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ABSTRACT

This document presents the basic test data obtained during the Lift-Propulsive Force Limit Wind Tunnel Test conducted during 1976 at the Boeing Vertol Wind Tunnel. Included are the rotor control positions, blade loads and six components of rotor force and moment, corrected for hub tare. Performance and blade loads are presented as the rotor lift limit is approached at fixed levels of rotor propulsive force coefficients and rotor tip speeds. Performance and blade load trends are presented for fixed levels of rotor lift coefficient as propulsive force is increased to the maximum obtainable by the model rotor. Test data is also included that defines the effect of stall proximity on rotor control power. This test data is presented in Volume II and III. The analysis of the data is presented in Volume I.

FOREWORD

This report was prepared by the Boeing Vertol Company for the National Aeronautics and Space Administration, Langley Research Center, under NASA contract NAS1-14317. It presents the test data and analysis from the Lift-Propulsive Force Limit Wind Tunnel Test. The analysis of the data establishes the useful flight envelope and the characteristics of a conventional rotor in high speed flight. The results are presented in three volumes.

- 1 Wind Tunnel Investigation of Rotor Lift and Propulsive Force Limits at High Speed -
- Data Analysis -

- 2 Wind Tunnel Investigation of Rotor Lift and
& -3 Propulsive Force Limits at High Speed -
- Test Data Appendix -

Mr. J. L. Jenkins (NASA Langley) was the technical monitor for this work.

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NOMENCLATURE

<u>Symbol</u>	<u>Definition</u>	<u>Units</u>
A	Rotor Area (πR^2)	m ² (ft ²)
A ₁ , a ₁	1st Harmonic Longitudinal Flapping Angle	rad(deg)
A ₁	Lateral Cyclic (- θ at $\psi = 0^\circ$)	rad(deg)
B ₁ , b ₁	1st Harmonic Lateral Flapping Angle	rad(deg)
B ₁	Longitudinal Cyclic (- θ at $\psi = 90^\circ$)	rad(deg)
CB12	Alternating Root Chord Bending Moment at 12% Blade Radius (P+P)/2	kg-m(in-lb)
CB53	Alternating Mid Span Chord Bending Moment at 53% Blade Radius (P+P)/2	kg-m(in-lb)
CDE/SB	Rotor Effective Drag Coefficient = $DE/\rho AV_{TIP}^2 \sigma$	
CH/SB	Rotor Longitudinal Force Coefficient = $H_{FORCE}/\rho AV_{TIP}^2 \sigma$	
CPMB	Rotor Pitching Moment = $PM/\rho AV_{TIP}^2 R$	
CP/SB	Rotor Power Coefficient = $Q/\rho AV_{TIP}^2 R \sigma$	
CRMB	Rotor Rolling Moment Coefficient = $RM/\rho AV_{TIP}^2 R$	
CT'/SB	Rotor Lift Coefficient = $L/\rho AV_{TIP}^2 \sigma$	
CX/SB	Rotor Propulsive Force Coefficient = $X/\rho AV_{TIP}^2 \sigma$	
CY/SB	Rotor Side Force Coefficient = $S.F./\rho AV_{TIP}^2 \sigma$	
FB12	Alternating Root Flap Bending at 12% Blade Radius (P+P)/2	kg-m(in-lb)
FB22	Alternating Inboard Flap Bending Moment at 22% Blade Radius (P+P)/2	kg-m(in-lb)

