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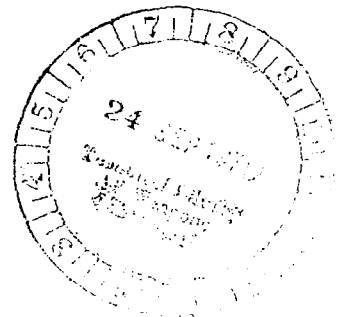
Rotary Balance Data for a Typical
Single-Engine General Aviation
Design for an Angle-of-Attack
Range of 8° to 90°

I - High-Wing Model B

William Bihrlé, Jr., and Randy S. Hultberg

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Prepared for
Langley Research Center
under Contract NAS1-14849

NASA

National Aeronautics
and Space Administration

**Scientific and Technical
Information Branch**

1979

SUMMARY

Aerodynamic characteristics obtained in a rotational flow environment utilizing a rotary balance located in the Langley spin tunnel are presented in plotted form for a 1/6.5-scale, single-engine, high-wing, general aviation airplane model. The configurations tested included the basic airplane, various wing leading-edge devices, tail designs, and rudder control settings as well as airplane components. Data are presented without analysis for an angle-of-attack range of 8° to 90° and clockwise and counter-clockwise rotations covering an $\frac{\Omega b}{2V}$ range from 0 to 0.85.

INTRODUCTION

The NASA Langley Research Center has initiated a broad general aviation stall/spin research program which includes spin-tunnel and free-flight radio control model tests, as well as full-scale flight tests for a number of configurations typical of light, general aviation airplanes. To support this effort, rotary balance wind tunnel force tests covering these same configurations will be conducted to establish a data base for analysis of model and full-scale flight results, and to develop design charts for desirable stall/spin characteristics.

A 1/6.5-scale, single-engine, general aviation airplane model, referred to as model B, having a high-wing location was tested in a rotational flow environment utilizing a rotary balance located in the Langley spin tunnel. This report presents the data obtained for the basic configuration, various wing leading-edge devices, tail designs and rudder control settings as well as airplane components. Data for model B having a low-wing location are presented in reference 1.

SYMBOLS

The units for physical quantities used herein are presented in the International System of Units (SI) and U.S. Customary Units. The measurements were made in the U.S. Customary Units; equivalent dimensions were determined by using the conversion factors given in reference 2.

- b** wing span, m (ft)
- \bar{c} mean aerodynamic chord, cm (in.)
- C_L lift-force coefficient, $\frac{\text{Lift force}}{qS}$
- C_N normal-force coefficient, $\frac{\text{Normal force}}{qS}$
- C_A axial-force coefficient, $\frac{\text{Axial force}}{qS}$
- C_Y side-force coefficient, $\frac{\text{Side force}}{qS}$
- C_l rolling moment coefficient, $\frac{\text{Rolling moment}}{qSb}$
- C_m pitching-moment coefficient, $\frac{\text{Pitching moment}}{qS\bar{c}}$
- C_n yawing-moment coefficient, $\frac{\text{Yawing moment}}{qSb}$
- q** free-stream dynamic pressure, N/m^2 (lb/ft²)
- S** wing area, m² (ft²)
- V** free-stream velocity, m/sec (ft/sec)
- α angle of attack, deg
- β angle of sideslip, deg
- Ω angular velocity about spin axis, rad/sec
- $\frac{\Omega b}{2V}$ spin coefficient, positive for clockwise spin
- δ_a aileron deflection, positive when right aileron is down
 $(\delta_{a_{\text{right}}} - \delta_{a_{\text{left}}})/2$, deg
- δ_e elevator deflection, positive when trailing edge is down, deg

δ_r rudder deflection, positive when trailing edge is to left, deg

Abbreviations:

cg center of gravity

LE leading edge

SR spin radius

TE trailing edge

TEST EQUIPMENT

A rotary balance measures the forces and moments acting on an airplane while subjected to rotational flow conditions; the background for this apparatus is discussed in reference 3. A photograph and sketch of the rotary balance apparatus installed in the Langley spin tunnel are shown in figures 1 and 2, respectively. The rotating portion of the balance system, mounted on a horizontal supporting boom which is hinged at the wall, is moved from the wall to the center of the tunnel by cables. The rotary arm of the balance system, which rotates about a vertical axis, is attached to the outer end of the horizontal supporting boom and is driven by a drive shaft through couplings and gears.

A test model is mounted on a strain gauge balance which is affixed to the bottom of the rotary balance apparatus. Controls located outside the tunnel are used to activate motors on the rig which position the model to the desired attitude. The angle-of-attack range of the rig is 8 to 90 degrees and the sideslip angle range is ± 15 degrees. The spin radius and the lateral displacement motors allow the operator to position the moment center of

the balance on the spin axis or at a specific distance from the spin axis. This is done for each combination of angle of attack and sideslip angle. The general practice is to mount the moment center of the balance at the cg location about which the aerodynamic moments are desired. Electrical current from the balance, and to the motors on the rig, is conducted through slip-rings located at the rig head. Examples of how the rig is positioned for different angle of attack and sideslip angles are shown in figures 2a and 2b, respectively.

The model can be rotated up to 90 rpm in either direction. By using different rotational speeds and a specific airflow in the tunnel, the motions of a steady spinning airplane can be simulated. The aerodynamic forces and moments can then be measured for values of $\frac{\Omega b}{2V}$, including the case of $\frac{\Omega b}{2V} = 0$, where static aerodynamic forces and moments can be obtained.

A NASA six-component strain gauge balance is mounted inside the model and measures the normal, lateral and longitudinal forces and the yawing, rolling and pitching moments acting about the model body axis. The interactions that exist between the six components are available from balance calibration tests and are accounted for after the balance voltages are converted to forces and moments.

The data acquisition, reduction and presentation system for the rotary balance set-up is composed of a 12-channel scanner/voltmeter, a mini-computer and a plotter. With this equipment,

on-line digital print-out and/or graphical plots of data are possible.

TEST PROCEDURES

Rotary aerodynamic data are obtained in two steps. The first step is to record the inertial forces and moments (tares) acting on the model at different attitudes and rotational speeds. To accomplish this, a covered bird-cage like structure is mounted to the upper rig which encloses the model without touching it. In this manner, the air immediately surrounding the model is rotated with it. As the rig is rotated at the desired attitude and rate, the inertial forces and moments generated by the model are measured and stored on magnetic tape for later use.

The second step in the data-gathering process is to measure aerodynamic and inertial forces at different attitudes and rotational speeds for a selected tunnel velocity with, of course, the cage structure removed. The tares are subtracted from these values, and the remaining aerodynamic forces and moments are then converted to coefficient form and stored on magnetic tape.

MODEL

A 1/6.5-scale fiberglass/aluminum model of a configuration considered to be a typical high-wing, single-engine, light general aviation airplane was tested in the present study. A three-view drawing of this model is shown in figure 3, dimensional characteristics of the model are presented in Table I, and a photograph of the model installed on the rotary balance located in the Langley spin tunnel is presented in figure 1.

The model was fabricated such that various airplane components were removable for component build-up tests and for testing alternate wing leading edges and tail configurations. In addition, allowance was made for attaching various fuselage modifications.

The four tail configurations tested involved different locations of the horizontal tail as shown in figure 4. The fuselage shape and wing leading-edge modifications tested are shown in figures 5 and 6, respectively.

The model control surfaces could be set at any position prior to the test. The maximum deflections for the control surfaces were:

Elevator, deg	28 up, 23 down
Rudder, deg	25 right, 25 left
Aileron, deg	20 up, 15 down

TEST CONDITIONS

The tests were conducted in the spin tunnel at a tunnel velocity of 7.62 m/sec (25 ft/sec) which corresponds to a Reynolds number of 119,378 based on the model mean aerodynamic chord. Unless noted otherwise in Table II, all the configurations were tested through an angle-of-attack range of 8 to 90° at a zero sideslip angle with the spin axis passing through the full-scale airplane cg location of .25c for angles of attack above 30°. For angles of attack below 35°, the spin axis was set 99 cm (39 in.) forward of the cg. Consequently, data was obtained for both a 0 and 99 cm (39 in.) spin radius at angles of attack of 30 and 35°. At each spin attitude, measurements

were obtained for nominal $\frac{\Omega b}{2V}$ values of .1, .2, .3, .4, .45, .55, .65, .75 and .85 in both clockwise and counter-clockwise directions, as well as for $\frac{\Omega b}{2V} = 0$ (static value).

DATA PRESENTATION

Table II identifies the configurations tested and the corresponding appendix figure numbers which present the aerodynamic data. The aerodynamic coefficients vs. $\frac{\Omega b}{2V}$ are presented for each configuration in six sequentially numbered figures in the following order: C_n , C_l , C_m , C_N , C_Y and C_A . Each figure, in turn, consists of four pages which present the subject aerodynamic coefficient vs. $\frac{\Omega b}{2V}$ for the following angles of attack and spin radii, unless noted otherwise in Table II.

- a) $\alpha = 8, 10, 12, 14, 16$ deg SR= 99 cm (39 in.)
- b) $\alpha = 18, 20, 25, 30, 35$ deg SR= 99 cm (39 in.)
- c) $\alpha = 30, 35, 40, 45, 50$ deg SR= 0
- d) $\alpha = 55, 60, 70, 80, 90$ deg SR= 0

All the moment data are presented for a cg position of 0.25c.

Lift coefficient as a function of angle of attack for zero rotation rate is presented at the end of the Appendix for several configurations cited in Table II.

REFERENCES

1. Bihrlle, William, Jr.; Hultberg, Randy S.: Rotary Balance Data for a Typical Single-Engine General Aviation Design for an Angle-of-Attack Range of 8° to 90° . II- Low-Wing Model B. NASA CR 3098, 1979.
2. Mechtly, E.A.: The International System of Units - Physical Constants and Conversion Factors. NASA SP-7012, 1973.
3. Bihrlle, William, Jr.; Hultberg, Randy S.; and Mulcay, William: Rotary Balance Data for a Typical Single-Engine Low-Wing General Aviation Design for an Angle-of-Attack Range of 30° to 90° . NASA CR 2972, 1978.

TABLE I.- DIMENSIONAL CHARACTERISTICS OF THE BASIC MODEL

Overall length, m (ft) 1.24 (4.05)

Wing:

Span, m (ft) 1.68 (5.51)

Area, m² (ft²)38 (4.12)

Root chord, cm (in.) 25.02 (9.85)

Tip chord, cm (in.) 17.39 (6.85)

Mean aerodynamic chord, cm (in.) 22.81 (8.98)

Leading edge of \bar{c} , distance rearward of leading
edge of root chord, cm (in.)53 (.21)

Aspect ratio 7.37

Dihedral at 0.25 \bar{c} along top surface, deg 1.7

Incidence:

Root, deg 1.5

Tip, deg -1.5

Airfoil section NACA 2412

Horizontal tail:

Span, m (ft). 0.53 (1.74)

Incidence, deg -3.5

Airfoil section:

Root NACA 0009

Tip NACA 0006

Vertical tail:

Airfoil section:

Root NACA 0009

Tip NACA 0006

TABLE II.- CONFIGURATIONS TESTED AND FIGURE INDEX

(Unless noted otherwise, all configurations tested through $\alpha = 8$ to 90° at $\beta = 0^\circ$.)

FIGURE NO.	CONFIGURATION	δ_e deg	δ_a deg	δ_r deg	REMARKS	
^a A1-A6	Basic	0	0	0	$\beta = 10^\circ$	
A7-A12	↓	↓	↓	↓		
A13-A18	↓	↓	↓	-25		
A19-A24	↓	23	↓	↓		
A25-A30	#1 Horizontal tail	0	↓	0		
A31-A36	↓	↓	↓	-25		
A37-A42	#2 Horizontal tail	↓	↓	0		
A43-A48	↓	↓	↓	-25		
A49-A54	T tail	↓	↓	0		
A55-A60	↓	↓	↓	-25		
A61-A66	Horizontal tail off	↓	↓	0		
A67-A72	Vertical tail off	↓	↓	↓		
A73-A78	#2 Horizontal tail with vertical tail off	↓	↓	↓		
A79-A84	Sharp-edged fuselage bottom aft of wing TE	↓	↓	↓		
A85-A90	Sharp-edged fuselage bottom aft of engine cowling	↓	↓	↓		
^a A91-A96	Full-span LE wing droop having moderate nose radius	↓	↓	↓		
^a A97-A102	Segmented LE wing droop	↓	↓	↓		
^b A103-A108	Outboard LE wing droop extended inboard 33.8cm (13.3in)	↓	↓	↓		$\alpha = 8-35^\circ$ only
^a A109-A114	Outboard wing Kruger flap	↓	↓	↓		$\alpha = 8-35^\circ$ only
^b A115-A120	Outboard LE wing droop extended inboard 42.7cm (16.8in)	↓	↓	↓		$\alpha = 16-30^\circ$ only
^b A121-A126	↓	↓	↓	↓	$\alpha = 16-30^\circ$ only	
^b A127-A132	↓	↓	↓	↓	$\alpha = 16-30^\circ$ only	
^b A133-A138	↓	↓	↓	↓	$\alpha = 16-30^\circ$ only	
	having moderate nose radius					

^a C_L vs. α presented in figure A139.

^b C_L vs. α presented in figure A140.

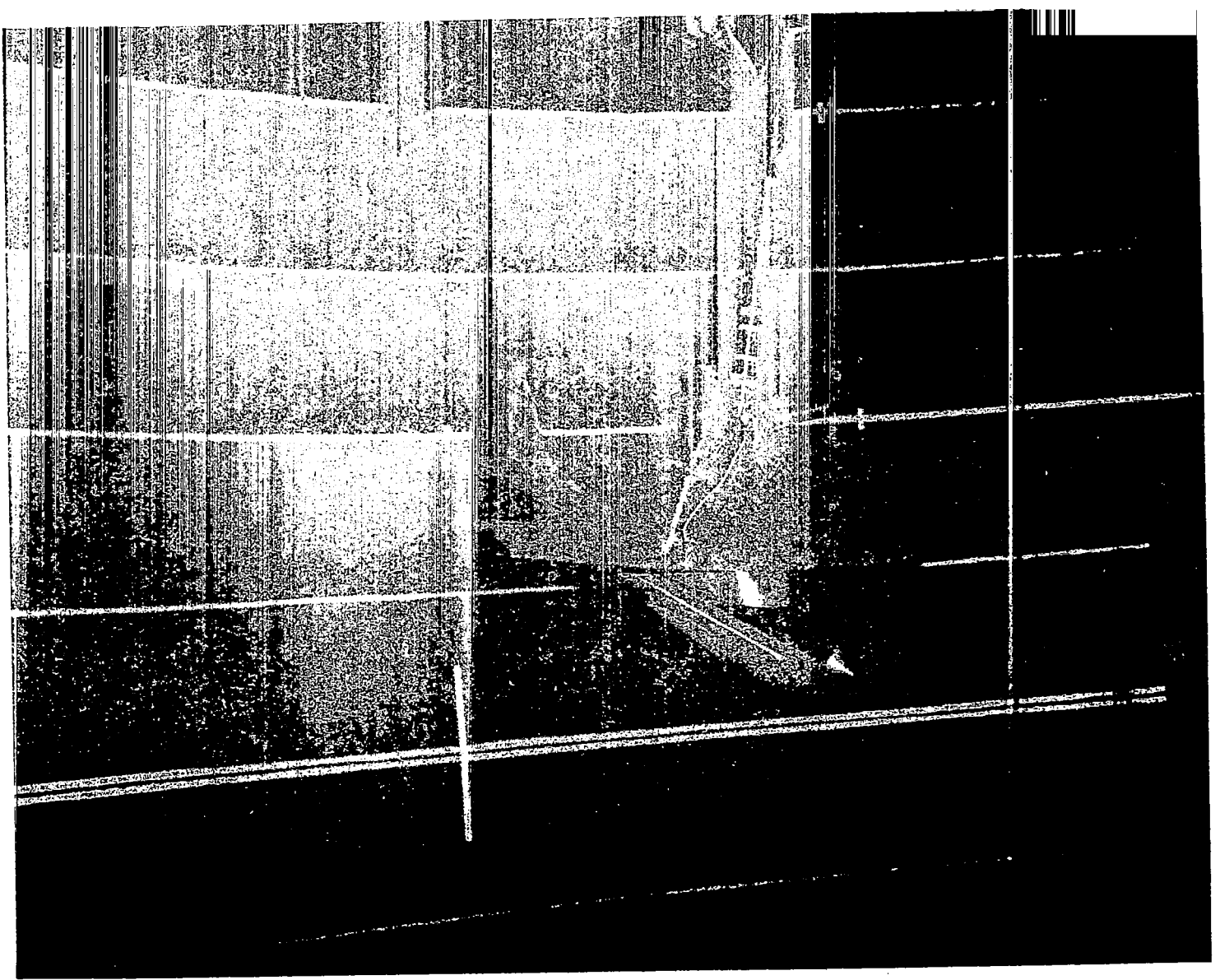
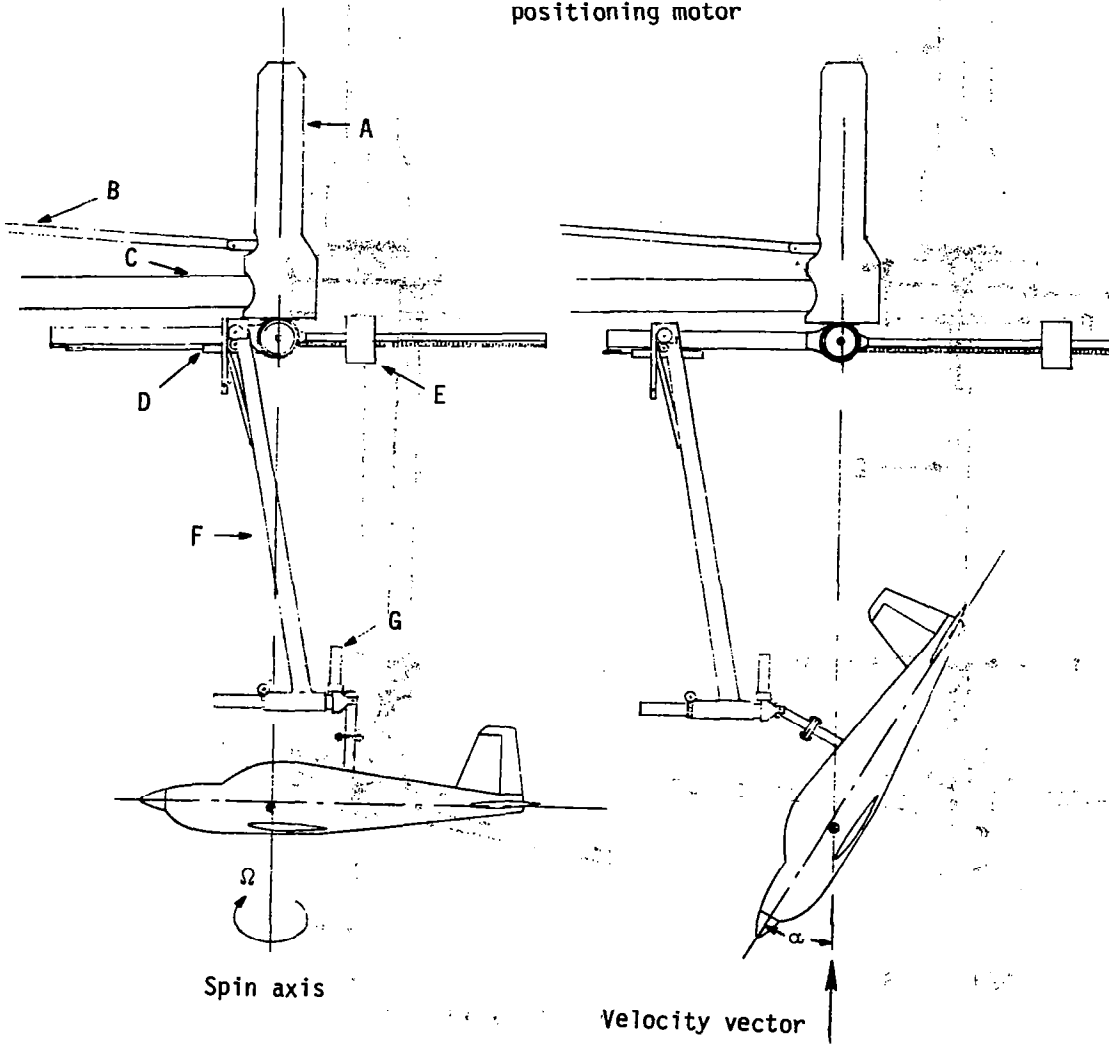


Figure 1.- ^{MR. BVL} Photograph of 1/6.5-scale model installed on rotary balance apparatus.

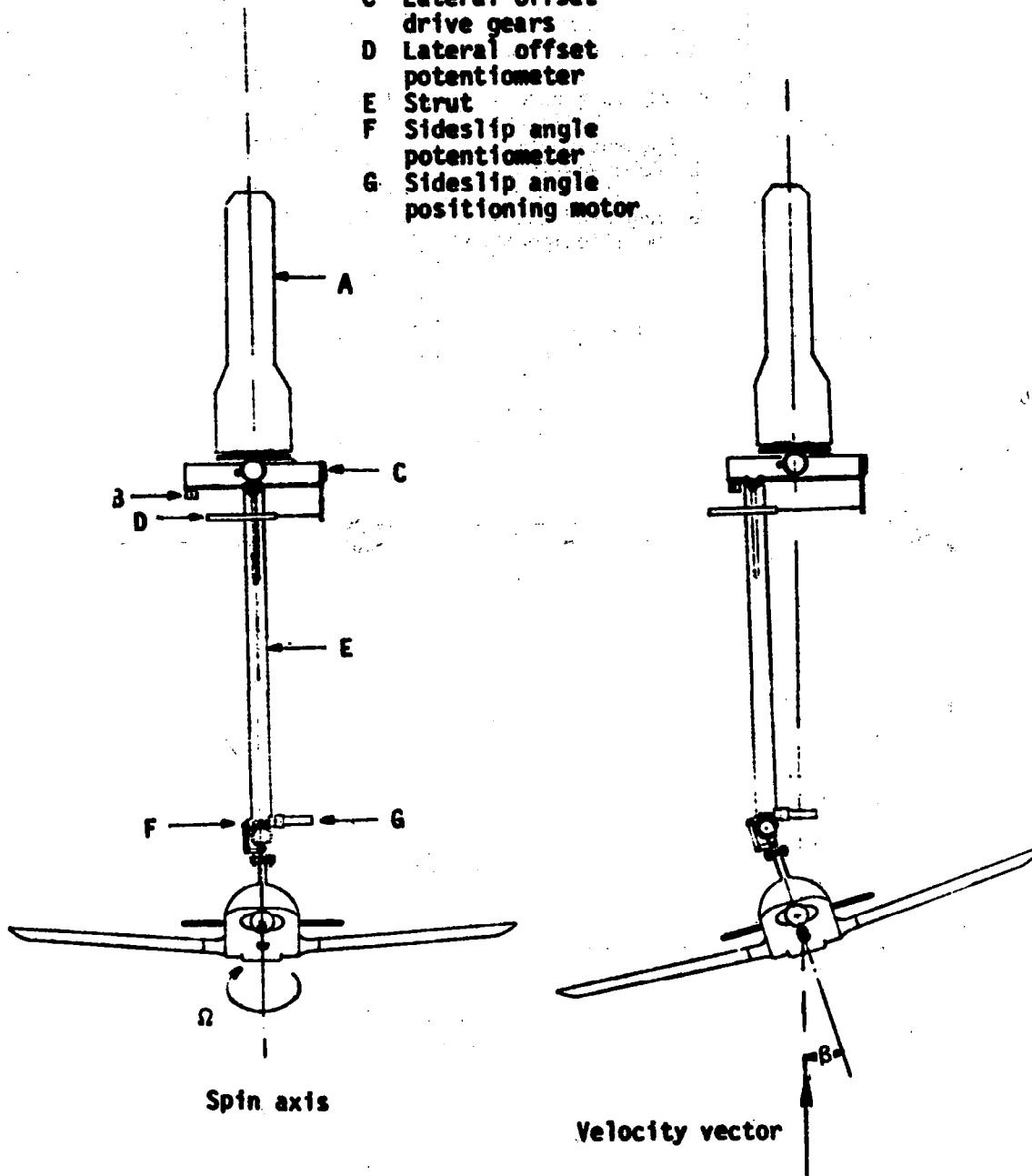
- A Slip ring housing
- B Drive shaft
- C Support boom
- D Spin radius offset potentiometer
- E Counterweight
- F Strut
- G Angle of attack positioning motor



(a) Side view of model.

Figure 2.- Sketch of rotary balance apparatus.

- A Slip ring housing
- B Spin radius offset potentiometer
- C Lateral offset drive gears
- D Lateral offset potentiometer
- E Strut
- F Sideslip angle potentiometer
- G Sideslip angle positioning motor



(b) Front view of model.

Figure 2.- Concluded.

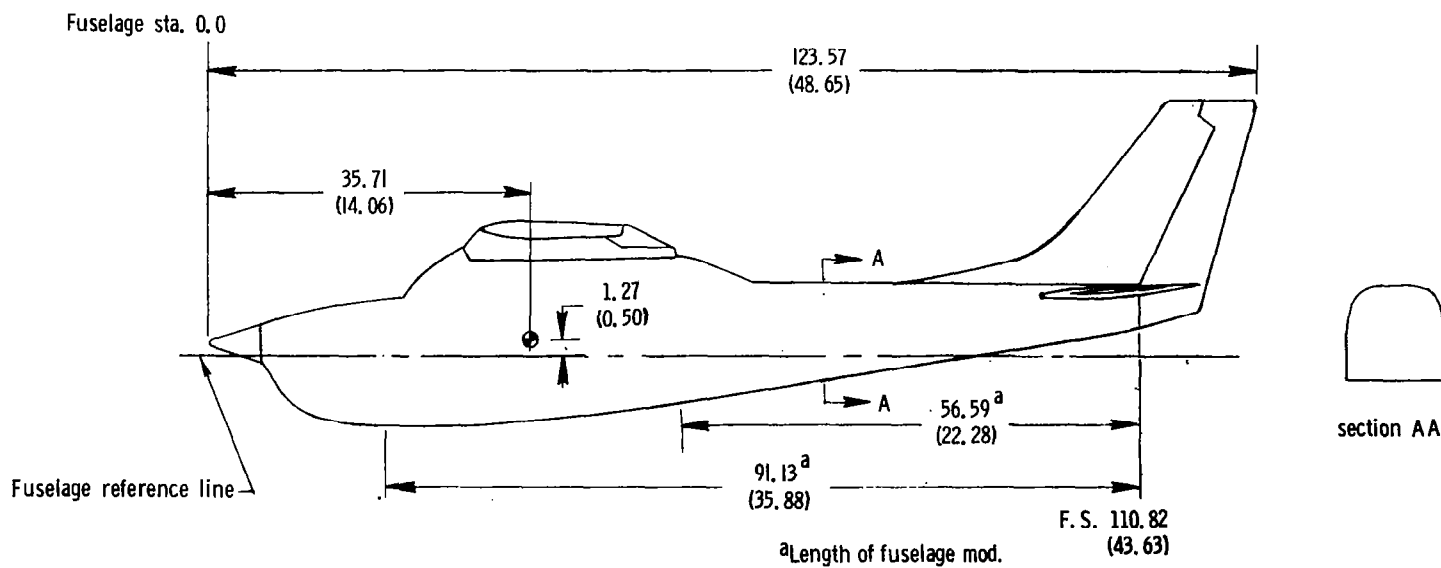
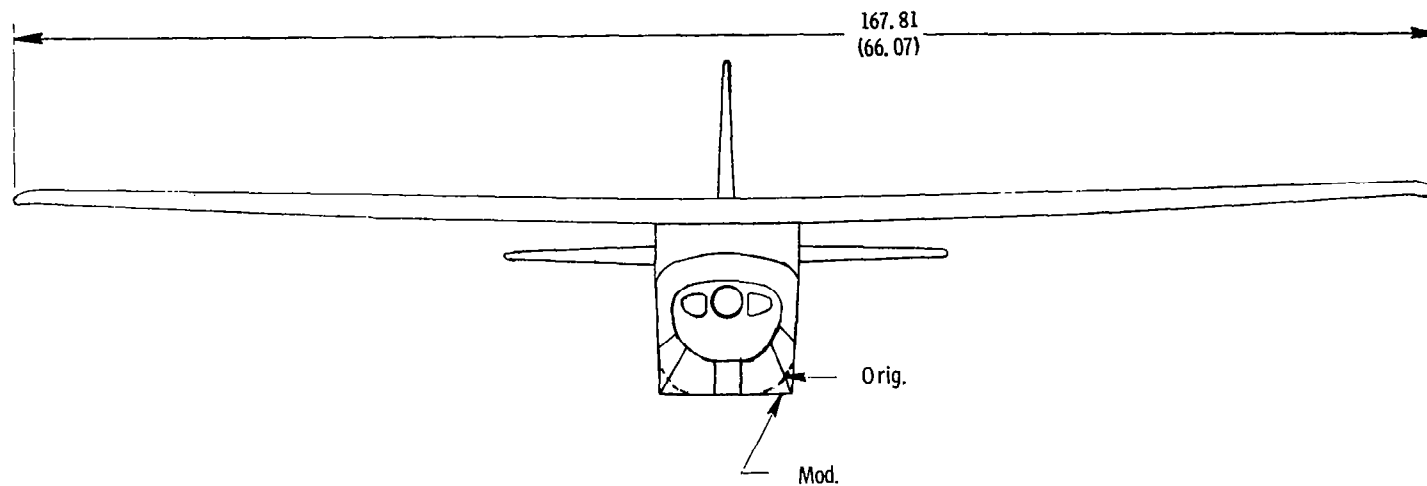
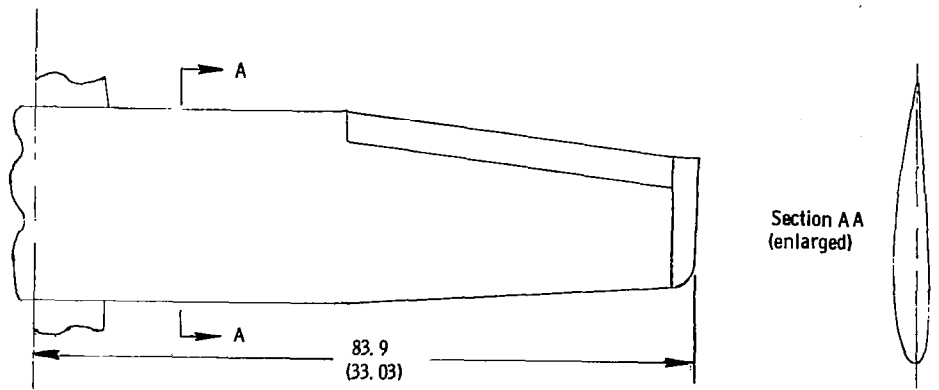
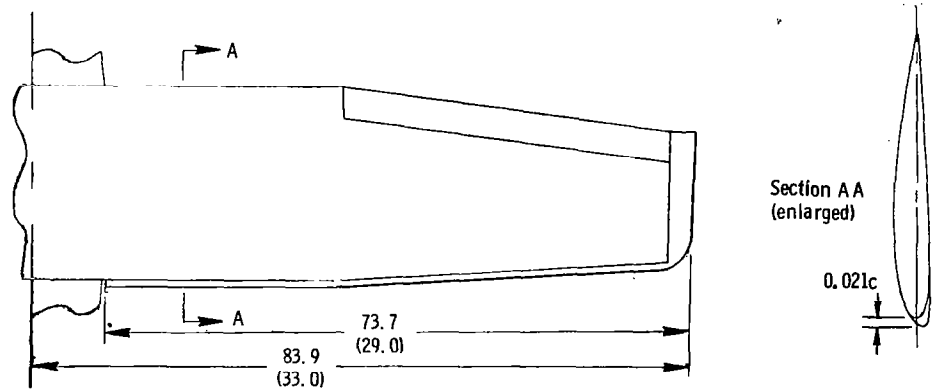


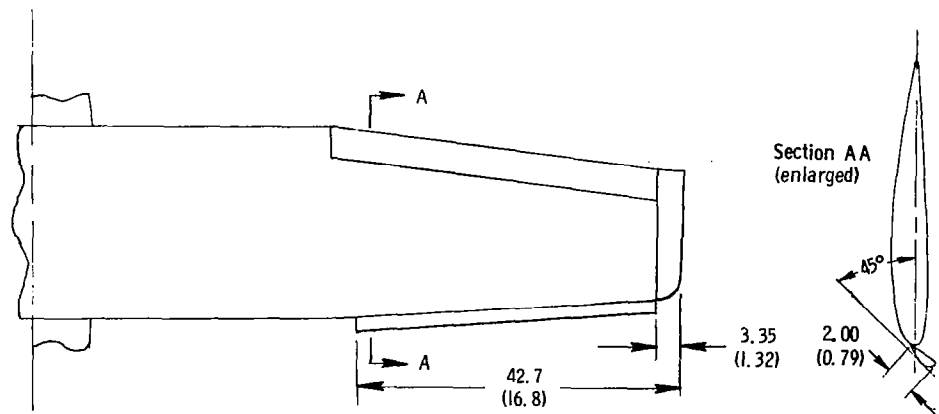
Figure 5. - Fuselage shape modifications tested on model. Dimensions are given in centimeters (inches), model scale.



(a) Basic wing

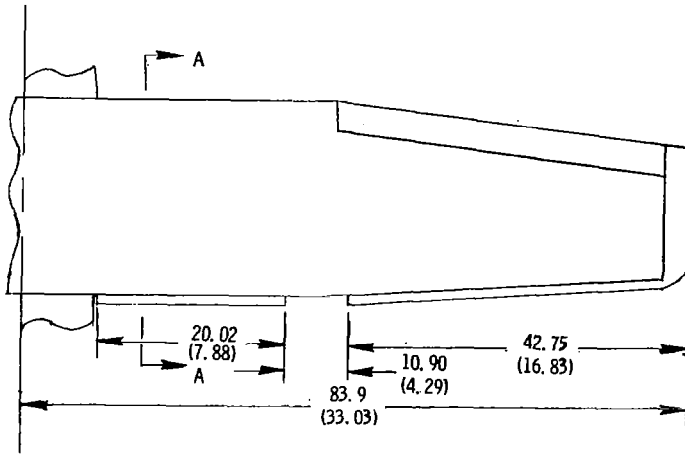


(b) Full-span LE wing droop having moderate nose radius.

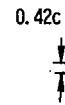


(c) Outboard LE wing Kruger flap.

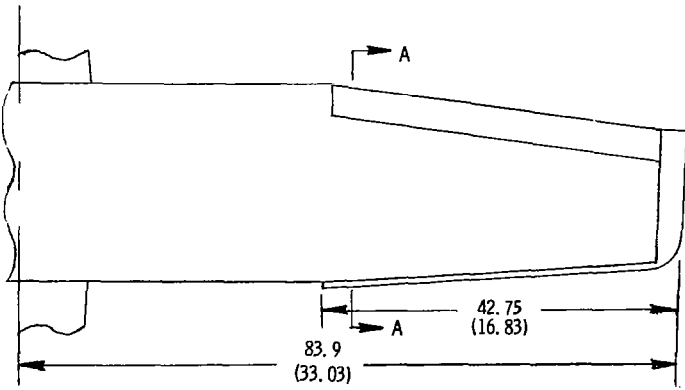
Figure 6. - Wing leading-edge modifications tested on model. Dimensions are given in centimeters (inches), model scale.



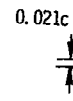
Section AA (enlarged)



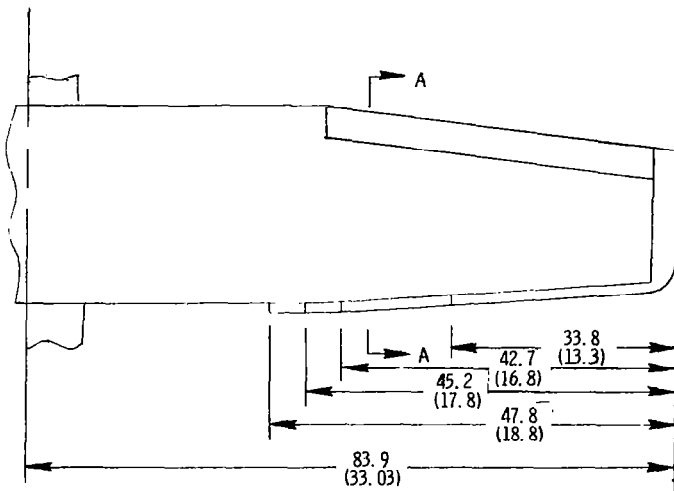
(d) Segmented LE wing droop.



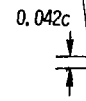
Section AA (enlarged)



(e) Outboard LE wing droop having moderate nose radius.



Section AA (enlarged)



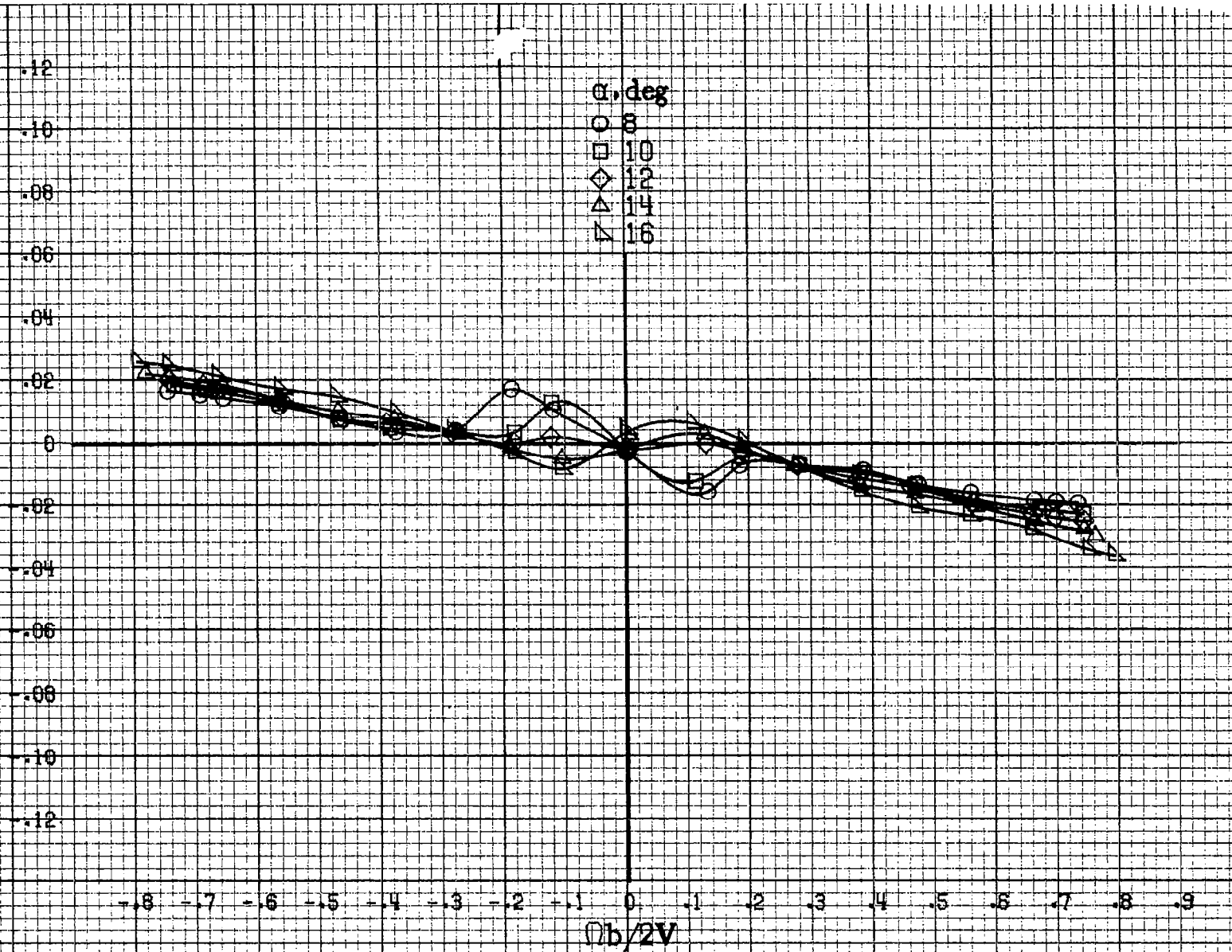
(f) Outboard LE wing droop.

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18.

APPENDIX

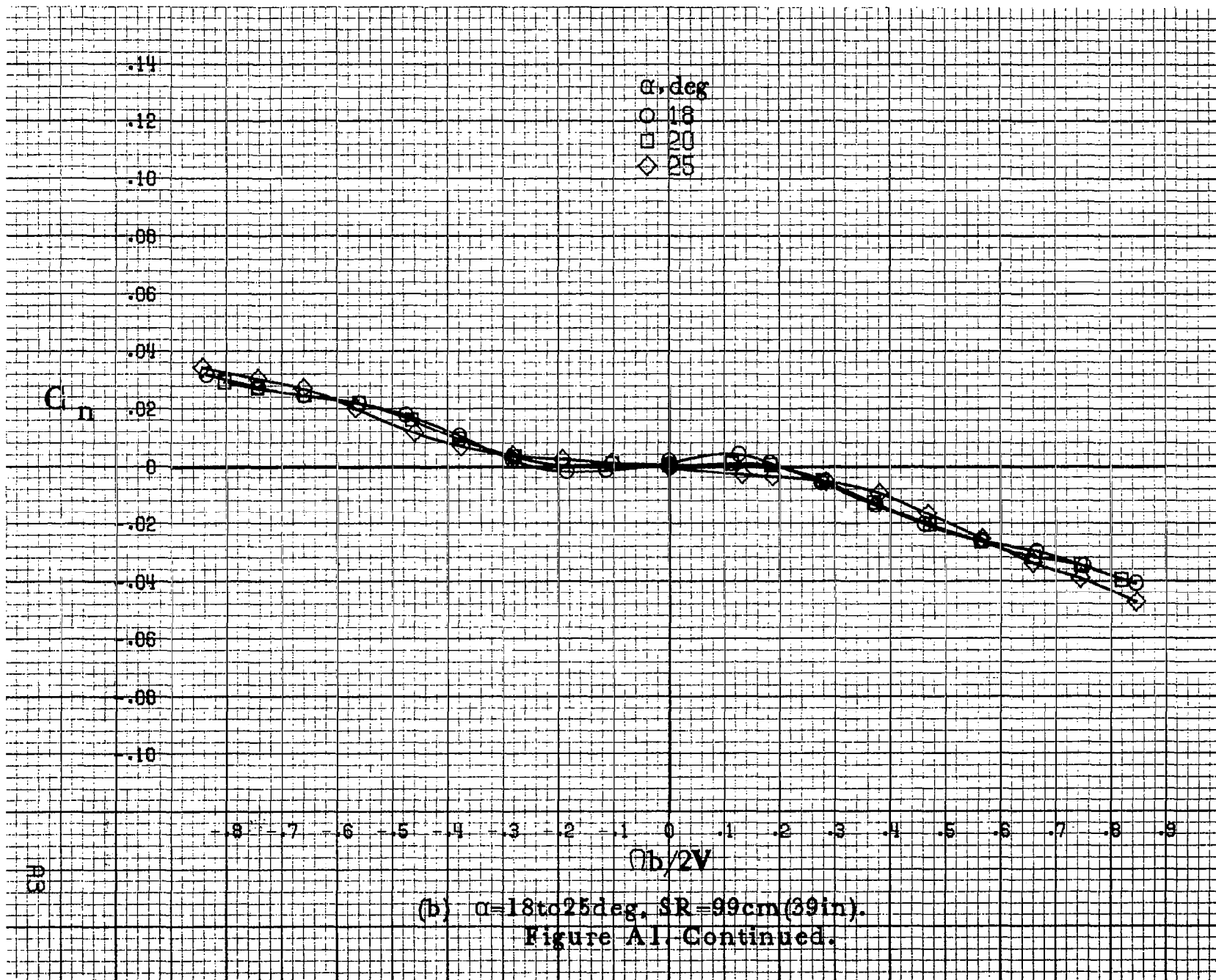
HP

C_n



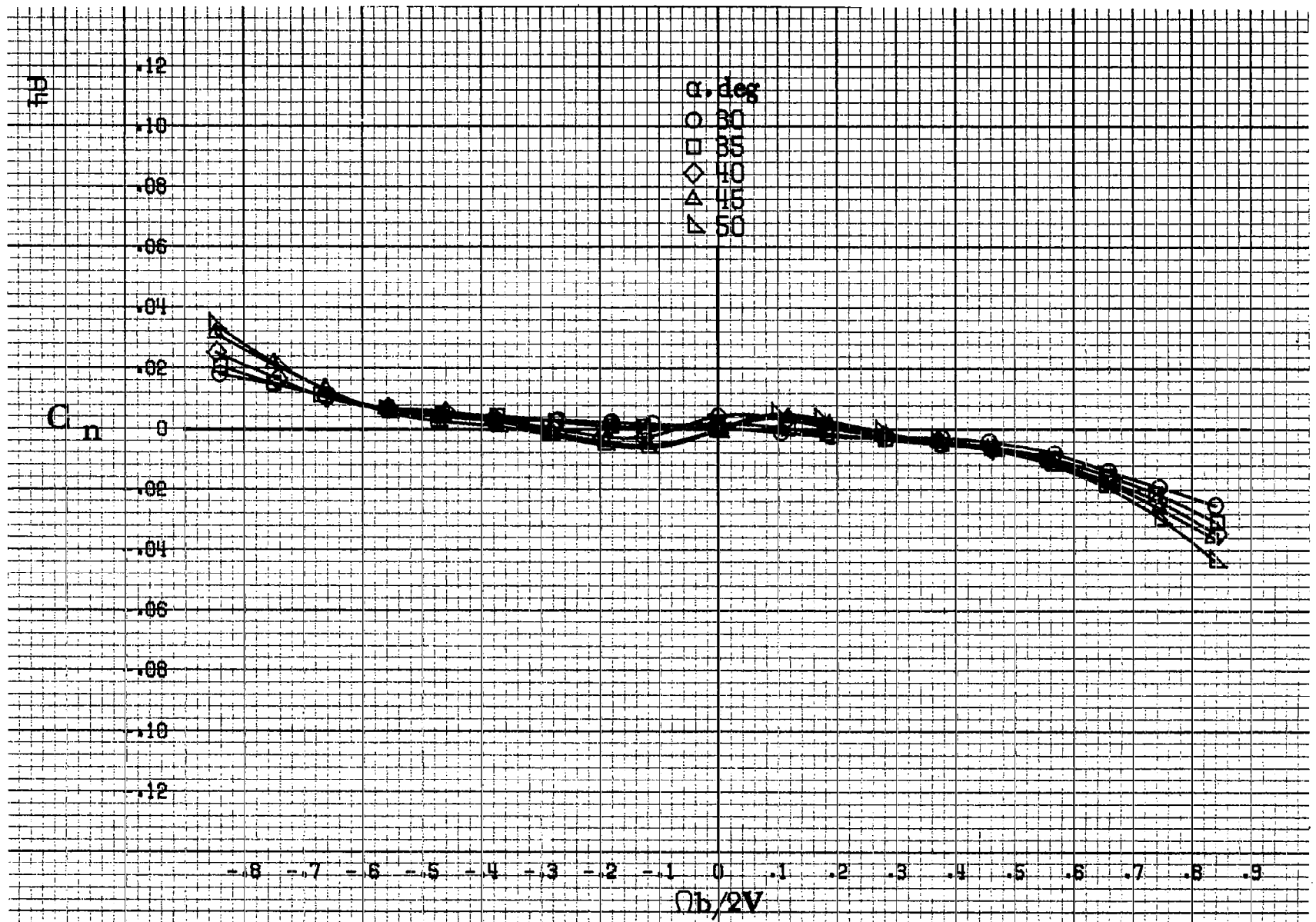
(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A1. Effect of rotation rate and angle of attack on yawing moment coefficient for basic configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

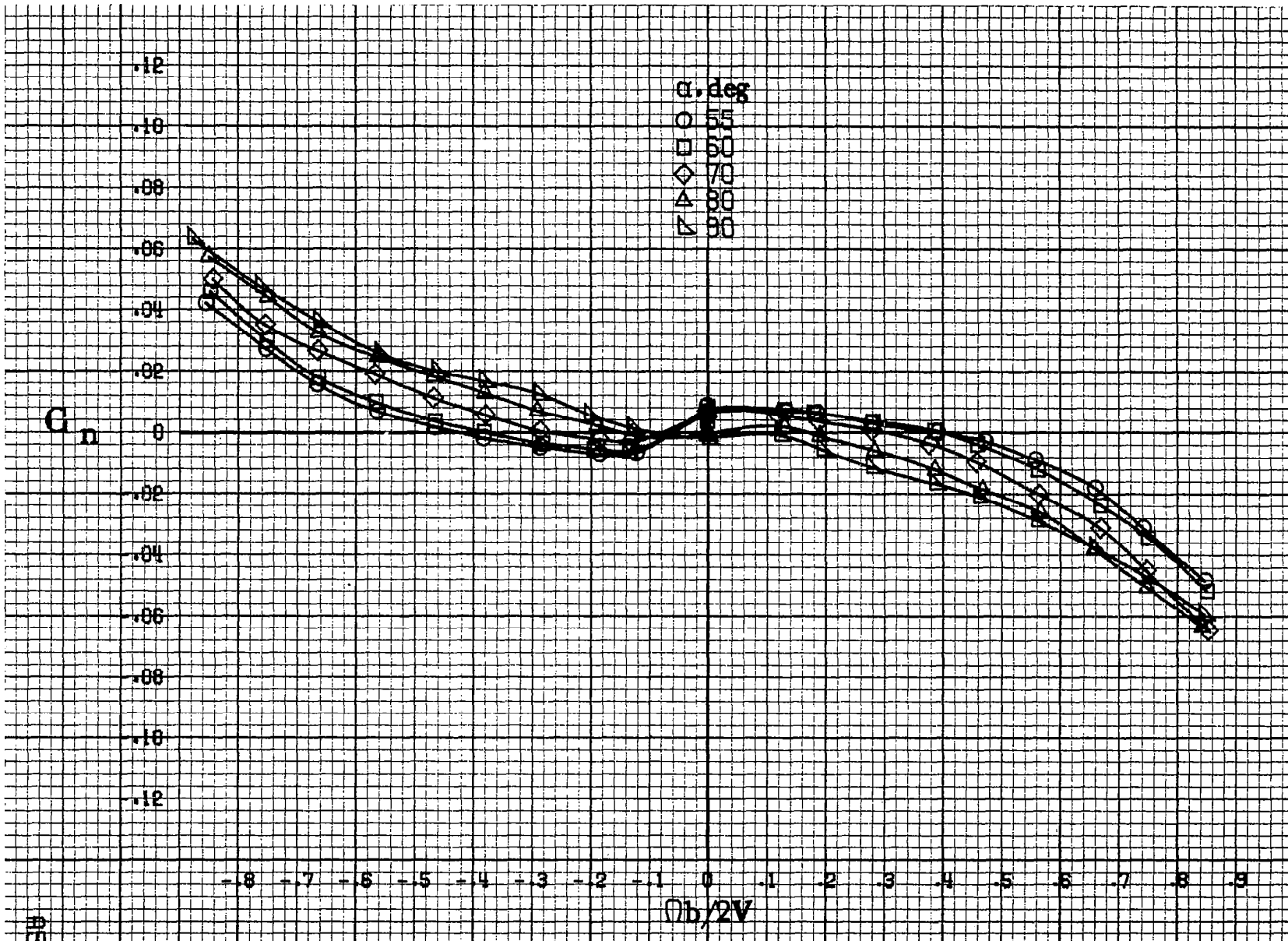


(b) $\alpha = 18$ to 25 deg, $SR = 99$ cm (39 in).
 Figure A1 Continued.

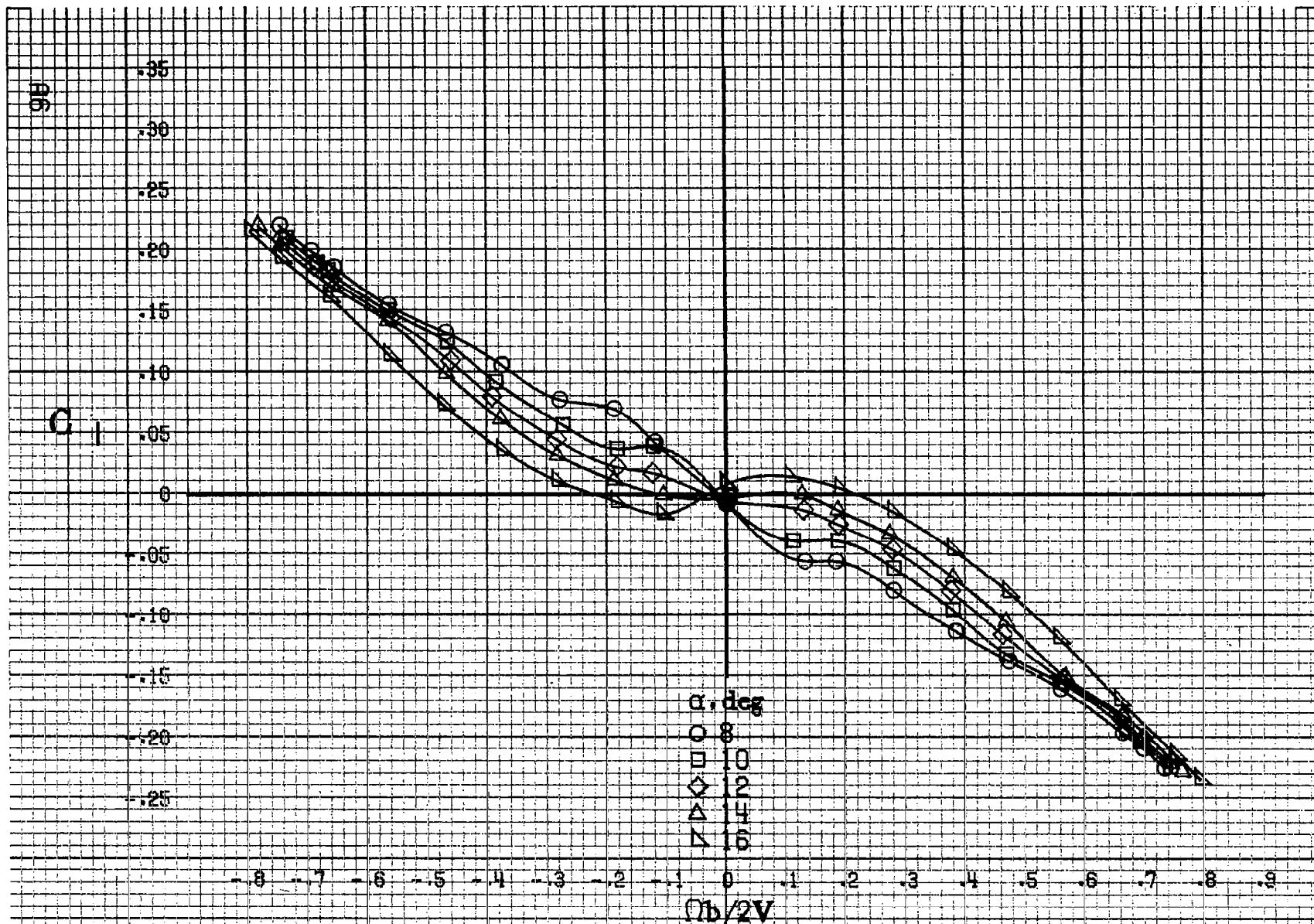
113



(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A1. Continued.

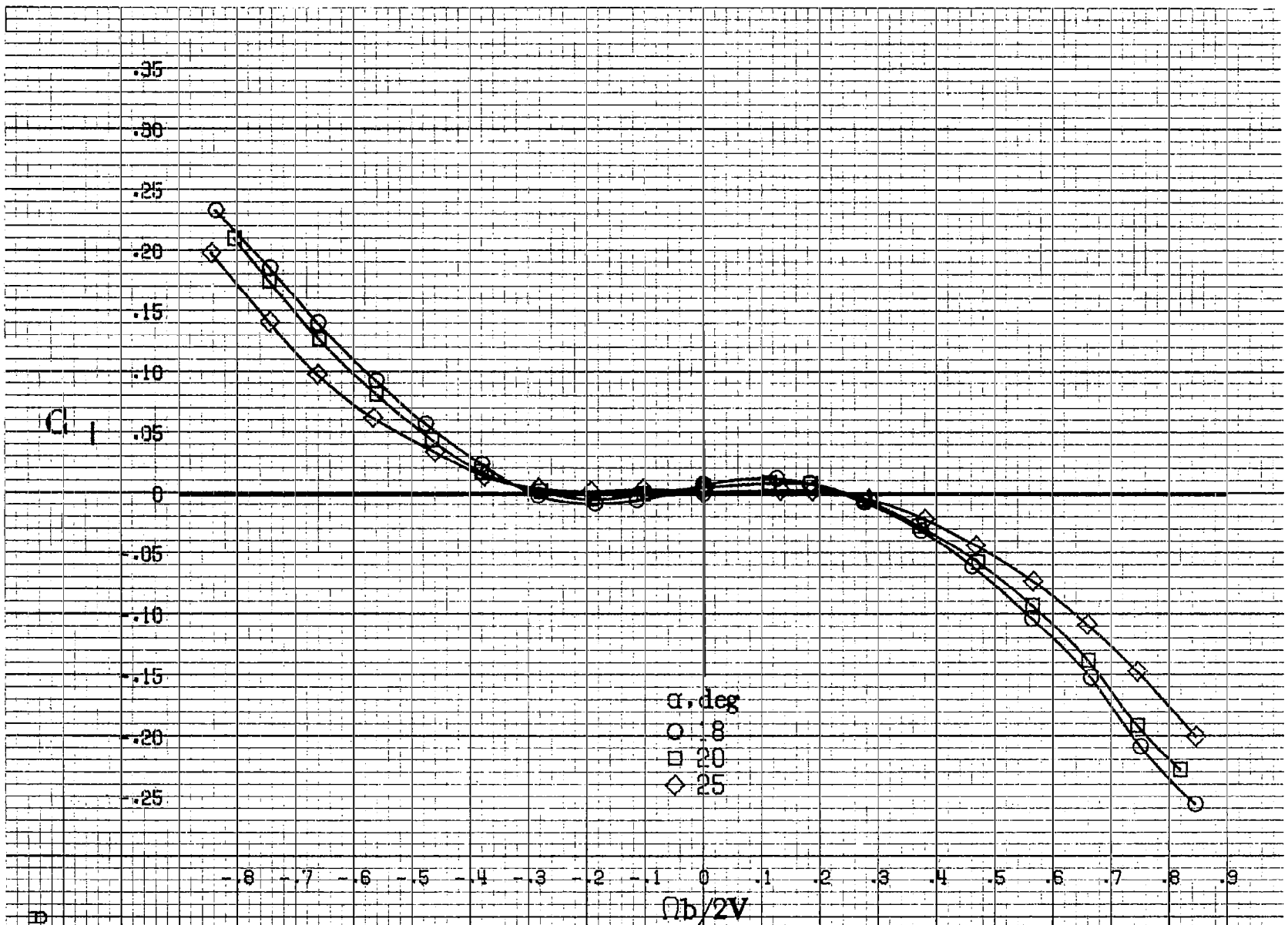


(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A1. Continued.

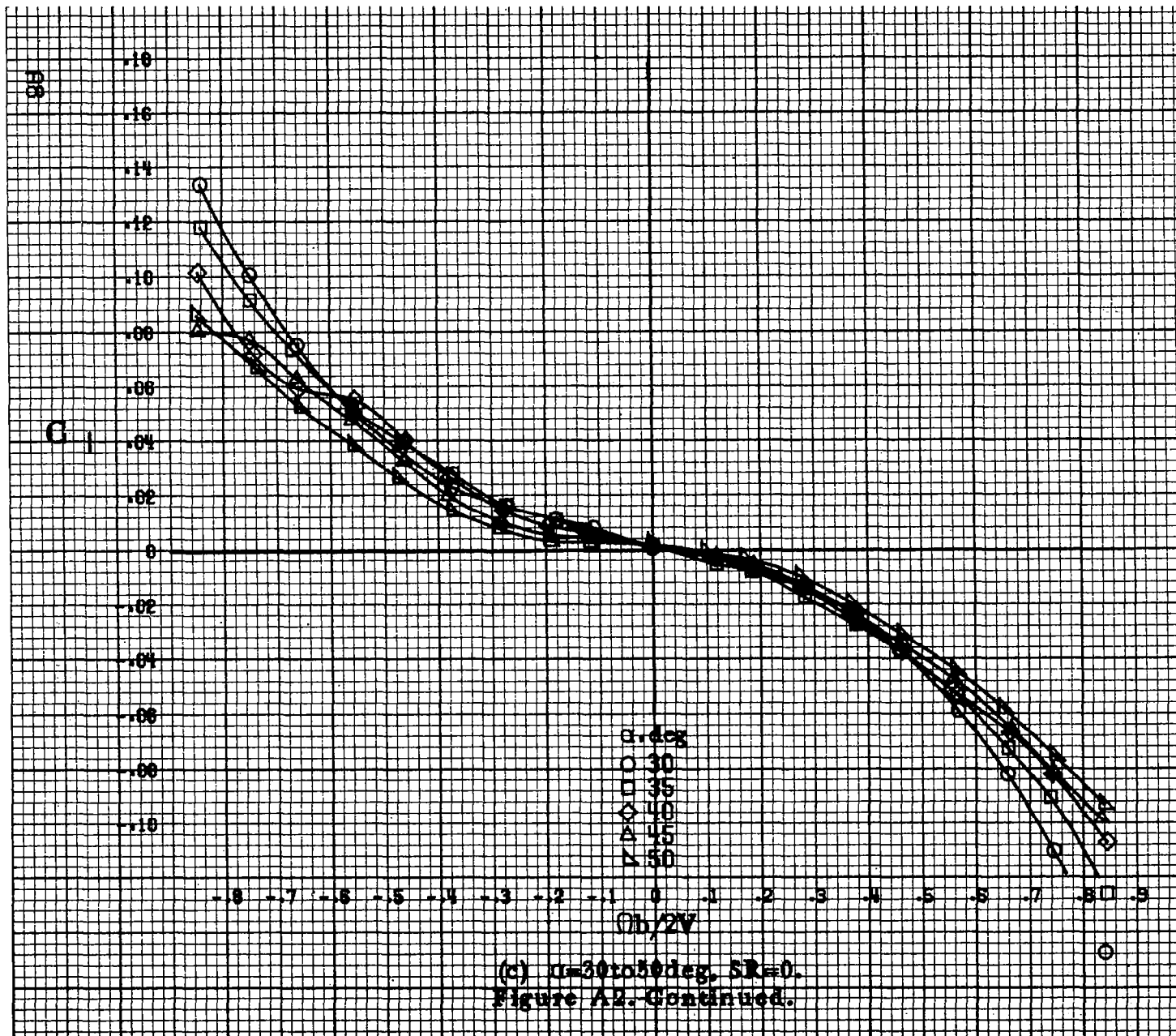


(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

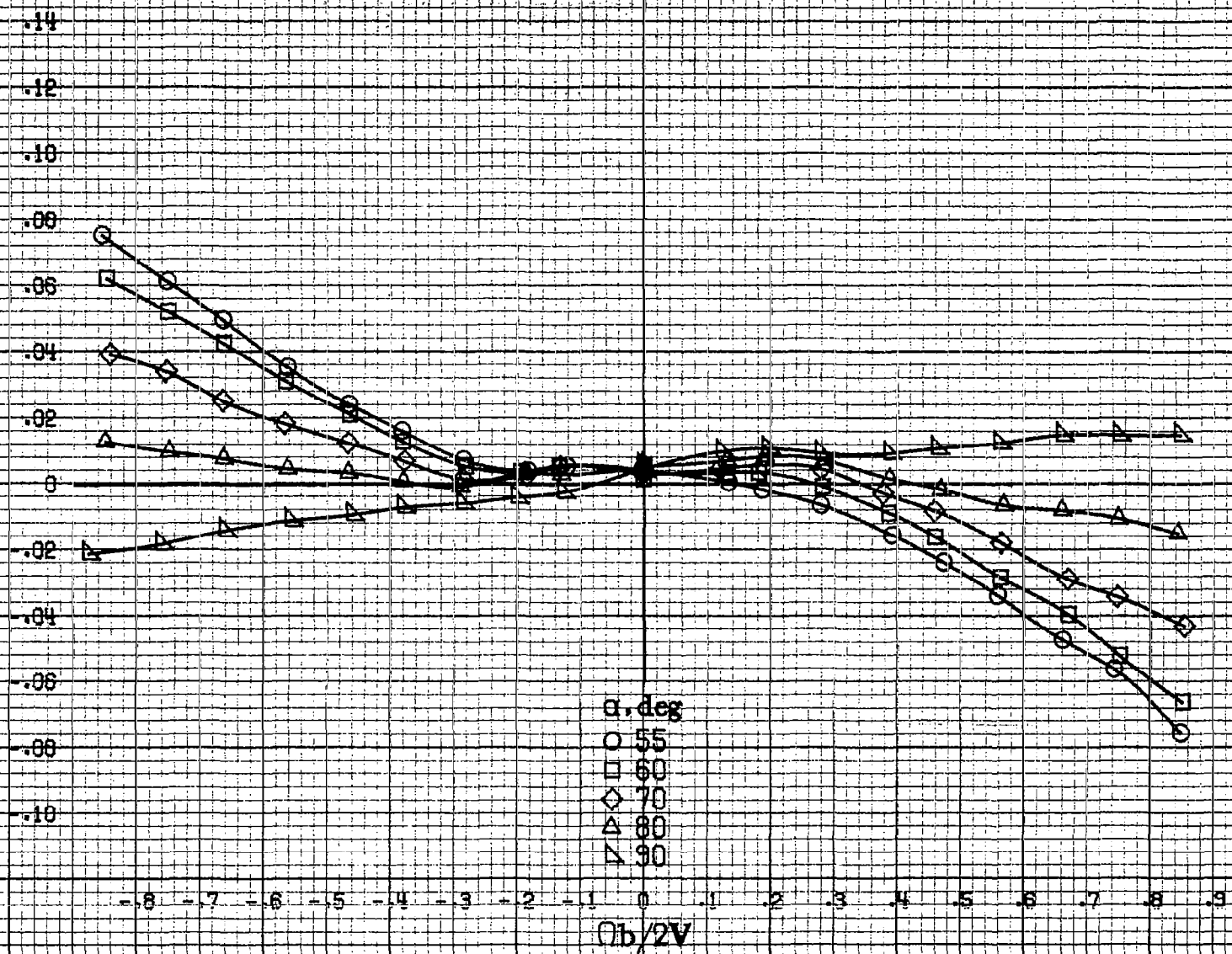
Figure A2.-Effect of rotation rate and angle of attack on rolling-moment coefficient for basic configuration. $\delta_a=0^\circ$, $\delta_b=0^\circ$, $\delta_r=0^\circ$. $B=0^\circ$.



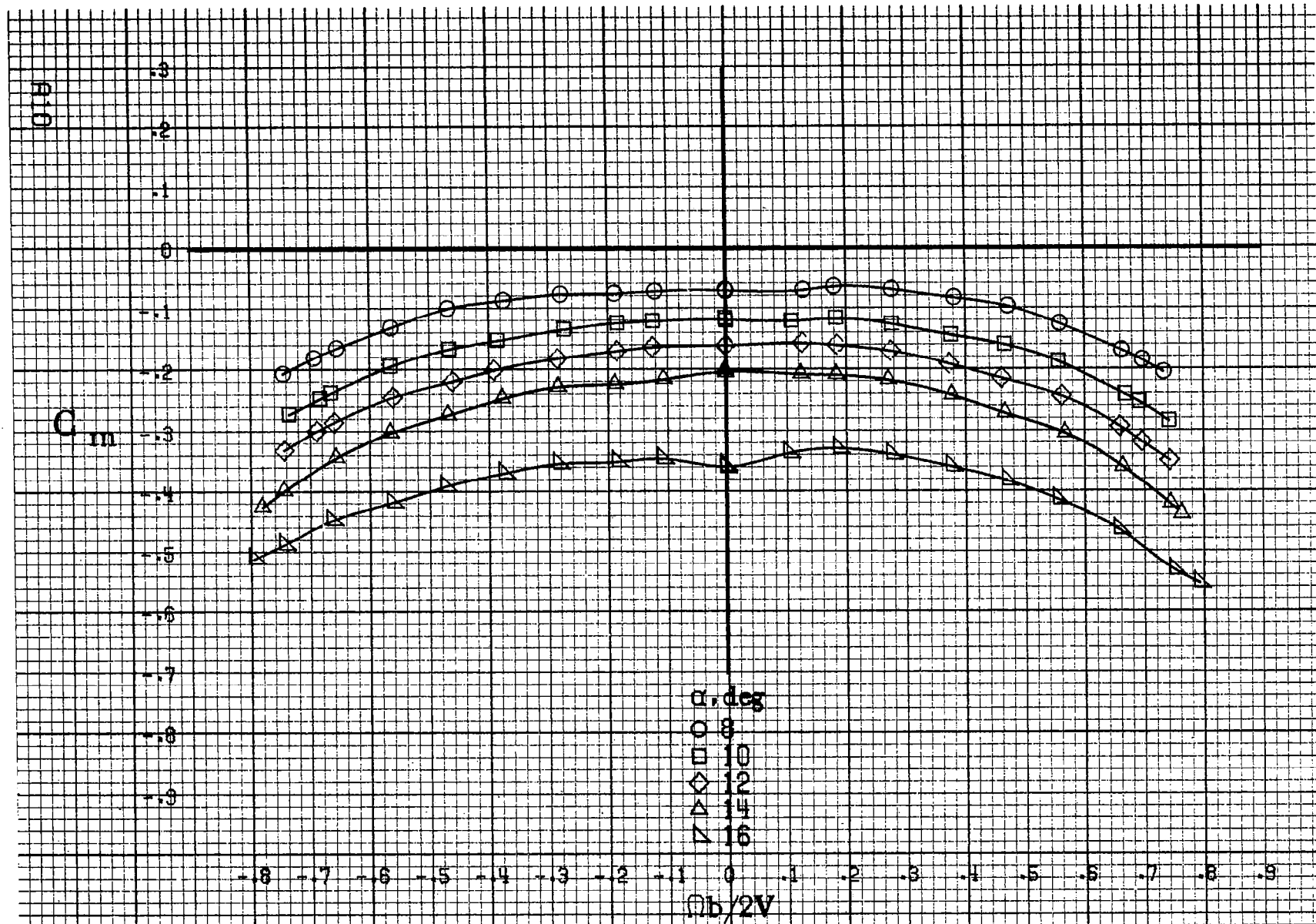
(b) $\alpha = 18$ to 25° , $SR = 99\text{cm}$ (39 in).
Figure A2. Continued.



C_L

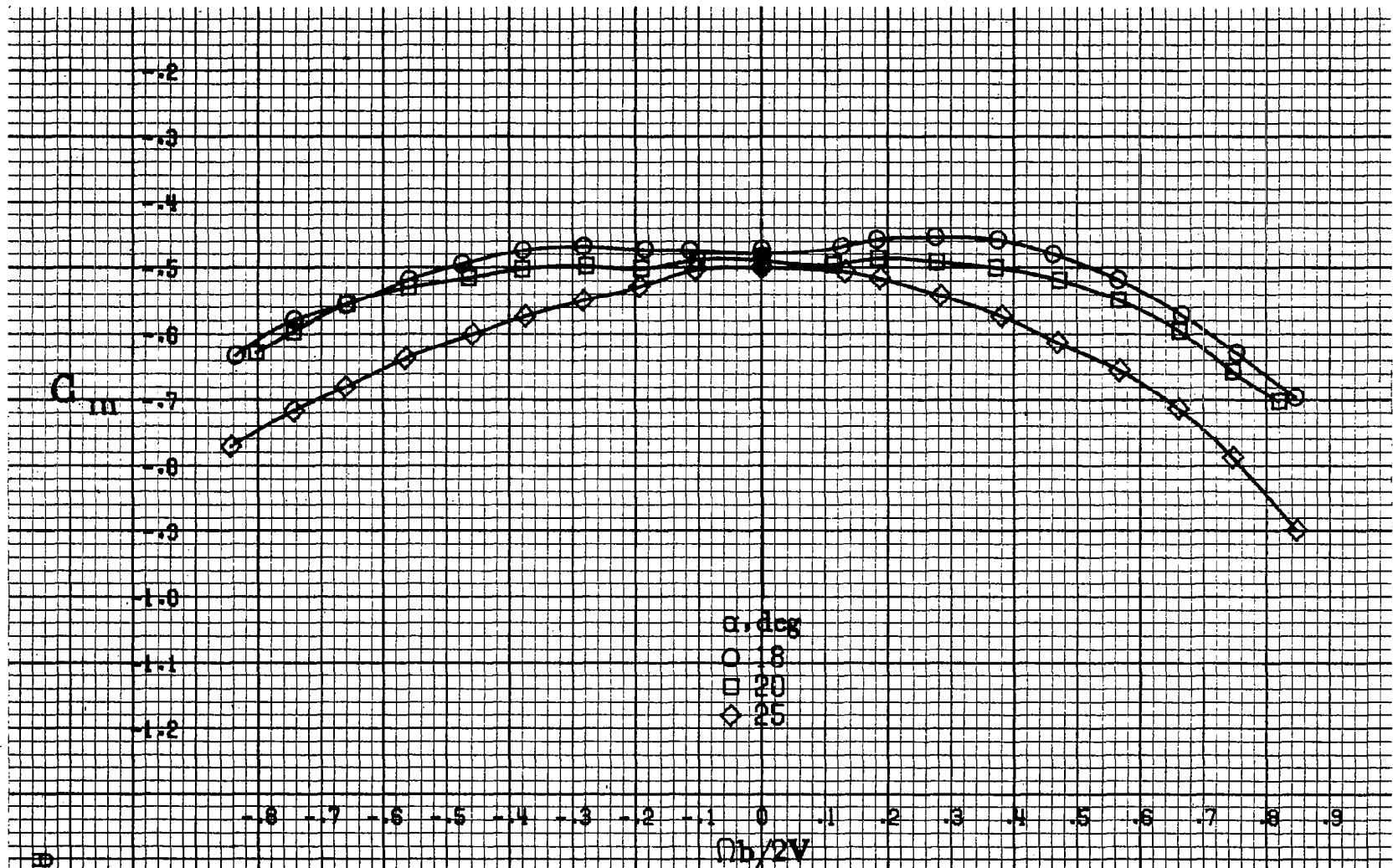


(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A2. Concluded.



(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

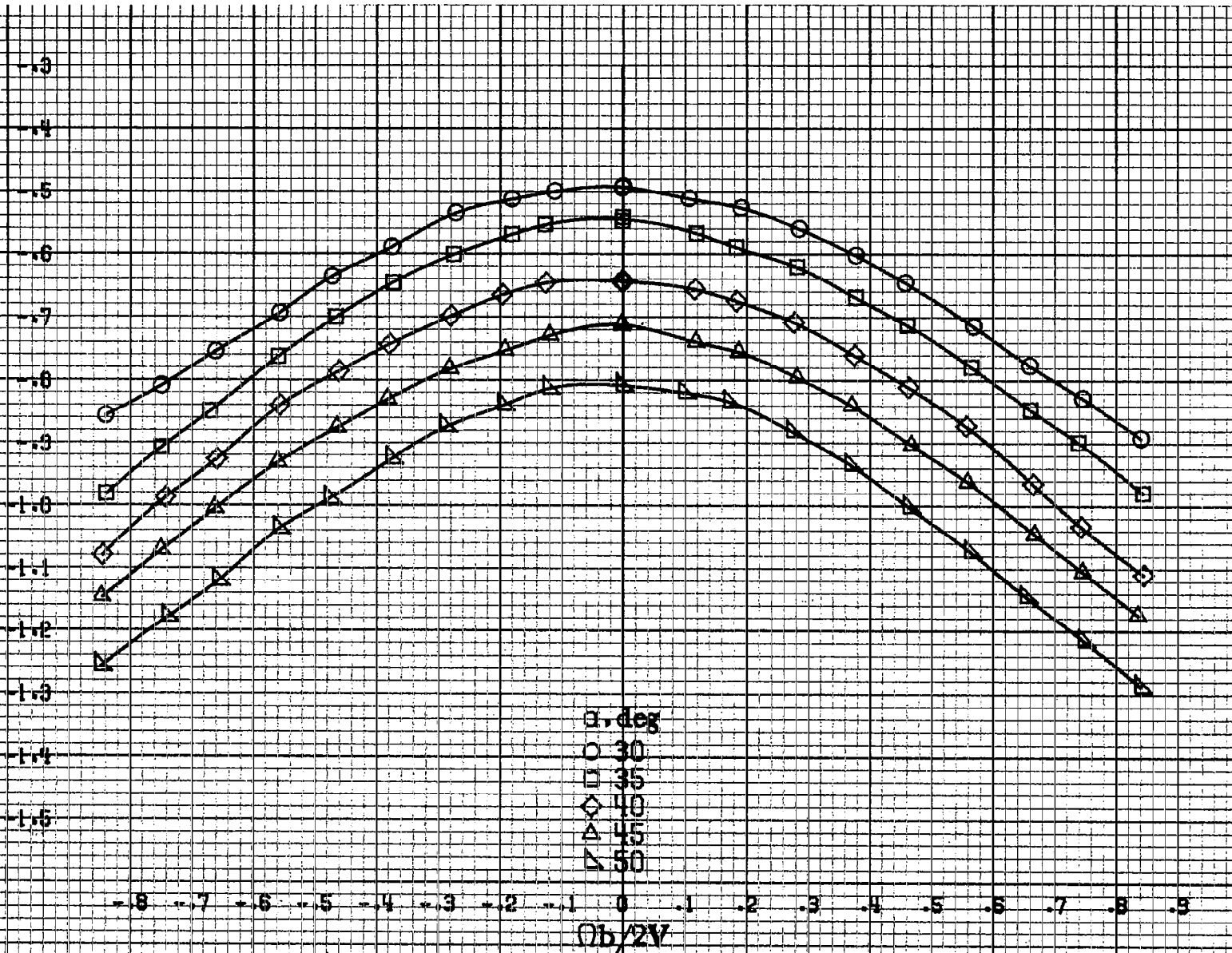
Figure A3. Effect of rotation rate and angle of attack on pitching moment coefficient for basic configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha=18$ to 25 deg, $SR=99$ cm (39 in).
 Figure A3-Continued.

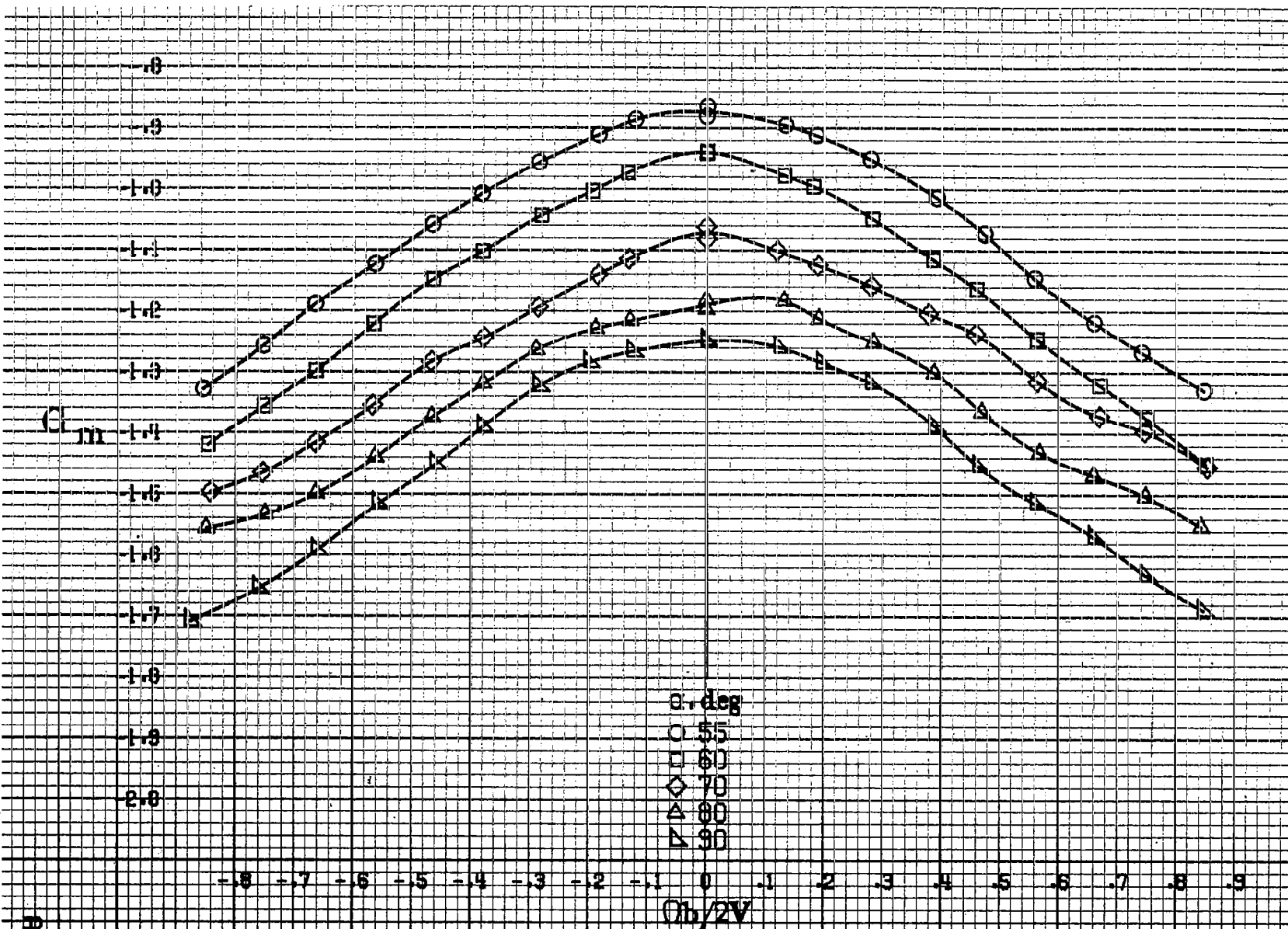
A111

C_m



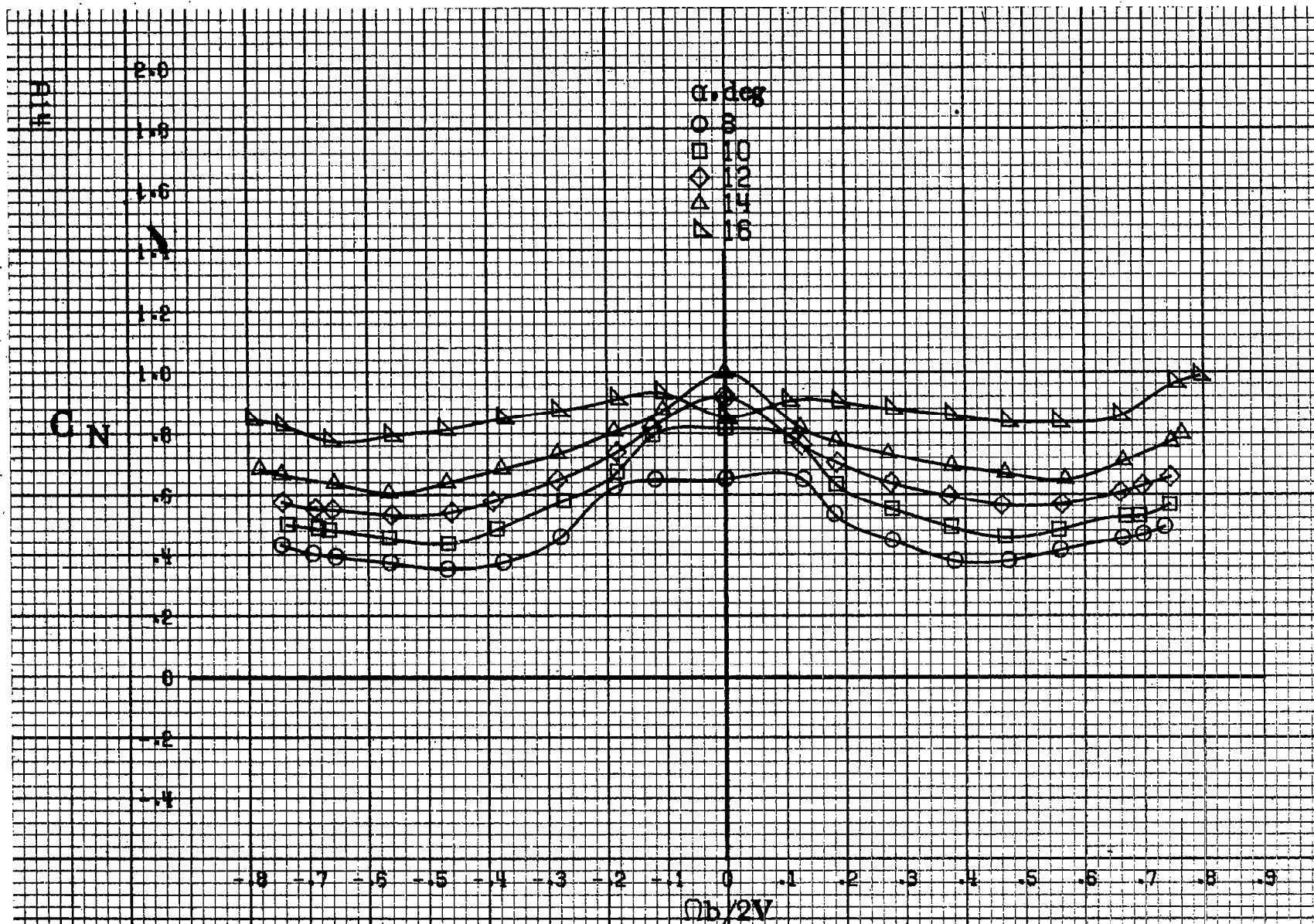
α, deg
 ○ 30
 □ 35
 ◇ 40
 △ 45
 ▽ 50

(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A.3. Continued.



(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A3. Continued.

613

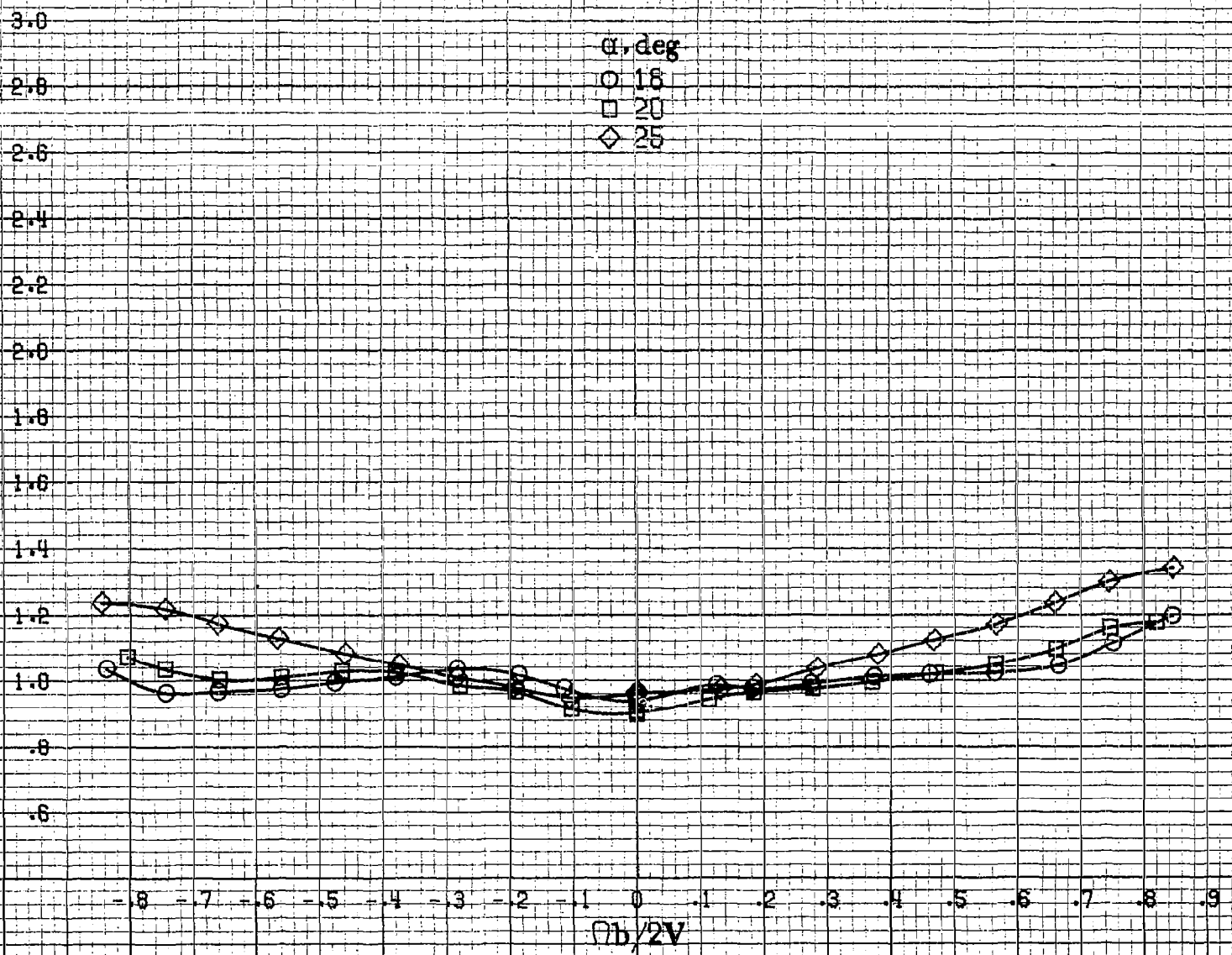


(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A4. Effect of rotation rate and angle of attack on normal force coefficient for basic configuration. $\delta_1 = 0^\circ$, $\delta_2 = 0^\circ$, $\delta_3 = 0^\circ$, $\beta = 0^\circ$.

PLS

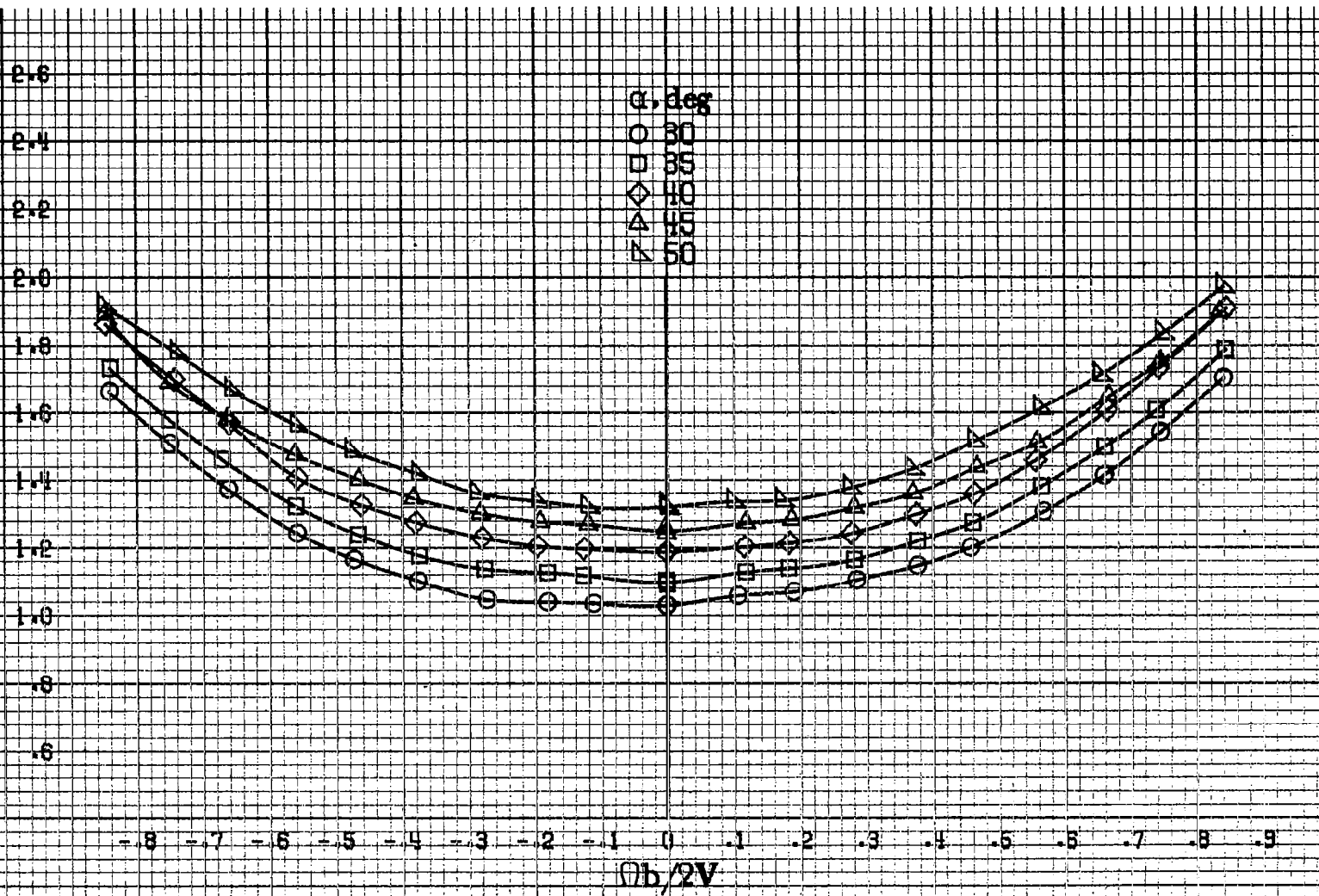
C_N



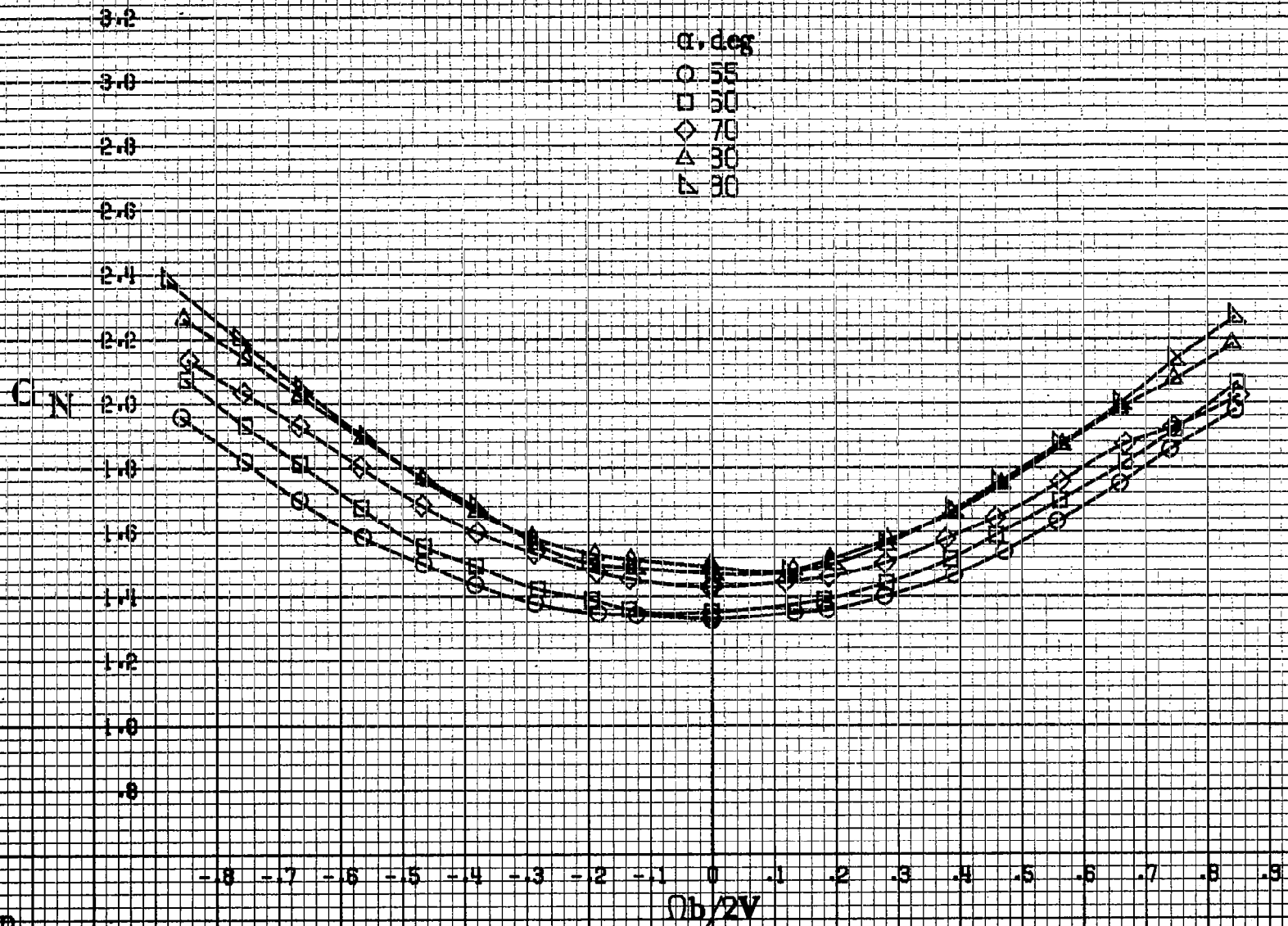
(b) $\alpha = 18$ to 25 deg, $SR = 99$ cm (39 in).
Figure A4. Continued.

816

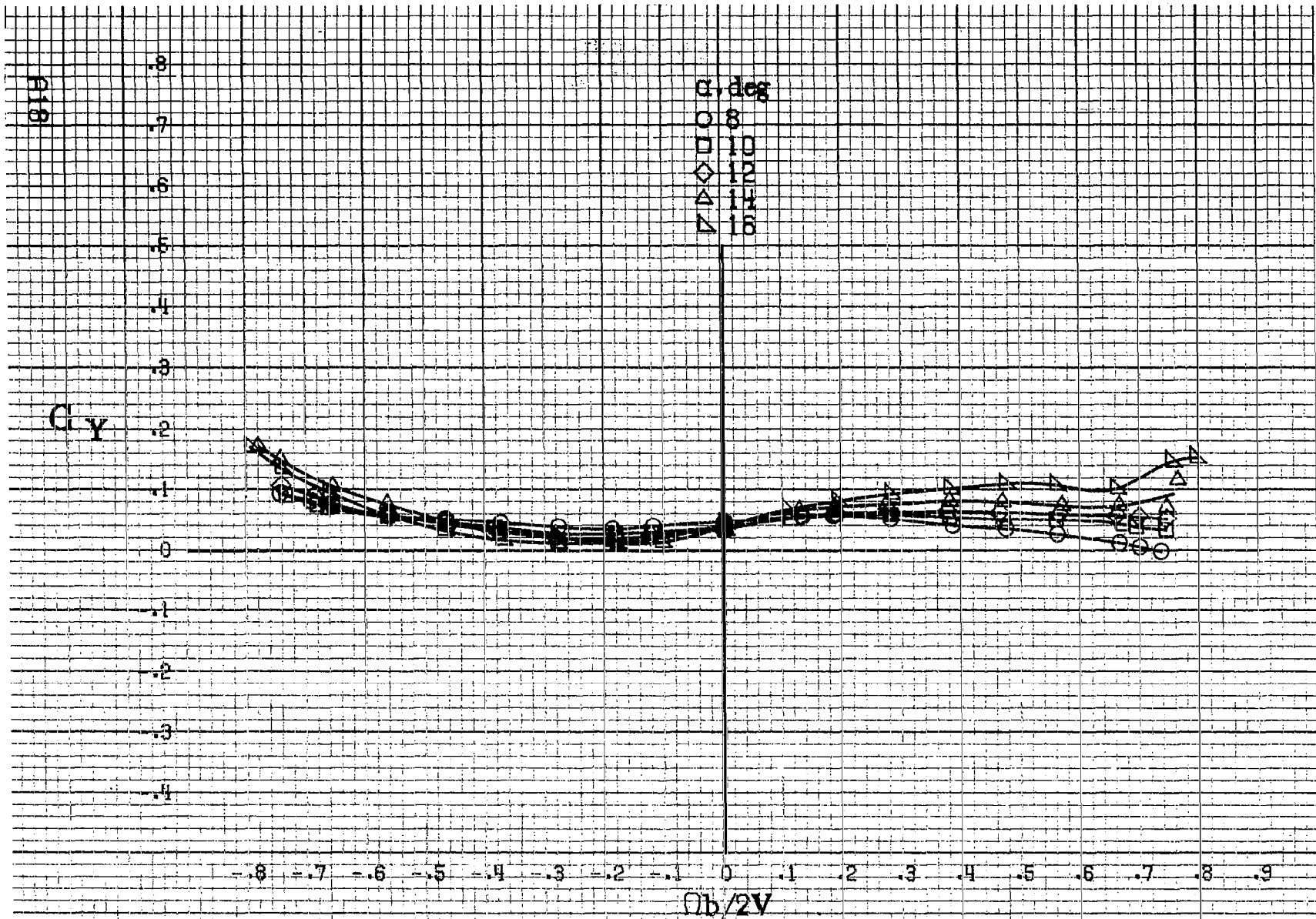
C_N



(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A.4. Continued.

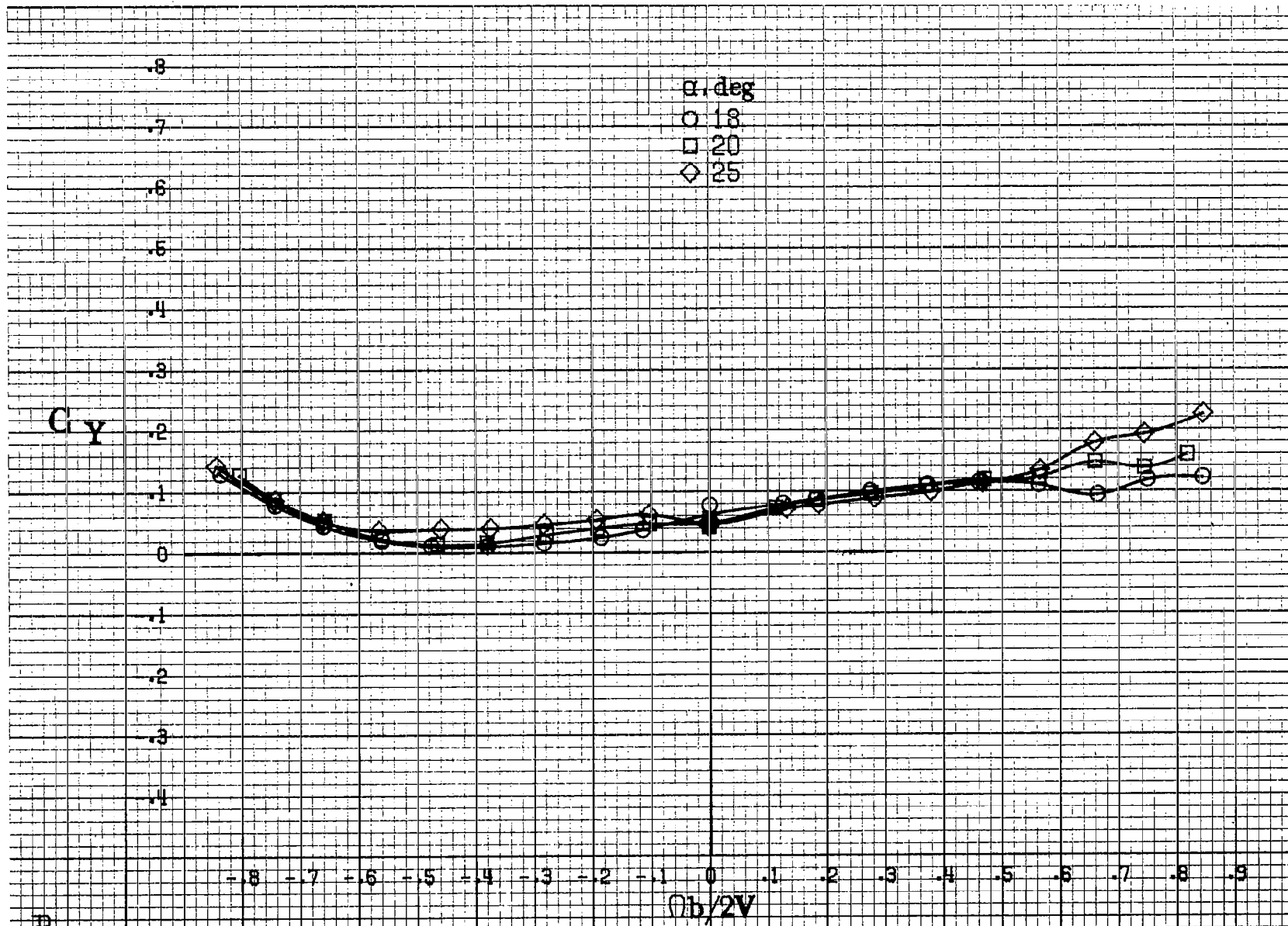


(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A4. Concluded.

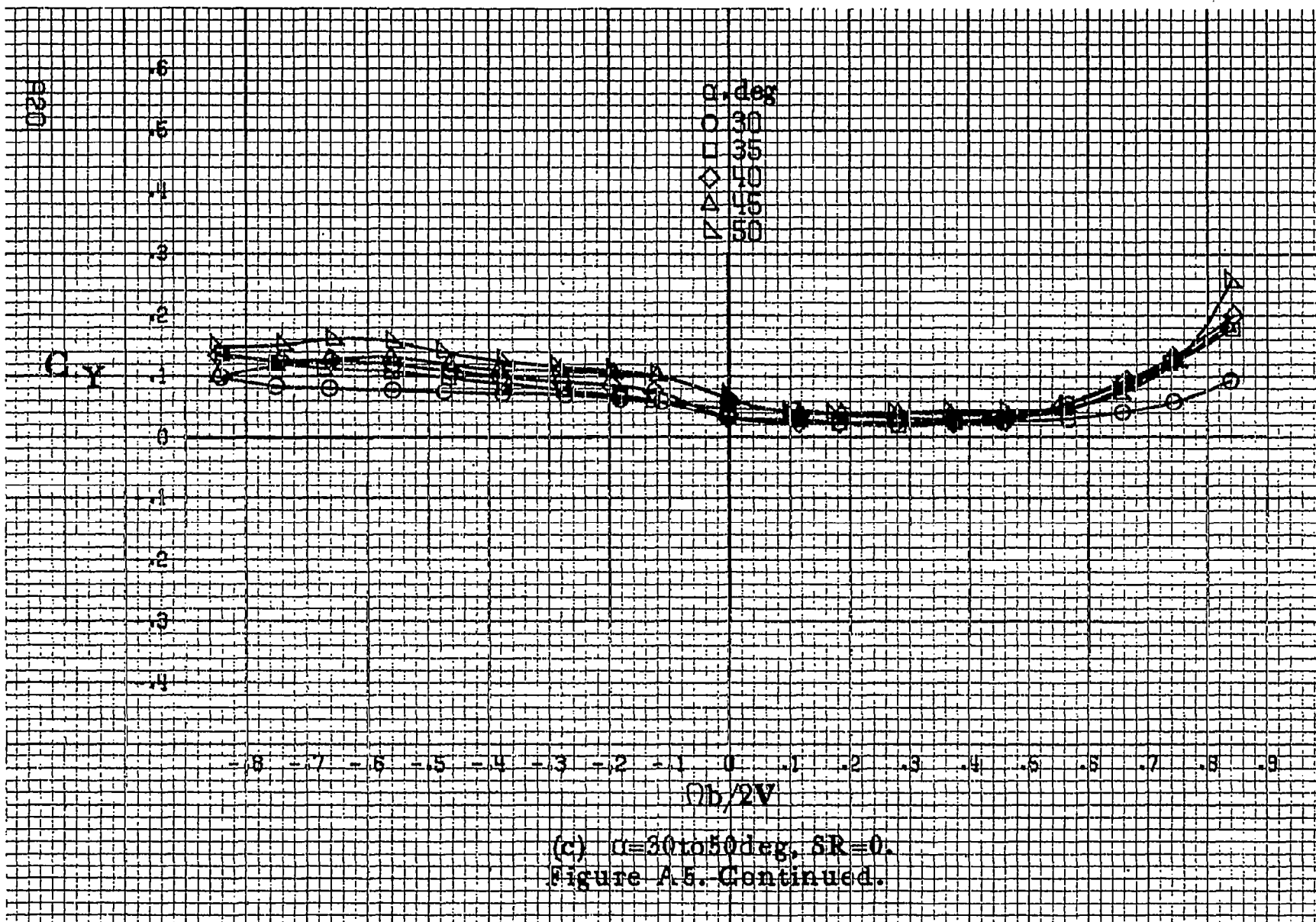


(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

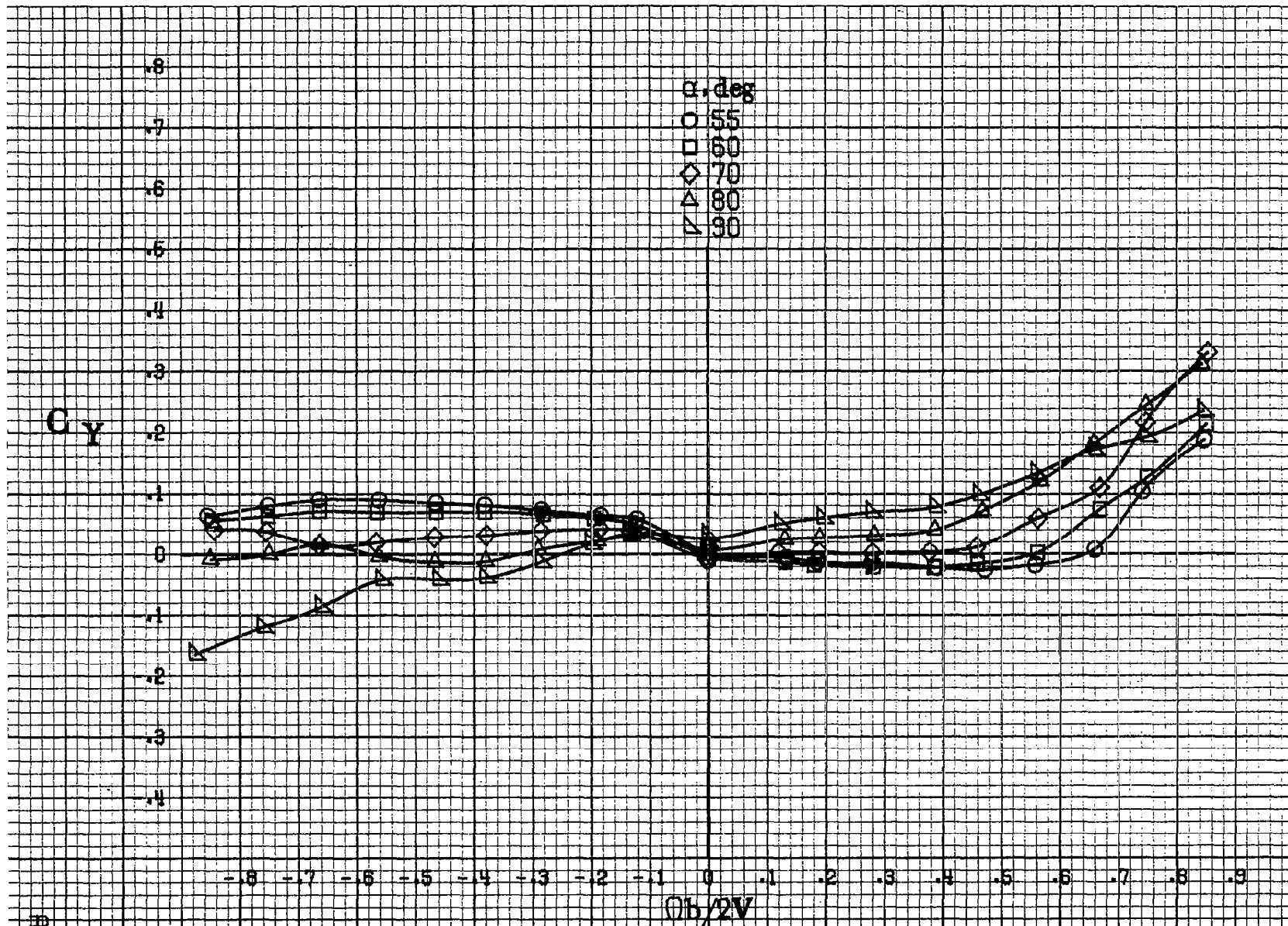
Figure A5.-Effect of rotation rate and angle of attack on side-force coefficient for basic configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 25 deg, $SR = 99$ cm (39 in).
Figure A5. Continued.



(c) $\alpha = 30$ to 50 deg, $\delta R = 0$.
 Figure A.5. Continued.



(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A.5. Concluded.

E22

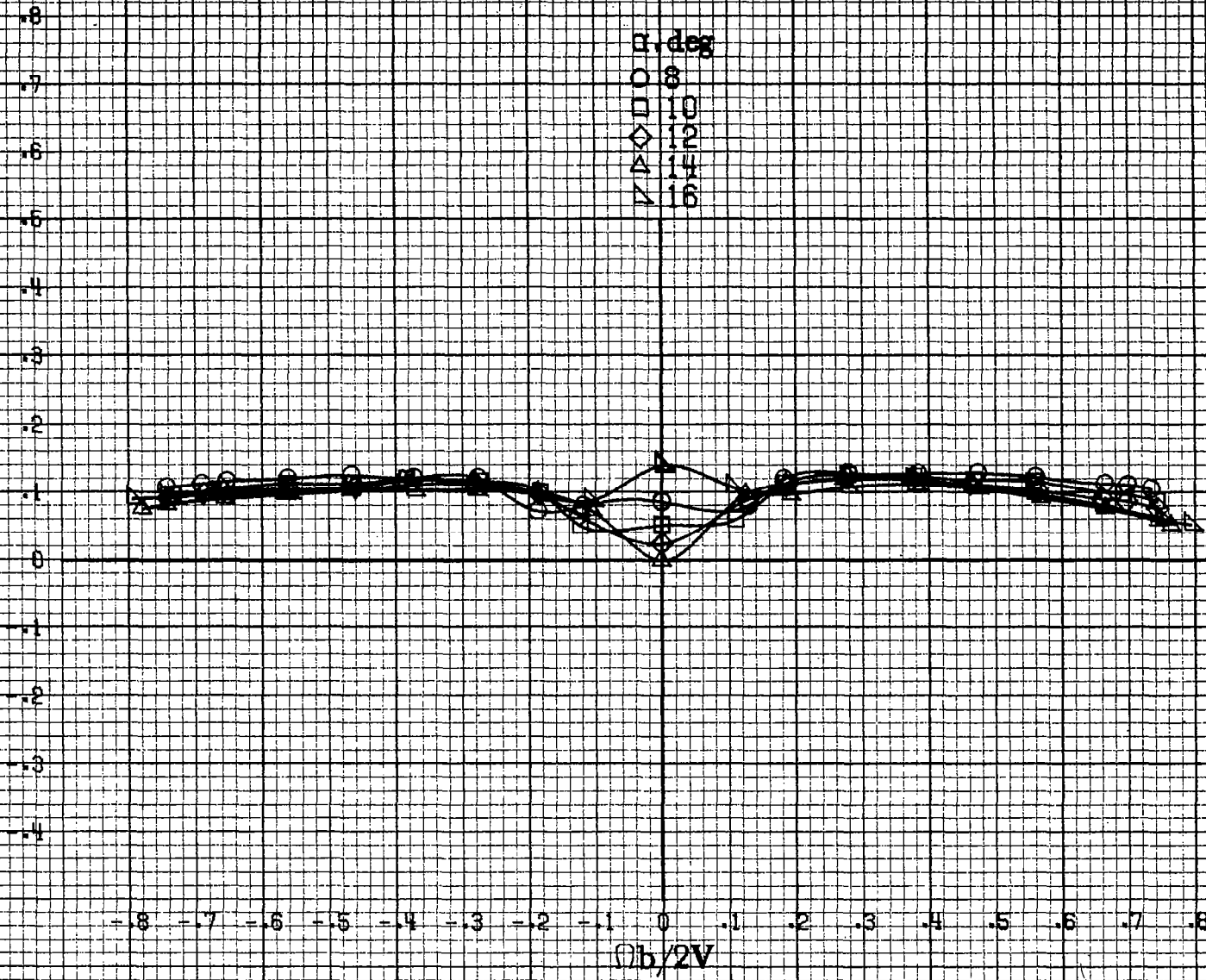
C_A

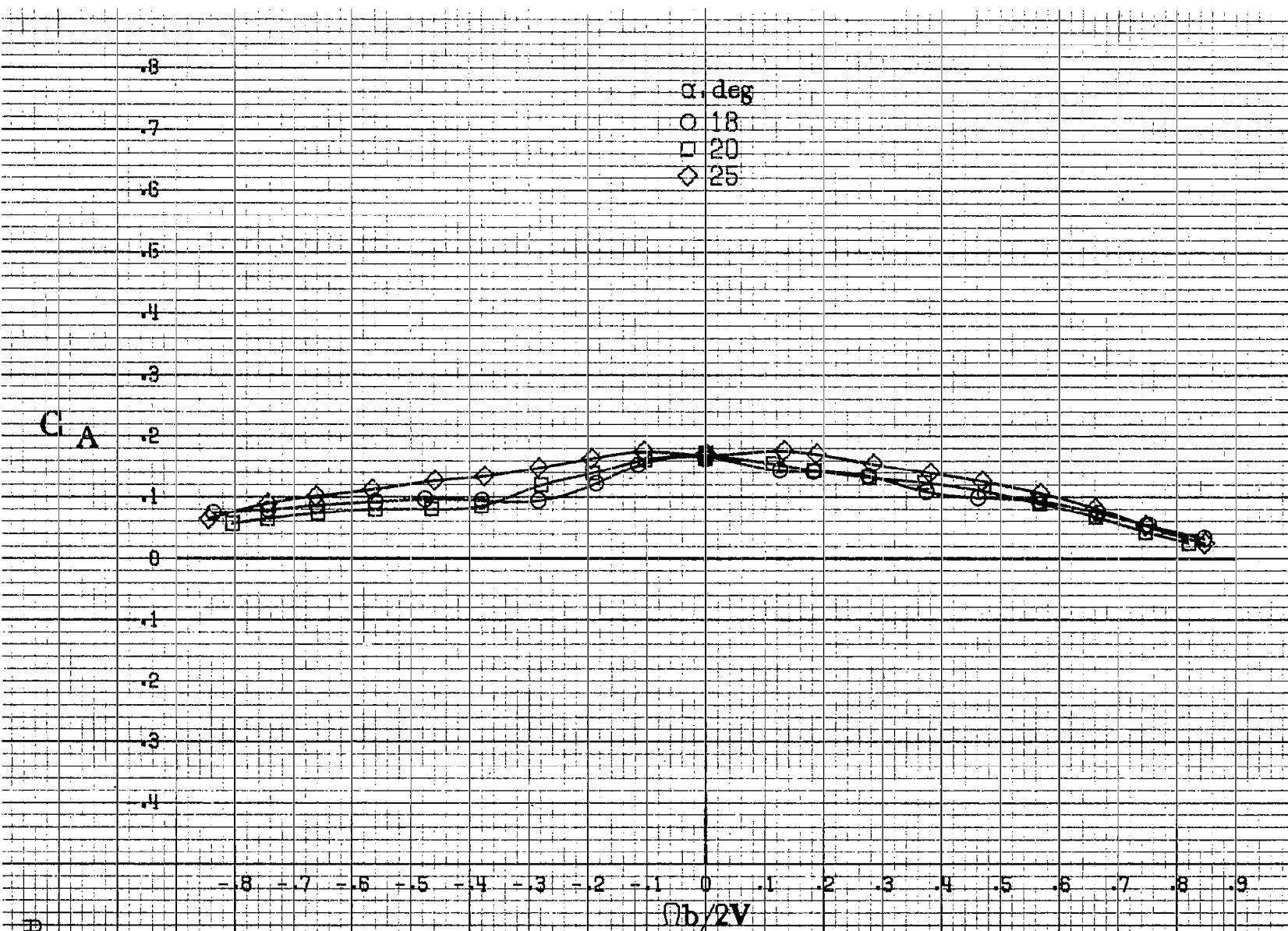
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4

α , deg
8
10
12
14
16

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\Omega b/2V$

(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).
Figure A6. Effect of rotation rate and angle of attack on axial-force coefficient for basic configuration. $\delta_a=0^\circ$, $\delta_s=0^\circ$, $\delta_r=0^\circ$, $\beta=0^\circ$.

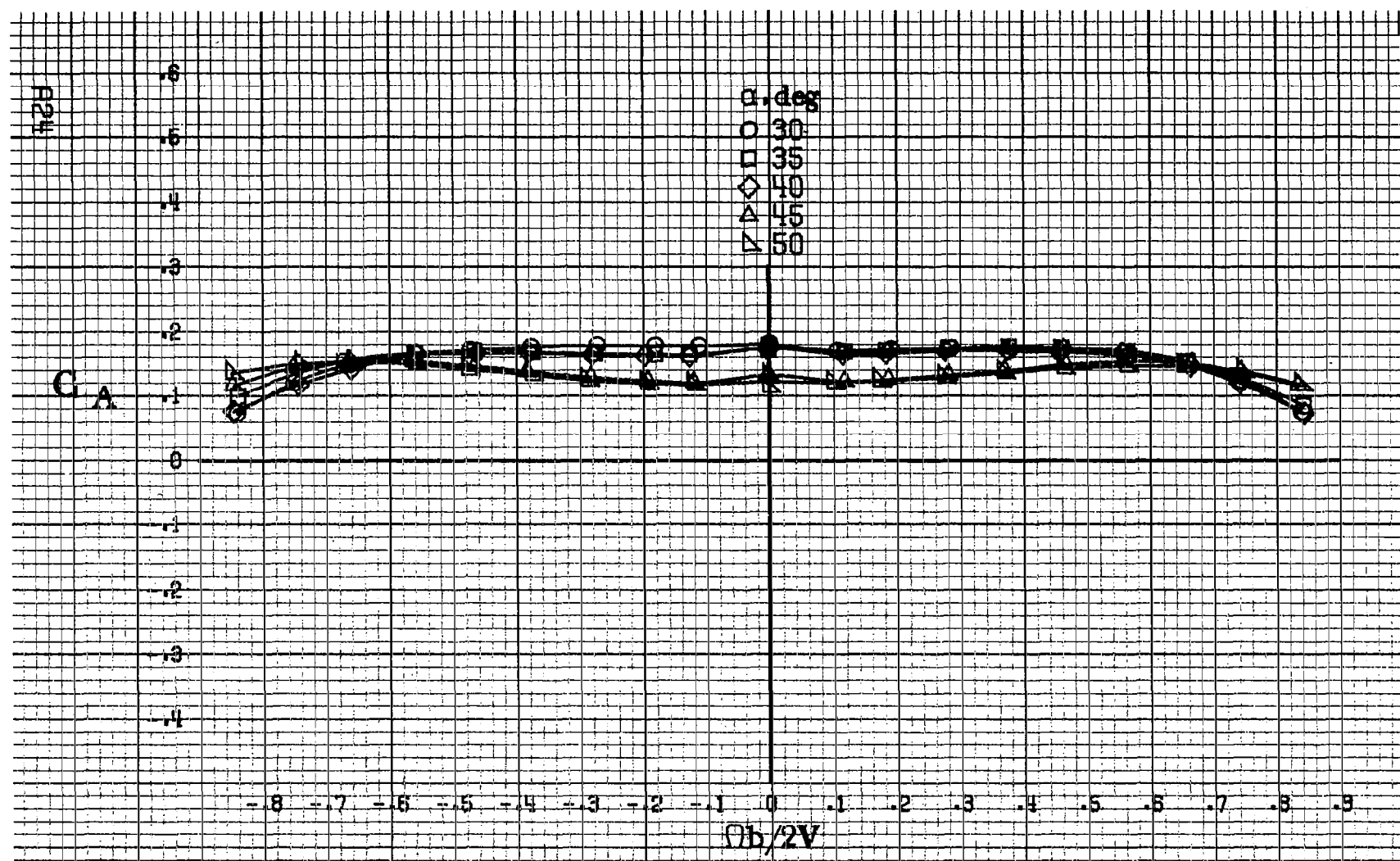




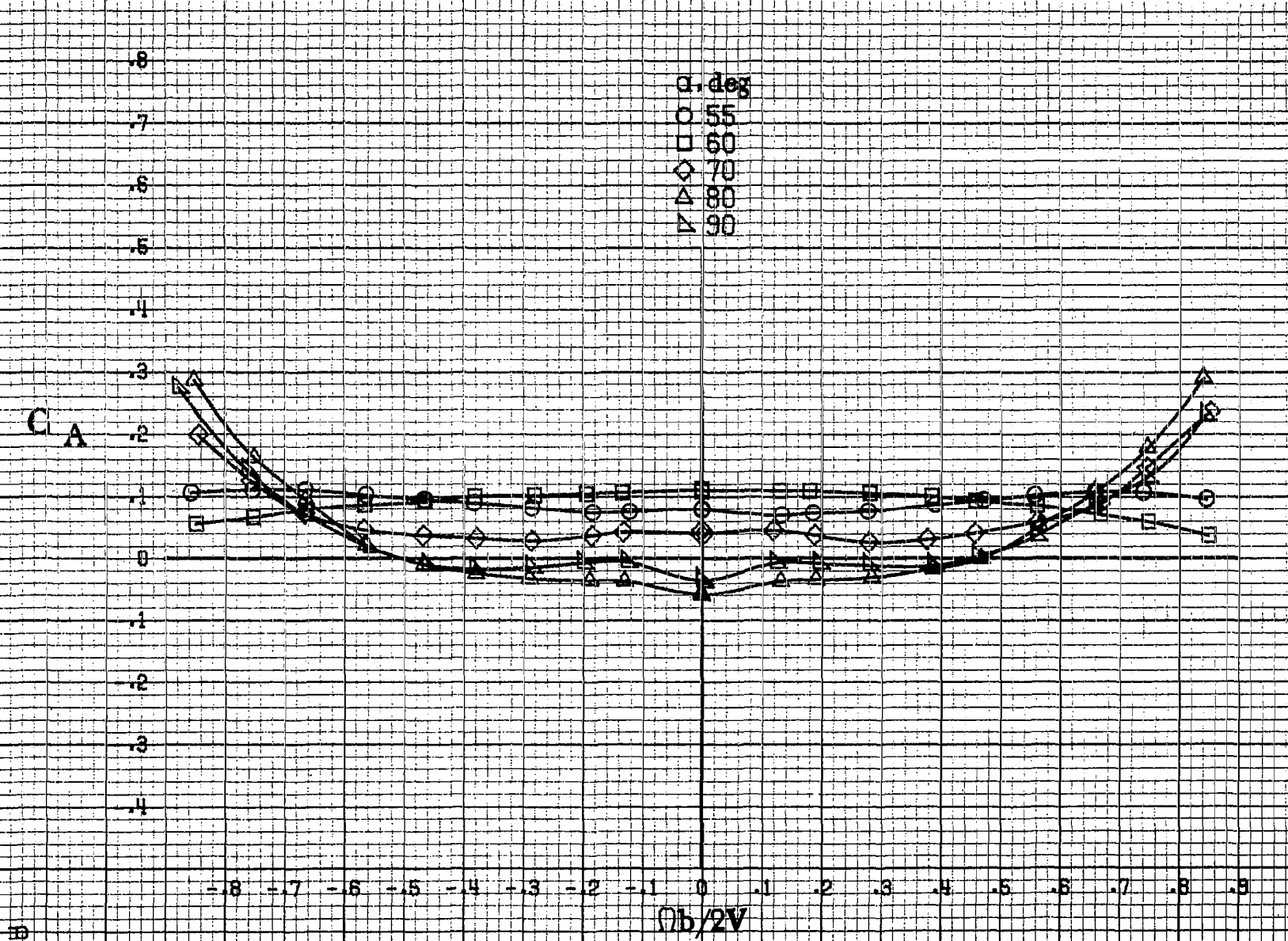
R25

(b) $\alpha = 18$ to 25 deg, $SR = 99$ cm (39 in).
Figure A6. Continued.

Figure A6

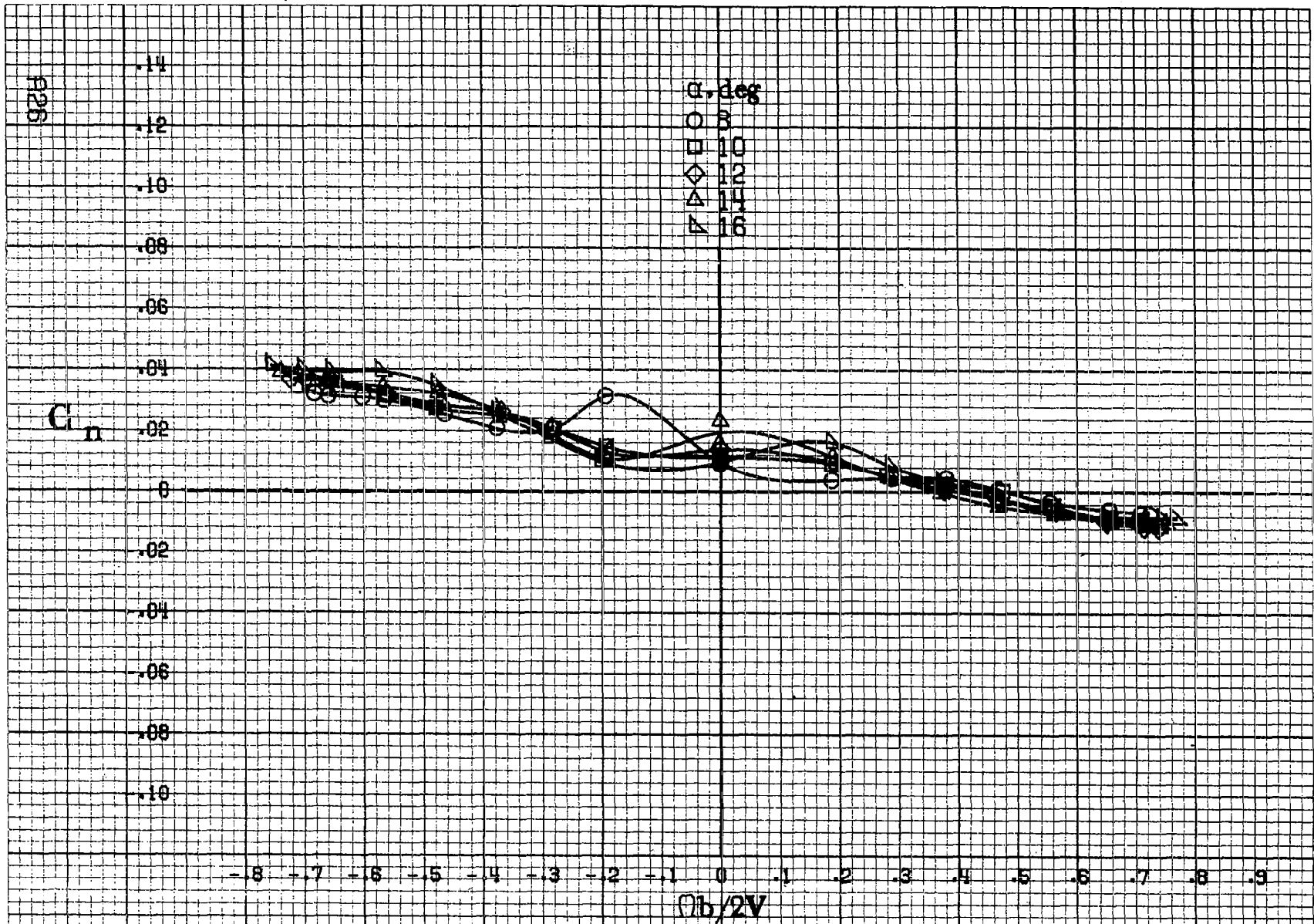


(c) $\alpha = 30$ to 50 deg. $SR = 0$.
Figure A6. Continued.



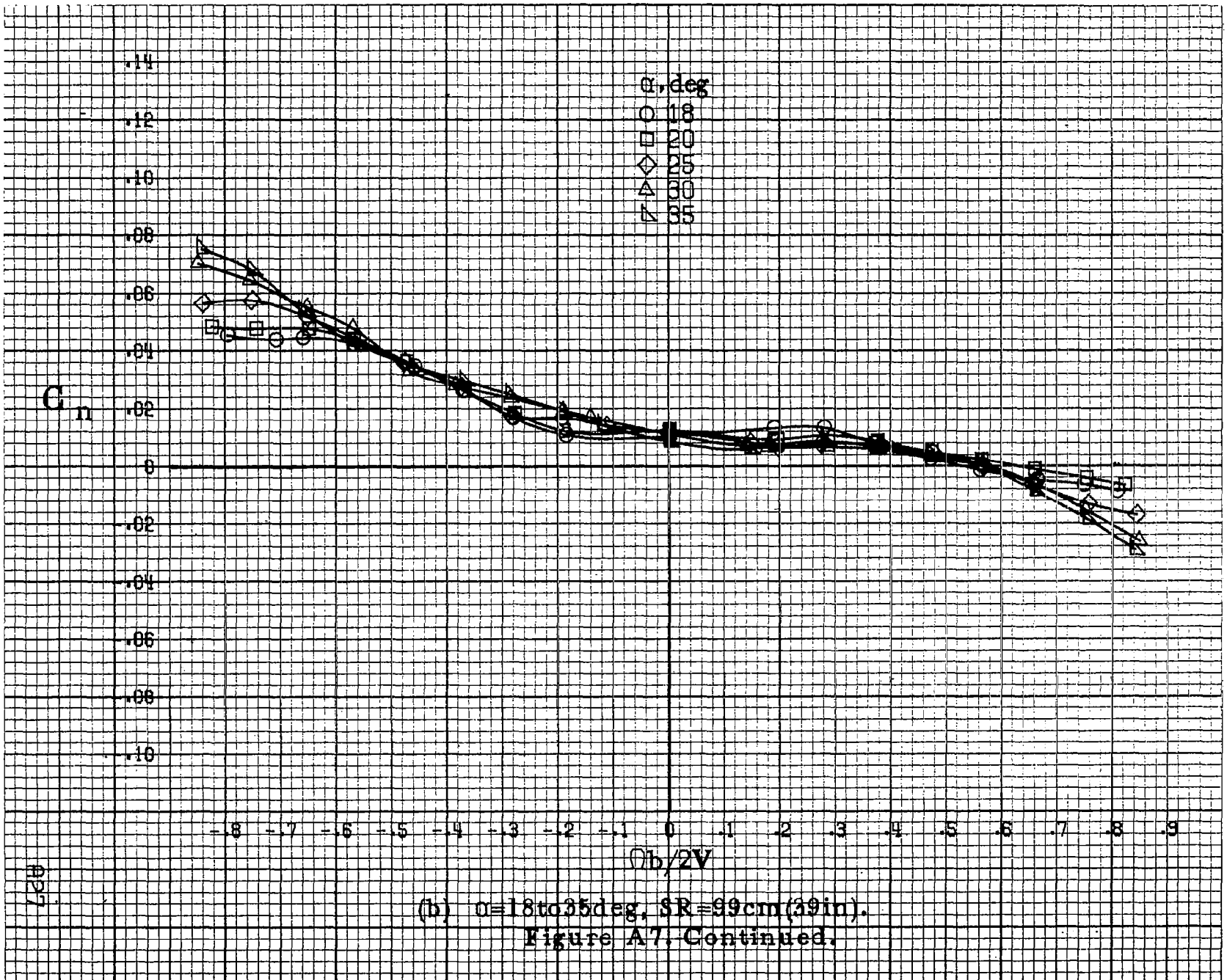
(d) $\alpha=55$ to 90° , $SR=0$.
 Figure A6. Concluded.

CP-5



(a) $\alpha = 3$ to 16 deg, $SR = 99$ cm (39 in).

Figure A7-Effect of rotation rate and angle of attack on yawing-moment coefficient for basic configuration. $\delta_s = 0^\circ$, $\delta_e = 0^\circ$, $\delta_r = 0^\circ$, $\delta = 10^\circ$.



(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A7. Continued.

828

C_n

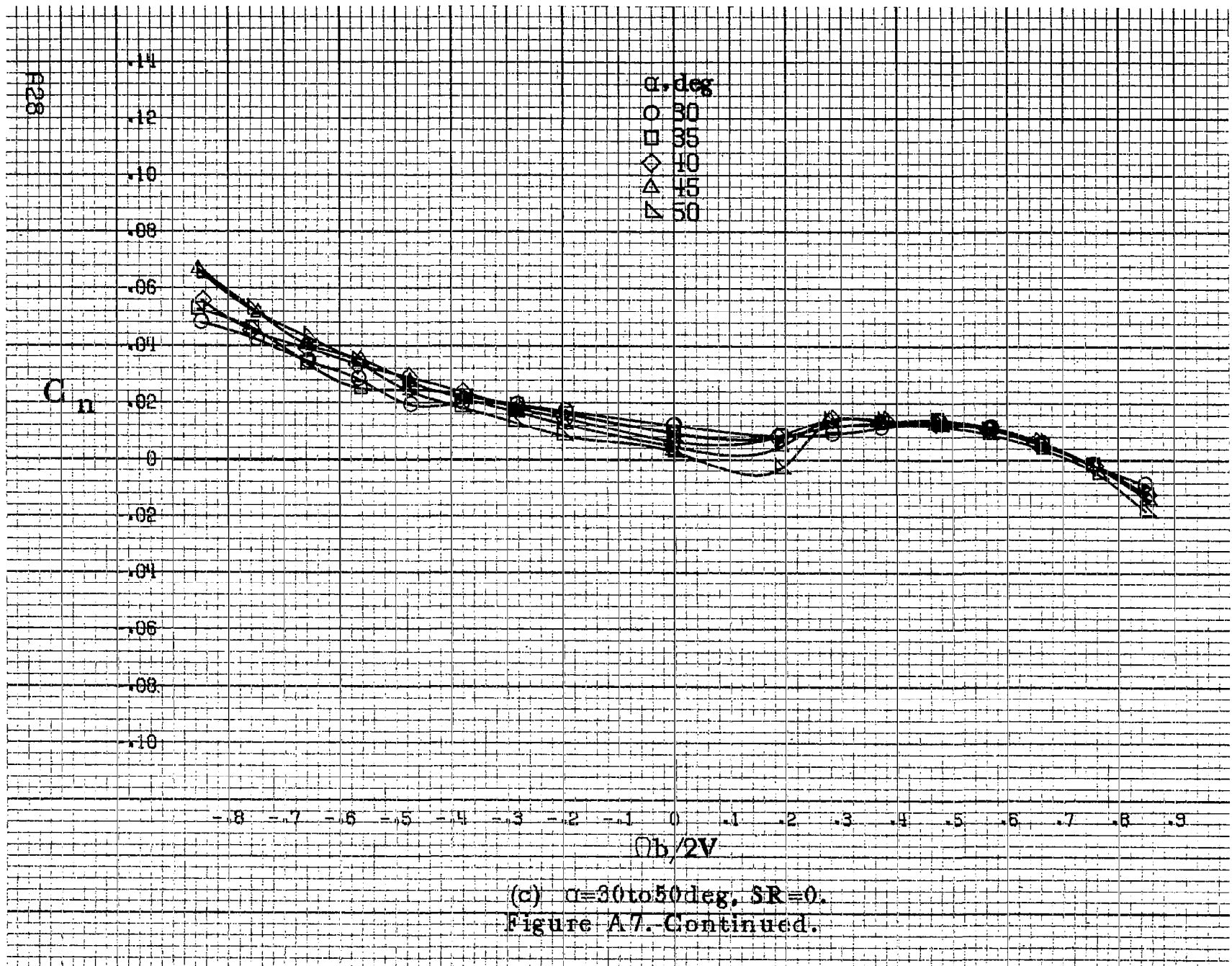
.14
.12
.10
.08
.06
.04
.02
0
.02
.04
.06
.08
.10

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

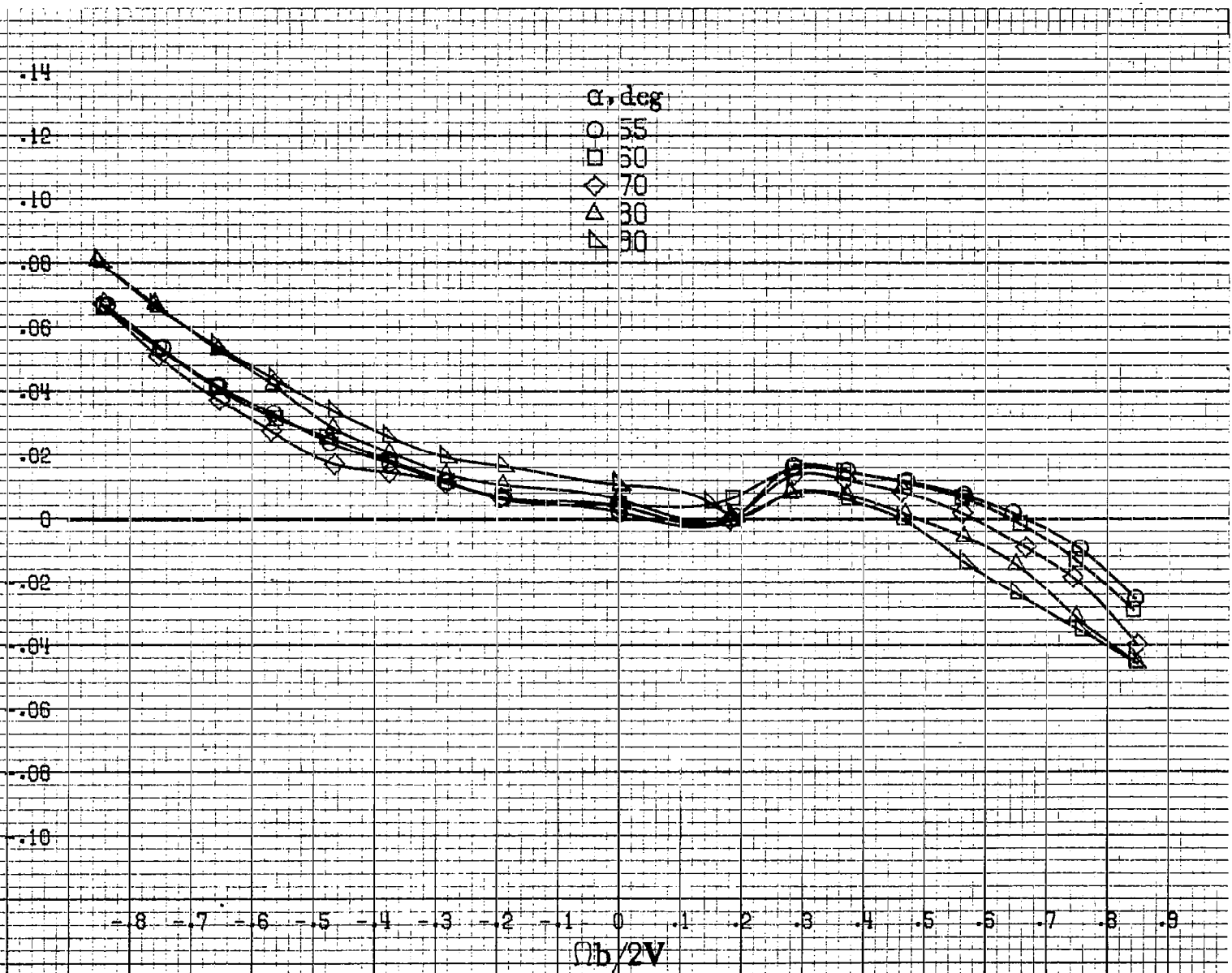
-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$\phi b/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A7. Continued.



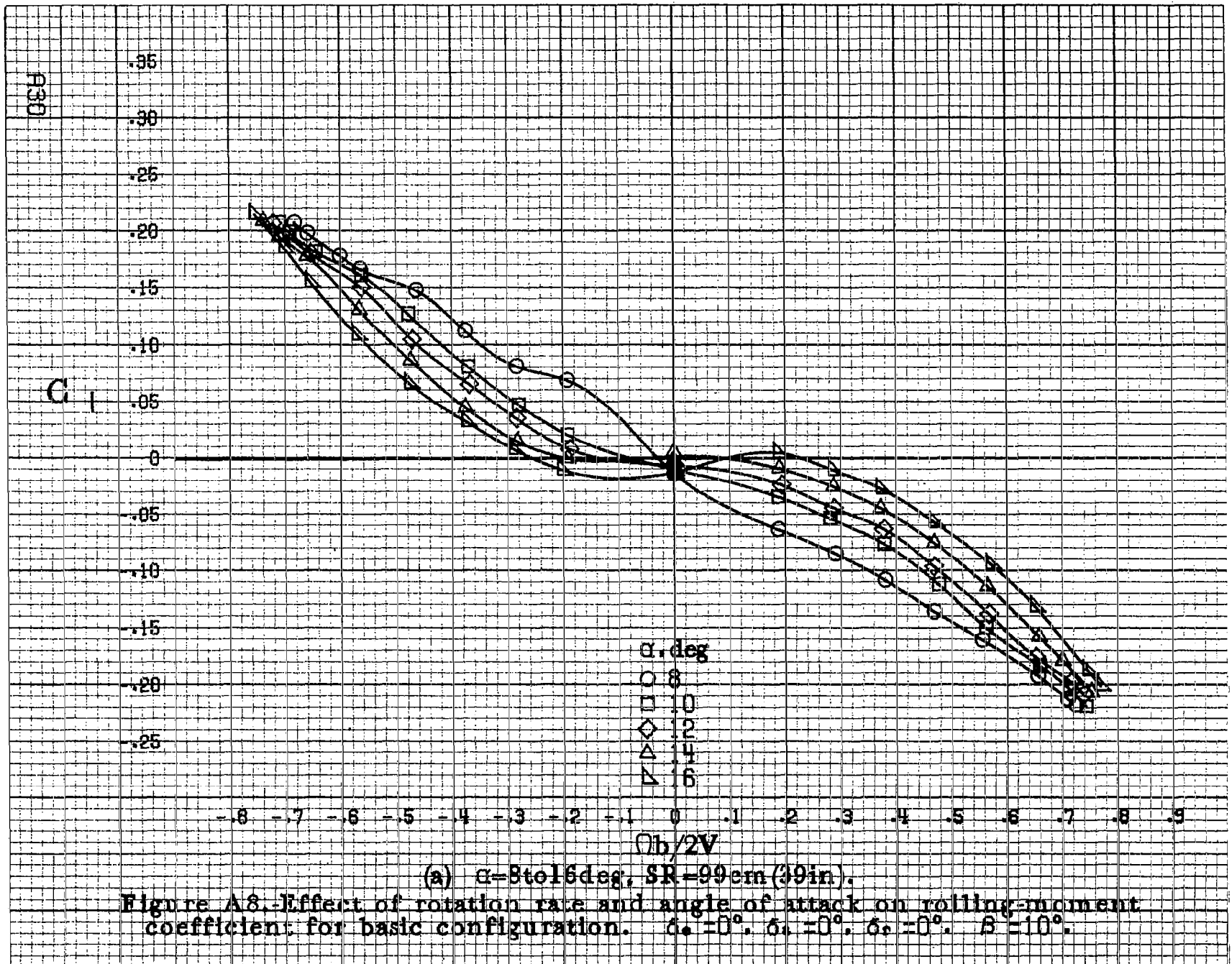
C_{in}

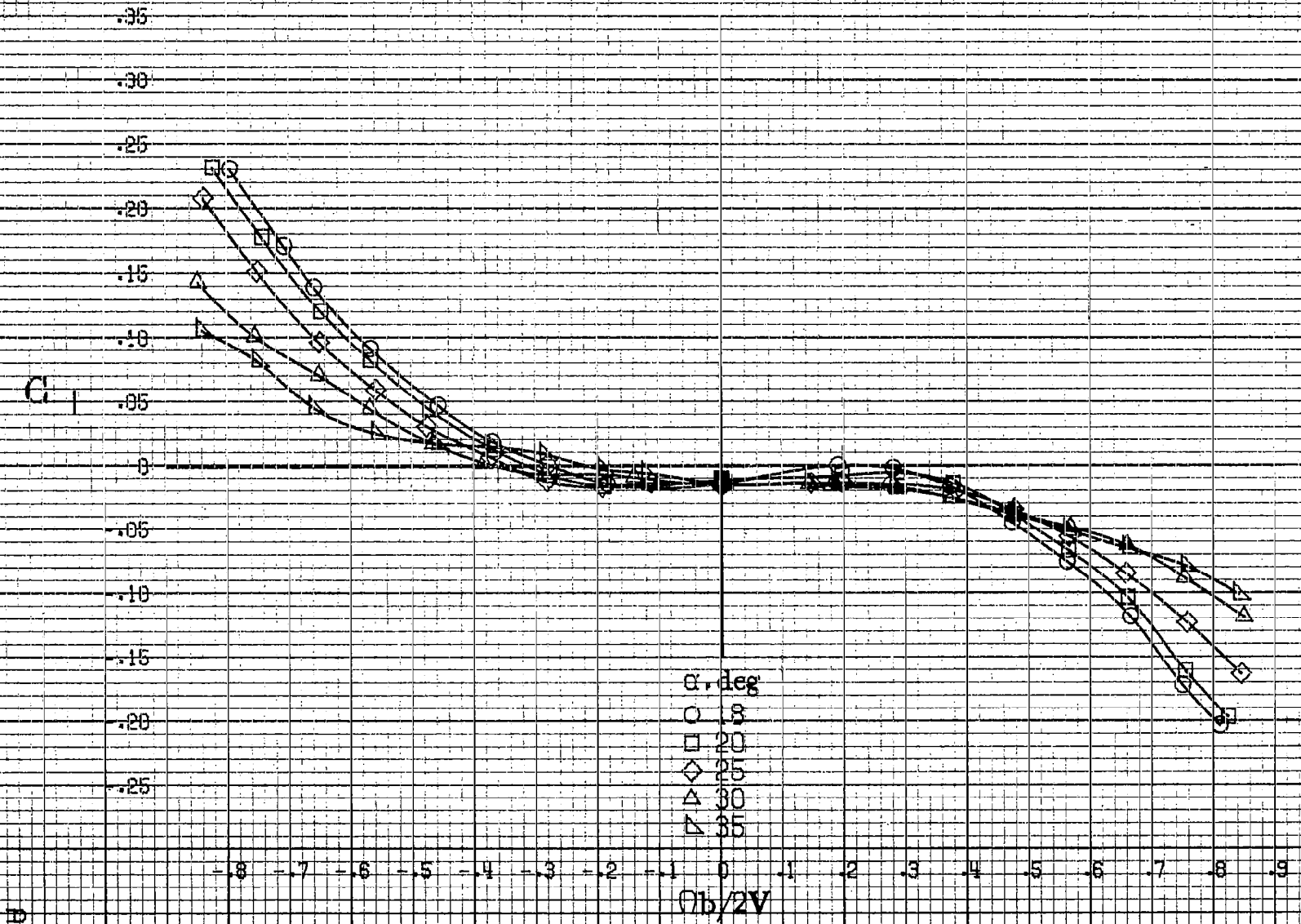


α, deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

A29

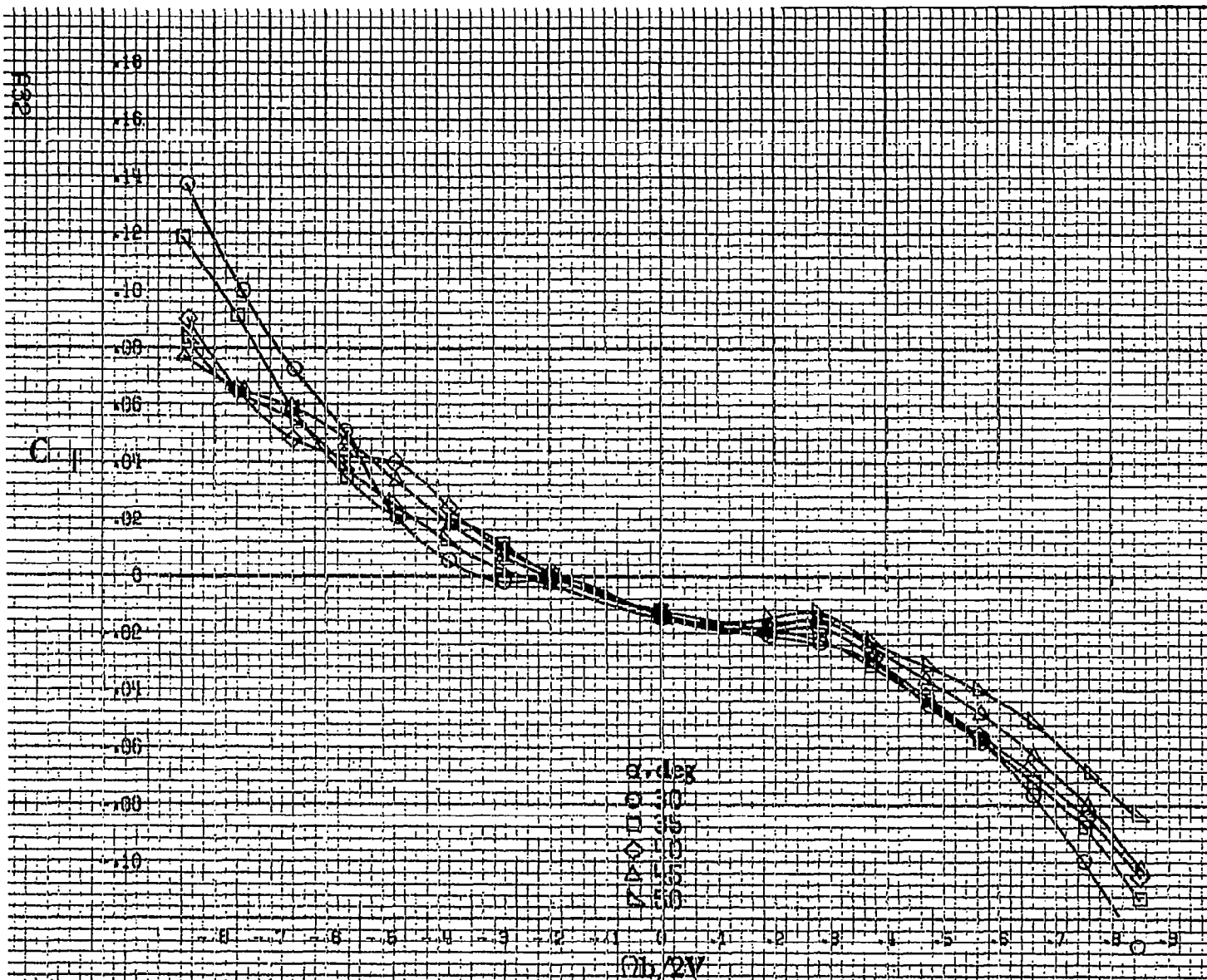
(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A7. Concluded.





A81

(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A8. Continued.



(c) $\theta = 30$ to 90 deg, $\delta R = 0$.
 Figure A.8. Continued.

C₁

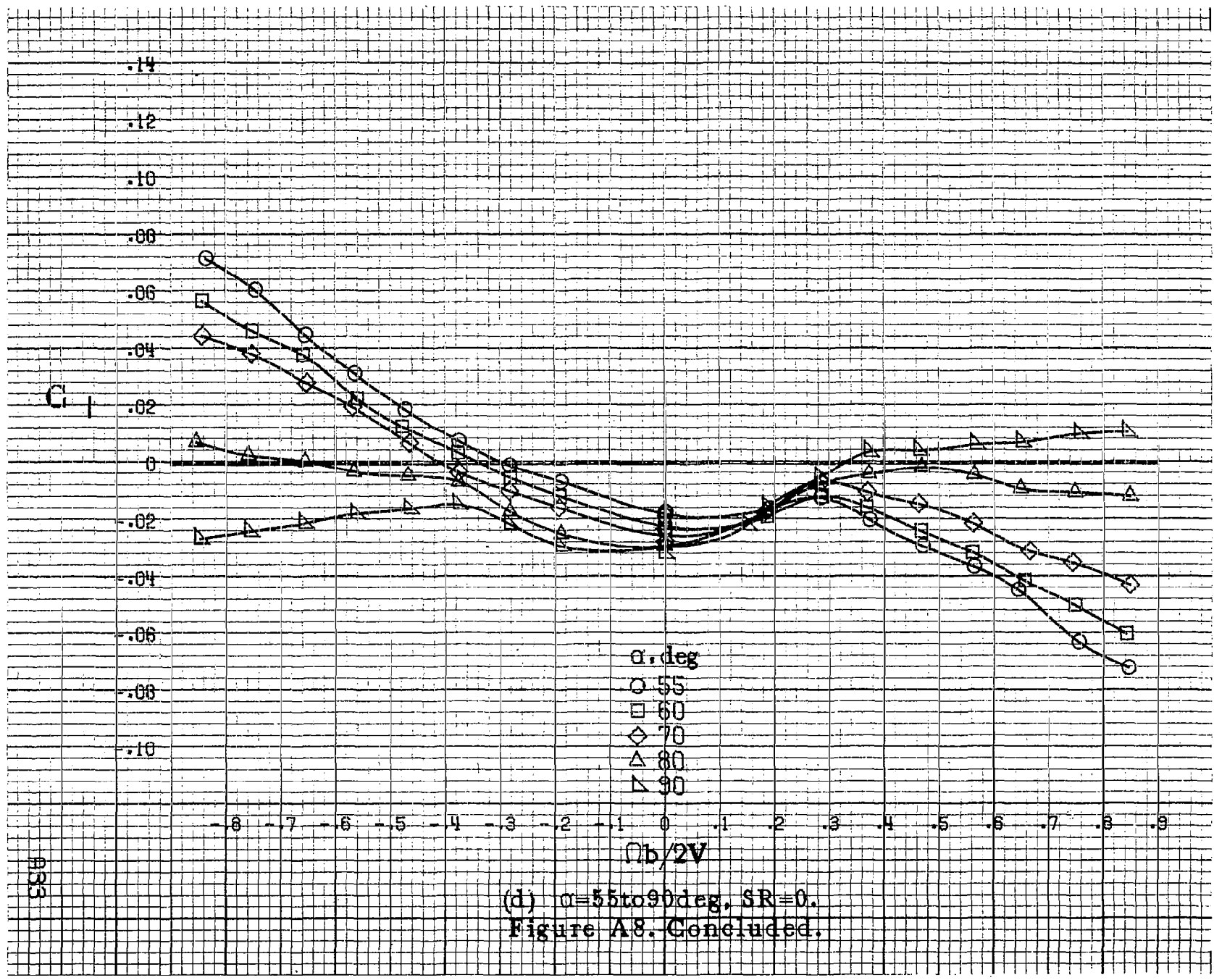
.14
.12
.10
.08
.06
.04
0
-.02
-.04
-.06
-.08
-.10

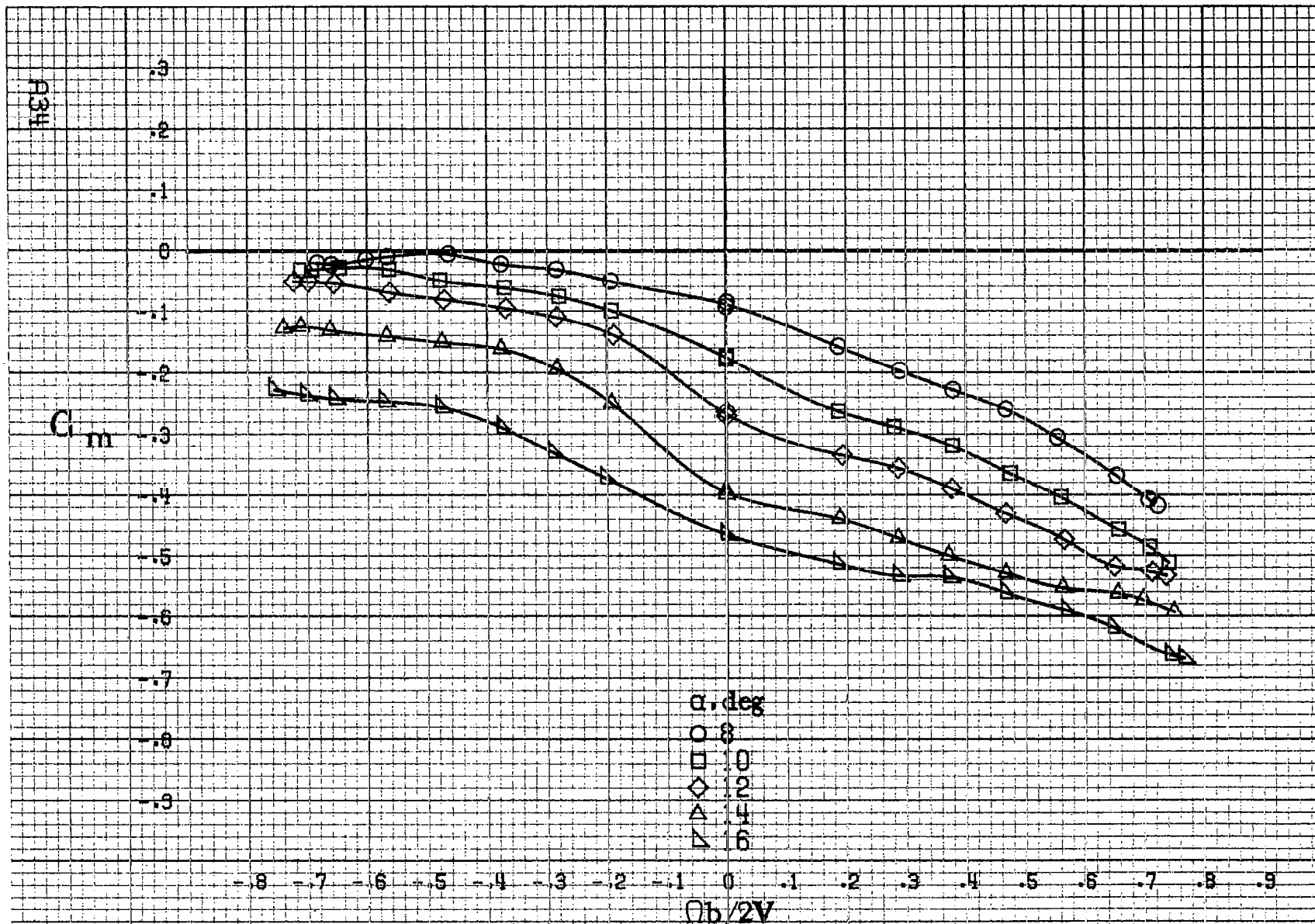
-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

555

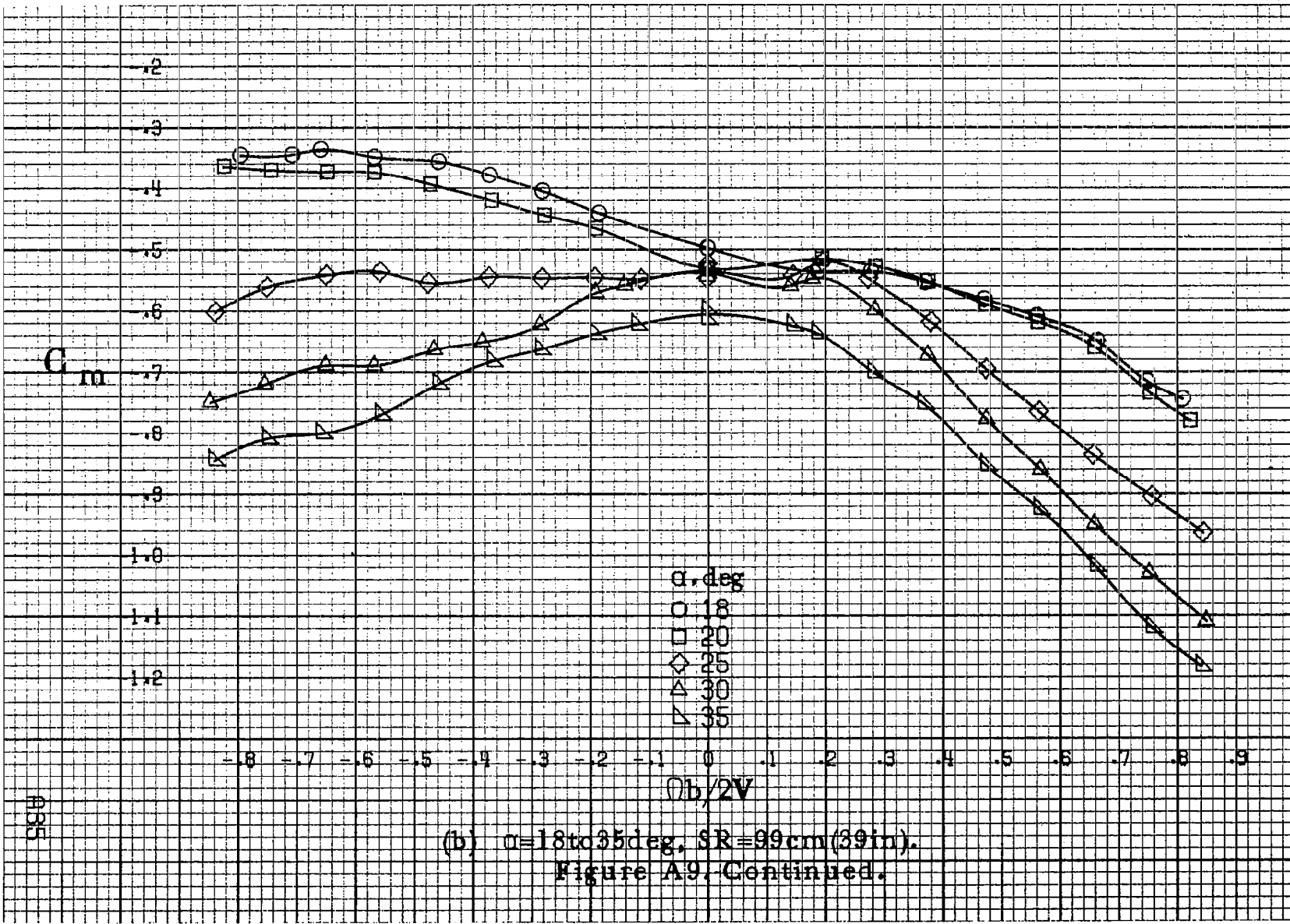
(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A8. Concluded.





(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A9. Effect of rotation rate and angle of attack on pitching-moment coefficient for basic configuration. $\delta_a = 0^\circ$, $\delta_n = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 10^\circ$.



(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A9. Continued.

935

R36

C_m

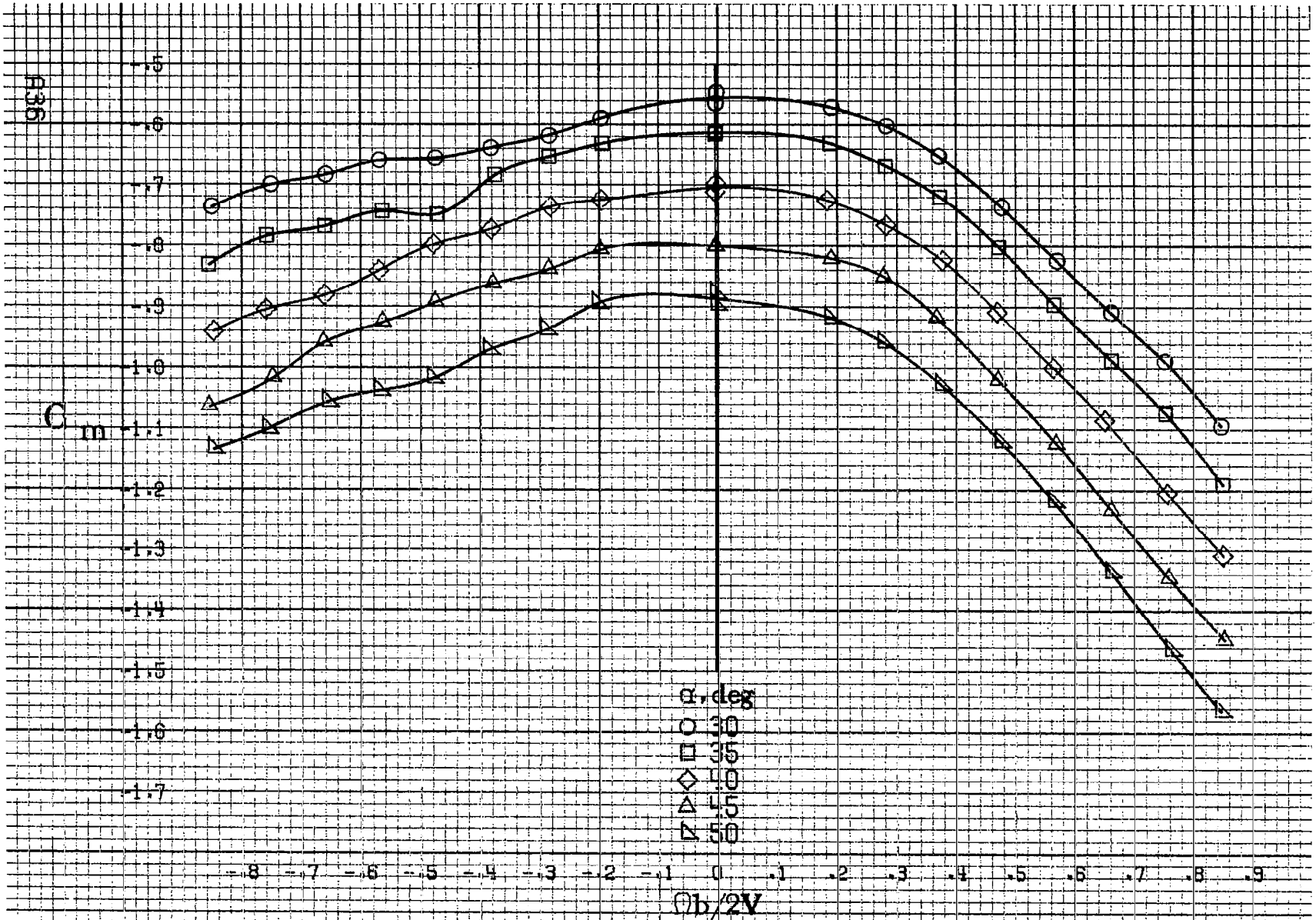
-.5
-.6
-.7
-.8
-.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7

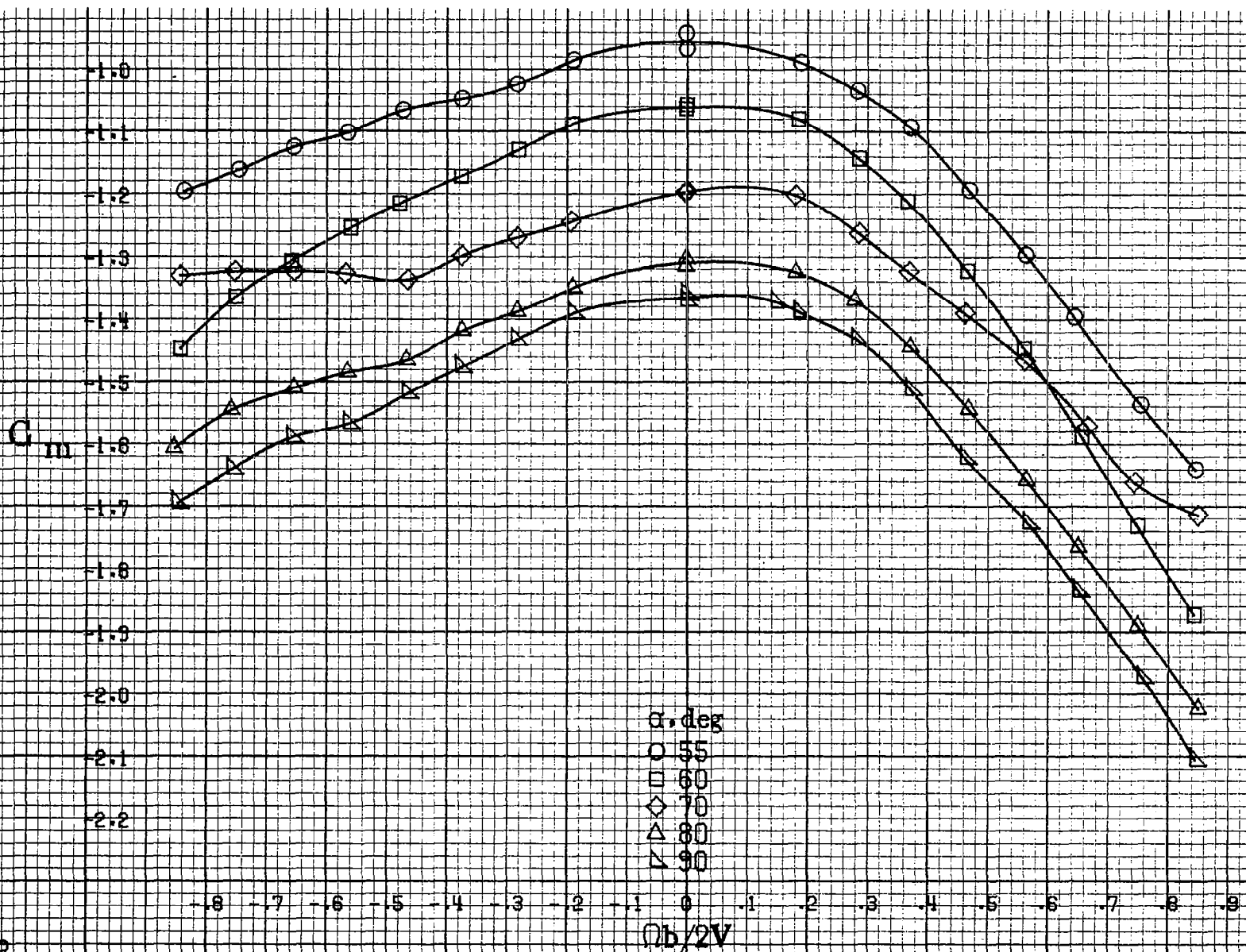
-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

α, deg
 ○ 30
 □ 35
 ◇ 40
 △ 45
 ▽ 50

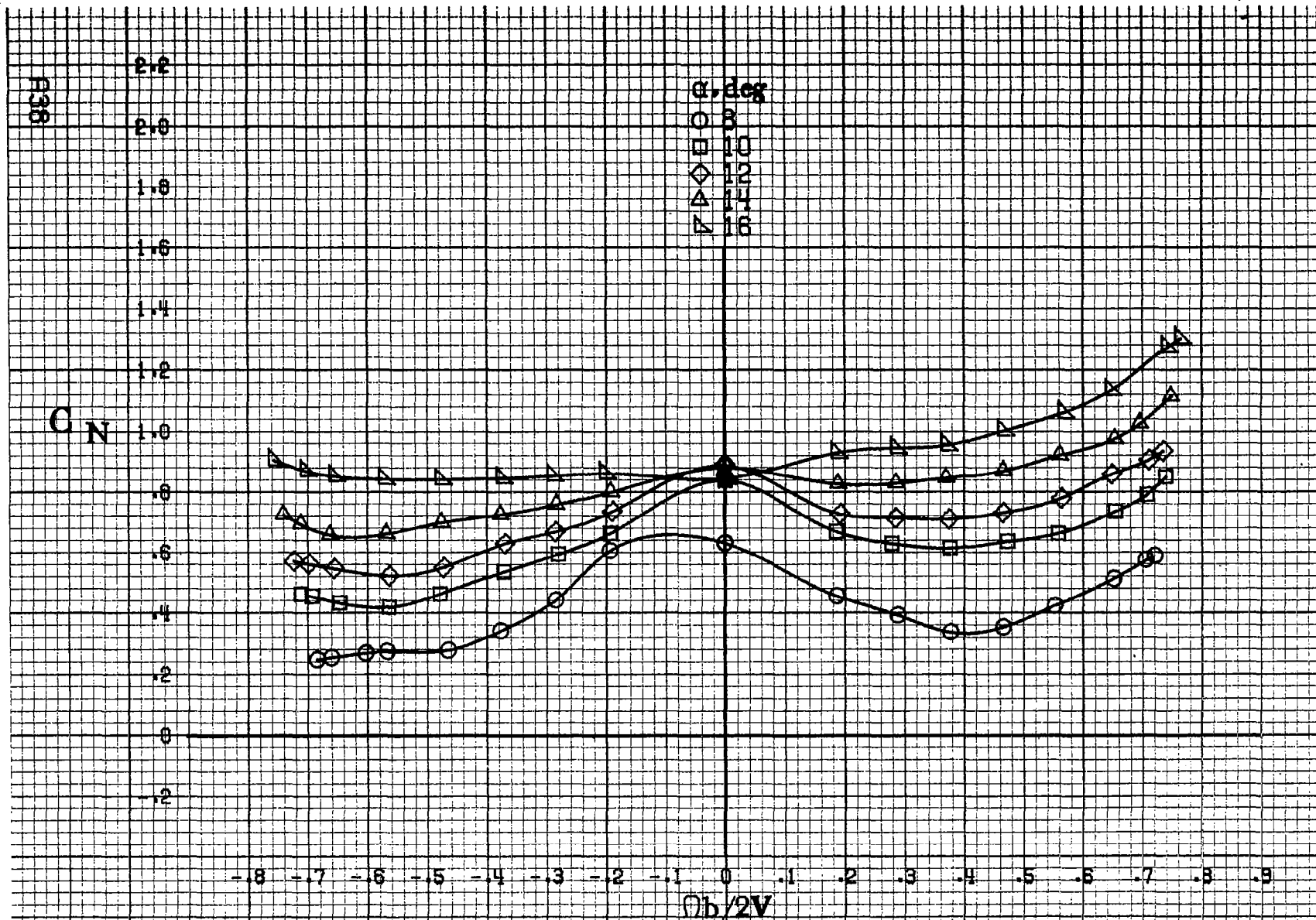
$b/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A-9. Continued.





(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A9. Concluded.



(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A10. Effect of rotation rate and angle of attack on normal-force coefficient for basic configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$. $\beta = 10^\circ$.

C_N

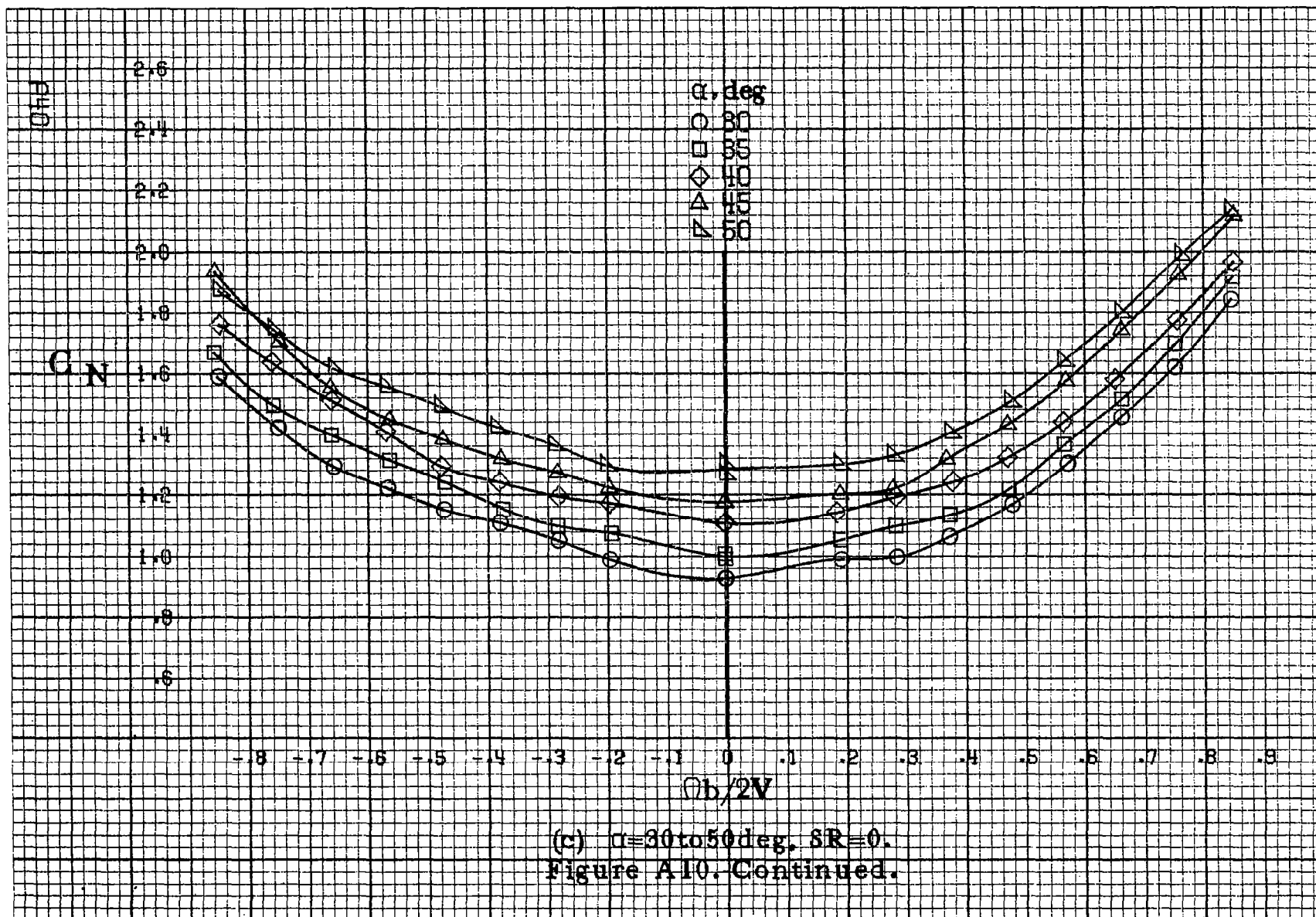
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6

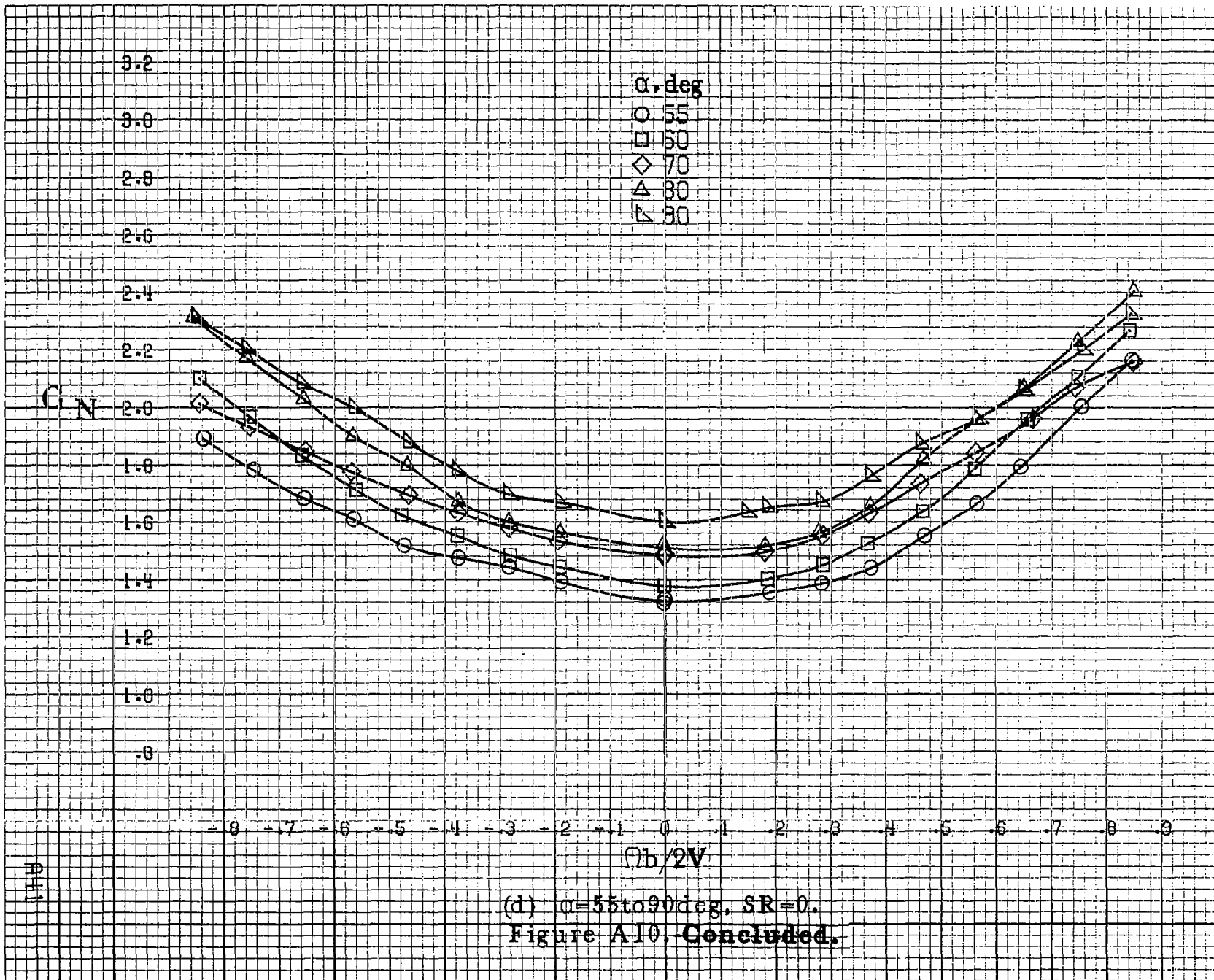
α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

-8 -7 -6 -5 -4 -3 -2 -1 0 -1 -2 -3 -4 -5 -6 -7 -8 -9

$\Omega b/2V$

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A10. Continued.





PH2

C_y

α , deg
○ 8
□ 10
◇ 12
△ 14
▽ 16

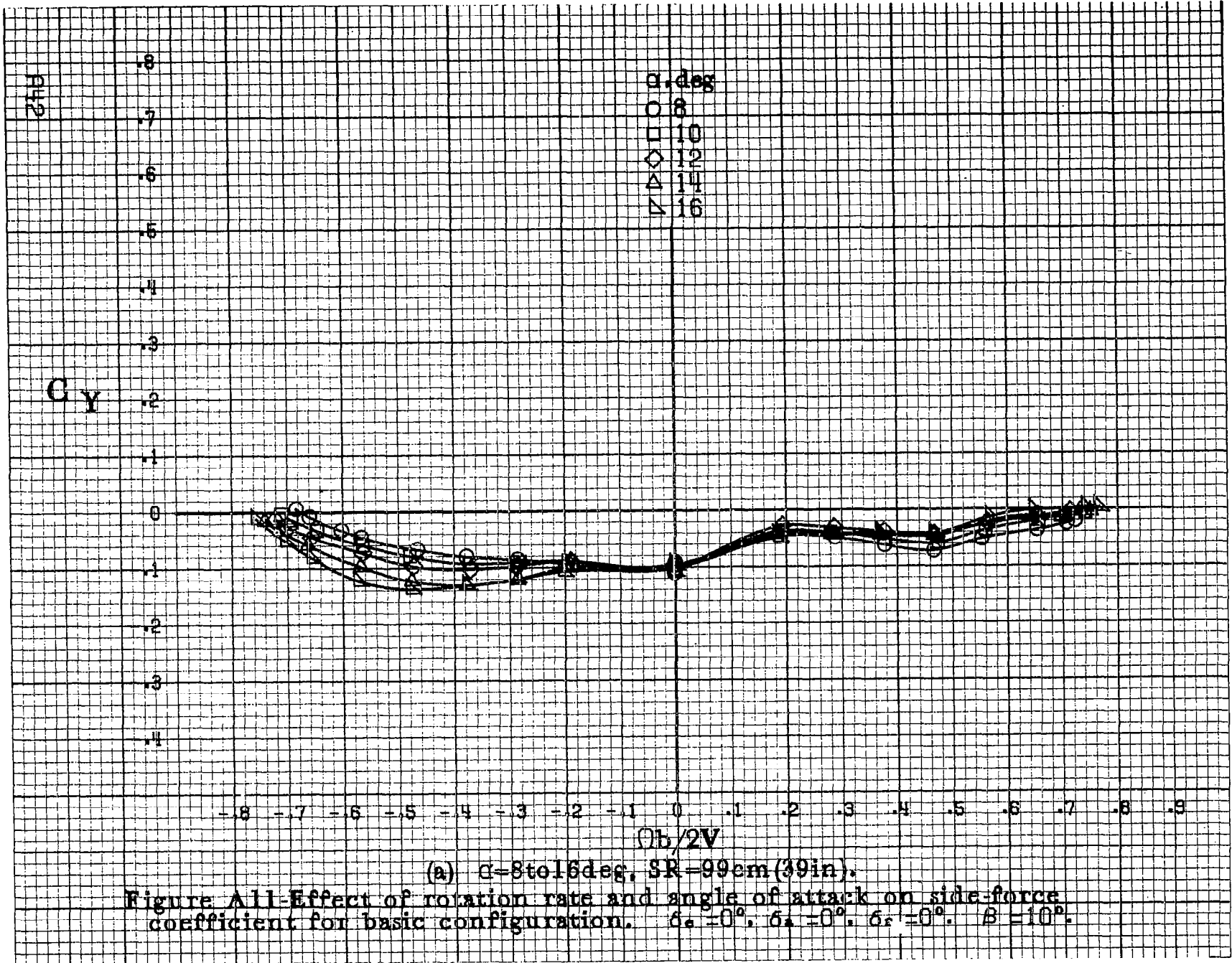
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$Ob/2V$

(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure All-Effect of rotation rate and angle of attack on side force coefficient for basic configuration. $\delta_e=0^\circ$, $\delta_a=0^\circ$, $\delta_r=0^\circ$. $B=10^\circ$.



C_y

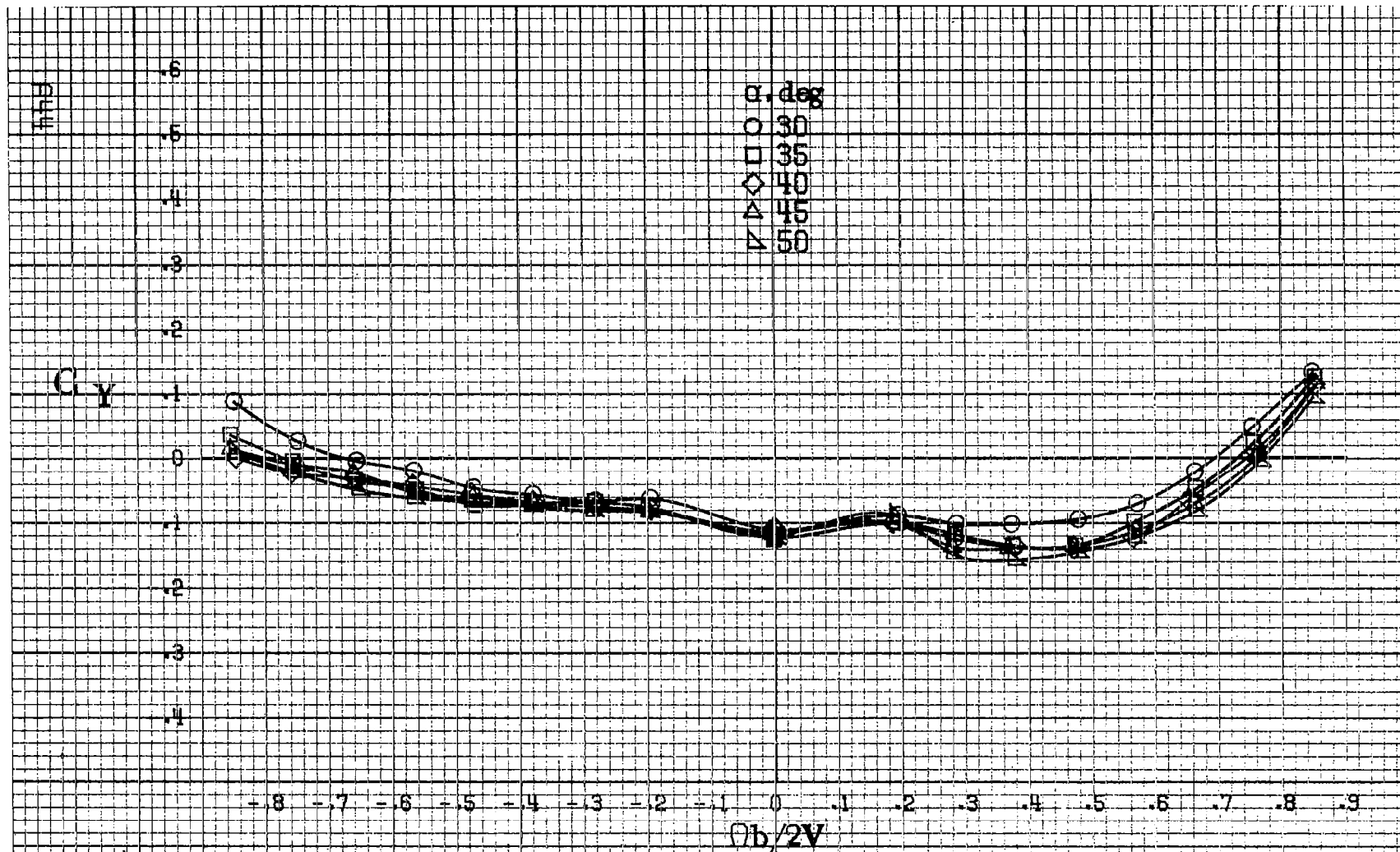
.8
.7
.6
.5
.4
.3
.2
.1
0
-1
-2
-3
-4

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

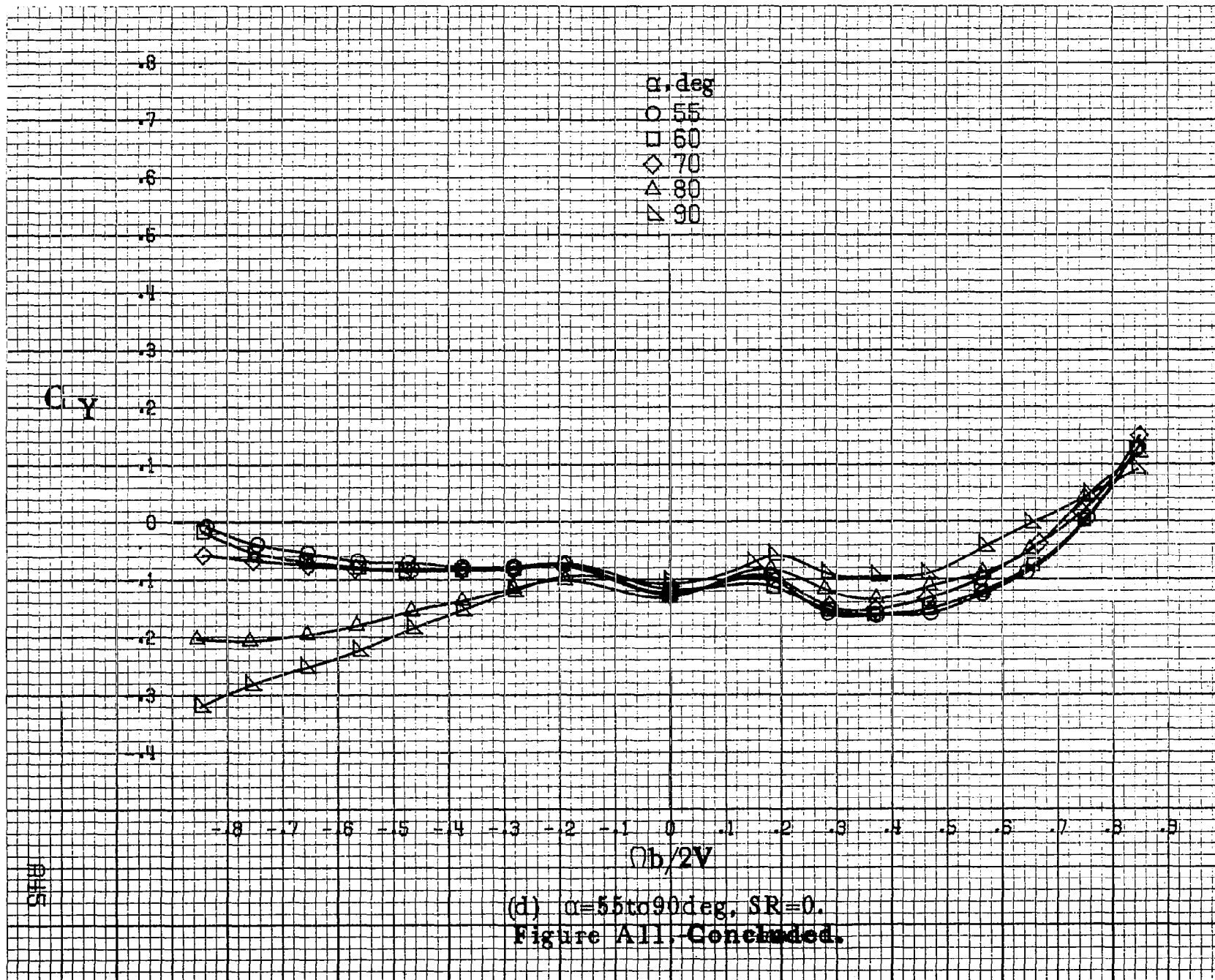
-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\sigma_b/2V$

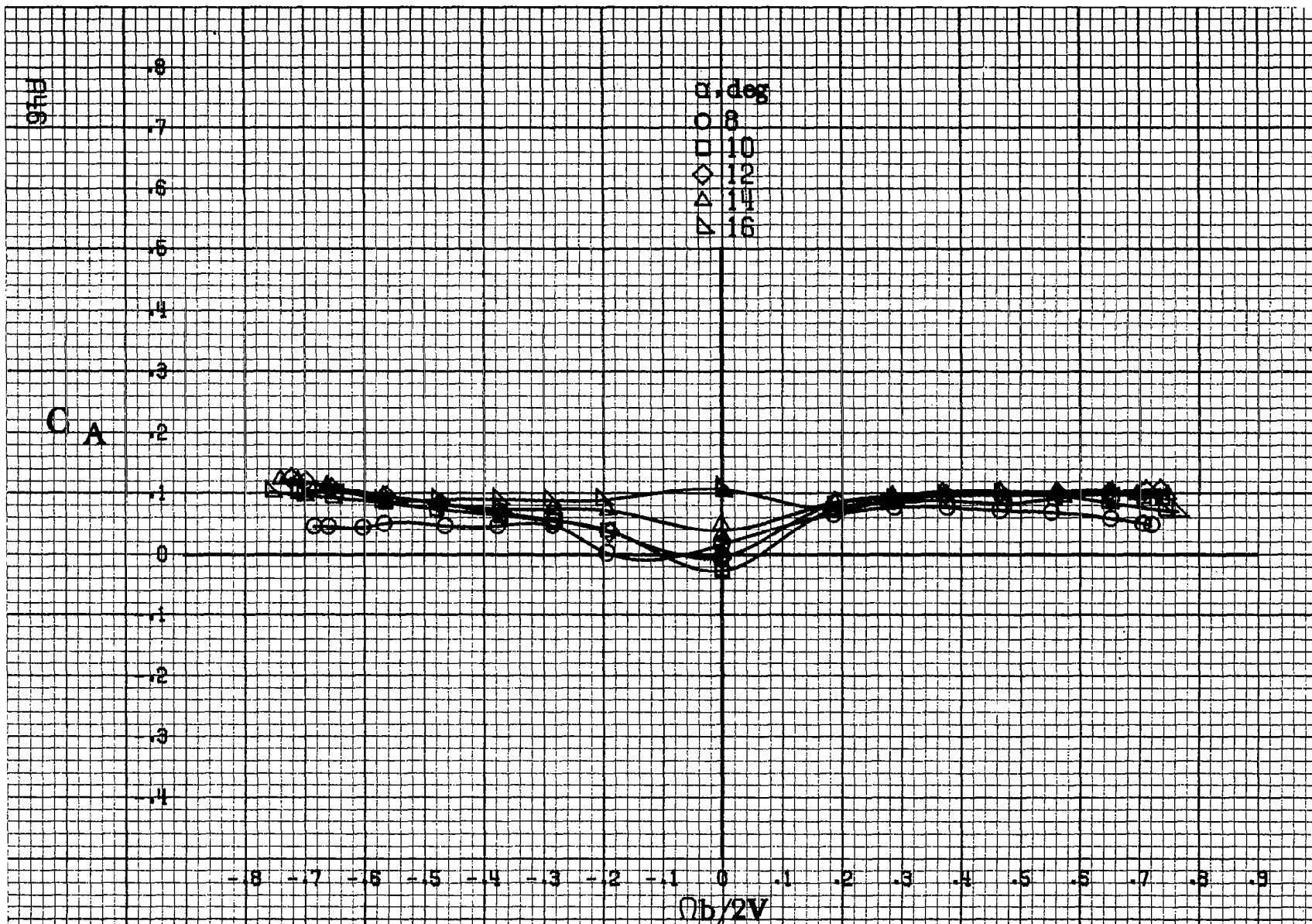
A13

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A11. Continued.



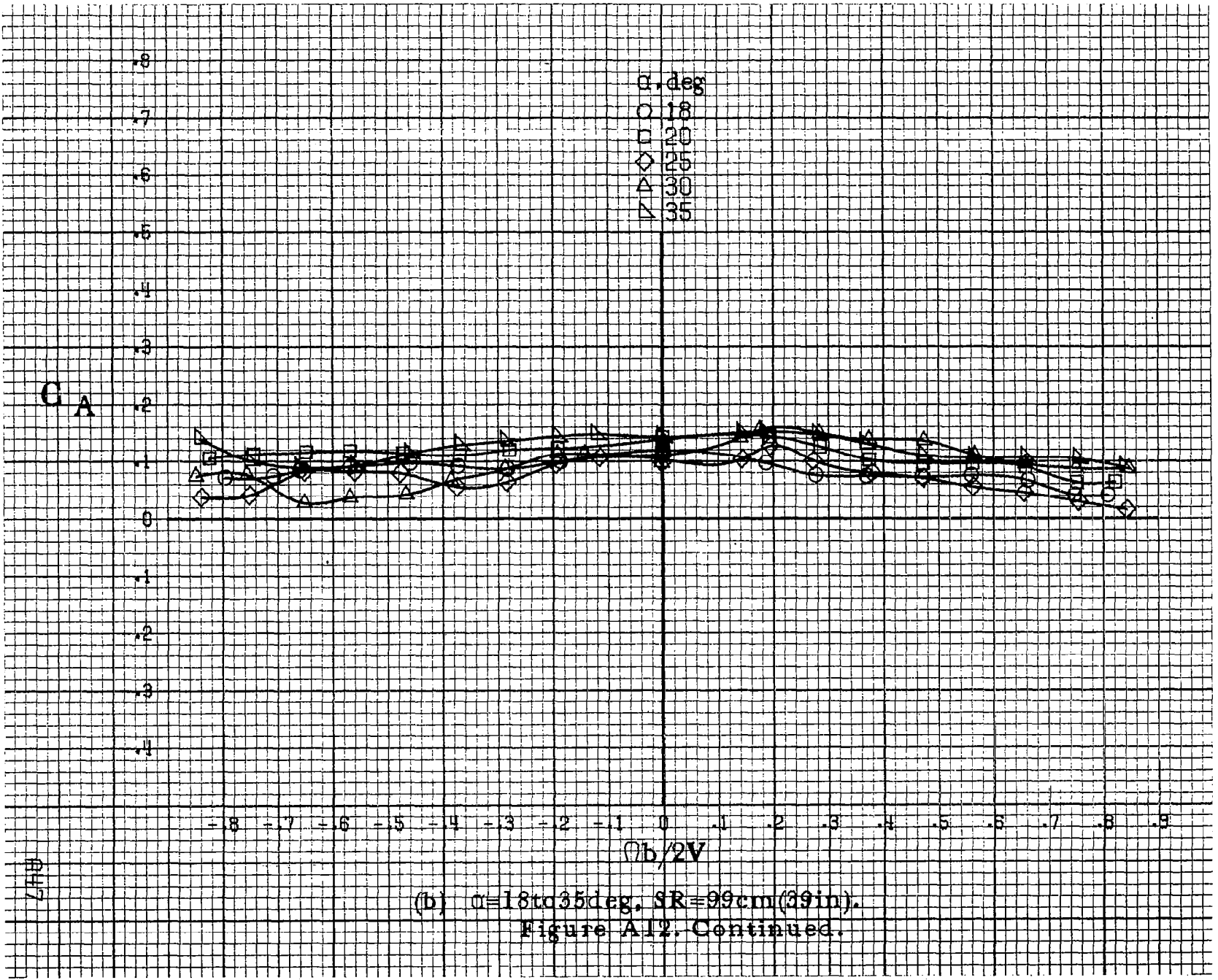
(c) $\alpha = 30$ to 50 deg, $SR = 0$.
 Figure A11. Continued.





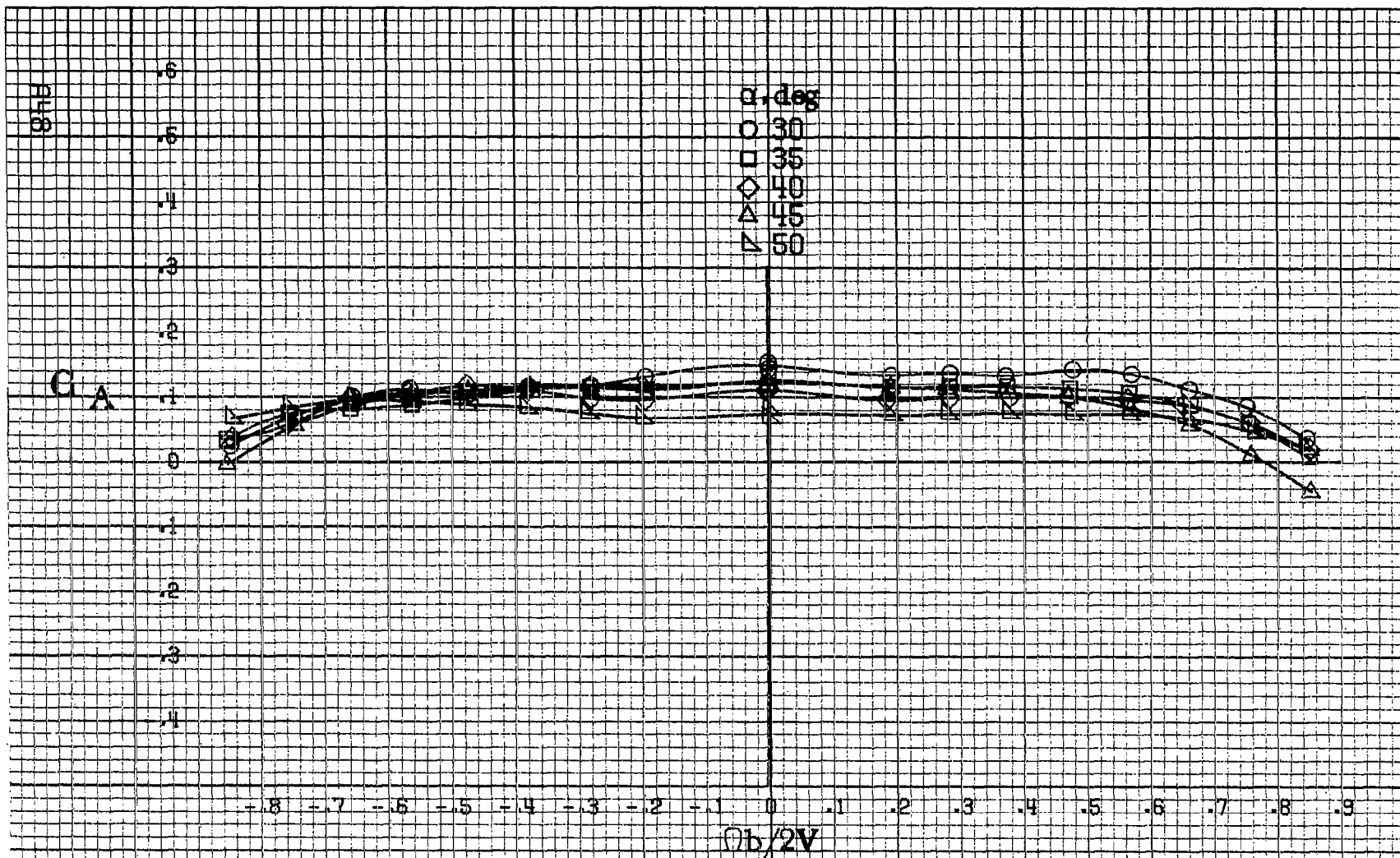
(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A12. Effect of rotation rate and angle of attack on axial force coefficient for basic configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 10^\circ$.

