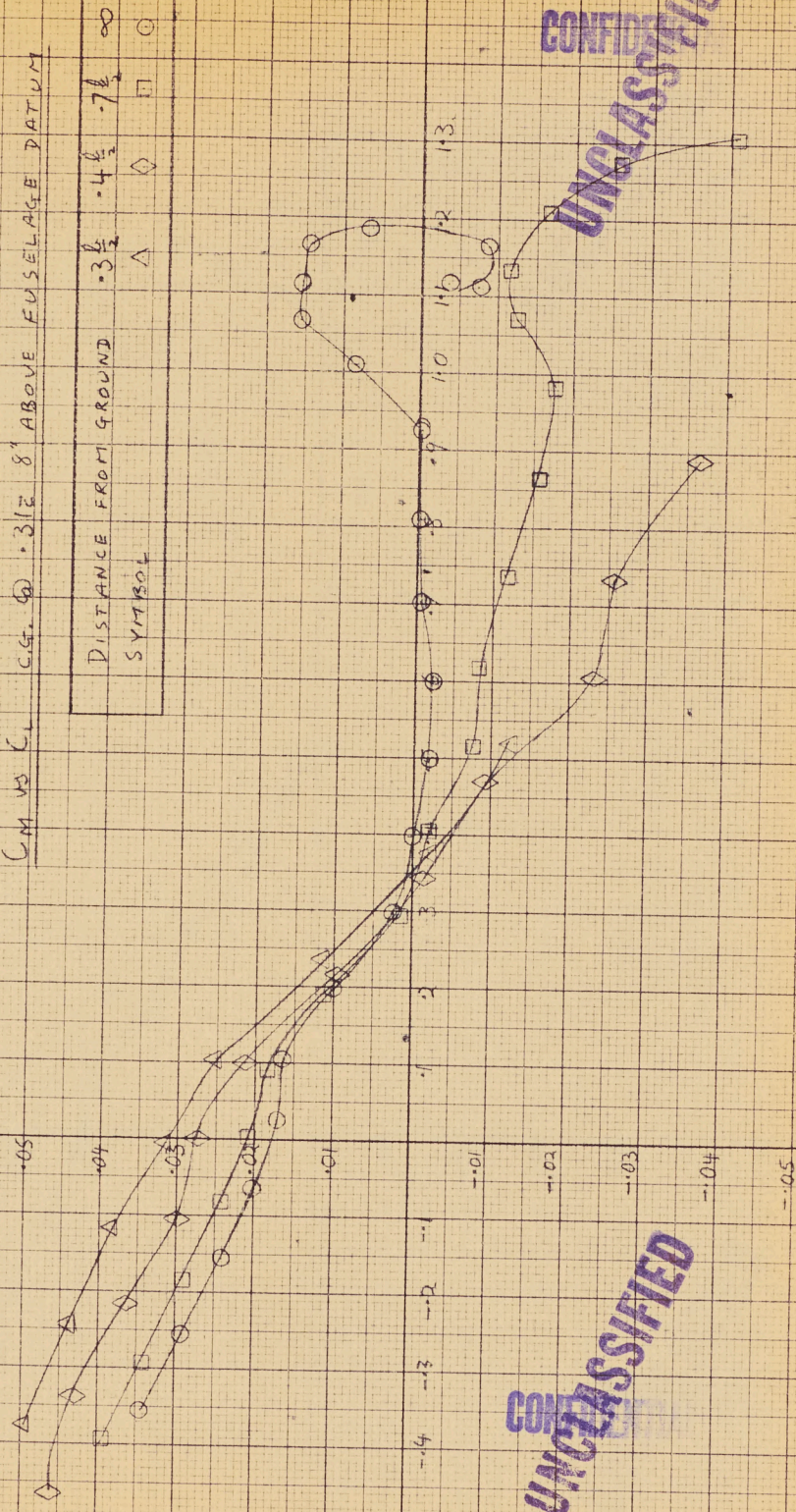
C-105

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1956)

GROUND EFFECT $\delta_0 = -2.5^\circ$

CM vs C_L C.G. @ $.312$ 8' ABOVE FUSELAGE DATUM

| DISTANCE FROM GROUND | $.3 \frac{1}{2}$ | $.4 \frac{1}{2}$ | $.7 \frac{1}{2}$ | ∞ |
|----------------------|------------------|------------------|------------------|----------|
| SYMBOL | Δ | \diamond | \square | \circ |



UNCLASSIFIED

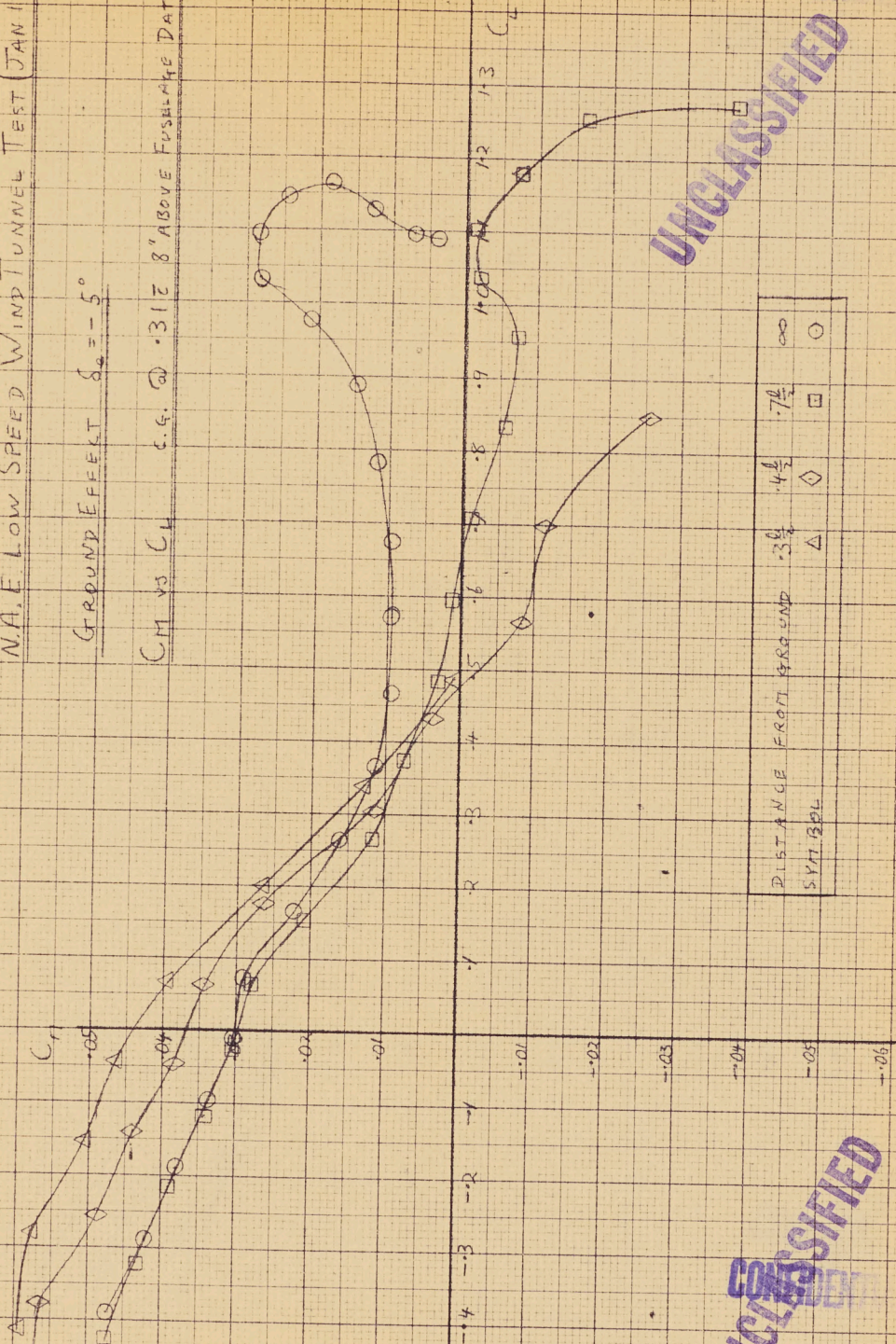
UNCLASSIFIED

C-105

N.A.E. LOW SPEED WIND TUNNEL TEST (JAN 1956)