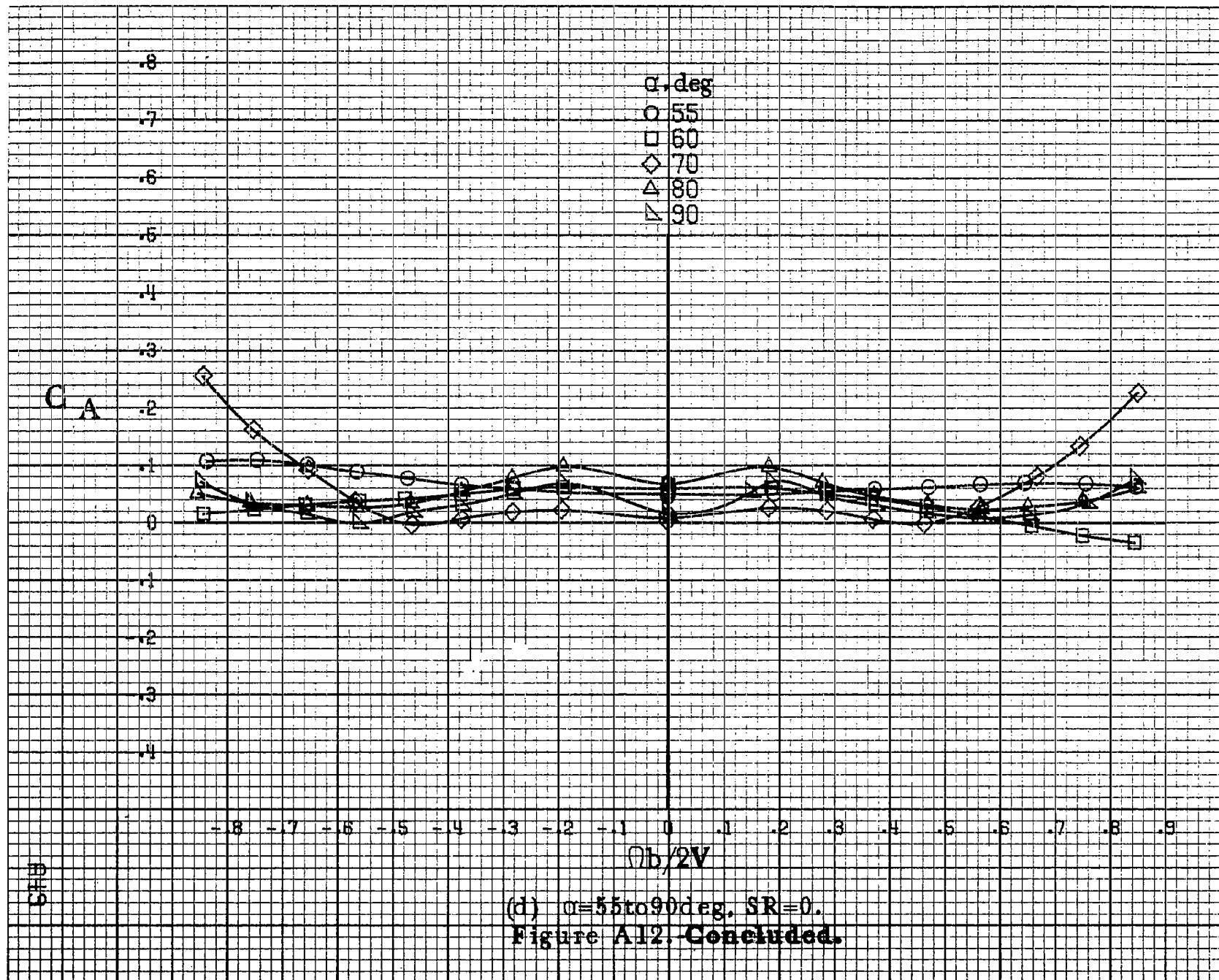


(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A12. Continued.

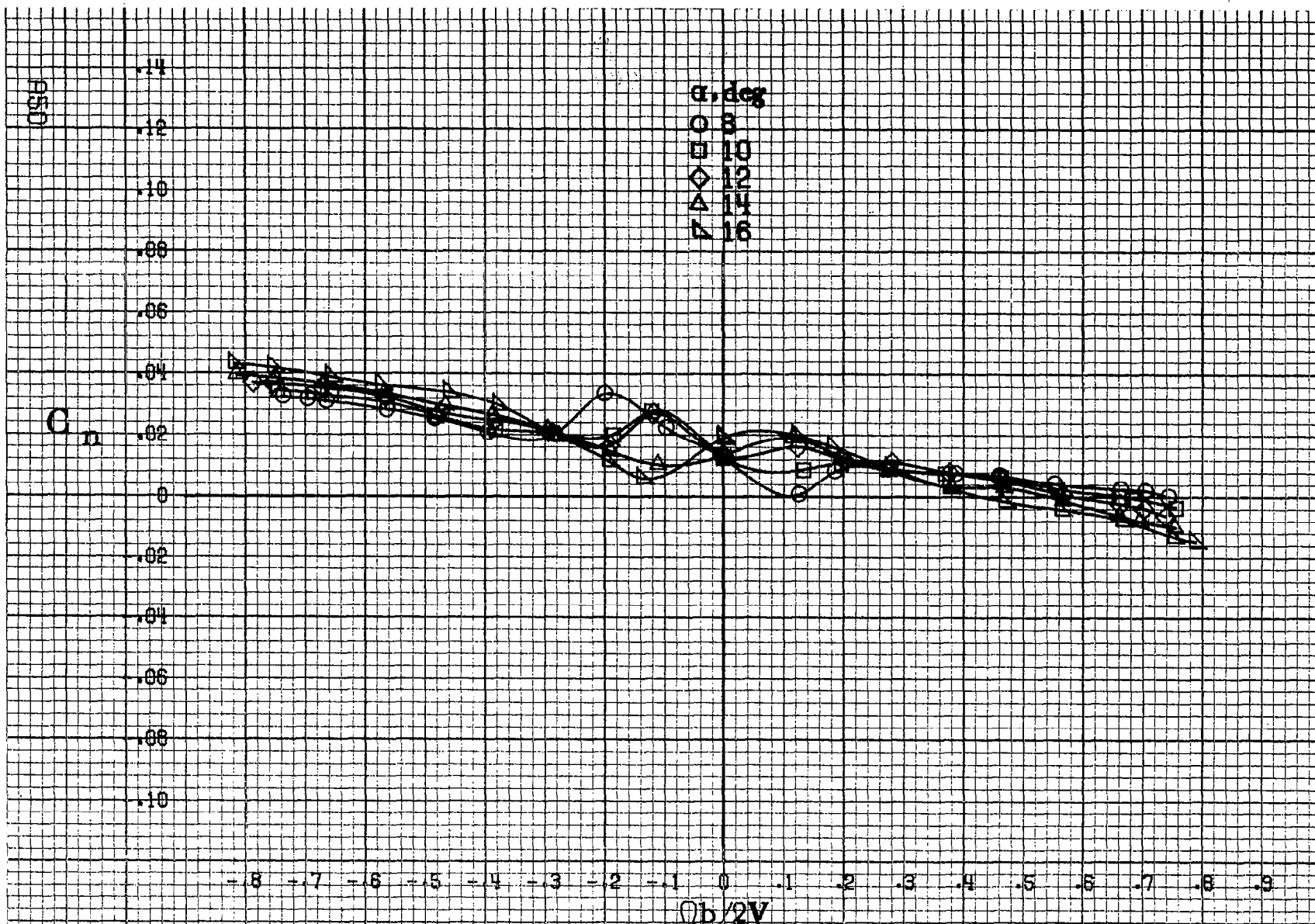
7/11/57



(c) $\alpha = 30$ to 50 deg. $SR = 0$.
 Figure A.12. Continued.

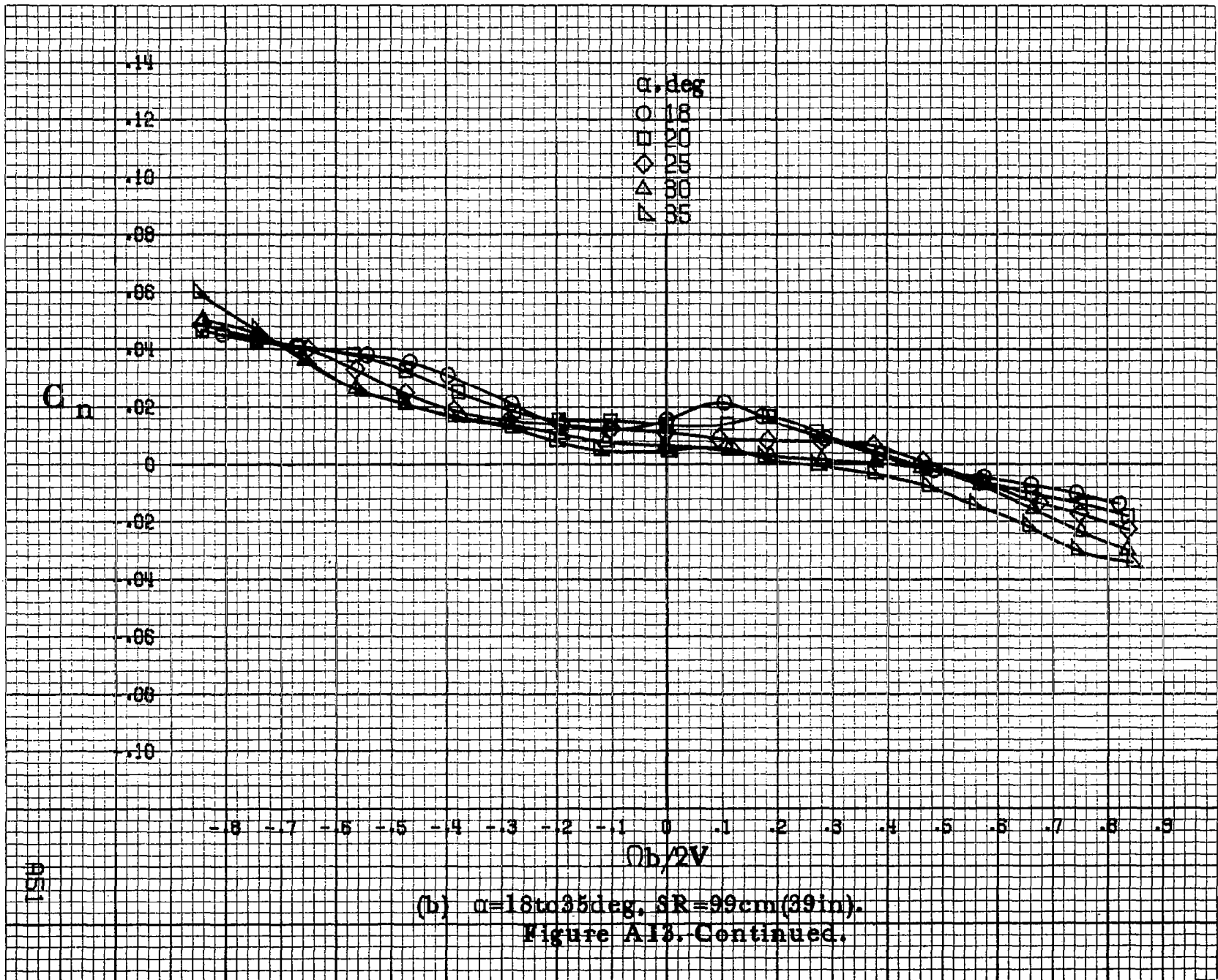


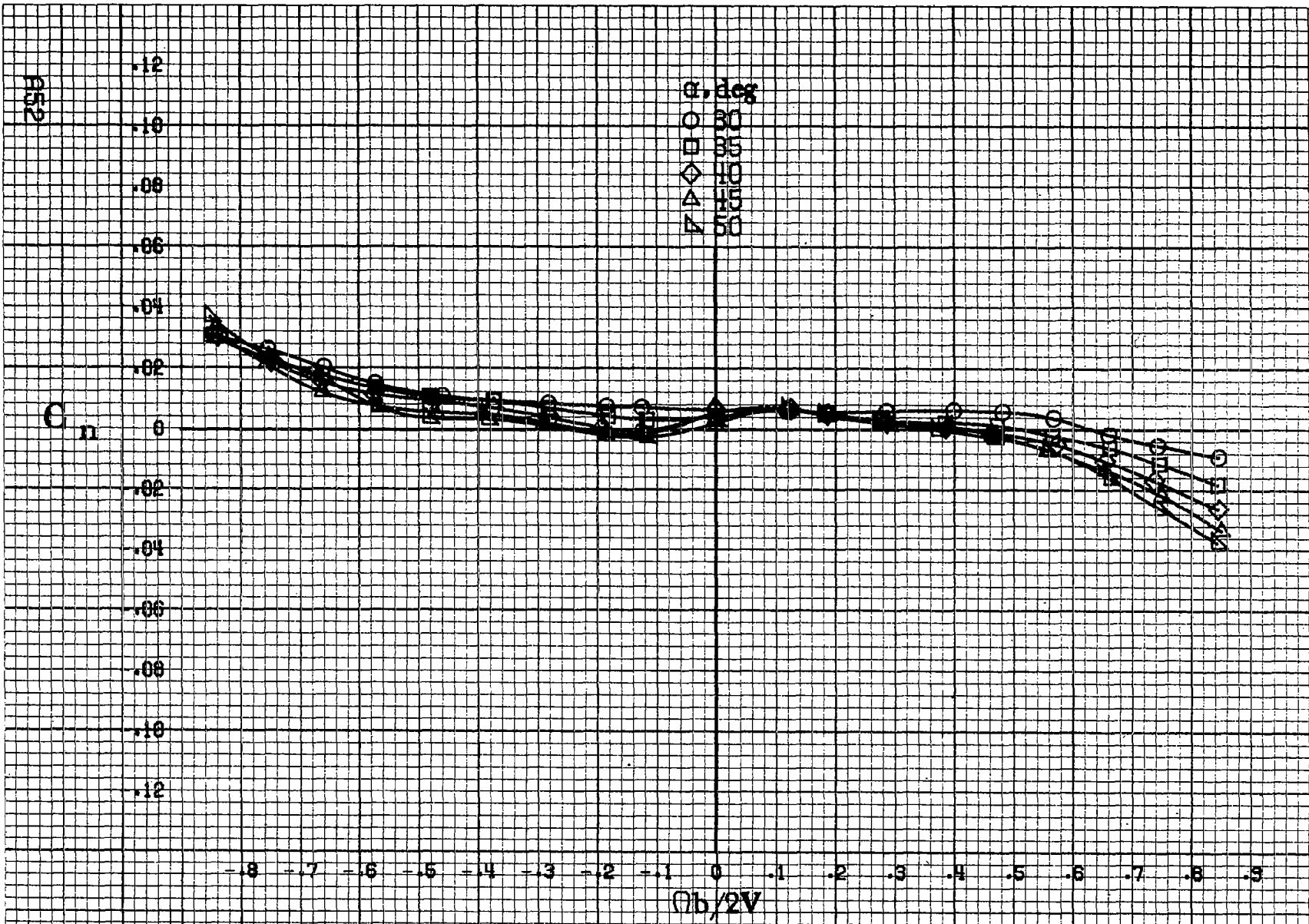
(d) $\alpha=55$ to 90° , $SR=0$.
 Figure A12. Concluded.



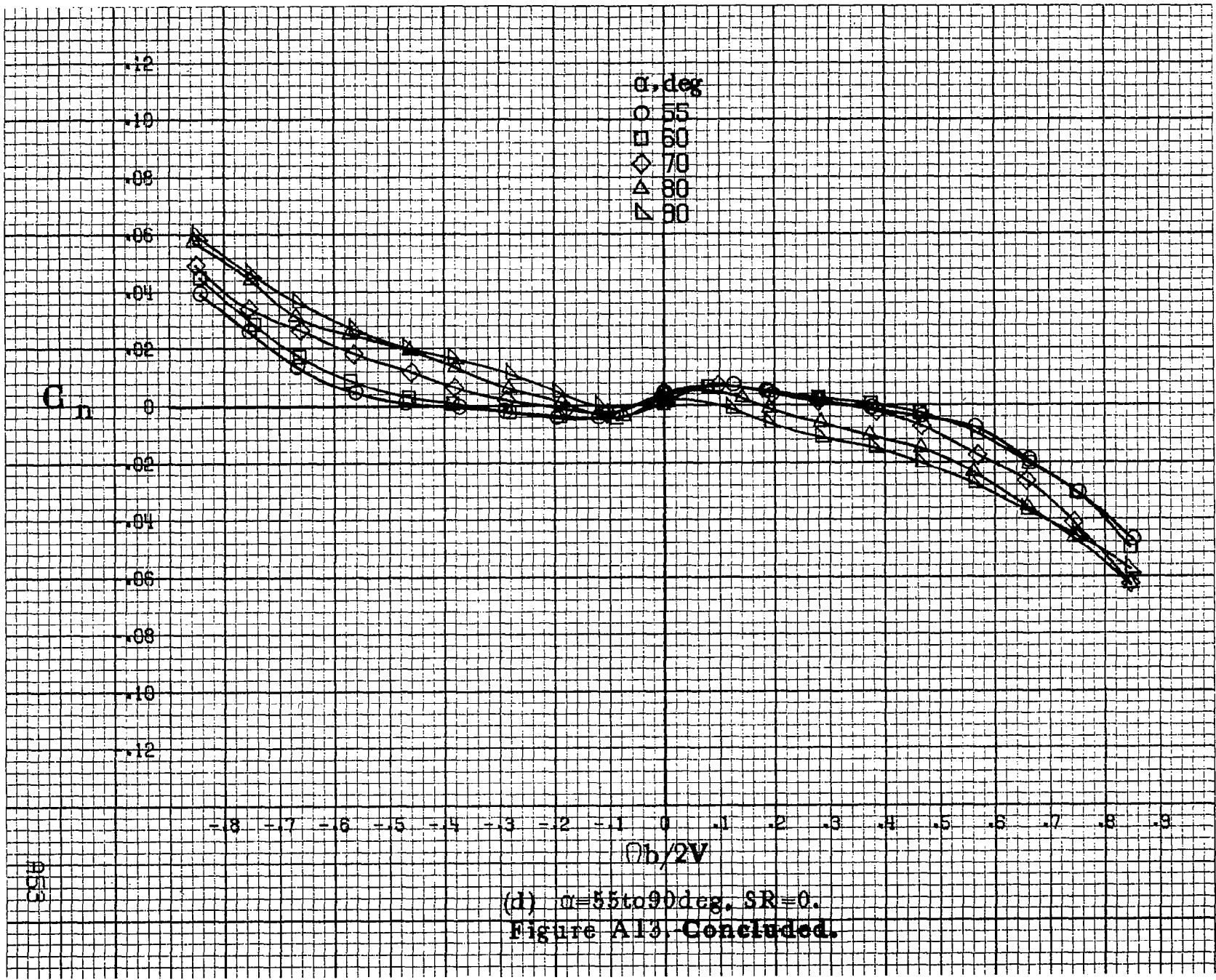
(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A13 Effect of rotation rate and angle of attack on yawing moment coefficient for basic configuration. $\delta_1=0^\circ$, $\delta_2=0^\circ$, $\delta_3=-25^\circ$, $\beta=0^\circ$.

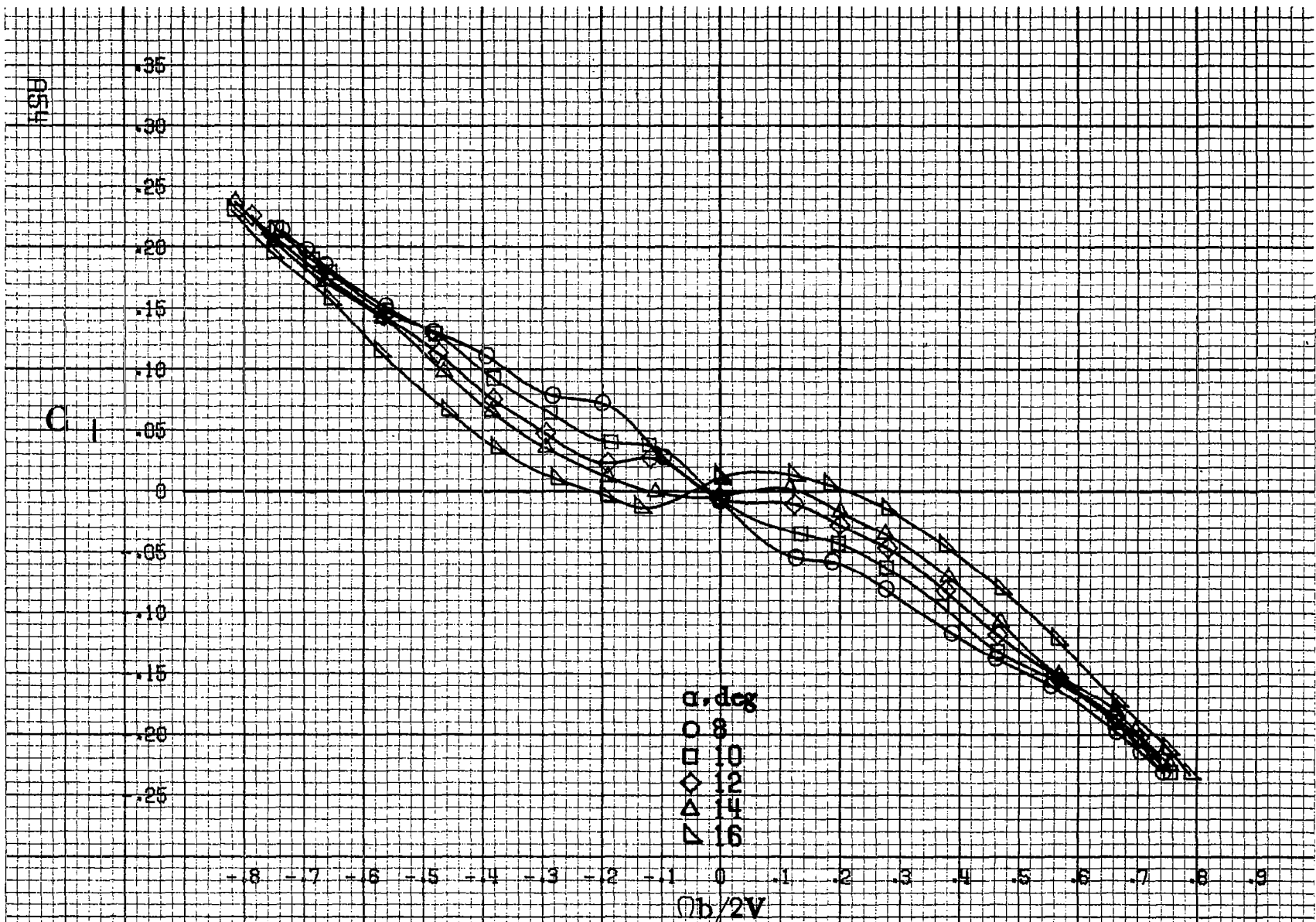




(c) $\alpha = 30$ to 50 deg, $SR = 0$.
 Figure A13. Continued.

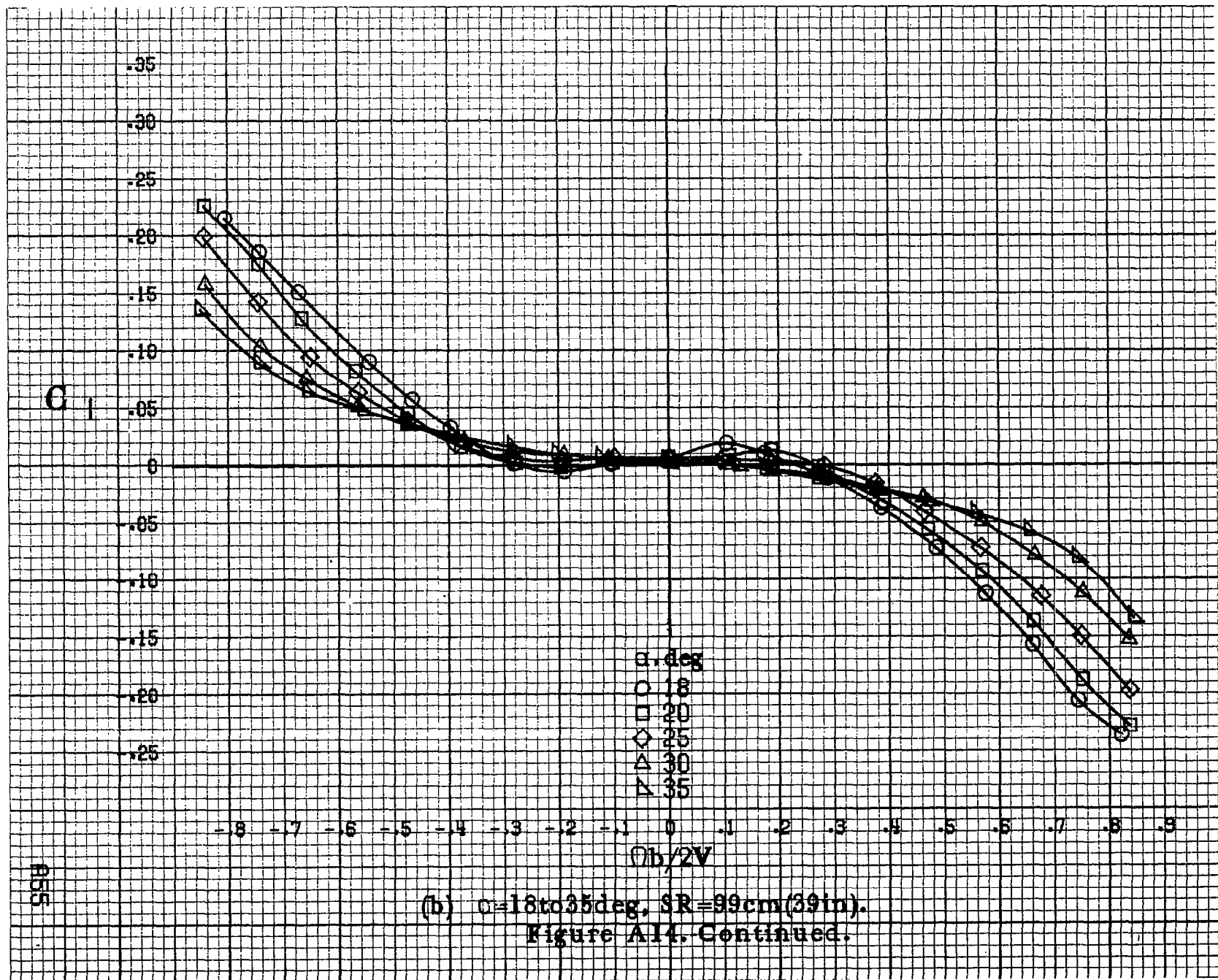


(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A13. Concluded.



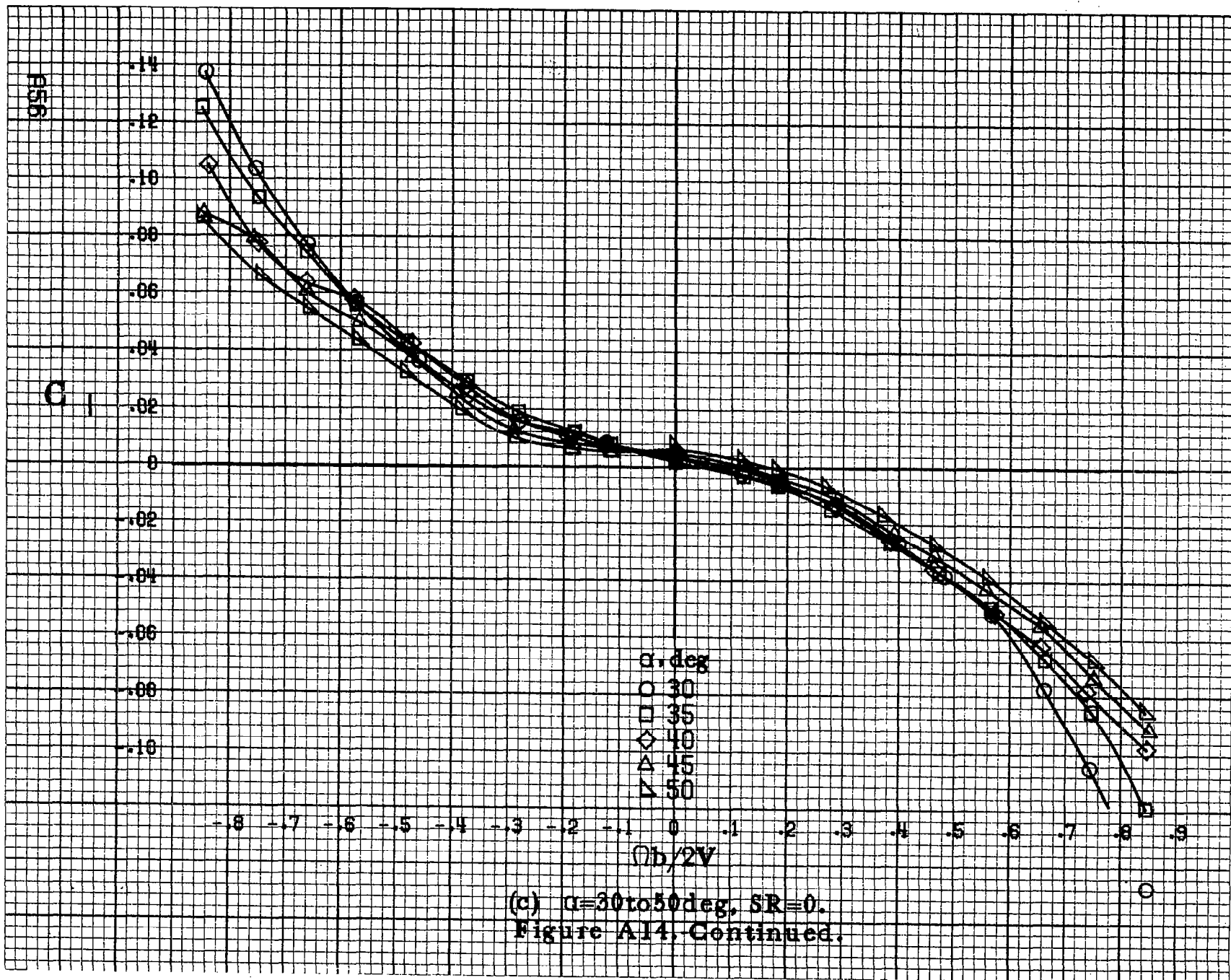
(a) $\alpha=8$ to 16 deg, SR=99em(39in).

Figure A14. Effect of rotation rate and angle of attack on rolling-moment coefficient for basic configuration. $\delta_1=0^\circ$, $\delta_2=0^\circ$, $\delta_3=25^\circ$, $\beta=0^\circ$.

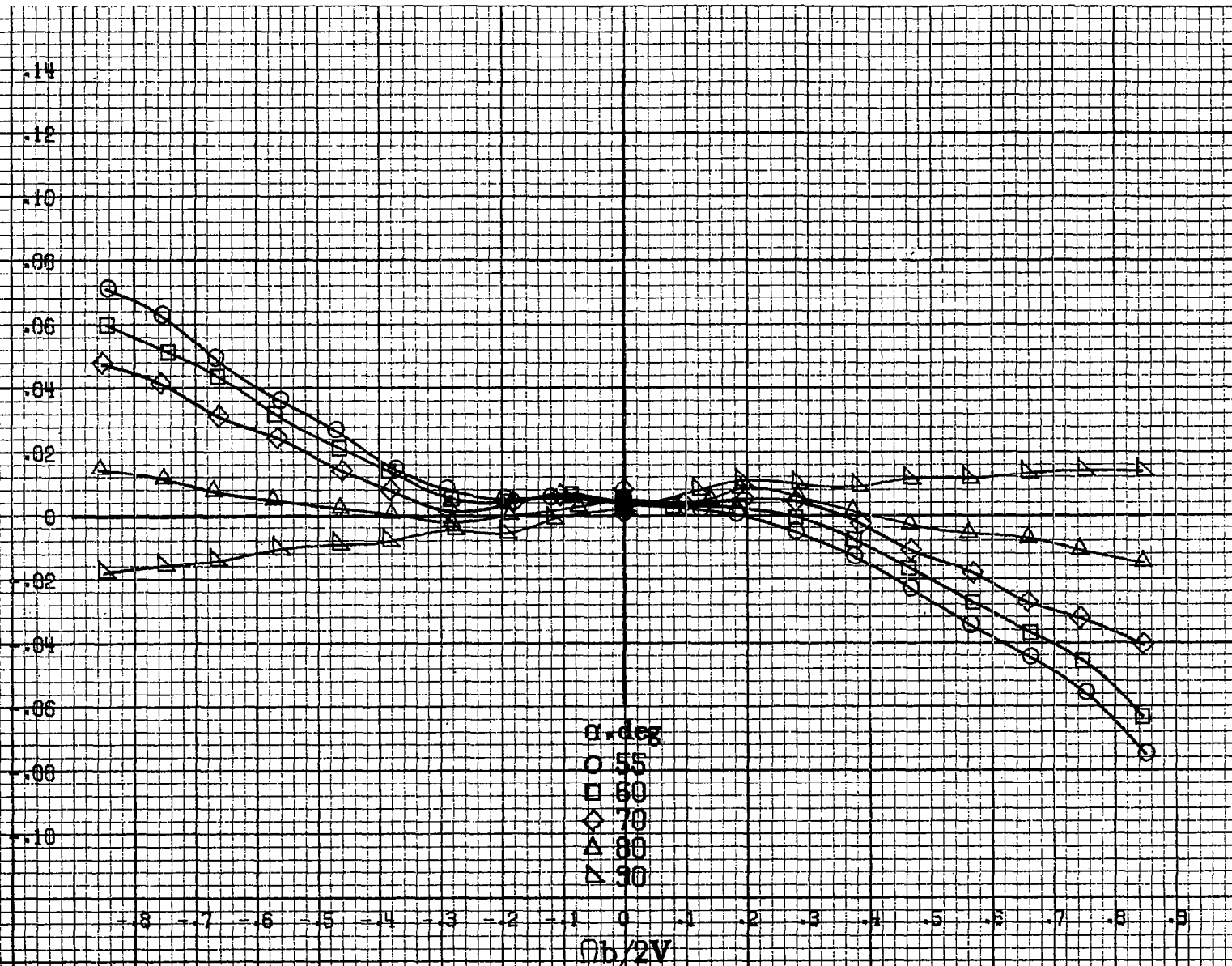


(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A14. Continued.

855



C_L

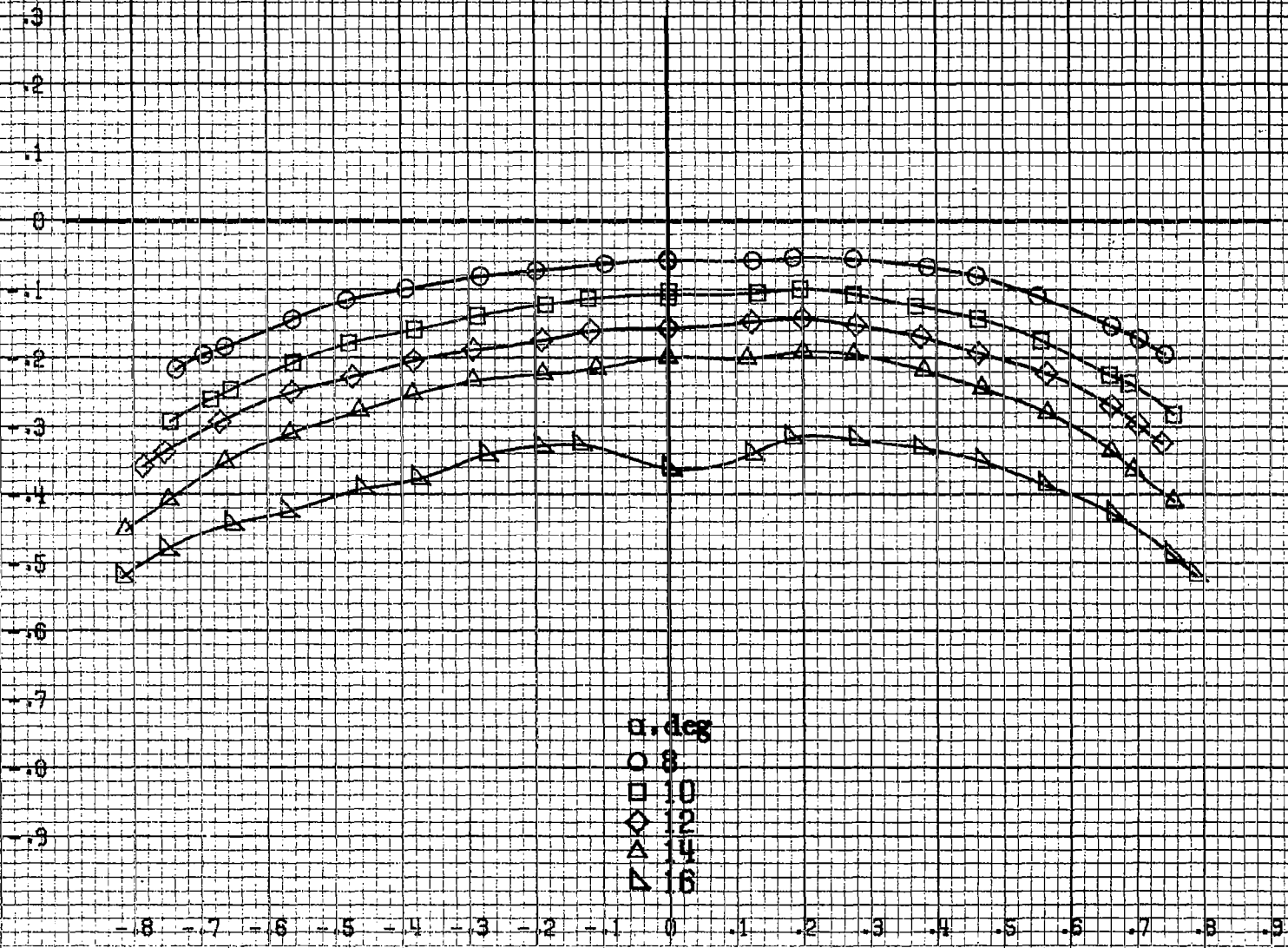


α, deg
O 55
□ 60
◇ 70
△ 80
▽ 90

AS7

(d) $\alpha = 55$ to 90 deg, $SR = 0$.
Figure A14. Continued.

C_m

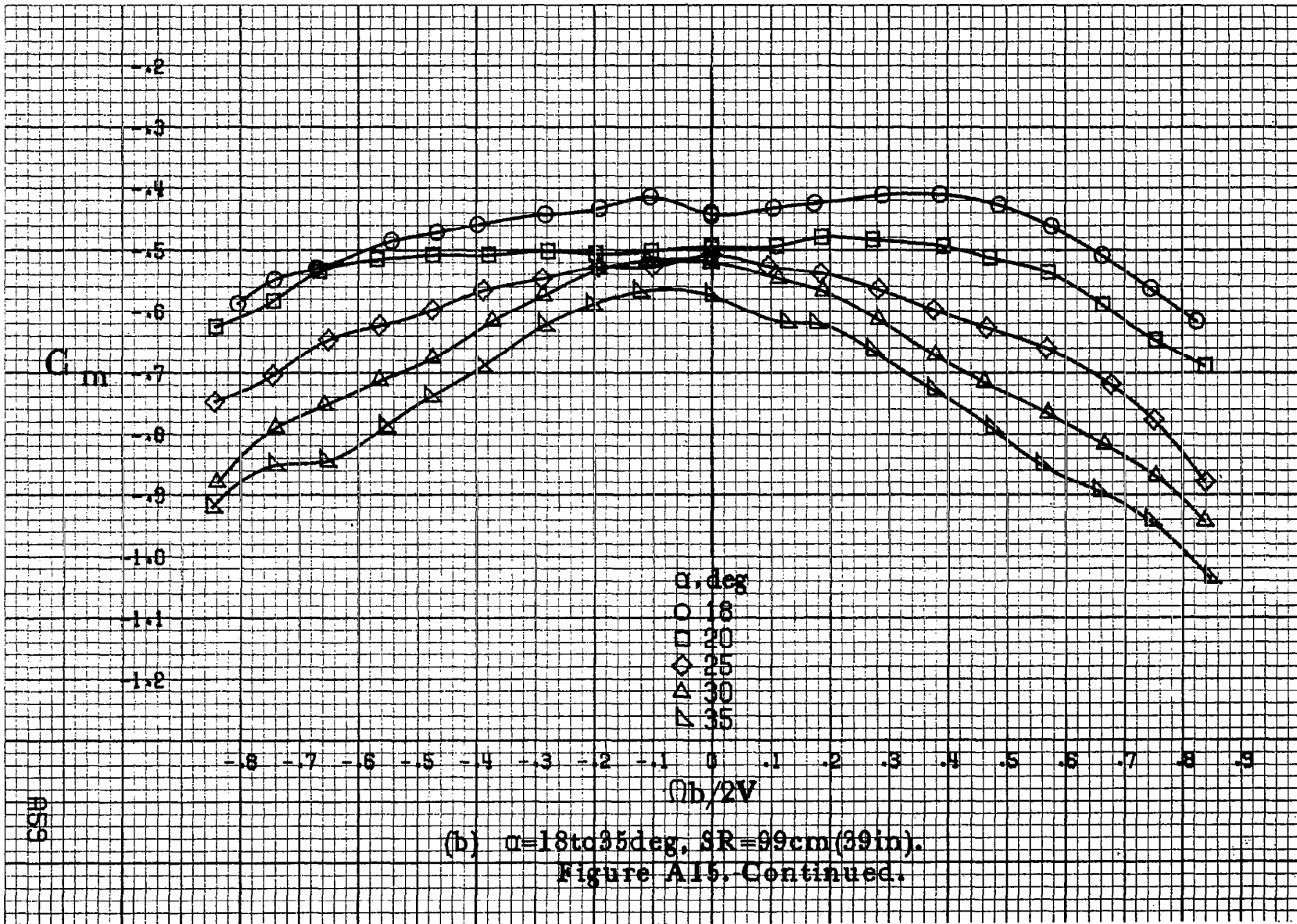


α, deg
 O 8
 □ 10
 ◇ 12
 △ 14
 ▽ 16

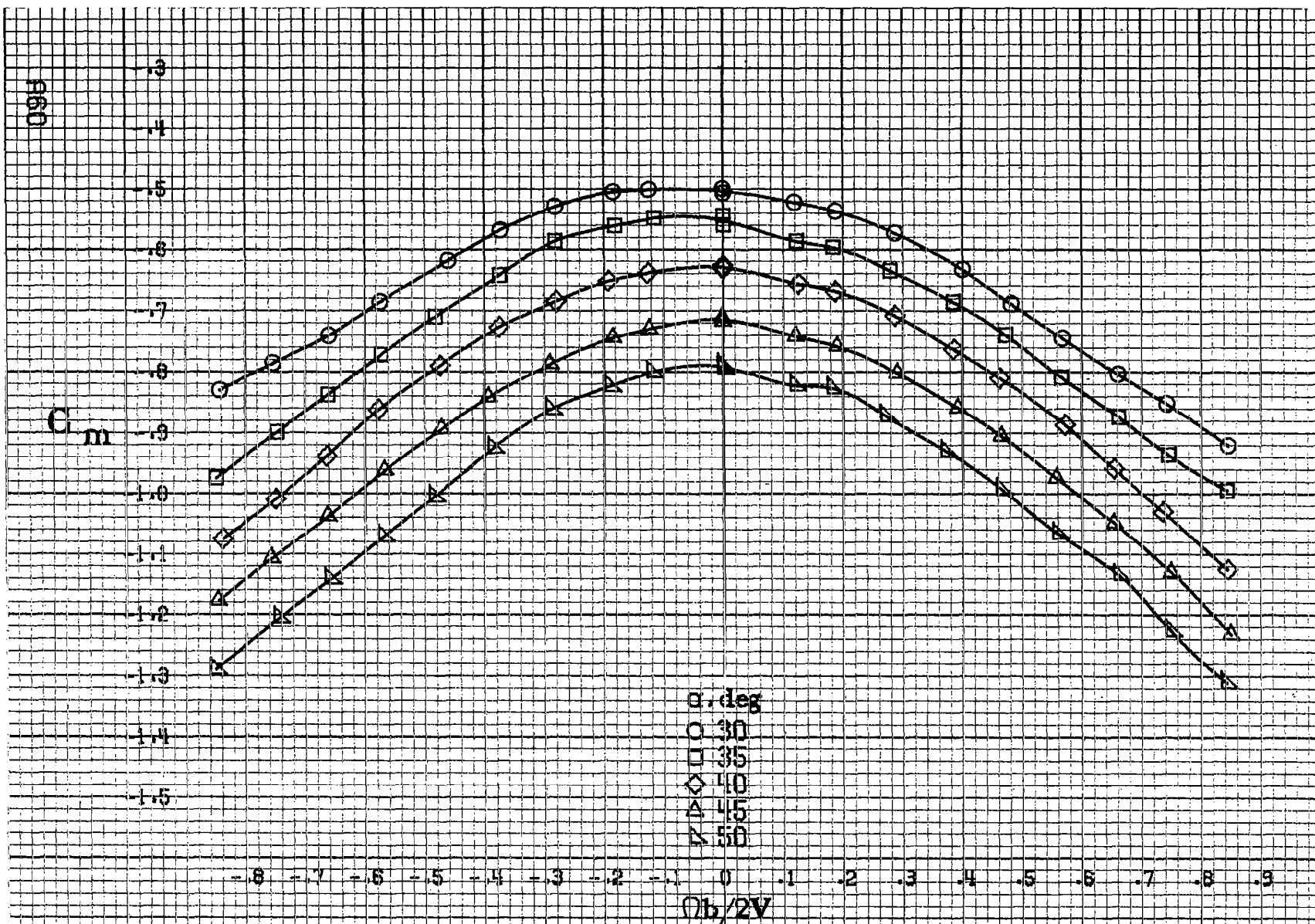
$Ob/2V$

(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A15. Effect of rotation rate and angle of attack on pitching-moment coefficient for basic configuration. $\delta = 0^\circ$, $\epsilon = 0^\circ$, $\zeta = -25^\circ$, $\theta = 0^\circ$.



1159



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A15. Continued.

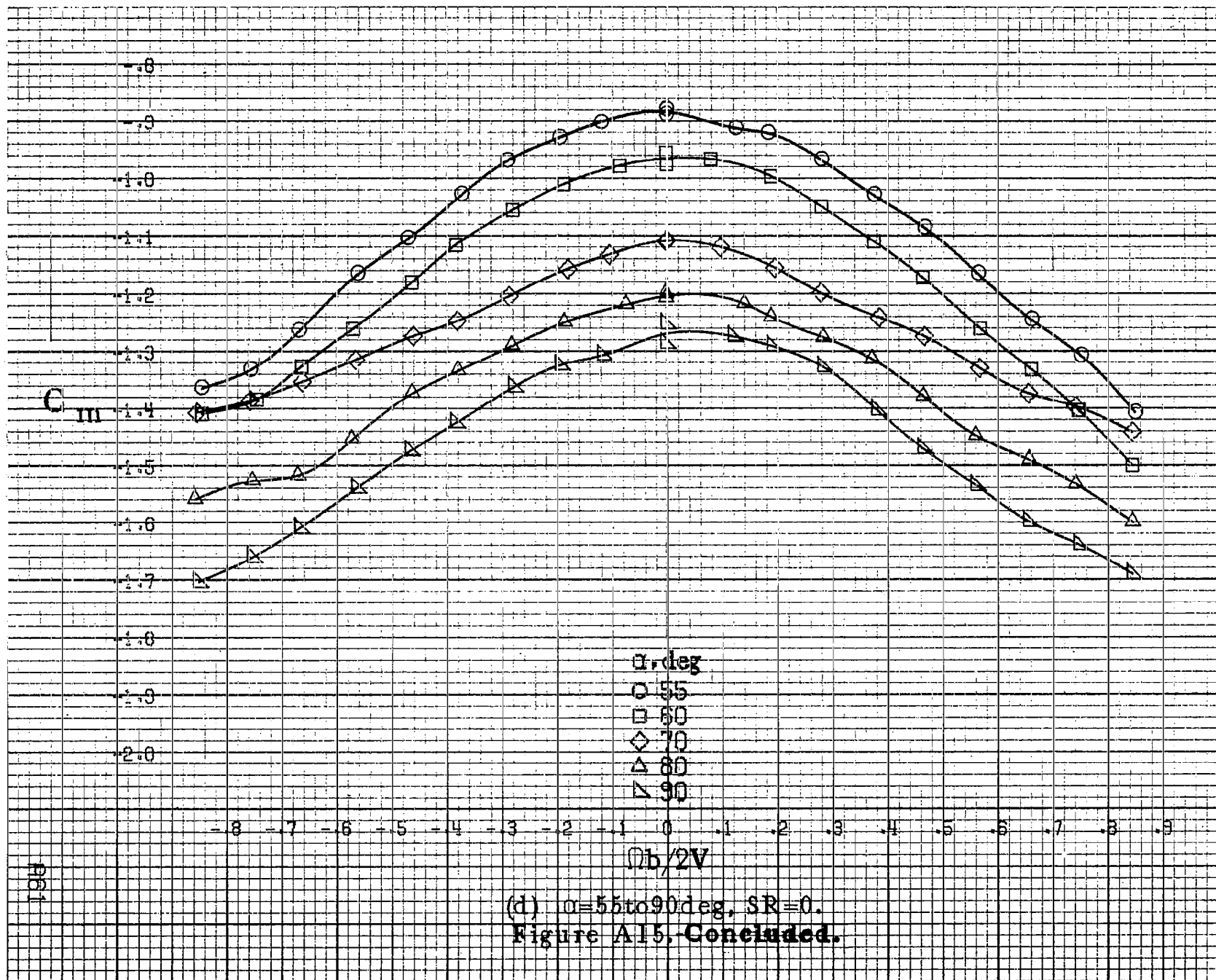
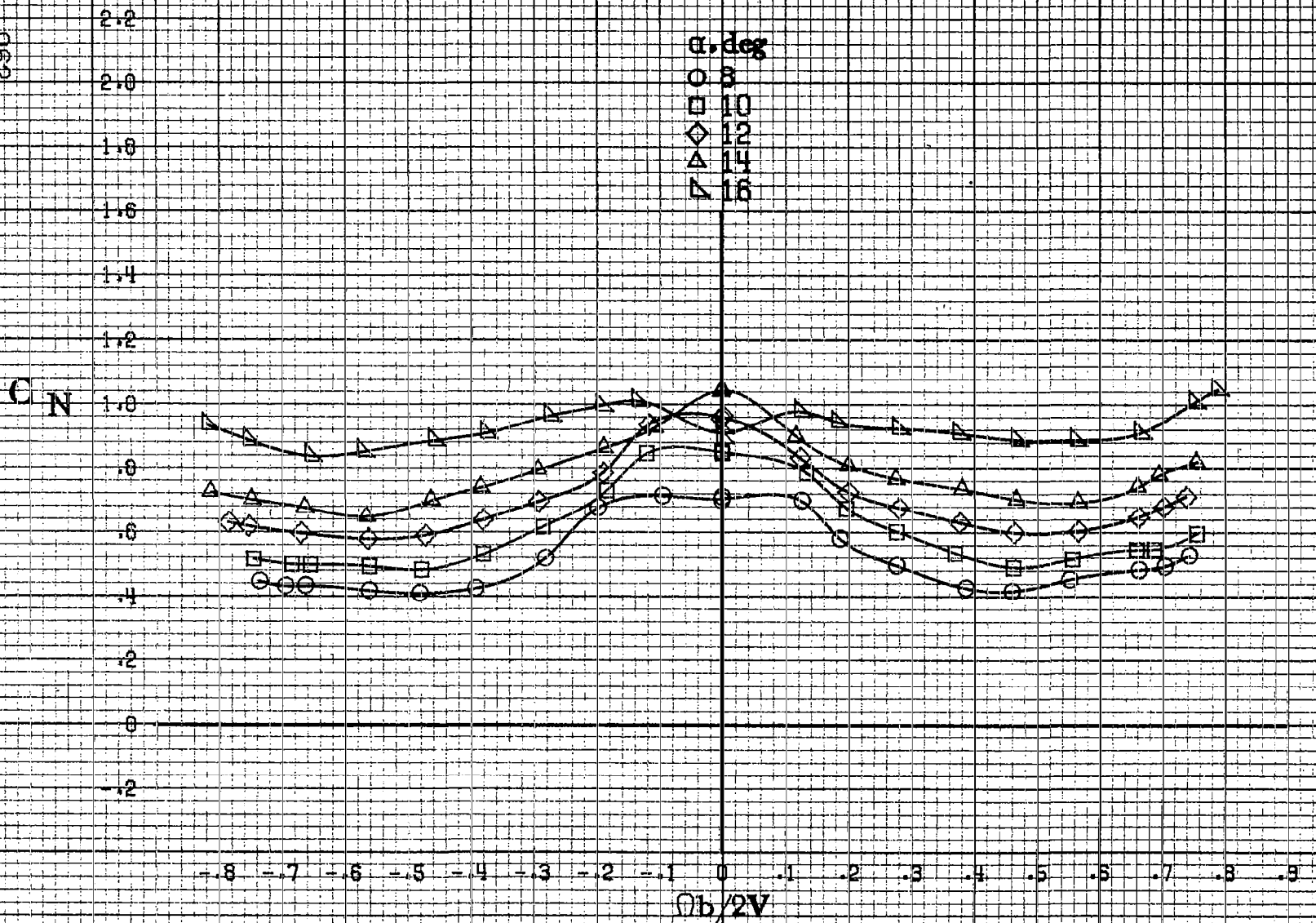


Fig 2

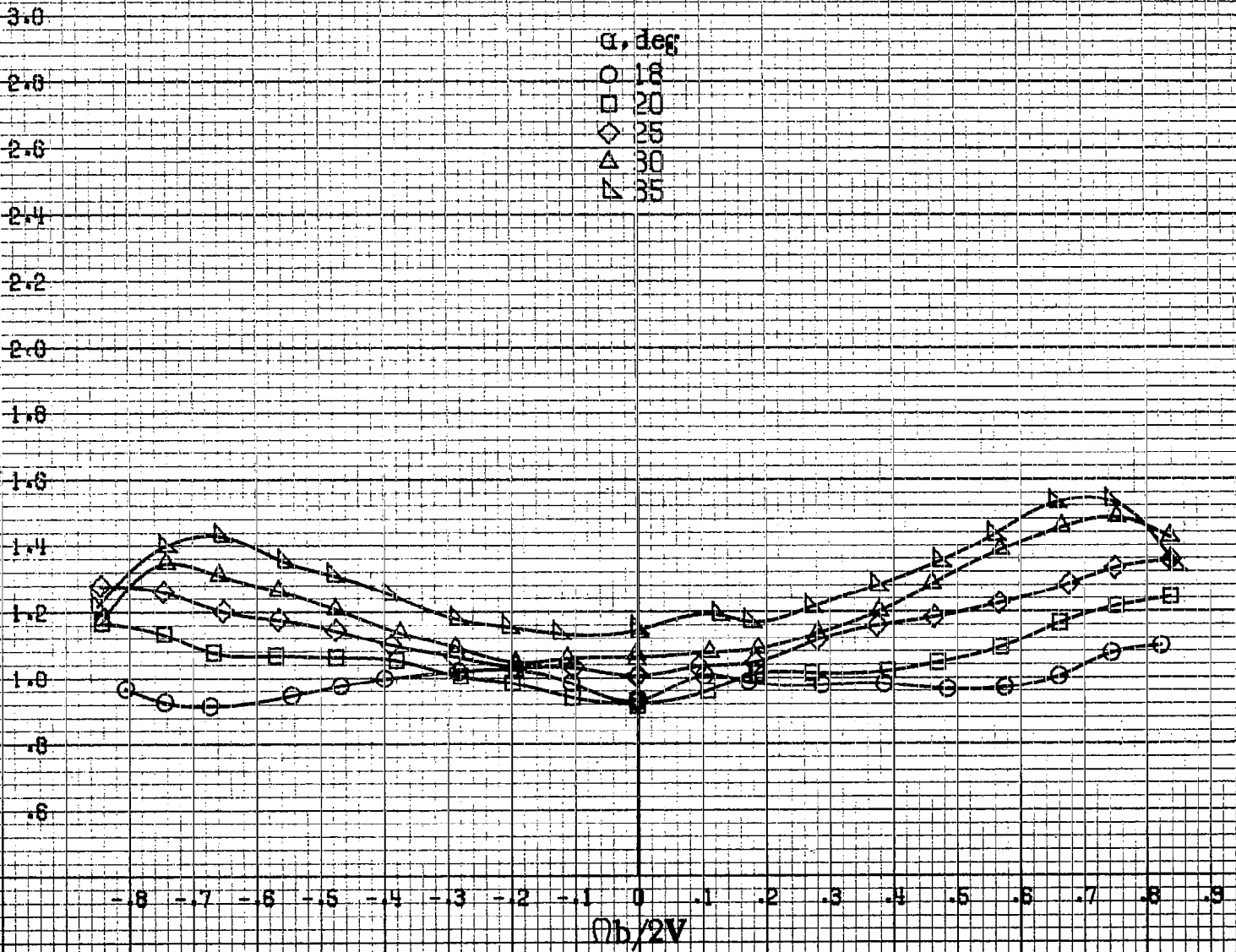


(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A16. Effect of rotation rate and angle of attack on normal-force coefficient for basic configuration. $\delta_a=0^\circ$, $\delta_s=0^\circ$, $\delta_r=-25^\circ$, $\beta=0^\circ$.

C_N

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35



855

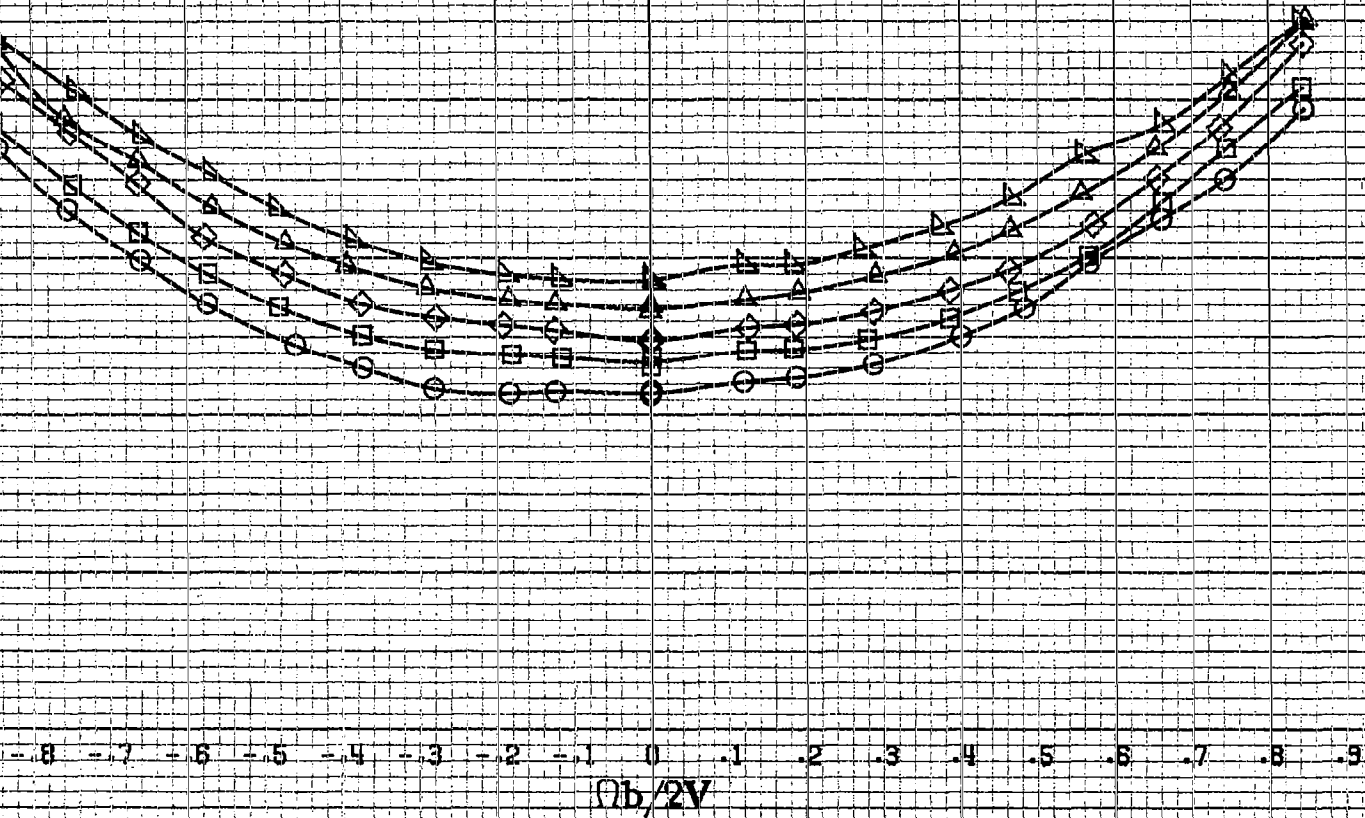
(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A16, Continued.

FIG. 16

C_N

2.80
2.60
2.40
2.20
2.00
1.80
1.60
1.40
1.20
1.00
.80
.60
.40

α, deg
○ 30
□ 35
◇ 40
△ 45
▽ 50



(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A16. Continued.

C_N

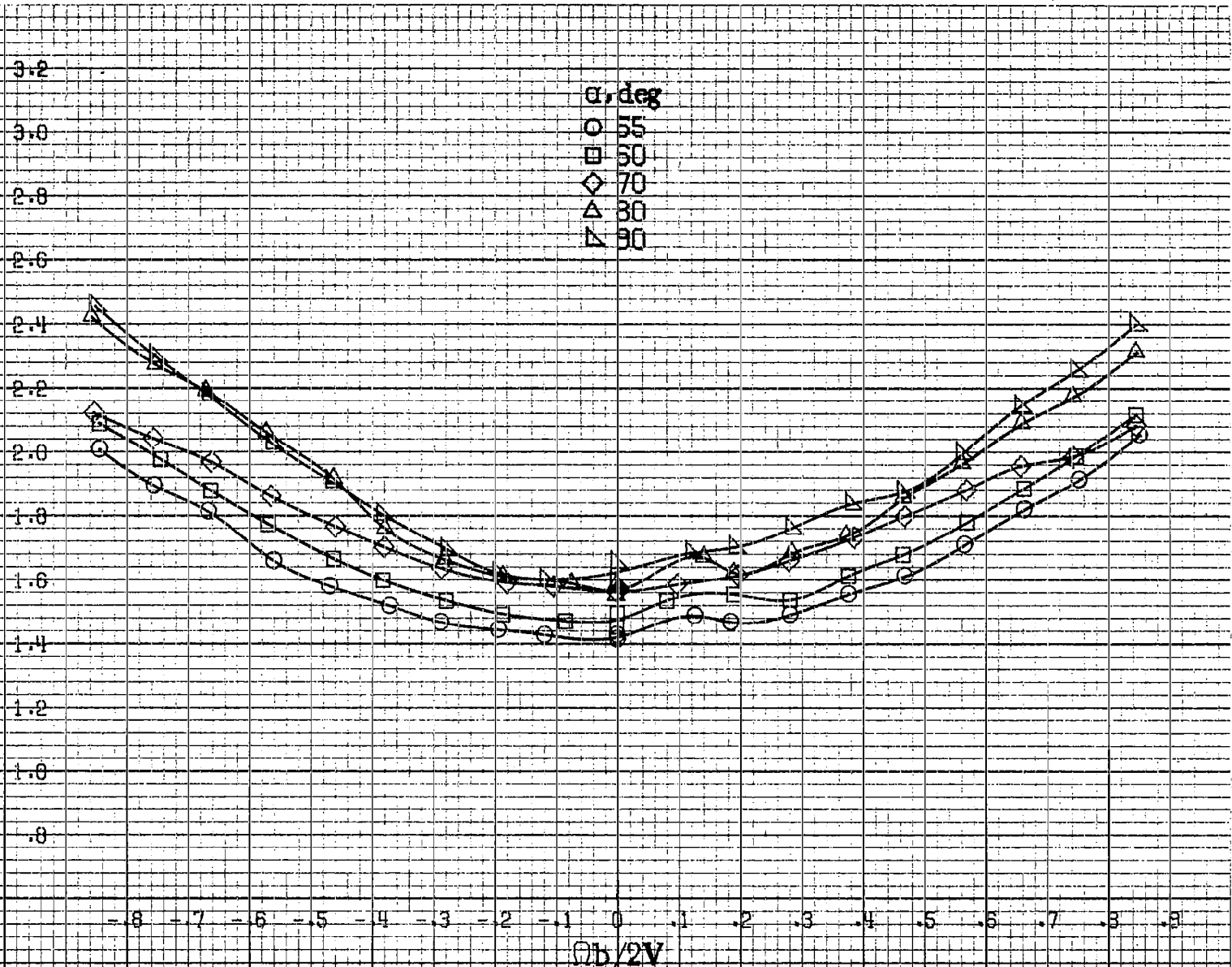


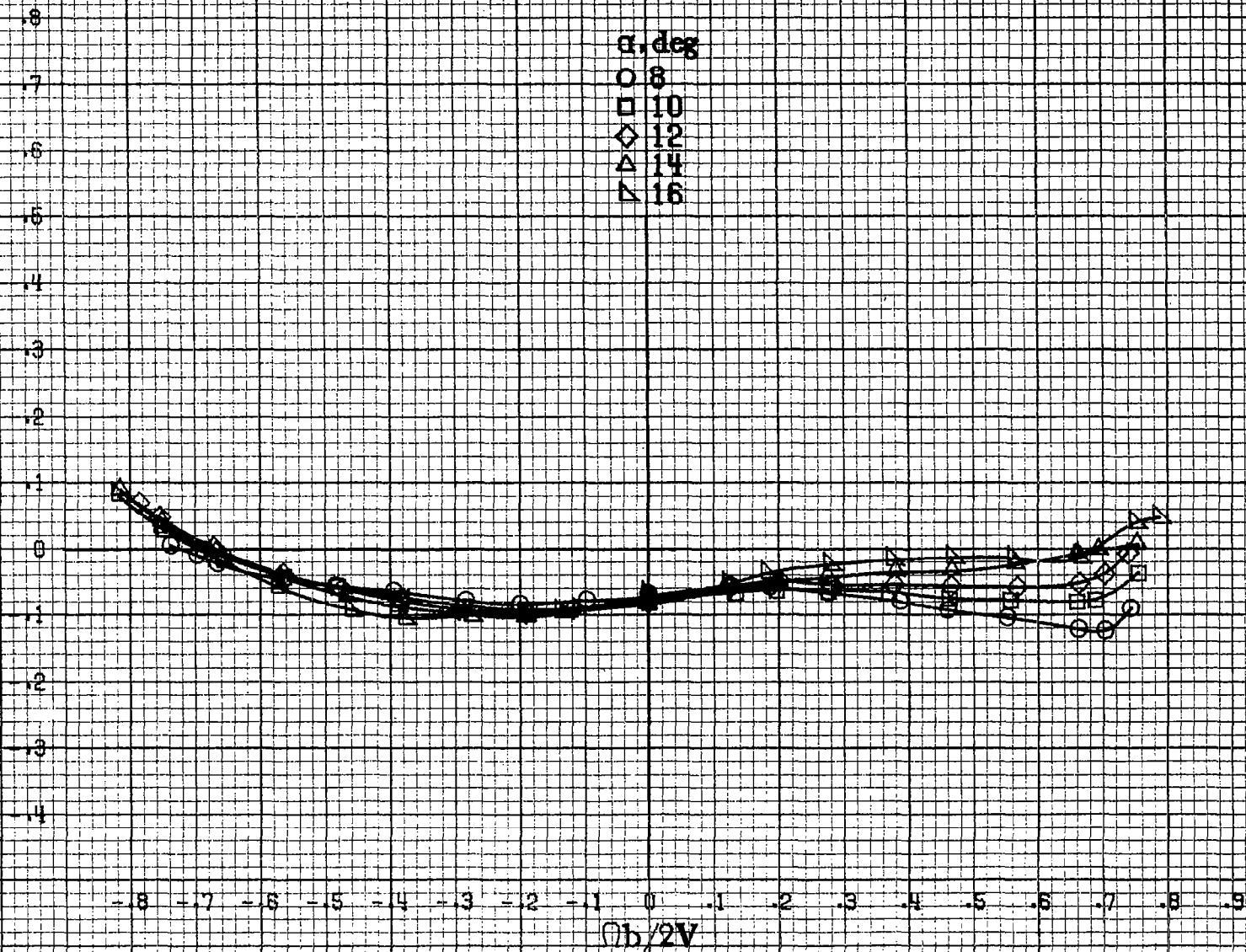
FIG 5

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A16. Concluded.

F66

C_y

α , deg
 O 8
 □ 10
 ◇ 12
 △ 14
 ▴ 16



(a) $\alpha=8$ to 16 deg, SR=99 cm (39 in).

Figure A17 Effect of rotation rate and angle of attack on side force coefficient for basic configuration. $\delta_a=0^\circ$, $\delta_s=0^\circ$, $\delta_r=25^\circ$, $\beta=0^\circ$.

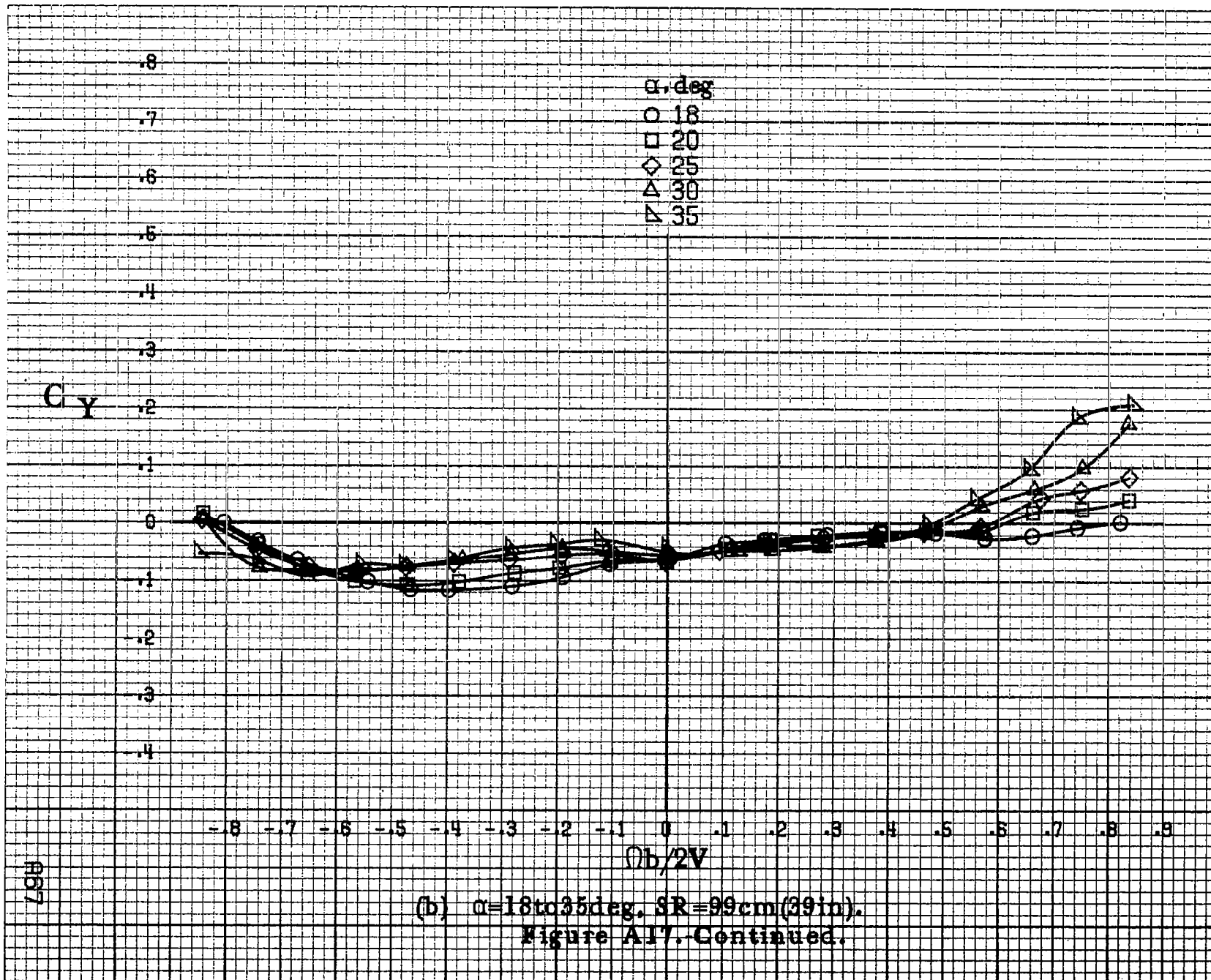
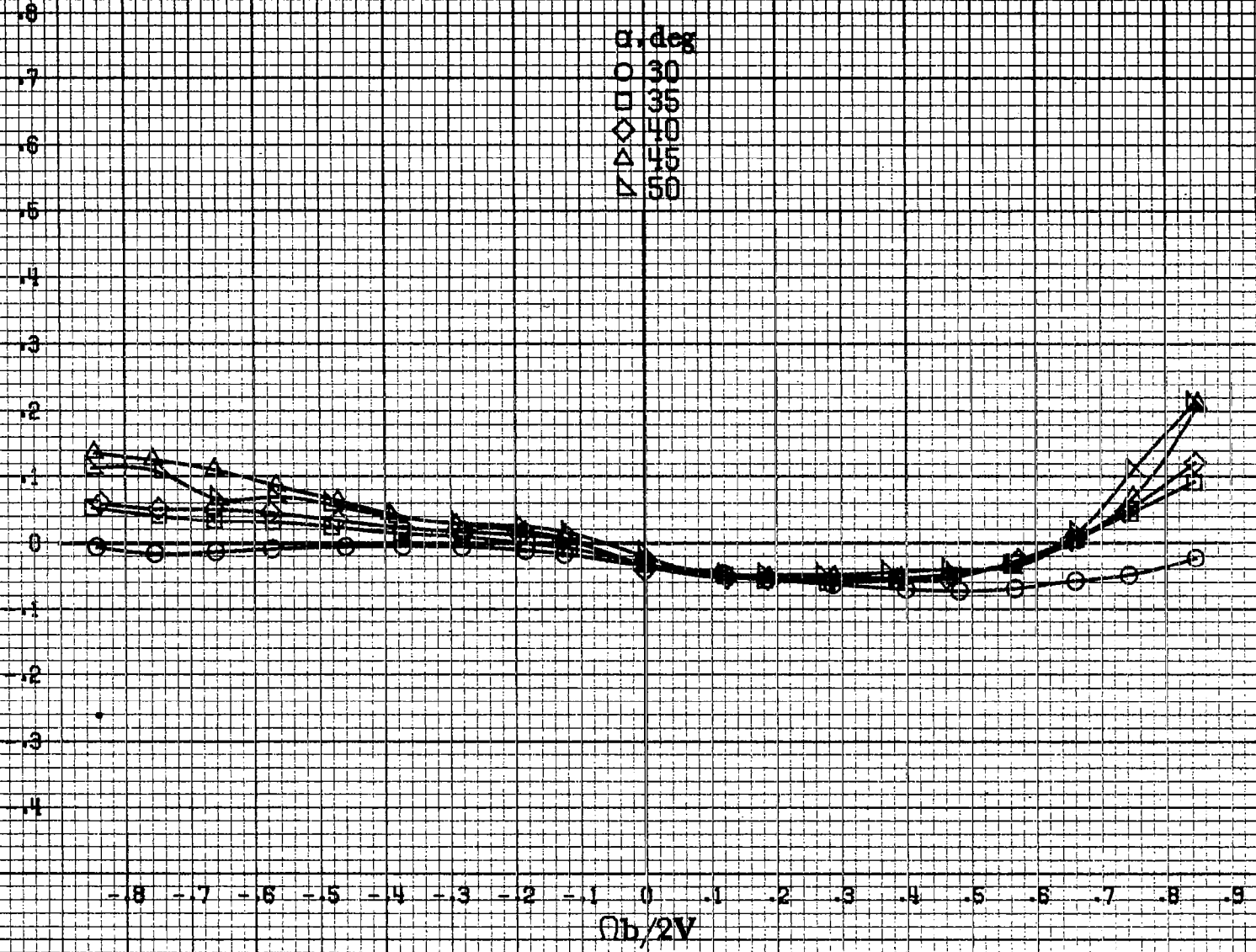


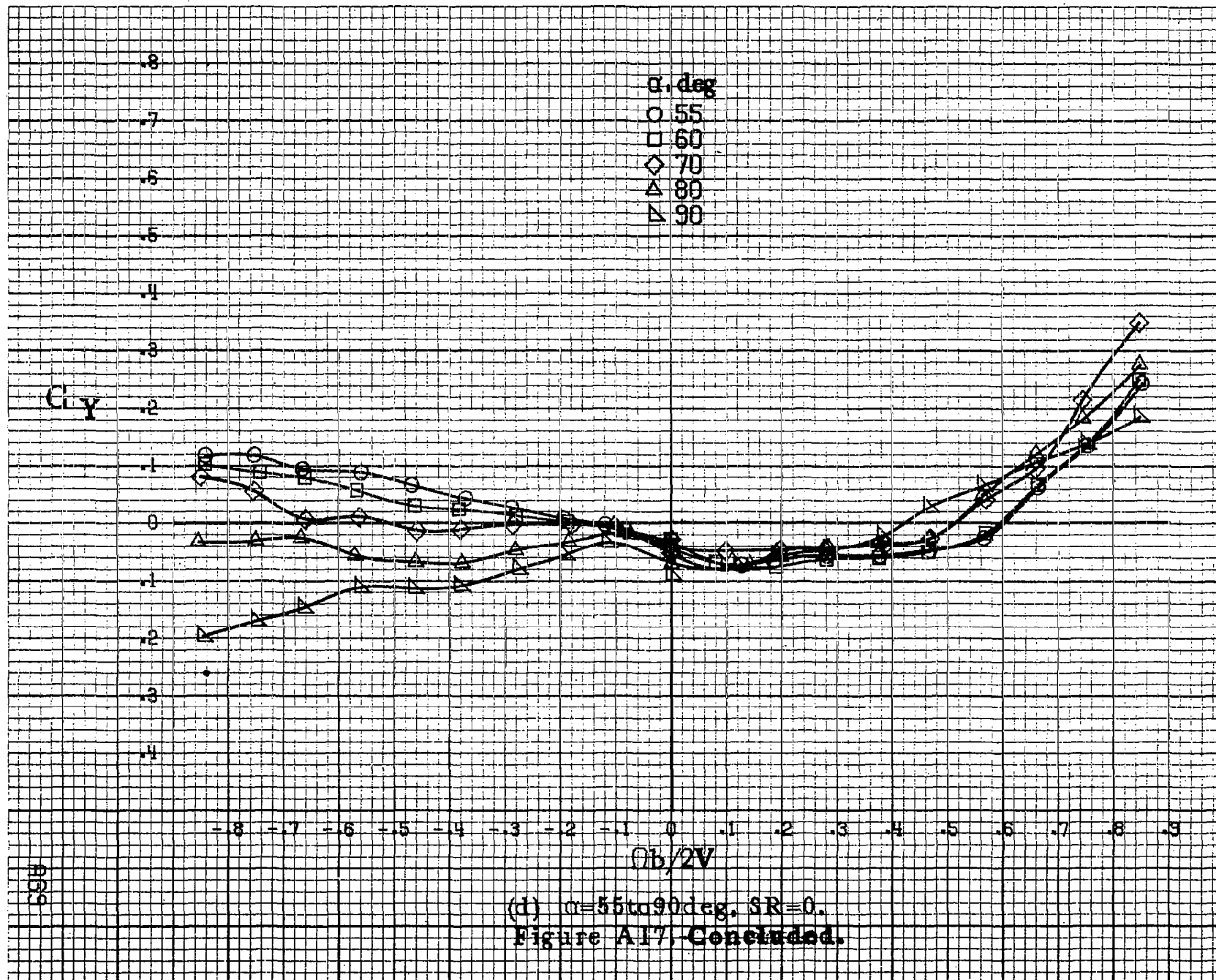
FIG 8

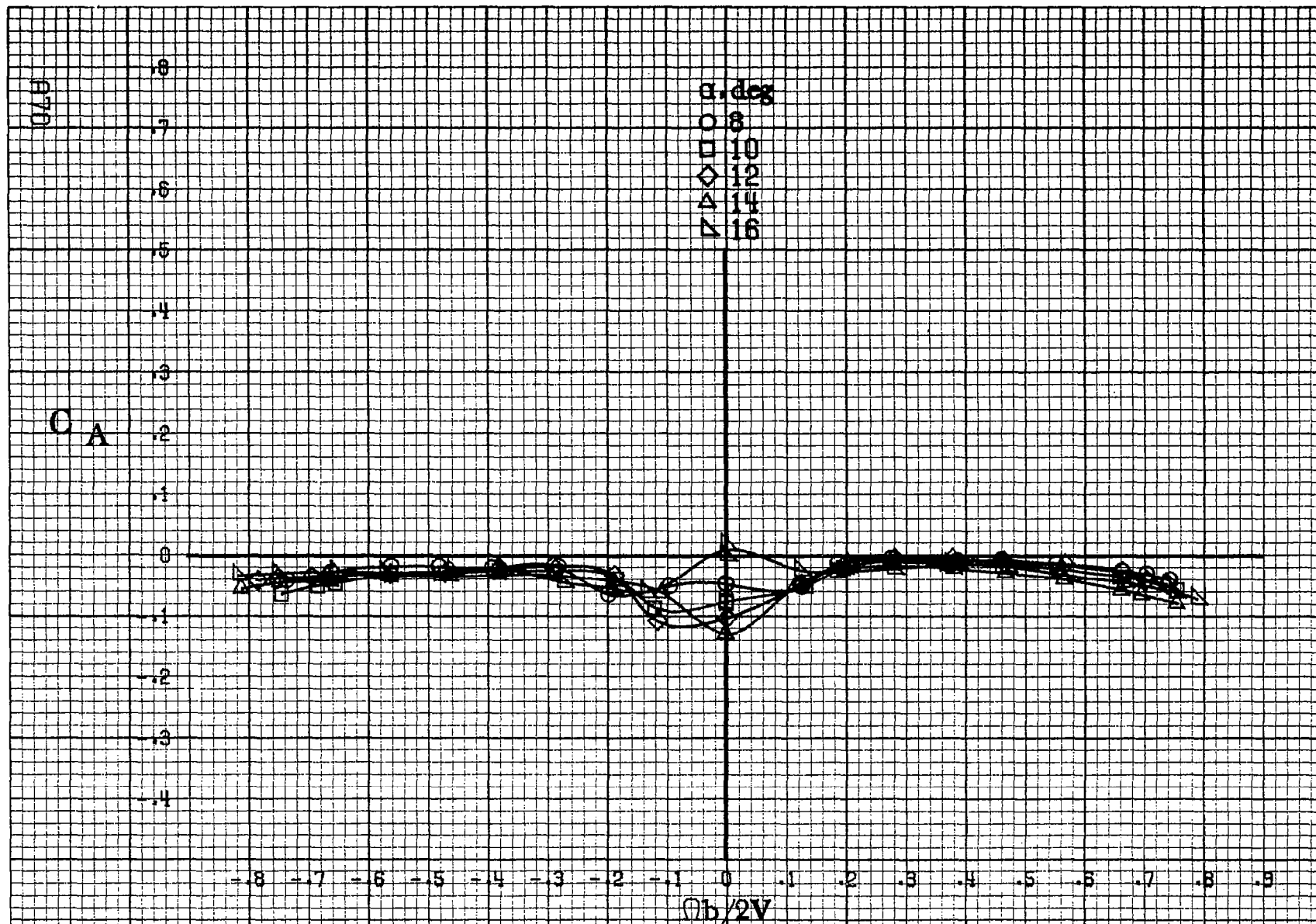
C_Y

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50



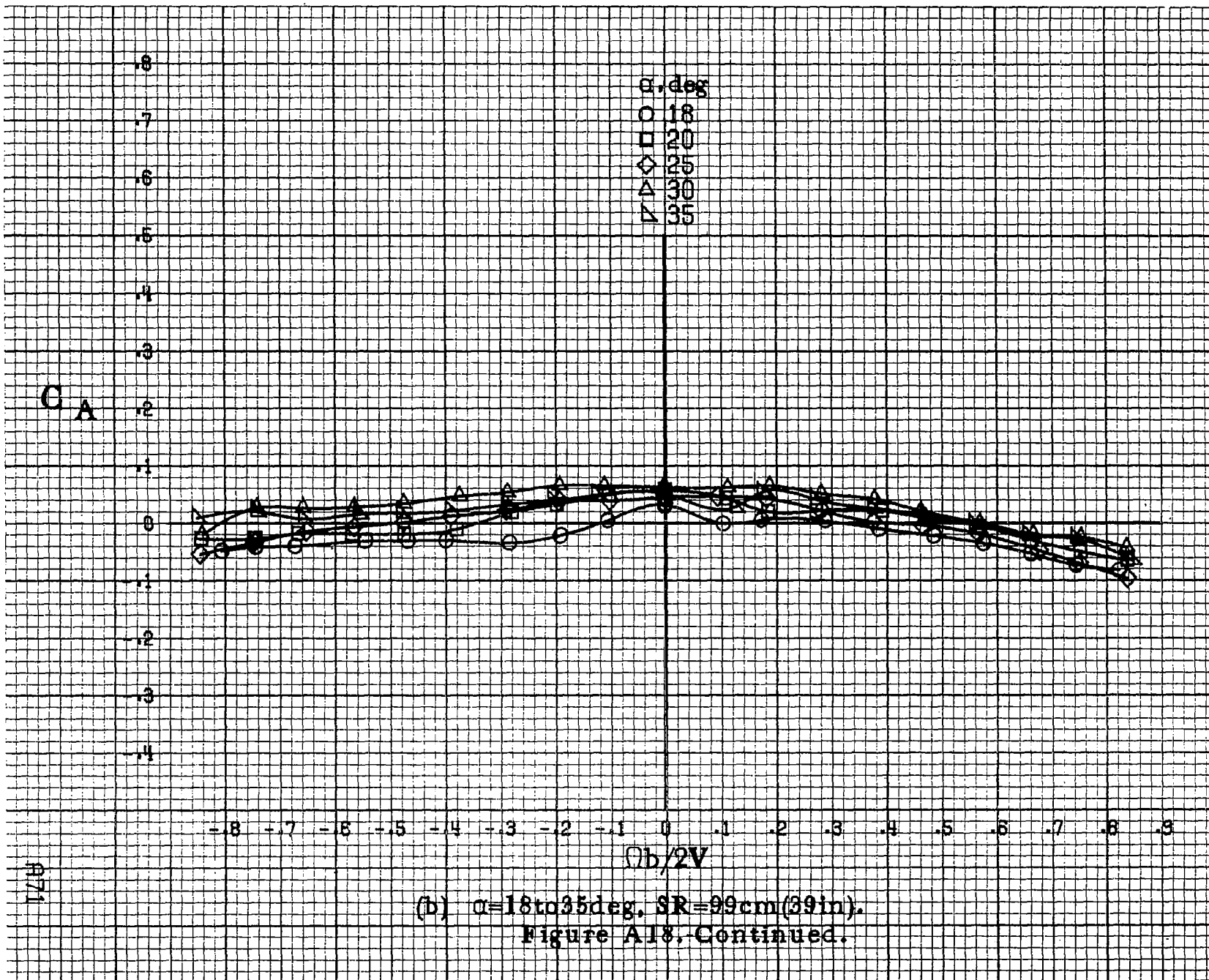
(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A17. Continued.

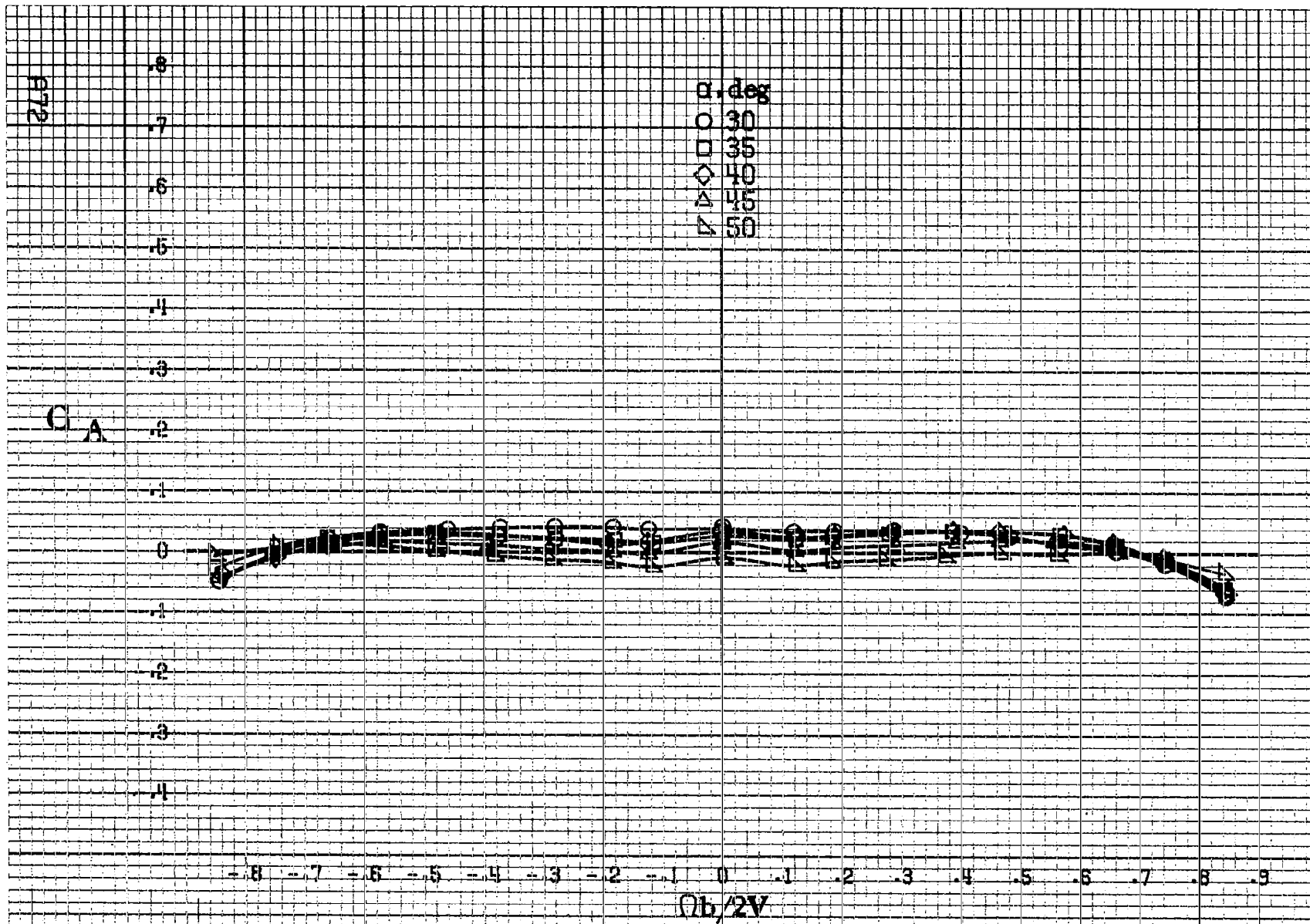




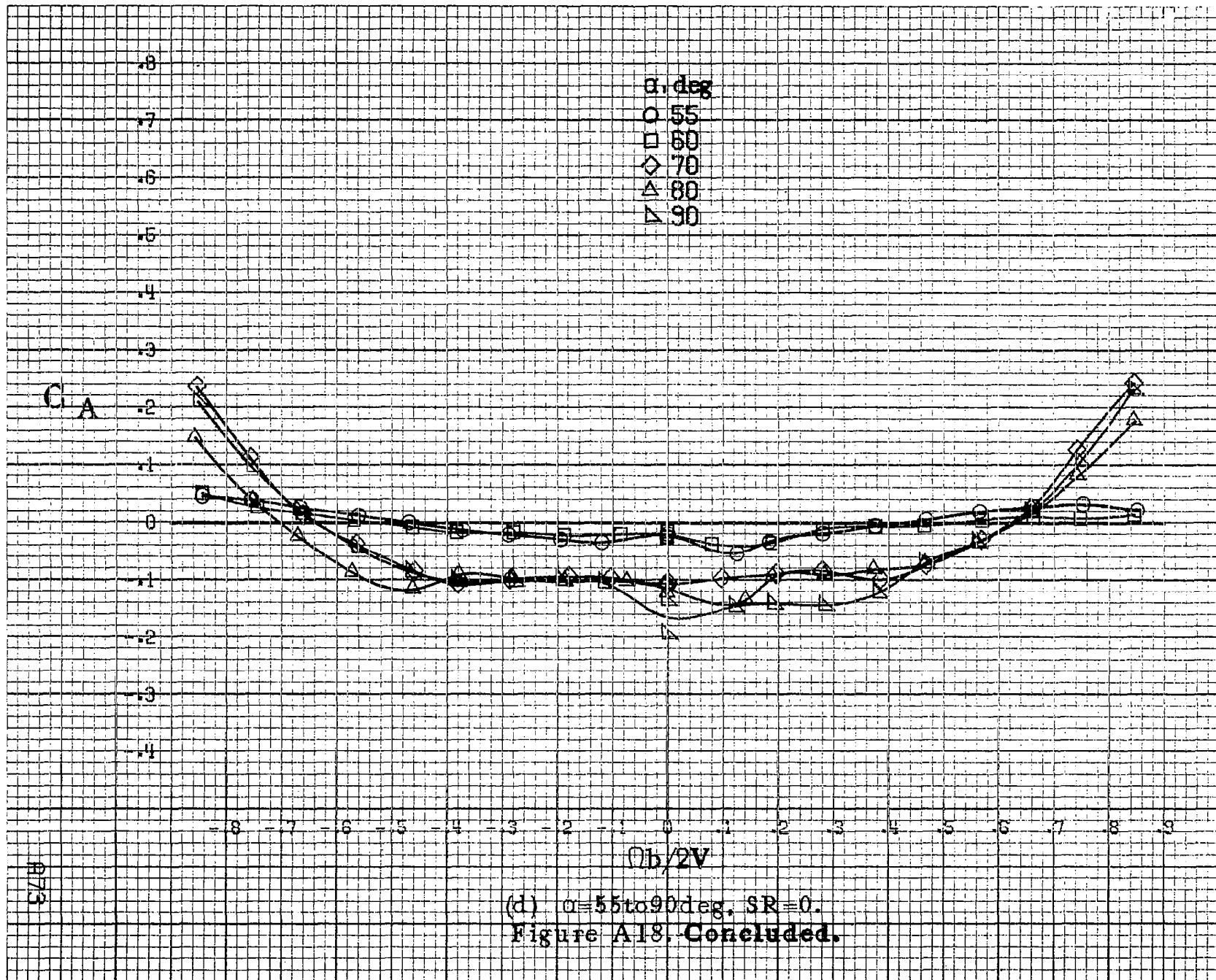
(a) $C=8$ to 16 deg, $SR=99$ cm (39 in).

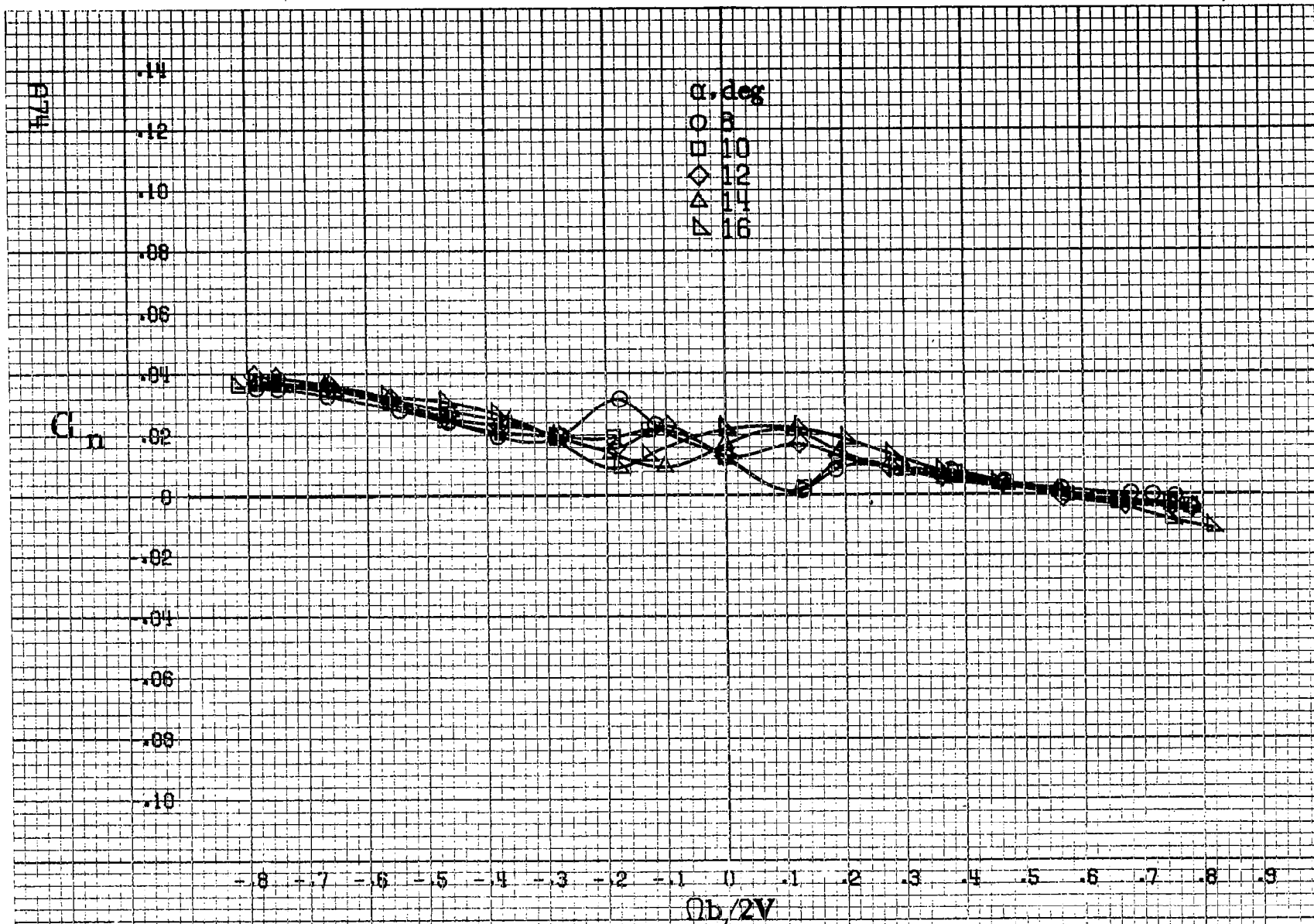
Figure A18. Effect of rotation rate and angle of attack on axial-force coefficient for basic configuration. $\delta_a=0^\circ$, $\delta_s=0^\circ$, $\delta_r=25^\circ$, $\beta=0^\circ$.





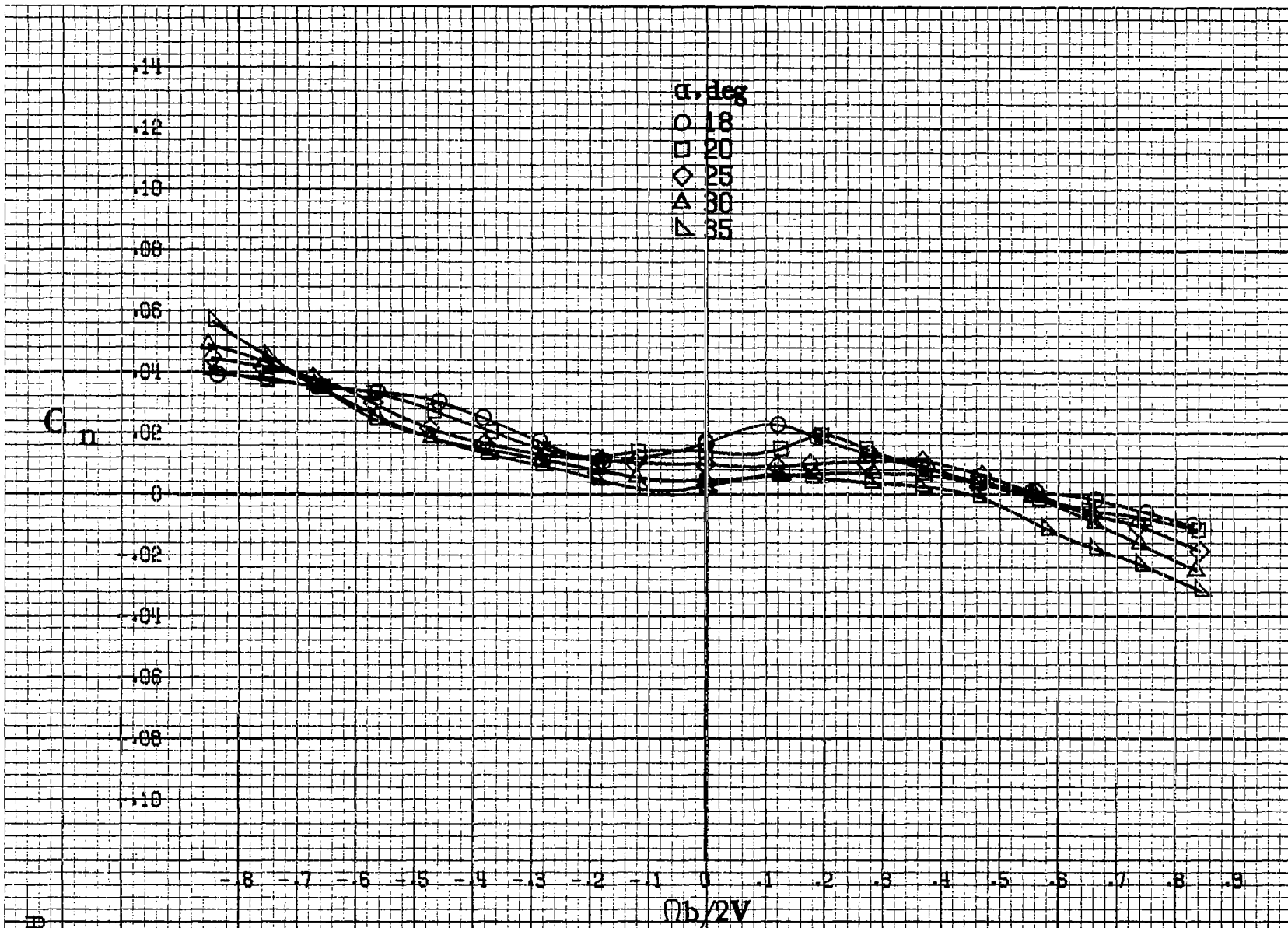
(c) $\alpha=30$ to 50 deg. $SR=0$.
 Figure A18 - Continued.





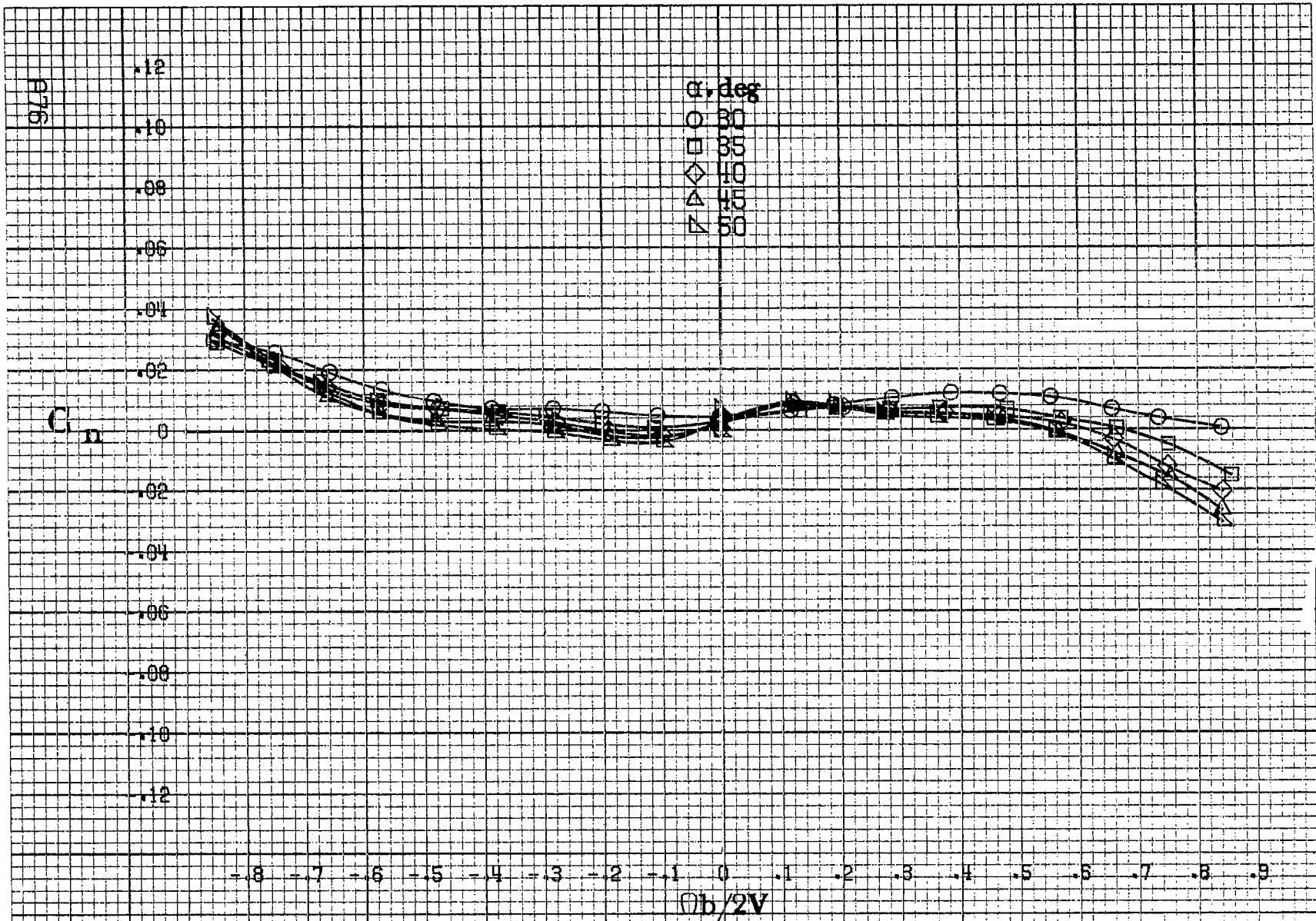
(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A19. Effect of rotation rate and angle of attack on yawing-moment coefficient for basic configuration. $\delta_a = 23^\circ$, $\delta_s = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.

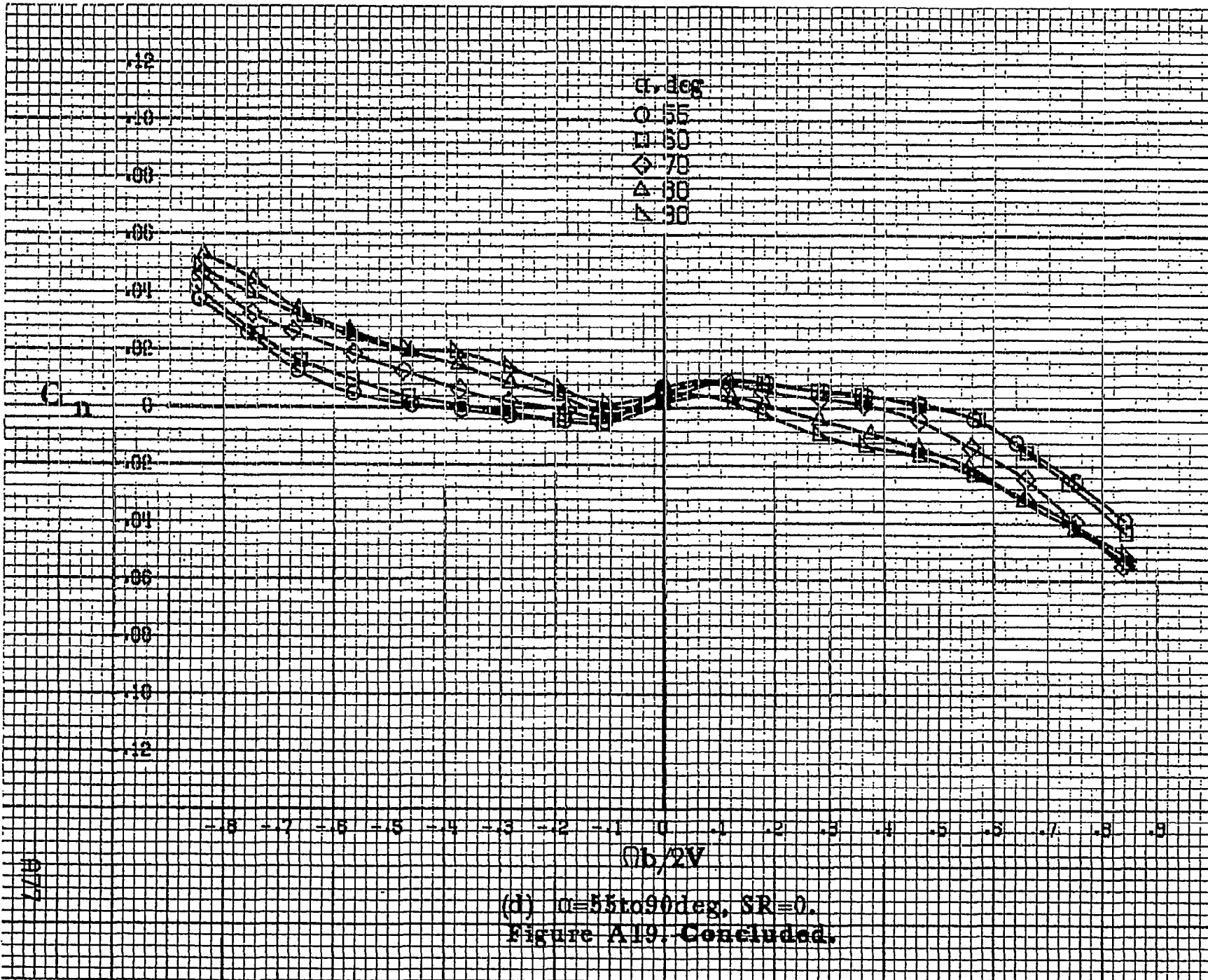


(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A19. Continued.

A175

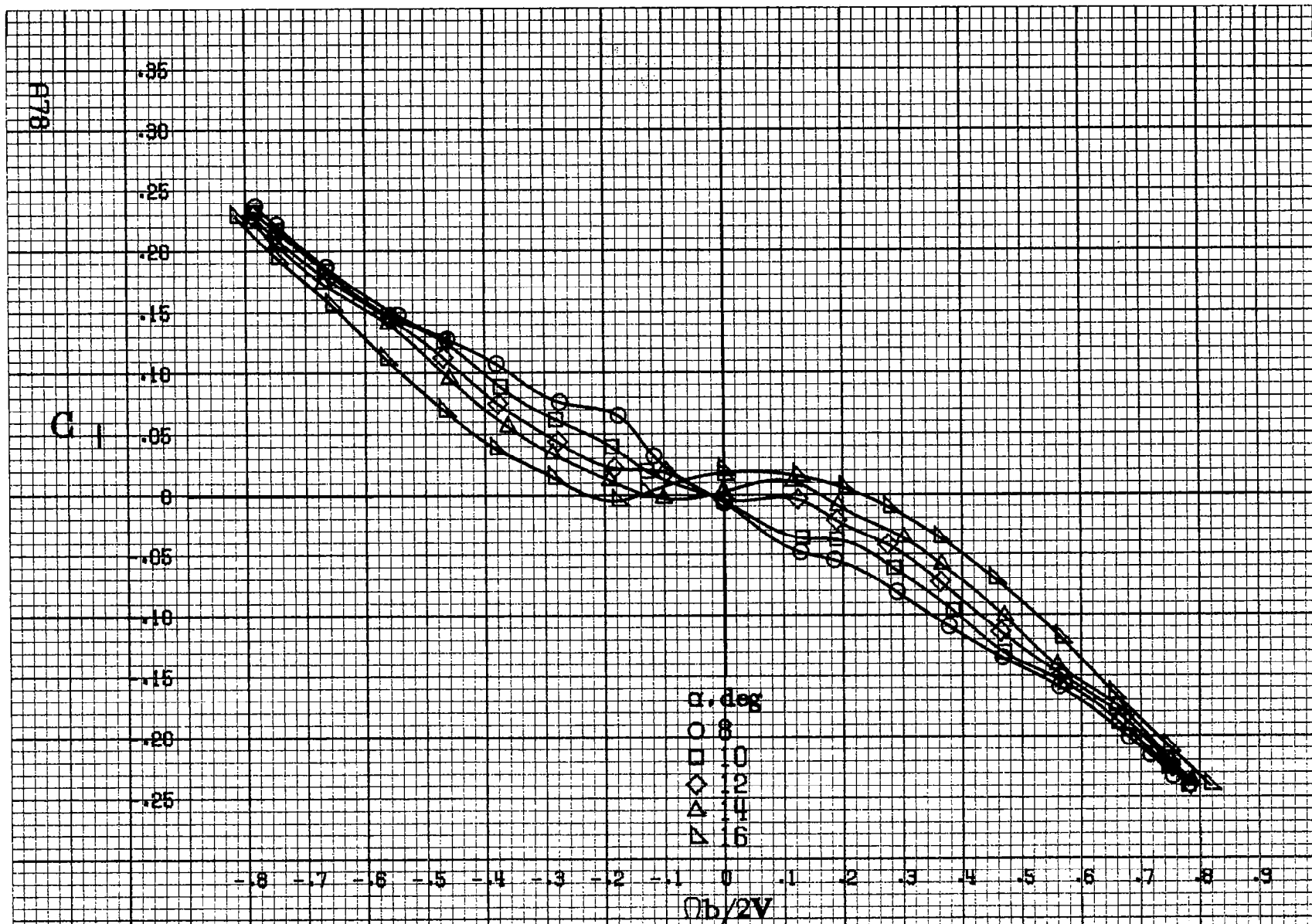


(c) $\alpha=30$ to 50 deg. $SR=0$.
 Figure A19. Continued.



(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A19. Concluded.

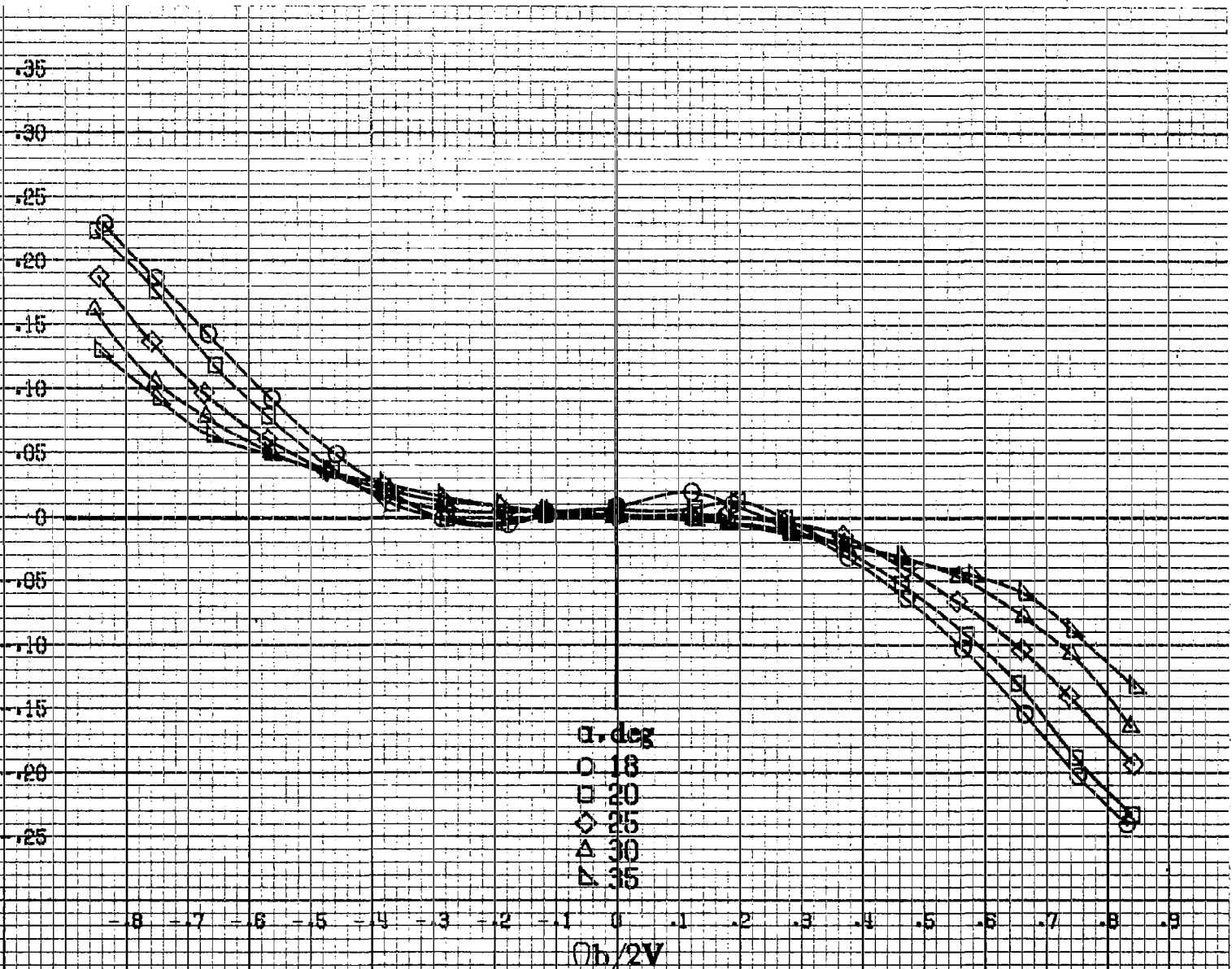
877



(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A20.—Effect of rotation rate and angle of attack on rolling-moment coefficient for basic configuration. $\delta_a = 23^\circ$, $\delta_s = 0^\circ$, $\delta_c = -25^\circ$, $B = 0^\circ$.

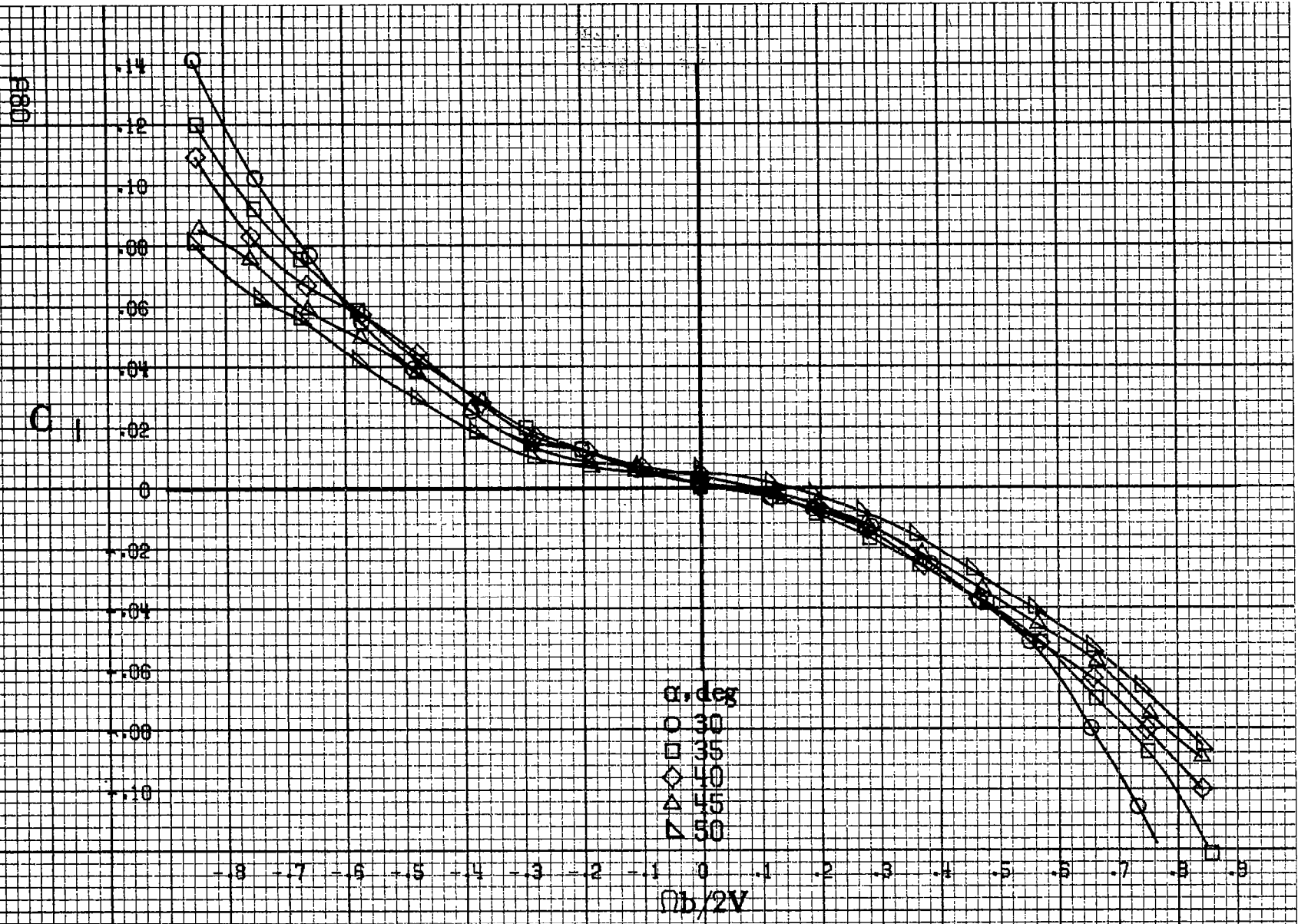
C₁



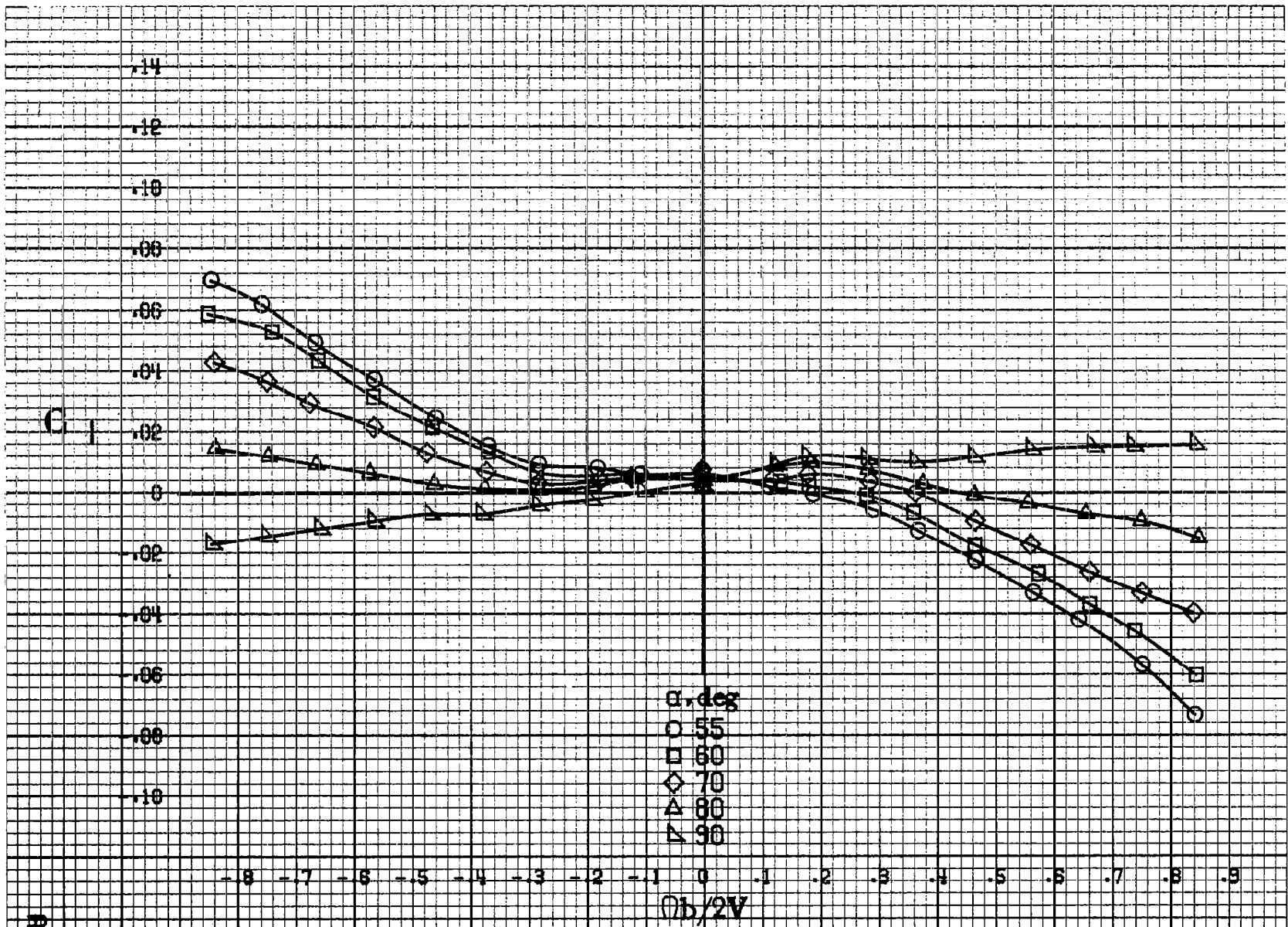
alpha, deg
O 18
□ 20
◇ 25
△ 30
▽ 35

879

(b) $\alpha=18$ to 35 deg, SR=99cm(39in).
Figure A20, Continued.

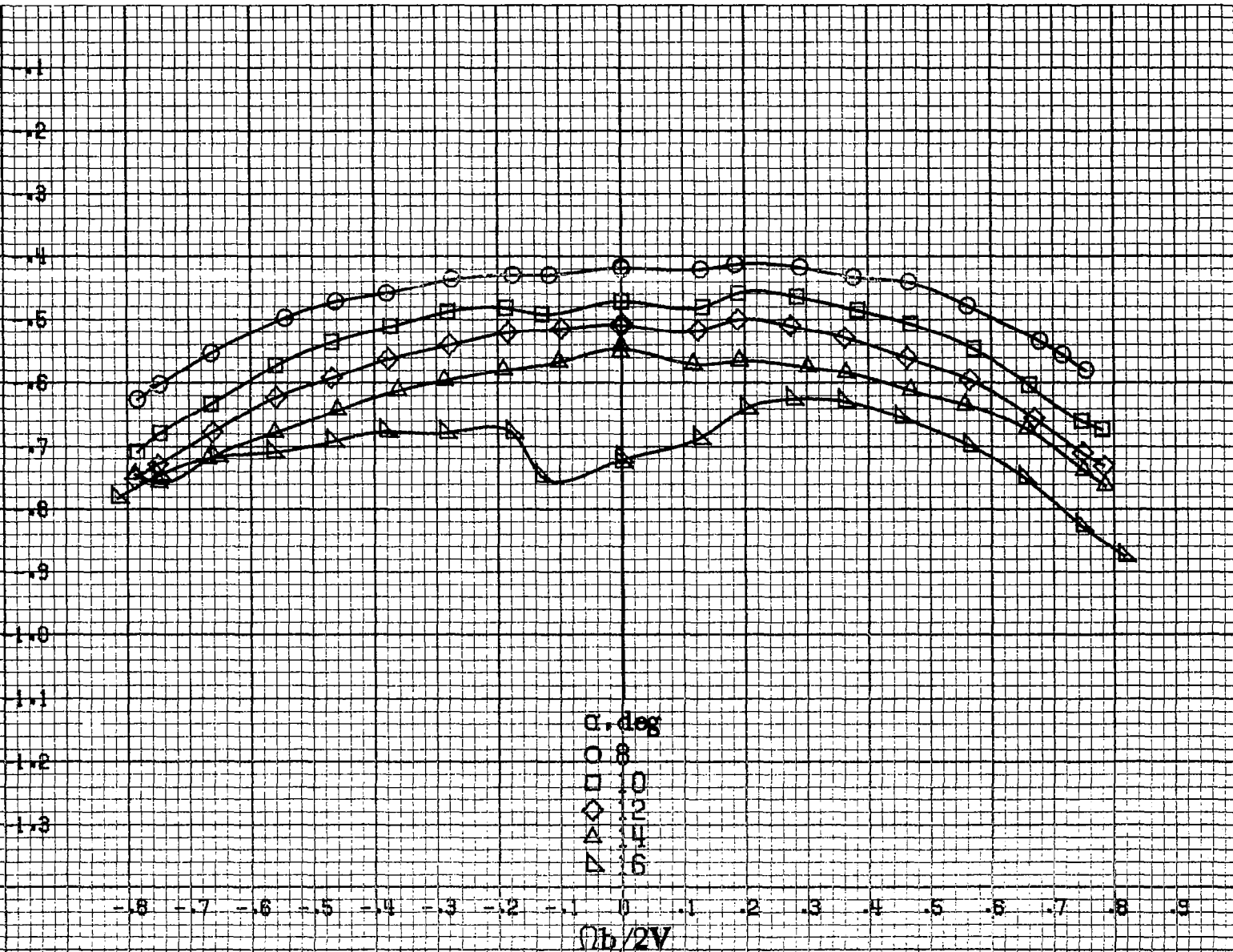


(c) $\alpha=30$ to 50 deg. $SR=0$.
 Figure A20. Continued.



(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A20. Concluded.

C_m



(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A21. Effect of rotation rate and angle of attack on pitching-moment coefficient for basic configuration. $\delta_a = 23^\circ$, $\delta_n = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.

C_m

-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2

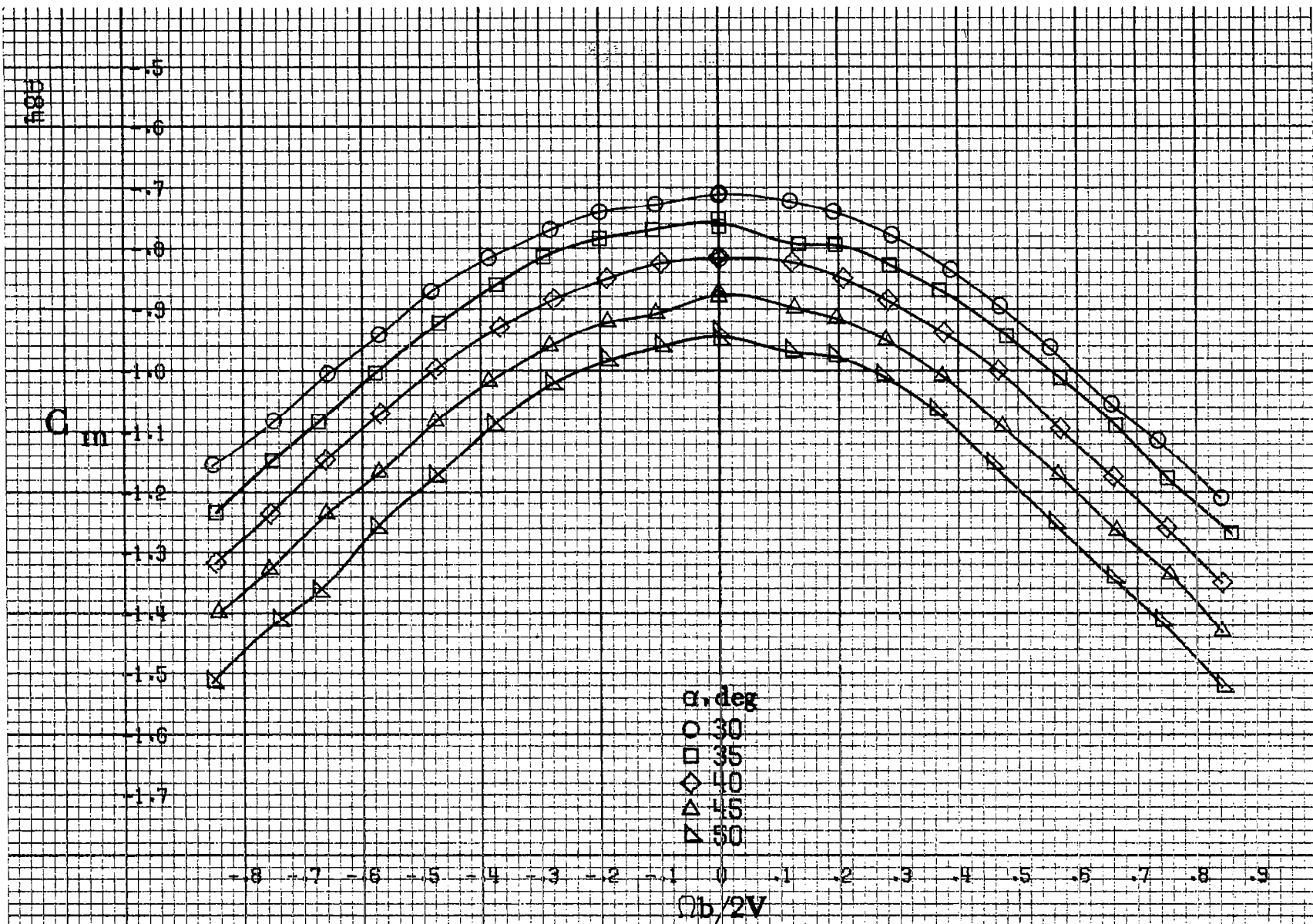
-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$\Omega b/2V$

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

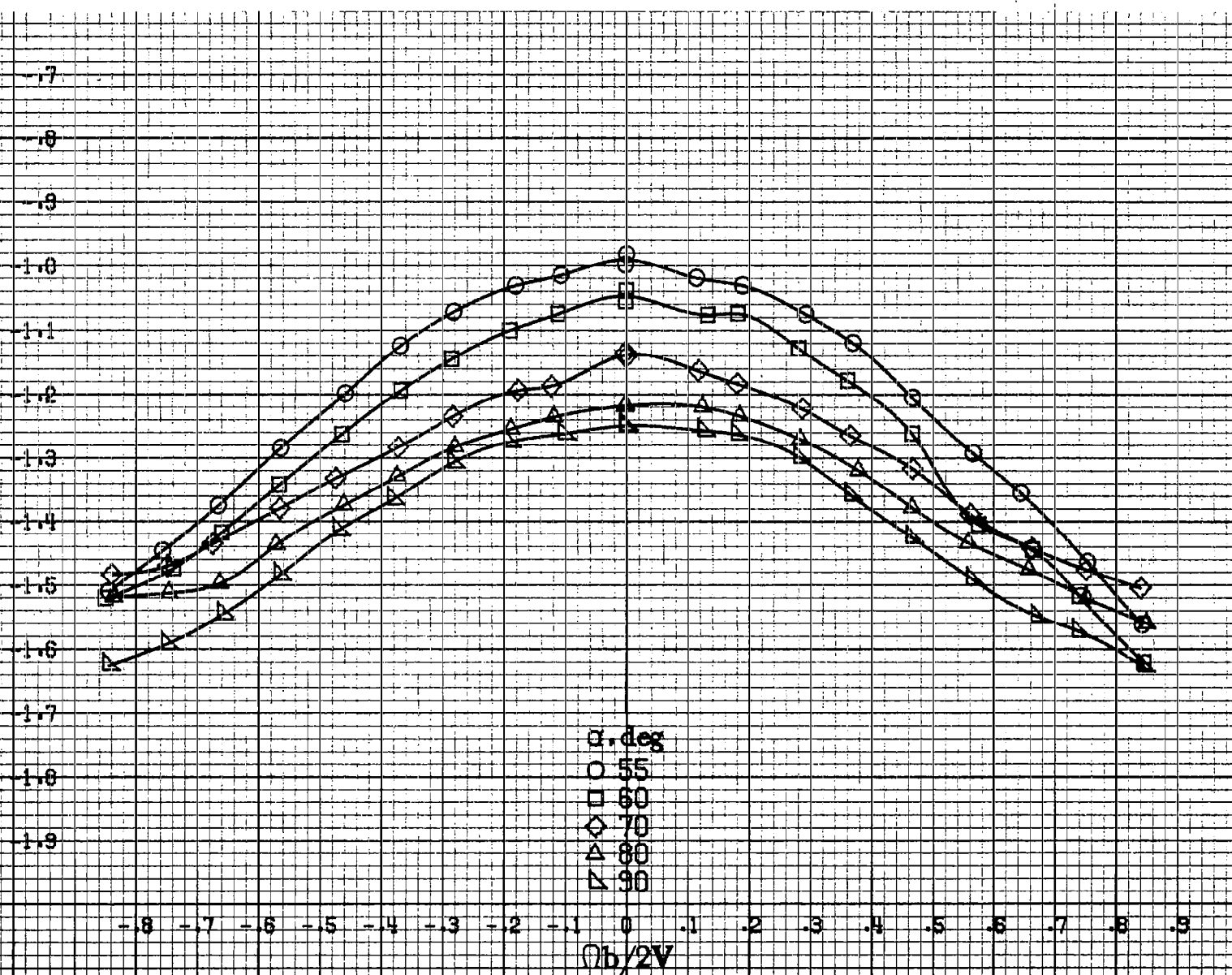
885

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A21. Continued.



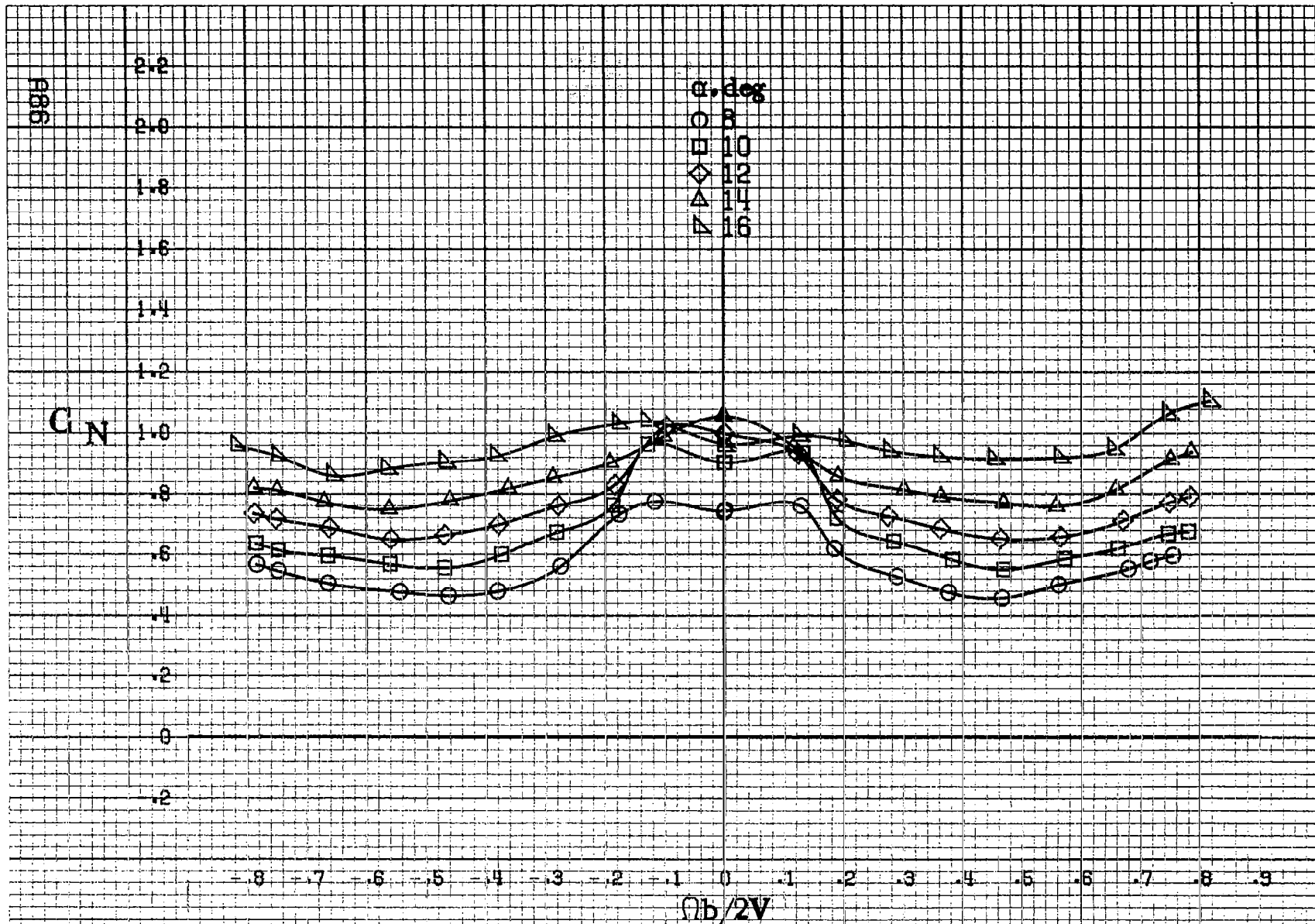
(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A21. Continued.

C_m



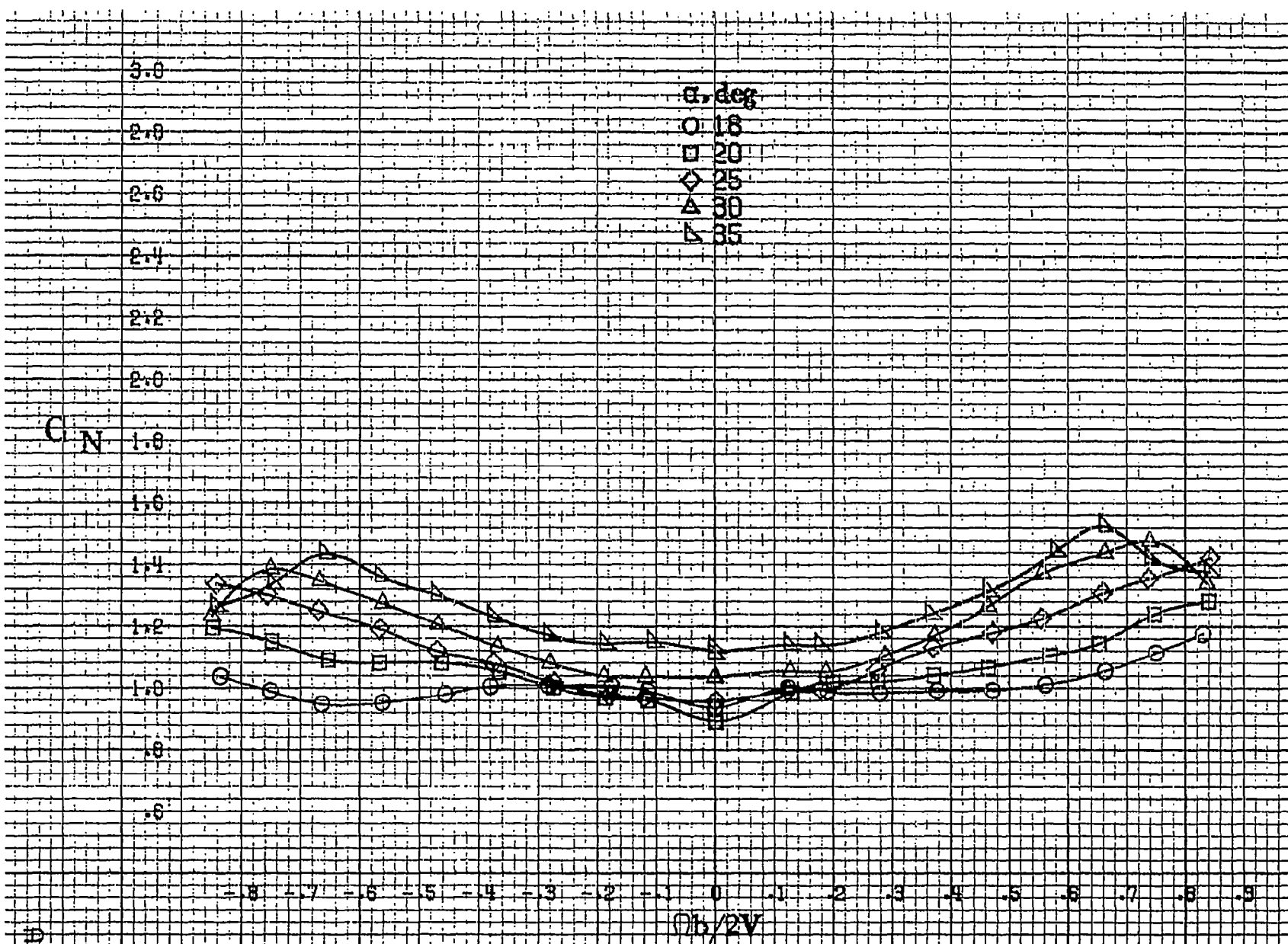
835

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A21. Concluded.



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A22.-Effect of rotation rate and angle of attack on normal-force coefficient for basic configuration. $\delta_a = 23^\circ$, $\delta_s = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.



180

(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A22, Continued.

888

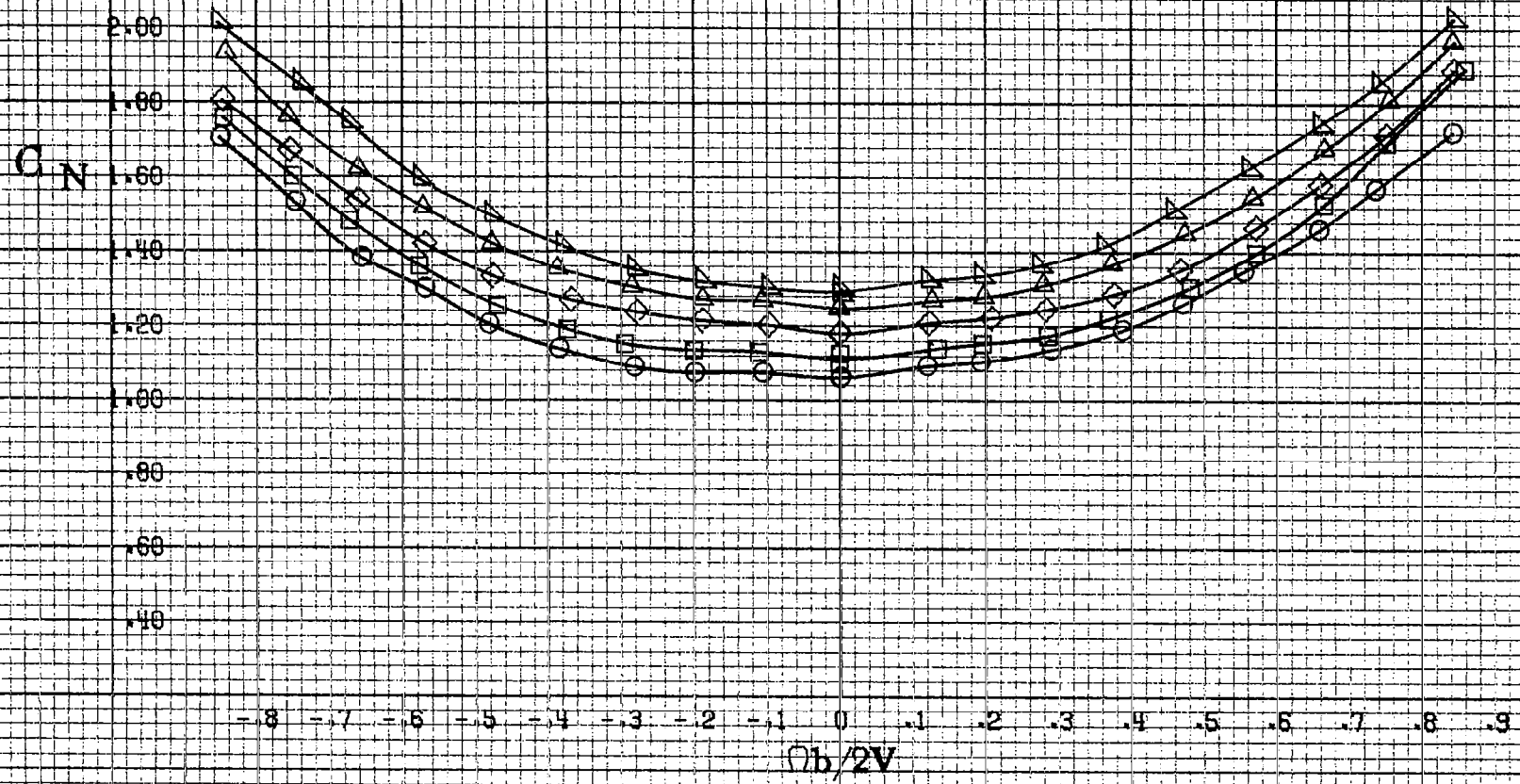
C_N

2.80
2.60
2.40
2.20
2.00
1.80
1.60
1.40
1.20
1.00
.80
.60
.40

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\Omega b/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A22. Continued.



C_N

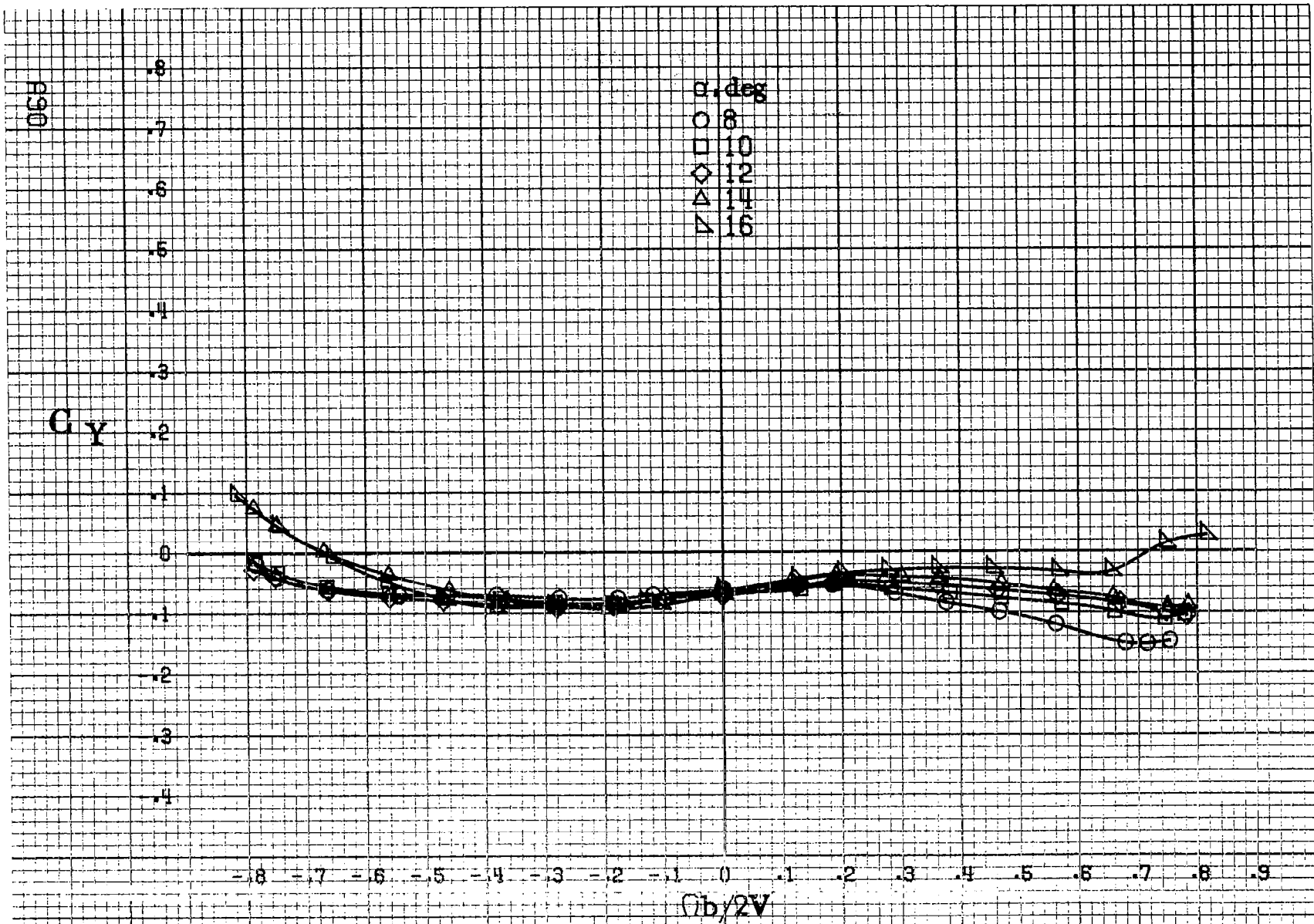
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6

α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\Omega b/2V$

FIG 9

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A22. Continued.



(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A23. Effect of rotation rate and angle of attack on side-force coefficient for basic configuration. $\delta_a = 23^\circ$, $\delta_s = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.

C_y

0
-1
-2
-3
-4
-5
-6
-7
-8

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$\Omega b/2V$

A91

(b) $\alpha=18$ to 35 deg. $SR=99$ cm (39 in).
Figure A23. Continued.

R92

C_Y

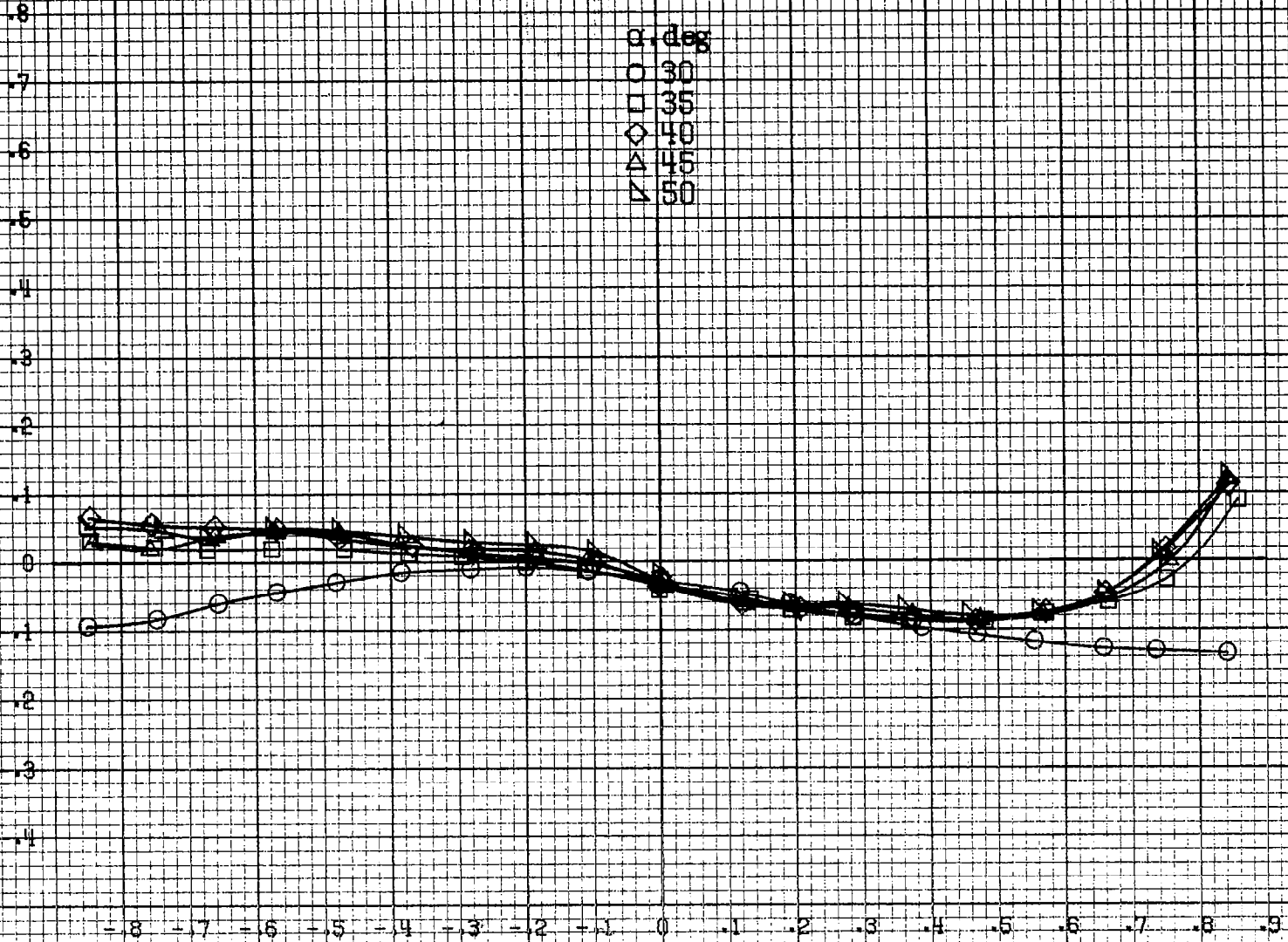
0
1
2
3
4
5
6
7
8

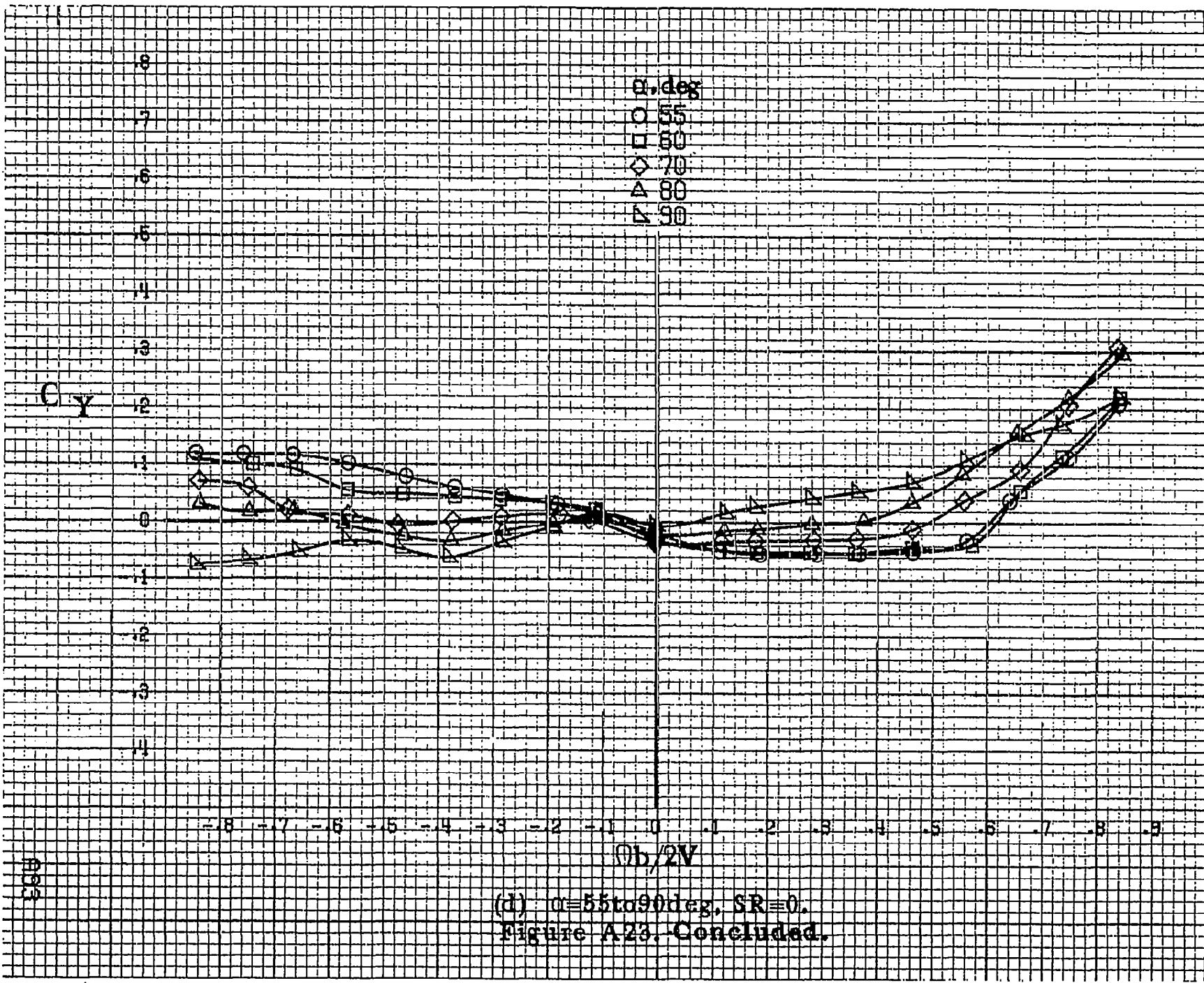
α , deg
 ○ 30
 □ 35
 ◇ 40
 △ 45
 ▽ 50

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

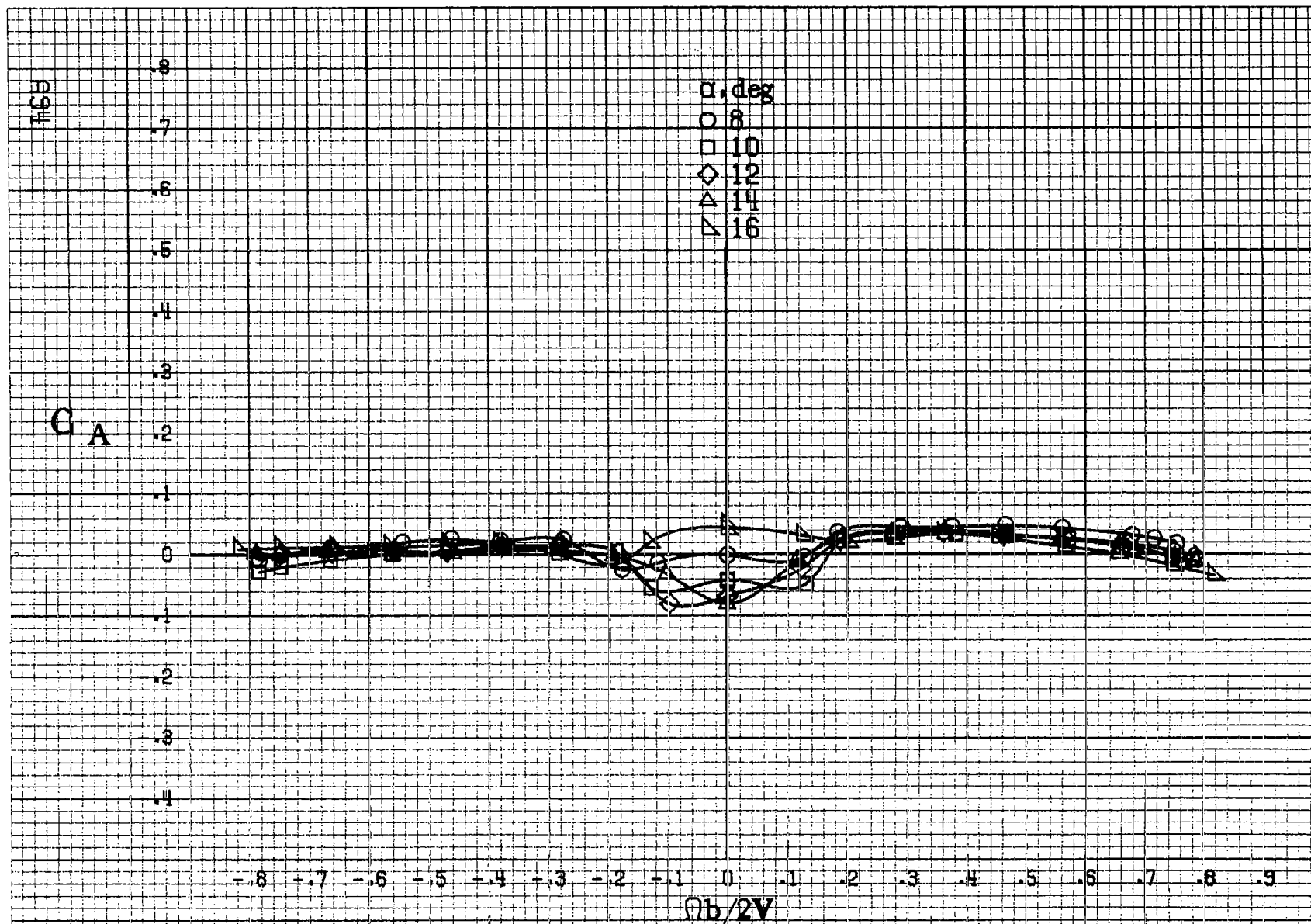
$Ob/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A23. Continued.



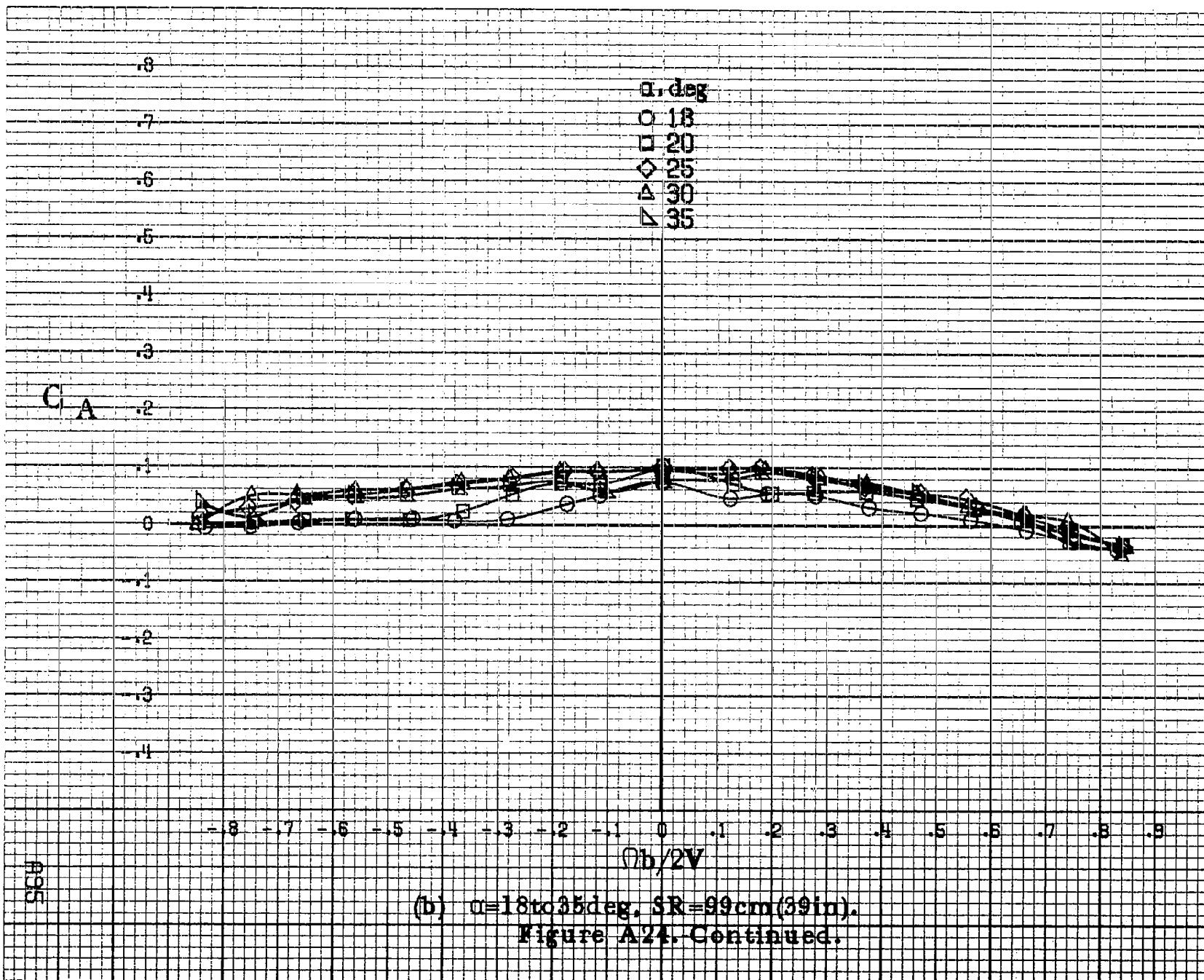


(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A23. Concluded.



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A24. Effect of rotation rate and angle of attack on axial-force coefficient for basic configuration. $\delta_a = 23^\circ$, $\delta_s = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.



9696

C_A

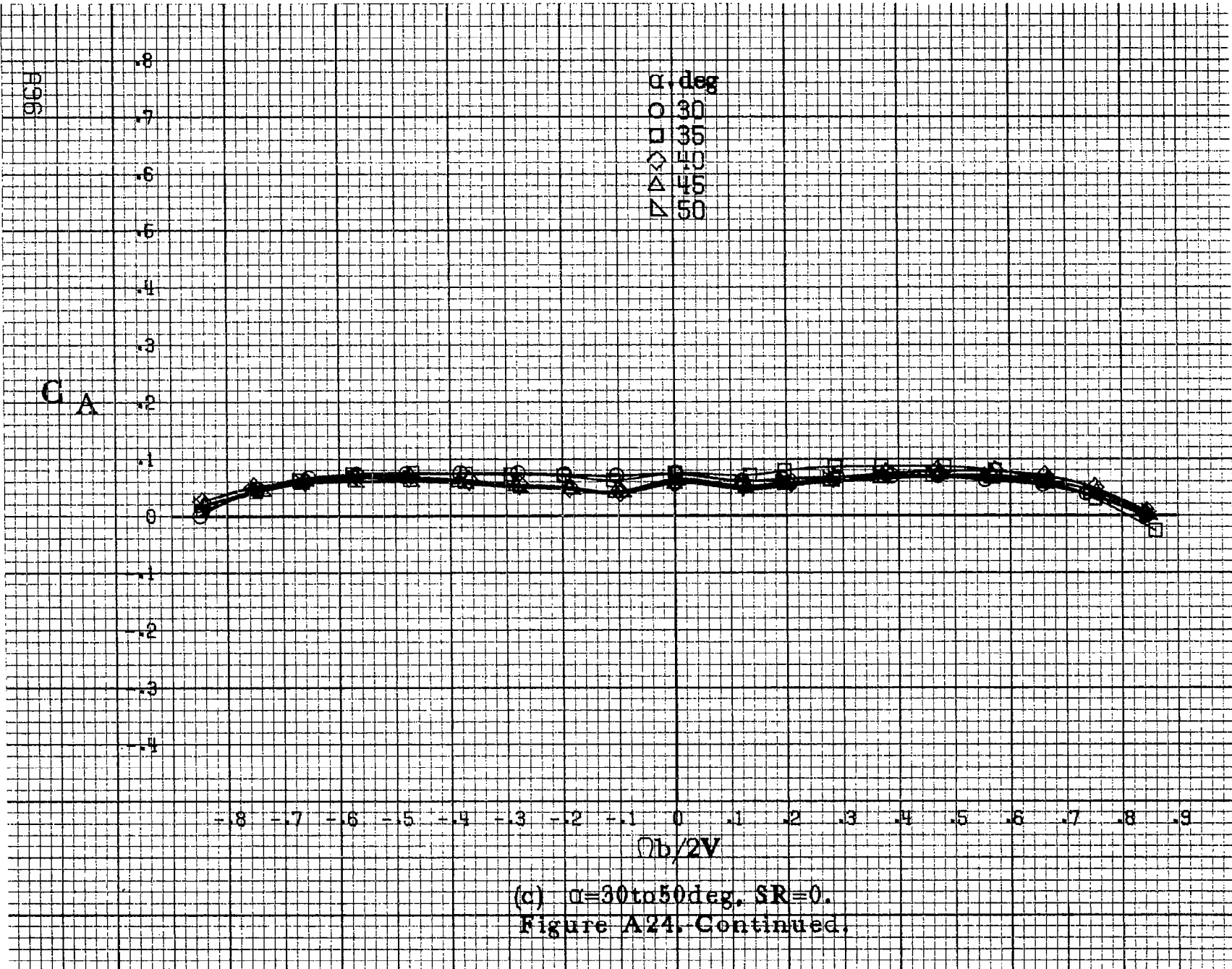
.8
.7
.6
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4

α , deg
 ○ 30
 □ 35
 ◇ 40
 △ 45
 ▽ 50

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$Ob/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A24. Continued.



C.A

8
7
6
5
4
3
2
1
0
-1
-2
-3
-4

α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$\Omega b/2V$

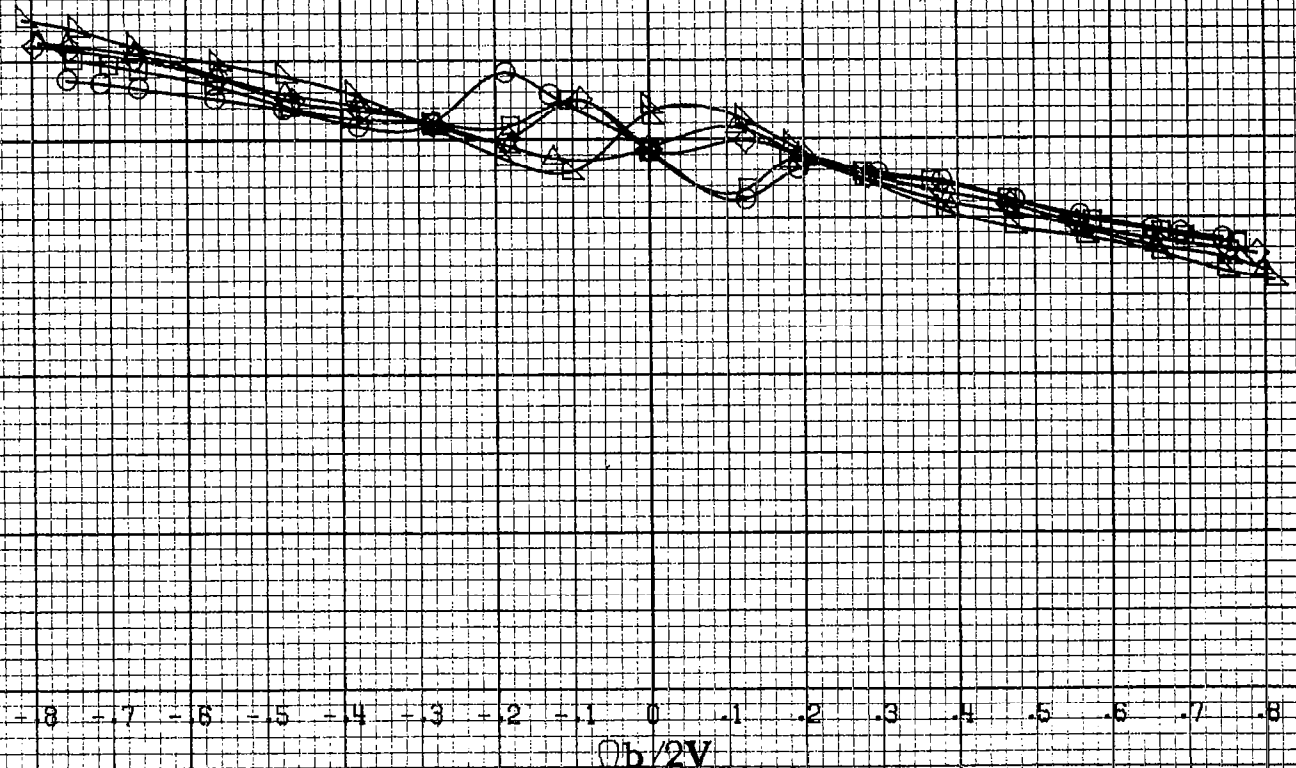
(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A24. Concluded.

E98

C_n

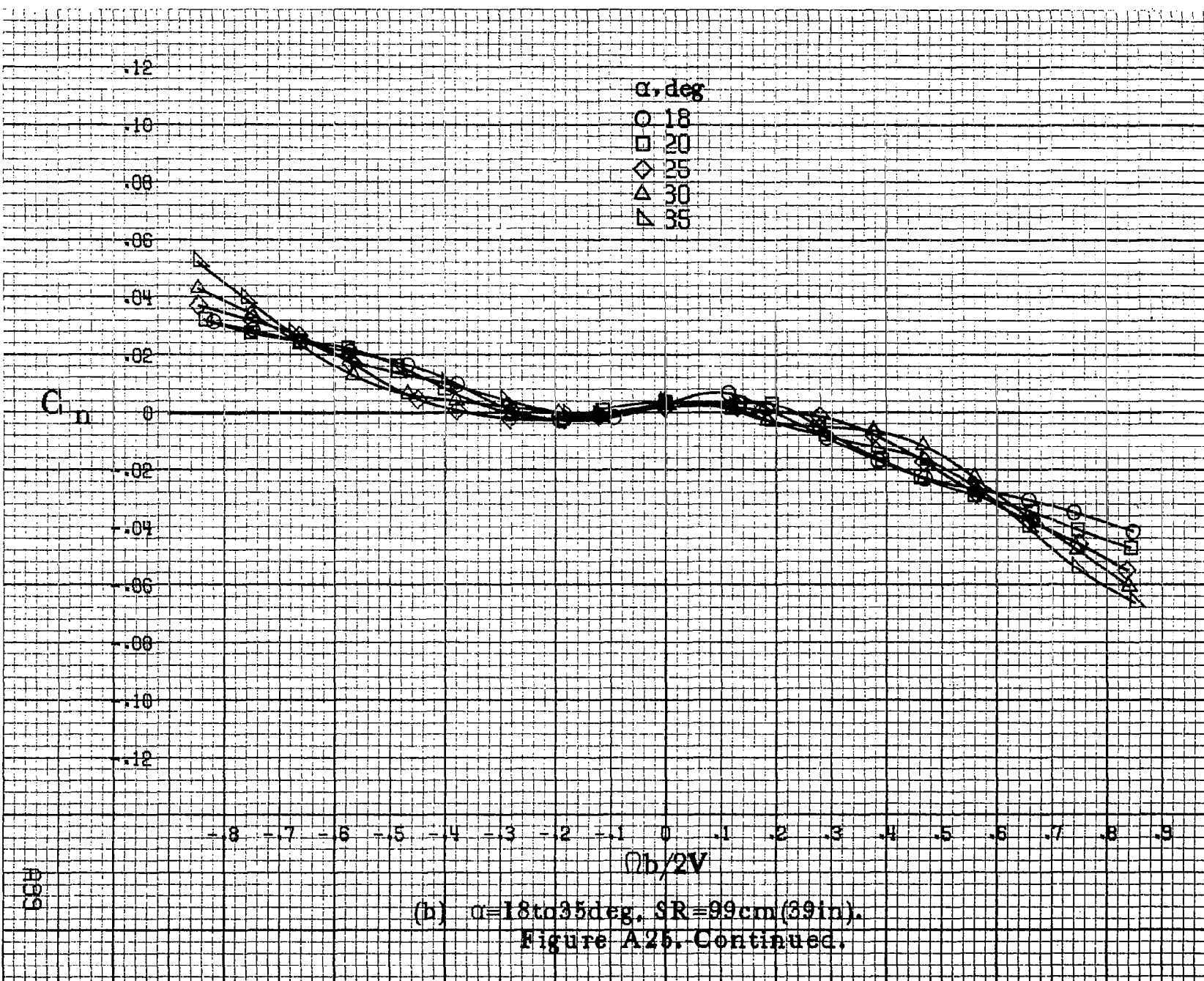
-0.12
-0.10
-0.08
-0.06
-0.04
0
0.02
0.04
0.06
0.08
0.10
0.12

α , deg
 ○ 8
 □ 10
 ◇ 12
 △ 14
 ▽ 16



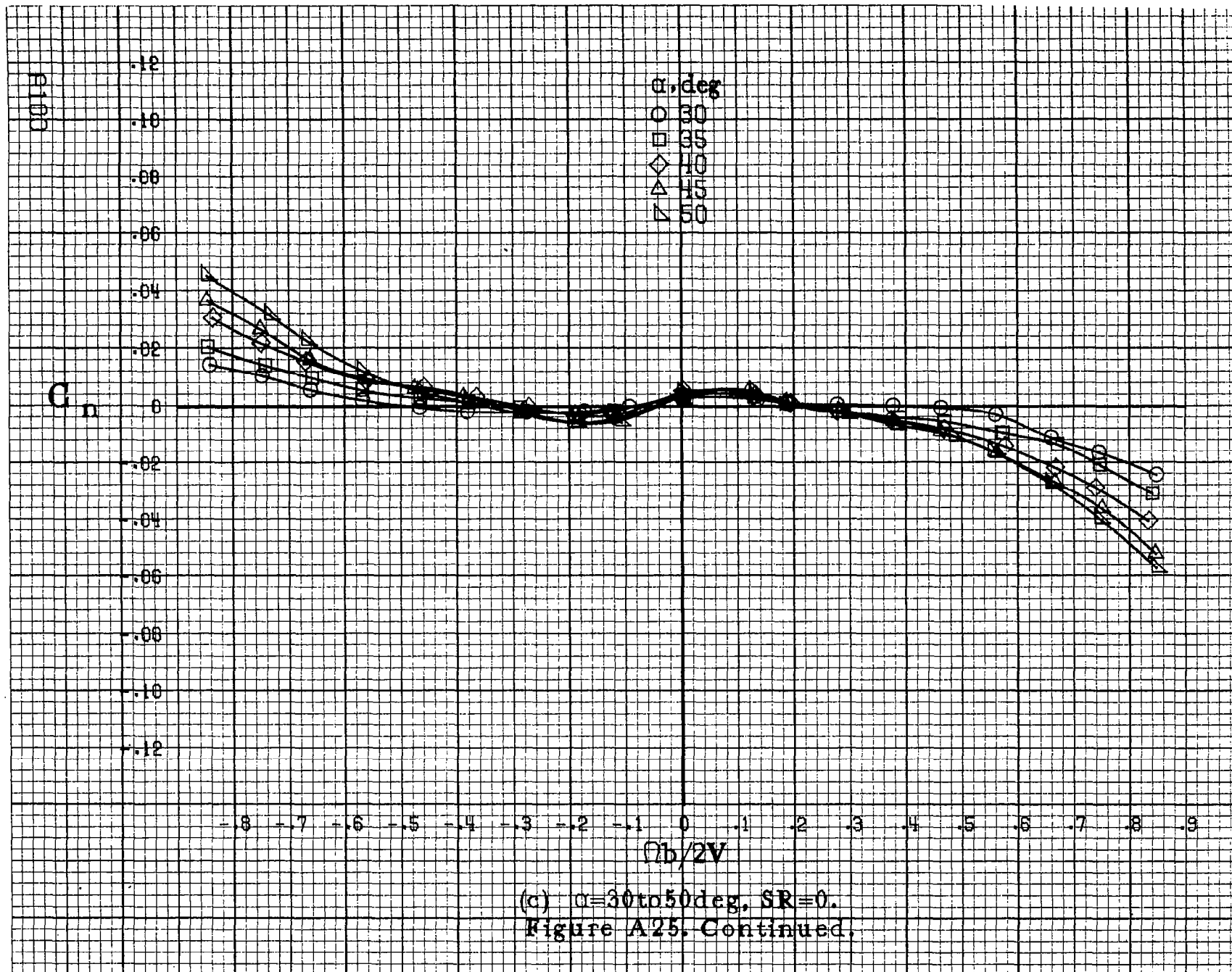
(a) $\alpha=8$ to 16 deg, SR=99cm (39in).

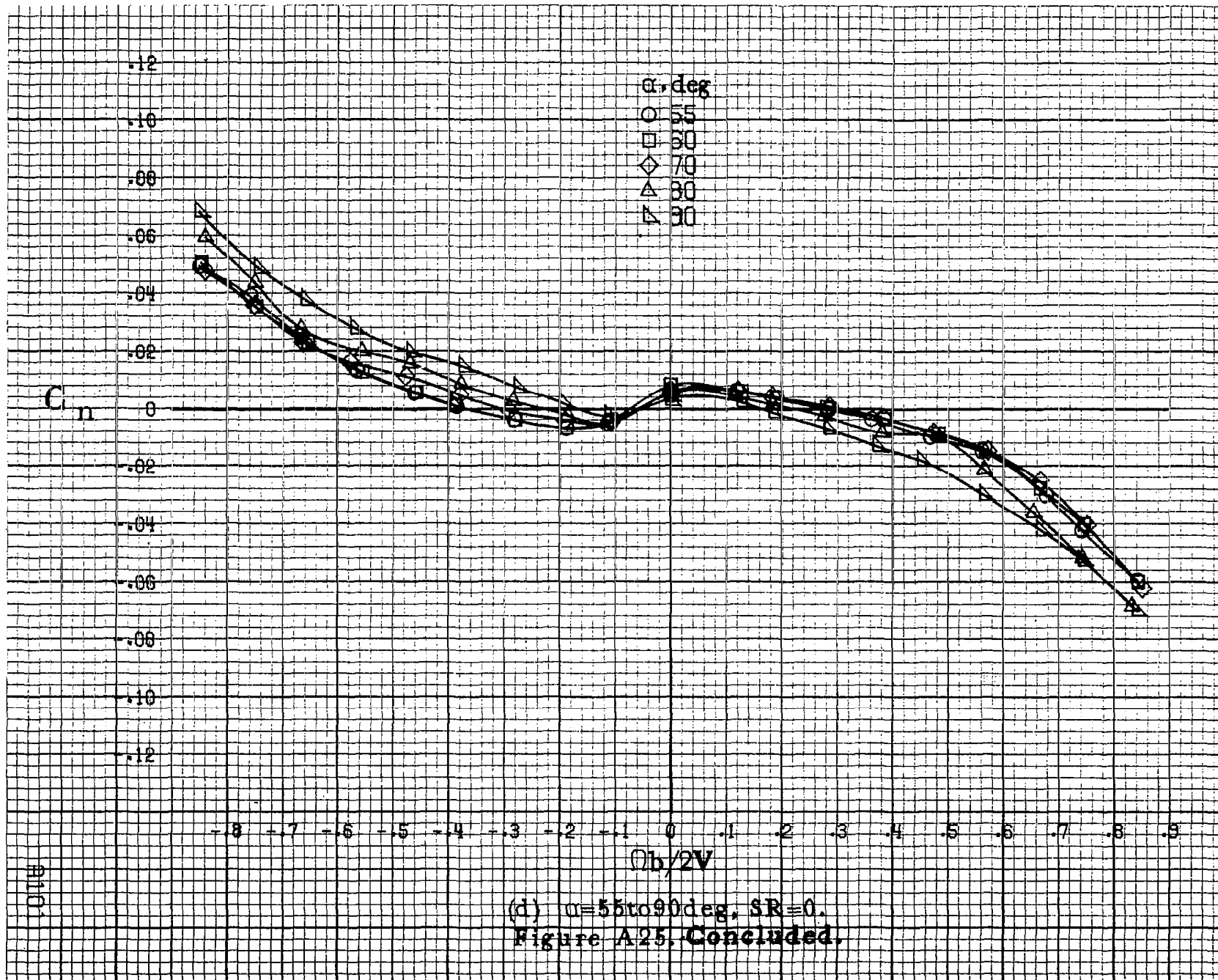
Figure A25. Effect of rotation rate and angle of attack on yawing moment coefficient for no. 1 horizontal tail configuration. $\delta_a \pm 0^\circ$, $\delta_z \pm 0^\circ$, $\delta_r \pm 0^\circ$, $\delta \pm 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A25. Continued.

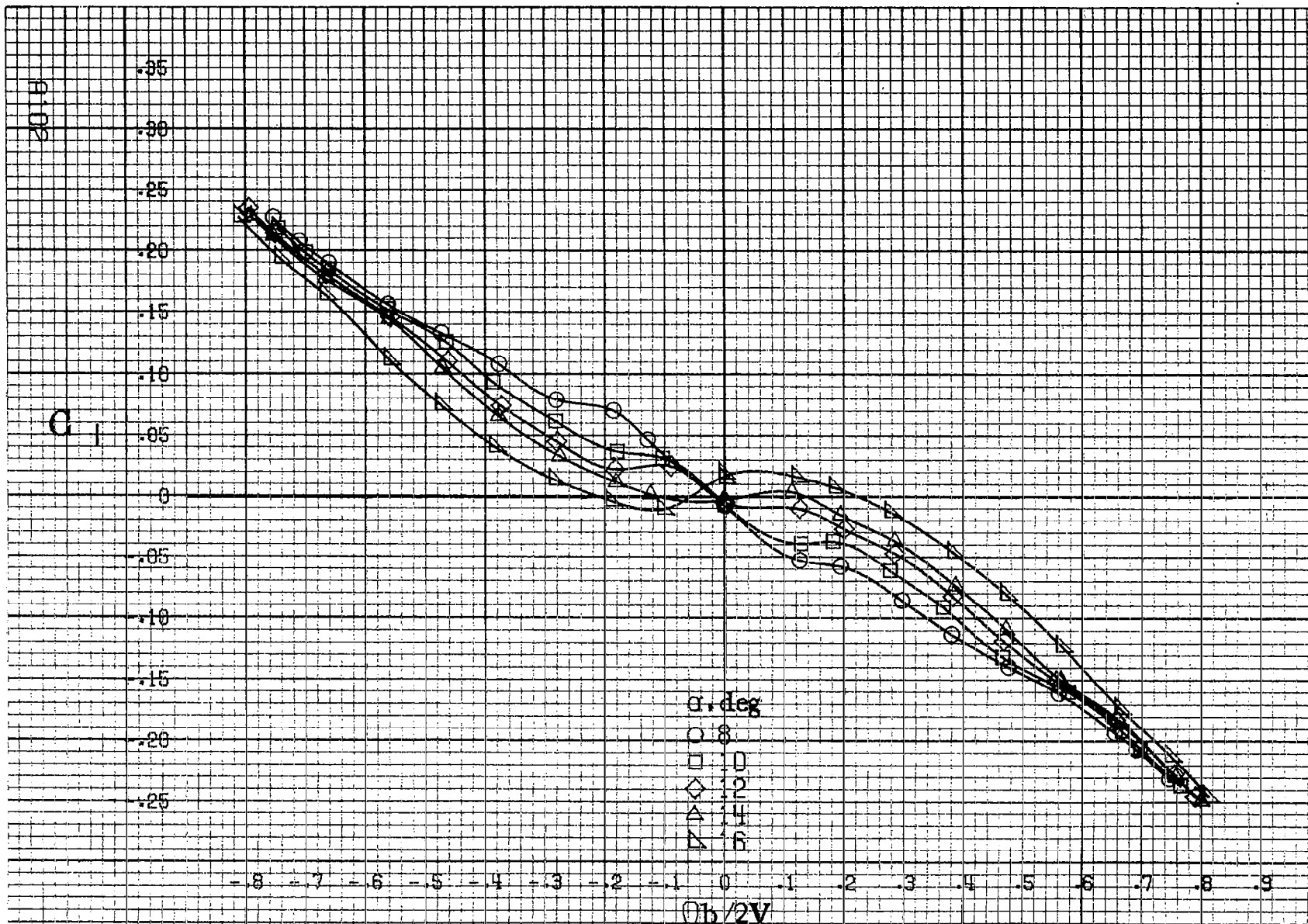
689





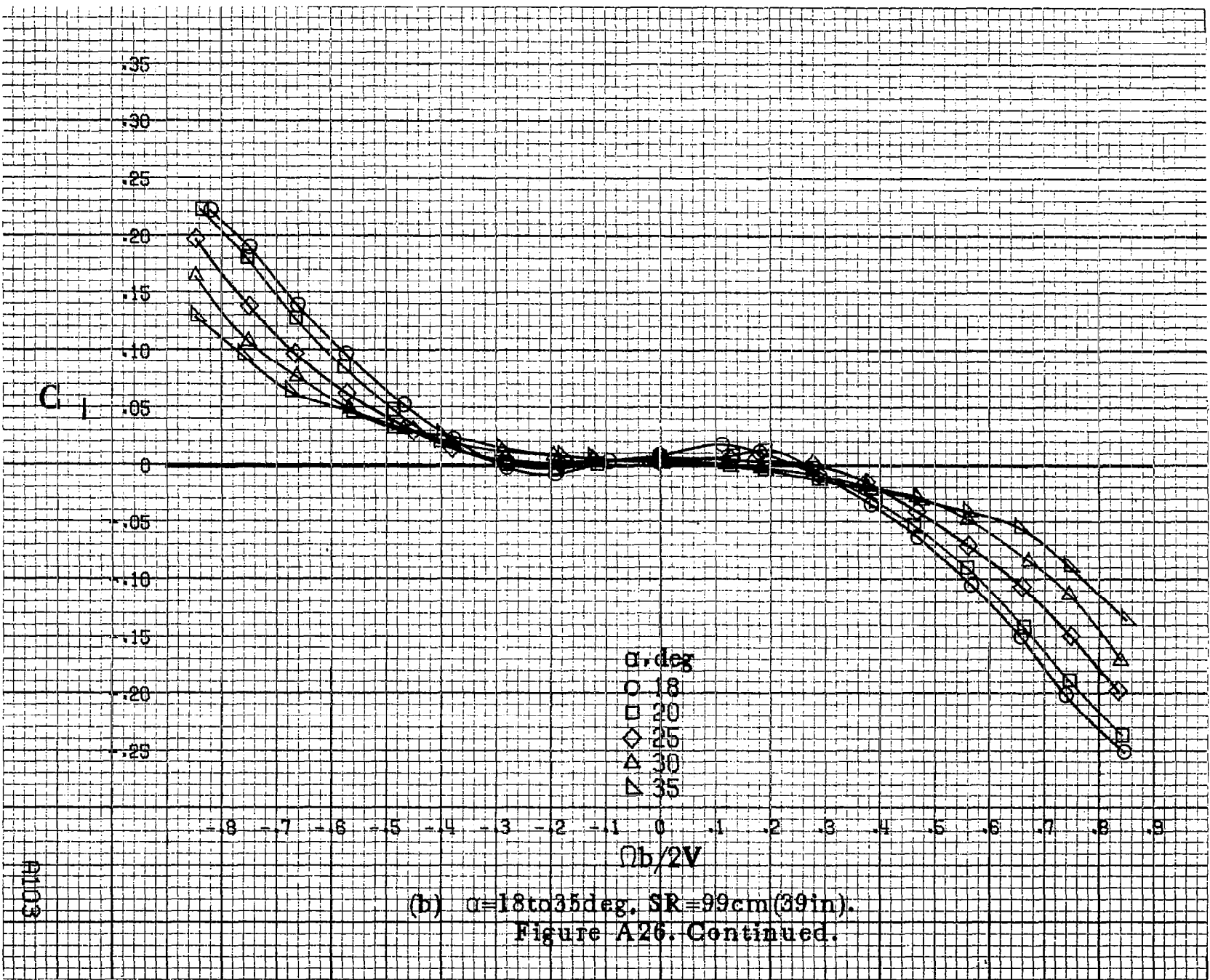
(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A25. **Concluded.**

#1101



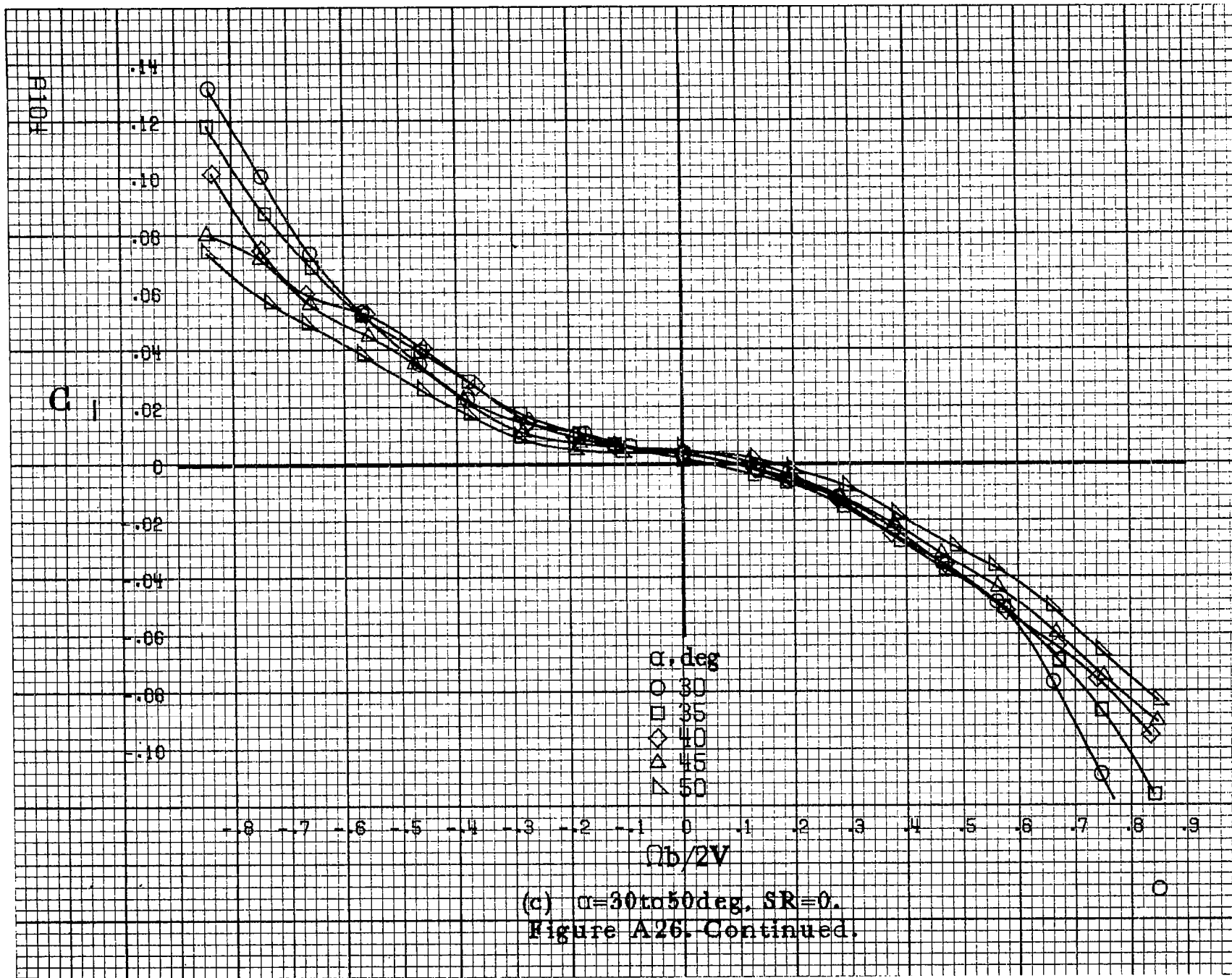
(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A26.-Effect of rotation rate and angle of attack on rolling-moment coefficient for no. 1 horizontal tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\delta = 0^\circ$.

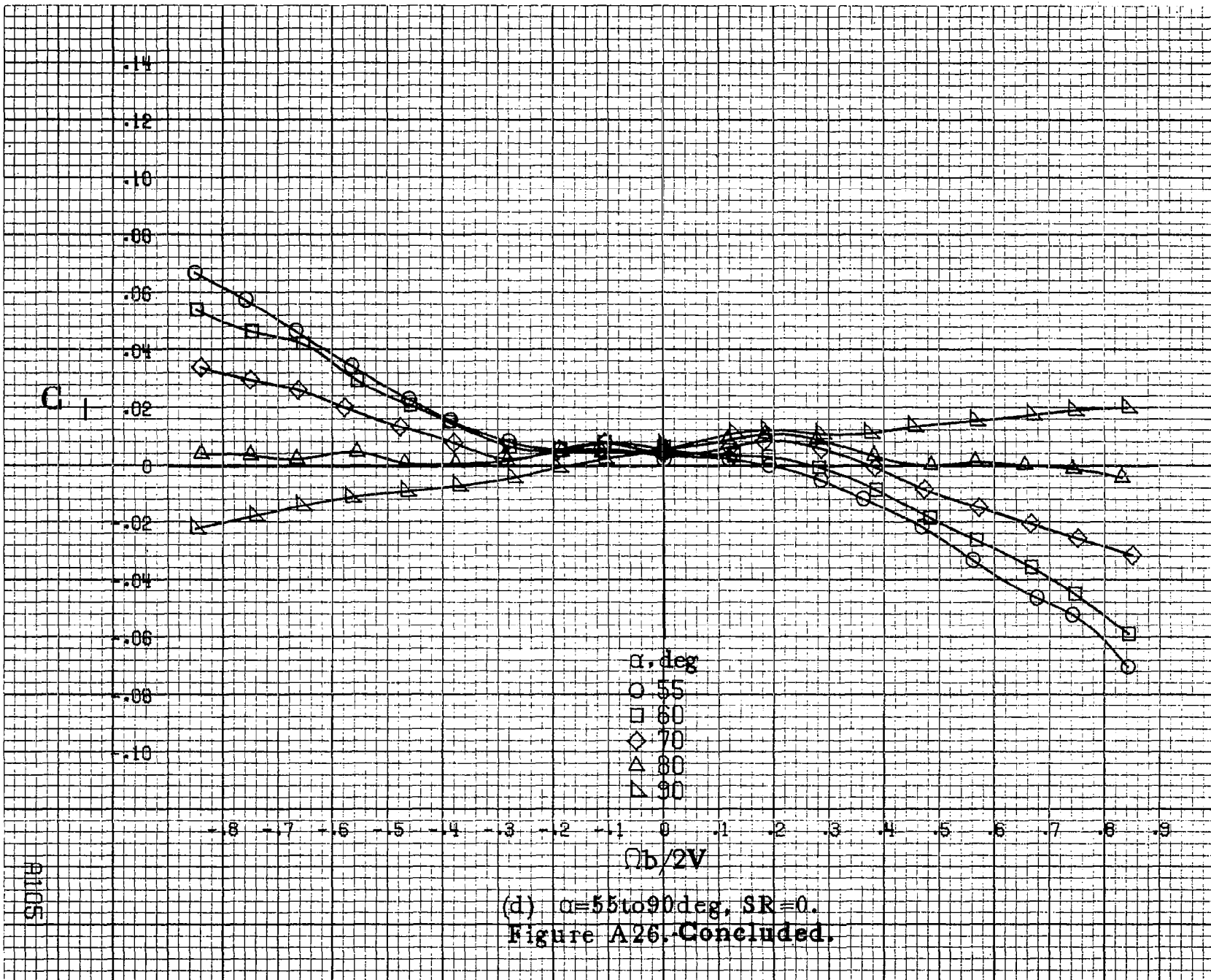


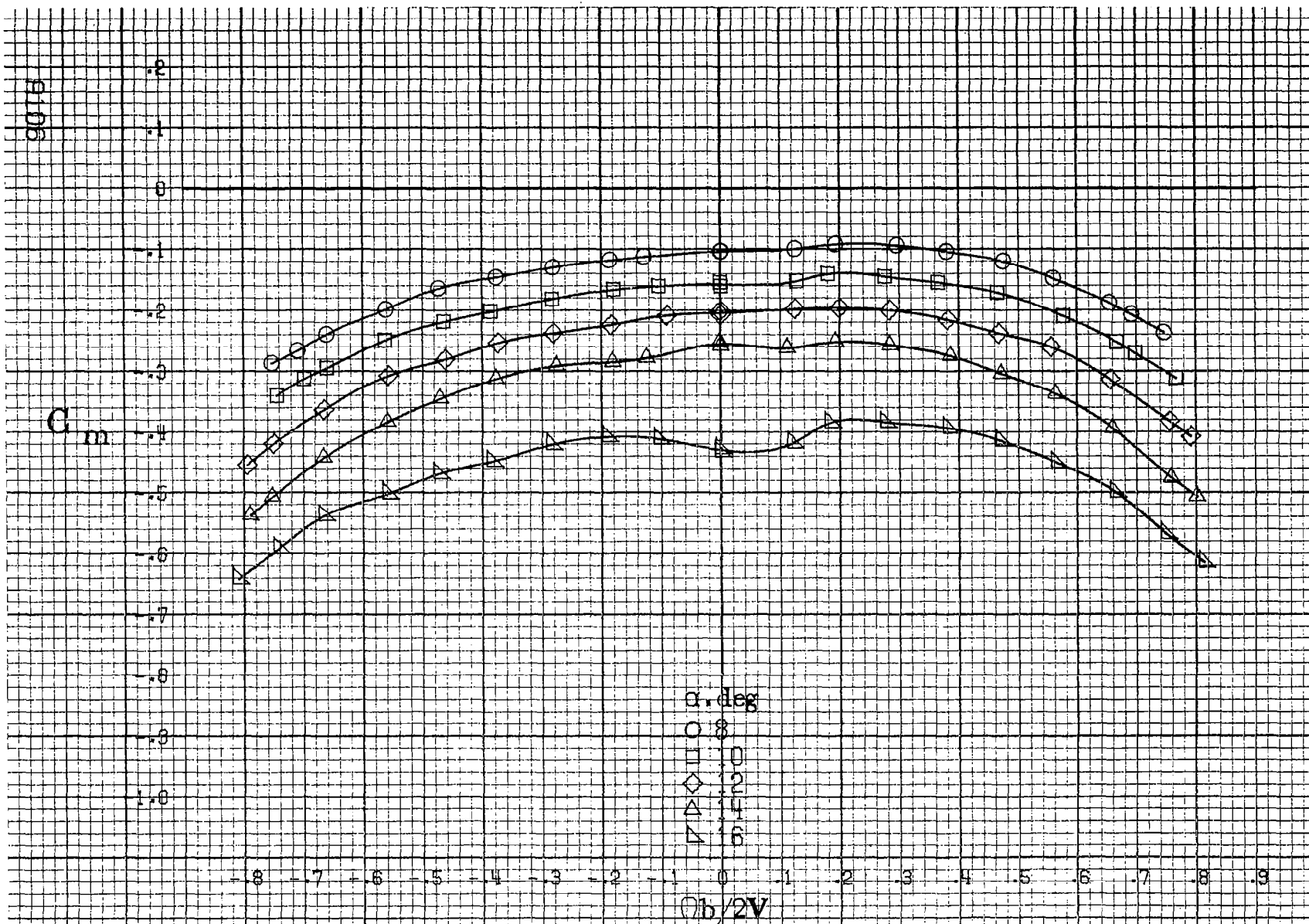
(b) $\alpha = 18$ to 35 deg. $SR = 99$ cm (39 in).
 Figure A26. Continued.

A103



(c) $\alpha = 30$ to 50 deg. $SR = 0$.
 Figure A26. Continued.

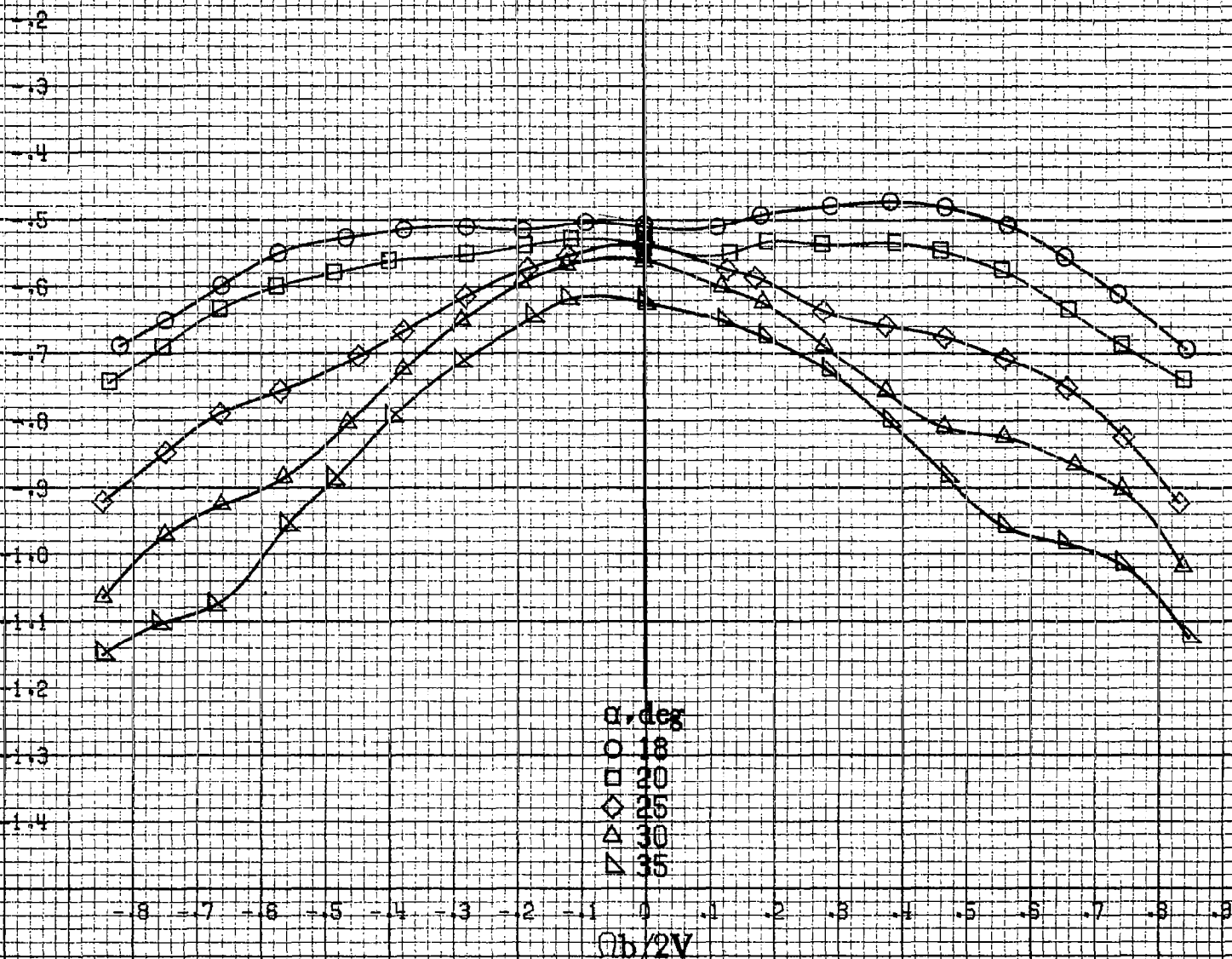




(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A27. Effect of rotation rate and angle of attack on pitching-moment coefficient for no. 1 horizontal tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\delta = 0^\circ$.