GROUND EFFECT $\delta_a = -5^\circ$

C_M vs C_L C.G. @ .317 8" ABOVE FUSelage DATUM

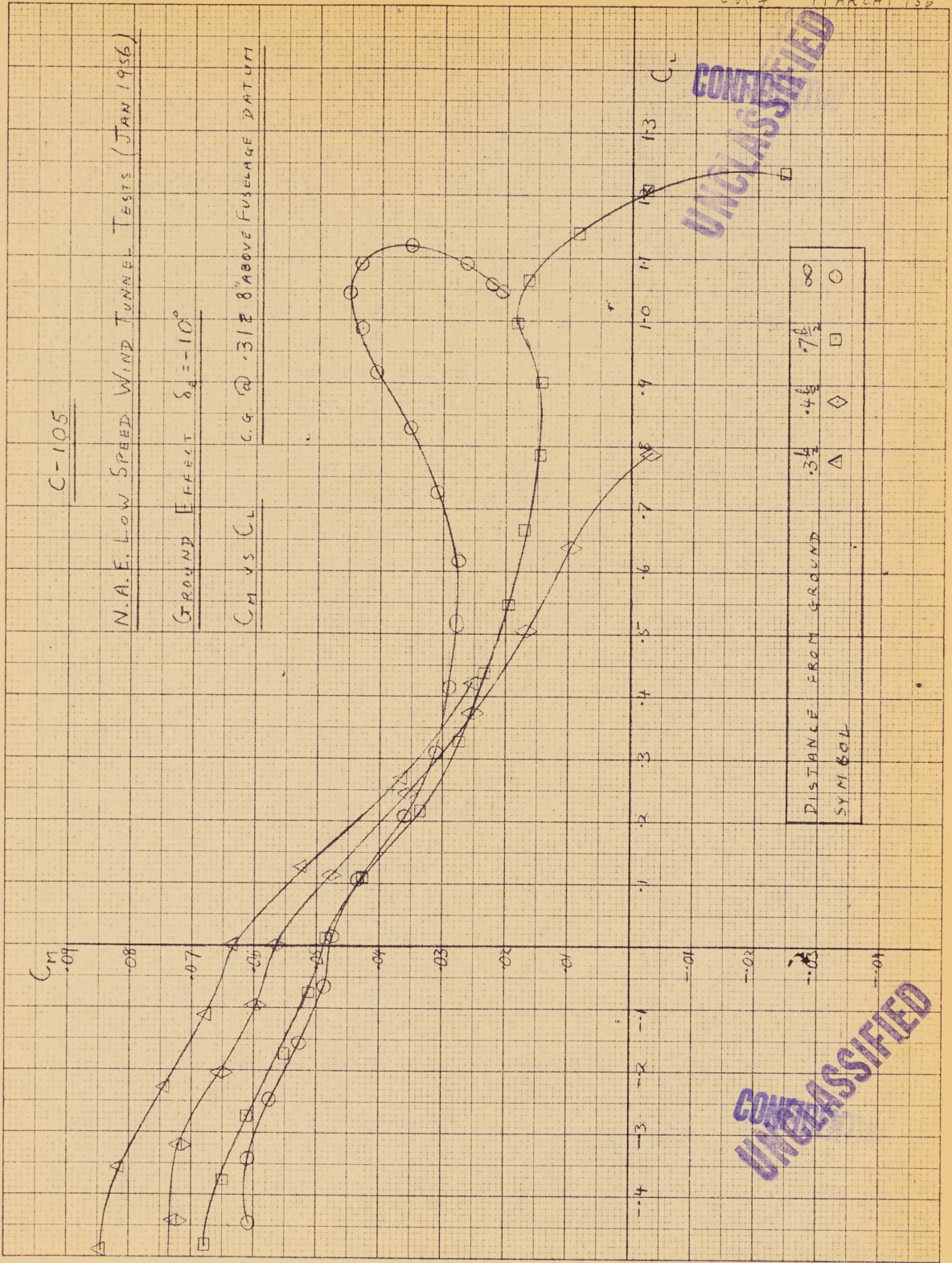


| | | | | |
|----------------------|----------|------------|-----------|----------|
| DISTANCE FROM GROUND | 0.36 | 0.42 | 0.74 | ∞ |
| SYMBOL | Δ | \diamond | \square | \circ |

UNCLASSIFIED

UNCLASSIFIED

UNCLASSIFIED



UNCLASSIFIED

P/WT/98 7.9
 MARCH 1956

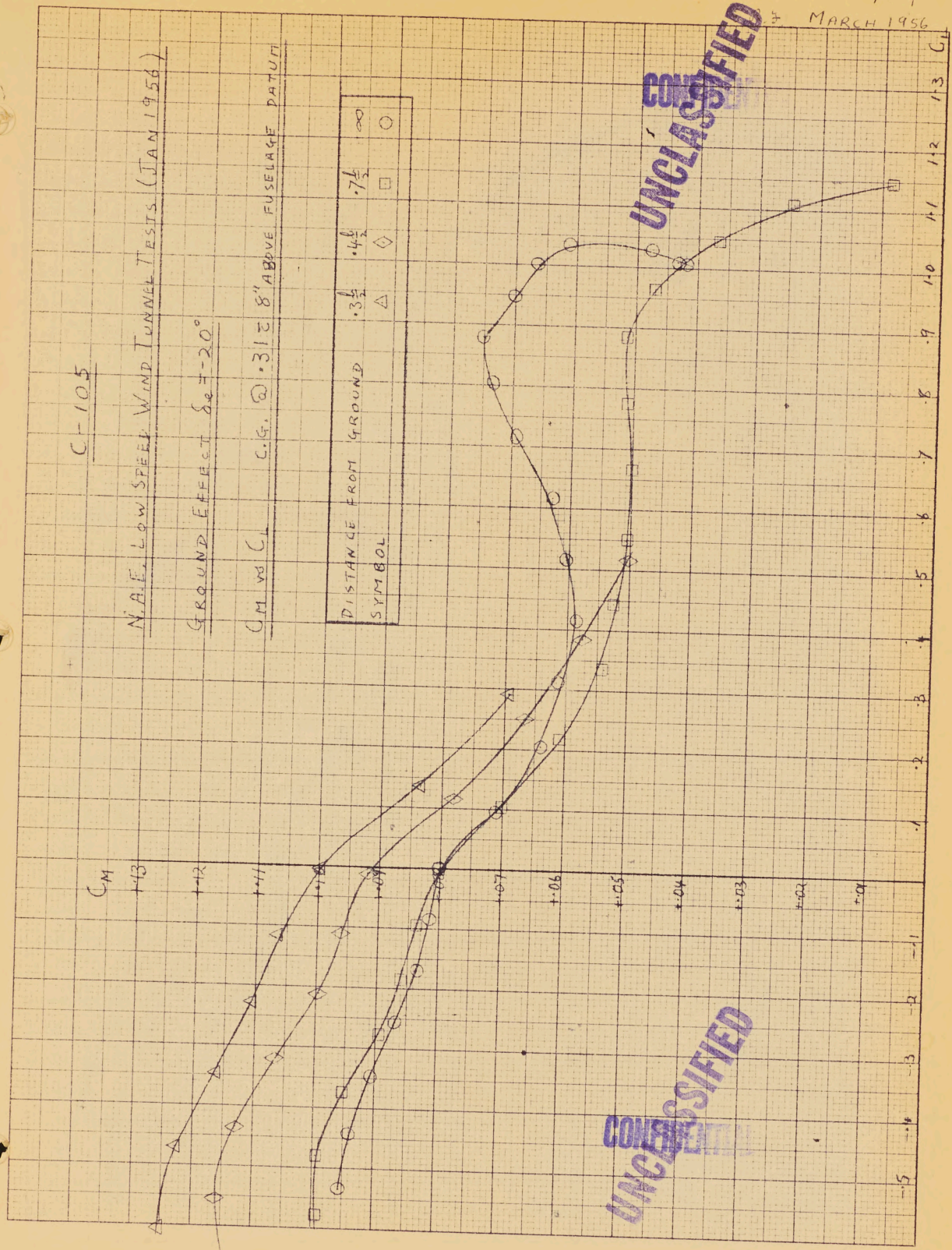
C-105

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1956)

GROUND EFFECT $\delta_e = -20^\circ$

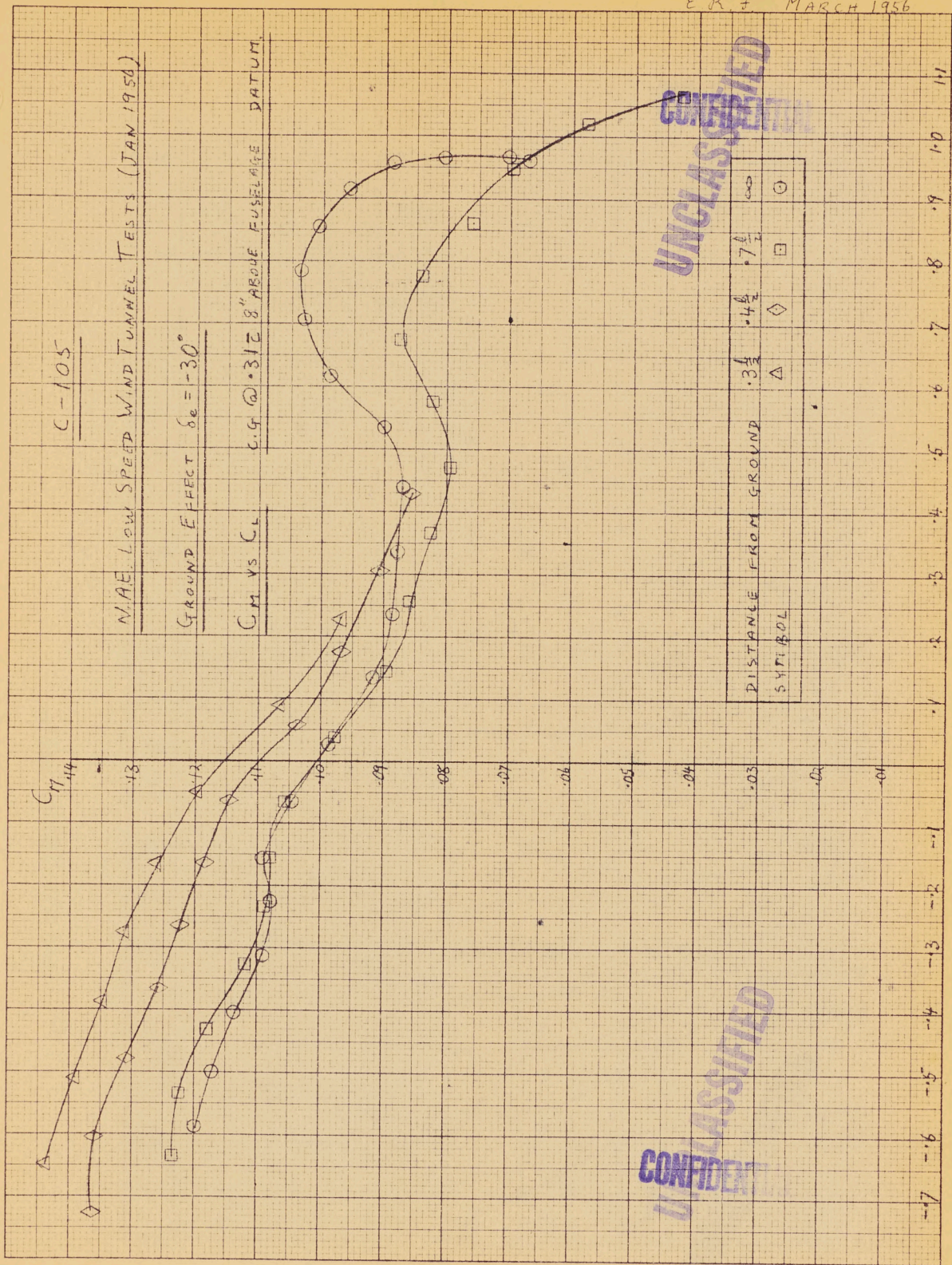
C.M. vs C.L. C.G. @ .31E 8" ABOVE FUSELAGE DATUM

| DISTANCE FROM GROUND | SYMBOL |
|----------------------|------------|
| .31 | Δ |
| .44 | \diamond |
| .71 | \square |
| ∞ | \circ |



UNCLASSIFIED

UNCLASSIFIED



UNCLASSIFIED

CONFIDENTIAL

C_m

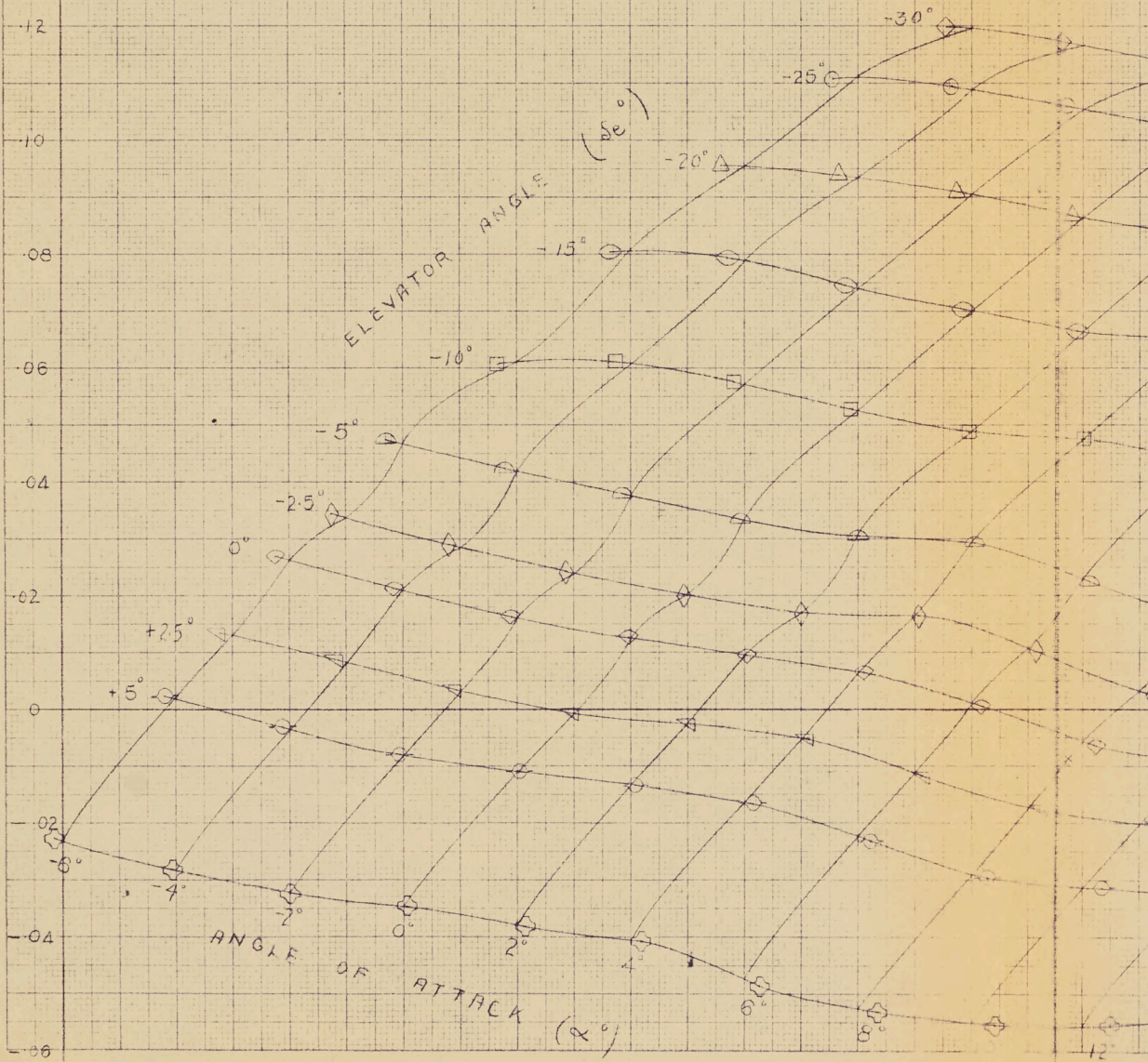
C-105

NRC W.T. TESTS

C_m vs α & δ_e

C.G. at 31E, 8" above F.D.