C_m



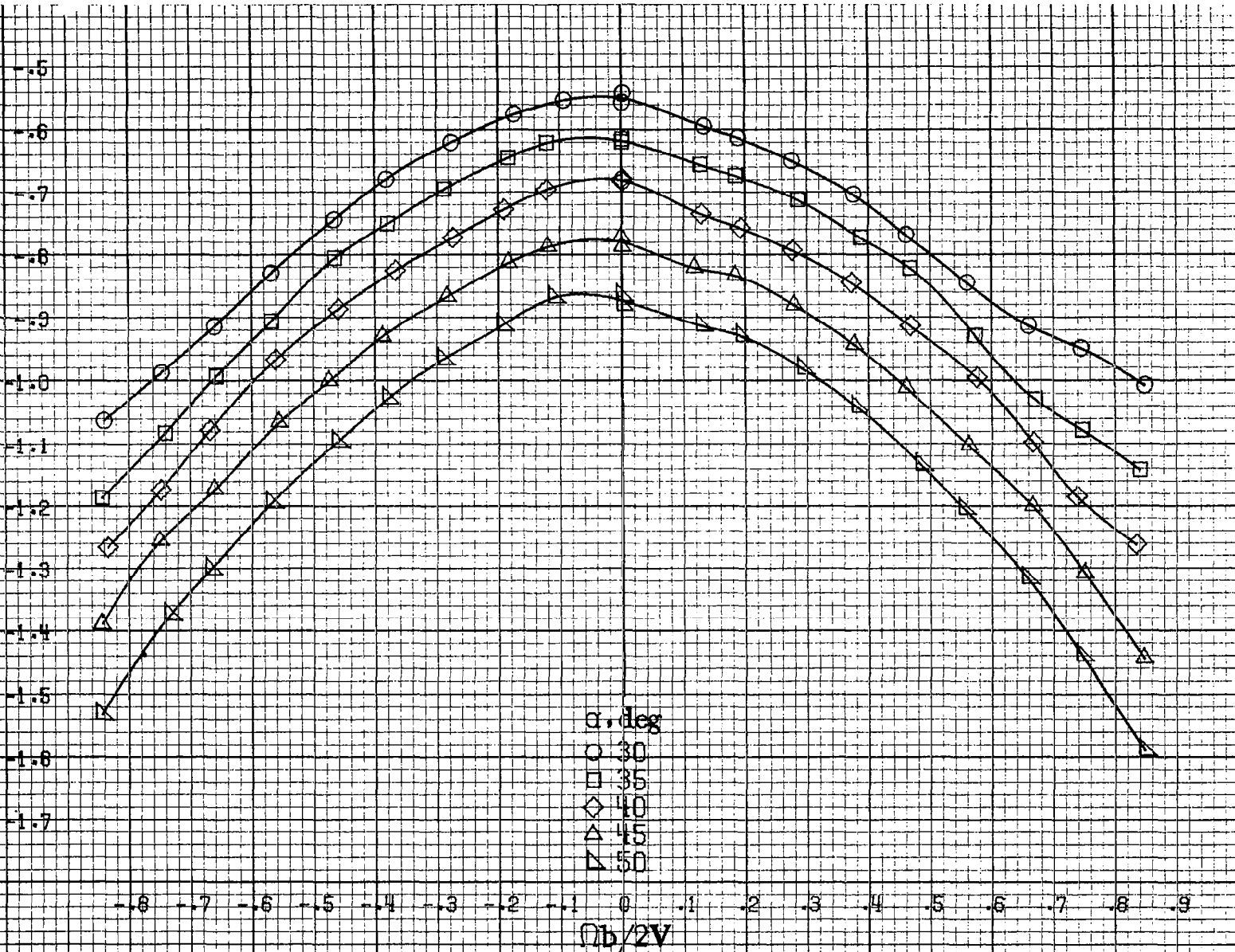
α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A27. Continued.

RI07

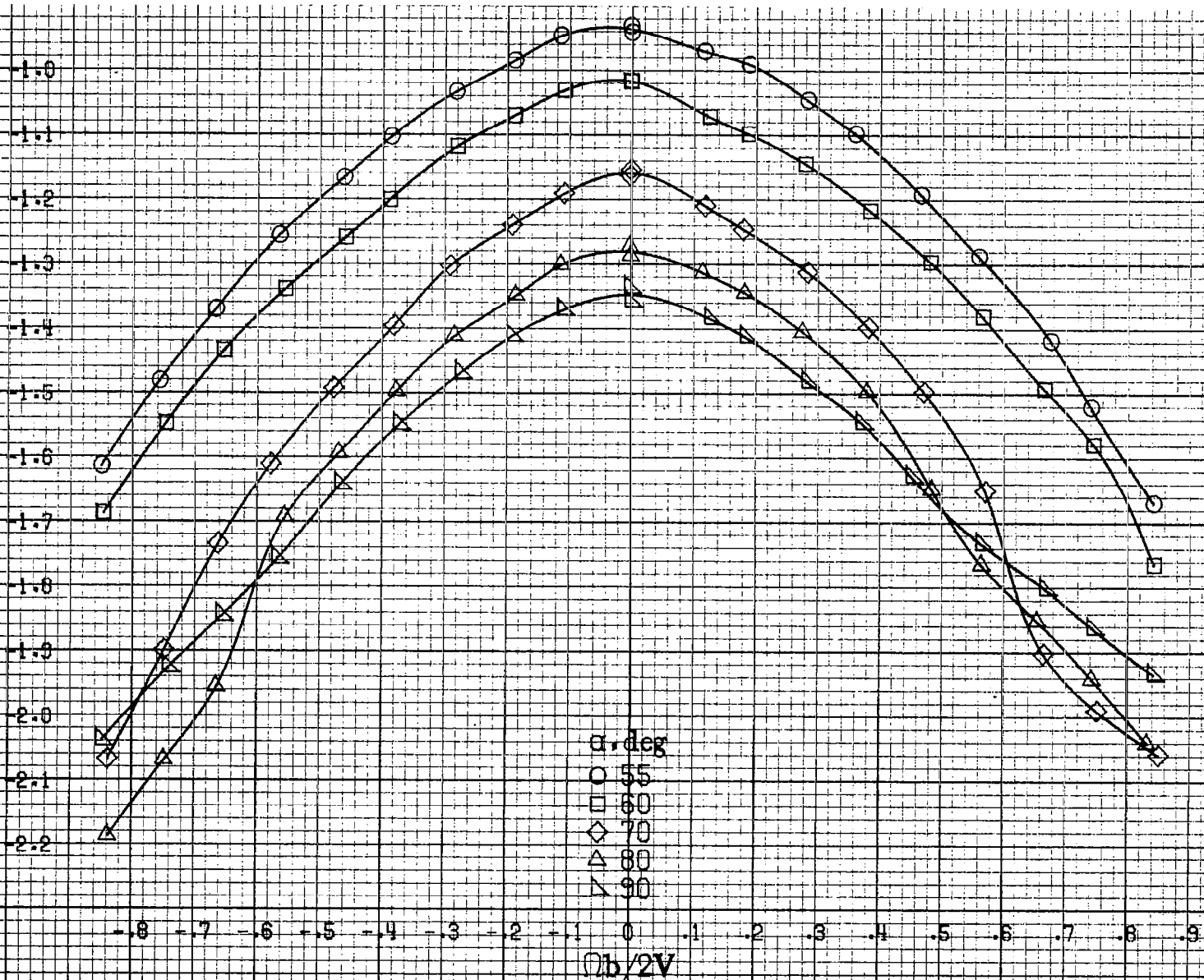
P108

G_m



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A27.-Continued.

C_m



α, deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

(d) $\alpha = 55$ to 90 deg, $SR = 0$.
Figure A27. Concluded.

9109

0115

C_N

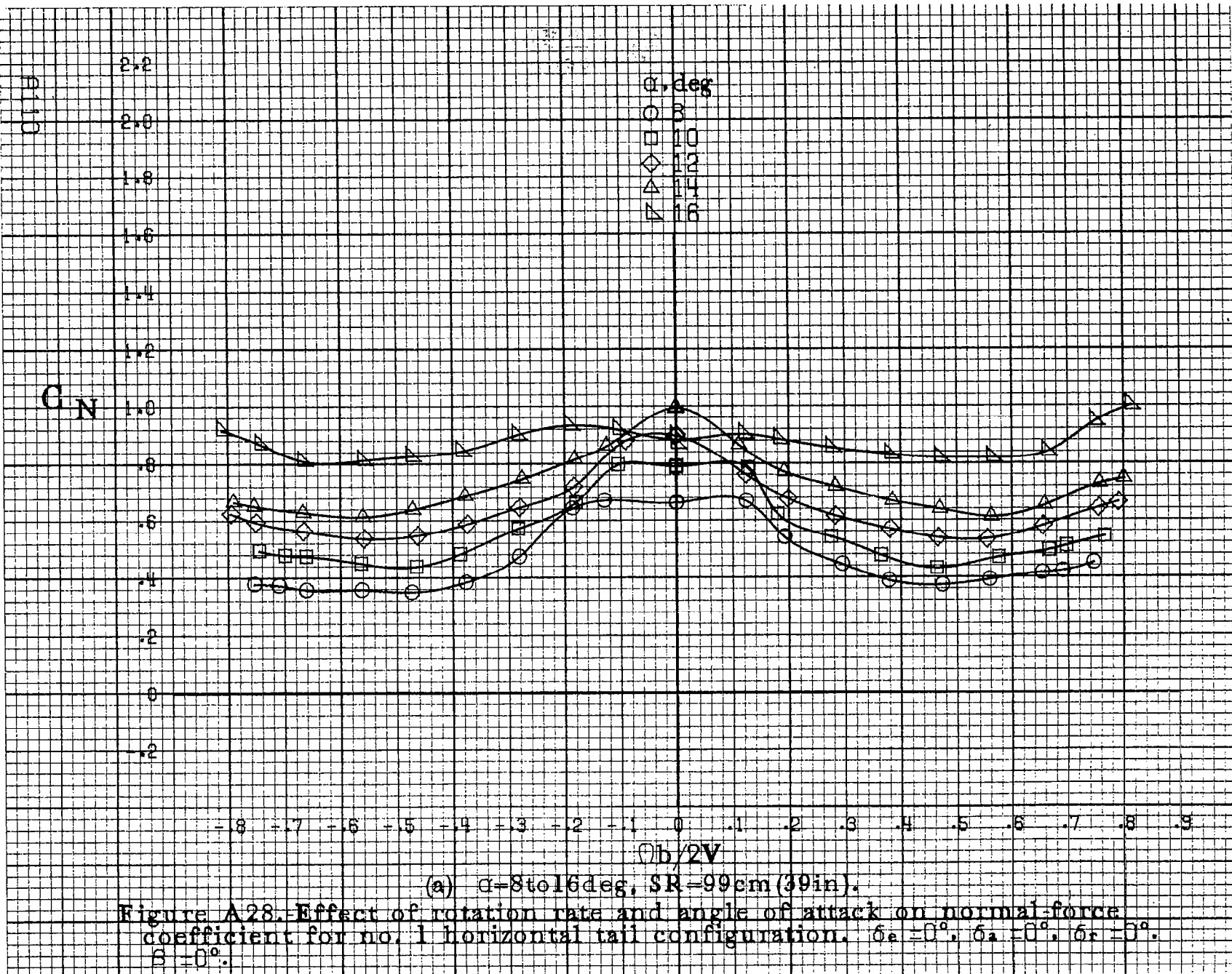
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
0
.2

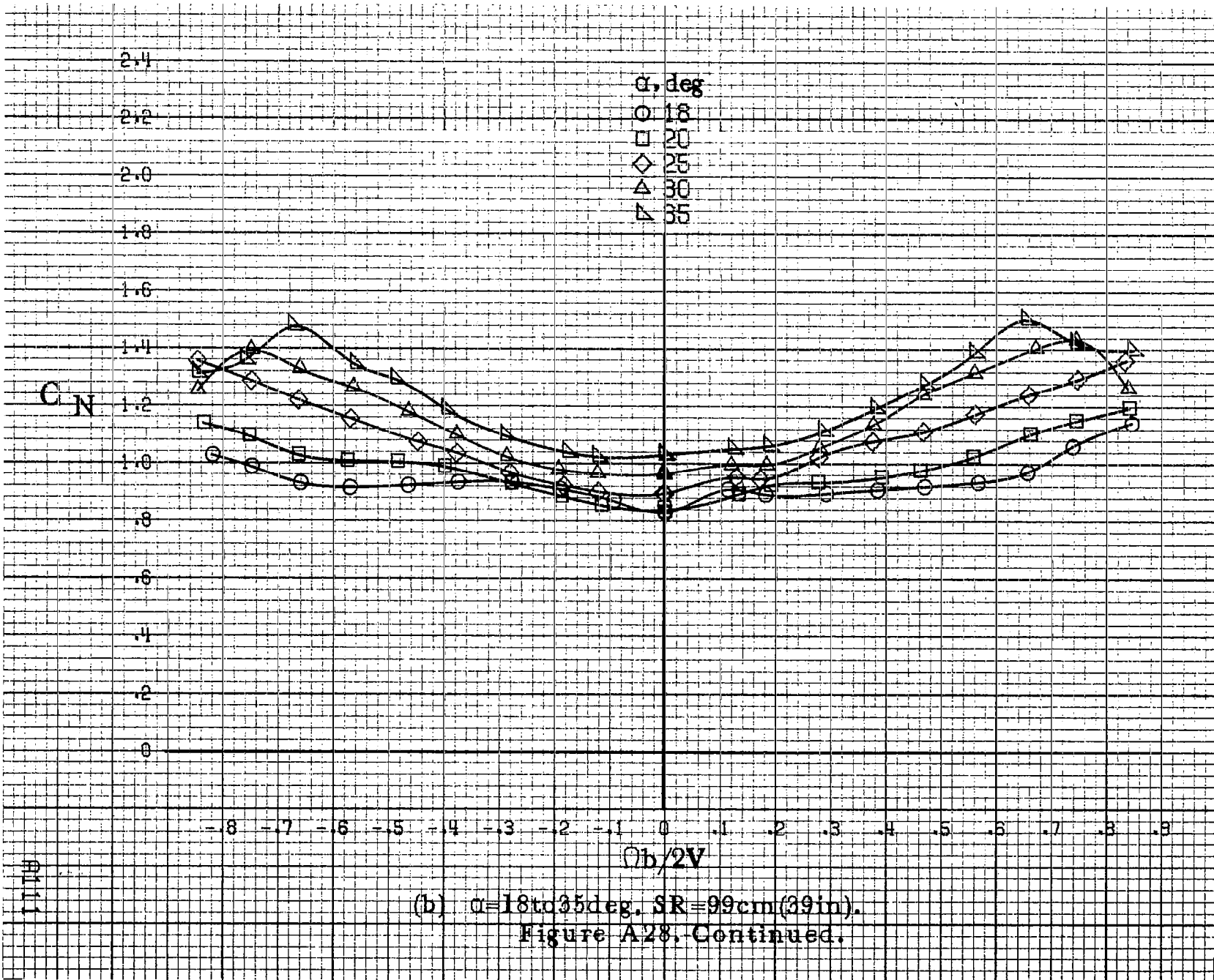
α , deg
○ 8
□ 10
◇ 12
△ 14
▽ 16

$\Omega b/2V$

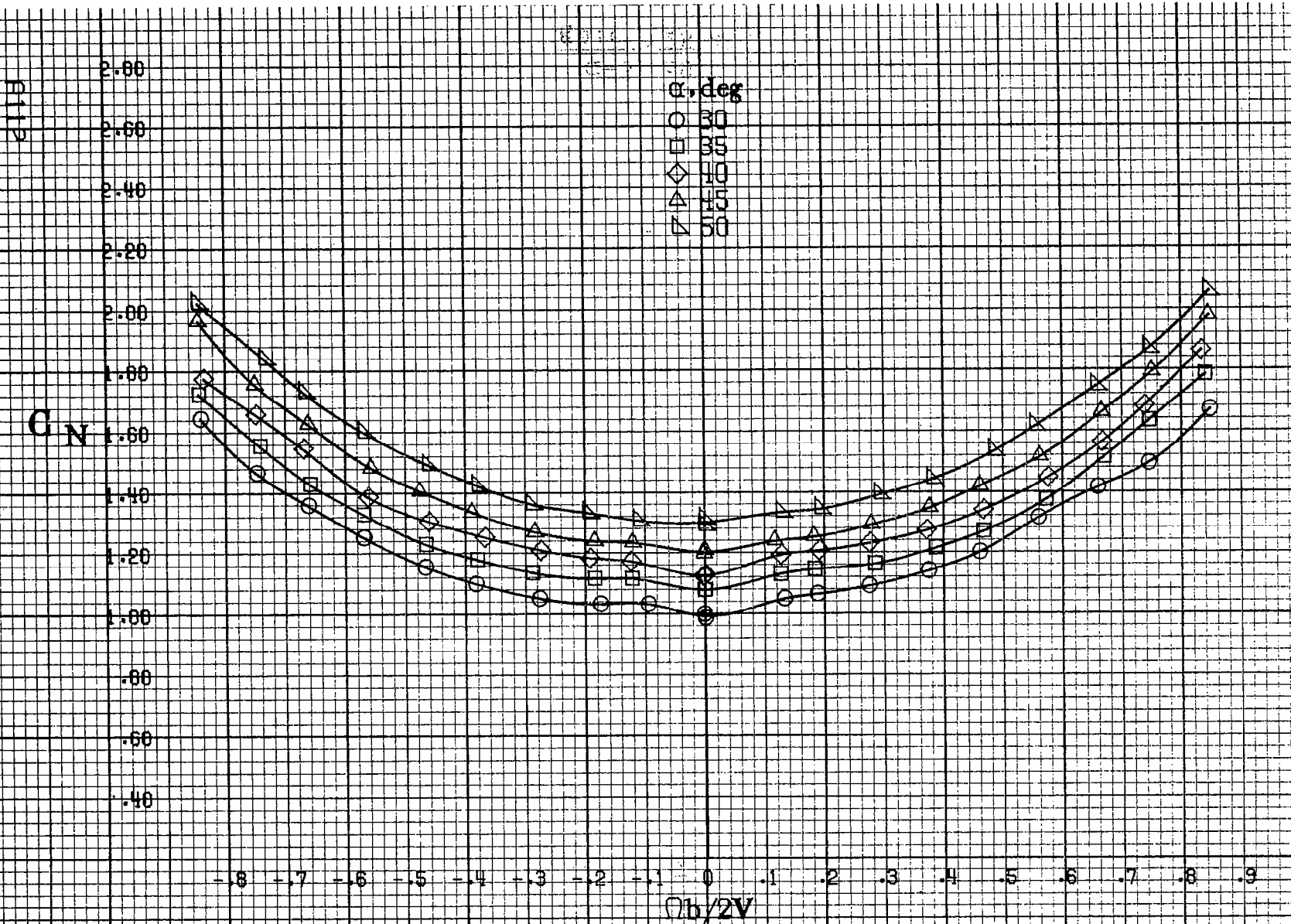
(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A28. Effect of rotation rate and angle of attack on normal-force coefficient for no. 1 horizontal tail configuration. $\delta_e=0^\circ$, $\delta_a=0^\circ$, $\delta_r=0^\circ$, $\delta=0^\circ$.





(b) $\alpha = 18$ to 35 deg. $SR = 99$ cm (39 in).
 Figure A28. Continued.



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A28. Continued.

C_N

3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8

α , deg

- 55
- 50
- ◇ 70
- △ 30
- ▽ 30

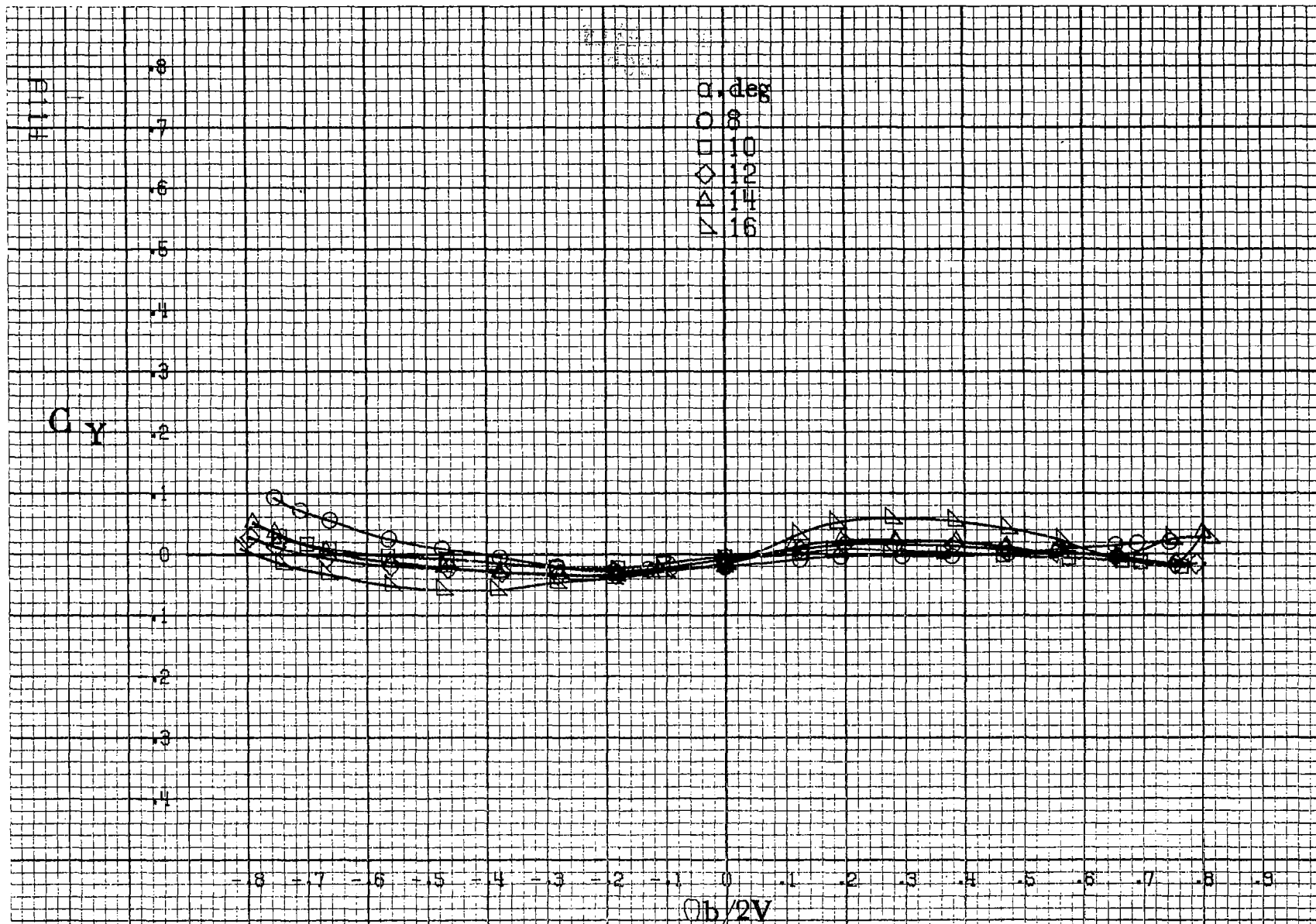
-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$b/2V$

(d) $\alpha = 55$ to 90 deg, $SR = 0$.

Figure A28. Concluded.

8113



(a) $\alpha=8$ to 16 deg, SR=99cm (39in).

Figure A29. Effect of rotation rate and angle of attack on side-force coefficient for no. 1 horizontal tail configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_y

.8
.7
.6
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4

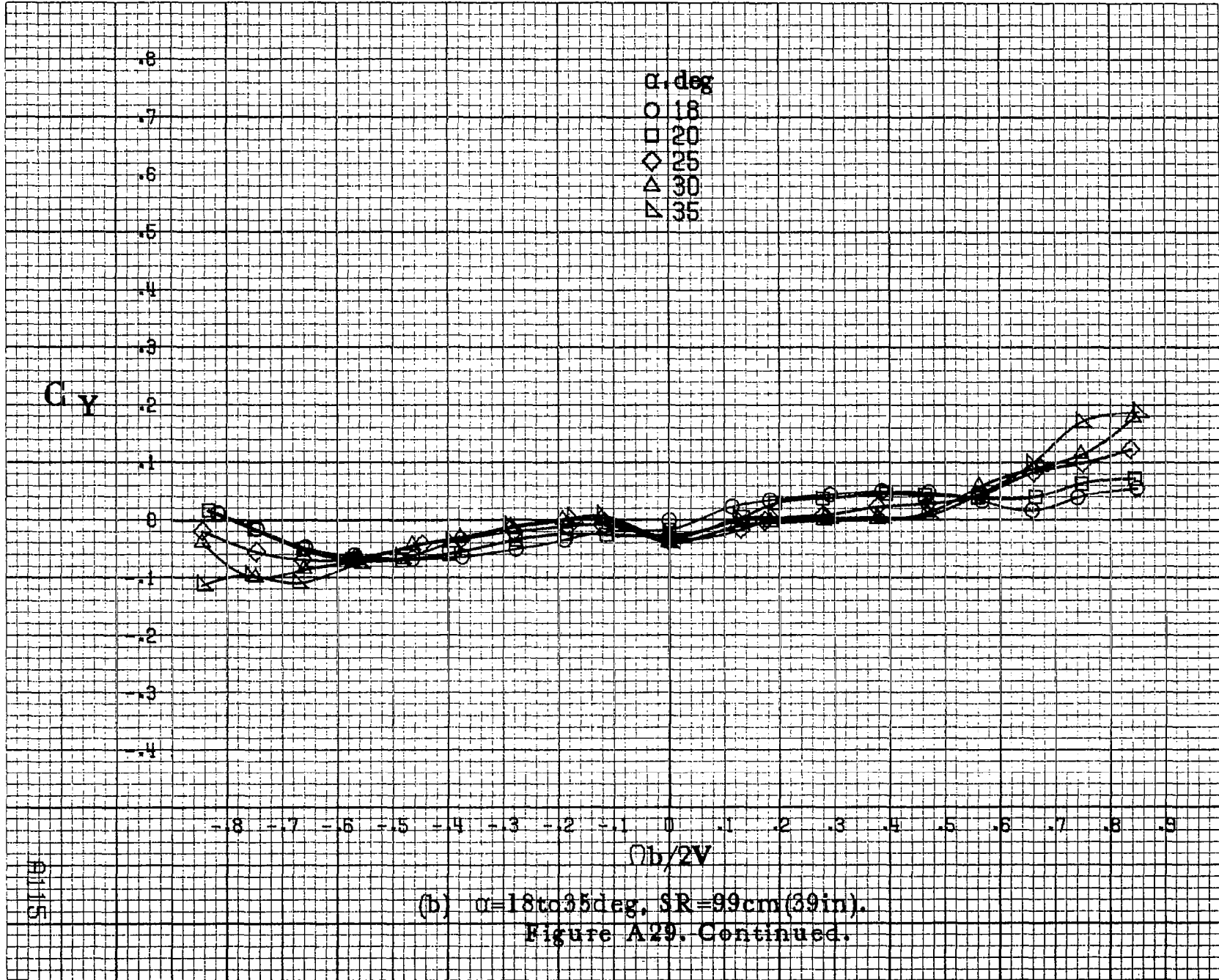
α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

$Ob/2V$

9115

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A29, Continued.



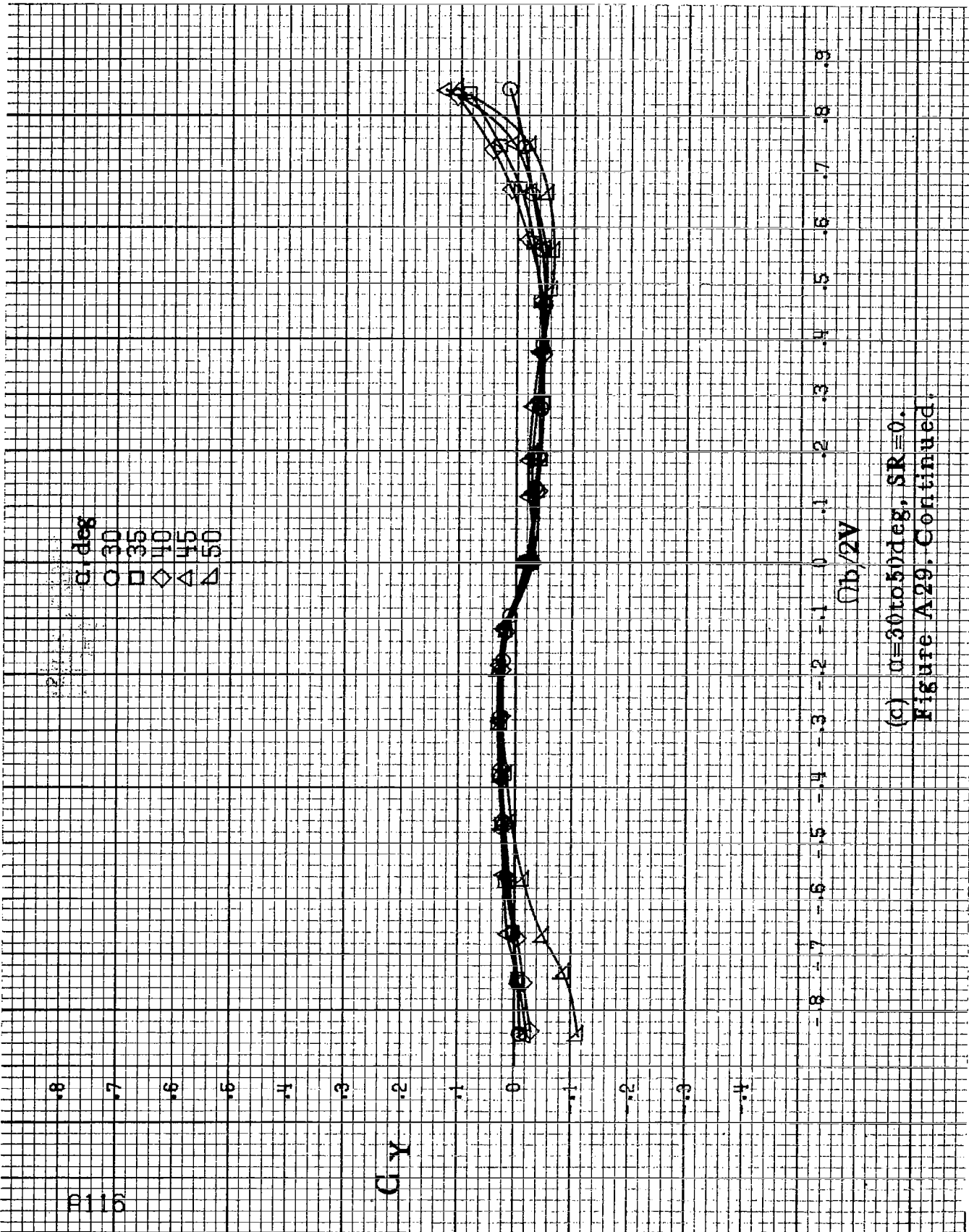
P116

Gy

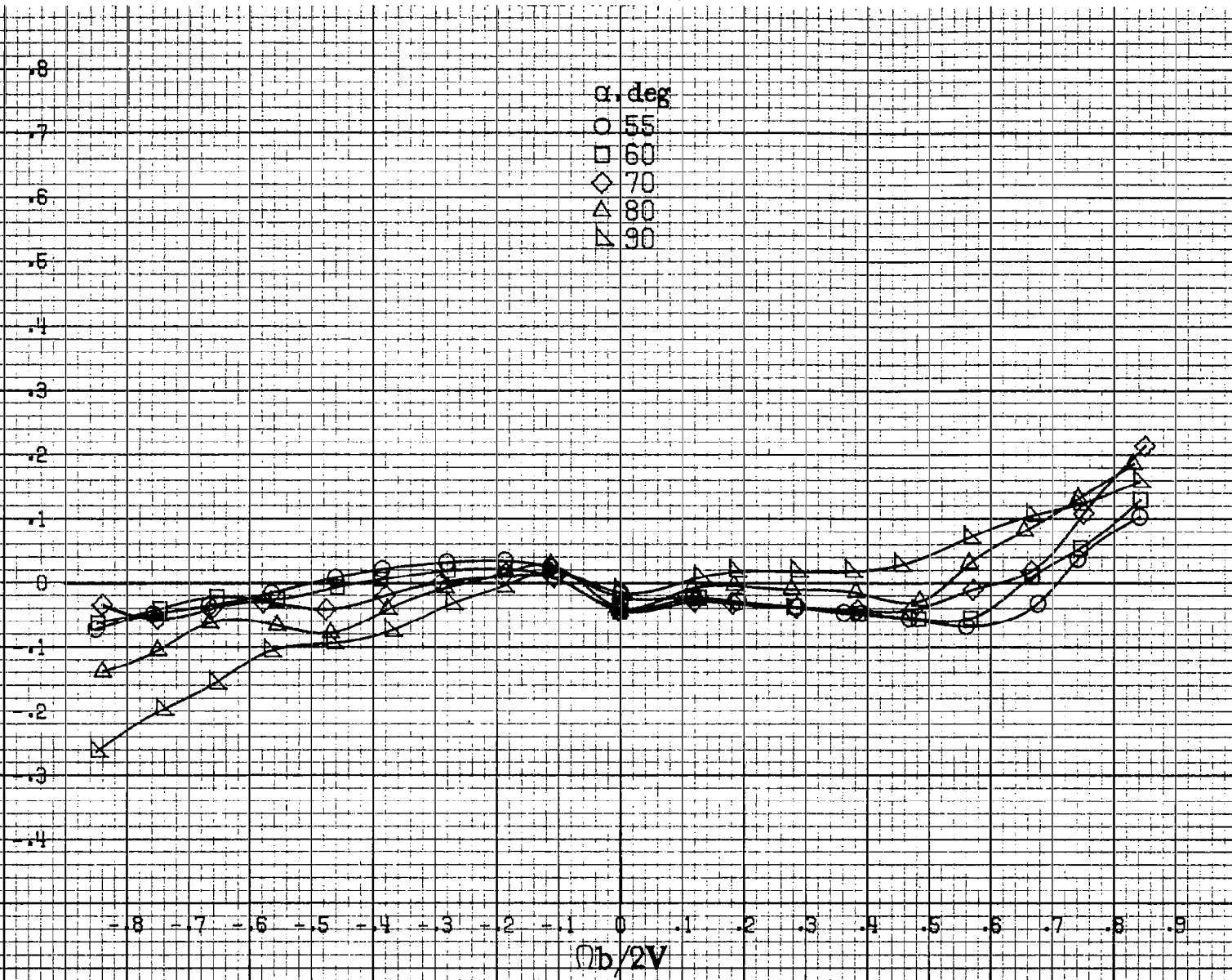
α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

$\Omega b/2V$

(c) $\alpha = 30$ to 50 deg, $SR = 0$.
Figure A-29. Continued.



C_Y



(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A29, Concluded.

A117

9118

C_A

0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4

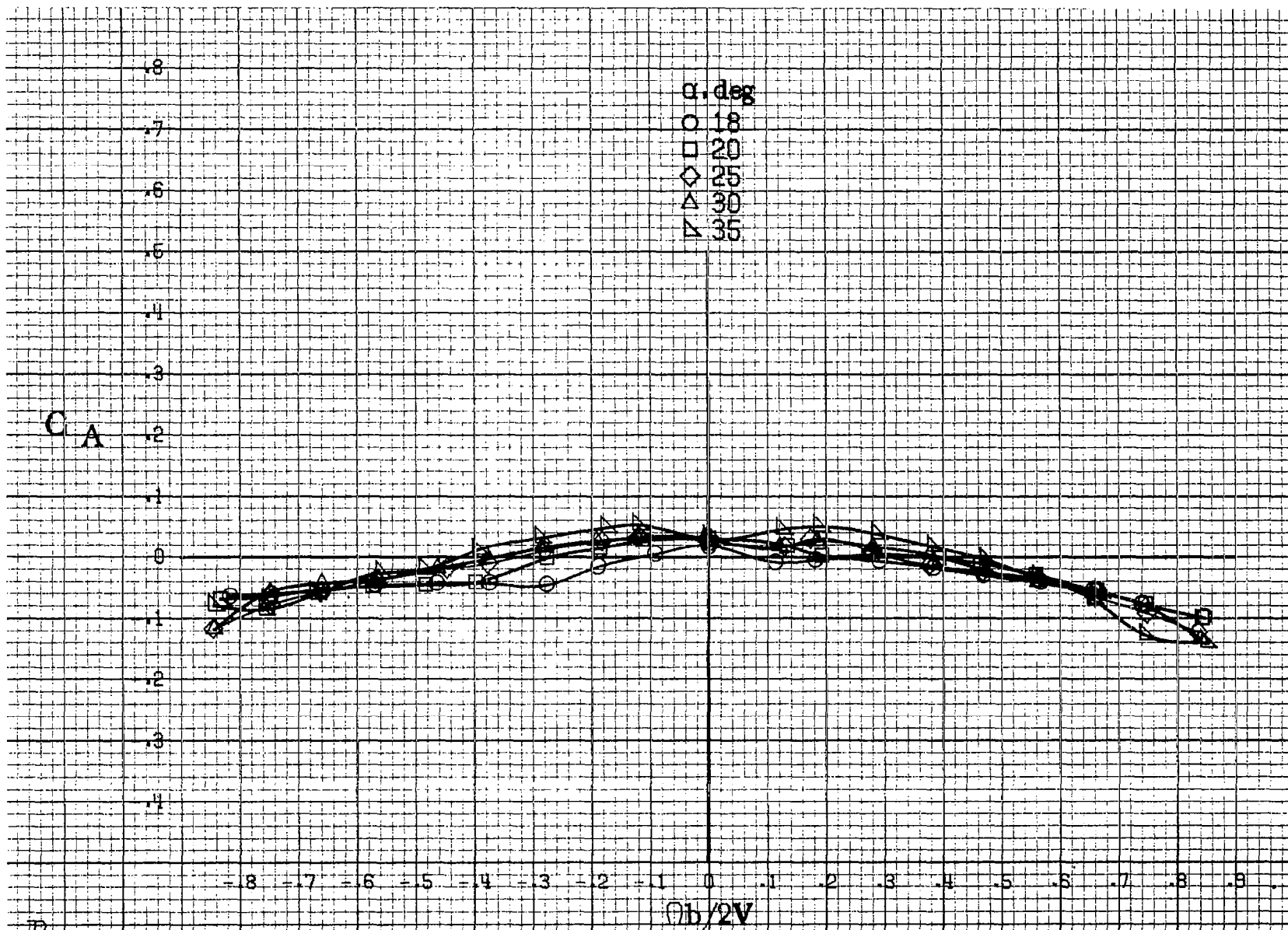
α , deg
 O 8
 □ 10
 ◇ 12
 △ 14
 ▽ 16

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9

$b/2V$

(a) $\alpha=8$ to 16 deg, SR=99 cm (39 in).

Figure A30. Effect of rotation rate and angle of attack on axial-force coefficient for no. 1 horizontal tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, SR = 99 cm (39 in).
Figure A30. Continued.

6111B

4123

C_A

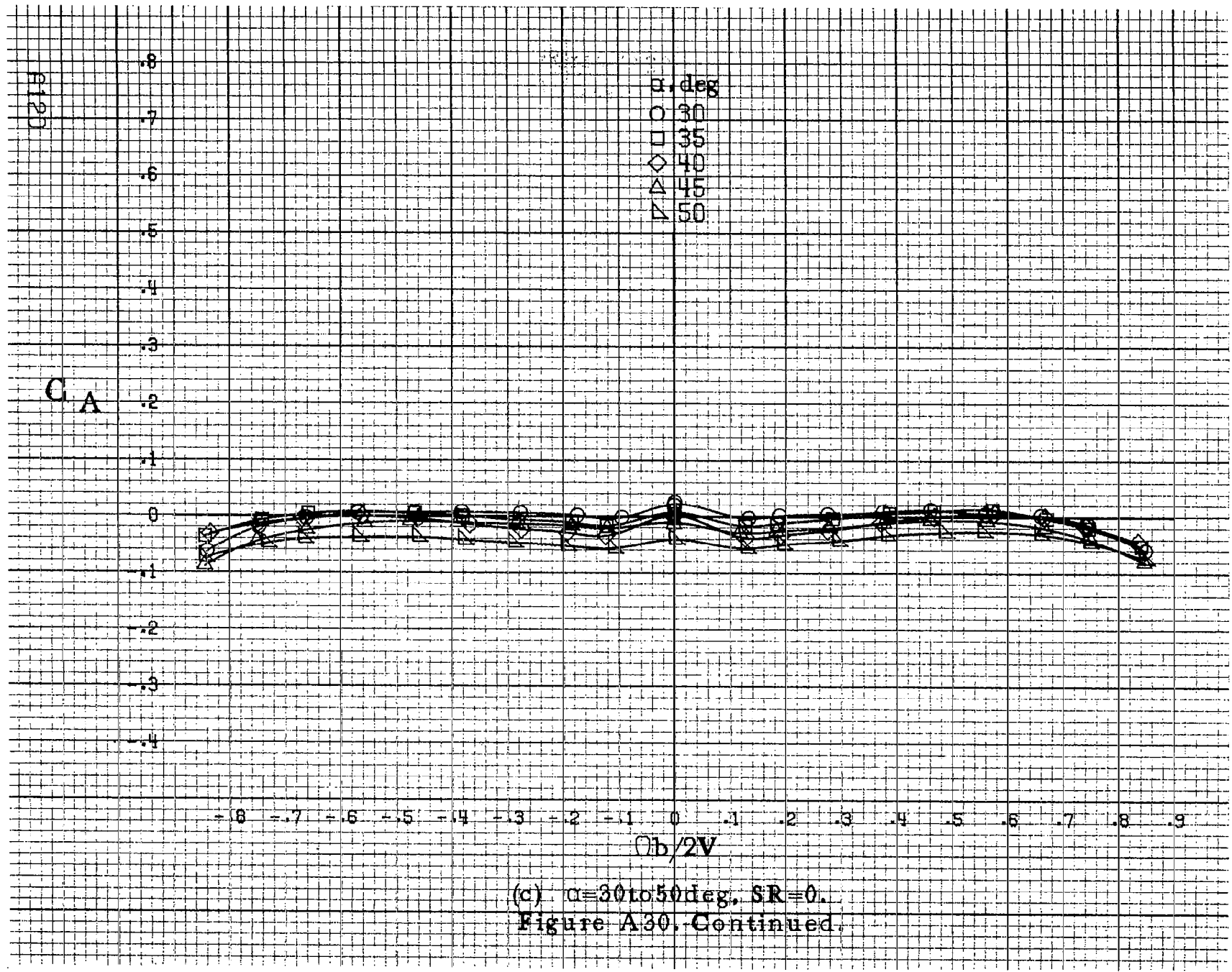
.8
.7
.6
.5
.4
.3
.2
.1
0
.1
.2
.3
.4

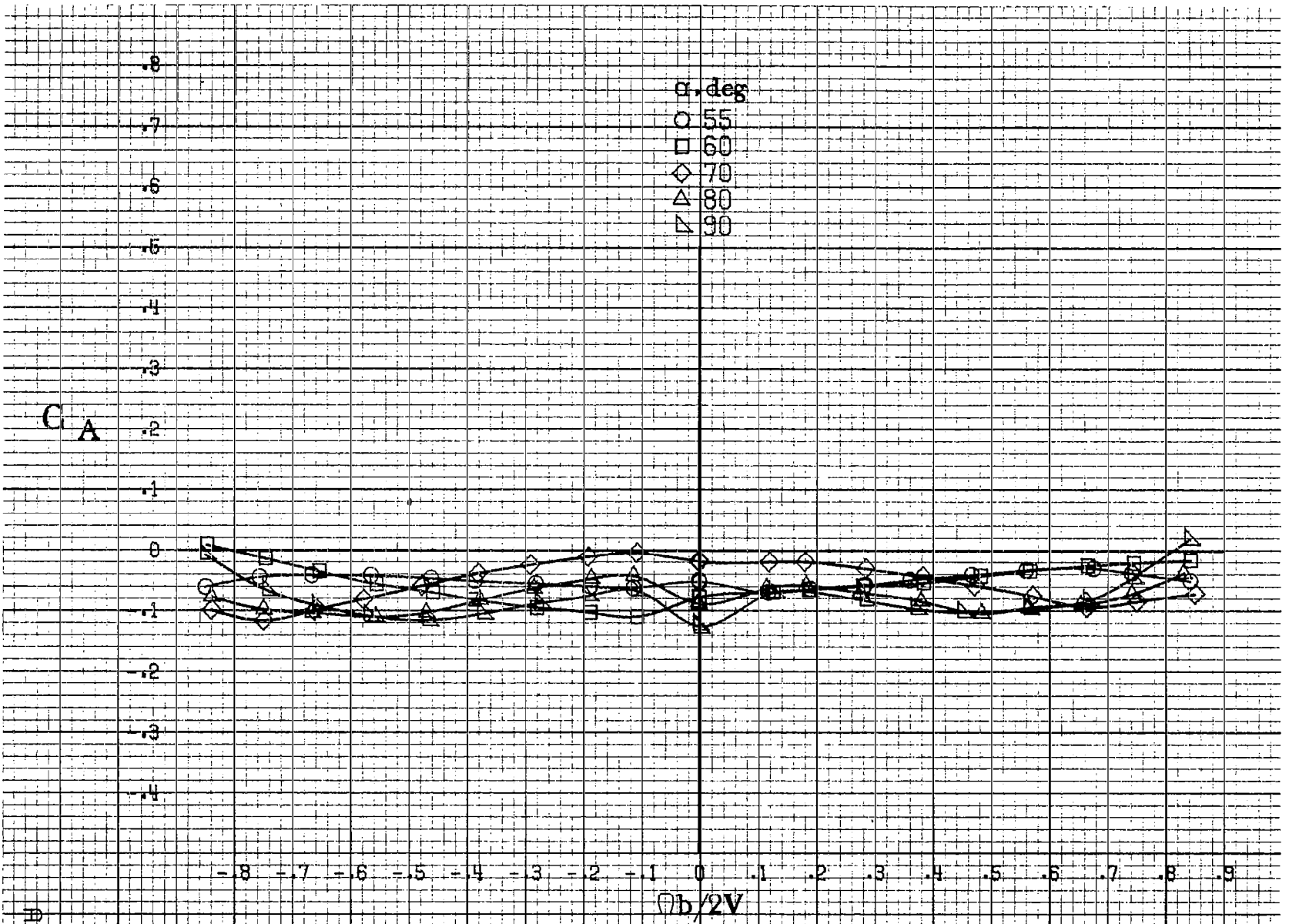
β , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$Ob/2V$

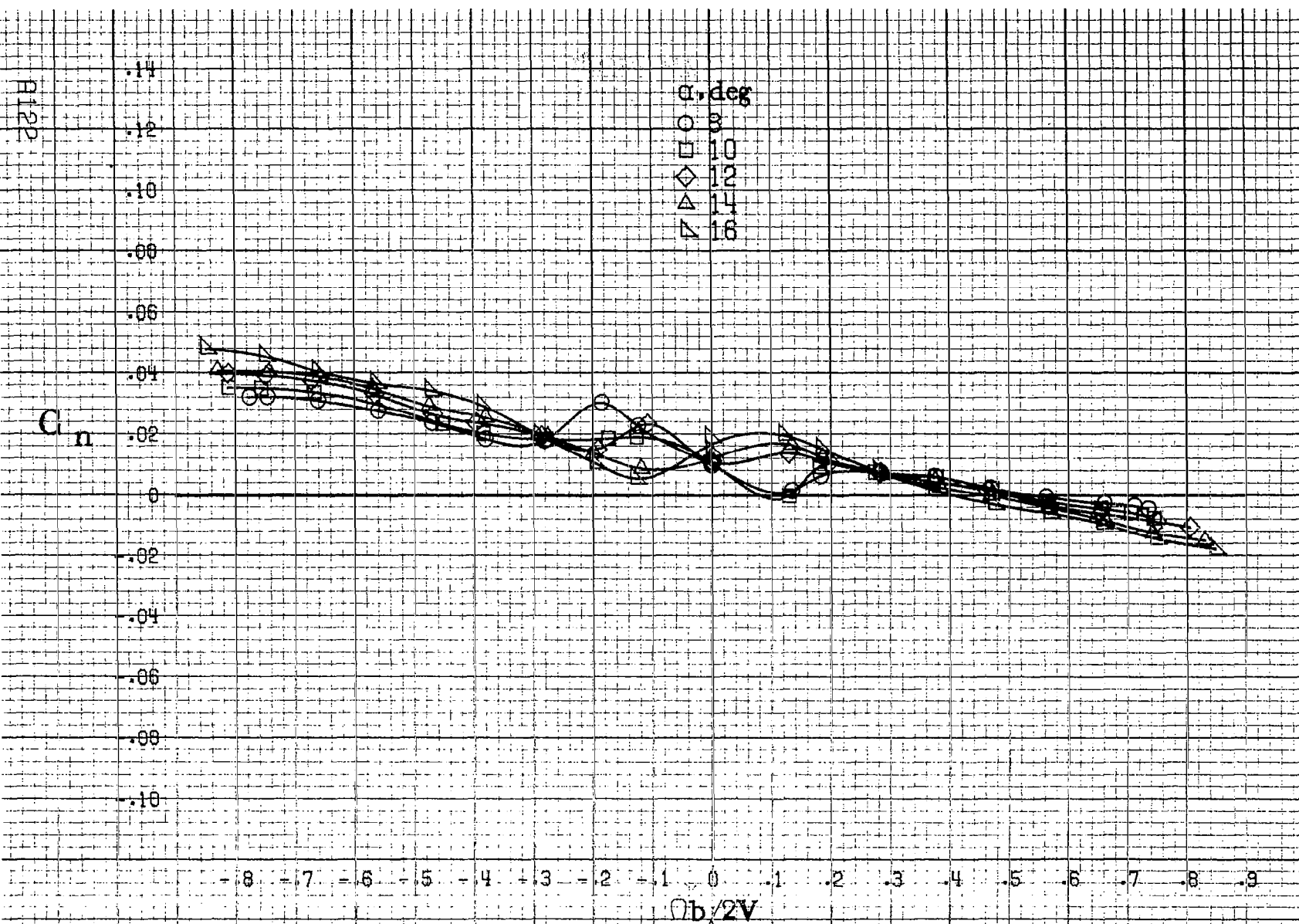
(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A30. Continued.



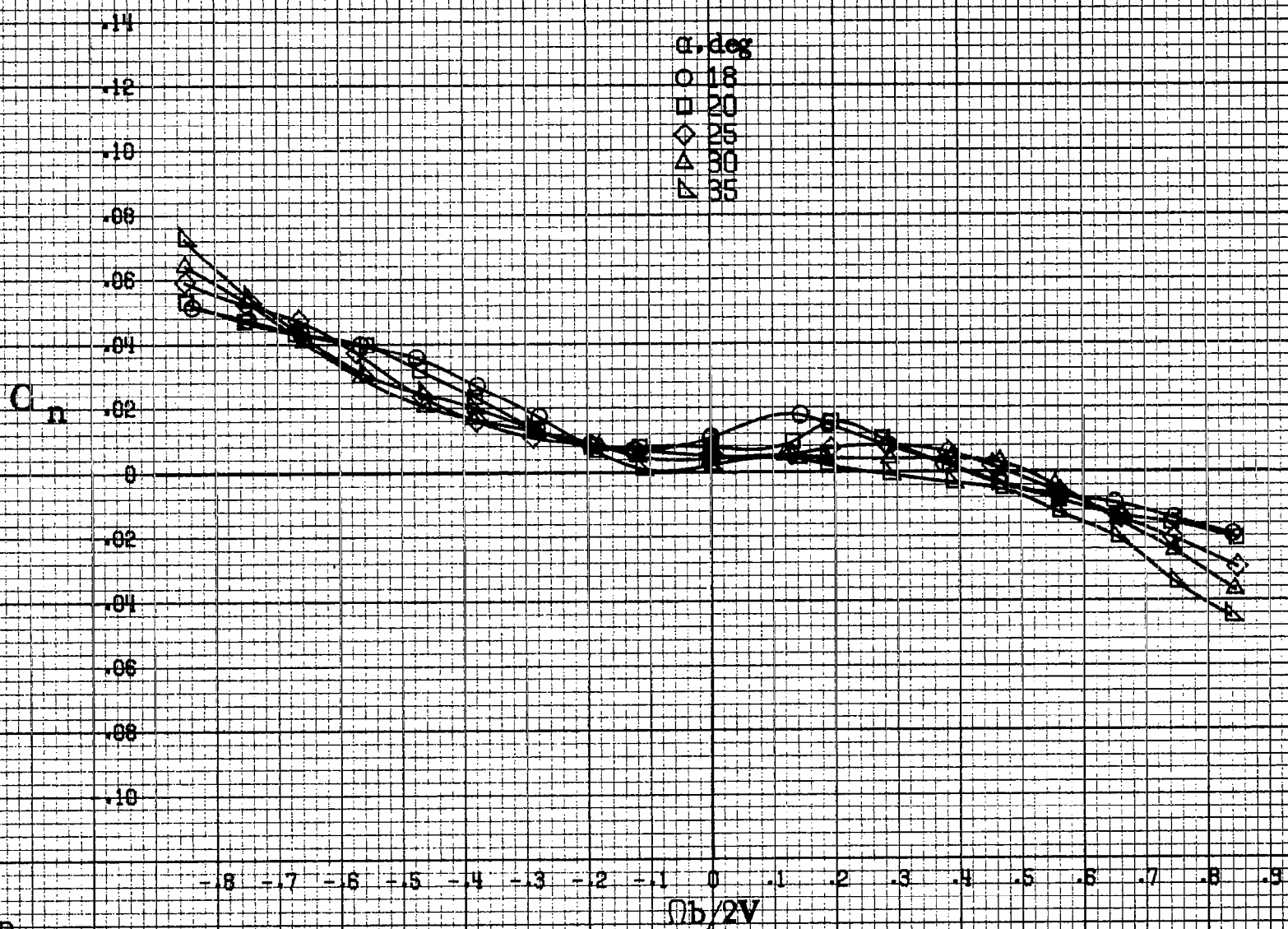


(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A30. Concluded.

R1121



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).
 Figure A31. Effect of rotation rate and angle of attack on yawing-moment coefficient for no. 1 horizontal tail configuration. $\delta_a = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = -25^\circ$.
 $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A31. Continued.

A123

H124

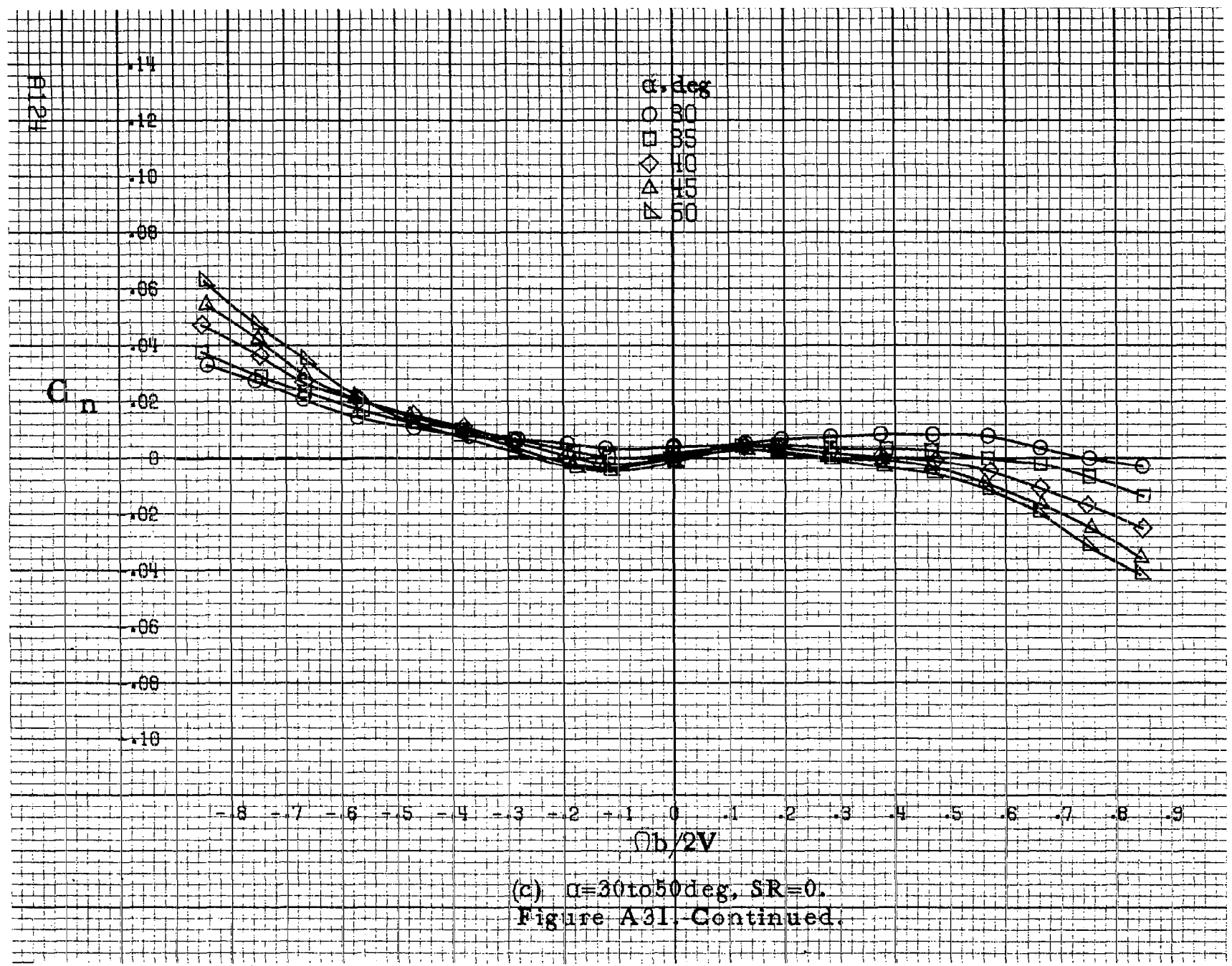
C_n

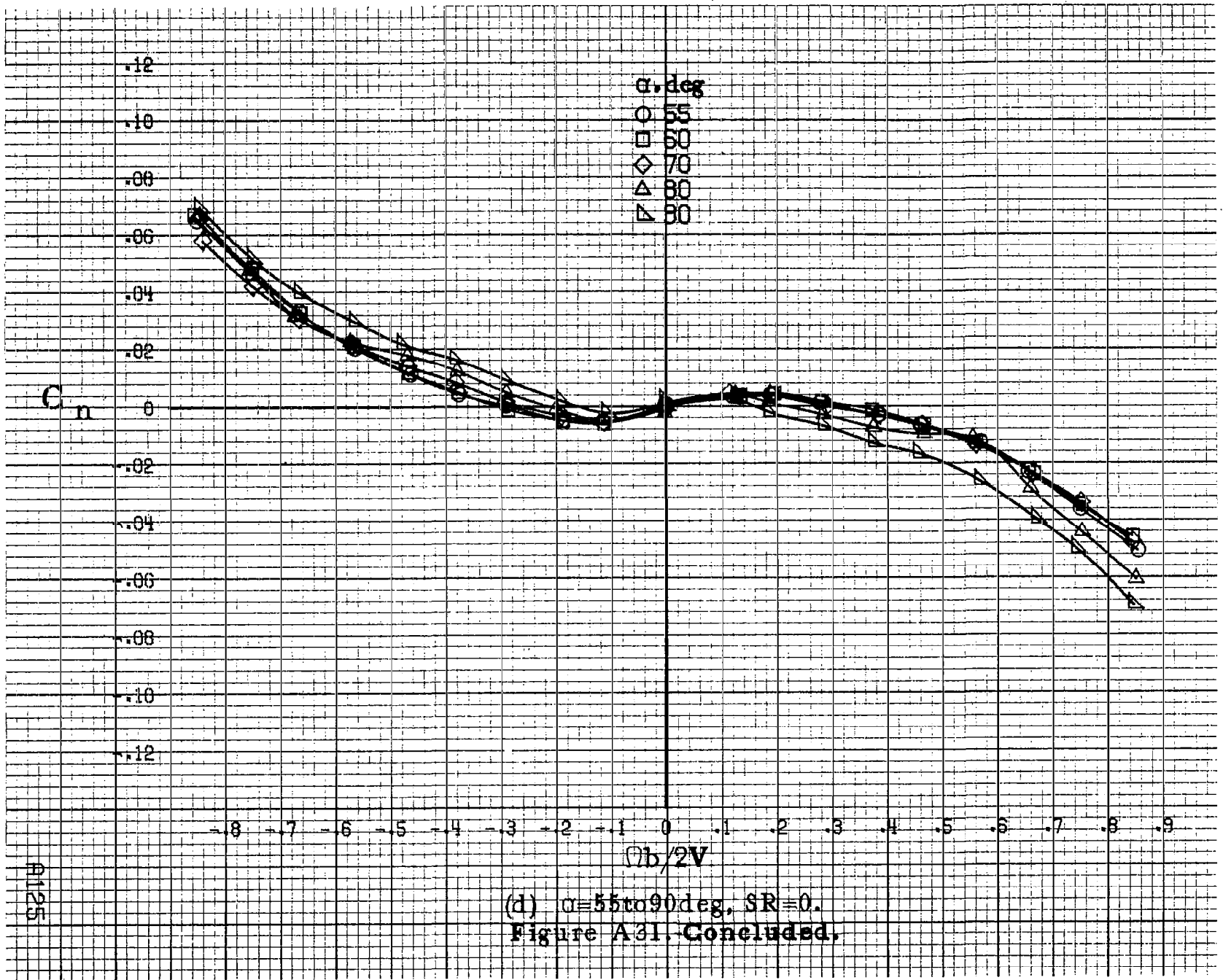
.14
.12
.10
.08
.06
.04
.02
0
.02
.04
.06
.08
.10

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\Omega b/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A31. Continued.



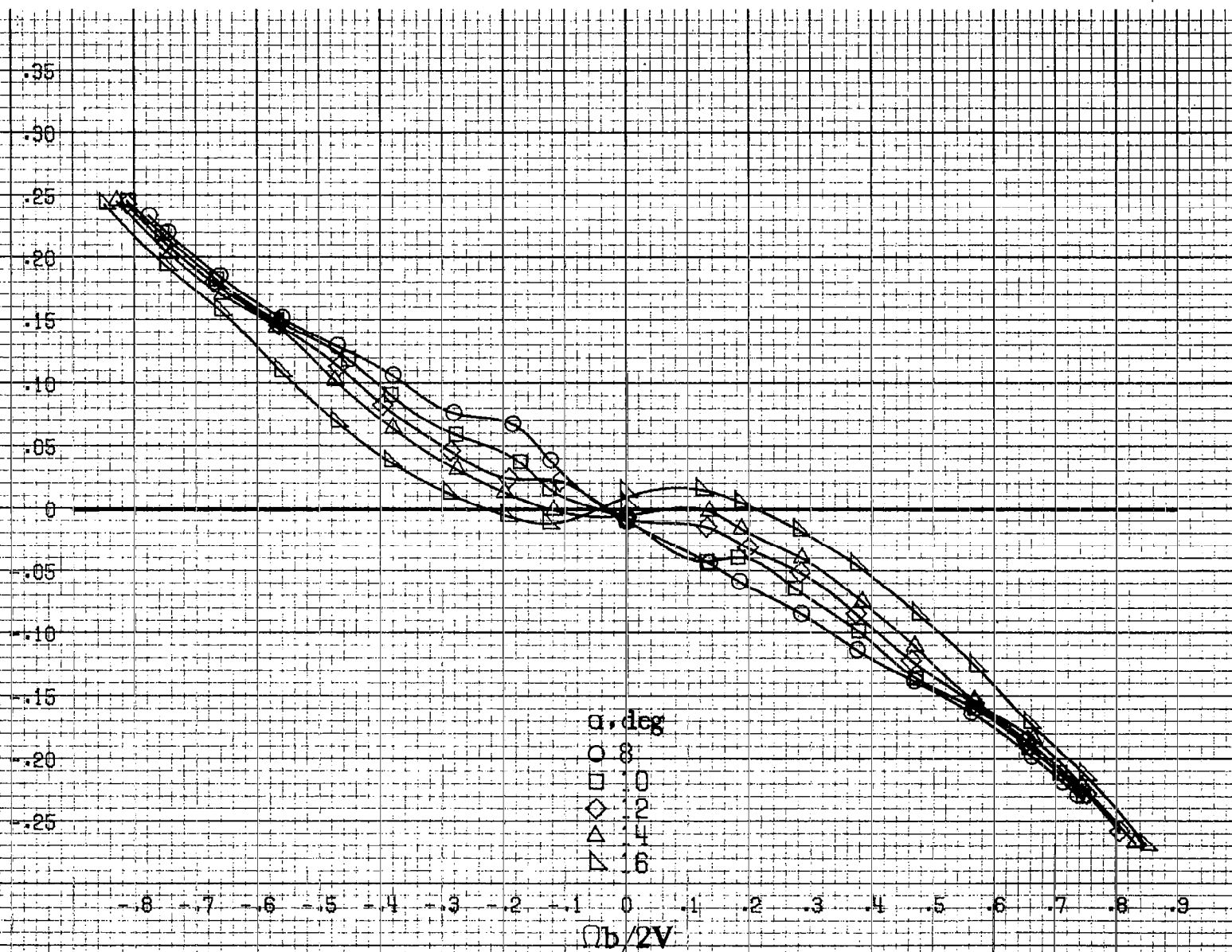


(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A31. Concluded.

A1255

9126

C_l



α , deg

- 8
- 10
- ◇ 12
- △ 14
- ▽ 16

$b/2V$

(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A32. Effect of rotation rate and angle of attack on rolling-moment coefficient for no. 1 horizontal tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.

C_I

.35
.30
.25
.20
.15
.10
.05
0
.05
.10
.15
.20
.25

- .8 - .7 - .6 - .5 - .4 - .3 - .2 - .1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

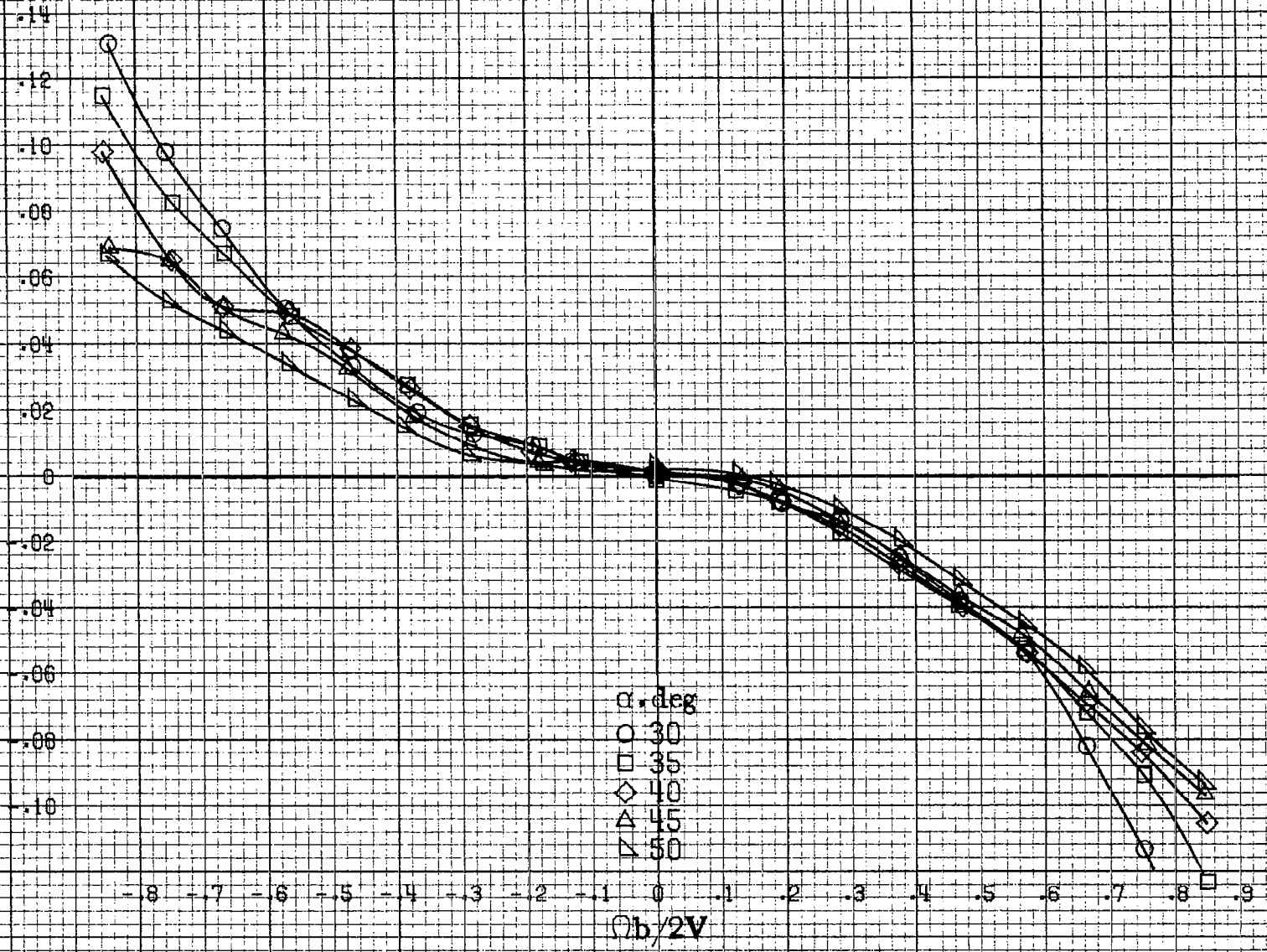
$Ob/2V$

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A32. Continued.

A127

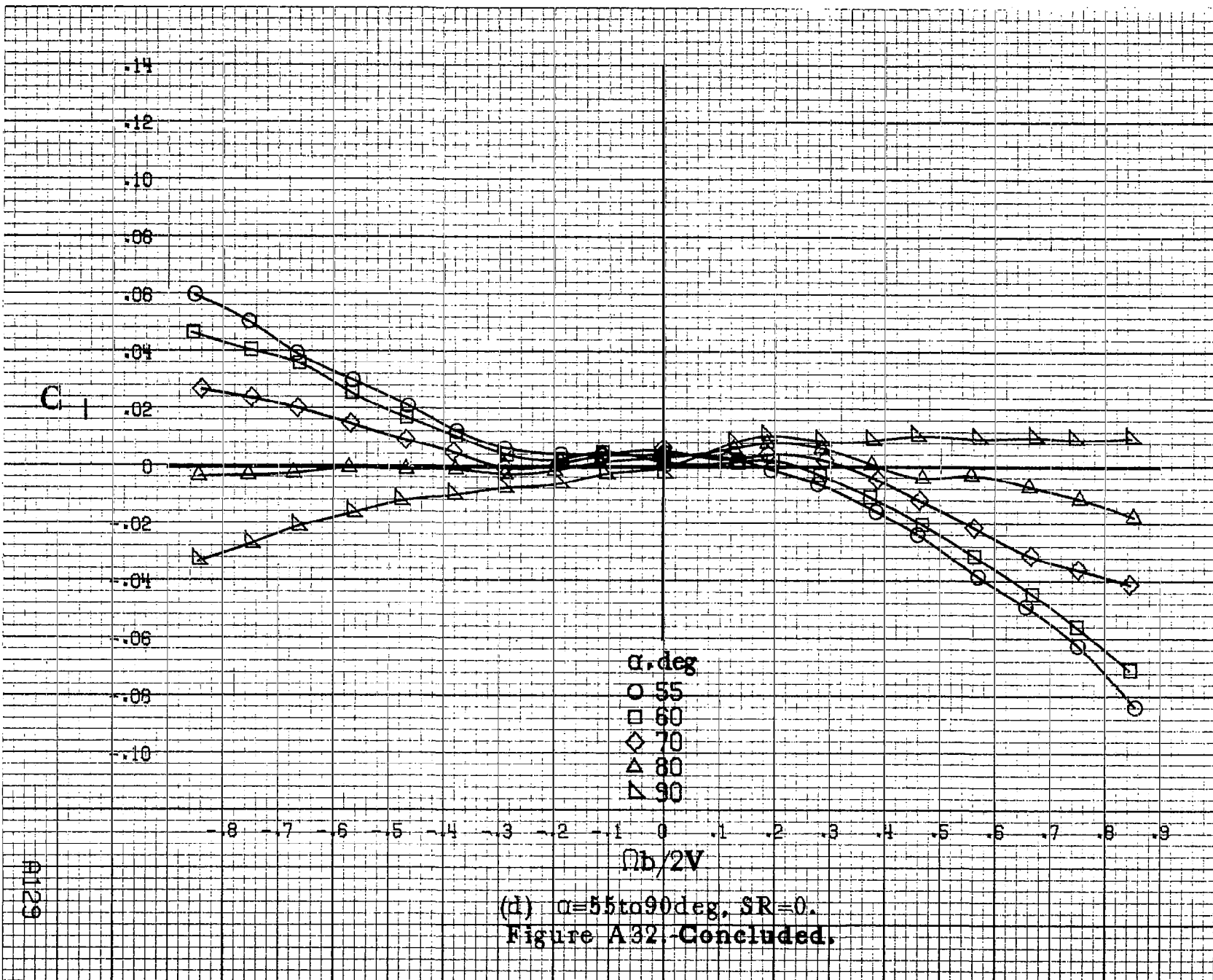
R128

C₁

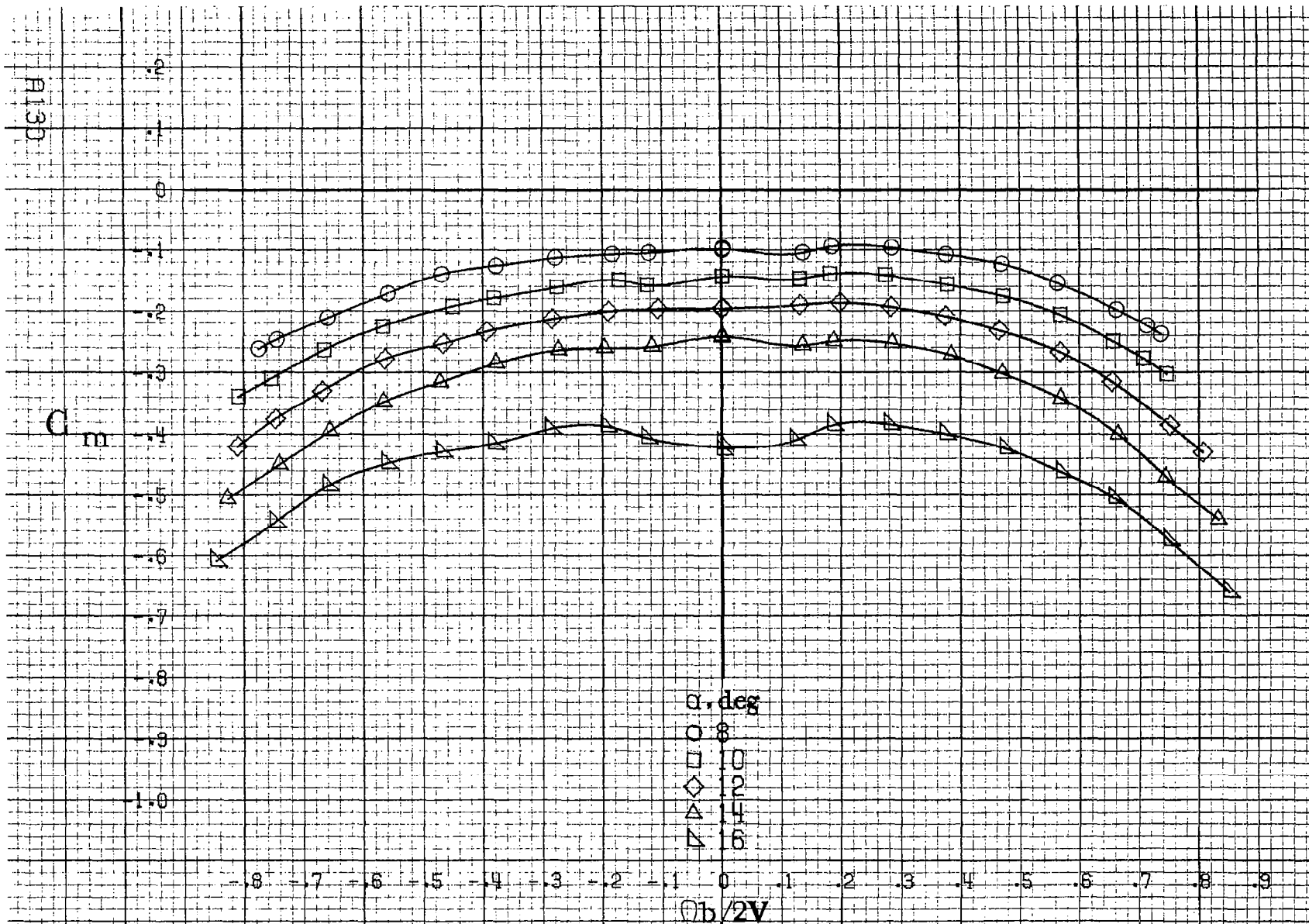


(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A32. Continued.

○

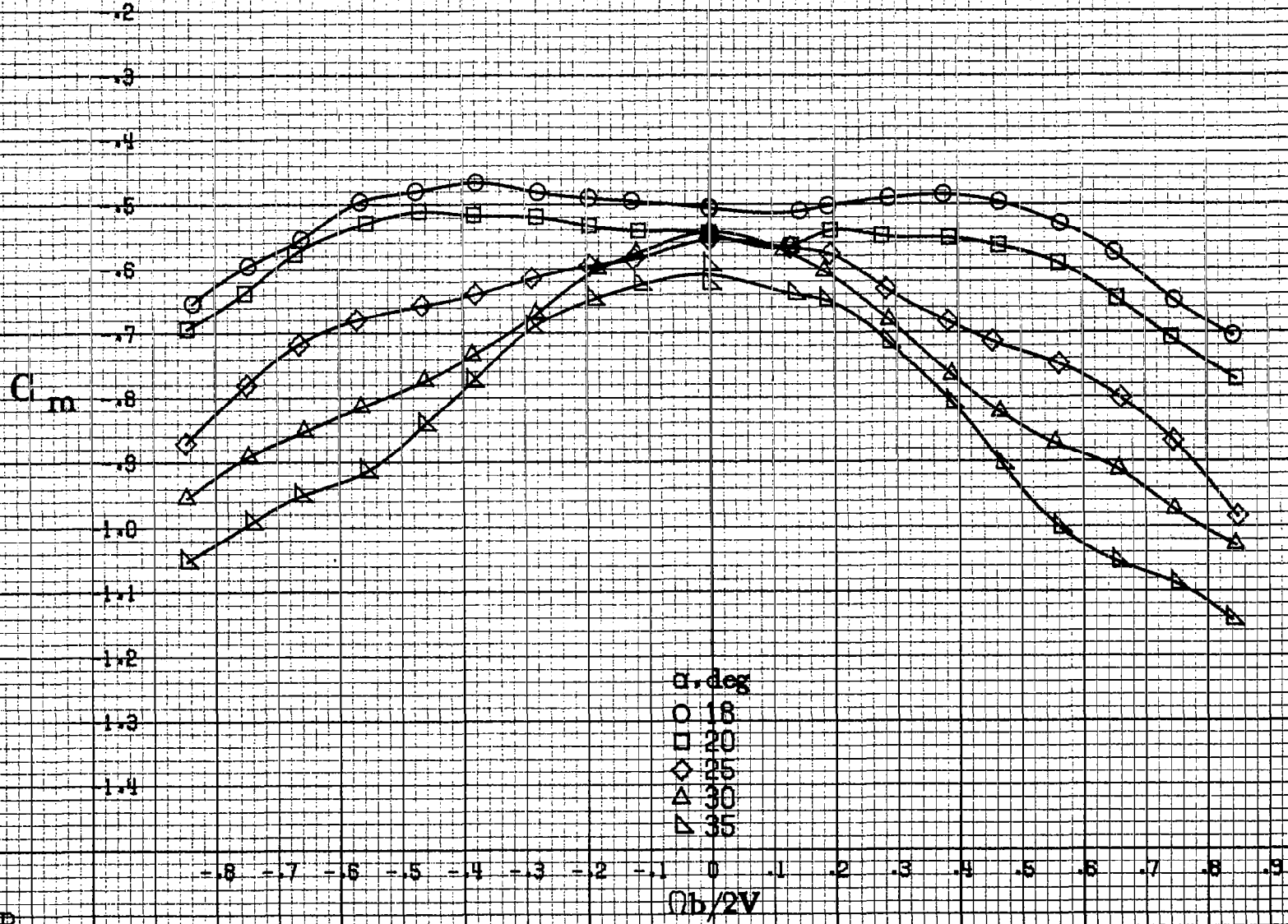


A1129



(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A33. Effect of rotation rate and angle of attack on pitching moment coefficient for no. 1 horizontal tail configuration. $\delta_e=0^\circ$, $\delta_a=0^\circ$, $\delta_r=-25^\circ$, $\beta=0^\circ$.

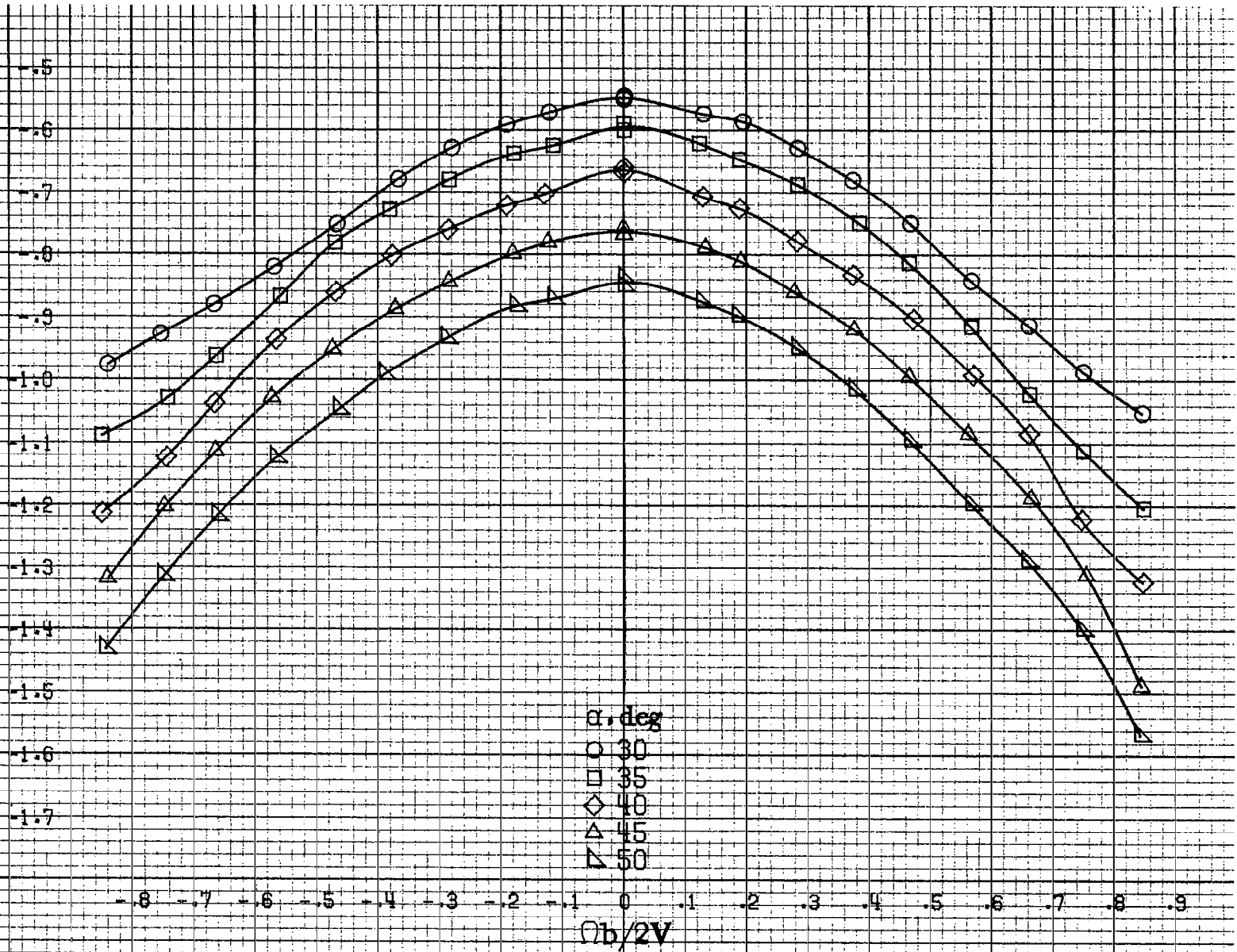


(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A33. Continued.

A131

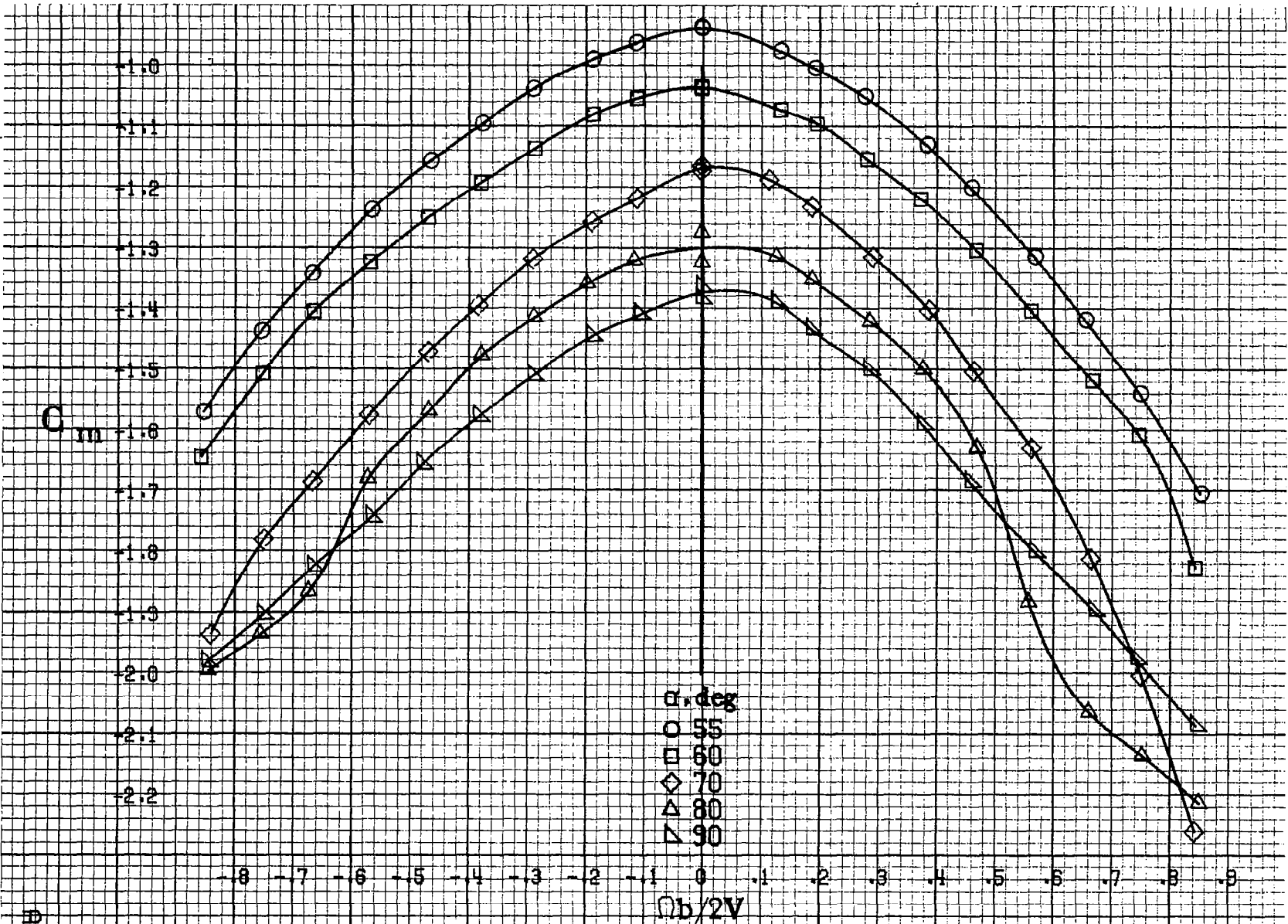
F13P

C_m



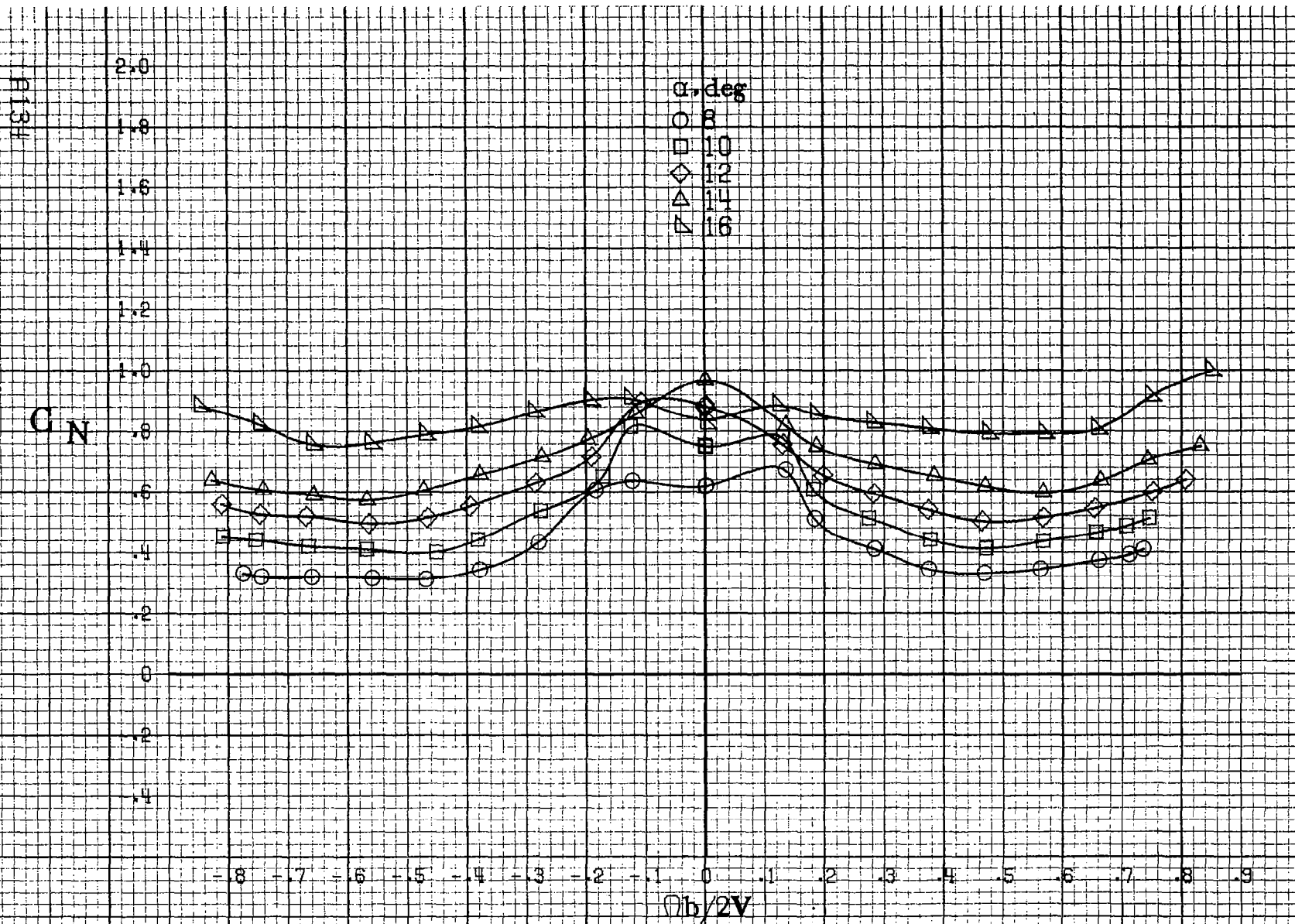
α, deg
 ○ 30
 □ 35
 ◇ 40
 △ 45
 ▽ 50

(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A33. Continued.



(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A33.-Concluded.

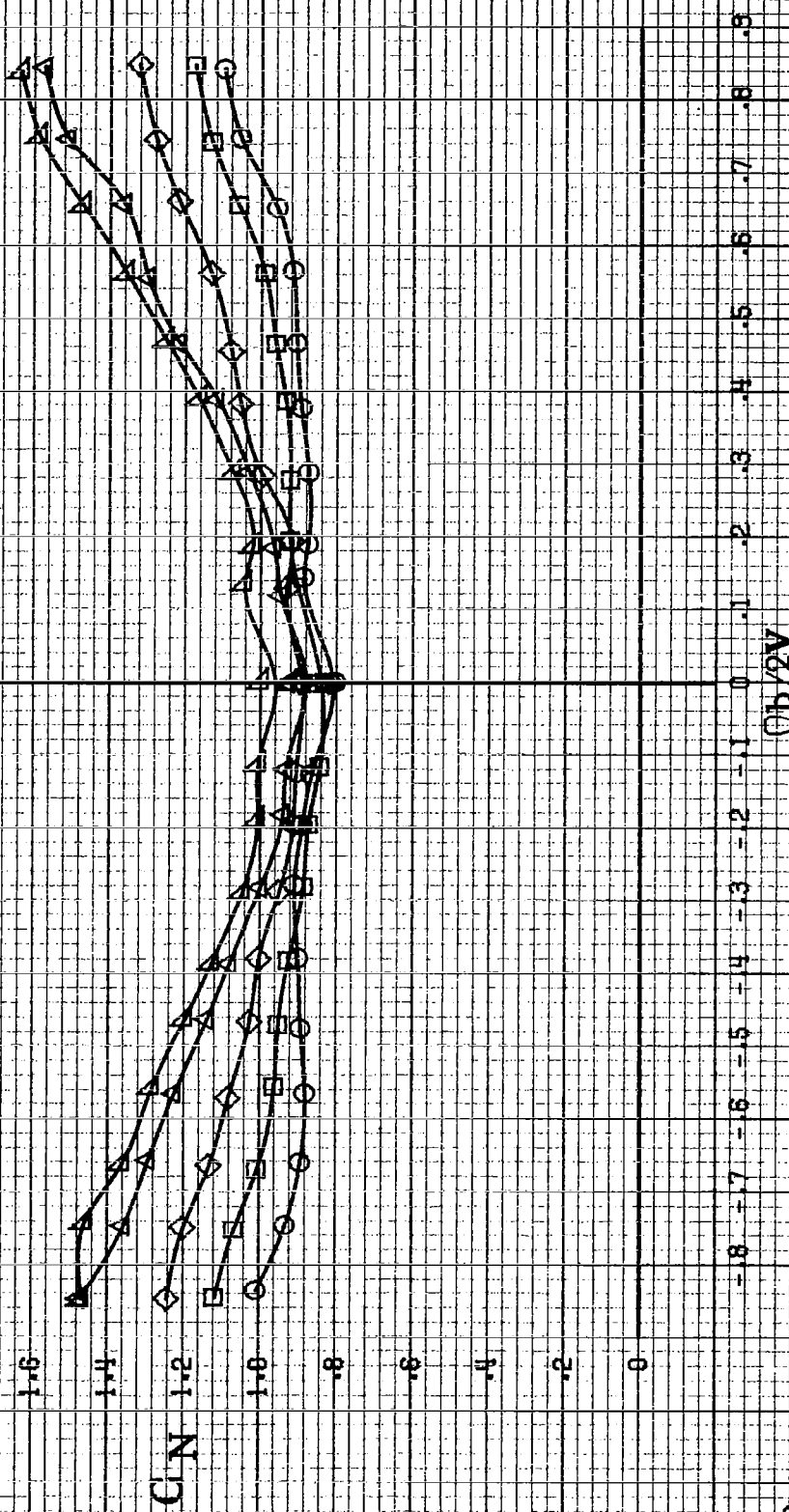
A133



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

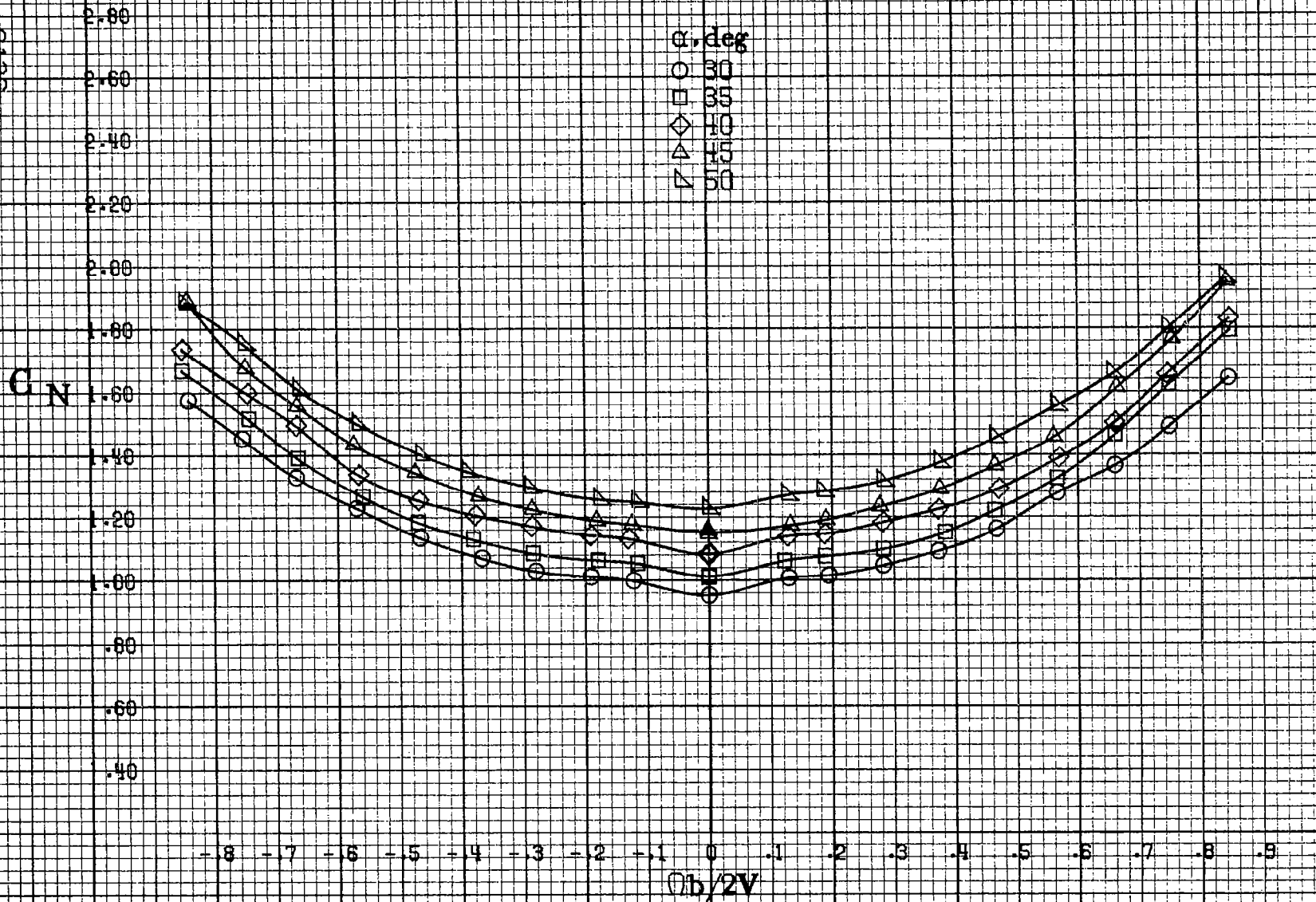
Figure A34. Effect of rotation rate and angle of attack on normal force coefficient for no. 1 horizontal tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.

α , deg
 O 18
 □ 20
 ◇ 25
 △ 30
 ▽ 35

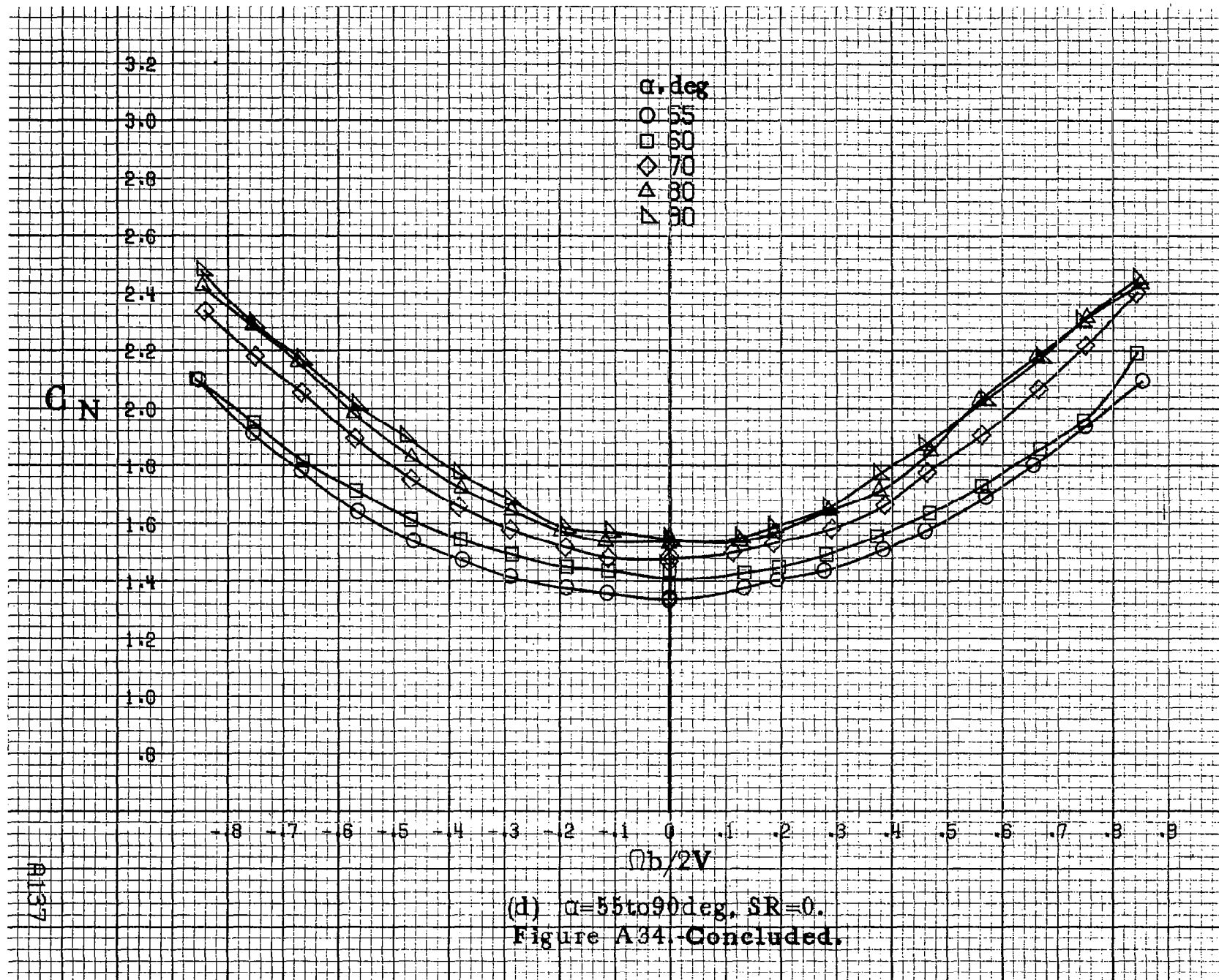


(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A34. Continued.

F1335



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A34, Continued.



(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A34. Concluded.

A137

E138

 C_Y 0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8 α , deg

○ 8
□ 10
◇ 12
△ 14
▽ 16

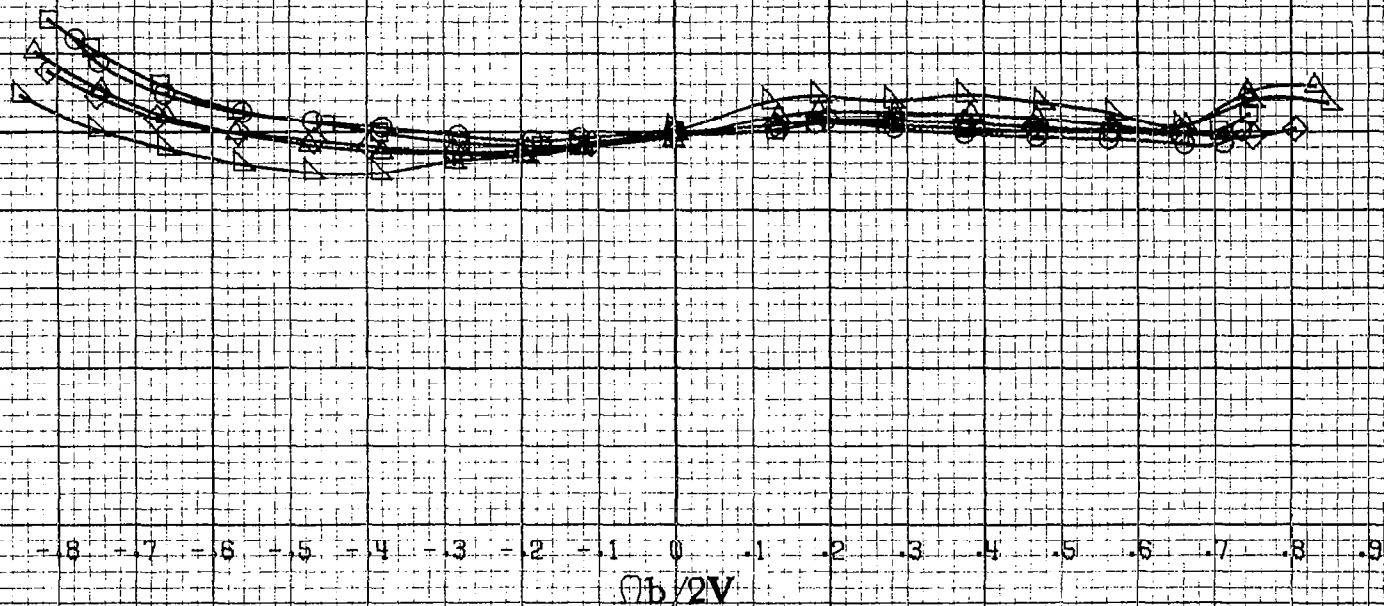
(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A.35. Effect of rotation rate and angle of attack on side-force coefficient for no. 1 horizontal tail configuration. $\delta_a=0^\circ$, $\delta_s=0^\circ$, $\delta_r=-25^\circ$, $\delta=0^\circ$.

C_y

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

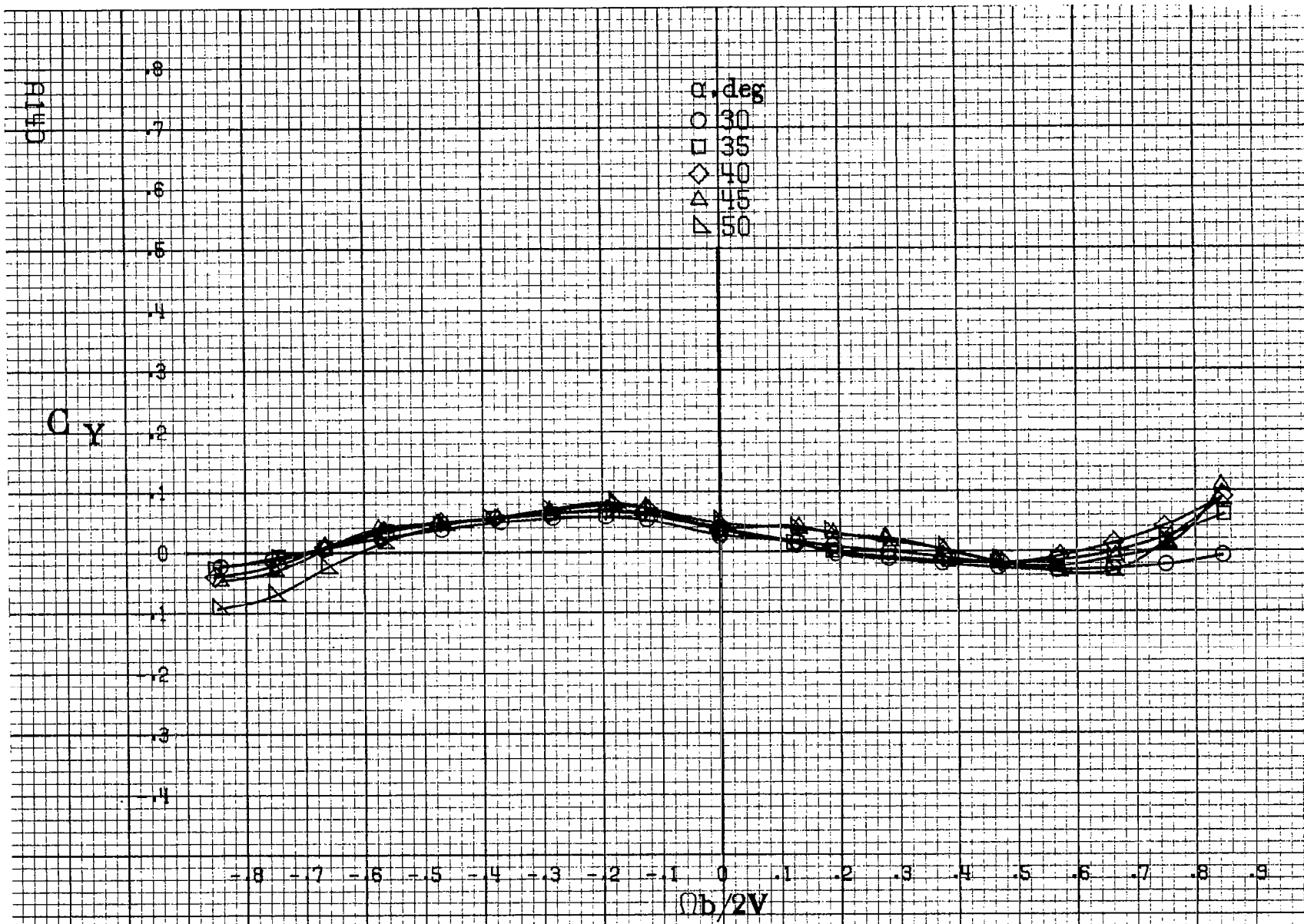
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

$Qb/2V$

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A35, Continued.

A139



(c) $\alpha = 30$ to 50 deg, $SR = 0$.
 Figure A35. Continued.

C_y

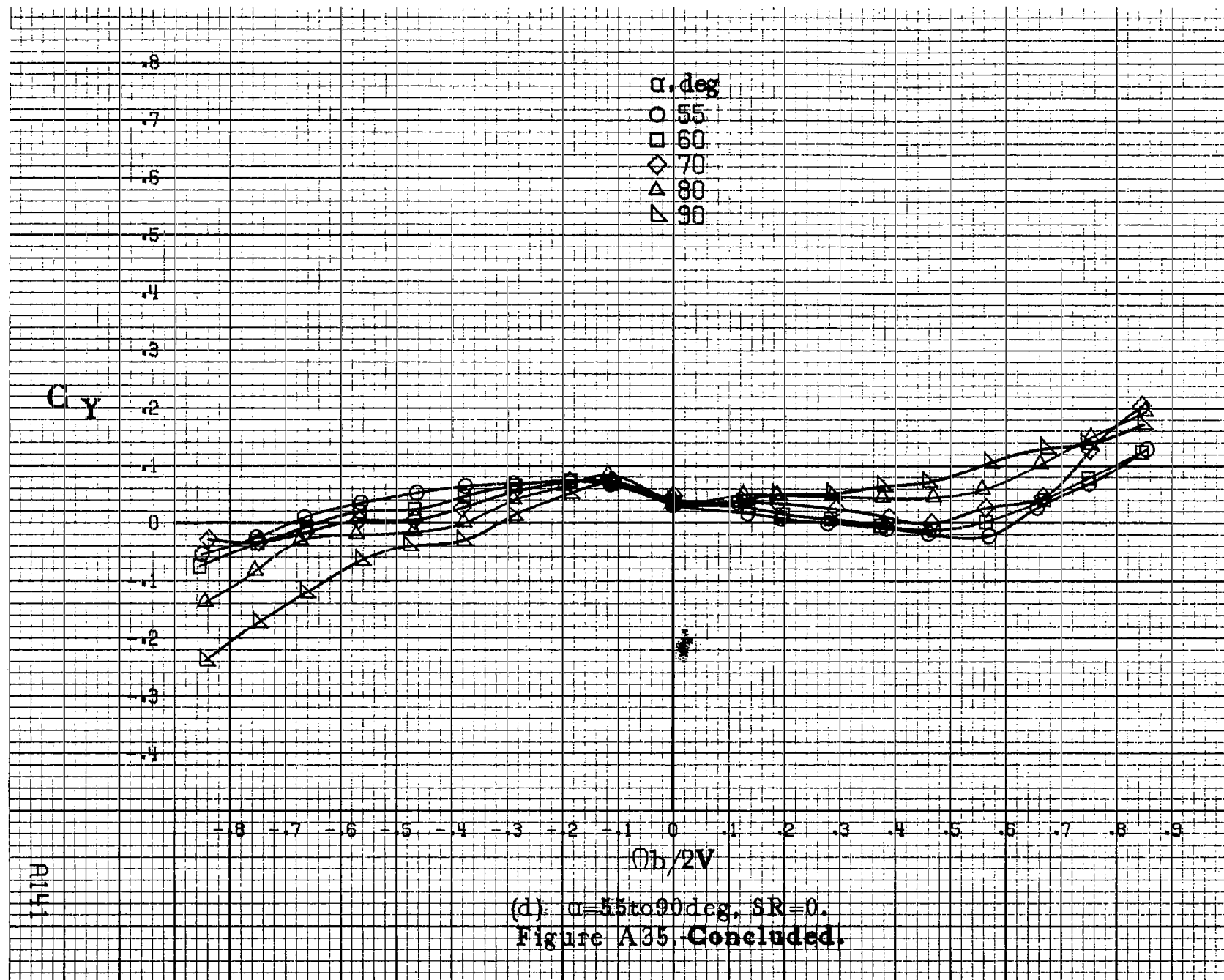
.8
.7
.6
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4

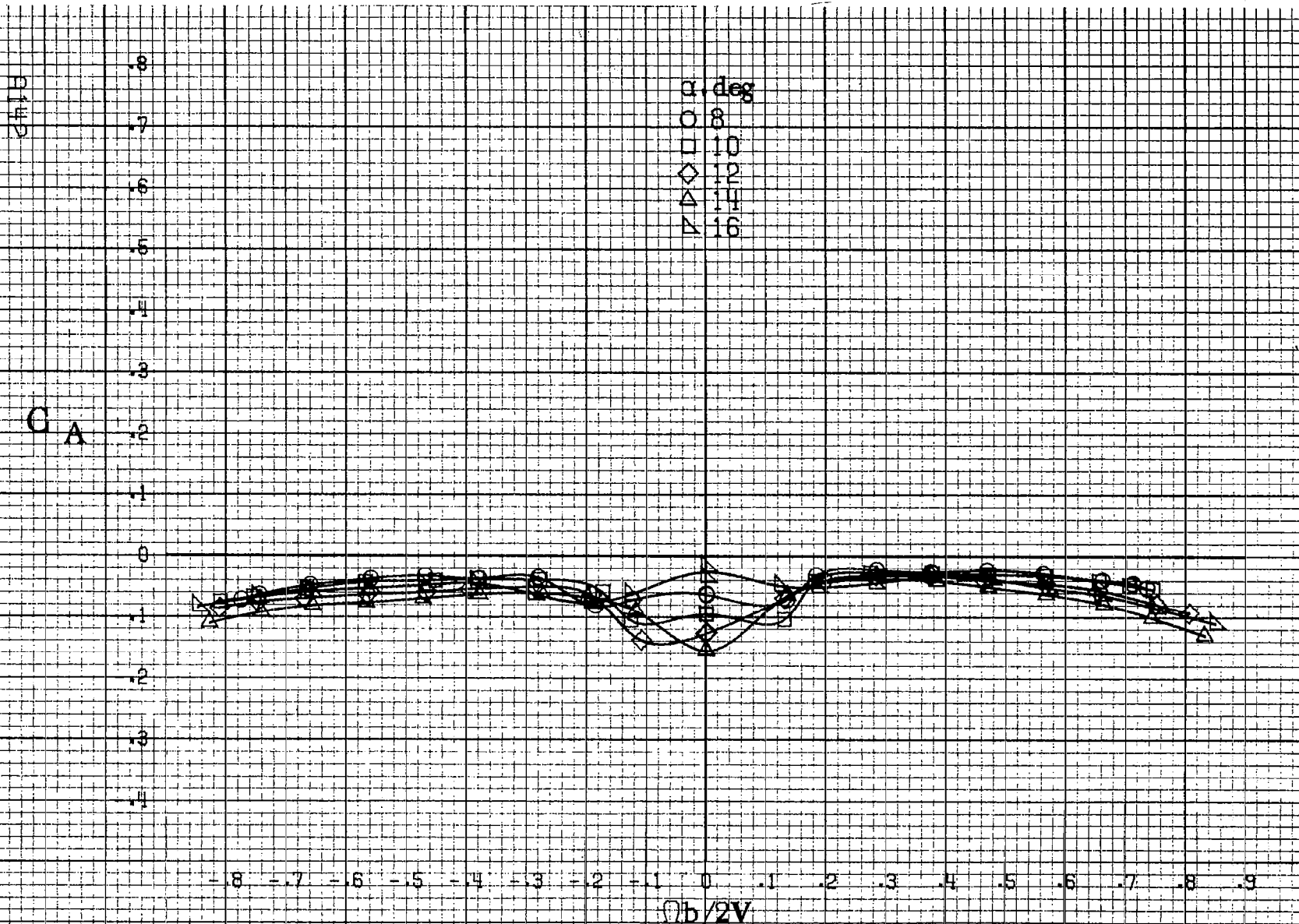
α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $b/2V$

R141

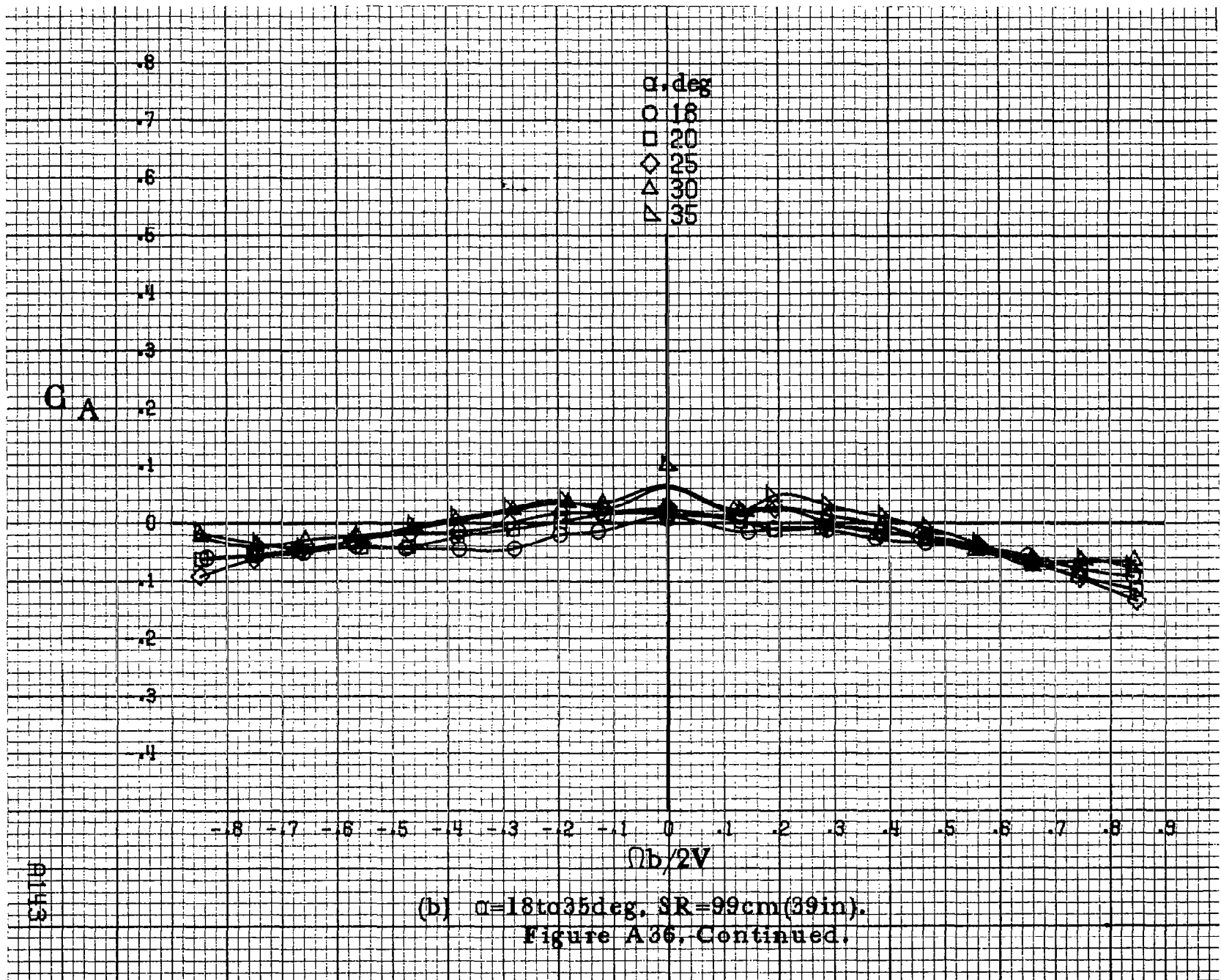
(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A35. Concluded.

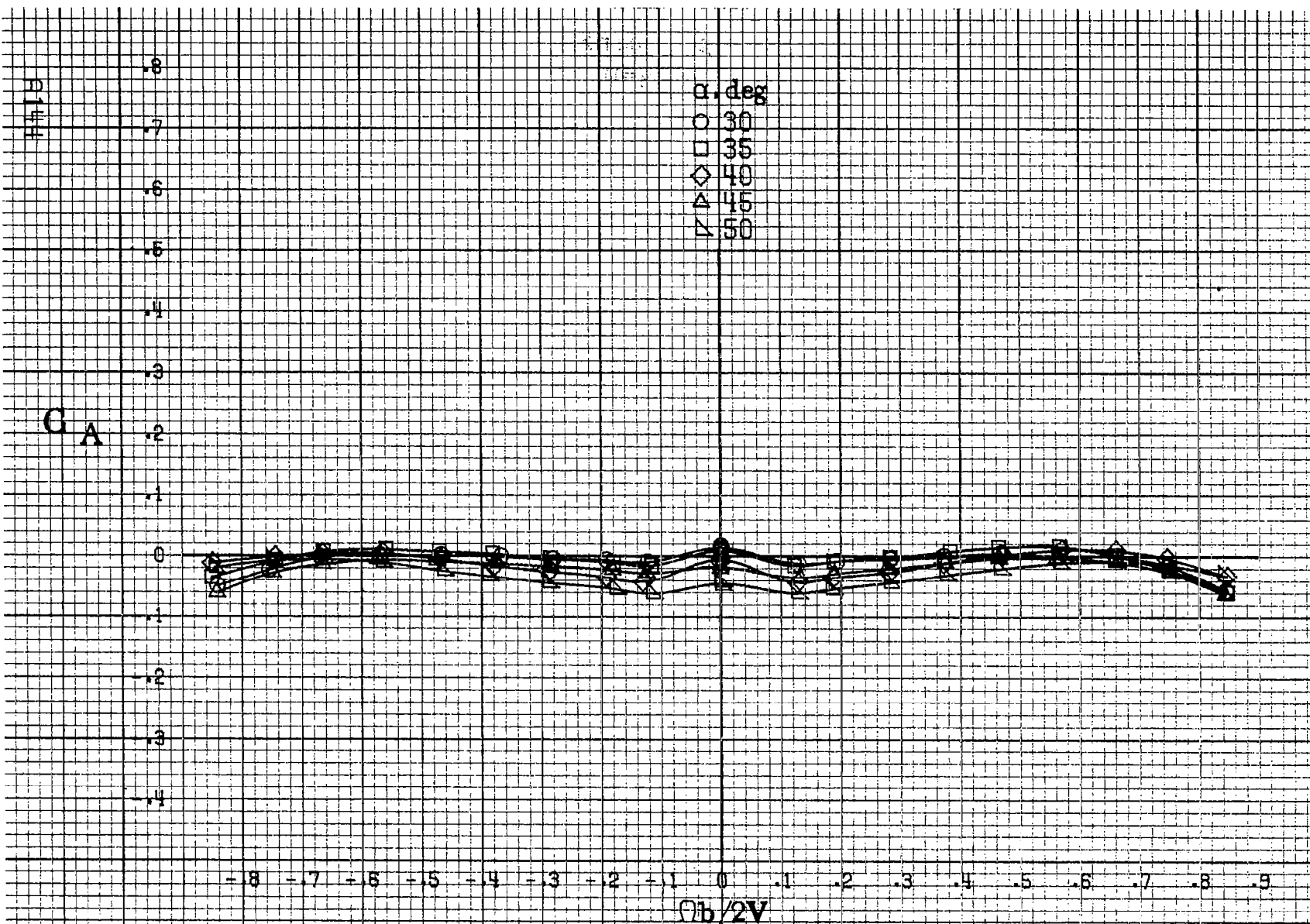




(a) $\alpha=8$ to 16 deg, SR=99cm (39in).

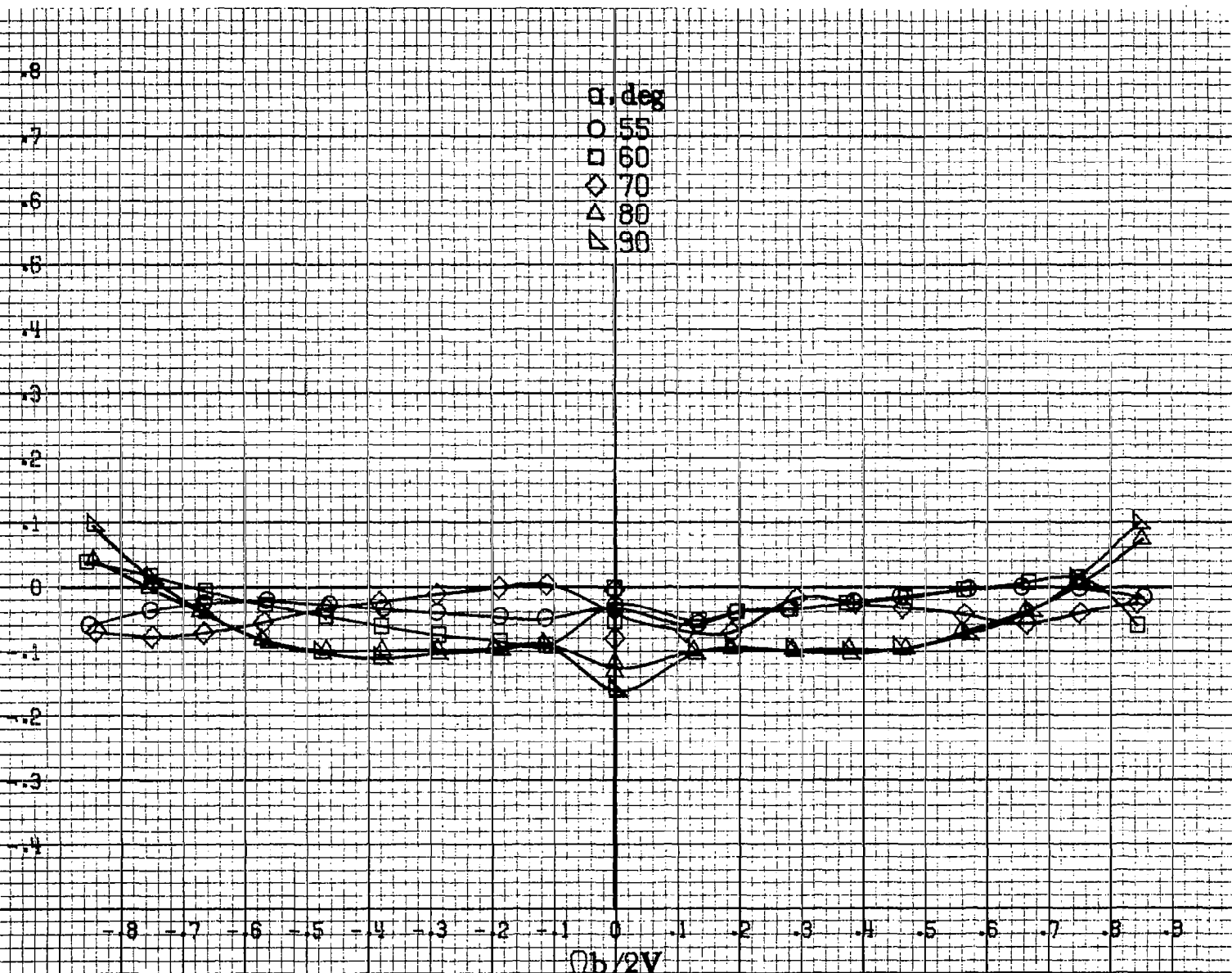
Figure A36.- Effect of rotation rate and angle of attack on axial force coefficient for no. 1 horizontal tail configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.





(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A36. Continued.

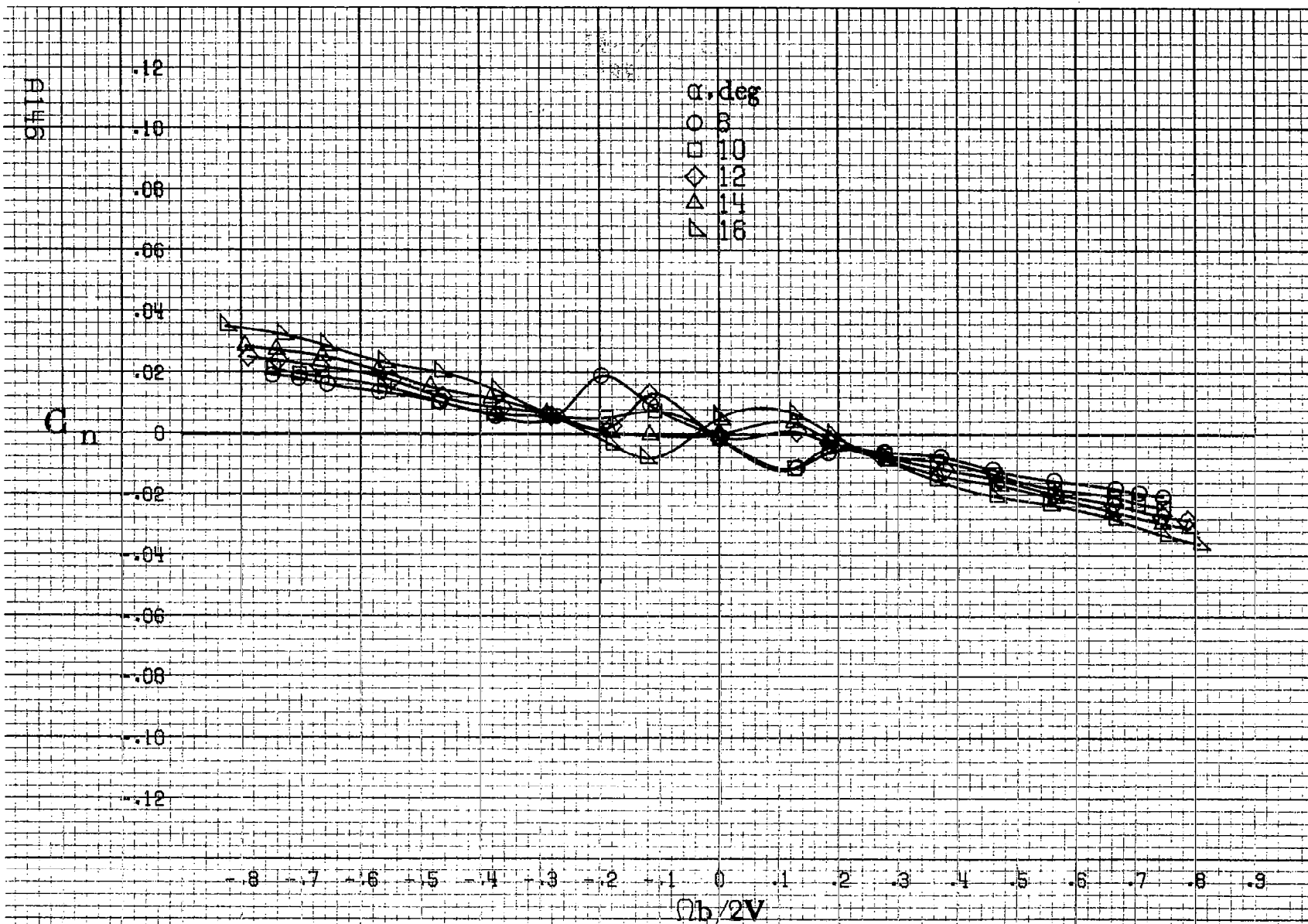
C_A



α, deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

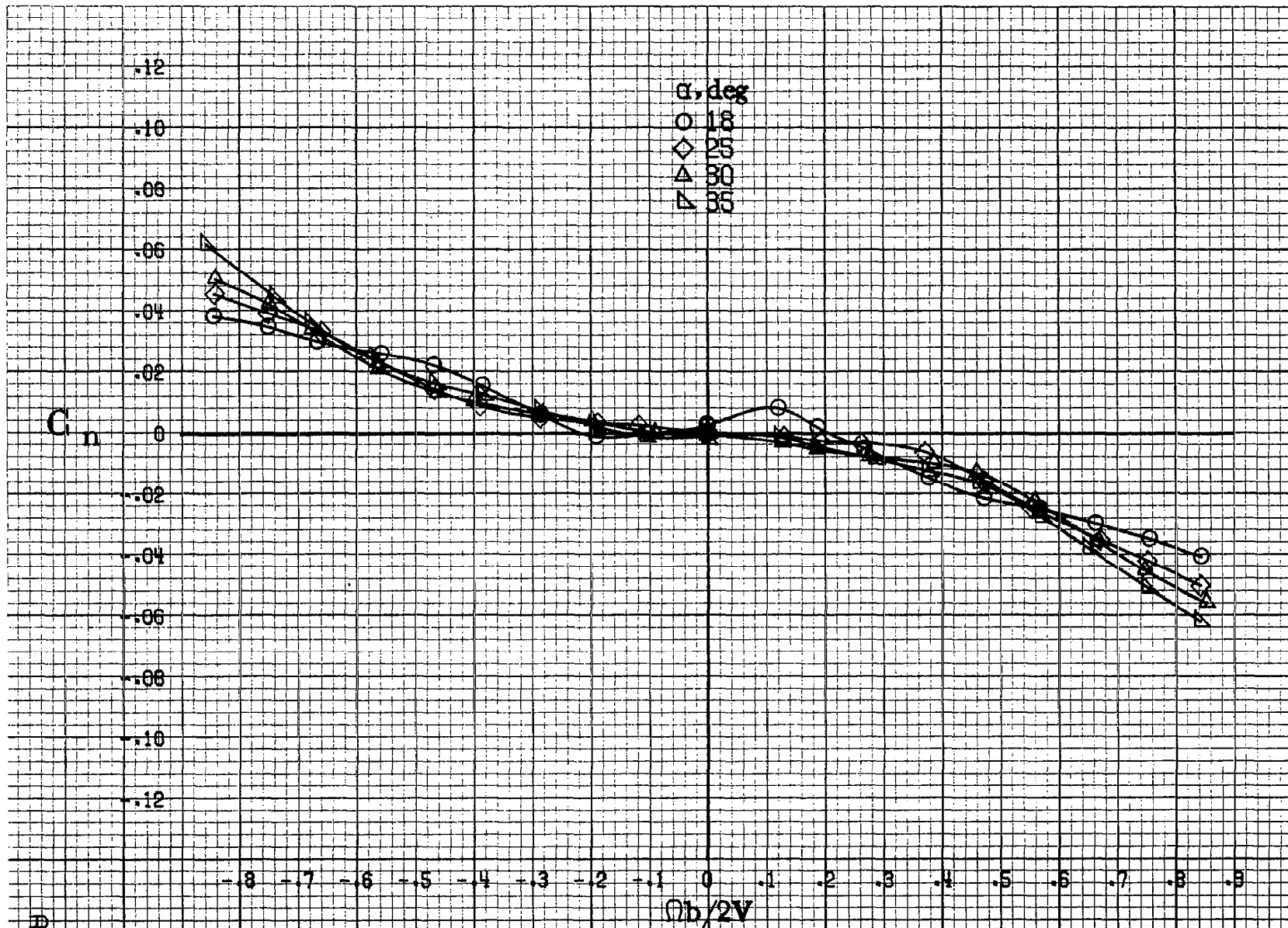
(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A36. Concluded.

0145

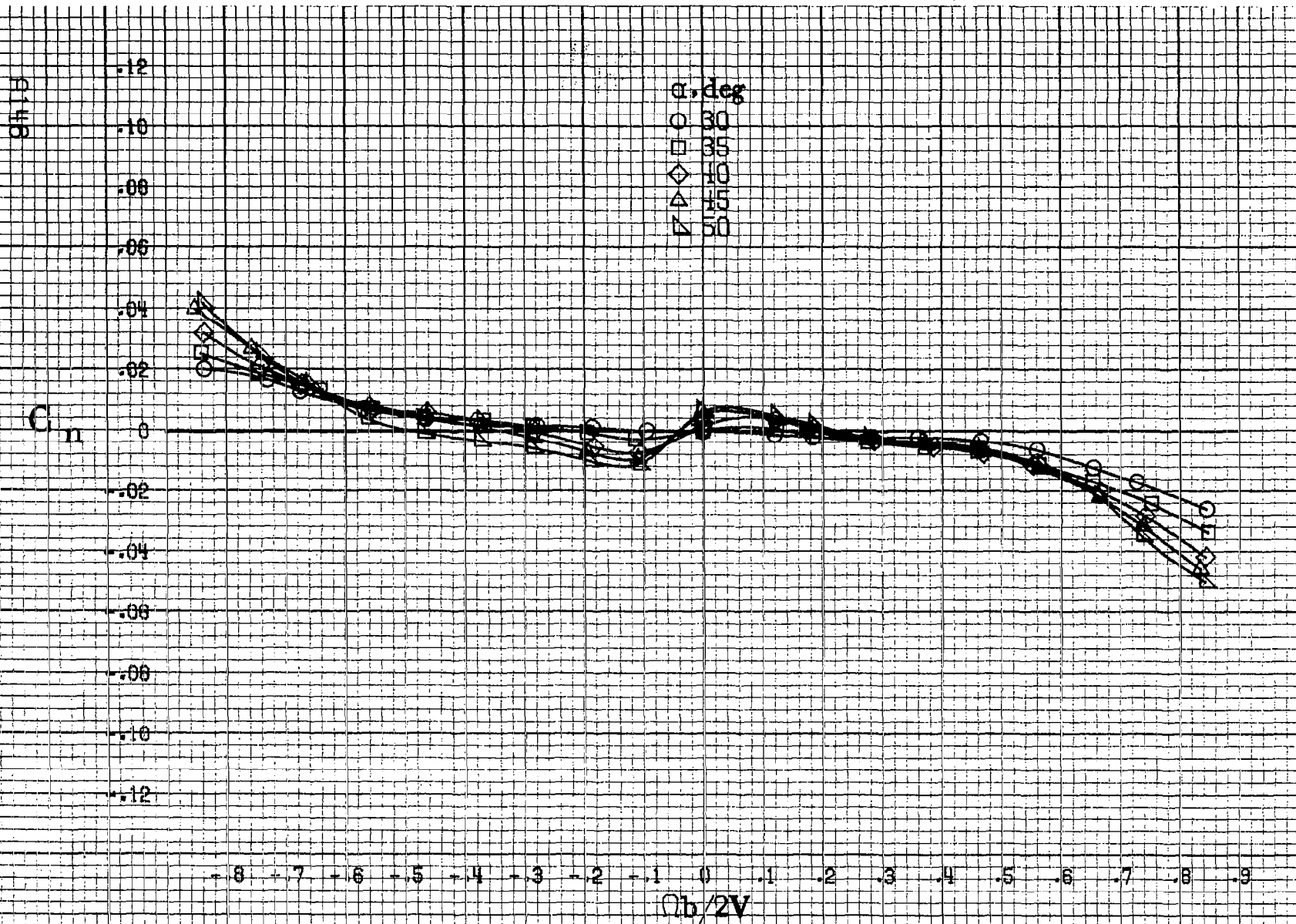


(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

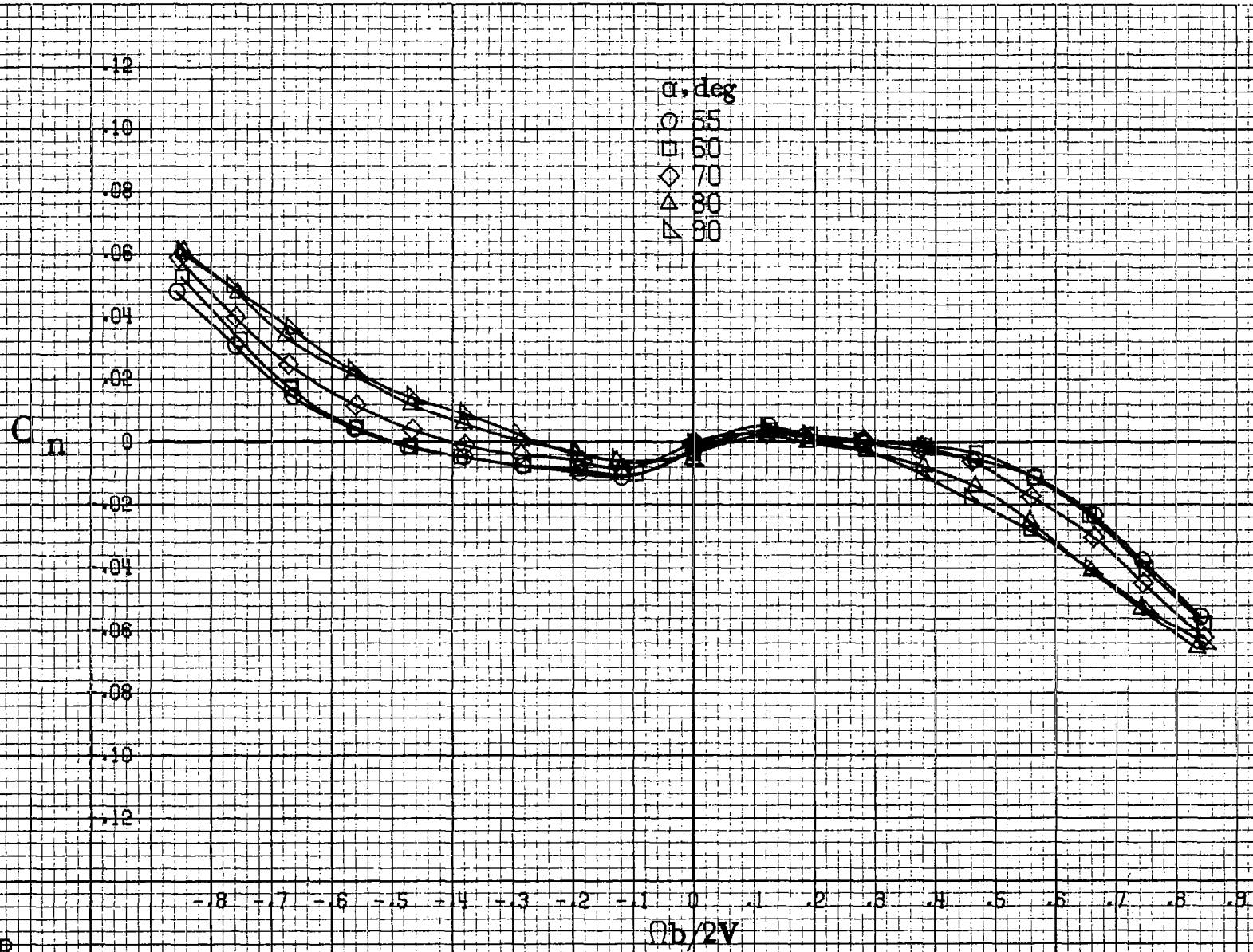
Figure A37. Effect of rotation rate and angle of attack on yawing-moment coefficient for no. 2 horizontal tail configuration. $\delta_a = 0^\circ$, $\delta_e = 0^\circ$, $\delta_r = 0^\circ$, $\delta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A37. Continued.

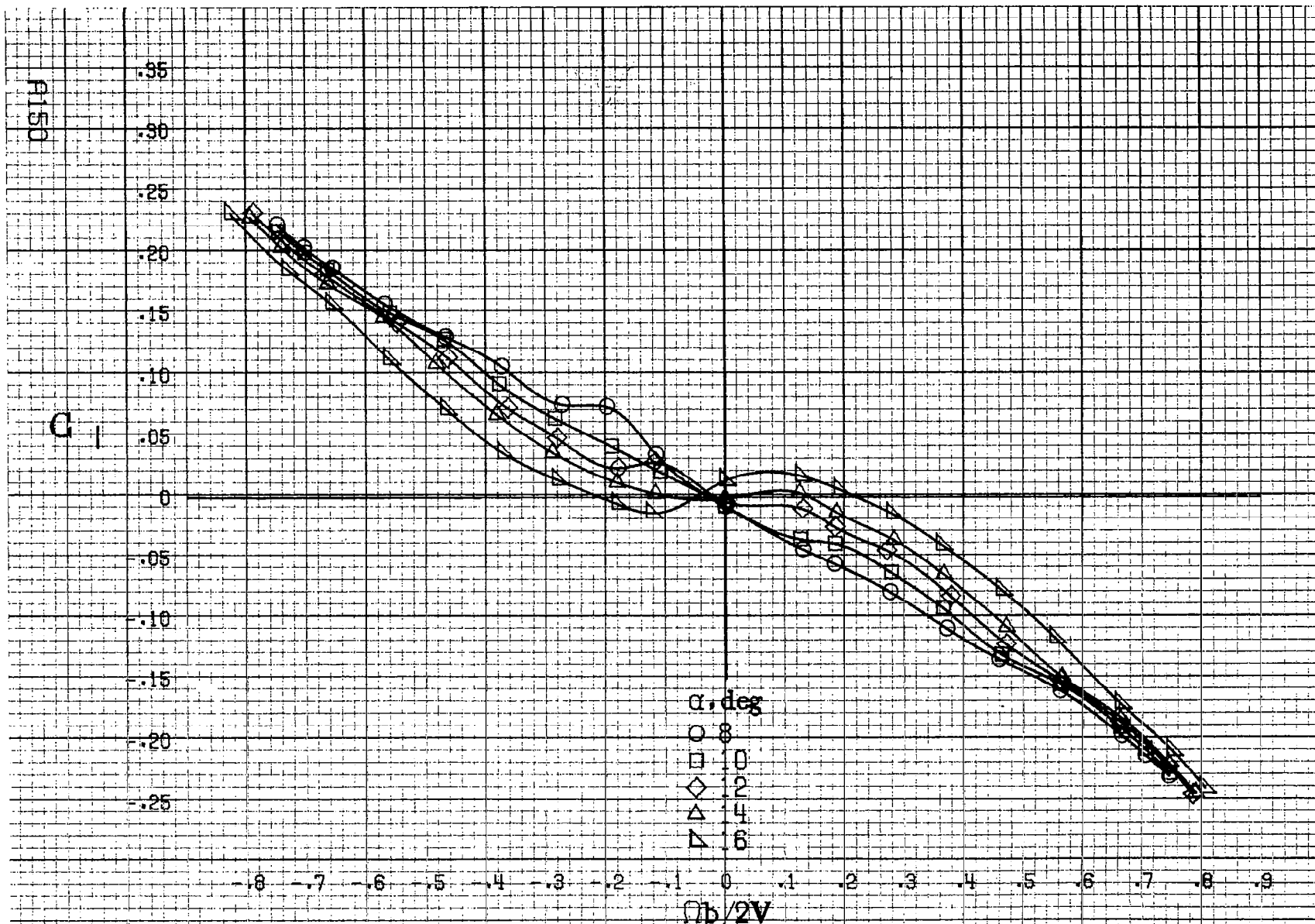


(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A37. Continued.



(d) $\alpha = 55$ to 90 deg. $SR = 0$.
 Figure A 37. Concluded.

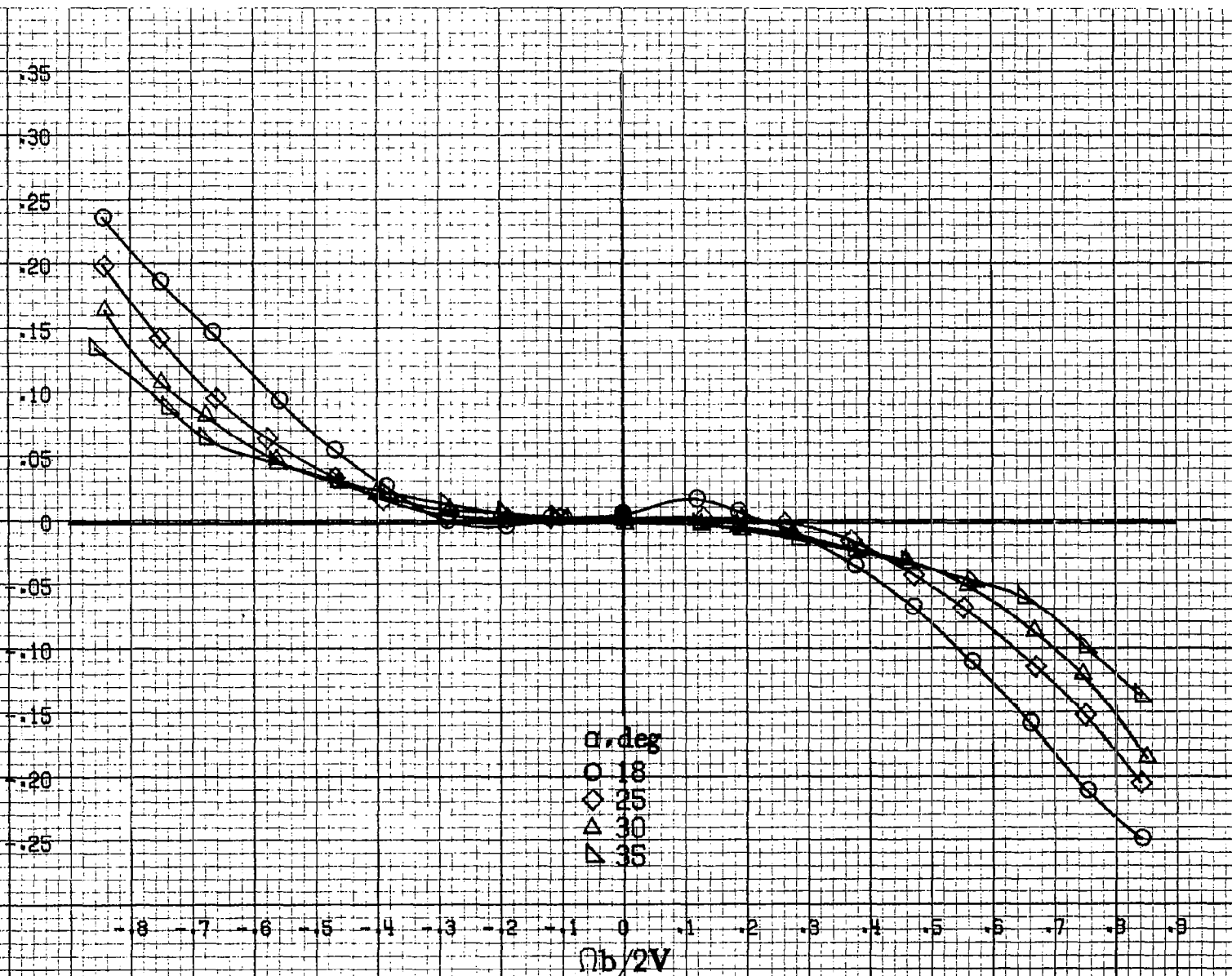
6149



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

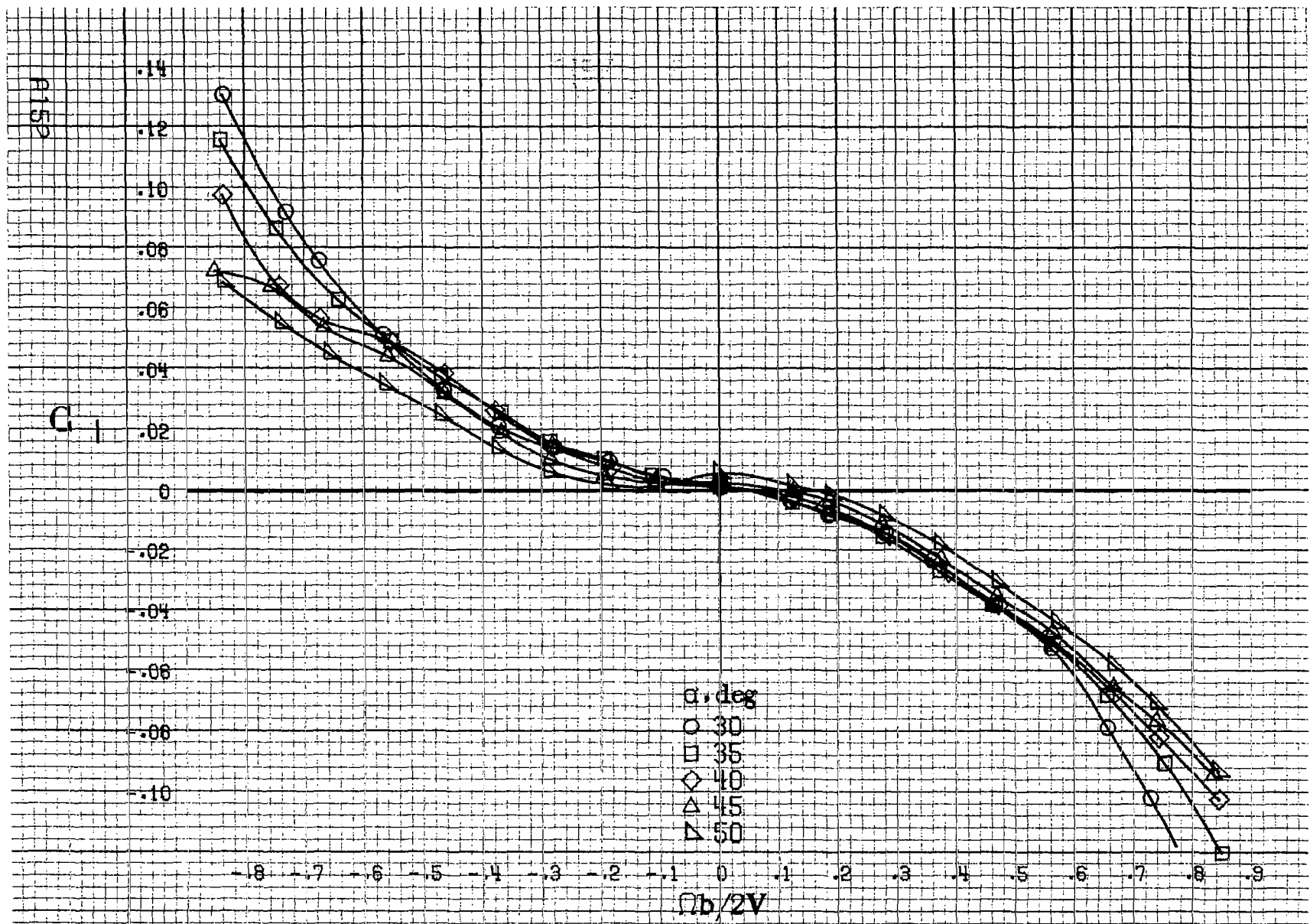
Figure A38. Effect of rotation rate and angle of attack on rolling moment coefficient for no. 2 horizontal tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_l



(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A38.-Continued.

A151



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A38. Continued.

C₁

.14
.12
.10
.08
.06
.04
.02
0
.02
.04
.06
.08
.10

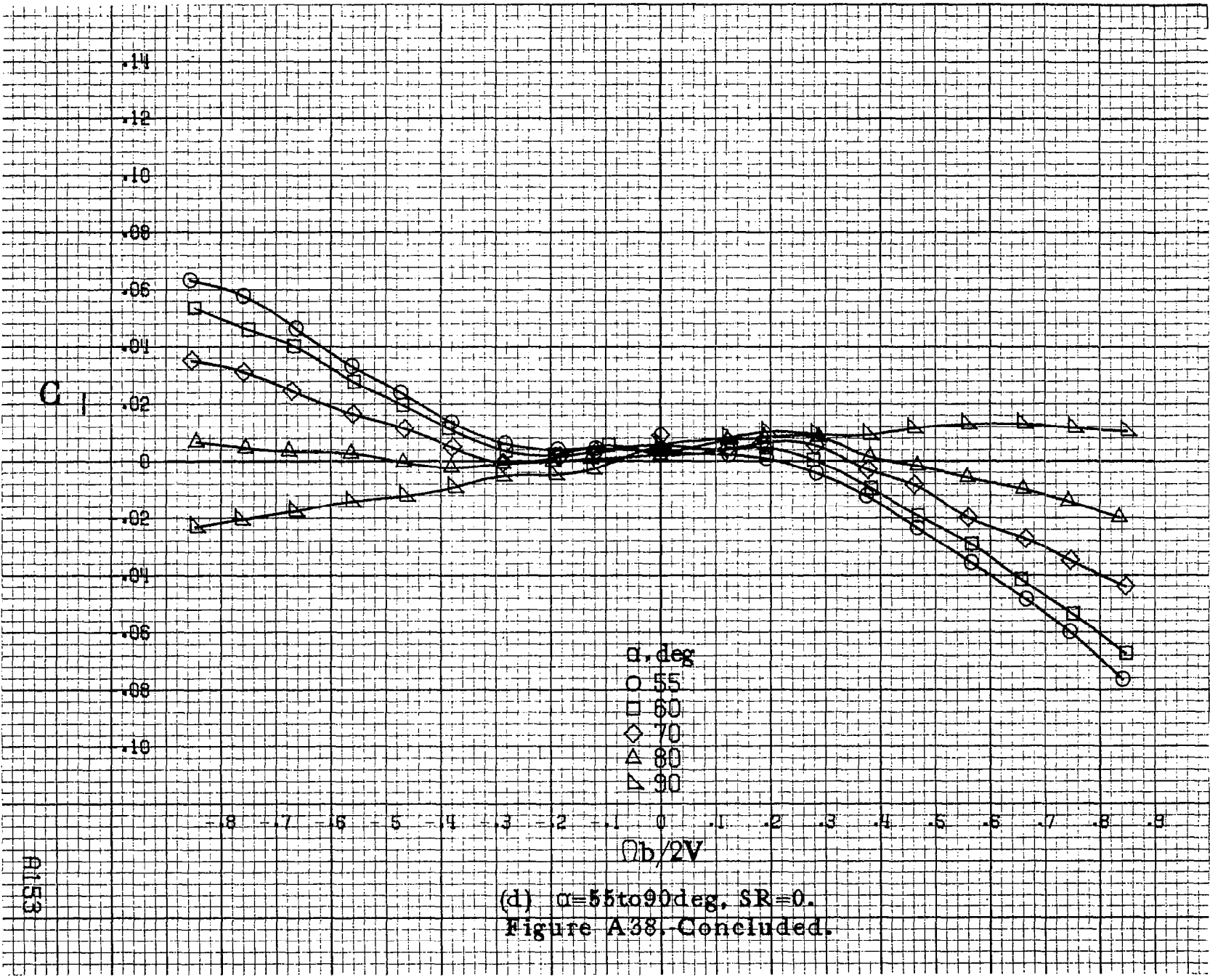
α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

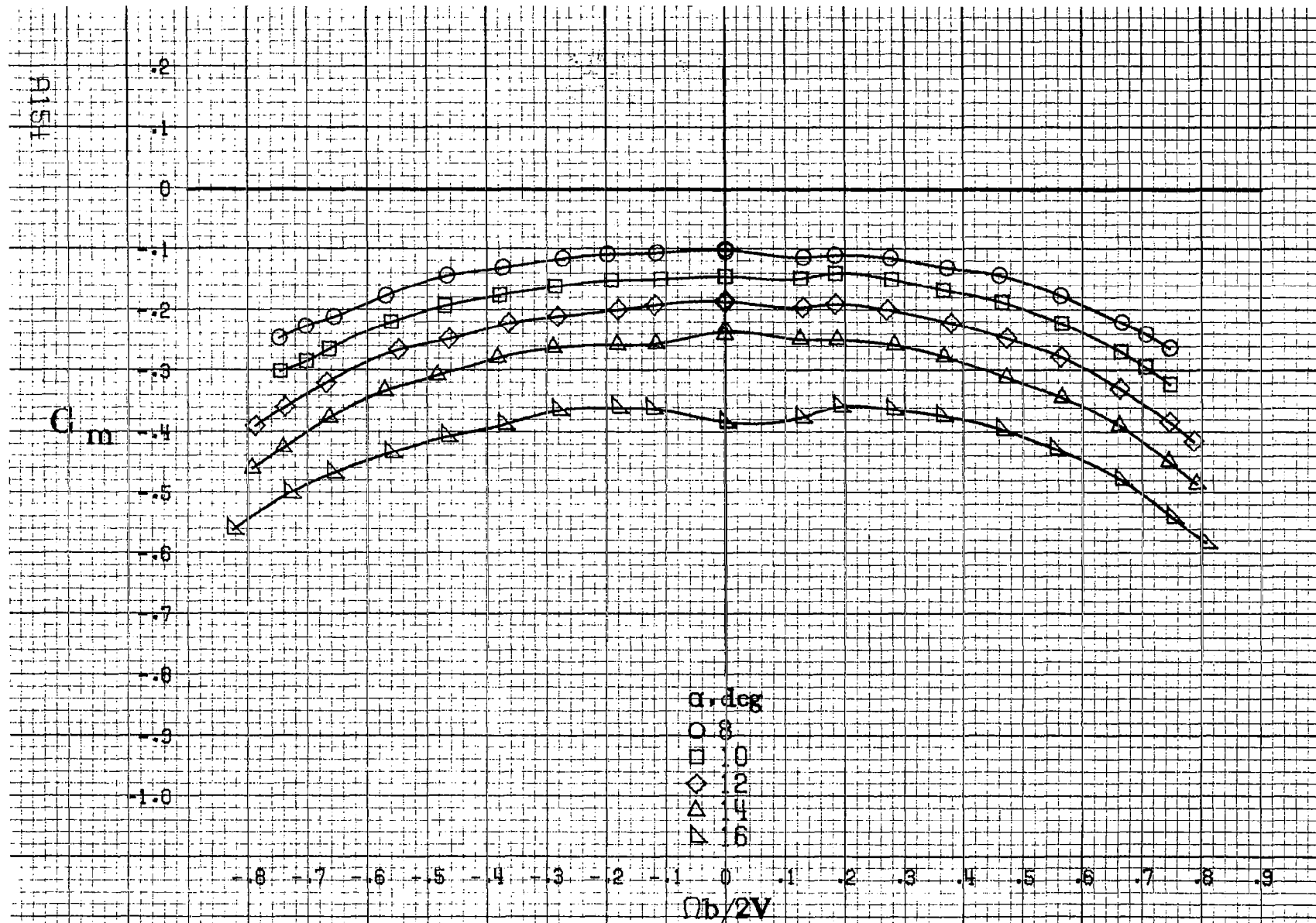
-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$Qb/2V$

A153

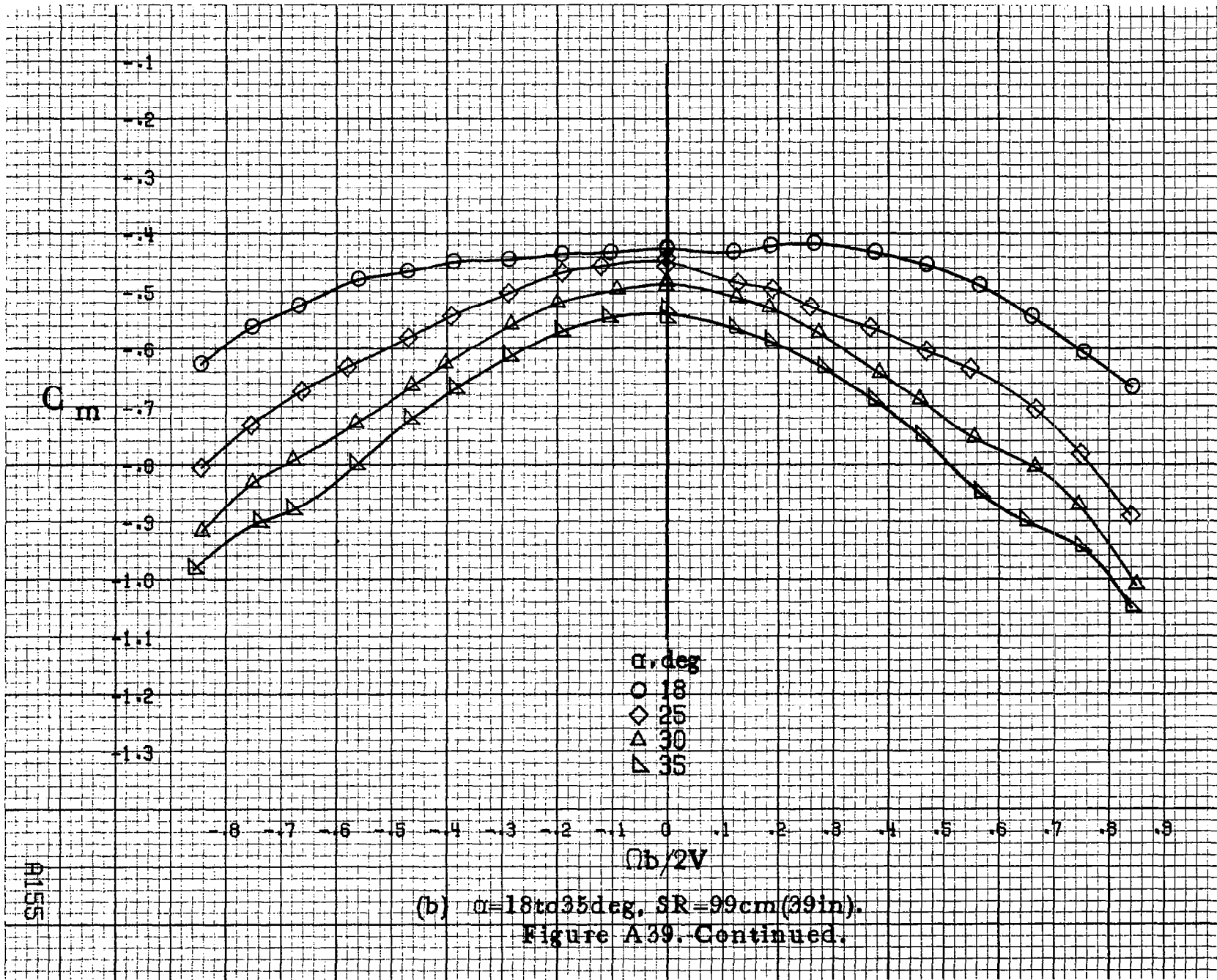
(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A38. Concluded.





(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A39. Effect of rotation rate and angle of attack on pitching-moment coefficient for no. 2 horizontal tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A39. Continued.

P156

C_m

-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6

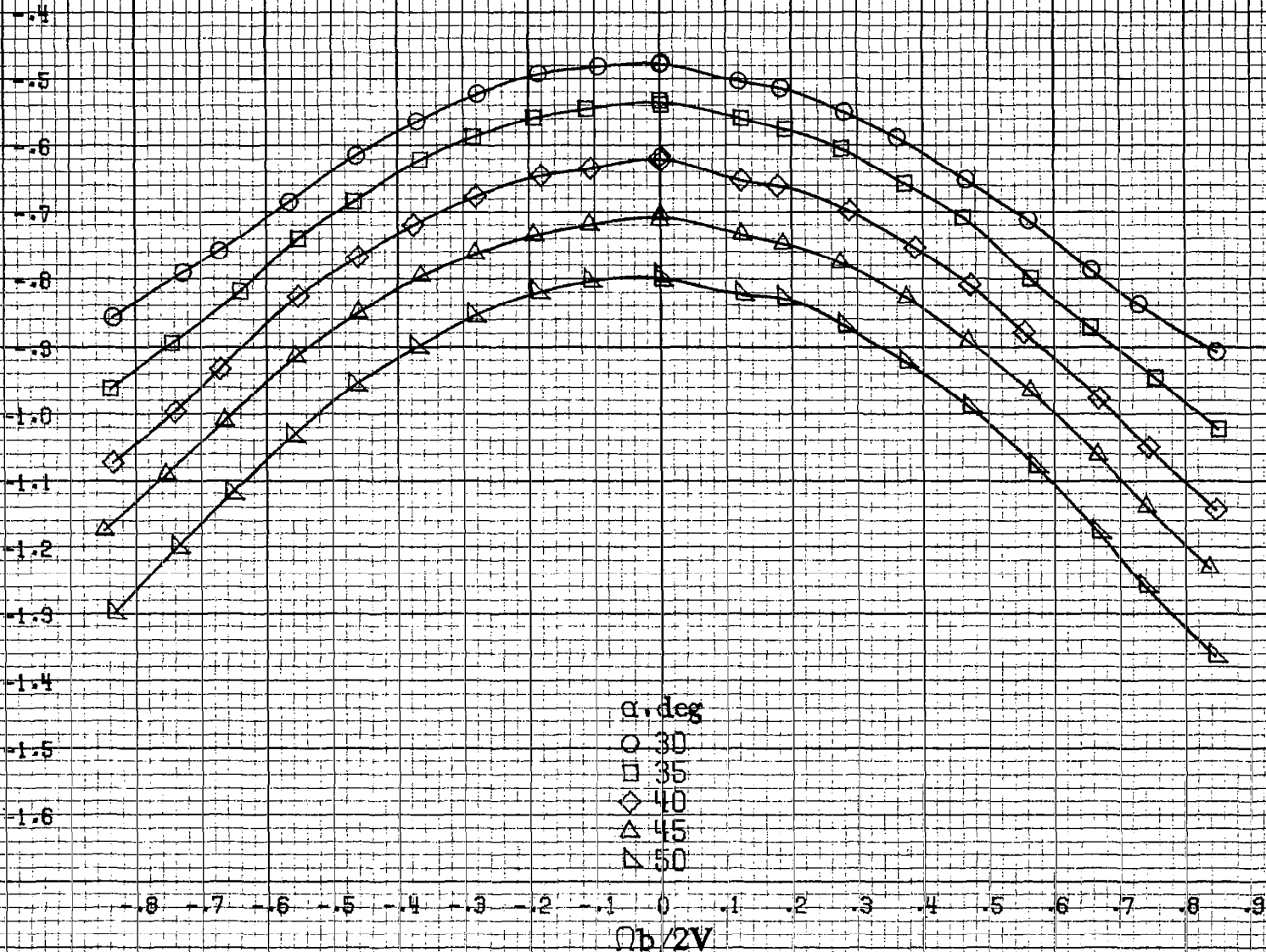
-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

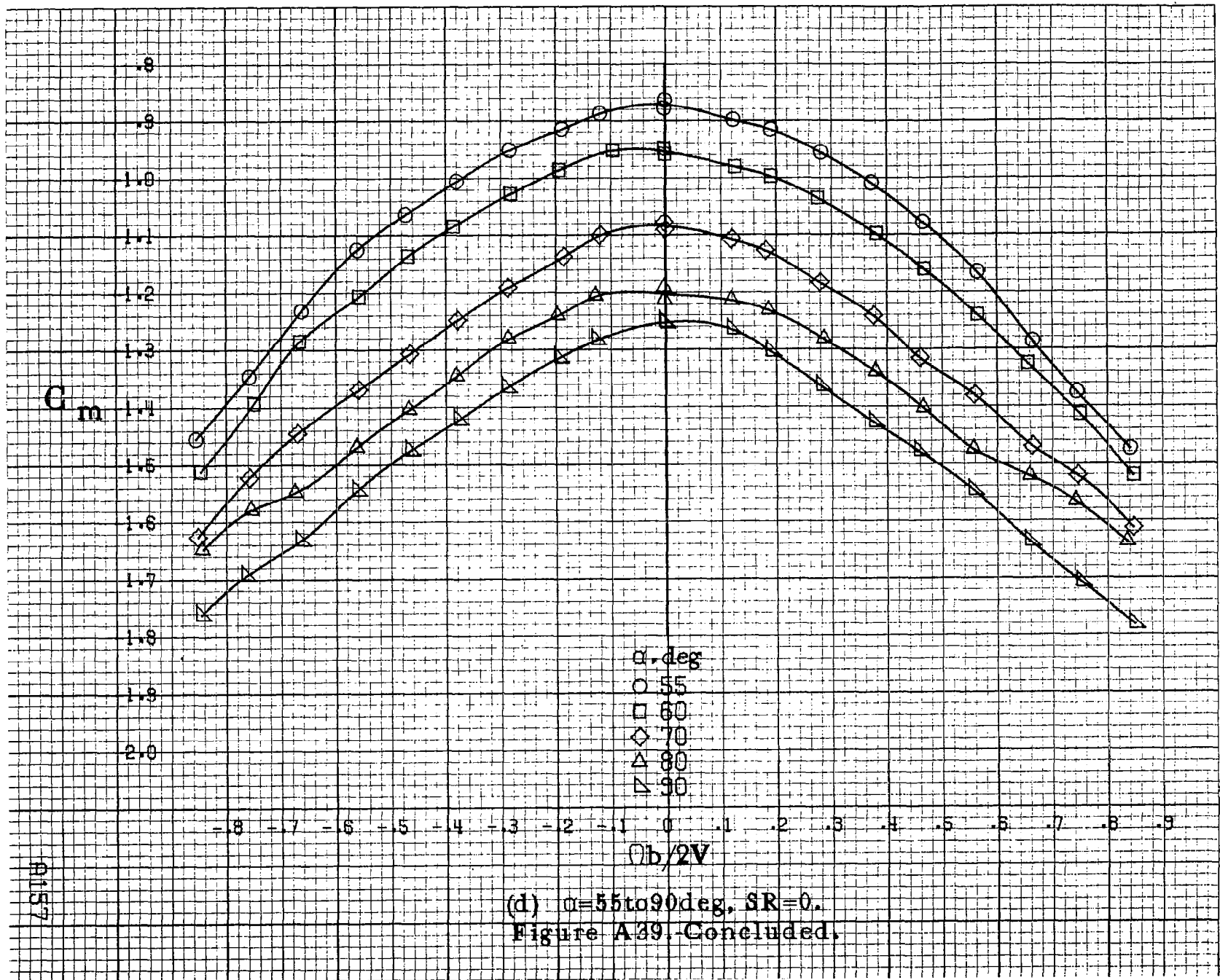
$\Omega b/2V$

α, deg

- 30
- 35
- ◇ 40
- △ 45
- ▽ 50

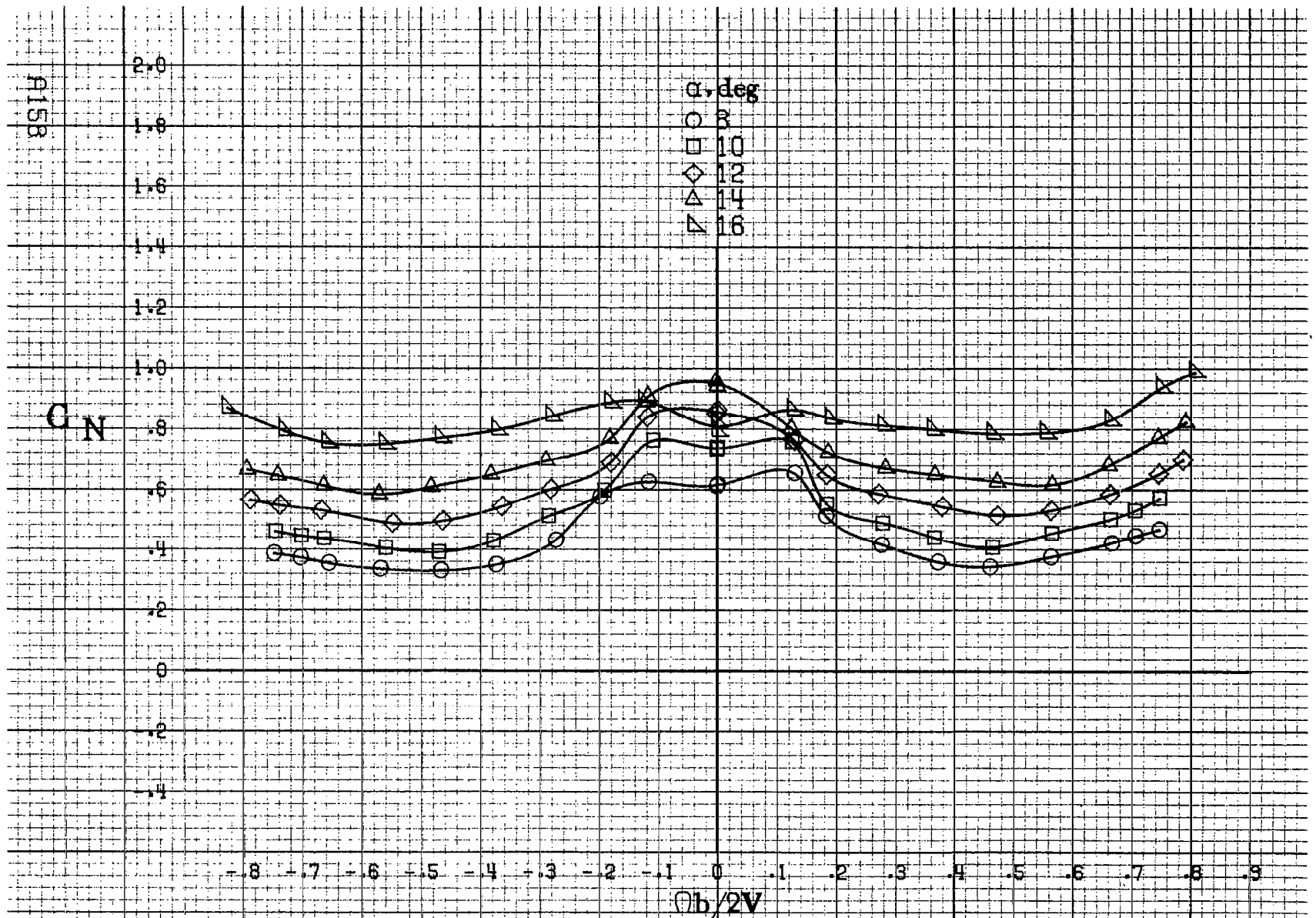
(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A39. Continued.





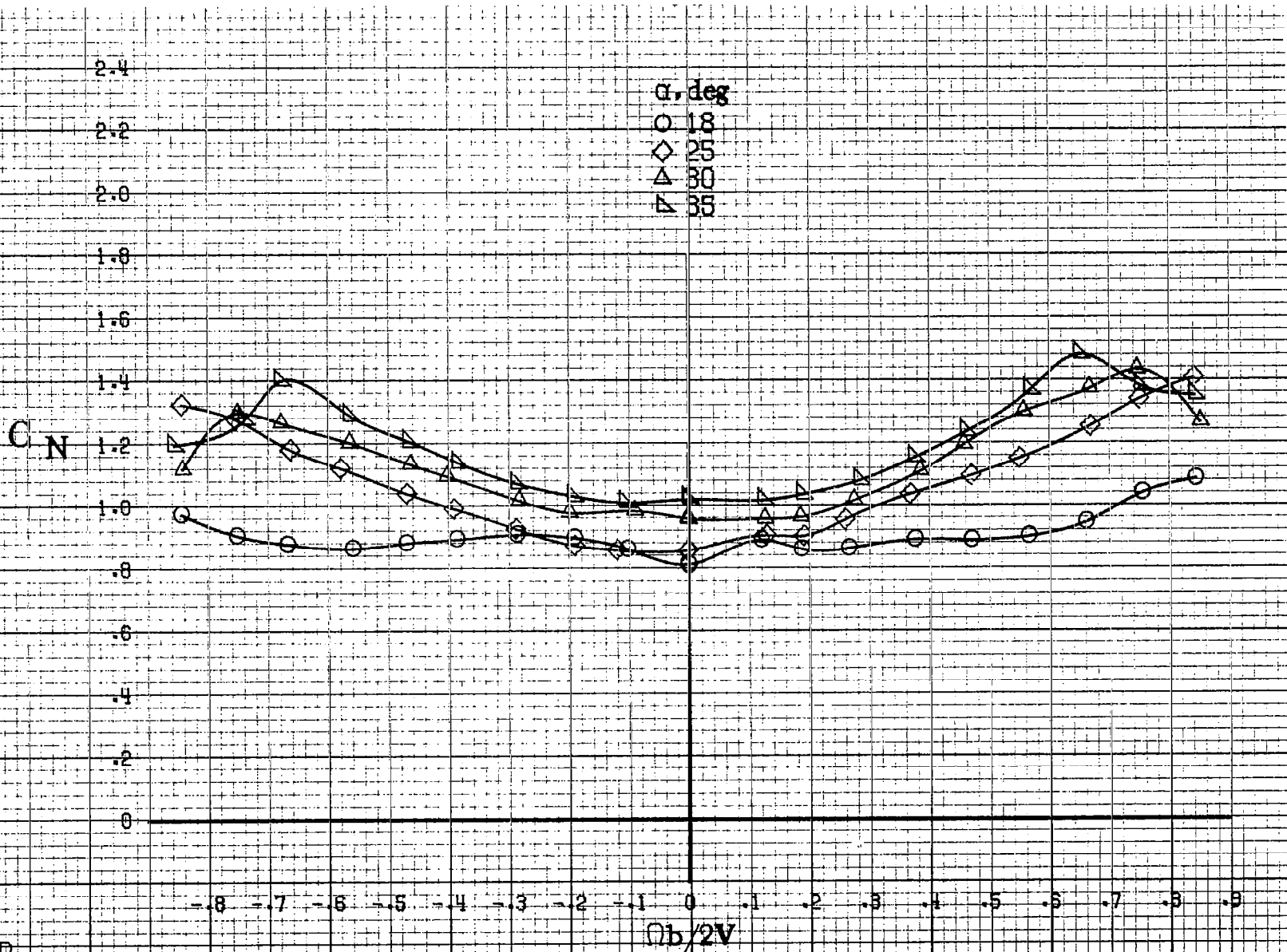
(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A39. Concluded.

A157



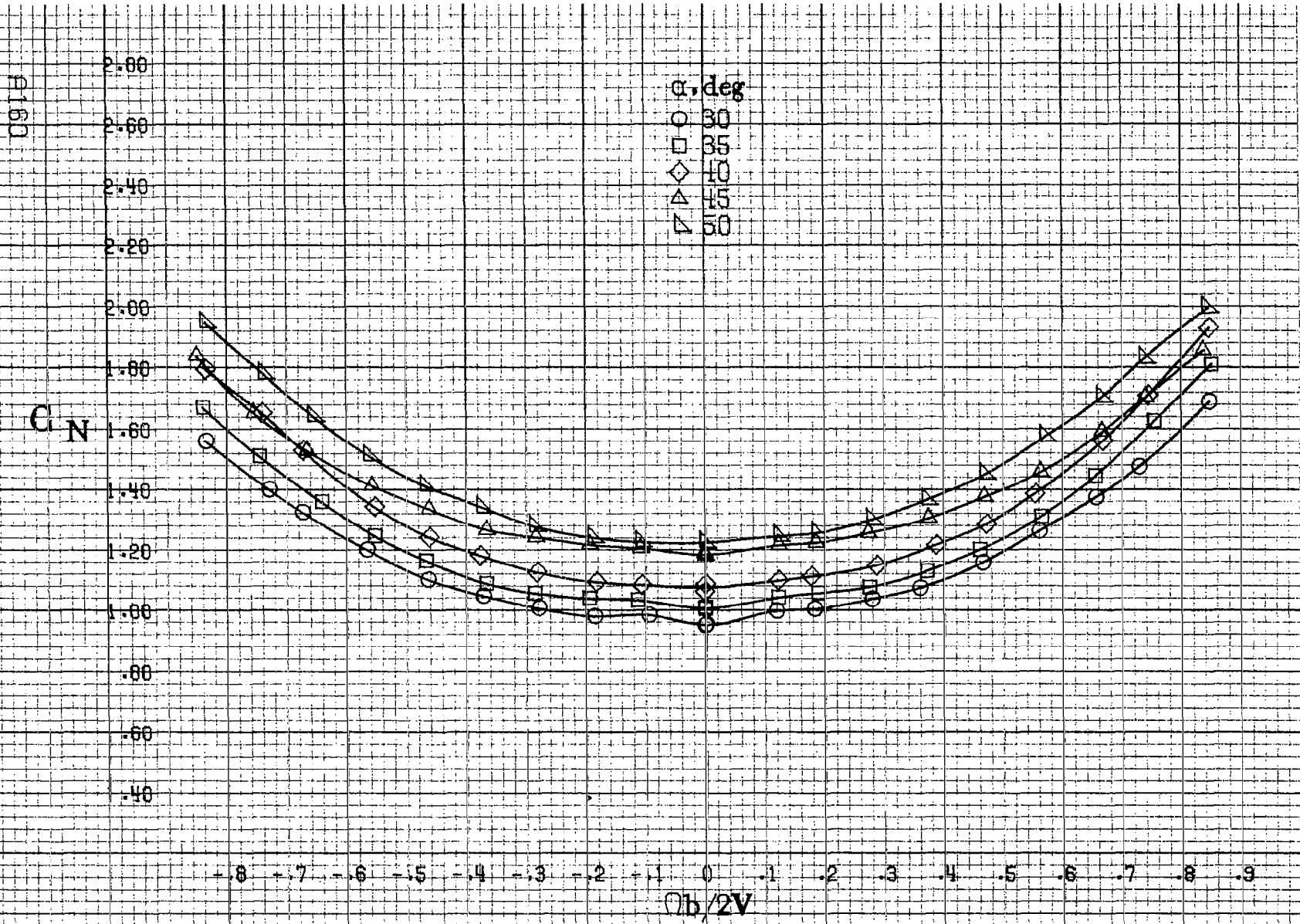
(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A40. Effect of rotation rate and angle of attack on normal force coefficient for no. 2 horizontal tail configuration. $\delta_e = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A40, Continued.

A159



(d) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A40. Continued.

C_N

3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8

α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$\Omega b/2V$

(d) $\alpha=55$ to 90 deg. $SR=0$.
Figure A40. Concluded.

H162

C_{L_Y}

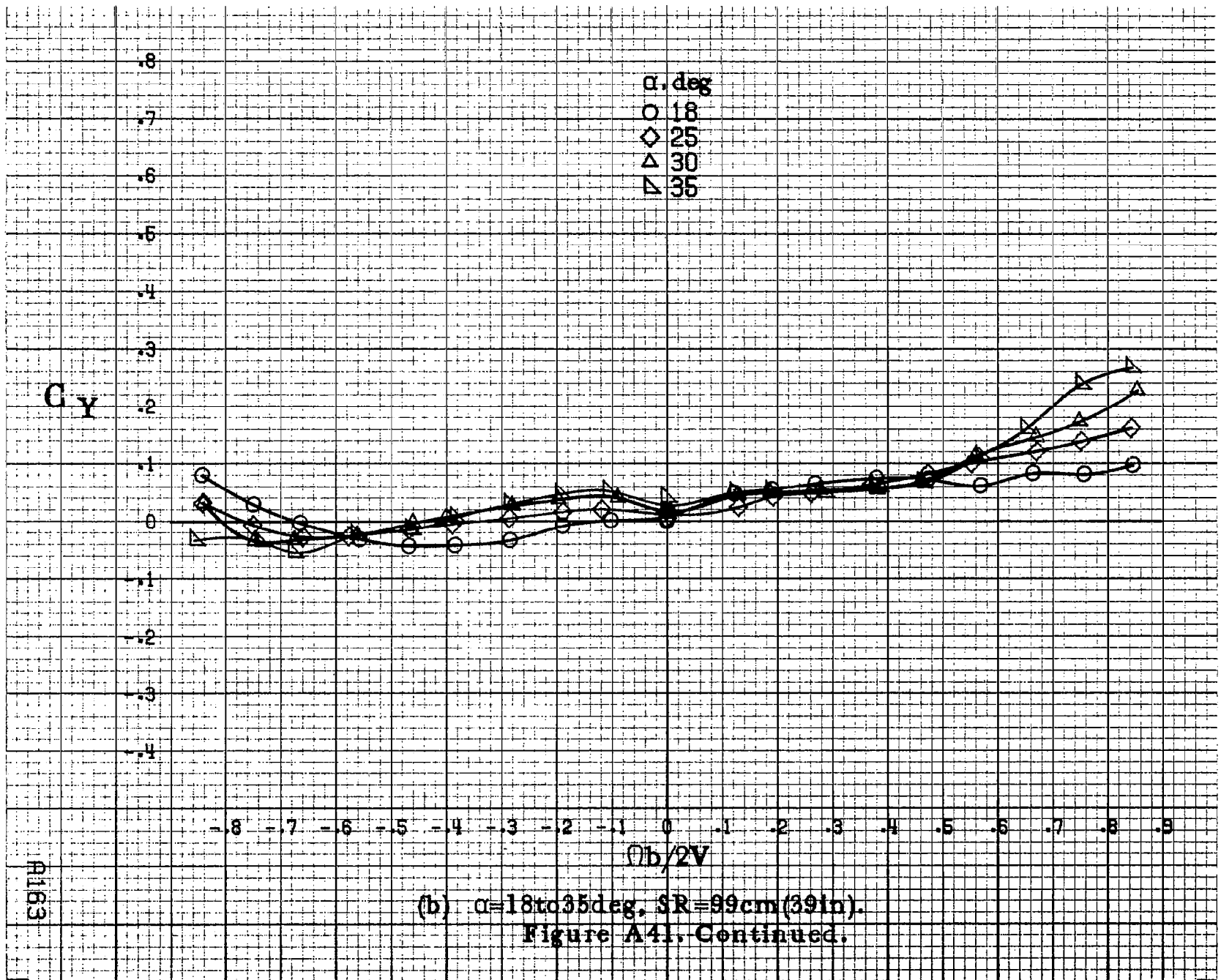
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4

α , deg
 ○ 8
 □ 10
 ◇ 12
 △ 14
 ▽ 16

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\Omega b / 2V$

(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A41. Effect of rotation rate and angle of attack on side-force coefficient for no. 2 horizontal tail configuration. $\delta_a = 0^\circ$, $\delta_e = 0^\circ$, $\delta_r = 0^\circ$, $B = 0^\circ$.



(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A41. Continued.

R163

FIG 4

C_y

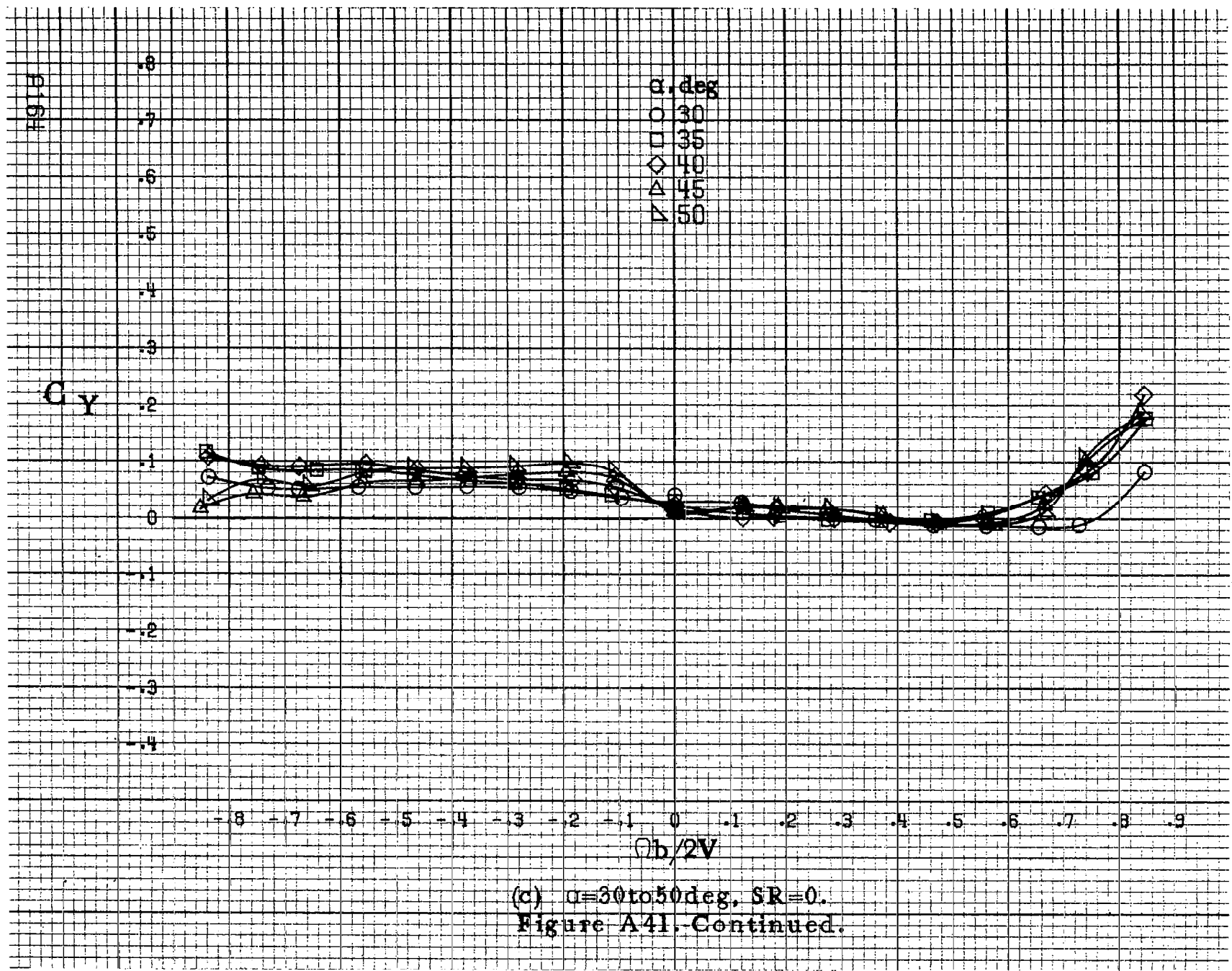
0
-1
-2
-3
-4
-5
-6
-7
-8
-9

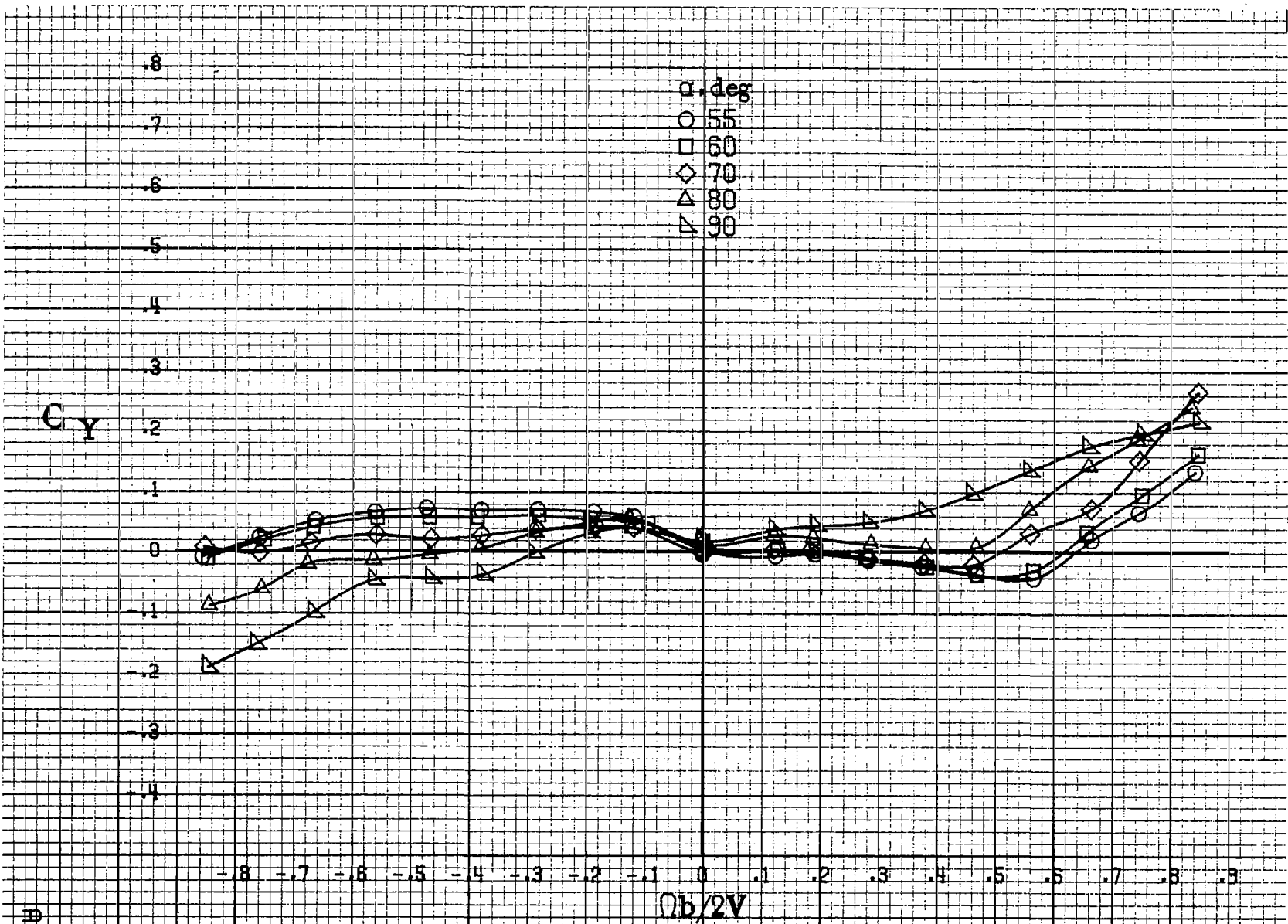
α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$b/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A41. Continued.





(d) $\alpha=55$ to 90 deg. $SR=0$.
 Figure A41.-Concluded.

9165

E165

C_A

0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4

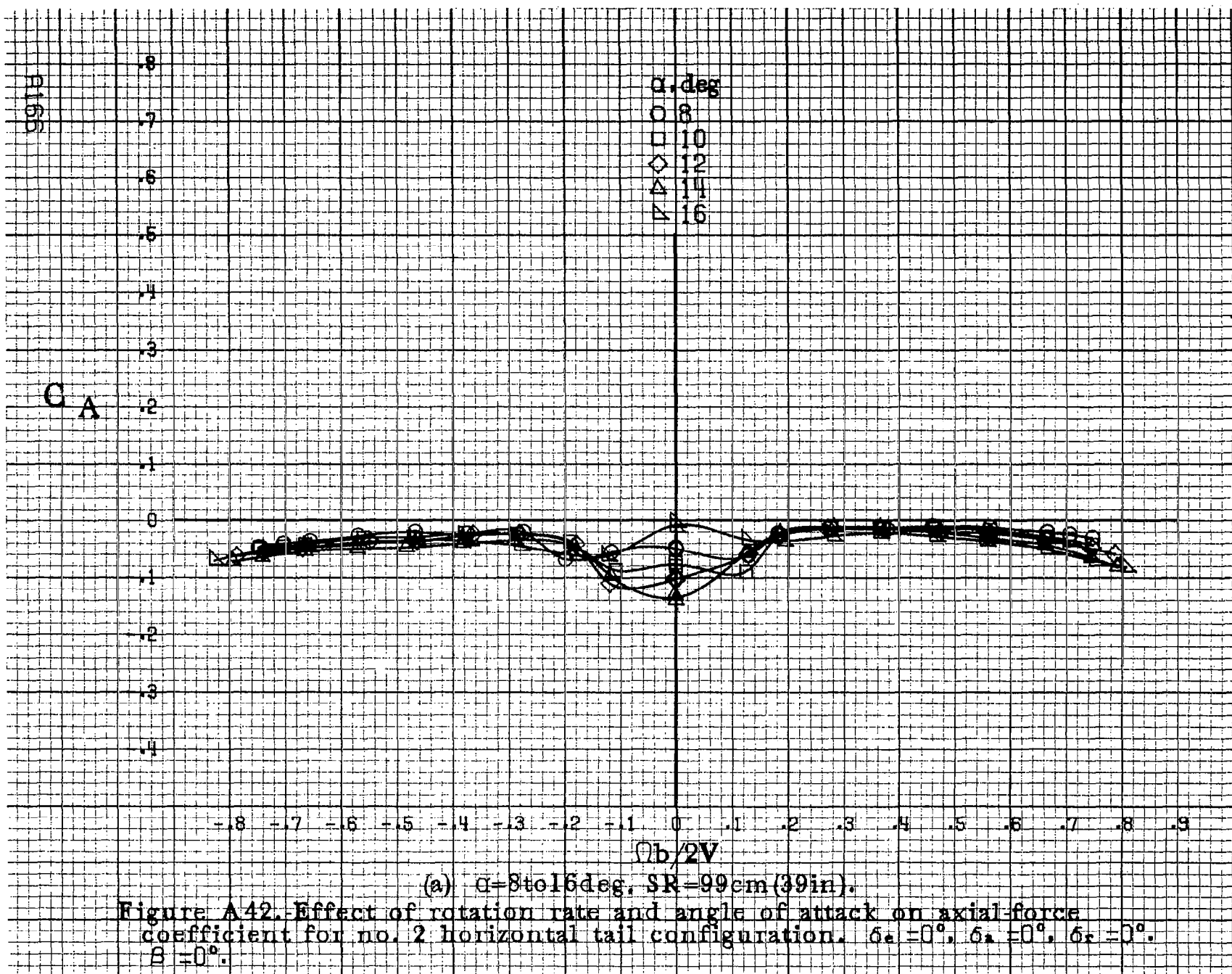
α , deg
 ○ 8
 □ 10
 ◇ 12
 △ 14
 ▽ 16

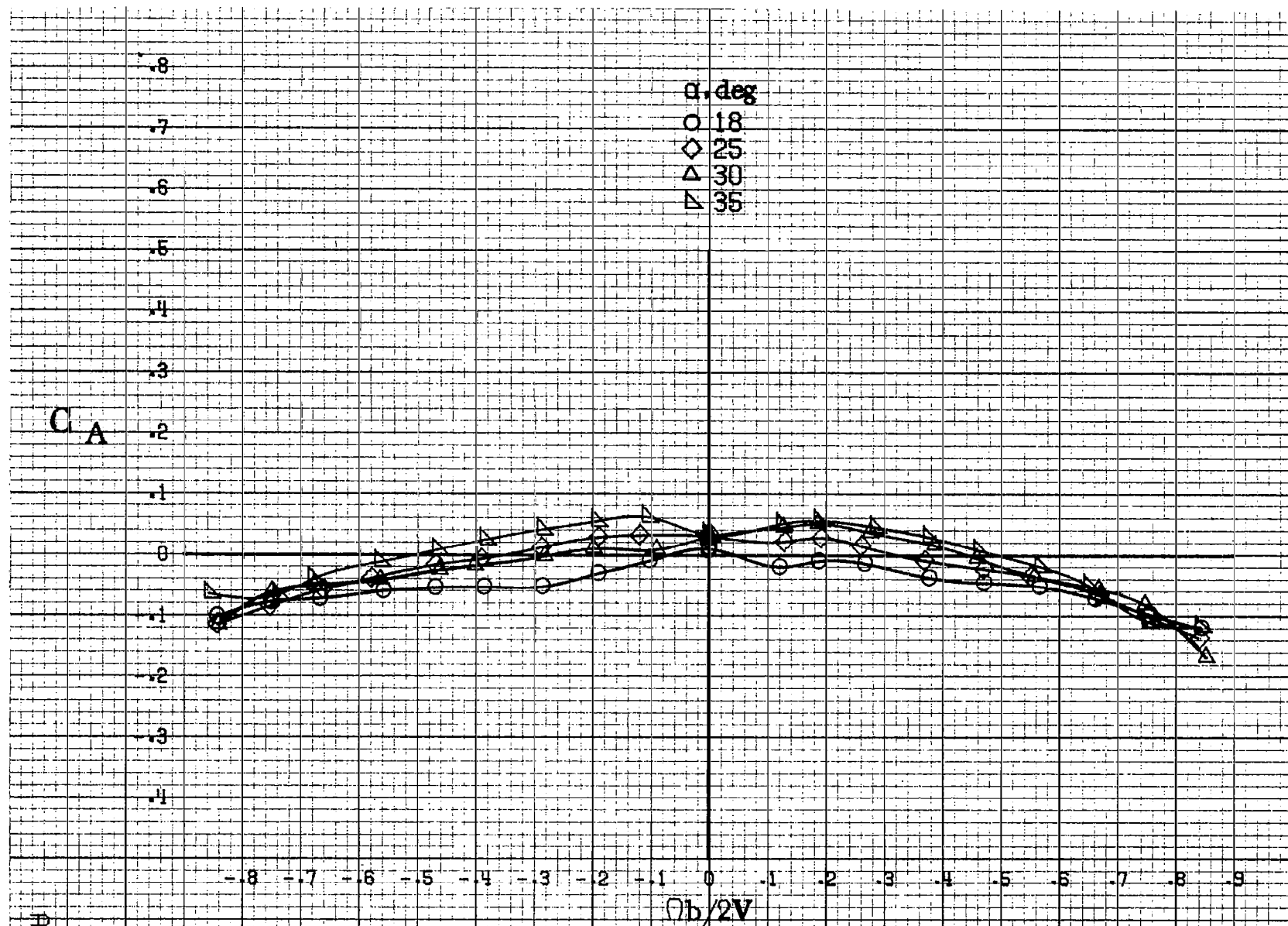
-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

$\Omega b/2V$

(a) $\alpha=8$ to 16 deg, SR=99 cm (39 in).

Figure A42. Effect of rotation rate and angle of attack on axial force coefficient for no. 2 horizontal tail configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$. $B = 0^\circ$.





(b) $\alpha = 18$ to 35 deg. $SR = 99$ cm (39 in).
 Figure A42. Continued.