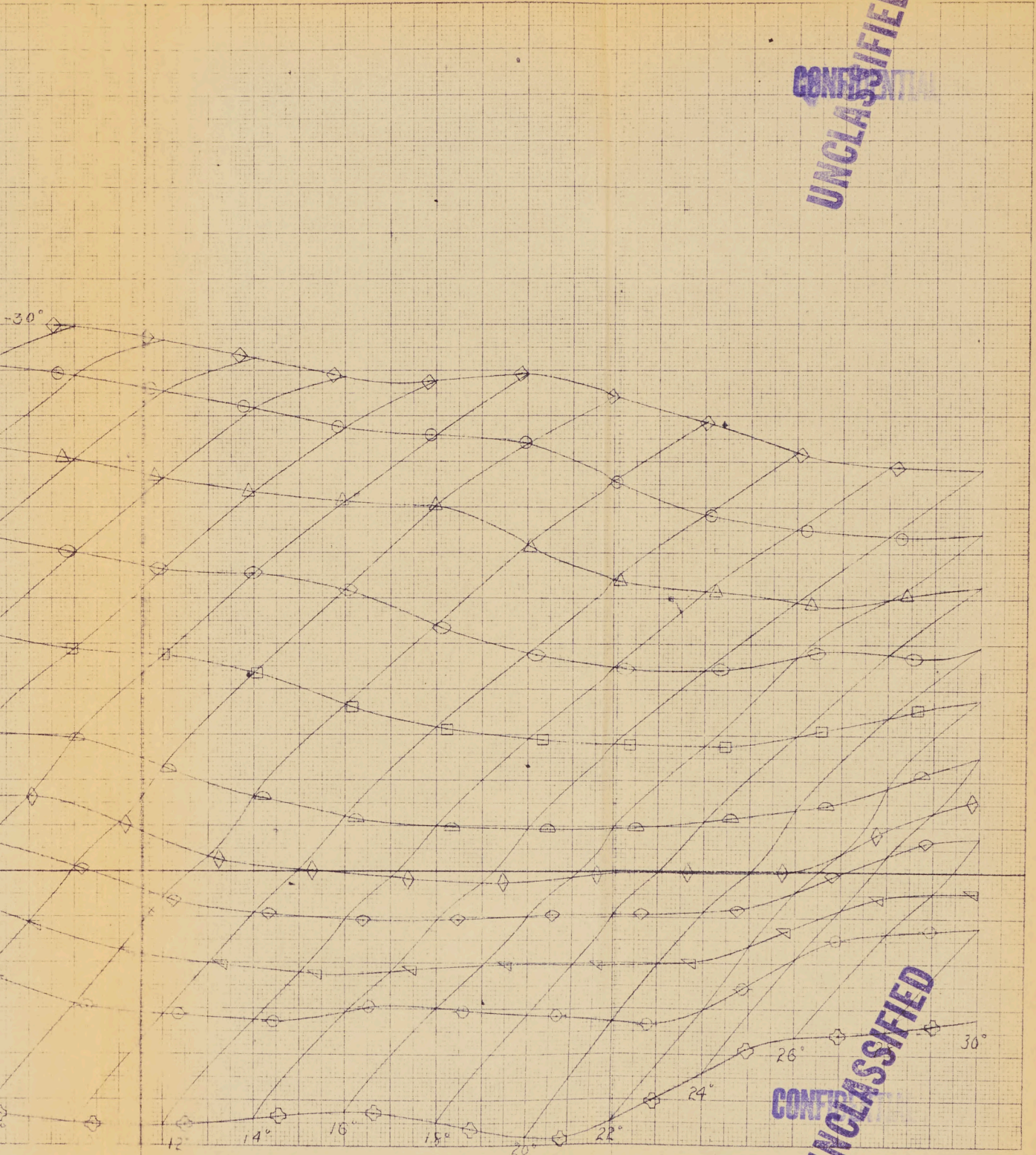
NO GROUND BOARD



10 X 10 TO THE CM. 359-141L
KEUFFEL & ESSER CO. WILMINGTON, DE.

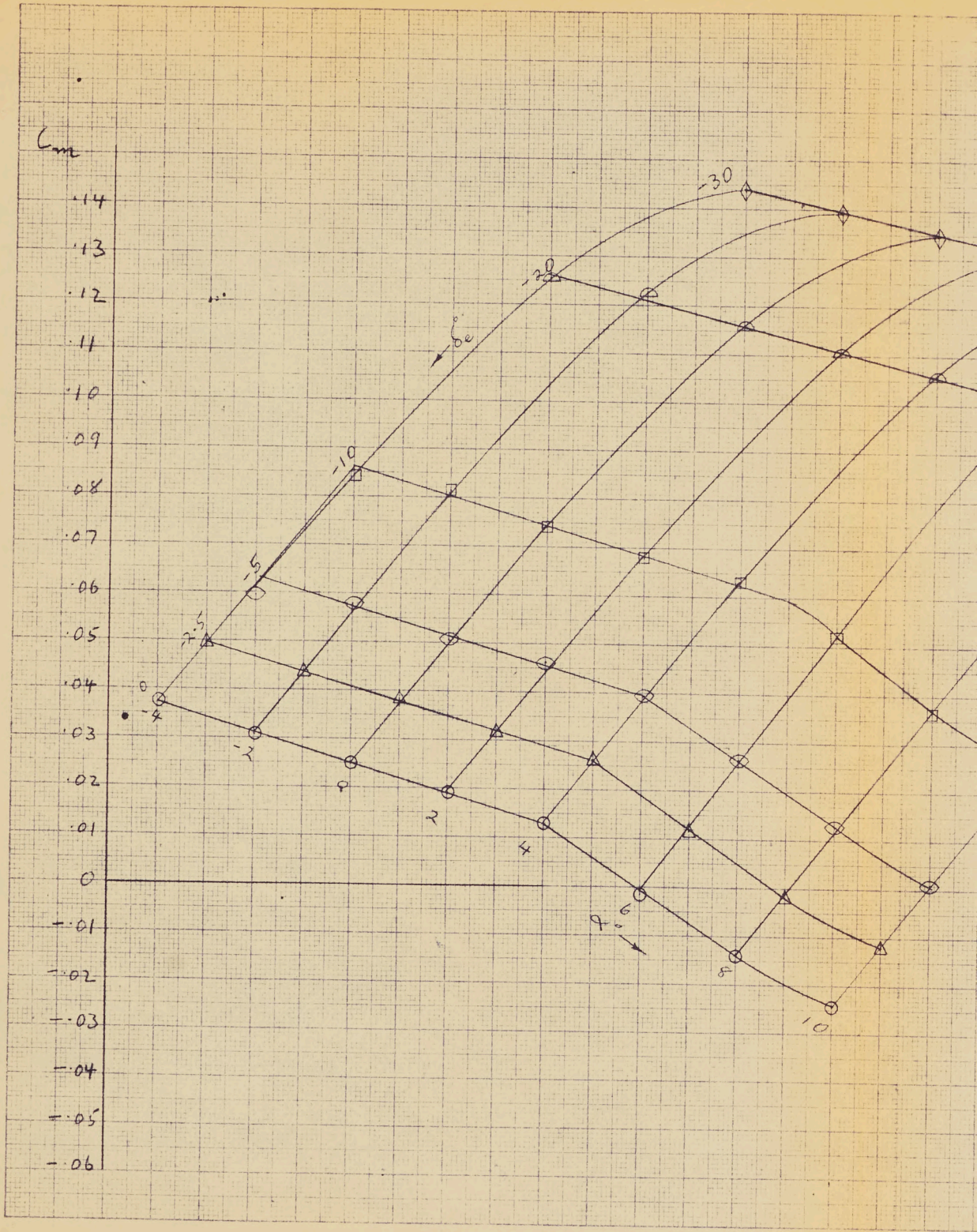
K&E

CONFIDENTIAL
UNCLASSIFIED



CONFIDENTIAL
UNCLASSIFIED

300-41 KUFFEL & ESSER CO.
Millimeter, 5 mm. lines, available in 100 boxes.
1934, 9. 2. 5.



P/W T/98 8.2

E. R. Fush May 1957

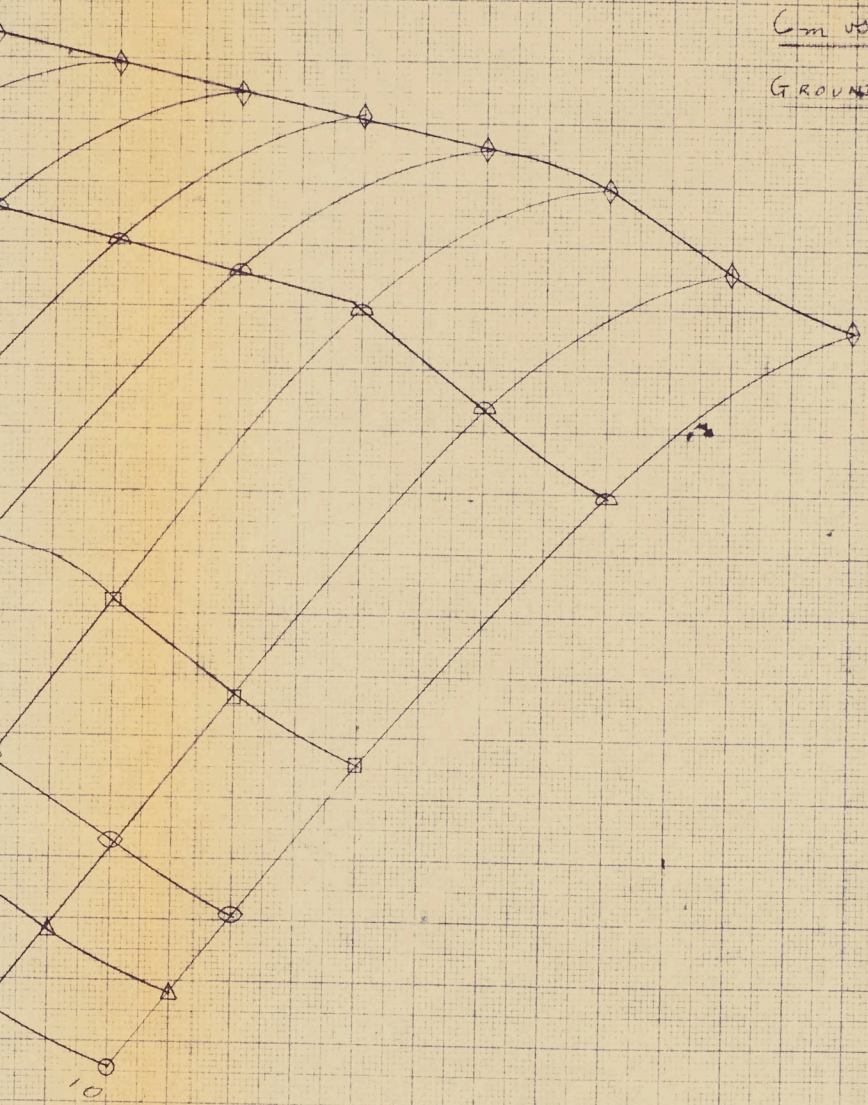
C-105

NAE LOW SPEED W/T TESTS

C_m vs α AND δ_0

GROUND BOARD = $-3 \frac{1}{2}$

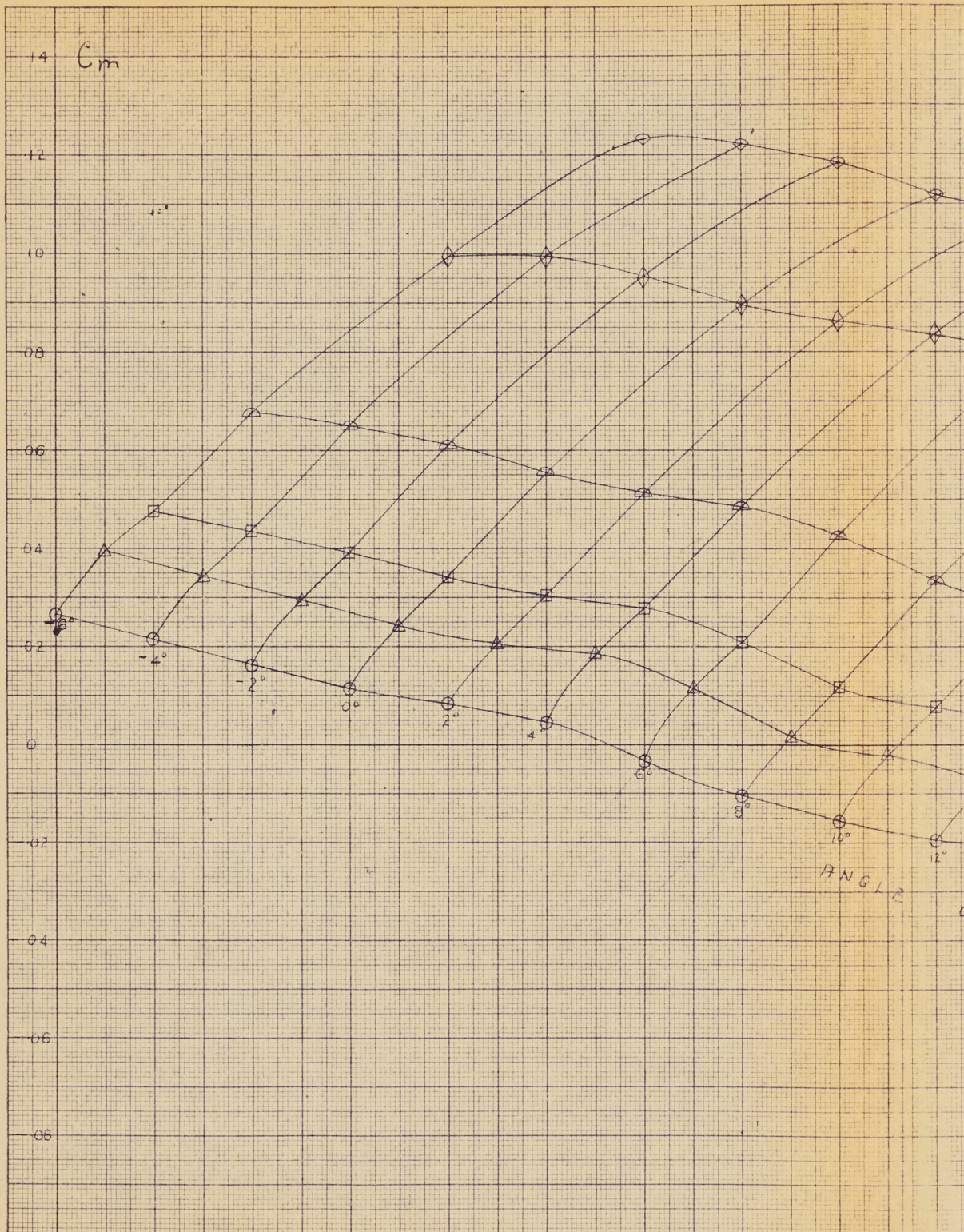
C.G.W. 31Z 8" ABOVE F.D.



CONFIDENTIAL
UNCLASSIFIED

UNCLASSIFIED
CONFIDENTIAL

359-14L KEUFFEL & ESSER CO.
Millimeters, 5 mm. lines accented, cm. lines heavy.
MADE IN U.S.A.



P/WT/98

max 156 488

8.3

G-105

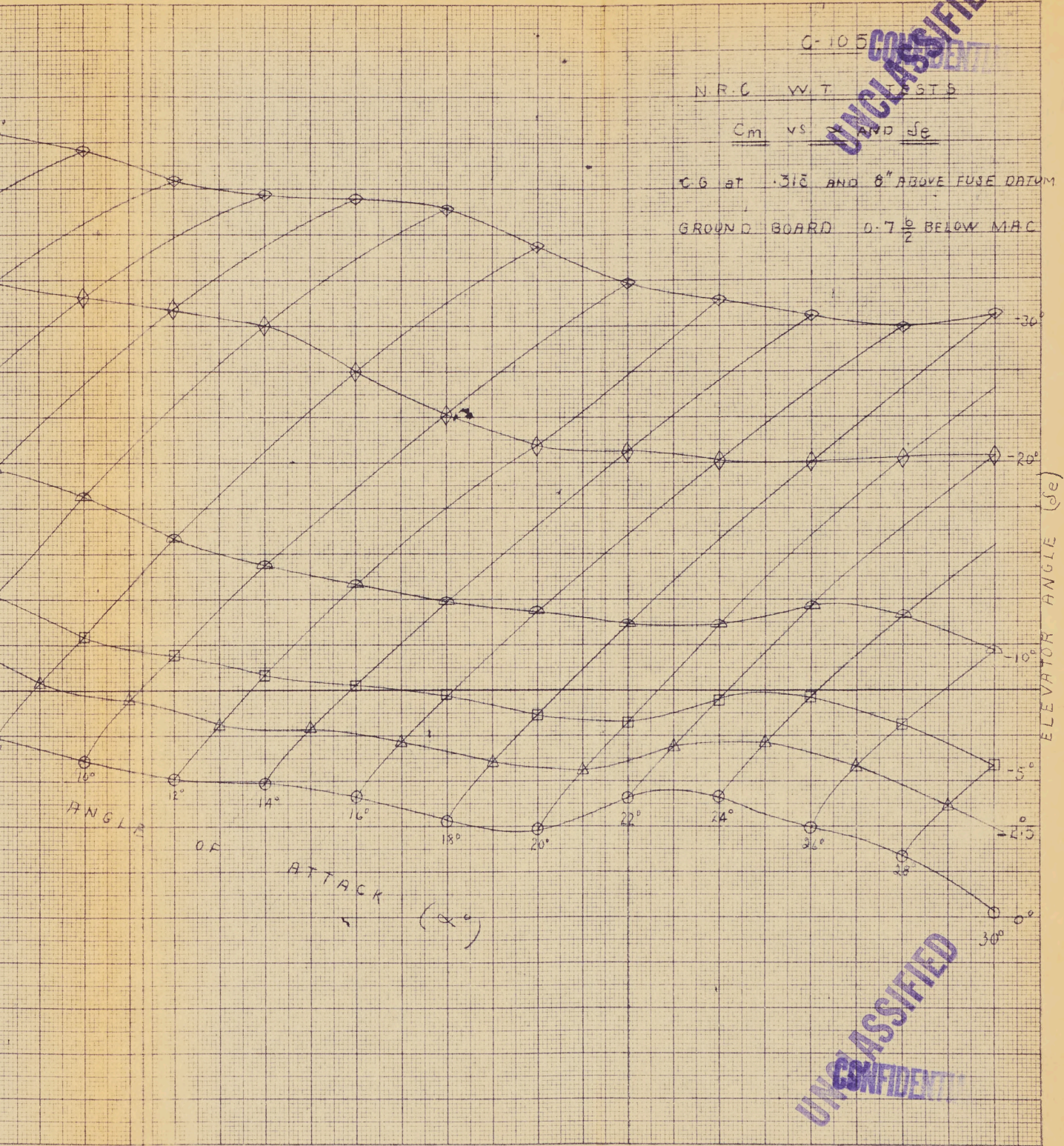
N.R.C W T TESTS

Cm vs AND Se

C.G. at .310 AND 8" ABOVE FUSE DATUM

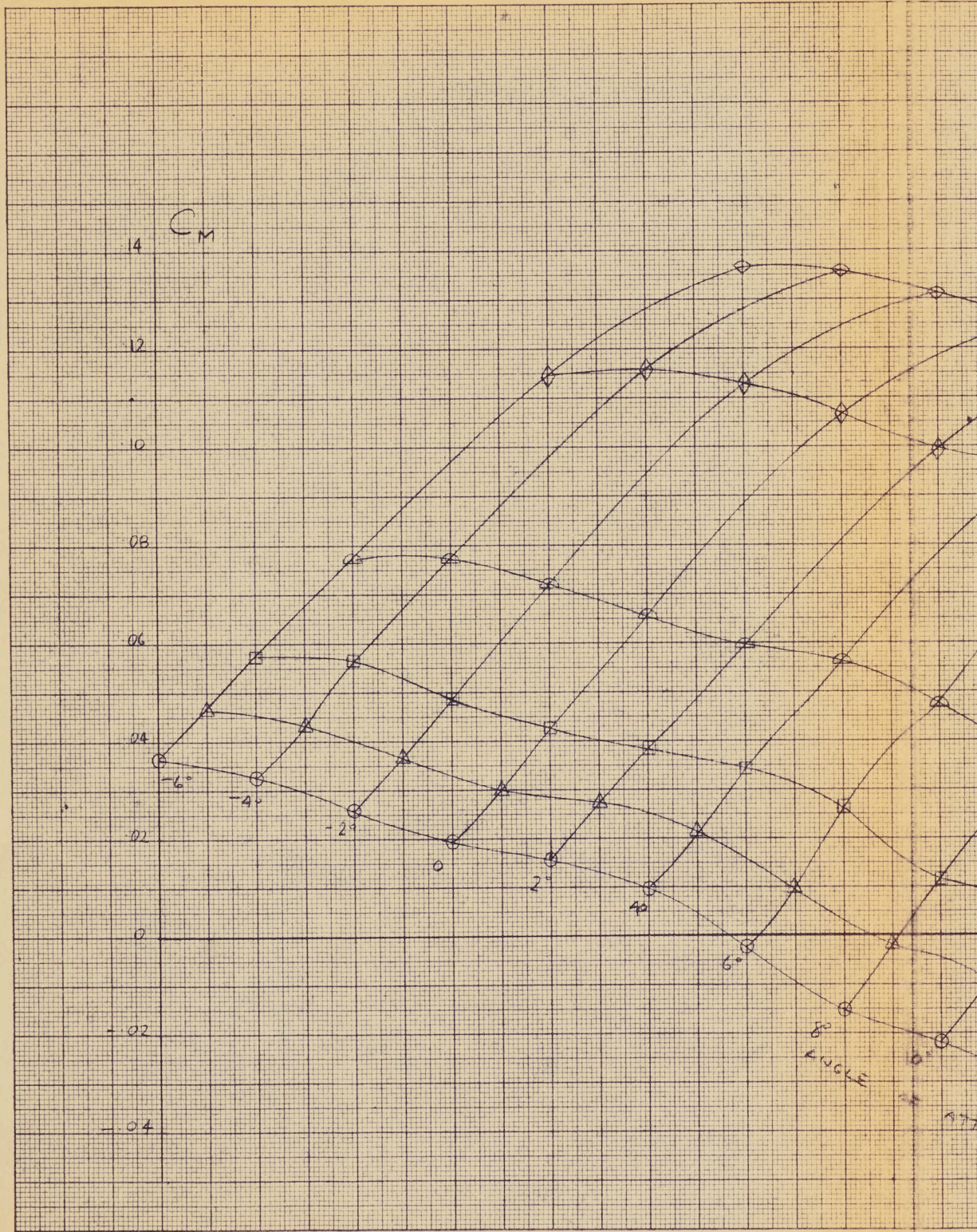
GROUND BOARD 0.7 ⁶/₂ BELOW MAC

UNCLASSIFIED
CONFIDENTIAL



UNCLASSIFIED
CONFIDENTIAL

359-14L KEUFFEL & ESSER CO.
Millimeters, 5 mm. lines accented, cm. lines heavy.
MADE IN U.S.A.