A167

#166

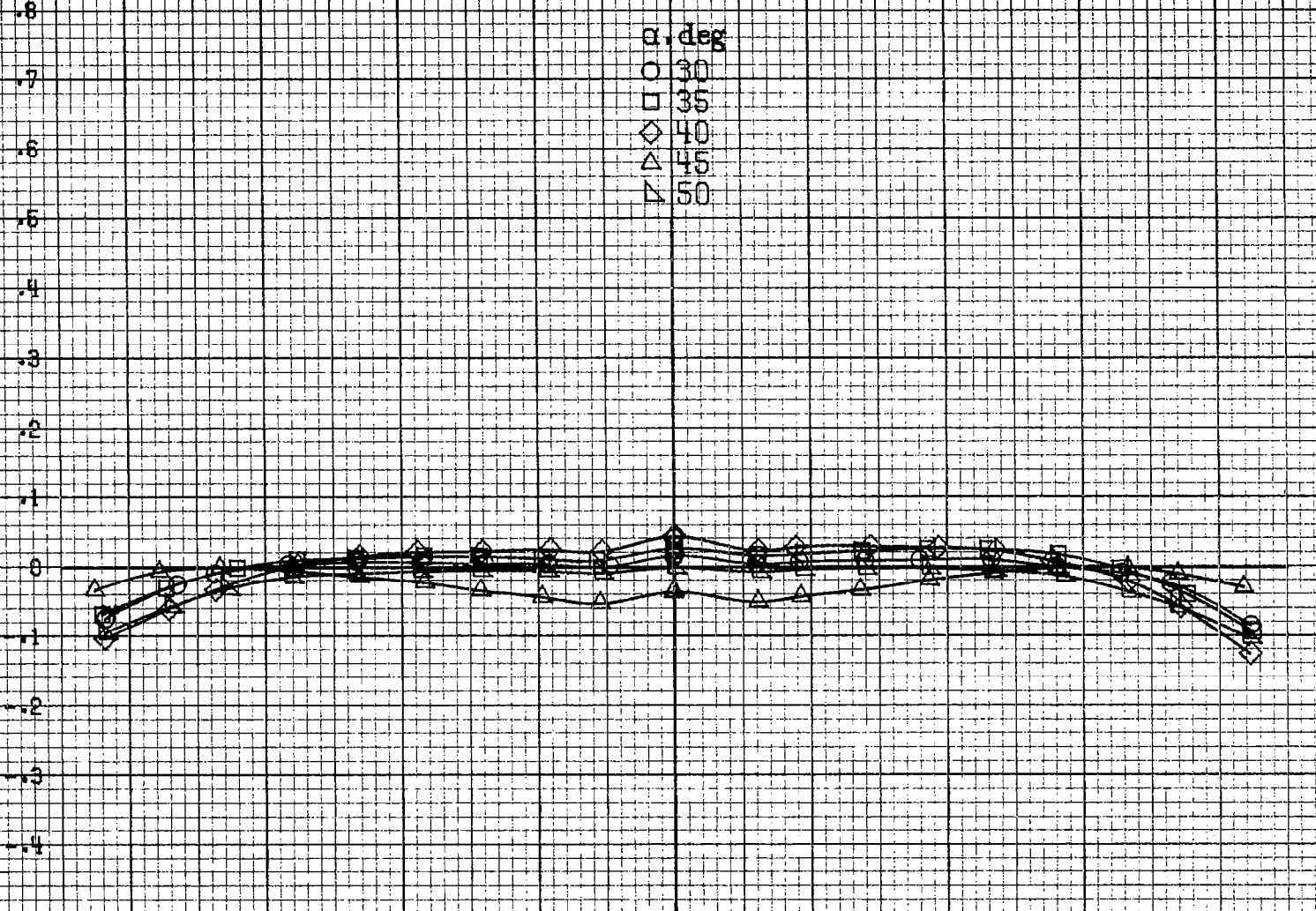
C_A

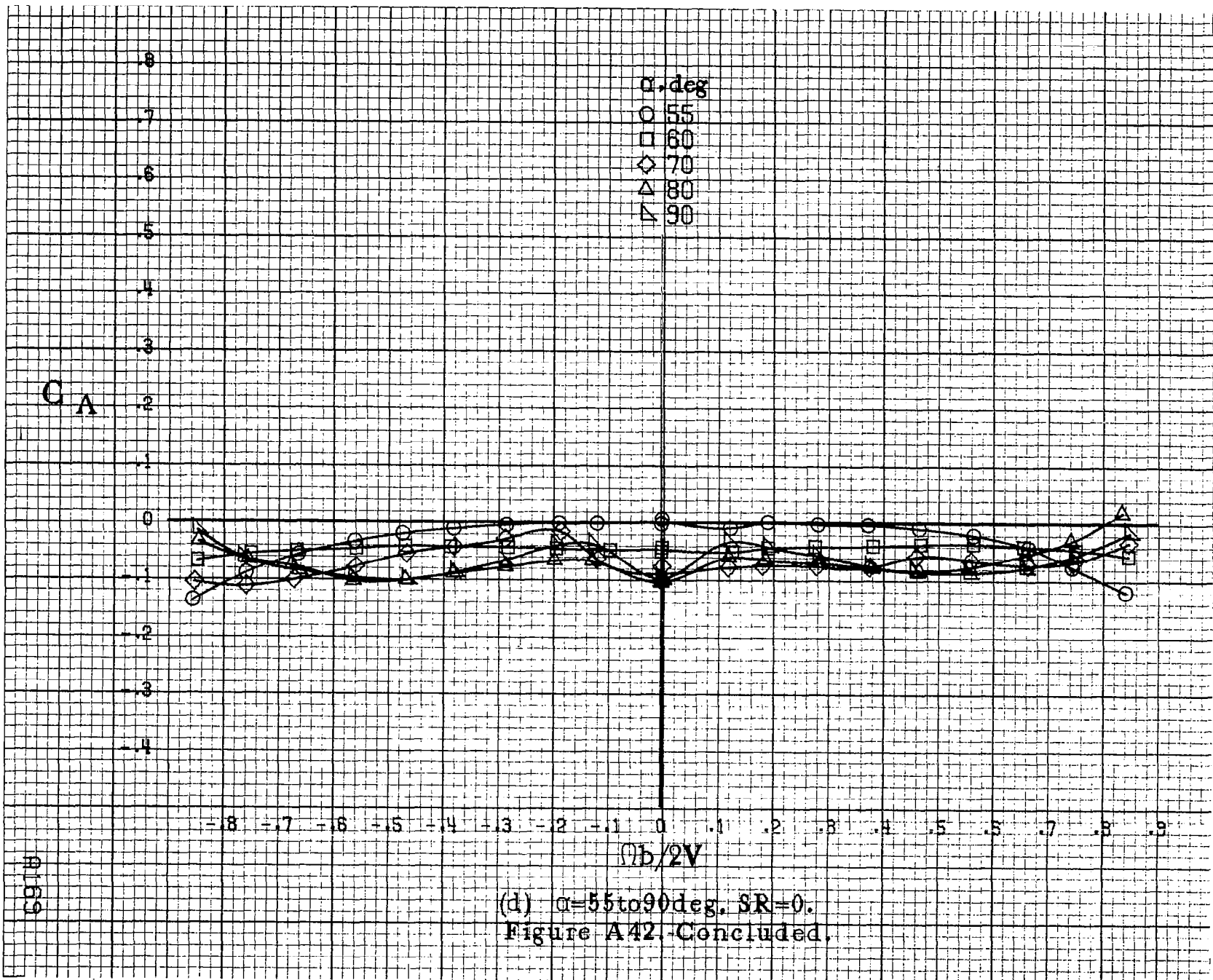
.8
.7
.6
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4

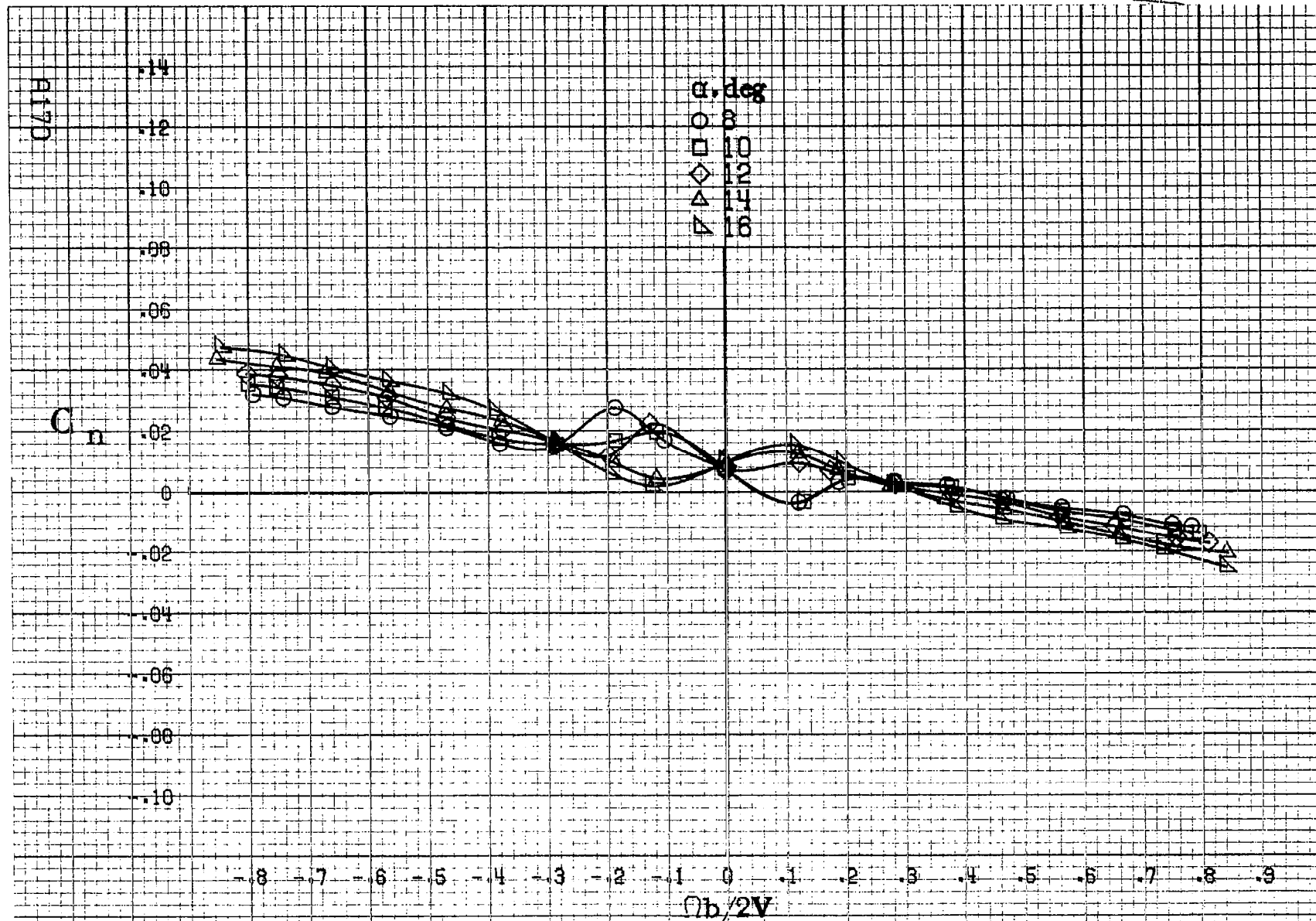
α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\Omega b/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A42. Continued.

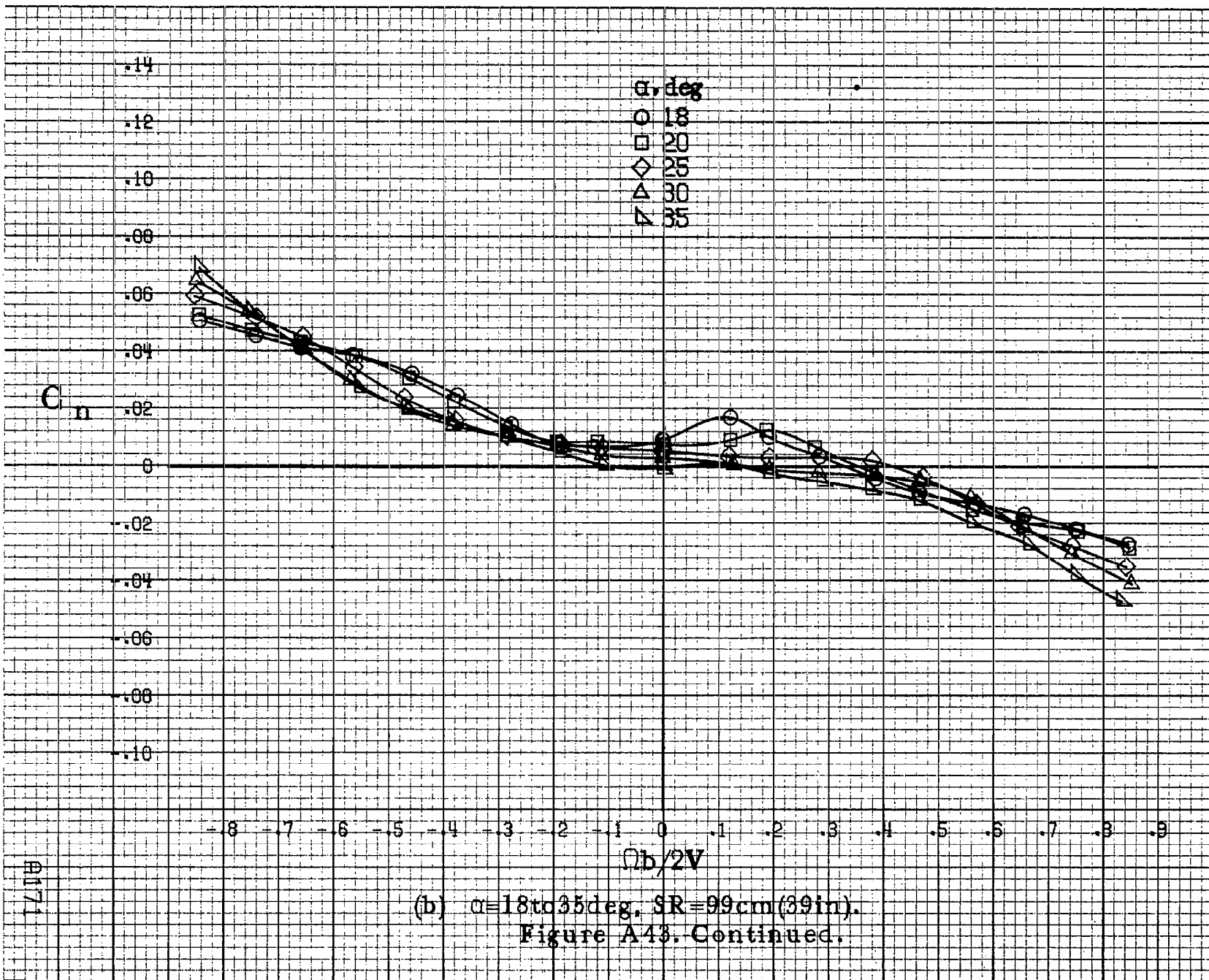






(a) $\alpha = 8$ to 15 deg, SR = 99 cm (39 in).

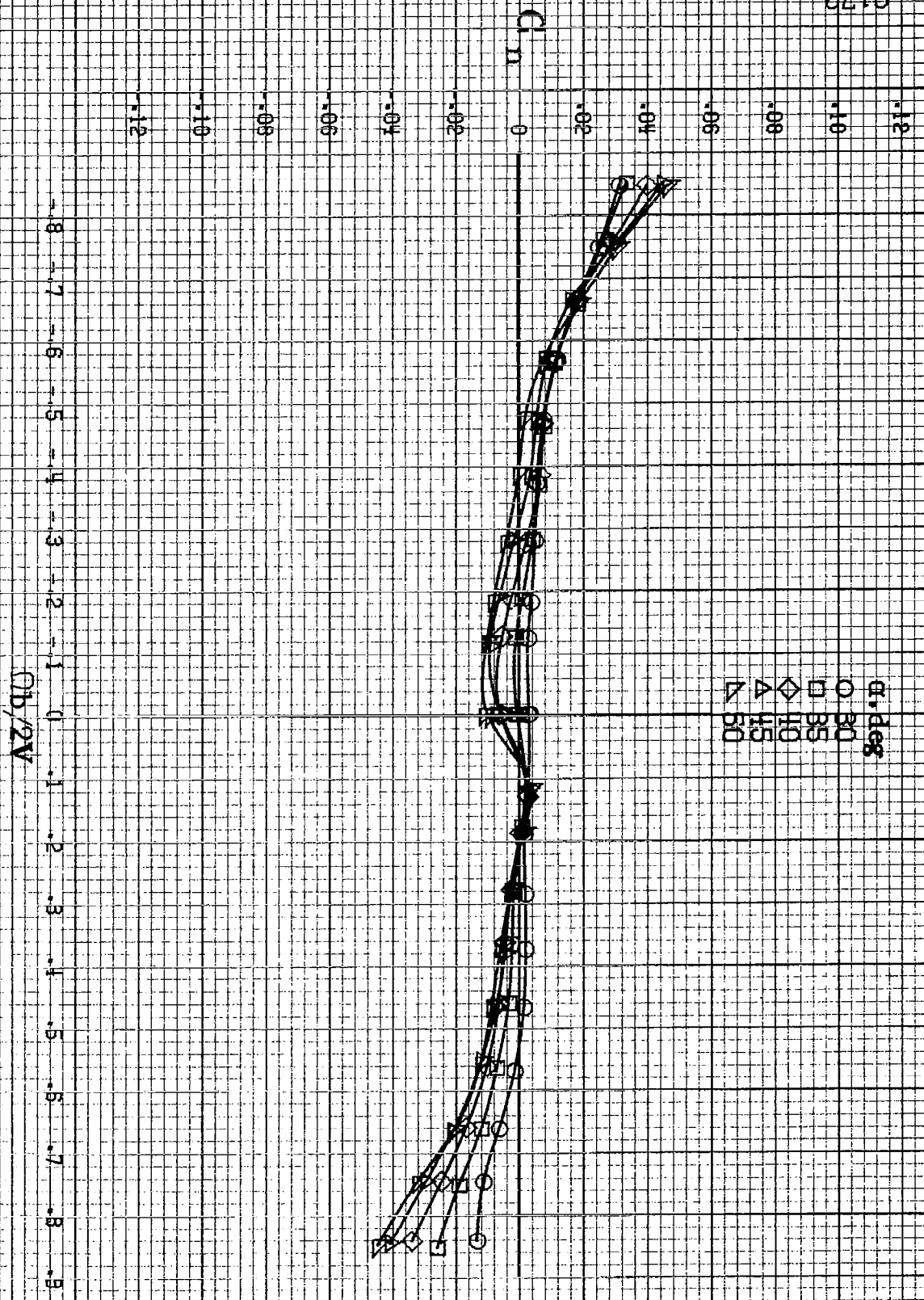
Figure A43. Effect of rotation rate and angle of attack on yawing-moment coefficient for no. 2 horizontal tail configuration. $\delta_a = 0^\circ$, $\delta_e = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.



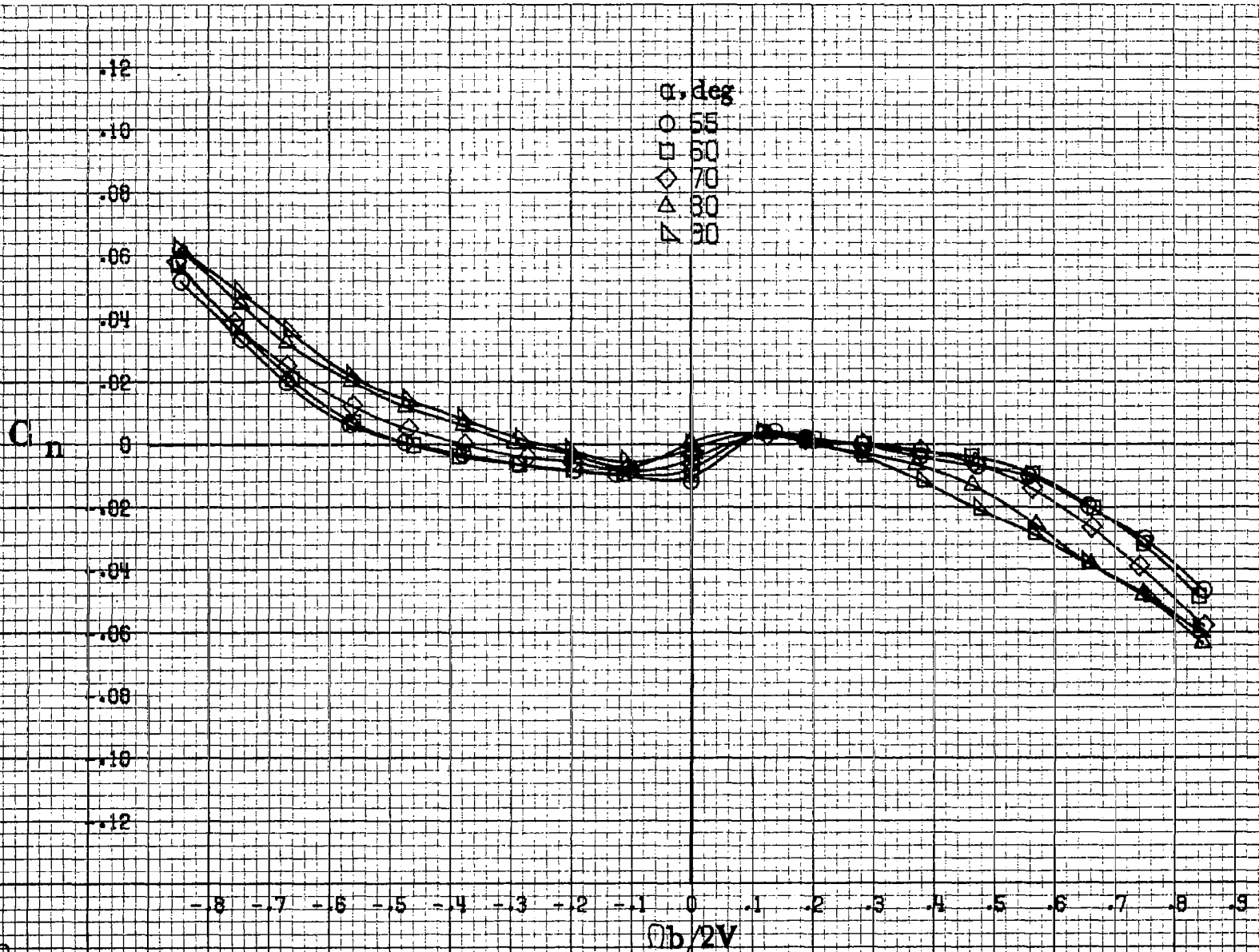
(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A43. Continued.

A1171

B172



(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A13, Continued.



(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A43, Concluded.

8173

A174

C_l

.35
 .30
 .25
 .20
 .15
 .10
 .05
 0
 -.05
 -.10
 -.15
 -.20
 -.25

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

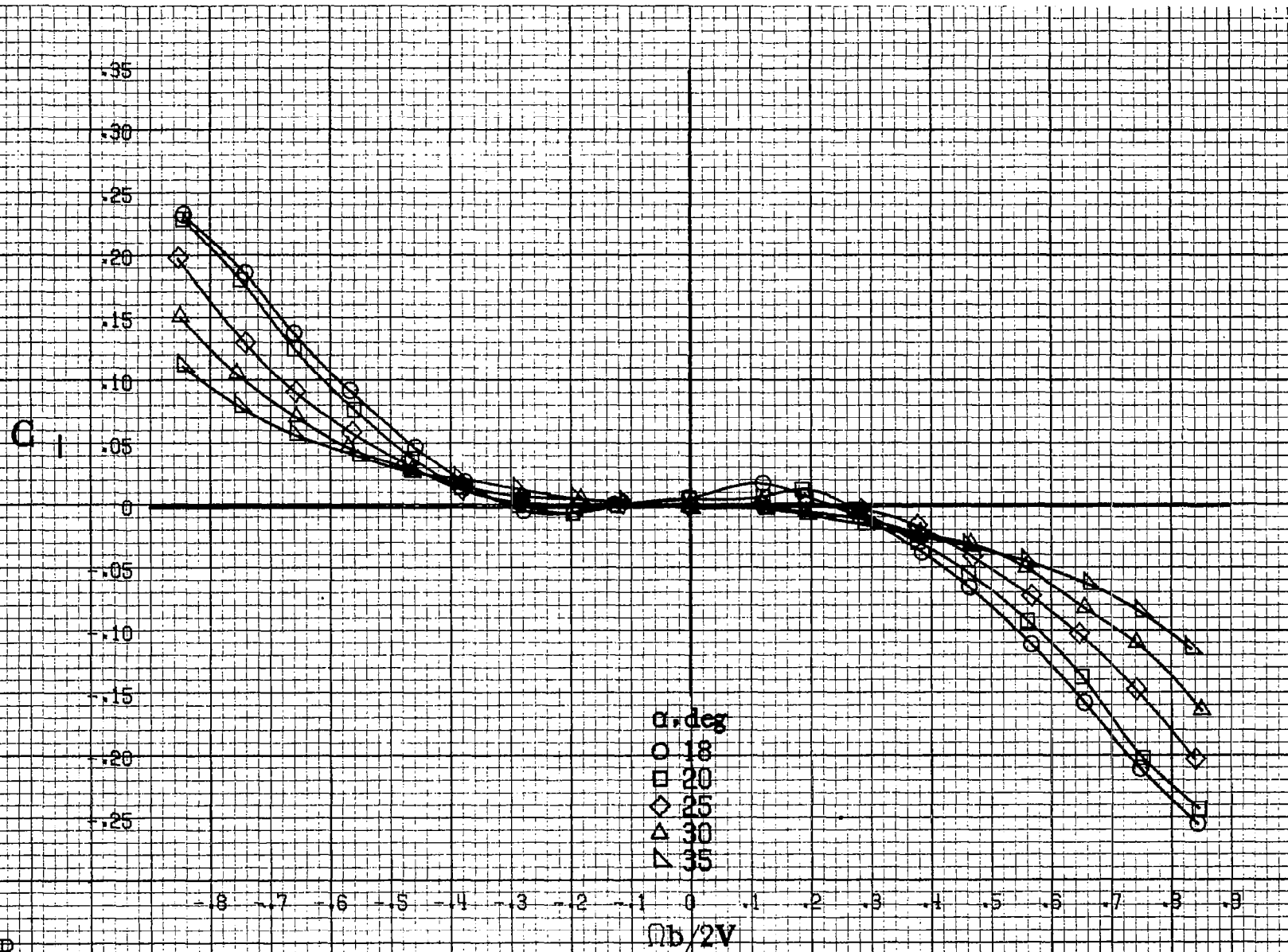
$\Omega b/2V$

α , deg

○ 8
 □ 10
 ◇ 12
 △ 14
 ▽ 16

(a) $\alpha=8$ to 16 deg, SR=99cm (39in).

Figure A44. Effect of rotation rate and angle of attack on rolling-moment coefficient for no. 2 horizontal tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A44. Continued.

RI175

R175

C_1

-.14
-.12
-.10
-.08
-.06
-.04
-.02
0
-.02
-.04
-.06
-.08
-.10

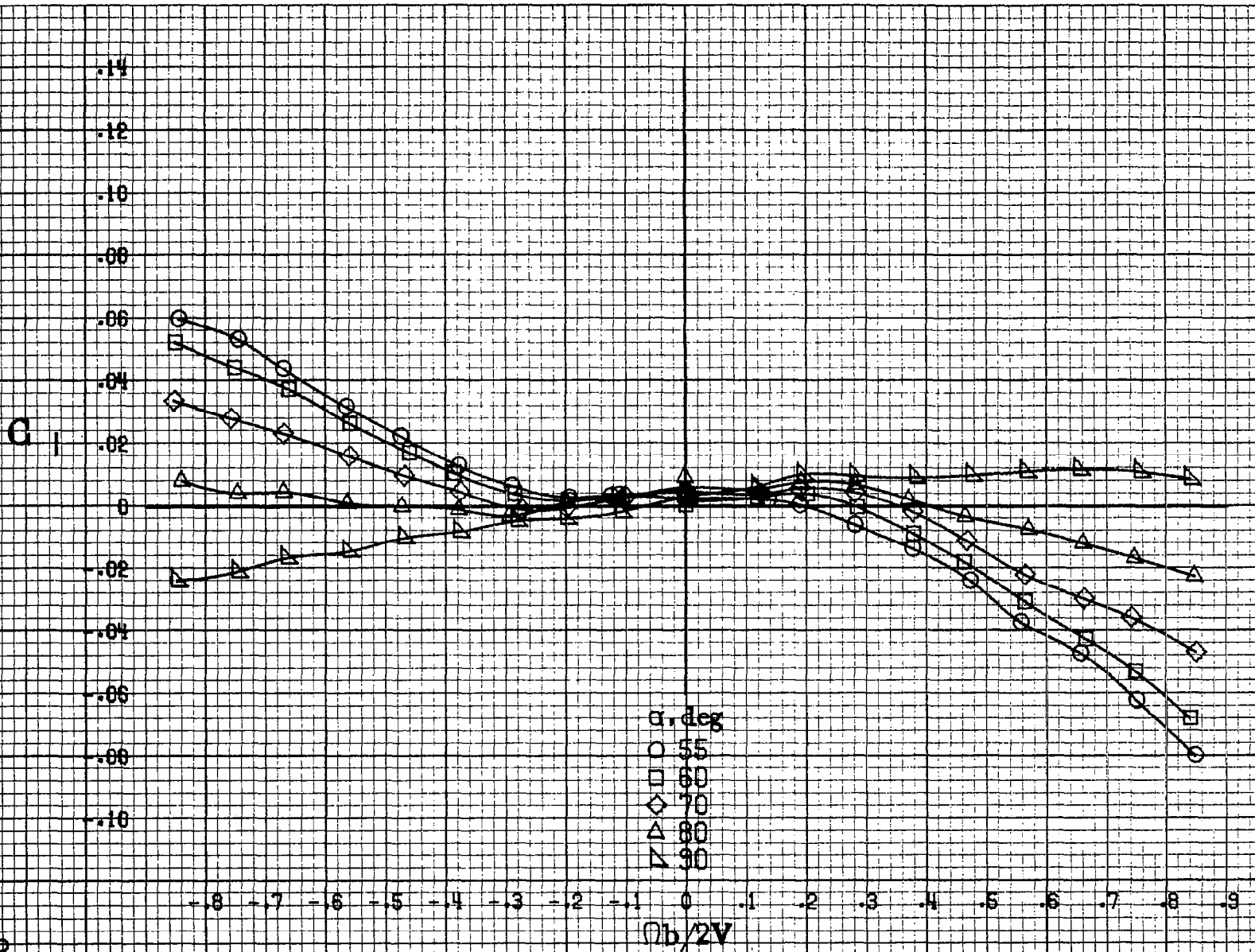
-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

α , deg
 ○ 30
 □ 35
 ◇ 40
 △ 45
 ▽ 50

$Ob/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A44. Continued.

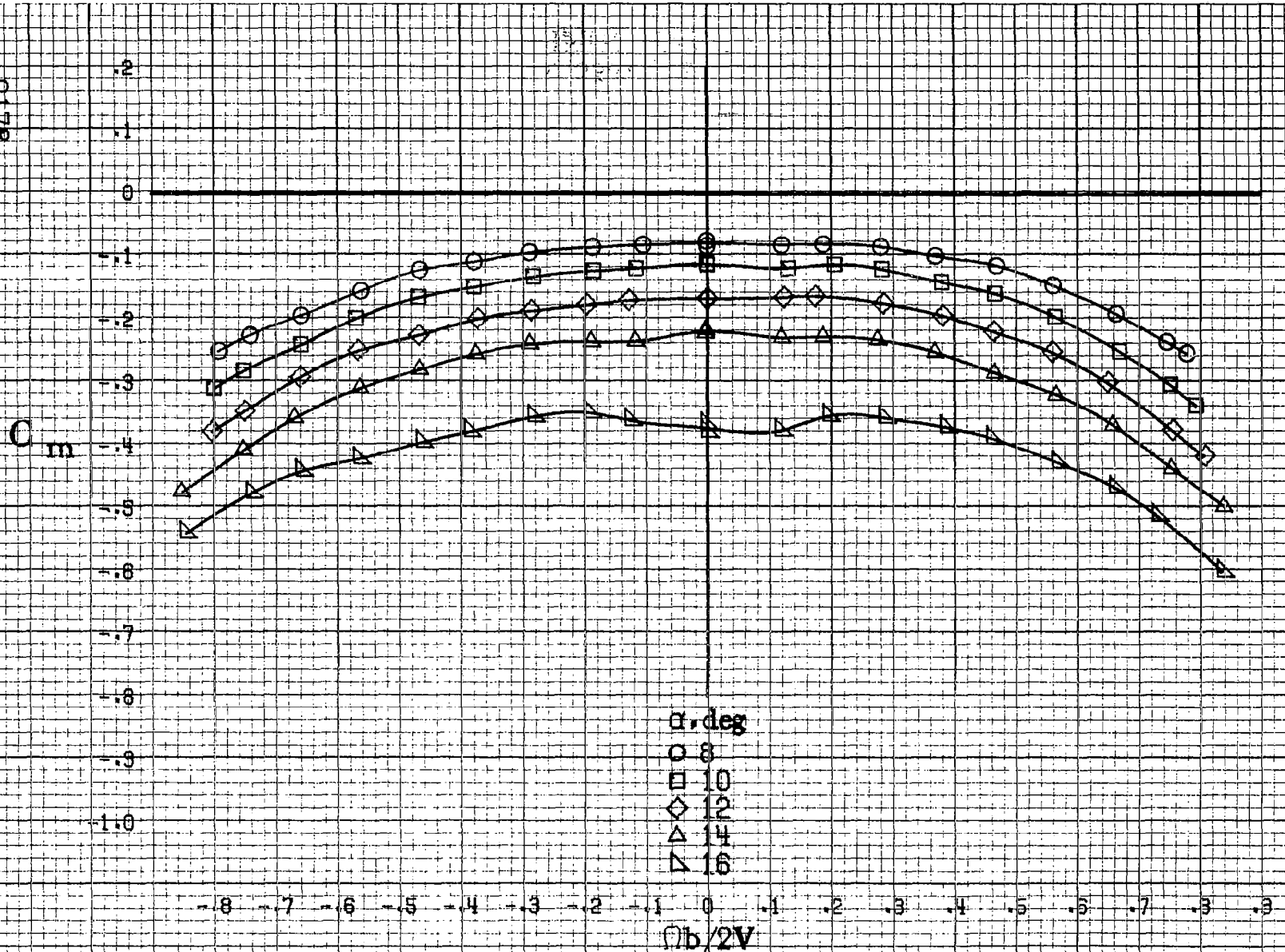
○



(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A44. Concluded.

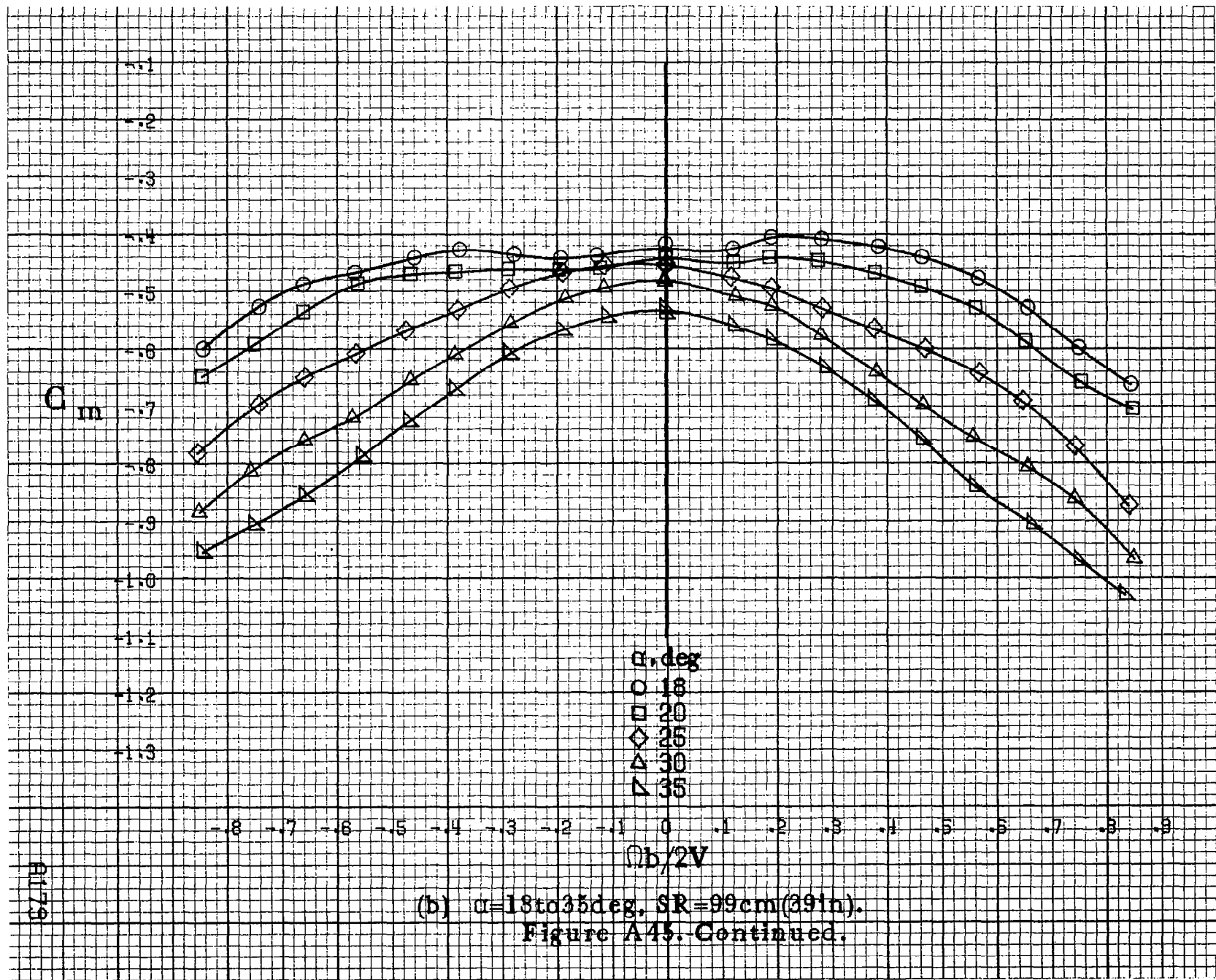
A177

PA178



(a) $\alpha = 8$ to 16 deg, $SR = 99em (39in)$.

Figure A 45. Effect of rotation rate and angle of attack on pitching moment coefficient for no. 2 horizontal tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A45. Continued.

8179

E160

C_m

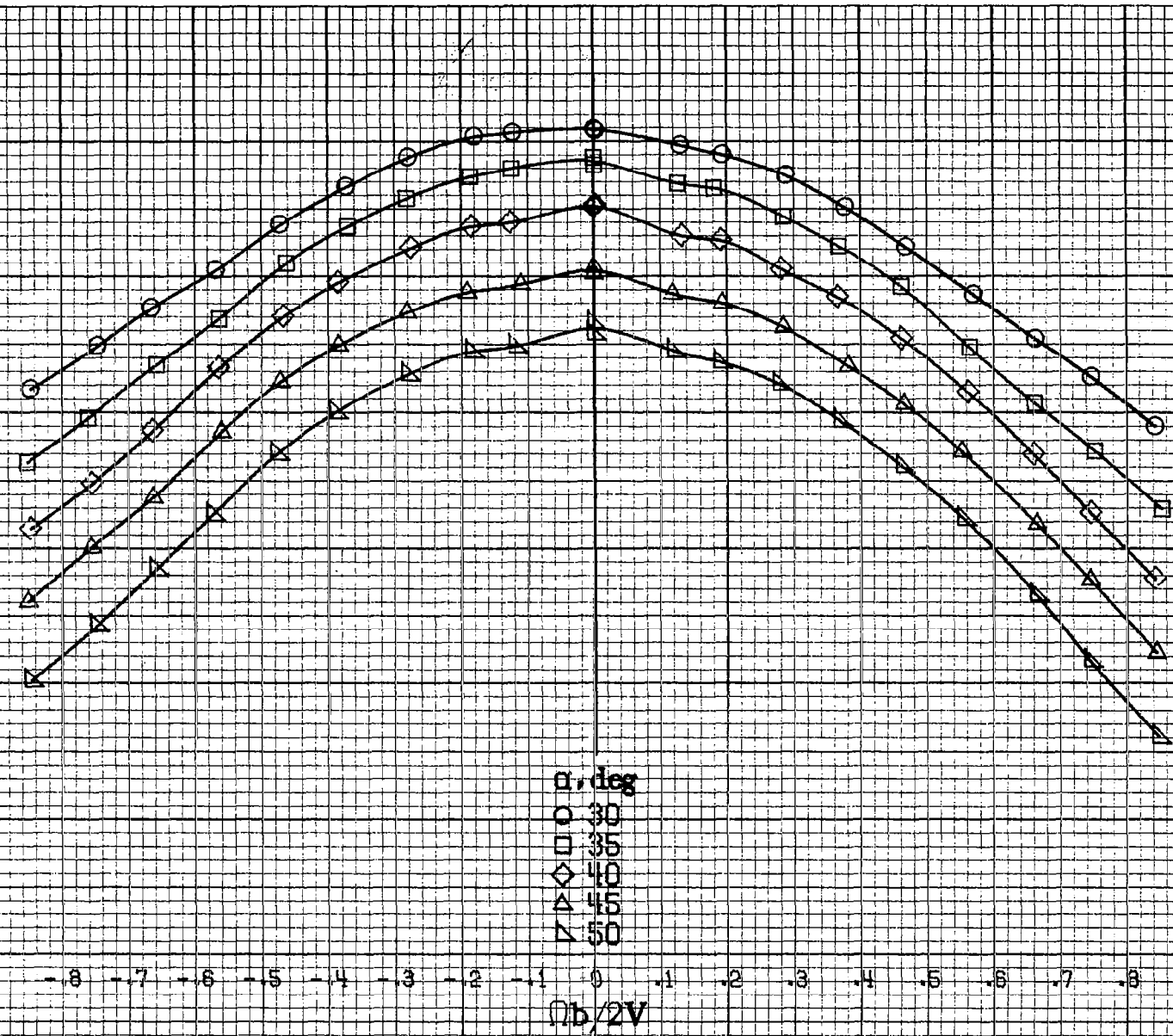
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6

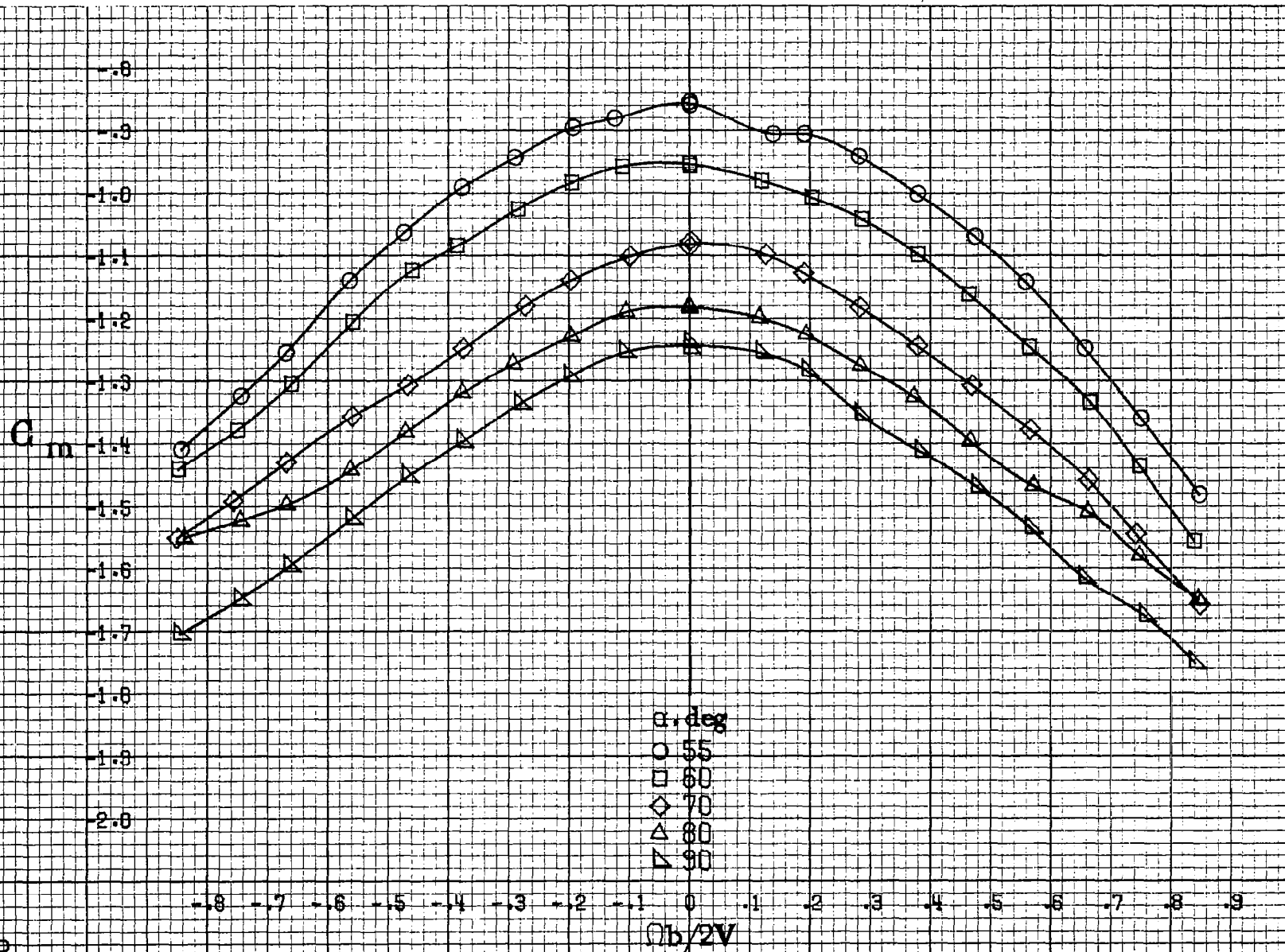
-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

$\sigma b/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A45. Continued.



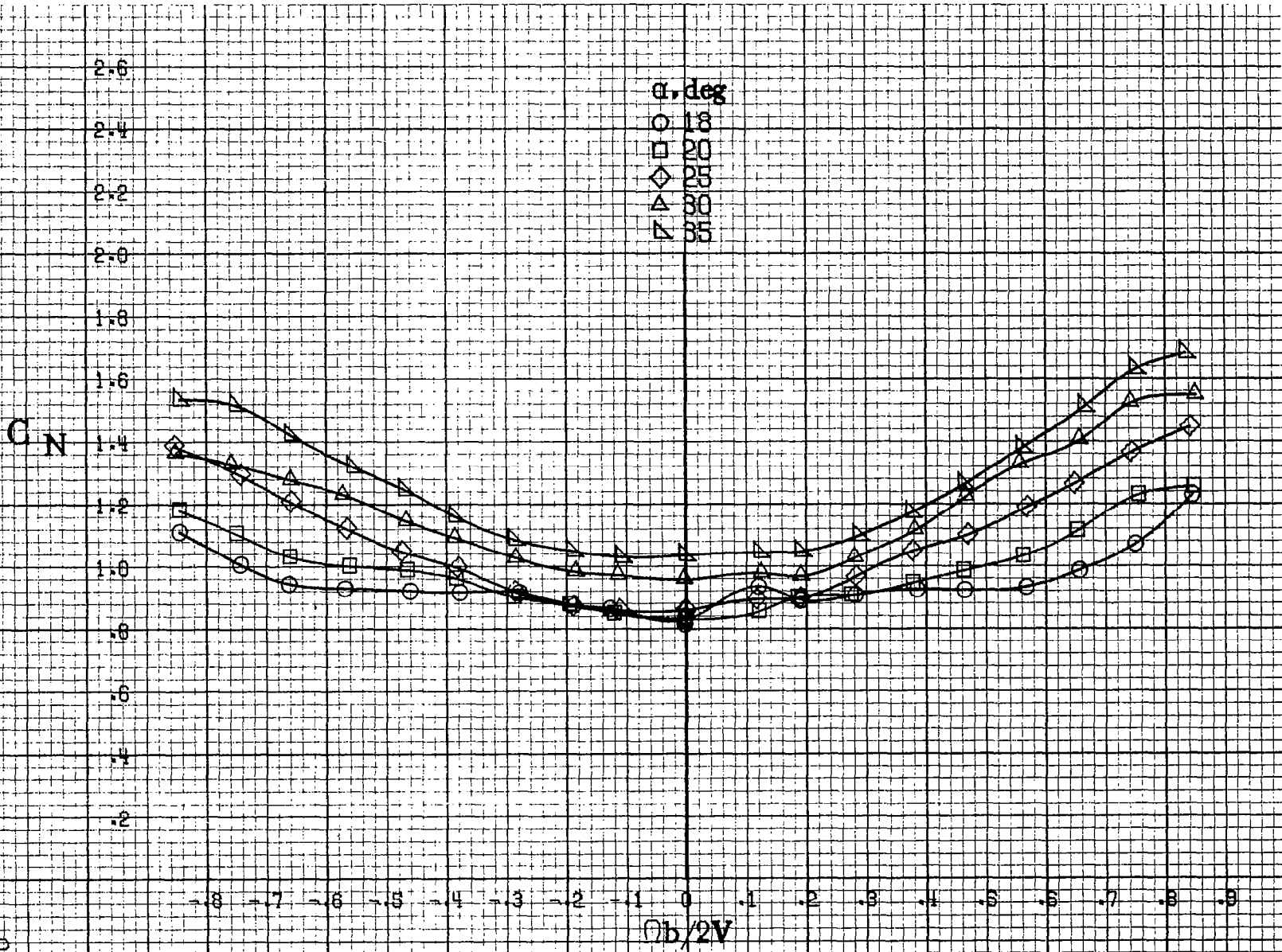


(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A45, Concluded.



(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A46. Effect of rotation rate and angle of attack on normal-force coefficient for no. 2 horizontal tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, SR = 99 cm (39 in).
 Figure A46. Continued.

AT183

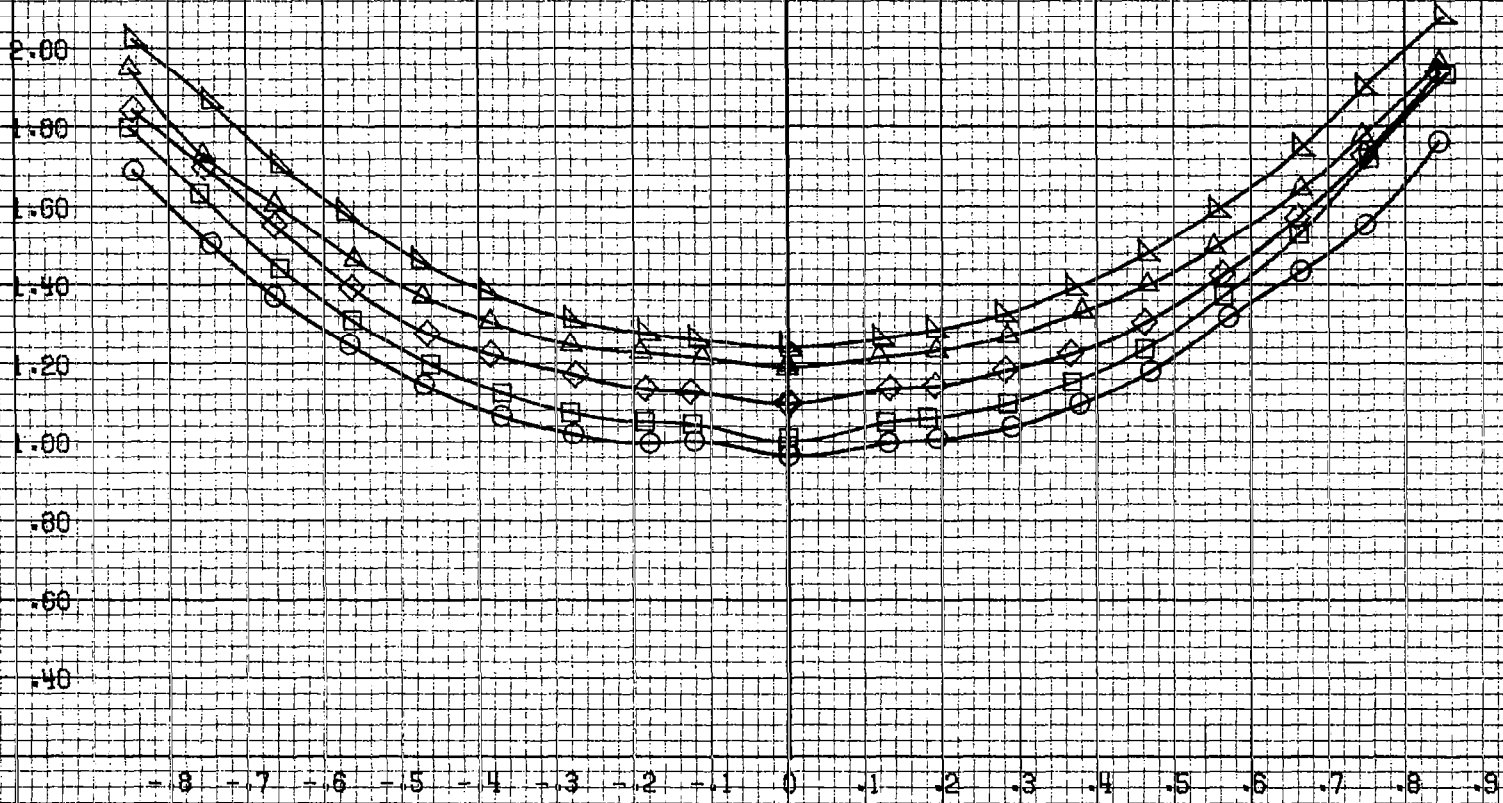
9104

C_N

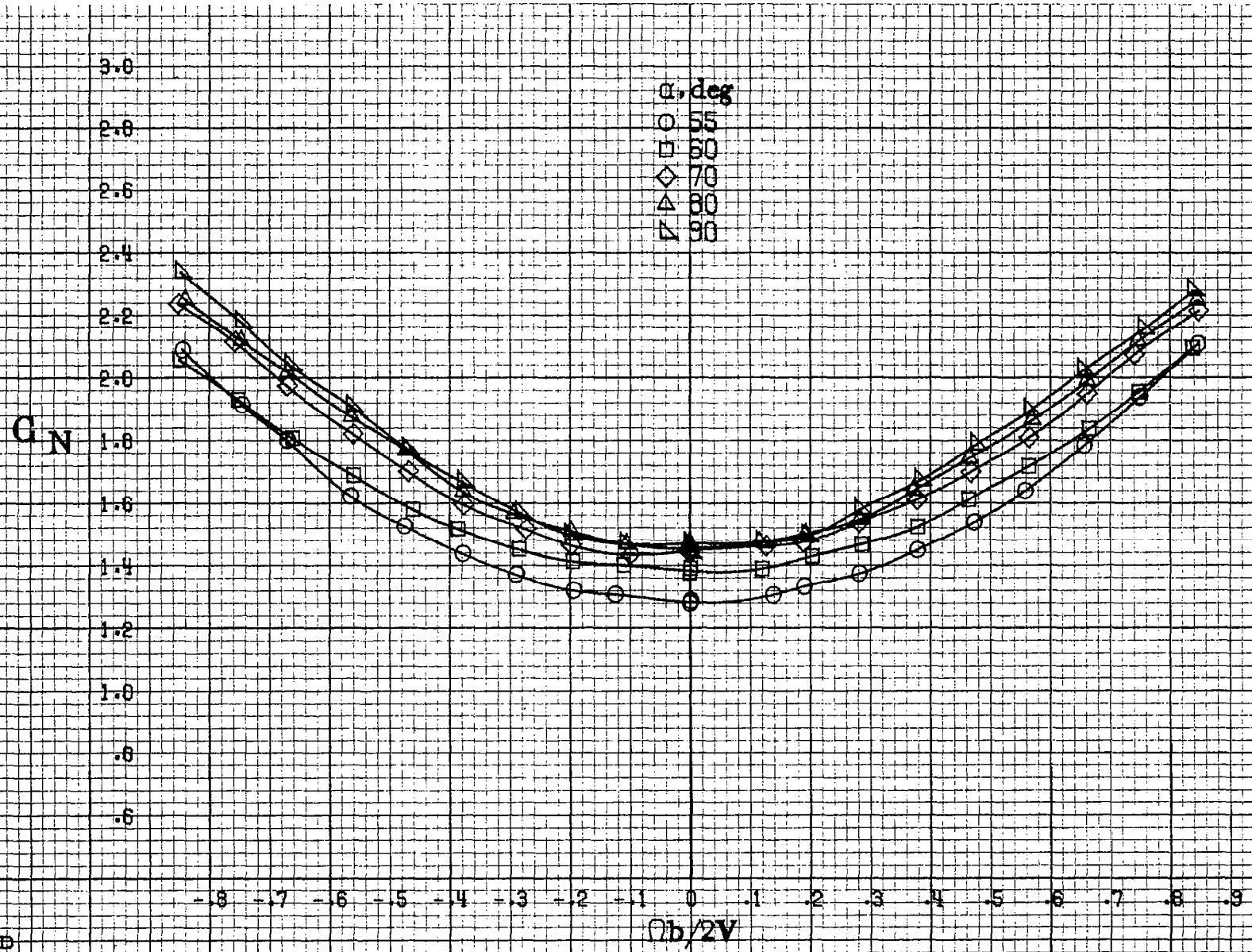
2.80
2.60
2.40
2.20
2.00
1.80
1.60
1.40
1.20
1.00
.80
.60
.40

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9
 $Ob/2V$

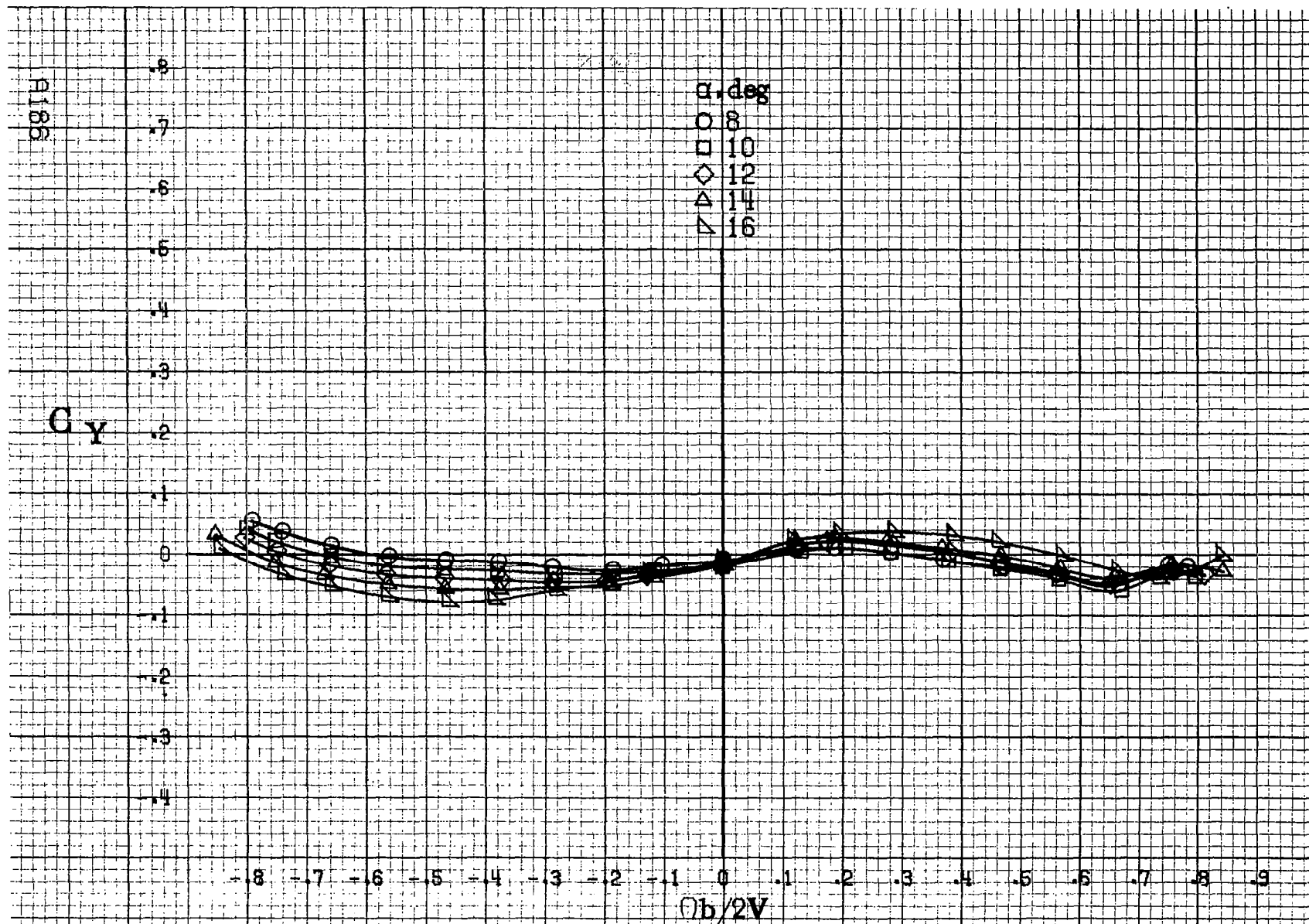


(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A46. Continued.



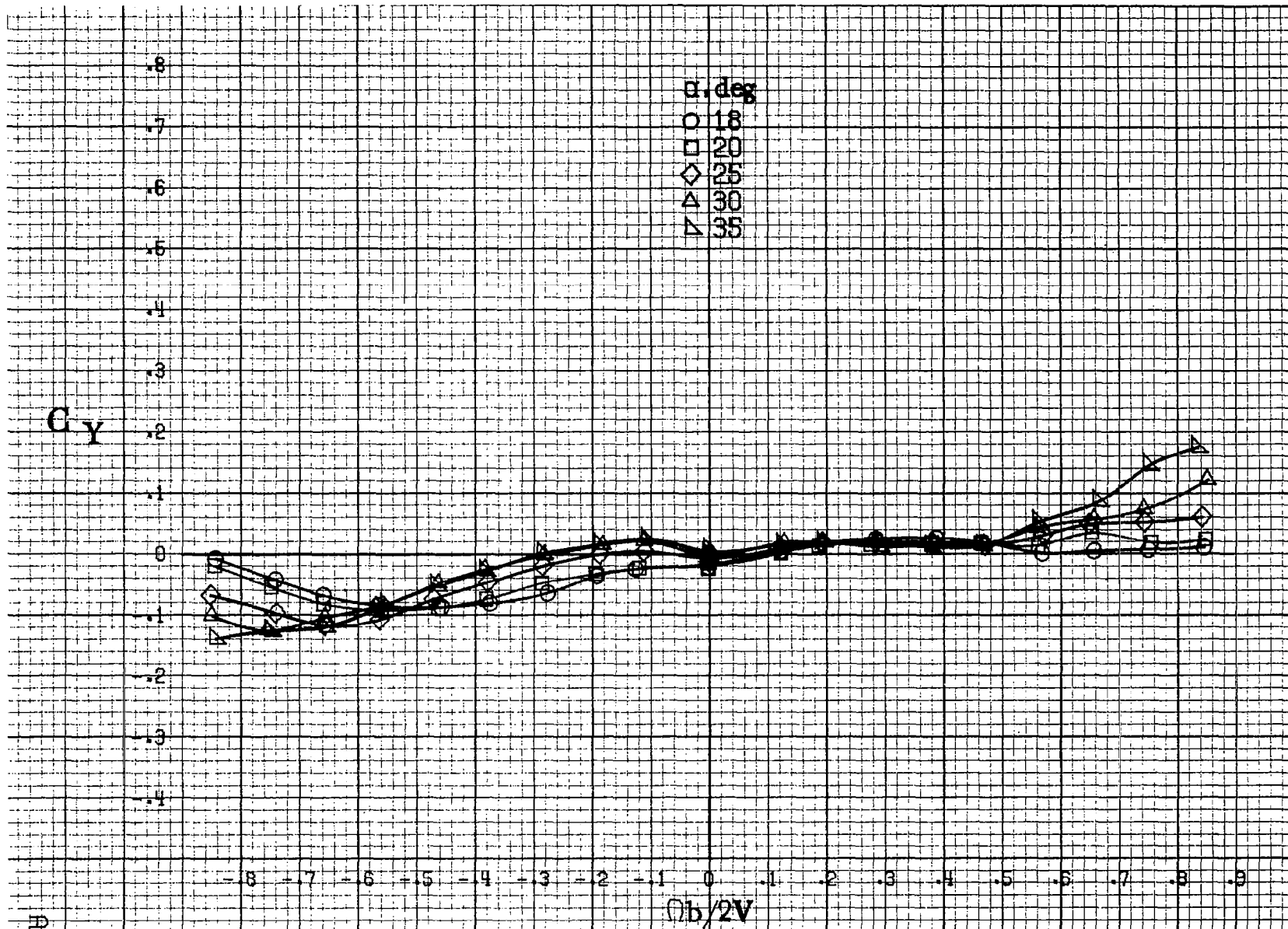
(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A46. Concluded.

A185



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A47. Effect of rotation rate and angle of attack on side-force coefficient for no. 2 horizontal tail configuration. $\delta_a = 0^\circ$, $\delta_\alpha = 0^\circ$, $\delta_r = -25^\circ$. $\beta = 0^\circ$.



(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A47, Continued.

A187

0185

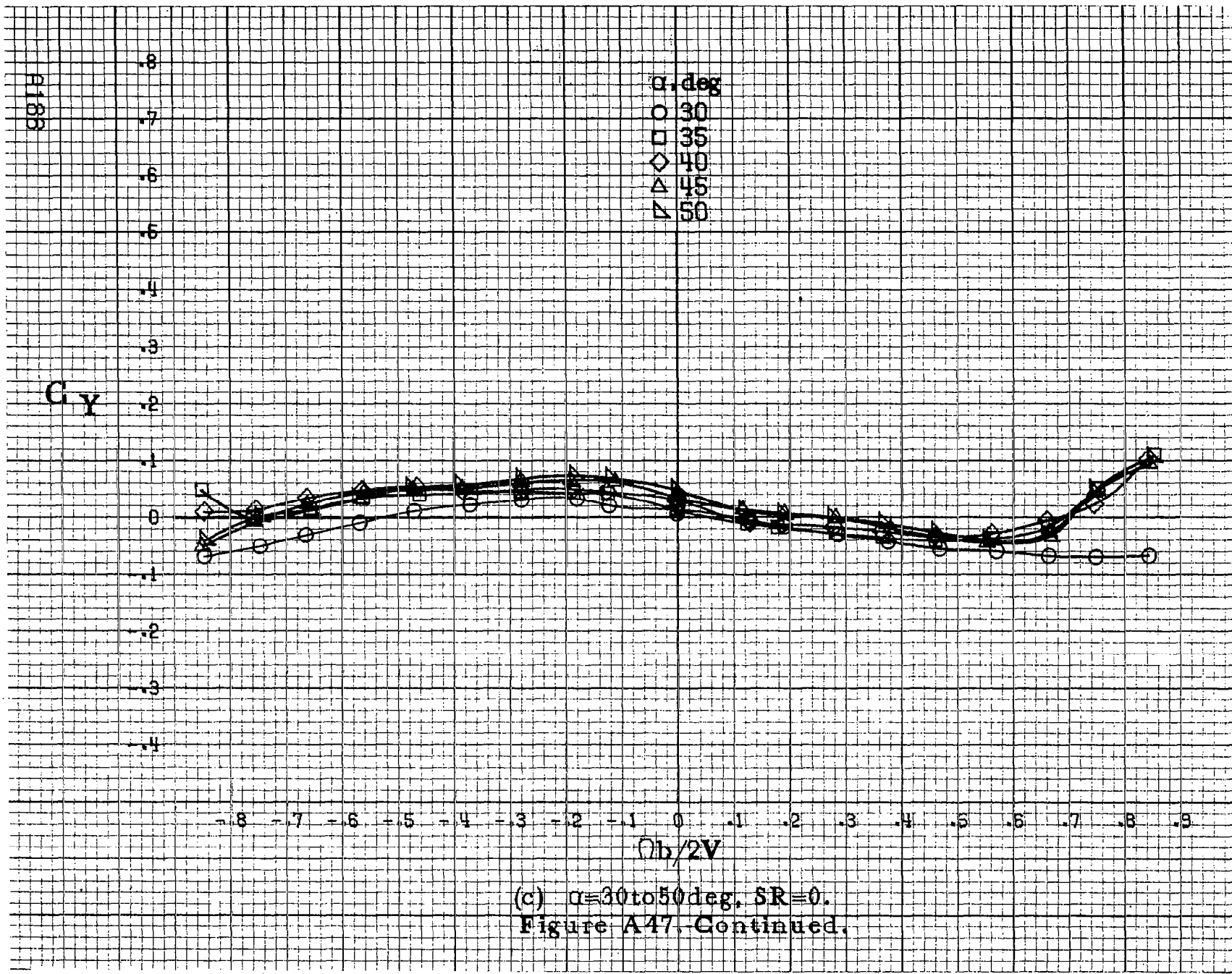
G_y

.8
.7
.6
.5
.4
.3
.2
.1
0
.1
.2
.3
.4

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

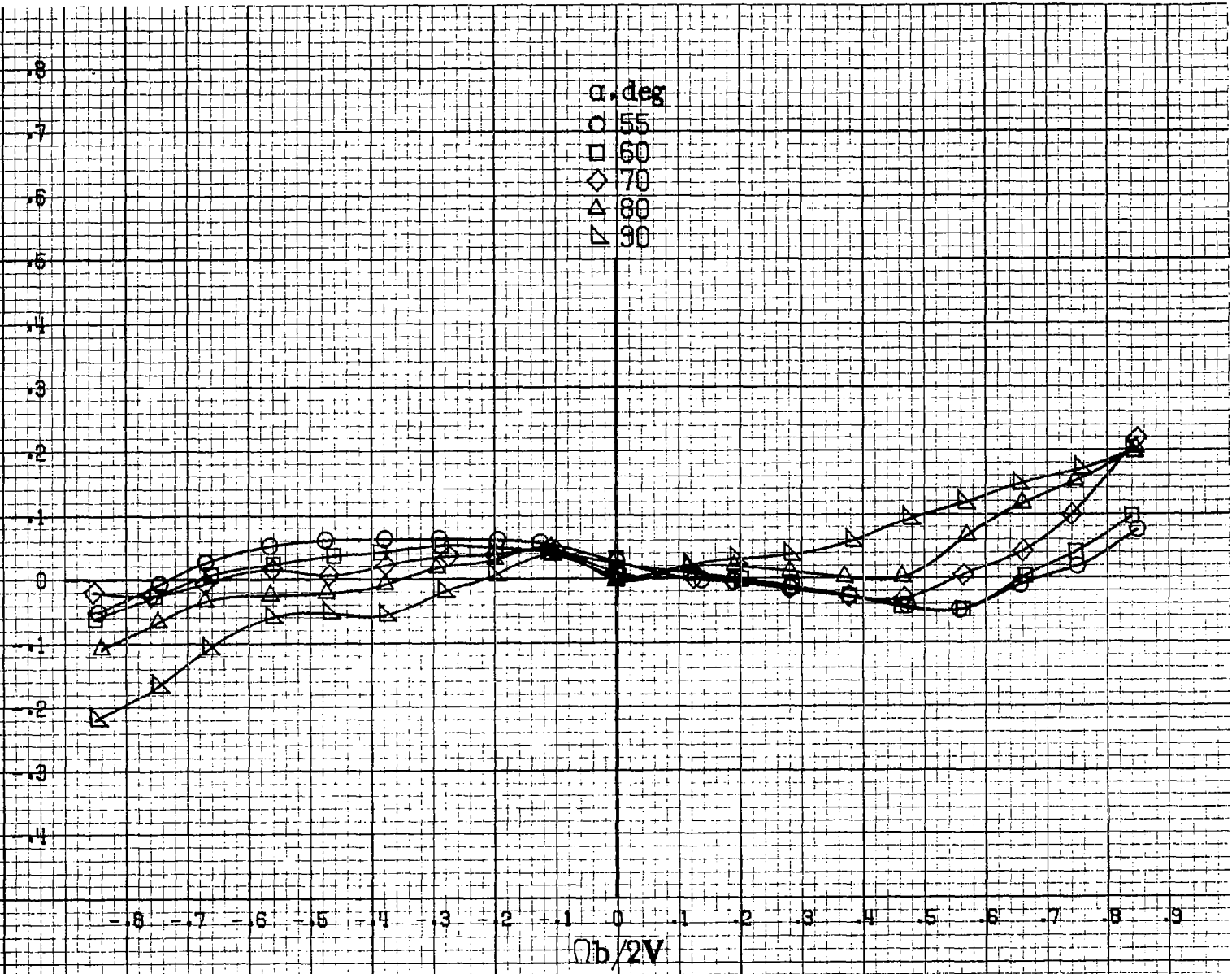
-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $Ob/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A47. Continued.



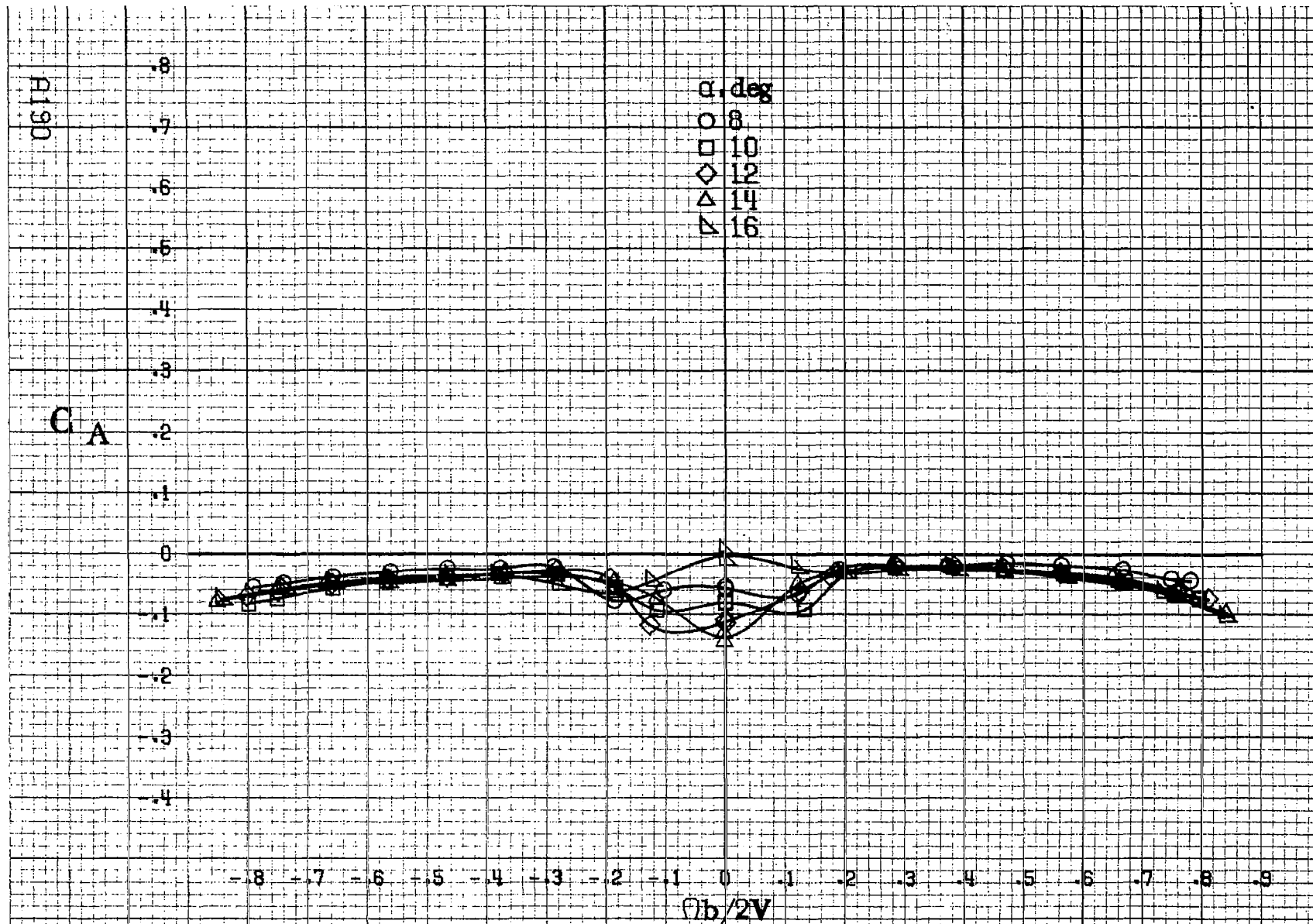
C_y

α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90



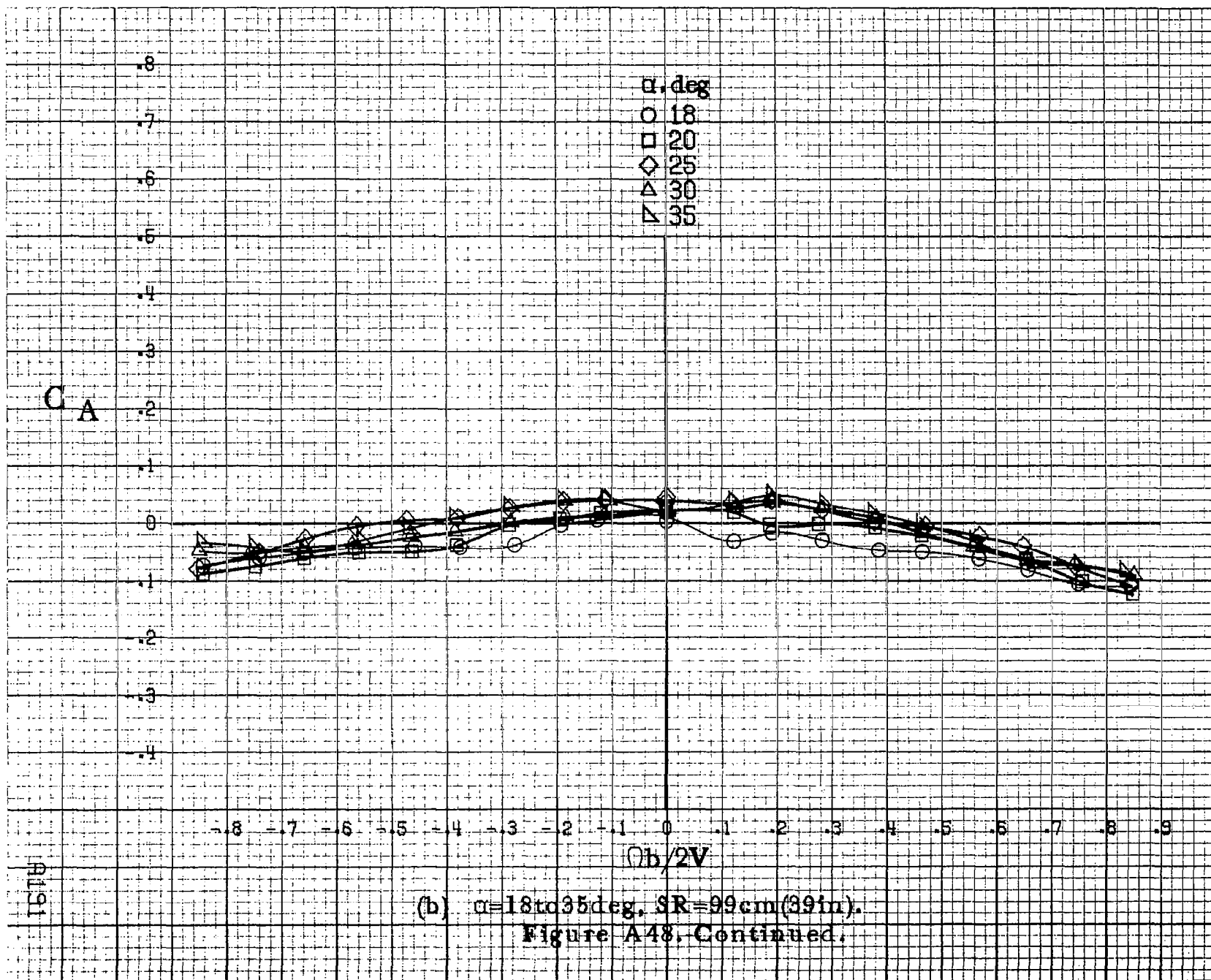
R189

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A47.-Concluded.



(a) $\alpha=8$ to 16 deg, SR=99 cm (39 in).

Figure A48. Effect of rotation rate and angle of attack on axial-force coefficient for no. 2 horizontal tail configuration. $\delta_a=0^\circ$, $\delta_s=0^\circ$, $\delta_r=-25^\circ$, $\beta=0^\circ$.



RL91

A192

C_A

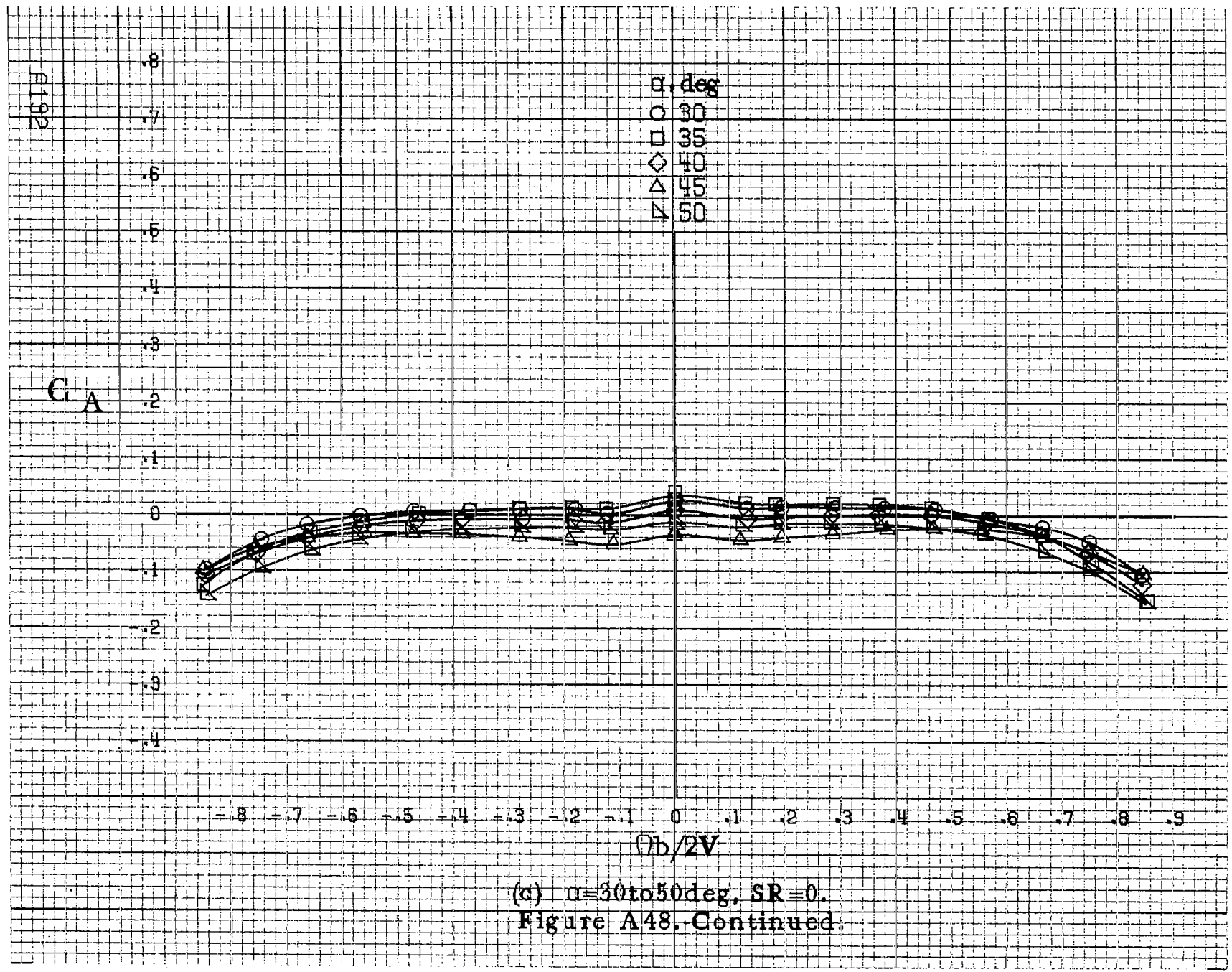
.8
.7
.6
.5
.4
.3
.2
.1
0
.1
.2
.3
.4

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$b/2V$

(a) $\alpha=30$ to 50 deg, $SR=0$.
Figure A48. Continued.



C_A

.8
.7
.6
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4

α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

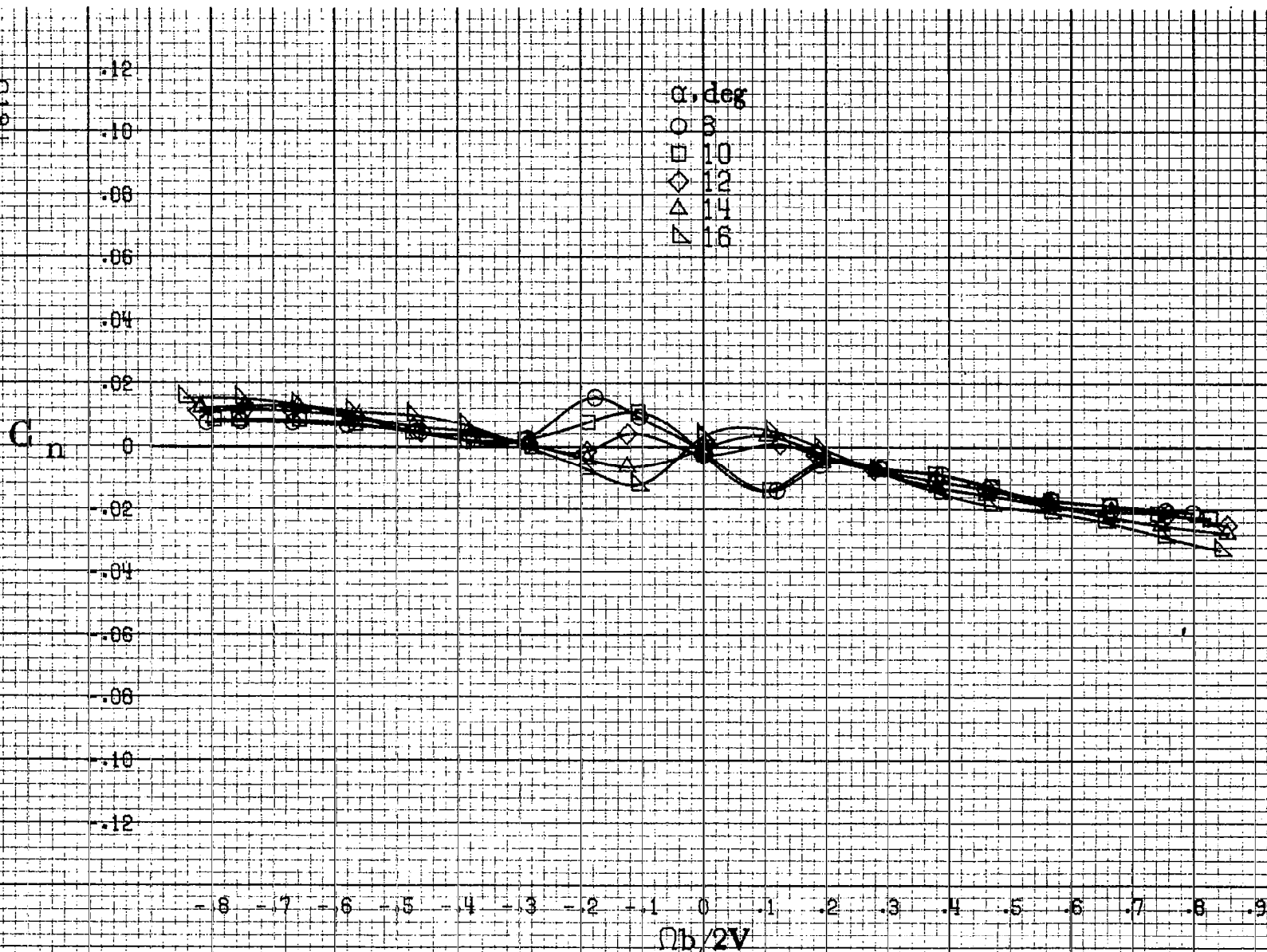
-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9

$Ob/2V$

R193

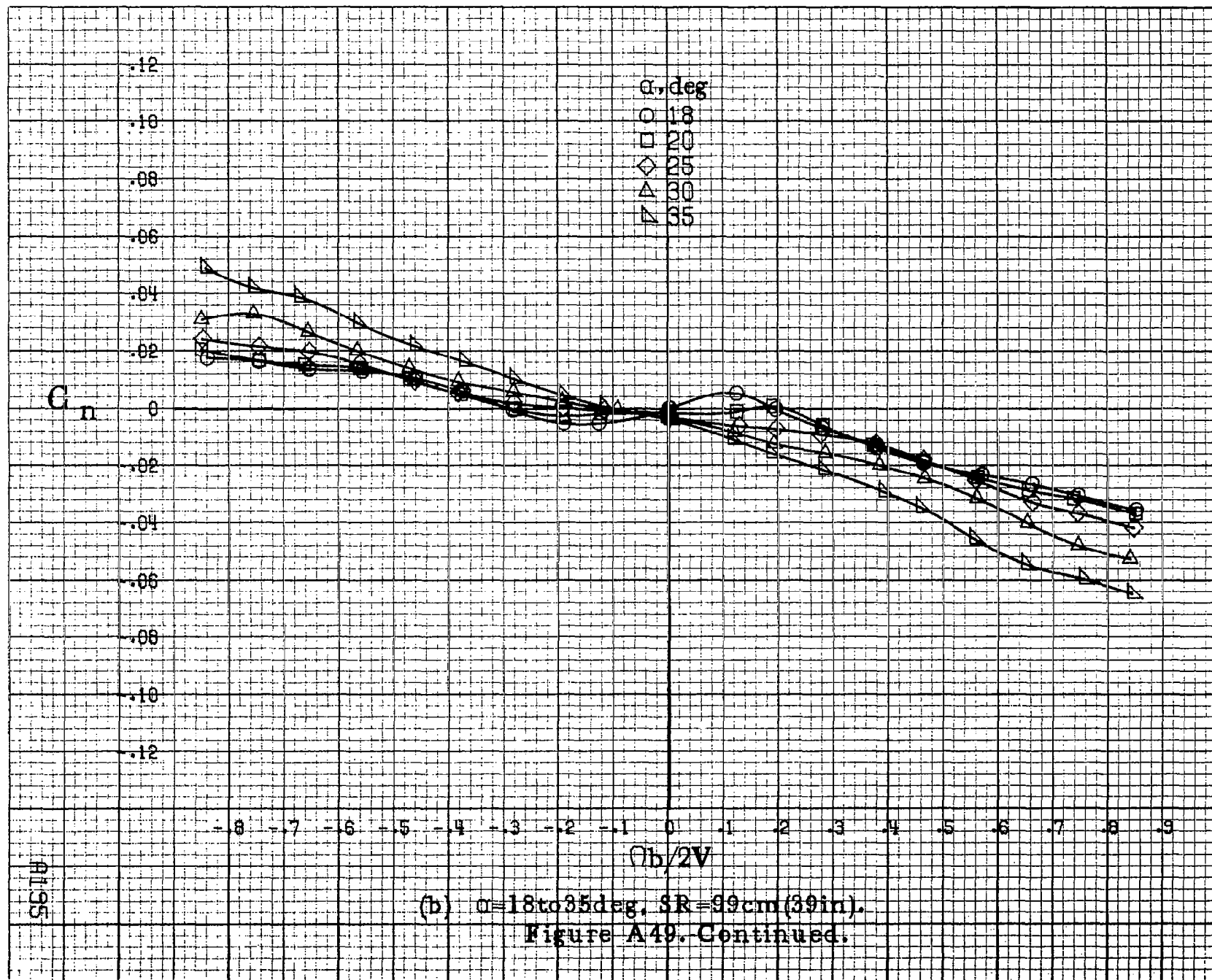
(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A48. Concluded.

FIG 19H



(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A49. Effect of rotation rate and angle of attack on yawing-moment coefficient for T-tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A49. Continued.

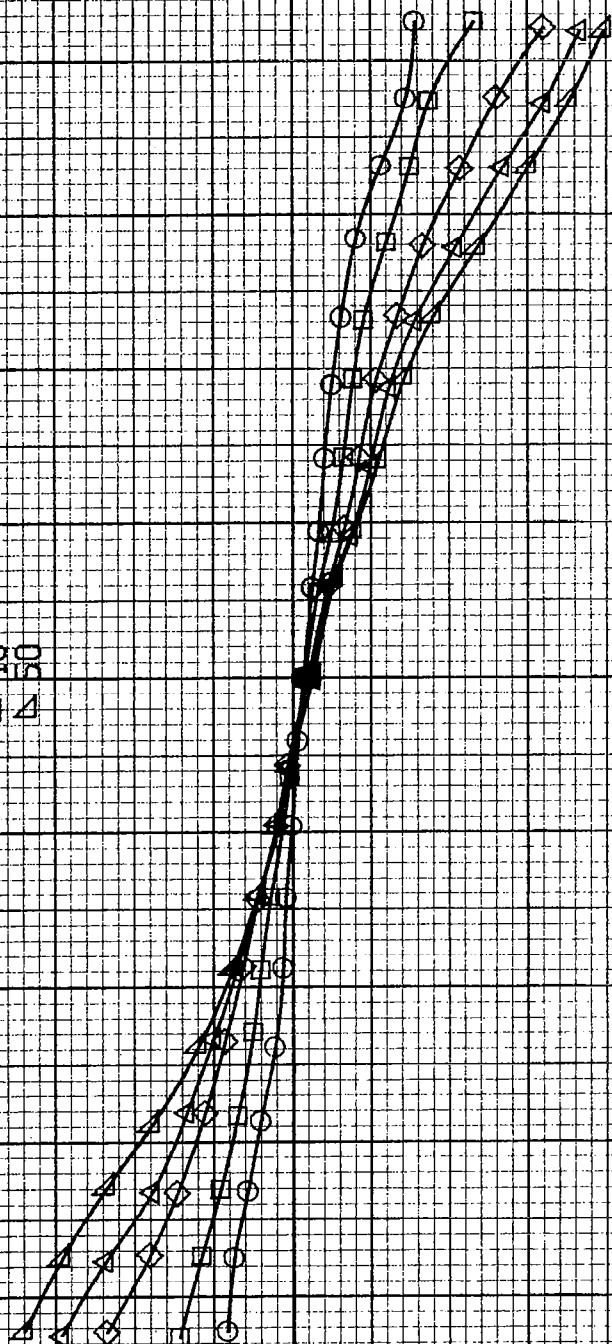
R195

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

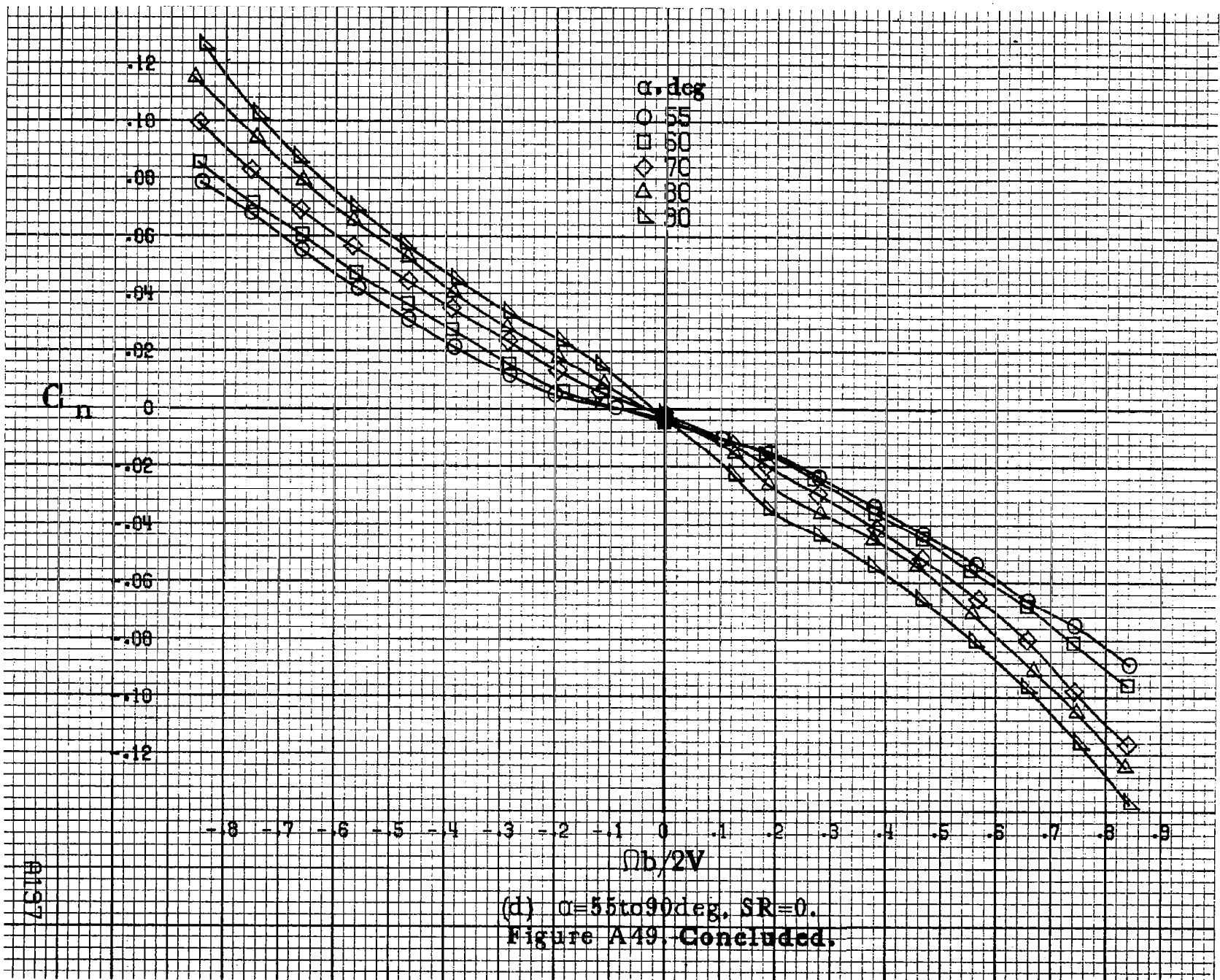
.12
.10
.08
.06
.04
.02
0
-.02
-.04
-.06
-.08
-.10
-.12

C_{Dn}

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $(b)/2V$

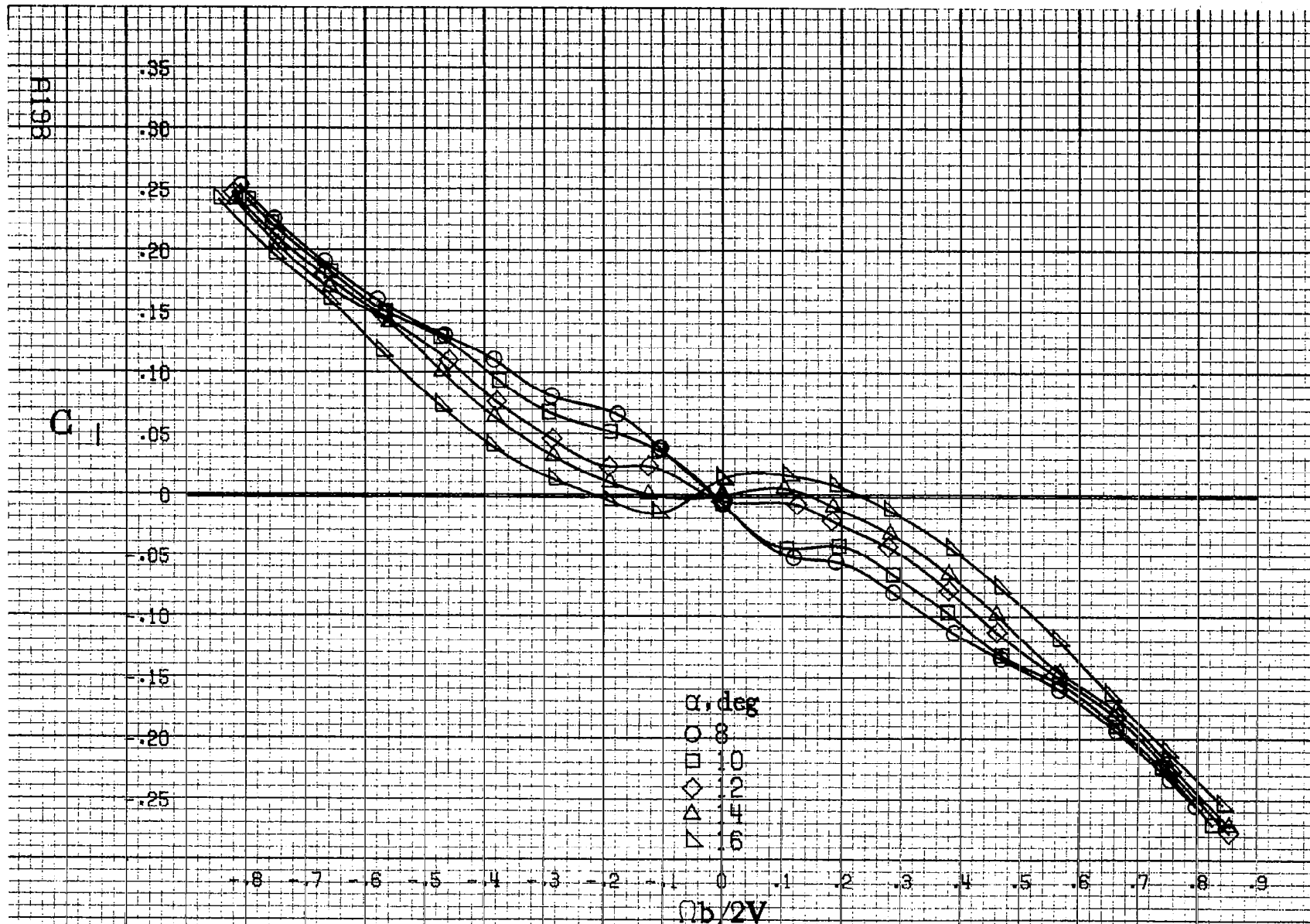


(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A-49, Continued.



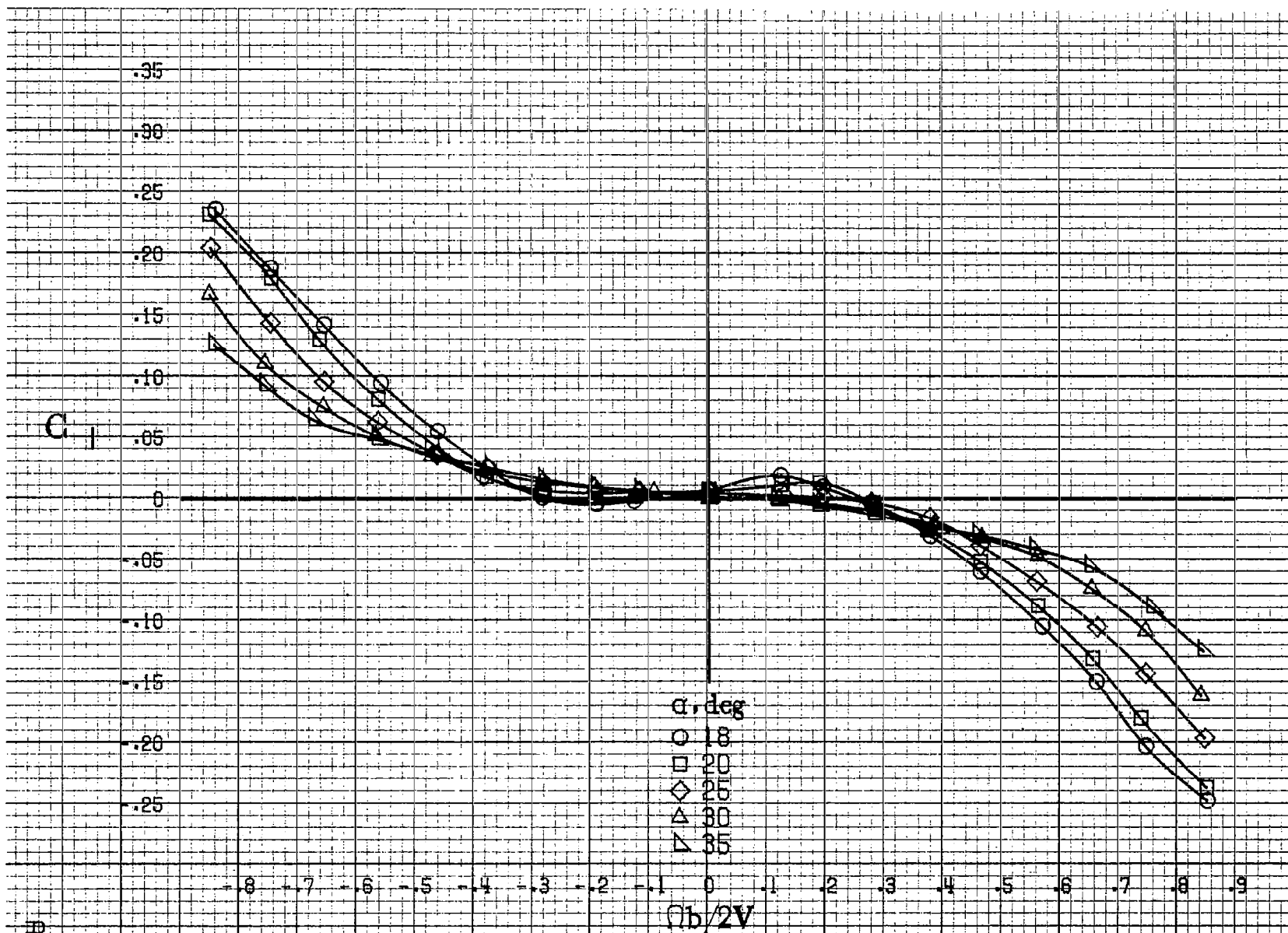
(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A49. Concluded.

A197



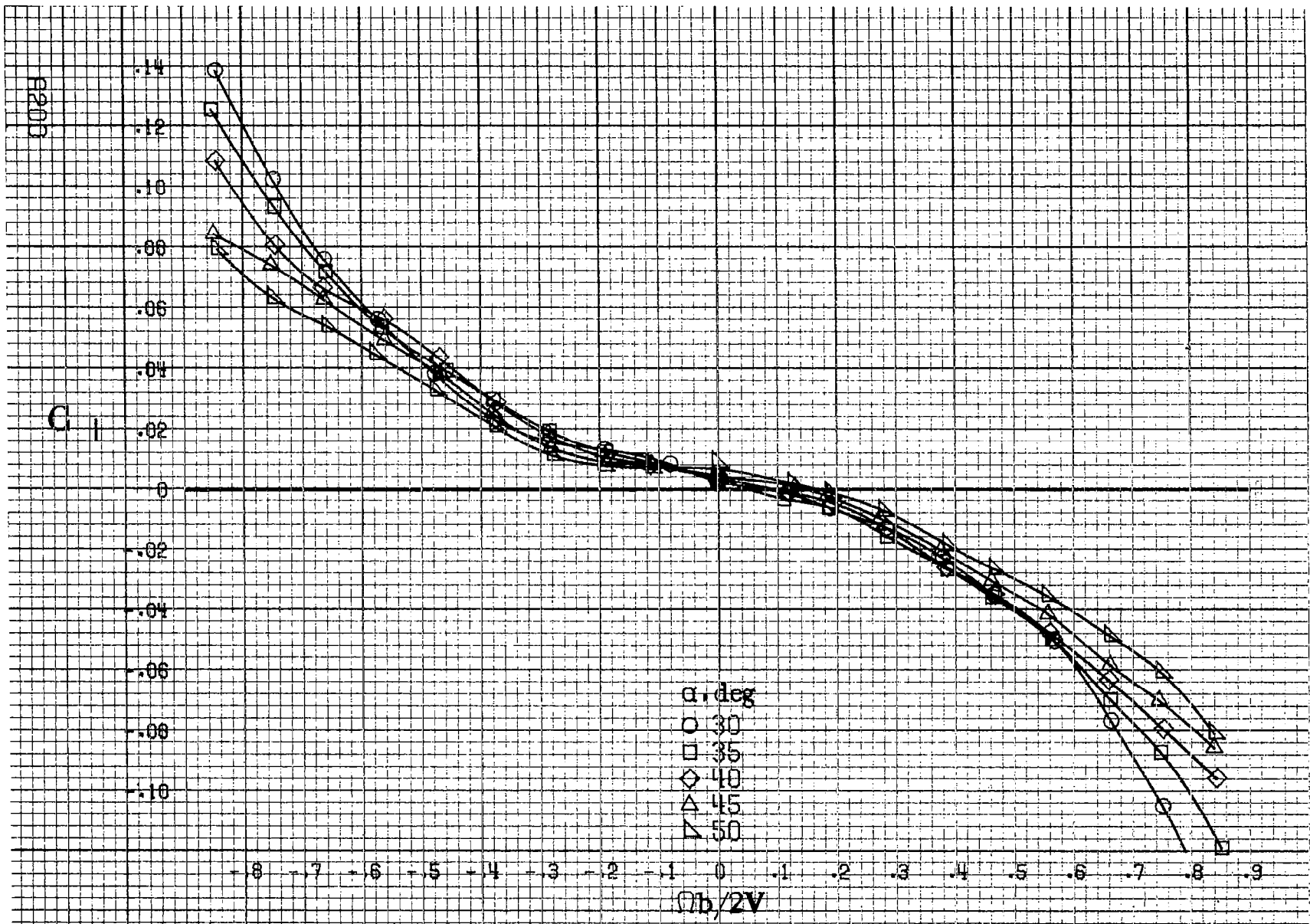
(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A50. Effect of rotation rate and angle of attack on rolling-moment coefficient for T-tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\beta = 0^\circ$.



P1193

(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A50. Continued.



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A50. Continued.

C_1

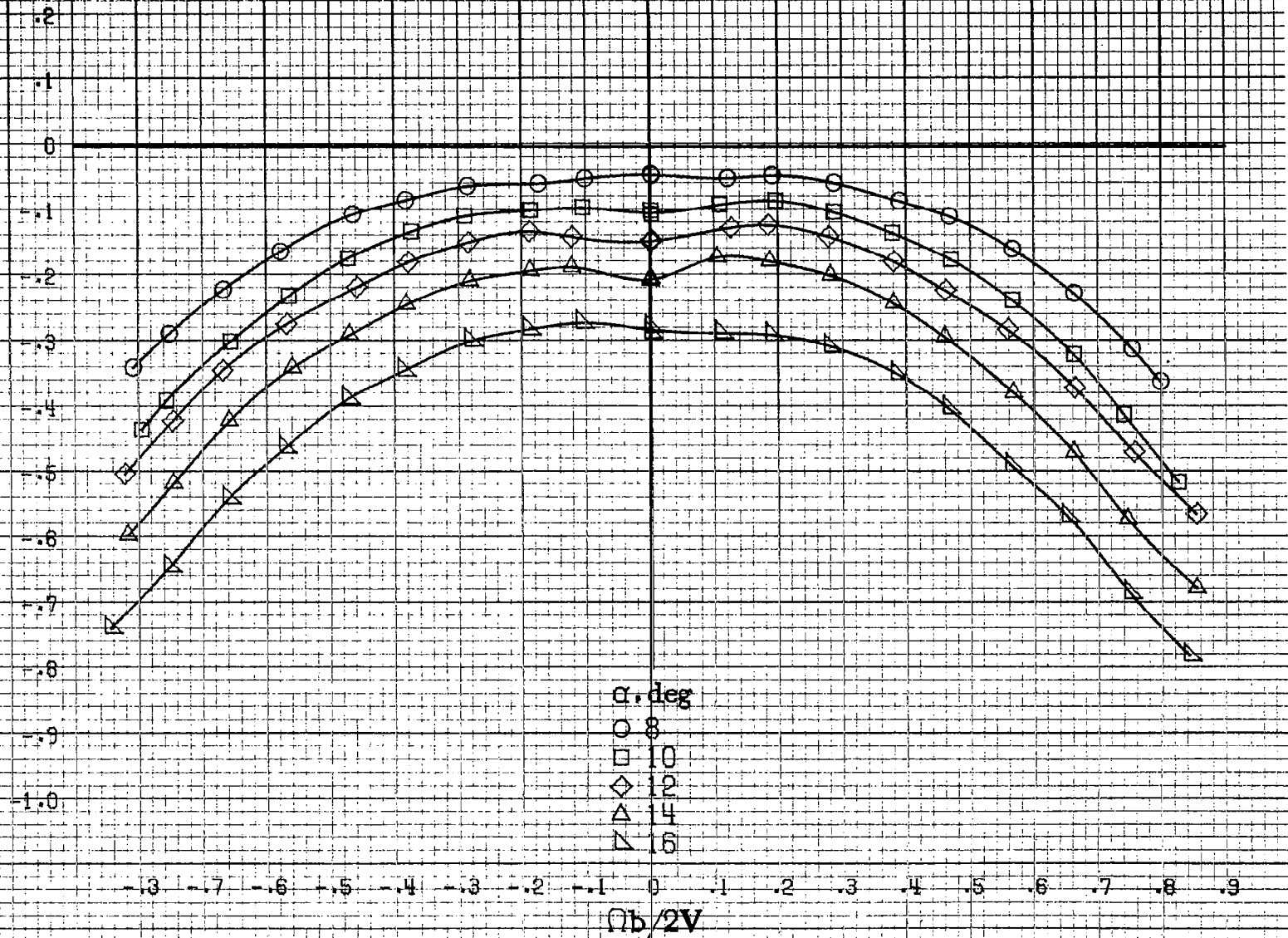
.14
.12
.10
.08
.06
.04
.02
0
-.02
-.04
-.06
-.08
-.10

α, deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\Omega b/2V$

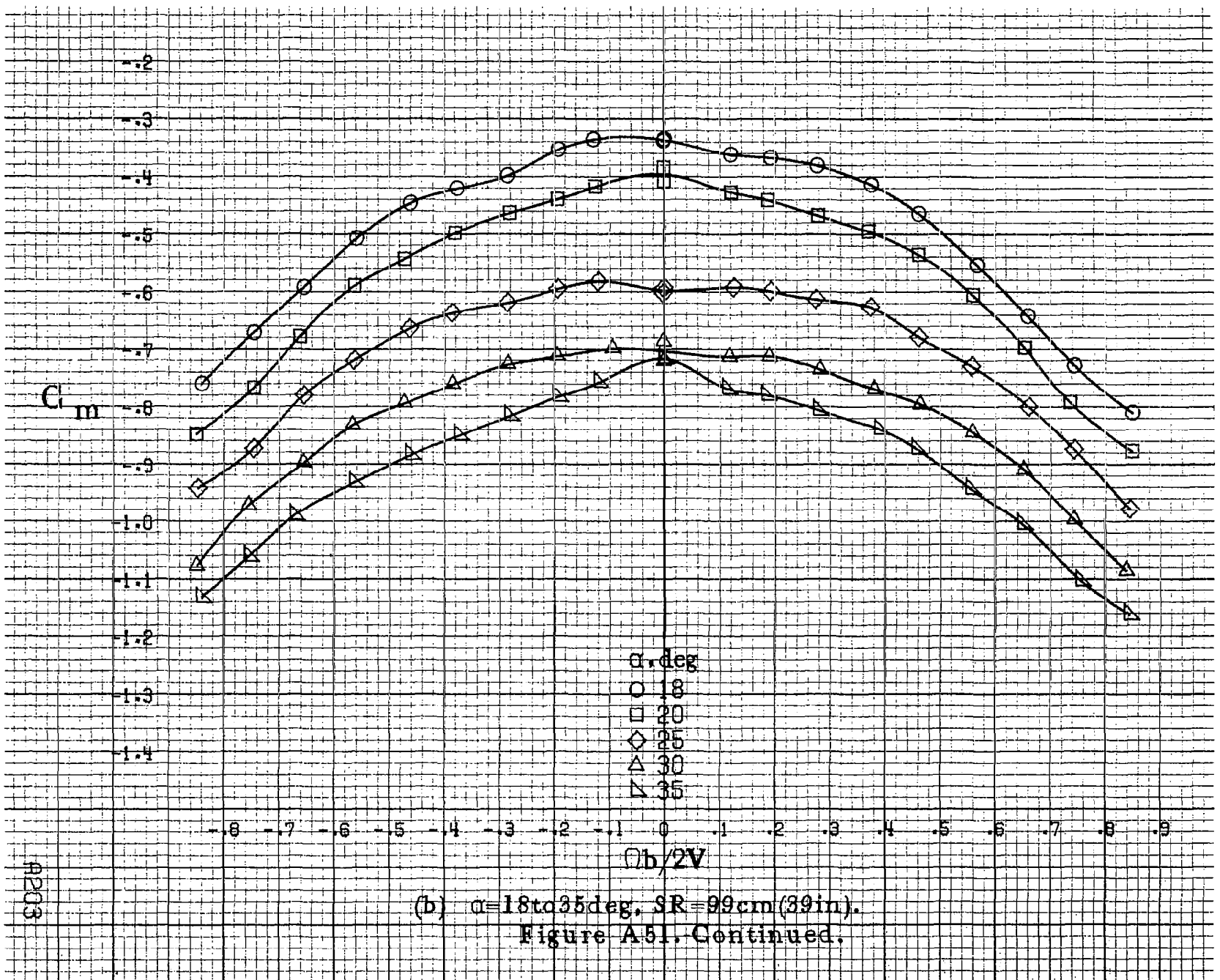
#201

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A50. Concluded.

C_m


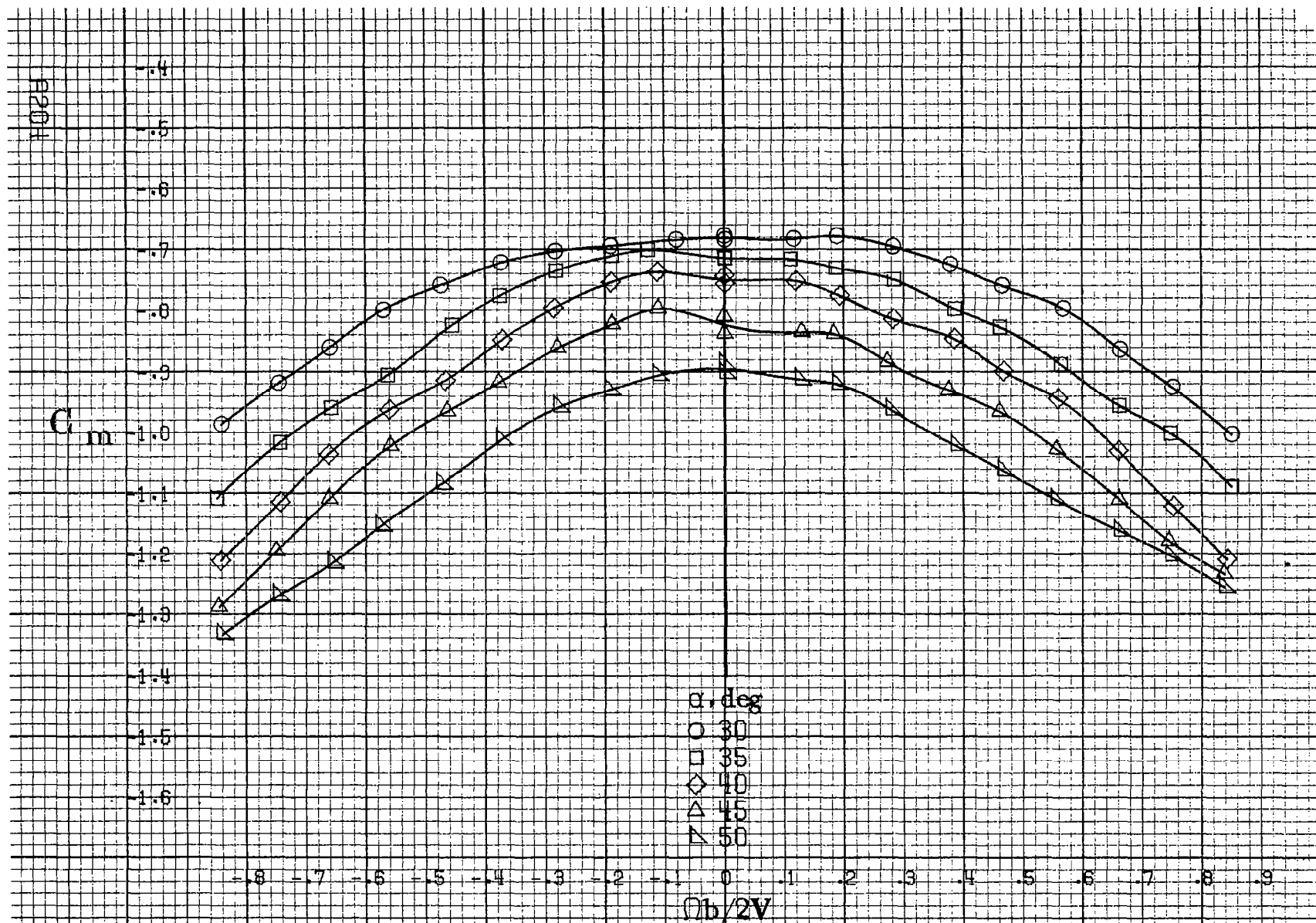
(a) $\alpha=8$ to 16 deg, SR=99 cm (39 in).

Figure A51. Effect of rotation rate and angle of attack on pitching-moment coefficient for T-tail configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A51, Continued.

A203



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A51. Continued.

C_m

-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
-2.1

α , deg

- 55
- 60
- ◇ 70
- △ 80
- ▽ 90

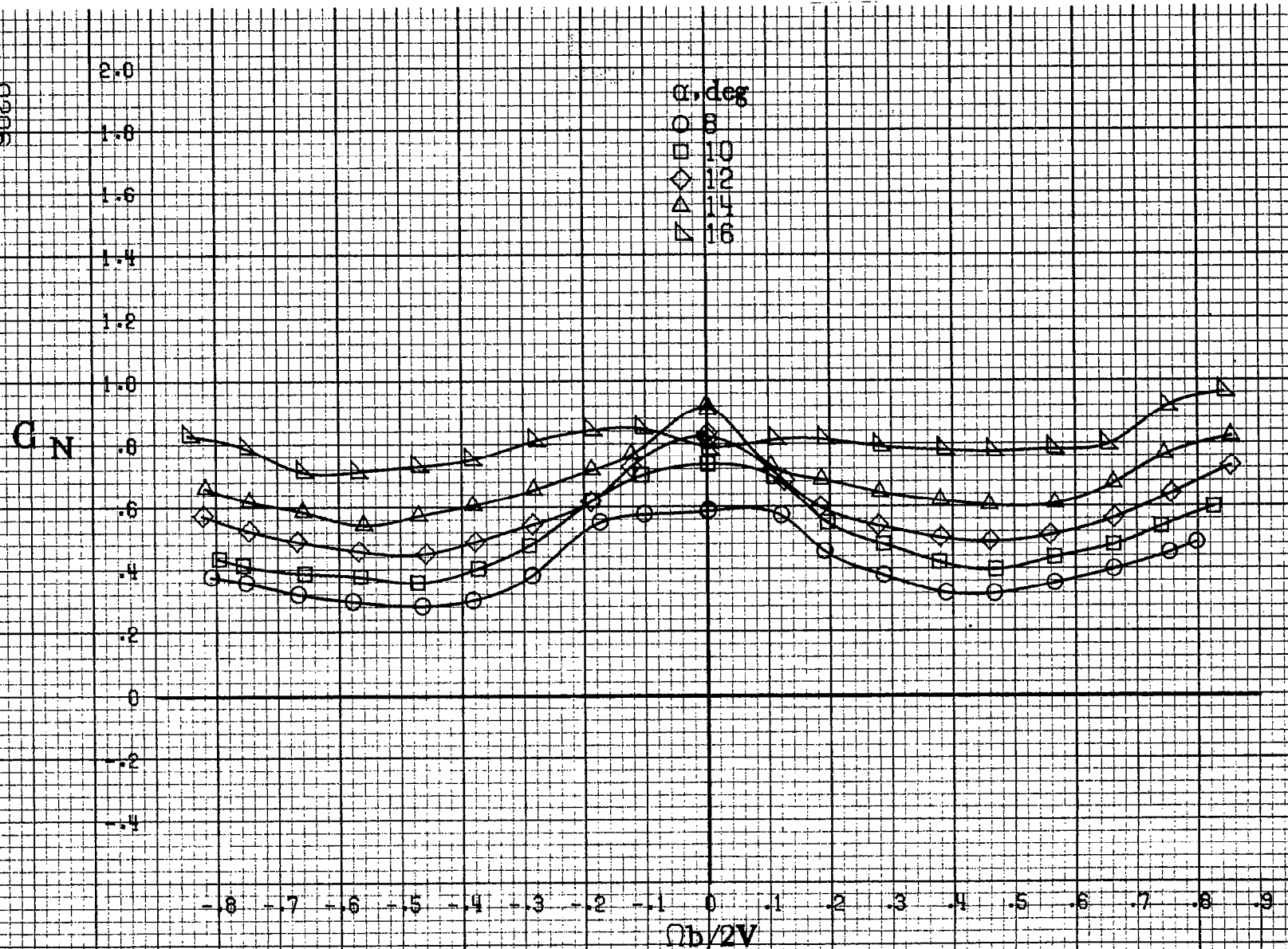
-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

$\Omega b/2V$

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A51. Concluded.

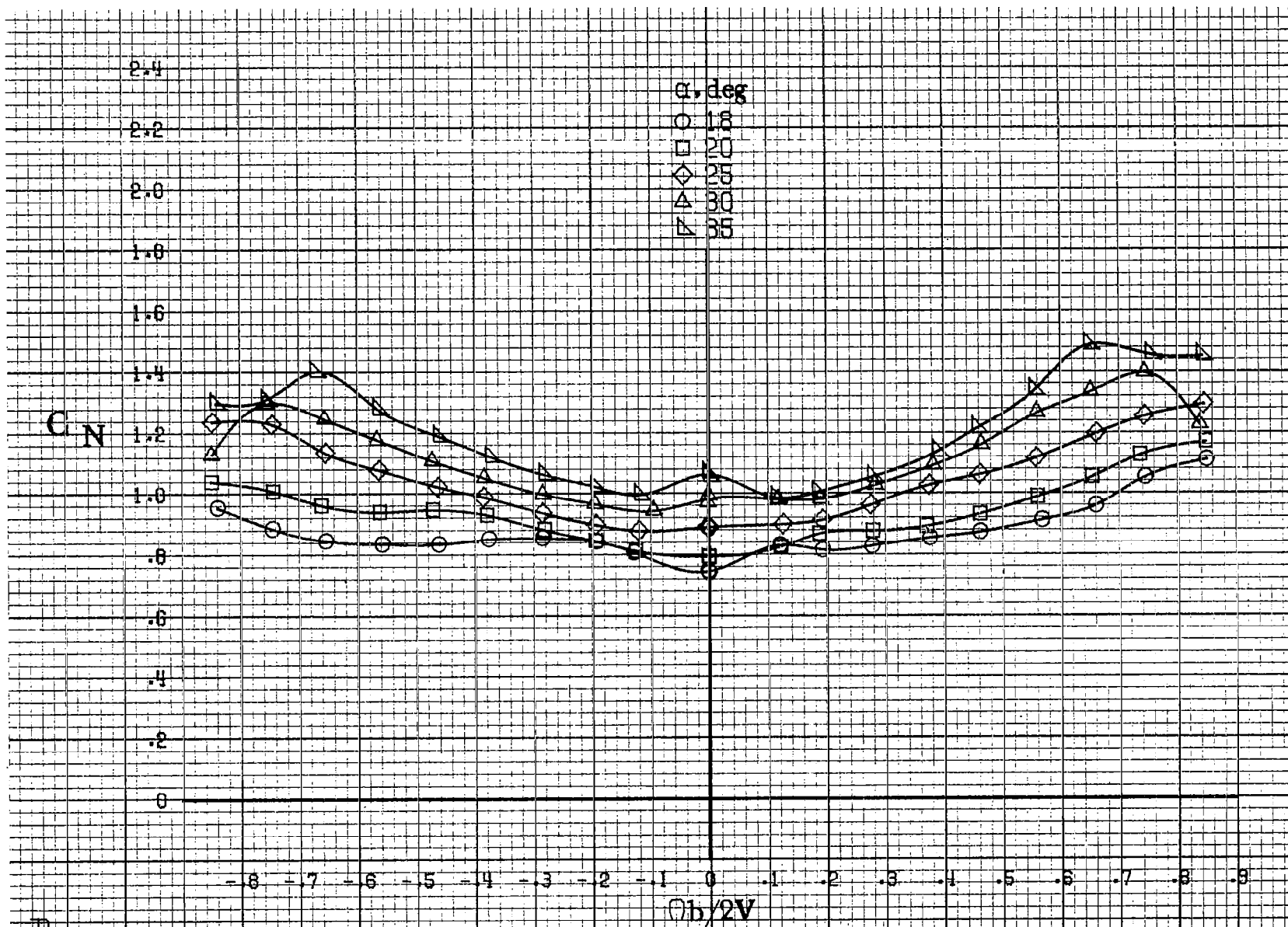
AP205

A206



(a) $\alpha=8$ to 16 deg, SR-99cm (39in).

Figure A52. Effect of rotation rate and angle of attack on normal-force coefficient for T-tail configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, SR = 99 cm (39 in).
 Figure A52, Continued.

A207

E208

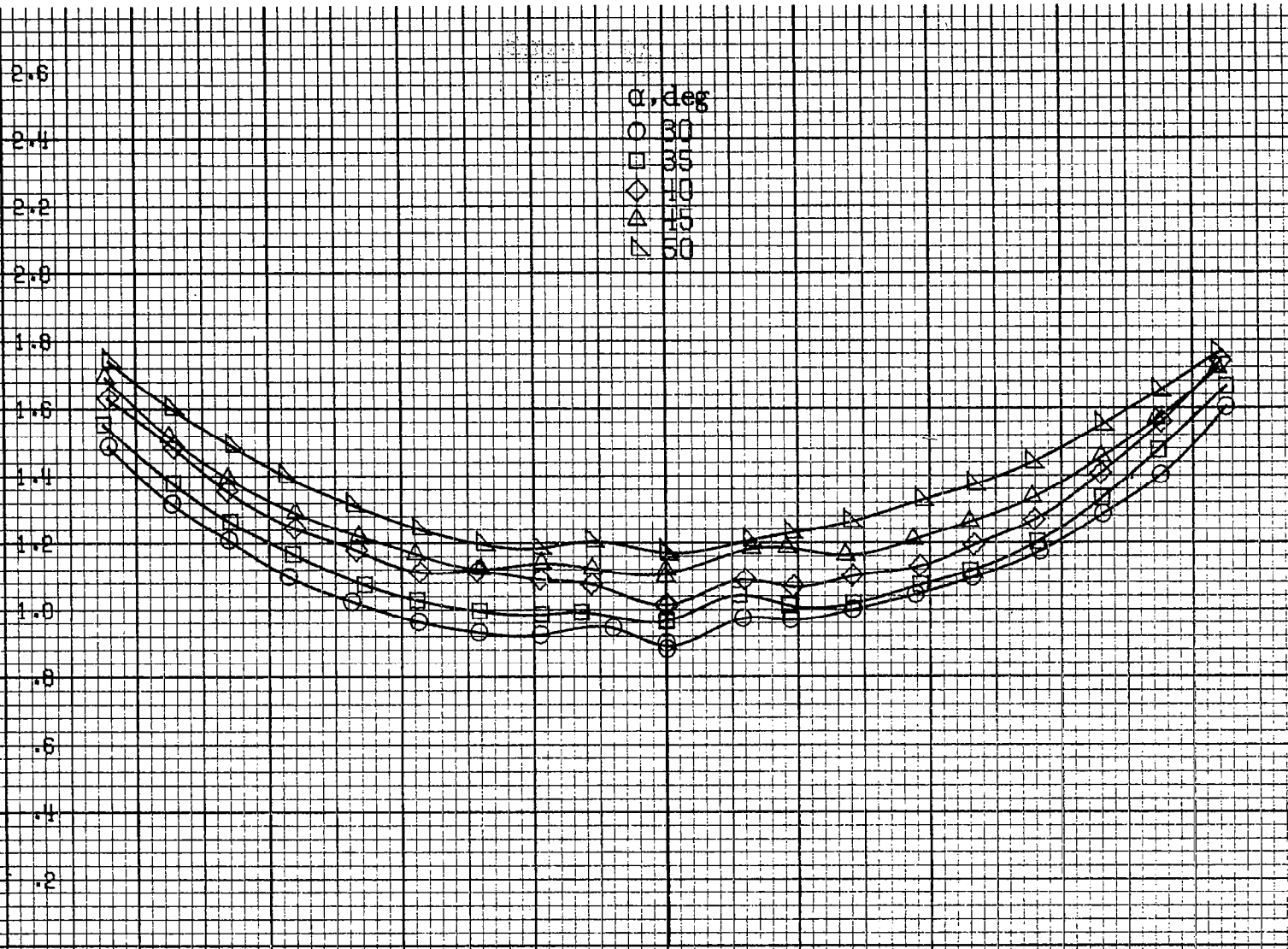
C_N

2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

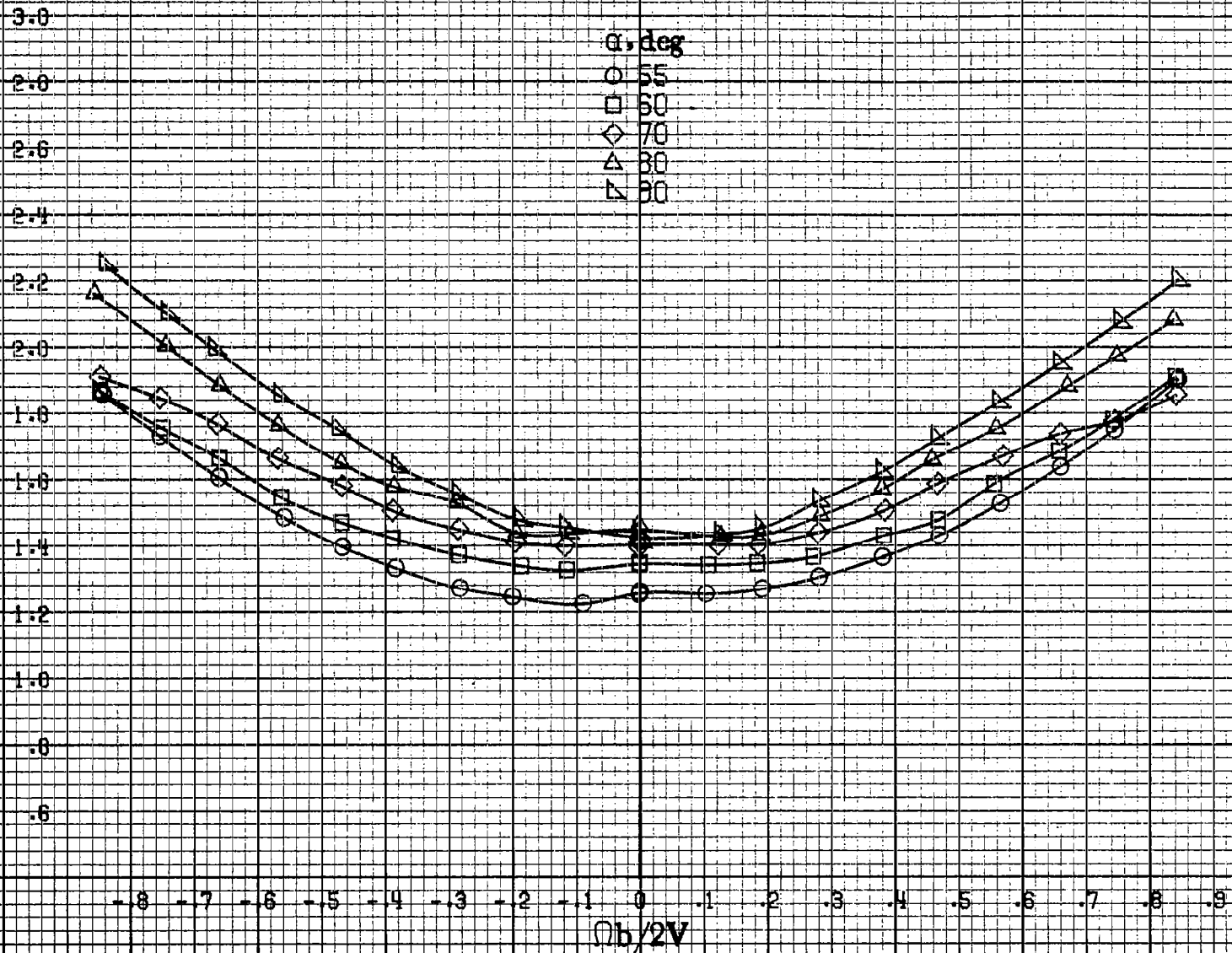
-8 -7 -6 -5 -4 -3 -2 -1 0 .1 2 .3 .4 .5 .6 .7 .8 .9
 $\theta b/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A52. Continued.



C_{LN}

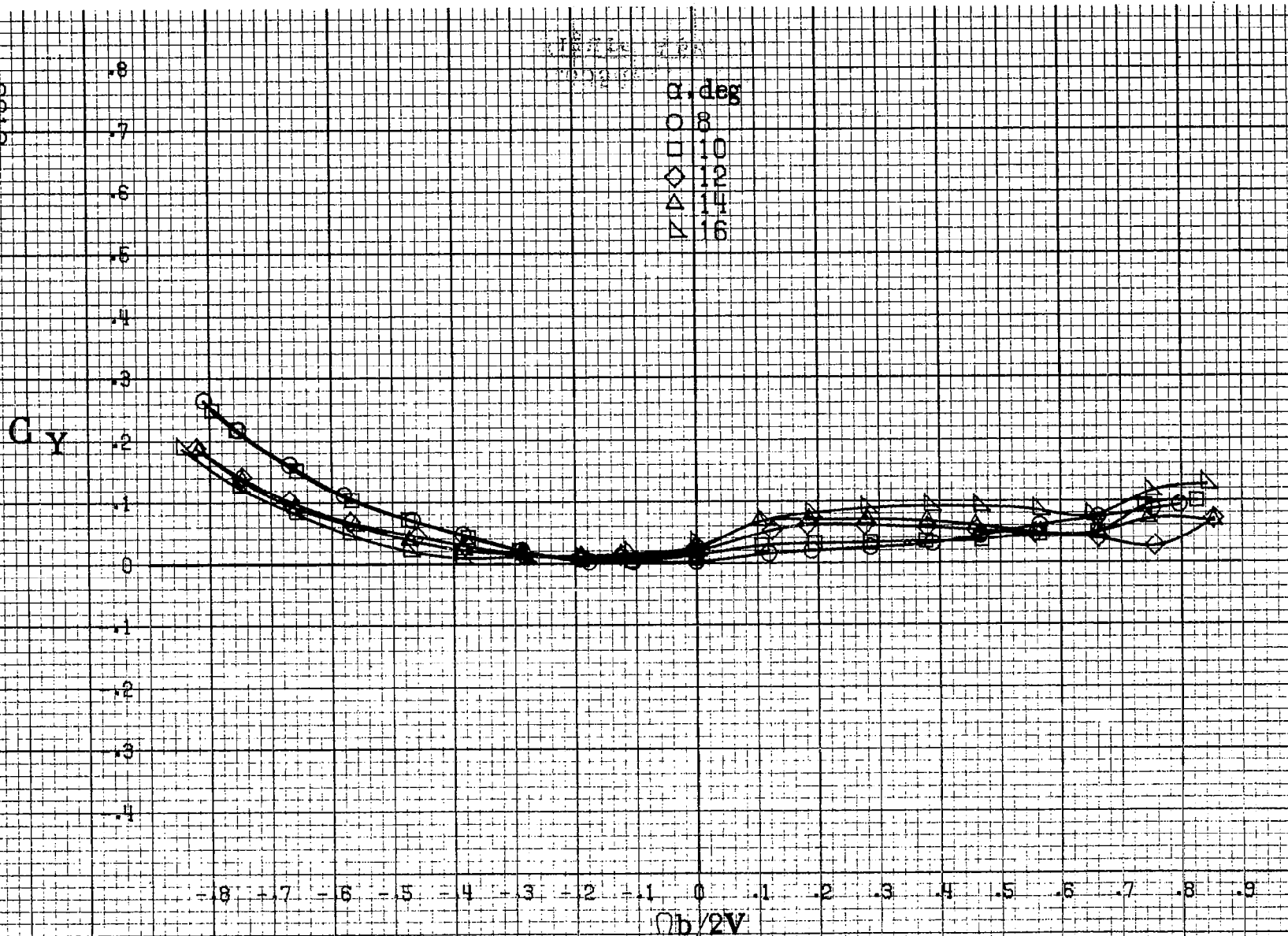
α, deg
○ 55
□ 60
◇ 70
△ 80
▽ 90



(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A52. **Concluded.**

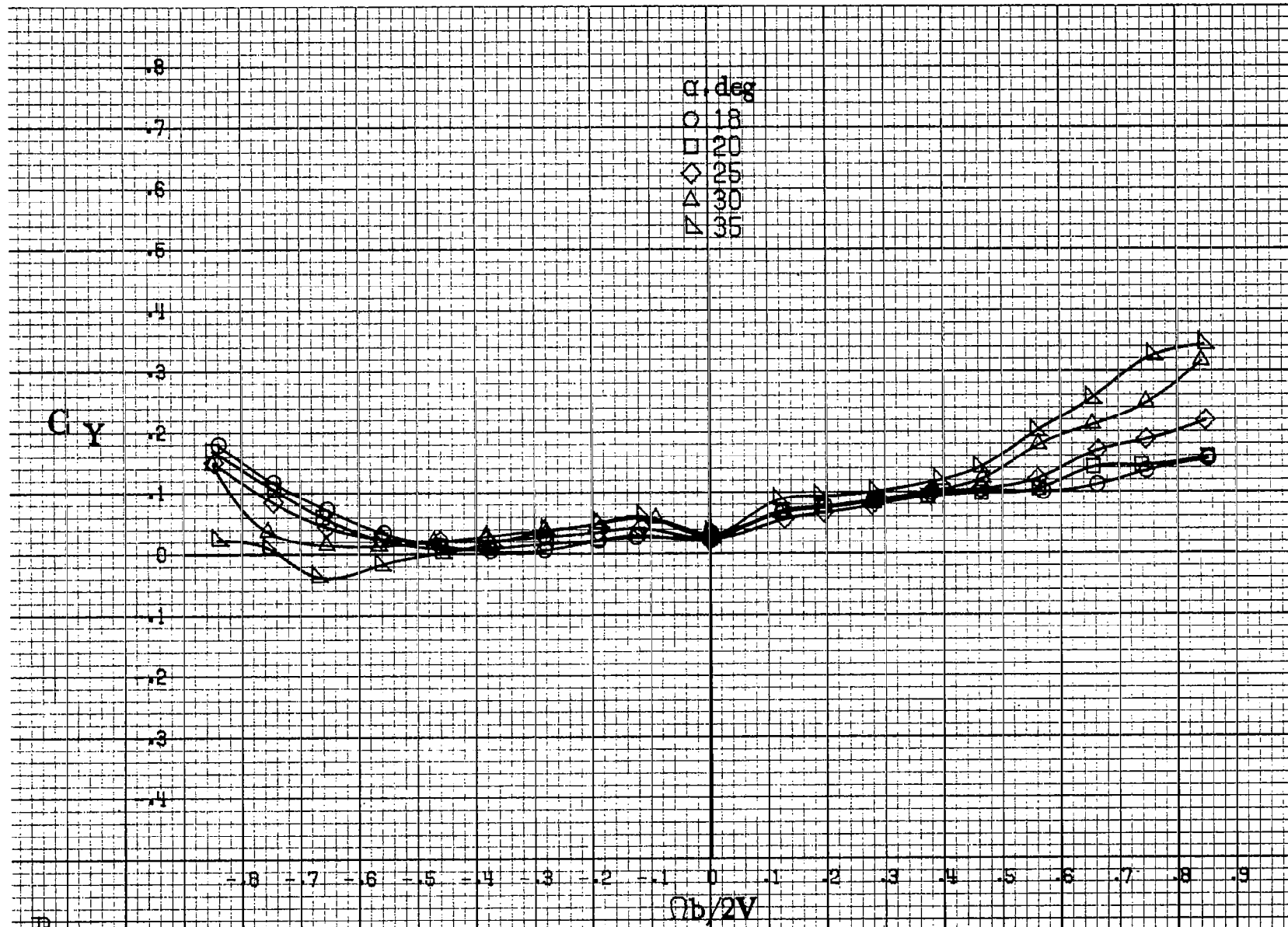
AP63

P219



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A58. Effect of rotation rate and angle of attack on side-force coefficient for T-tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A58. Continued.

AP11

E212

C_Y

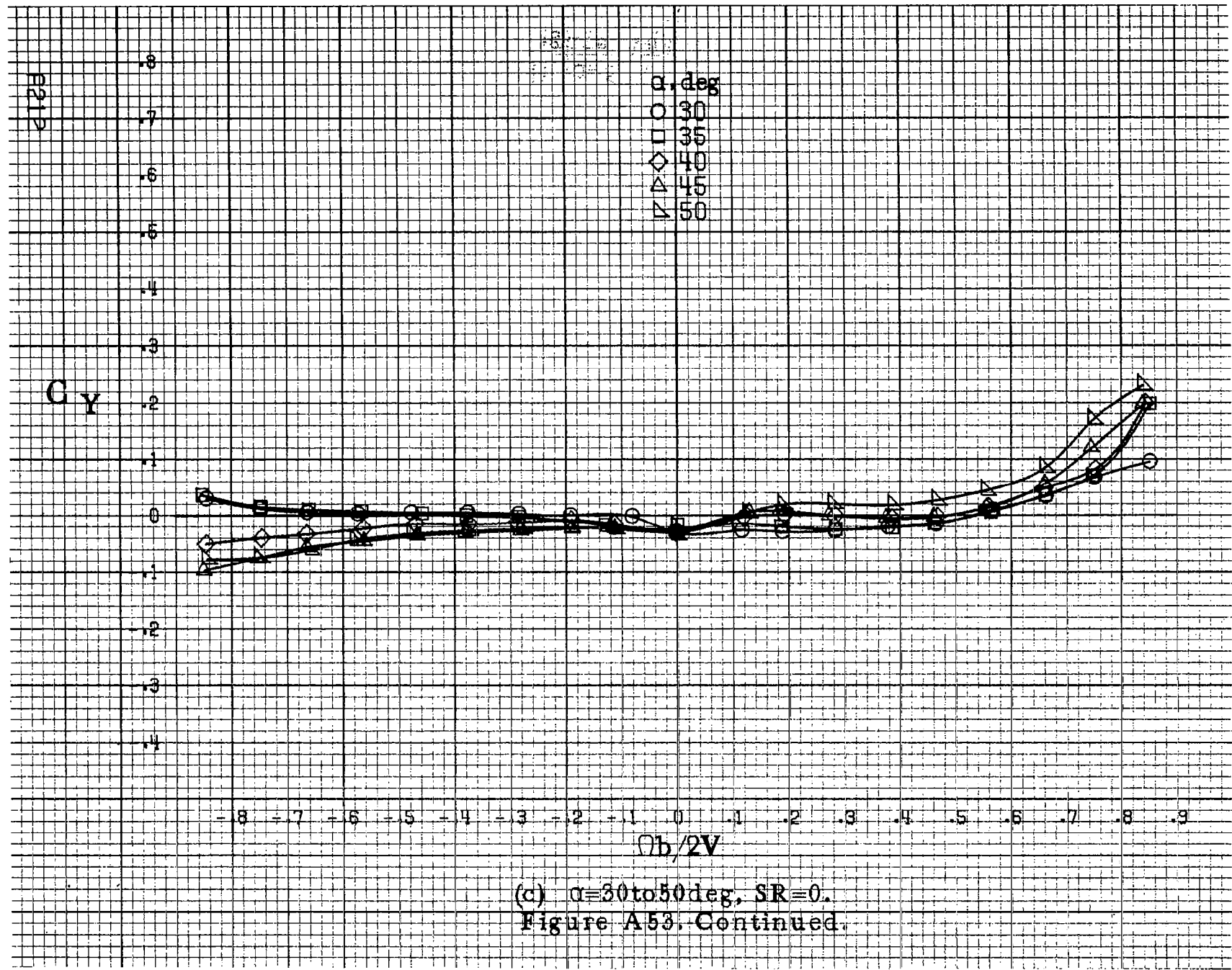
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9

$Ob/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A53. Continued.



8213

C_{γ}

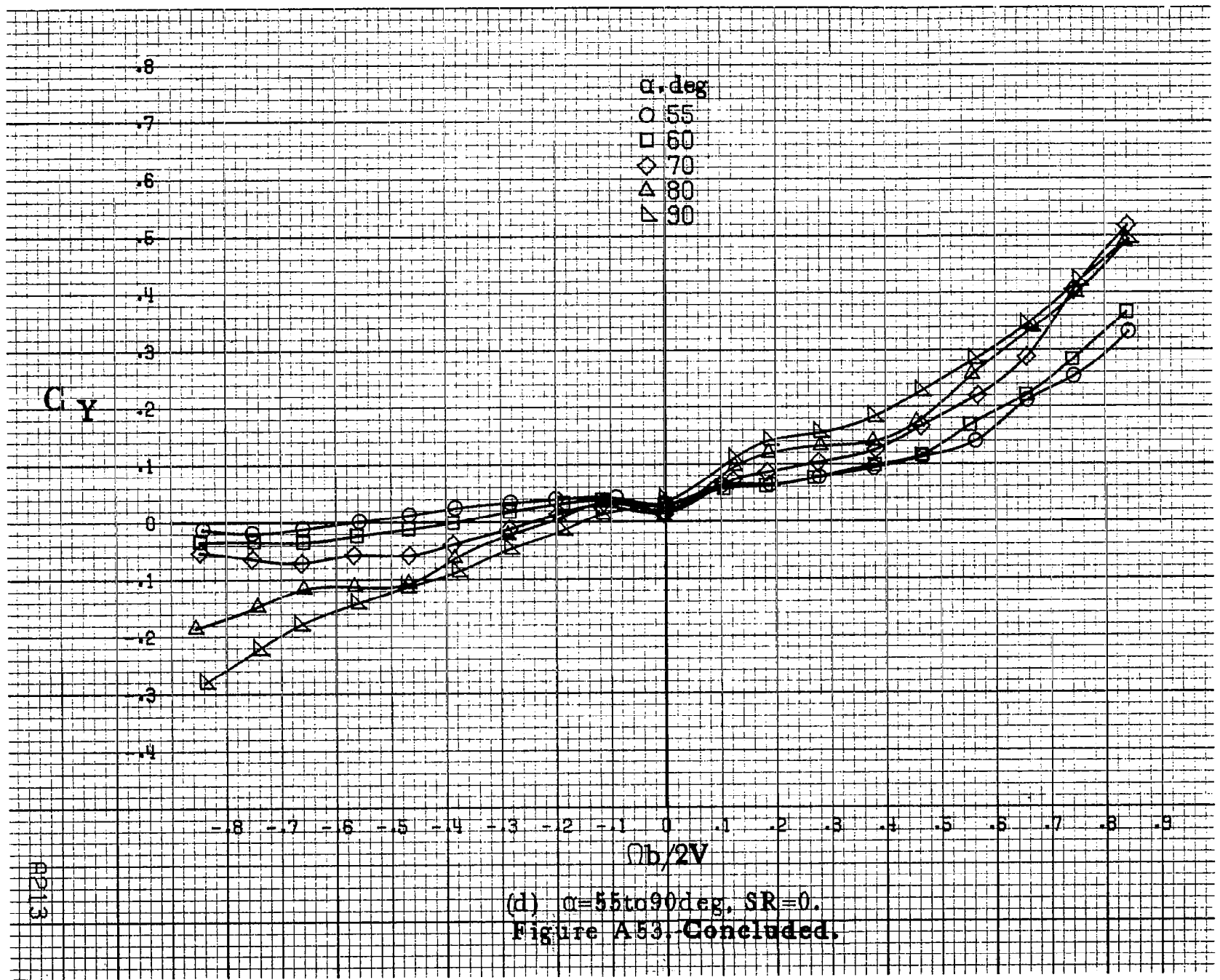
.8
.7
.6
.5
.4
.3
.2
.1
0
.1
.2
.3
.4

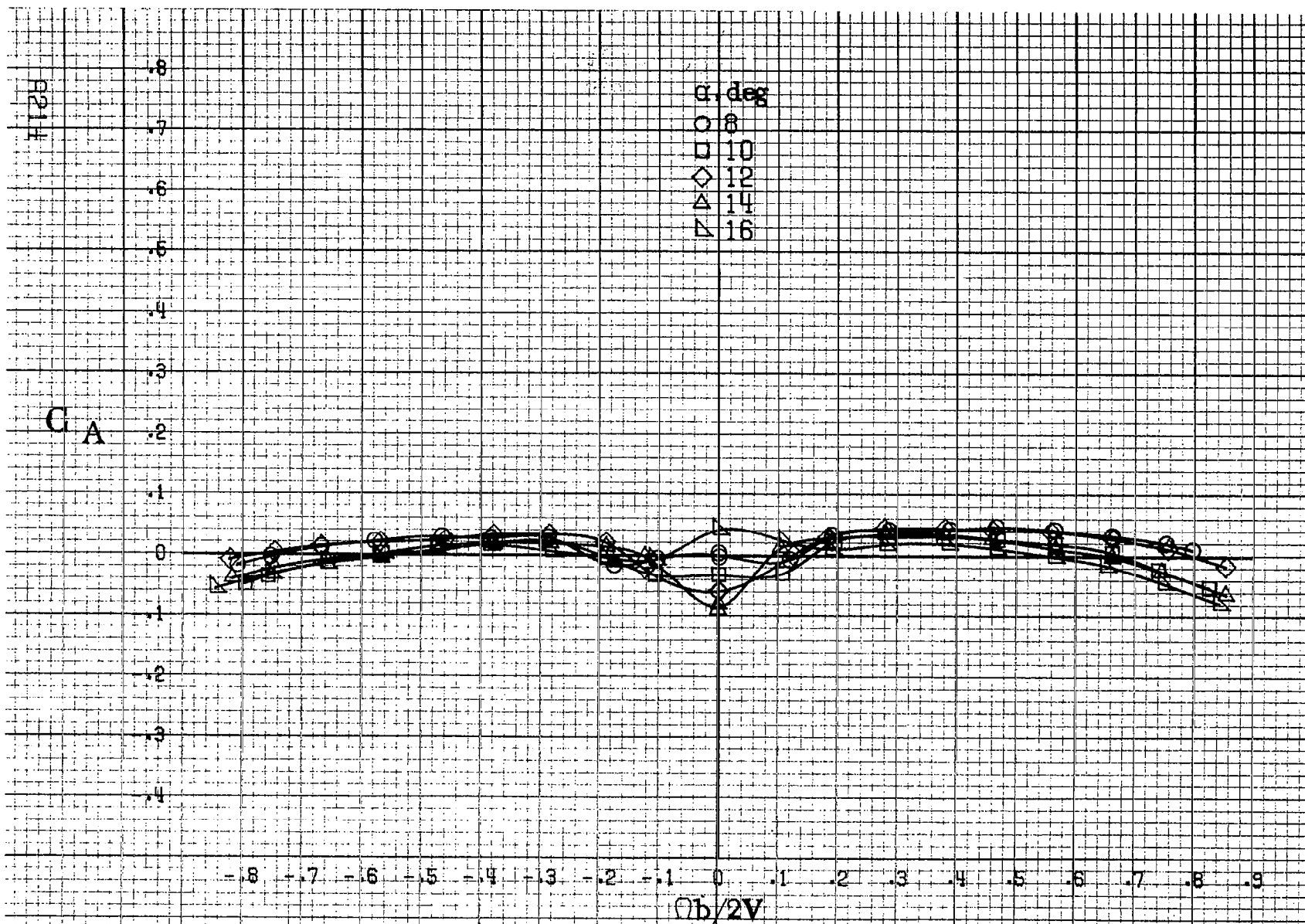
α, deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$\Omega b/2V$

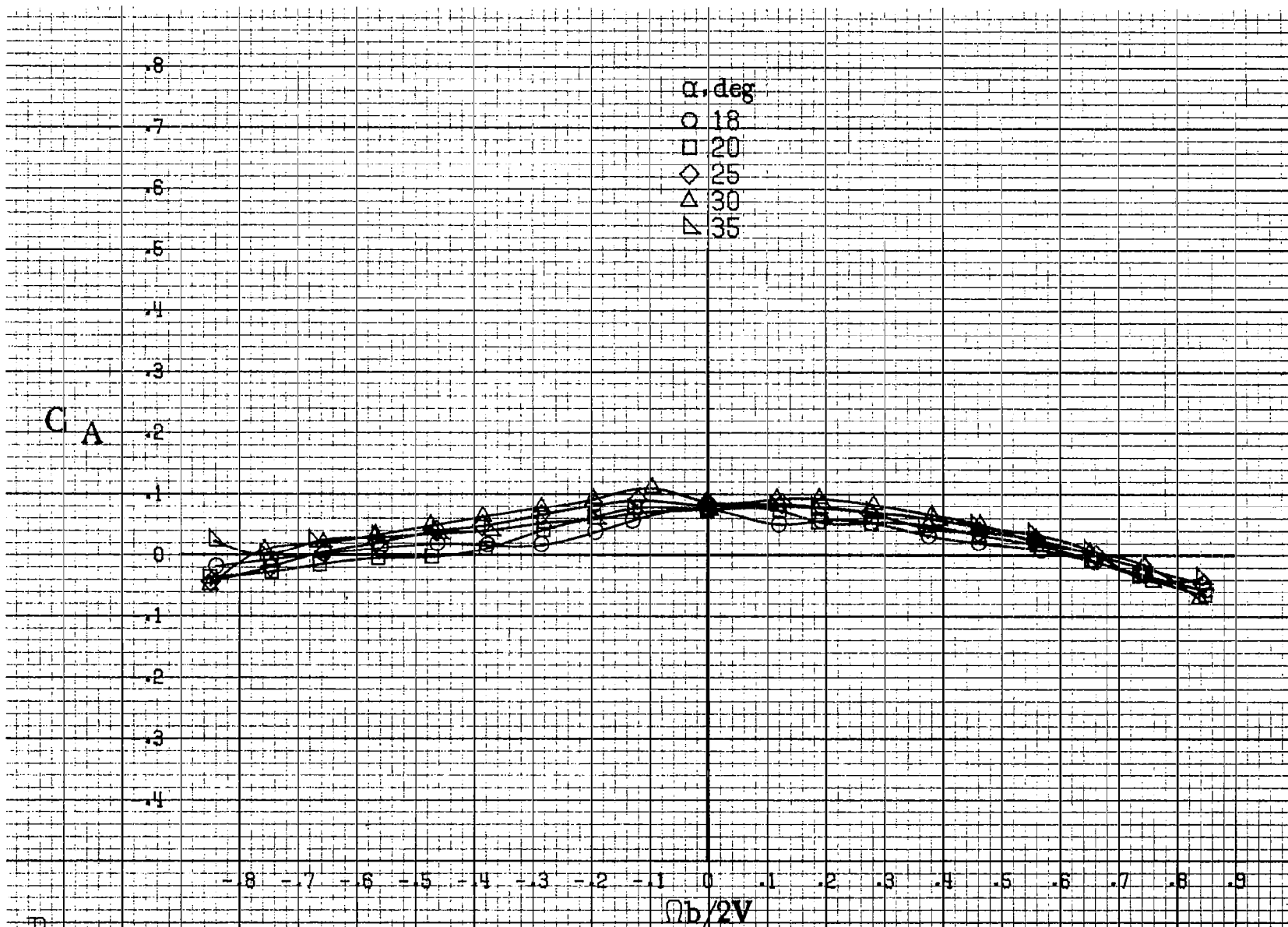
(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A53. Concluded.





(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A54.-Effect of rotation rate and angle of attack on axial-force coefficient for T-tail configuration. $\delta_a=0^\circ$, $\delta_s=0^\circ$, $\delta_r=0^\circ$, $\beta=0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A54. Continued.

RP215

A216

C_A

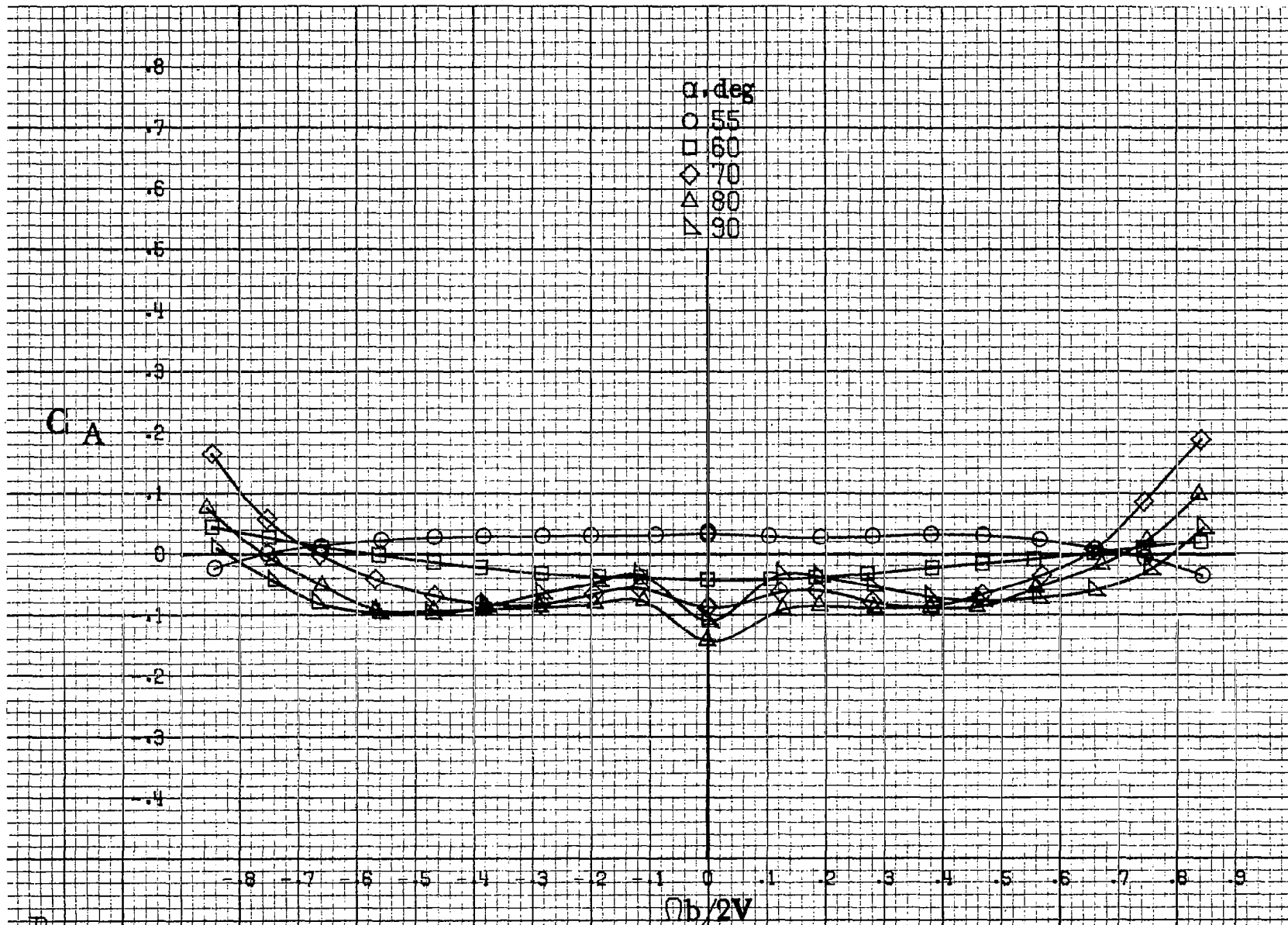
.8
.7
.6
.5
.4
.3
.2
.1
0
.1
.2
.3
.4

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

- .8 - .7 - .6 - .5 - .4 - .3 - .2 - .1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

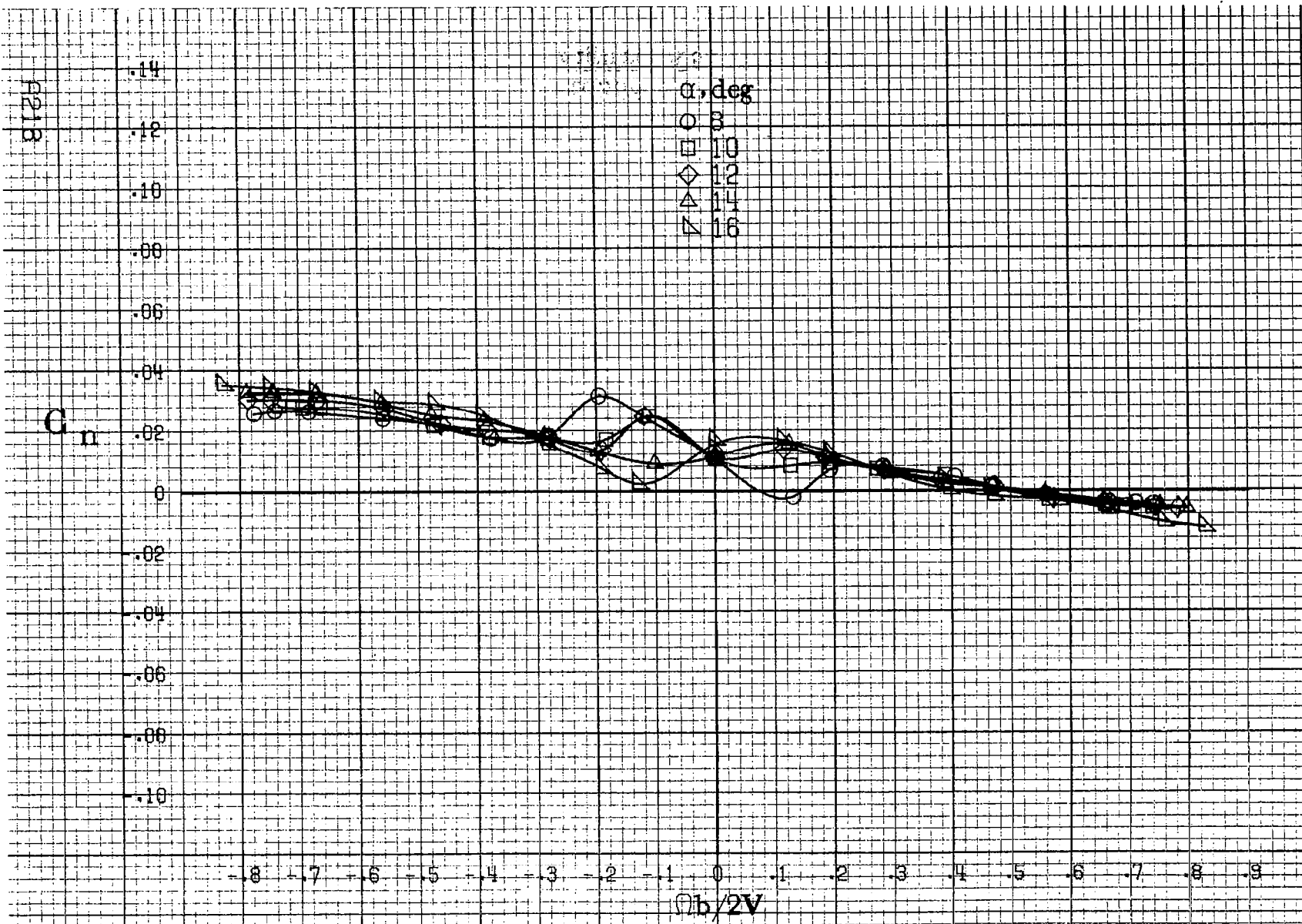
$\Omega b/2V$

(c) $\alpha=30$ to 50 deg. $SR=0$.
Figure A54. Continued.



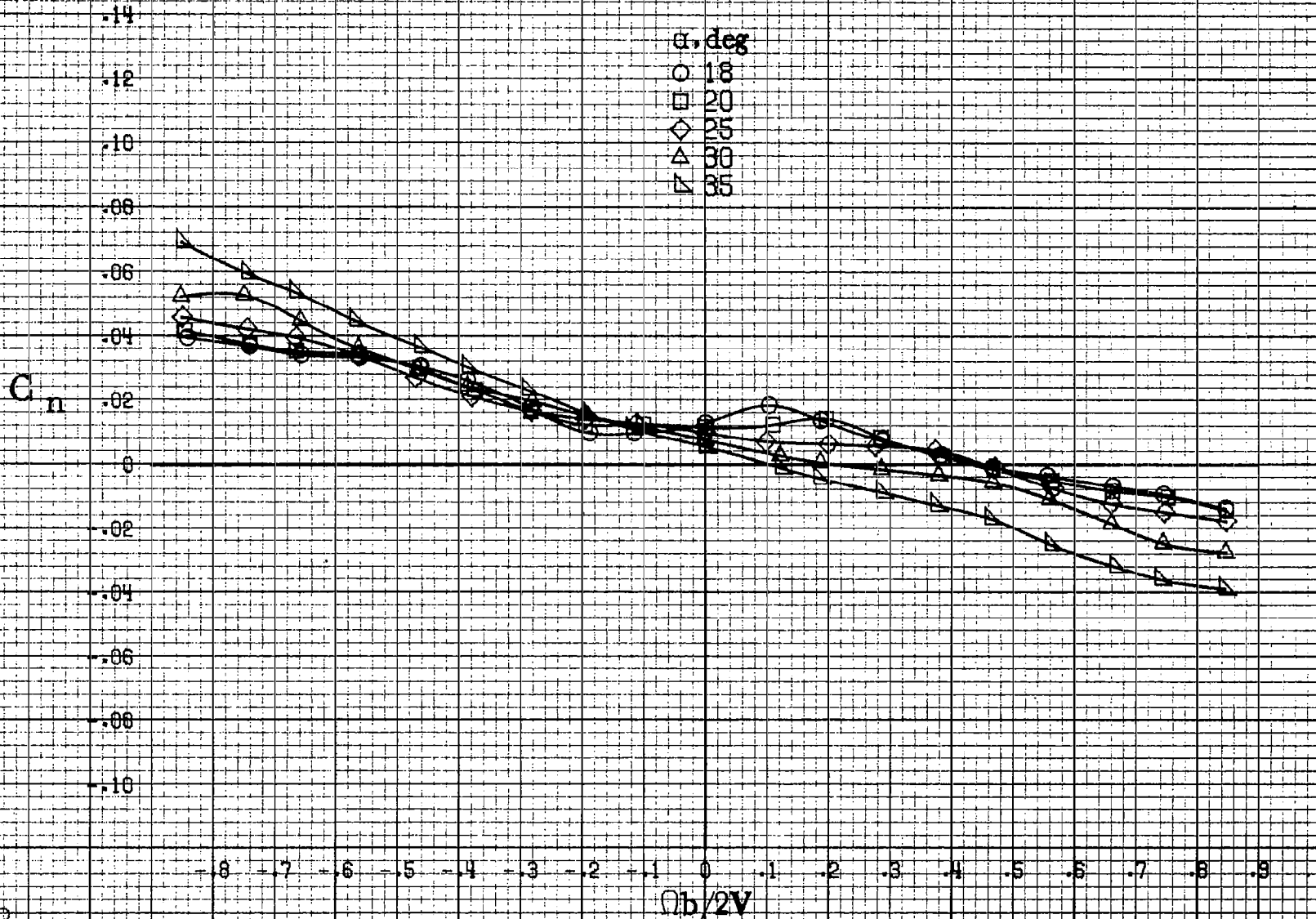
(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A54. Concluded.

R217



(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A55. Effect of rotation rate and angle of attack on yawing-moment coefficient for T-tail configuration. $\delta_c=0^\circ$, $\delta_a=0^\circ$, $\delta_r=-25^\circ$, $\beta=0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A55. Continued.

0219

E223

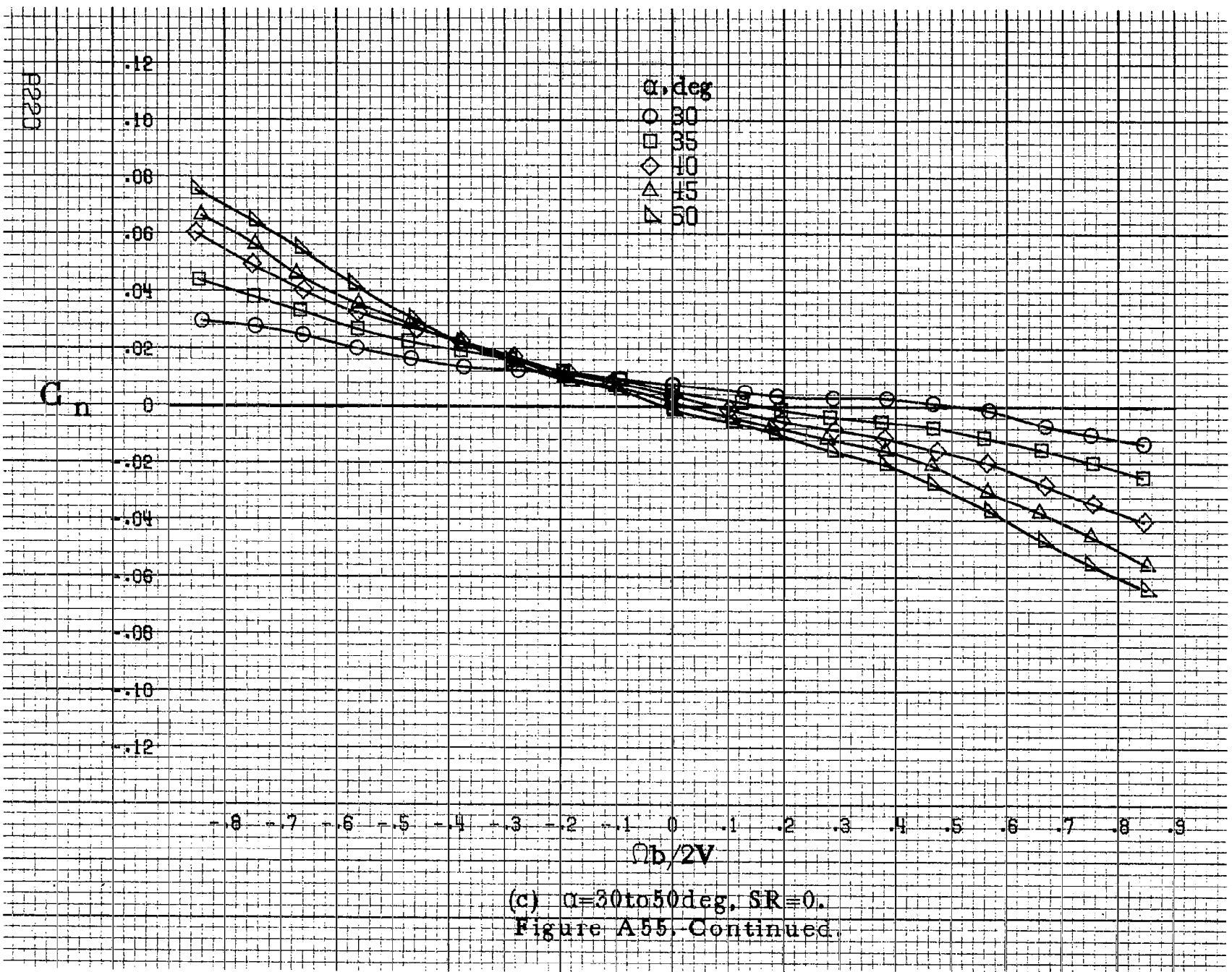
C_n

.12
.10
.08
.06
.04
.02
0
-.02
-.04
-.06
-.08
-.10
-.12

α, deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $Qb/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A55, Continued.



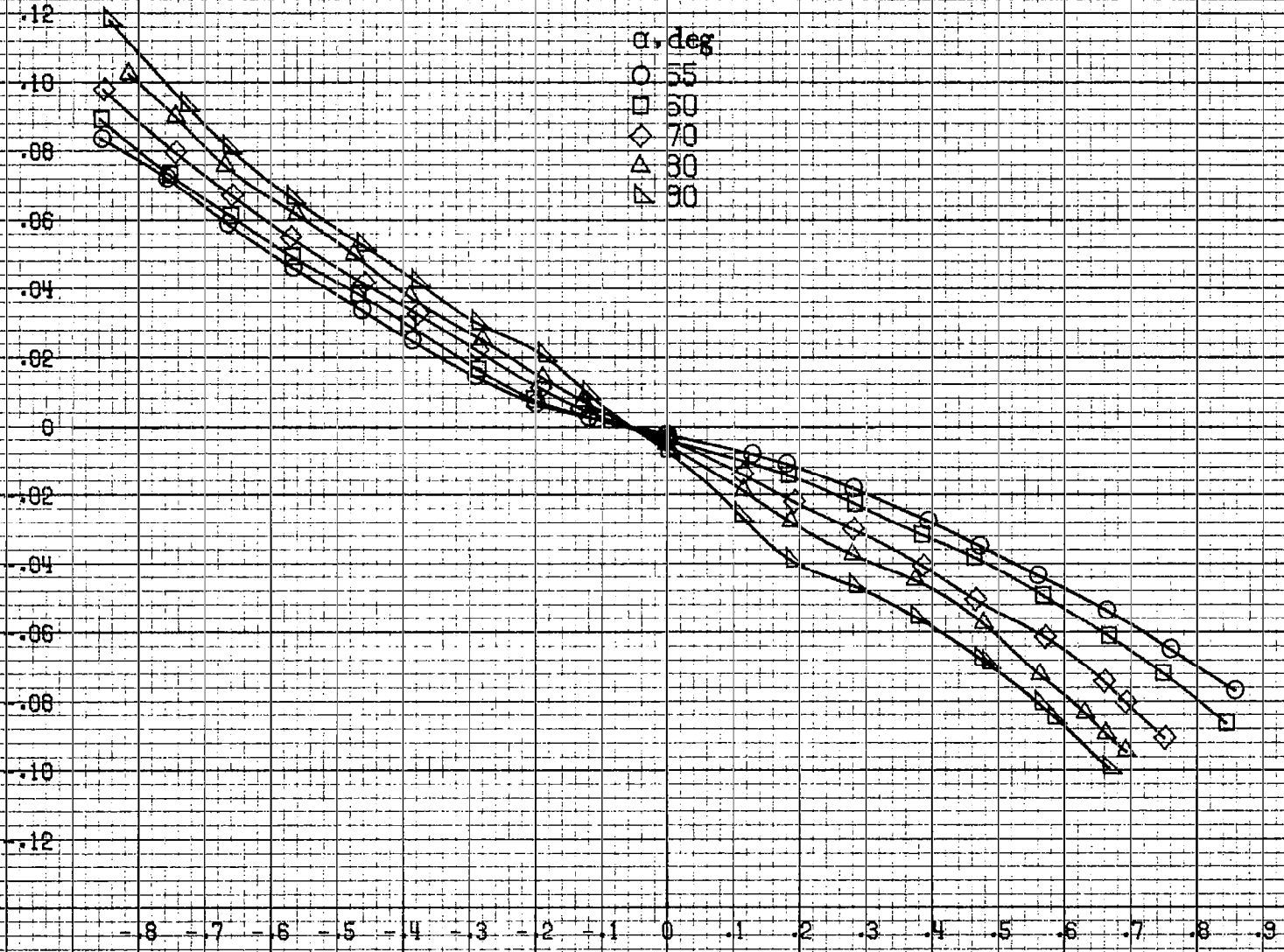
C_n

α, deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $Ob/2V$

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A55. Concluded.

A221



R222

C_l

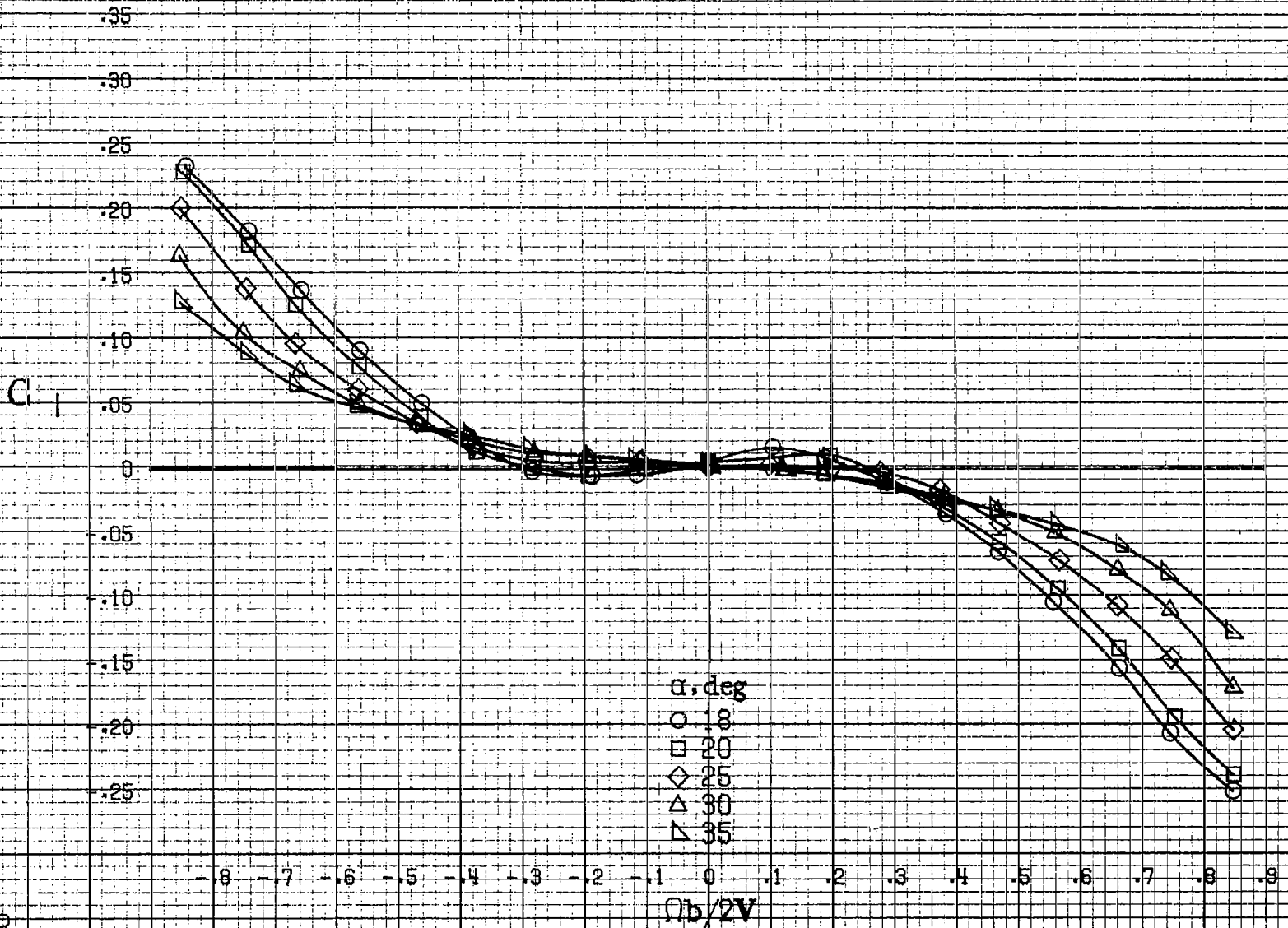
.35
.30
.25
.20
.15
.10
.05
0
-.05
-.10
-.15
-.20
-.25

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

α , deg
○ 8
□ 0
◇ 2
△ 4
▽ 6

(a) $\alpha = 8$ to 16 deg, SR-99 em (39 in).

Figure A56. Effect of rotation rate and angle of attack on rolling-moment coefficient for T-tail configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_c = -25^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A56. Continued.

A223

9224

G_1

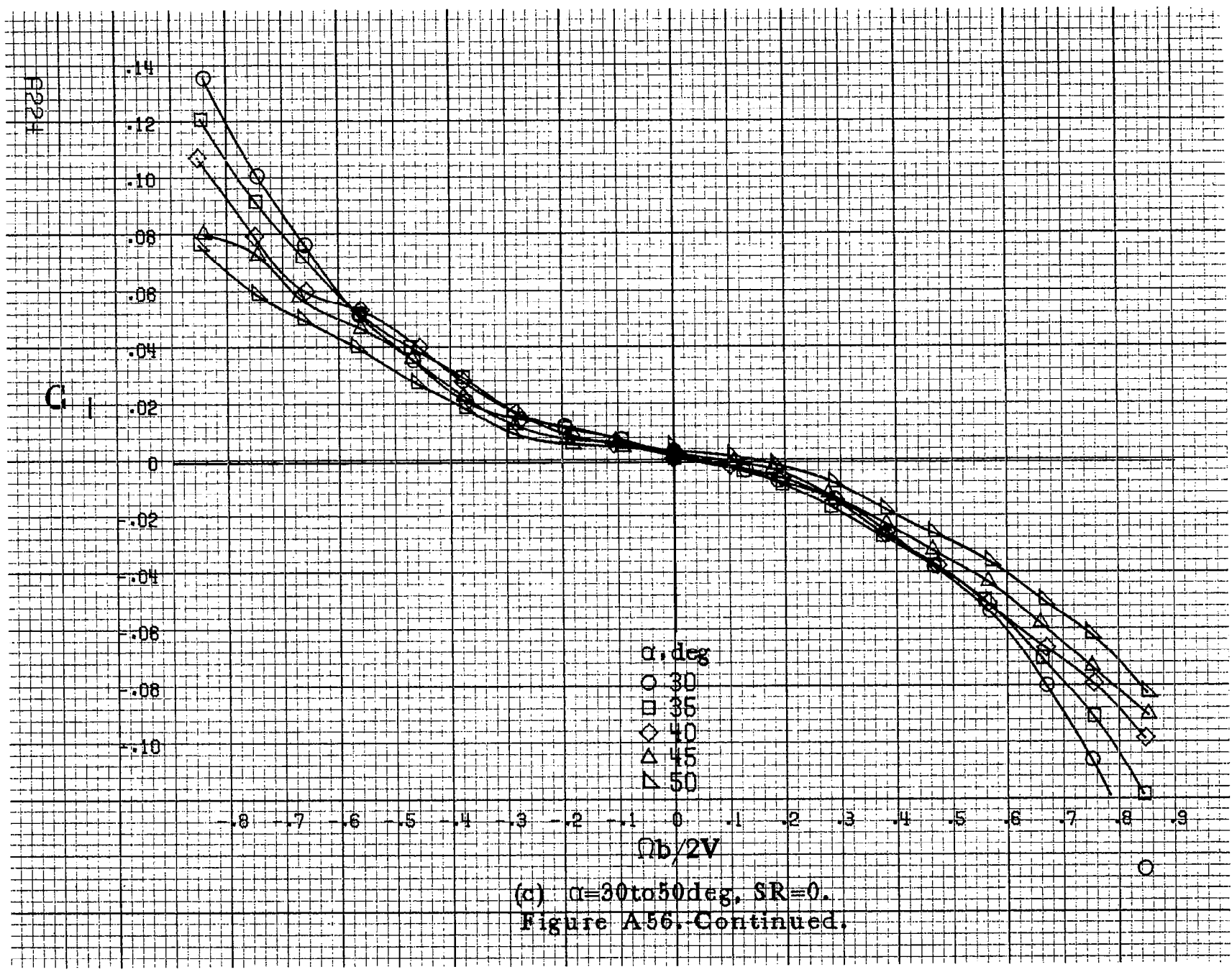
.14
.12
.10
.08
.06
.04
.02
0
-.02
-.04
-.06
-.08
-.10

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

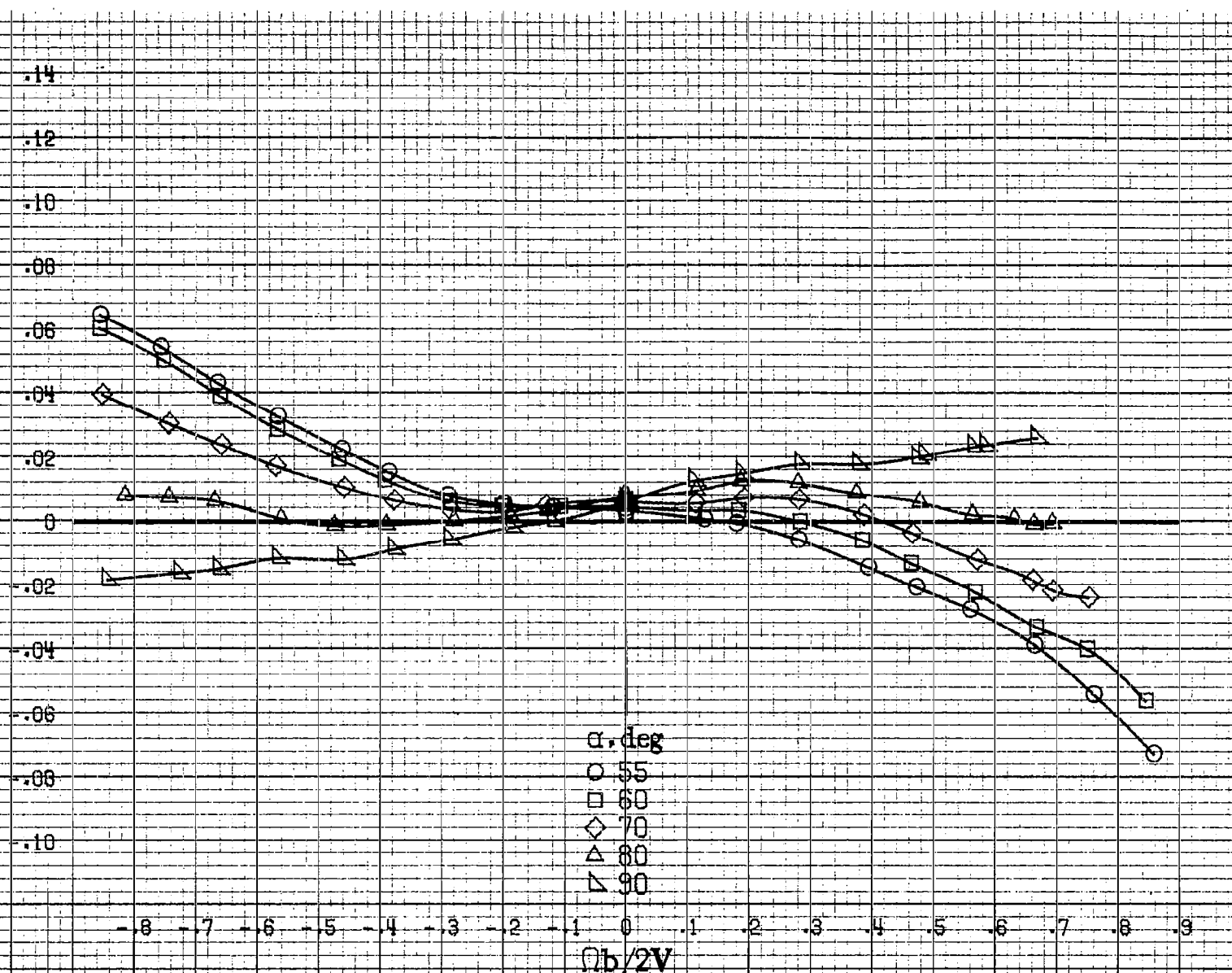
α, deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

$\Omega b/2V$

(a) $\alpha=30$ to 50 deg, $SR=0$.
Figure A56. Continued.



C_1

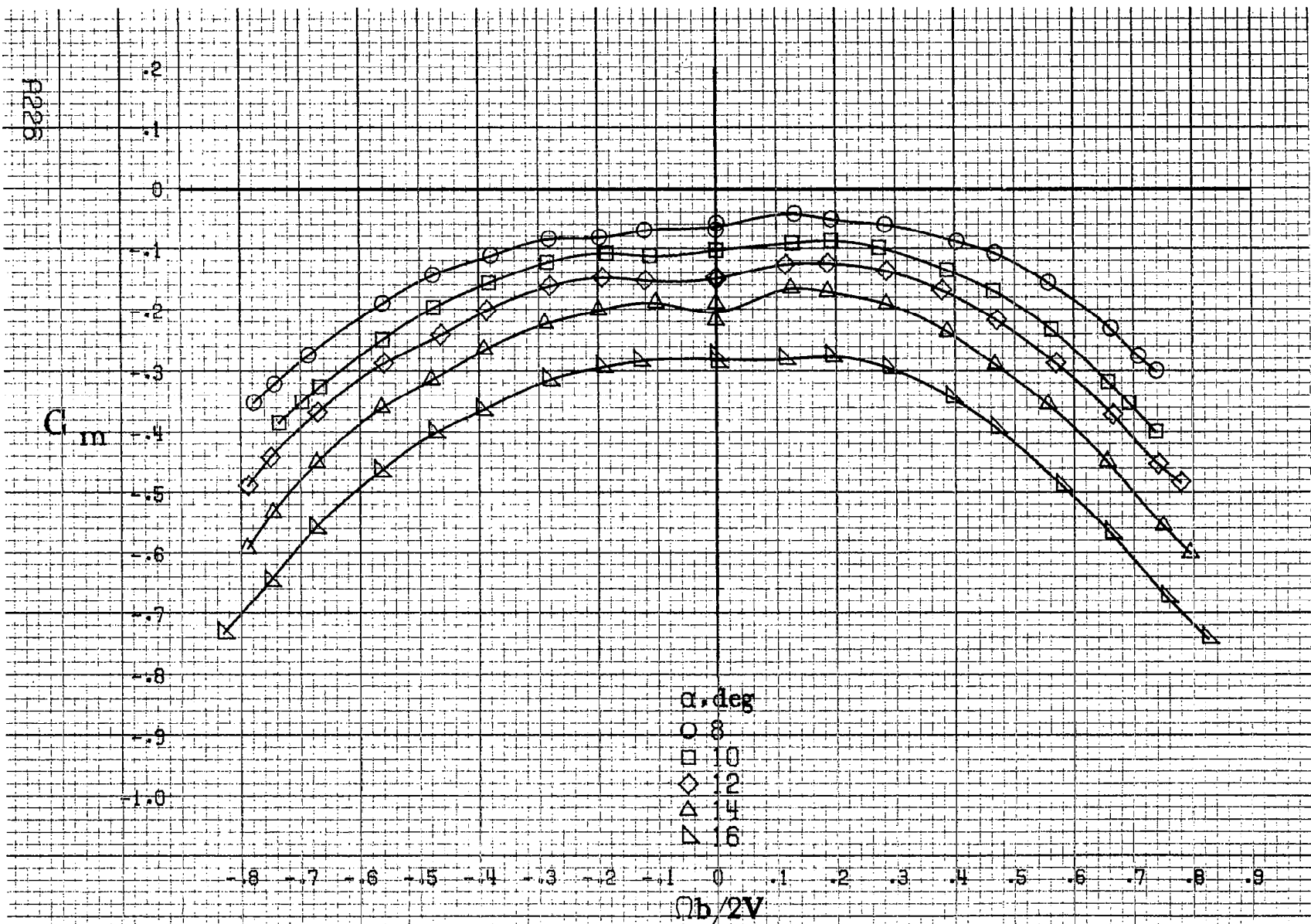


α, deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A56. Concluded.

A225

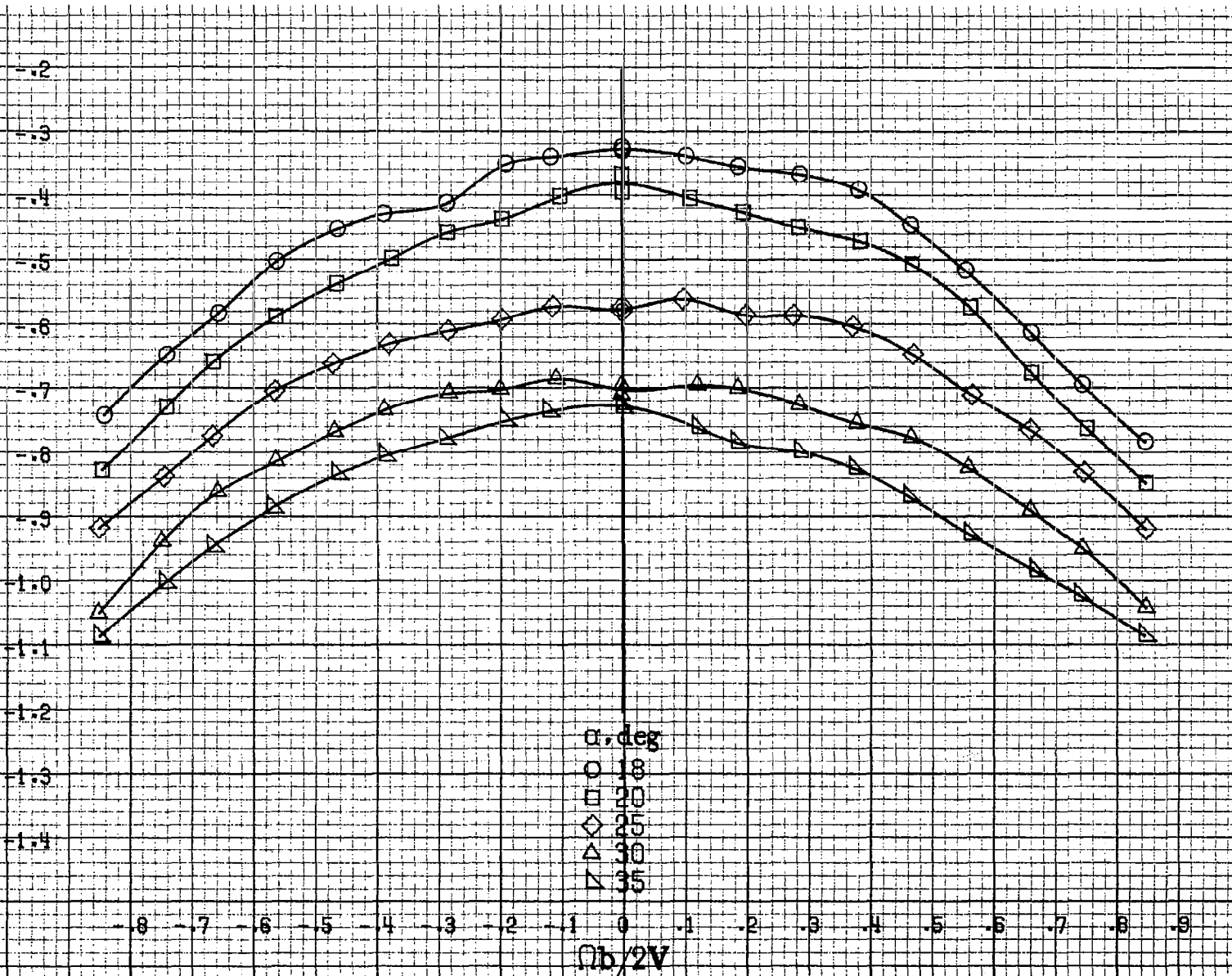
P225



(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A57. Effect of rotation rate and angle of attack on pitching moment coefficient for T-tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.

C_m



α, deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A57. Continued.

A227

8228

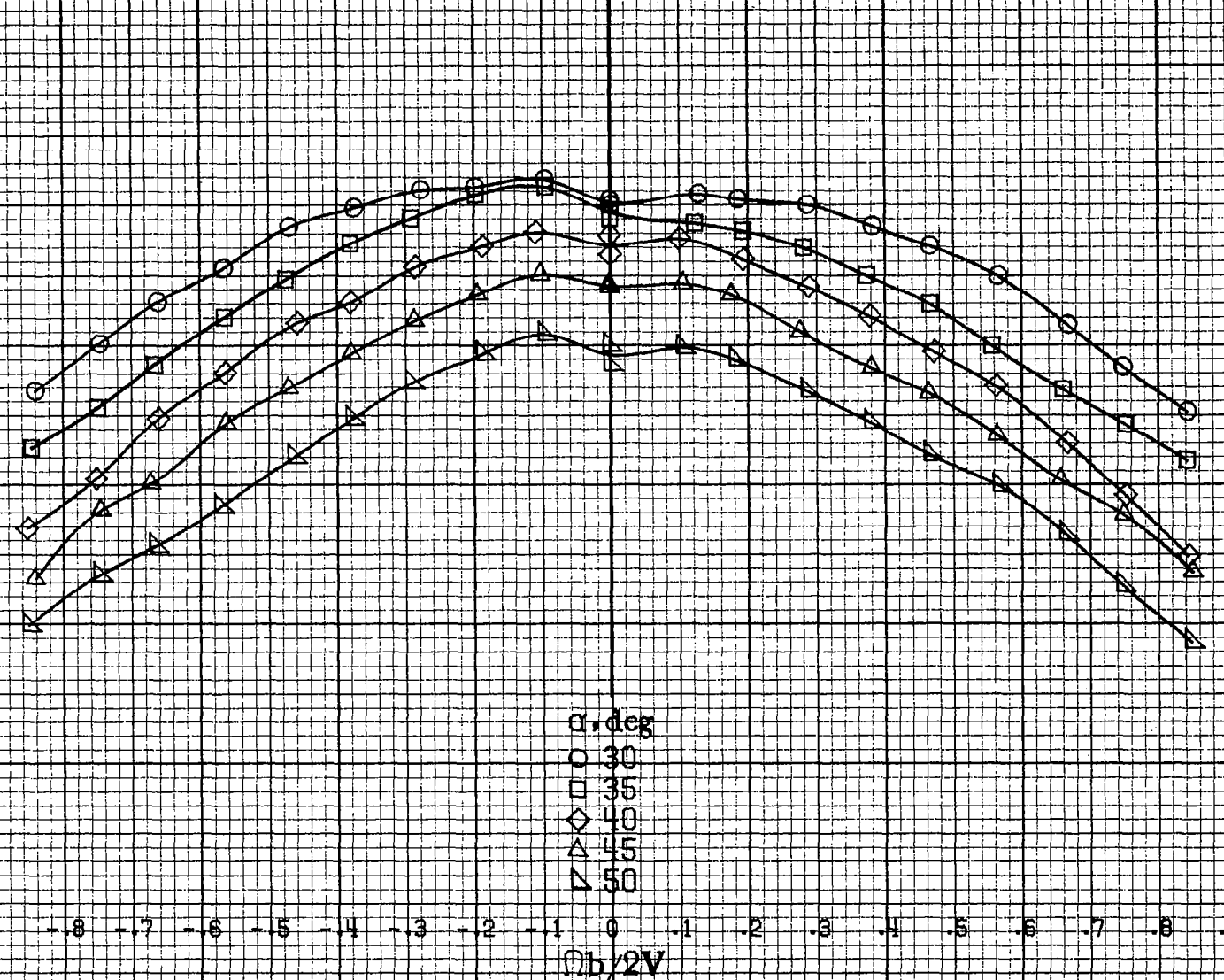
C_m

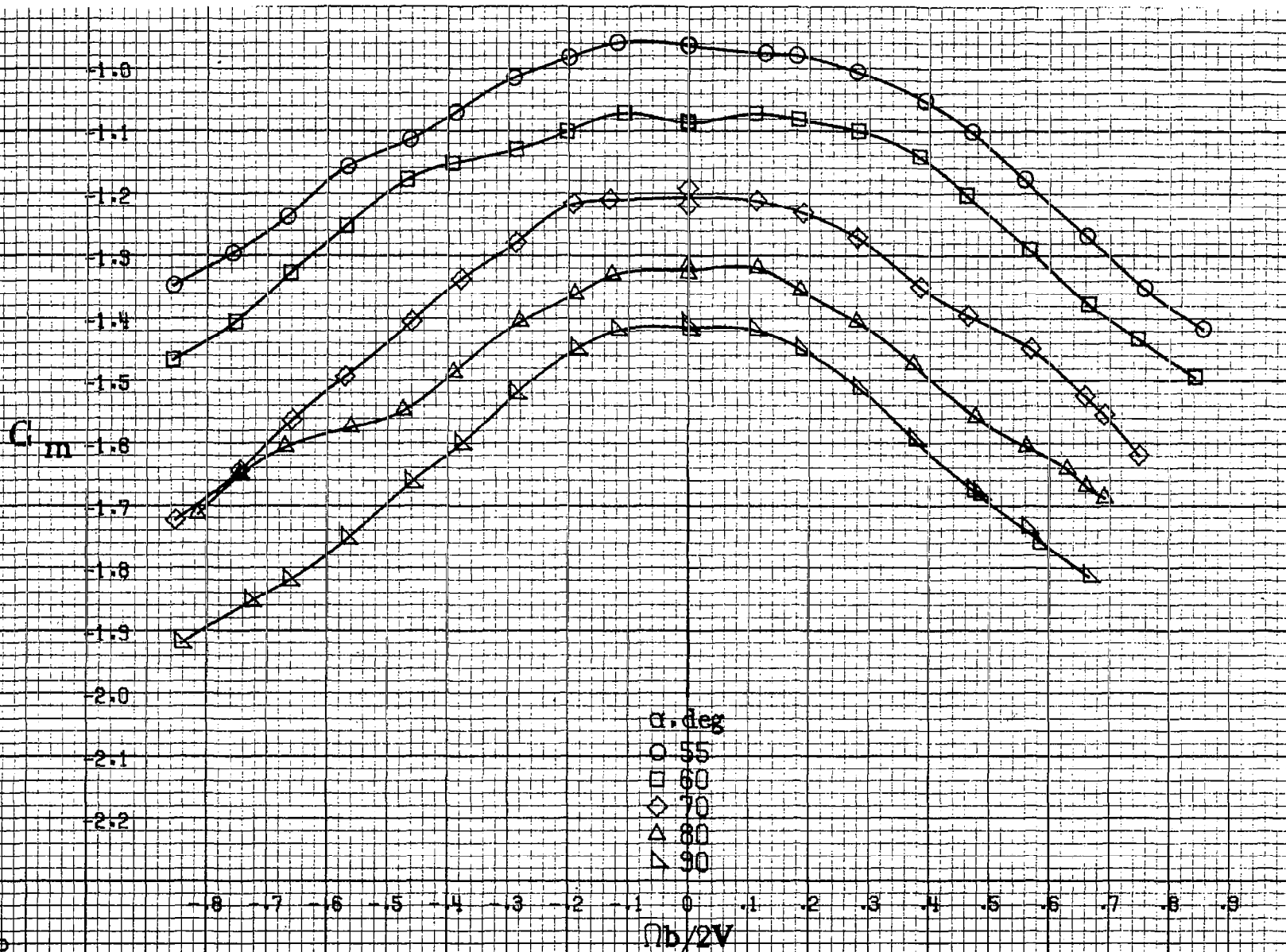
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\Omega b/2V$

α , deg
 ○ 30
 □ 35
 ◇ 40
 △ 45
 ▽ 50

(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A57. Continued.

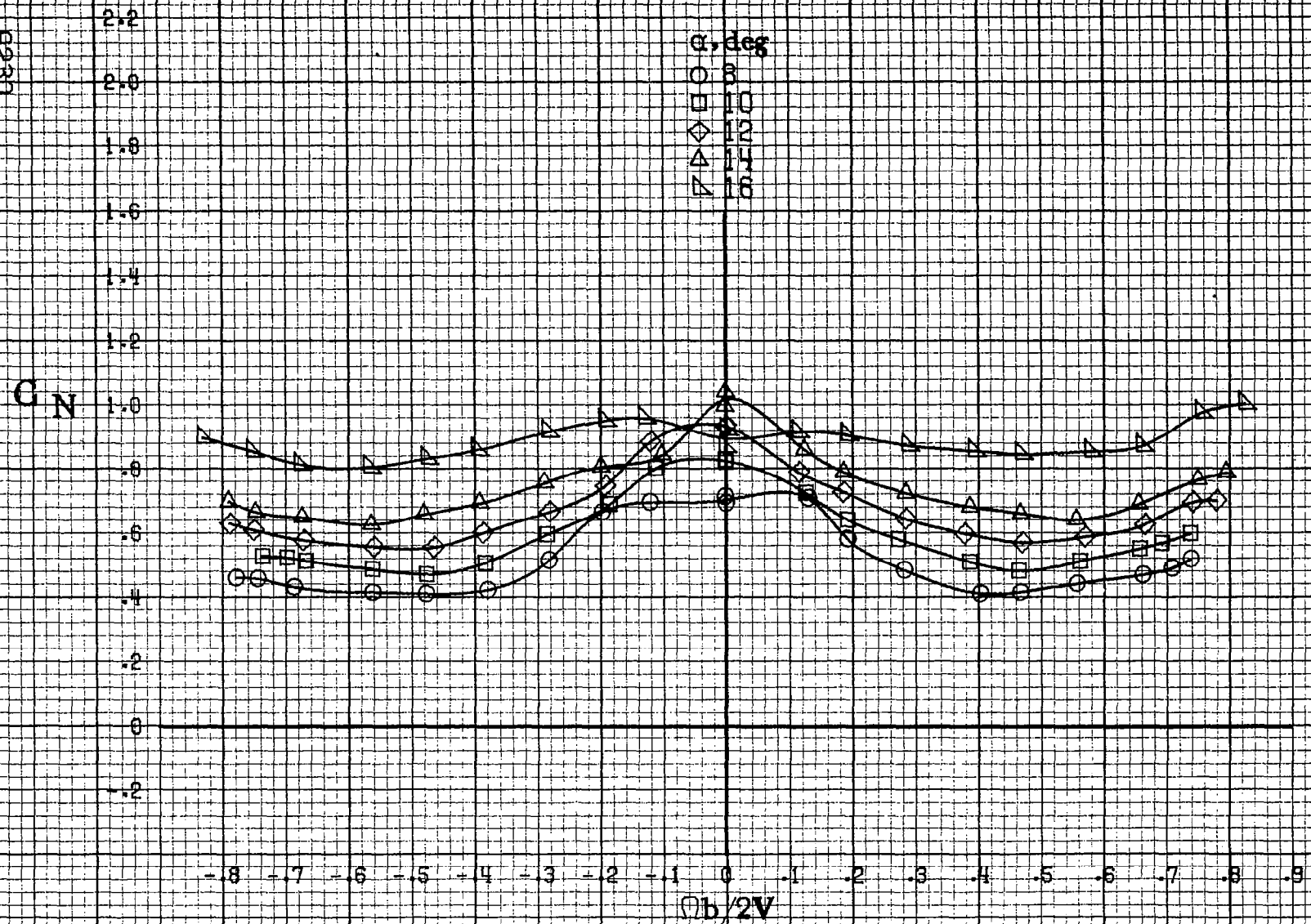




(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A57 - Concluded.