MAR 16th 1956 D.D.C.

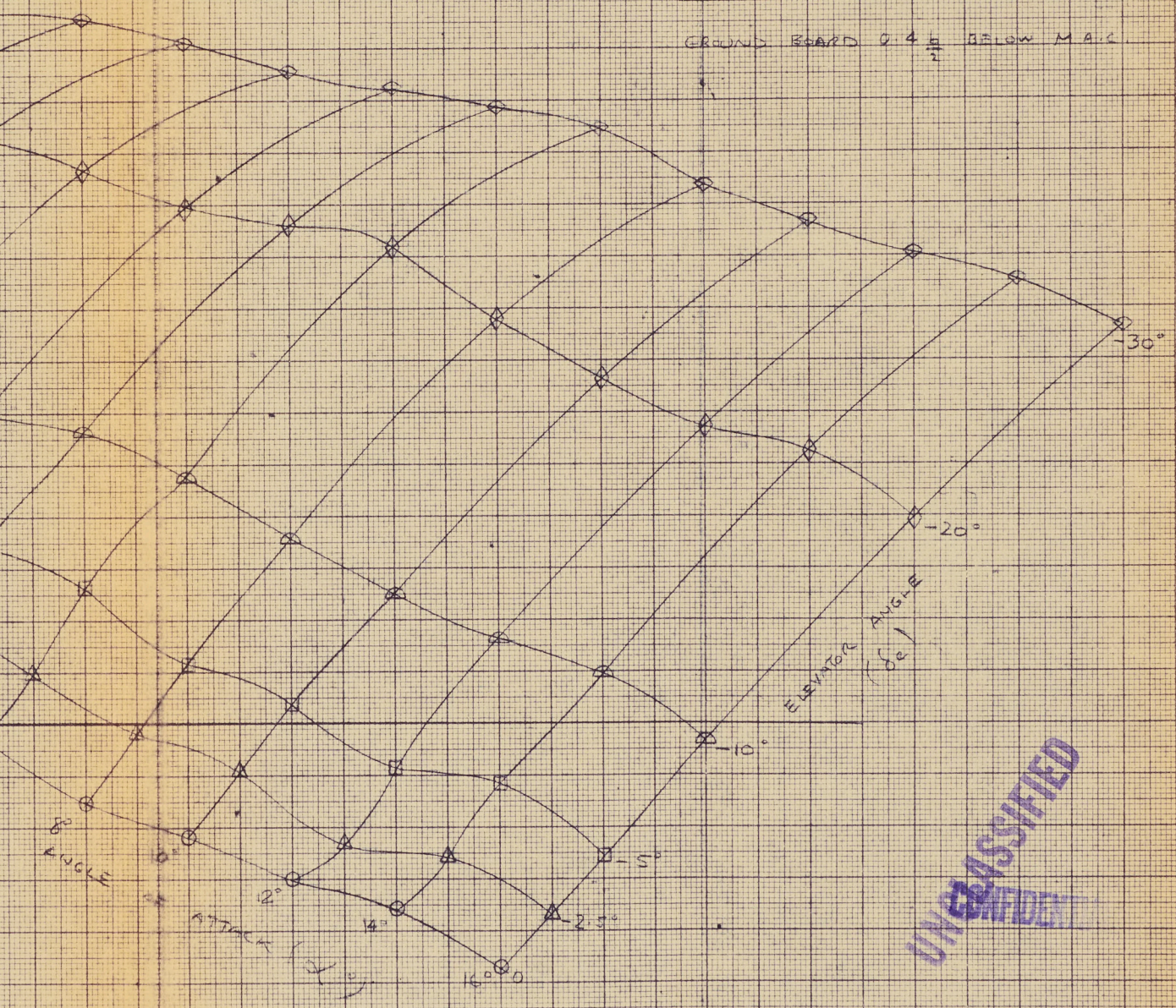
C-105

N.R.S. WIND TUNNEL TESTS

C.M. vs α AND α_e

CG AT 0.31c AND 8" ABOVE FUEL DATUM

GROUND BOARD 0.4 $\frac{h}{c}$ BELOW M.A.C.



UNCLASSIFIED
CONFIDENTIAL

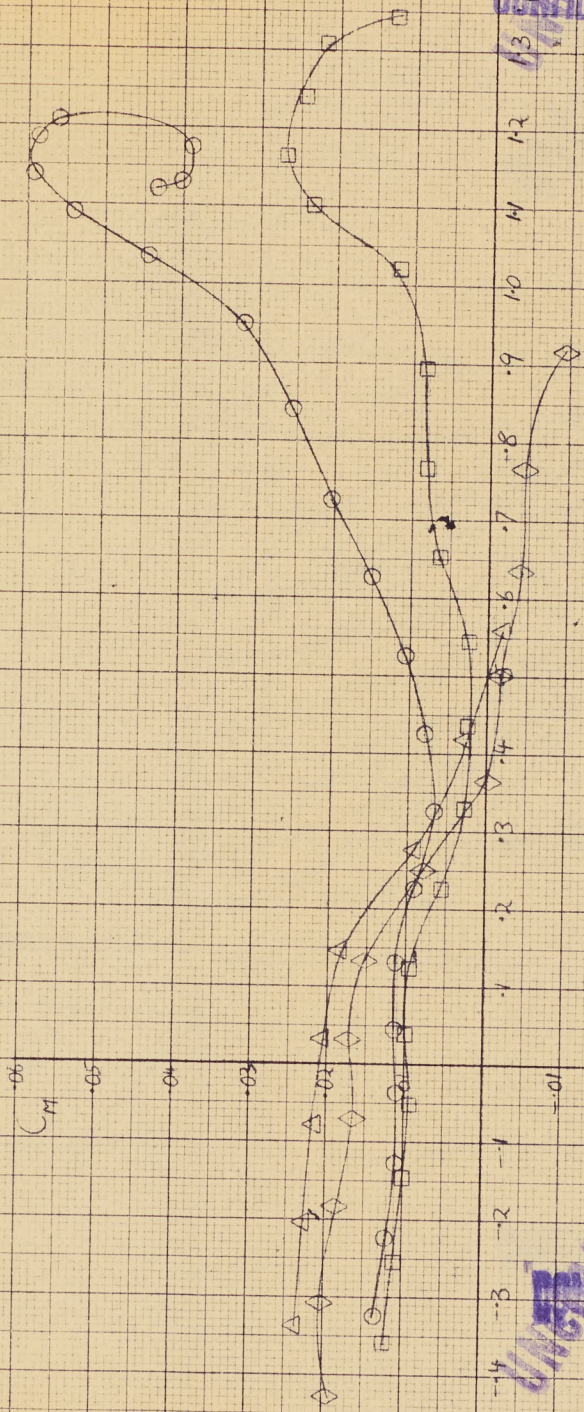
UNCLASSIFIED
CONFIDENTIAL

C-105

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1955)

GROUND EFFECT $\delta_g = 0$

C.M. vs C.L. C.G. @ .35Z, 8" ABOVE FUSELAGE DATUM



| DISTANCE FROM GROUND | SYMBOL |
|----------------------|------------|
| 0.3Z | Δ |
| 0.4Z | \diamond |
| 0.7Z | \square |
| ∞ | \circ |