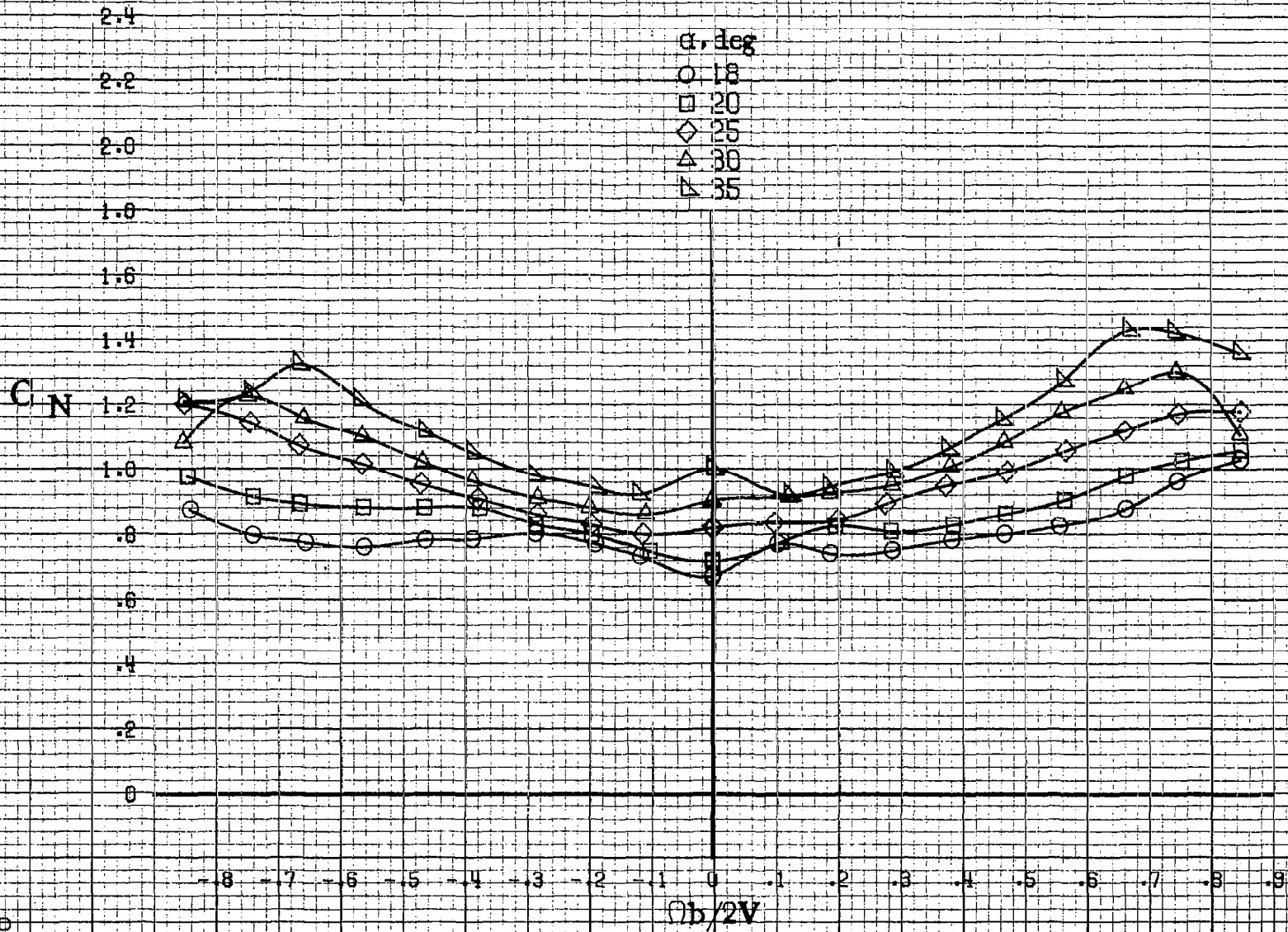
A9259

A233



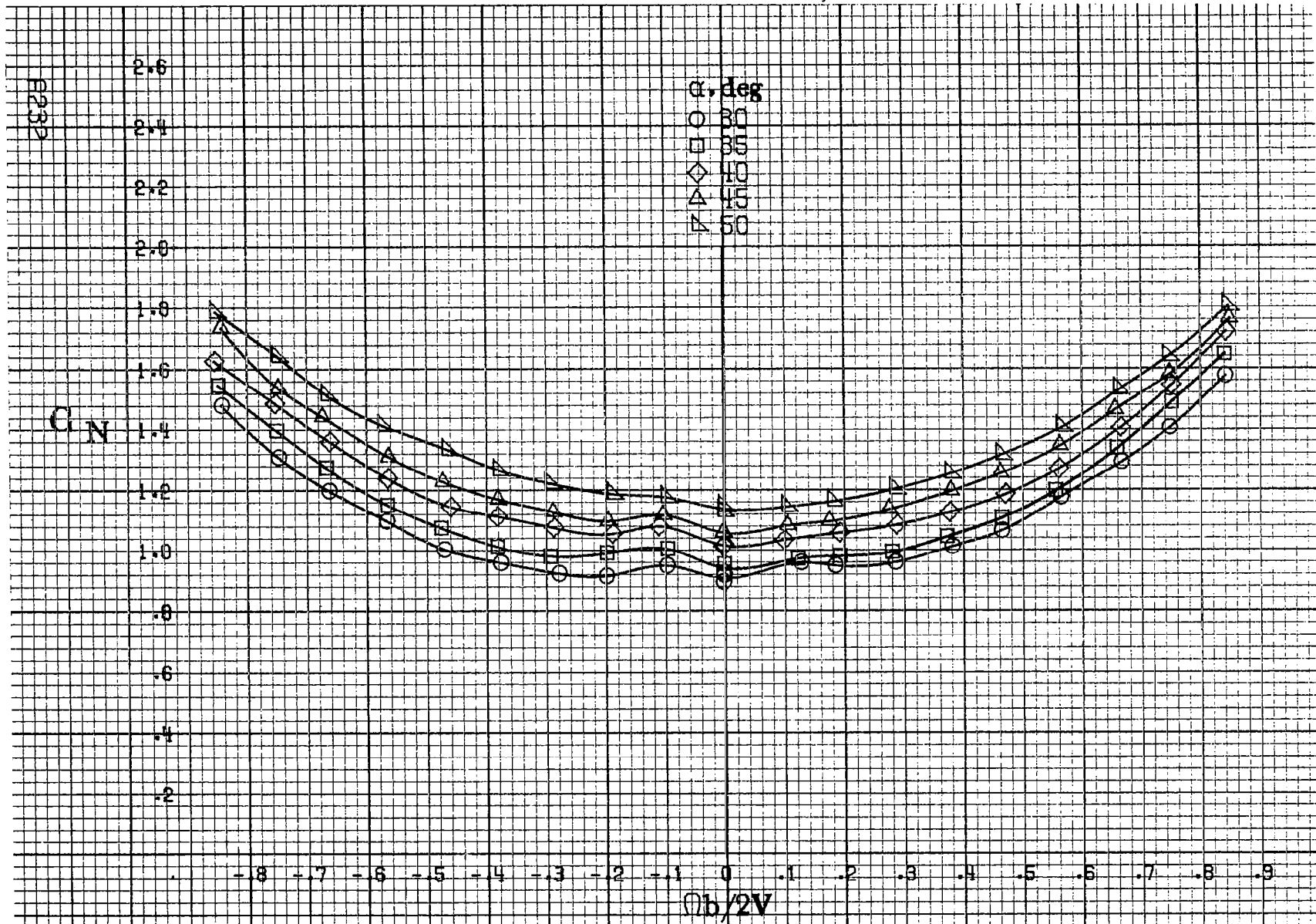
(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A58. Effect of rotation rate and angle of attack on normal-force coefficient for T-tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = -25^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, SR = 99 cm (39 in).
 Figure A58. Continued.

R231



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A58. Continued.

C_N

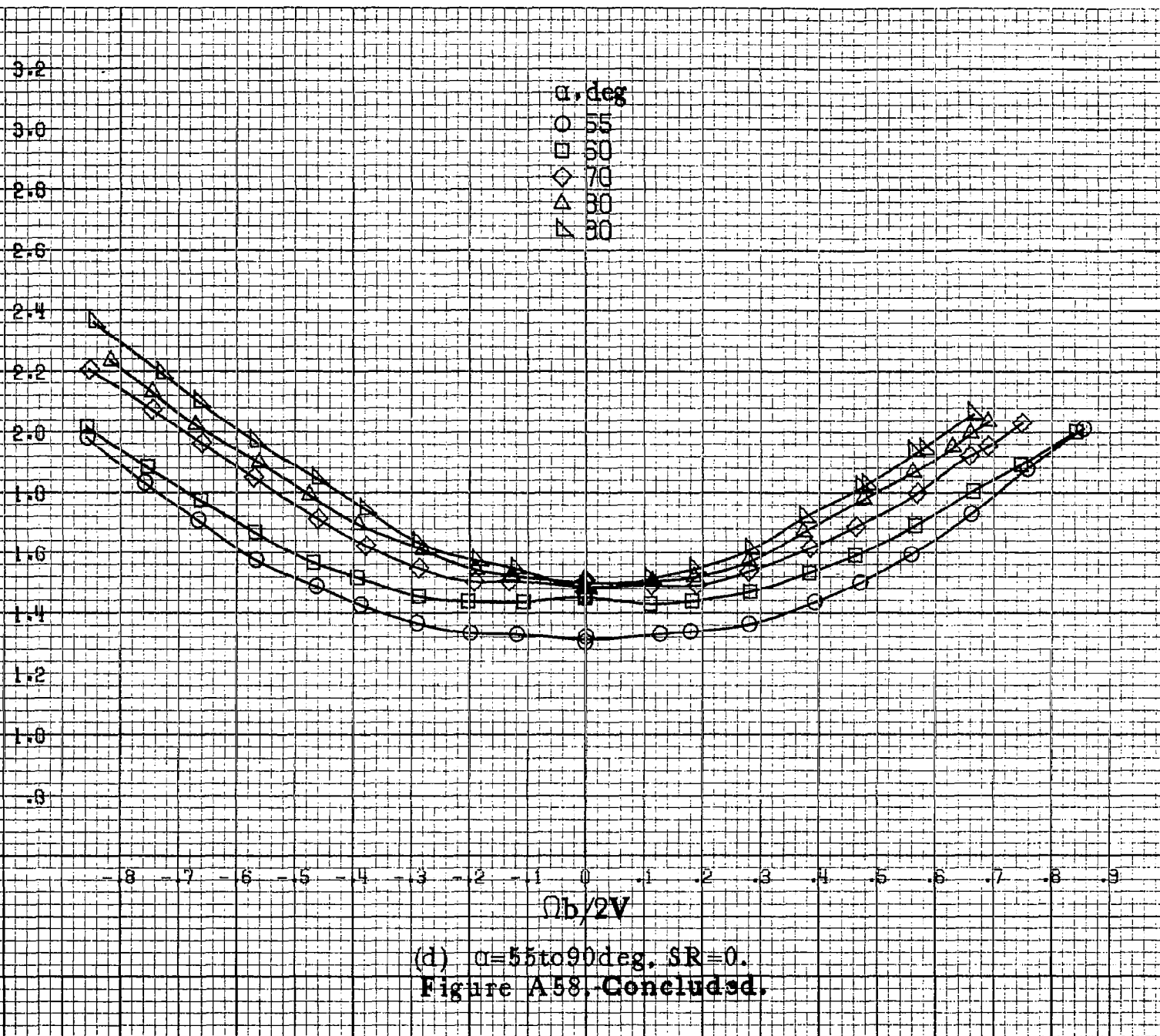
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8

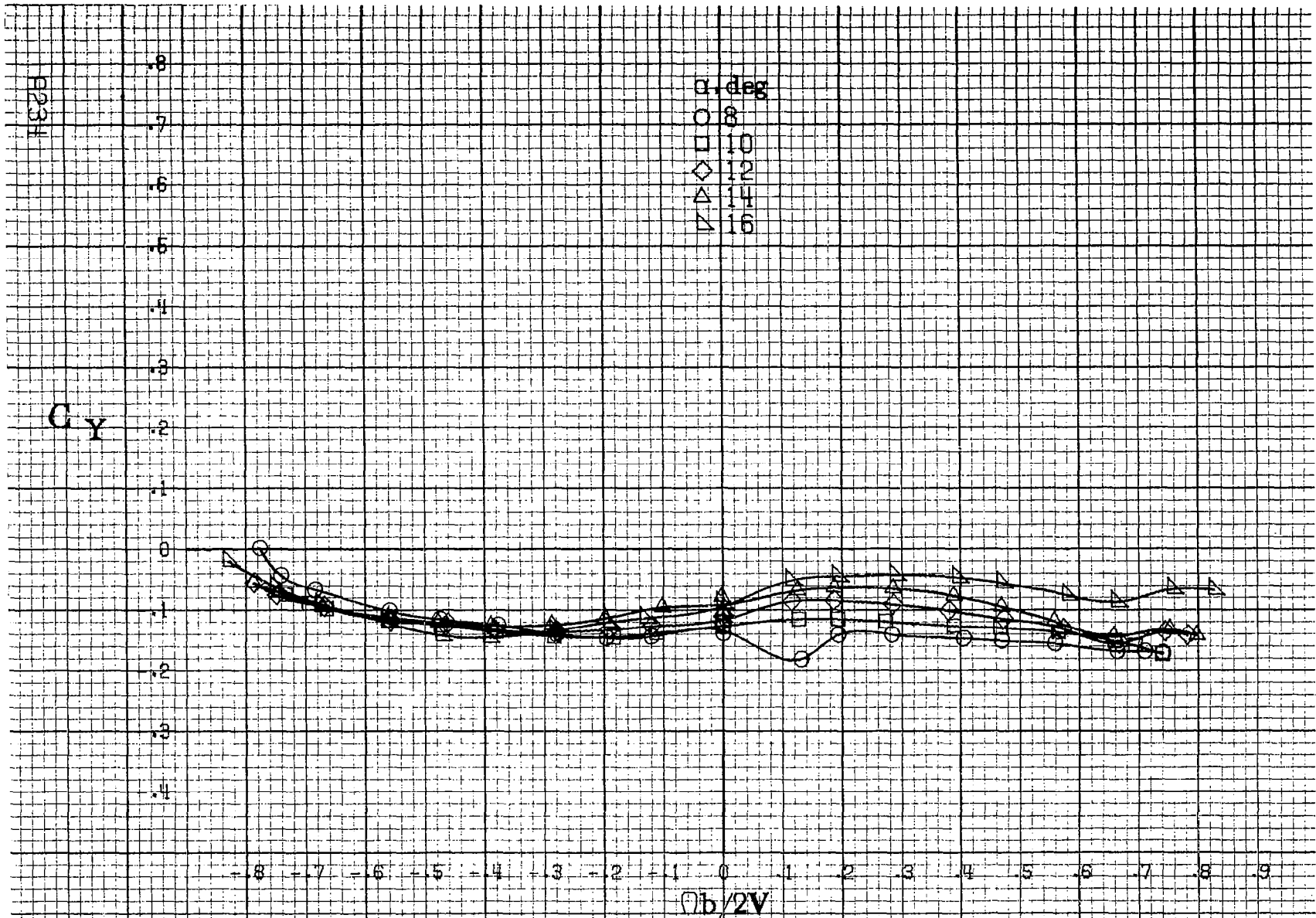
α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 9
 $\Omega b/2V$

A233

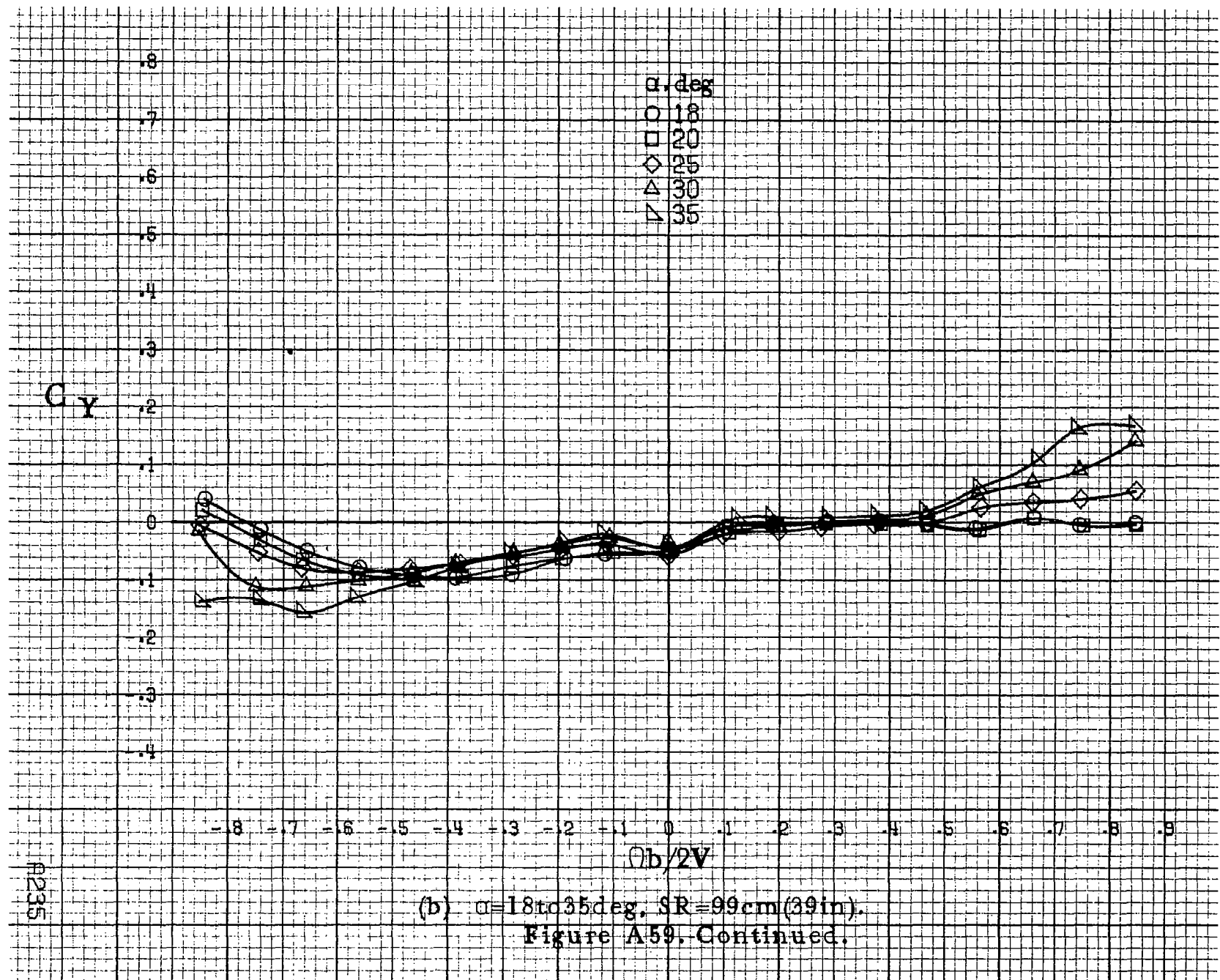
(d) $\alpha=55$ to 90 deg. $SR=0$.
Figure A58. Concluded.





(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A59.-Effect of rotation rate and angle of attack on side-force coefficient for T-tail configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = -25^\circ$, $\delta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A59. Continued.

A2335

E235

C_y

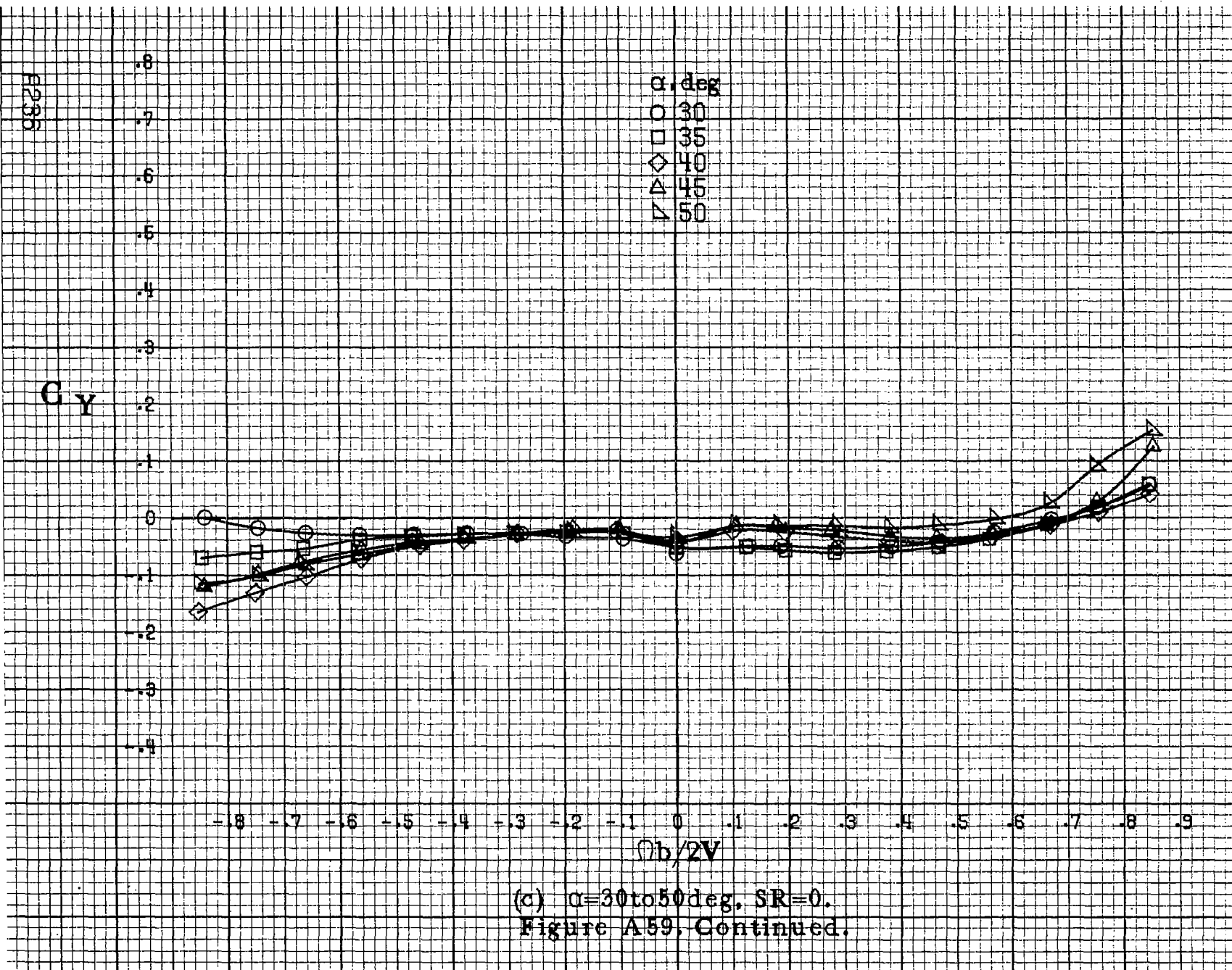
α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

.8
.7
.6
.5
.4
.3
.2
.1
0
-1
-2
-3
-4

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$\Omega b/2V$

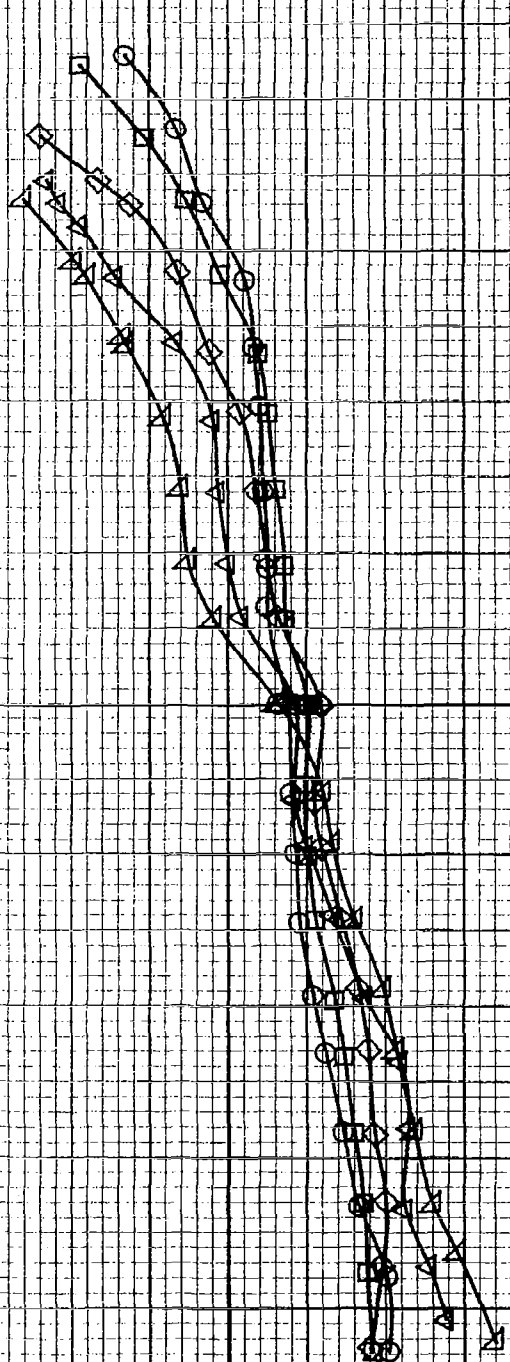
(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A59, Continued.



α , deg
 ○ 55
 □ 60
 ◇ 70
 △ 80
 ▽ 90

Cly

.8
.7
.6
.5
.4
.3
.2
.1
0
.1
.2
.3
.4



$\Omega b/2V$

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A59, Concluded.

R238

C_A

8
7
6
5
4
3
2
1
0
-1
-2
-3
-4

α , deg
○ 8
□ 10
◇ 12
△ 14
▽ 16

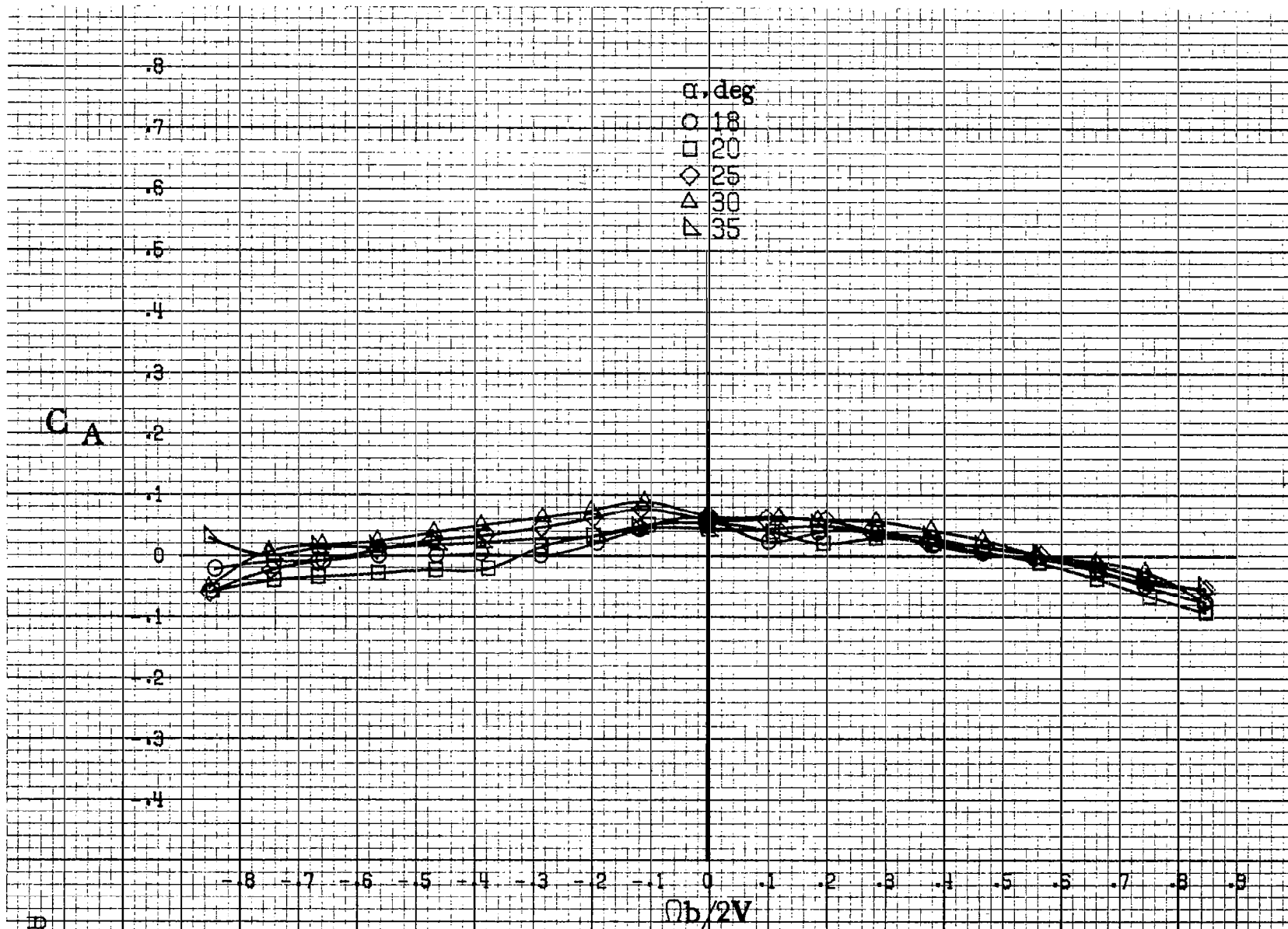
-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$\Omega b/2V$

(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

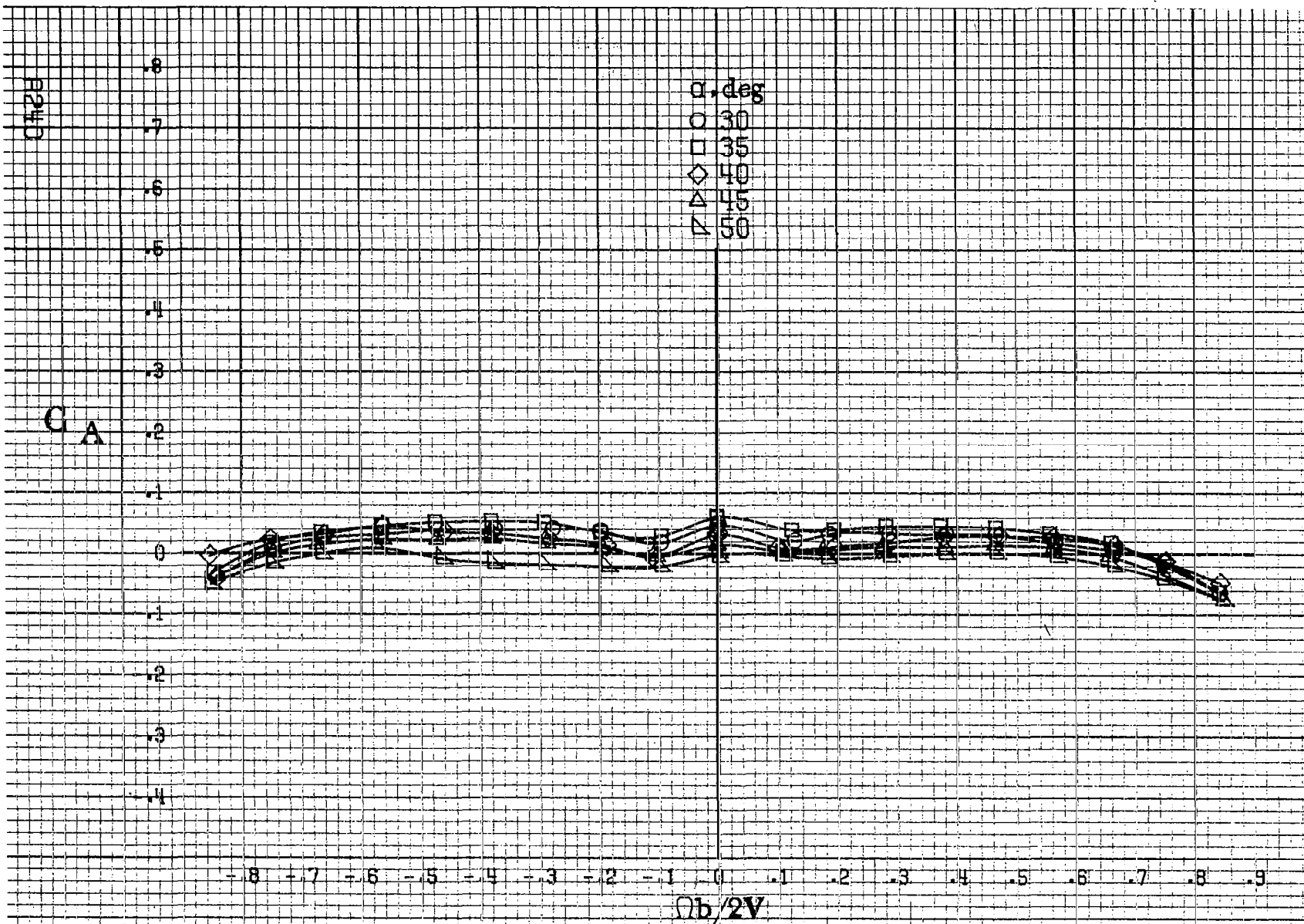
Figure A60. Effect of rotation rate and angle of attack on axial-force coefficient for T-tail configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_c = -25^\circ$, $\beta = 0^\circ$.



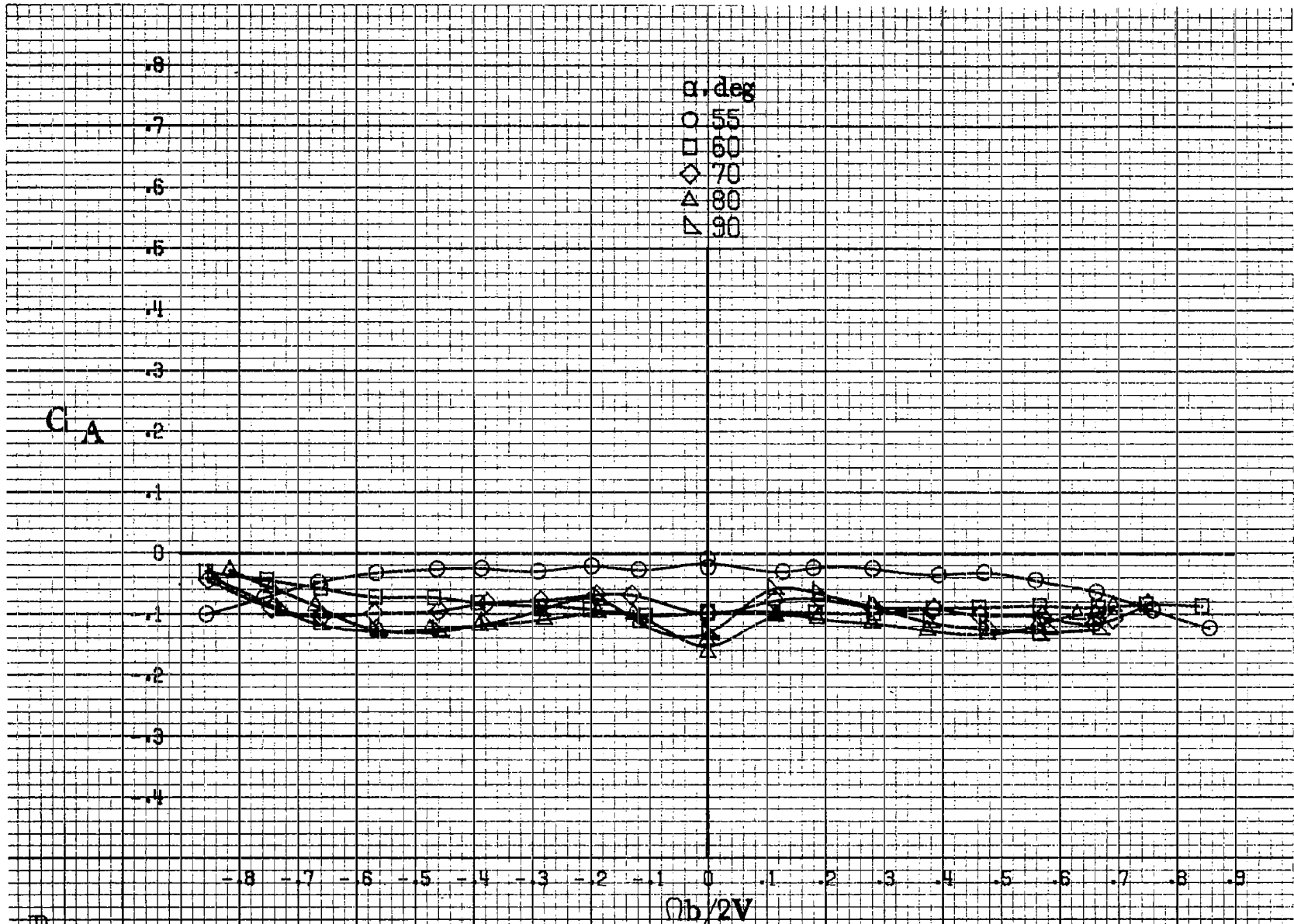


A239

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A60. Continued.

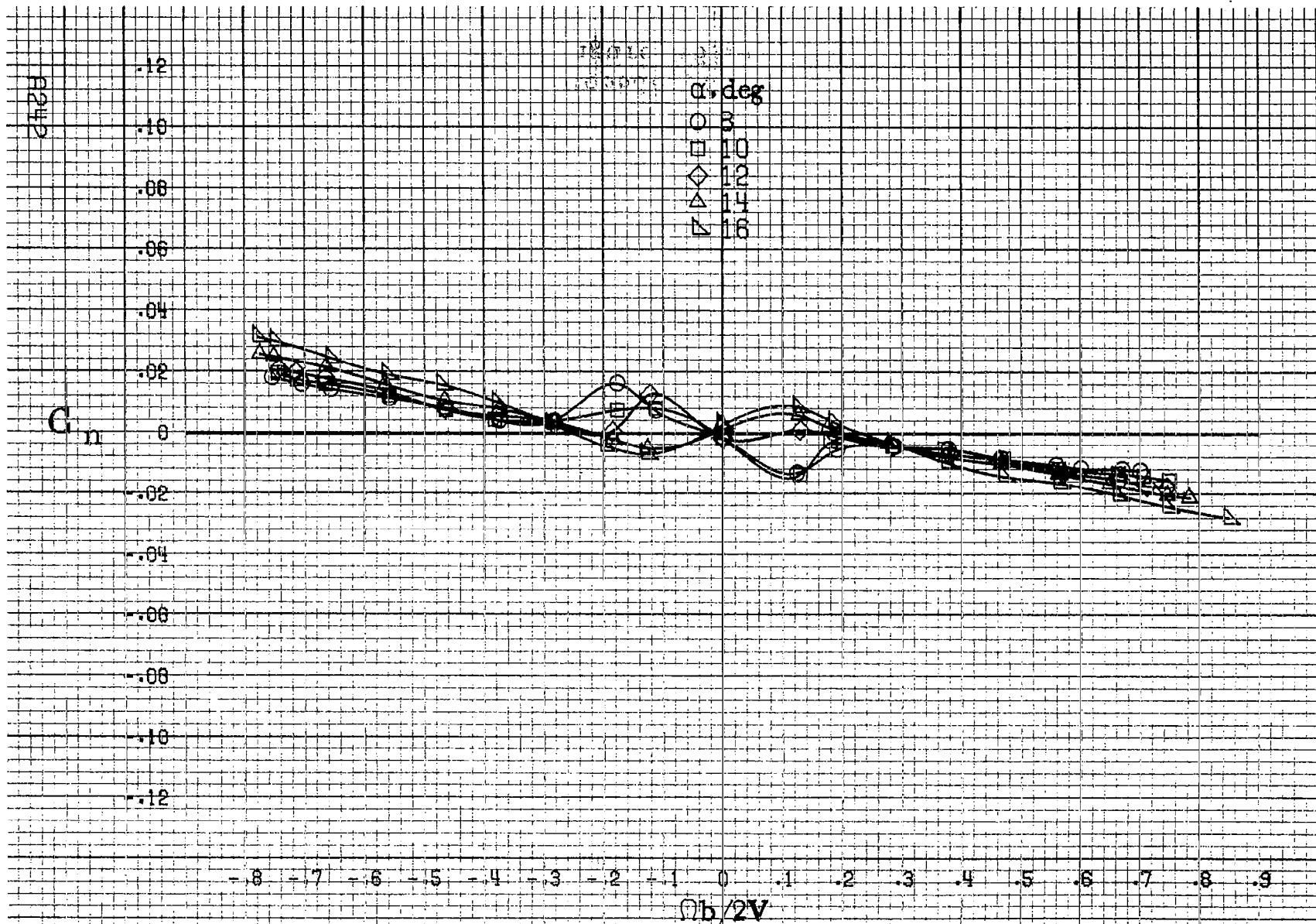


(c) $\alpha=30$ to 50 deg, $\delta R=0$.
 Figure A60. Continued.



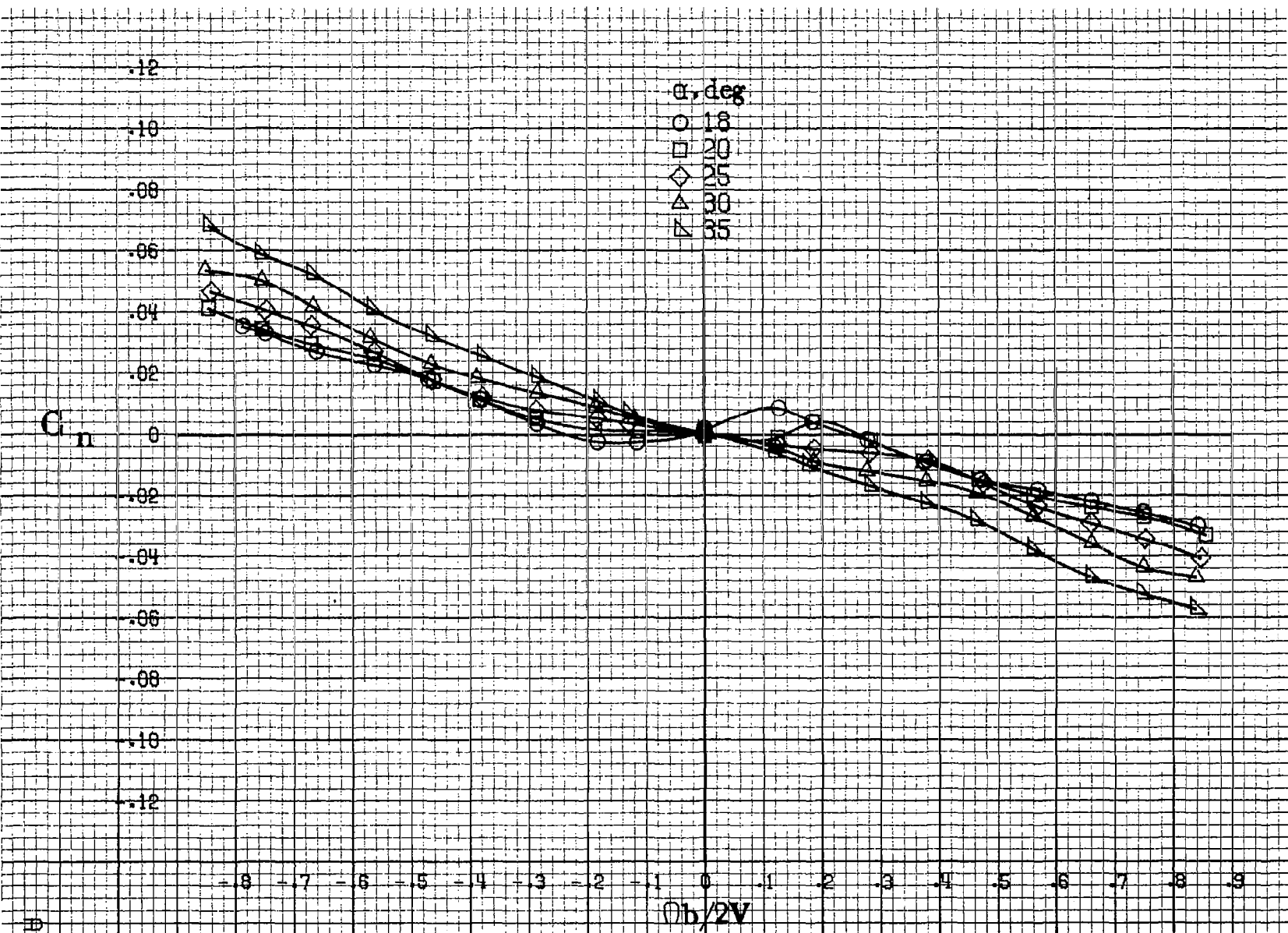
(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A60. Concluded.

0241



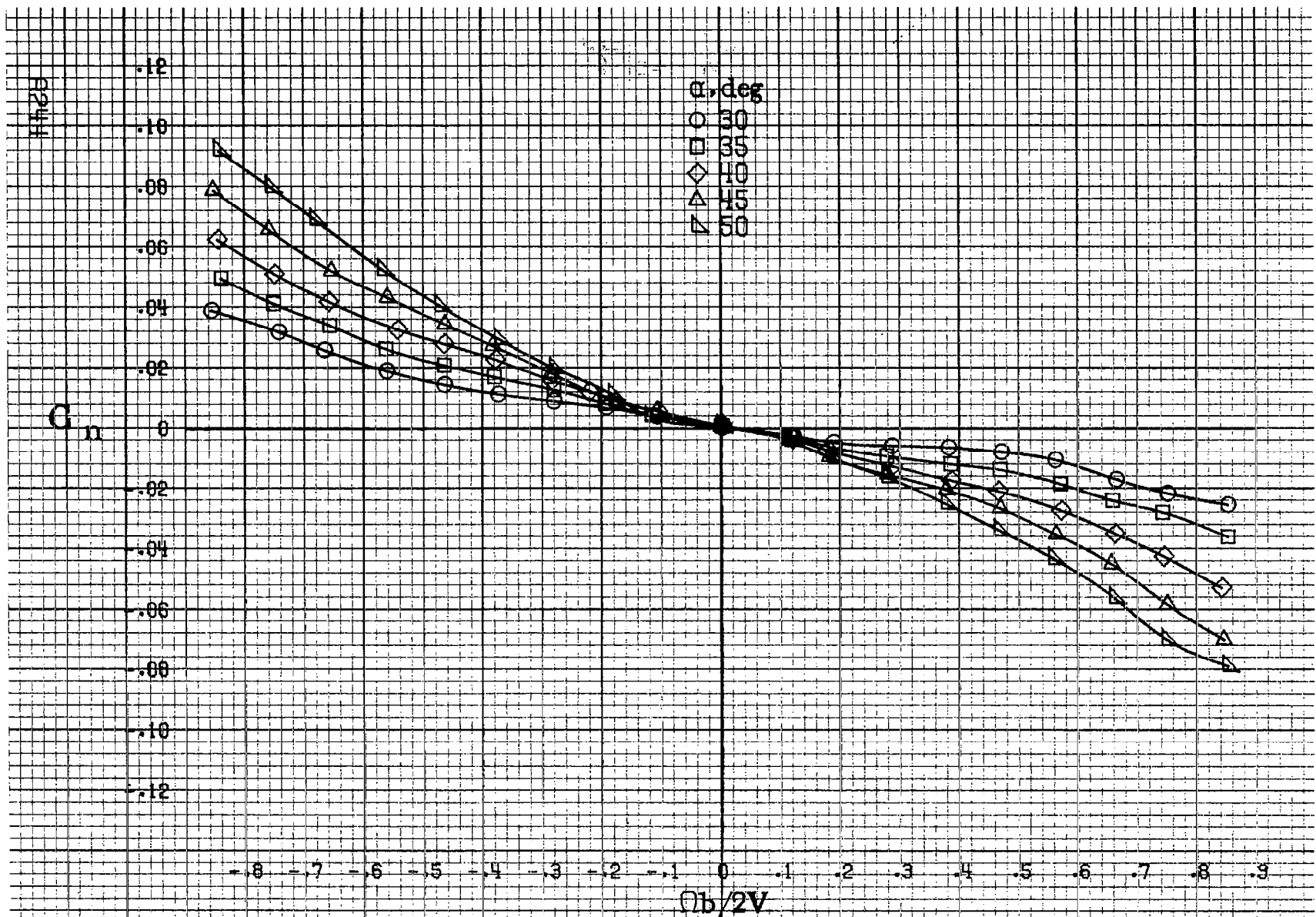
(a) $\alpha = 8$ to 15 deg, $SR = 99$ cm (39 in).

Figure A61. Effect of rotation rate and angle of attack on yawing-moment coefficient for horizontal tail off configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$. $\beta = 0^\circ$.

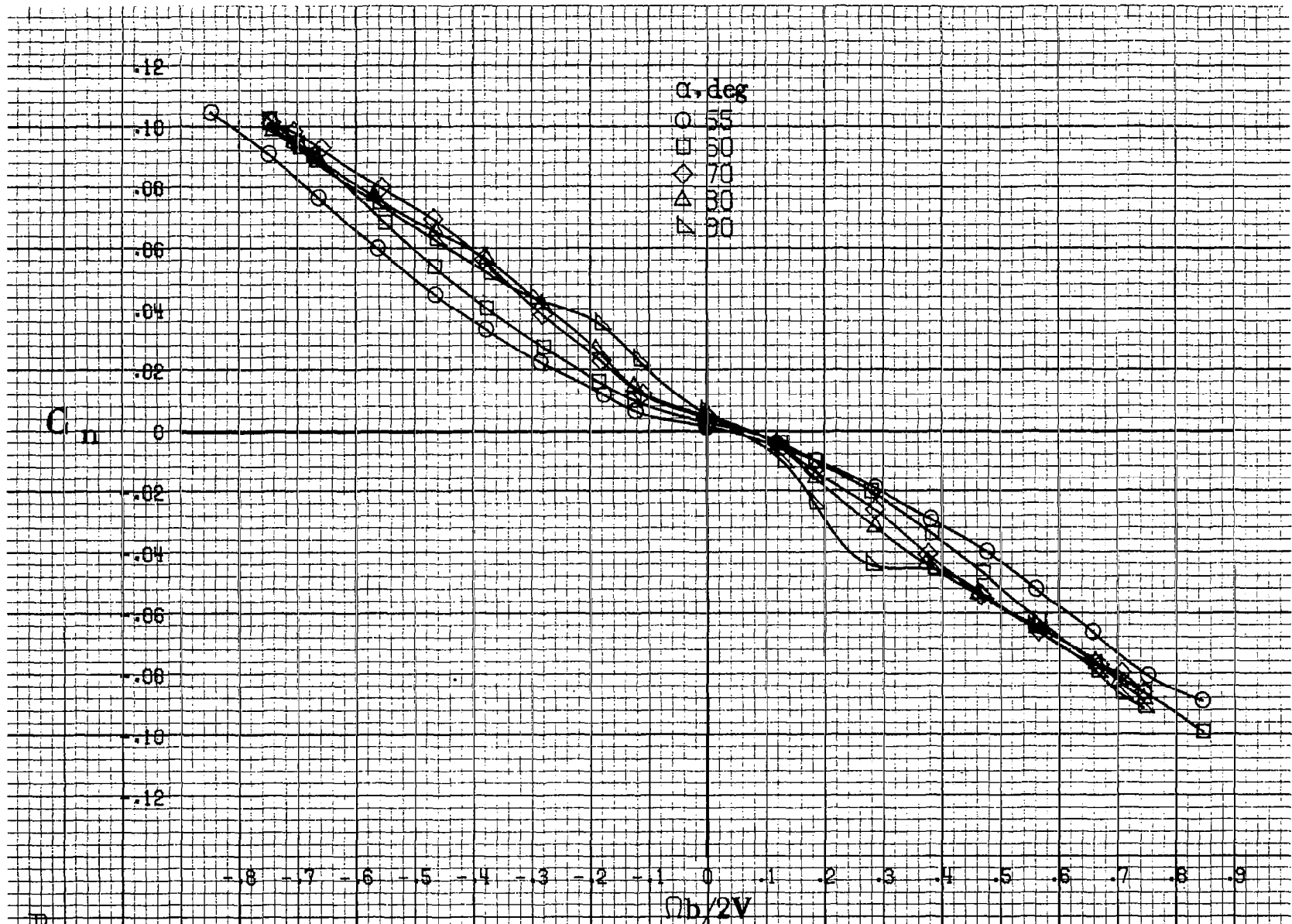


(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A61. Continued.

A2413

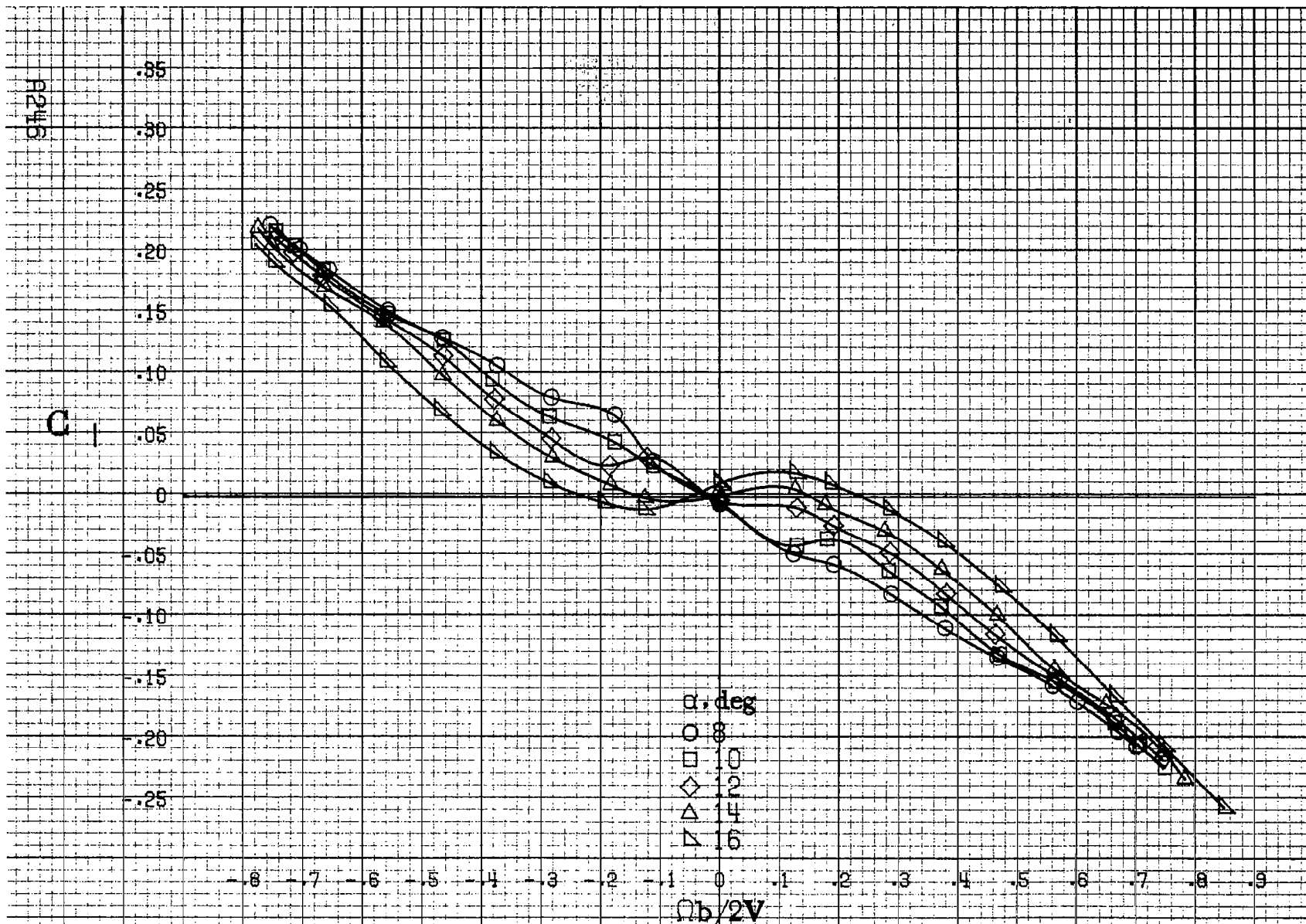


(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A61. Continued.



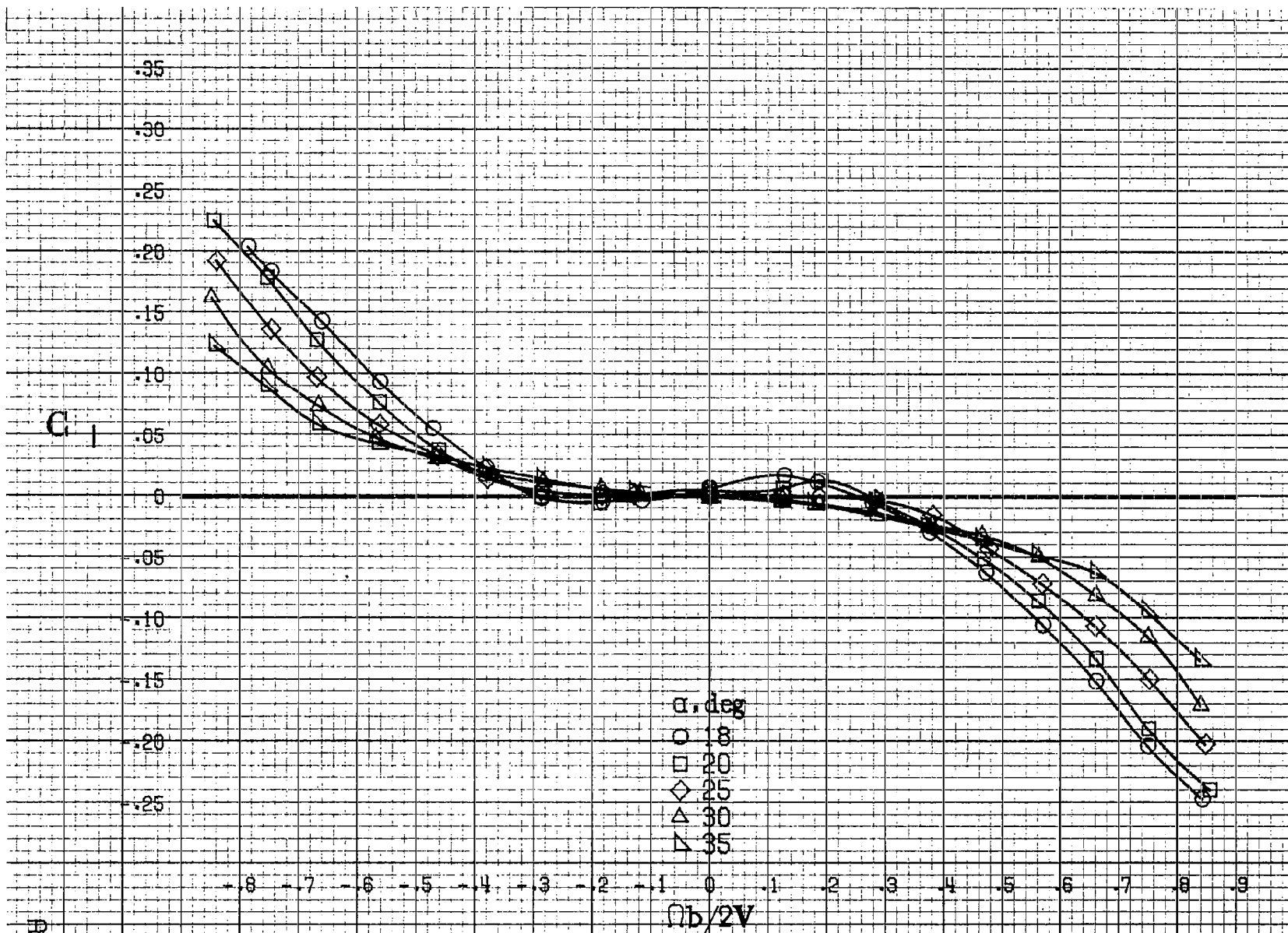
AP45

(d) $\alpha \equiv 55$ to 90 deg, $SR \equiv 0$.
 Figure A61. Concluded.



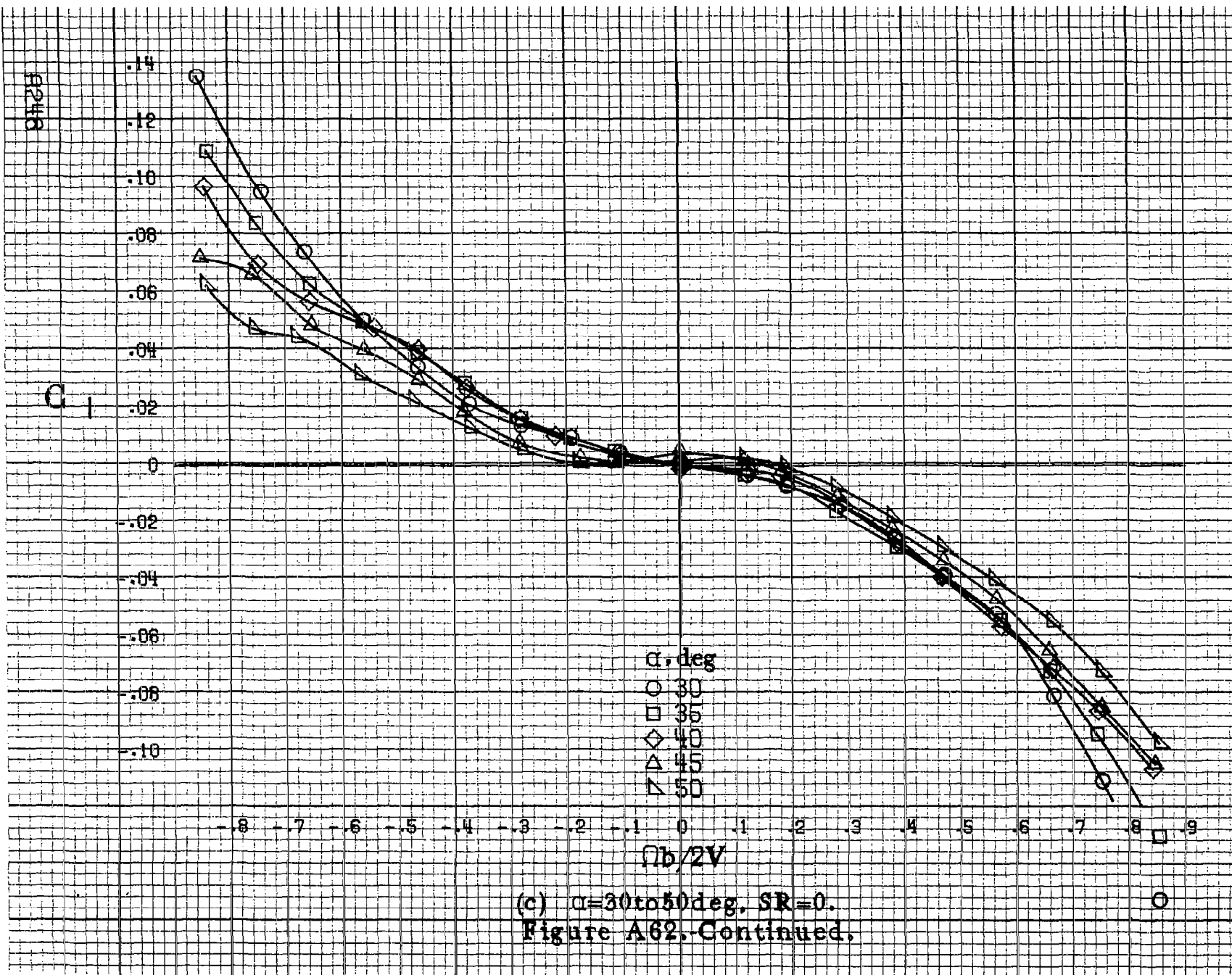
(a) $\alpha=8$ to 16 deg, SR=99 cm (39 in).

Figure A.62. Effect of rotation rate and angle of attack on rolling-moment coefficient for horizontal tail off configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

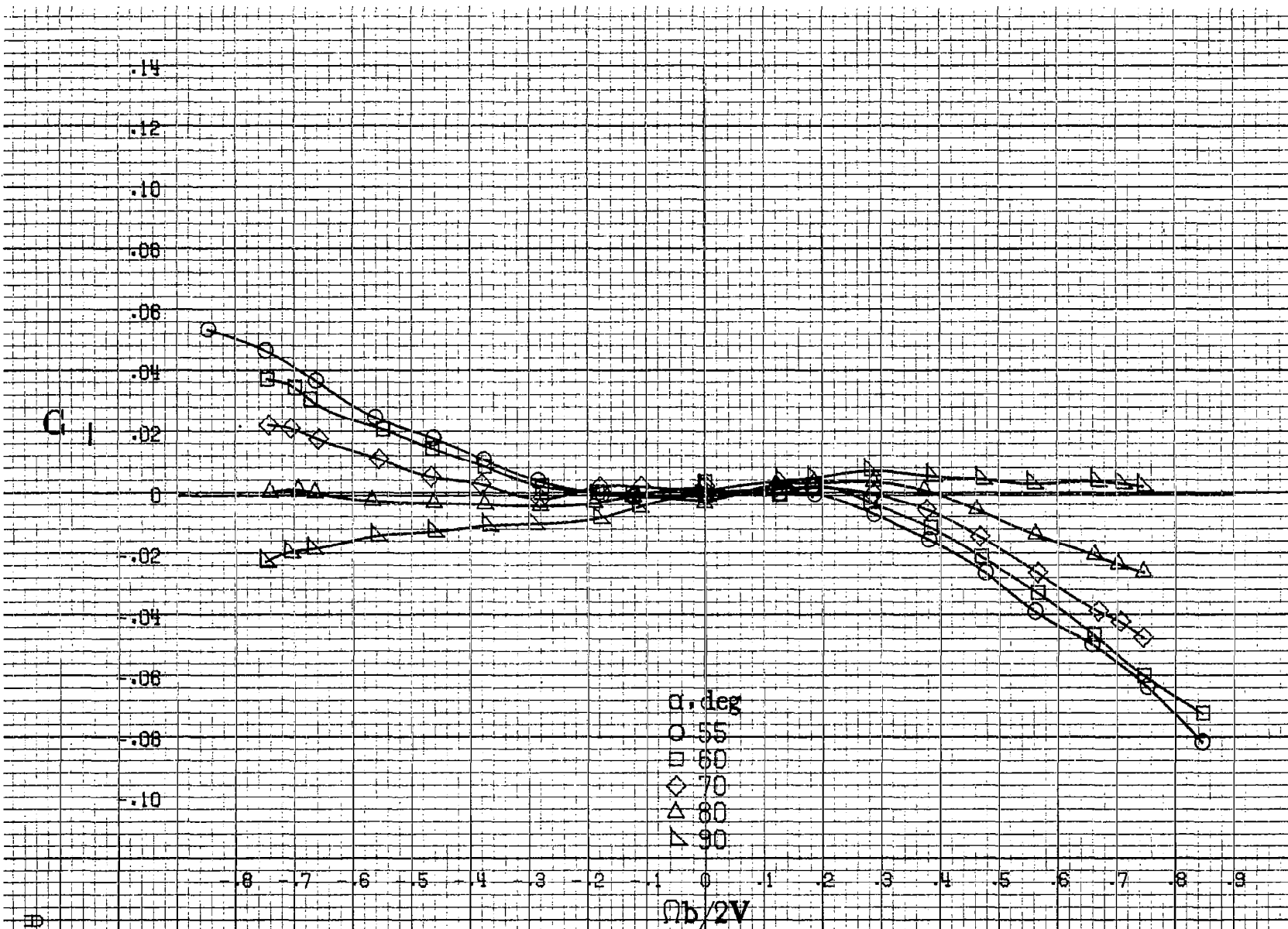


(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A62. Continued.

A247



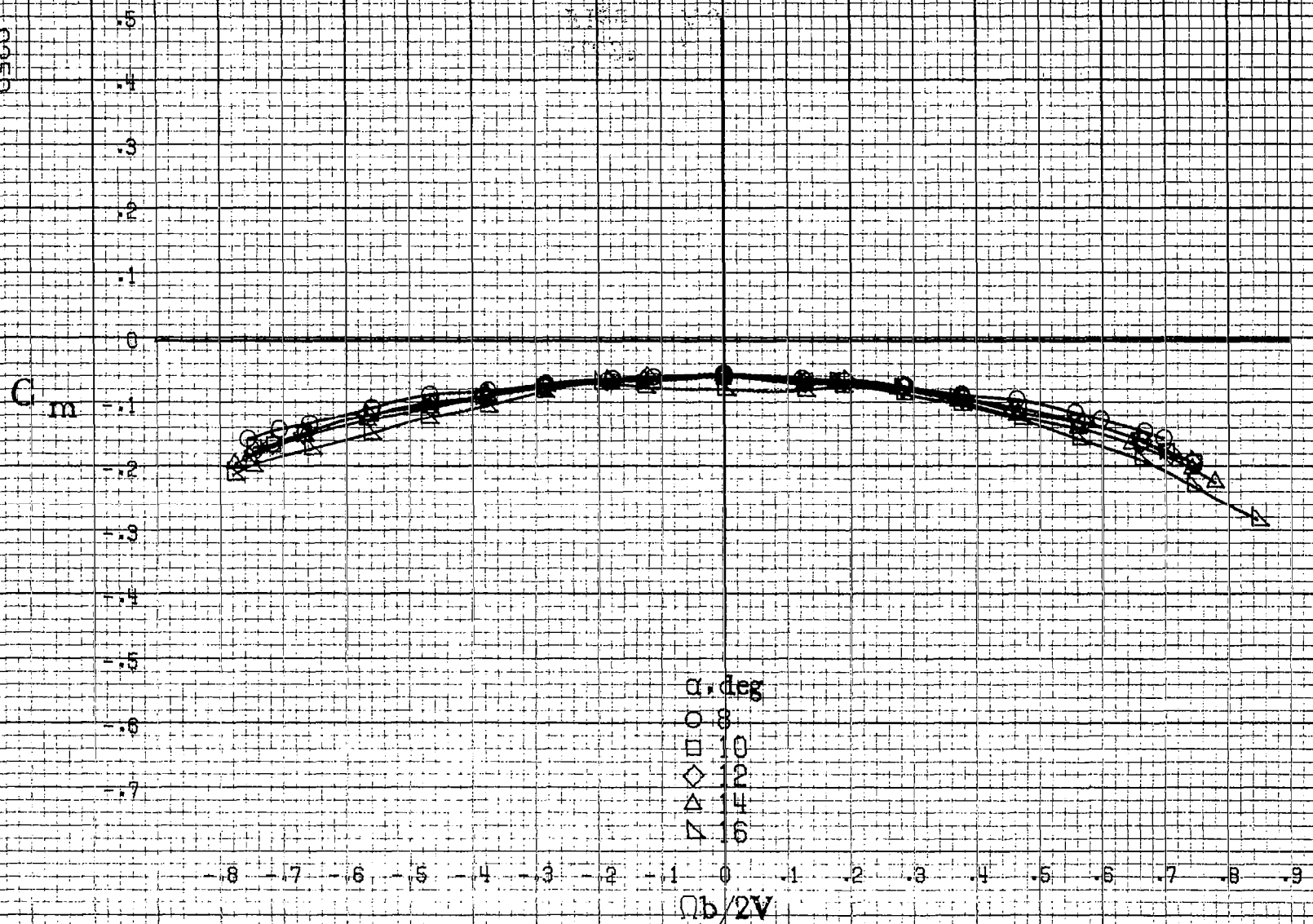
(c) $\alpha = 30$ to 50 deg, $SR = 0$.
 Figure A62. Continued.



R2419

(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A62. Concluded.

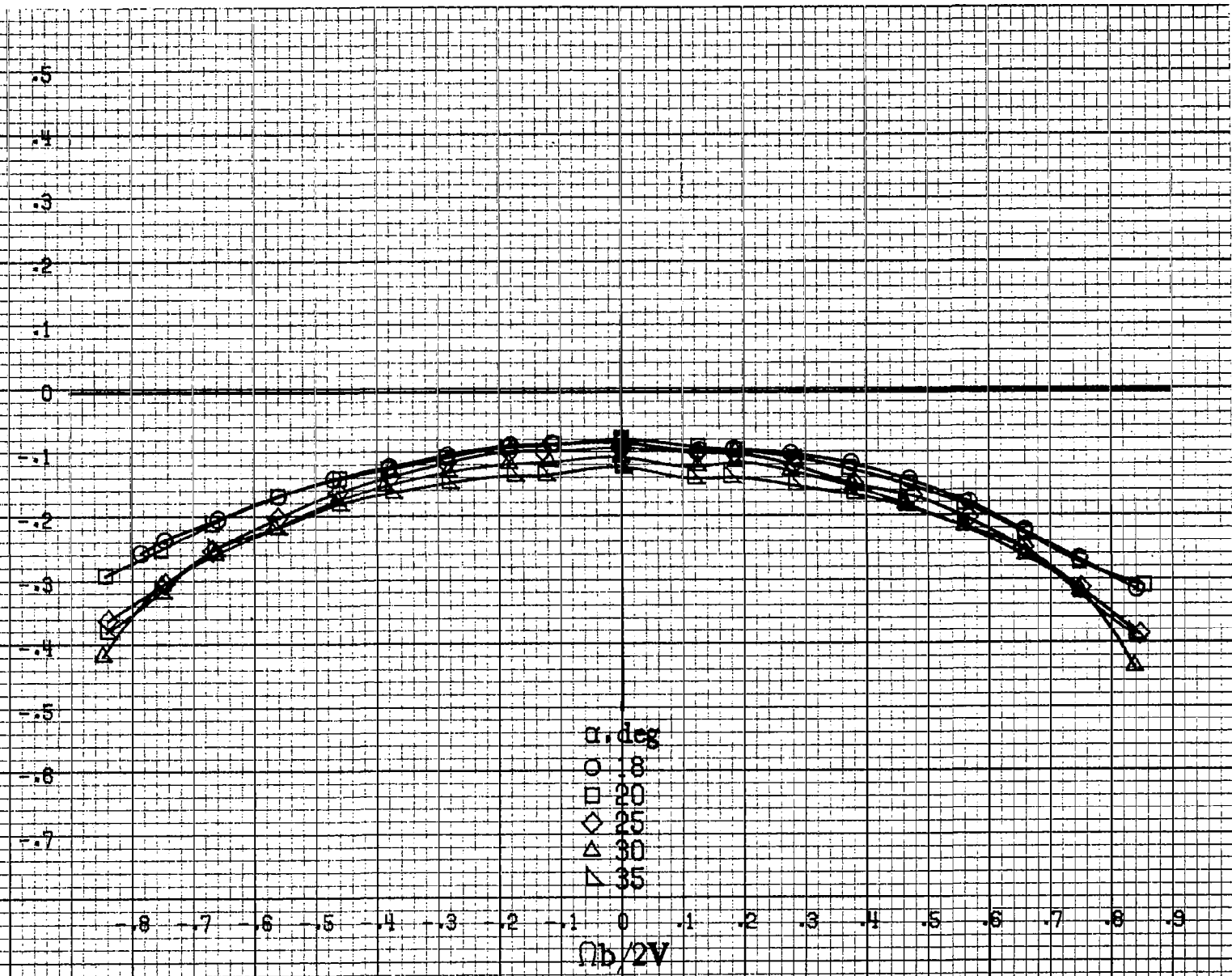
R25D



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A63. Effect of rotation rate and angle of attack on pitching moment coefficient for horizontal tail off configuration. $\delta_a = 0^\circ$, $\delta_e = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

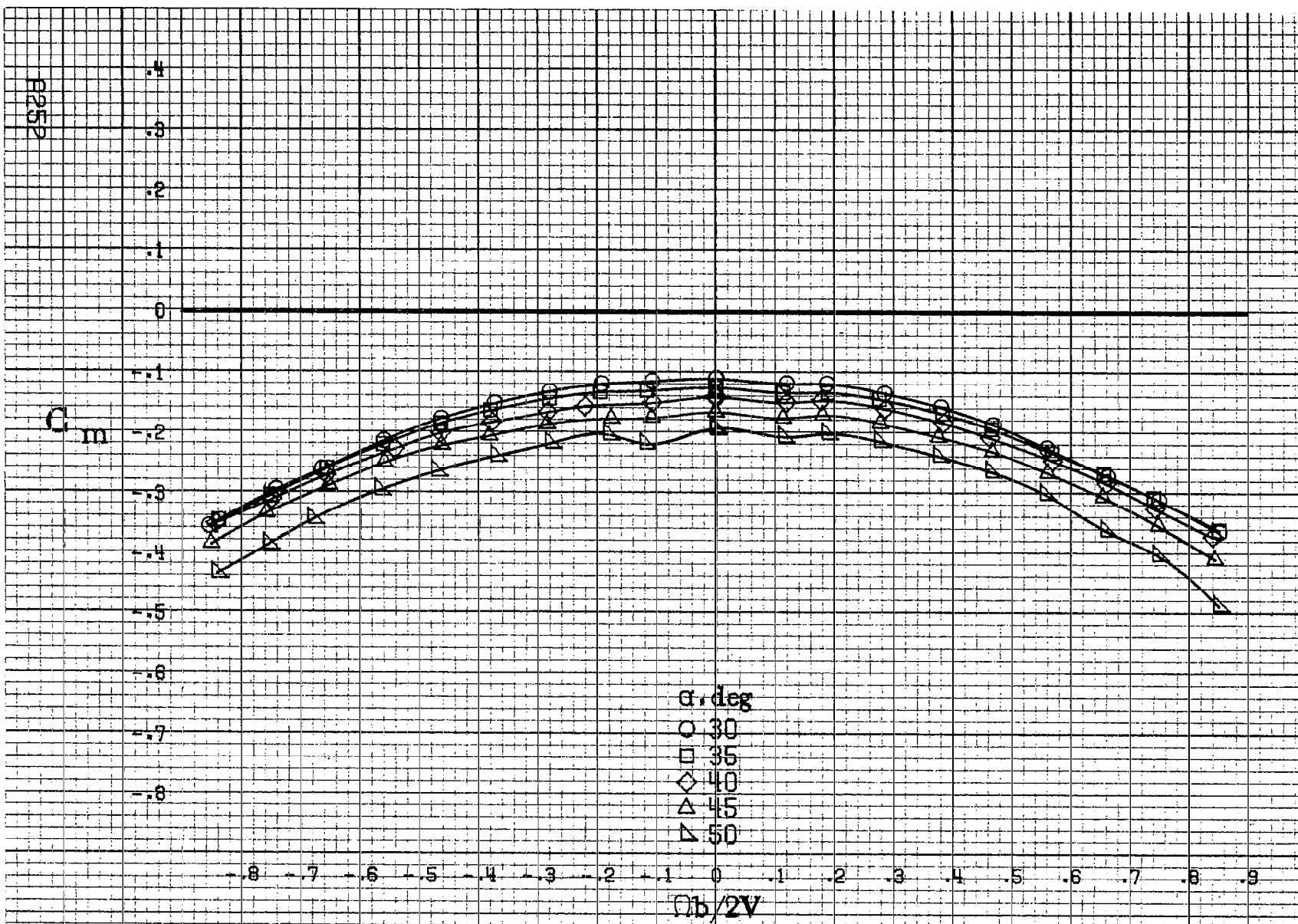
C_m



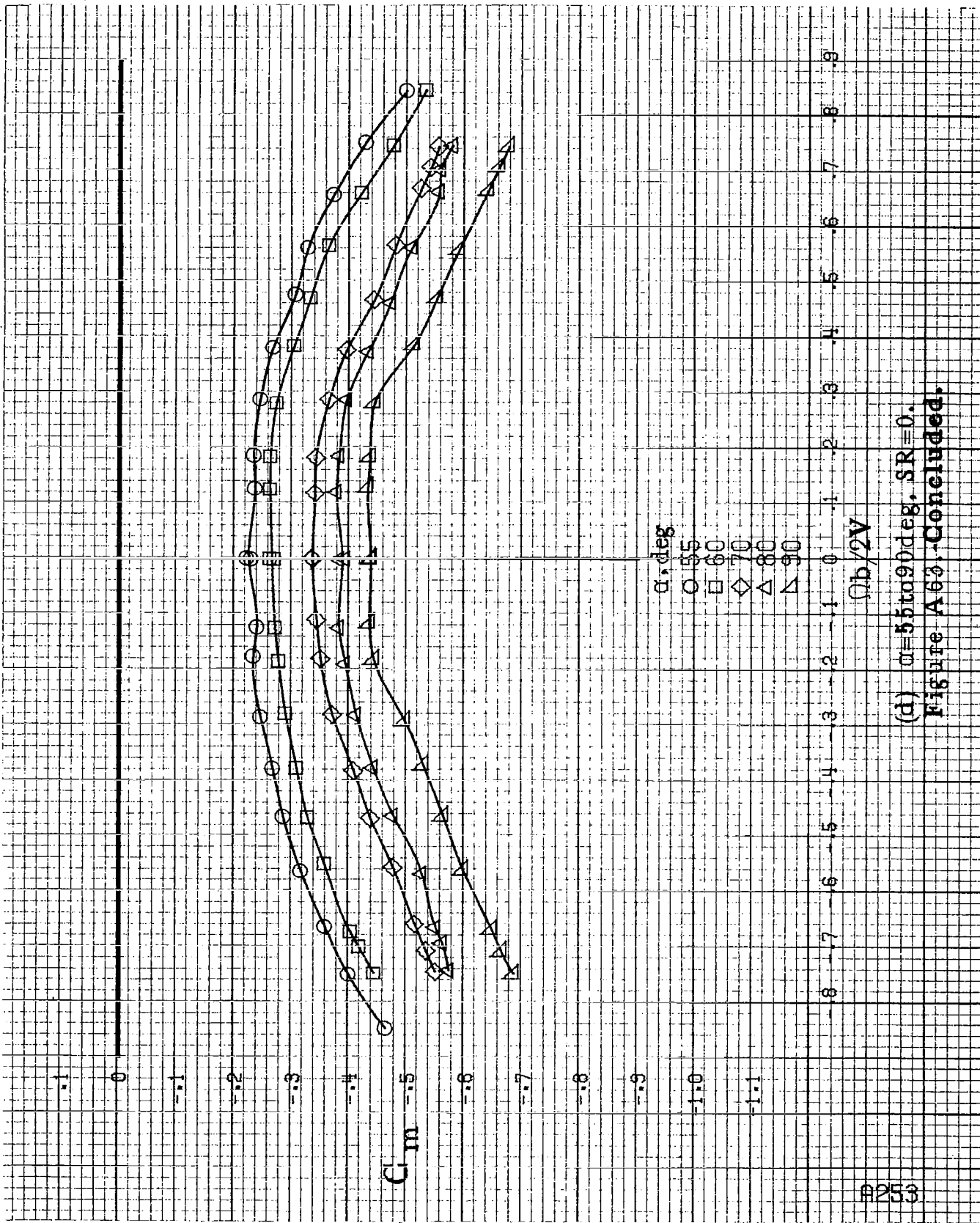
α, deg
○ 8
□ 20
◇ 25
△ 30
▽ 35

(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A63. Continued.

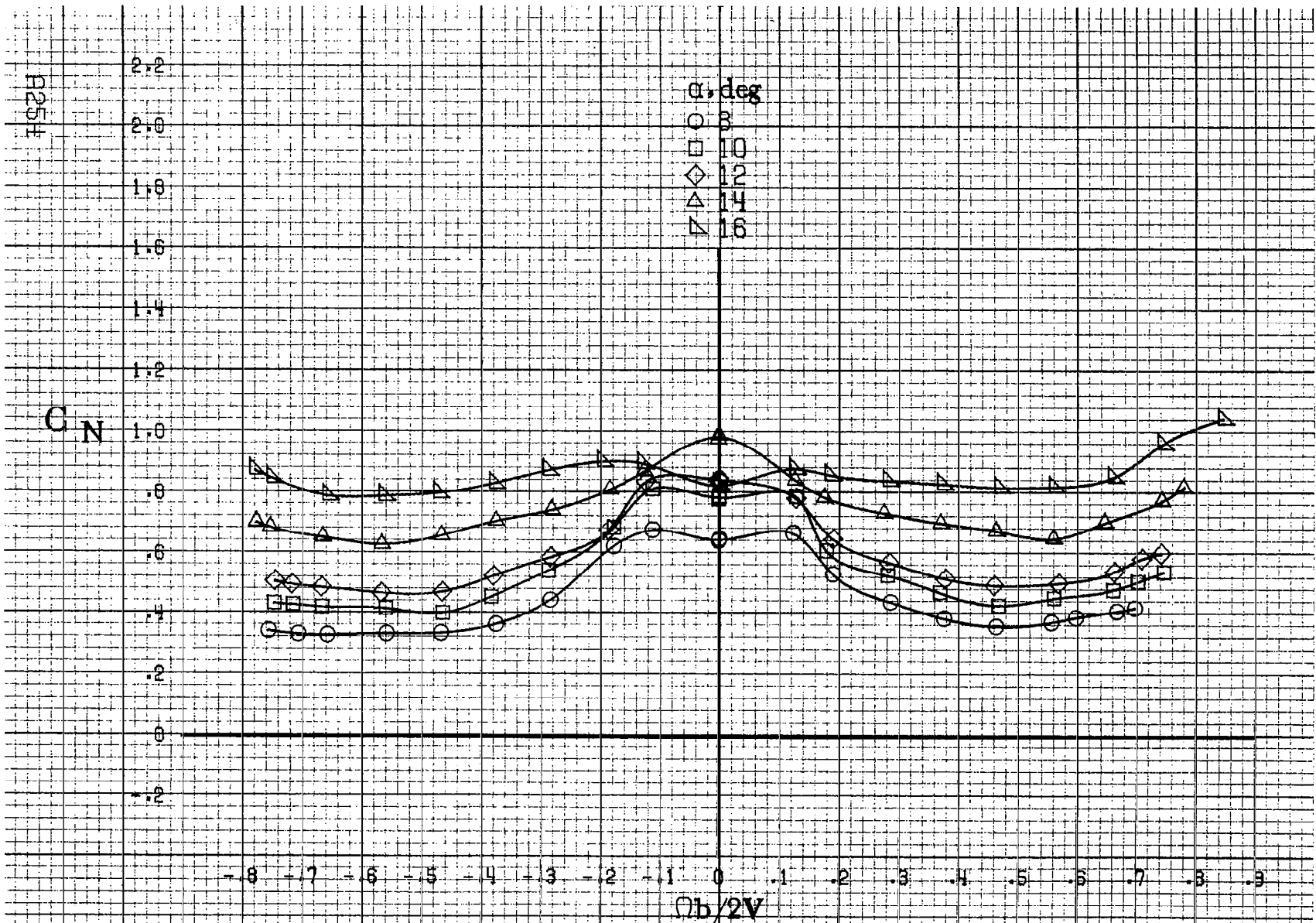
#251



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A63. Continued.

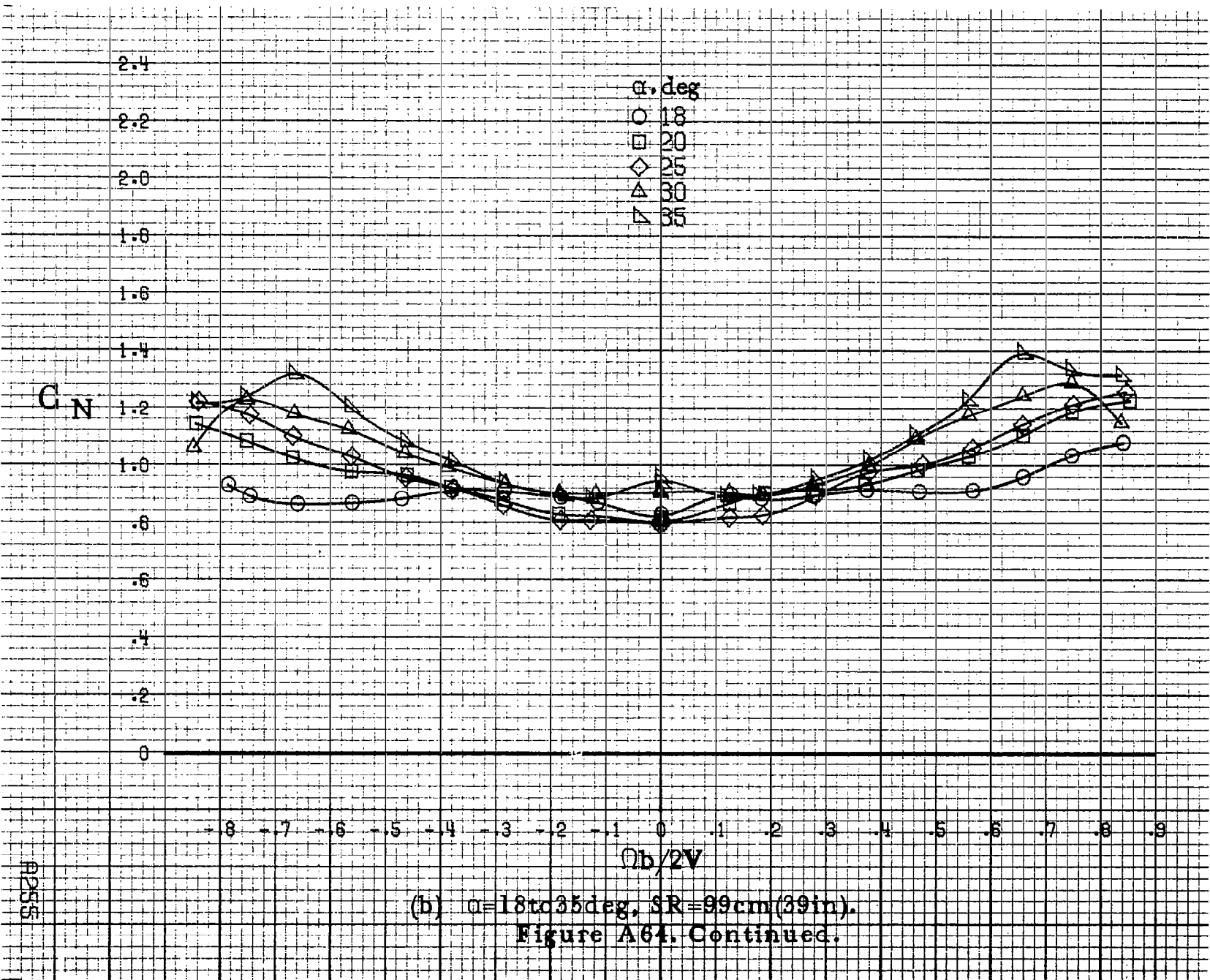


(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A63. -Concluded.



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

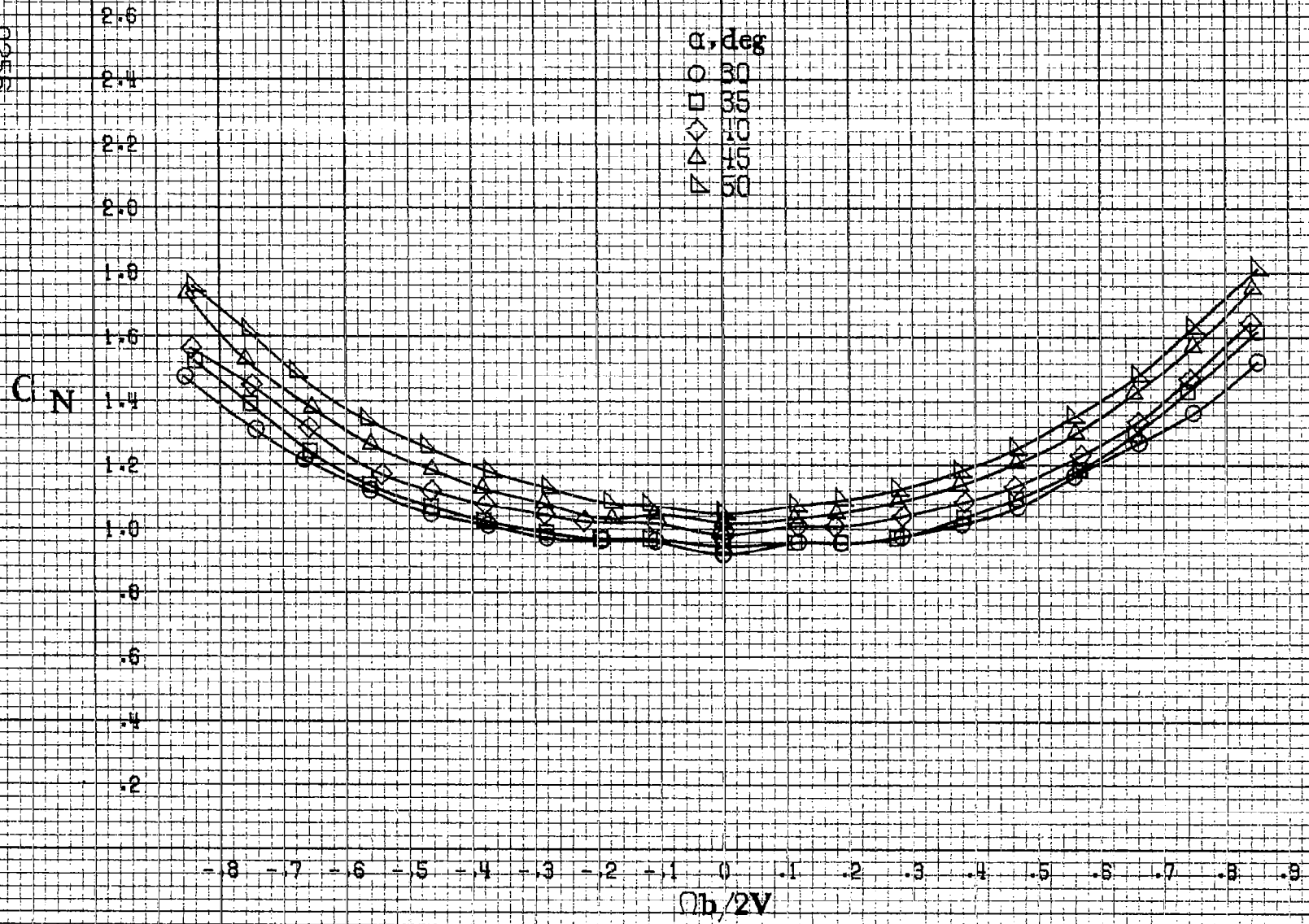
Figure A64. Effect of rotation rate and angle of attack on normal-force coefficient for horizontal tail off configuration. $\delta_a = 0^\circ$, $\delta_e = 0^\circ$, $\delta_r = 0^\circ$. $\beta = 0^\circ$.



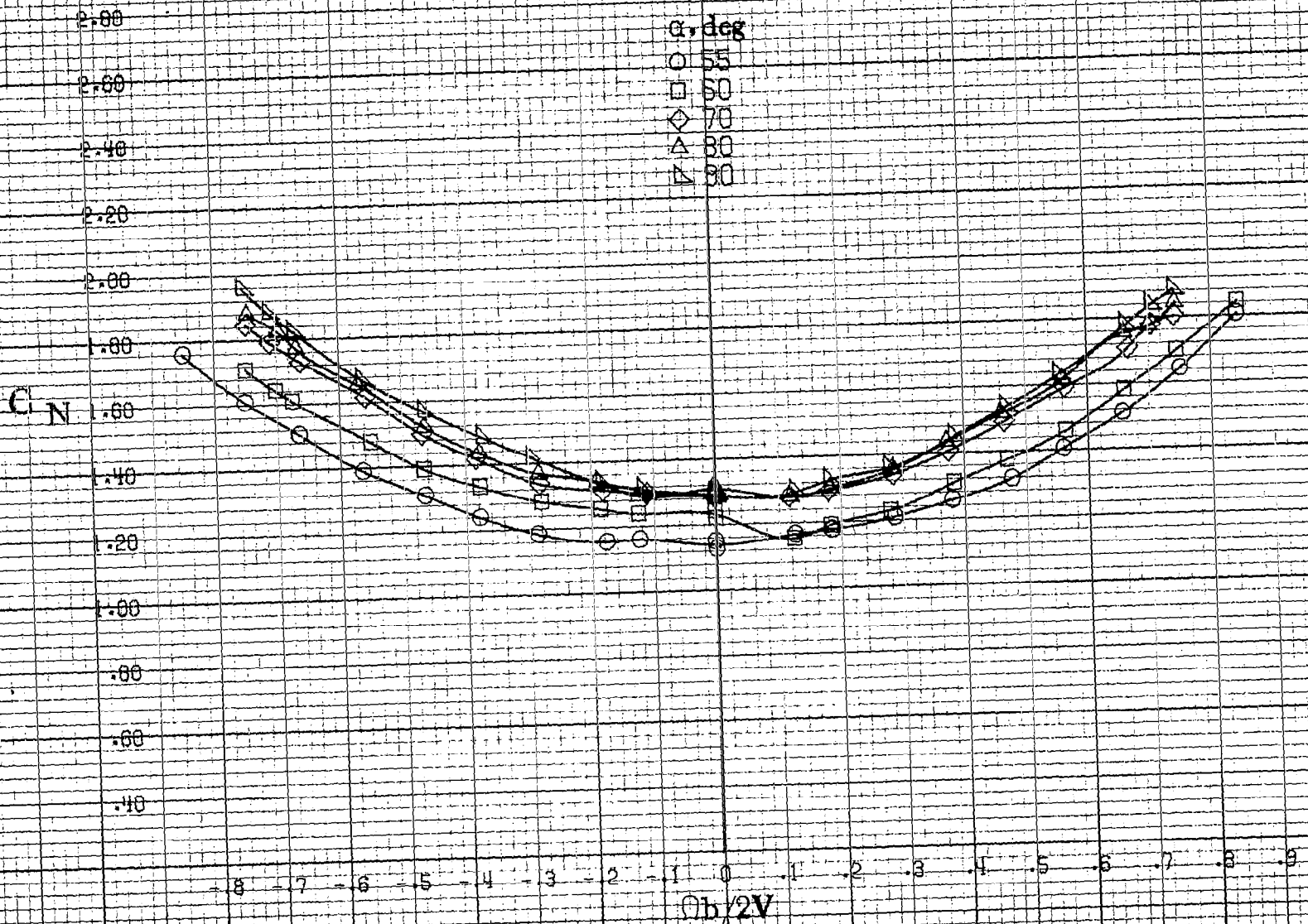
(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A64. Continued.

APSS

2255

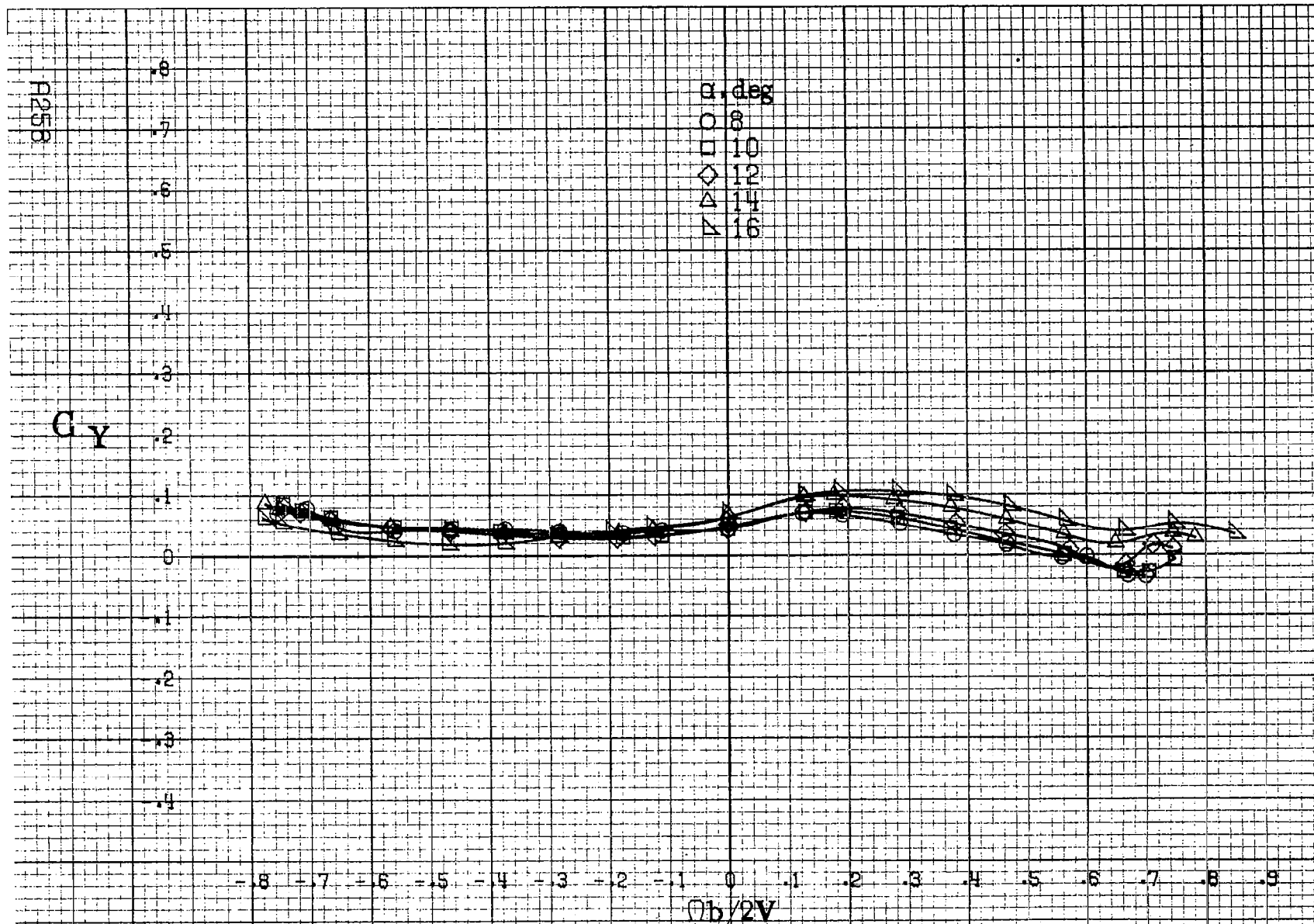


(c) $\alpha=30$ to 50 deg. $SR=0$.
 Figure A64. Continued.



(d) $\alpha = 55$ to 90 deg. $SR = 0$.
 Figure A64. Concluded.

P257



(a) $\alpha = 8$ to 16 deg, $SR = 99 \text{ cm (39 in)}$.

Figure A65. Effect of rotation rate and angle of attack on side-force coefficient for horizontal tail off configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_y

8
7
6
5
4
3
2
1
0
-1
-2
-3
-4

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$O_b/2V$

A259

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A65. Continued.

8260

C_y

.8
.7
.6
.5
.4
.3
.2
.1
0
.1
.2
.3
.4

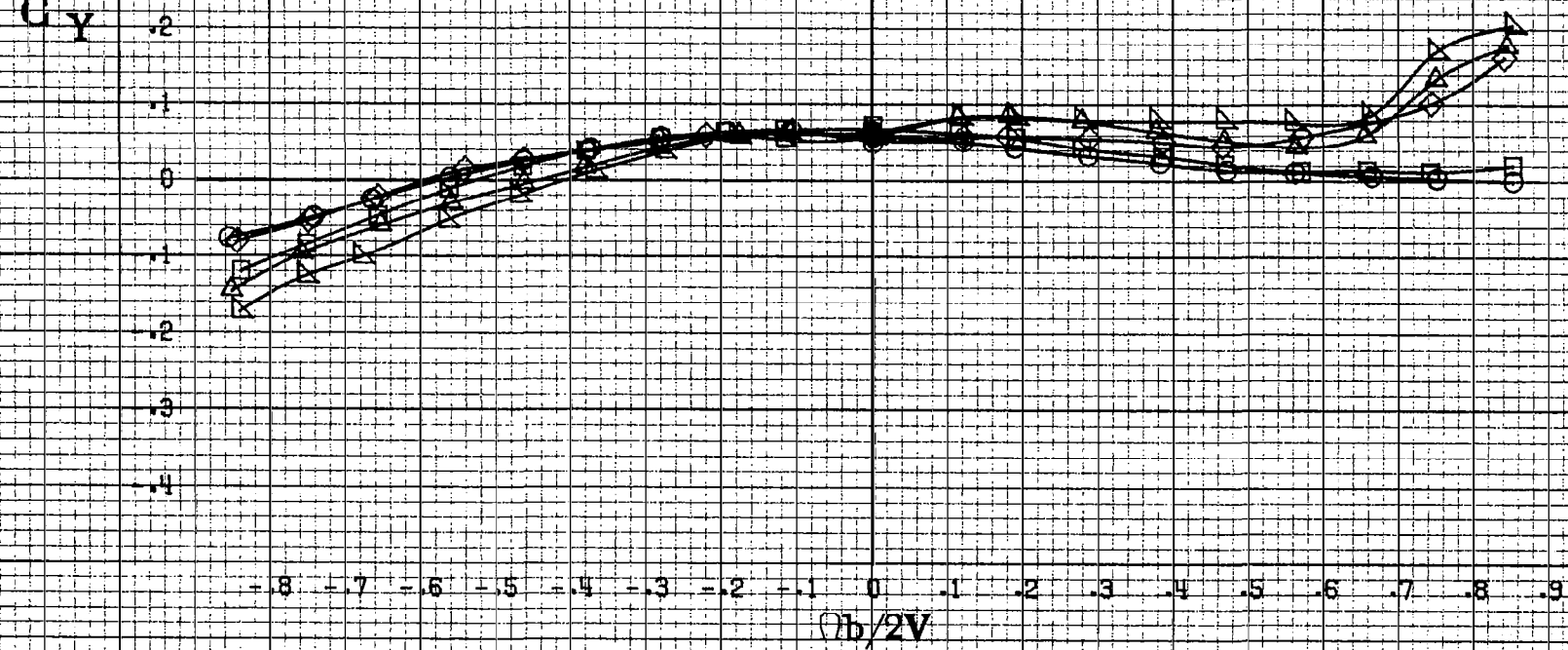
α , deg

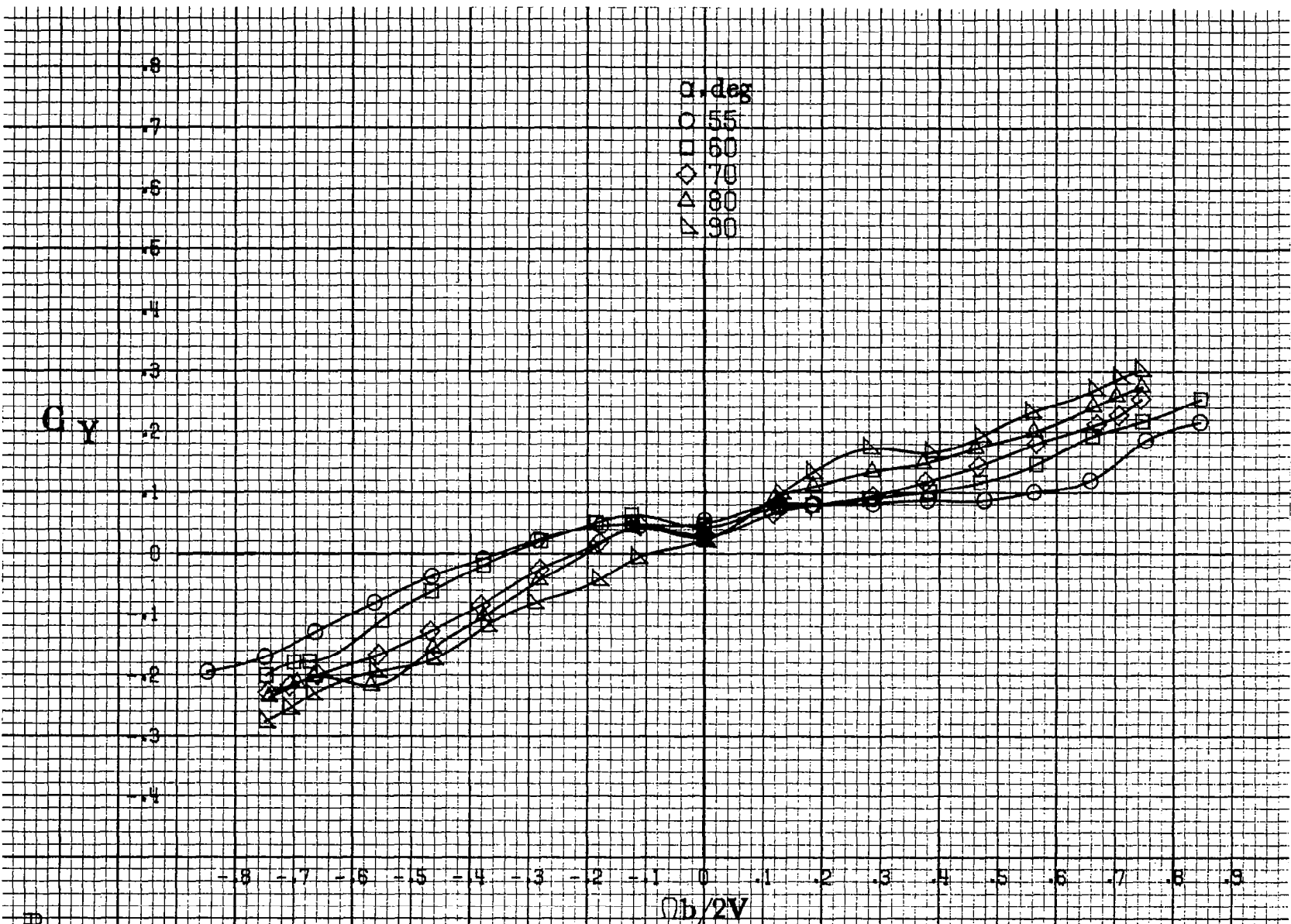
- 30
- 35
- ◇ 40
- △ 45
- ▽ 50

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$b/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A65. Continued.





A65-1

(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A65. Concluded.

F262

C_A

8
7
6
5
4
3
2
1
0
-1
-2
-3
-4

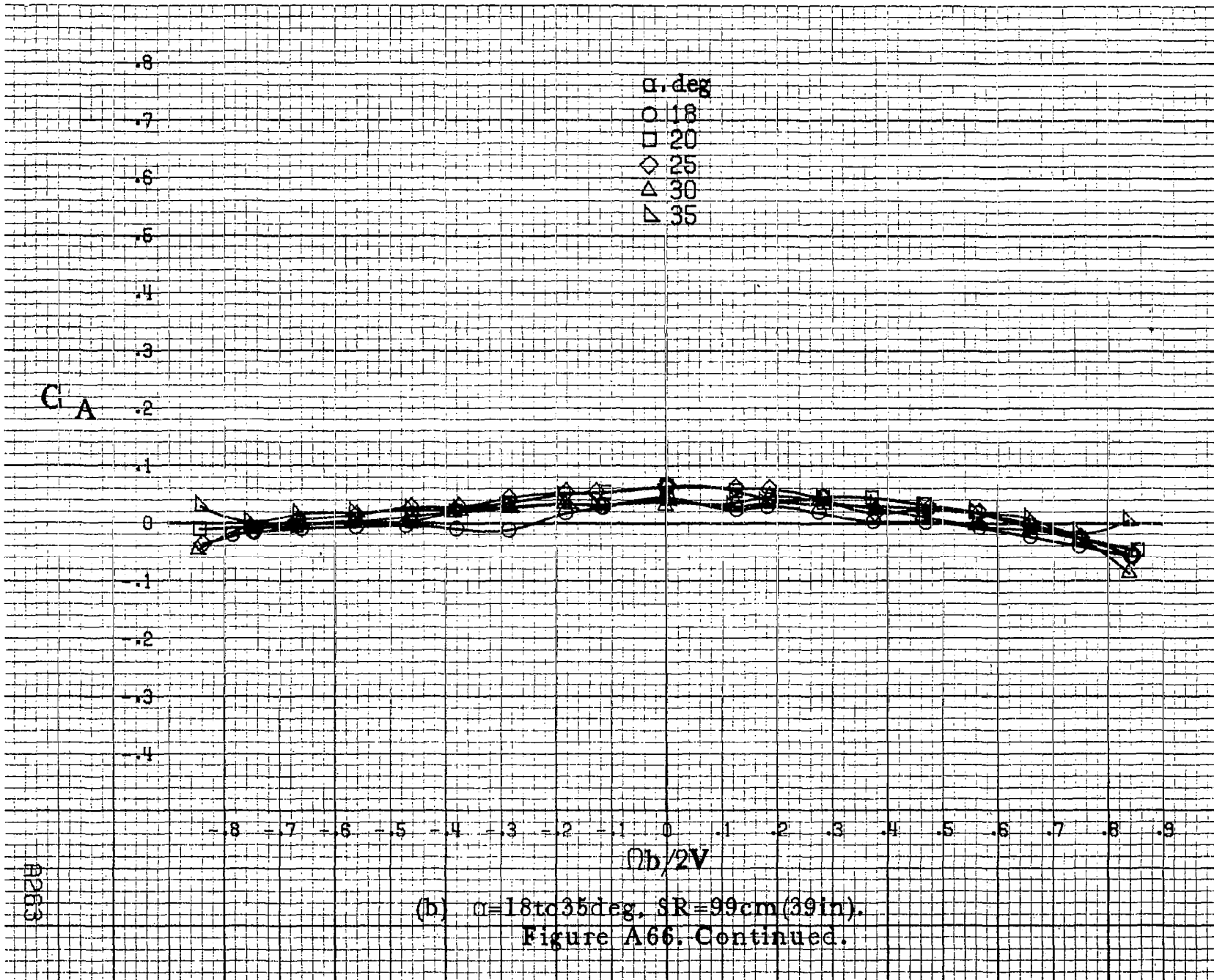
α , deg
8
10
12
14
16

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$Ob/2V$

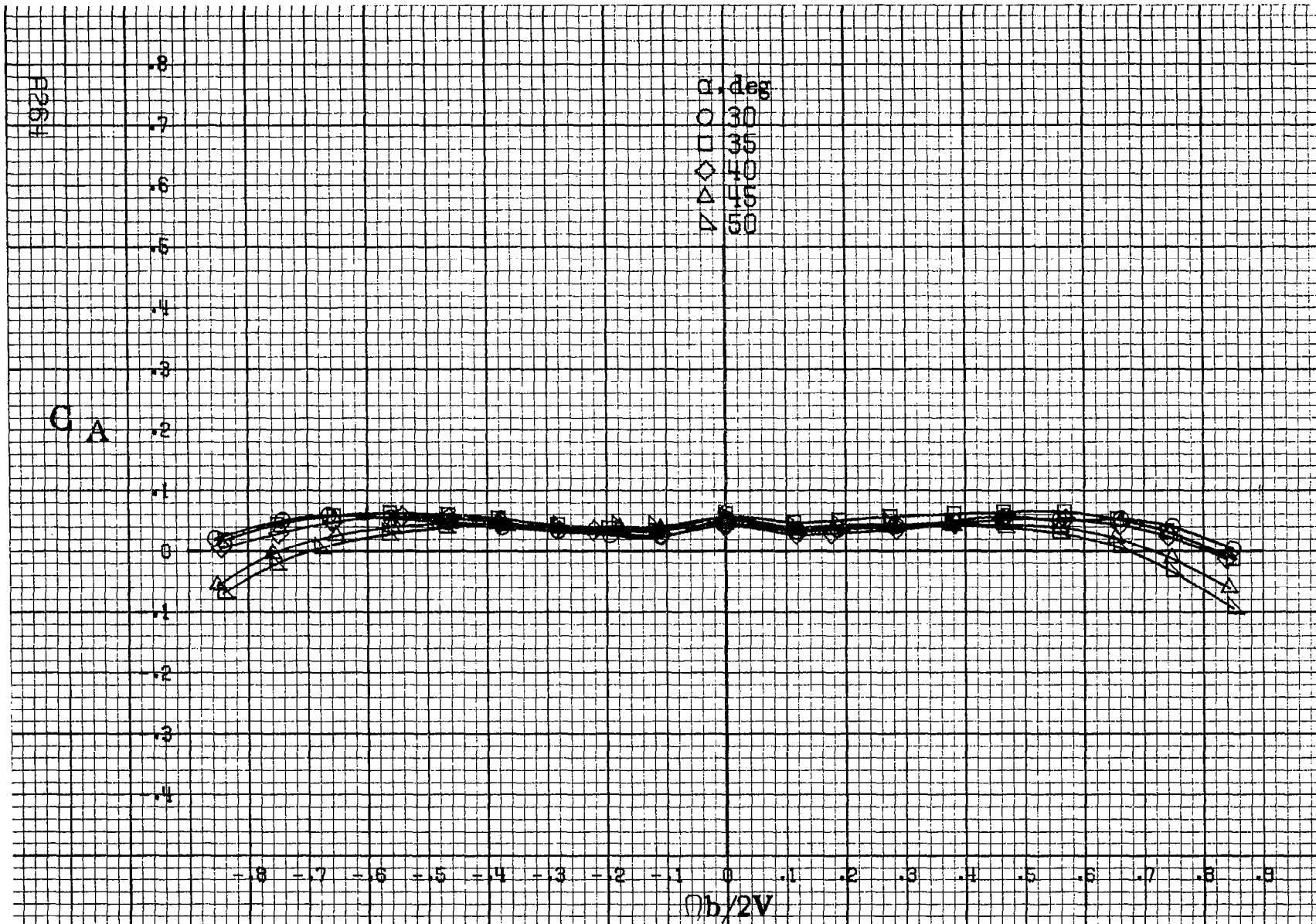
(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A66. Effect of rotation rate and angle of attack on axial force coefficient for horizontal tail off configuration. $\delta_e = 0^\circ$, $\delta_a = 10^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

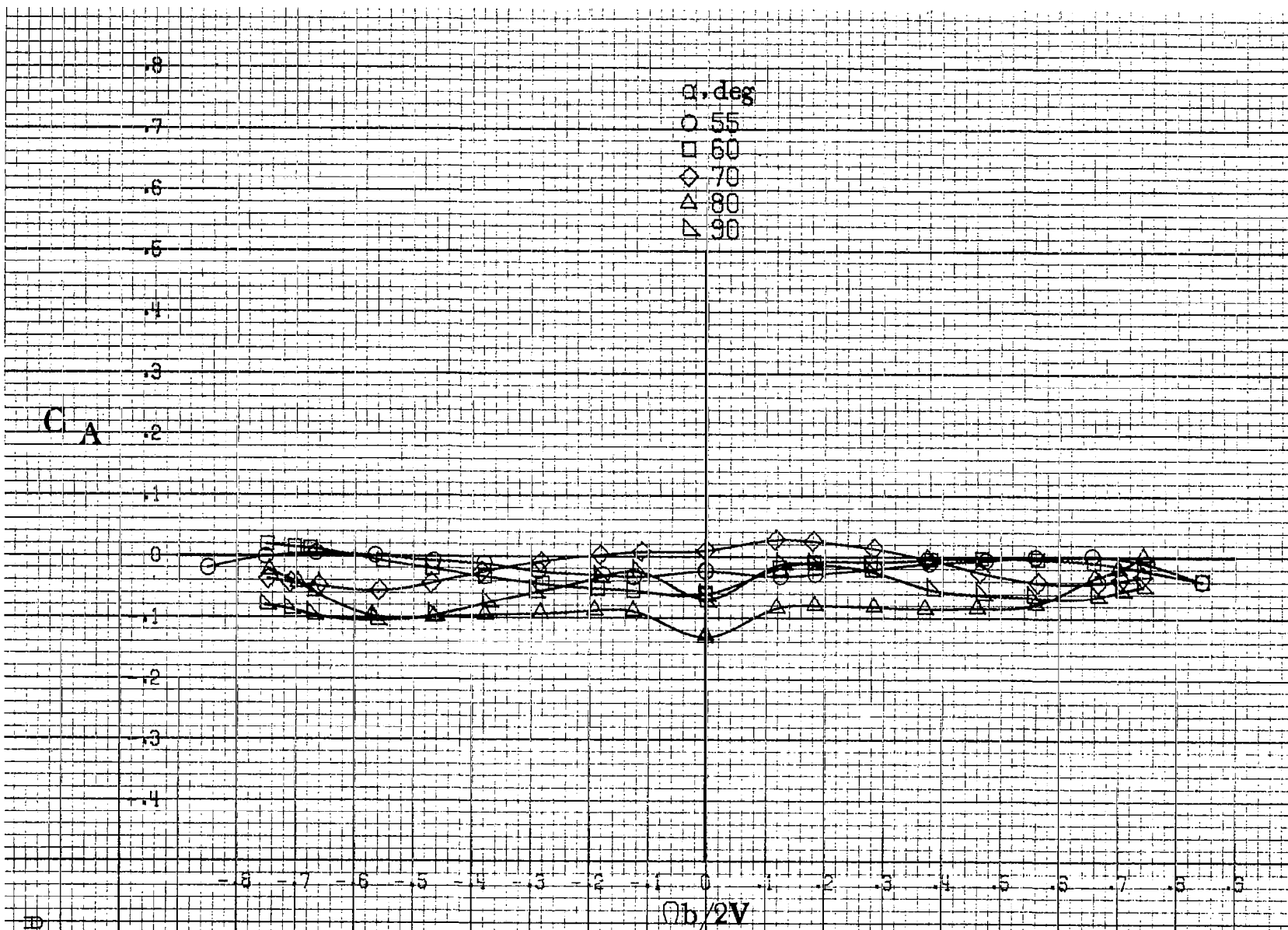


(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A66. Continued.

A263



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A66, Continued.



A265

(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A66. **Concluded.**

P265

C_n

.12
.10
.08
.06
.04
0
-.02
-.04
-.06
-.08
-.10
-.12

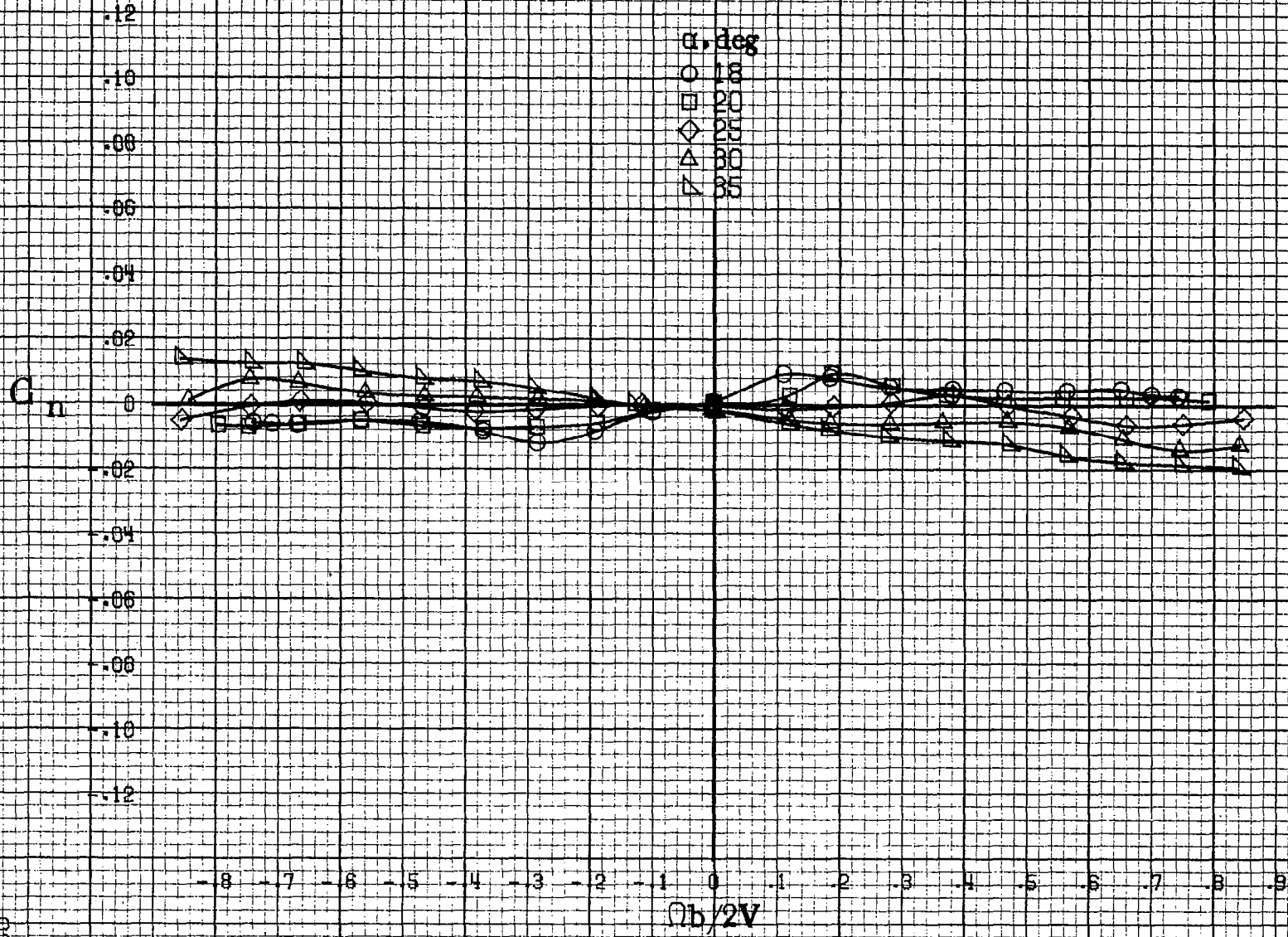
α , deg
○ 8
□ 10
◇ 12
△ 14
▽ 16

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$\Omega b/2V$

(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A.67. Effect of rotation rate and angle of attack on yawing-moment coefficient for vertical tail off configuration. $\delta_a=0^\circ$, $\delta_s=0^\circ$, $\delta_r=0^\circ$, $\beta=0^\circ$.



(b) $\alpha=18$ to 35 deg. $SR=99$ cm (39 in).
 Figure A67. Continued.

A2657

E268

C_n

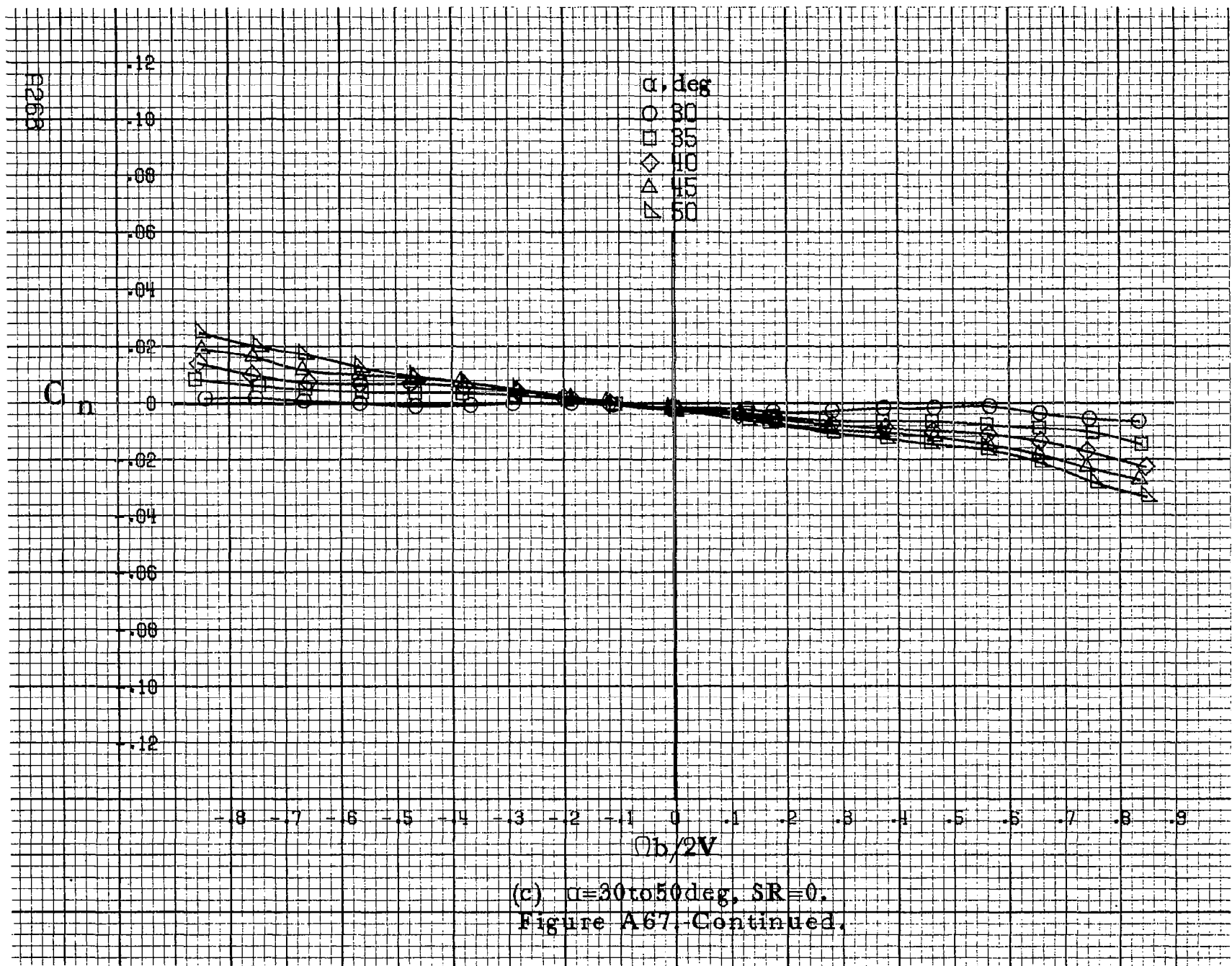
.12
.10
.08
.06
.04
0
-.02
-.04
-.06
-.08
-.10
-.12

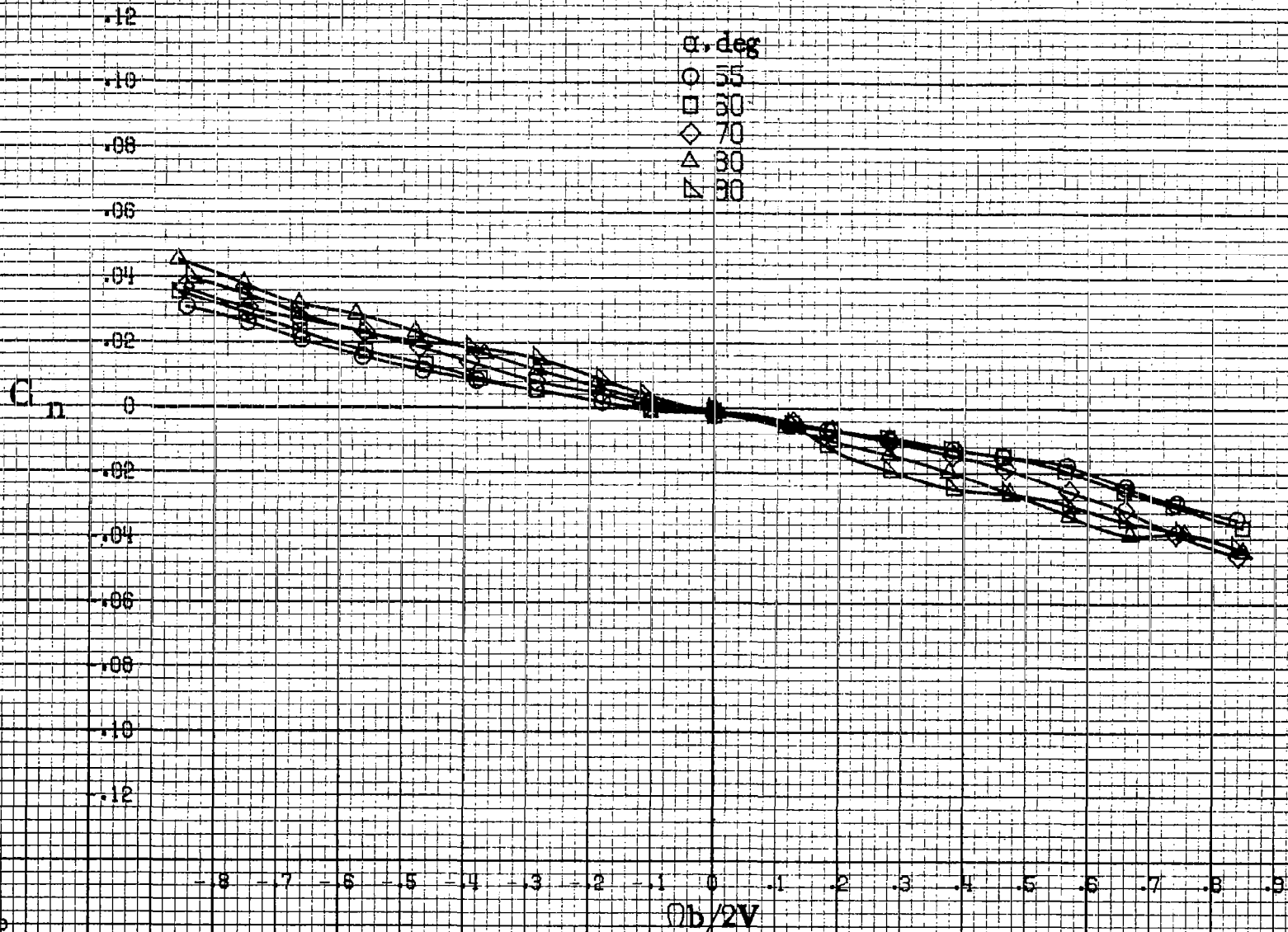
α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$\theta b/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A67. Continued.





(d) $\alpha = 55$ to 90 deg, $SR = 0$.
Figure A67, Concluded.

R270

C_l

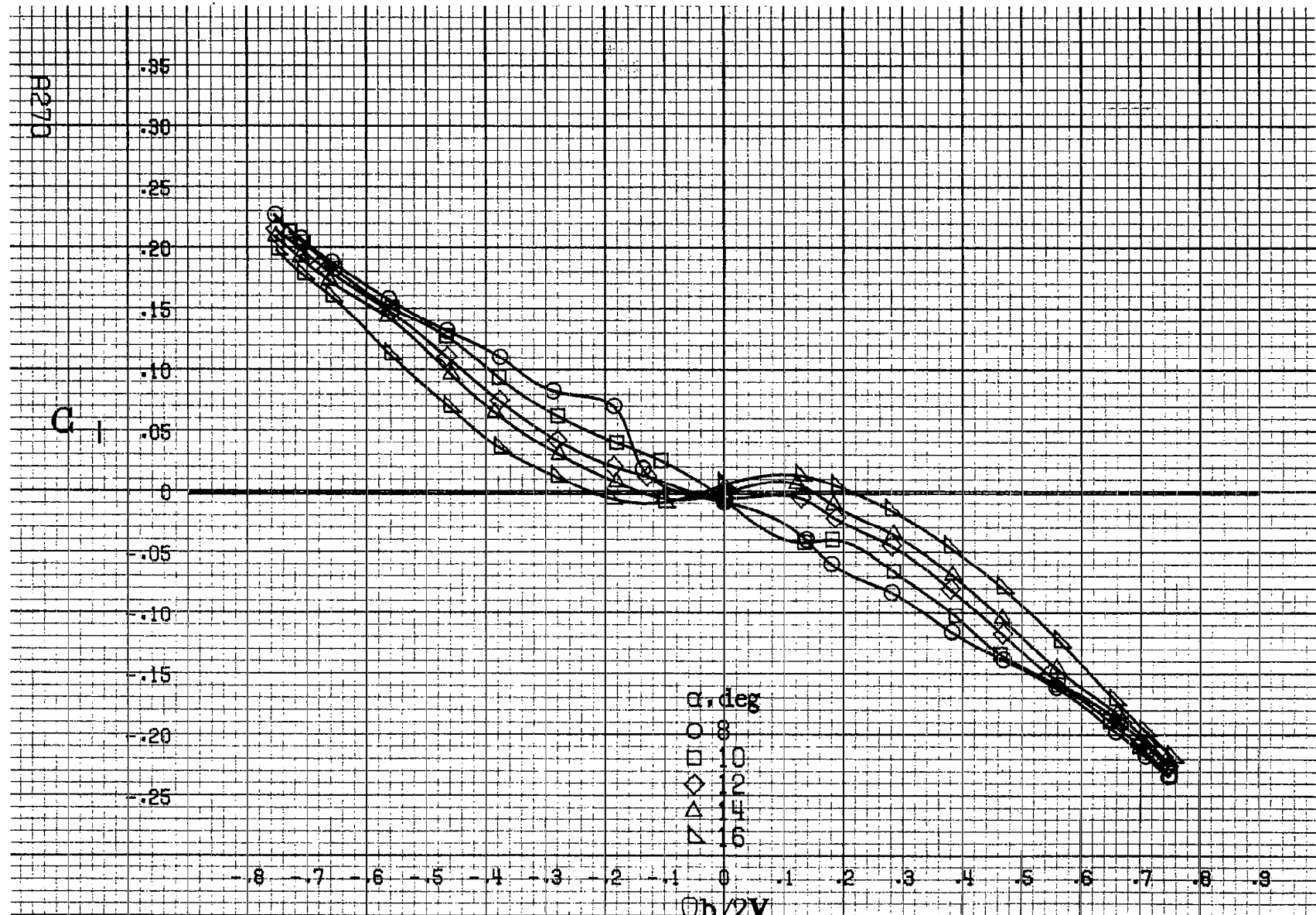
.35
.30
.25
.20
.15
.10
.05
0
-.05
-.10
-.15
-.20
-.25

α , deg
○ 8
□ 10
◇ 12
△ 14
▽ 16

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\Omega b/2V$

(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A68. Effect of rotation rate and angle of attack on rolling-moment coefficient for vertical tail off configuration. $\delta_e=0^\circ$, $\delta_a=0^\circ$, $\delta_r=0^\circ$, $\beta=0^\circ$.



C_I

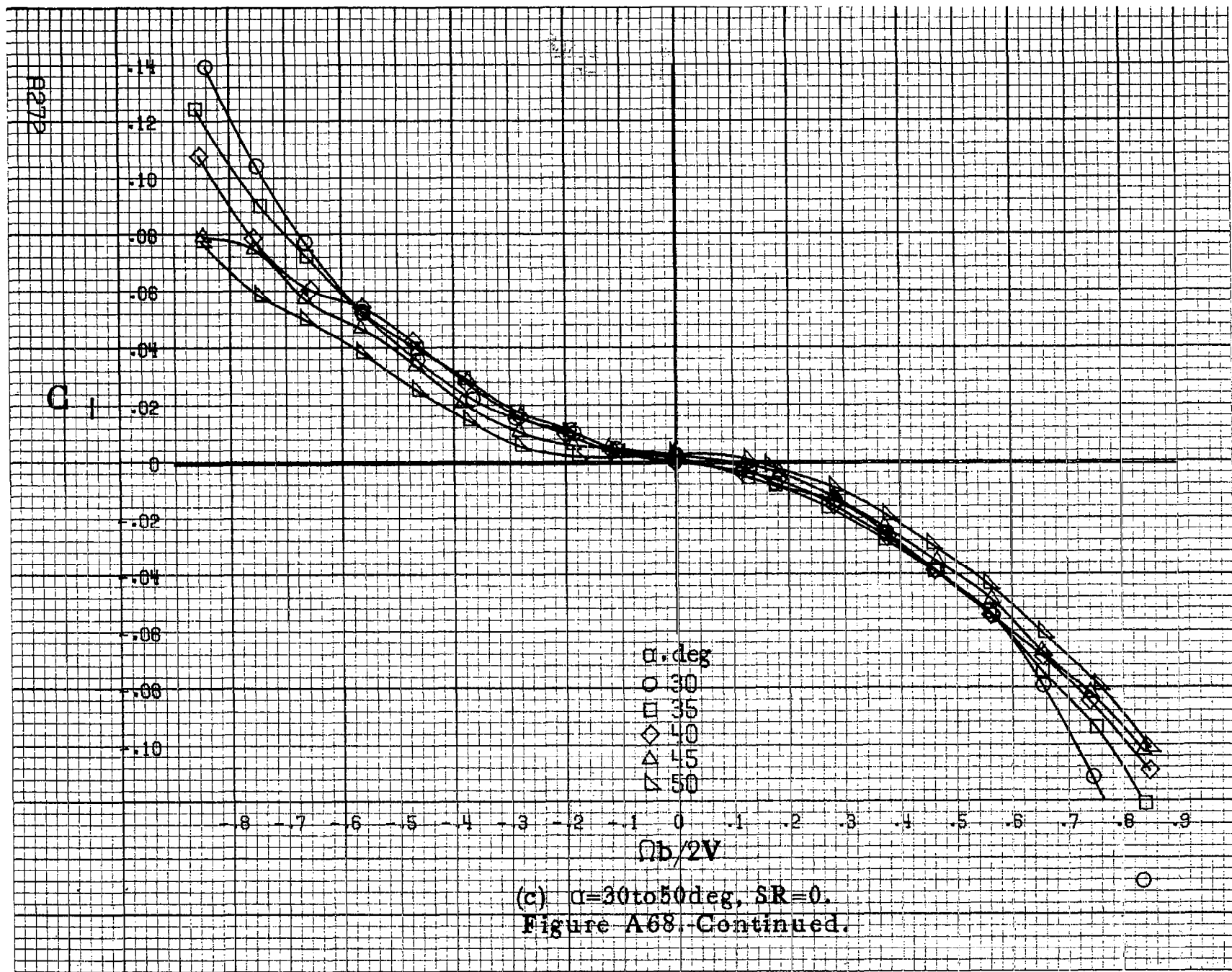
.35
.30
.25
.20
.15
.10
.05
0
-.05
-.10
-.15
-.20
-.25

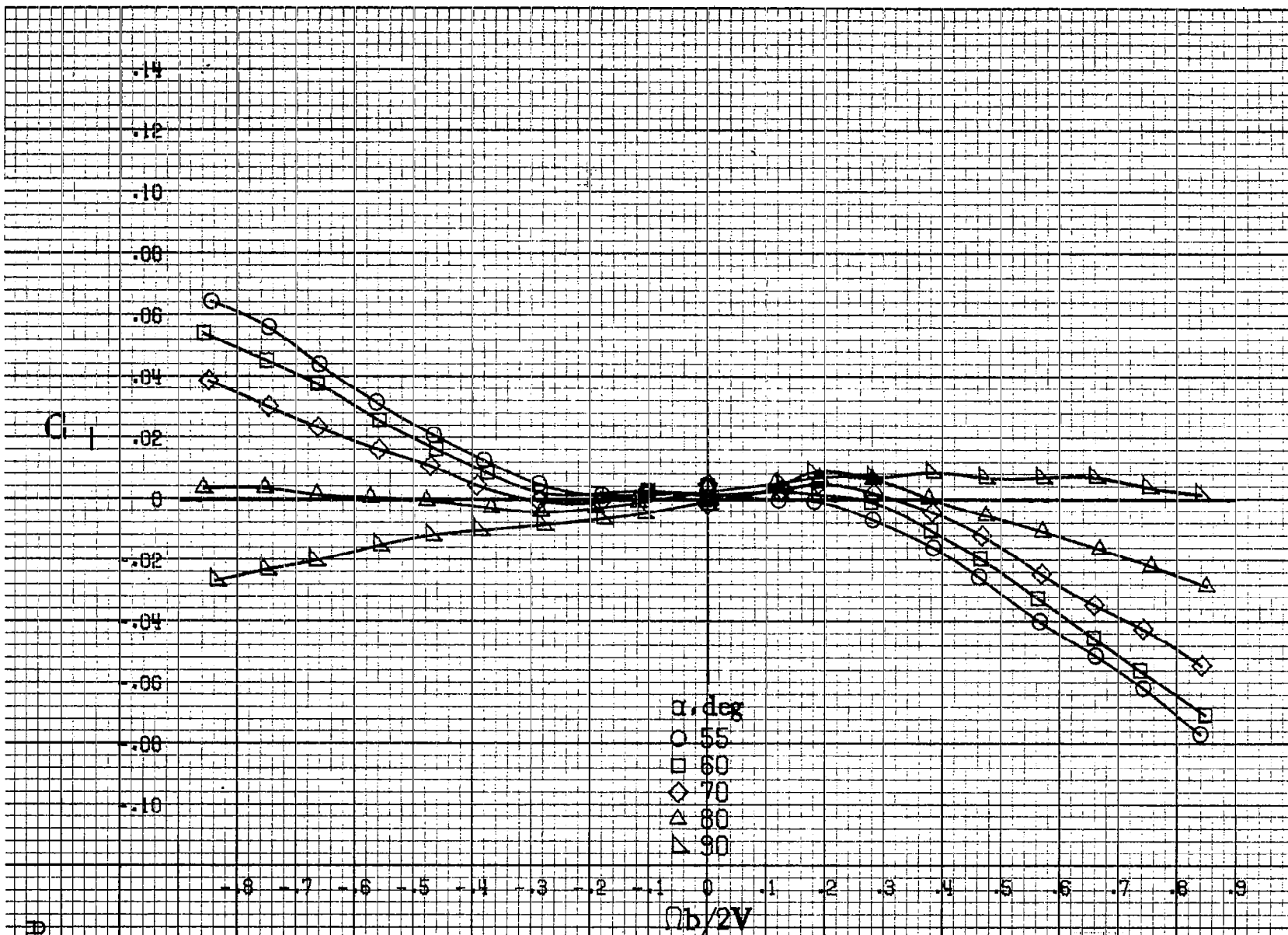
.8 .7 .6 .5 .4 .3 .2 .1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\Omega b/2V$

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

AP71

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A68. Continued.



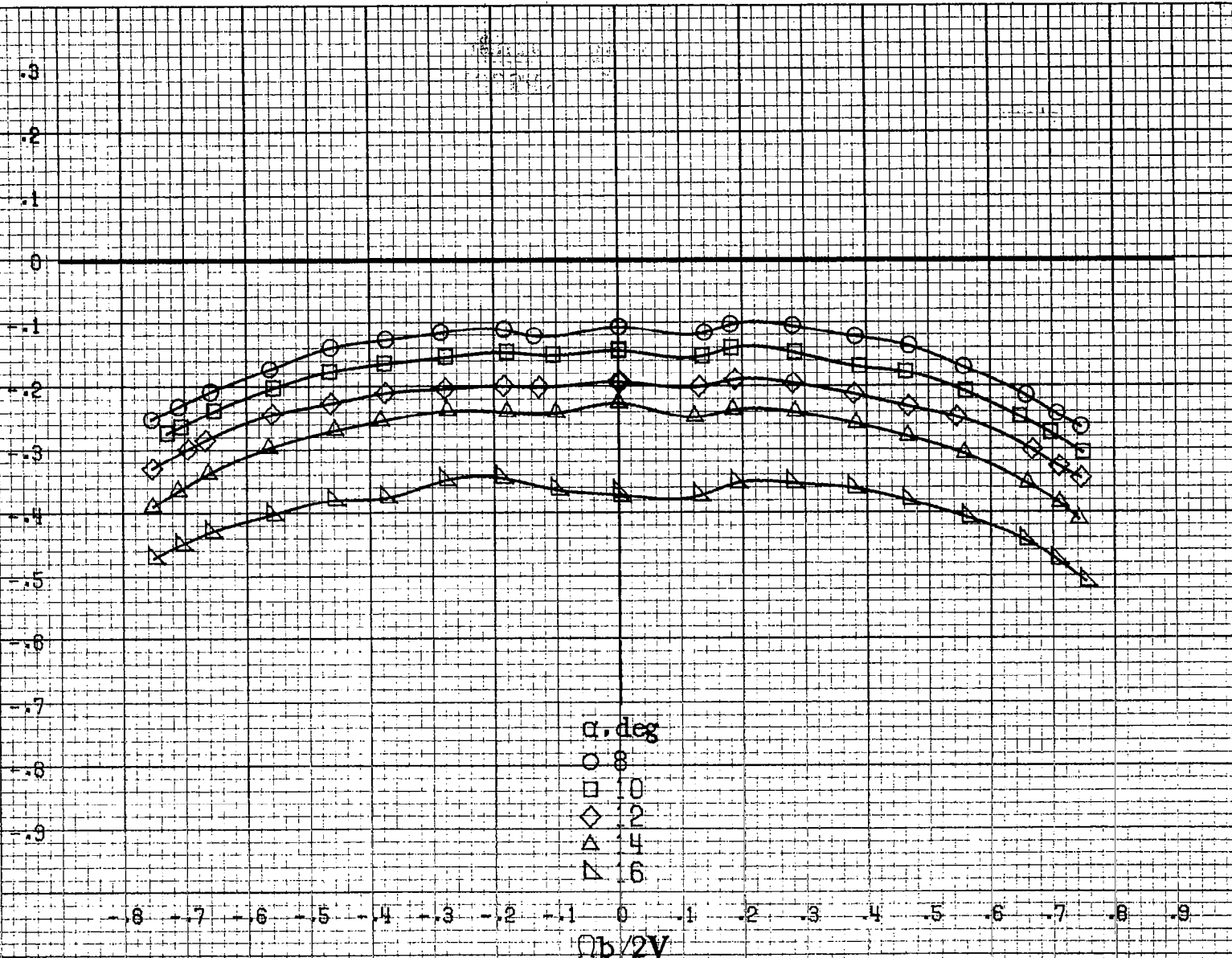


(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A68. Concluded.

R273

R27H

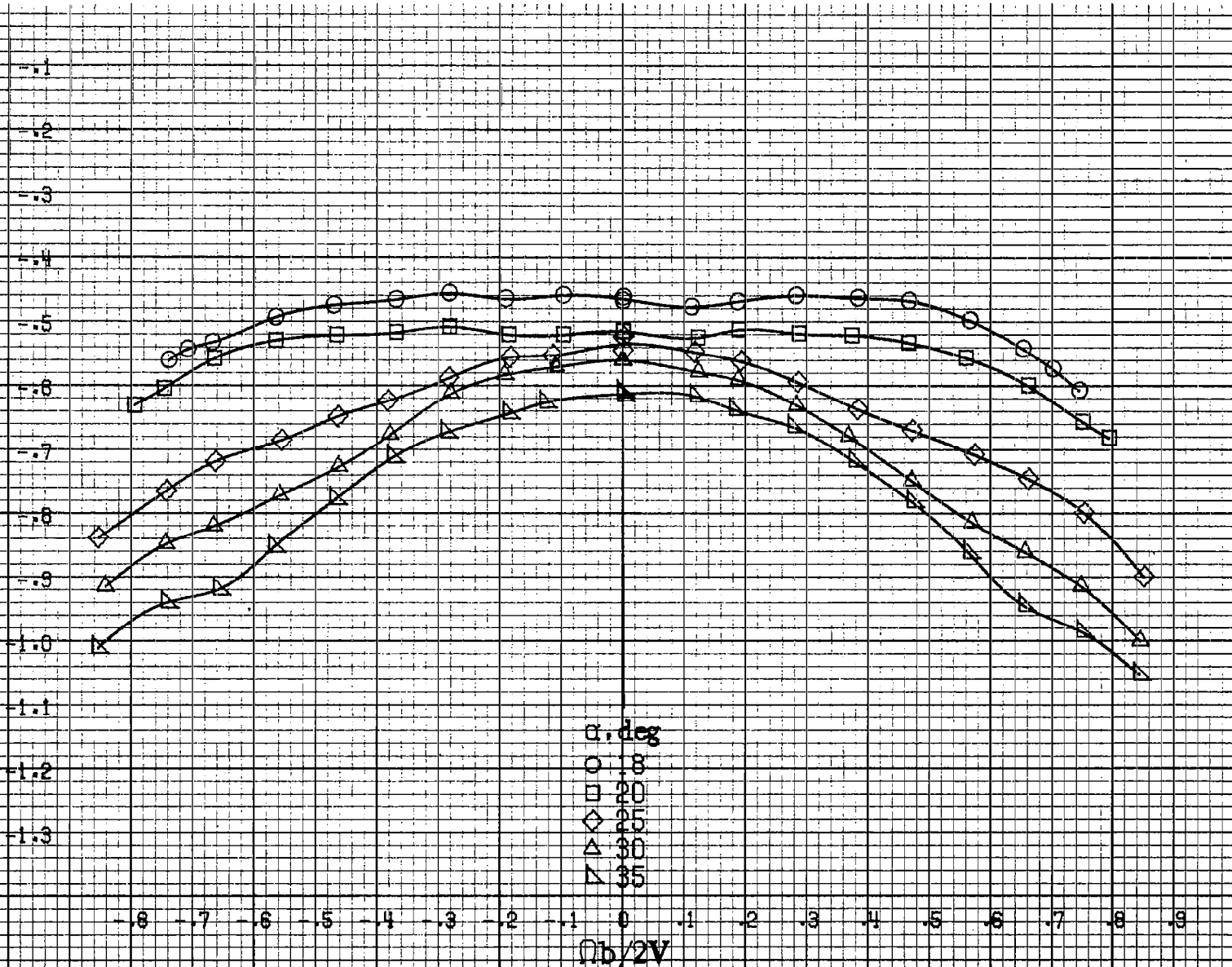
C_m



(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A69. Effect of rotation rate and angle of attack on pitching-moment coefficient for vertical tail off configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_m



α, deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

#275

(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
Figure A69. Continued.

A276

C_m

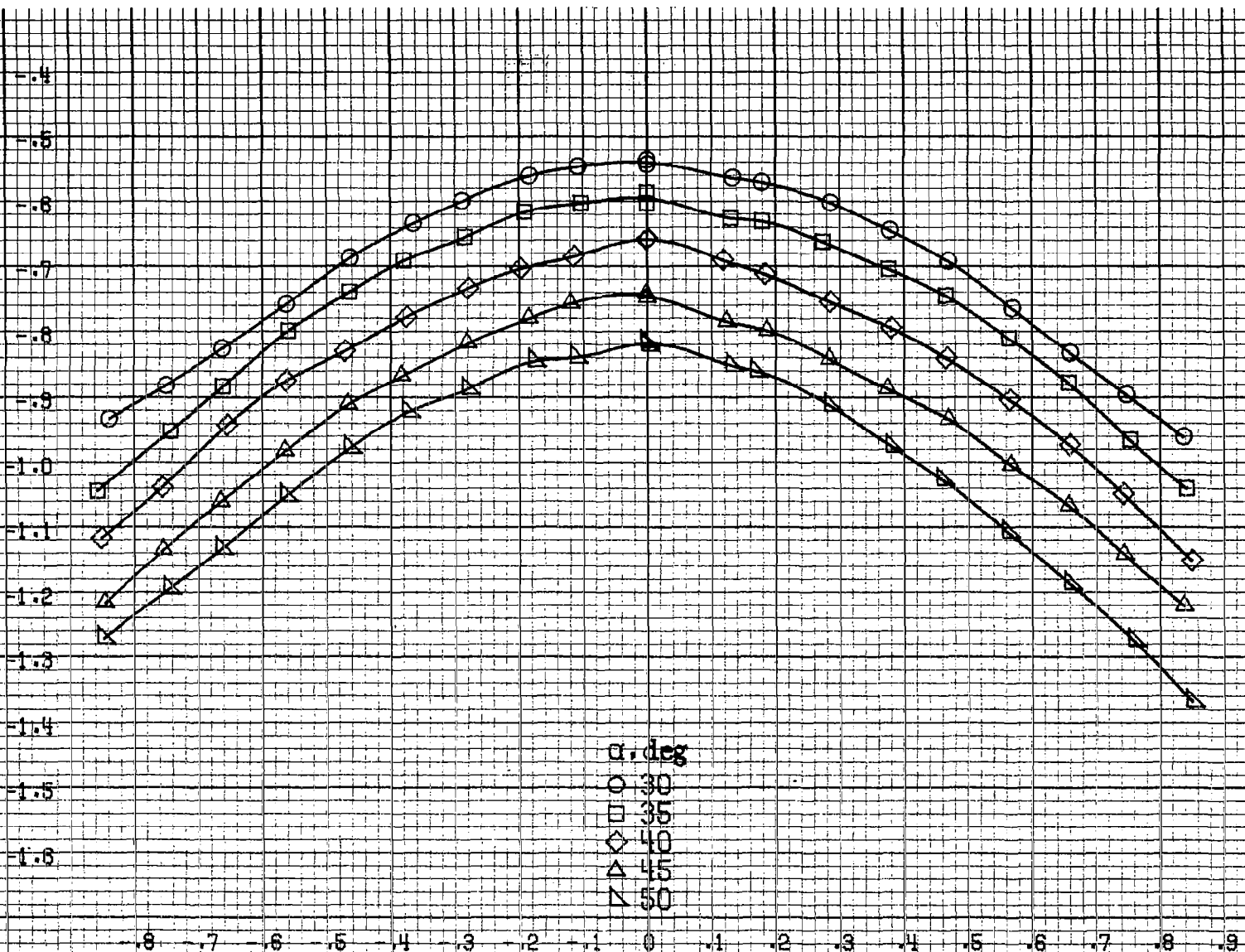
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6

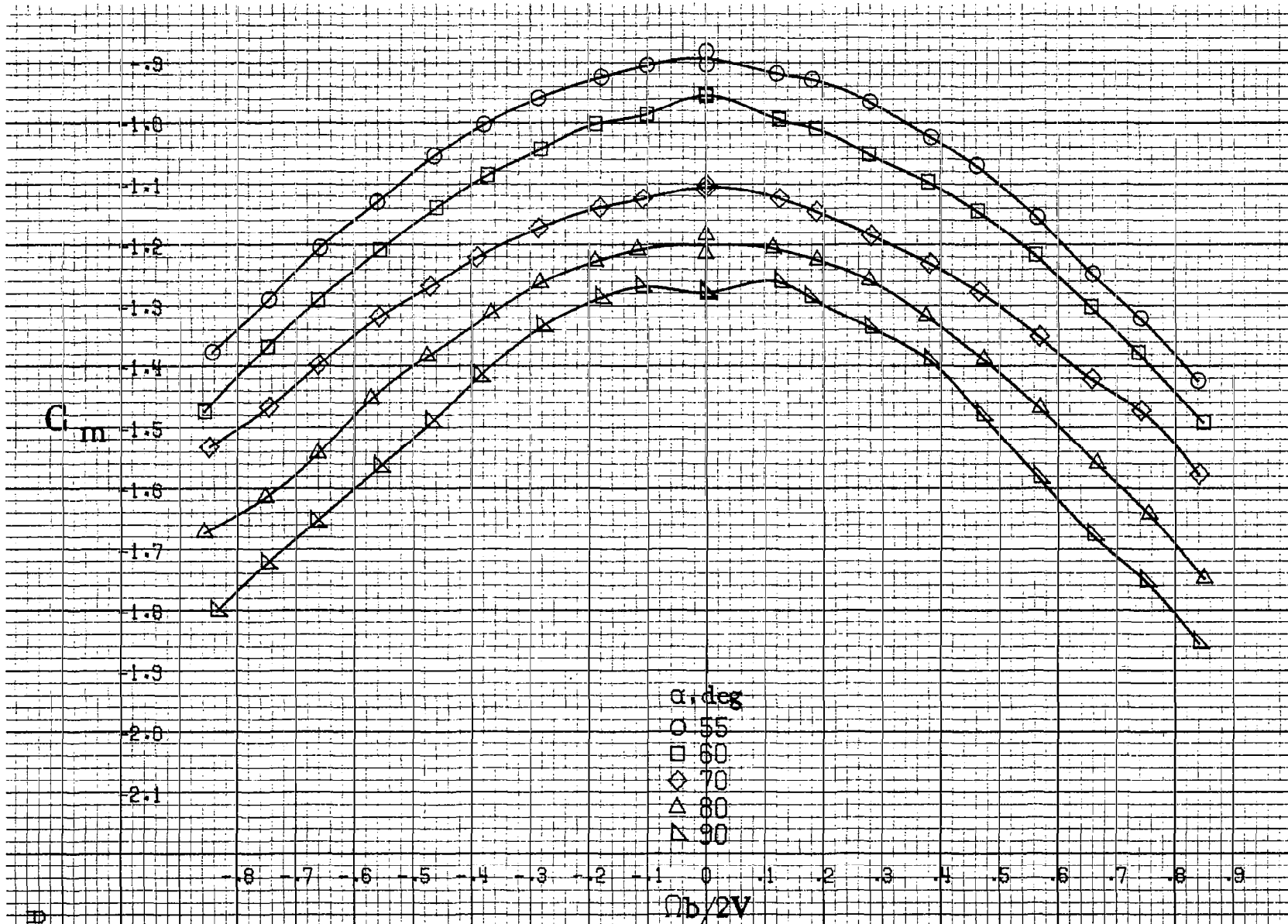
-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

$\Omega b/2V$

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A69. Continued.





(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A69. Concluded.

A9277

P278

C_N

2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
-0.2
-0.4

α , deg
 ○ 8
 □ 10
 ◇ 12
 ▲ 14
 △ 16

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$\Omega b/2V$

(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A70. Effect of rotation rate and angle of attack on normal force coefficient for vertical tail off configuration. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_N

2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
0

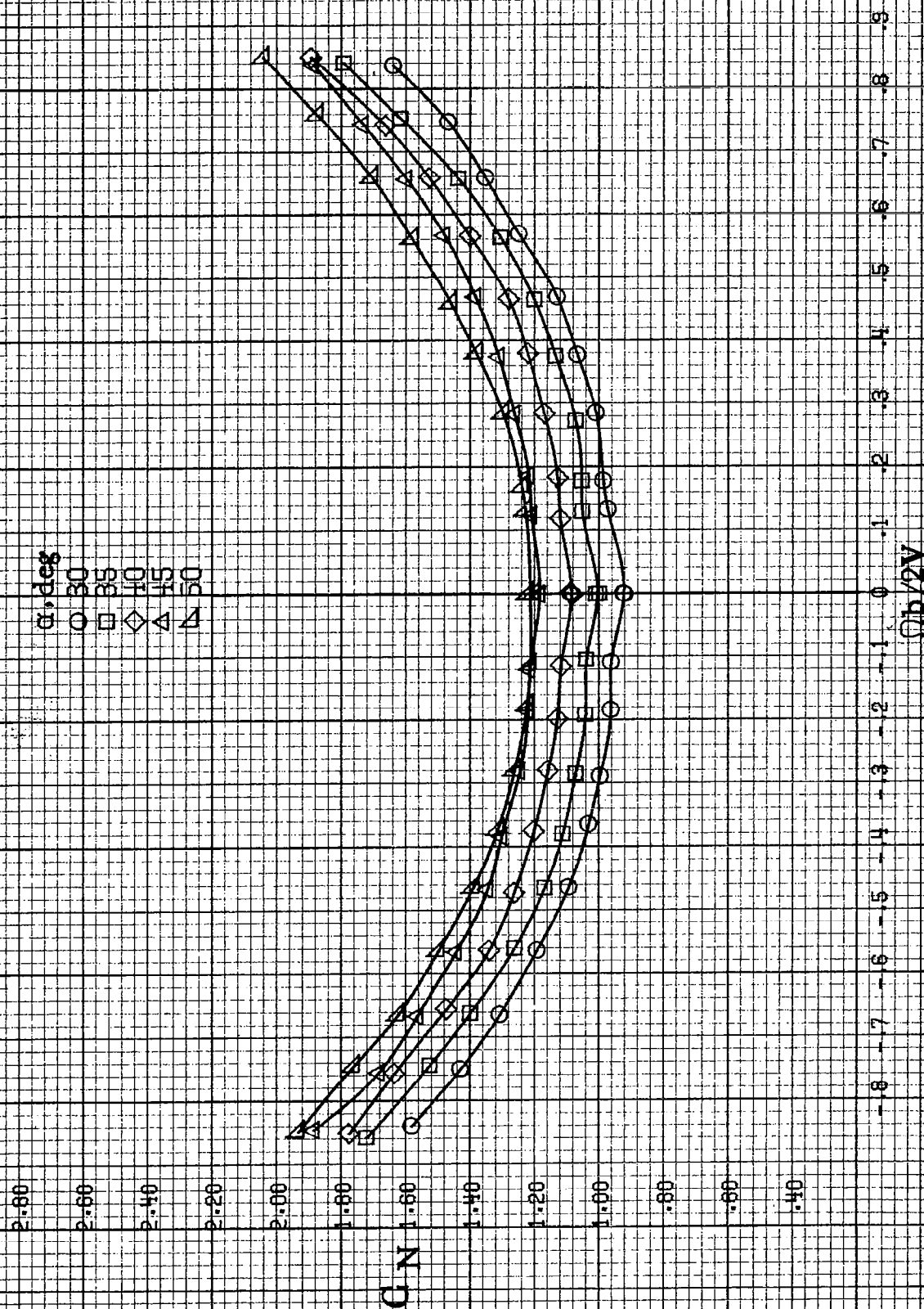
α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

-6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

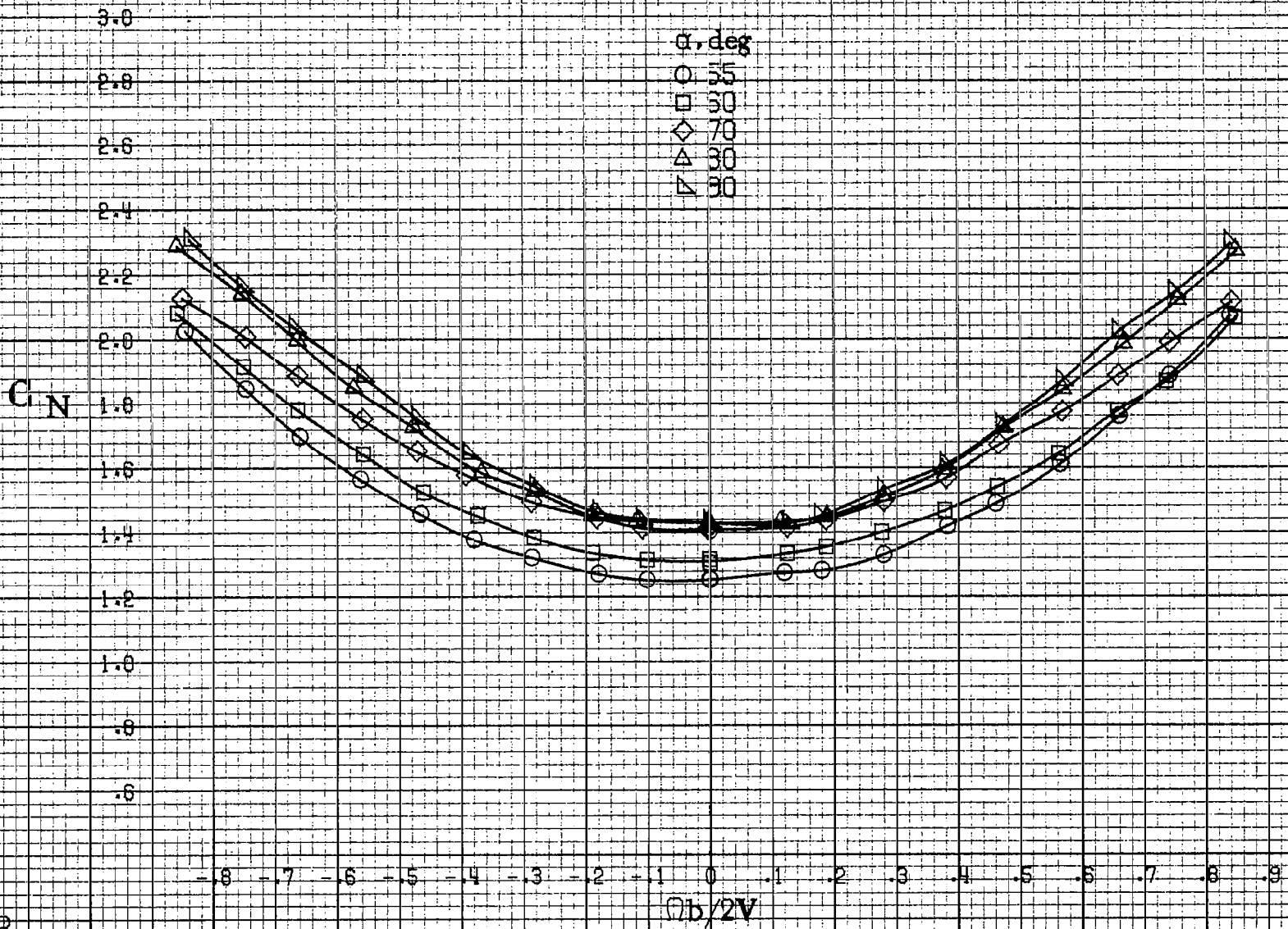
$b/2V$

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A70. Continued.

R280



(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A70. Continued.



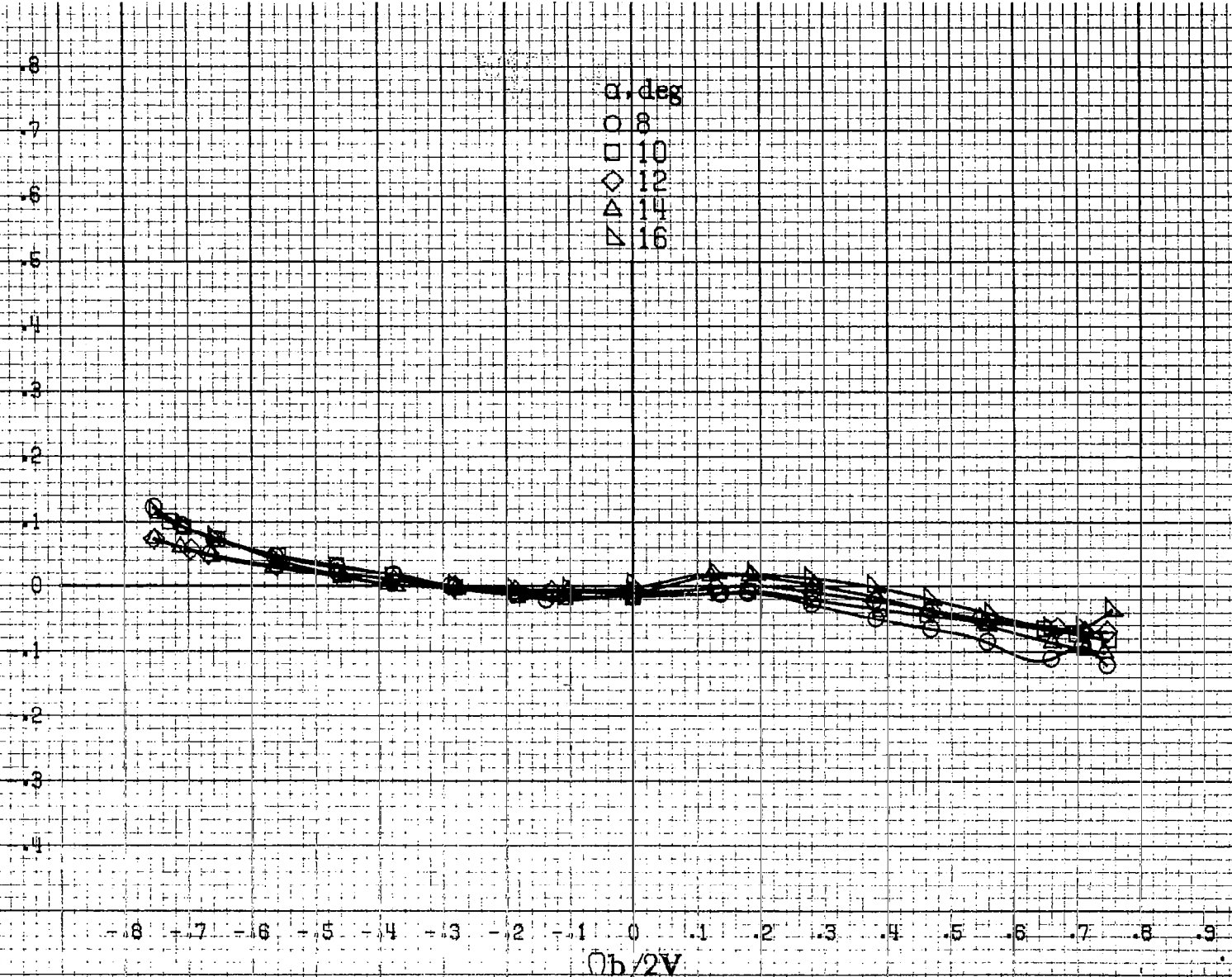
(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A70. Concluded.

A70

R282

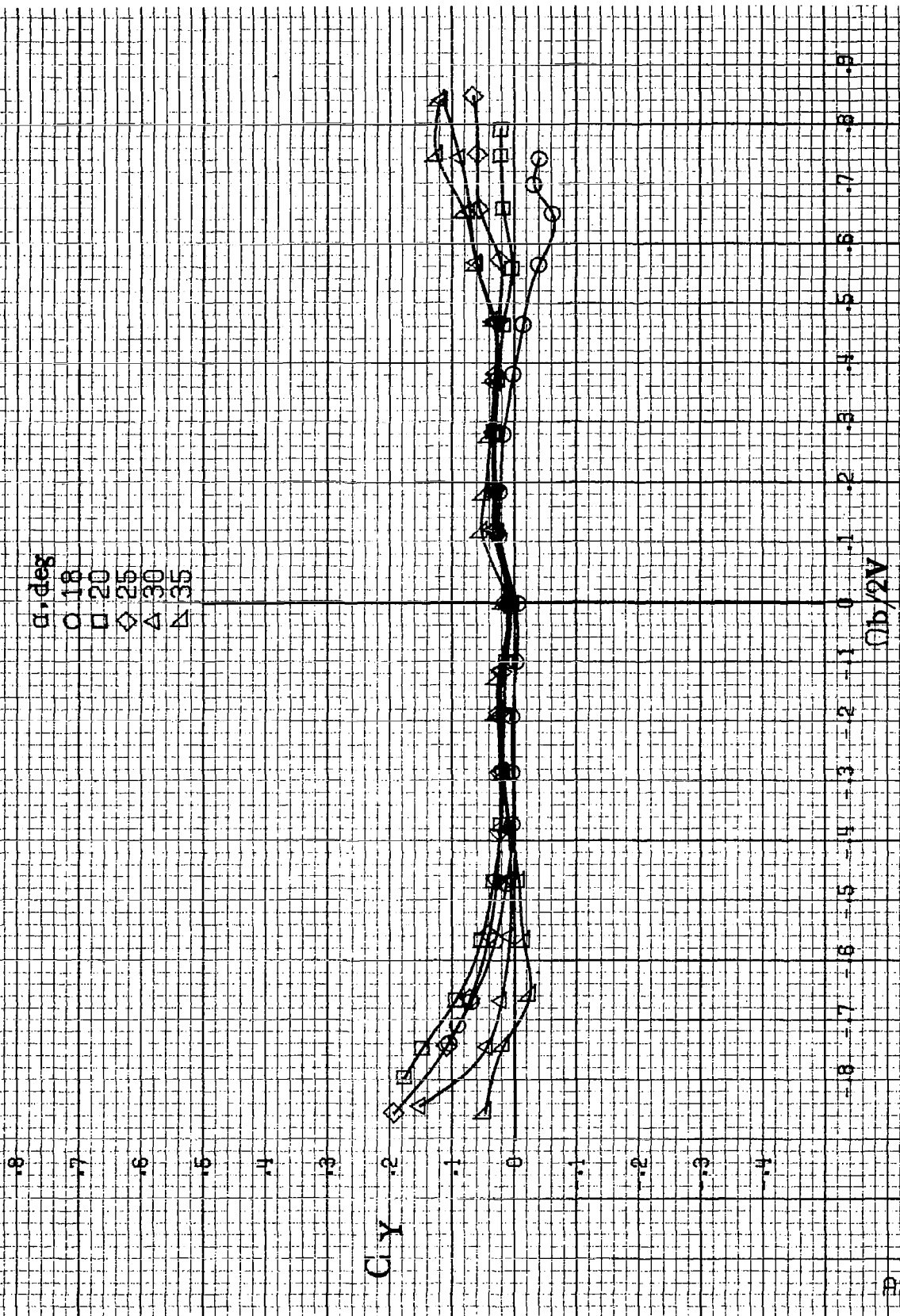
C_Y

α , deg
○ 8
□ 10
◇ 12
△ 14
▽ 16



(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A71. Effect of rotation rate and angle of attack on side-force coefficient for vertical tail off configuration. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

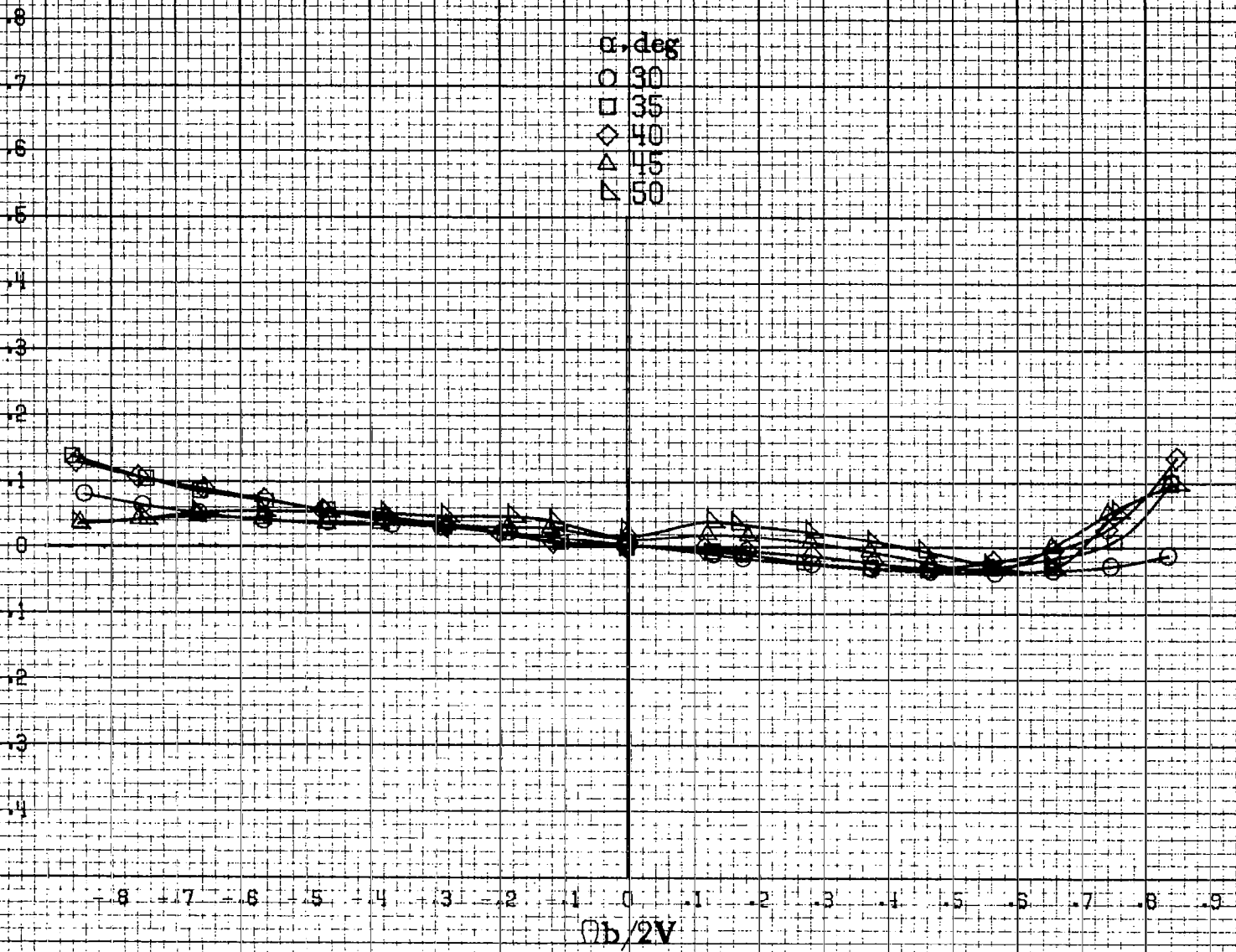


(b) $\alpha = 18$ to 35 deg, $sR = 99$ cm (39 in).
 Figure A7.1, Continued.

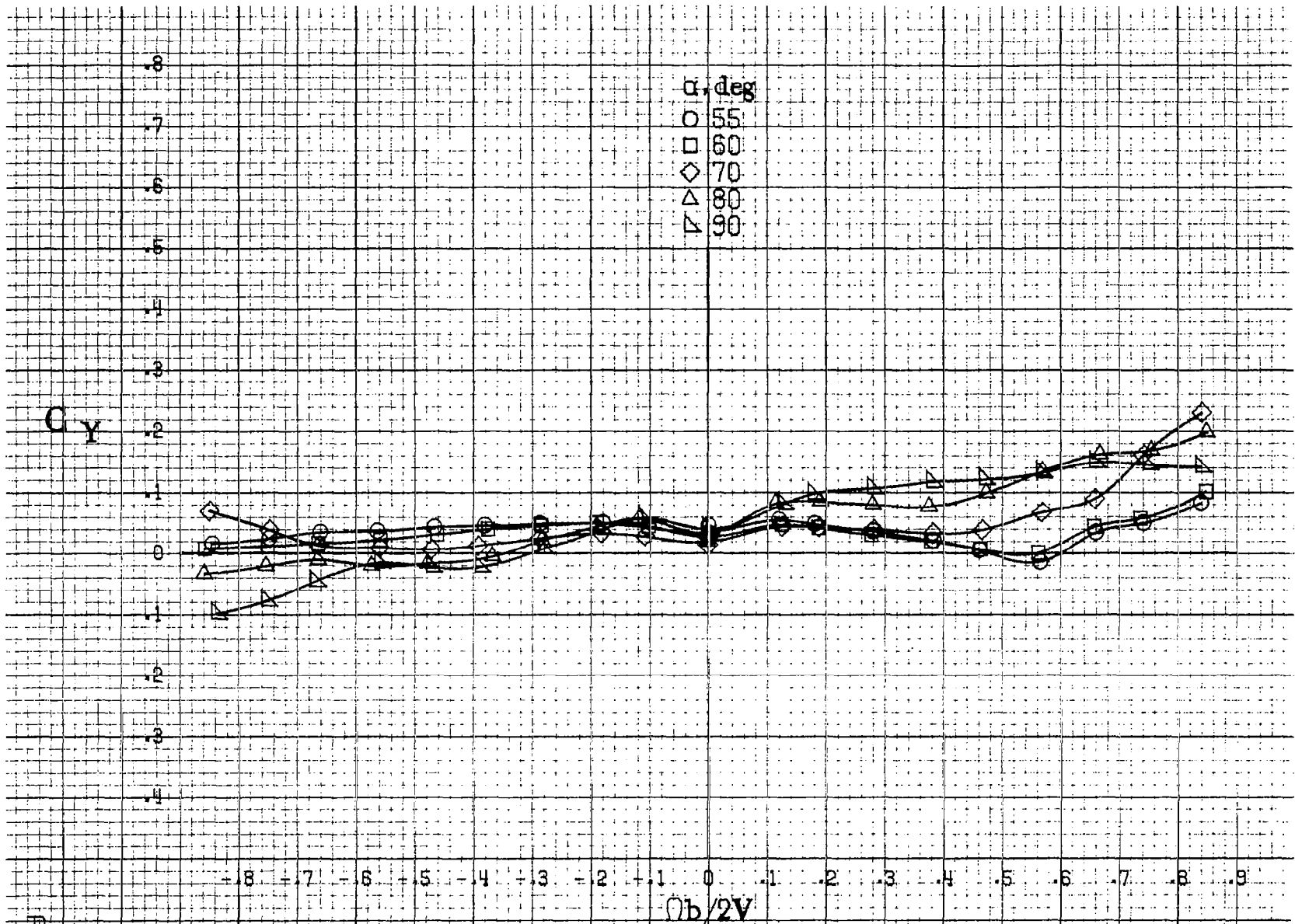
P284

C_y

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50



(c) $\alpha = 30$ to 50 deg, $SR = 0$.
Figure A71 - Continued.



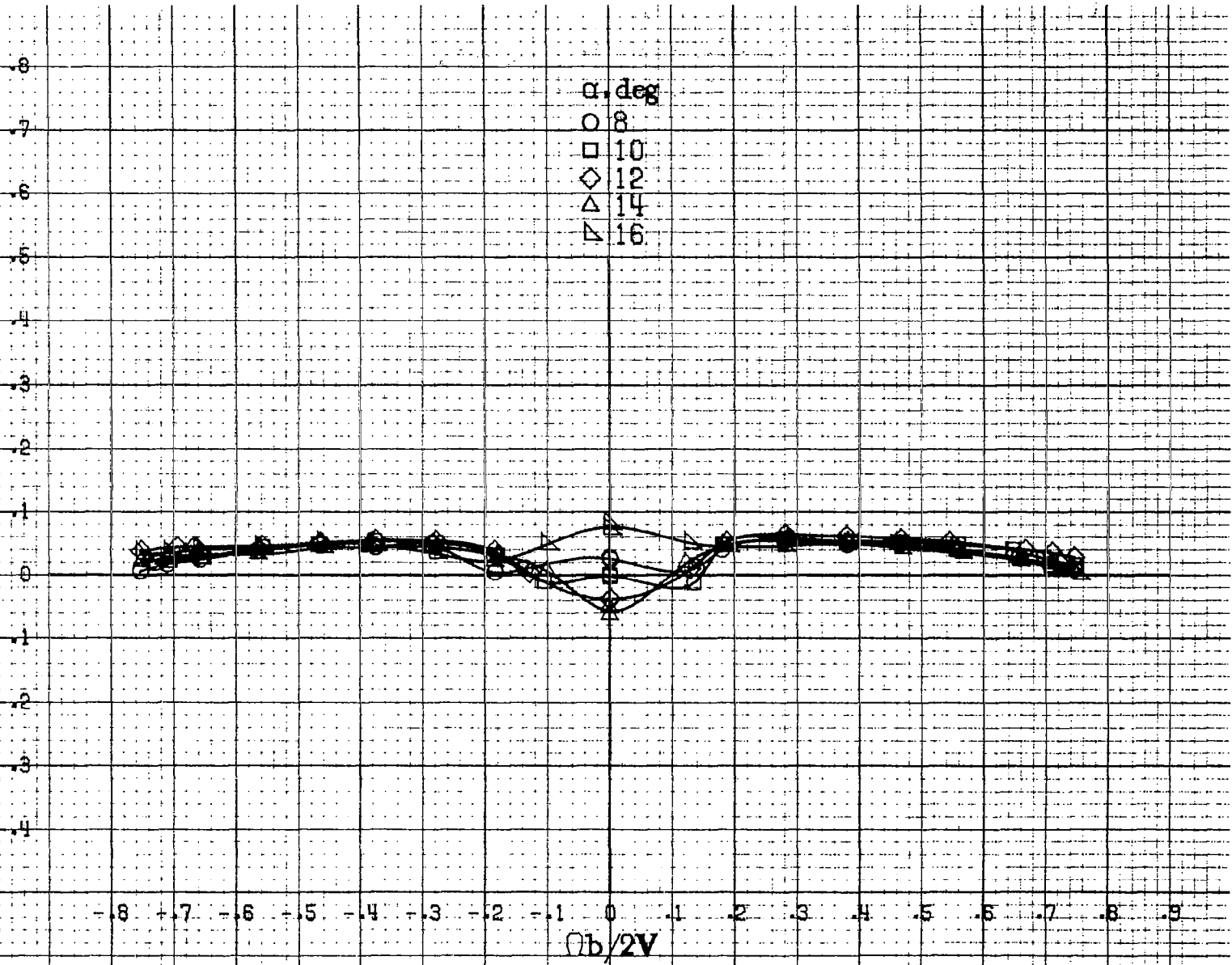
R285

(d) $\alpha=55$ to 90 deg. $SR=0$.
 Figure A.71. -Concluded.

A286

C_A

α , deg
○ 8
□ 10
◇ 12
△ 14
▽ 16



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A 72. Effect of rotation rate and angle of attack on axial force coefficient for vertical tail off configuration. $\delta_1 = 0^\circ$, $\delta_2 = 0^\circ$, $\delta_3 = 0^\circ$, $\beta = 0^\circ$.

C_A

0
1
2
3
4
5
6
7
8

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9

$\Omega b/2V$

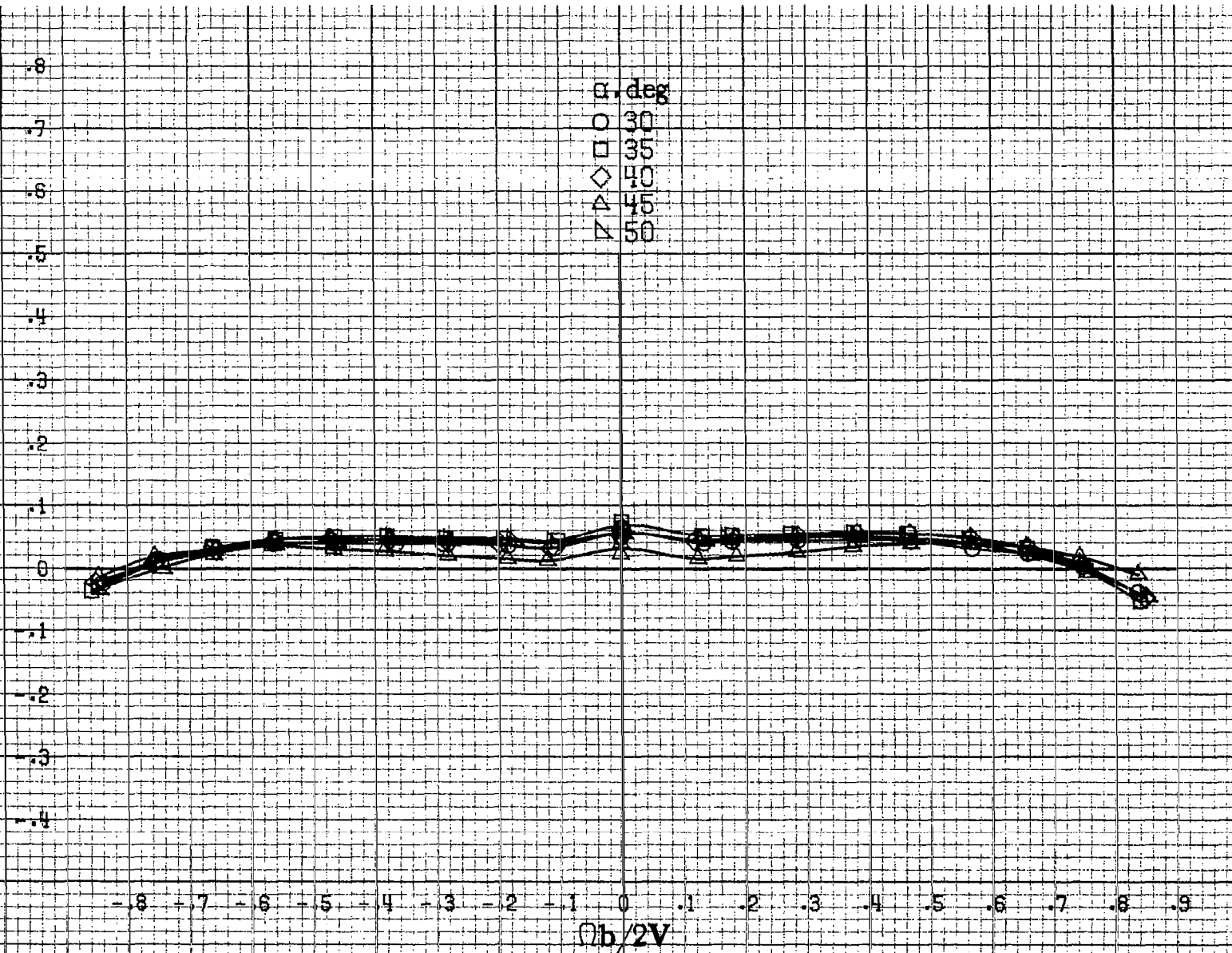
A287

(b) $\alpha=18$ to 35 deg. $SR=99$ cm (39 in).

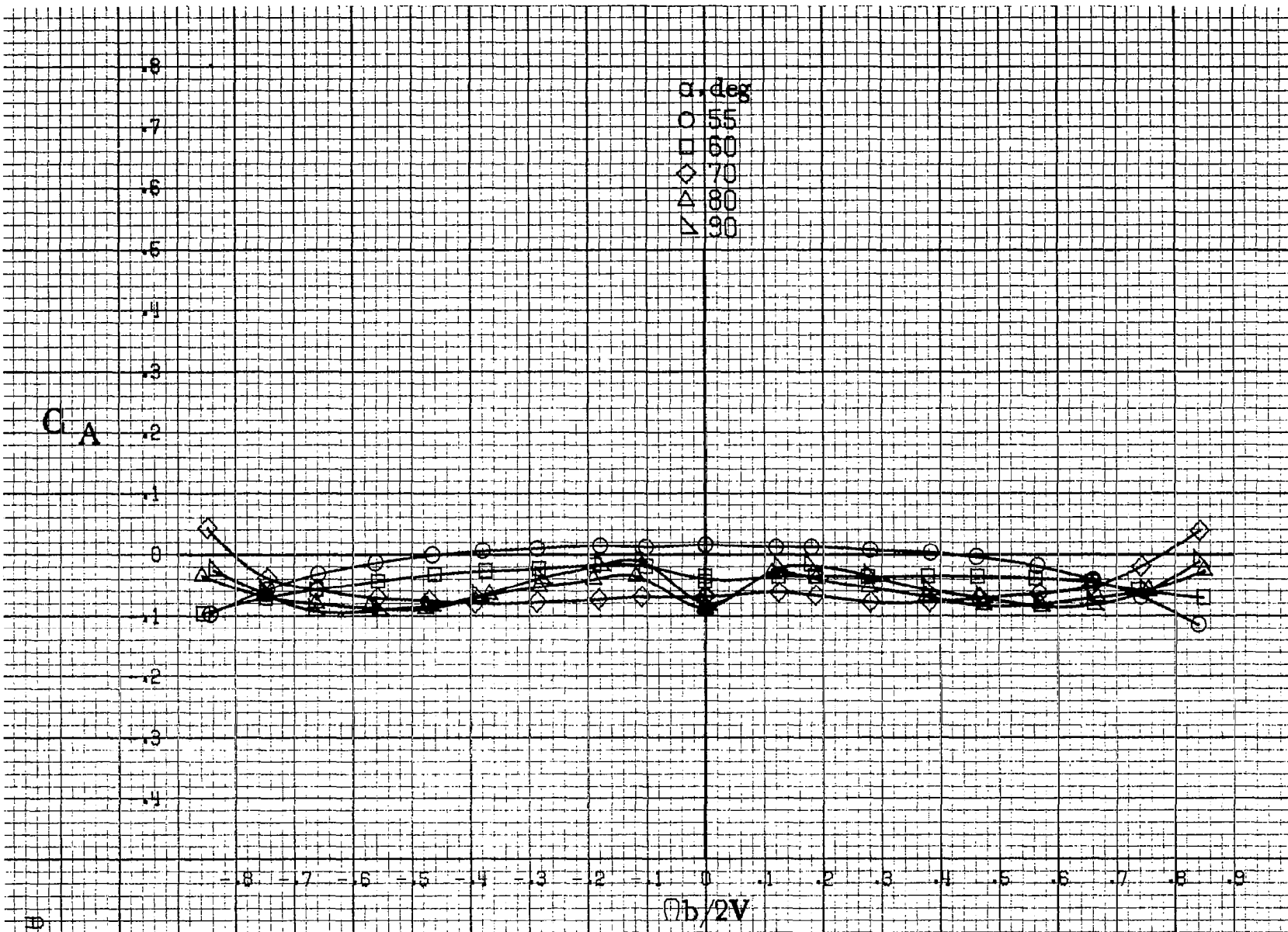
Figure A72. Continued.

A288

C_A

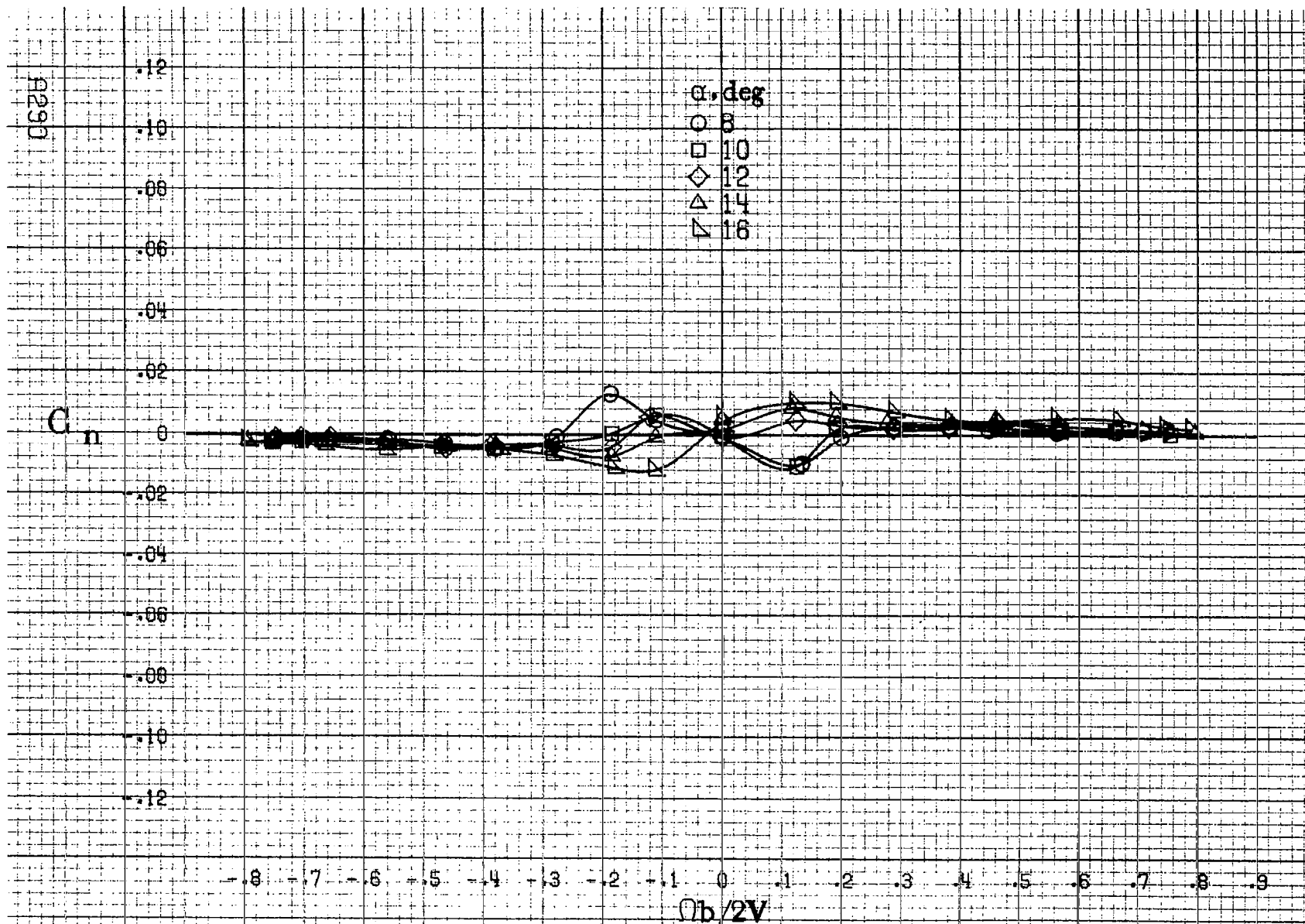


(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A72, Continued.



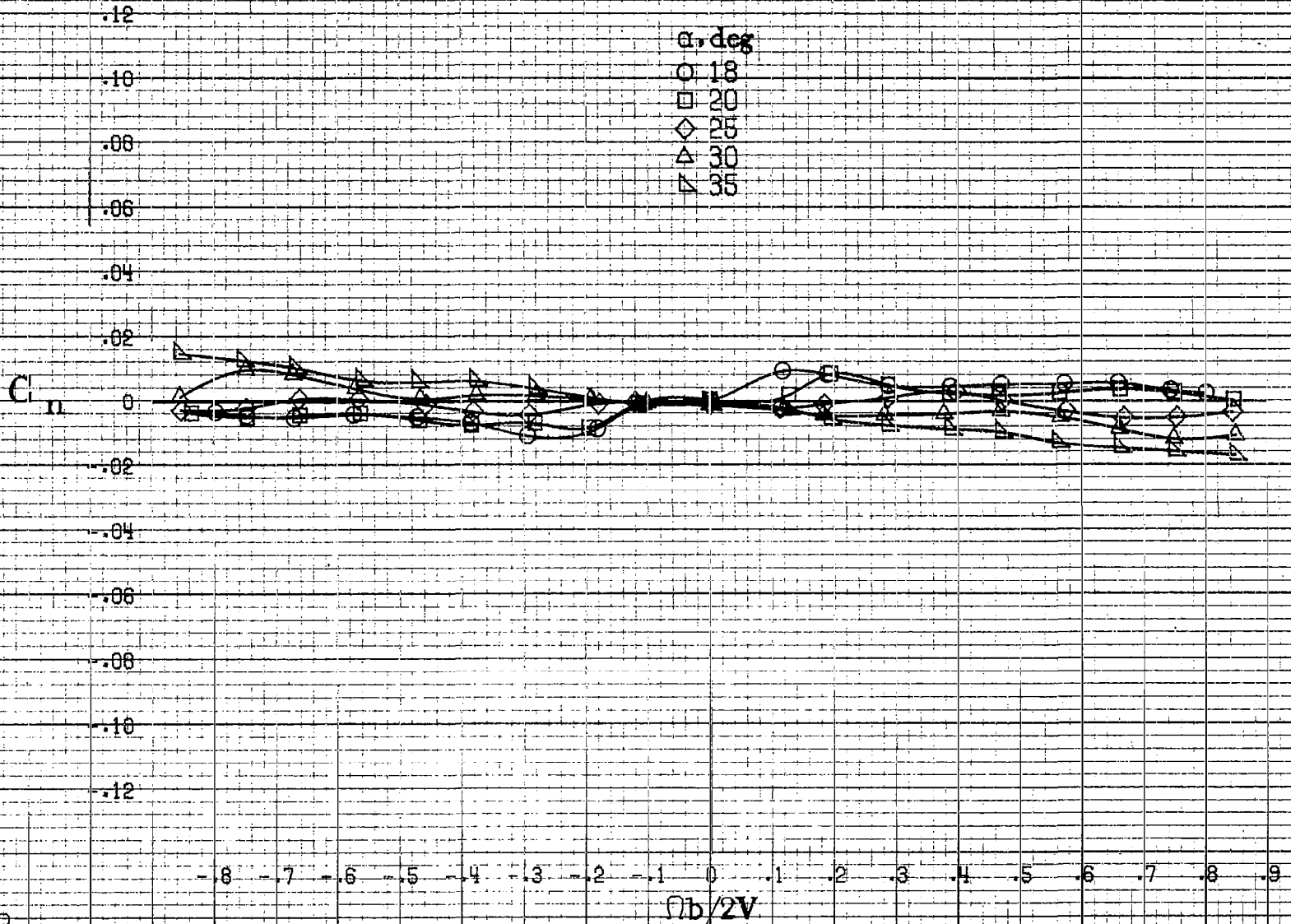
#283

(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A72 Concluded.



(a) $\alpha=8\text{ to }16\text{ deg}$, $SR=99\text{ cm (39 in)}$.

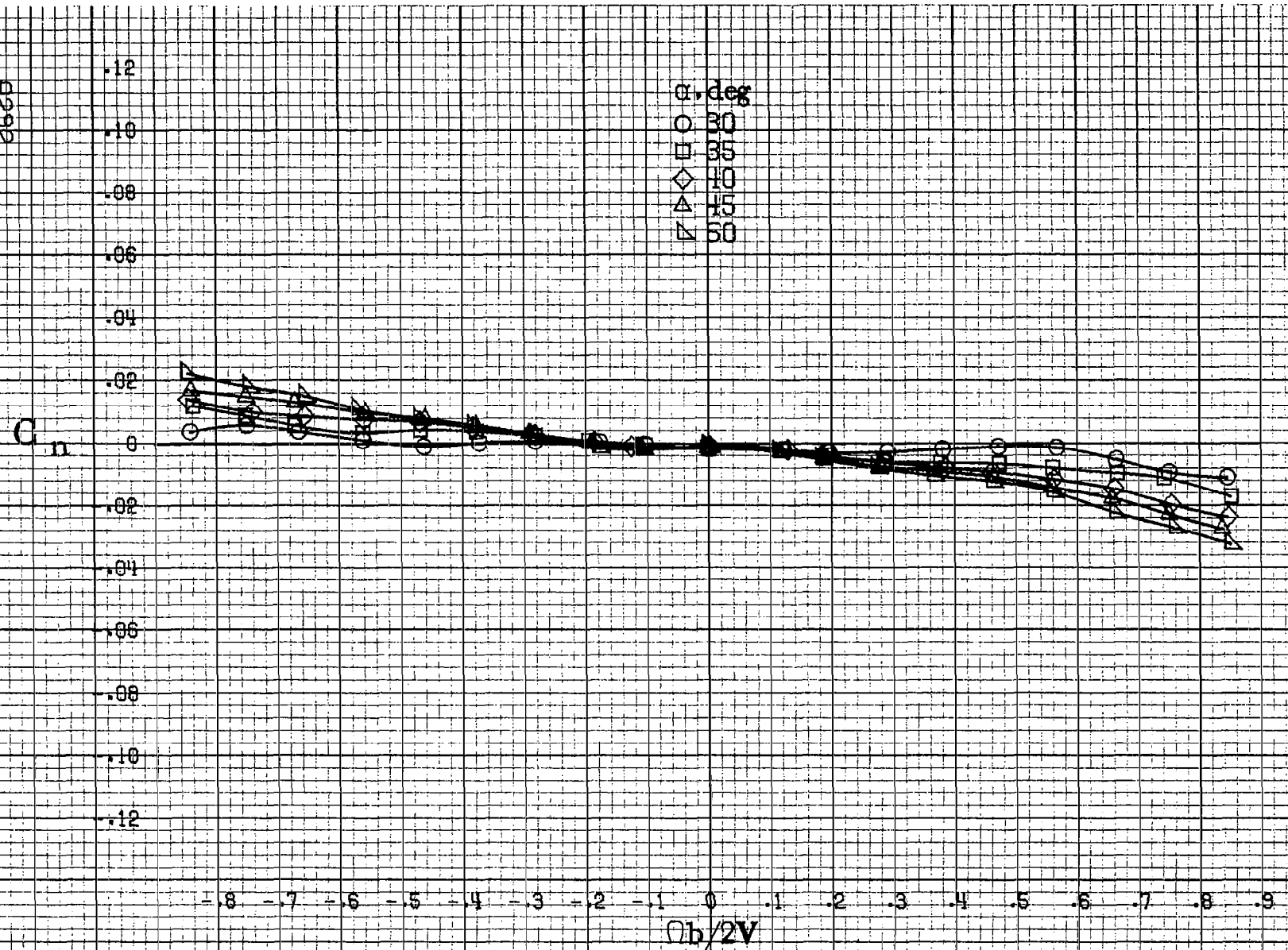
Figure A73. Effect of rotation rate and angle of attack on yawing-moment coefficient for no. 2 horizontal tail configuration with vertical tail off.
 $\delta_e=0^\circ$, $\delta_a=0^\circ$, $\delta_r=0^\circ$, $\beta=0^\circ$.



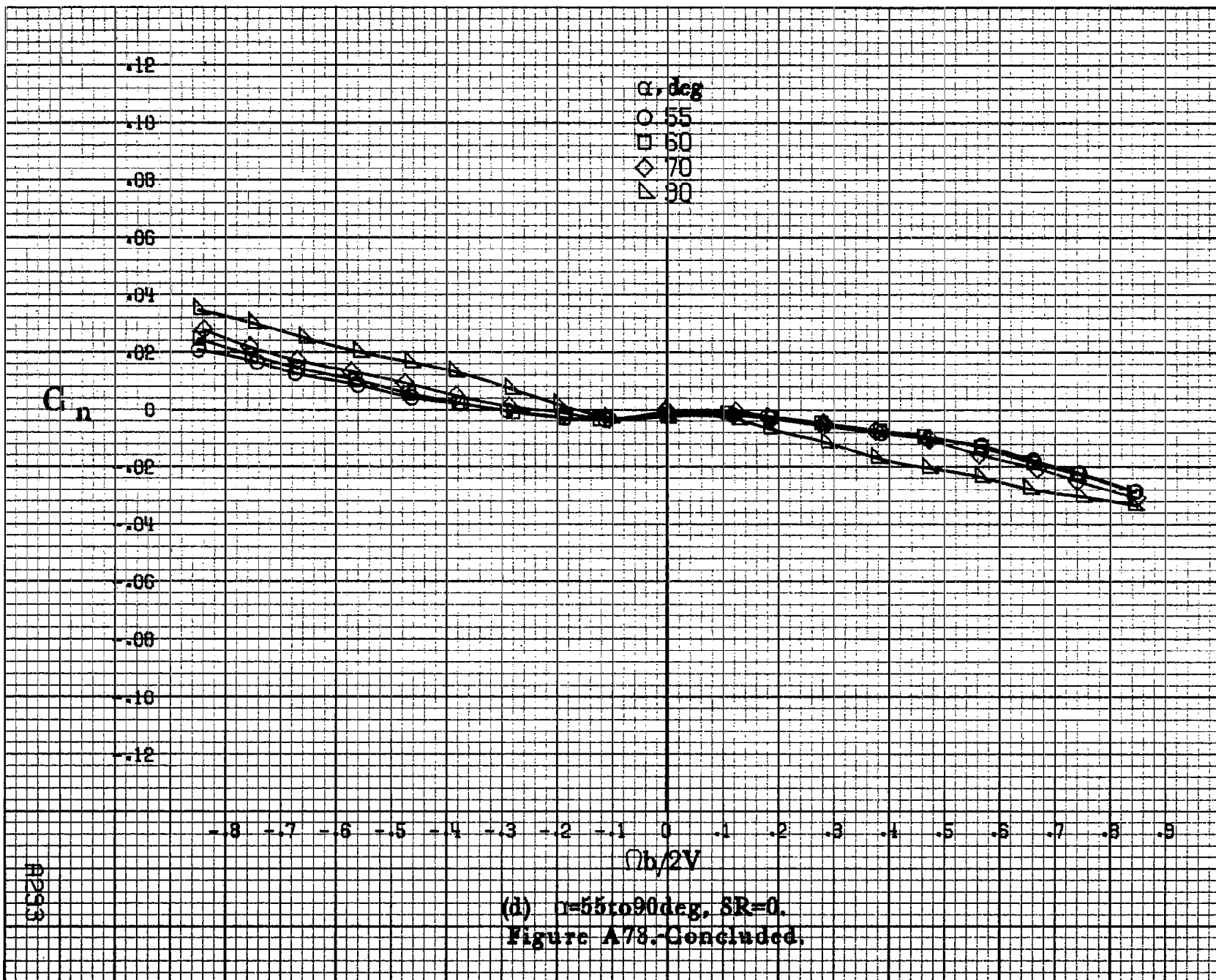
(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A73. Continued.