UNCLASSIFIED

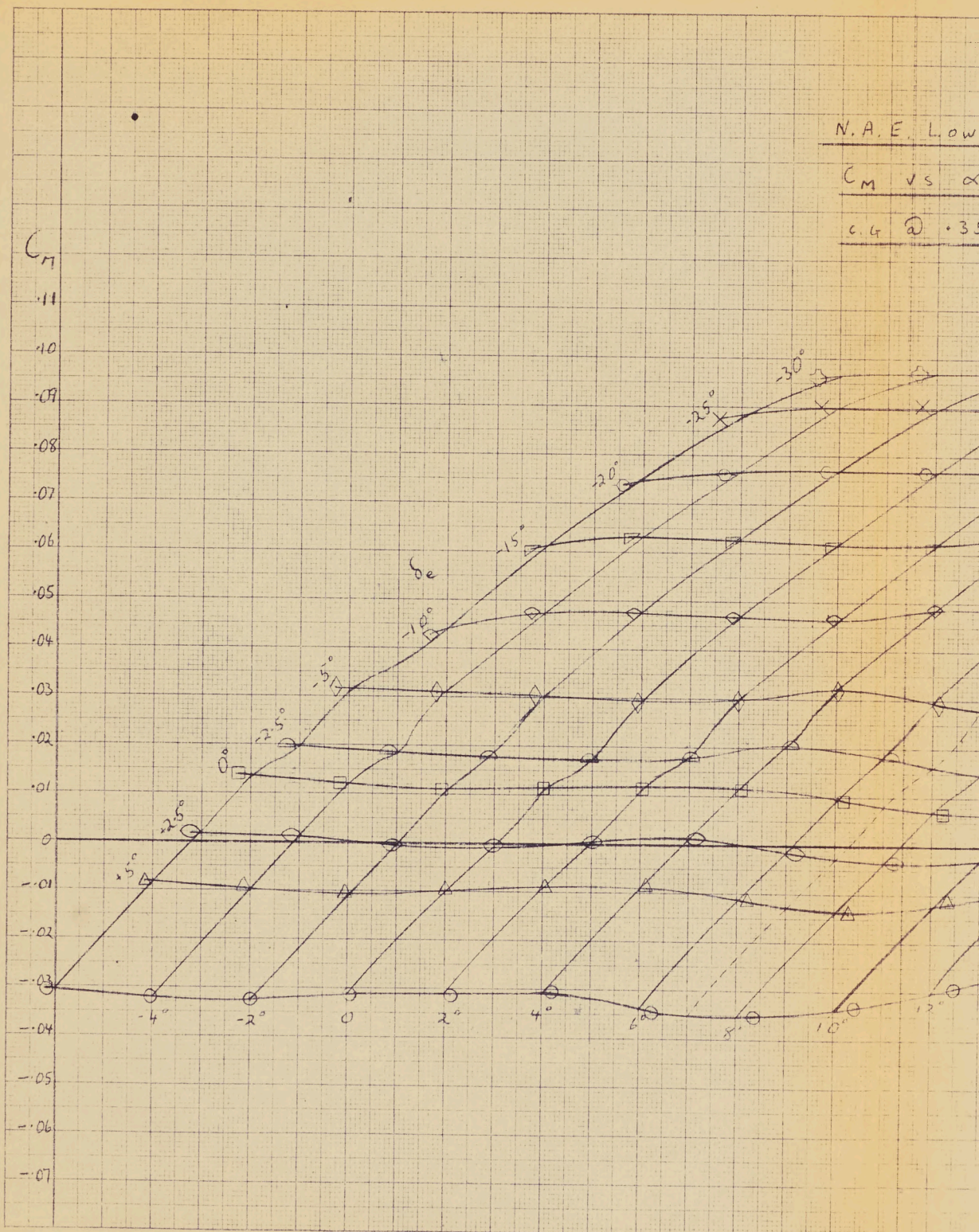
UNCLASSIFIED

10 X 10 TO THE CM. 359-14L
KEUFFEL & ESSER CO. N.Y. N.Y.

N.A.E. Low

C_M vs α

c. 4 @ +35



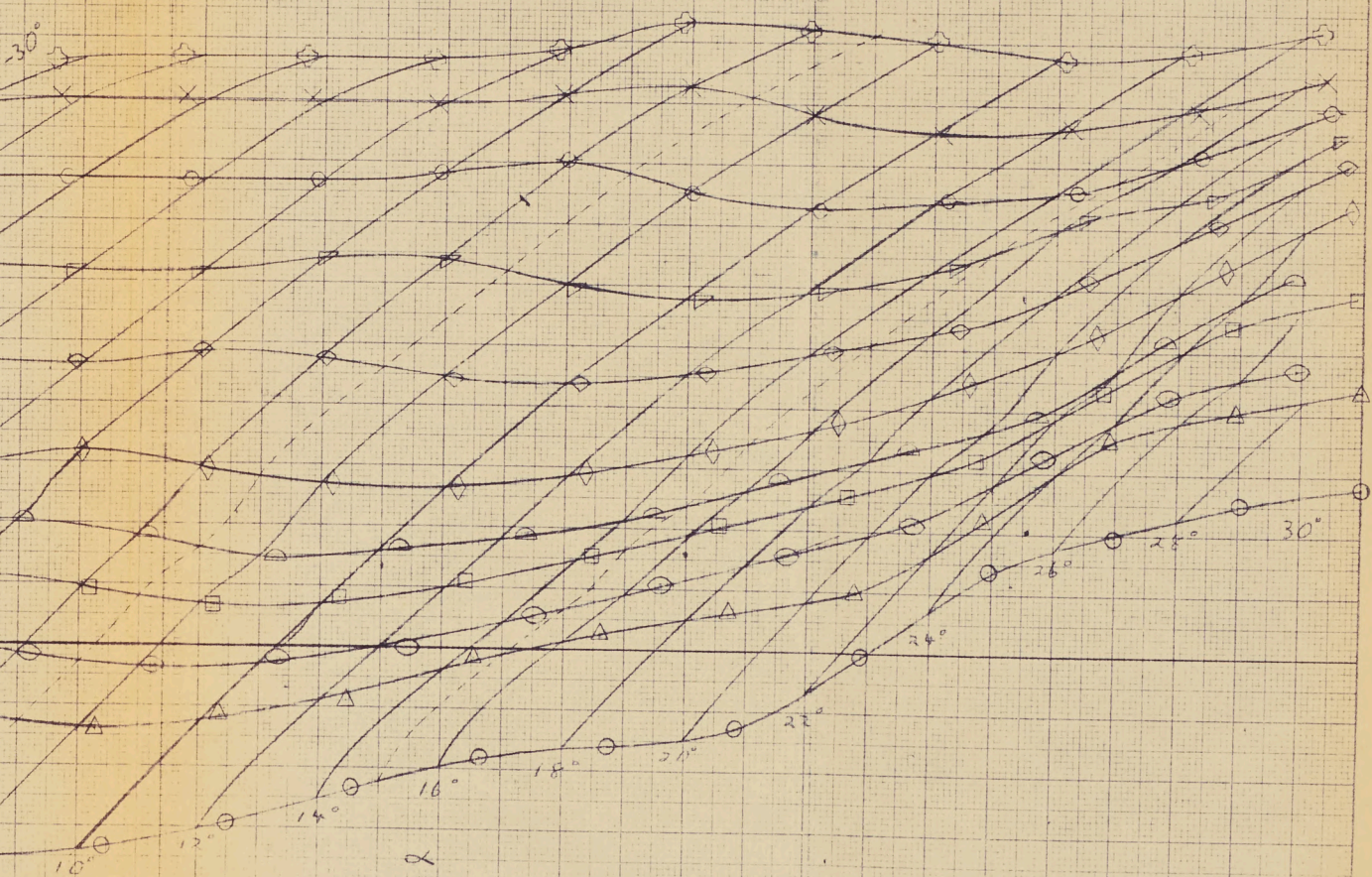
C-105

N.A.E. LOW SPEED WIND TUNNEL TESTS (JAN 1956)

C_M VS α AND δ_e

C.G. @ .35 \bar{z} 8" ABOVE FUSELAGE DATUM

CONFIDENTIAL
UNCLASSIFIED



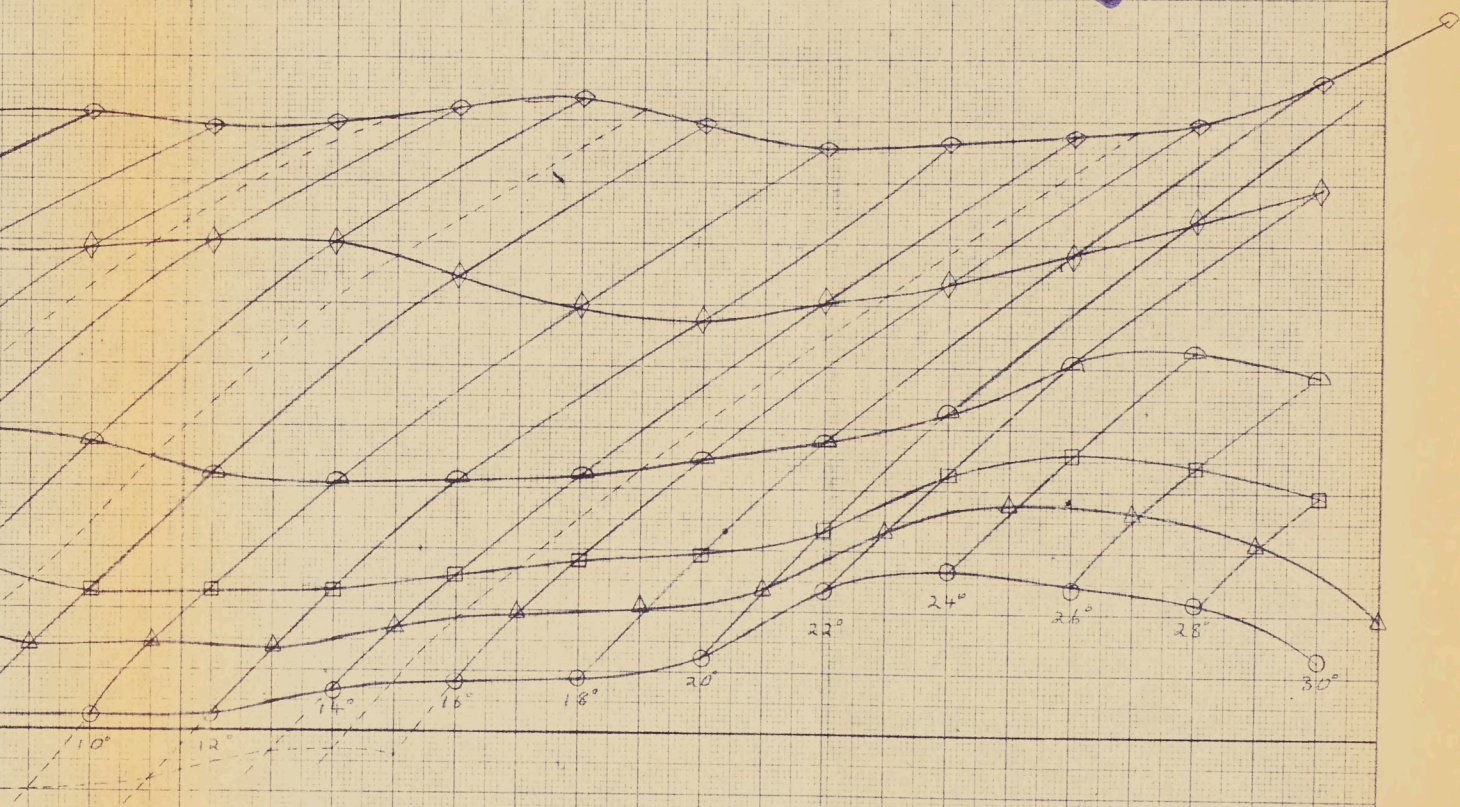
CONFIDENTIAL

C-105

WIND TUNNEL TESTS (JAN 1956)

C.G. @ -35E 8' ABOVE FUSELAGE DATUM

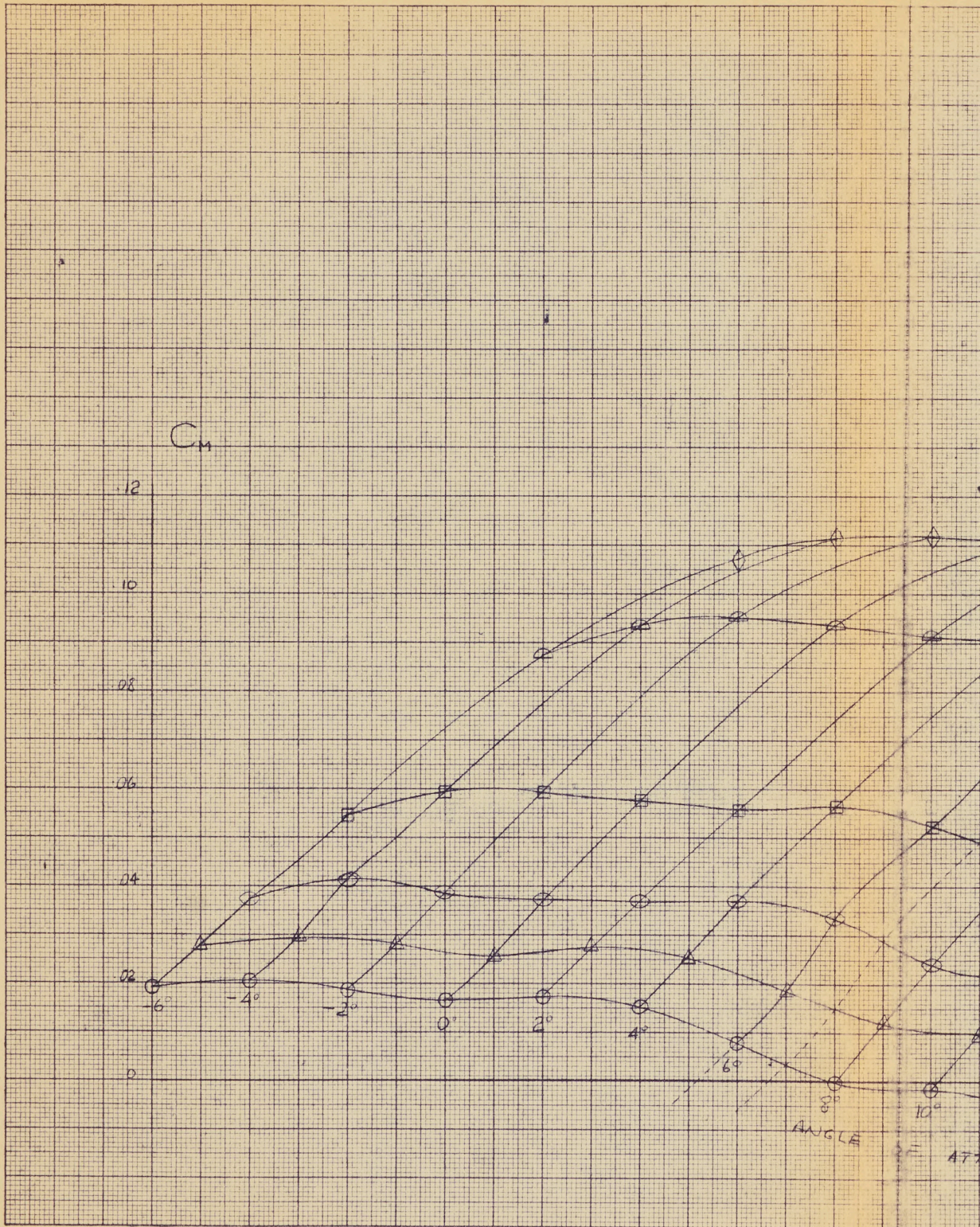
GROUND 17'



CONFIDENTIAL
UNCLASSIFIED

CONFIDENTIAL
UNCLASSIFIED

330-141 KEUFFEL & ESSER CO.
Millimeters, 5 mm. lines spaced, cm. lines heavy.
MADE IN U.S.A.



MARCH 16th 1956

D.B.C.

C-105

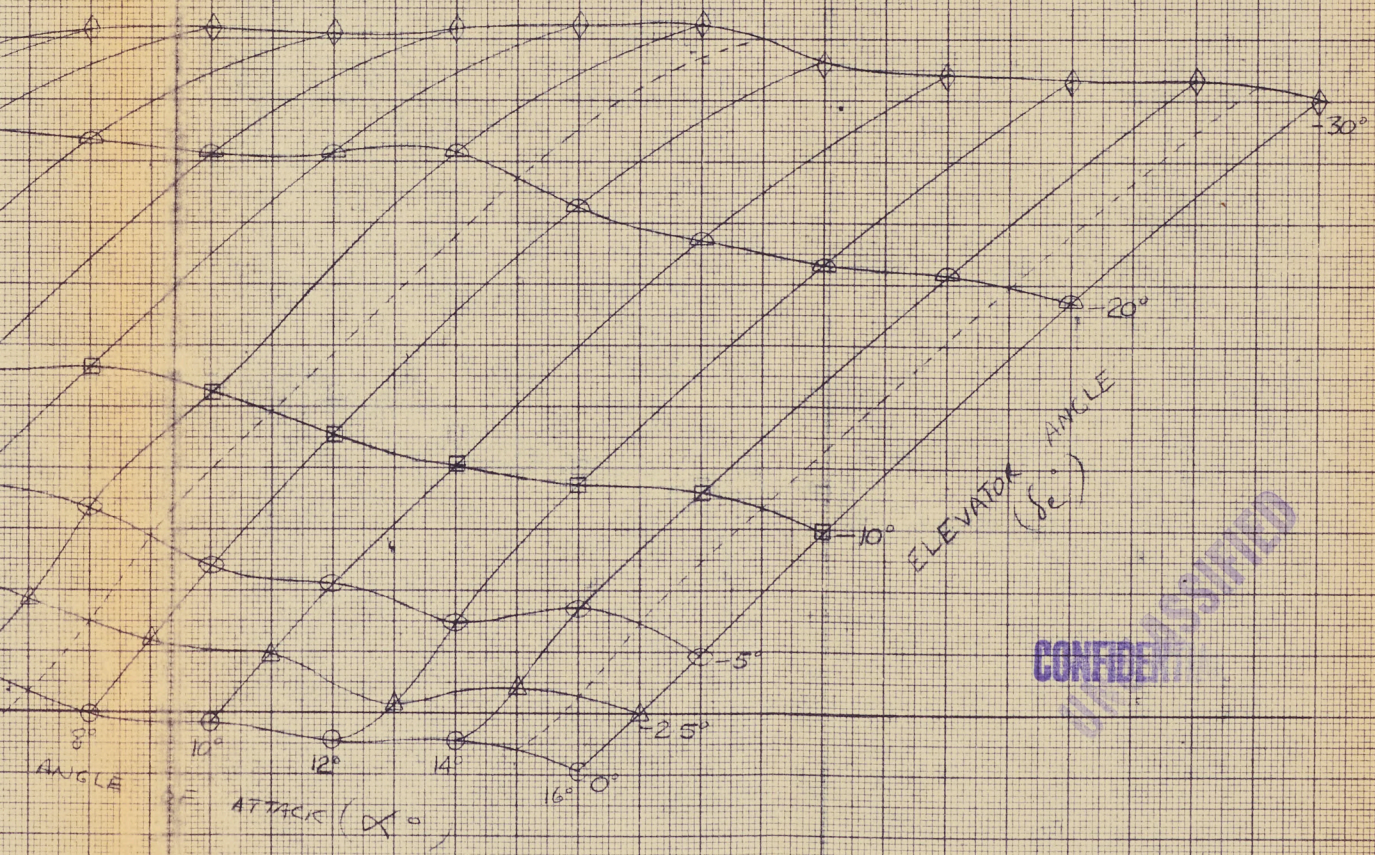
N.R.C. WIND TUNNEL TESTS

C_M vs α AND δ_e

CG AT 0.35c AND 8" ABOVE FUSELAGE DATUM

GROUND-BOARD 0.46 BELOW MAC

CONFIDENTIAL
UNCLASSIFIED



CONFIDENTIAL
UNCLASSIFIED



11067410
3558
MAGNETUS