#291

A292

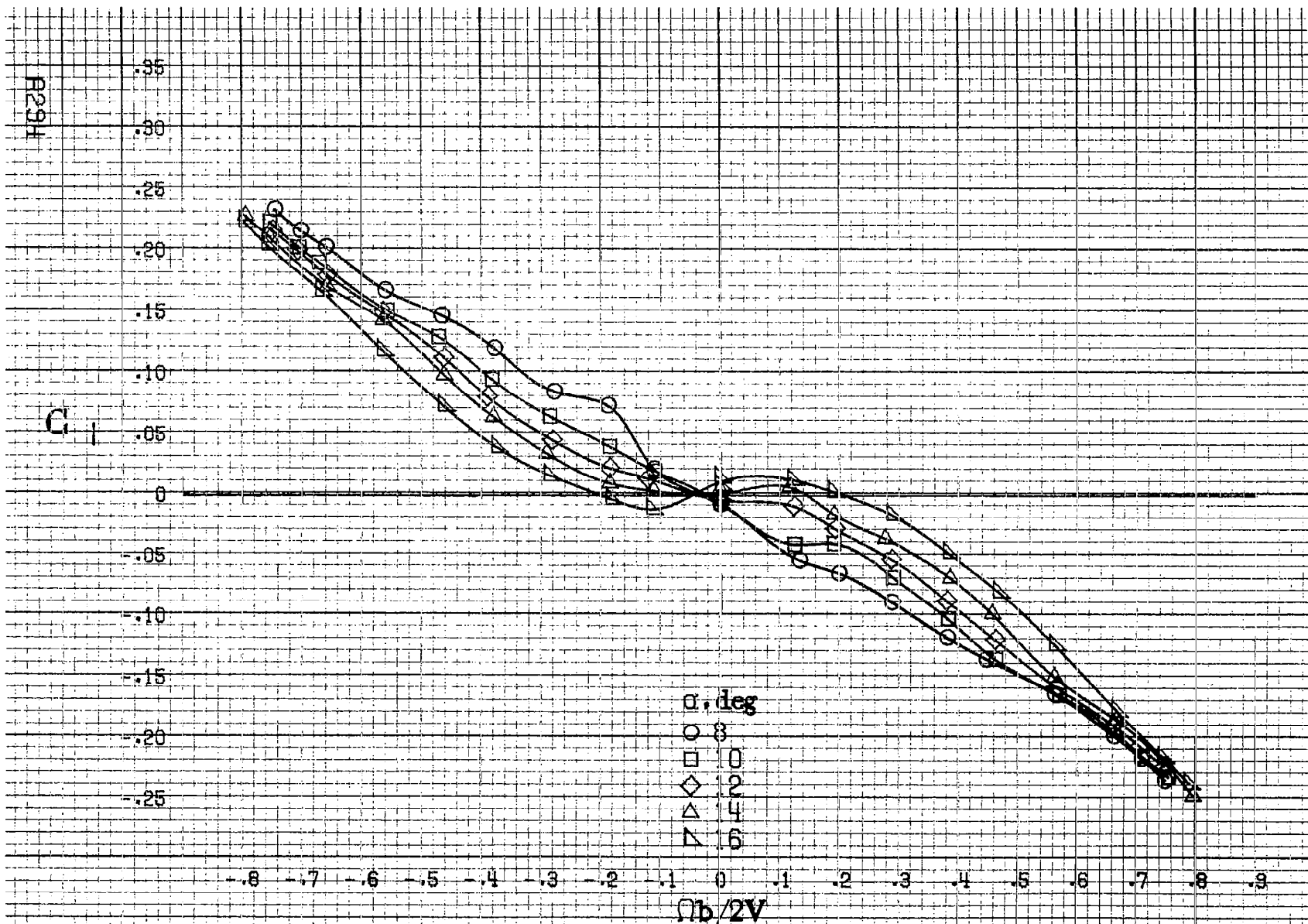


(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A73. Continued.



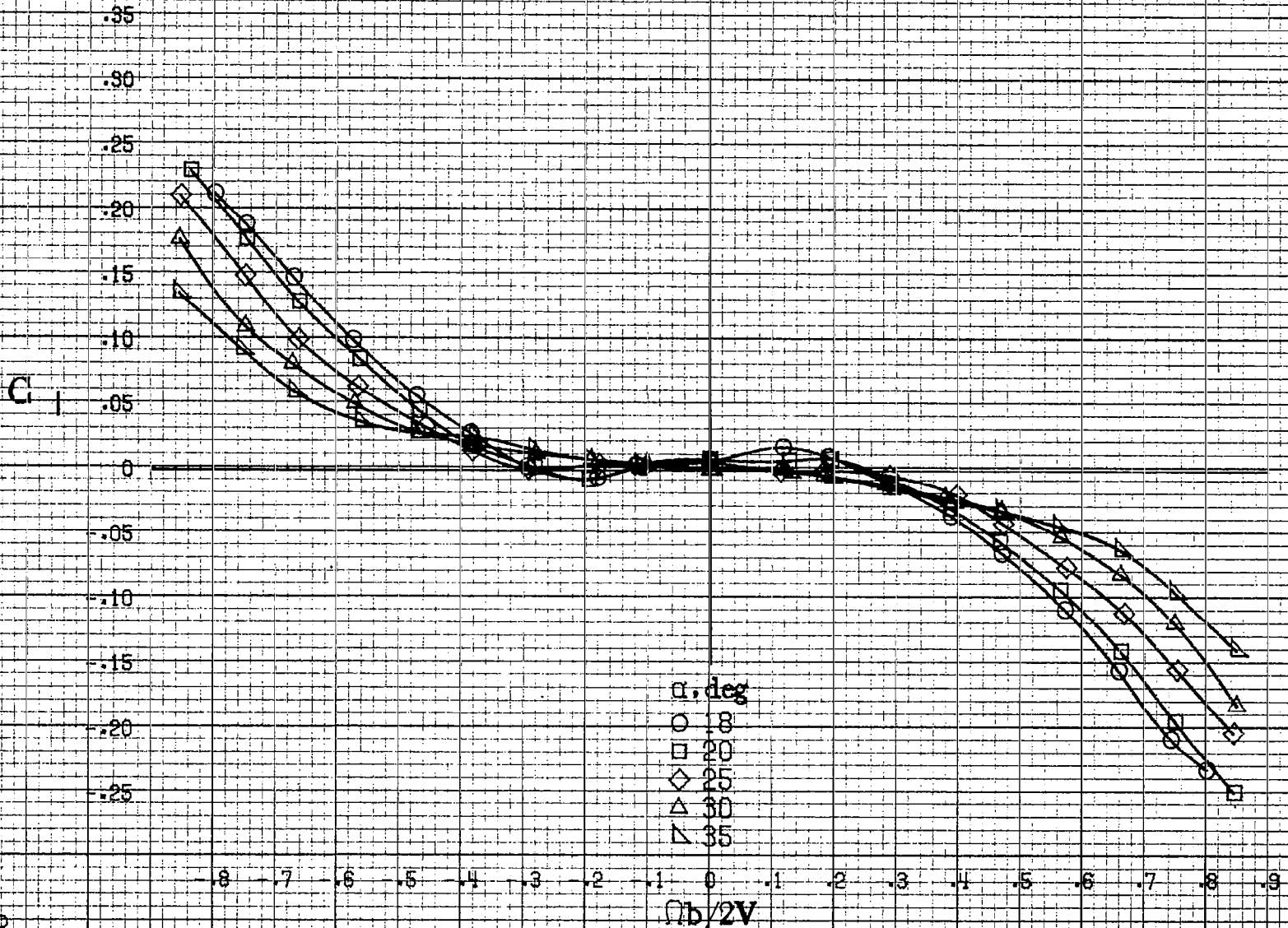
(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A78.-Concluded.

A293



(a) $\alpha=8$ to 16 deg, SR=99 cm (39 in).

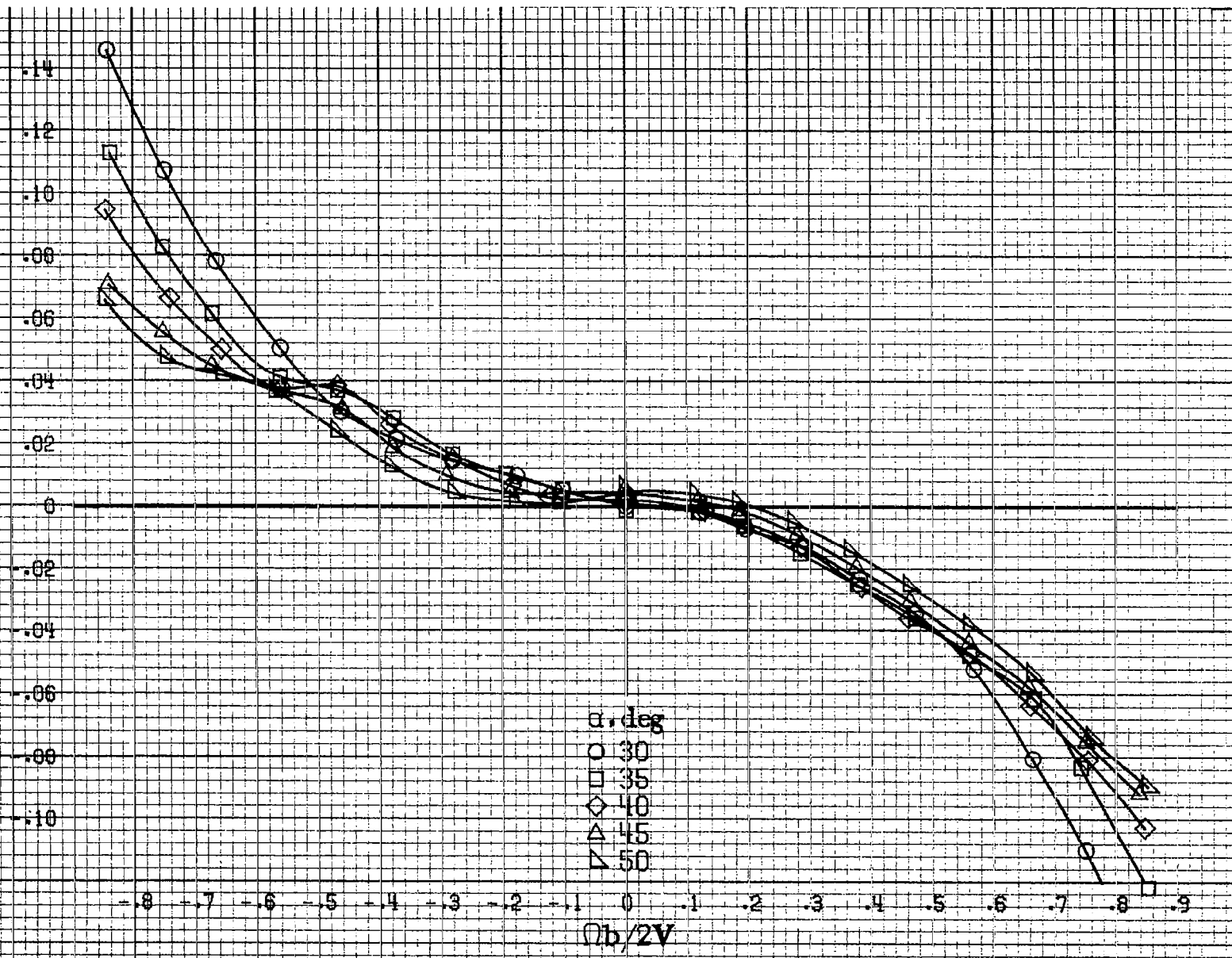
Figure A74. Effect of rotation rate and angle of attack on rolling-moment coefficient for no. 2 horizontal tail configuration with vertical tail off.
 $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



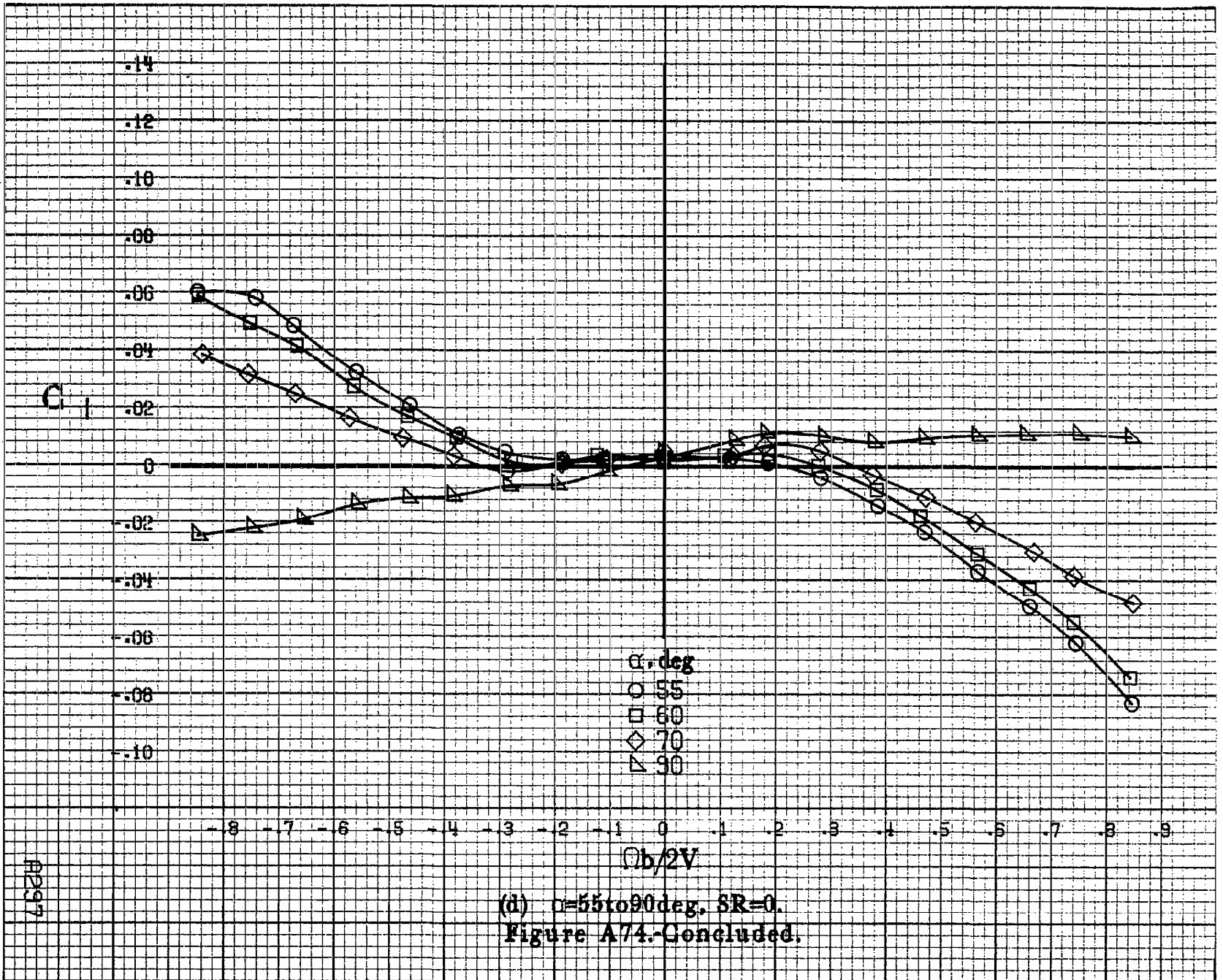
(b) $\alpha = 18$ to 35° , $SR = 99$ cm (39 in).
 Figure A74. Continued.

A2236

C_1



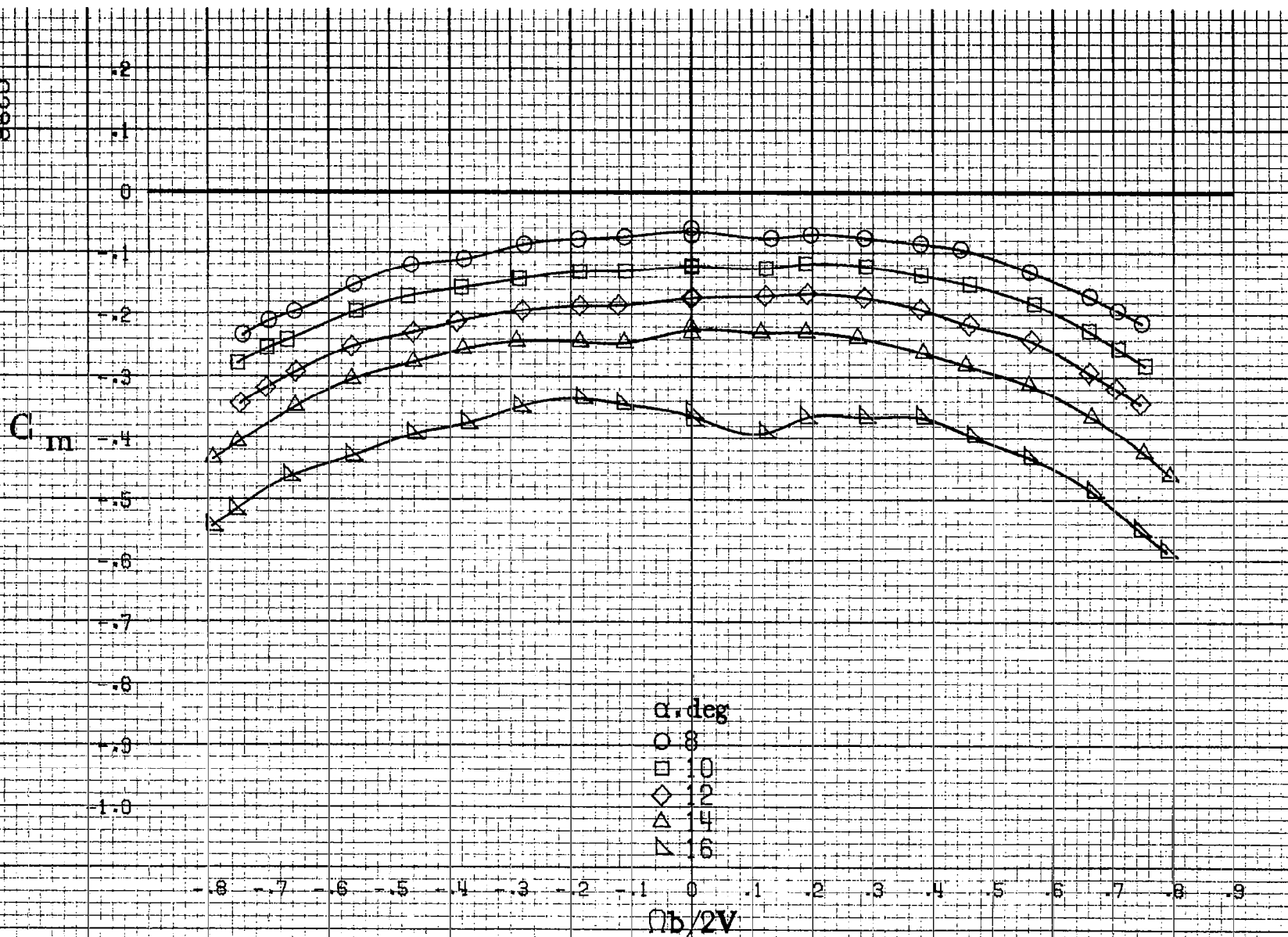
(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A74. Continued.



(d) $\alpha = 55$ to 90 deg. $SR = 0$.
 Figure A74 - Concluded.

RP297

E298



(a) $\alpha=8$ to 16 deg, SR-99cm (39in).

Figure A75.-Effect of rotation rate and angle of attack on pitching-moment coefficient for no. 2 horizontal tail configuration with vertical tail off. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

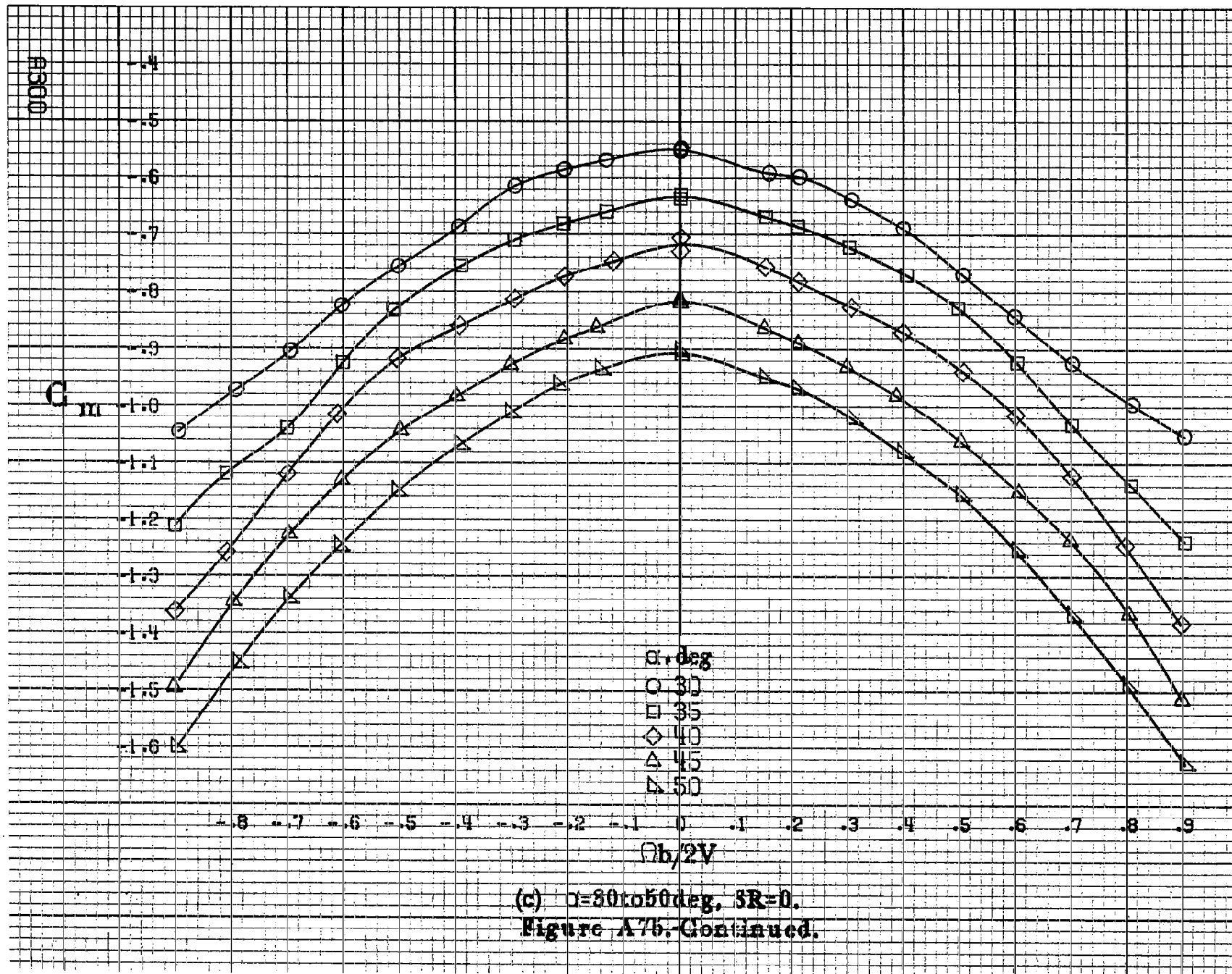
C_m

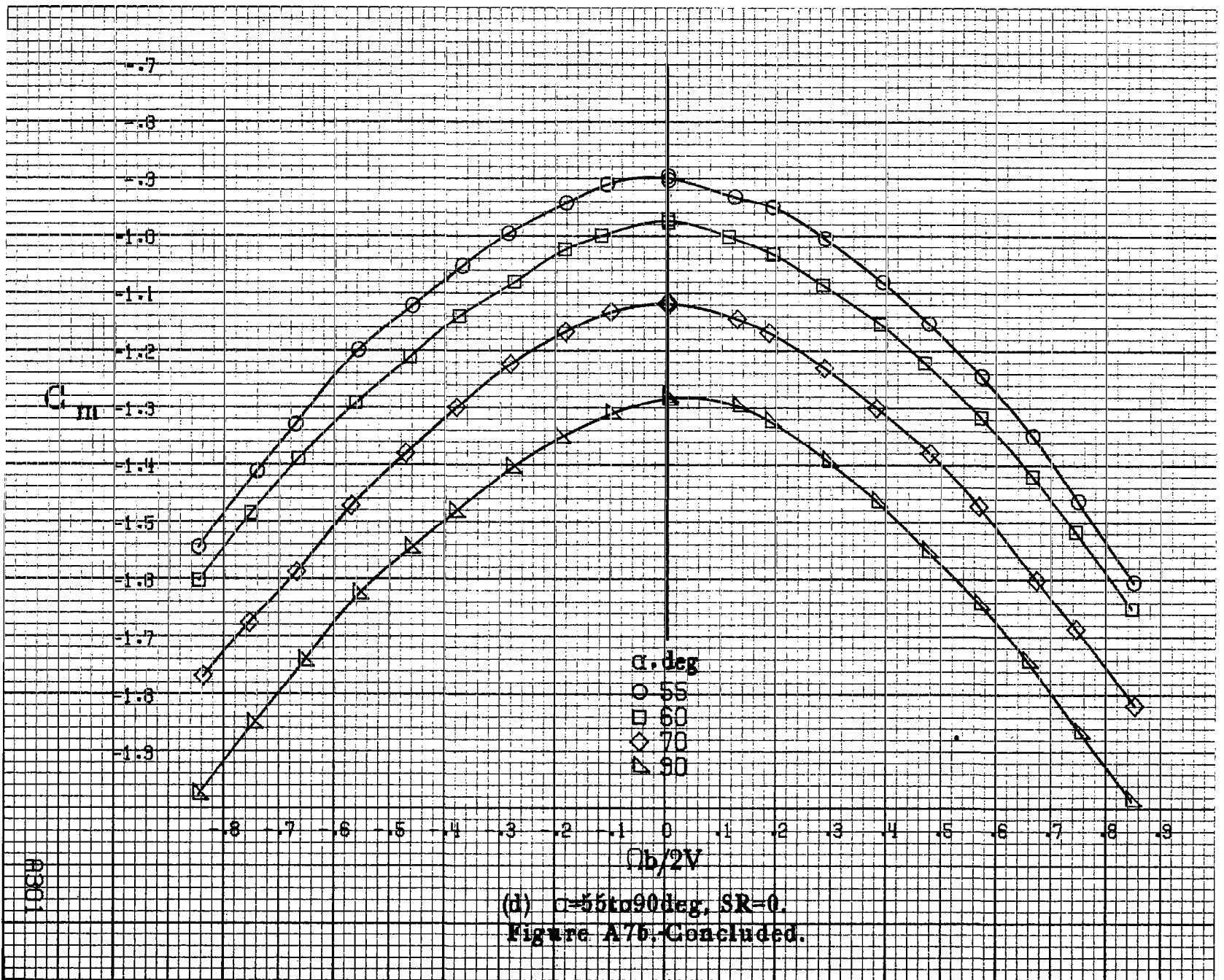
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9
 $\Omega b/2V$

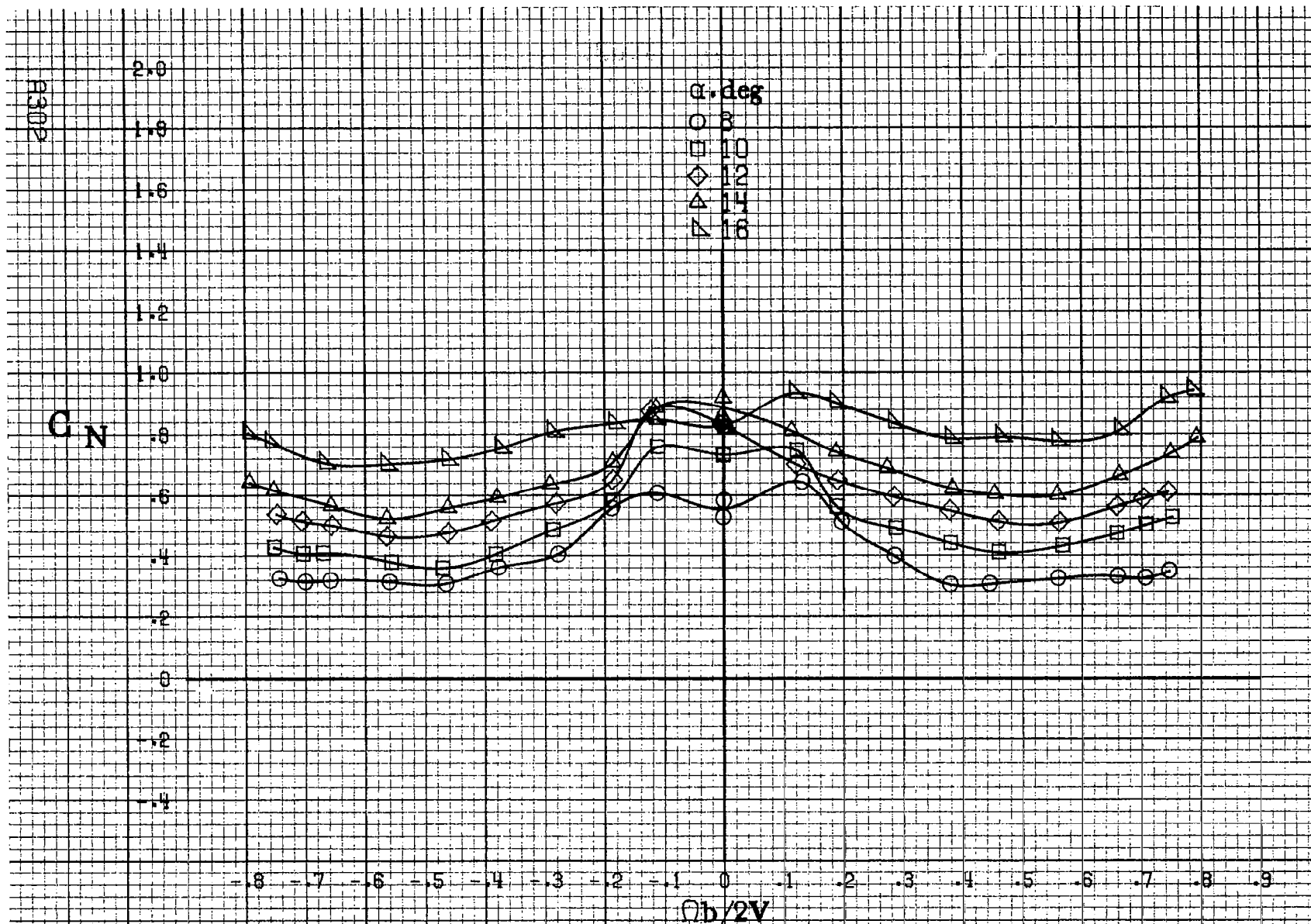
(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A75. Continued.





(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A75-Concluded.

A301



(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A76. Effect of rotation rate and angle of attack on normal-force coefficient for no. 2 horizontal tail configuration with vertical tail off. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_N

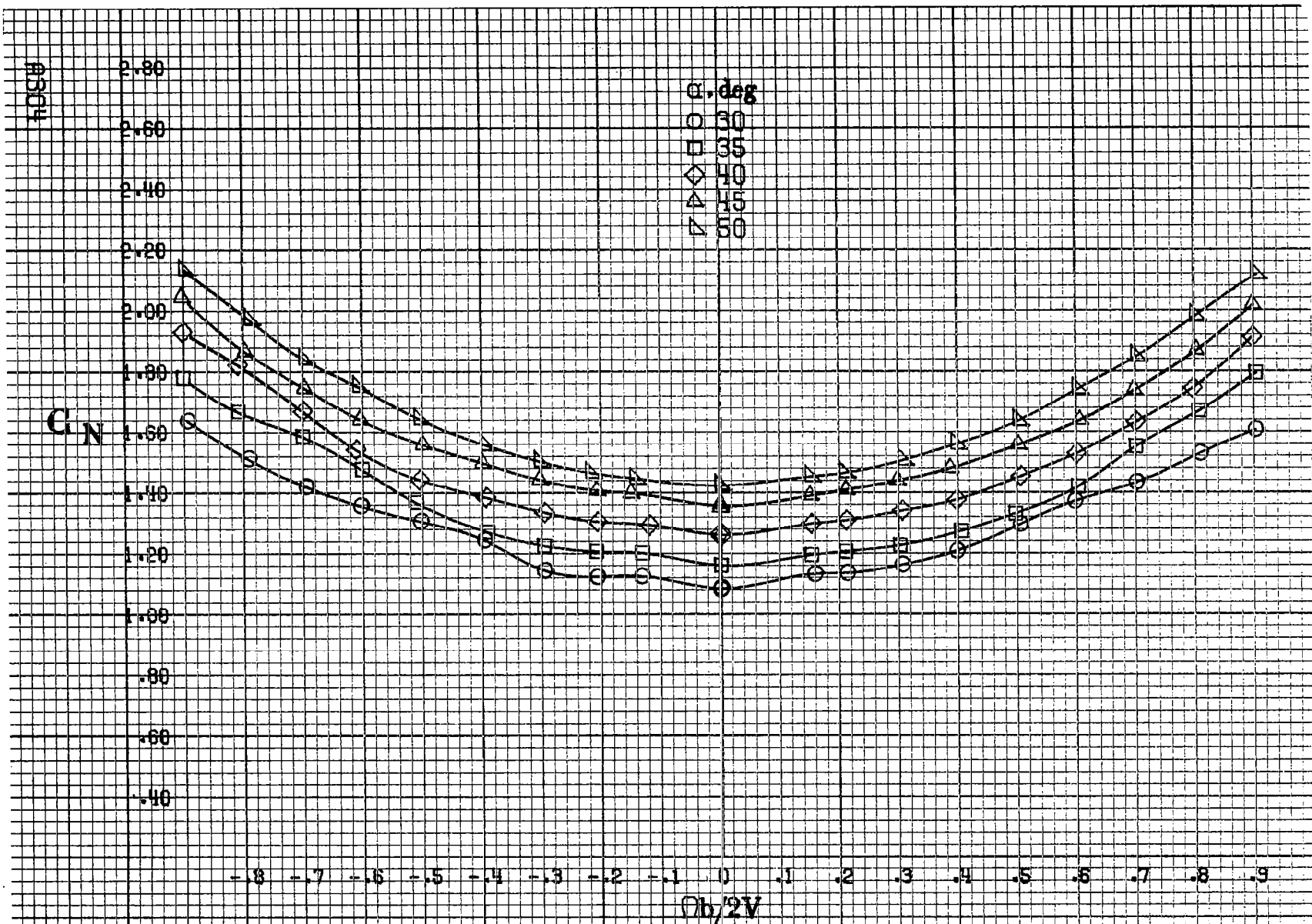
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
0

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

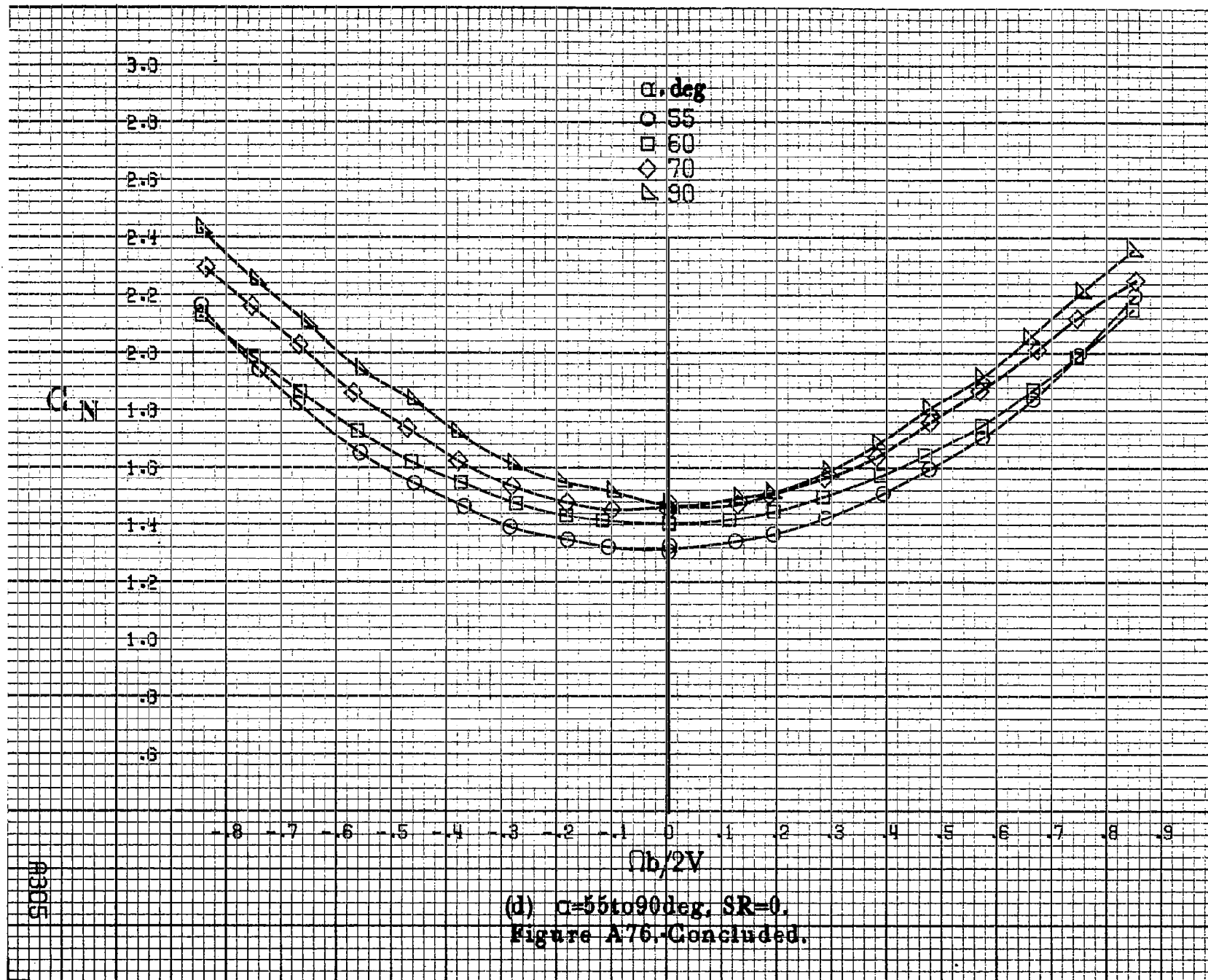
-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\Omega b/2V$

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A76, Continued.

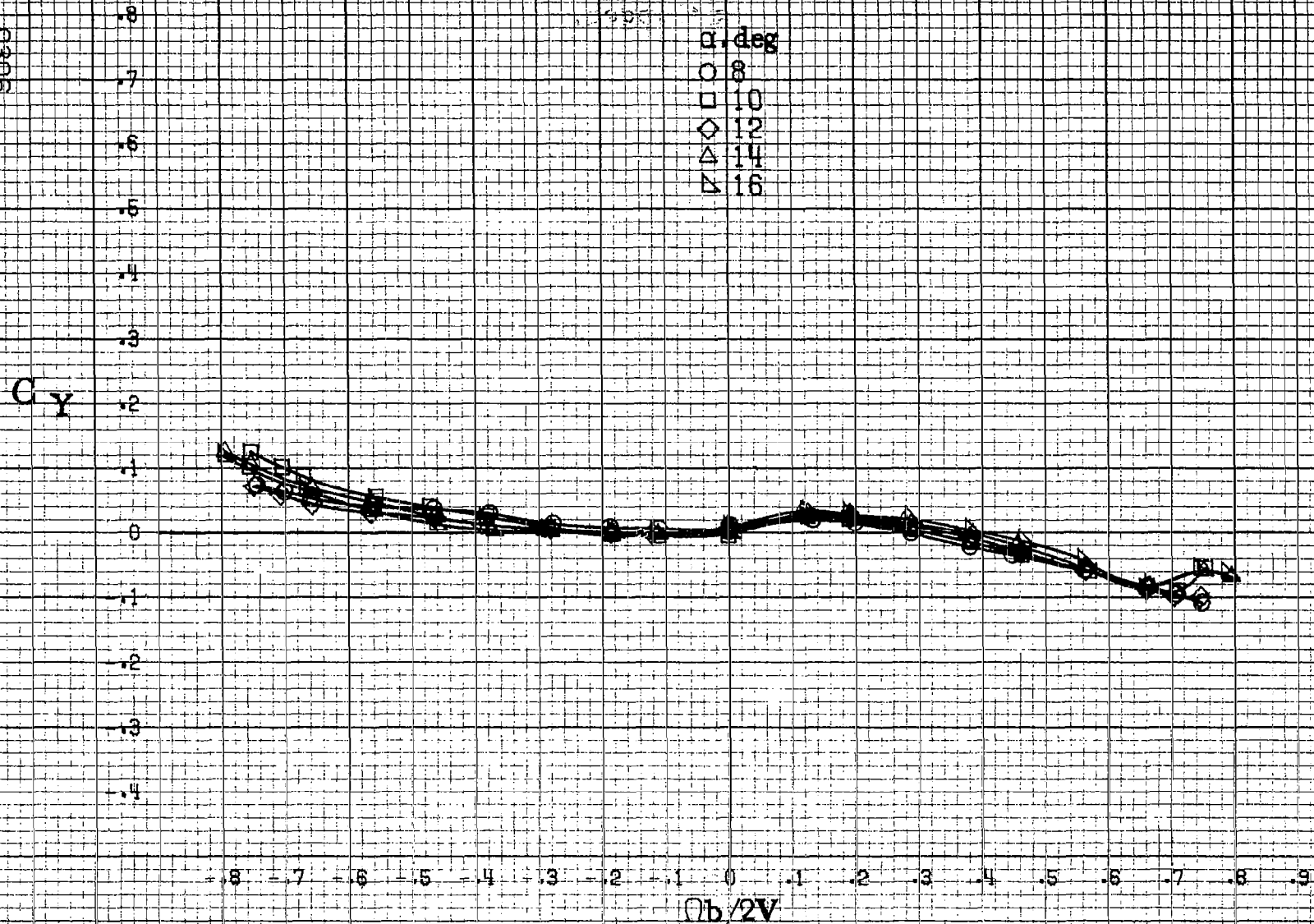
4303



(c) $\alpha = 50$ to 55 deg, $SR = 0$.
 Figure A76-Continued.



9306



(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A77. Effect of rotation rate and angle of attack on side-force coefficient for no. 2 horizontal tail configuration with vertical tail off. $\delta_a = 0^\circ$, $\delta_z = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_y

.8
.7
.6
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4

α , deg
O 18
□ 20
◇ 25
△ 30
▽ 35

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\theta_b/2V$

A307

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A77. Continued.

E308

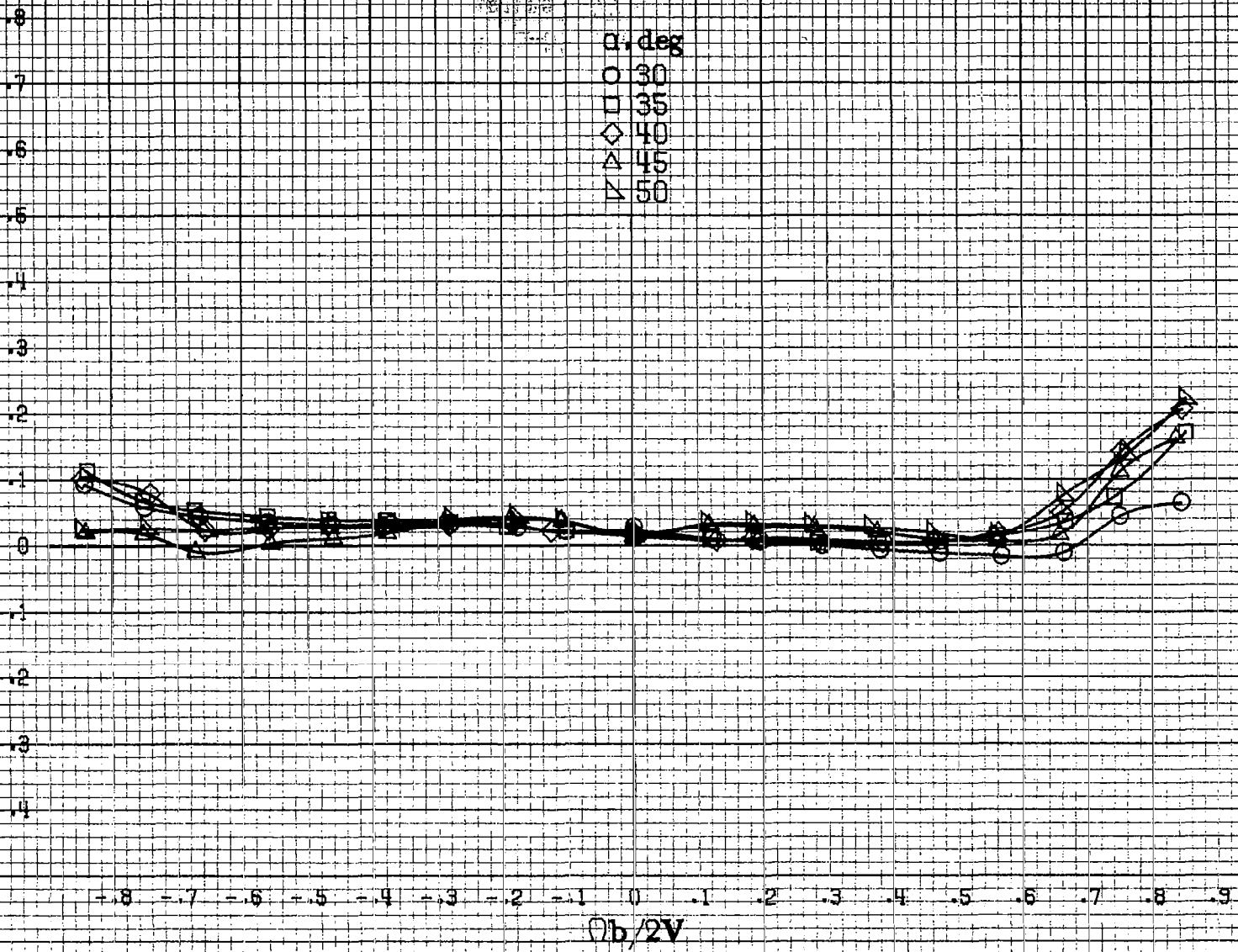
C_y

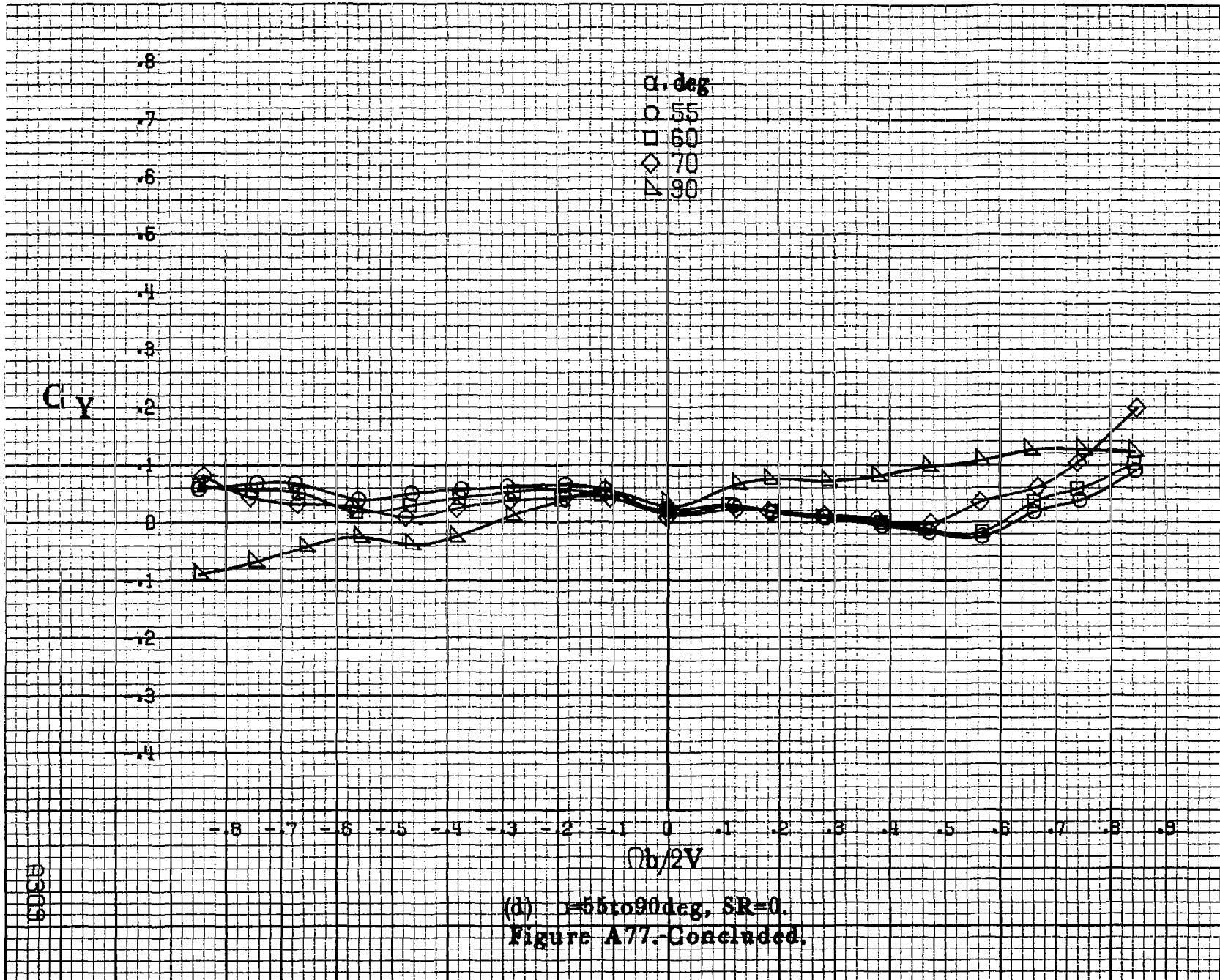
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\theta b/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A77, Continued.





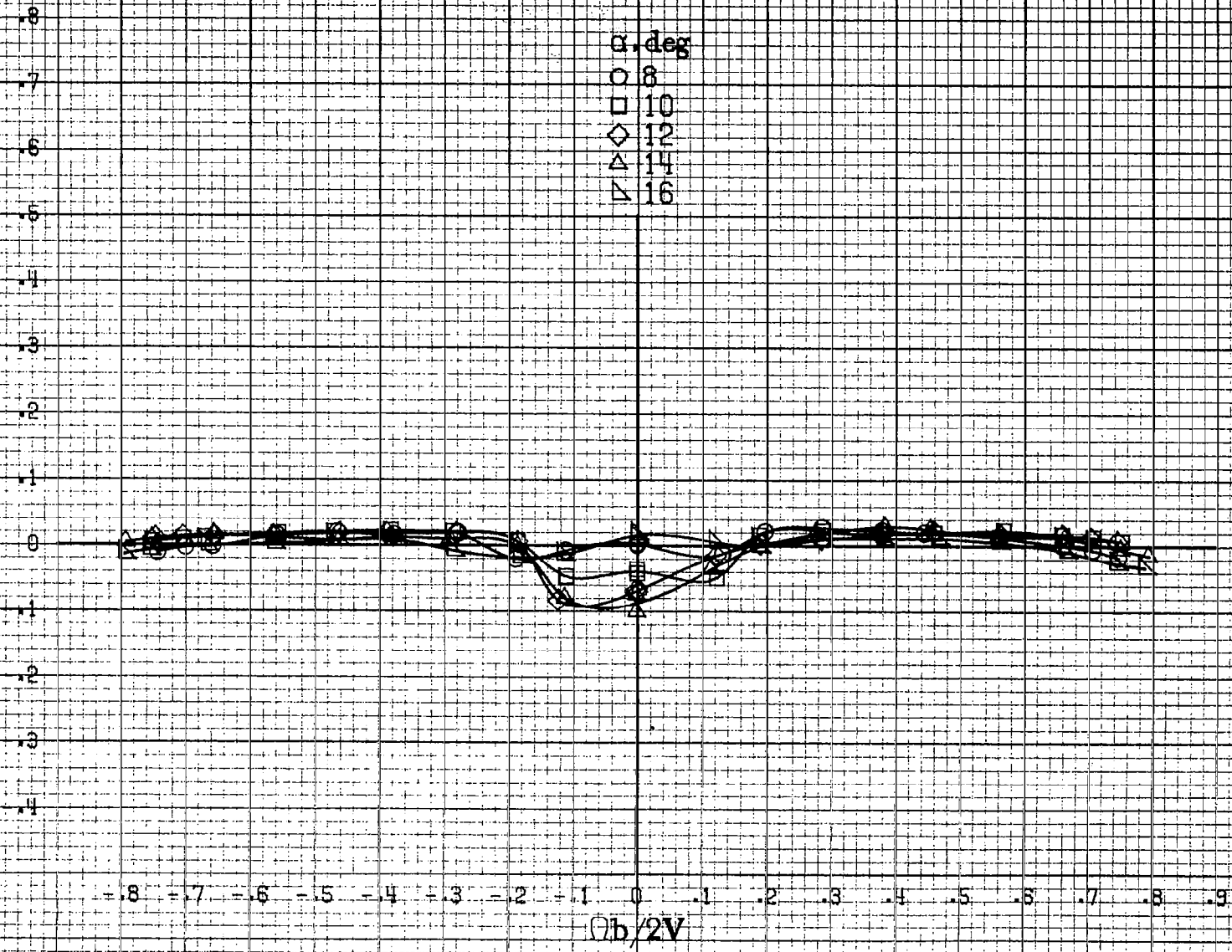
43009

(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A77 - Concluded.

8310

C_A

α , deg
 ○ 8
 □ 10
 ◇ 12
 △ 14
 ▽ 16



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A78. Effect of rotation rate and angle of attack on axial-force coefficient for no. 2 horizontal tail configuration with vertical tail off. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_A

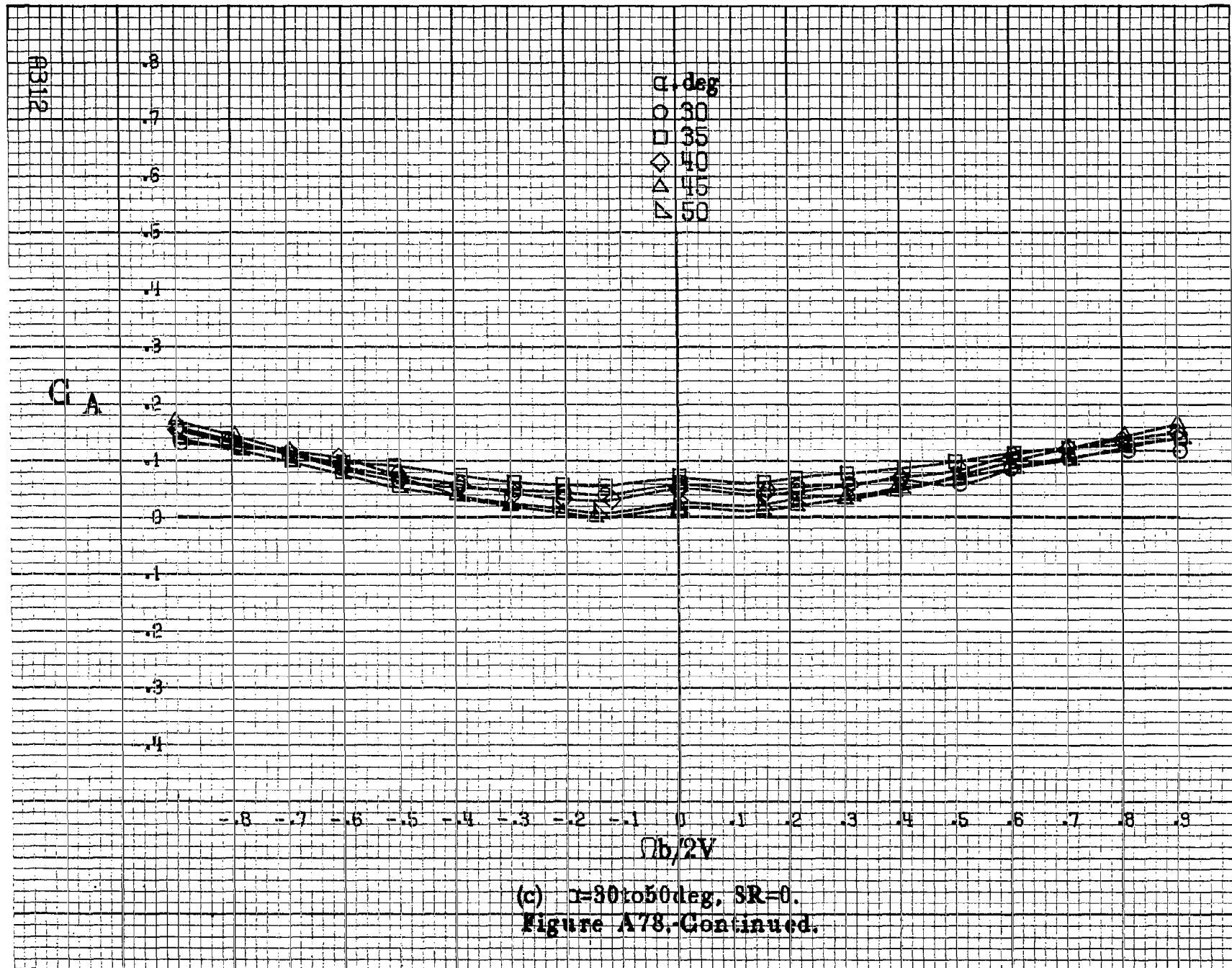
.8
.7
.6
.5
.4
.3
.2
.1
0
.1
.2
.3
.4

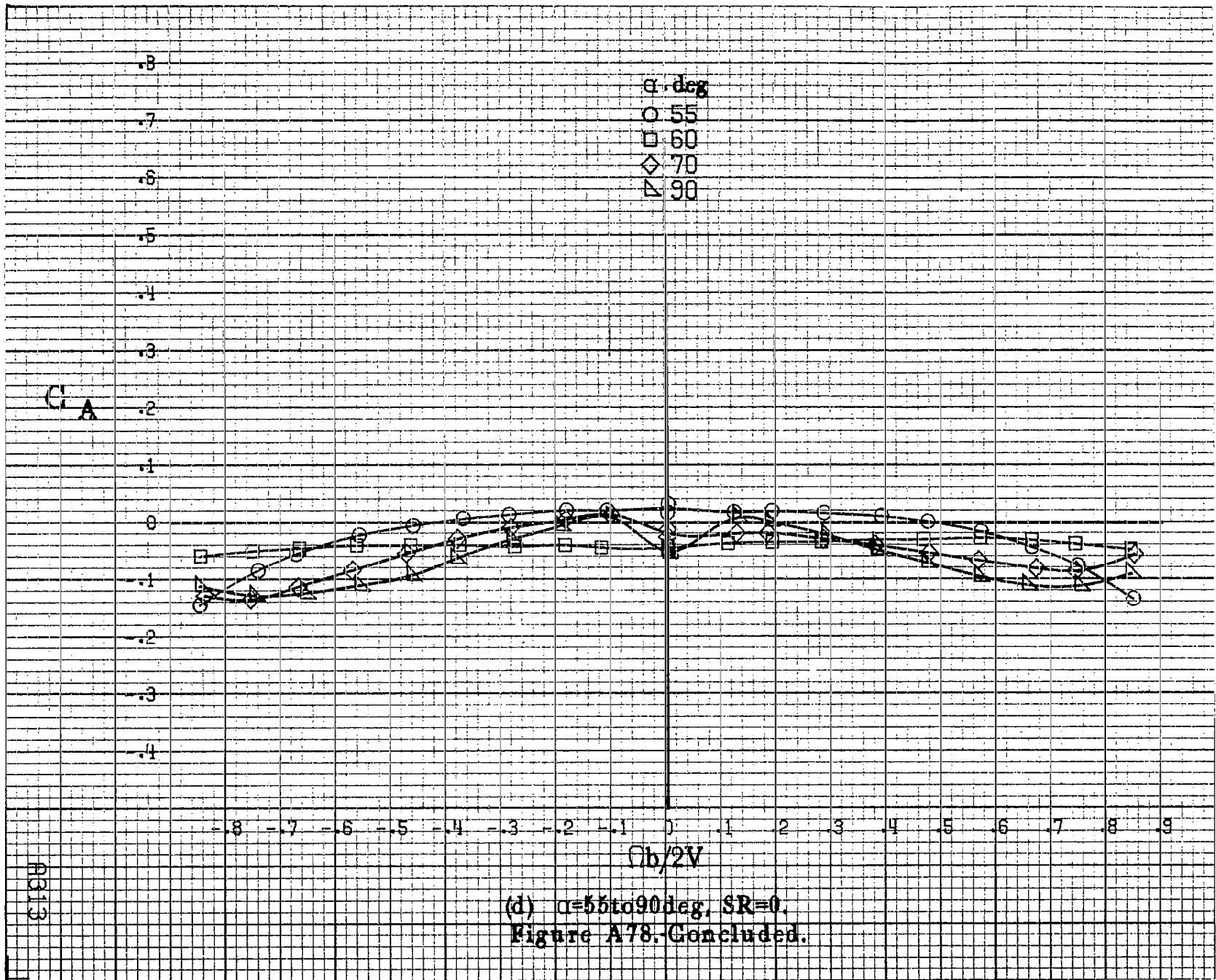
α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $b/2V$

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A78. Continued.

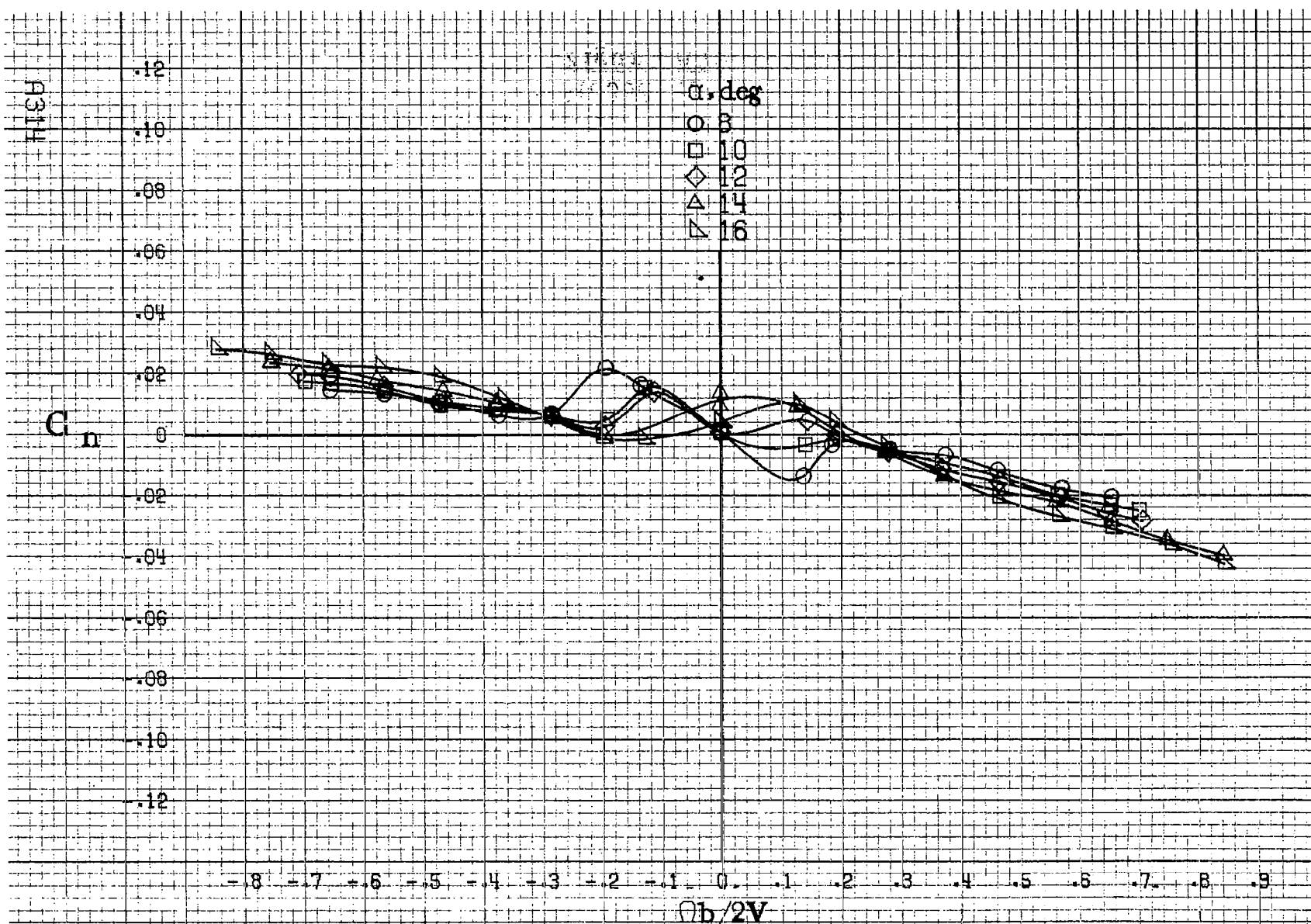
A311





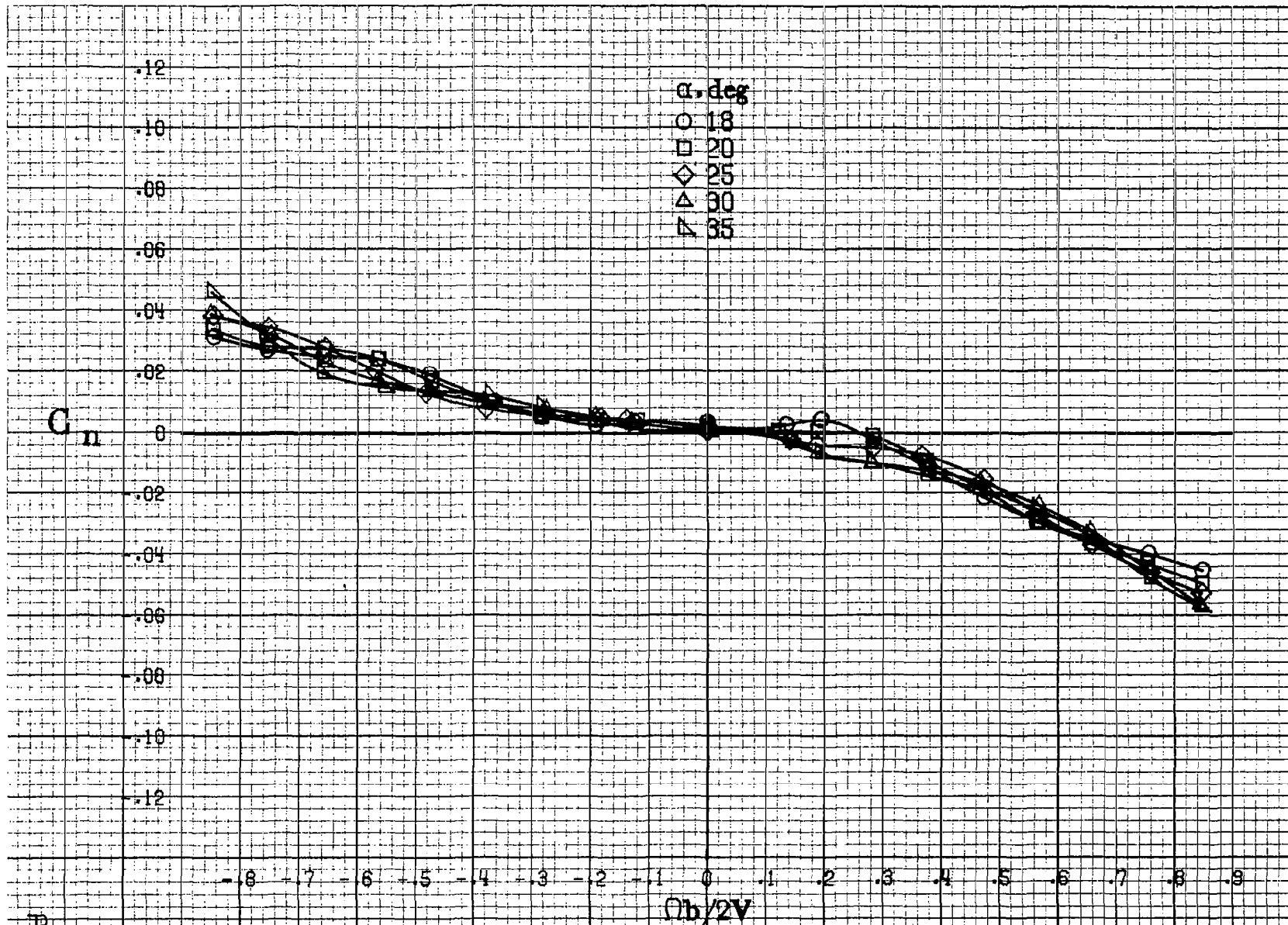
(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A78. Concluded.

R313



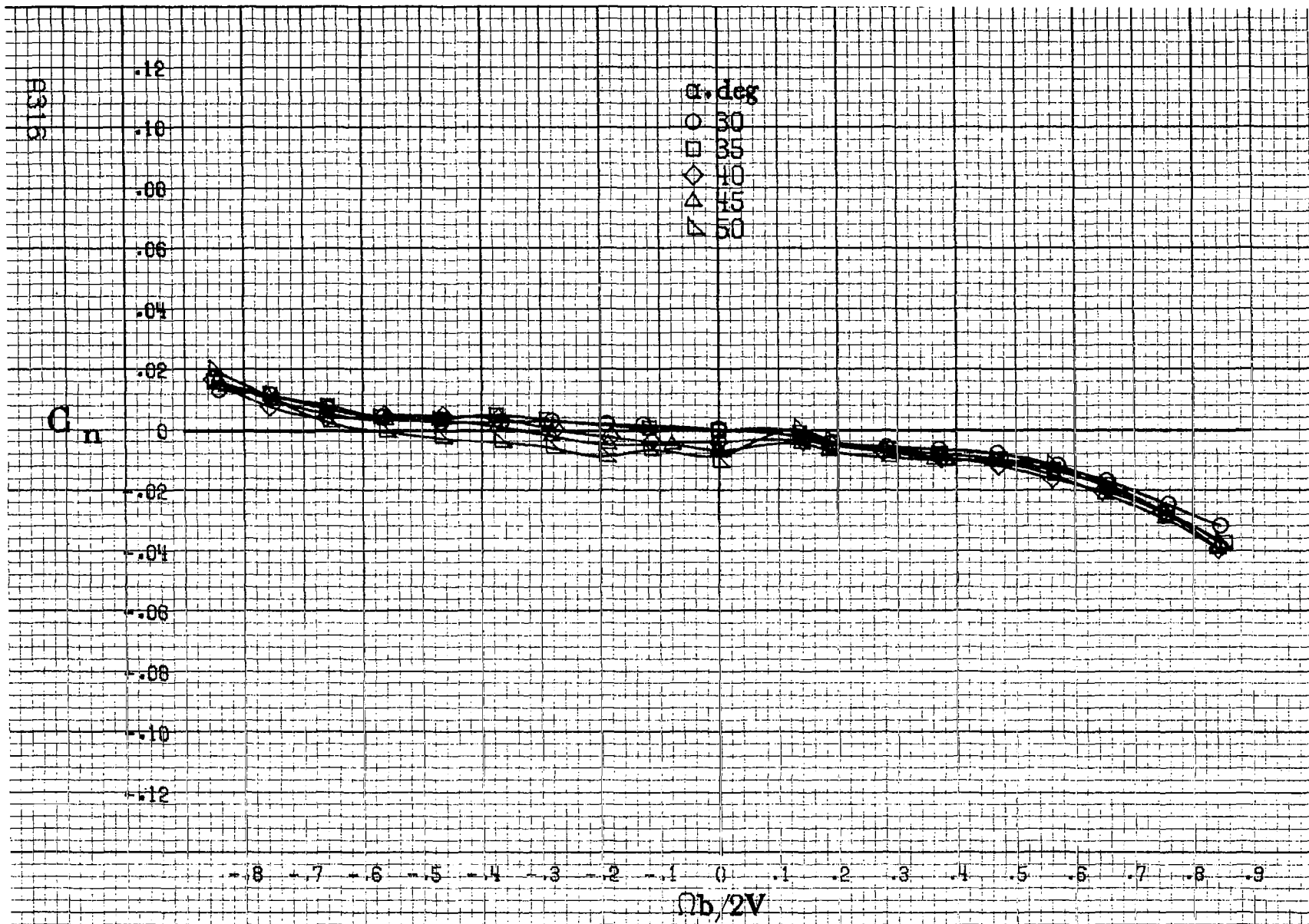
(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A79. Effect of rotation rate and angle of attack on yawing-moment coefficient for configuration having sharp-edged fuselage bottom aft of wing
 TE. $\delta_a=0^\circ$, $\delta_s=0^\circ$, $\delta_r=0^\circ$, $\beta=0^\circ$.

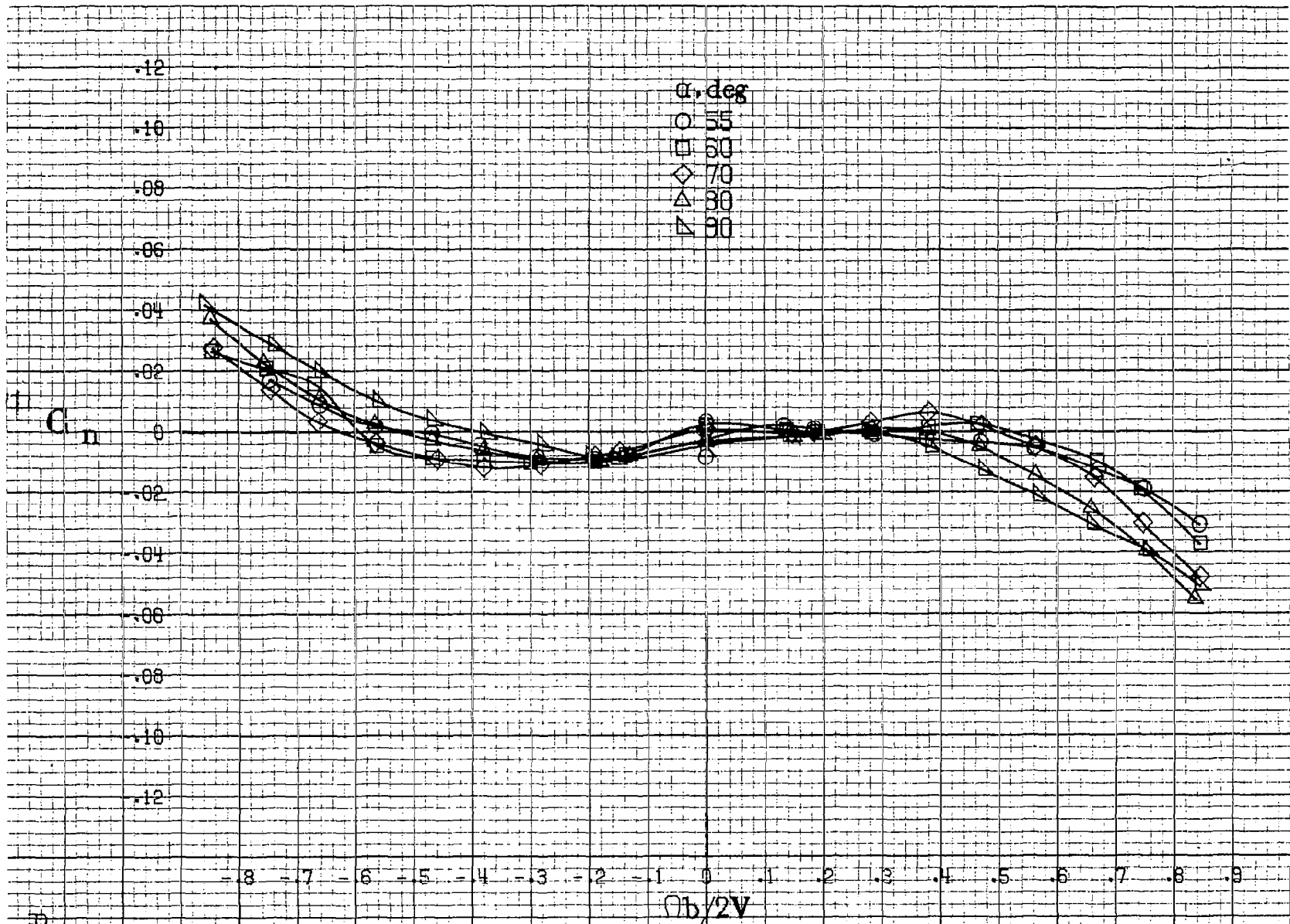


(b) $\alpha = 18$ to 35 deg. $SR = 99$ cm (39 in).
Figure A79. Continued.

A315

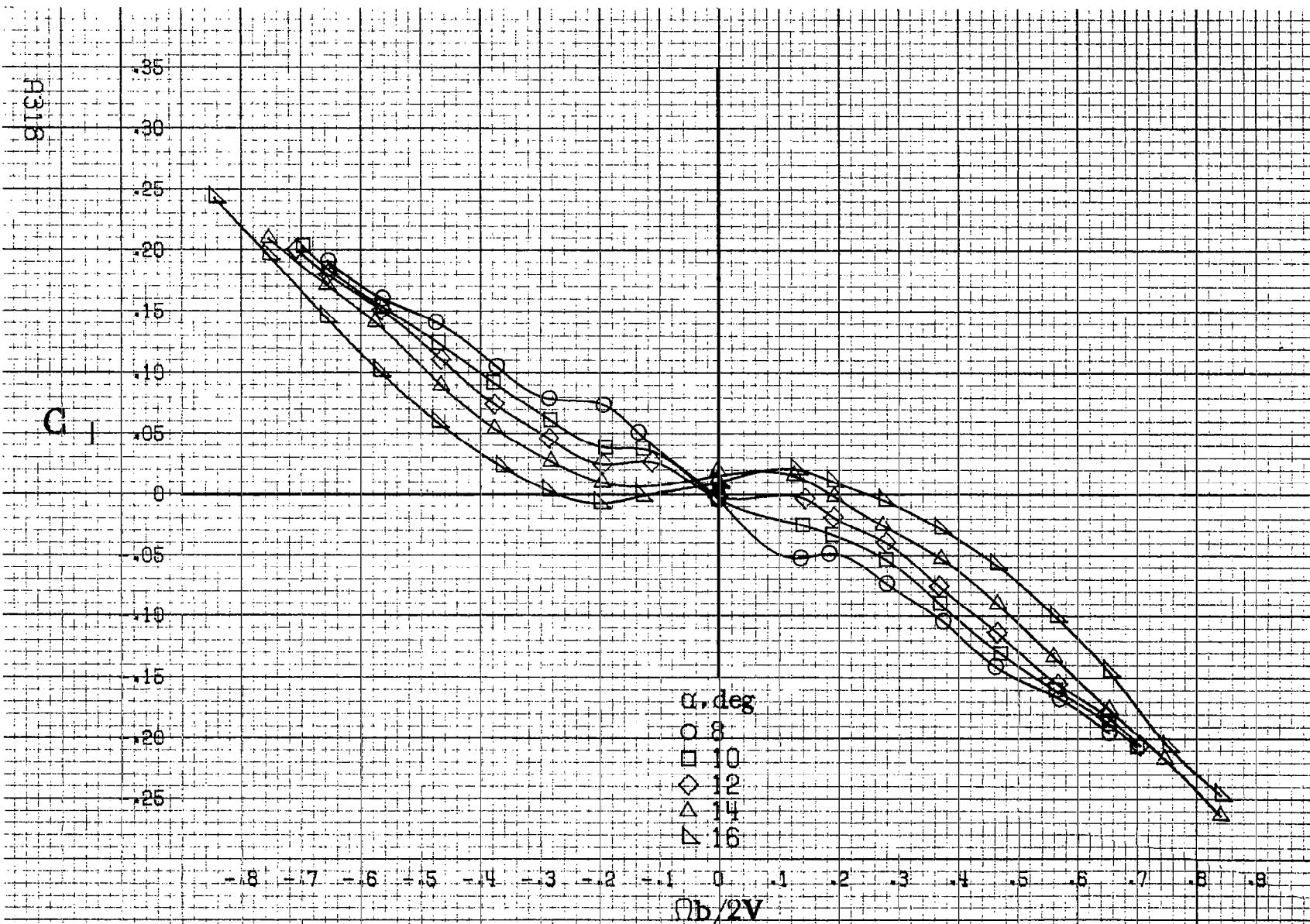


(c) $\alpha = 30$ to 50 deg. $SR = 0$.
 Figure A79, Continued.



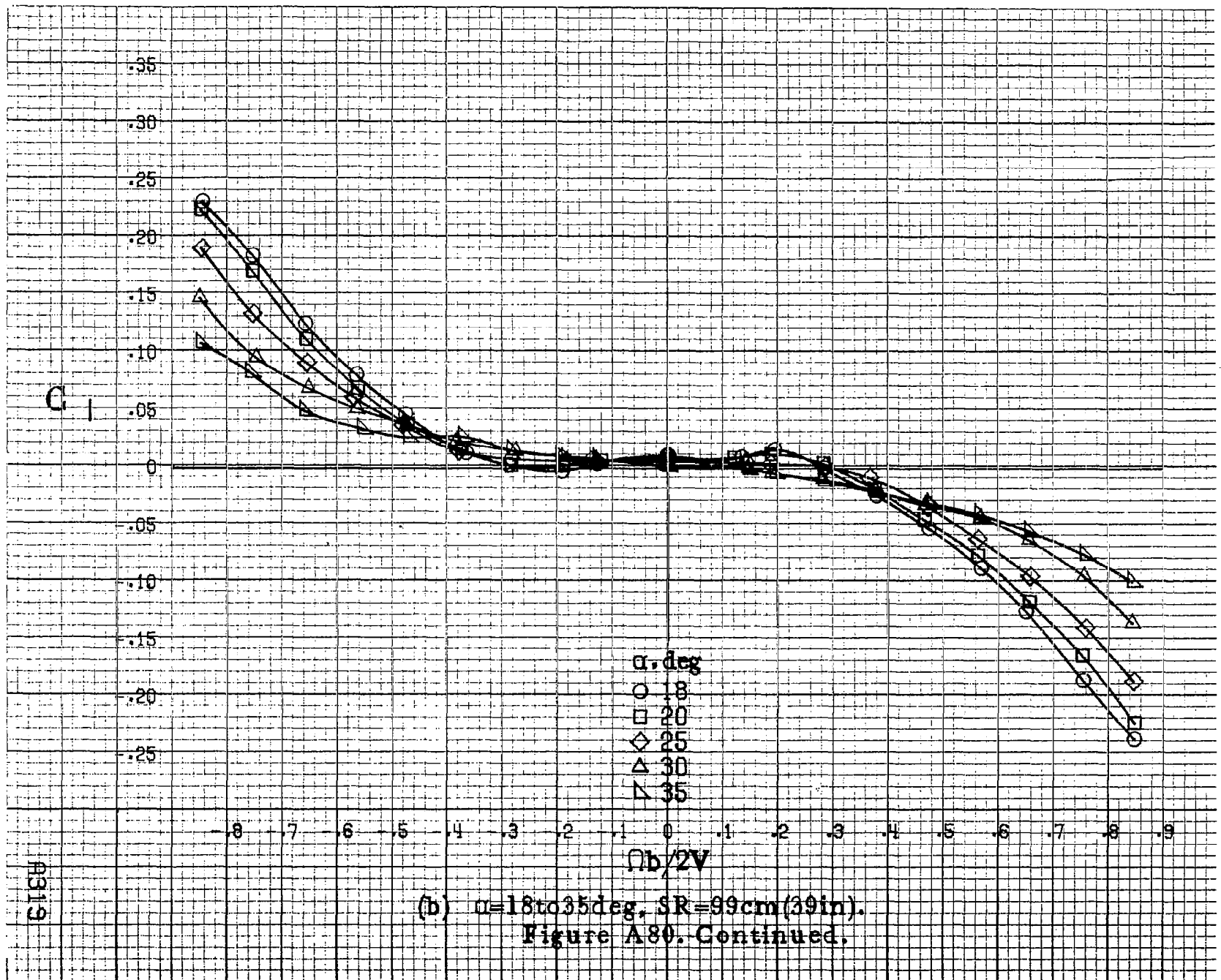
(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A.79. Concluded.

R317

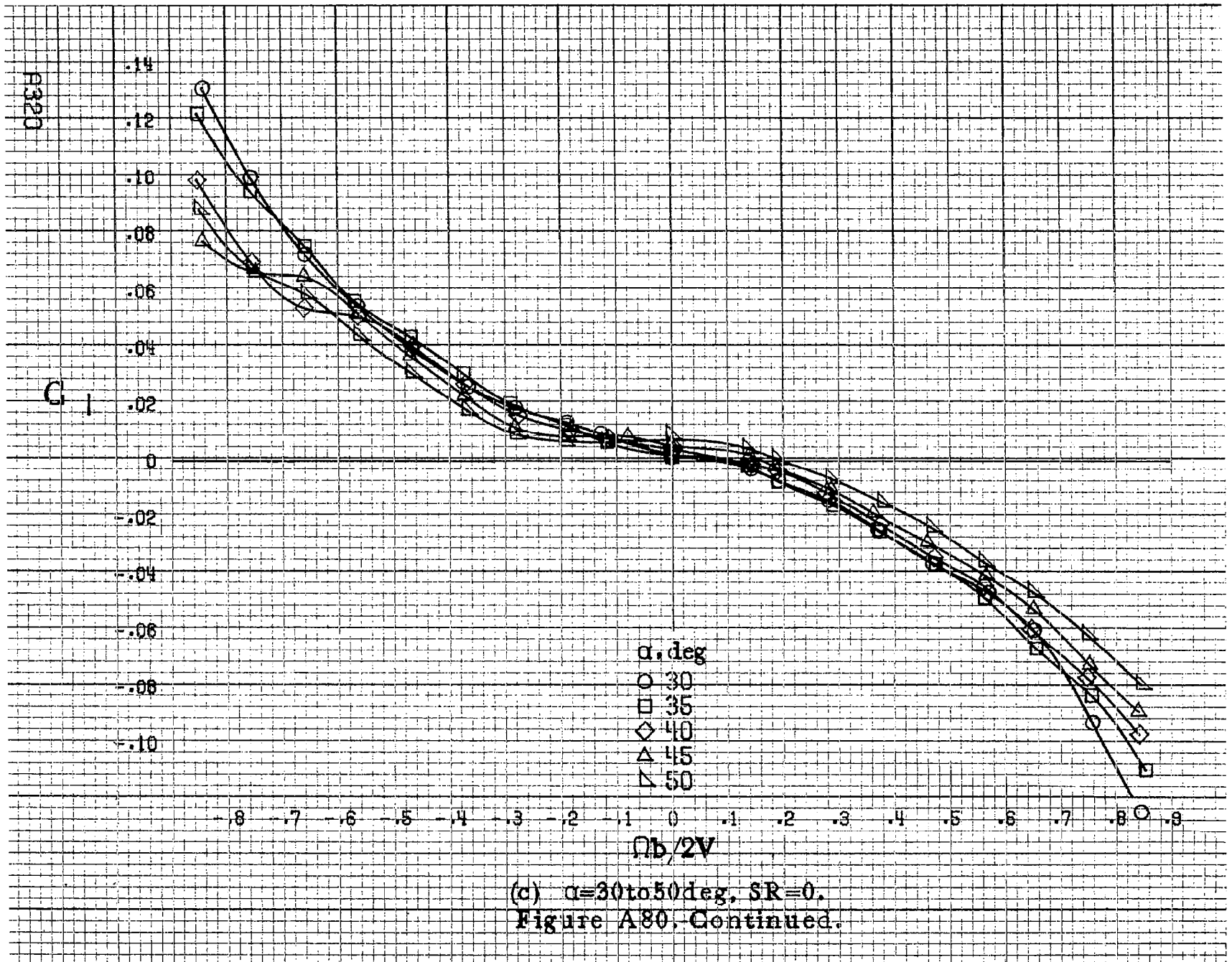


(a) $\alpha=8$ to 16 deg, SR=99cm (39in).

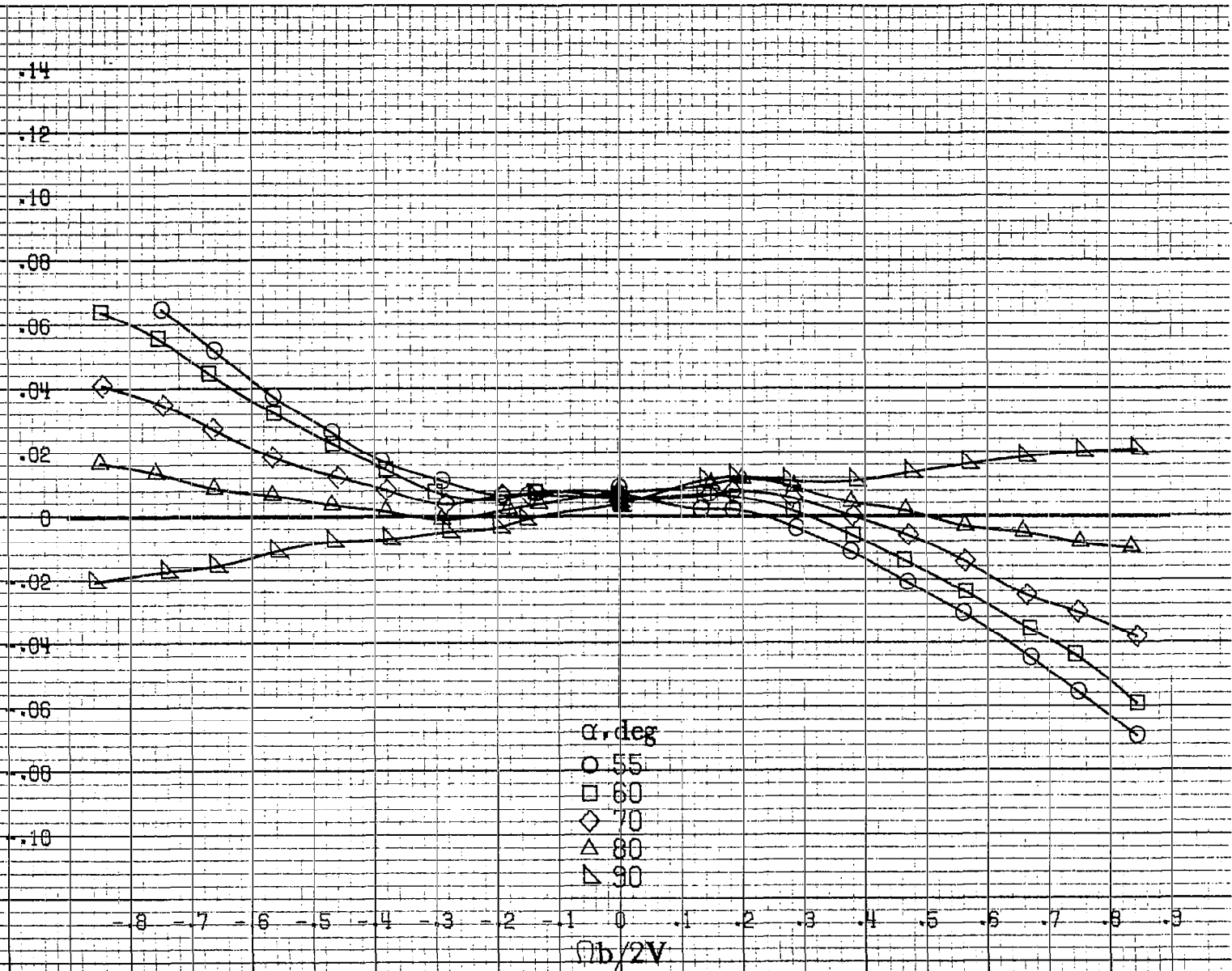
Figure A80. Effect of rotation rate and angle of attack on rolling-moment coefficient for configuration having sharp-edged fuselage bottom aft of wing TE. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A80. Continued.



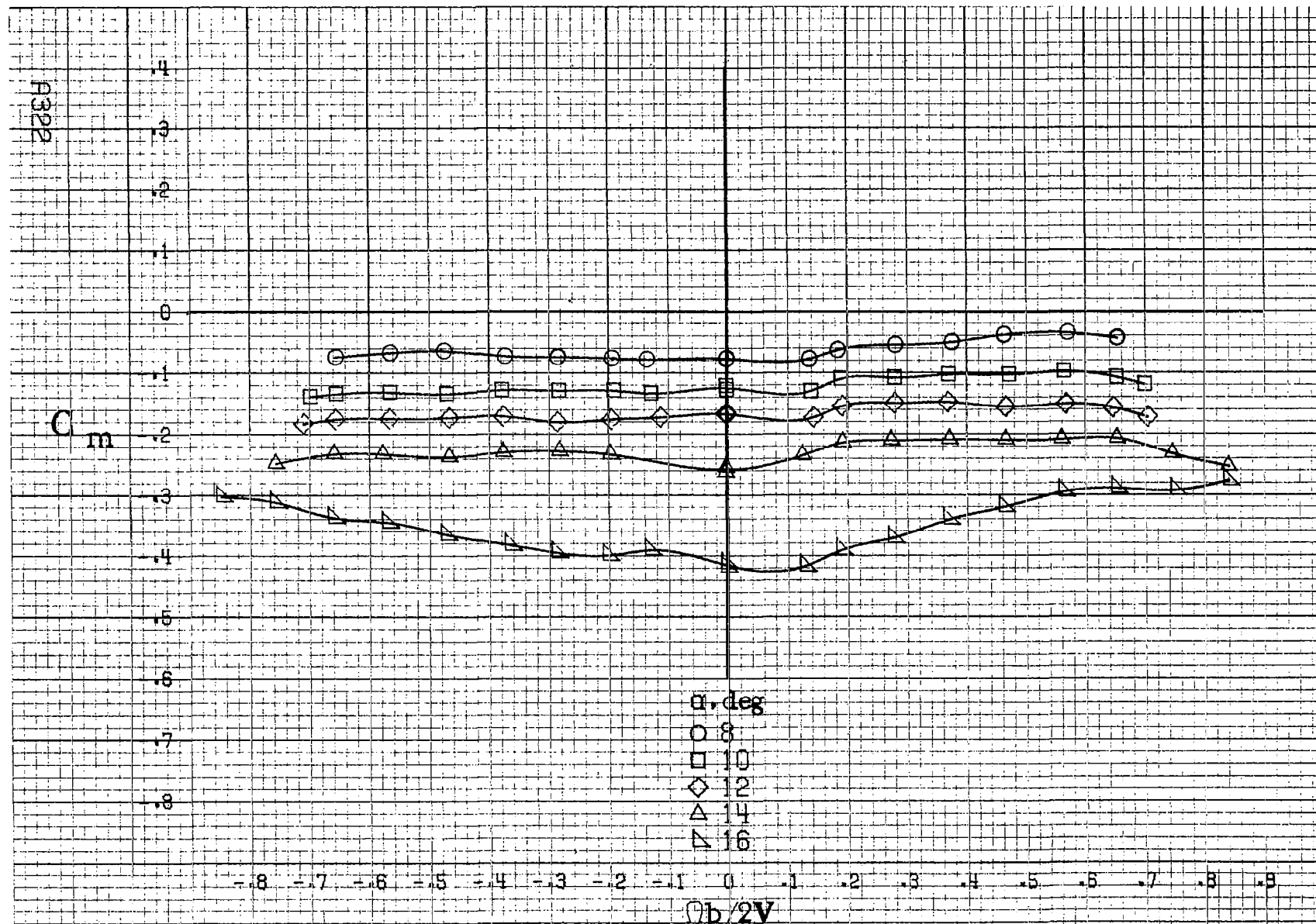
C₁



alpha, deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

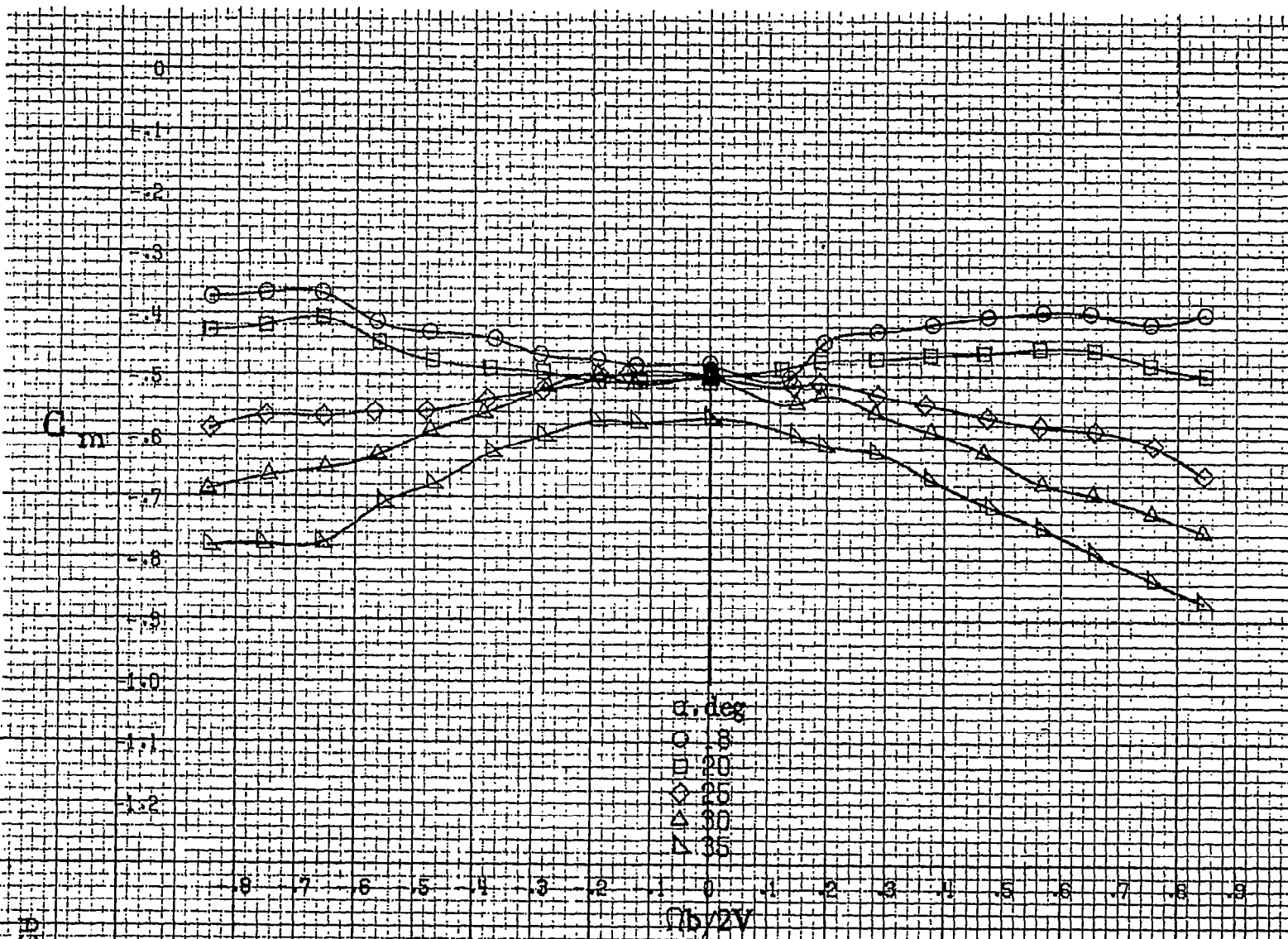
(d) alpha=55 to 90 deg, SR=0.
Figure A80. Concluded.

A321



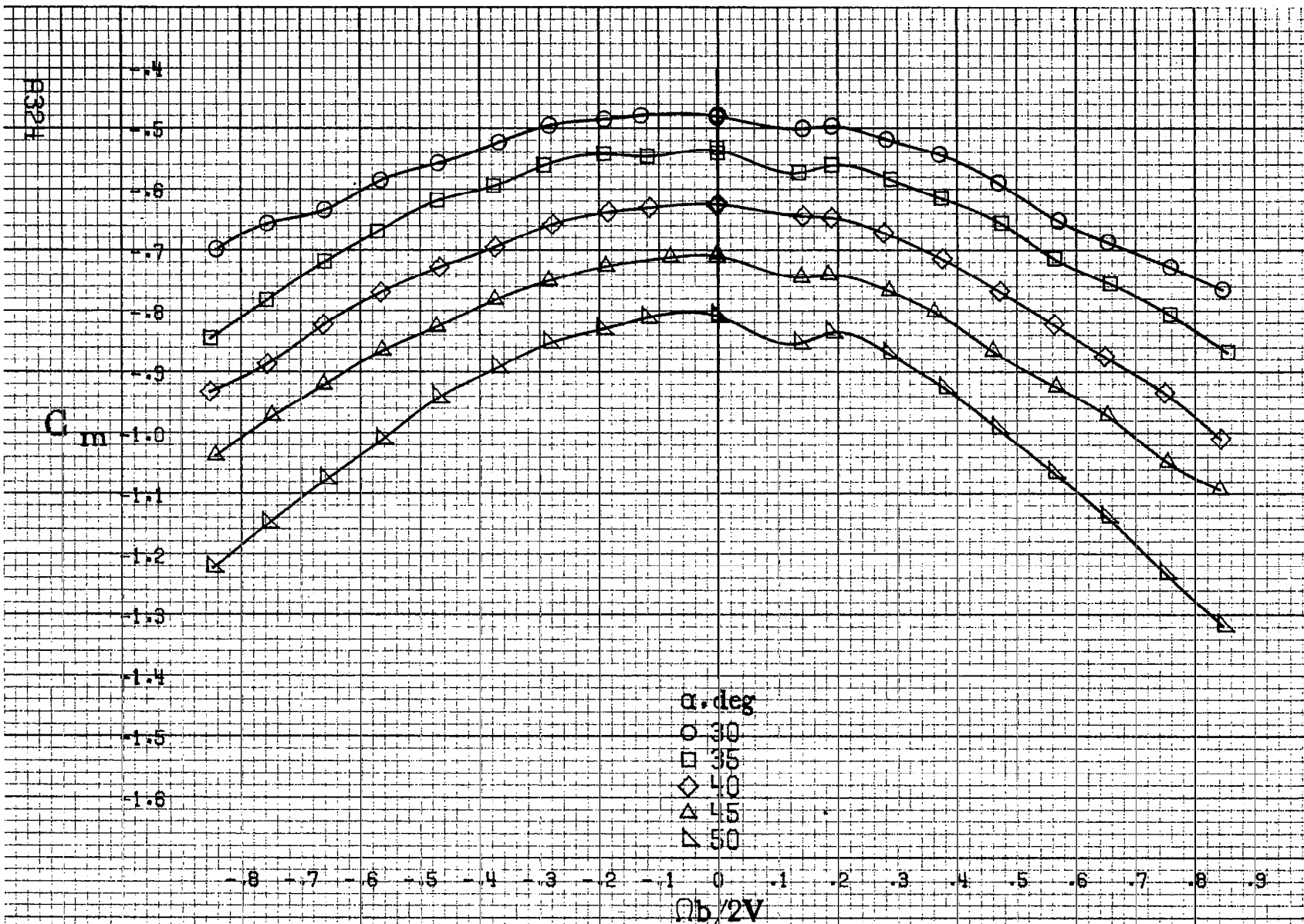
(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A81.-Effect of rotation rate and angle of attack on pitching-moment coefficient for configuration having sharp-edged fuselage bottom aft of wing TL. $\delta_a=0^\circ$, $\delta_b=0^\circ$, $\delta_r=0^\circ$. $B=0^\circ$.



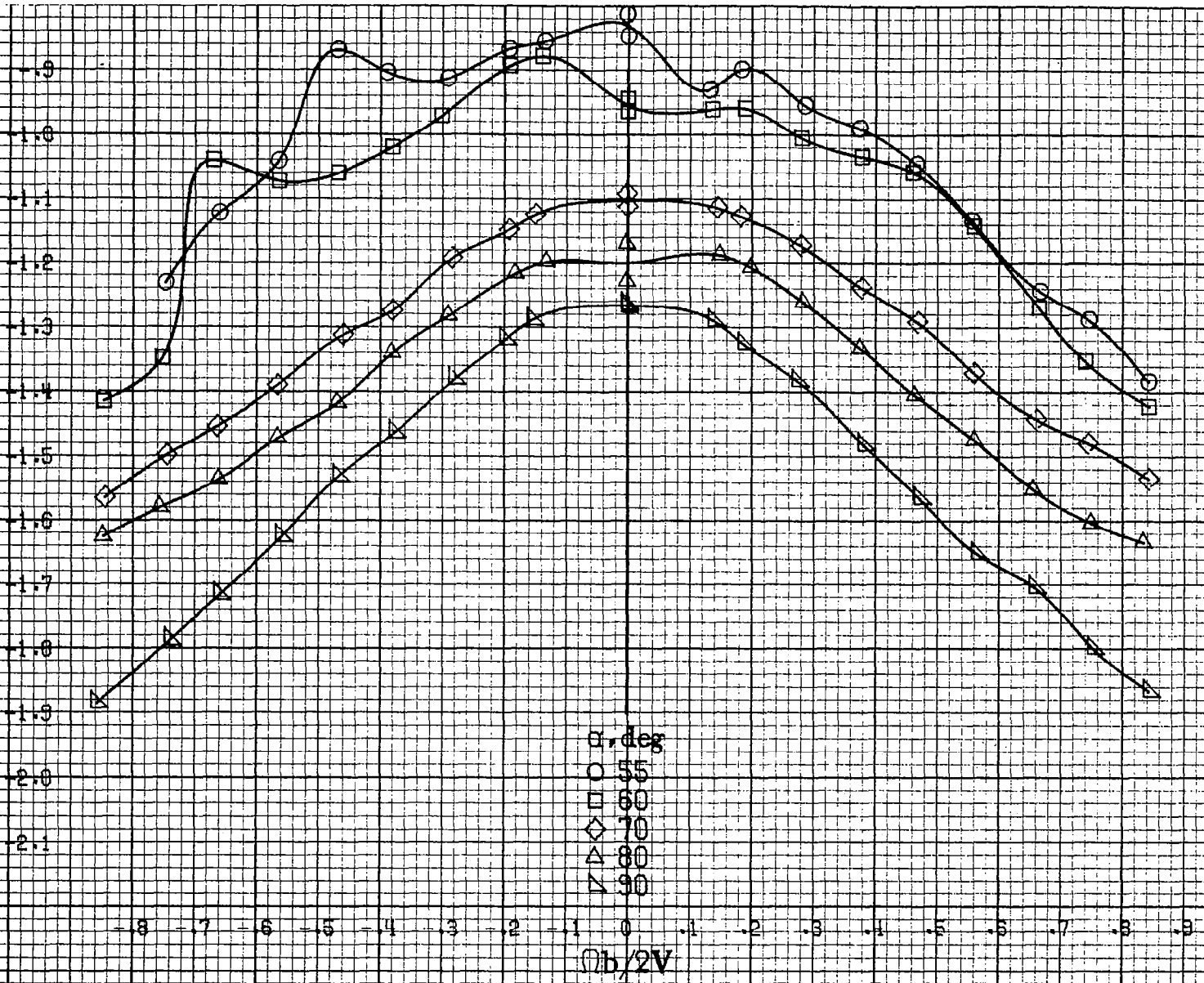
(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A81. Continued.

A829



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A81, Continued.

C_m

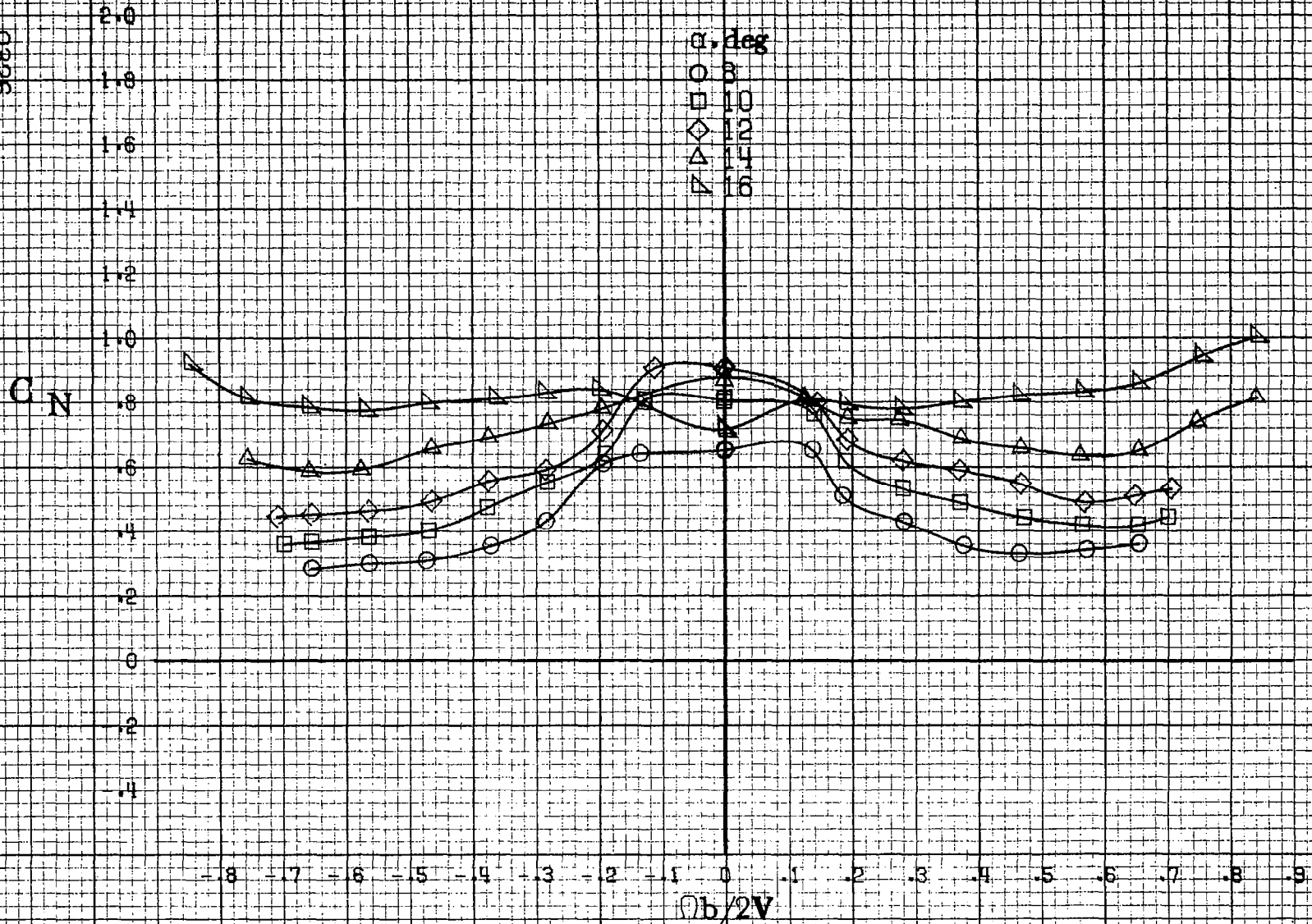


α, deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

(d) $\alpha = 55$ to 90 deg, $SR = 0$.
Figure A81. Concluded.

8325

A926



(a) $\alpha = 8 \text{ to } 16 \text{ deg}$, $SR = 99 \text{ cm (39 in)}$.

Figure A82. Effect of rotation rate and angle of attack on normal-force coefficient for configuration having sharp-edged fuselage bottom aft of wing
 TE. $\delta_a = 0^\circ$, $\delta_\alpha = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_{LN}

2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2

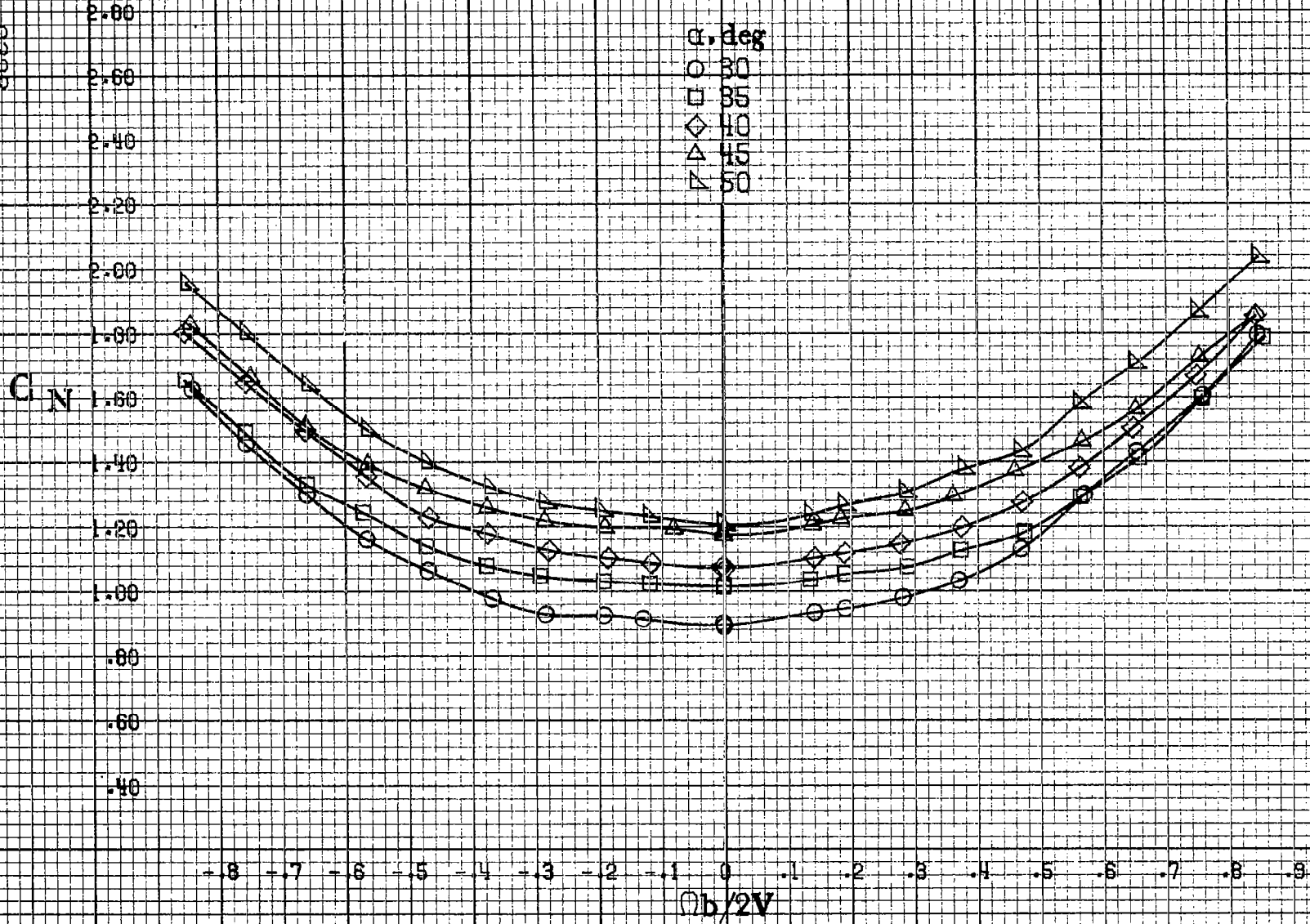
α, deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\theta b/2V$

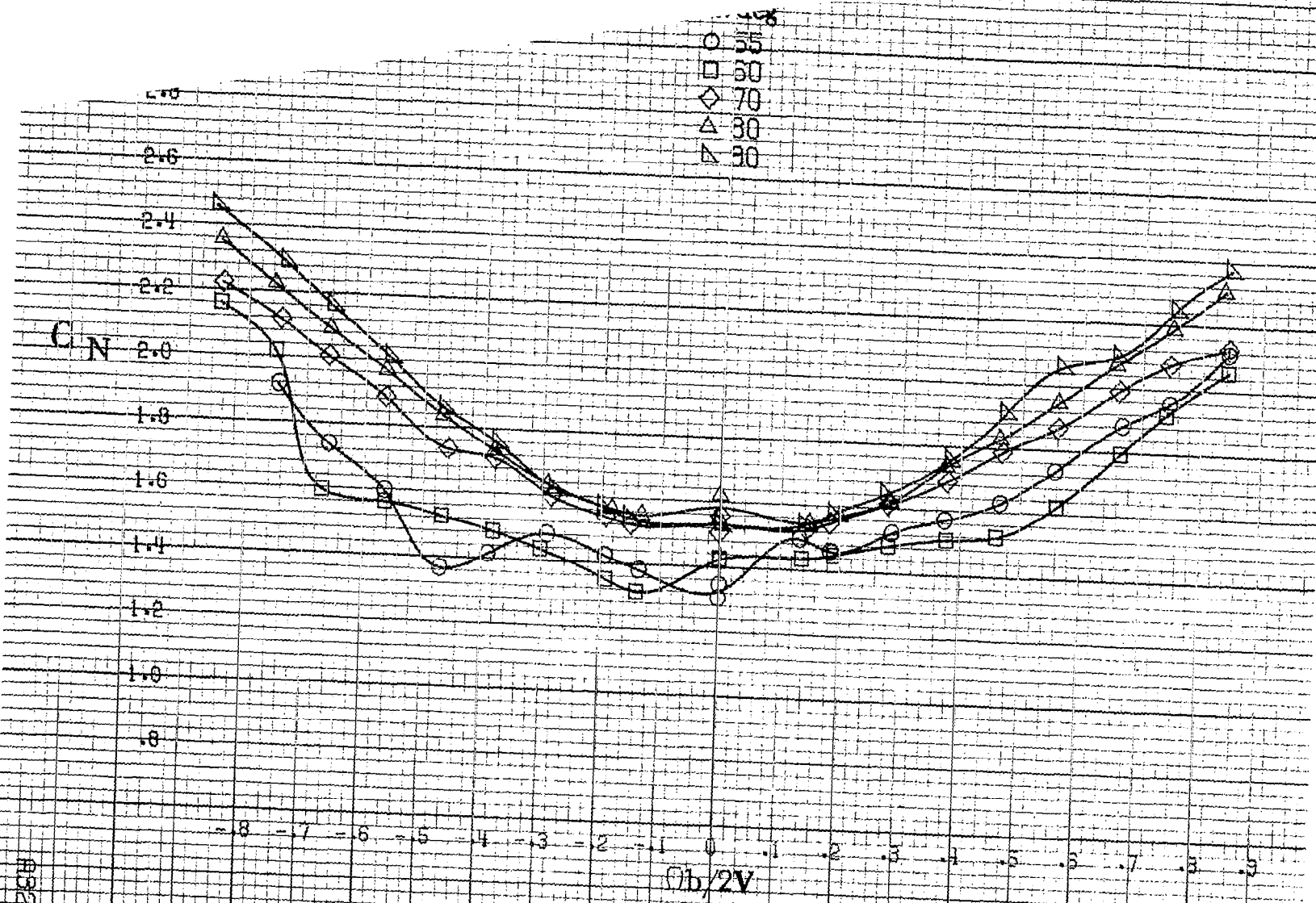
(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A82. Continued.

A827

8323

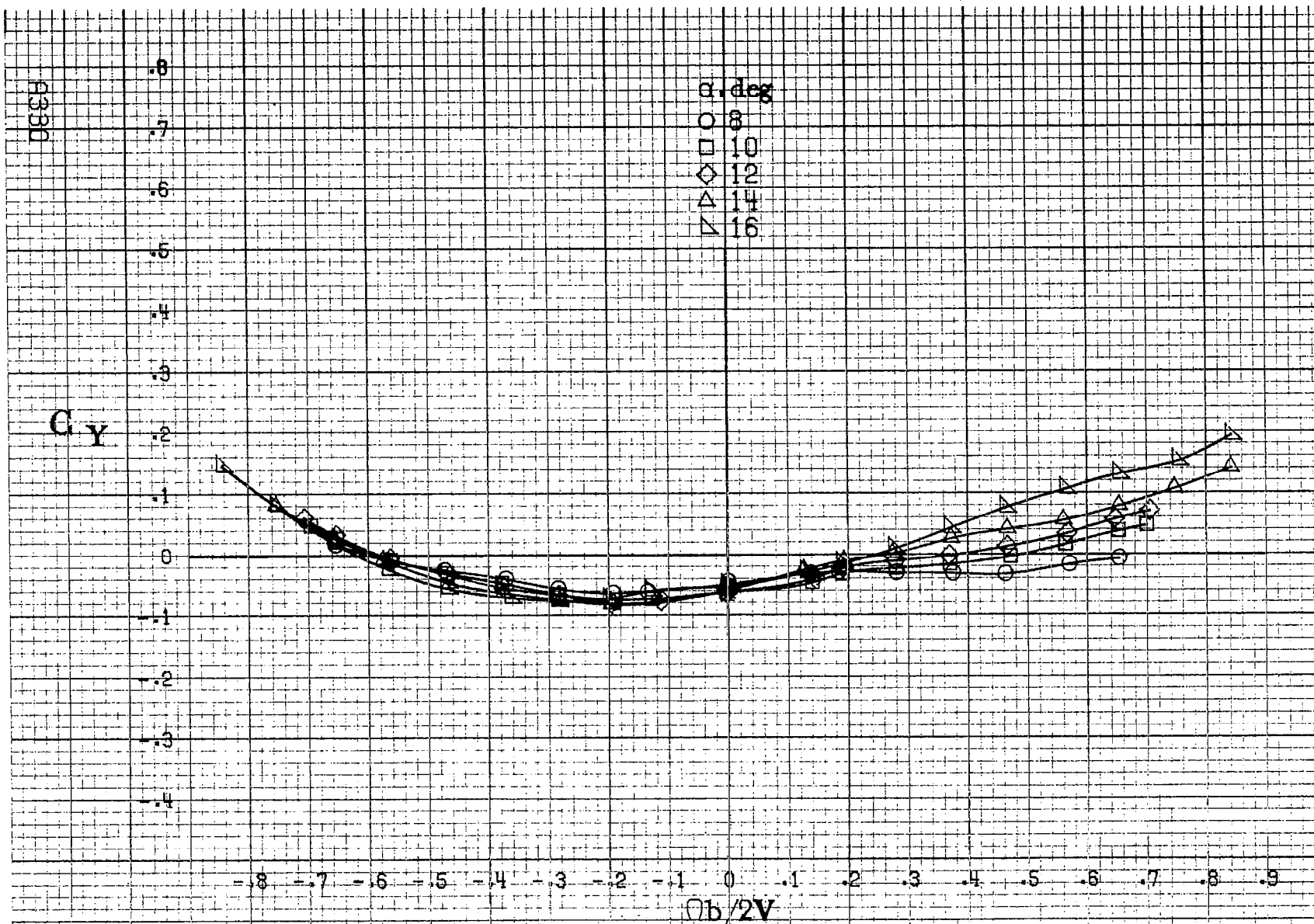


(c) $\alpha=30$ to 50 deg, $\delta R=0$.
 Figure A82, Continued.



A8229

(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A82. Concluded.



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A83. Effect of rotation rate and angle of attack on side force coefficient for configuration having sharp-edged fuselage bottom aft of wing T.E. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_y

0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9
 $\Omega b/2V$

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A83. Continued.

A3331

A832

C_y

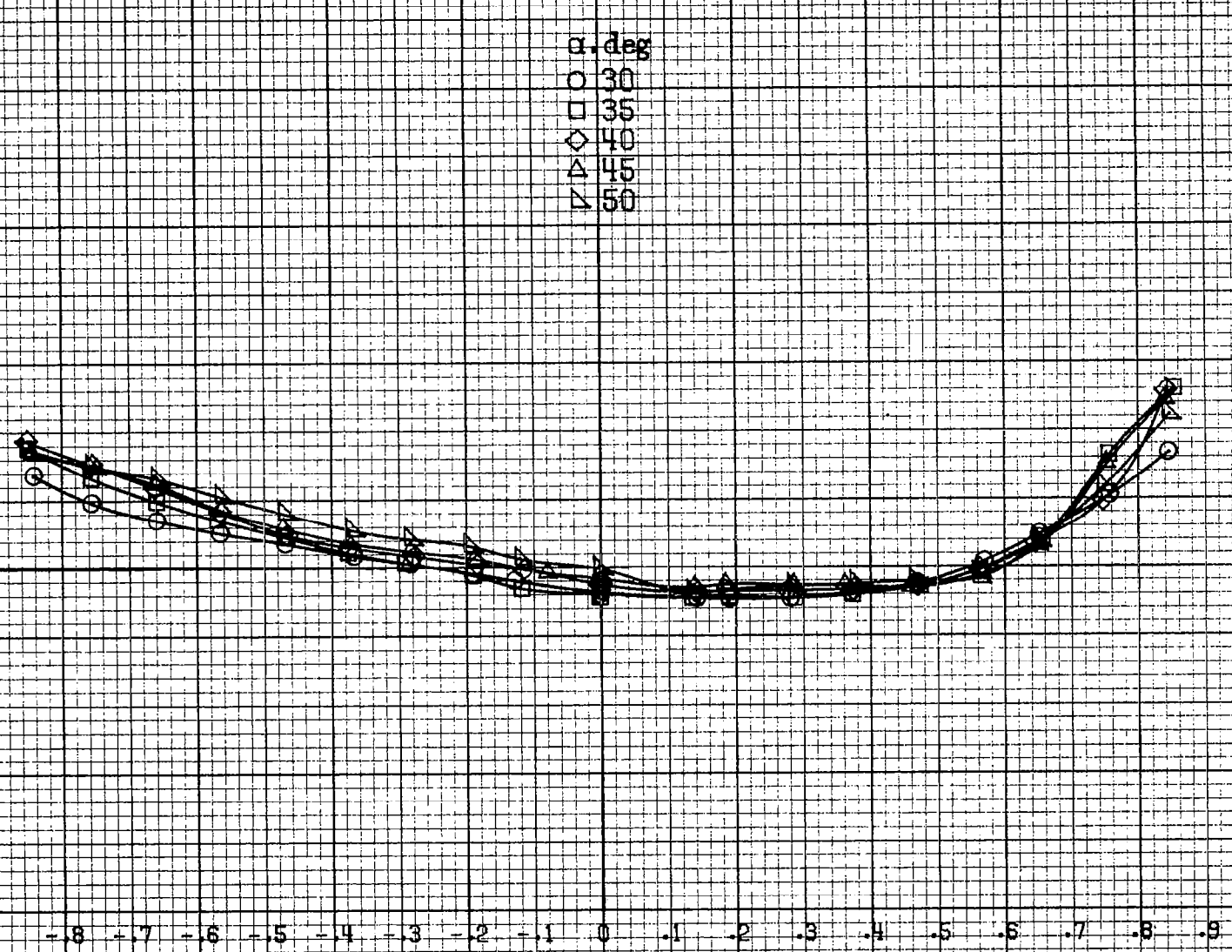
- α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

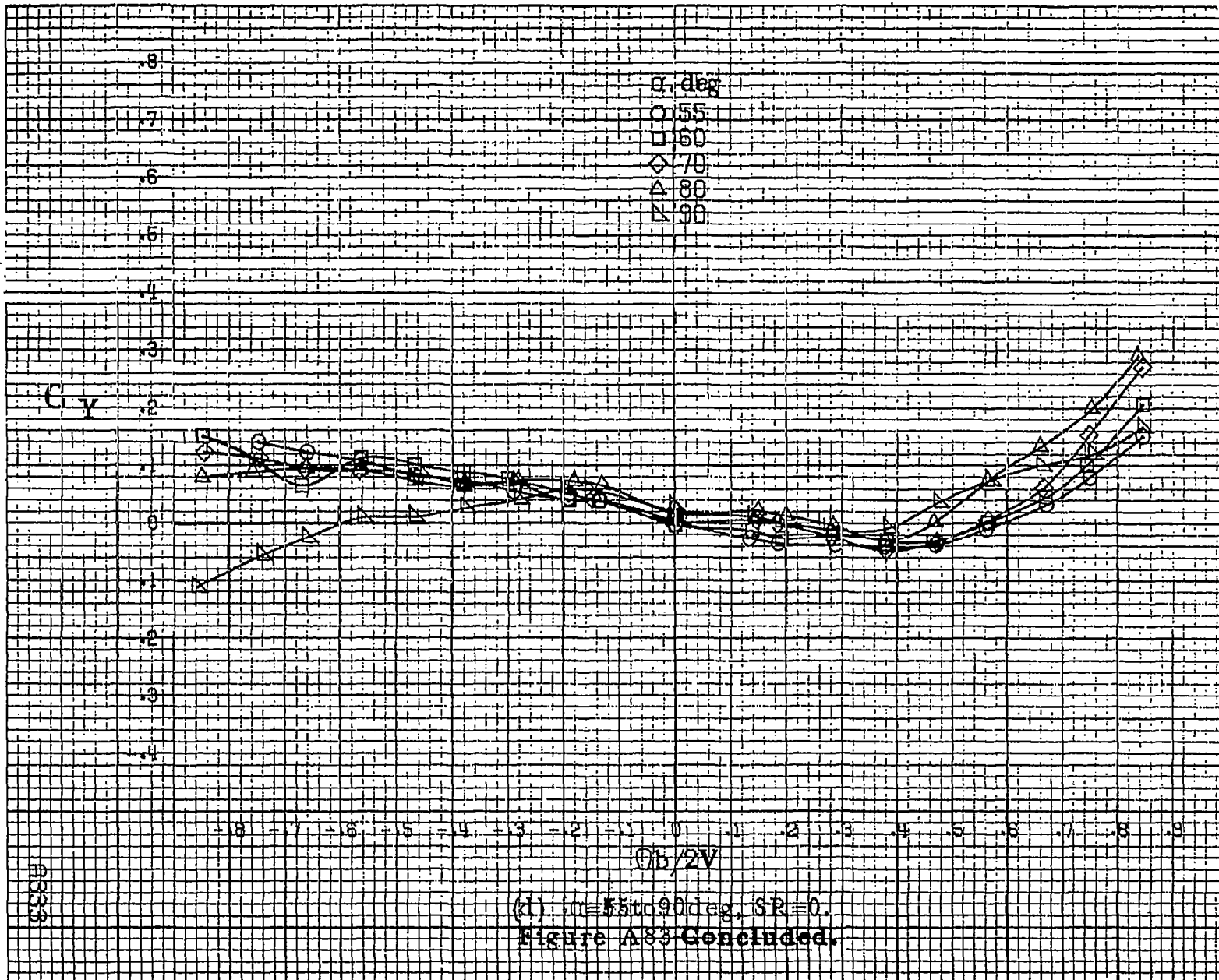
.8
.7
.6
.5
.4
.3
.2
.1
0
.1
.2
.3
.4

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$b/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A83. Continued.





16384

C_A

0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4

α , deg
○ 8
□ 10
◇ 12
△ 14
▽ 16

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9
 $Ob/2V$

(a) $\alpha=8$ to 16 deg, SR=99cm (39in).

Figure A84. Effect of rotation rate and angle of attack on axial-force coefficient for configuration having sharp-edged fuselage bottom aft of wing TE. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\delta_l = 0^\circ$.

C_A

α , deg

○ 18

□ 20

◇ 25

△ 30

▽ 35

.8

.7

.6

.5

.4

.3

.2

.1

0

-.1

-.2

-.3

-.4

-.8

-.7

-.6

-.5

-.4

-.3

-.2

-.1

0

.1

.2

.3

.4

.5

.6

.7

.8

.9

$Ob/2V$

R335

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A84. Continued.

B336

C_A

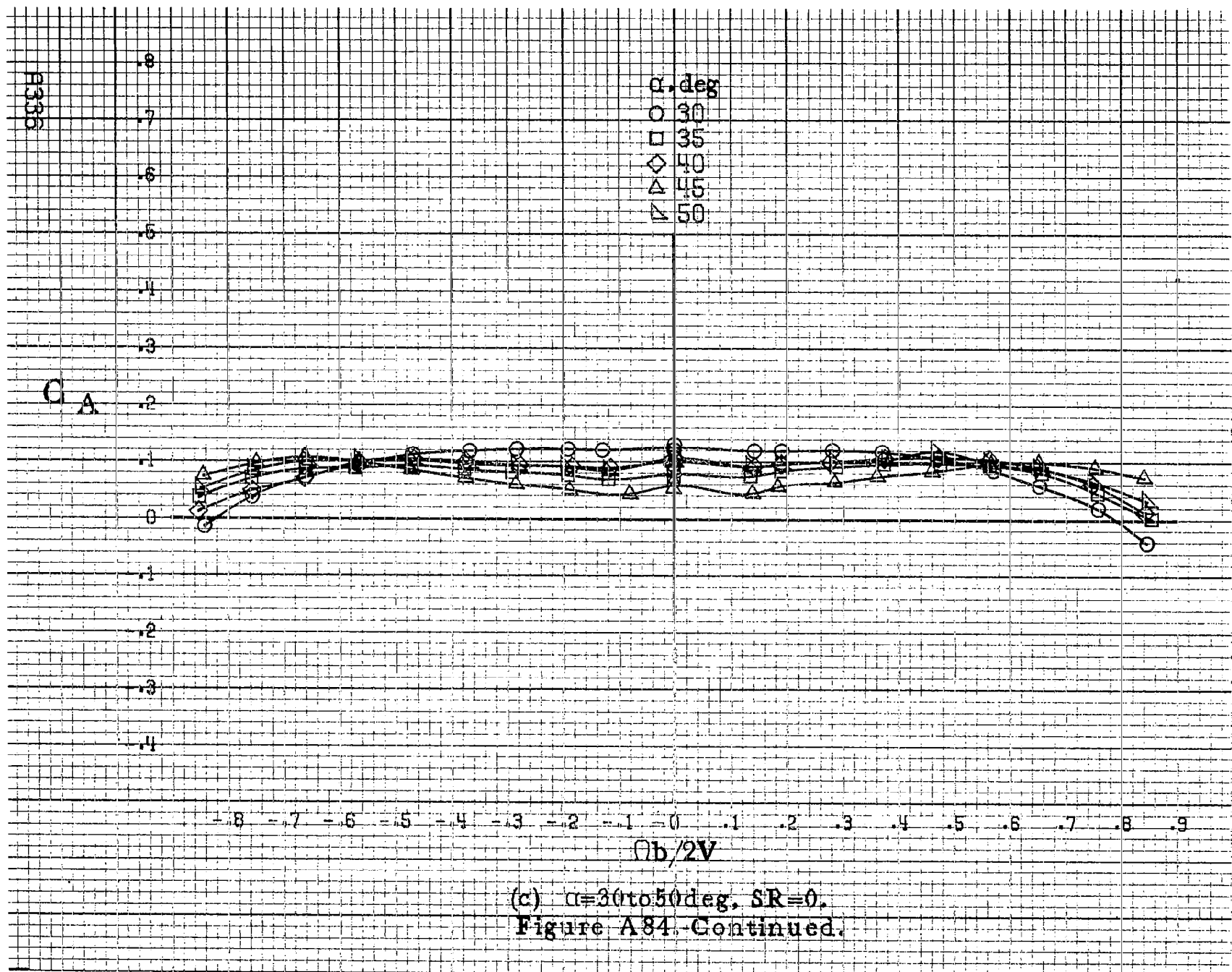
α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

.8
.7
.6
.5
.4
.3
.2
.1
0
.1
.2
.3
.4

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$Ob/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A84. Continued.



C_A

8
7
6
5
4
3
2
1
0
-1
-2
-3
-4

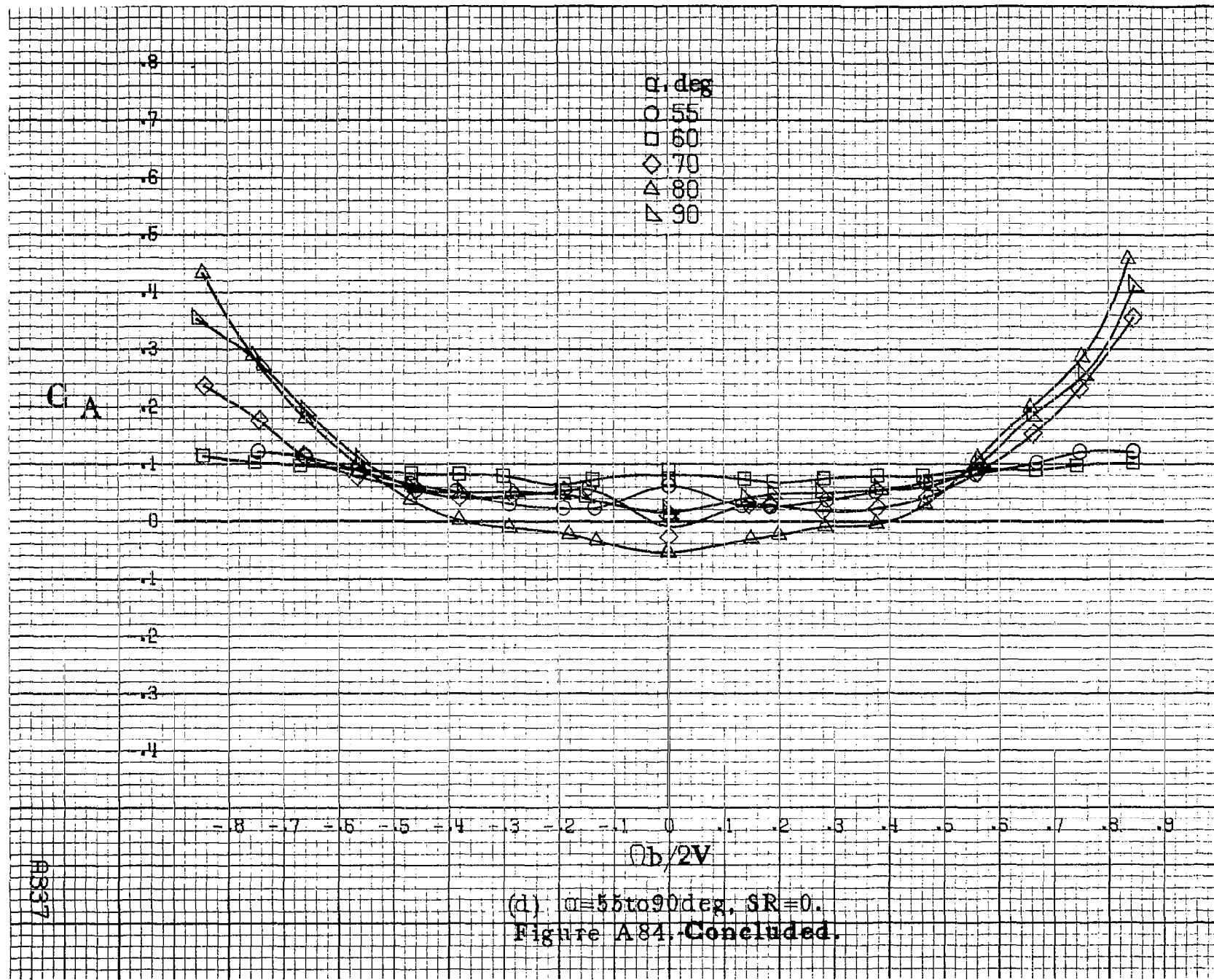
α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

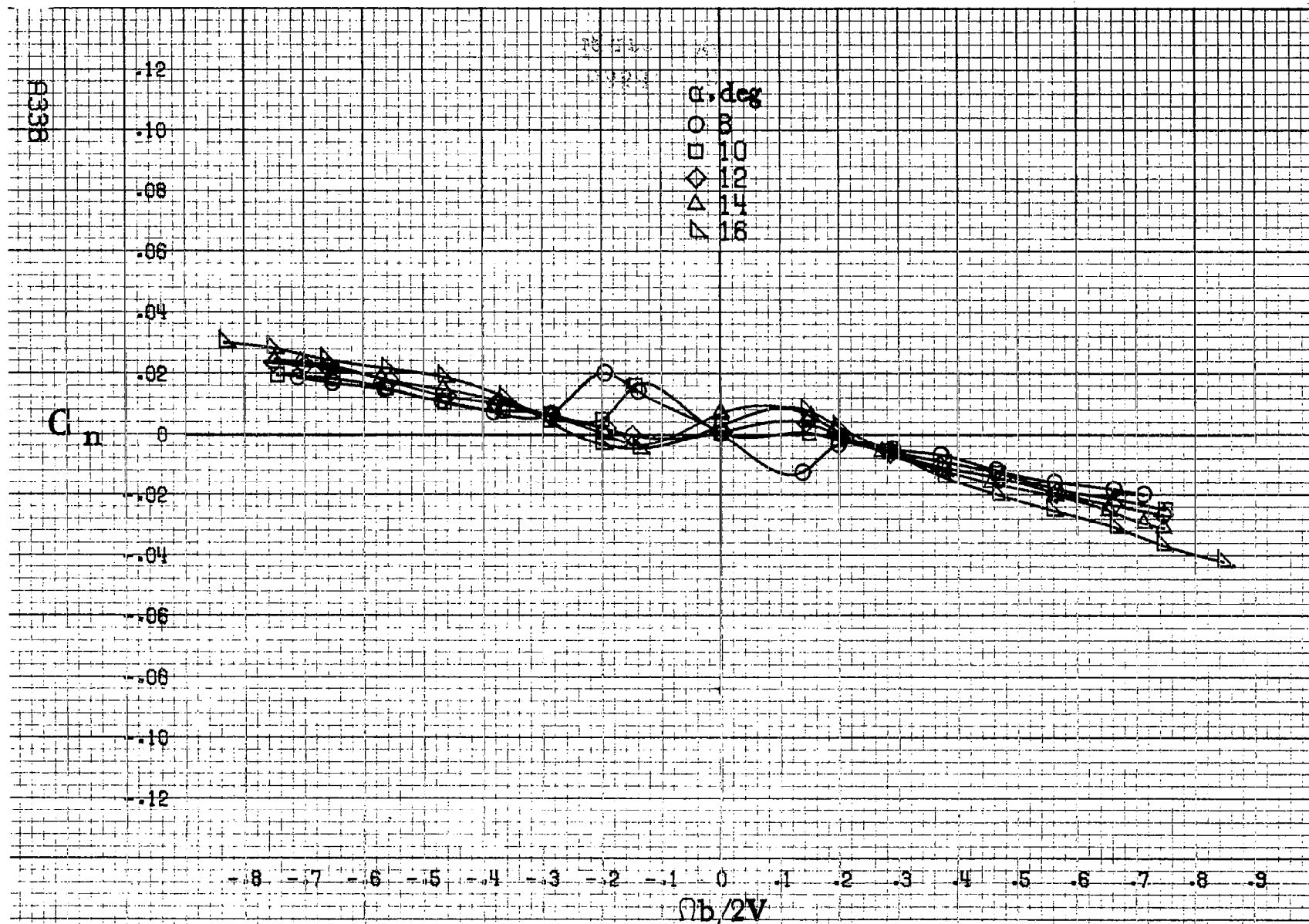
-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$Ob/2V$

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A84. Concluded.

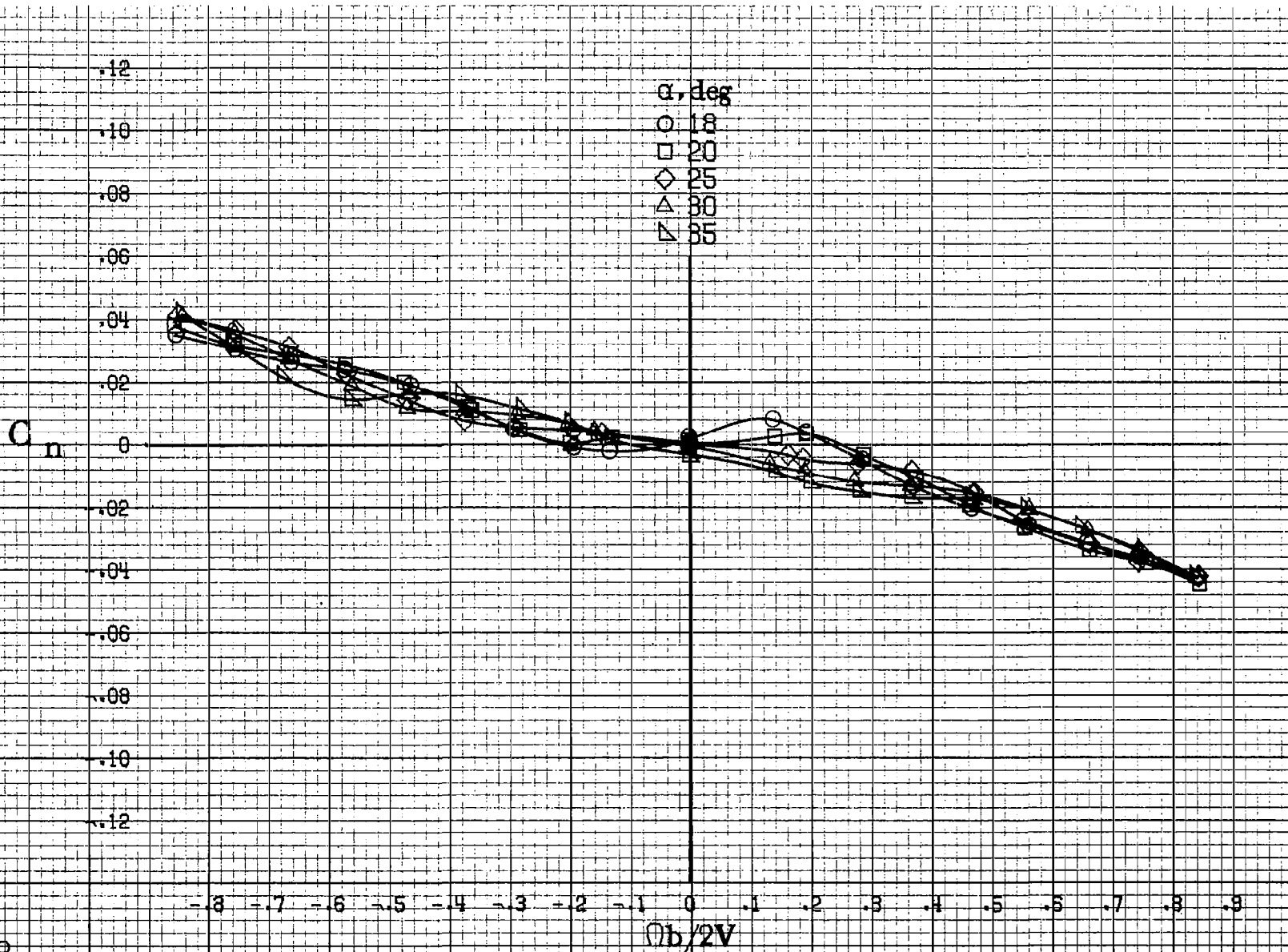
A337



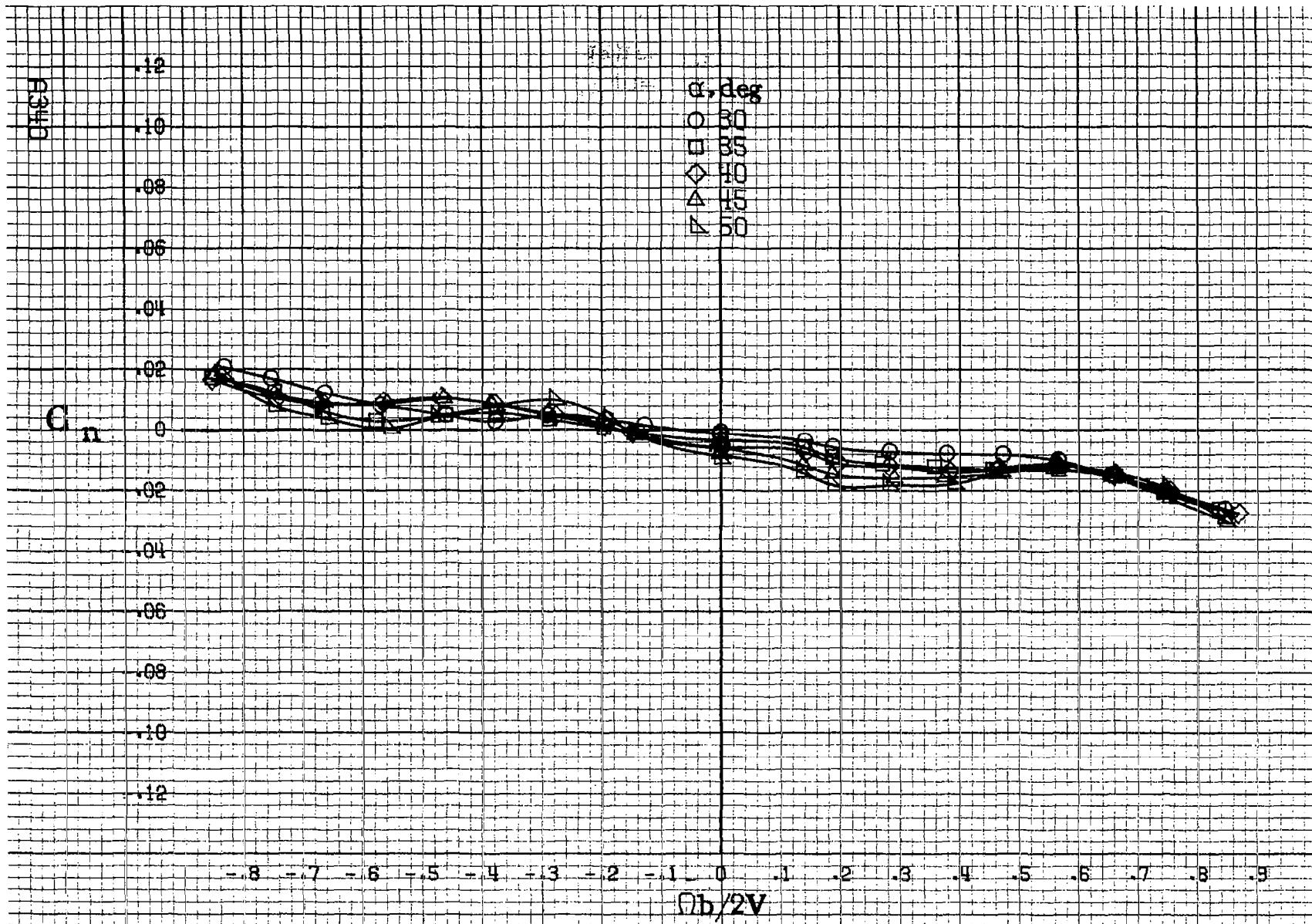


(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

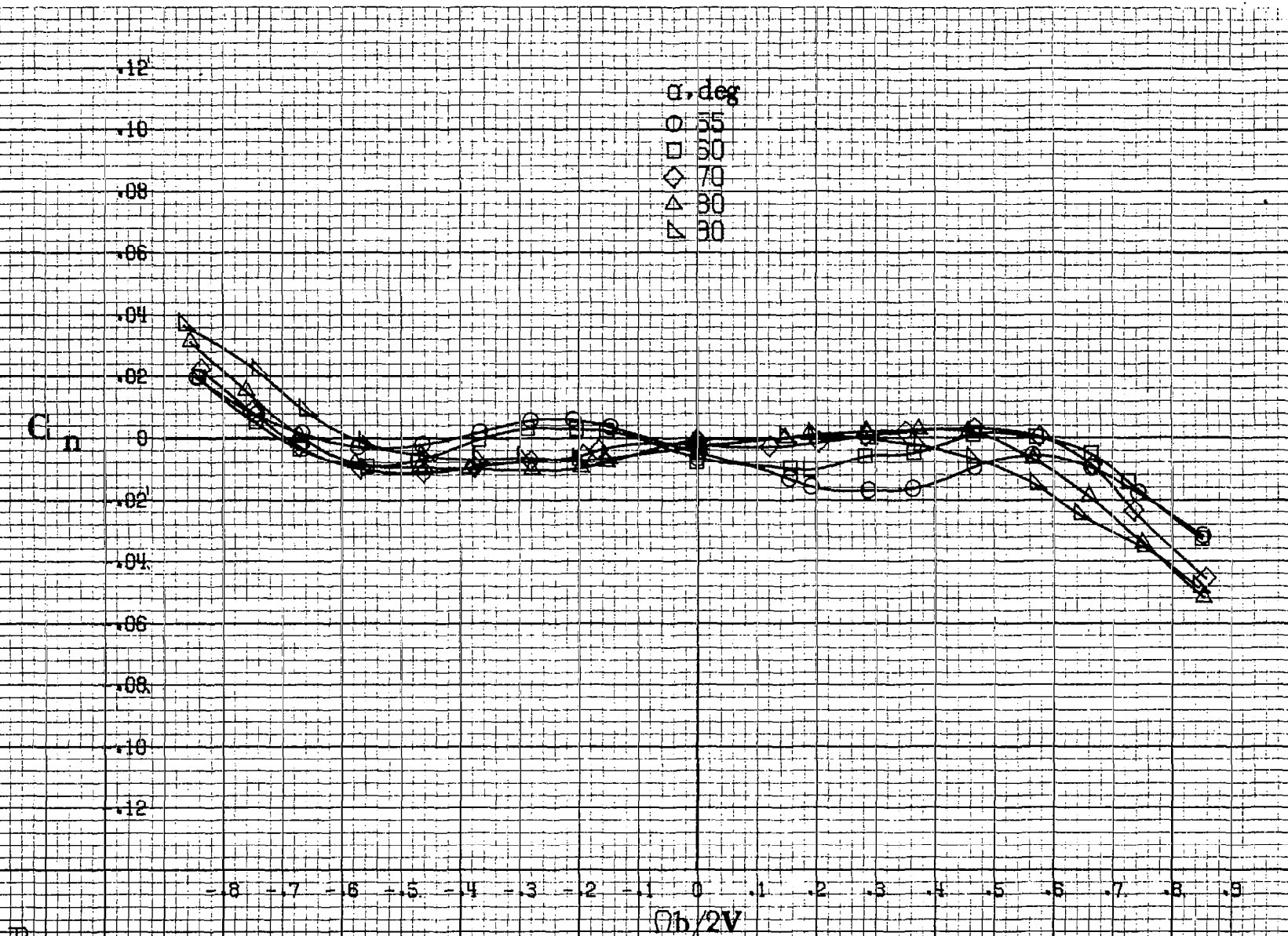
Figure A85. Effect of rotation rate and angle of attack on yawing moment coefficient for configuration having sharp-edged fuselage bottom aft of engine cowling. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A85. Continued.

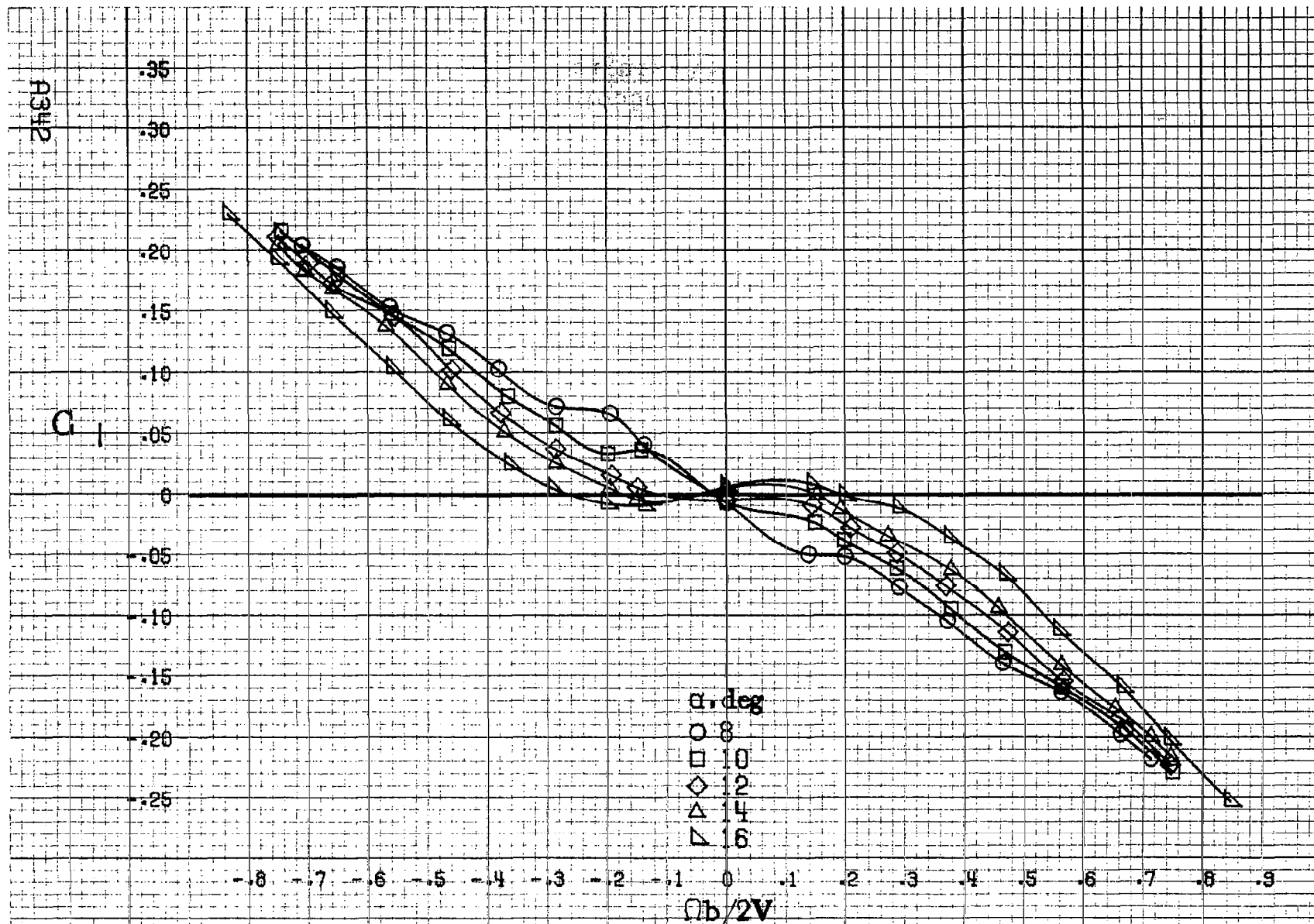


(c) $\alpha = 30$ to 50 deg, $SR = 0$.
 Figure A85. Continued.



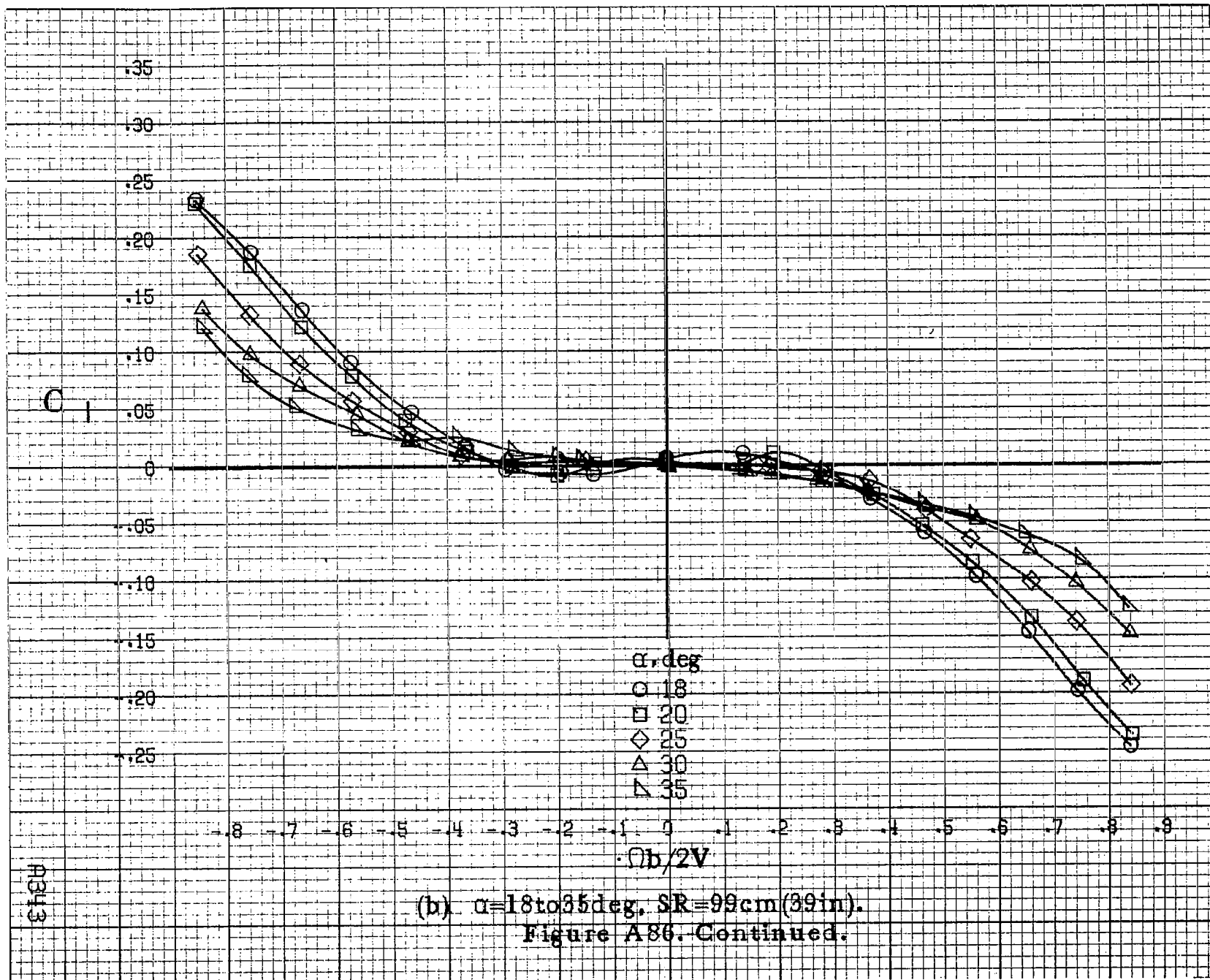
(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A85. Concluded.

1341

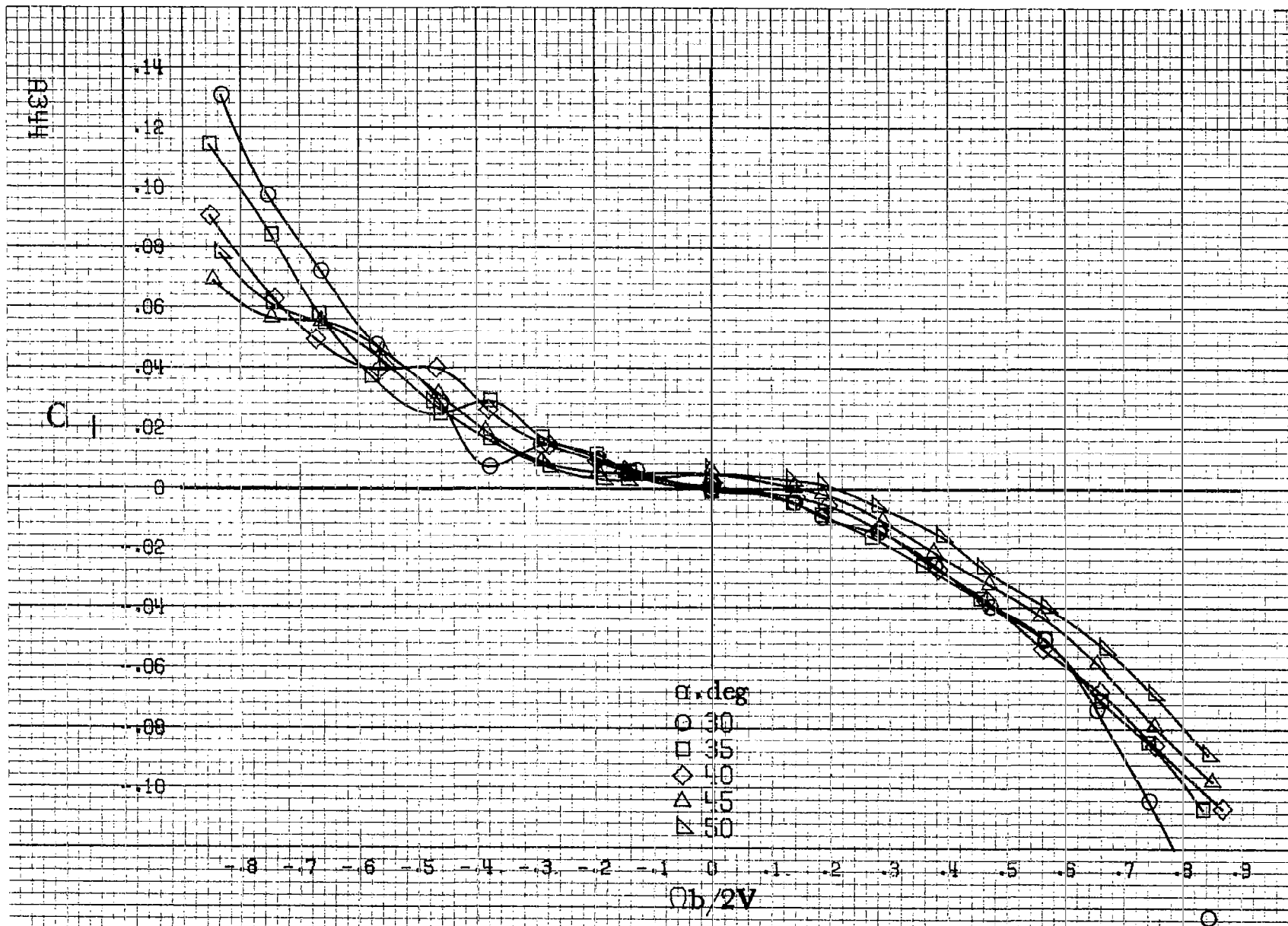


(a) $\alpha=8$ to 16 deg, SR=99 cm (39 in).

Figure A86. Effect of rotation rate and angle of attack on rolling-moment coefficient for configuration having sharp-edged fuselage bottom aft of engine cowlings. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



A313



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A86. Continued.

C₁

.14
.12
.10
.08
.06
.04
0
-.02
-.04
-.06
-.08
-.10

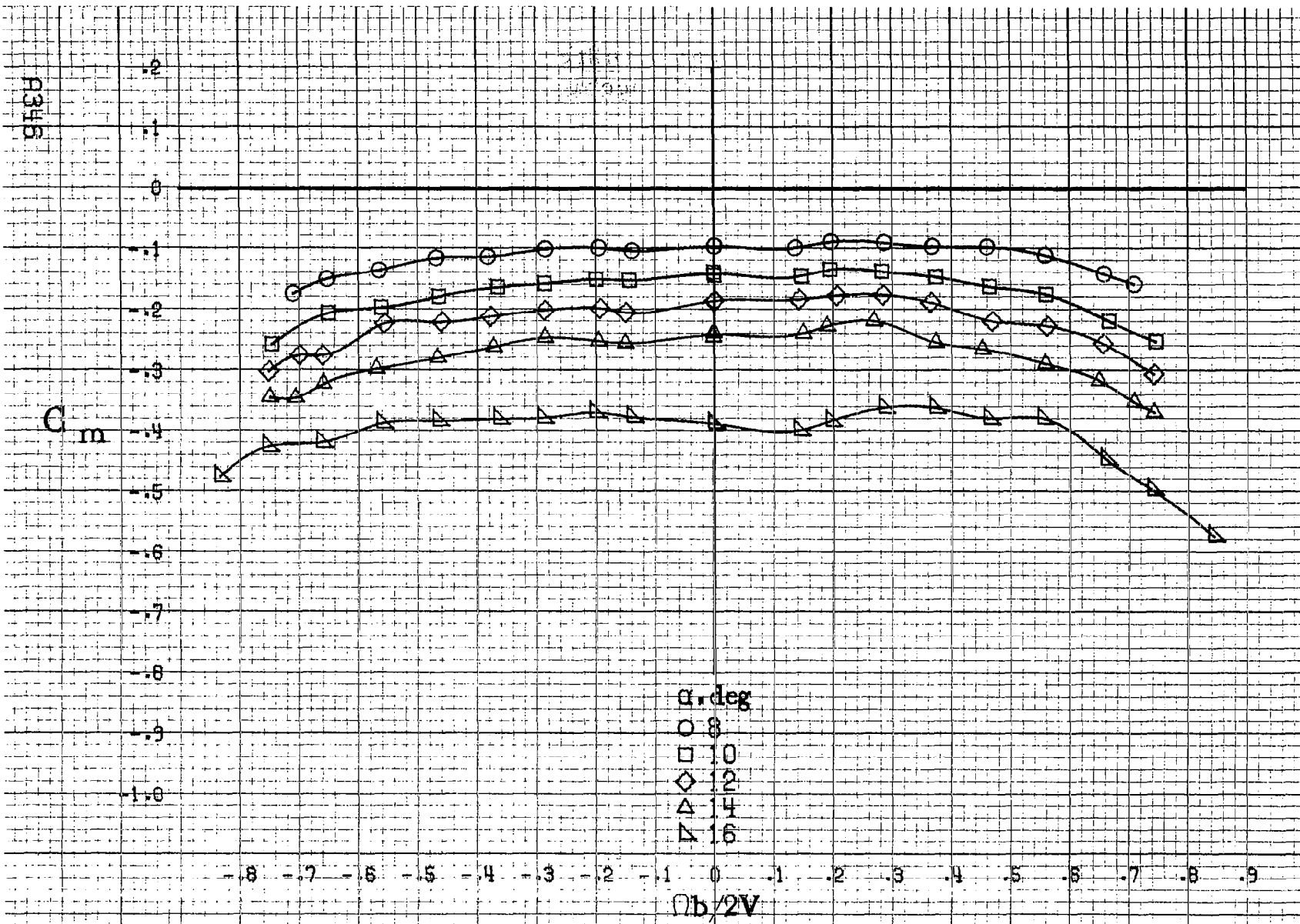
-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

$C_b/2V$

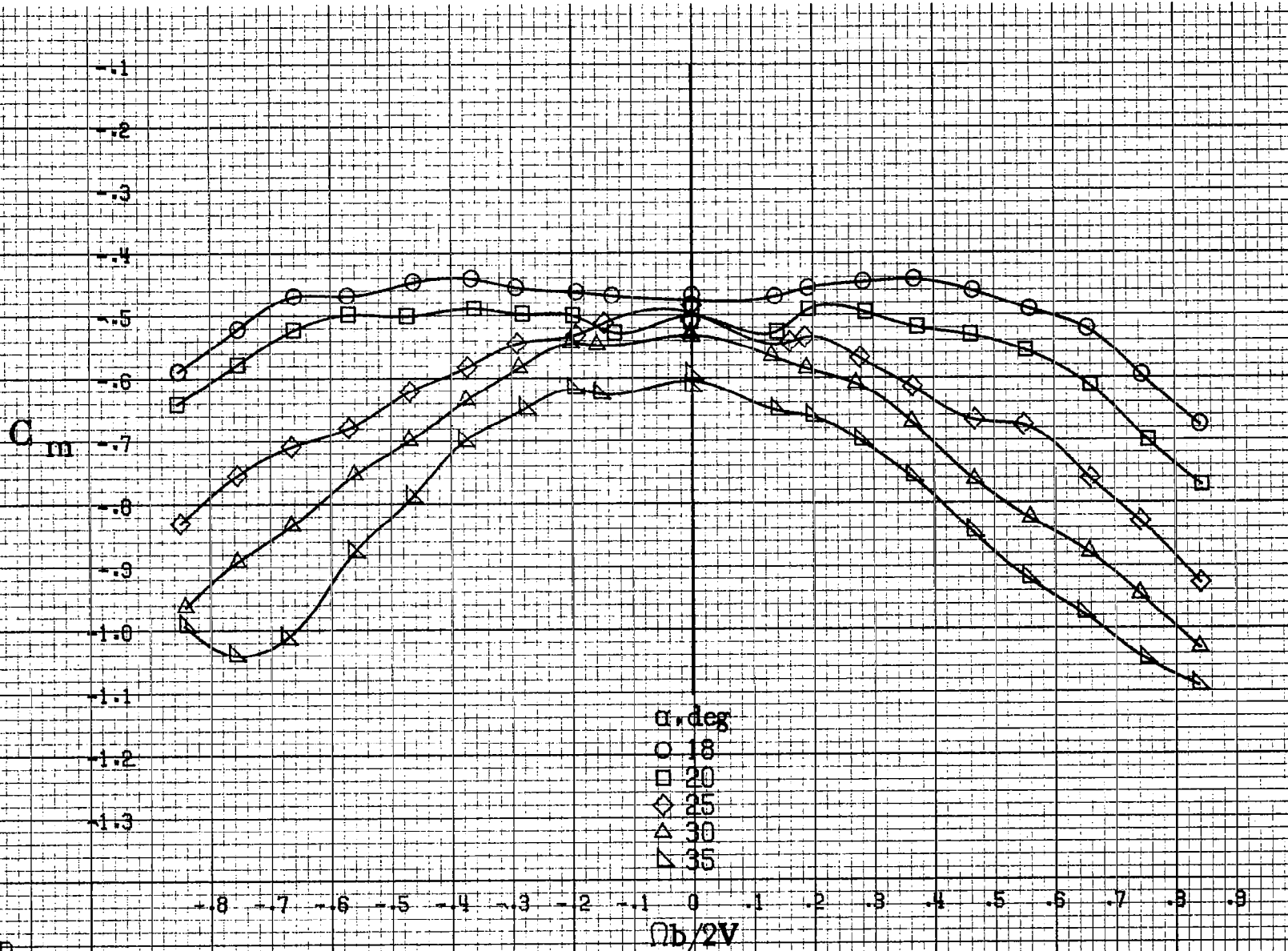
1345

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A86. Concluded.

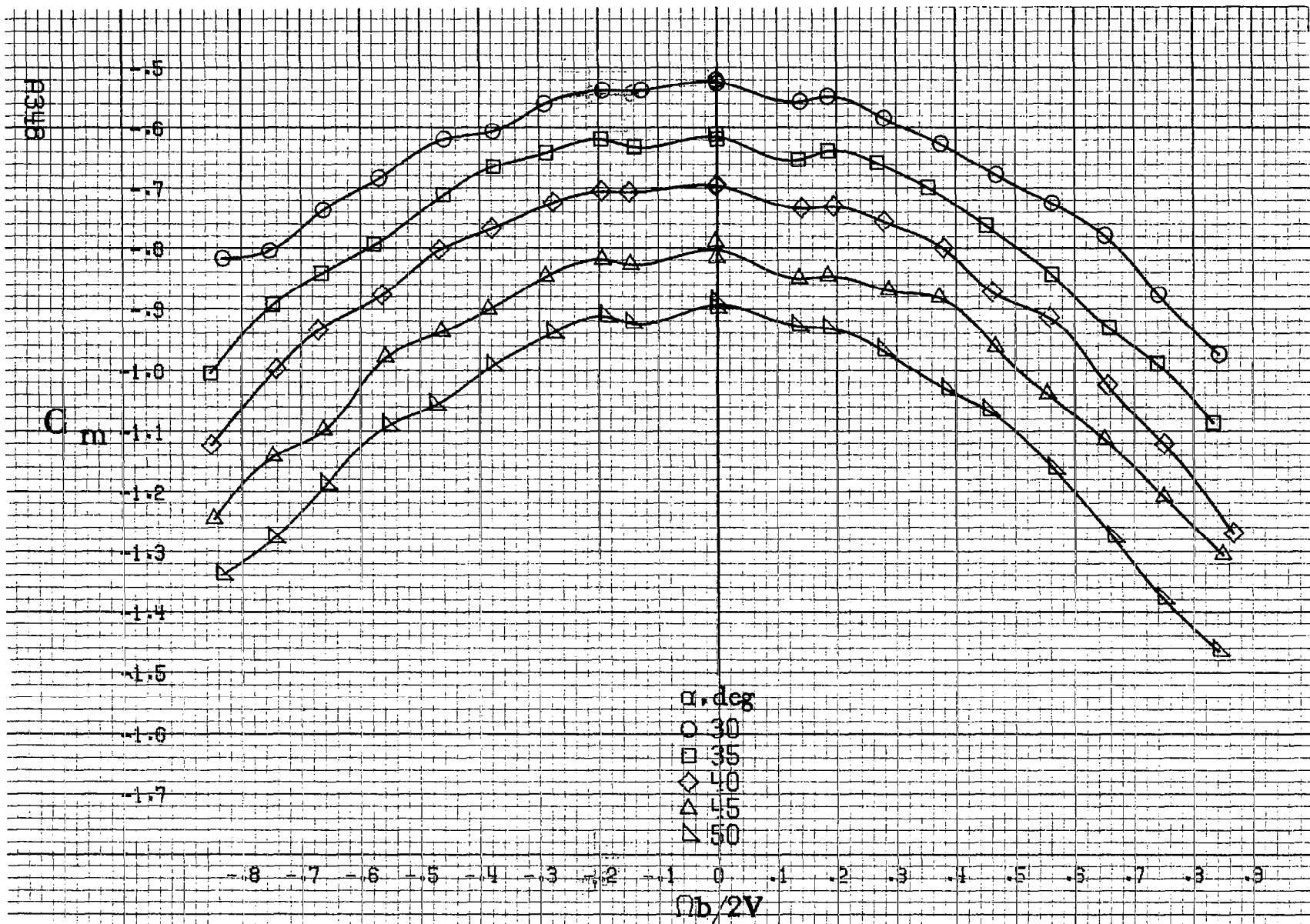


(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

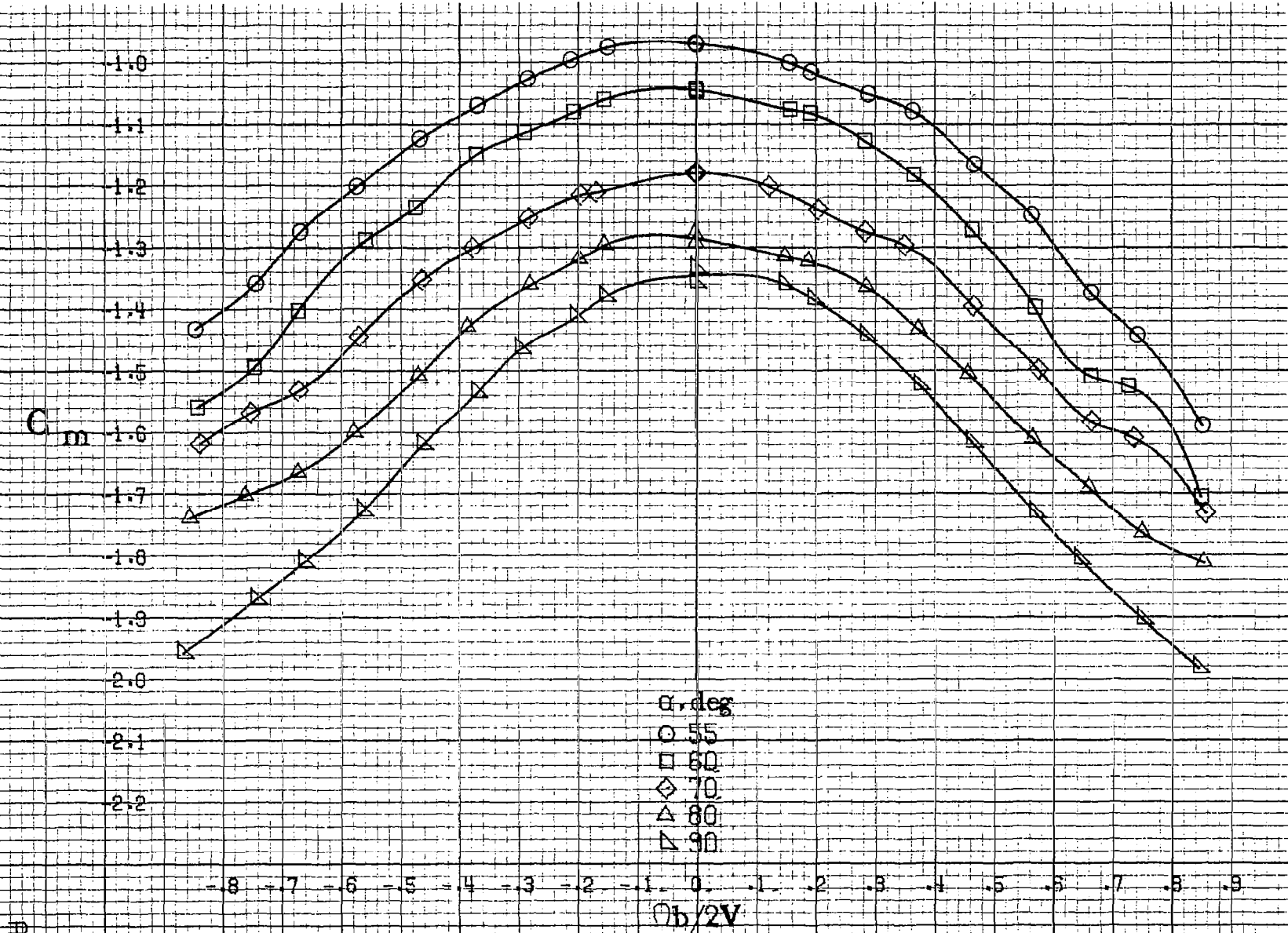
Figure A87. Effect of rotation rate and angle of attack on pitching-moment coefficient for configuration having sharp-edged fuselage bottom aft of engine cowling. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha=18$ to 35 deg, SR=99cm (39in).
Figure A87. Continued.

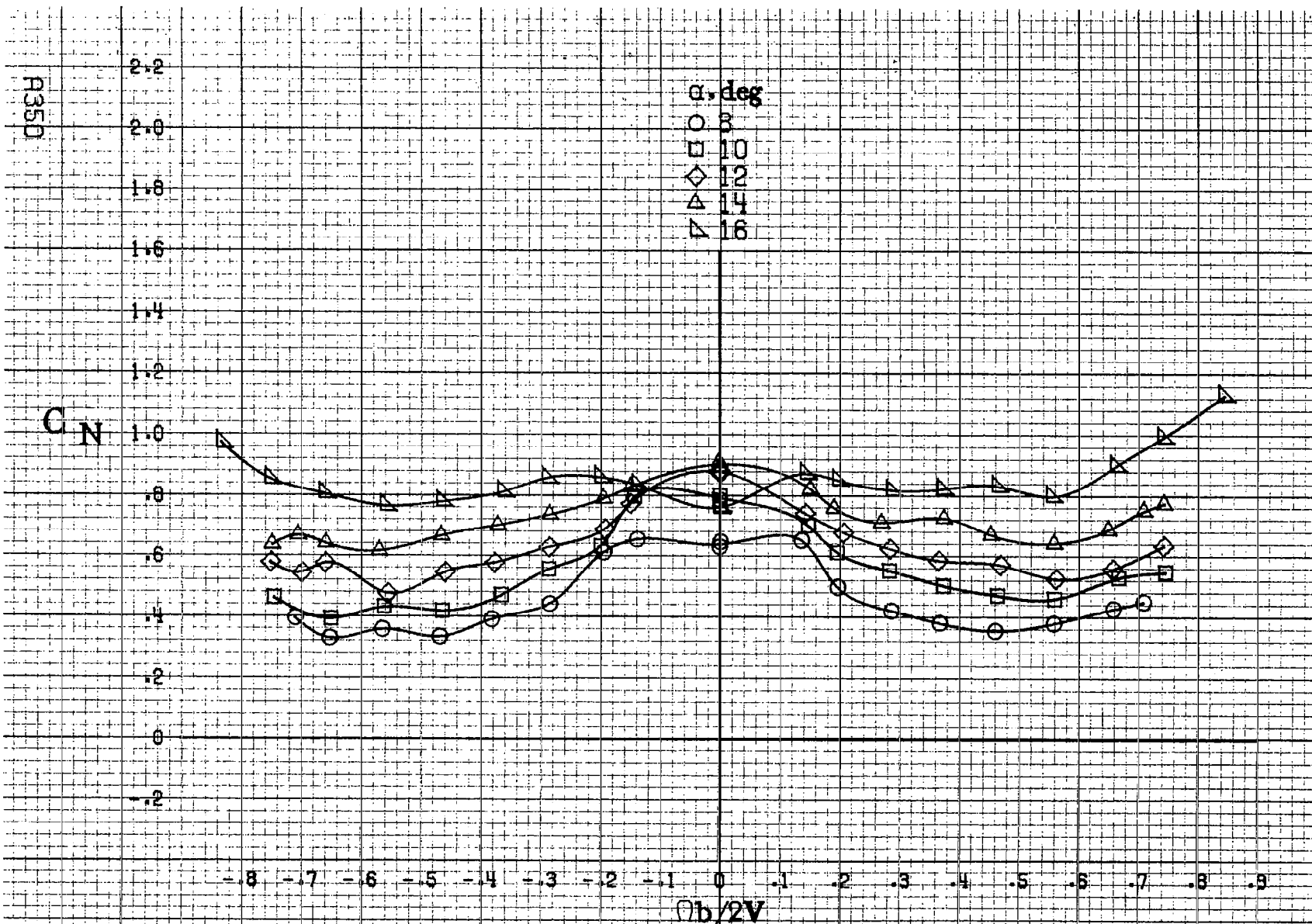


(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A87. Continued.



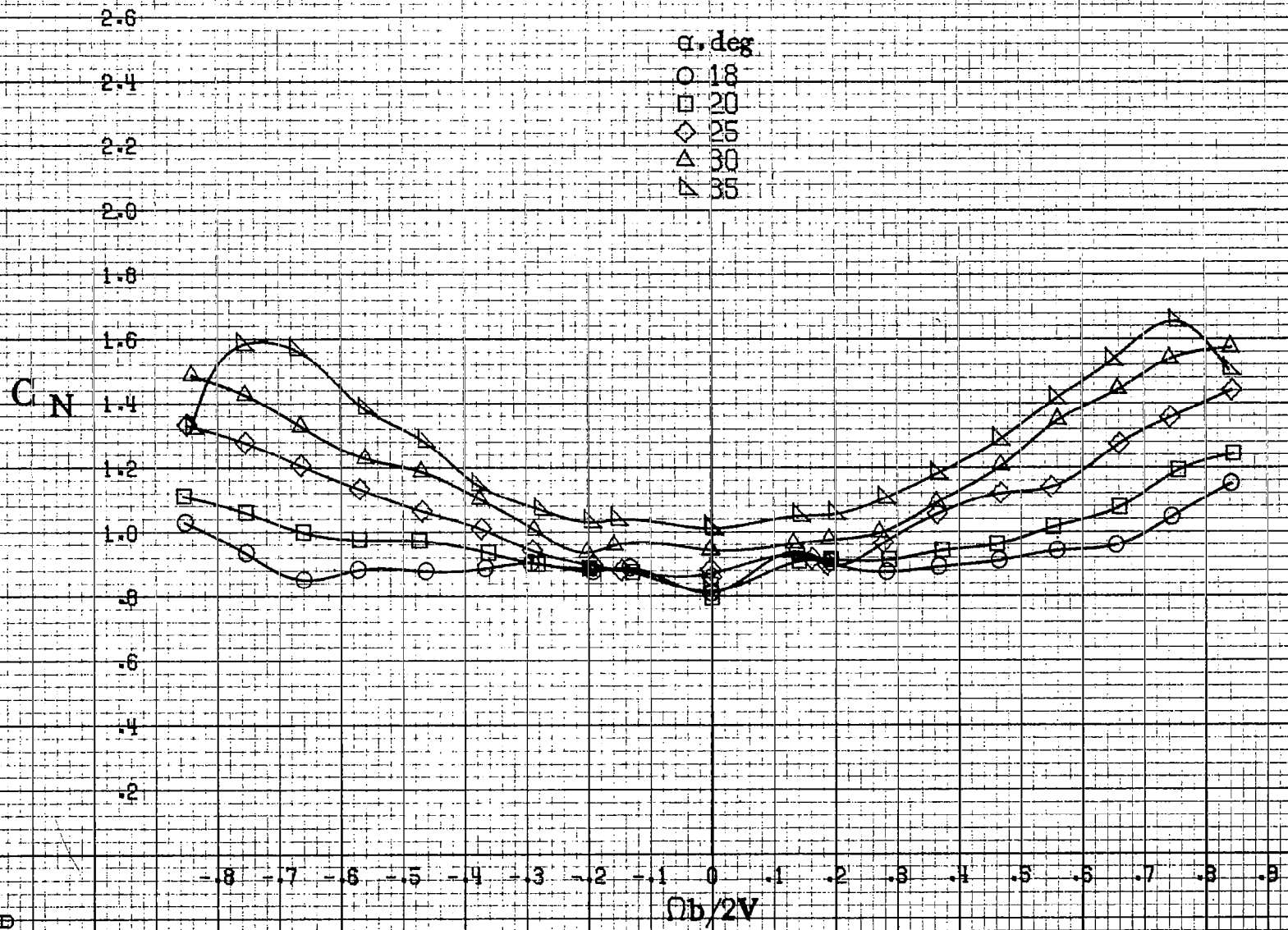
R349

(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A87. Concluded.



(a) $\alpha = 8 \text{ to } 16 \text{ deg}$, $SR = 99 \text{ cm (39 in)}$.

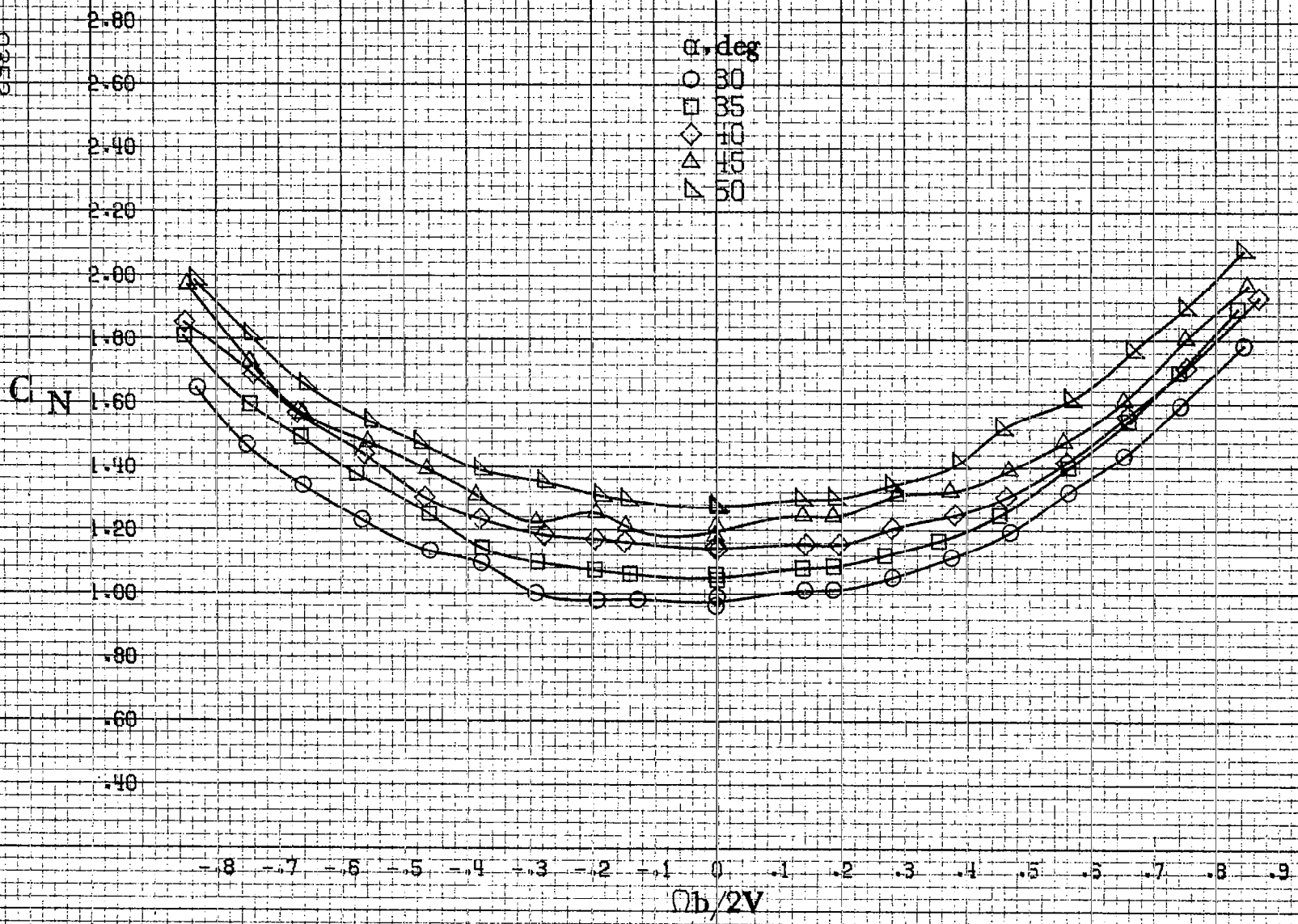
Figure A88. Effect of rotation rate and angle of attack on normal-force coefficient for configuration having sharp-edged fuselage bottom aft of engine cowlings. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_c = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A88, Continued.

R351

9352



(c) $\alpha=30$ to 50° , $SR=0$.
Figure A88 - Continued.

C_N

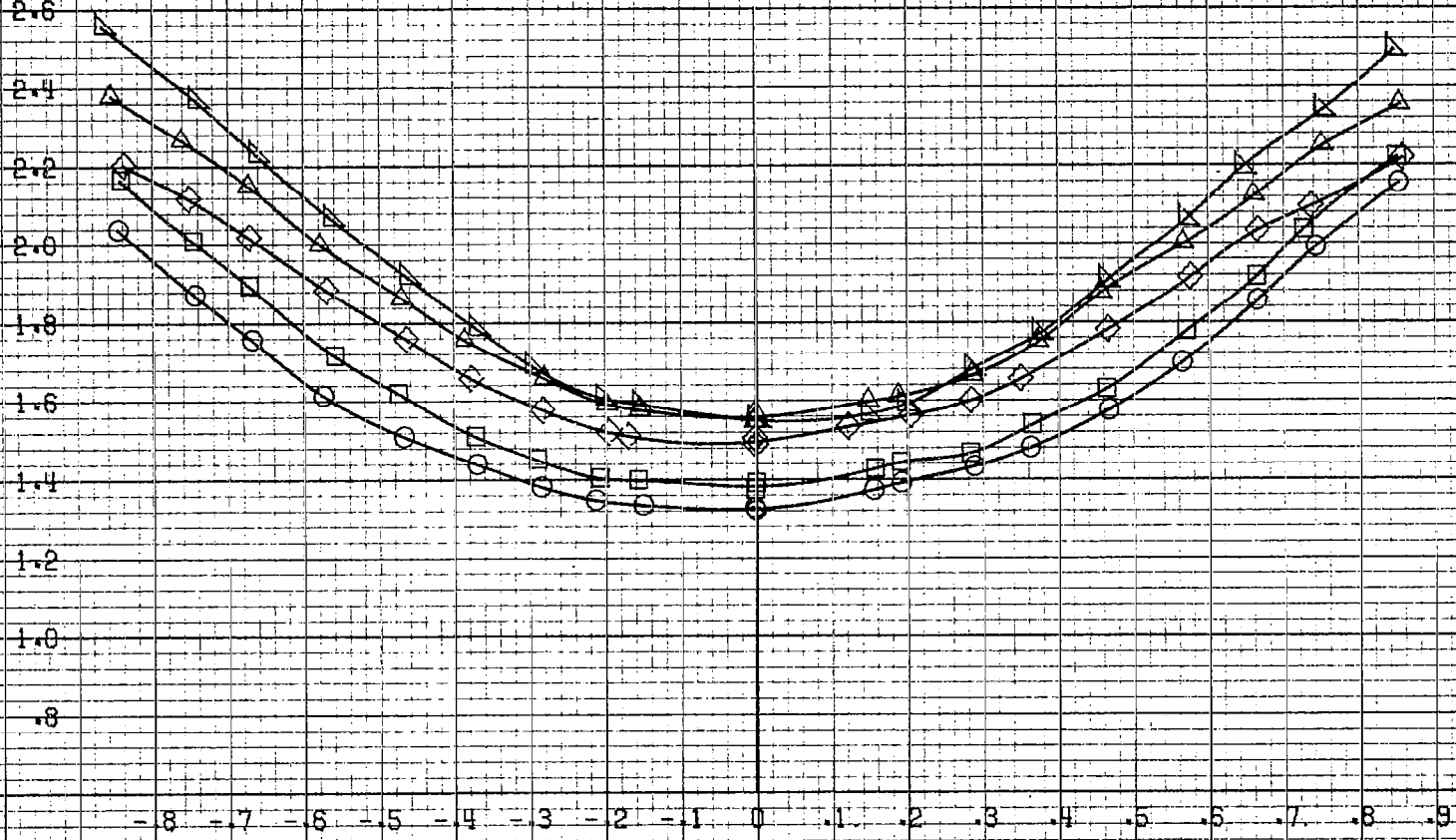
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8

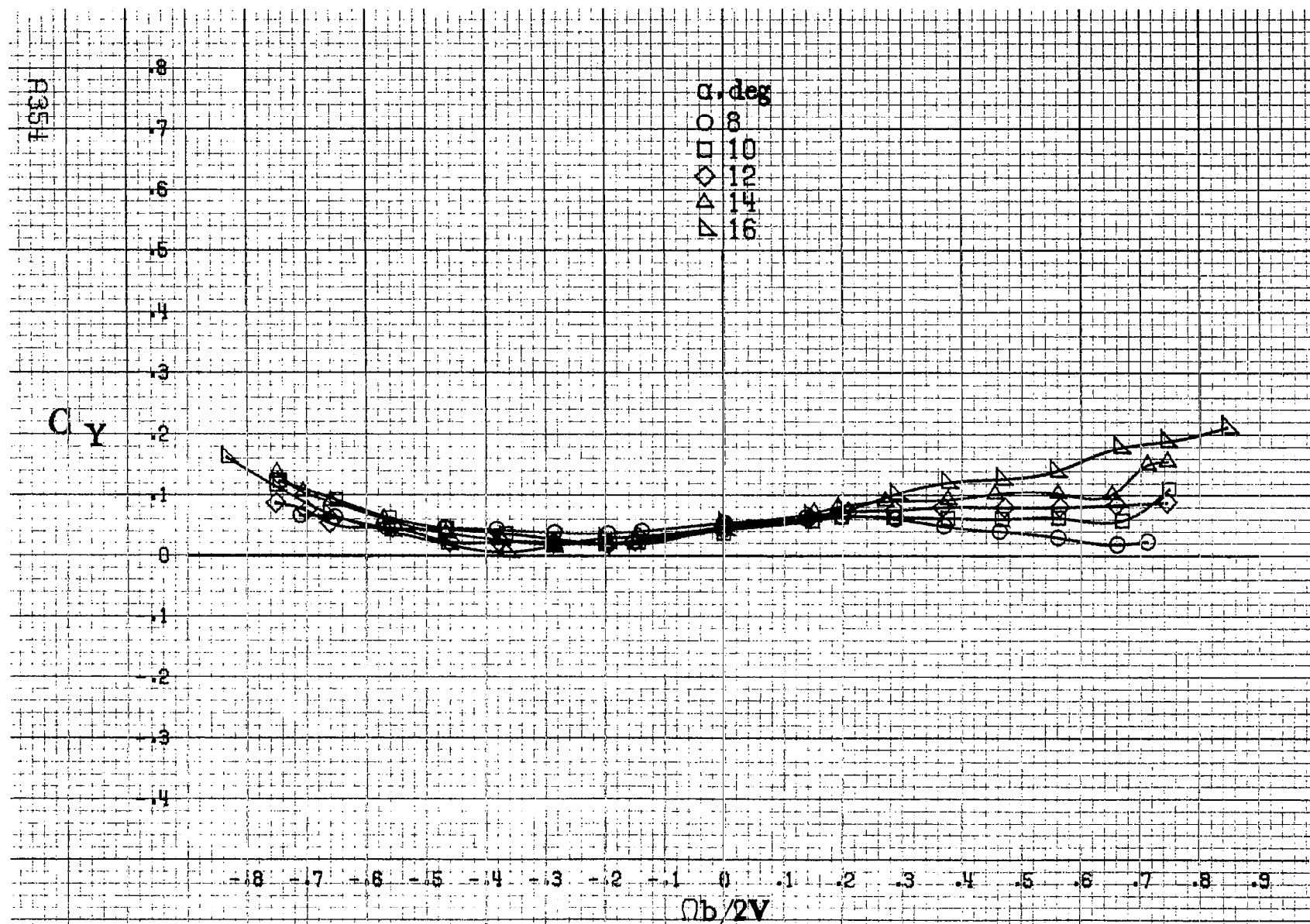
α, deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $Ob/2V$

0353

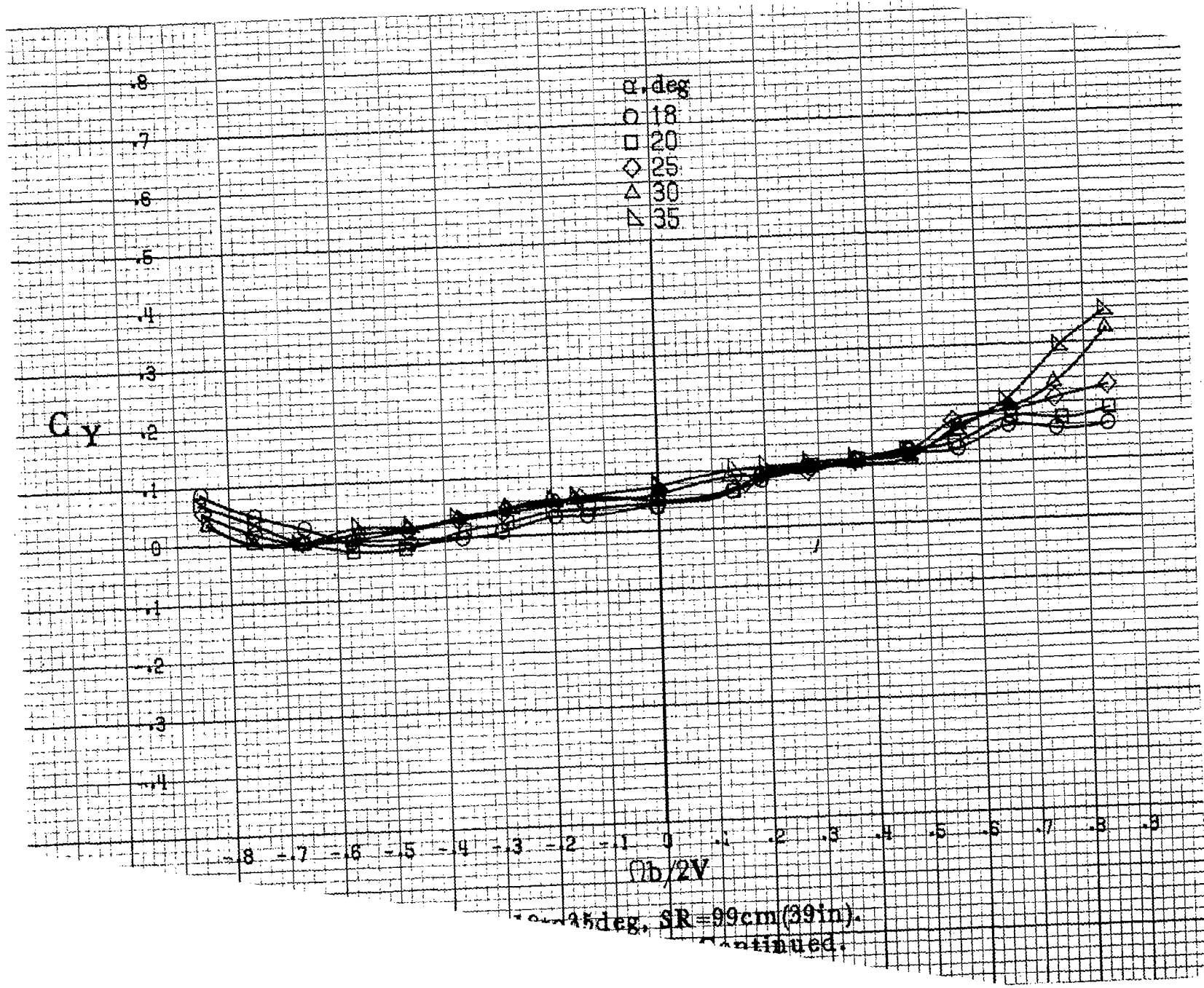
(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A88-Concluded.





(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A 89.-Effect of rotation rate and angle of attack on side-force coefficient for configuration having sharp-edged fuselage bottom aft of engine cowling. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



$\alpha = 35^\circ$, $SR = 99\text{cm} (39\text{in})$.
 continued.

E355

C_y

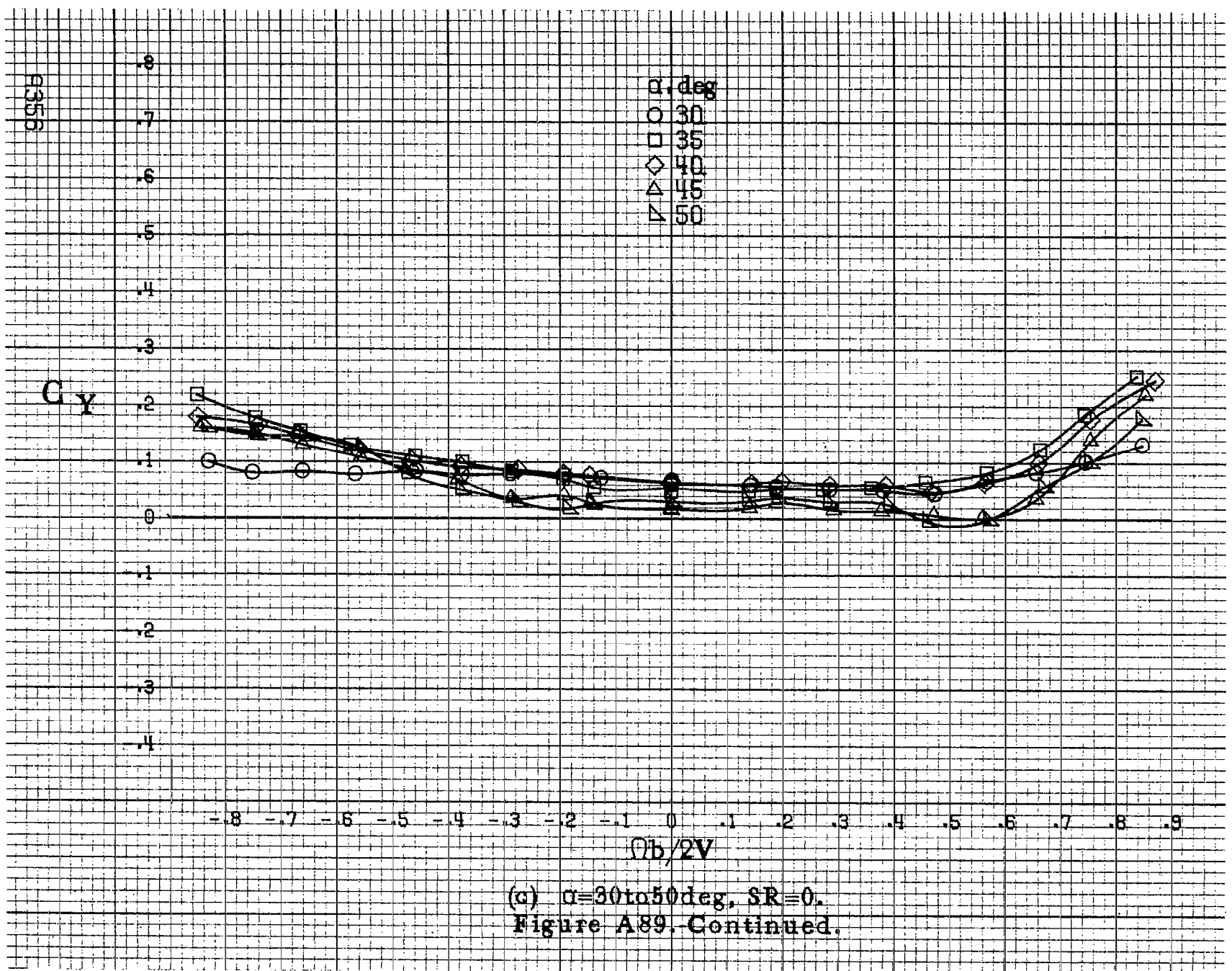
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4

α , deg
 ○ 30
 □ 35
 ◇ 40
 △ 45
 ▽ 50

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

$0b/2V$

(a) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A89. Continued.



C_y

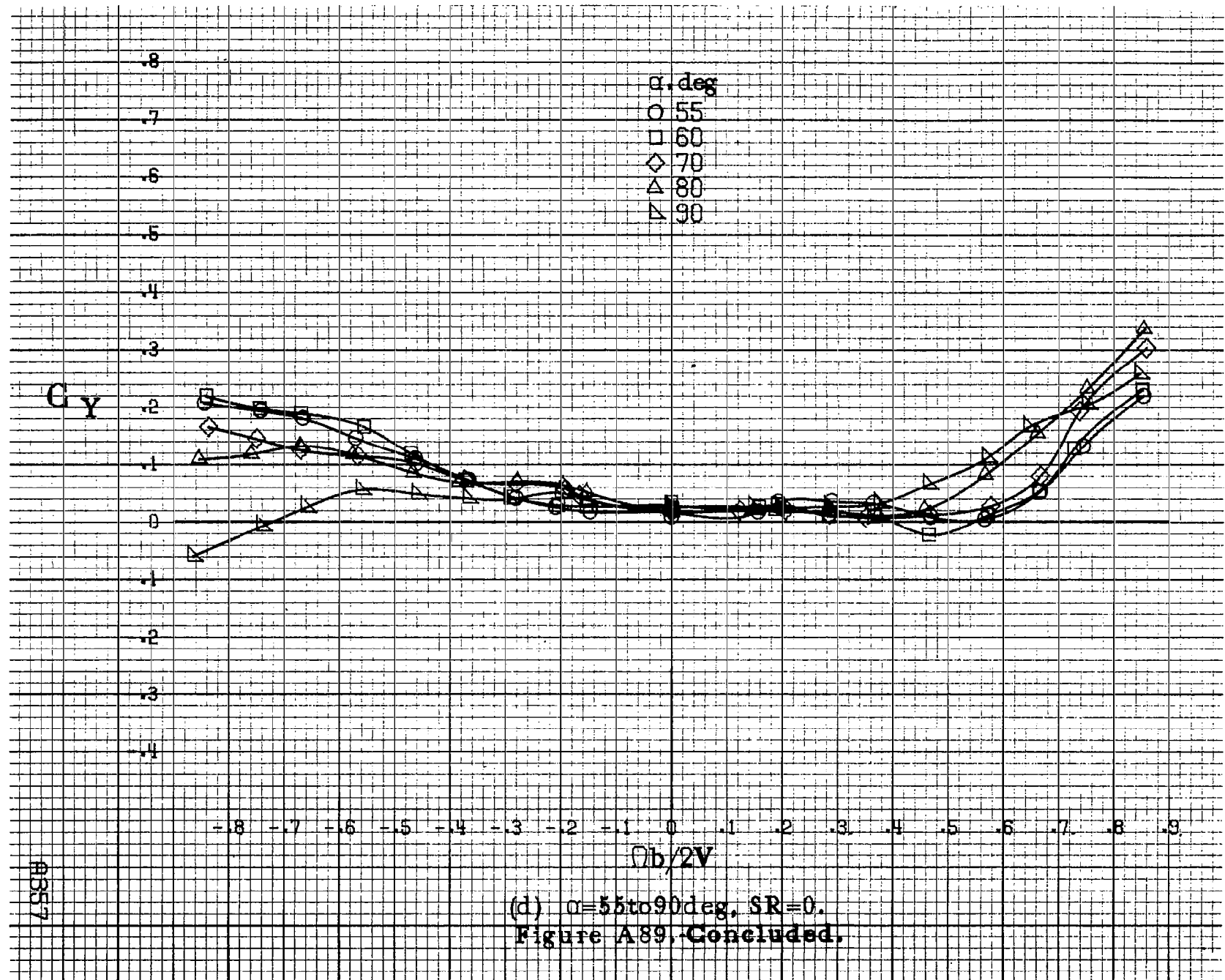
.8
.7
.6
.5
.4
.3
.2
.1
0
-1
-2
-3
-4

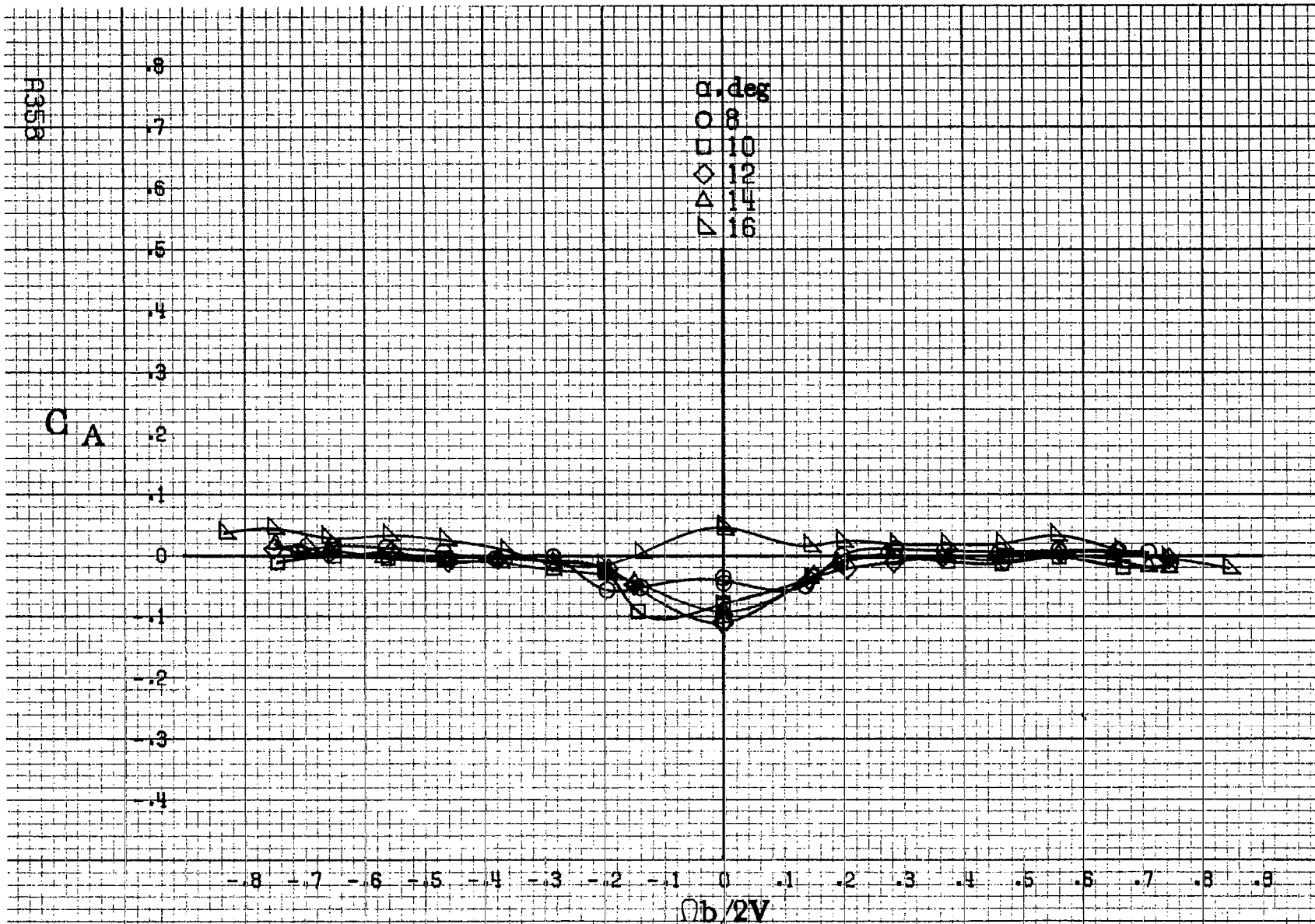
α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $Ob/2V$

A357

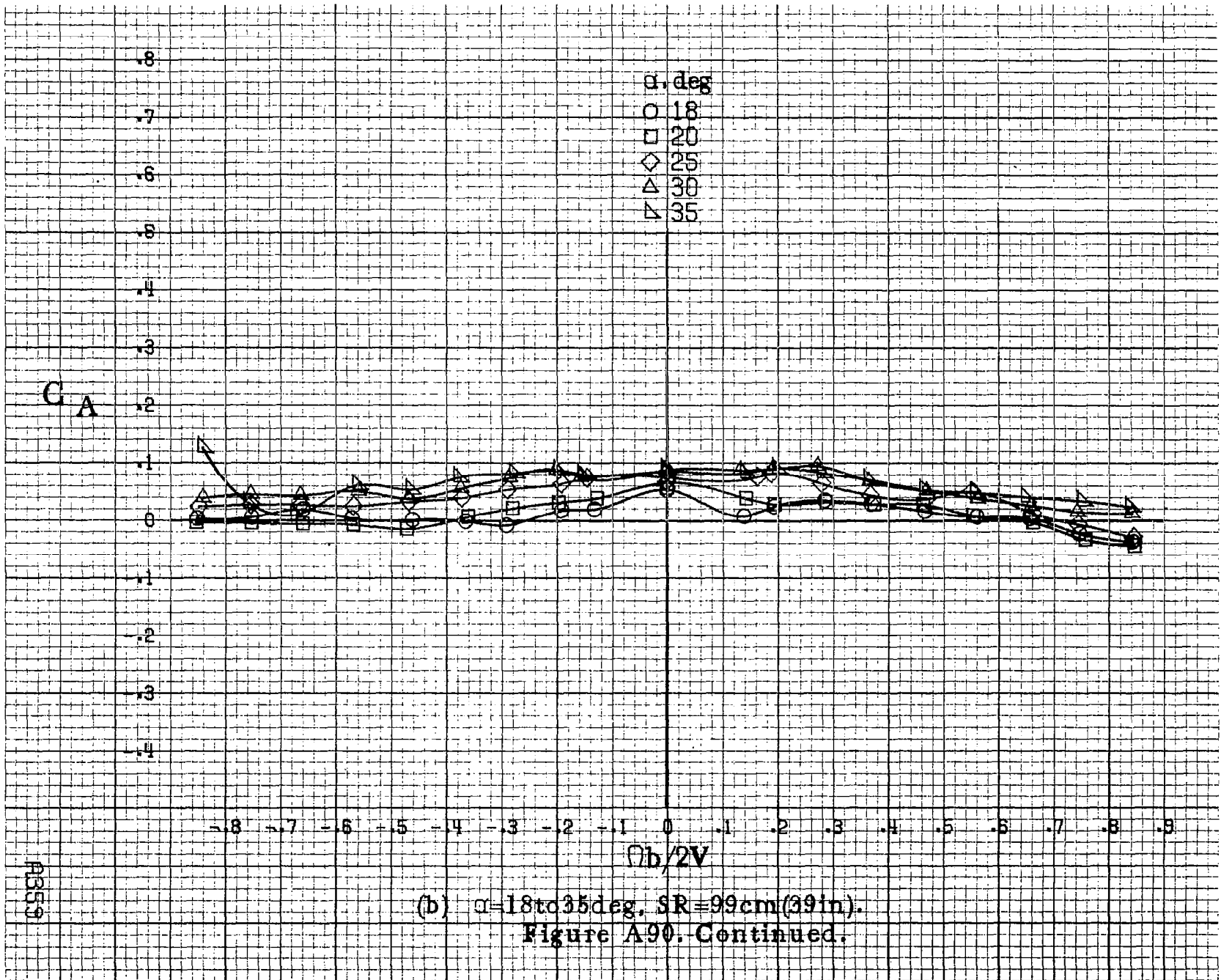
(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A89, Concluded.





(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A90.-Effect of rotation rate and angle of attack on axial-force coefficient for configuration having sharp-edged fuselage bottom aft of engine cowlings. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A90. Continued.

A9559

E360

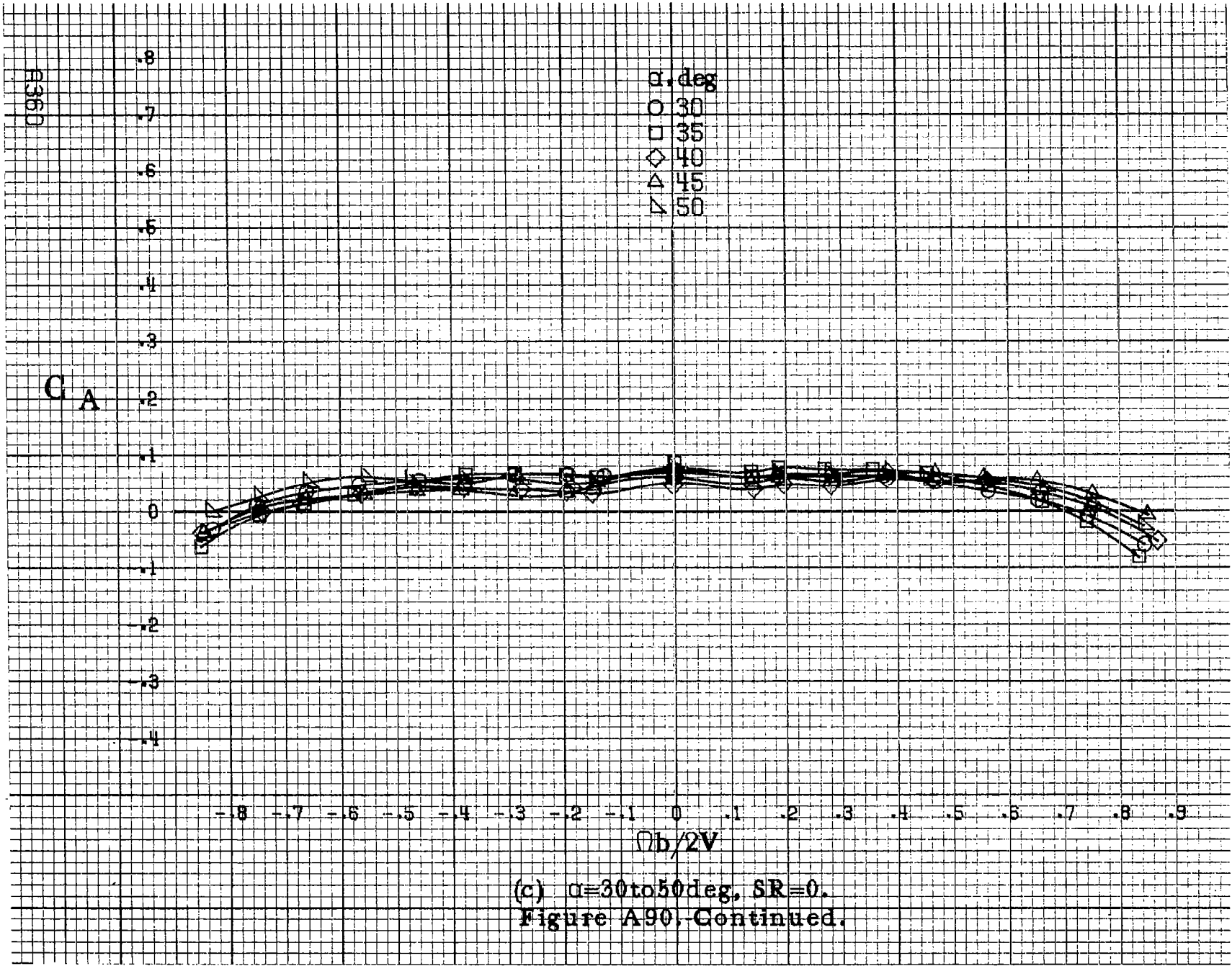
C_A

.8
.7
.6
.5
.4
.3
.2
.1
0
.1
.2
.3
.4

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-18 -17 -16 -15 -14 -13 -12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $Ob/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A90.-Continued.



G_A

.8
.7
.6
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4

α, deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

- .8 - .7 - .6 - .5 - .4 - .3 - .2 - .1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$\Omega b/2V$

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A90. Concluded.

A962

C_n

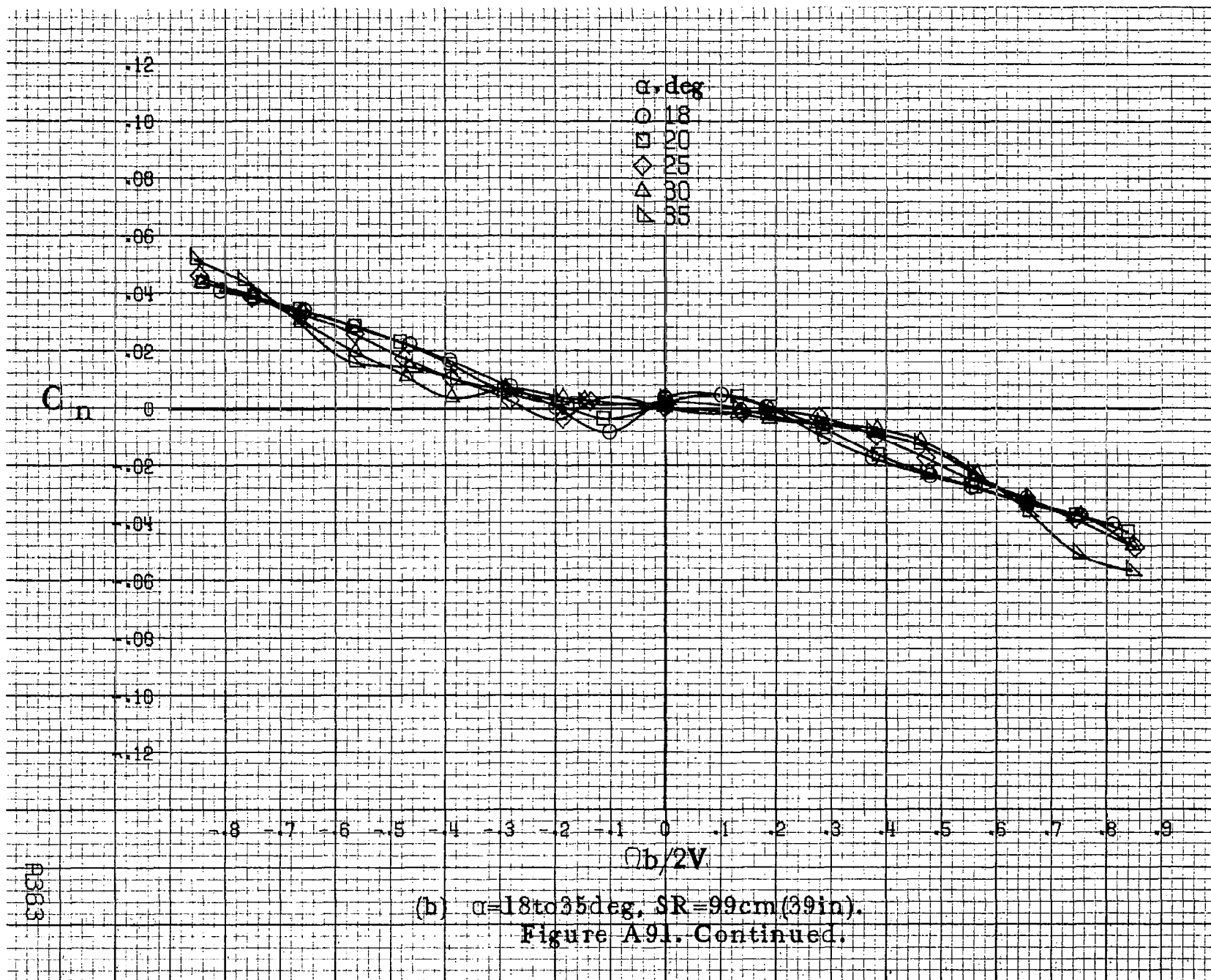
.12
.10
.08
.06
.04
0
.02
.04
.06
.08
.10
.12

α , deg
○ 8
□ 10
◇ 12
△ 14
▽ 16

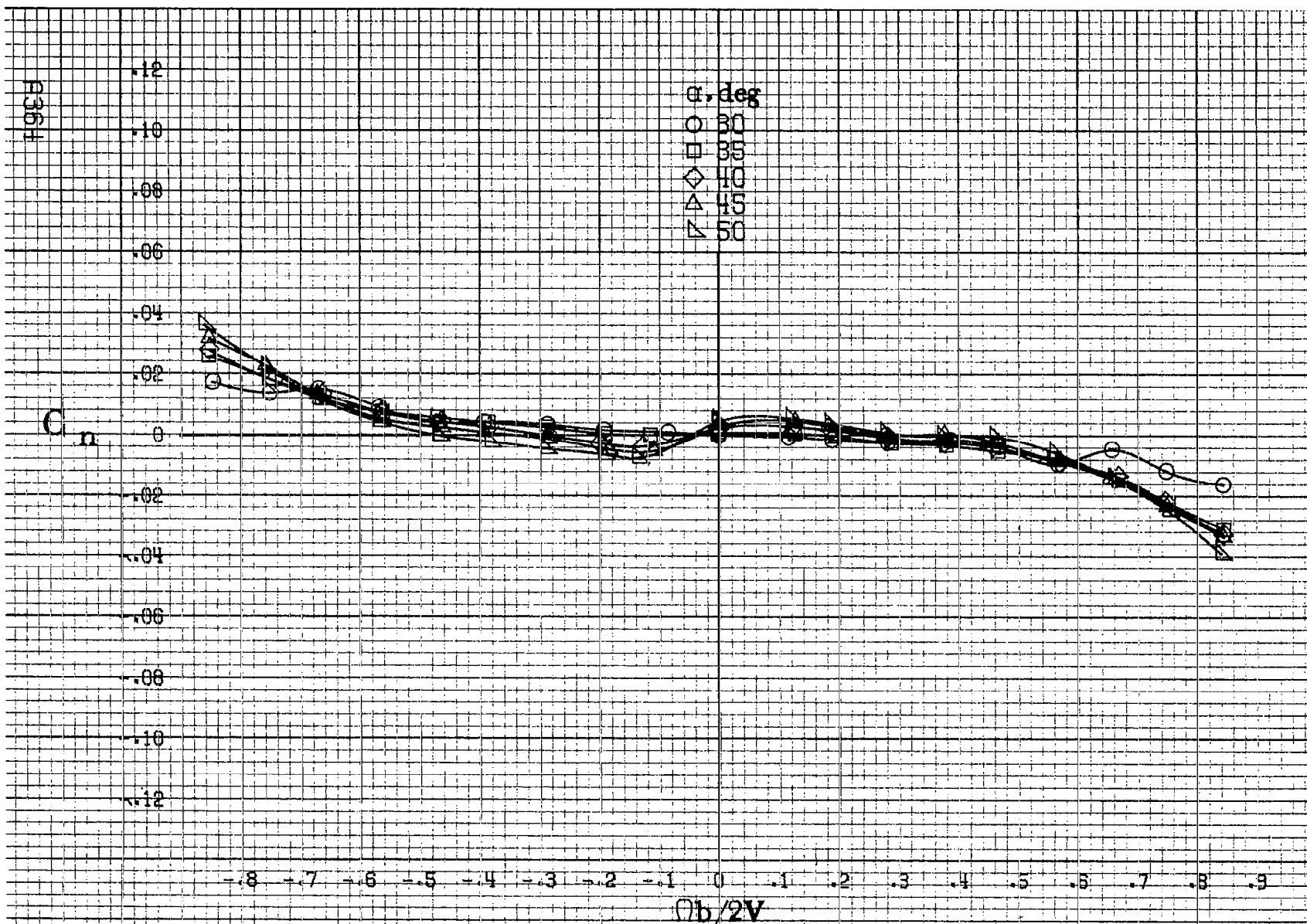
-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $\Omega b/2V$

(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

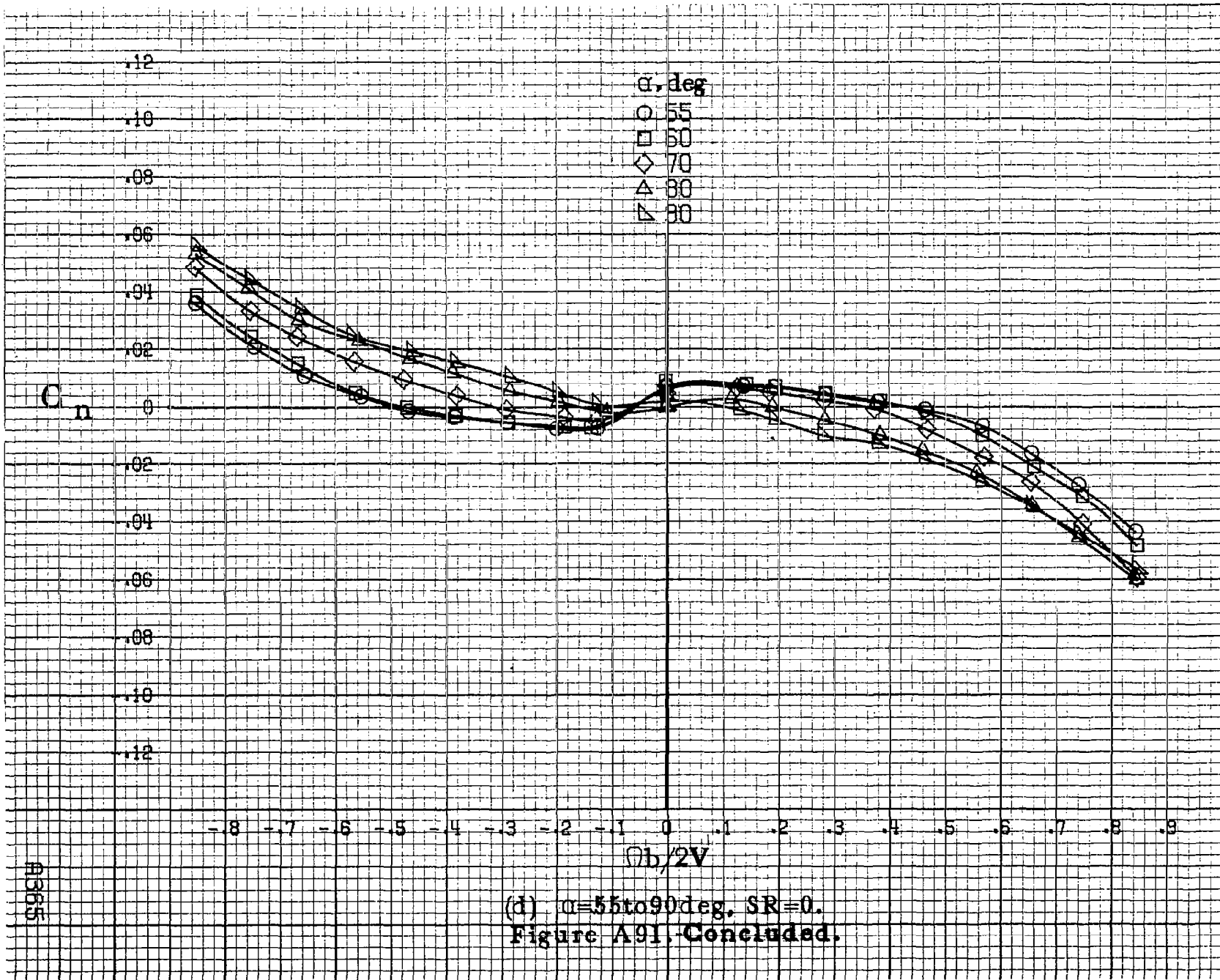
Figure A91. Effect of rotation rate and angle of attack on yawing-moment coefficient for configuration having full-span LE wing droop with moderate nose radius. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



A91(b)



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A91. Continued.



(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A91. Concluded.

A3165

A366

C_l

.35
.30
.25
.20
.15
.10
.05
0
-.05
-.10
-.15
-.20
-.25

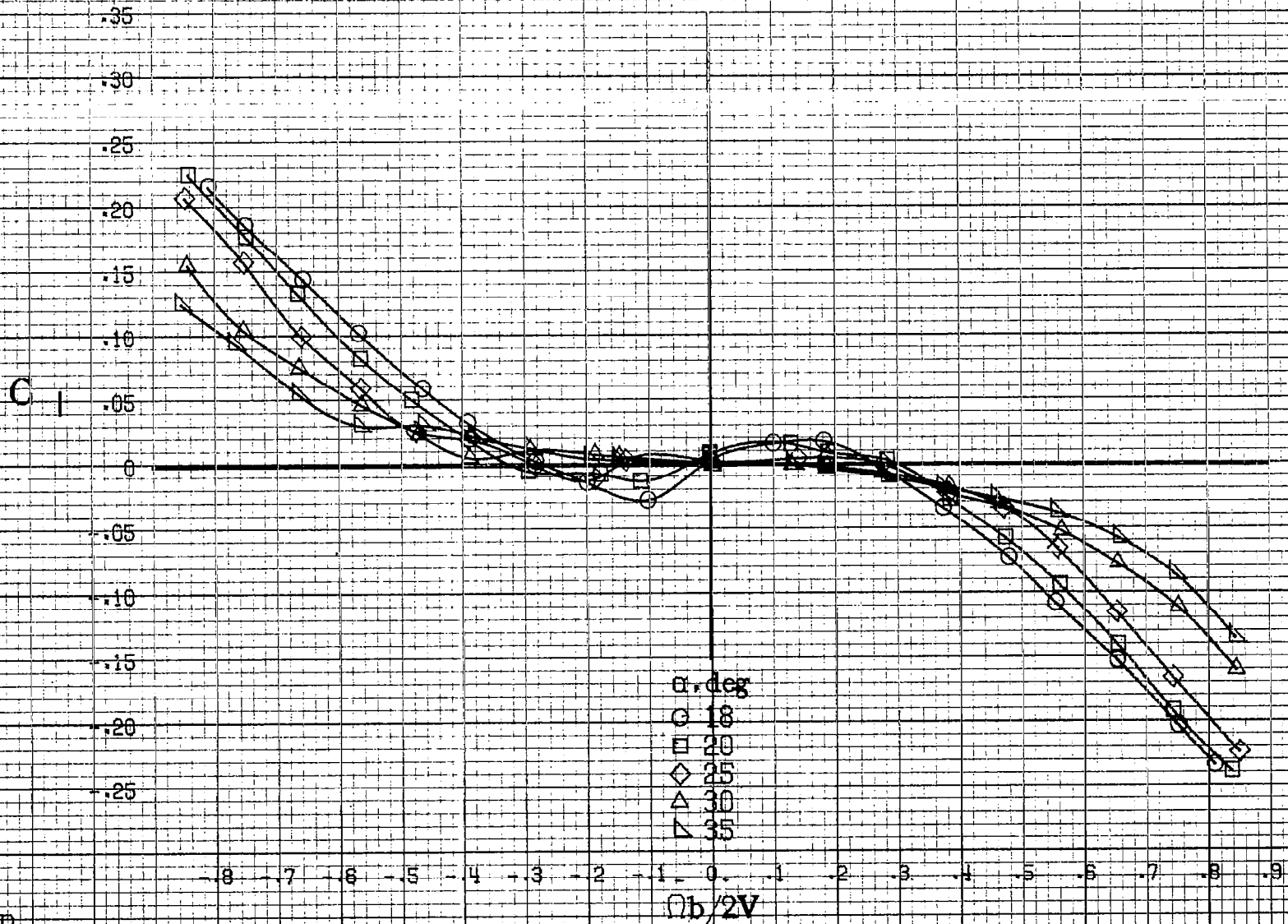
-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

α , deg
○ 8
□ 10
◇ 12
△ 14
▽ 16

$\Omega b/2V$

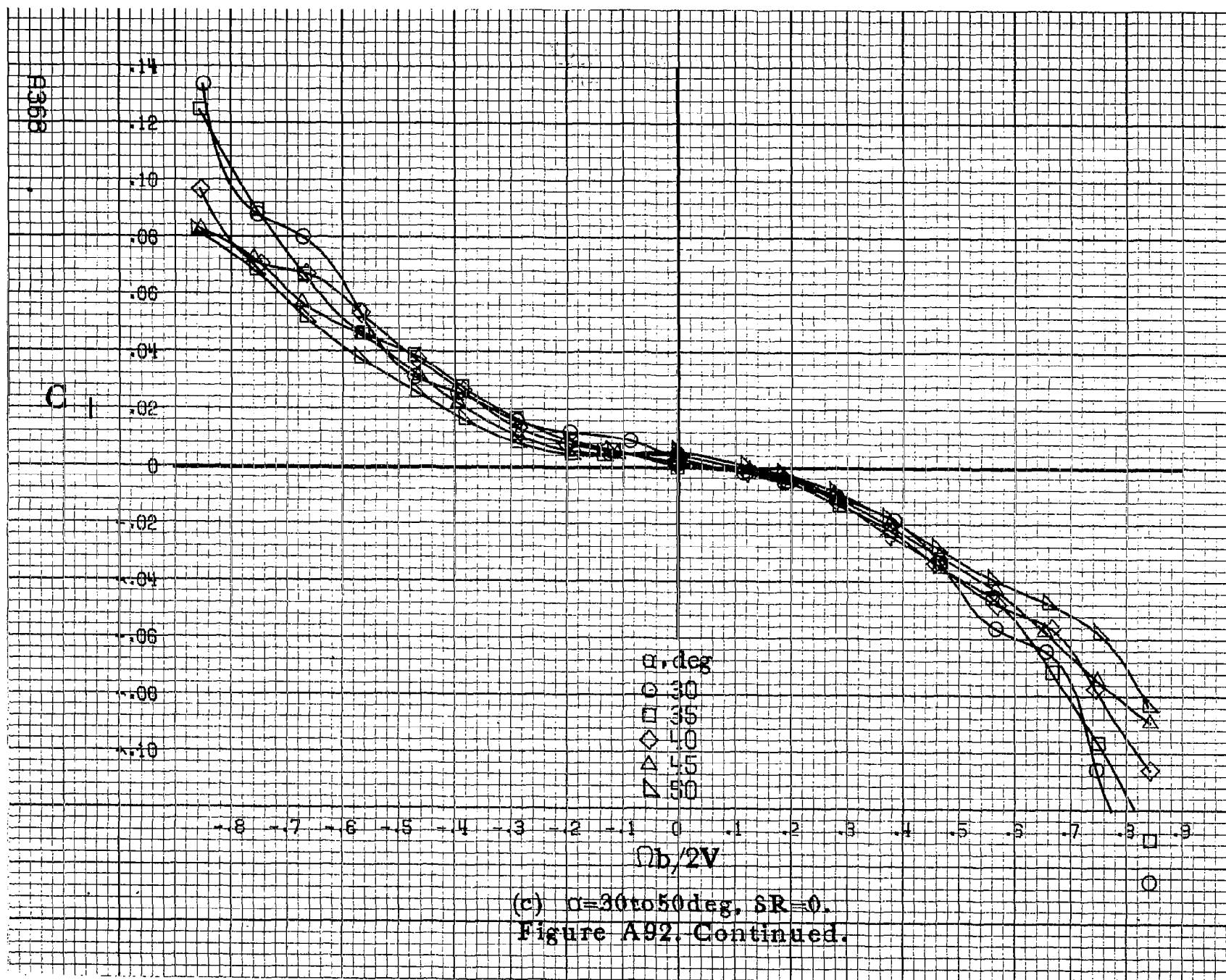
(a) $\alpha=8$ to 16 deg, SR=99cm(39in).

Figure A92. Effect of rotation rate and angle of attack on rolling-moment coefficient for configuration having full-span LE wing droop with moderate nose radius. $\delta_e = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A92. Continued.

A367



C_I

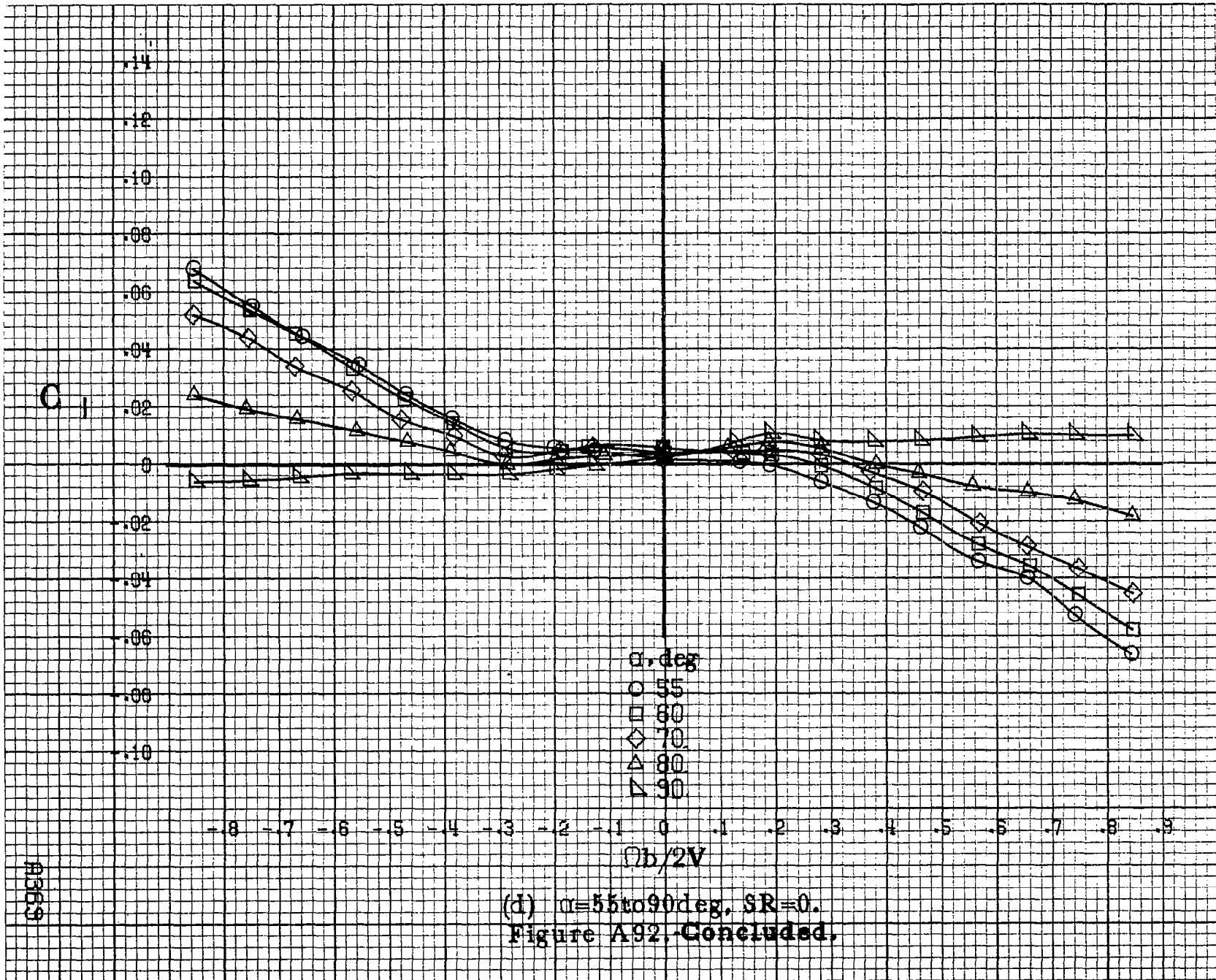
.14
.12
.10
.08
.06
.04
.02
0
-.02
-.04
-.06
-.08
-.10

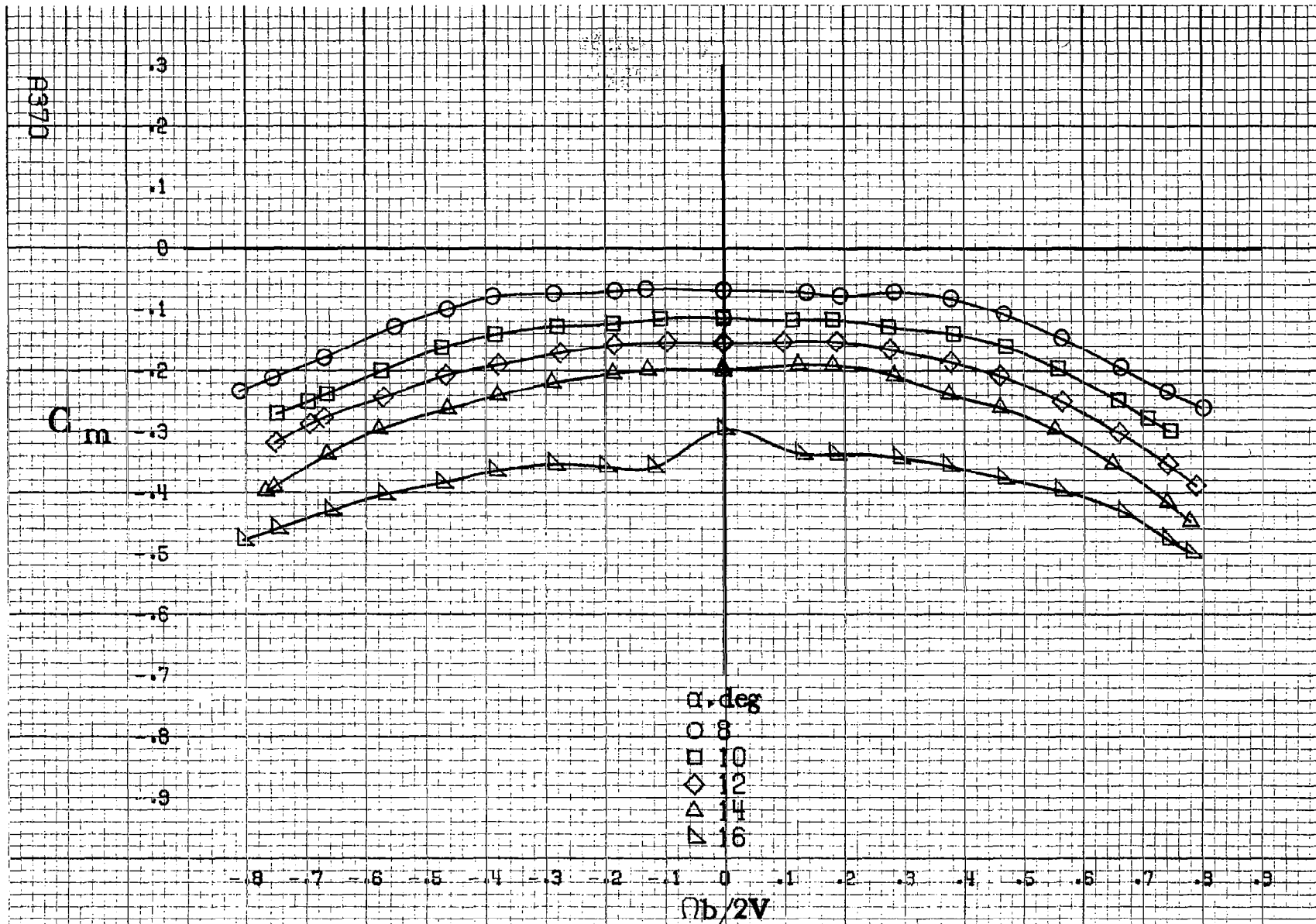
-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9

α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A92, Concluded.

A369





(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A93. Effect of rotation rate and angle of attack on pitching-moment coefficient for configuration having full-span LE wing droop with moderate nose radius. $\delta_a = 0^\circ$, $\delta_e = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_m

-.1
-.2
-.3
-.4
-.5
-.6
-.7
-.8
-.9
-1.0
-1.1
-1.2
-1.3

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

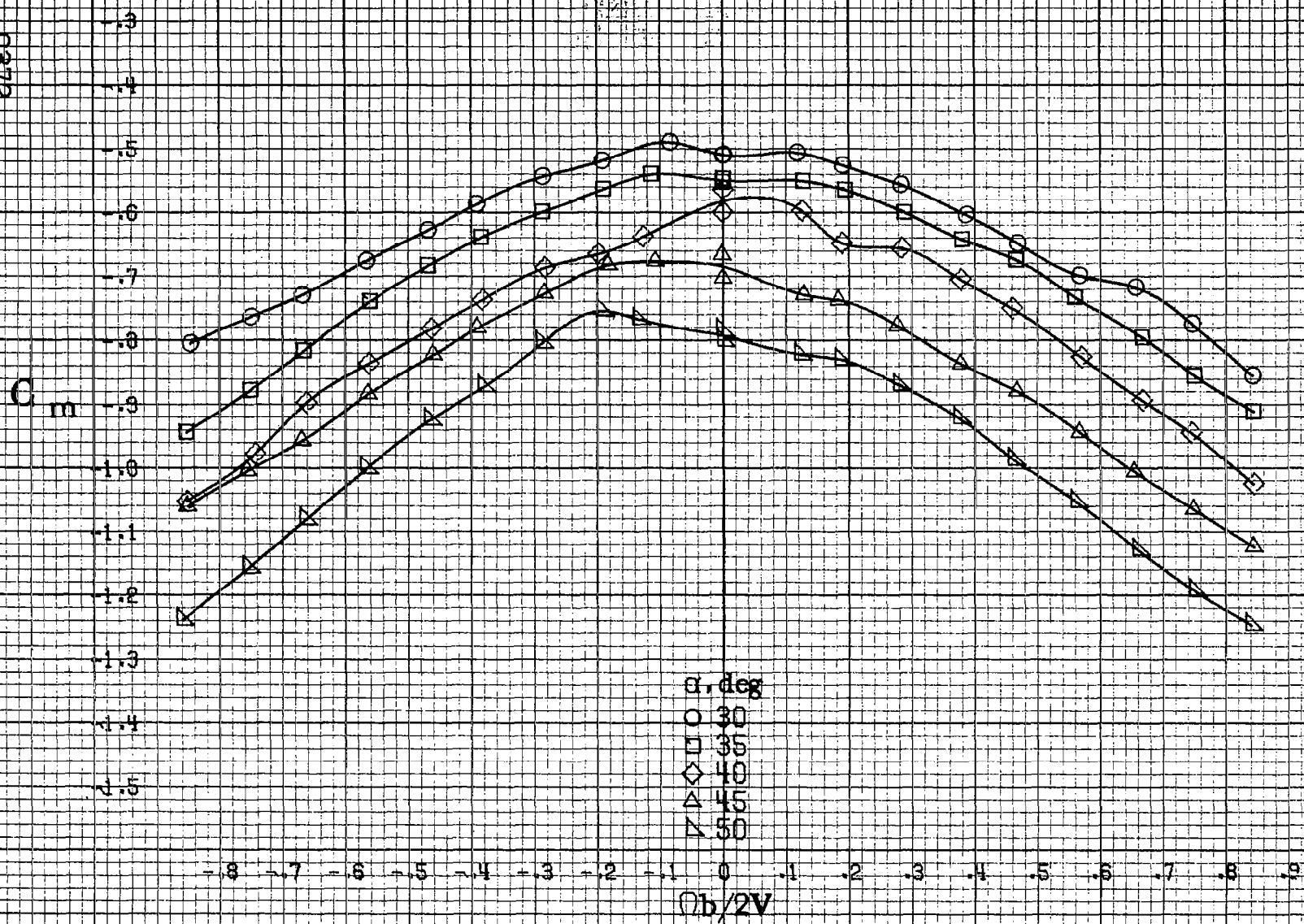
α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

$b/2V$

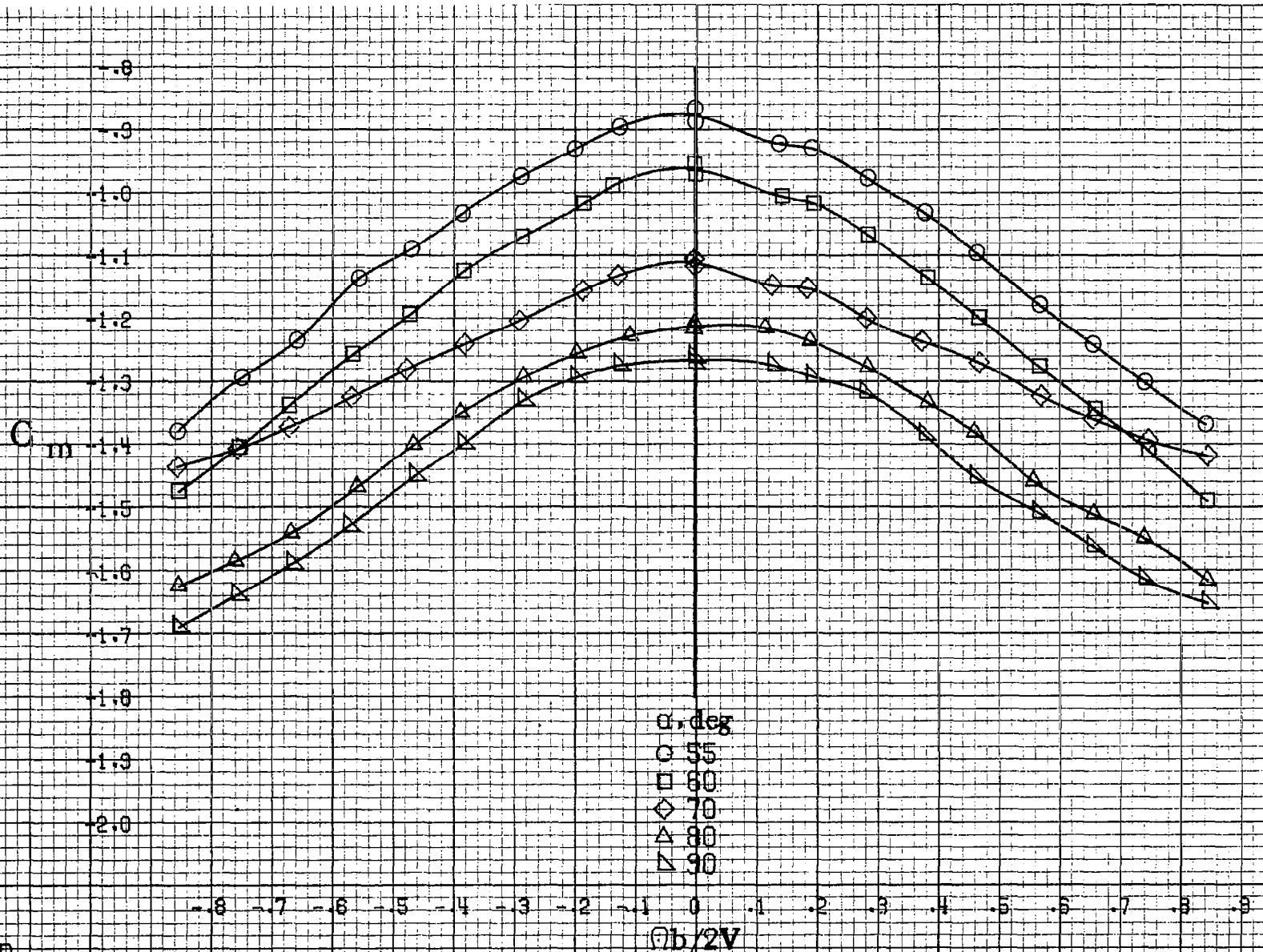
(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A93, Continued.

#97

E372



(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A93. Continued.



A873

(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A93. Concluded.

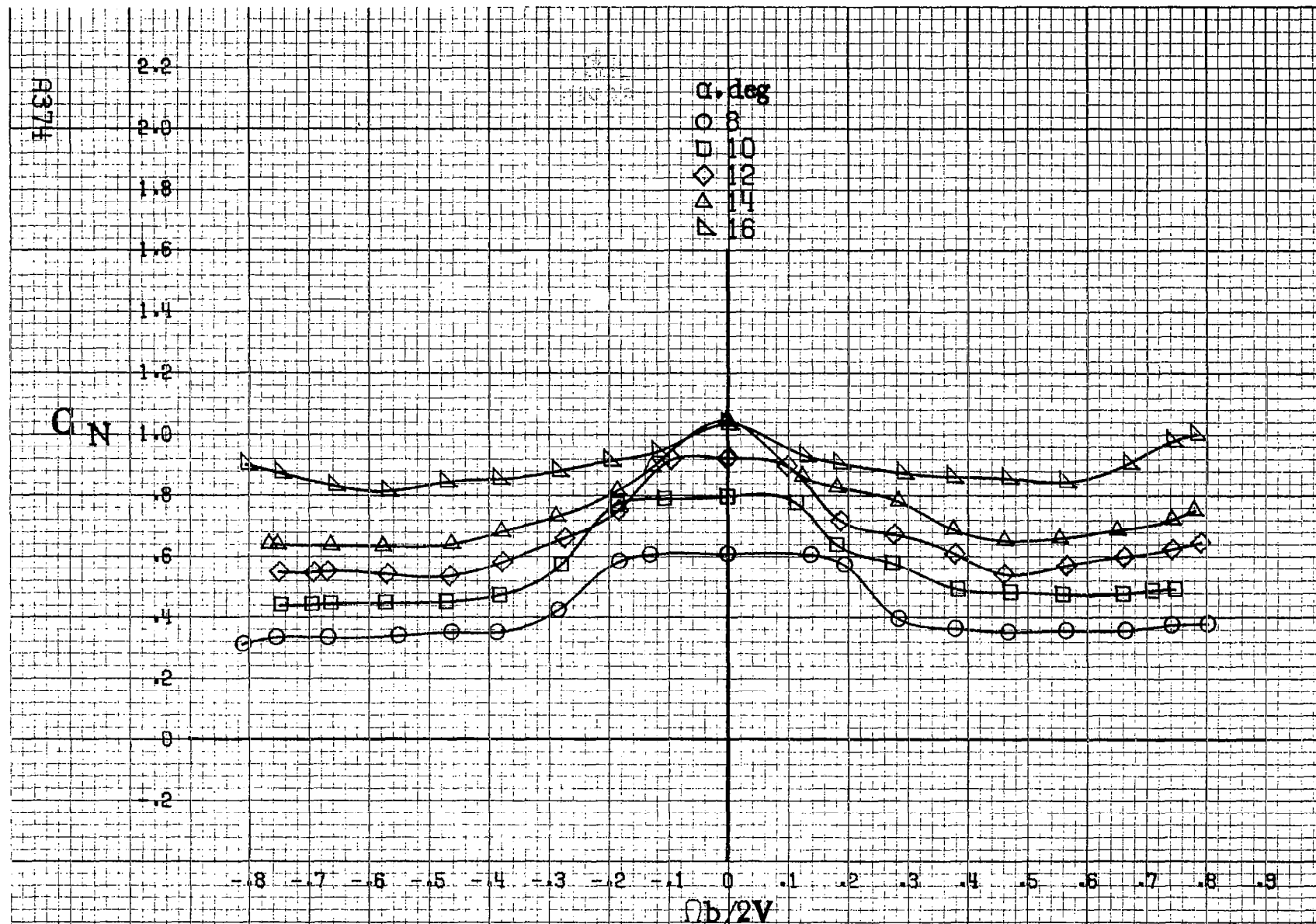


Figure A94. Effect of rotation rate and angle of attack on normal-force coefficient for configuration having full-span LE wing droop with moderate nose radius. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_N

α , deg

○ 18

□ 20

◇ 25

△ 30

▽ 35

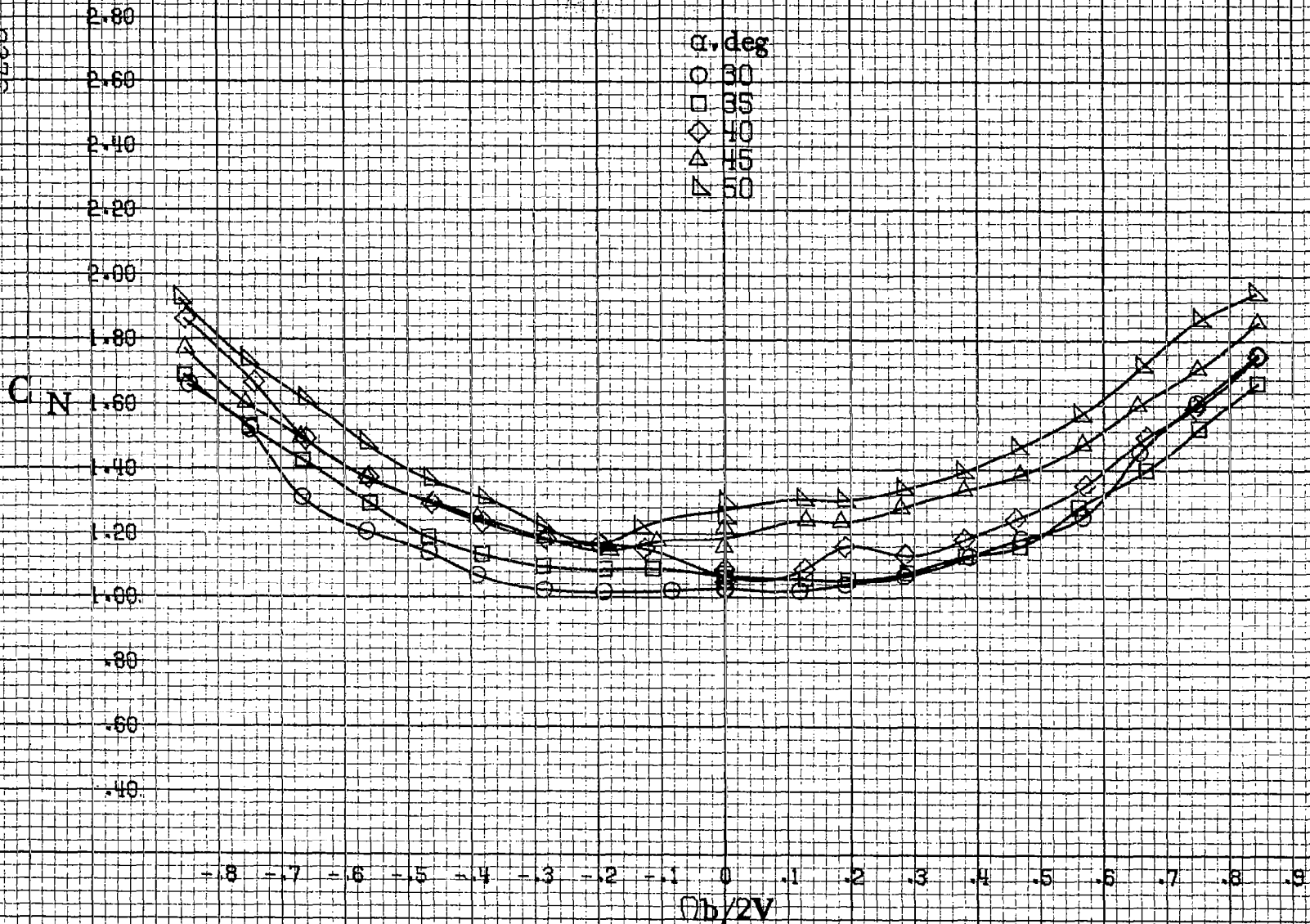
- .8 - .7 - .6 - .5 - .4 - .3 - .2 - .1 0 .1 .2 .3 .4 .5 .5 .7 .8 .9

$\theta b/2V$

(b) $\alpha=18$ to 35 deg, SR=99 cm (39 in).
Figure A94. Continued.

A9375

E376



(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A94, Continued.

C_N

3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
0

α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $Ob/2V$

(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A94. Concluded.

A1377

B378

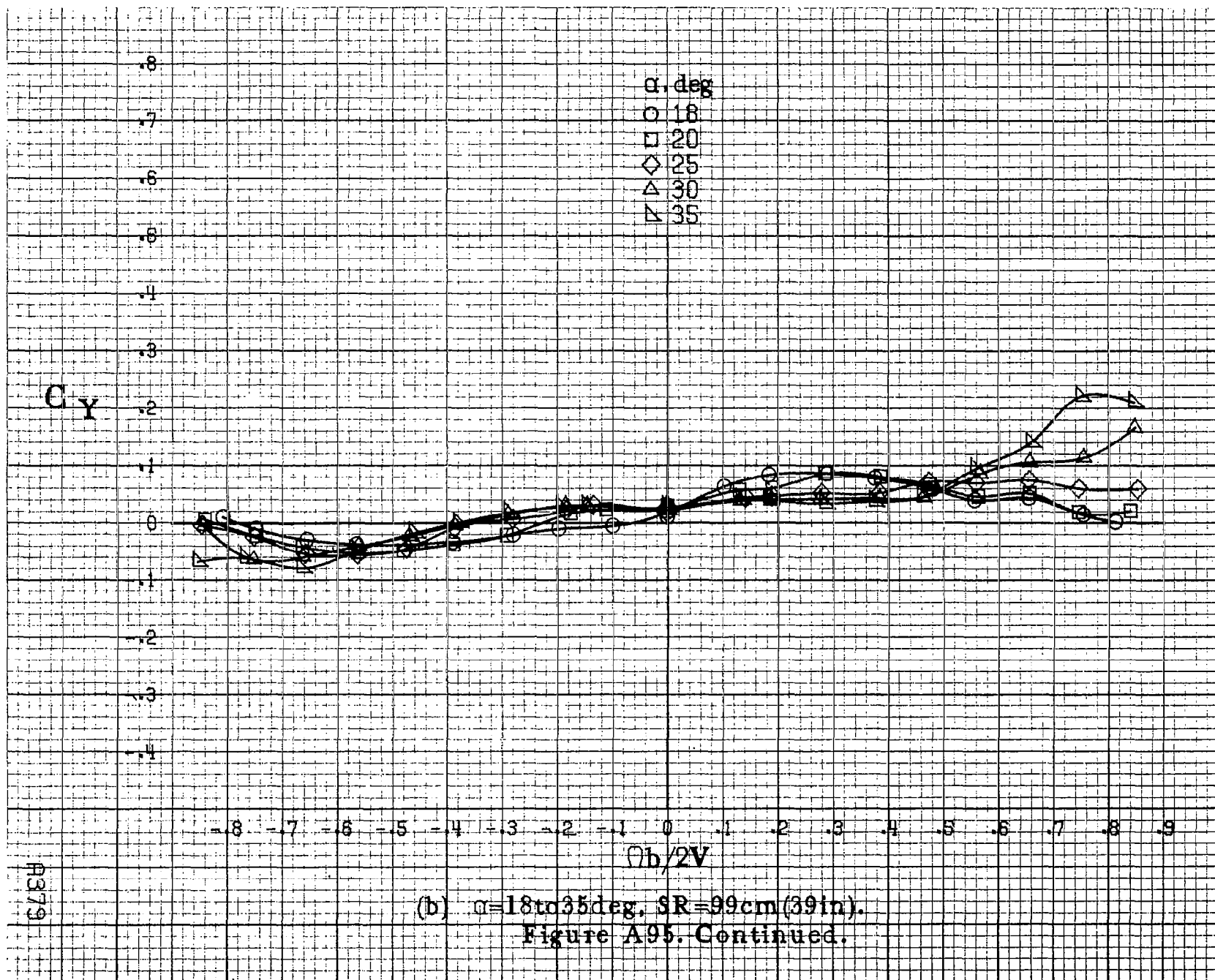
 C_y .8
.7
.6
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4

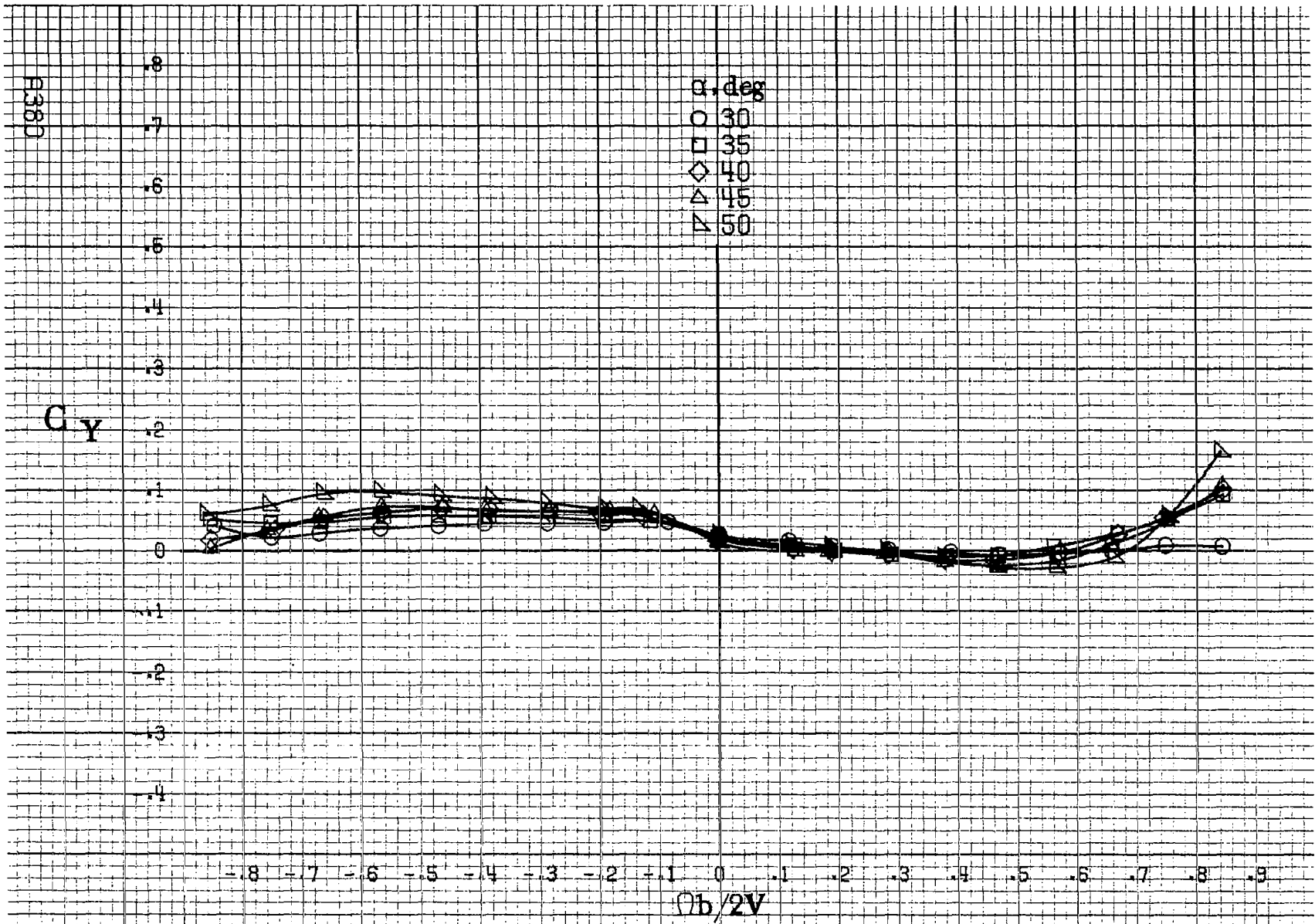
α , deg
 ○ 8
 □ 10
 ◇ 12
 △ 14
 ▽ 16

- .8 - .7 - .6 - .5 - .4 - .3 - .2 - .1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

 $\Omega b/2V$ (a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A95. Effect of rotation rate and angle of attack on side-force coefficient for configuration having full-span LE wing droop with moderate nose radius. $\delta_a=0^\circ$, $\delta_a=0^\circ$, $\delta_r=0^\circ$, $\beta=0^\circ$.





(c) $\alpha = 30$ to 50 deg, $SR = 0$.
 Figure A95. Continued.

C_y

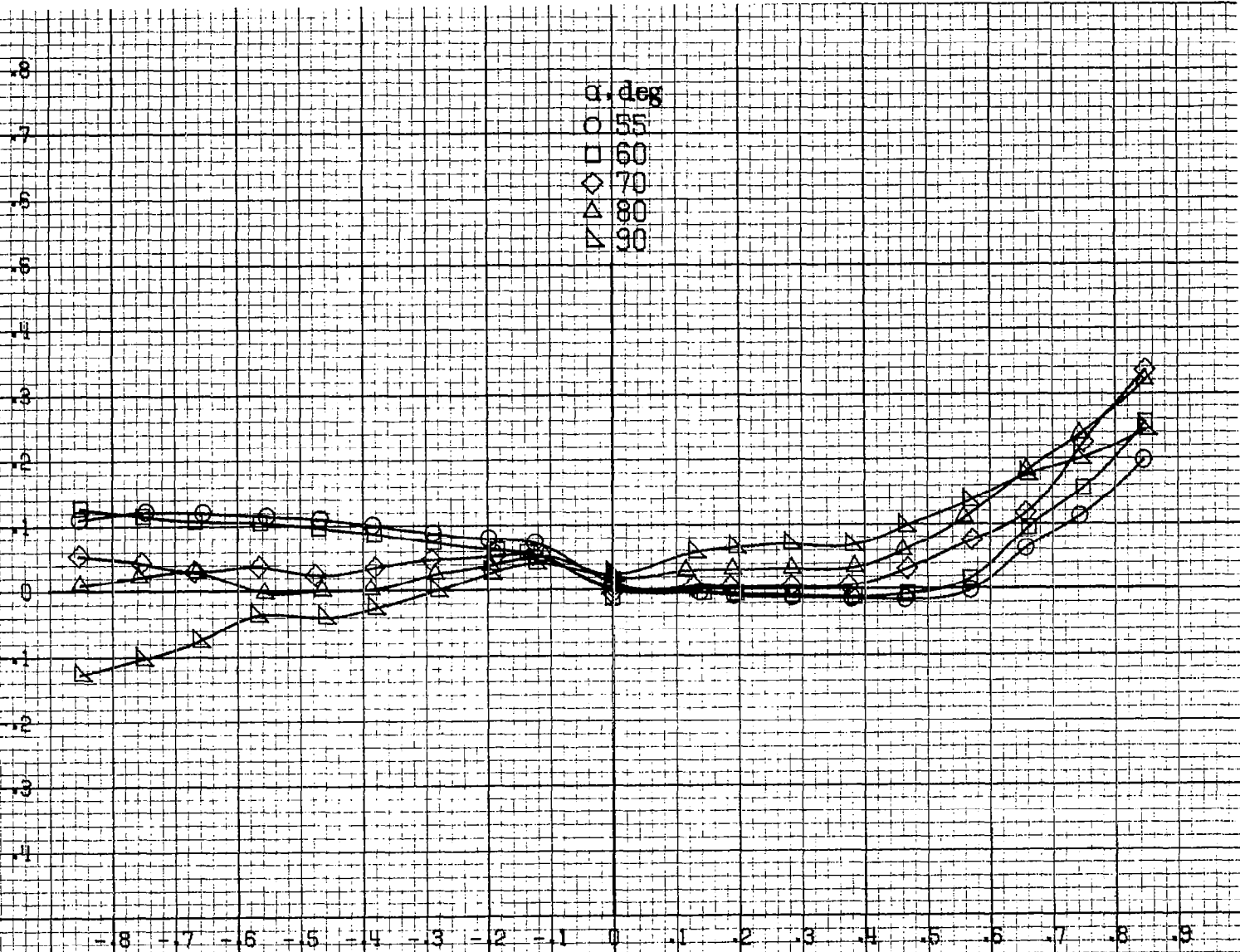
.8
.7
.6
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4

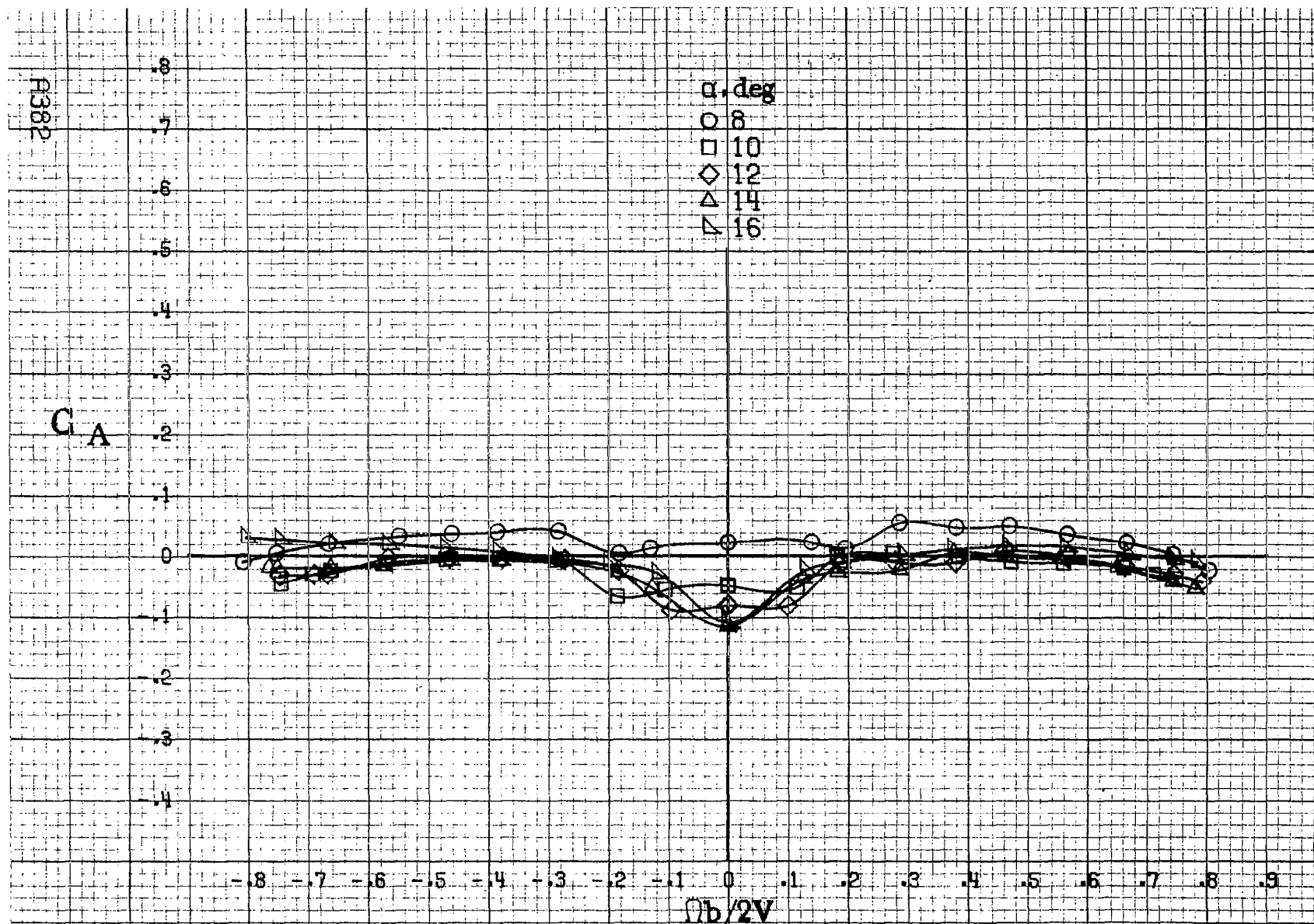
α , deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $b/2V$

A95

(d) $\alpha=55$ to 90 deg. $SR=0$.
Figure A95. Concluded.





(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A96.- Effect of rotation rate and angle of attack on axial-force coefficient for configuration having full-span LE wing droop with moderate nose radius. $\delta_n = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_A

.8
.7
.6
.5
.4
.3
.2
.1
0
-1
-2
-3
-4

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

.8 .7 .6 .5 .4 .3 .2 .1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $Ob/2V$

A983

(b) $\alpha=18$ to 35 deg, SR=99cm (39in).
Figure A96. Continued.

H984

C_A

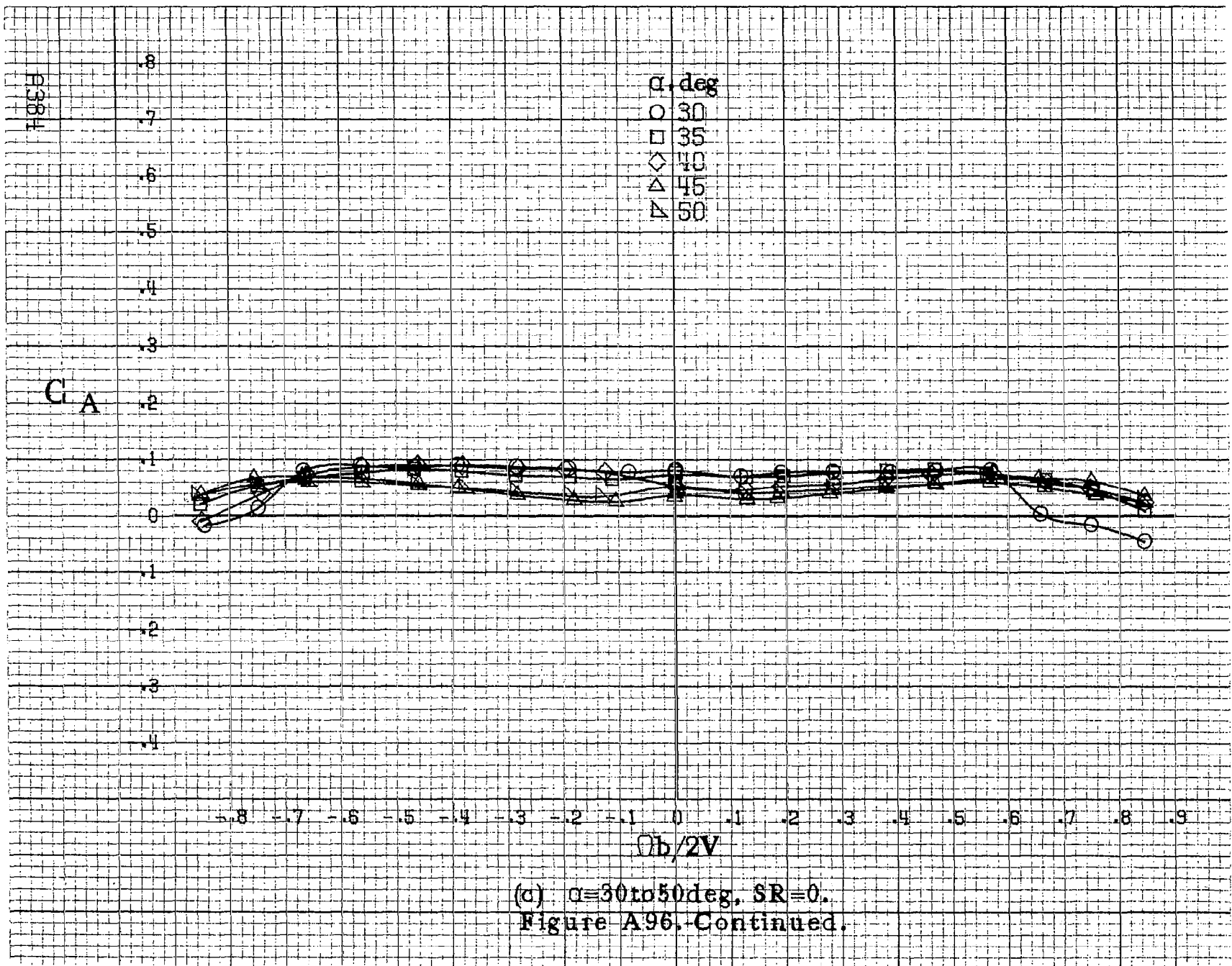
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4

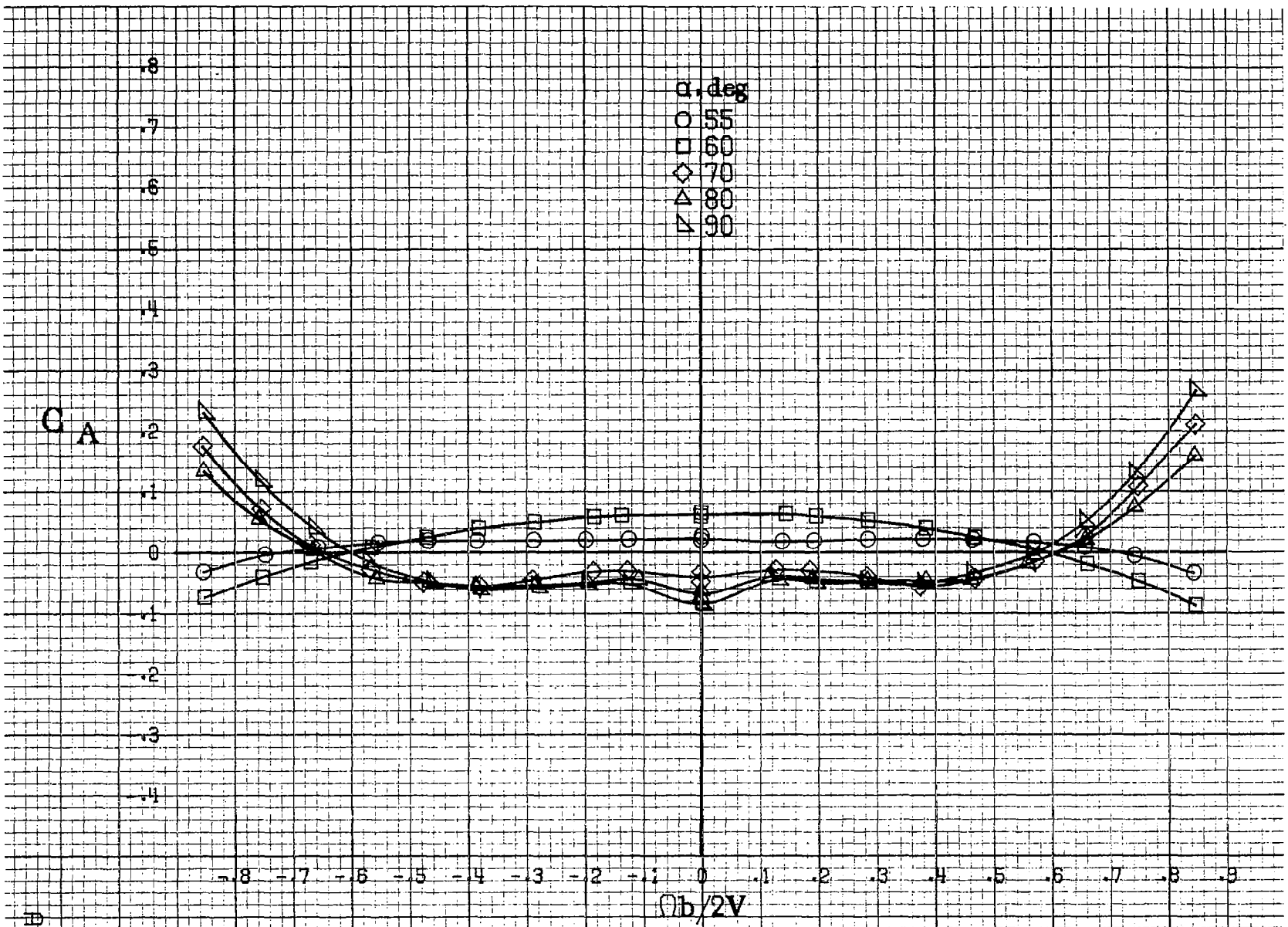
α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$b/2V$

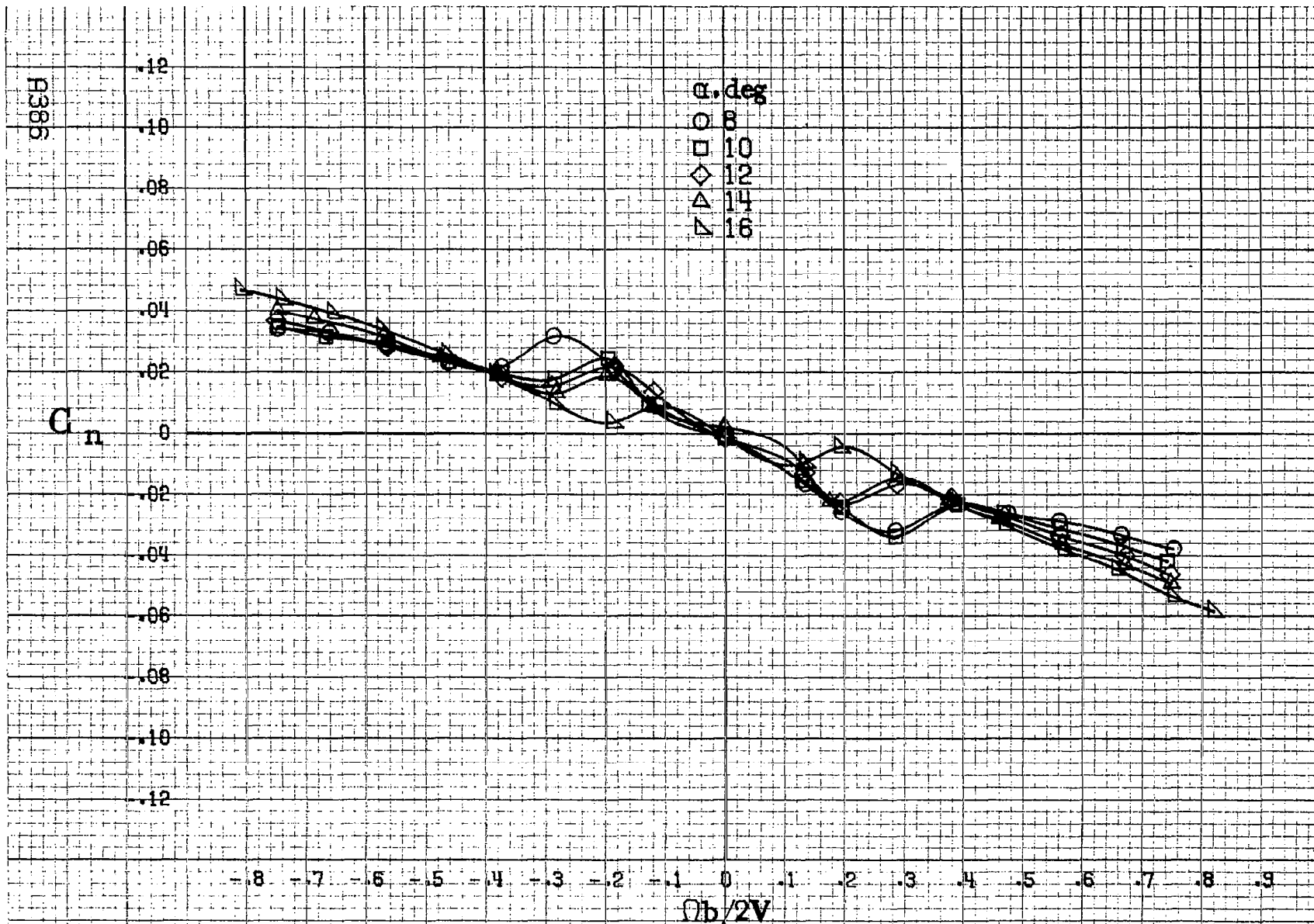
(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A96. Continued.





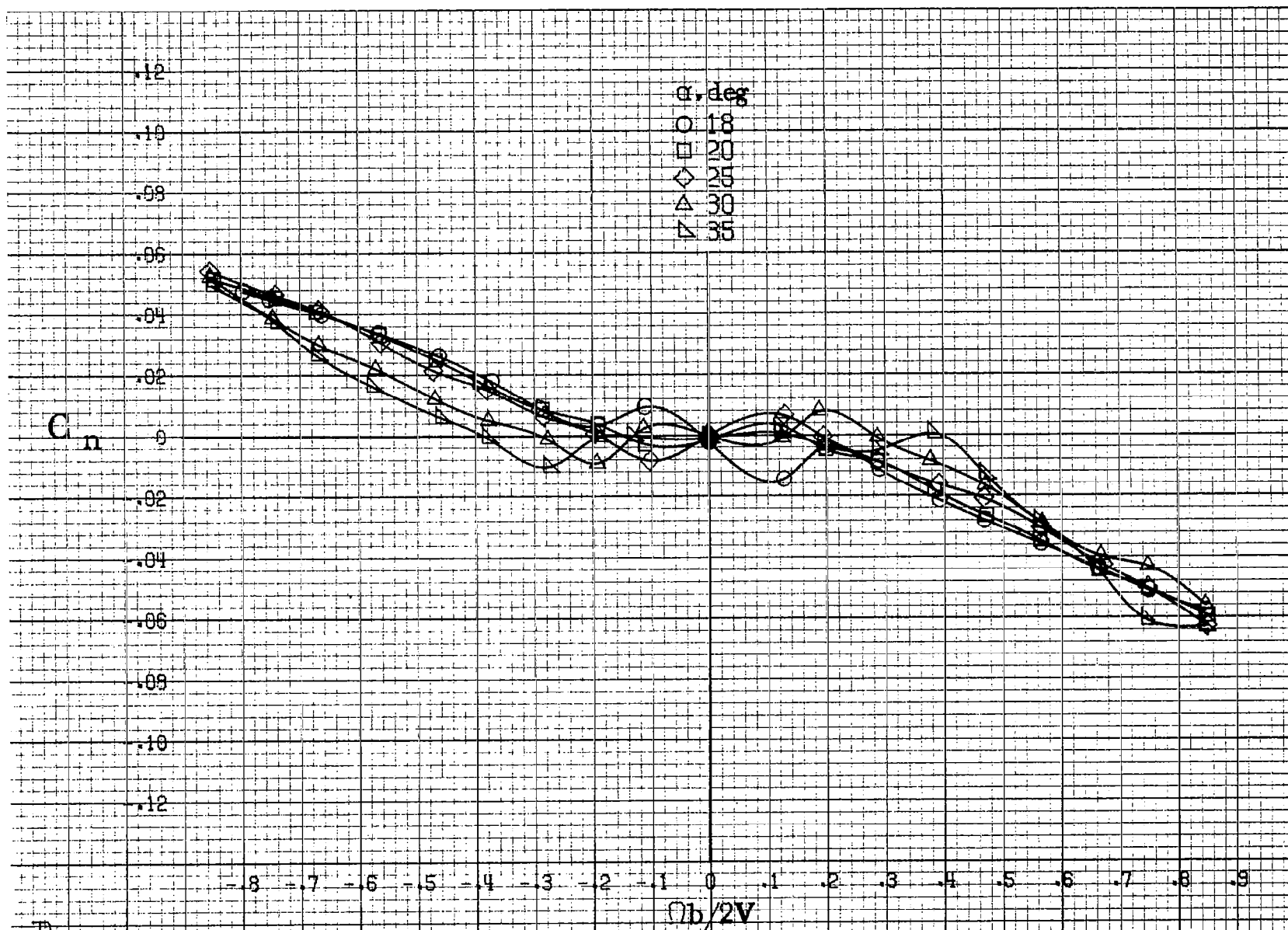
A965

(d) $\alpha=55$ to 90 deg. $SR=0$.
 Figure A96. Concluded.



(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A97. Effect of rotation rate and angle of attack on yawing-moment coefficient for configuration having segmented LE wing droop. $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A97, Continued.

A387

A388

C_n

.12
.10
.08
.06
.04
0
.02
.04
.06
.08
.10
.12

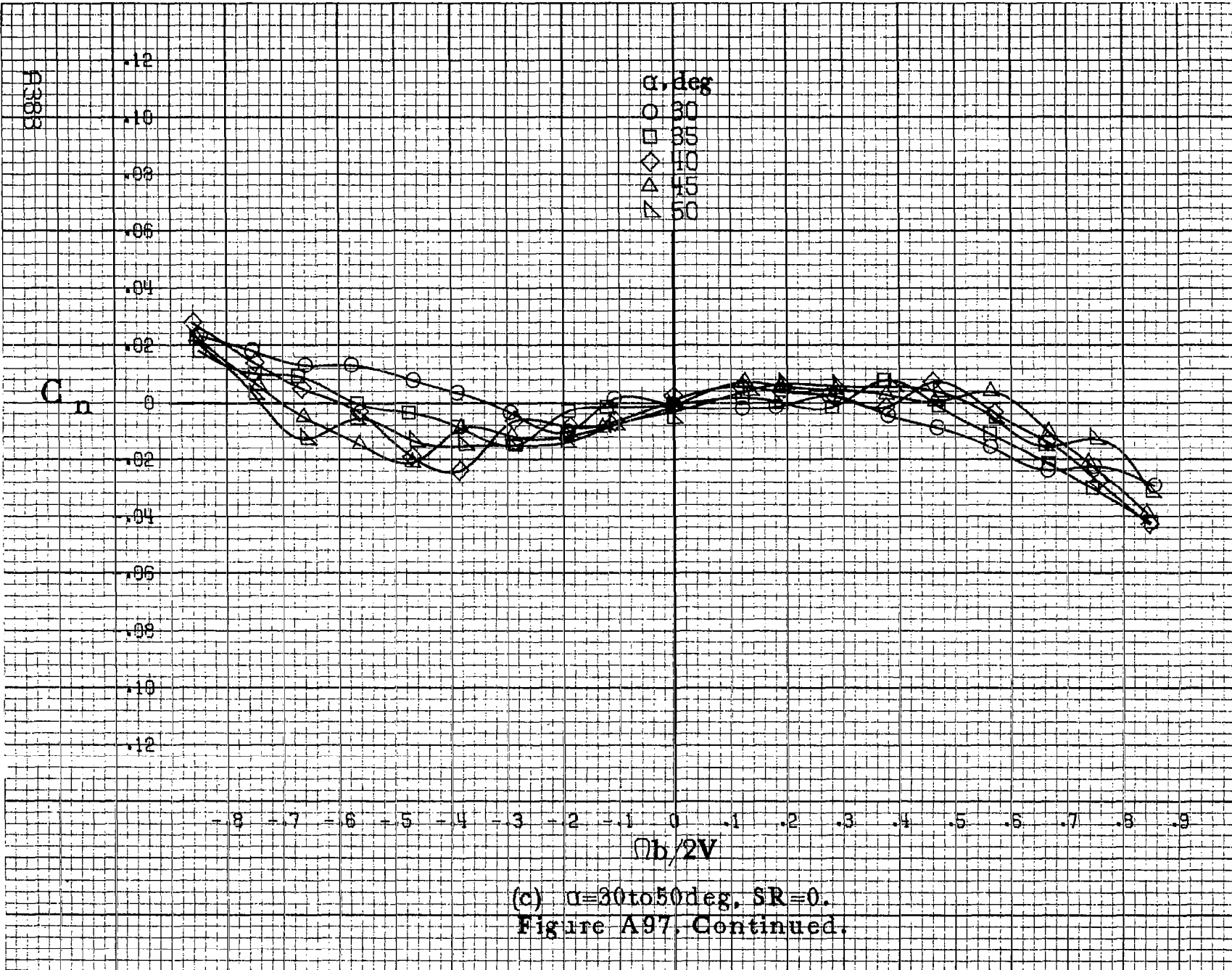
α , deg

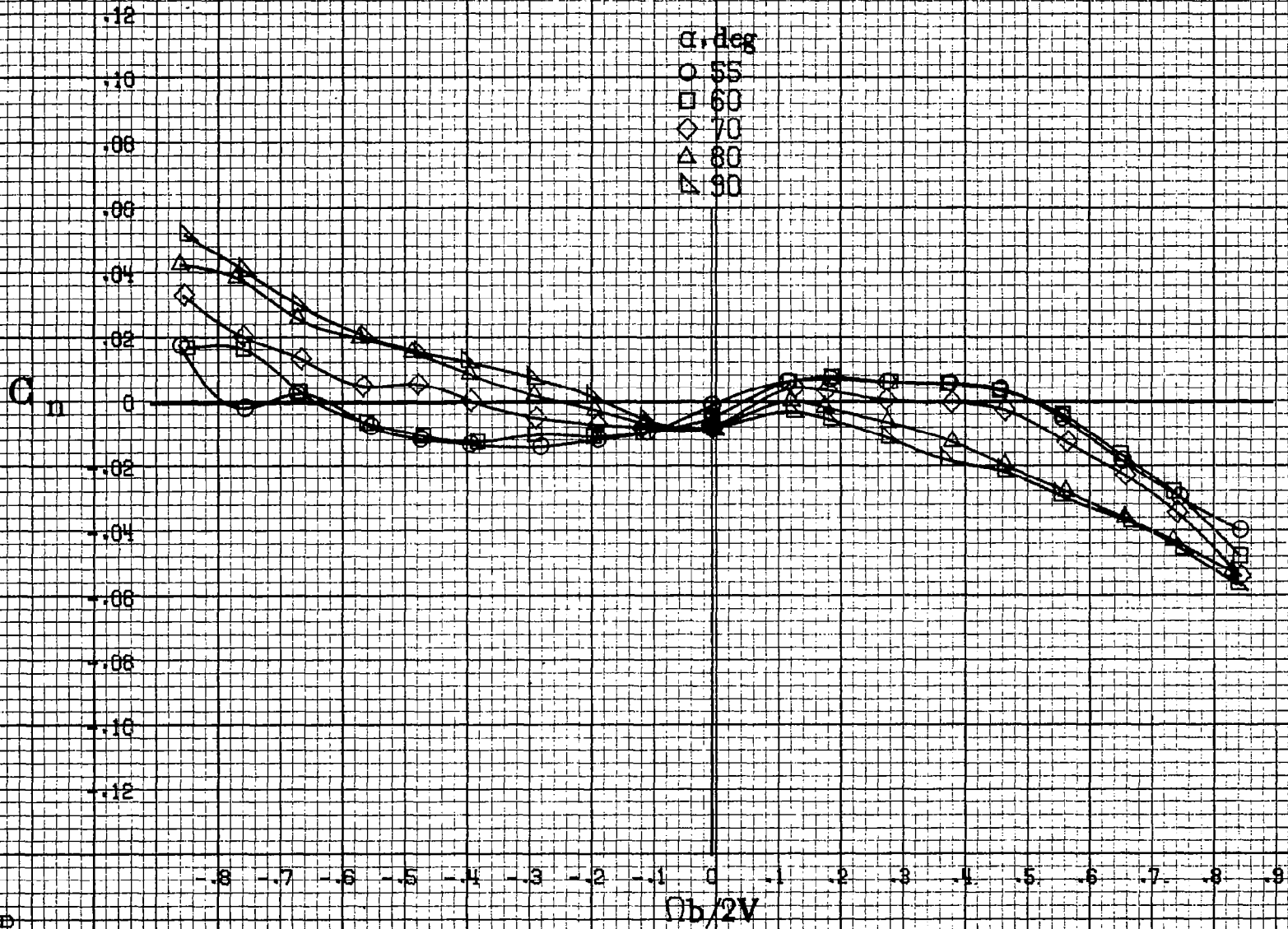
- 30
- 35
- ◇ 40
- △ 45
- ▽ 50

-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$b/2V$

(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A97, Continued.





(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A97. Concluded.

43669

A390

C_l

.35
.30
.25
.20
.15
.10
.05
0
-.05
-.10
-.15
-.20
-.25

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

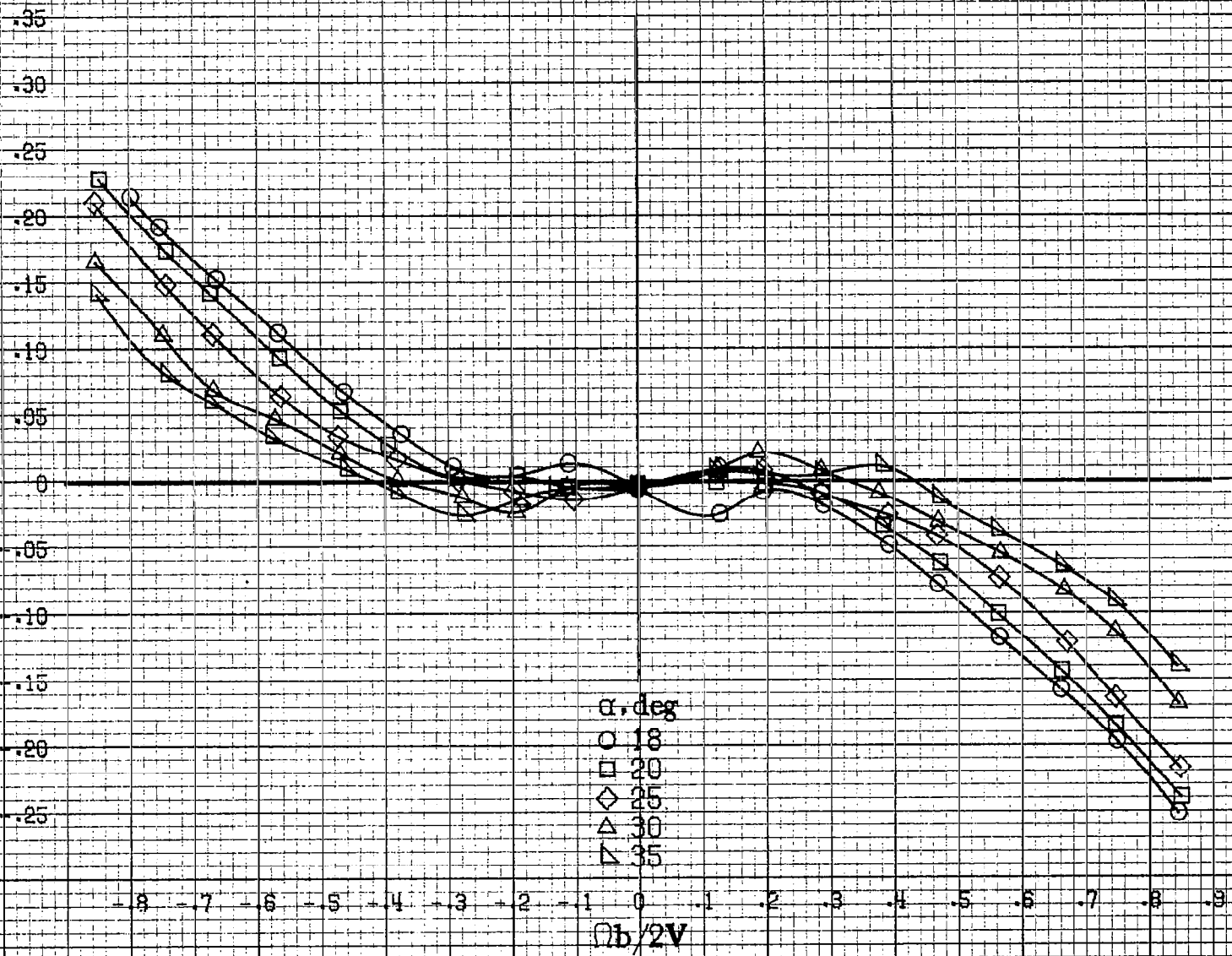
α , deg
○ 8
□ 10
◇ 12
△ 14
▽ 16

$\Omega b/2V$

(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A98. Effect of rotation rate and angle of attack on rolling-moment coefficient for configuration having segmented LE wing droop. $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C₁



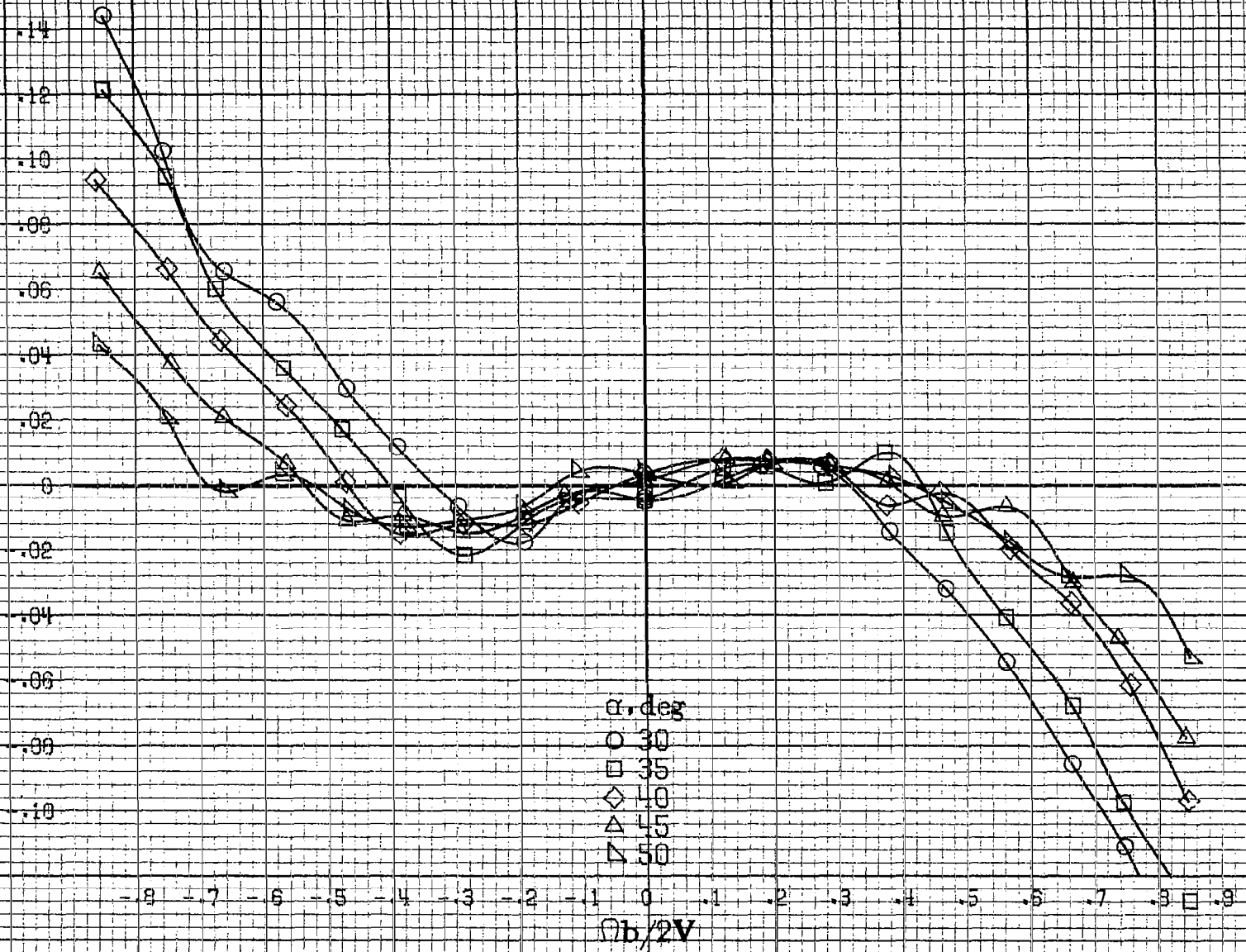
α, deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A98. Continued.

A331

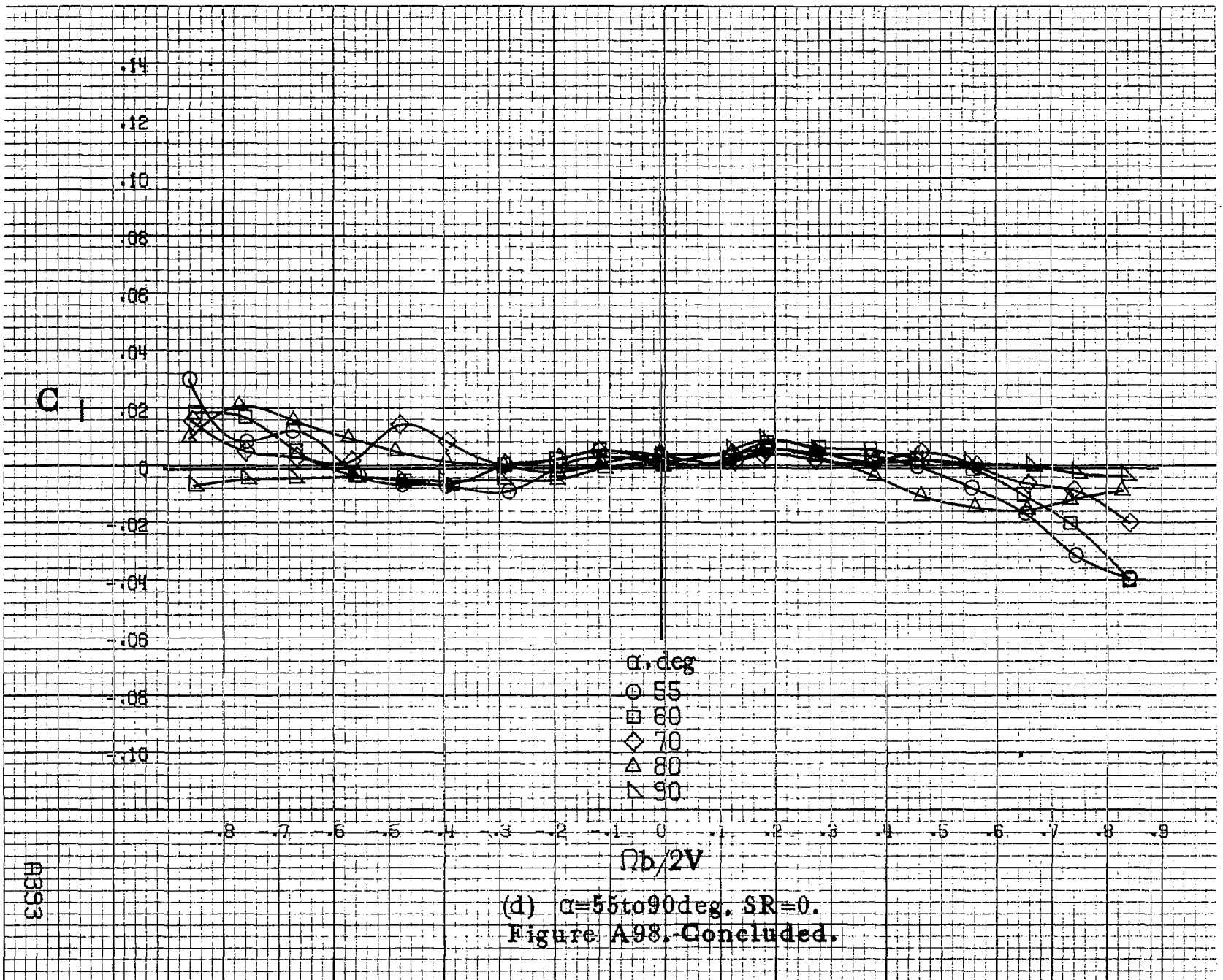
8392

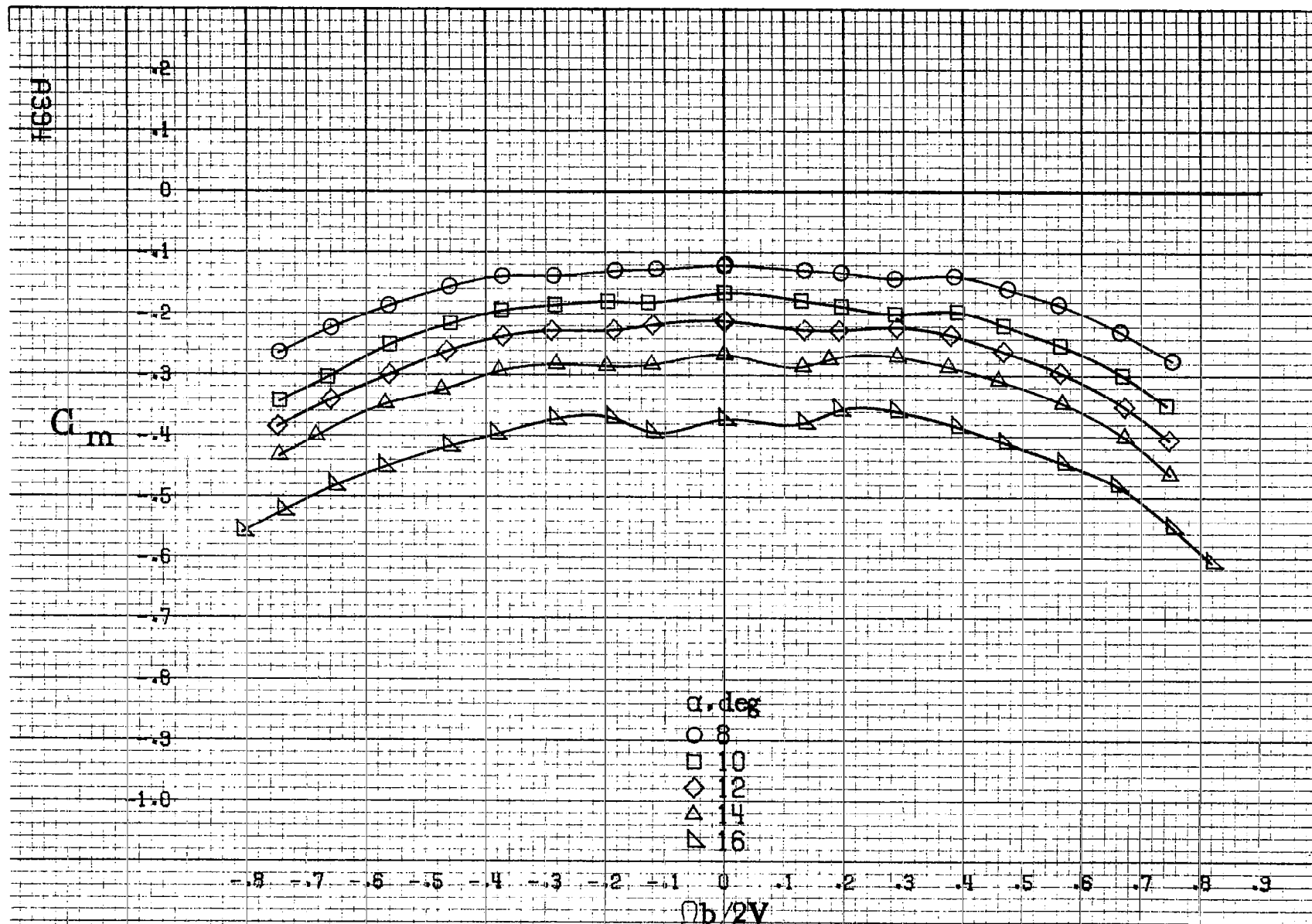
C_I



(c) $\alpha = 30$ to 50 deg, $SR = 0$.
Figure A98, Continued.

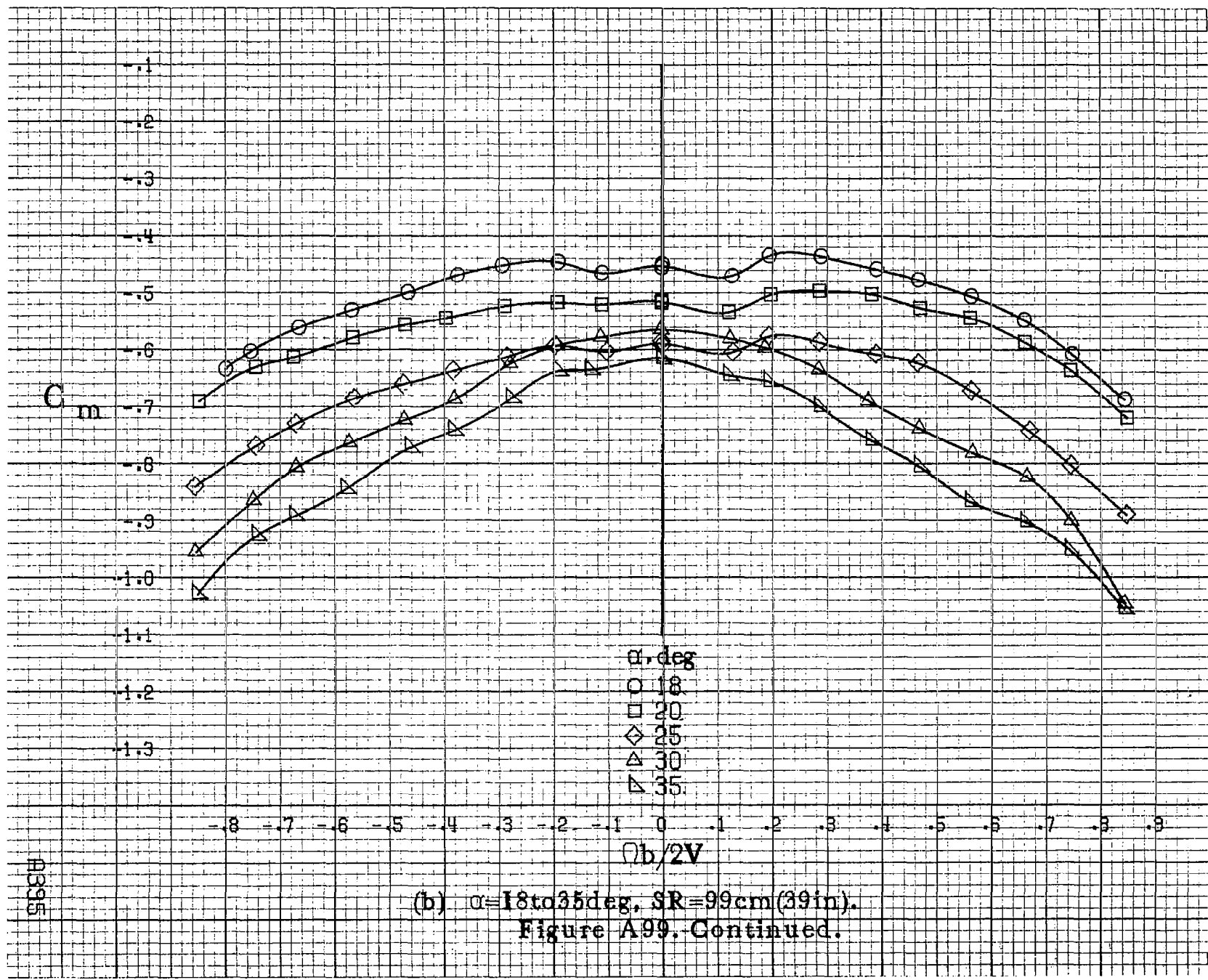
○





(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A99.-Effect of rotation rate and angle of attack on pitching-moment coefficient for configuration having segmented LE wing droop. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A99. Continued.

A9395

8396

C_m

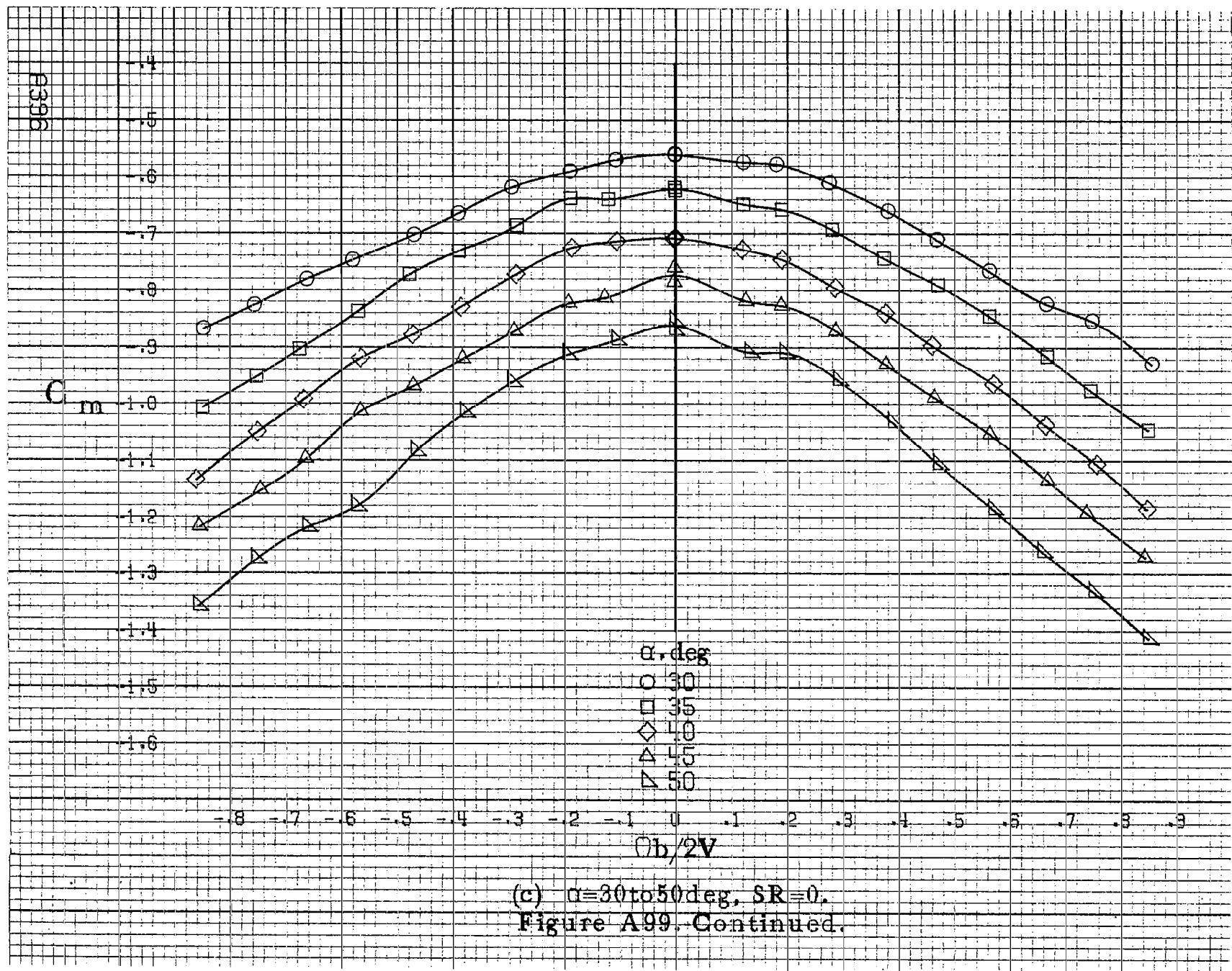
-.4
-.5
-.6
-.7
-.8
-.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6

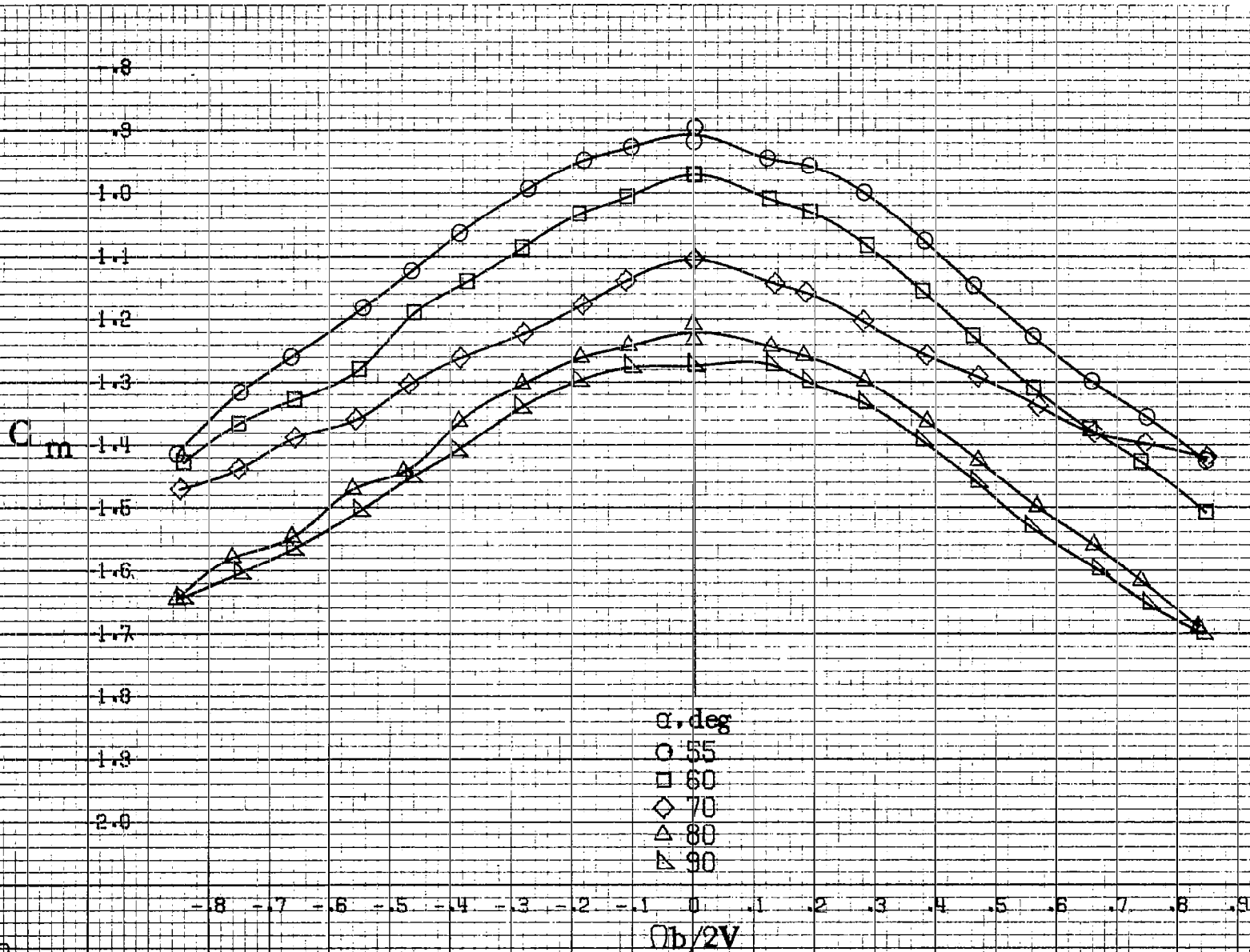
-8 -7 -6 -5 -4 -3 -2 -1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$\theta_b/2V$

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

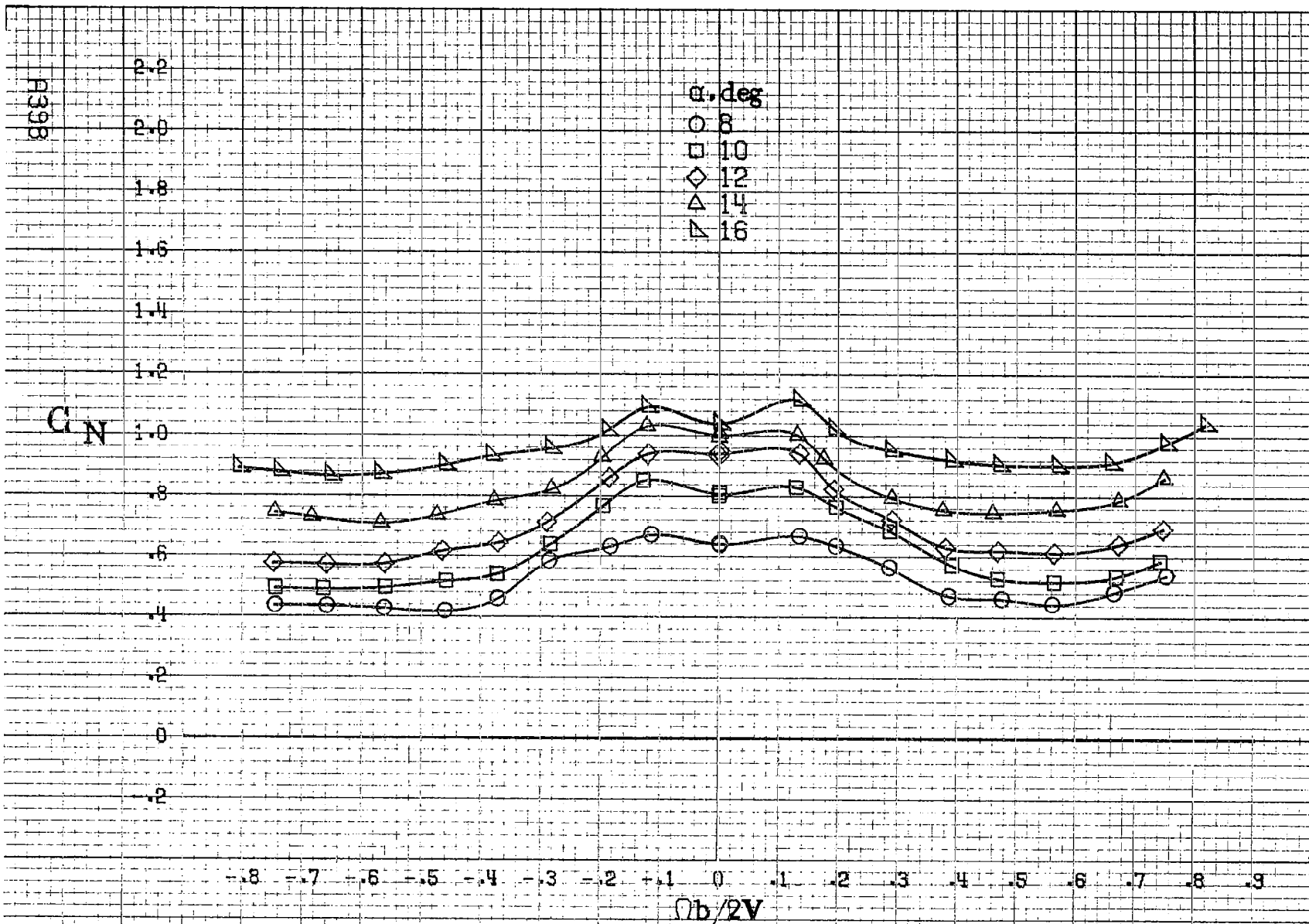
(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A99. Continued.





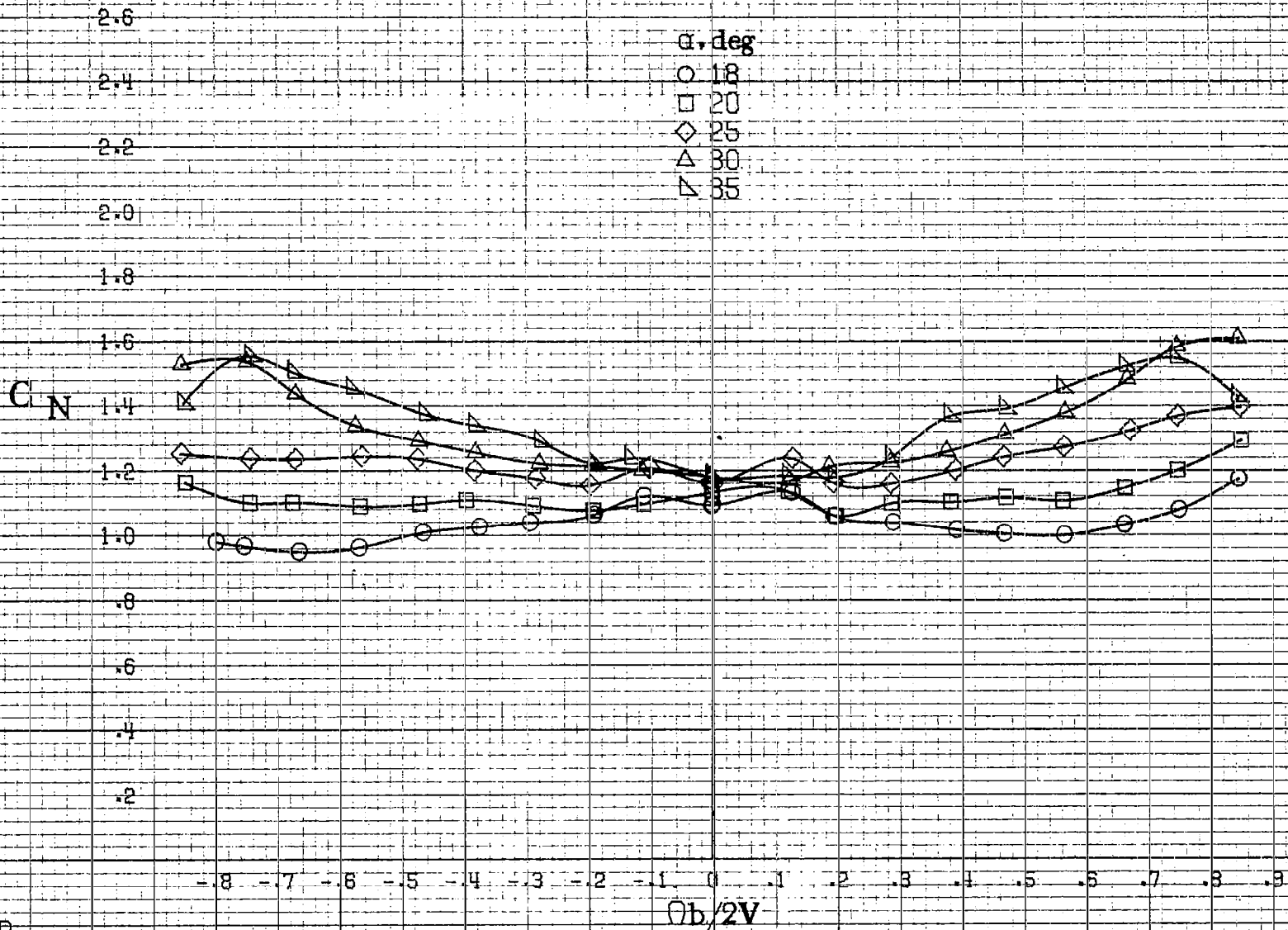
(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A99. Concluded.

F3317



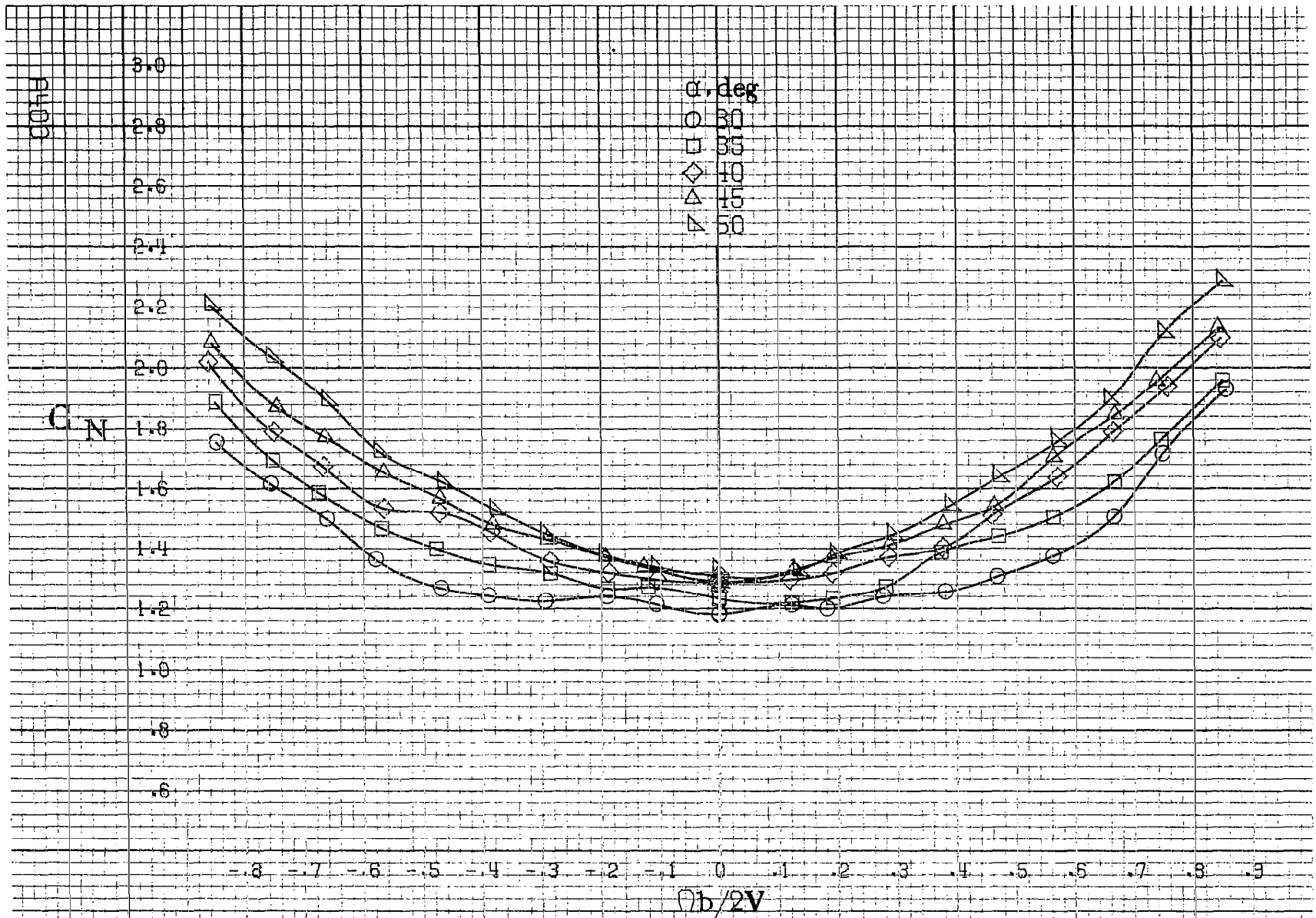
(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A100.-Effect of rotation rate and angle of attack on normal force coefficient for configuration having segmented LE wing droop. $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



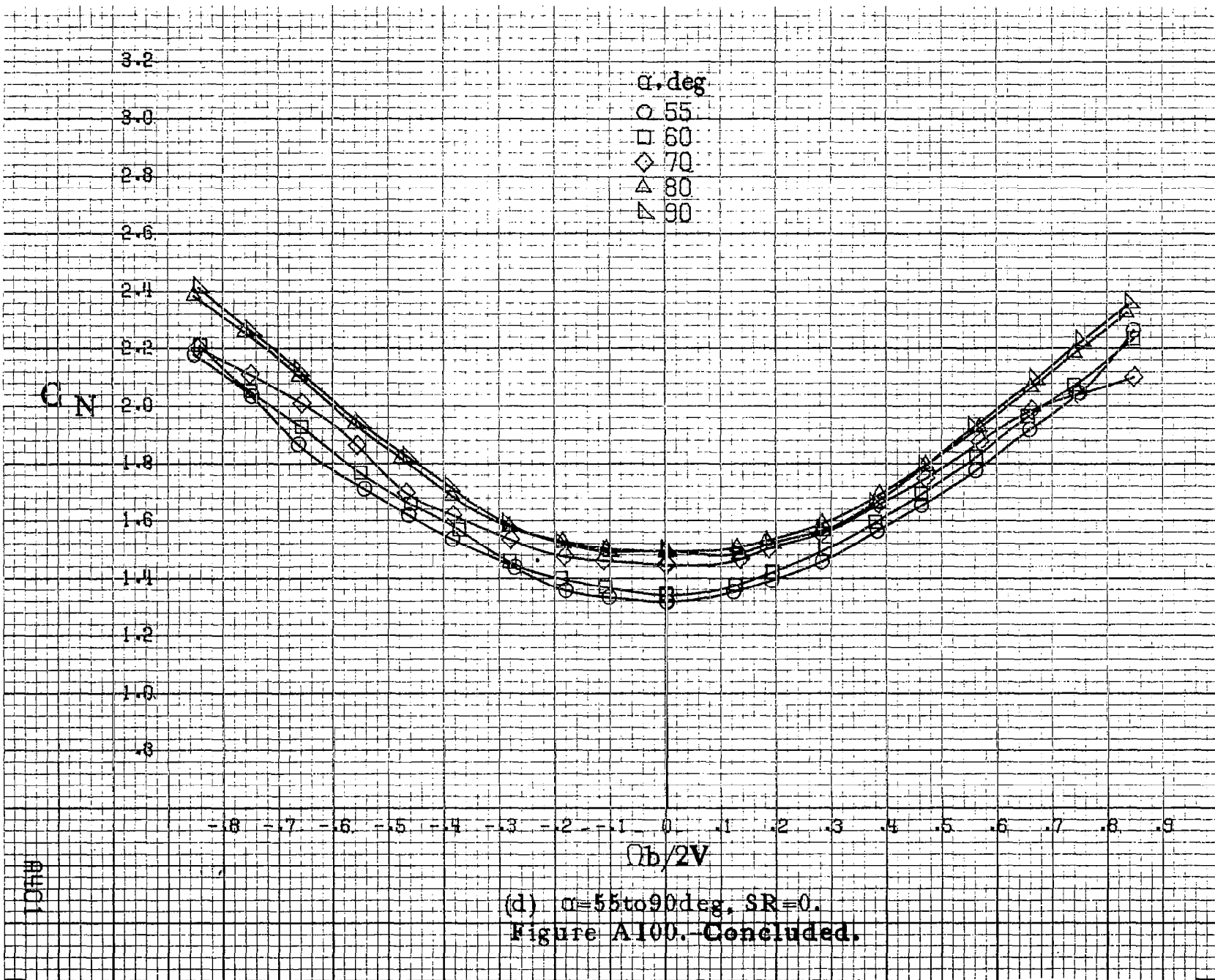
(b) $\alpha=18$ to 35 deg, SR=99cm (39in).
 Figure A100. Continued.

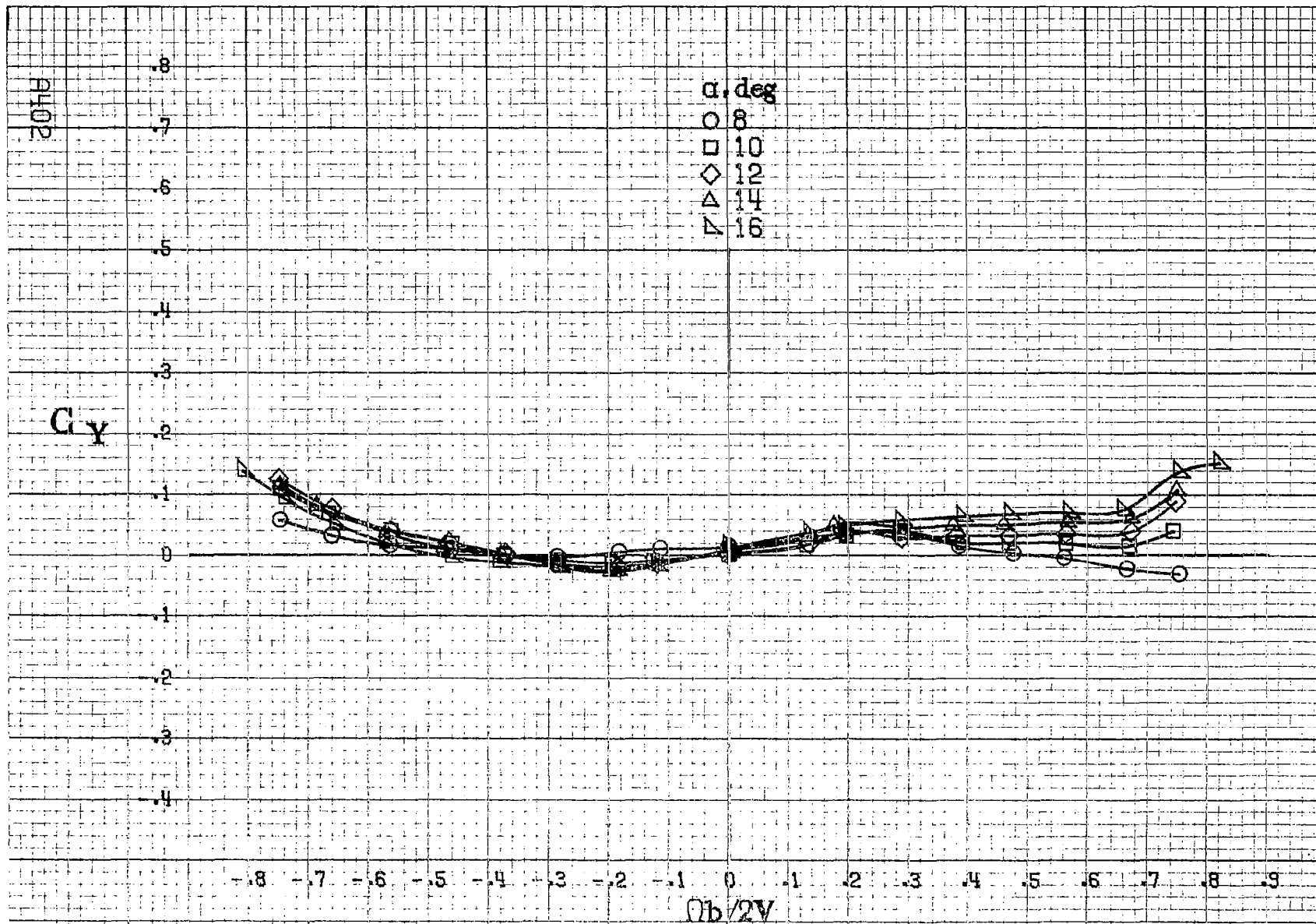
A339



(c) $\alpha=30$ to 50 deg, $SR=0$.

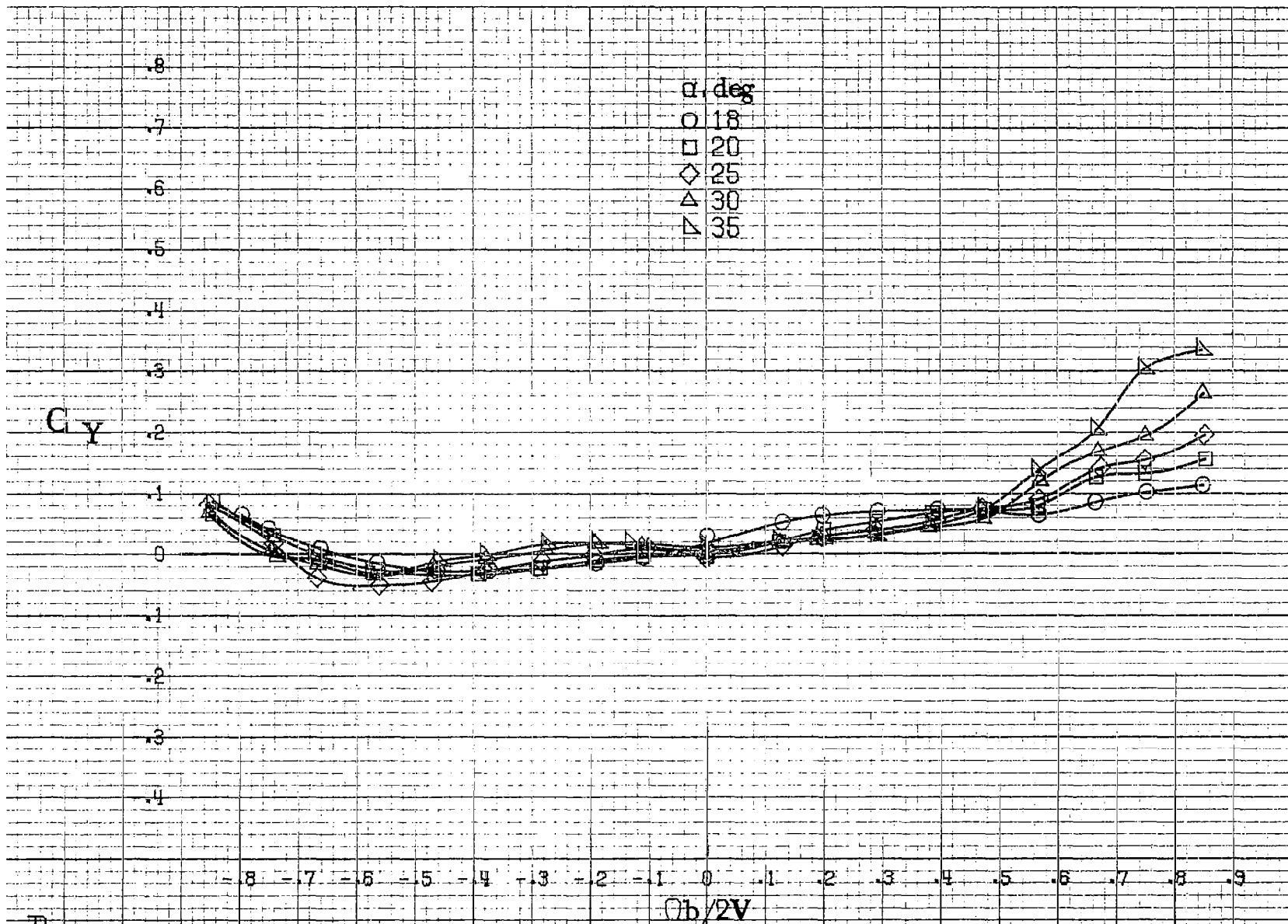
Figure A100. Continued.





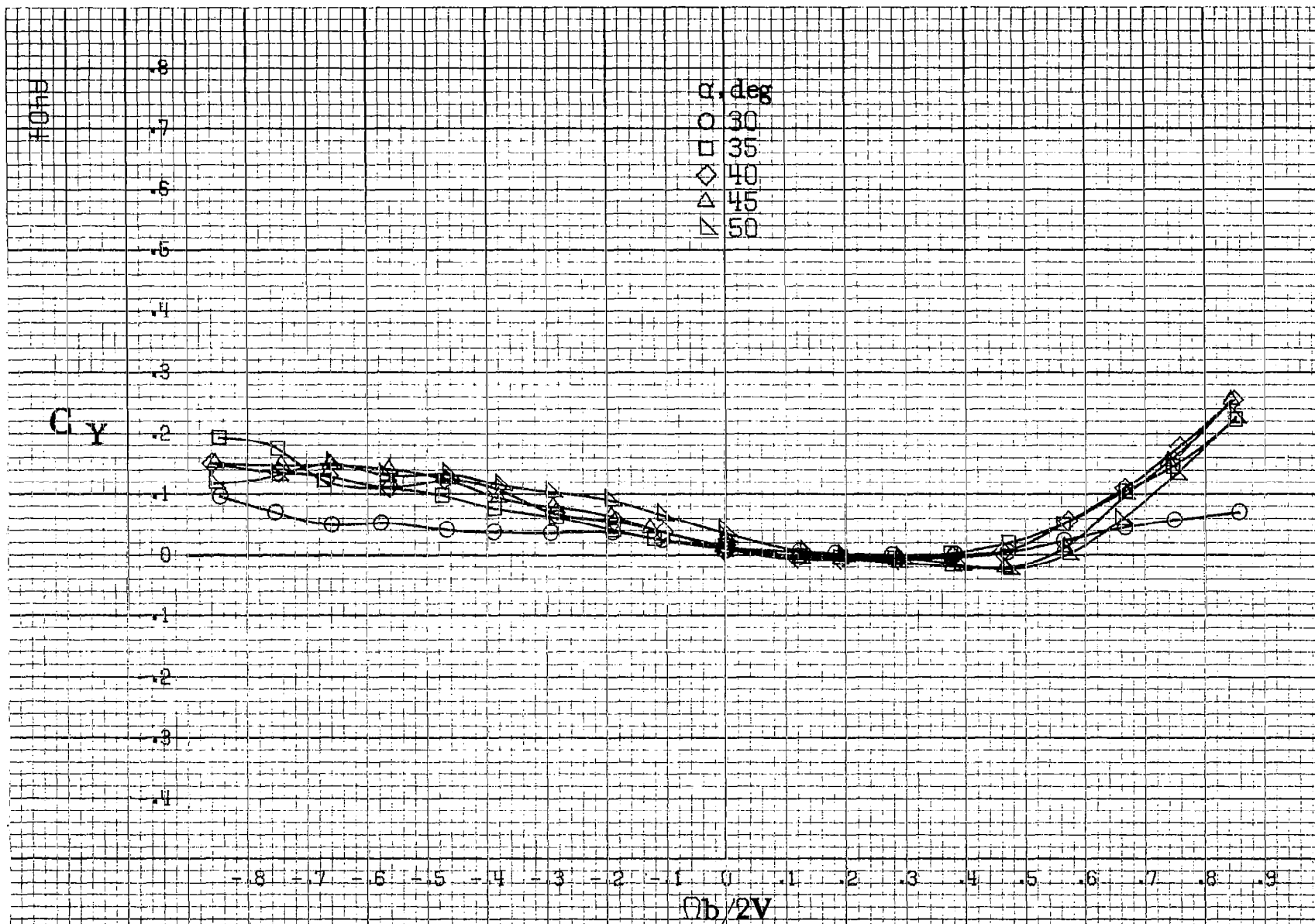
(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A101. Effect of rotation rate and angle of attack on side force coefficient for configuration having segmented LE wing droop. $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $B = 0^\circ$.

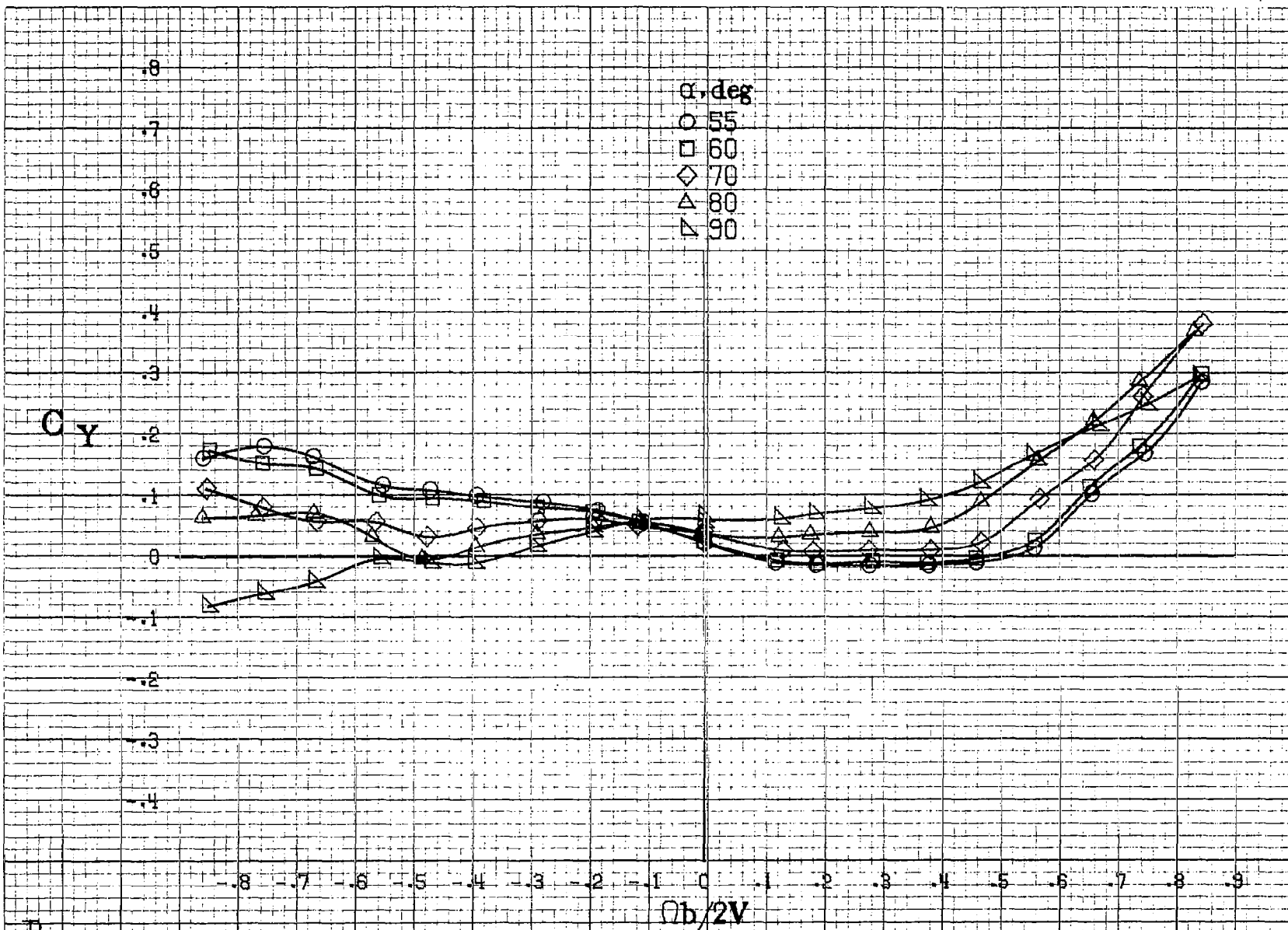


(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A101. Continued.

R103

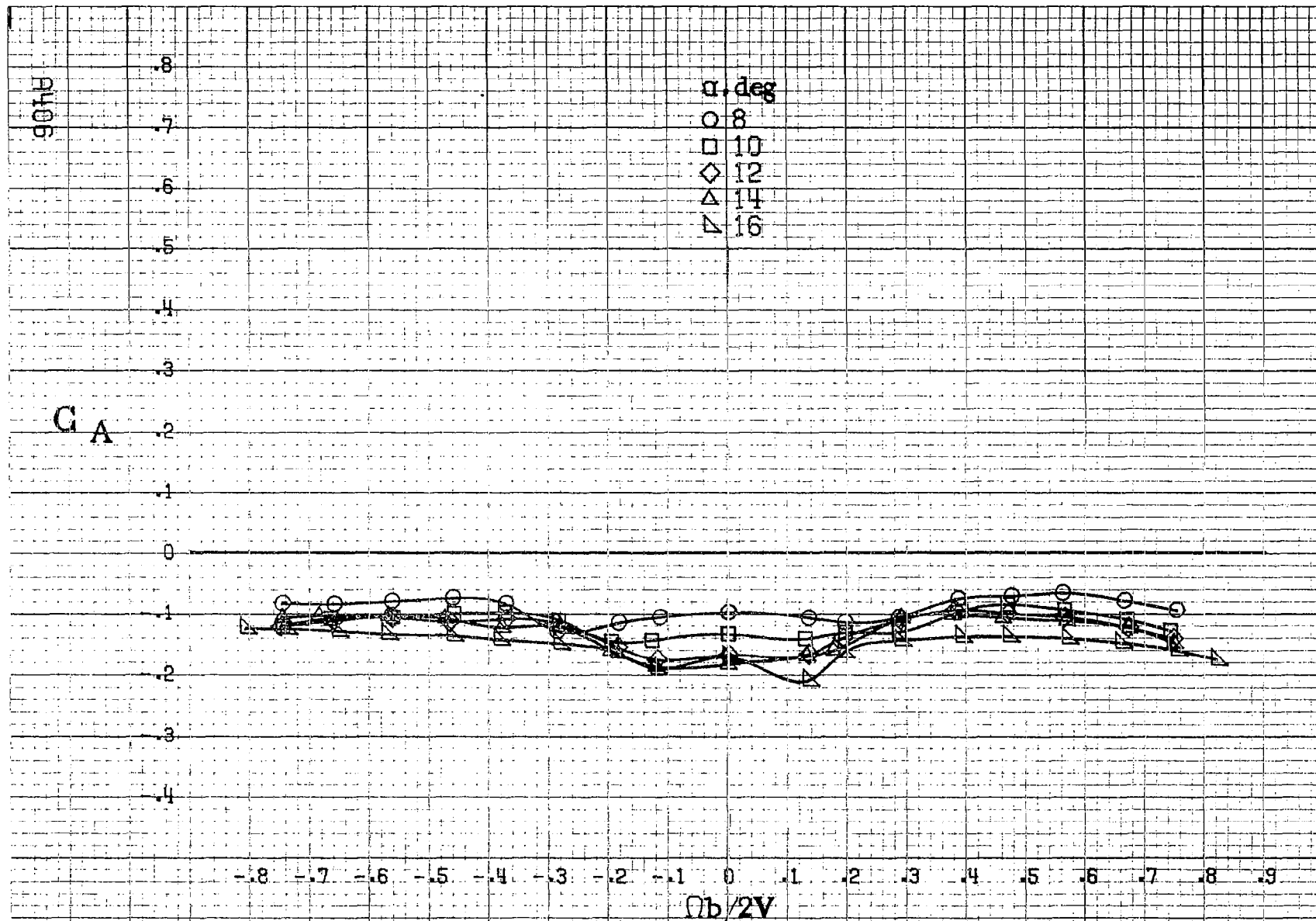


(c) $\alpha=30$ to 50 deg. $SR=0$.
 Figure A101. Continued.



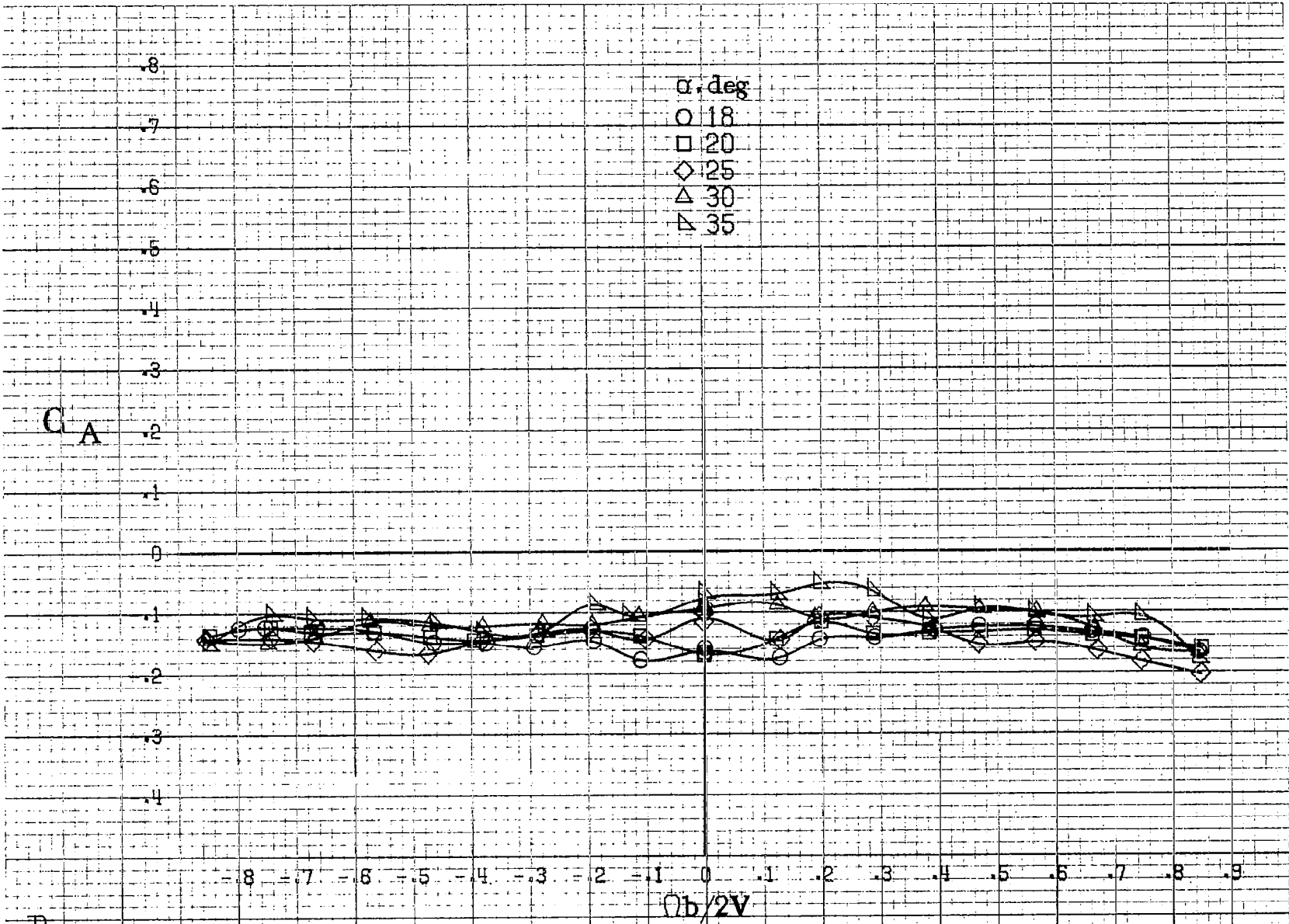
(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A101, Concluded.

PHOS



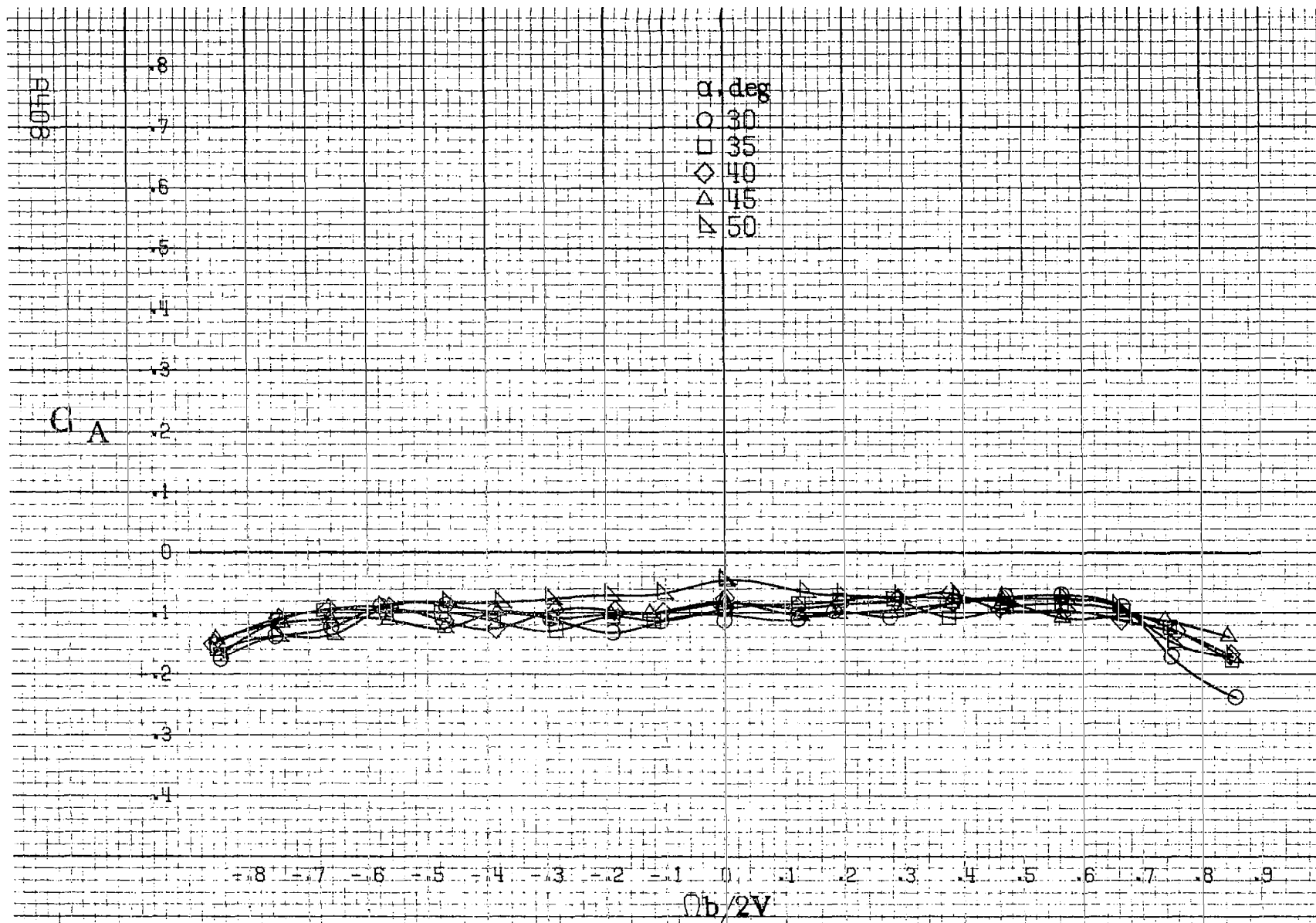
(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A102.-Effect of rotation rate and angle of attack on axial-force coefficient for configuration having segmented LE wing droop. $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

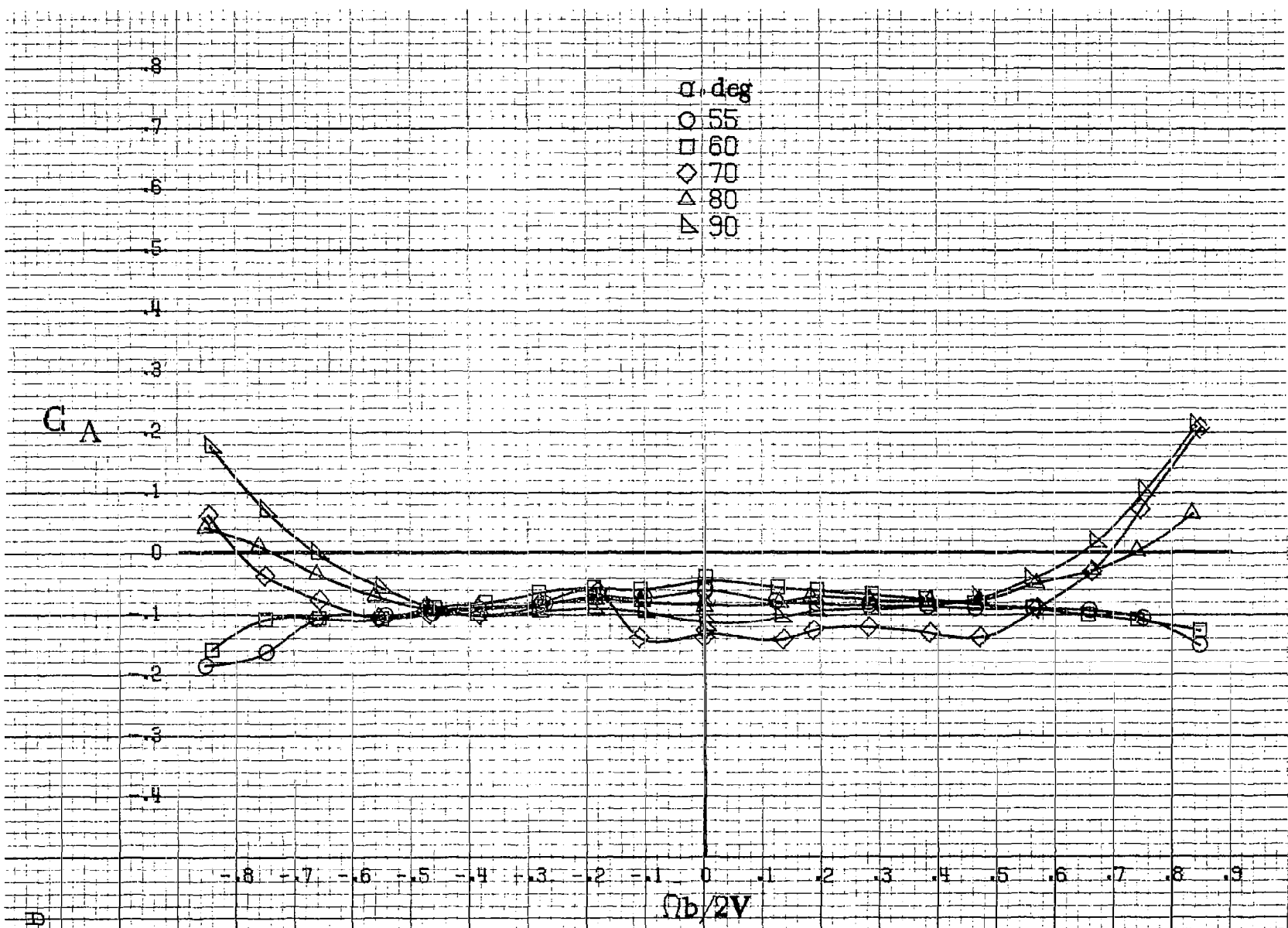


(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A102. Continued.

A107

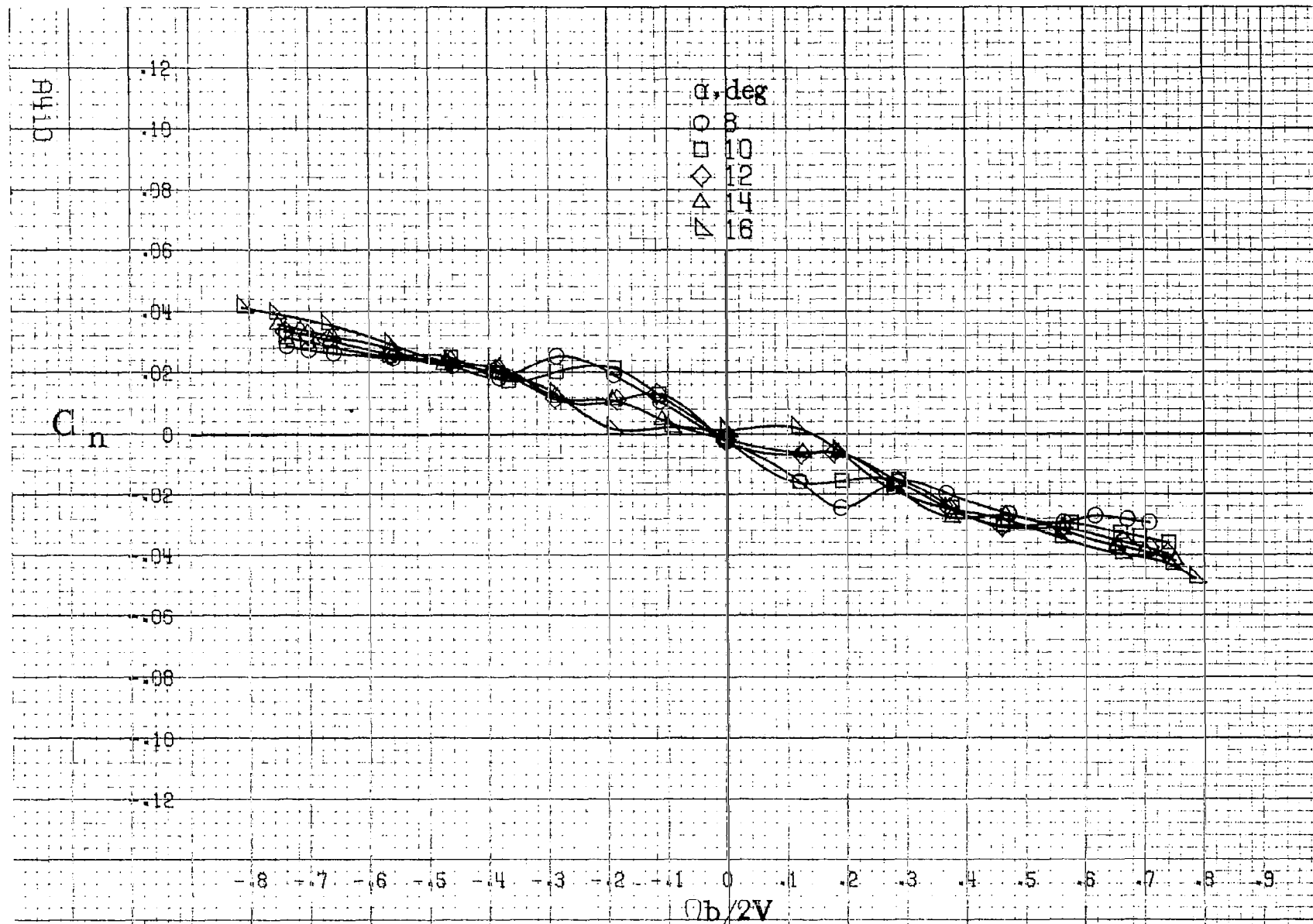


(c) $\alpha=30$ to 50 deg. $SR=0$.
 Figure A102.-Continued.



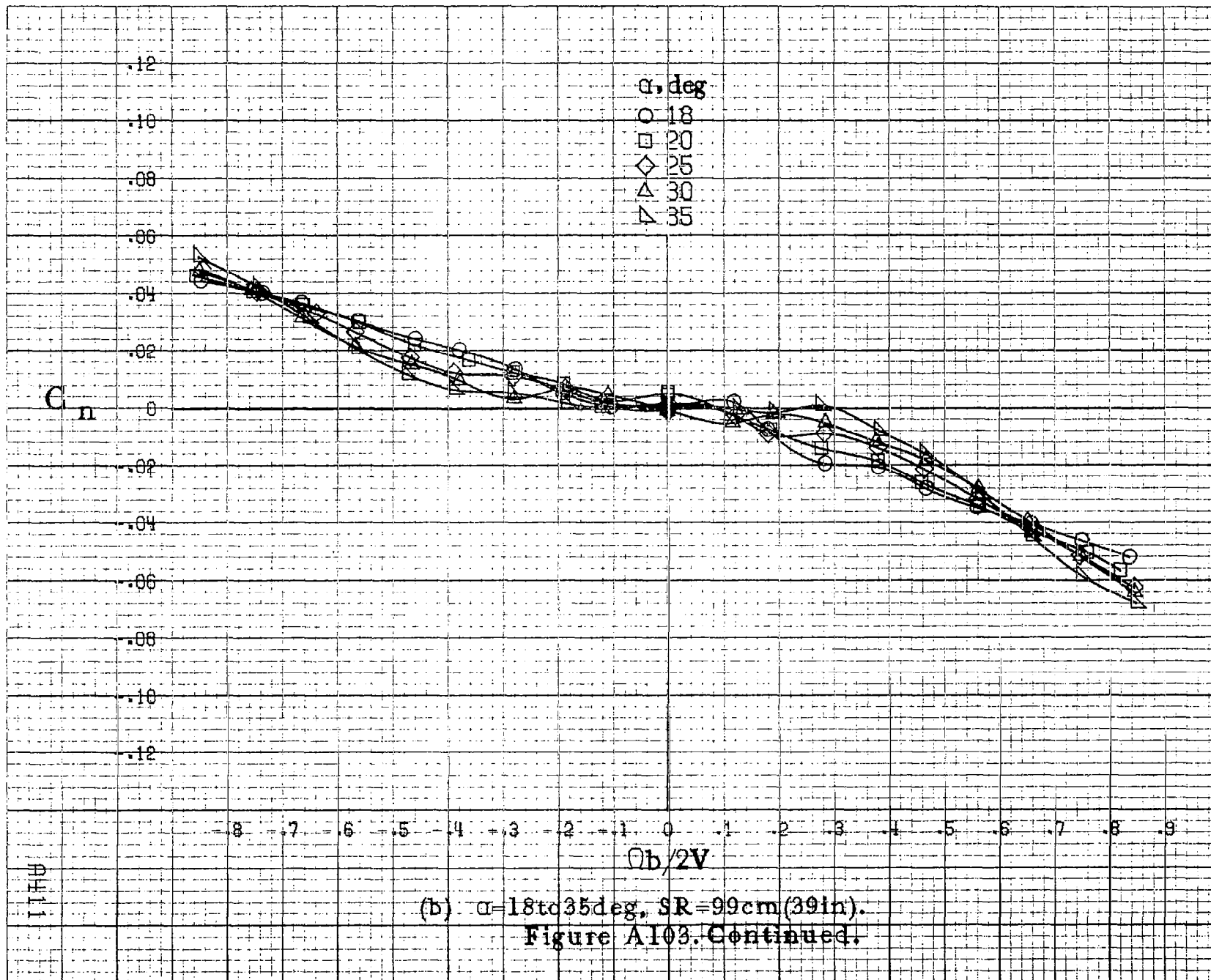
RHGS

(d) $\alpha=55$ to 90 deg. $SR=0$.
 Figure A102. Concluded.



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A103.-Effect of rotation rate and angle of attack on yawing-moment coefficient for configuration having outboard LE wing droop extended inboard 33.8 cm (13.3 in). $\delta_a = 0^\circ$, $\delta_{a_1} = 0^\circ$, $\delta_r = 0^\circ$, $B = 0^\circ$.



RH12

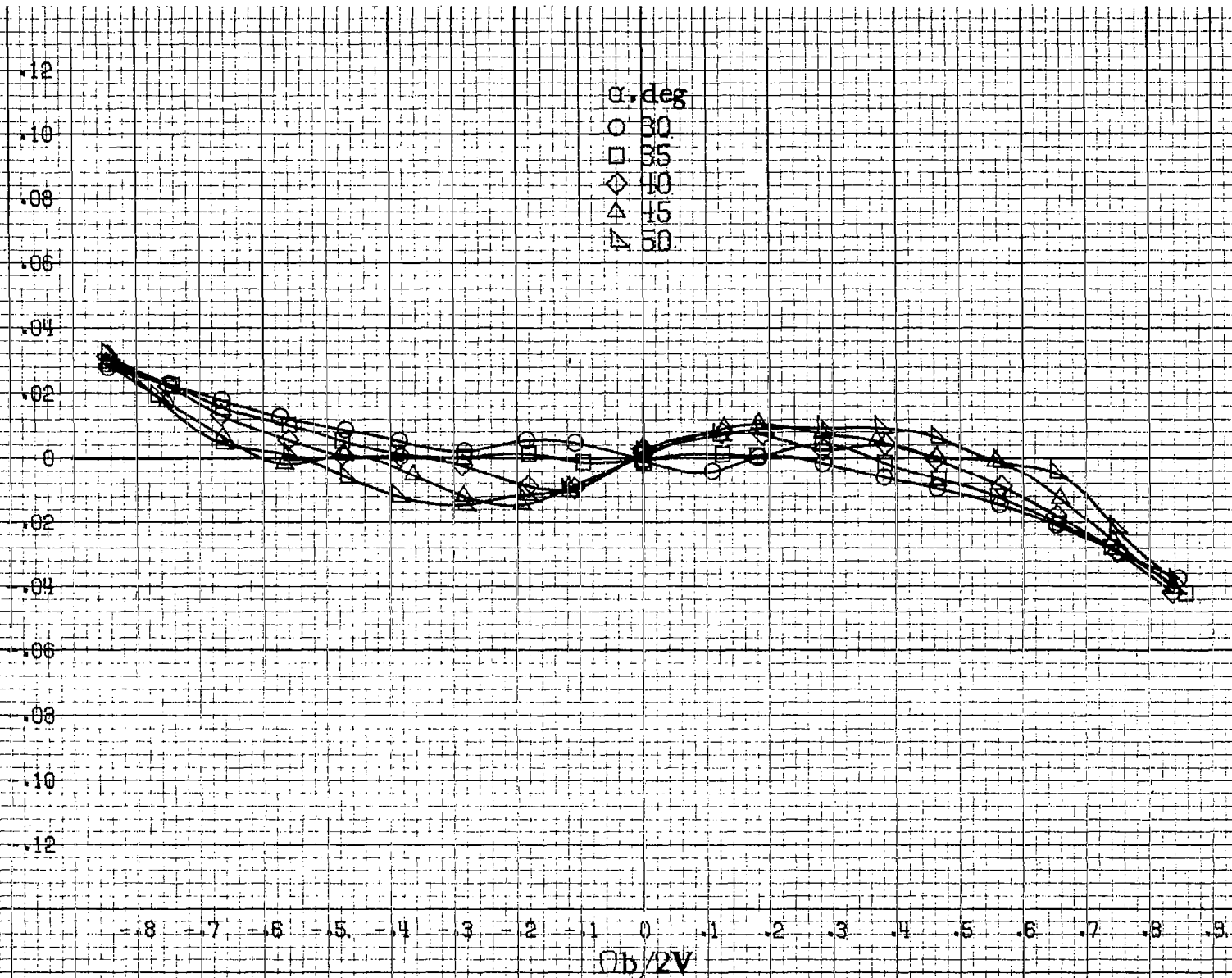
C_{11}

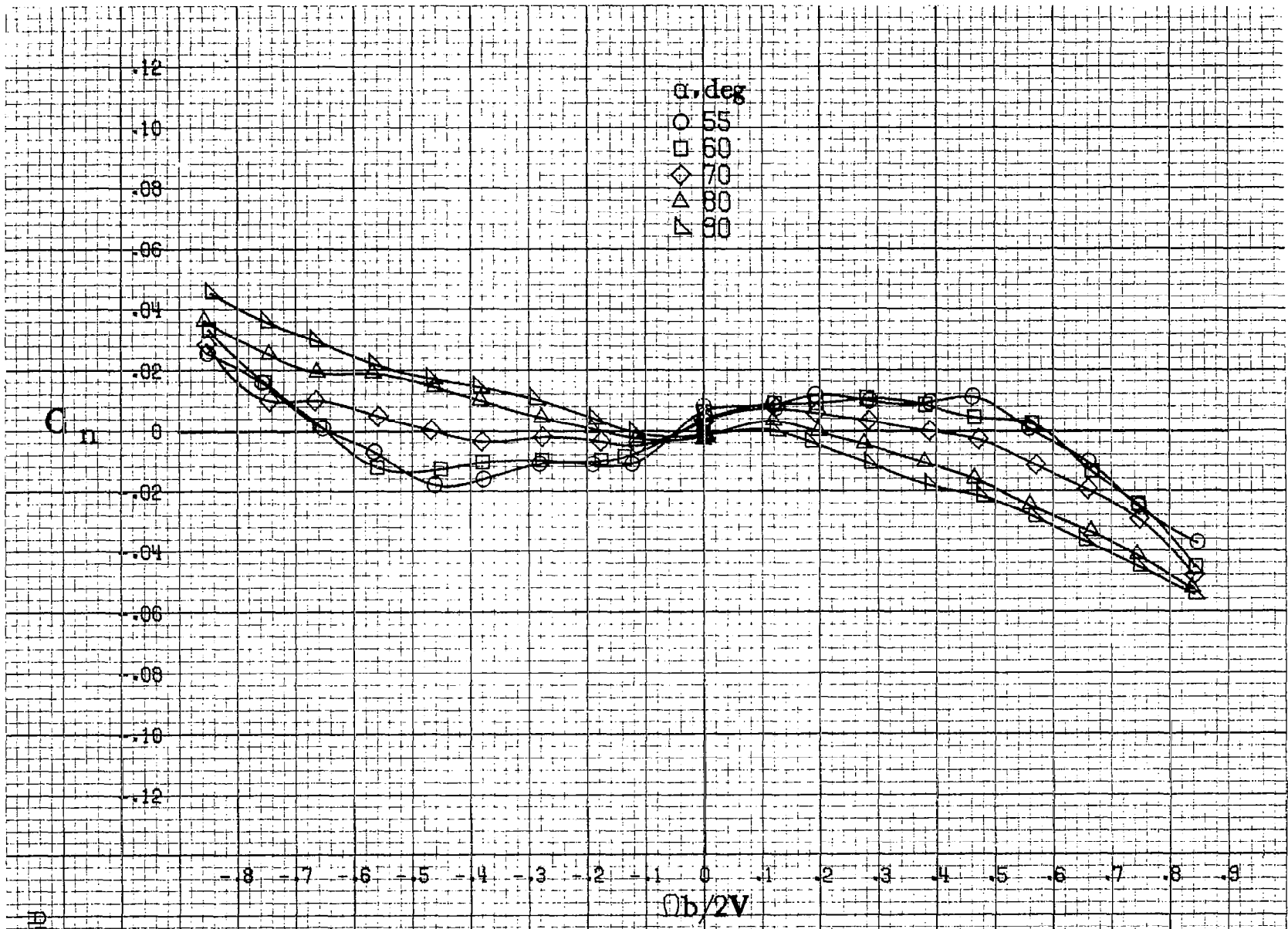
.12
.10
.08
.06
.04
0
.02
.04
.06
.08
.10
.12

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9
 $Ob/2V$

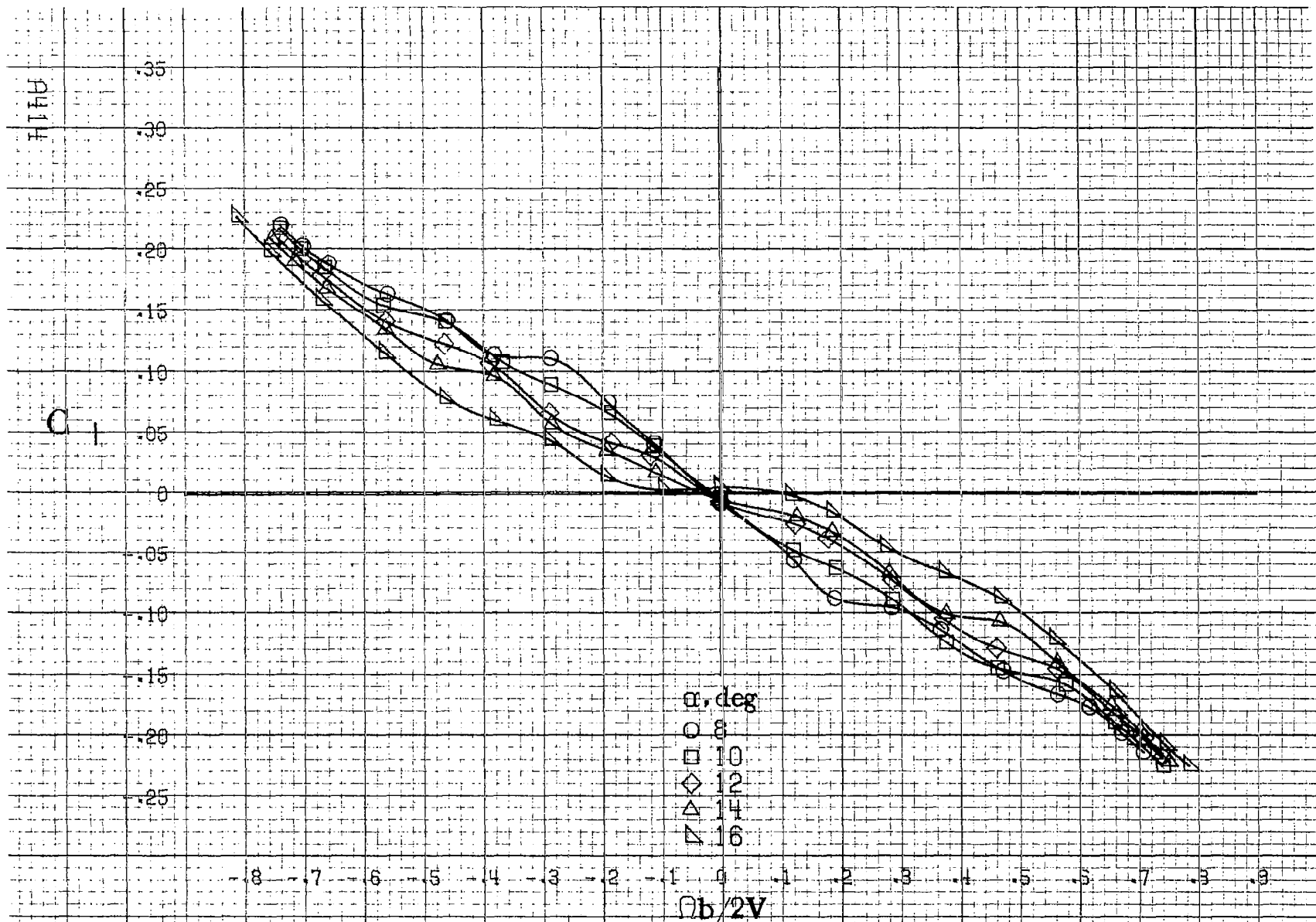
(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A103. Continued.





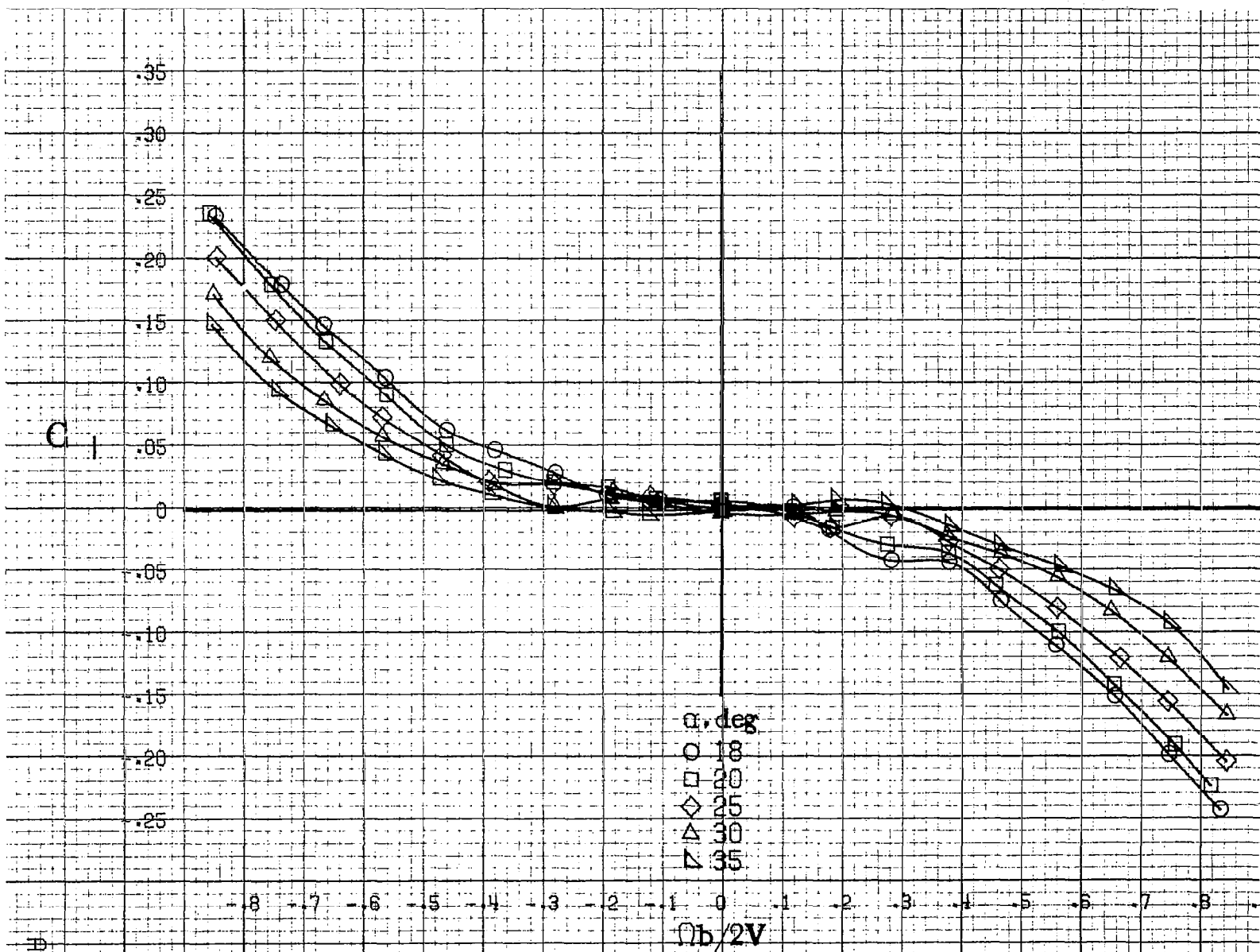
PH13

(d) $\alpha = 55$ to 90 deg, $SR = 0$.
 Figure A103. Concluded.



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A104.-Effect of rotation rate and angle of attack on rolling-moment coefficient for configuration having outboard LE wing droop extended inboard 33.8 cm (13.3 in). $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

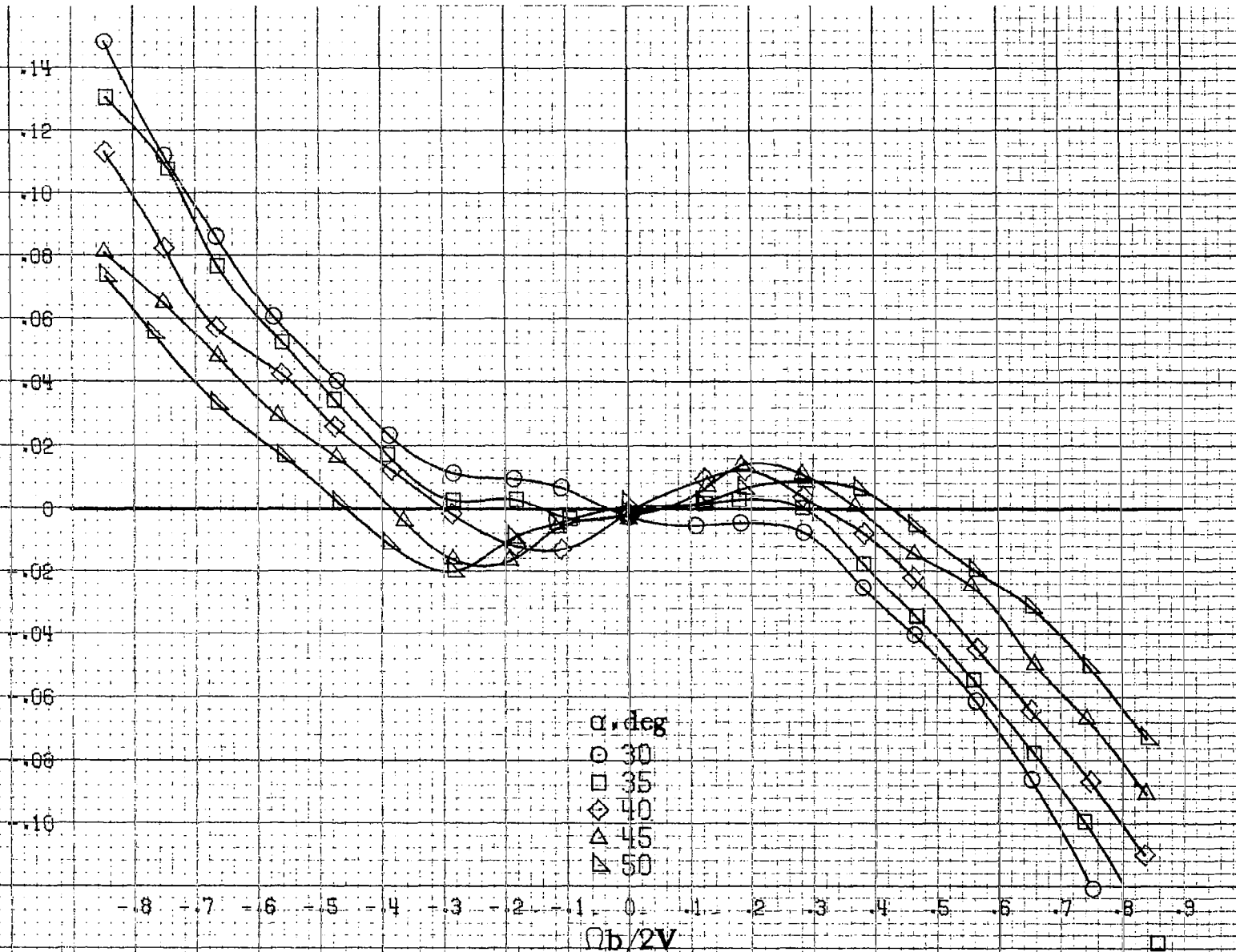


(b) $\alpha=18$ to 35 deg. SR=99cm (39in).
Figure A104. Continued.

PH 15

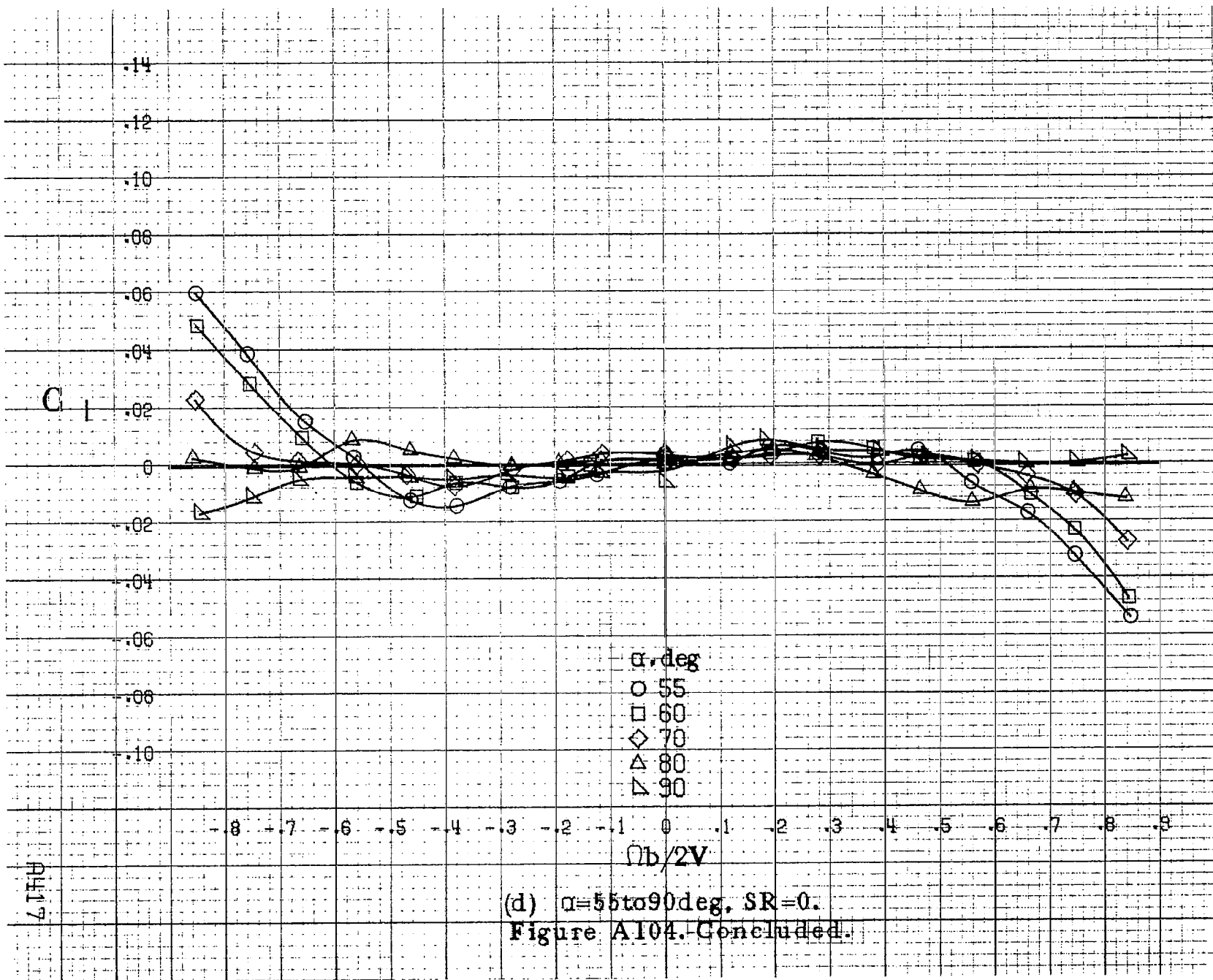
A416

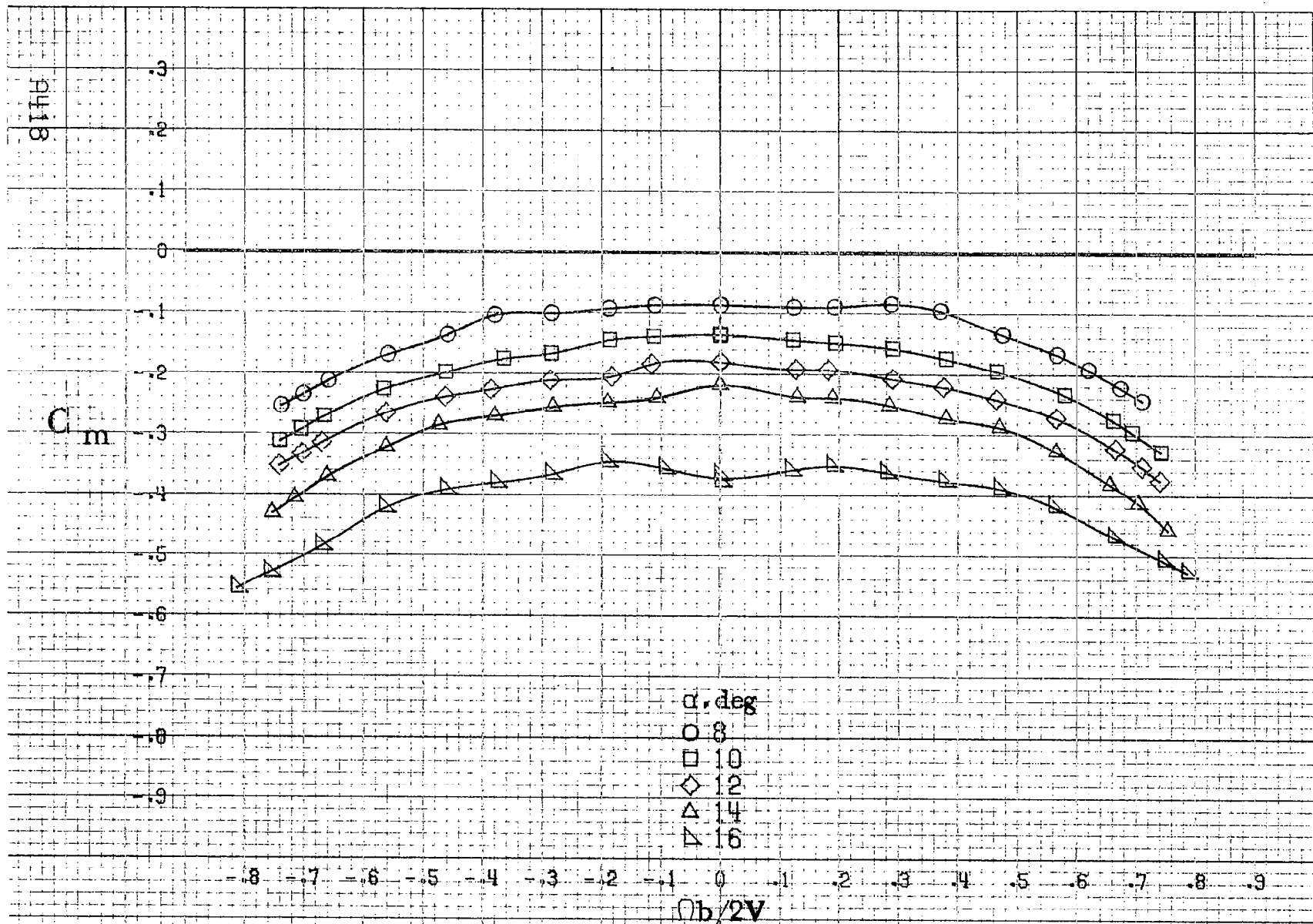
C_1



α, deg
 ○ 30
 □ 35
 ◇ 40
 △ 45
 ▽ 50

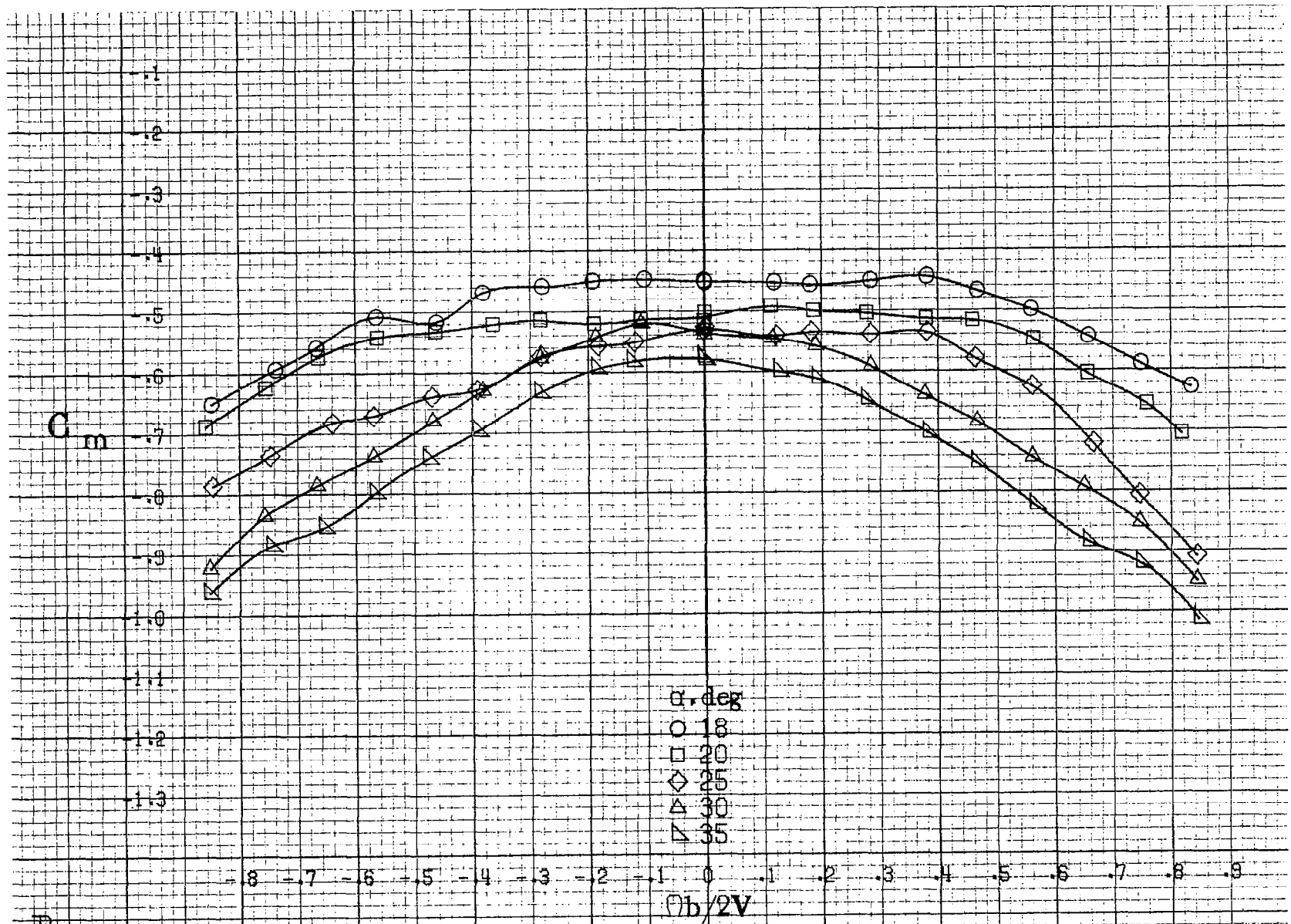
(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A104. Continued.



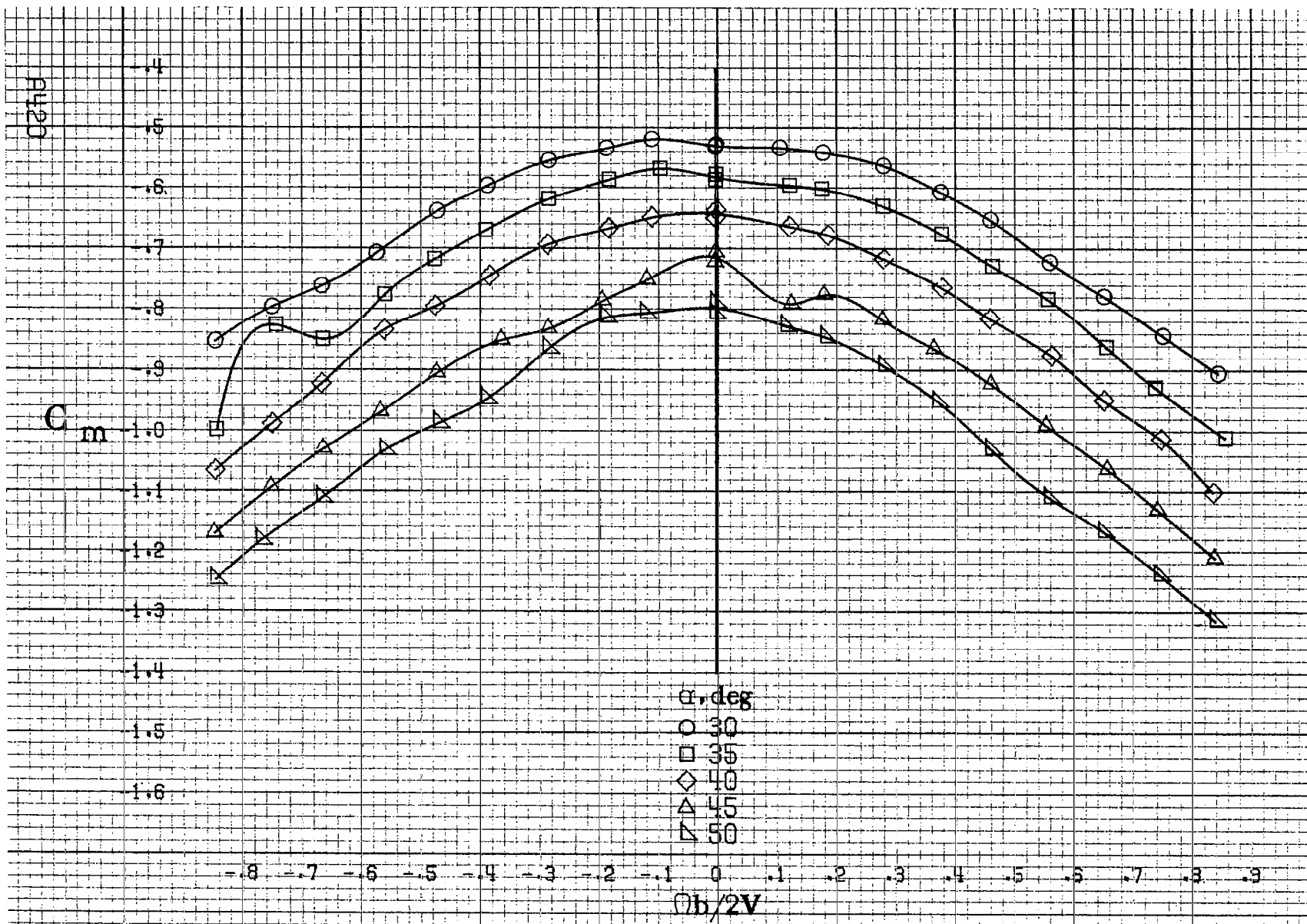


(a) $\alpha = 8$ to 16° , $SR = 99\text{cm}$ (39in).

Figure A105. Effect of rotation rate and angle of attack on pitching-moment coefficient for configuration having outboard LE wing droop extended inboard 33.8cm (13.3in). $\delta_e = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\delta = 0^\circ$.



(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A105. Continued.



(c) $\alpha=30$ to 50 deg, $SR=0$.
 Figure A105. Continued.

C_m

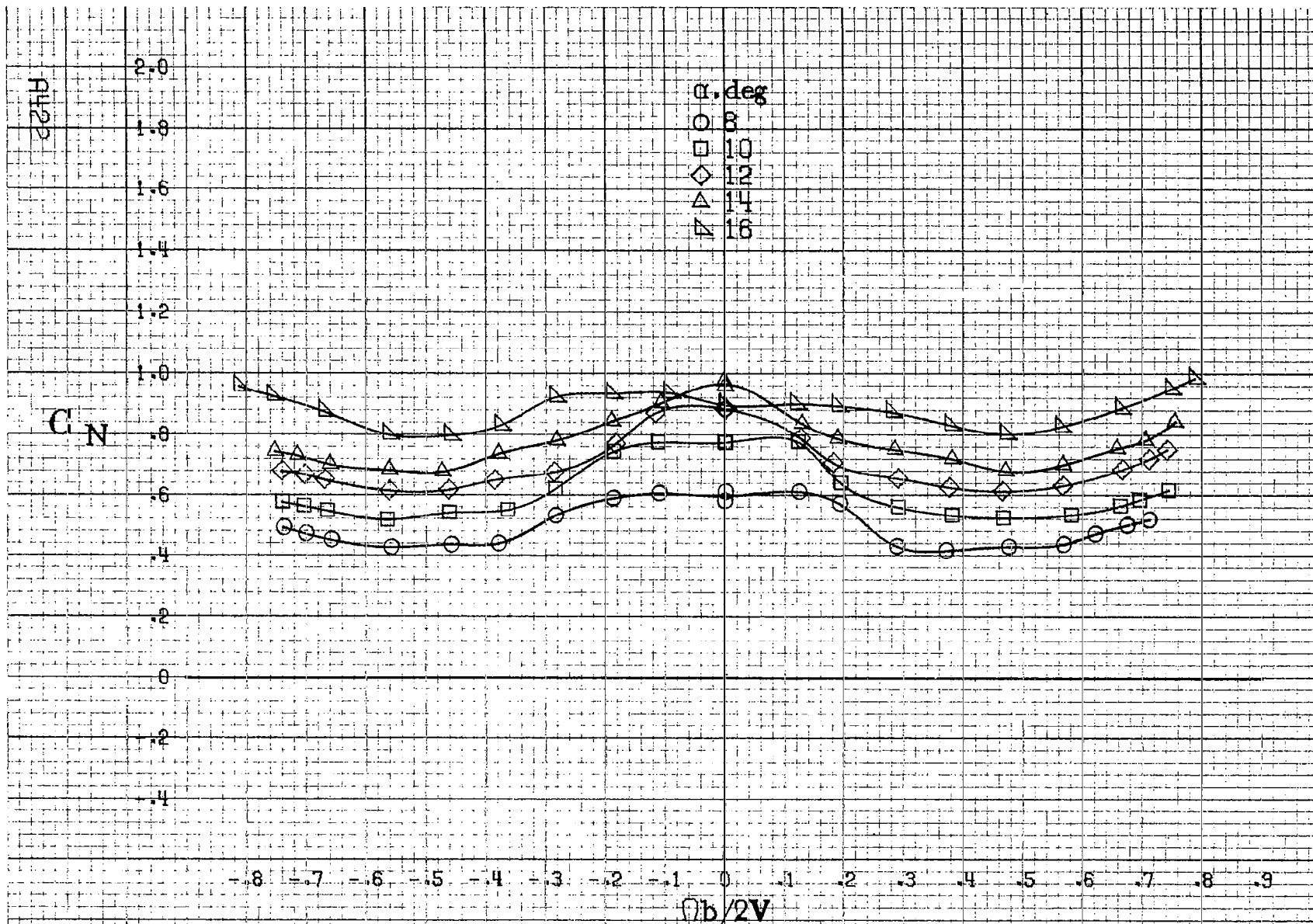
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0

α, deg
○ 55
□ 60
◇ 70
△ 80
▽ 90

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9
 $\Omega b/2V$

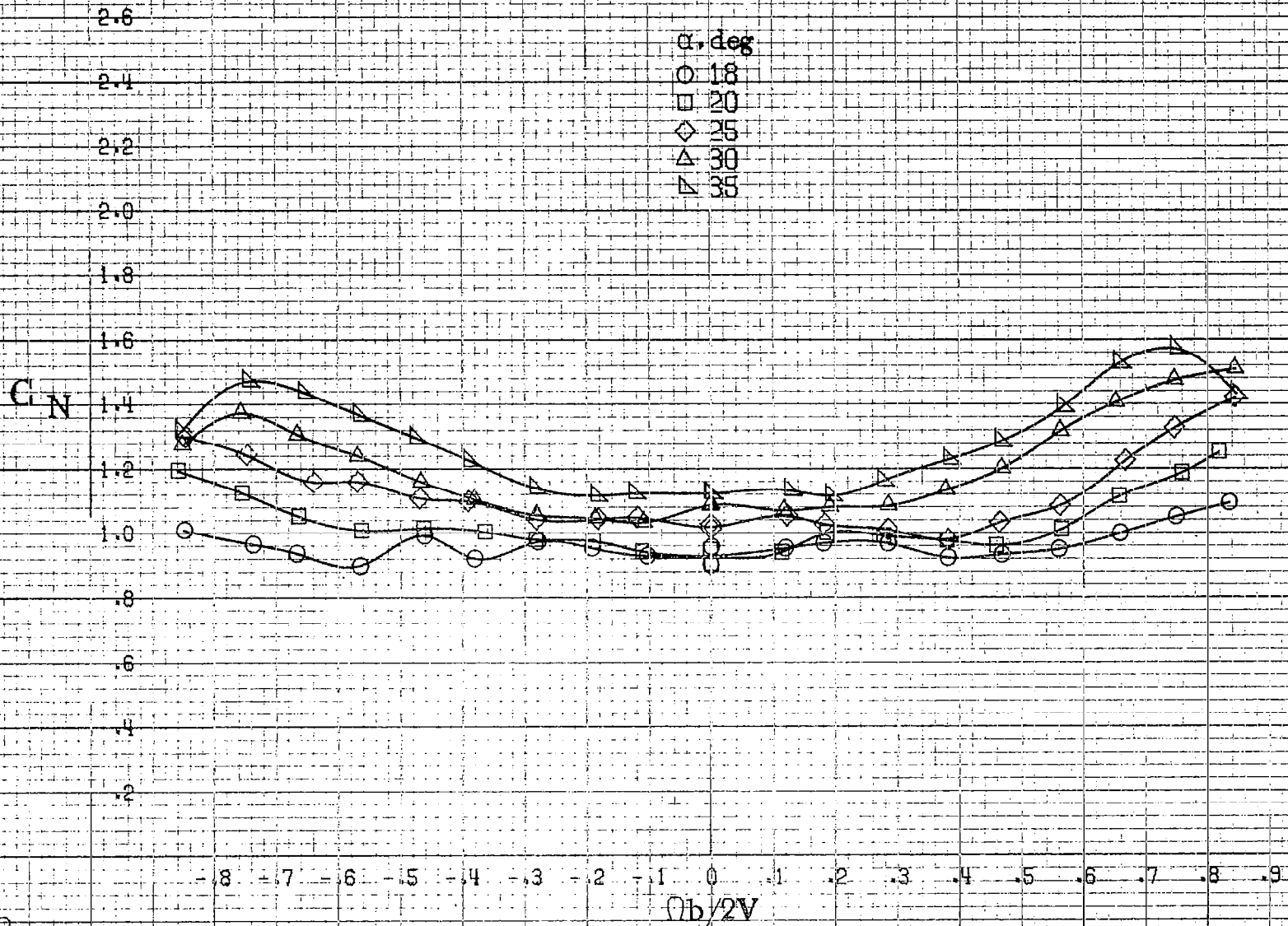
(d) $\alpha=55$ to 90 deg, $SR=0$.
Figure A105. Concluded.

A121



(a) $\alpha=8$ to 16 deg, SR=99 cm (39 in).

Figure A106. Effect of rotation rate and angle of attack on normal force coefficient for configuration having outboard LE wing droop extended inboard 33.8 cm (13.3 in). $\delta_a = 0^\circ$, $\delta_b = 0^\circ$, $\delta_c = 0^\circ$, $\beta = 0^\circ$.



(b) $\alpha = 18$ to 35 deg, SR = 99 cm (39 in).

Figure A106. - Continued.

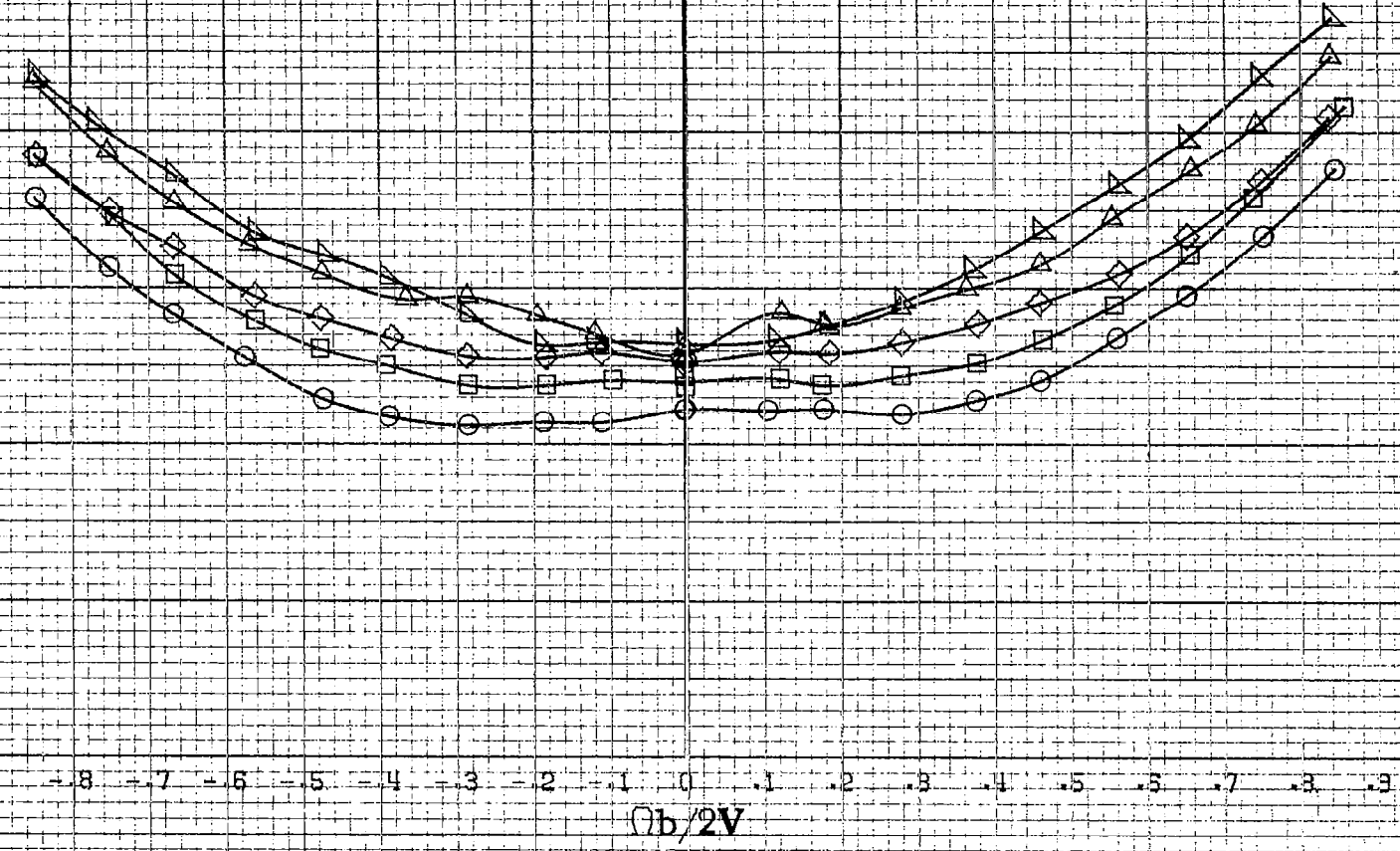
A423

PL24

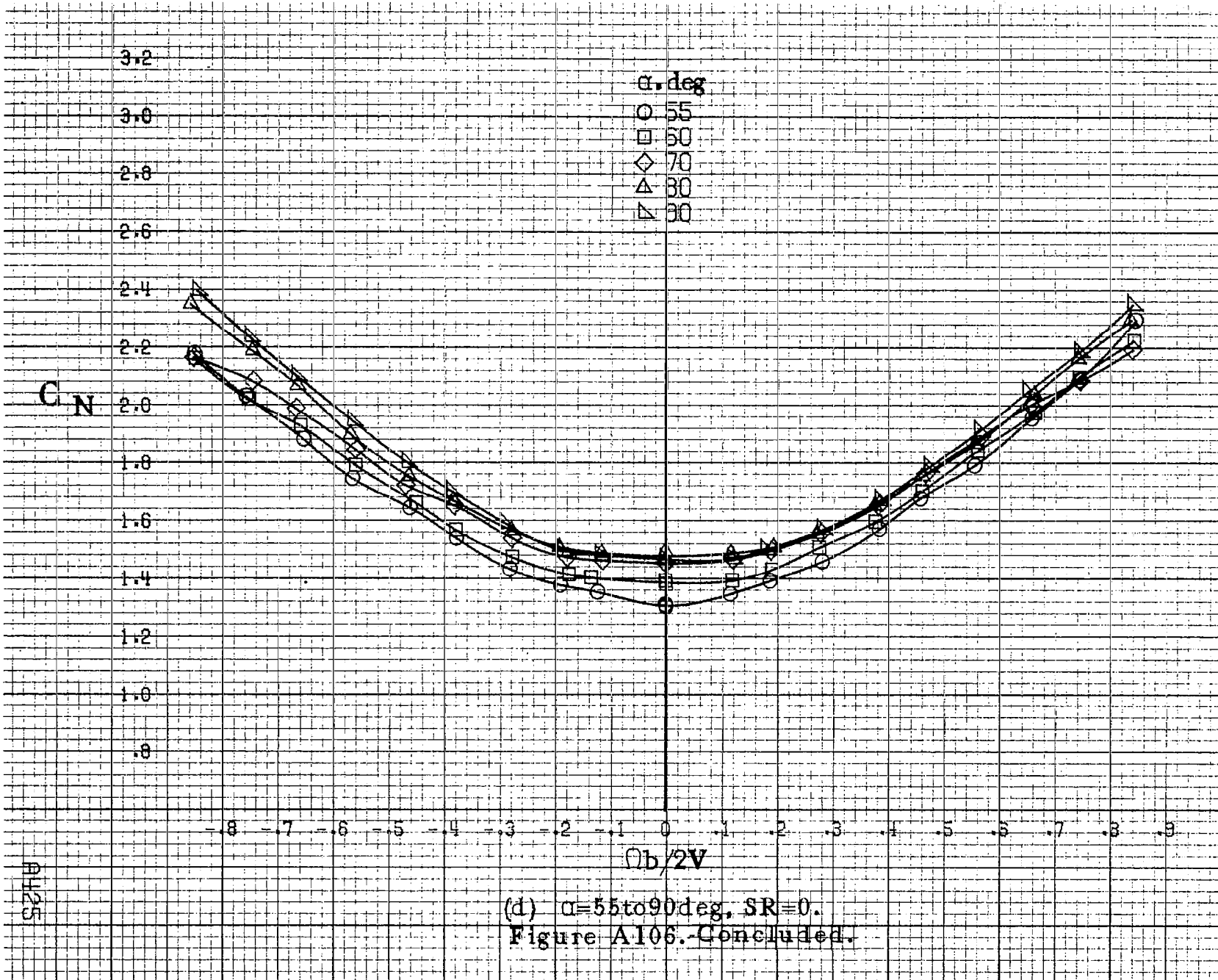
C_N

2.80
2.60
2.40
2.20
2.00
1.80
1.60
1.40
1.20
1.00
1.80
1.60
1.40

α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

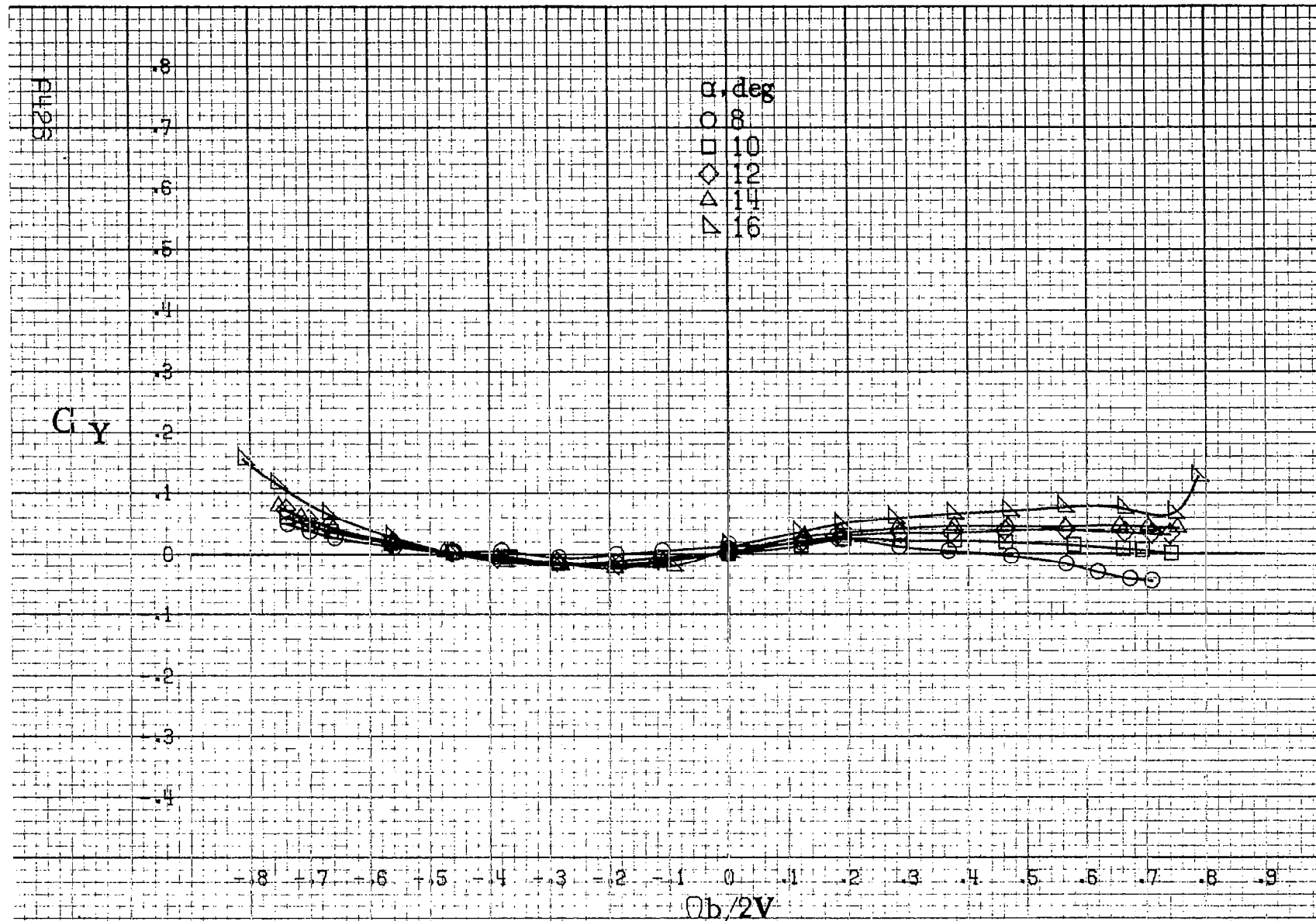


(c) $\alpha=30$ to 50 deg, $SR=0$.
Figure A106. Continued.



(d) $\alpha=55$ to 90° , $SR=0$.
 Figure A106.-Concluded.

A125



(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A107. Effect of rotation rate and angle of attack on side-force coefficient for configuration having outboard LE wing droop extended inboard 33.8 cm (13.3 in). $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

C_y

.8
.7
.6
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

-.8 -.7 -.6 -.5 -.4 -.3 -.2 -.1 0 .1 .2 .3 .4 .5 .6 .7 .8 .9

$Ob/2V$

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A107. Continued.

RH27

PH 28

C_y

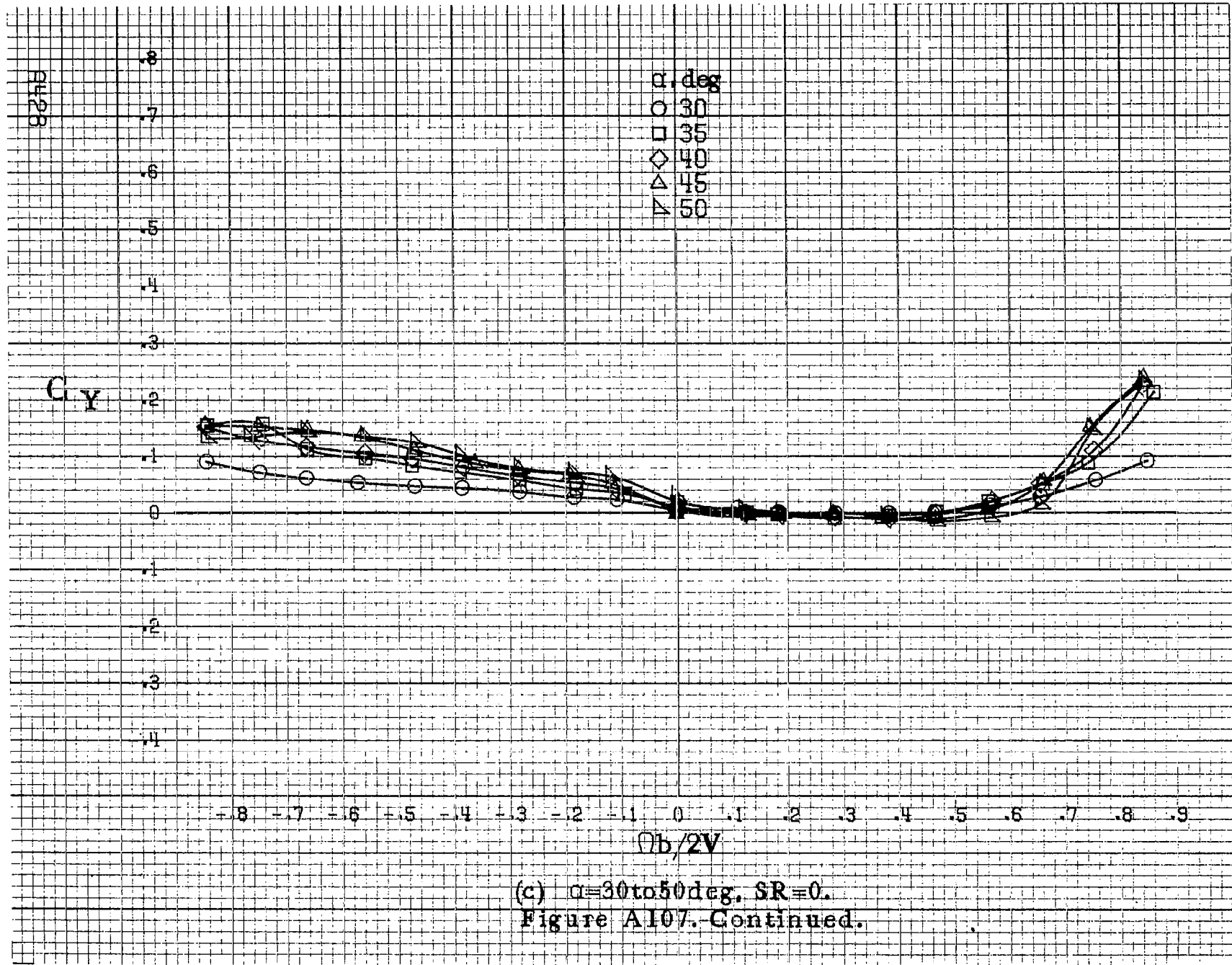
α , deg
○ 30
□ 35
◇ 40
△ 45
▽ 50

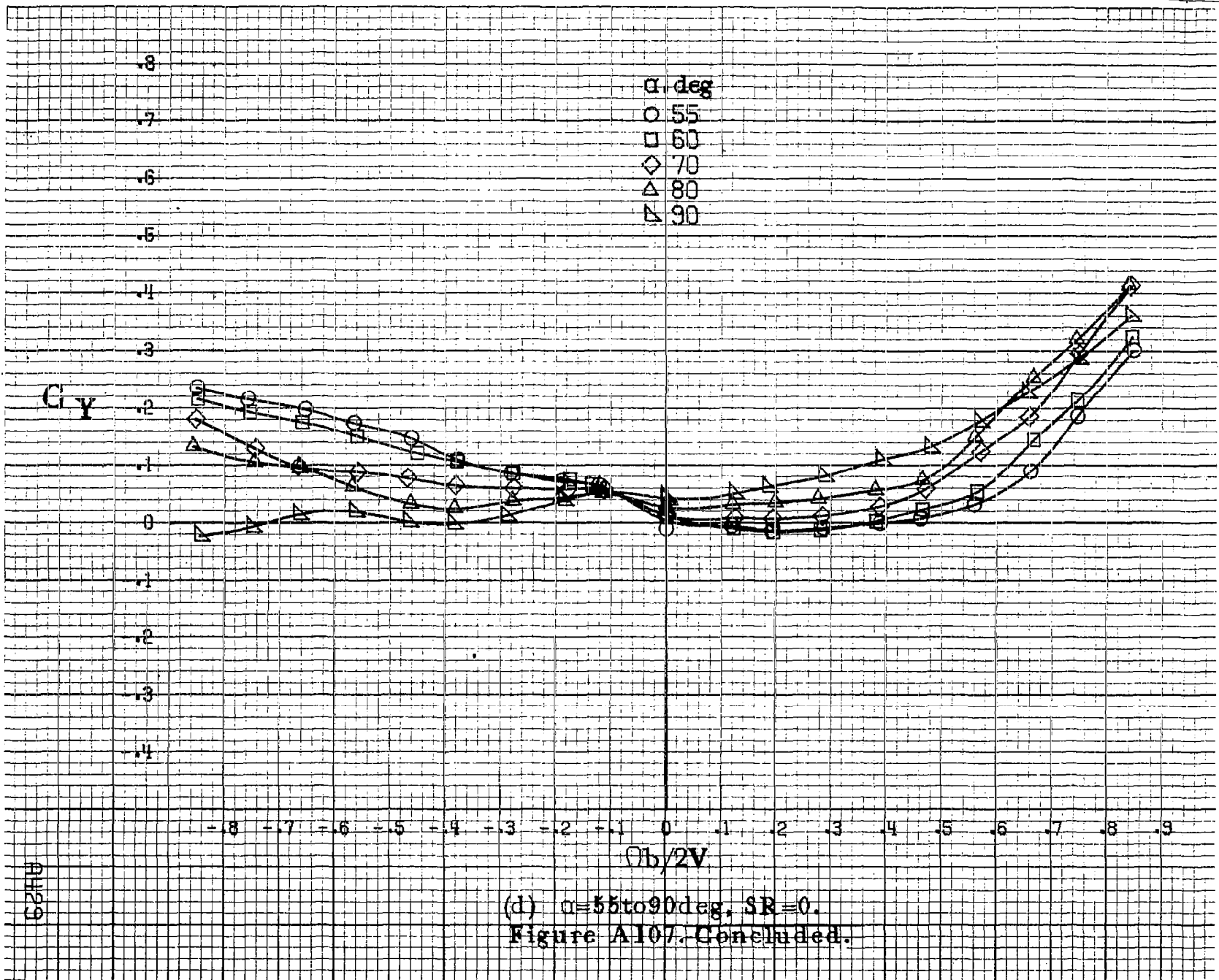
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4

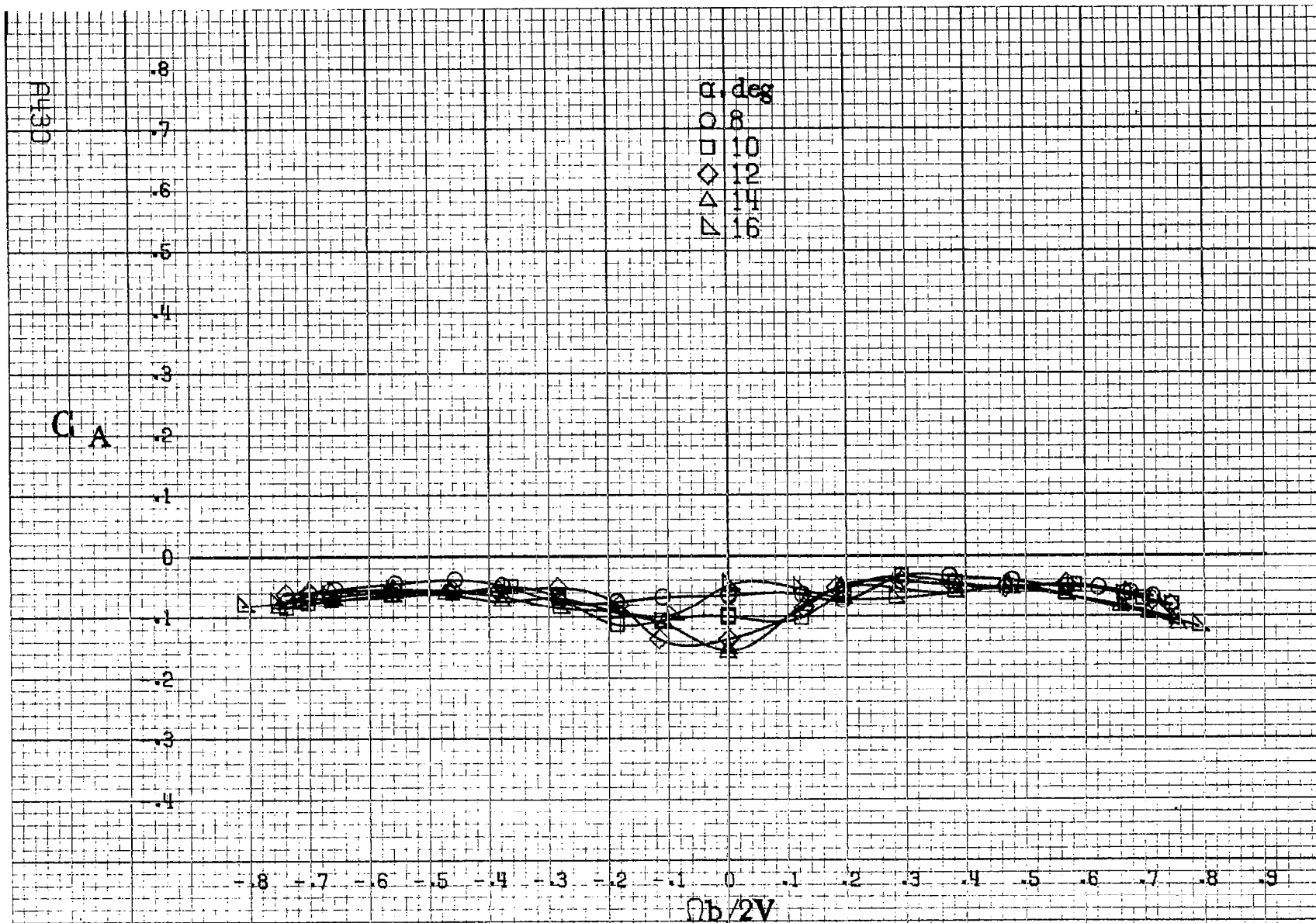
-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

$\Omega b/2V$

(c) $\alpha=30$ to 50 deg. $SR=0$.
Figure A107. Continued.

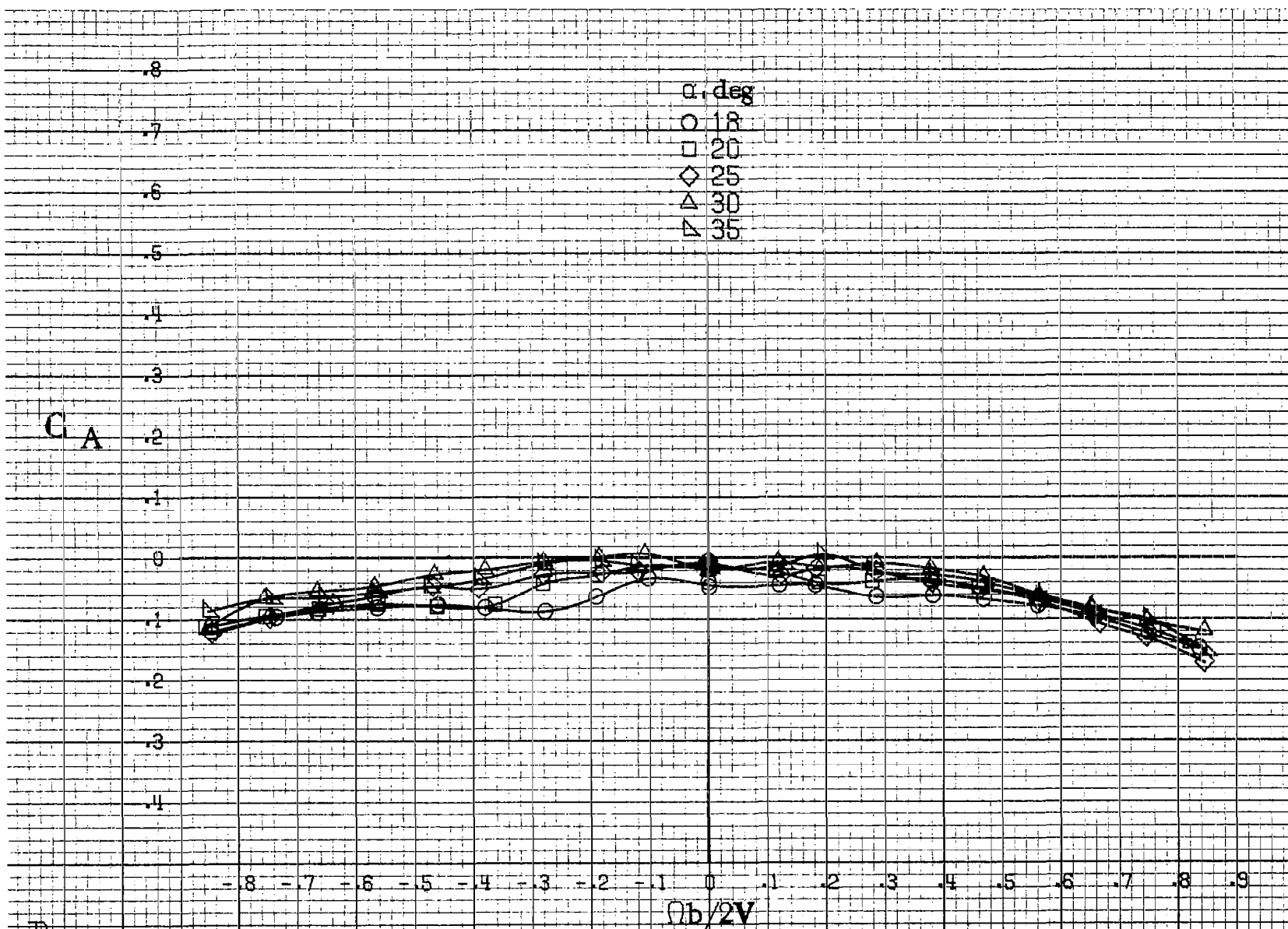






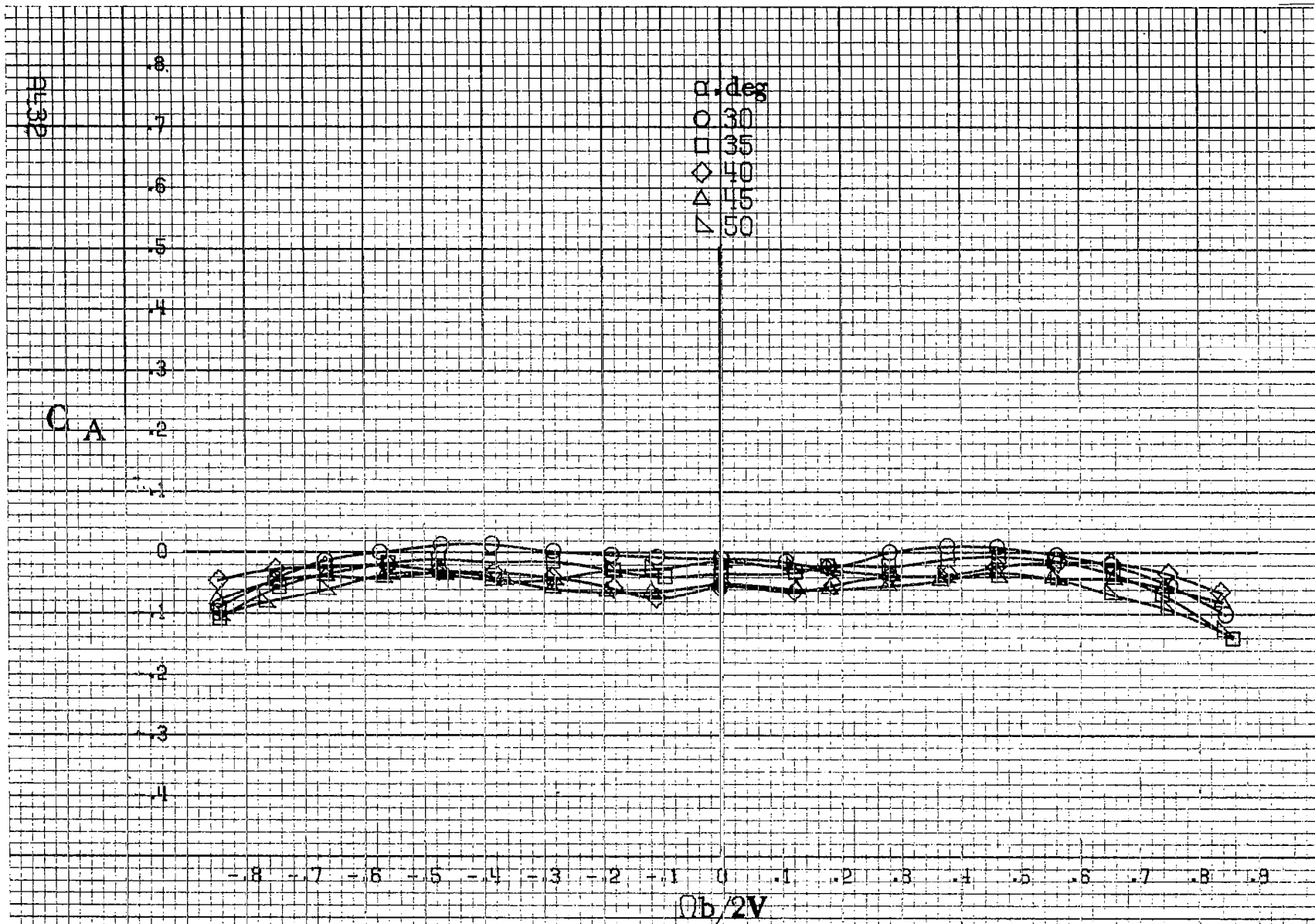
(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A108. Effect of rotation rate and angle of attack on axial force coefficient for configuration having outboard LE wing droop extended inboard 33.8 cm (13.3 in). $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

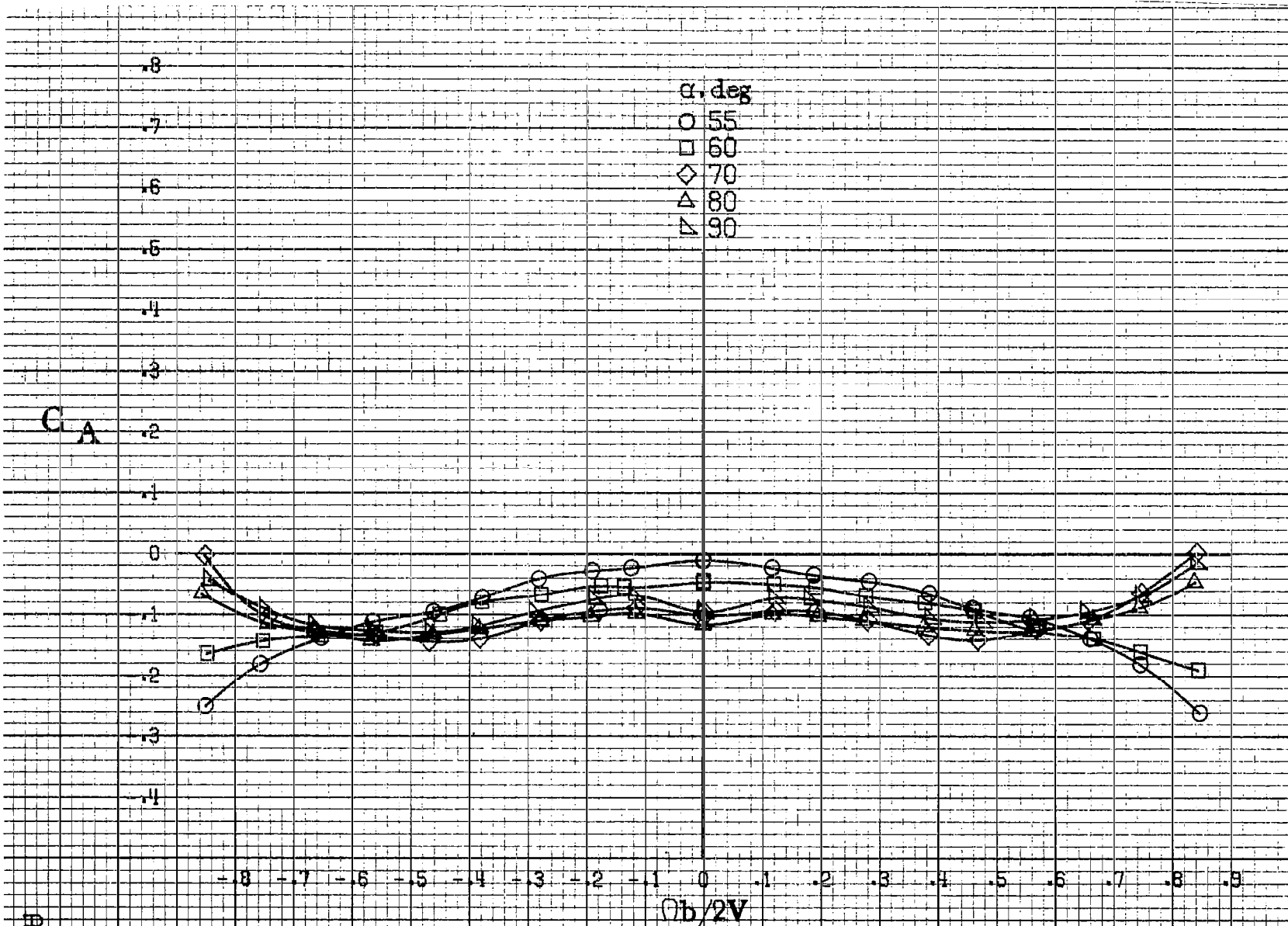


(b) $\alpha=18$ to 35 deg. $SR=99$ cm (39 in).
 Figure A108. Continued.

PLS

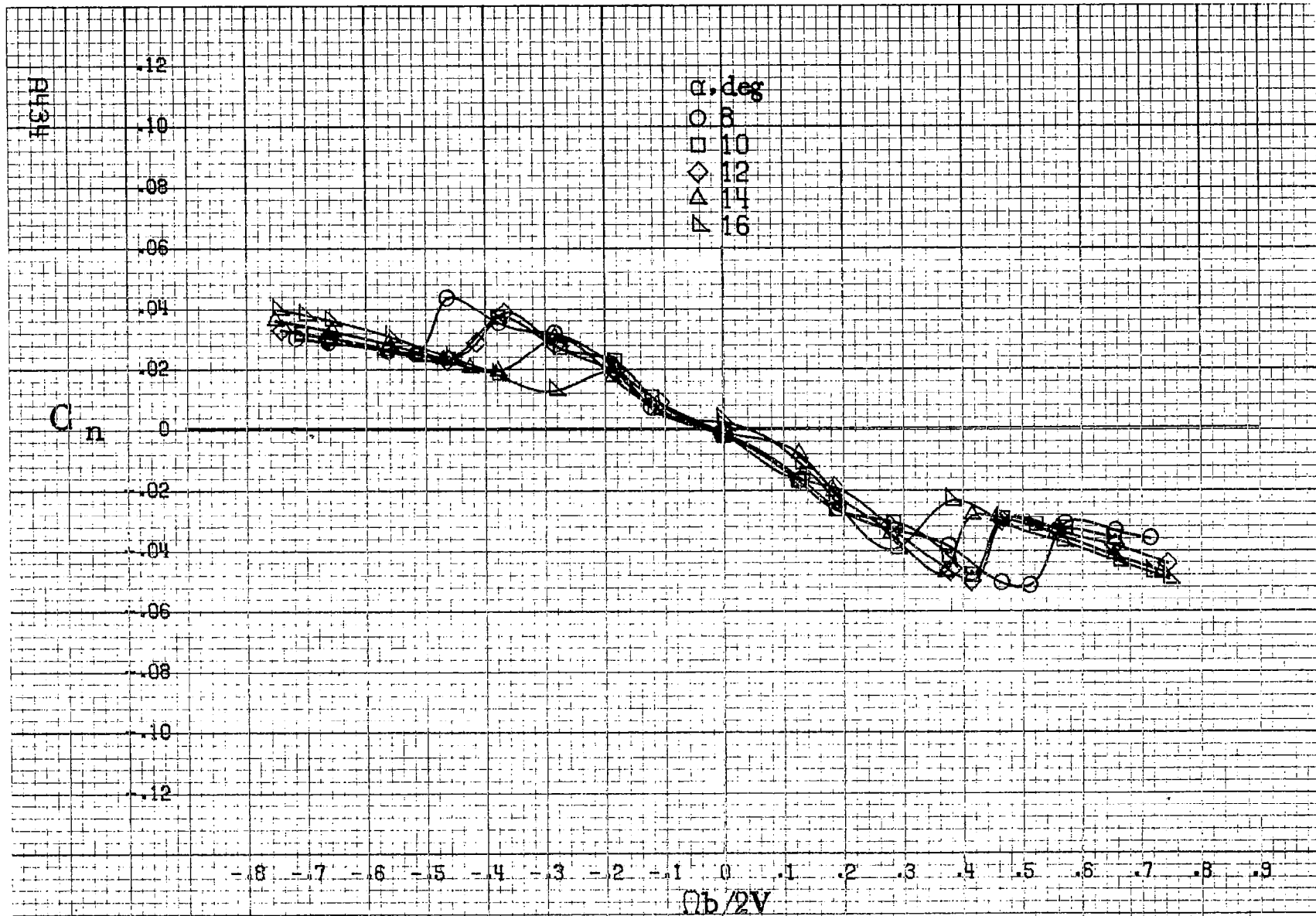


(c) $\alpha = 30$ to 50 deg, $SR = 0$.
 Figure A108. Continued.



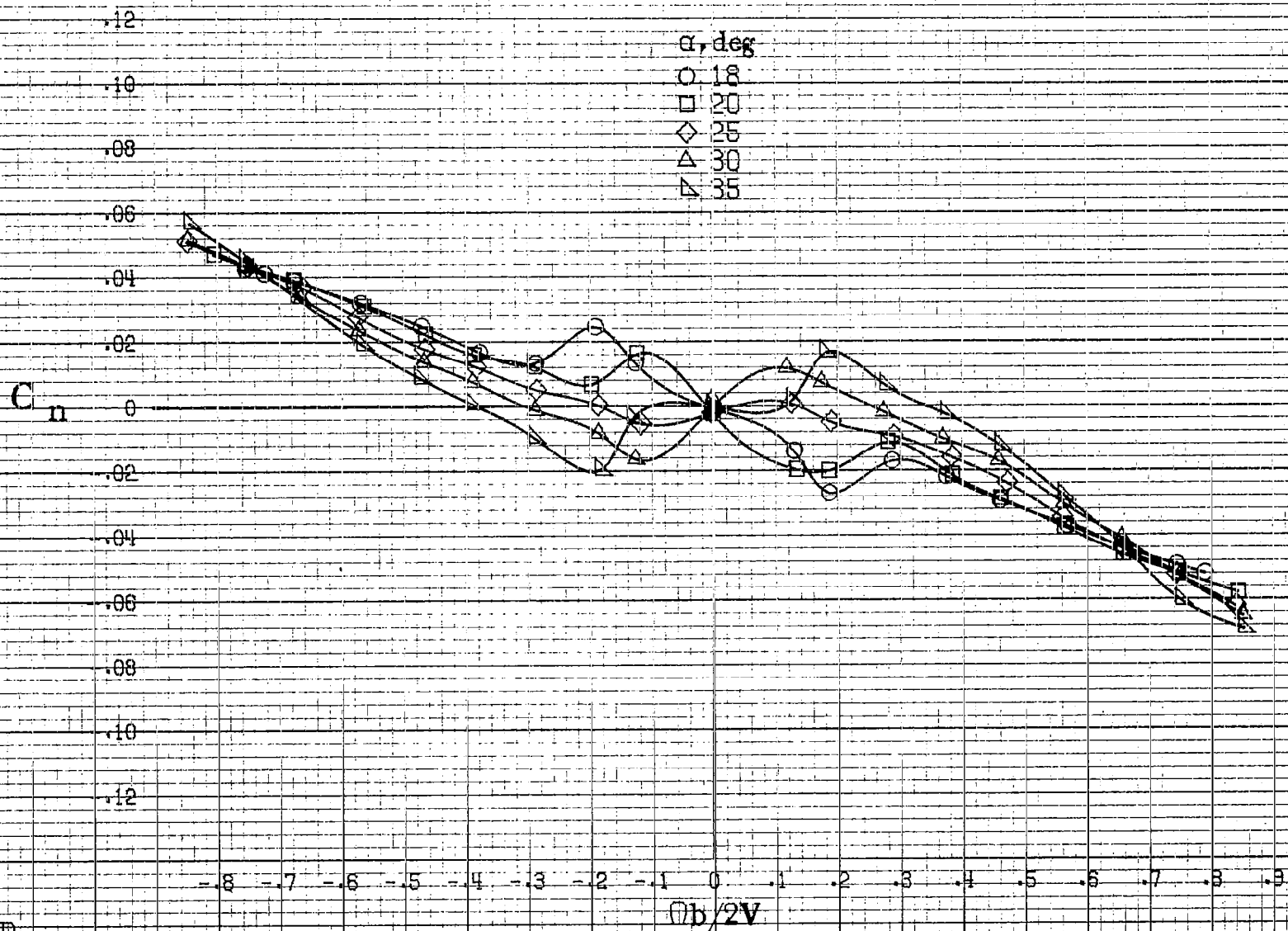
B133

(d) $\alpha=55$ to 90 deg, $SR=0$.
 Figure A108. Concluded.



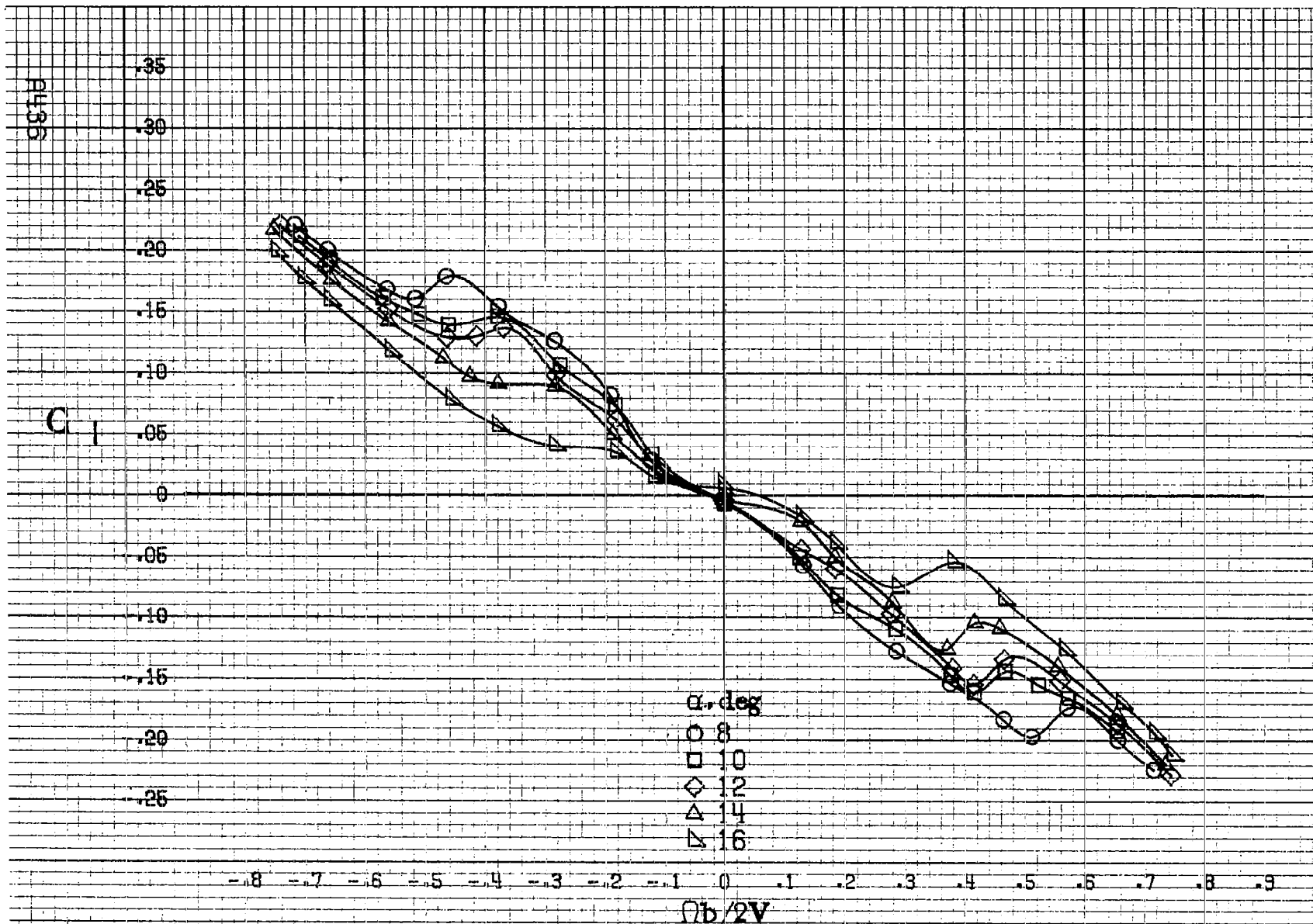
(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A109. Effect of rotation rate and angle of attack on yawing-moment coefficient for configuration having outboard wing Kruger flap. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$. $\beta = 0^\circ$.



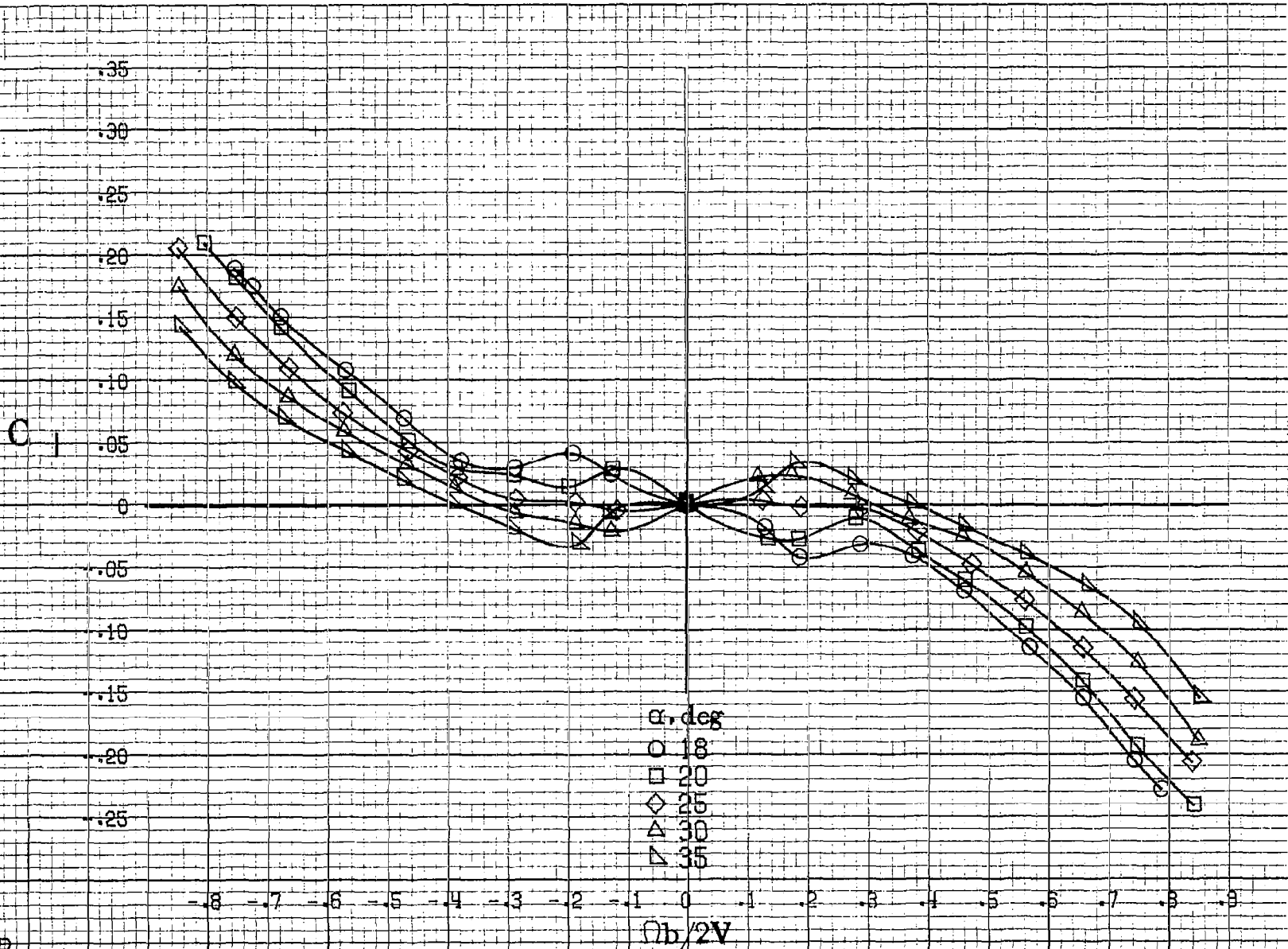
(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A109. Concluded.

PL135



(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A110.-Effect of rotation rate and angle of attack on rolling-moment coefficient for configuration having outboard wing Kruger flap. $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $B = 0^\circ$.

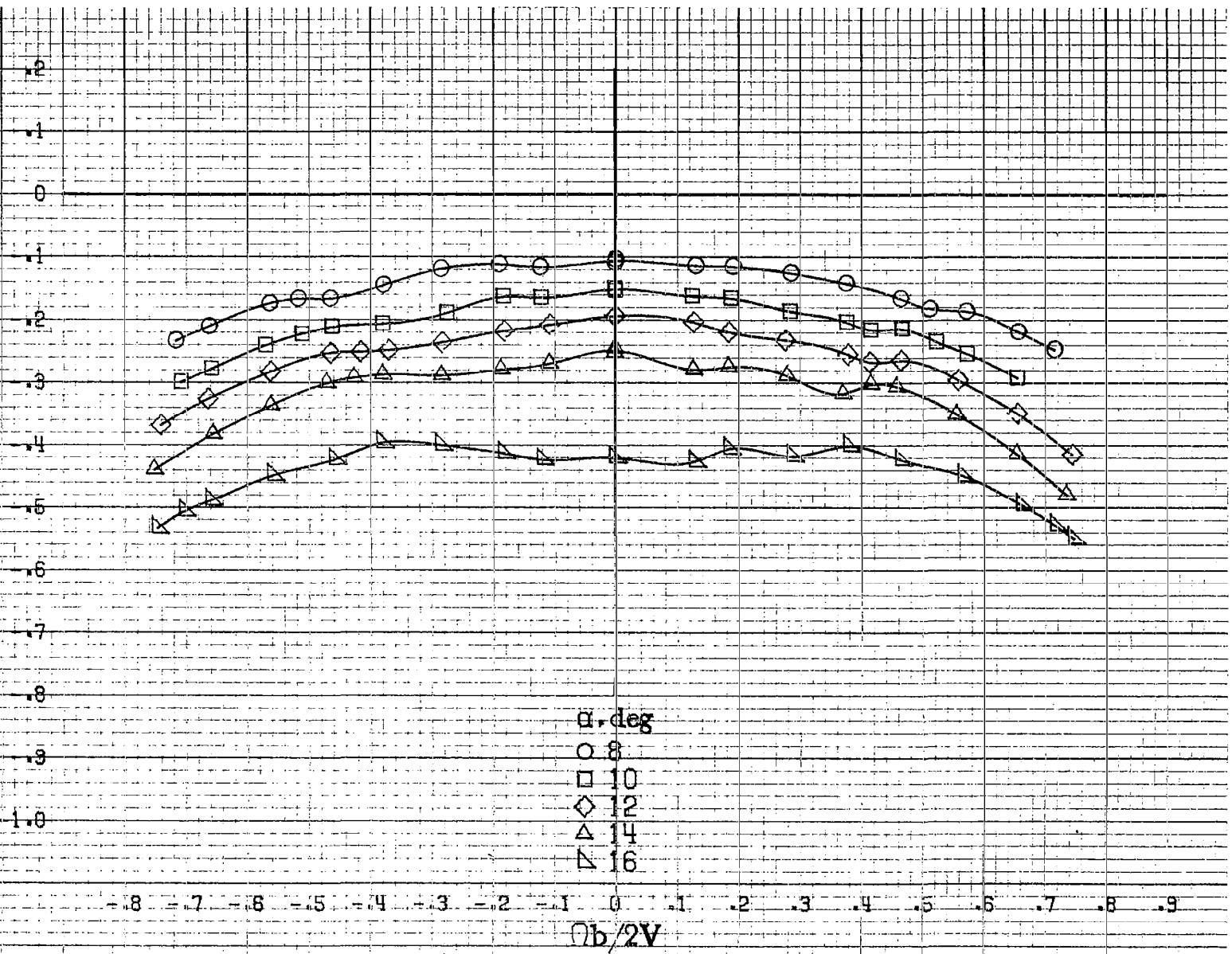


(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A110. Concluded.

A110

8438

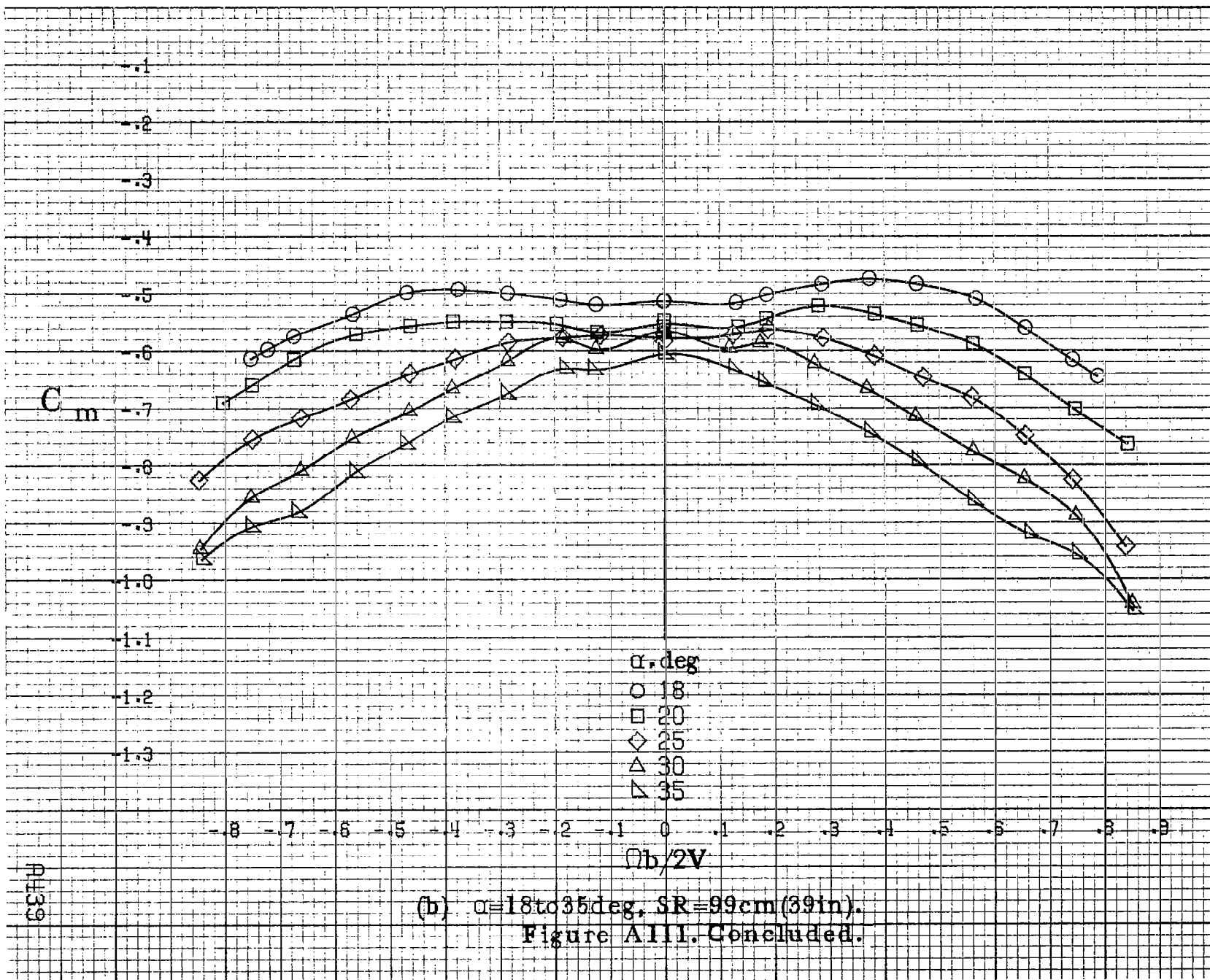
C_m

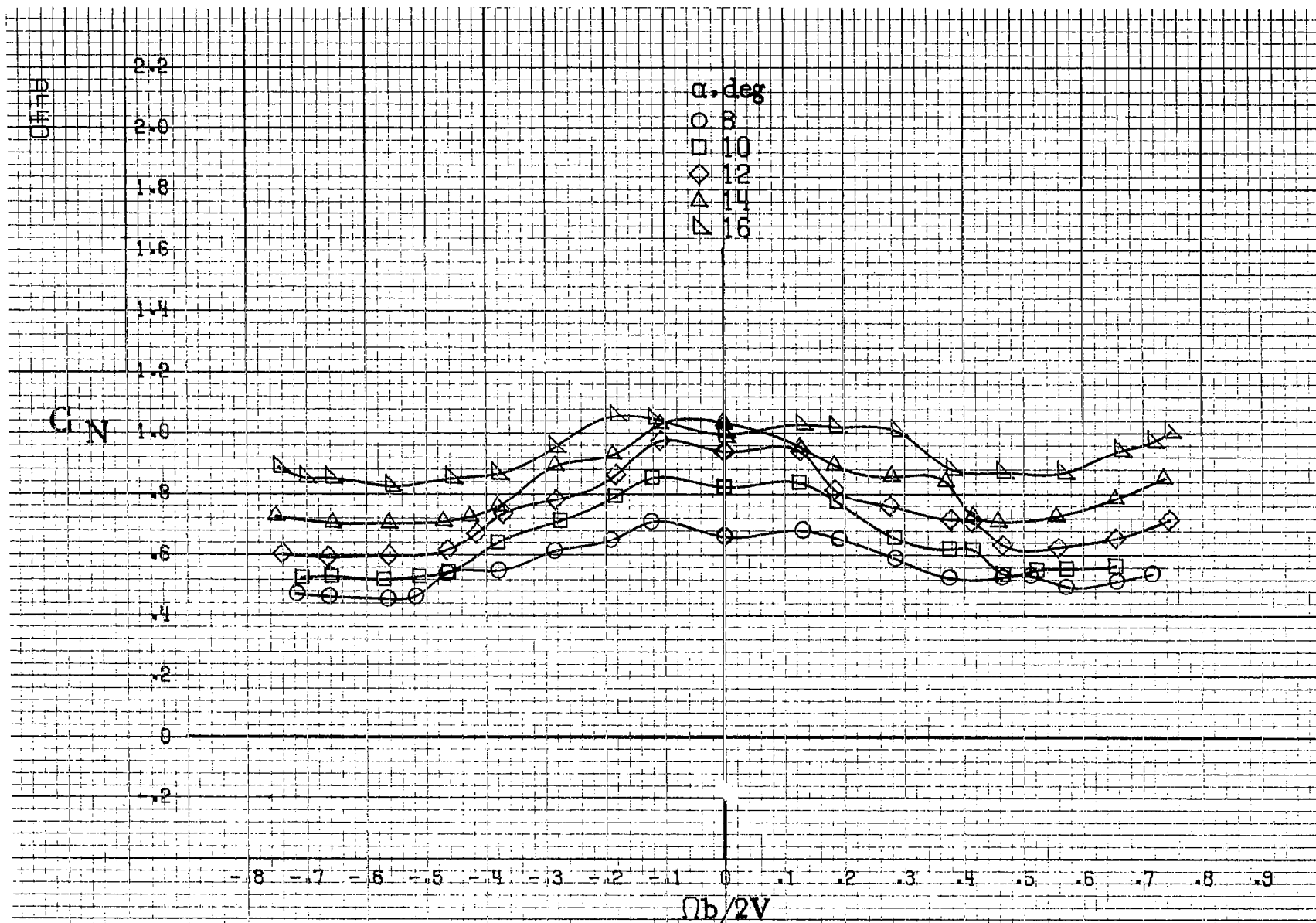


α, deg
 O 8
 □ 10
 ◇ 12
 △ 14
 ▽ 16

(a) $\alpha = 8 \text{ to } 16 \text{ deg}$, $SR = 99 \text{ cm (39 in)}$.

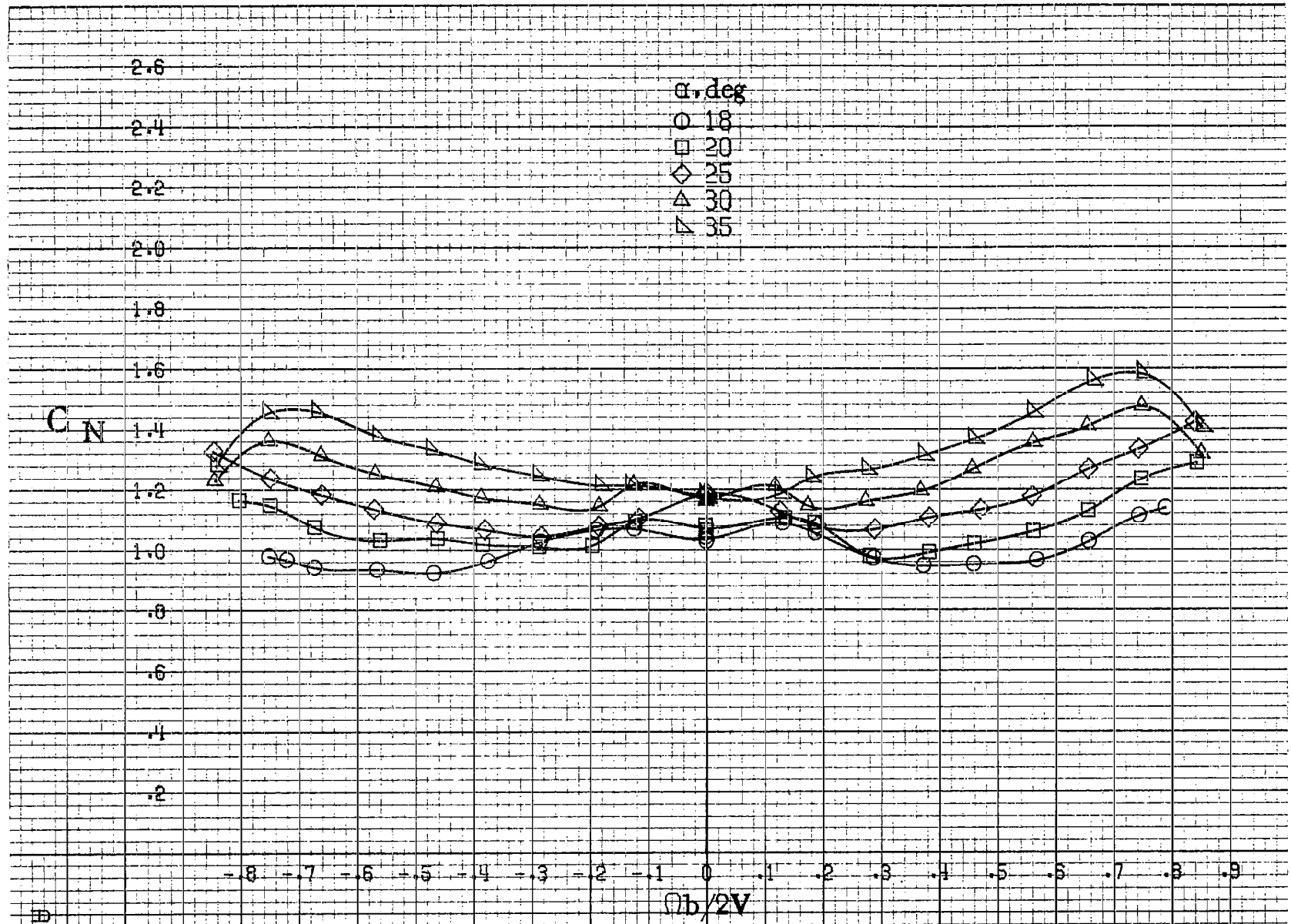
Figure A111. Effect of rotation rate and angle of attack on pitching moment coefficient for configuration having outboard wing Kruger flap. $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.





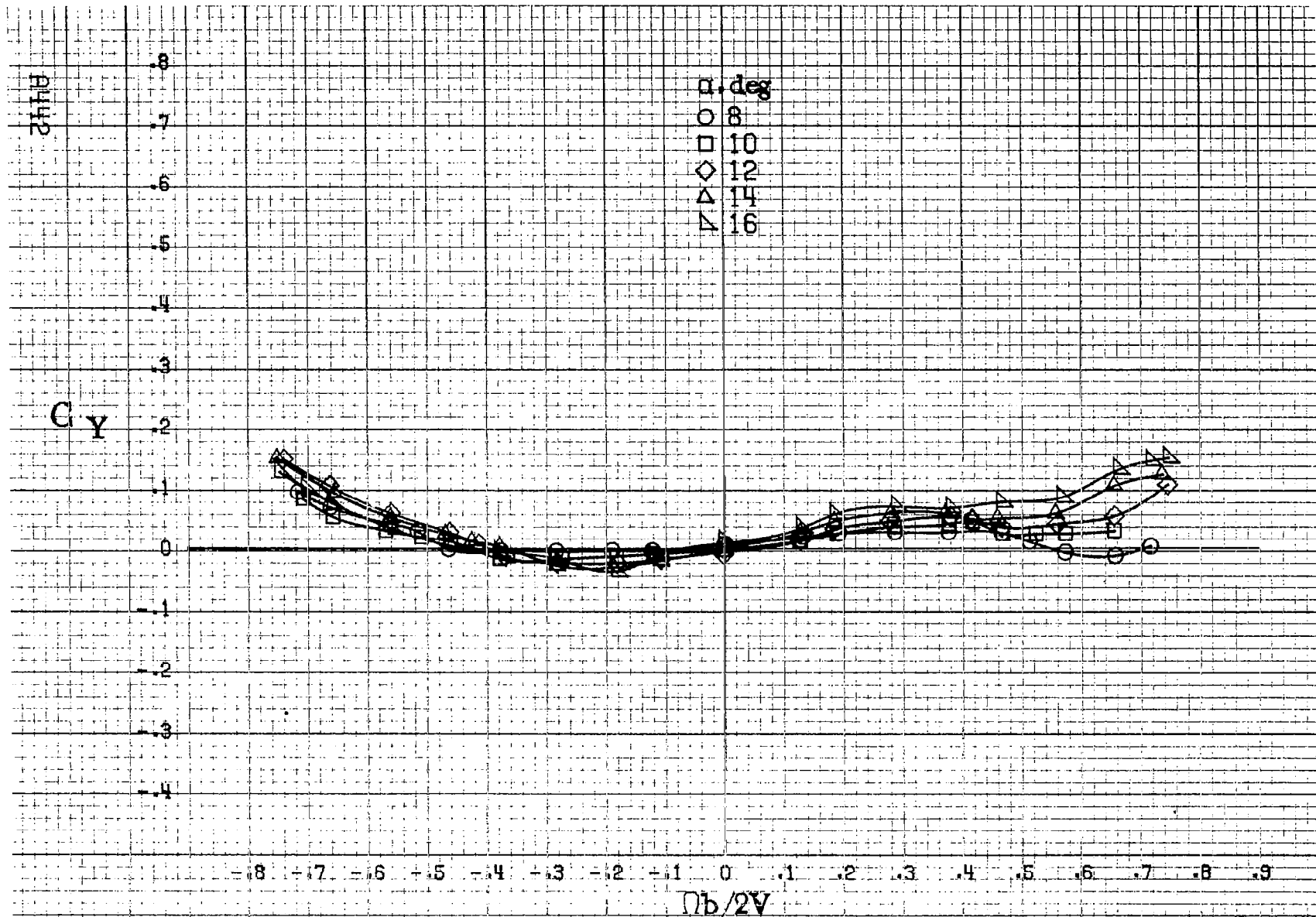
(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A112.-Effect of rotation rate and angle of attack on normal-force coefficient for configuration having outboard wing Kruger flap. $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



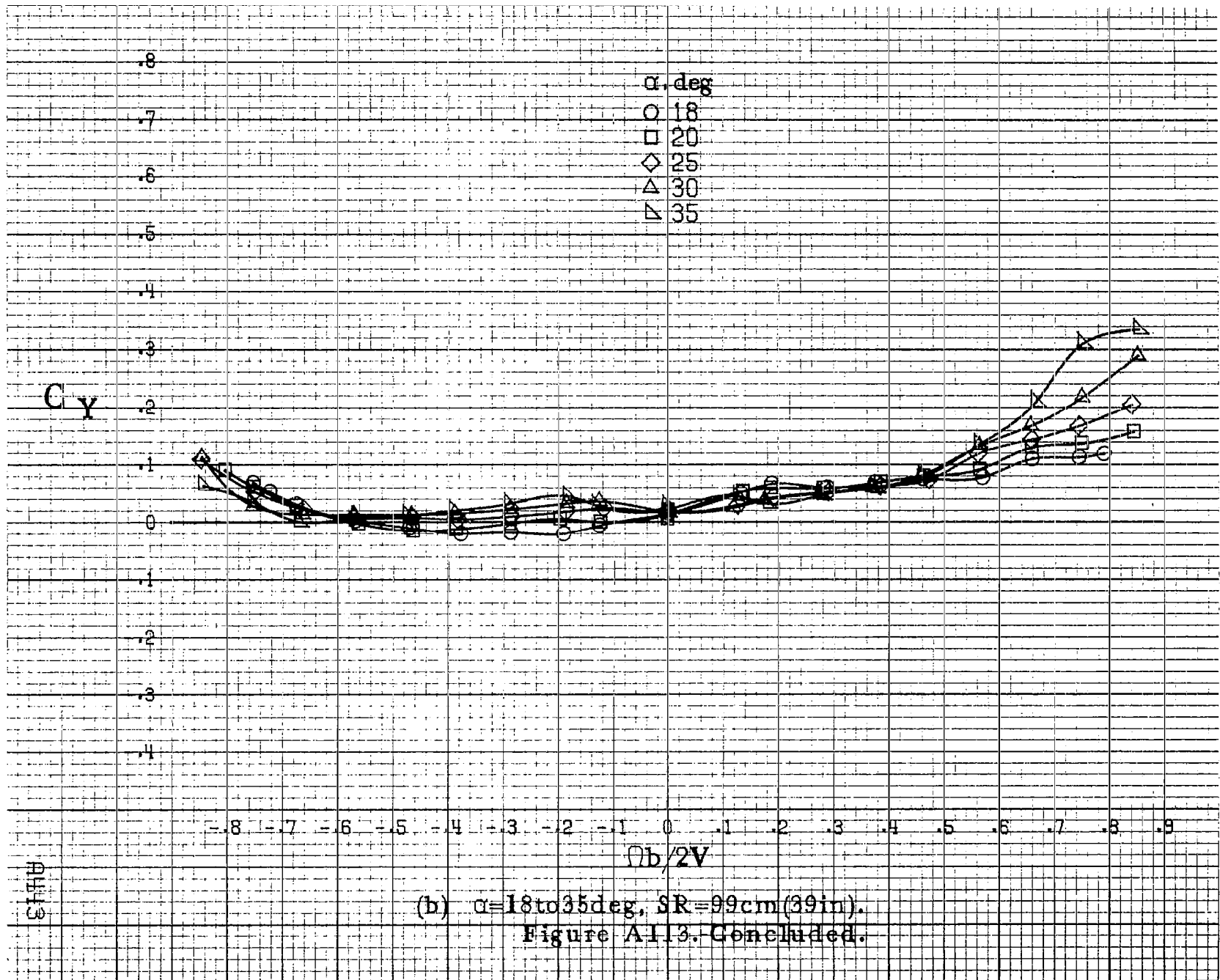
(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A112. Concluded.

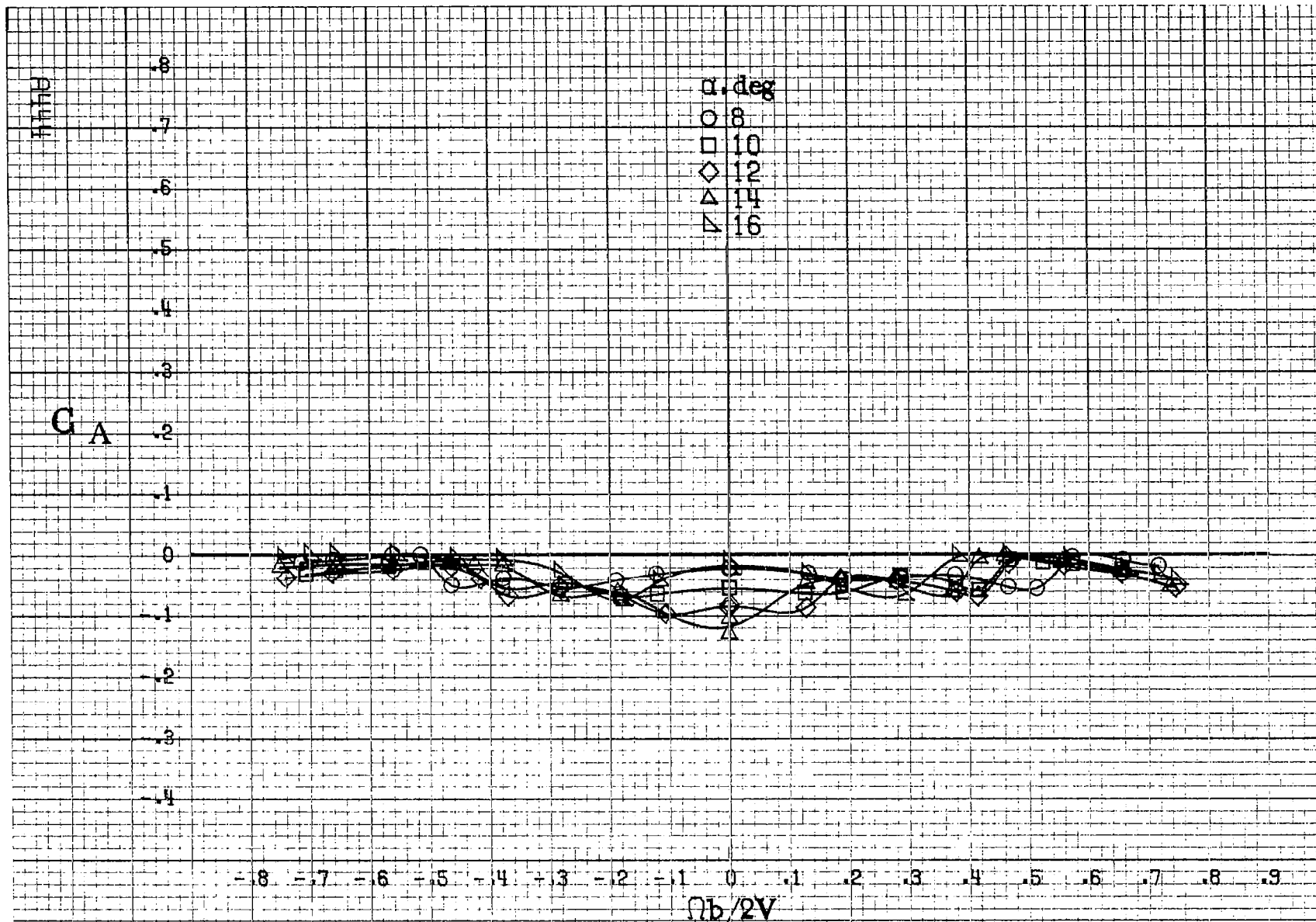
1111



(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

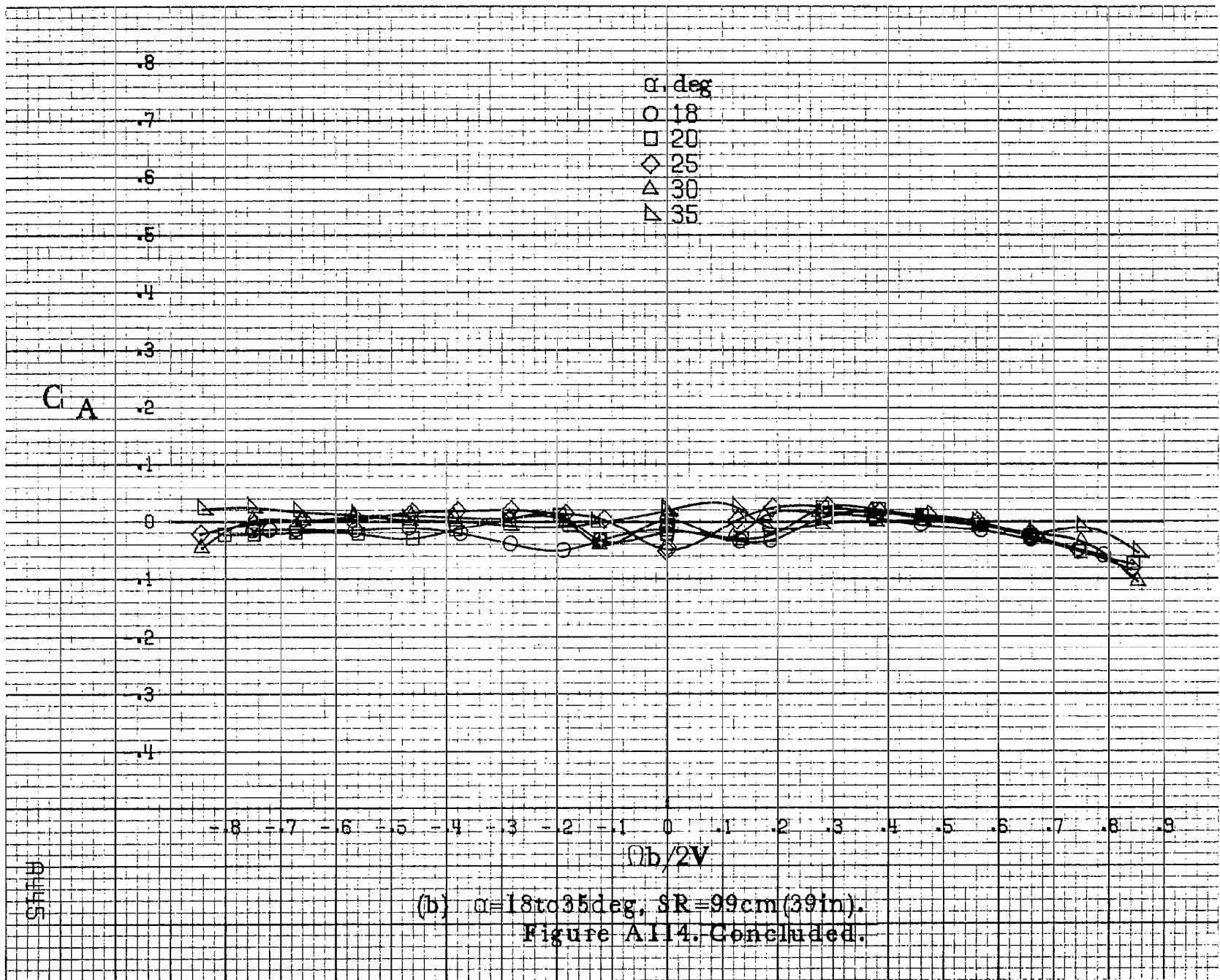
Figure A113.-Effect of rotation rate and angle of attack on side force coefficient for configuration having outboard wing Kruger flap. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

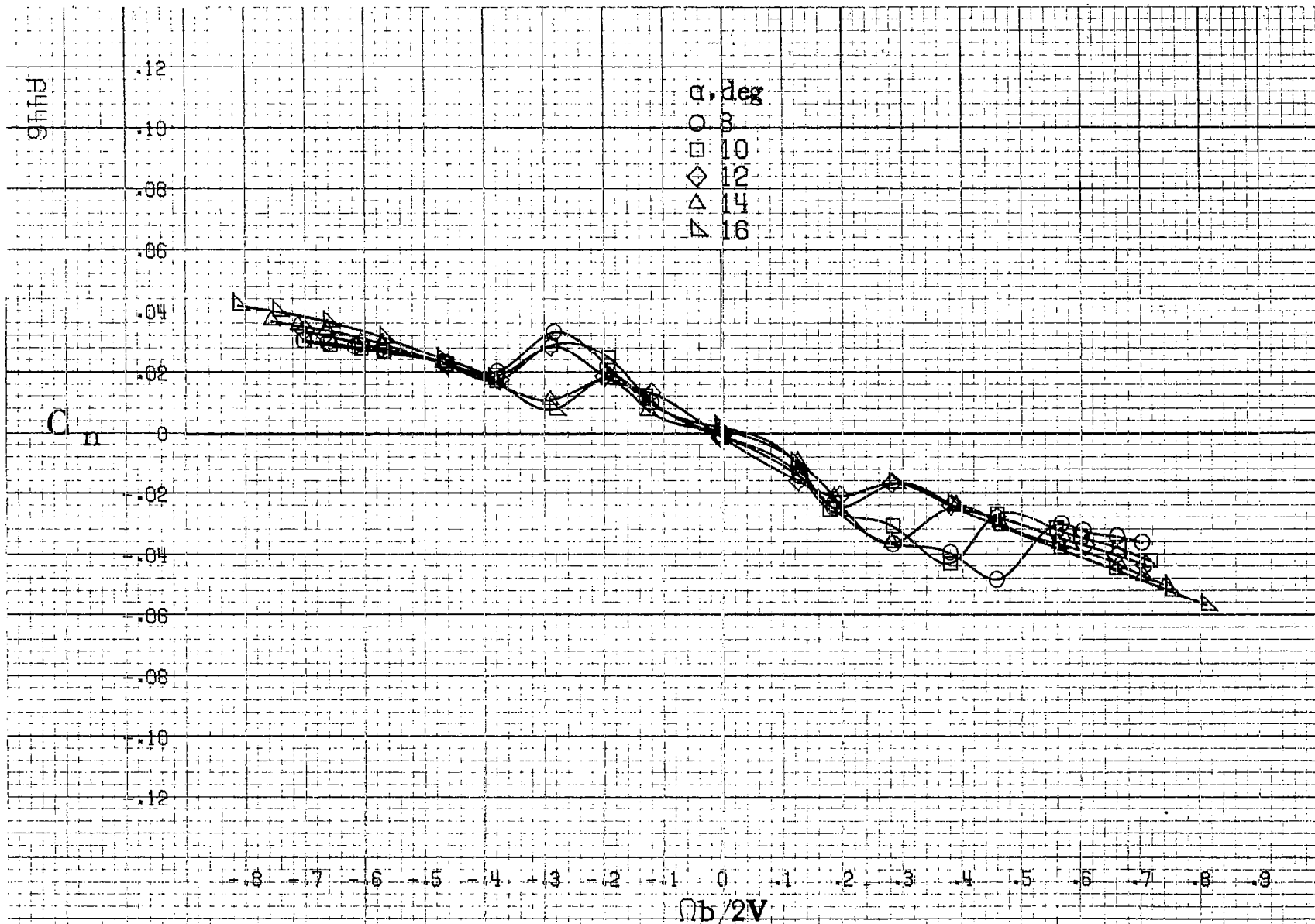




(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A114. Effect of rotation rate and angle of attack on axial force coefficient for configuration having outboard wing Kruger flap. $\delta_e = 0^\circ$, $\delta_r = 0^\circ$, $\delta_f = 0^\circ$.





(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A115. Effect of rotation rate and angle of attack on yawing moment coefficient for configuration having outboard LE wing droop extended inboard 42.7 cm (16.8 in). $\delta_e=0^\circ$, $\delta_a=0^\circ$, $\delta_r=0^\circ$. $\beta=0^\circ$.

C_n

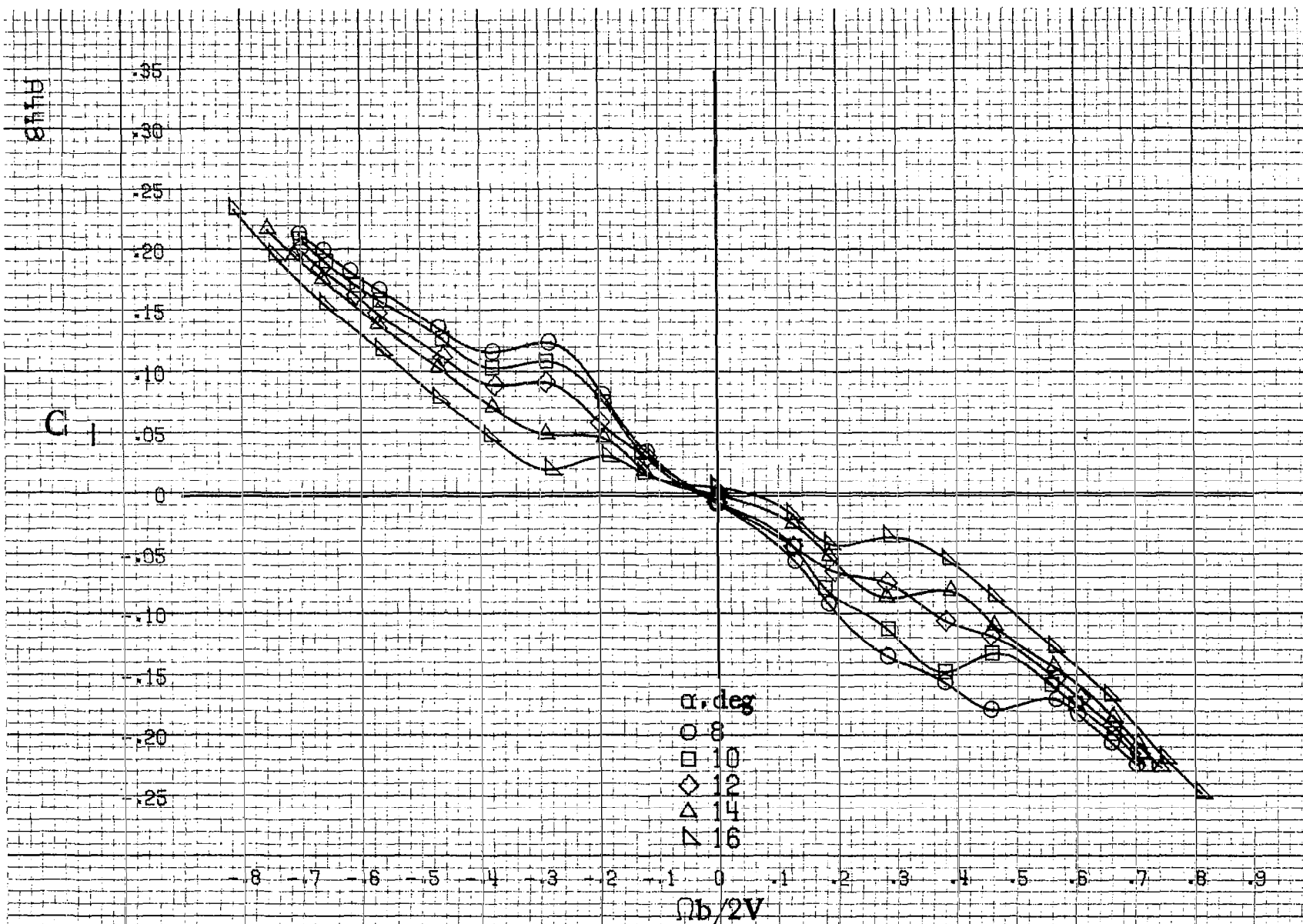
.12
.10
.08
.06
0
.02
.04
.06
.08
.10
.12

α , deg
○ 18
□ 20
◇ 25
△ 30
▽ 35

-0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9
 $Ob/2V$

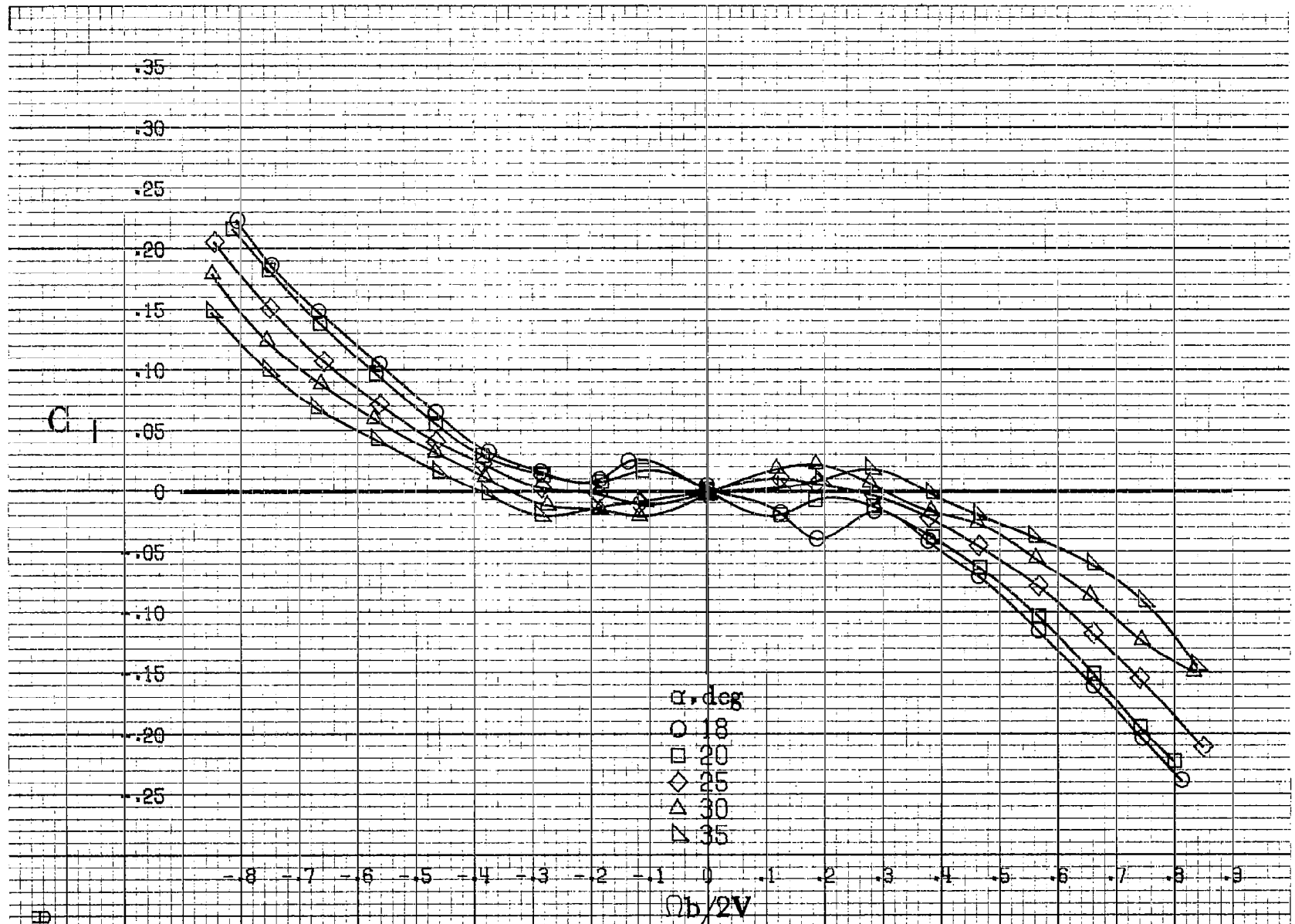
PHIL 7

(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
Figure A115. Concluded.



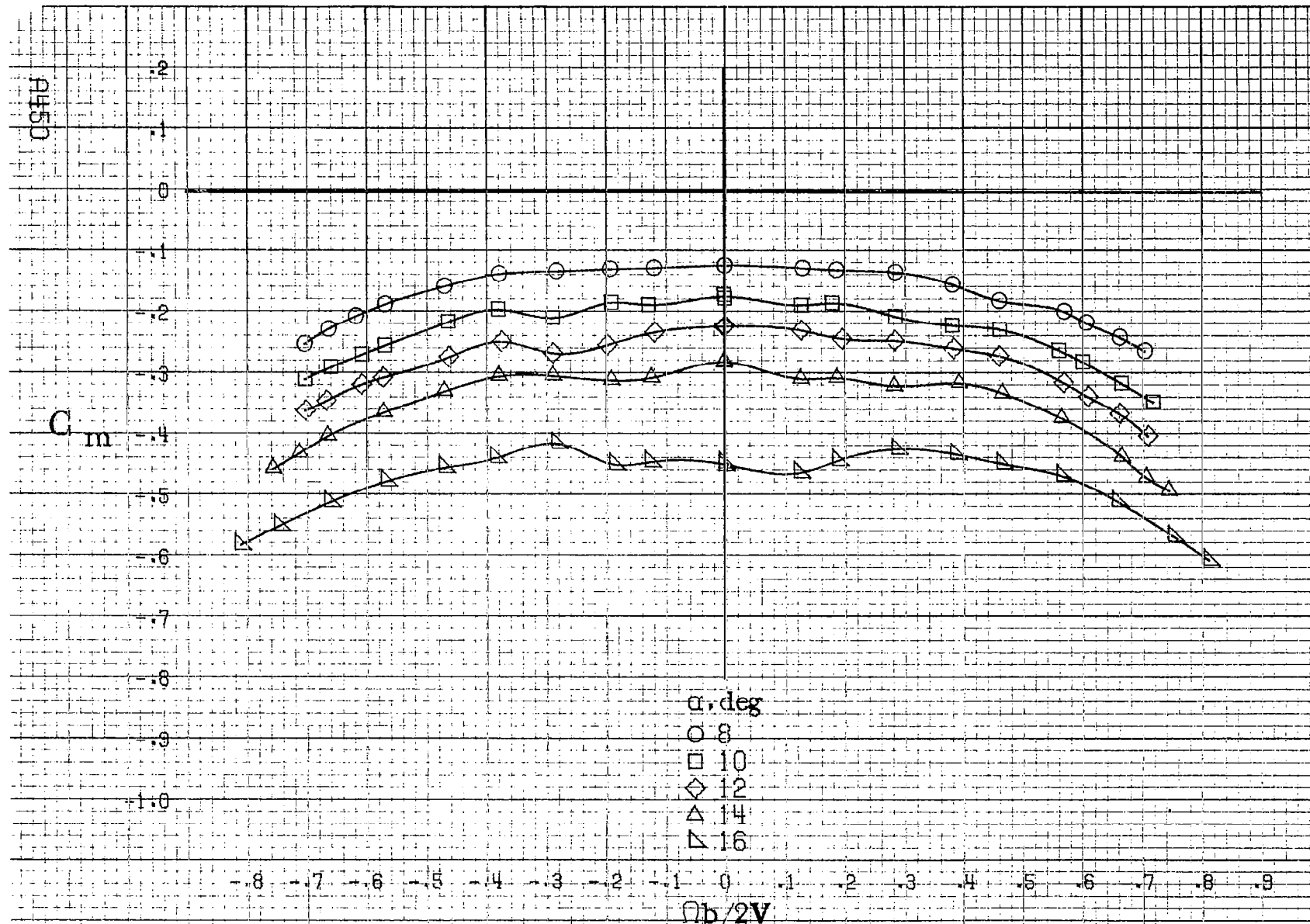
(a) $\alpha = 8$ to 16 deg, SR = 99 cm (39 in).

Figure A116.-Effect of rotation rate and angle of attack on rolling-moment coefficient for configuration having outboard LE wing droop extended inboard 42.7 cm (16.8 in). $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



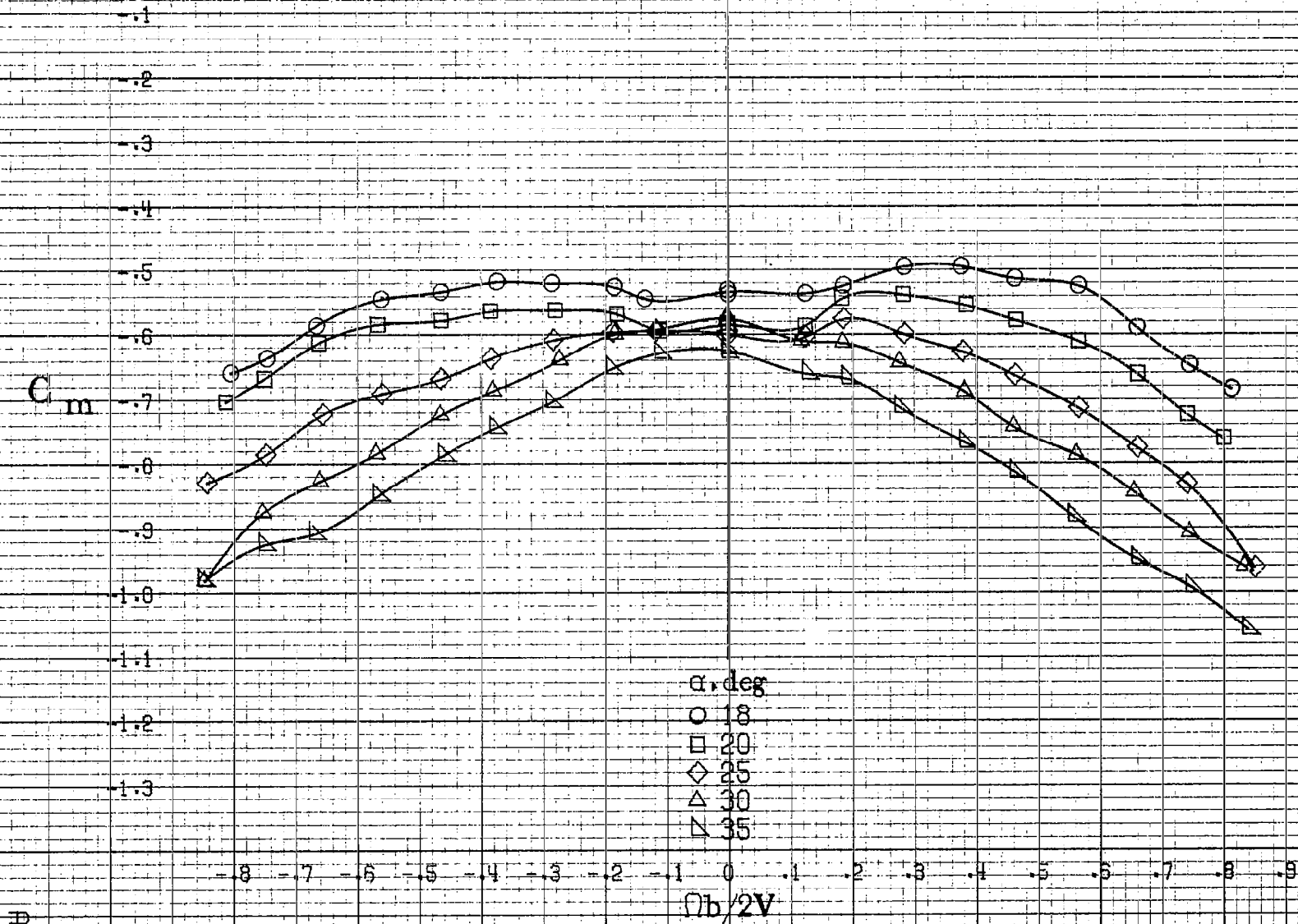
(b) $\alpha=18$ to 35 deg, $SR=99$ cm (39 in).
 Figure A116. Concluded.

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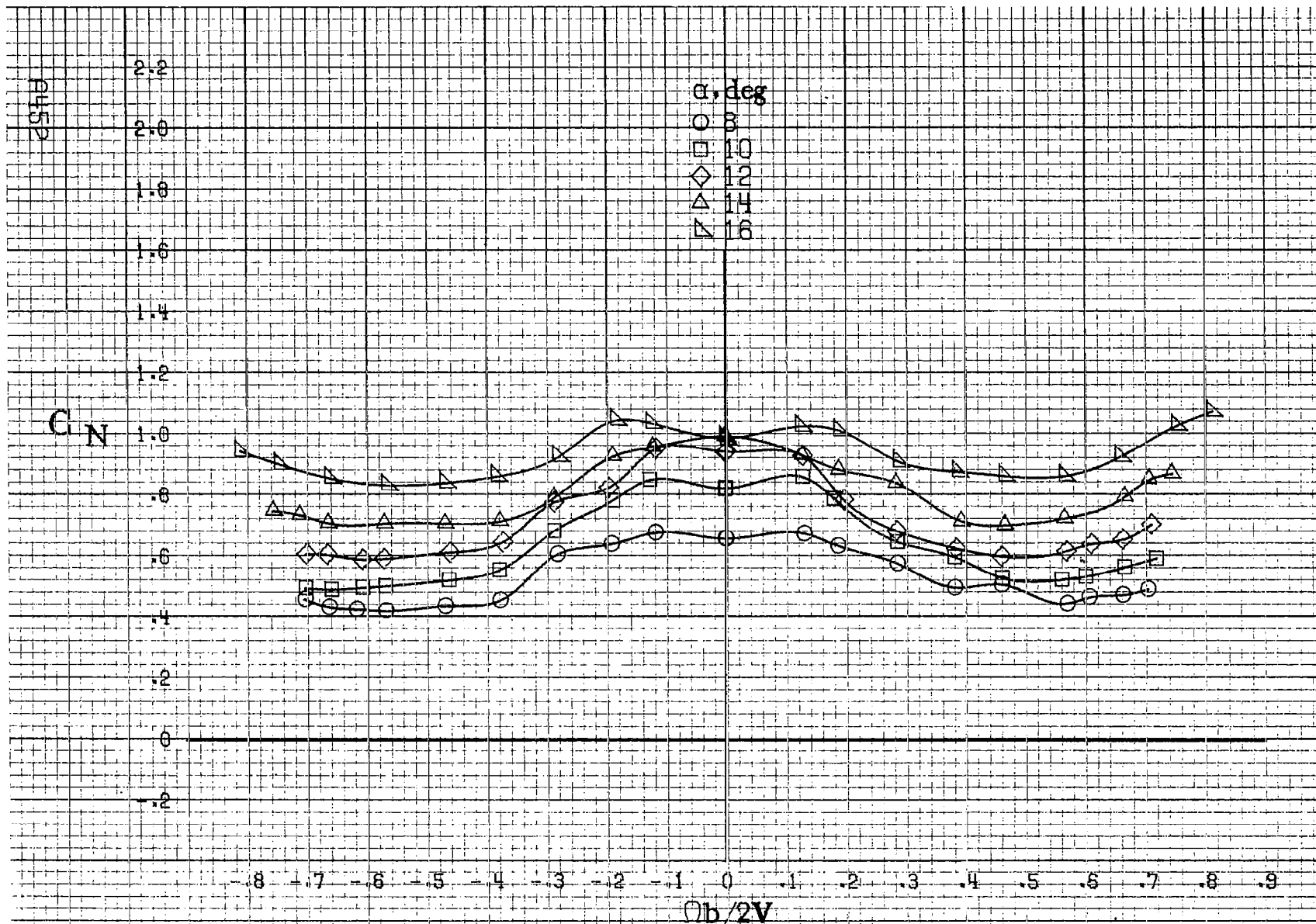


(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A117. Effect of rotation rate and angle of attack on pitching-moment coefficient for configuration having outboard LE wing droop extended inboard 42.7 cm (16.8 in). $\delta_{a1} = 0^\circ$, $\delta_{a2} = 0^\circ$, $\delta_r = 0^\circ$, $\delta = 0^\circ$.

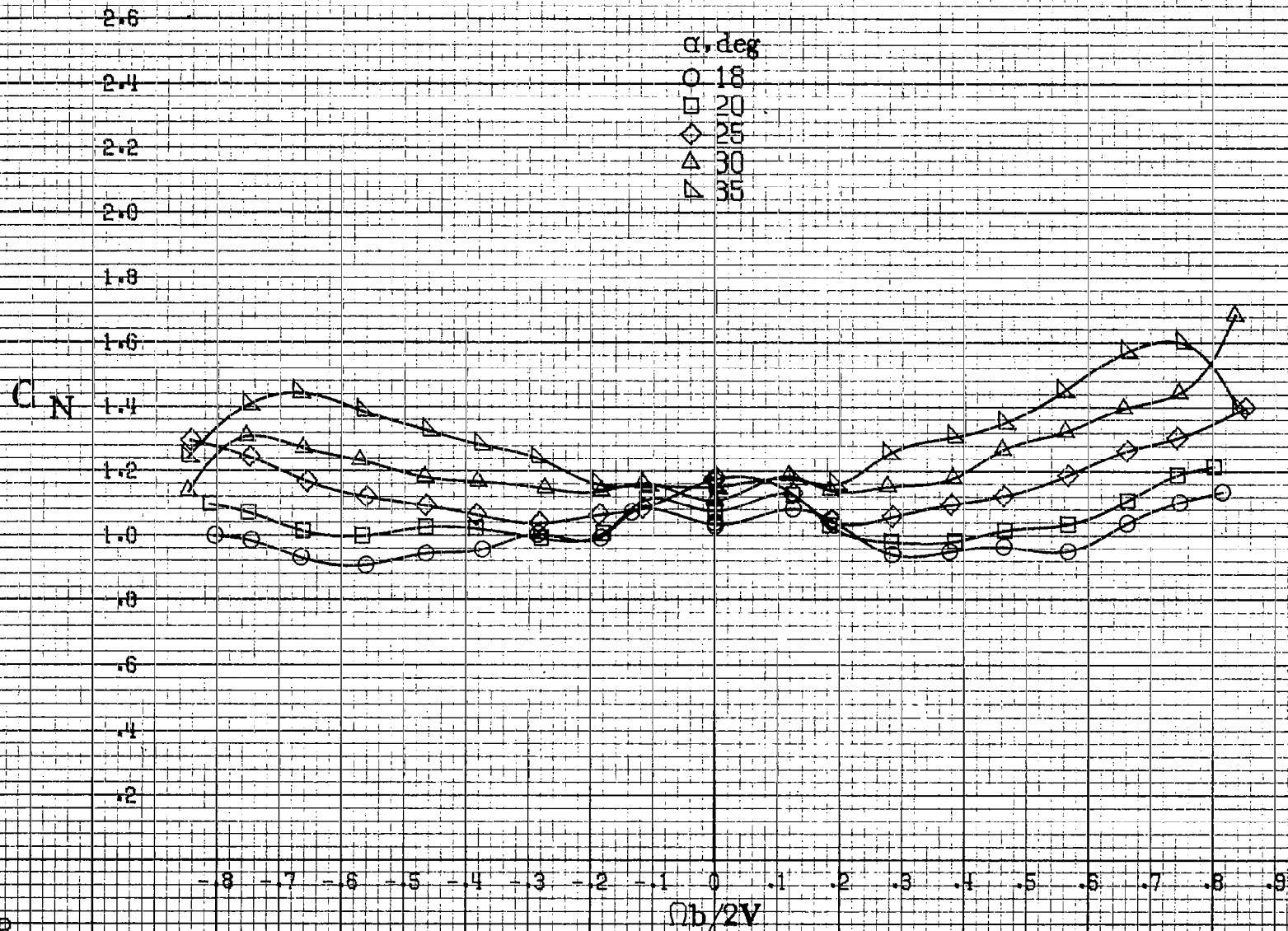


(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A117. Concluded.



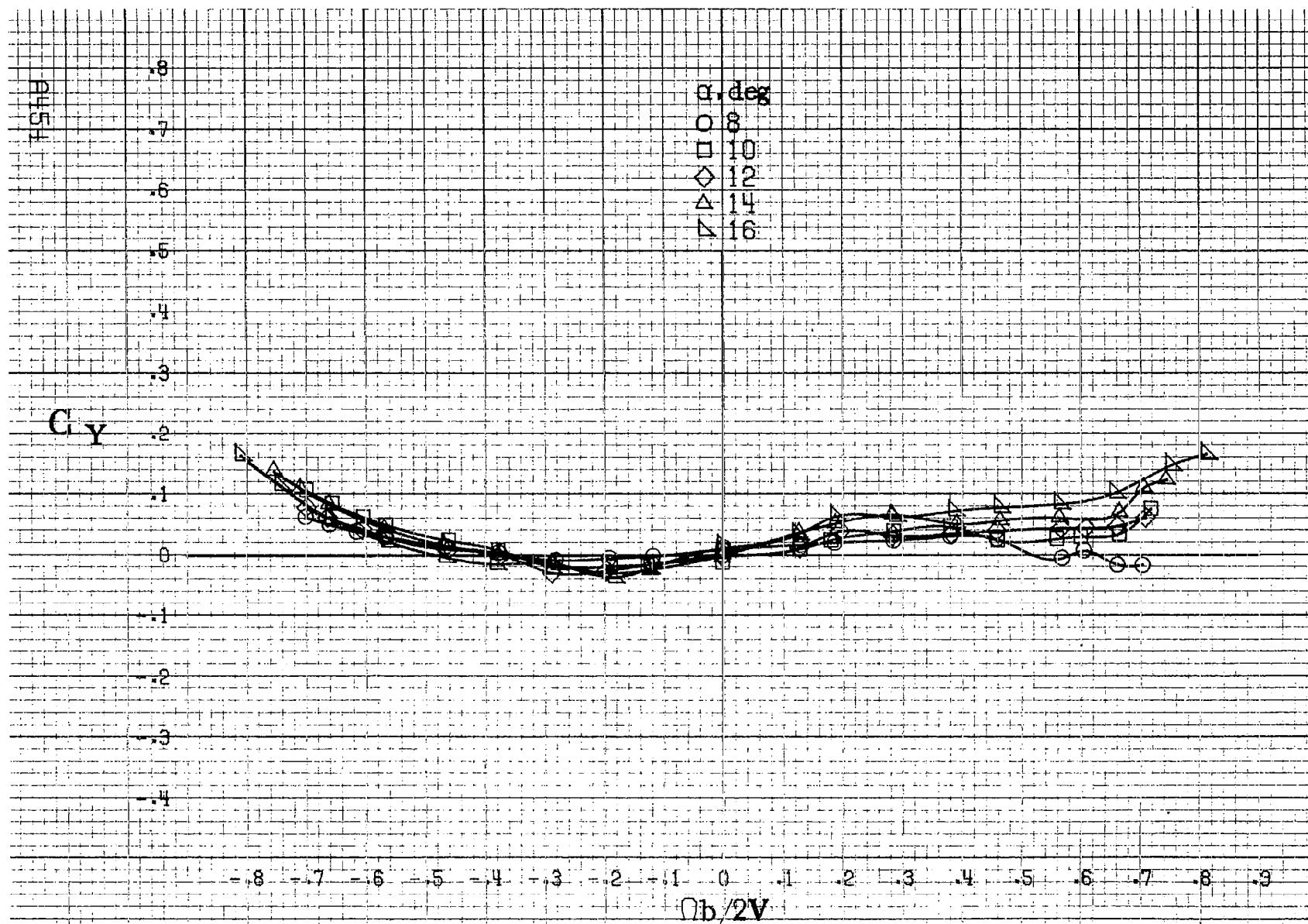
(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

Figure A118. Effect of rotation rate and angle of attack on normal-force coefficient for configuration having outboard LE wing droop extended inboard 42.7 cm (16.8 in). $\delta_a=0^\circ$, $\delta_a=0^\circ$, $\delta_r=0^\circ$, $\beta=0^\circ$.



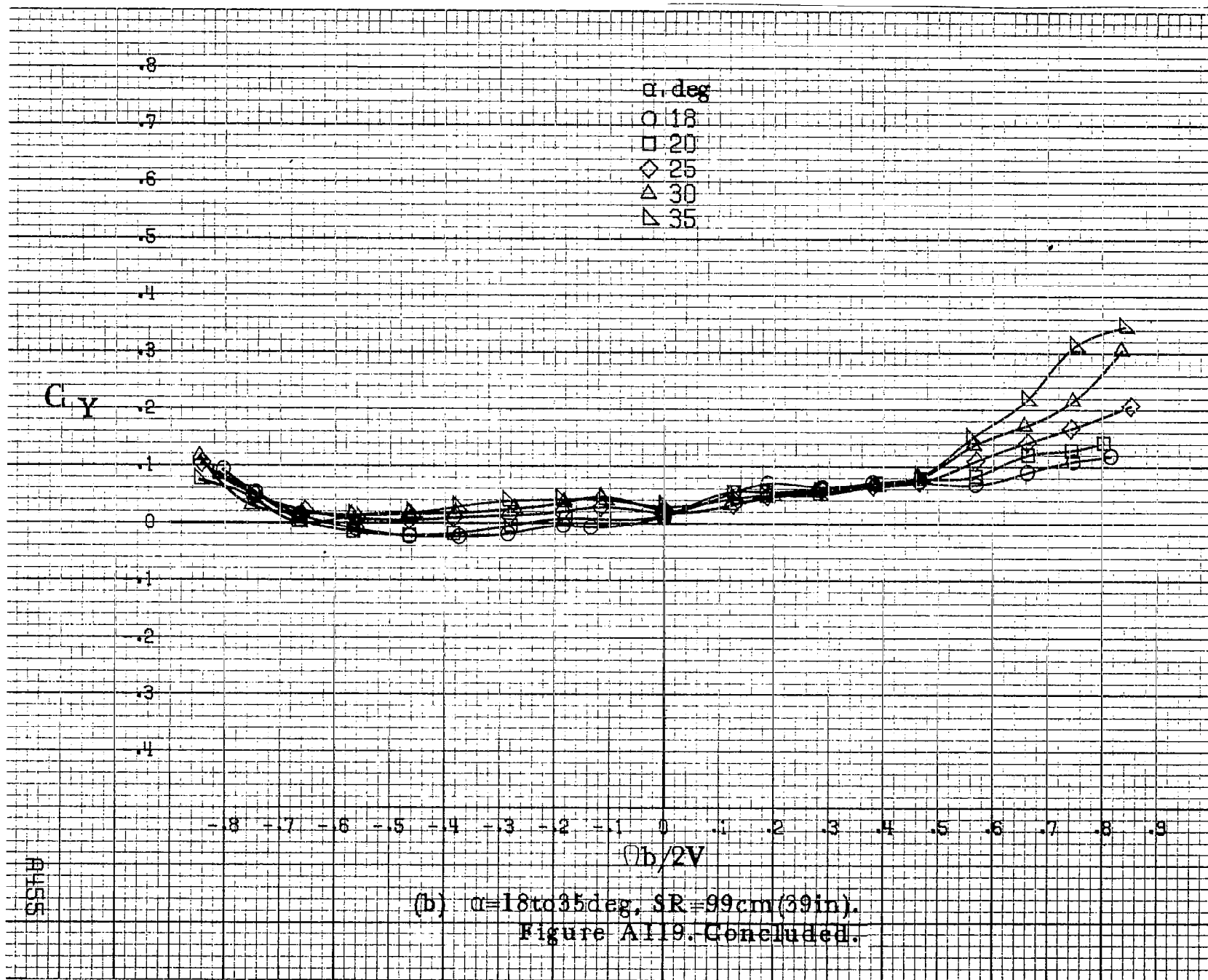
(b) $\alpha = 18$ to 35 deg, $SR = 99$ cm (39 in).
 Figure A118. Concluded.

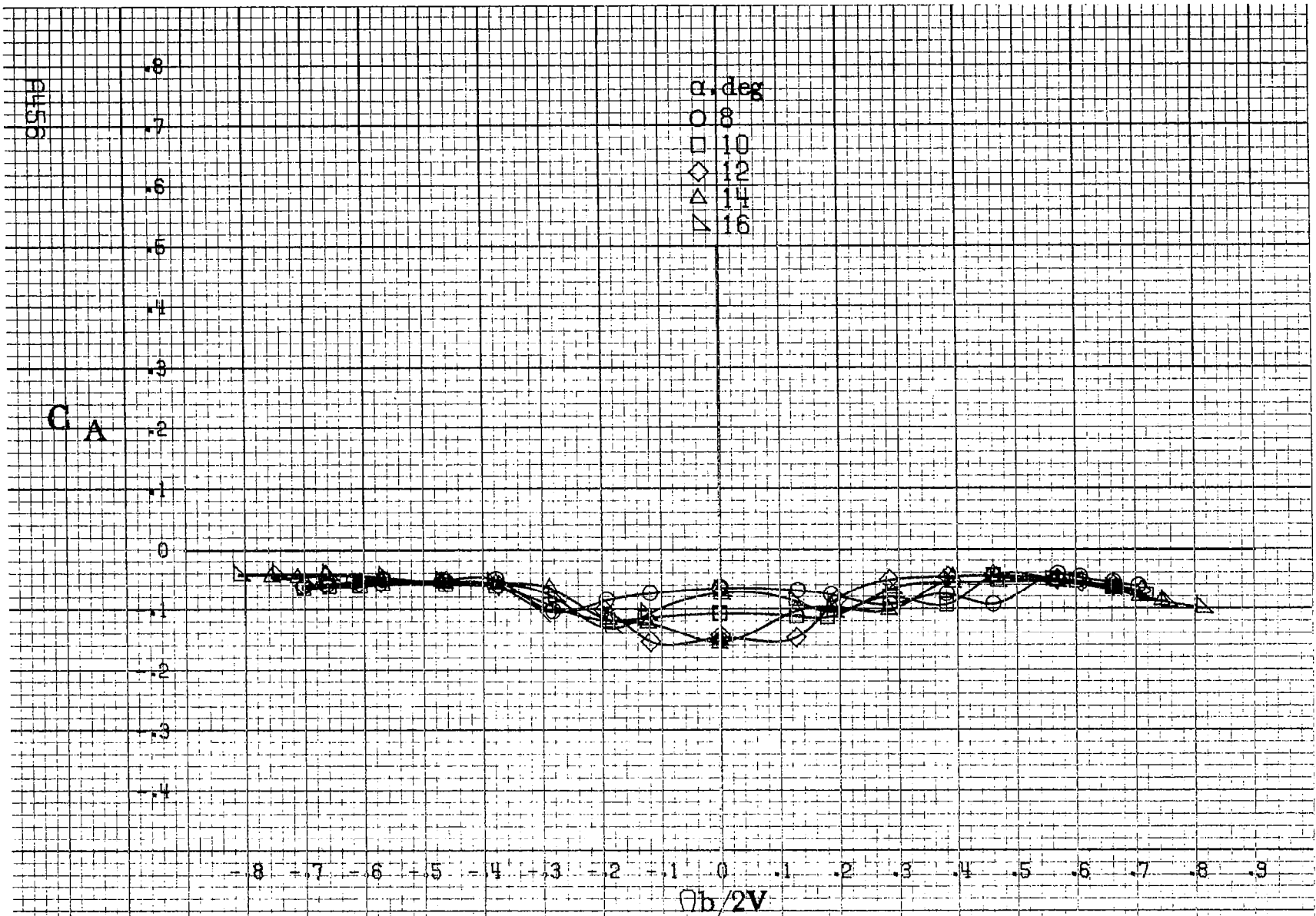
A118



(a) $\alpha=8$ to 16 deg, $SR=99$ cm (39 in).

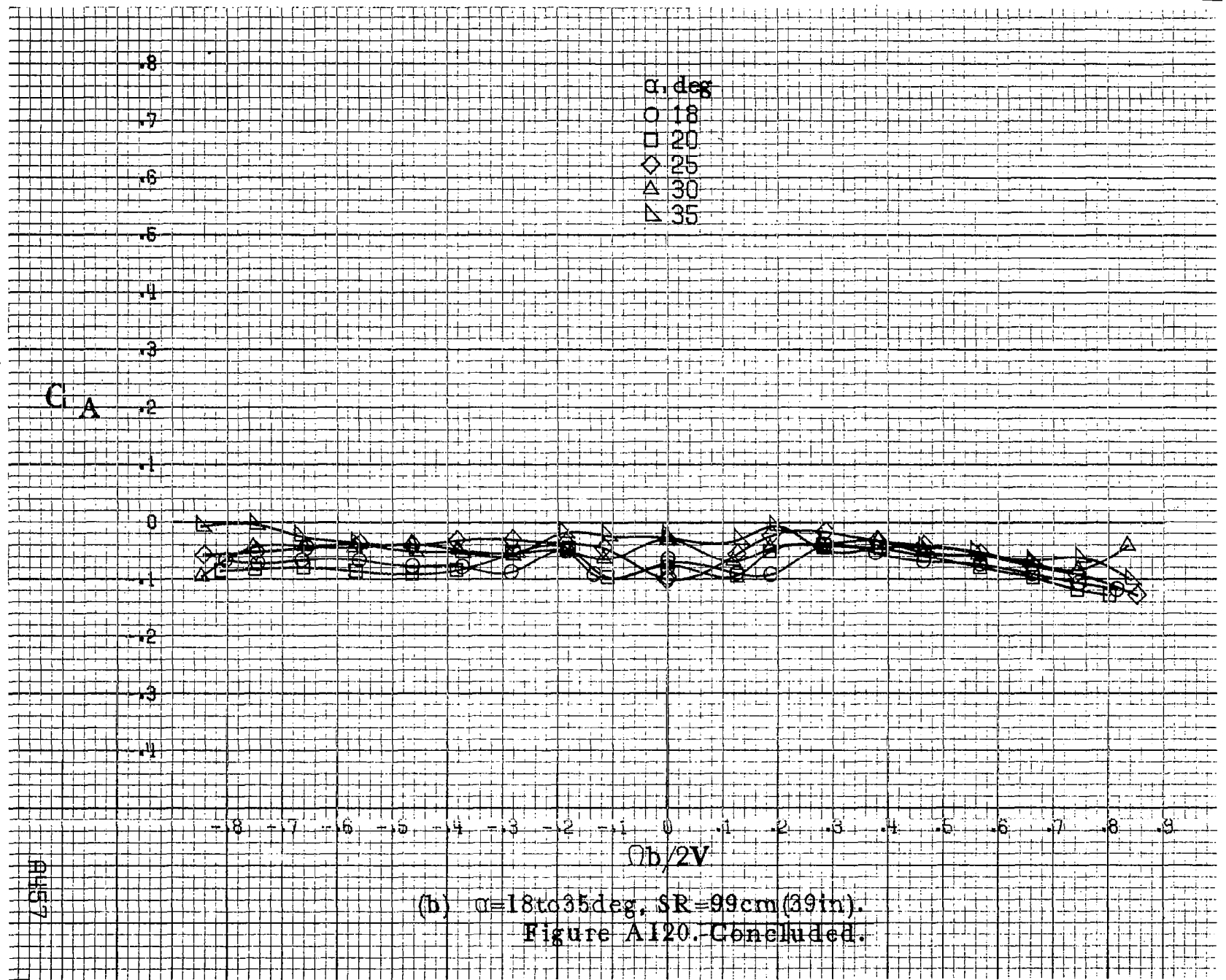
Figure A119 Effect of rotation rate and angle of attack on side force coefficient for configuration having outboard LE wing droop extended inboard 42.7 cm (16.8 in). $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



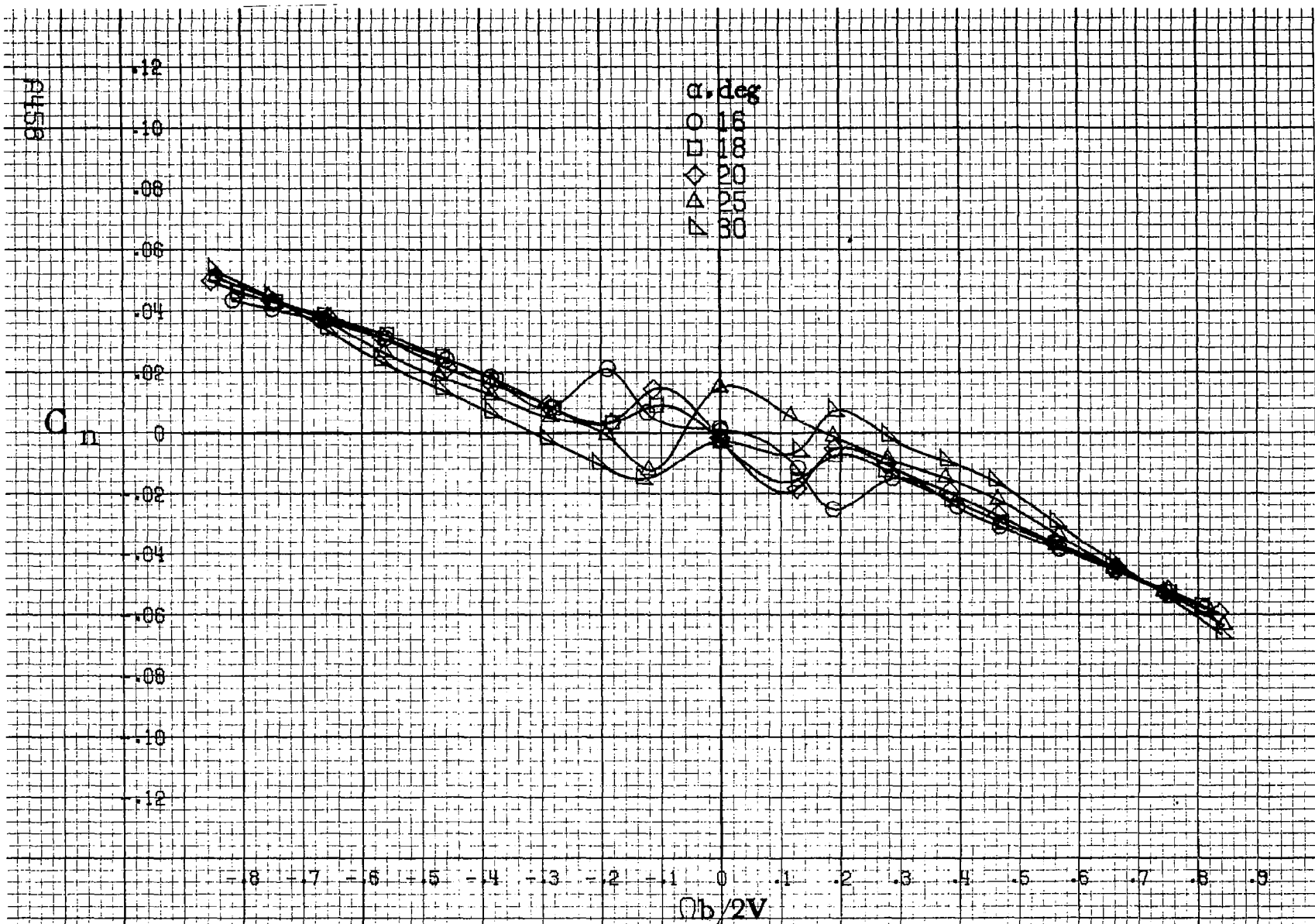


(a) $\alpha = 8$ to 16 deg, $SR = 99$ cm (39 in).

Figure A120. Effect of rotation rate and angle of attack on axial force coefficient for configuration having outboard LE wing droop extended inboard 42.7 cm (16.8 in). $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

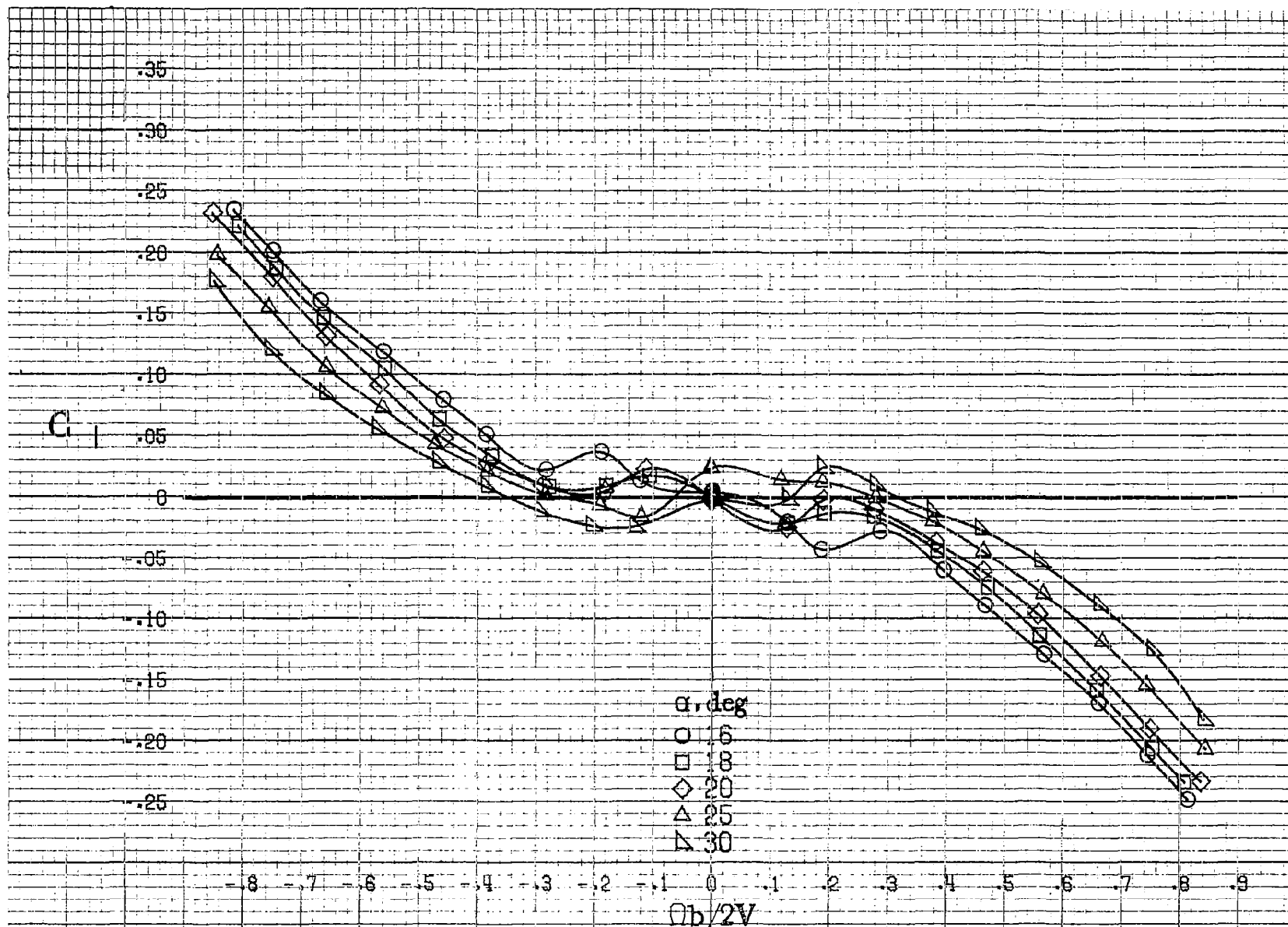


AHS7



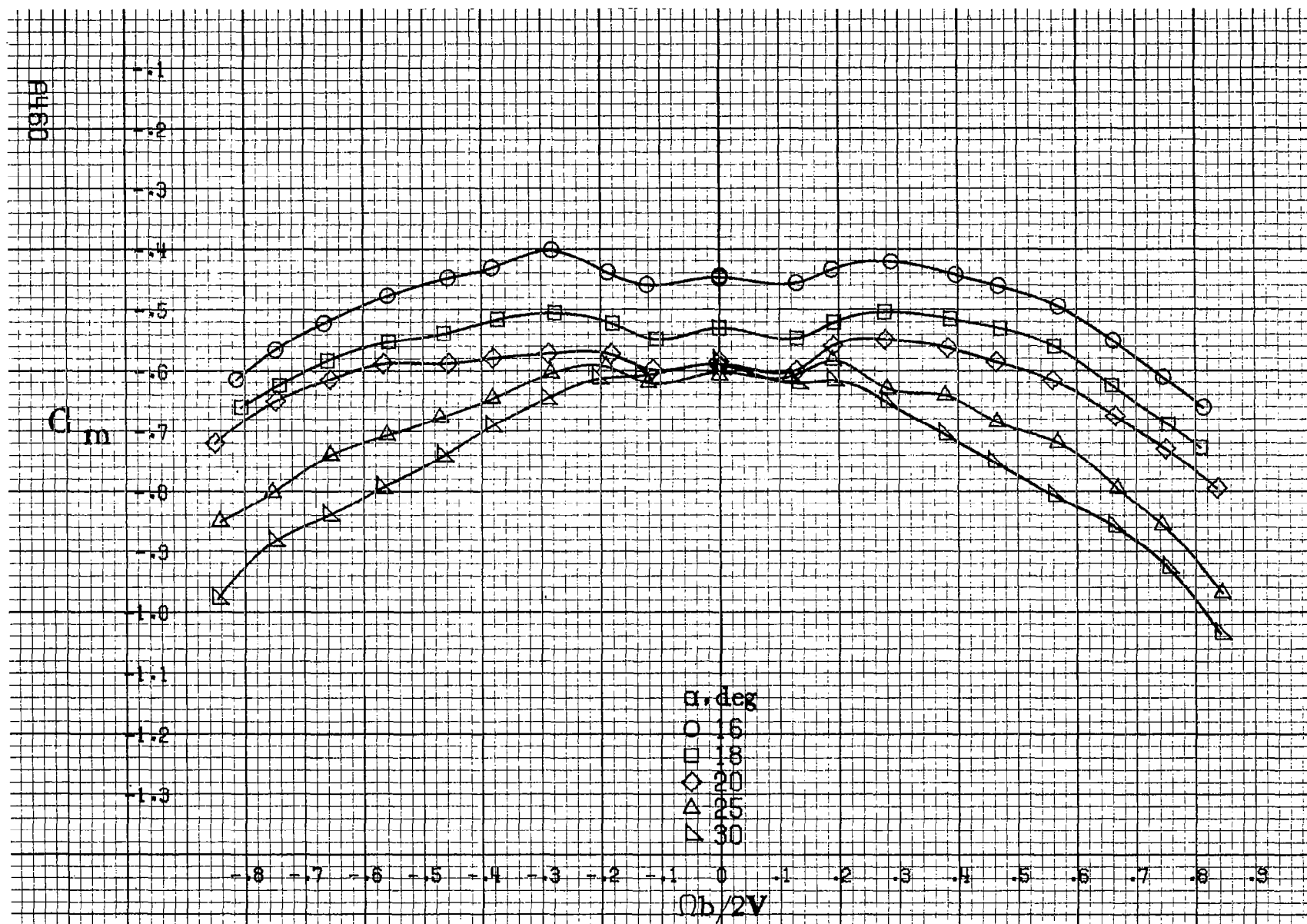
$\alpha=16$ to 30 deg, $SR=99$ cm (39 in).

Figure A121. Effect of rotation rate and angle of attack on yawing moment coefficient for configuration having outboard LE wing droop extended inboard 45.2 cm (17.8 in). $\delta_a=0^\circ$, $\delta_s=0^\circ$, $\delta_r=0^\circ$, $\beta=0^\circ$.



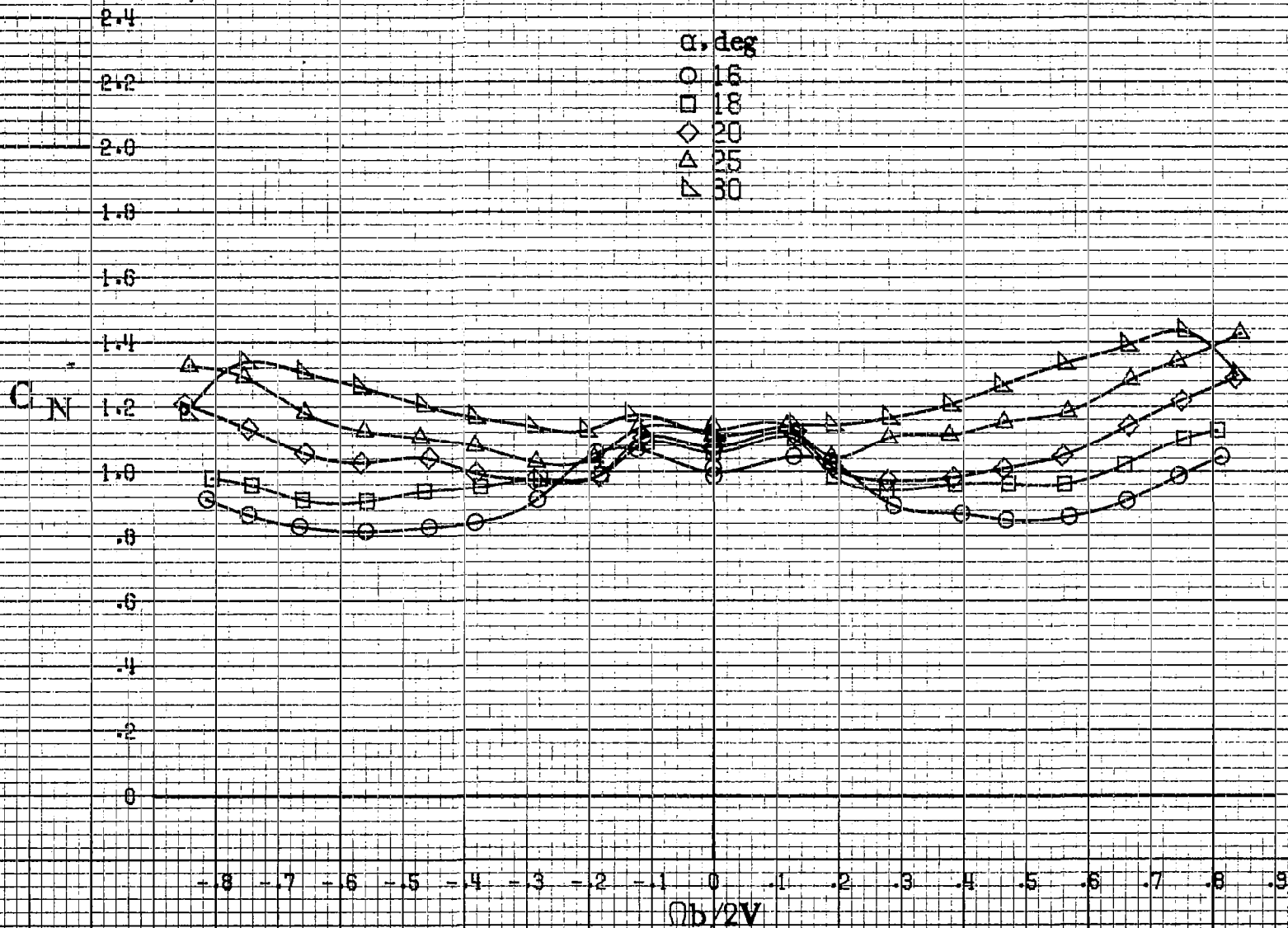
$\alpha = 16$ to 30 deg, $SR = 99$ cm (39 in).

Figure A122. Effect of rotation rate and angle of attack on rolling-moment coefficient for configuration having outboard LE wing droop extended inboard 45.2 cm (17.8 in). $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$. $\beta = 10^\circ$.



$\alpha = 16$ to 30 deg, $SR = 99$ cm (39 in).

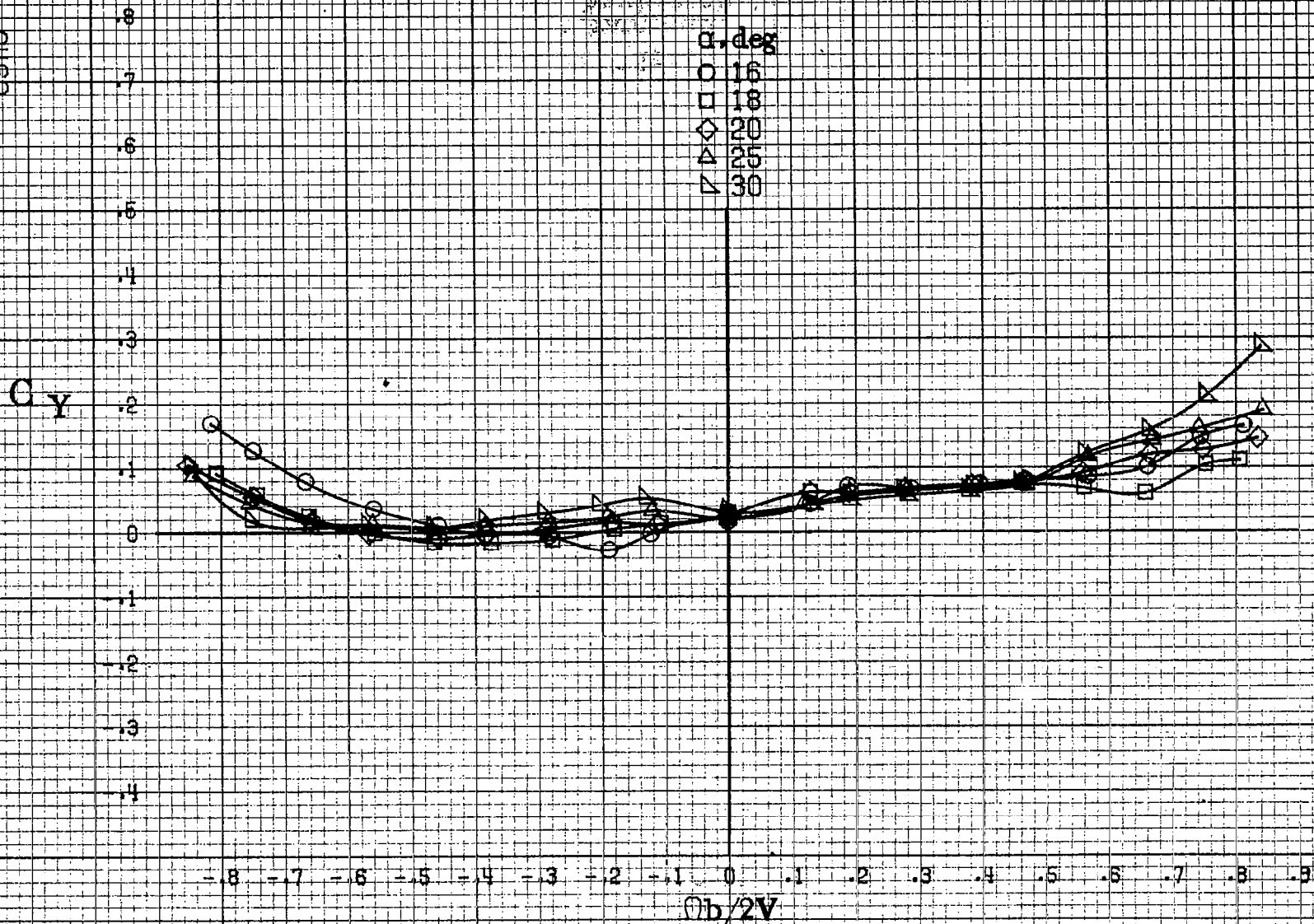
Figure A123.-Effect of rotation rate and angle of attack on pitching moment coefficient for configuration having outboard LE wing droop extended inboard 45.2 cm (17.8 in). $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



$\alpha = 16$ to 30 deg, $SR = 99$ cm (39 in).

Figure A124. Effect of rotation rate and angle of attack on normal-force coefficient for configuration having outboard LE wing droop extended inboard 45.2 cm (17.8 in). $\delta_s = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.

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$\alpha=16$ to 30 deg, $SR=99$ cm (39 in).

Figure A125. Effect of rotation rate and angle of attack on side force coefficient for configuration having outboard LE wing droop extended inboard 45.2 cm (17.8 in). $\delta_a=0^\circ$, $\delta_s=0^\circ$, $\delta_r=0^\circ$. $\beta=0^\circ$.



$\alpha=16$ to 30° , $SR=99\text{cm}(39\text{in})$.

Figure A126.-Effect of rotation rate and angle of attack on axial force coefficient for configuration having outboard LE wing droop extended inboard 45.2cm(17.8in). $\delta_s=0^\circ$, $\delta_a=0^\circ$, $\delta_r=0^\circ$, $\beta=0^\circ$.

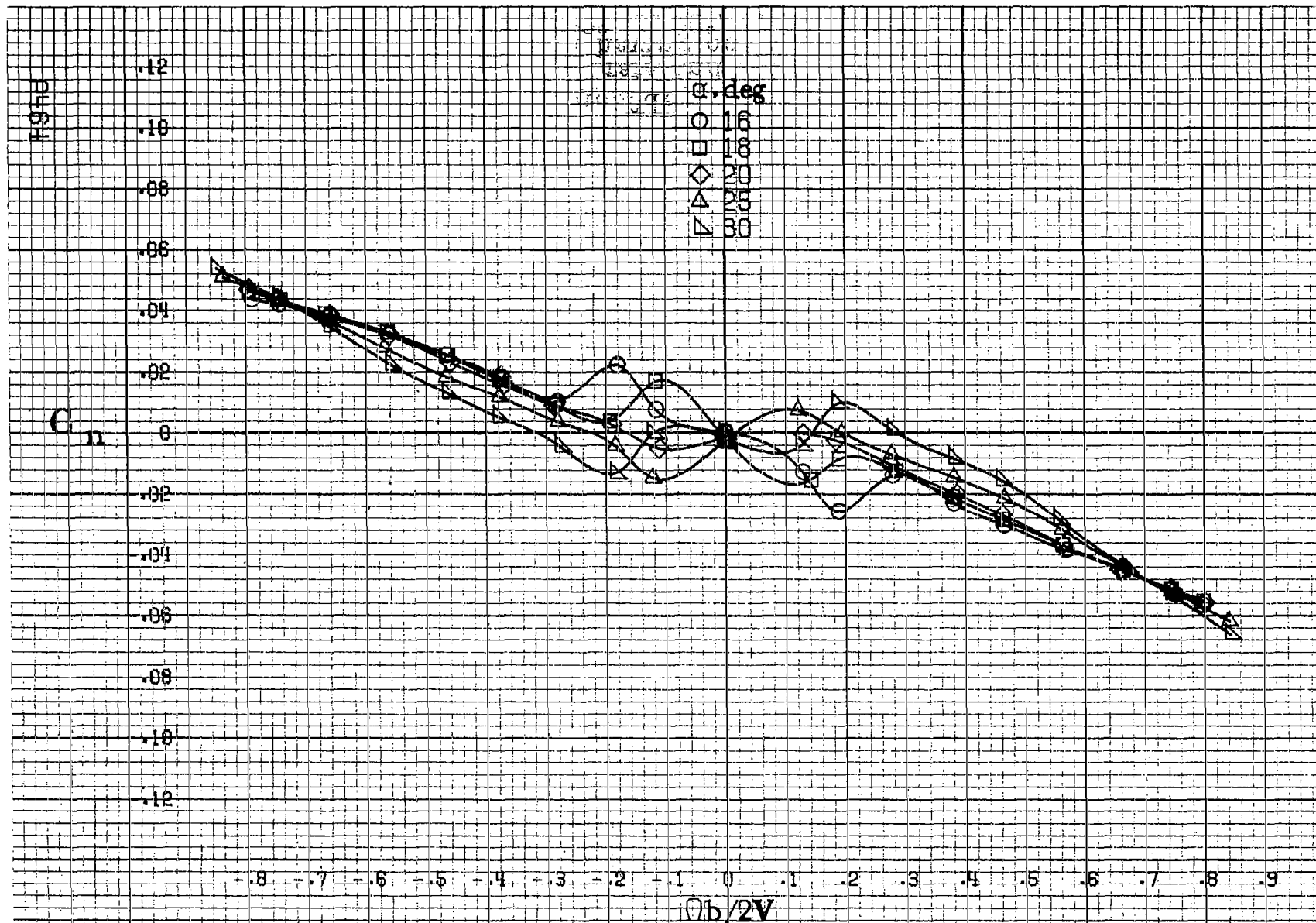
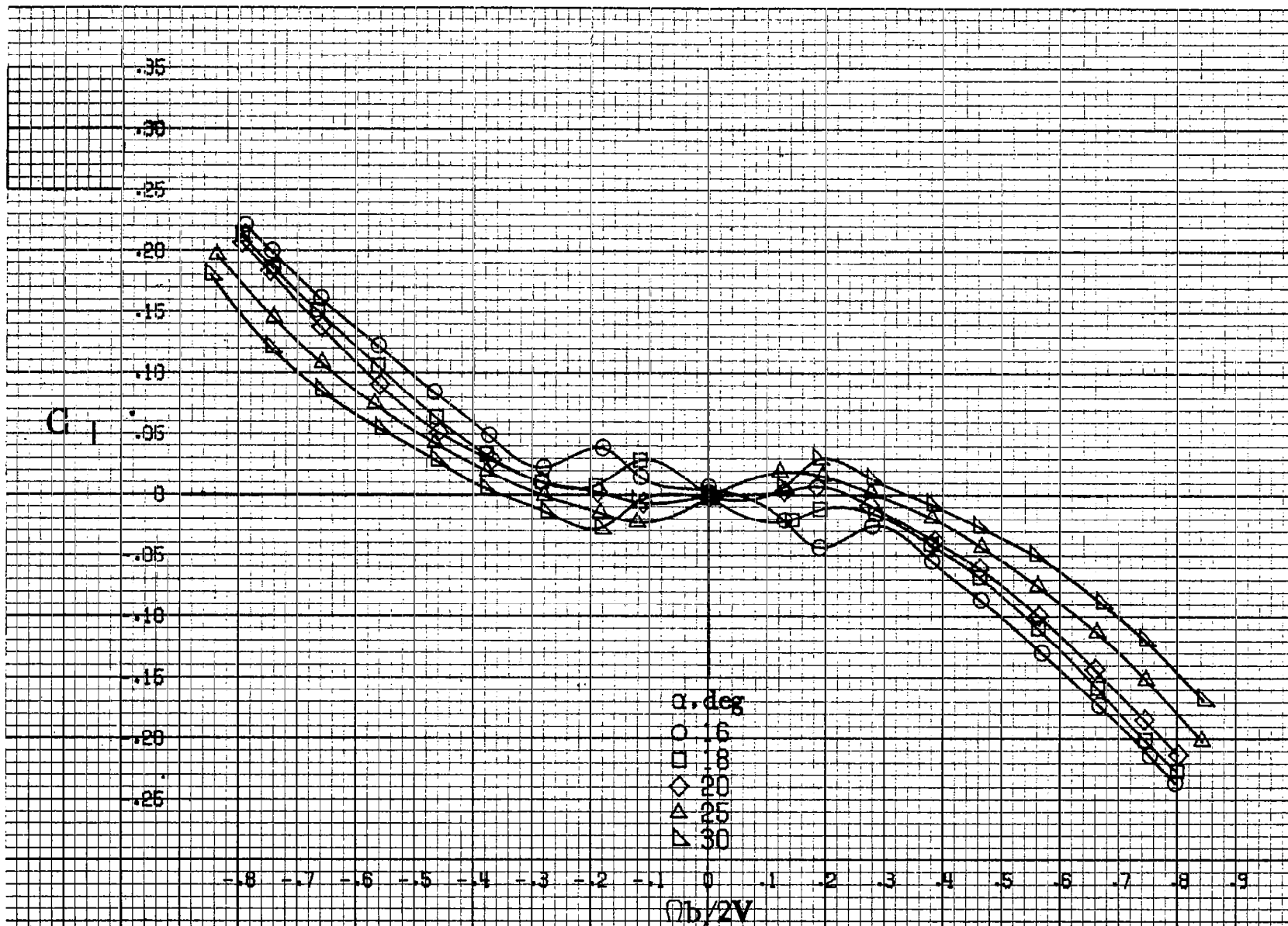
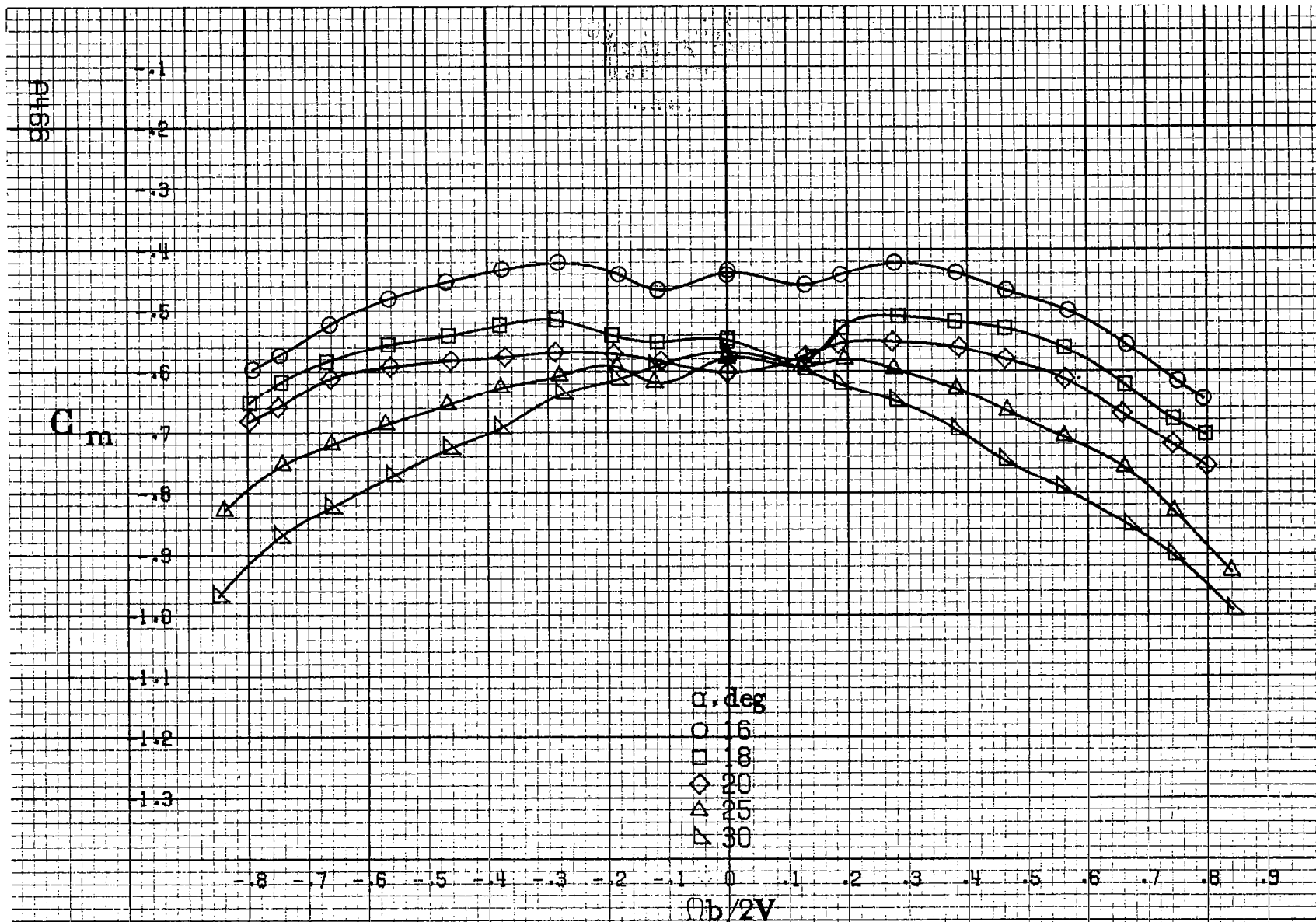


Figure A127.-Effect of rotation rate and angle of attack on yawing-moment coefficient for configuration having outboard LE wing droop extended inboard 47.8cm (18.8in). $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



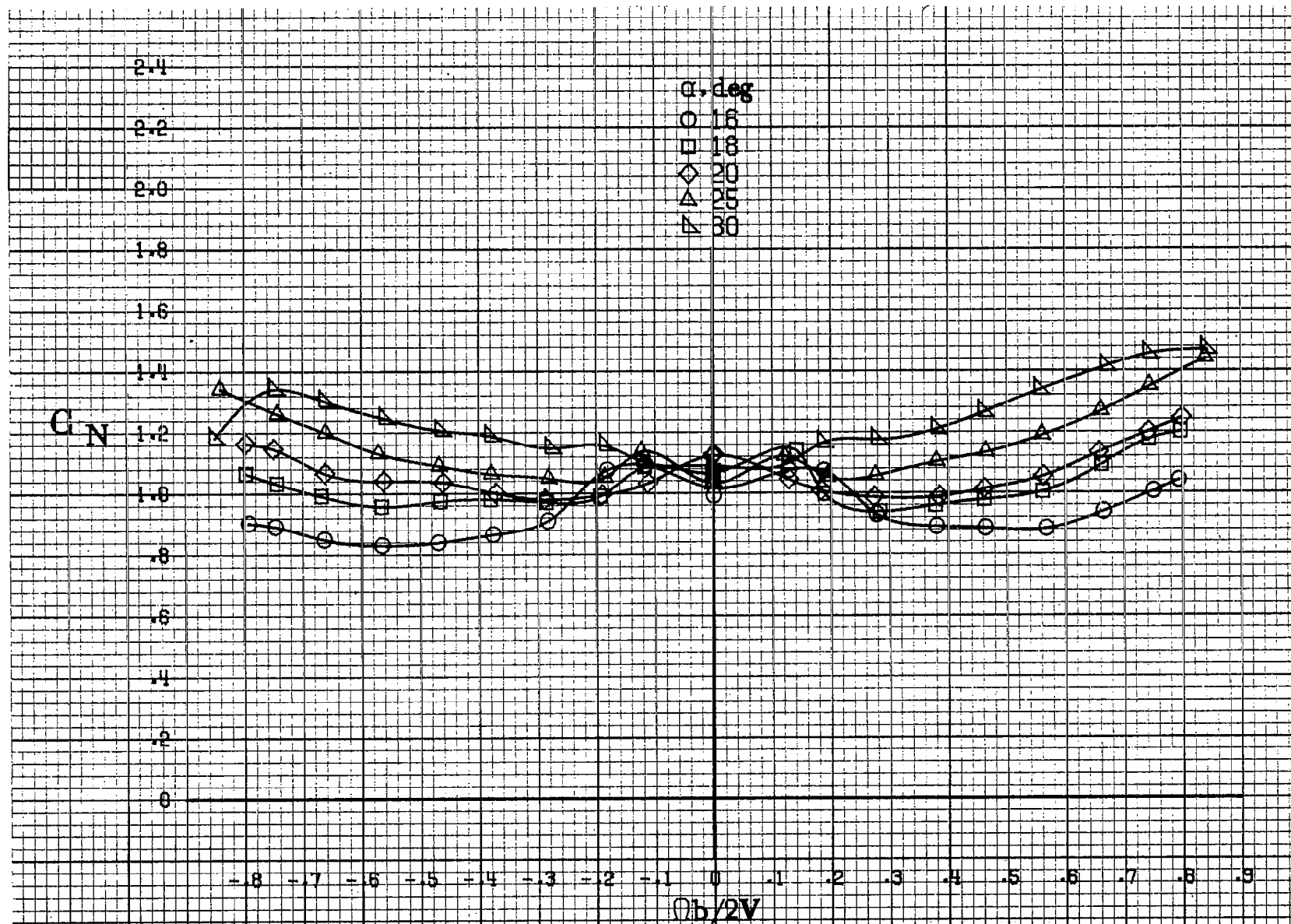
$\alpha=16$ to 30 deg, $SR=99$ cm (39 in).

Figure A128. Effect of rotation rate and angle of attack on rolling-moment coefficient for configuration having outboard LE wing droop extended inboard 47.8 cm (18.8 in). $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\delta = 0^\circ$.



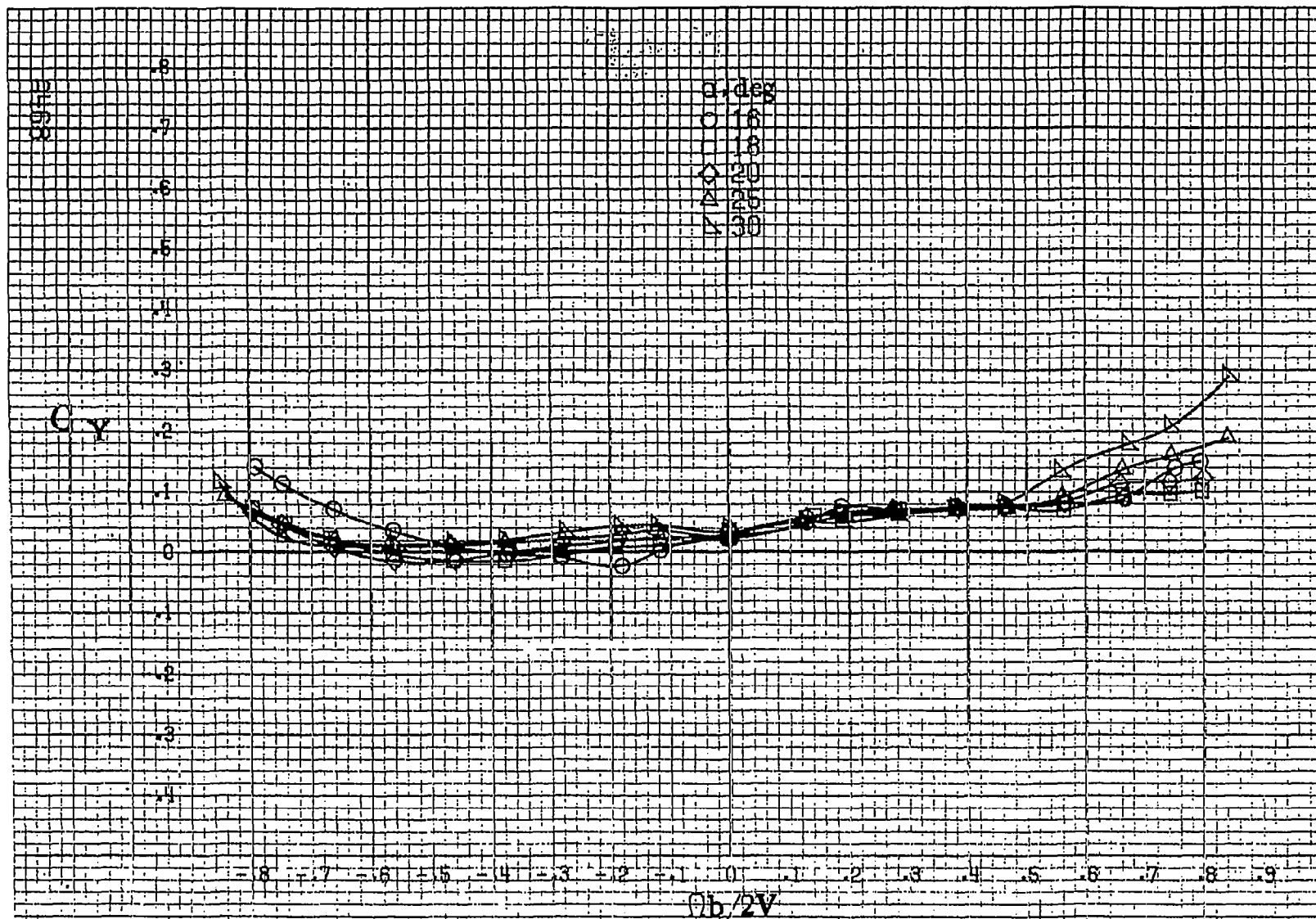
$\alpha=16$ to 30° , $SR=99\text{cm}(39\text{in})$.

Figure A129. Effect of rotation rate and angle of attack on pitching-moment coefficient for configuration having outboard LE wing droop extended inboard 47.8cm(18.8in). $\delta_s=0^\circ$, $\delta_a=0^\circ$, $\delta_r=0^\circ$, $\beta=0^\circ$.



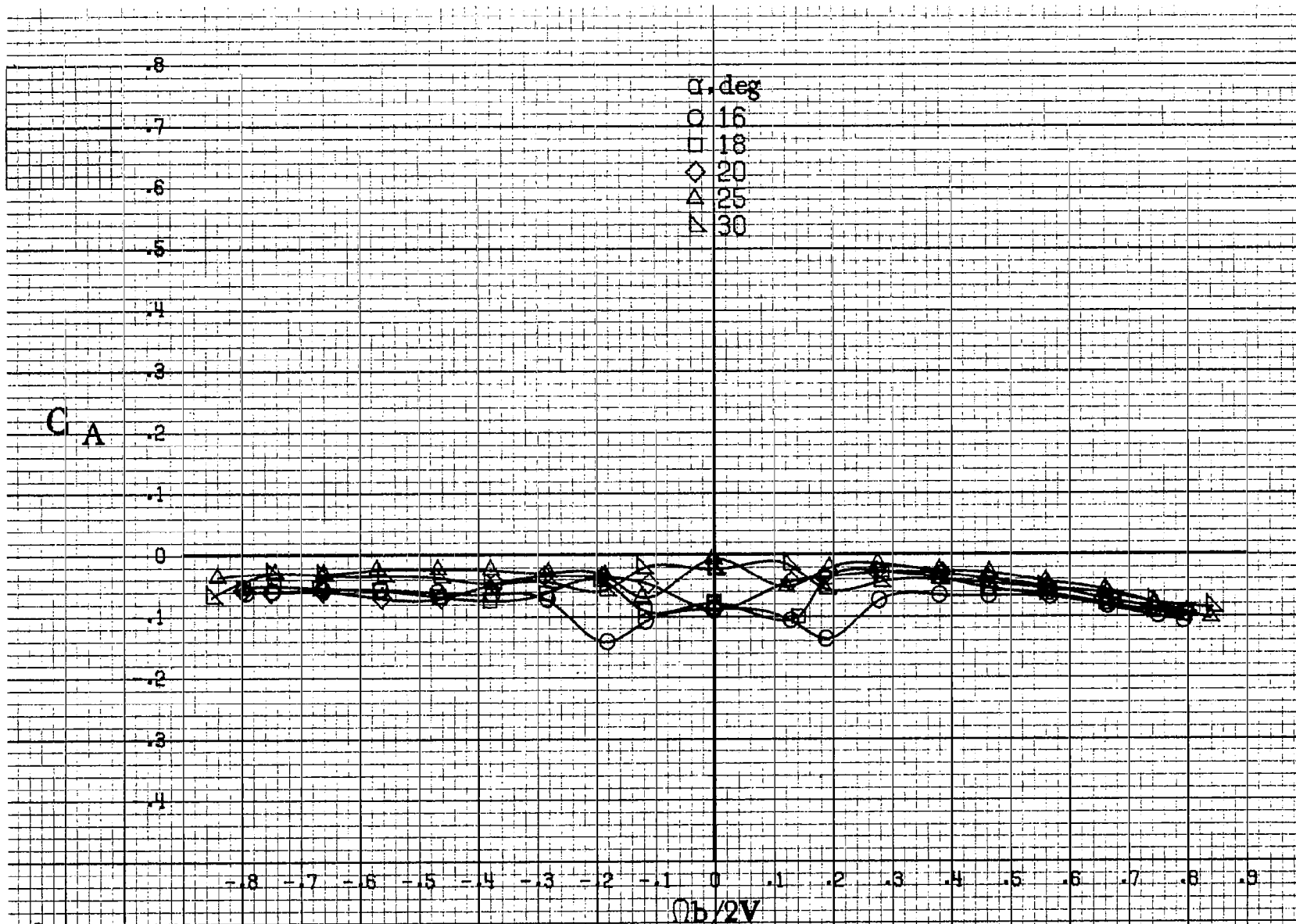
$\alpha = 16$ to 30 deg, SR = 99 cm (39 in).

Figure A130.-Effect of notations rate and angle of attack on normal-force coefficient for configuration having outboard LE wing droop extended inboard 47.8 cm (18.8 in). $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



$\alpha = 16^\circ$ to 30° deg, $SR = 99$ cm (39 in).

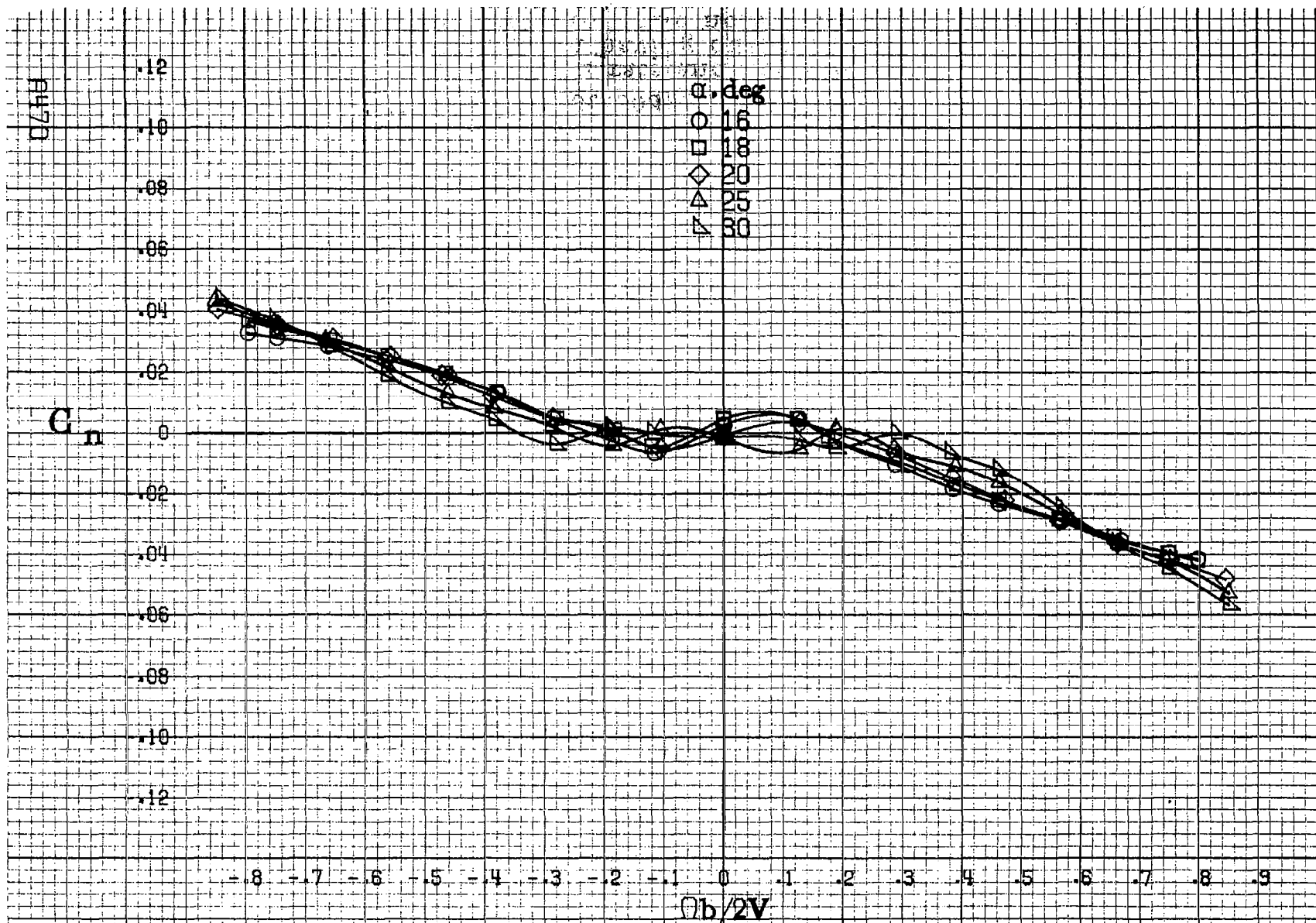
Figure A131.-Effect of rotation rate and angle of attack on side force coefficient for configuration having outboard LE wing droop extended inboard 47.8 cm (18.8 in). $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$. $B = 0^\circ$.



$\alpha = 16$ to 30 deg, SR = 99 cm (39 in).

Figure A132. Effect of rotation rate and angle of attack on axial force coefficient for configuration having outboard LE wing droop extended inboard 47.8 cm (18.8 in). $\delta_s = 0^\circ$, $\delta_n = 0^\circ$, $\delta_r = 0^\circ$. $\beta = 0^\circ$.

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$\alpha = 16$ to 30 deg. $SR = 99$ cm (39 in).

Figure A133. Effect of rotation rate and angle of attack on yawing-moment coefficient for configuration having outboard LE wing droop extended inboard 42.7 cm (16.8 in) with moderate nose radius. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\delta = 0^\circ$.

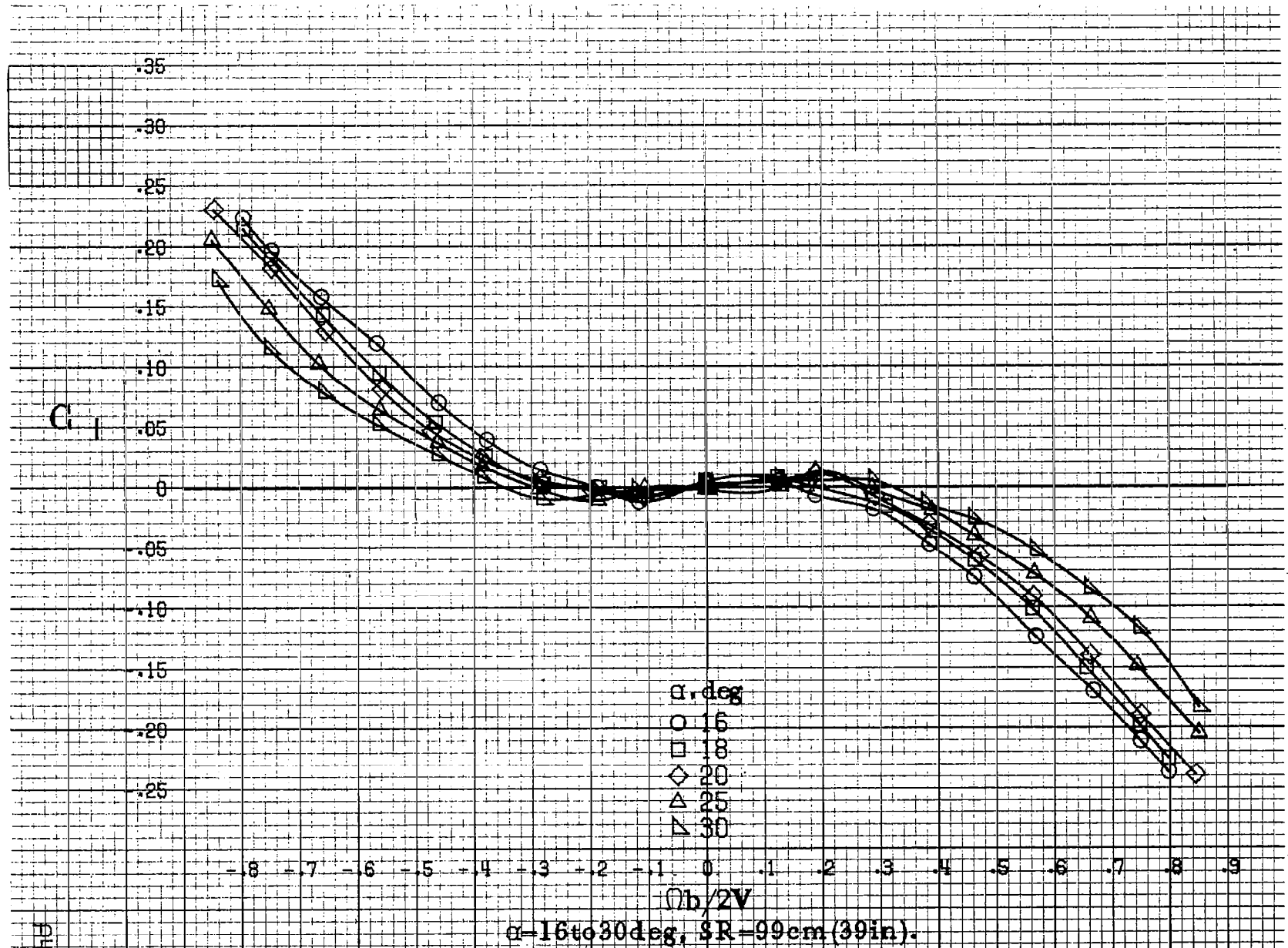


Figure A134. Effect of rotation rate and angle of attack on rolling moment coefficient for configuration having outboard LE wing droop extended inboard 42.7cm (16.8in) with moderate nose radius. $\delta_a = 0^\circ$, $\delta_b = 0^\circ$, $\delta_c = 0^\circ$, $\delta = 0^\circ$.

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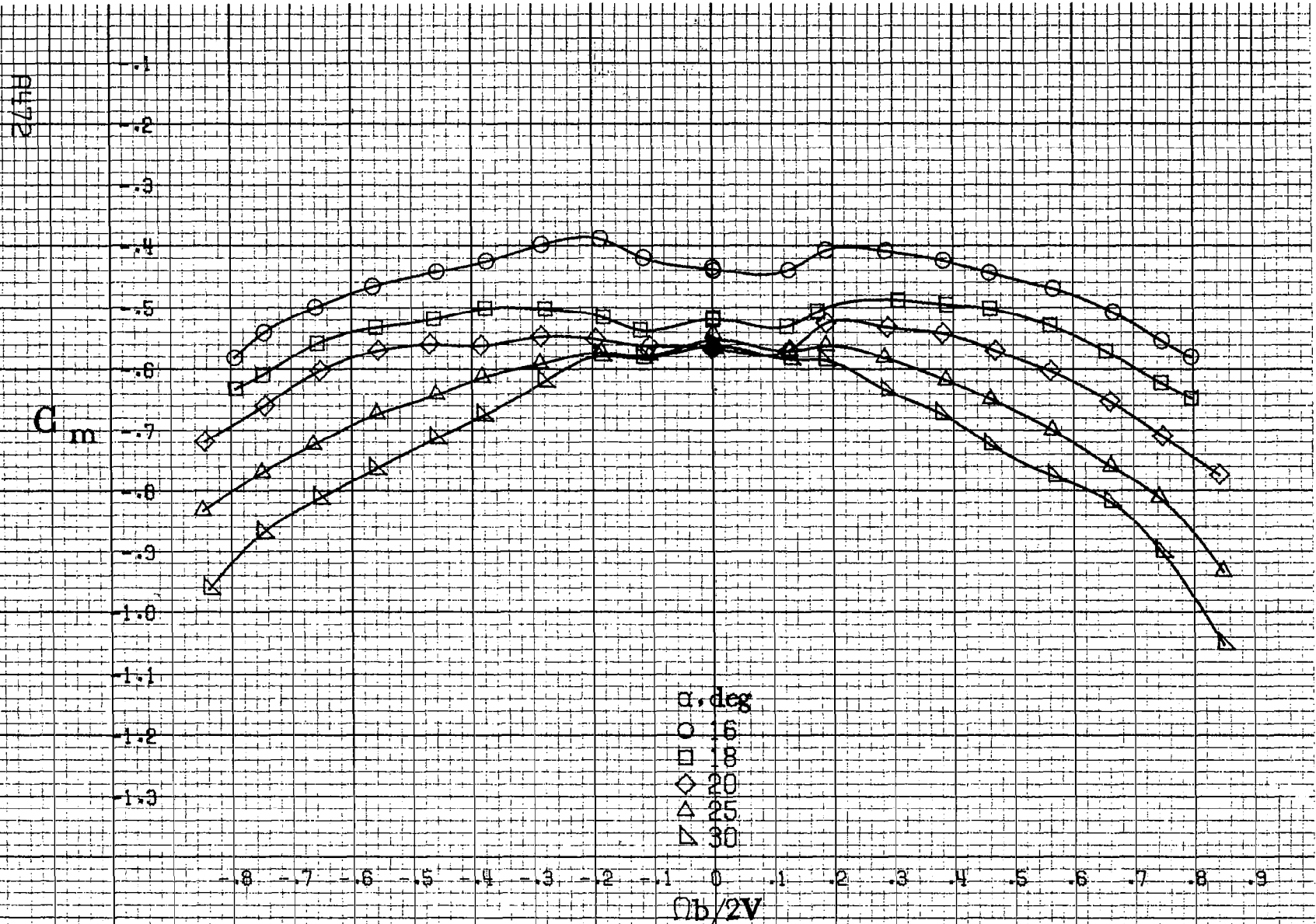
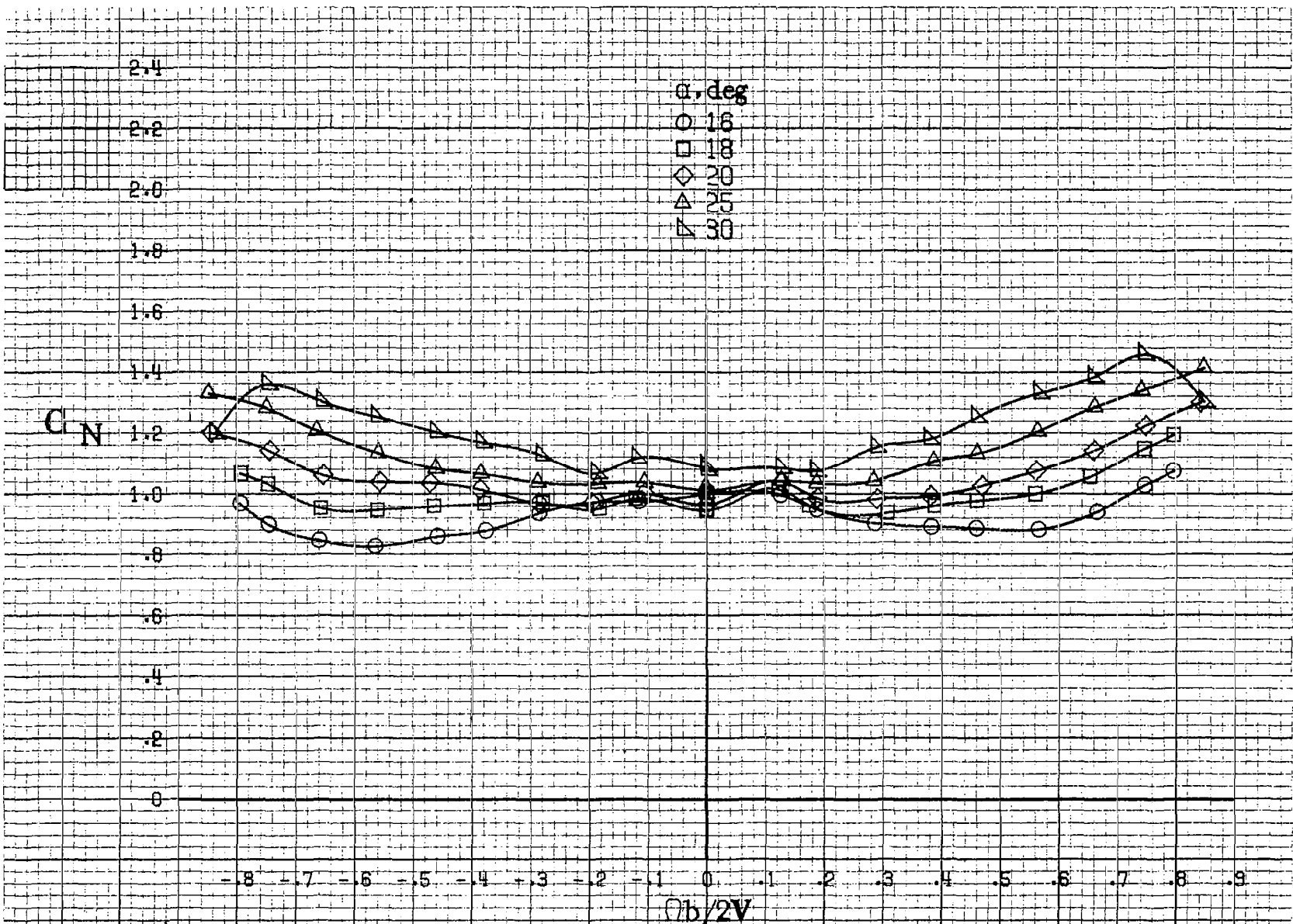


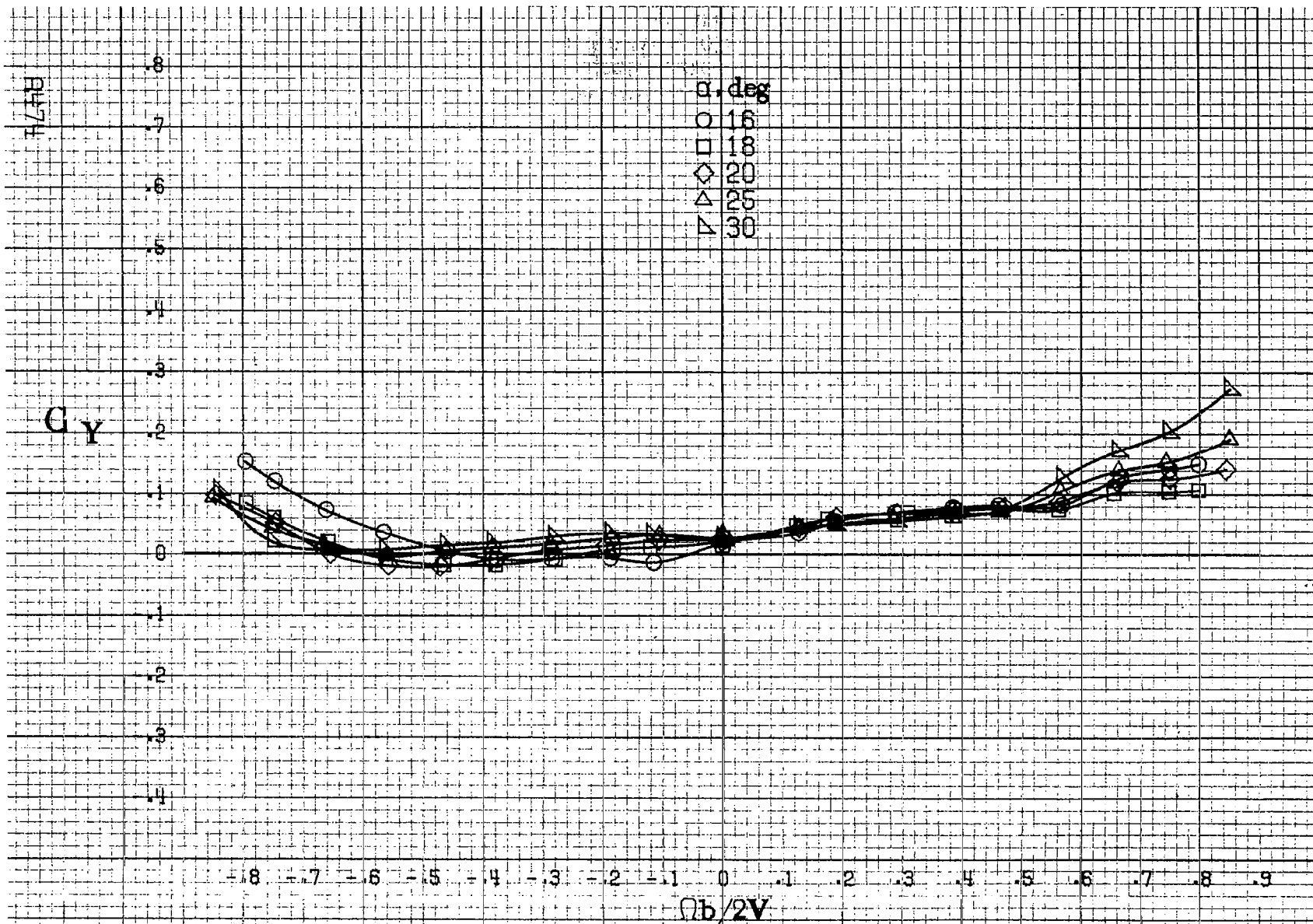
Figure A135. Effect of rotation rate and angle of attack on pitching moment coefficient for configuration having outboard LE wing droop extended inboard 42.7cm (16.8in) with mode 1c nose radius. $\delta_e = 0^\circ$, $\delta_a = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



$\alpha=16$ to 30 deg, SR=99 cm (39 in).

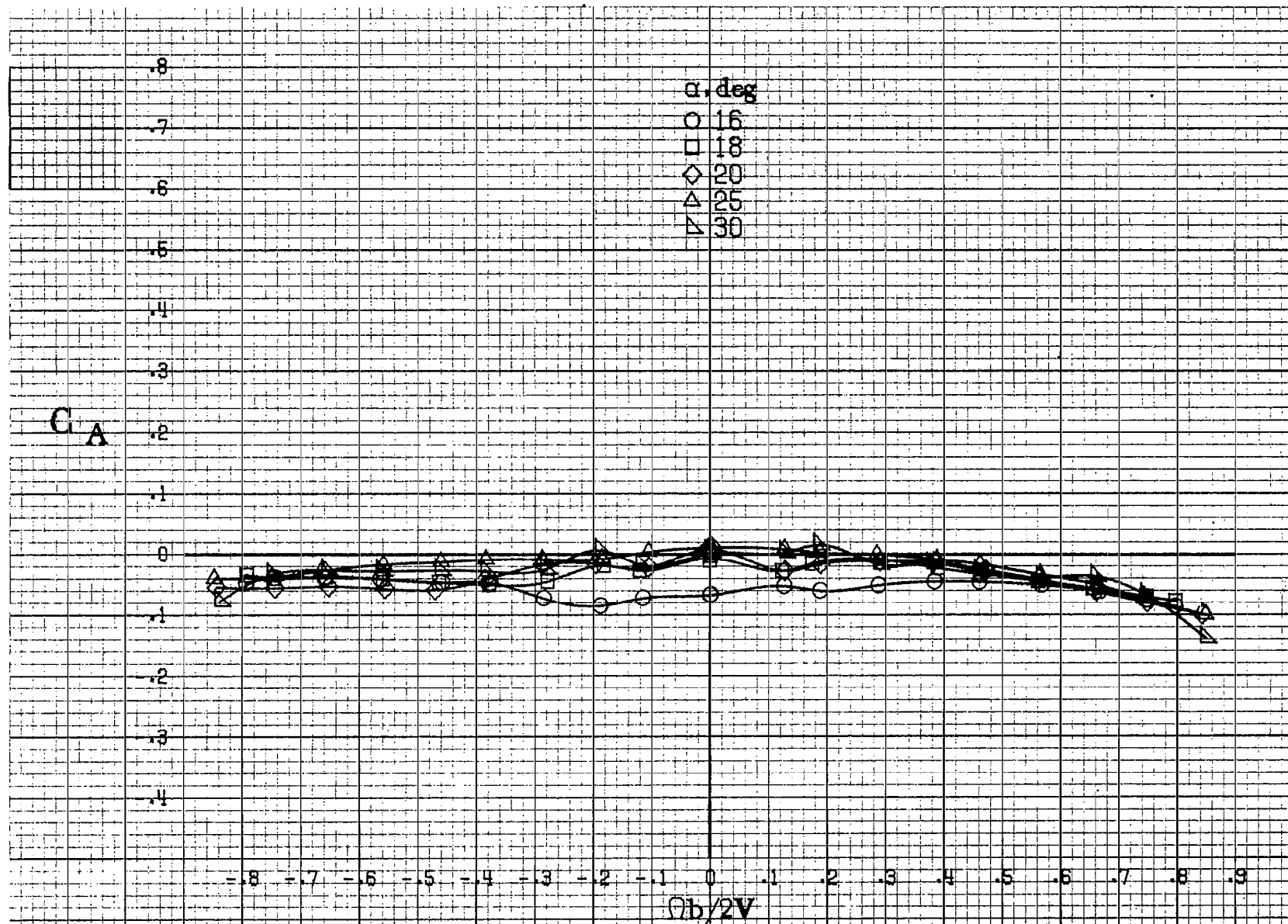
Figure A136.-Effect of rotation rate and angle of attack on normal-force coefficient for configuration having outboard LE wing droop extended inboard 42.7 cm (16.8 in) with moderate nose radius. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\delta = 0^\circ$.

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$\alpha = 16$ to 30 deg, $SR = 99$ cm (39 in).

Figure A137.-Effect of rotation rate and angle of attack on side-force coefficient for configuration having outboard LE wing droop extended inboard 42.7 cm (16.8 in) with moderate nose radius. $\delta_a = 0^\circ$, $\delta_s = 0^\circ$, $\delta_r = 0^\circ$, $\beta = 0^\circ$.



$\alpha=16$ to 30 deg, $SR=99$ cm (39 in).

Figure A138. Effect of rotation rate and angle of attack on axial force coefficient for configuration having outboard LE wing droop extended inboard 42.7 cm (16.8 in) with moderate nose radius. $\delta_a = 0^\circ$, $\delta_b = 0^\circ$, $\delta_c = 0^\circ$, $\delta = 0^\circ$.

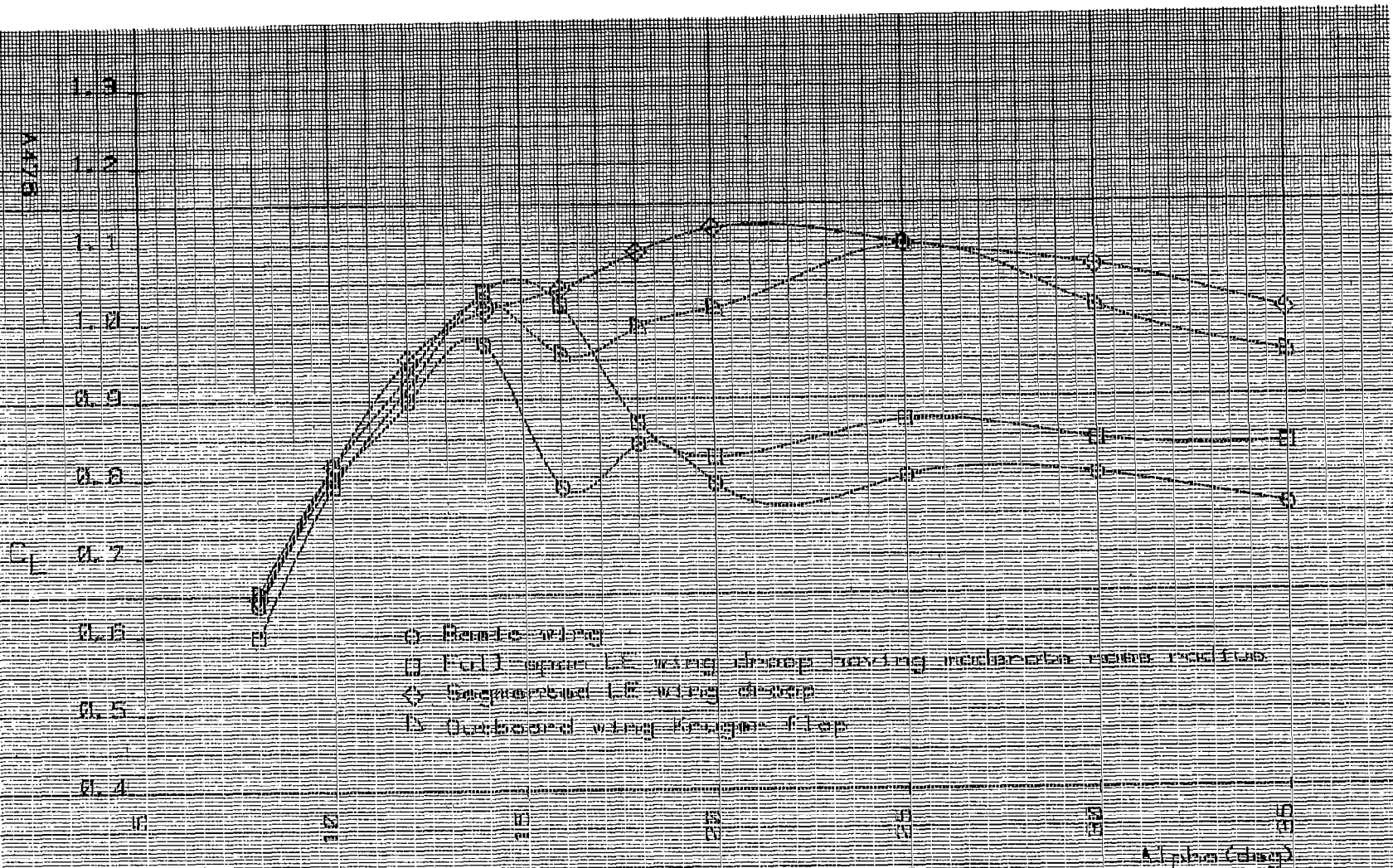


Figure A-136. Lift coefficient C_L as a function of angle of attack for various wing LE devices.

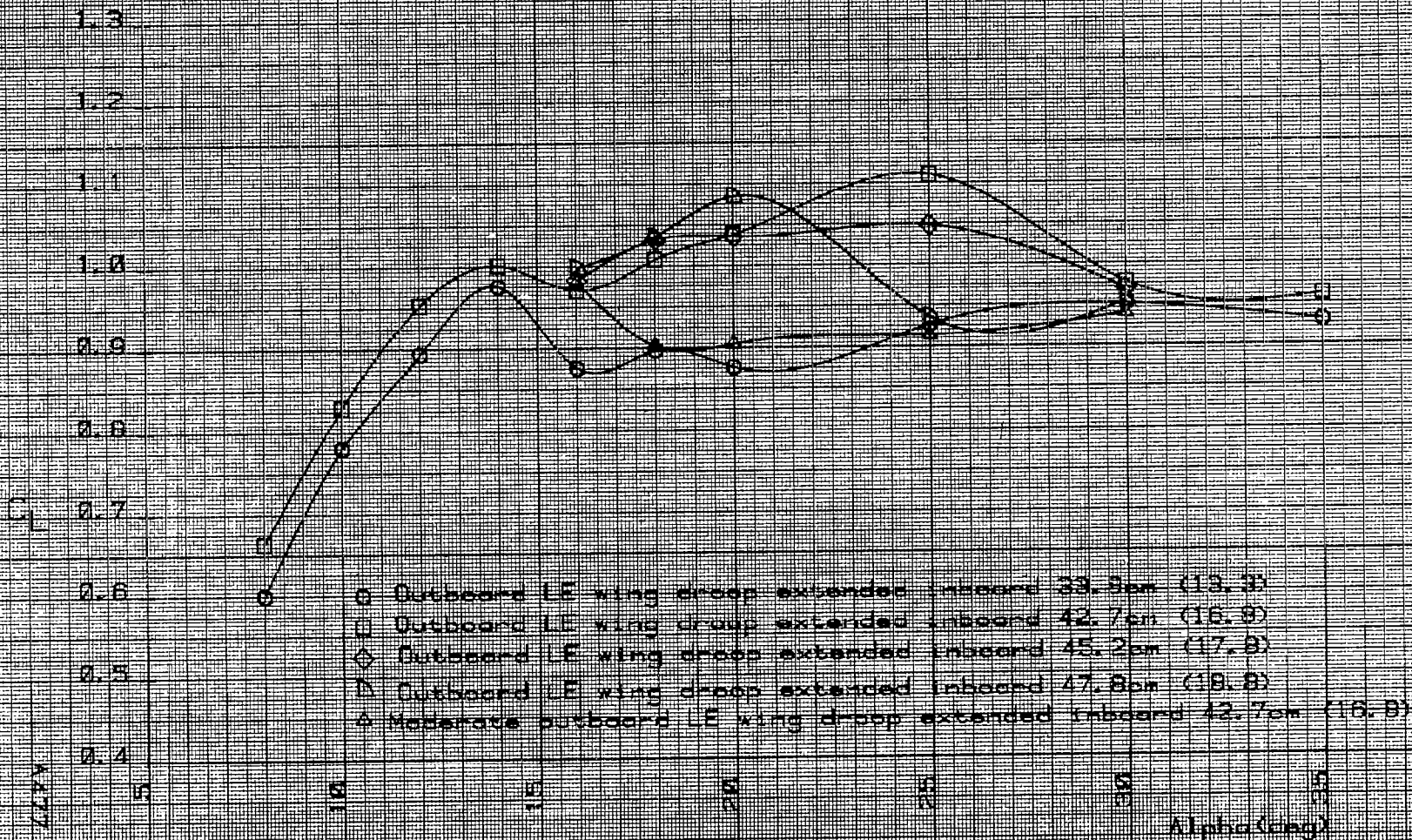


Figure A142 - C_L coefficient as a function of angle of attack for various span LE outboard wing droops.

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4. Title and Subtitle Rotary Balance Data for a Typical Single-Engine General Aviation Design for an Angle-of-Attack Range of 8° to 90°. I - High-Wing Model B.		5. Report Date September 1979	6. Performing Organization Code
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15. Supplementary Notes Langley Technical Monitor: James S. Bowman, Jr. Topical report			
16. Abstract Aerodynamic characteristics obtained in a rotational flow environment utilizing a rotary balance located in the Langley spin tunnel are presented in plotted form for a 1/6.5-scale, single-engine, high-wing, general aviation airplane model. The configurations tested included the basic airplane, various wing leading-edge devices, tail designs, and rudder control settings as well as airplane components. Data are presented without analysis for an angle-of attack range of 8° to 90° and clockwise and counter-clockwise rotations covering an $\frac{\Omega b}{2V}$ range from 0 to 0.85.			
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