<u>Symbol</u>	<u>Definition</u>	<u>Units</u>
FB48	Alternating Mid Span Flap Bending Moment at 48% Blade Radius (P+P)/2	kg-m(in-lb)
FB79	Alternating Outboard Flap Bending Moment at 79% Blade Radius (P+P)/2	kg-m(in-lb)
PM	Hub Pitching Moment	m-kg(ft-lb)
Q	Rotor Torque	kg-m(lb-ft)
R	Rotor Radius	m(ft)
RM	Hub Rolling Moment	m-kg(ft-lb)
SF	Rotor Side Force	kg(lb)
T	Rotor Thrust	kg(lb)
TB12	Alternating Root Torsion at 12% Blade Radius = (P+P)/2	kg-m(in-lb)
TB20	Alternating Inboard Torsion at 20% Blade Radius = (P+P)/2	kg-m(in-lb)
TB51	Alternating Mid Span Torsion at 51% Blade Radius = (P+P)/2	kg-m(in-lb)
TB81	Alternating Outboard Torsion at 81% Blade Radius = (P+P)/2	kg-m(in-lb)
V	Tunnel Velocity	m/s(ft/s)
V _{TIP}	Rotor Tipspeed	m/s(ft/s)
X	Rotor X Force	kg(lb)
α_s	Shaft Angle of Attack	rad(deg)
θ	Collective Pitch	rad(deg)
μ	Advance Ratio = V/V_{TIP}	

<u>Symbol</u>	<u>Definition</u>	<u>Units</u>
ρ	Tunnel Density	N/m^2 (slugs/ft ²)
σ	Rotor Solidity $bc/\pi R$	

A. Basic Test Data from Lift Limit Testing

As indicated in Section 5 of the main report, the lift limit testing was conducted at fixed levels of propulsive force by increasing the collective pitch, increasing the rotor shaft angle of attack and trimming the hub moment to zero with longitudinal and lateral cyclic. This was repeated at each propulsive force level and advance ratio for the basic rotor tip speed of 620 ft/sec. Similar testing was accomplished at a tip speed of 570 ft/sec.

The test data obtained for each of these test runs has been combined to show the impact of advance ratio at a fixed level of propulsive force or conversely the impact of propulsive force at a fixed advance ratio. The combinations, identified as plot sets, are defined in Table A-1 and are marked on the bottom of each sheet. Within each plot set are a series of graphs presenting the variation of each component of measured data with rotor lift coefficient. The sequence of these graphs is as follows:

Rotor Lift Coefficient versus Rotor Propulsive
Force Coefficient

Rotor Lift Coefficient versus Shaft Angle of Attack

Rotor Lift Coefficient versus Collective Pitch

Rotor Lift Coefficient versus Longitudinal Cyclic

Rotor Lift Coefficient versus Lateral Cyclic

Rotor Lift Coefficient versus Rotor Power Coefficient

Rotor Lift Coefficient versus Rotor Pitching Moment Coefficient

Rotor Lift Coefficient versus Rotor Rolling Moment Coefficient

Rotor Lift Coefficient versus Rotor Longitudinal Force
Coefficient

Rotor Lift Coefficient versus Rotor Side Force Coefficient

Rotor Lift Coefficient versus Alternating Root Torsion TB12

Rotor Lift Coefficient versus Alternating Inboard Torsion TB20

Rotor Lift Coefficient versus Alternating Mid Span Torsion TB51

Rotor Lift Coefficient versus Alternating Outboard Torsion TB81

Rotor Lift Coefficient versus Alternating Root Flap Bending FB12

Rotor Lift Coefficient versus Alternating Inboard Flap Bending FB22

Rotor Lift Coefficient versus Alternating Mid Span Flap Bending FB48

Rotor Lift Coefficient versus Alternating Root Chord Bending CB12

Rotor Lift Coefficient versus Alternating Mid Span Chord CB53

Rotor Lift Coefficient versus Coning Angle

Rotor Lift Coefficient versus 1st Harmonic Longitudinal Flapping A1

Rotor Lift Coefficient versus 1st Harmonic Lateral Flapping B1

Rotor Lift Coefficient versus Alternating Lead-Lag Angle

Rotor Pitching Moment Coefficient versus 1st Harmonic Longitudinal Flapping A1

Rotor Rolling Moment Coefficient versus 1st Harmonic Lateral Flapping B1

TABLE A-1 DATA PLOTTING SUMMARY FOR LIFT LIMIT TESTING

PLOT SET	RUN NO.	ROTOR TIP SPEED V_T	ADVANCE RATIO μ	ROTOR LIFT COEFF. G_L/σ	ROTOR PROPULSIVE FORCE COEFF. $X/qd^2\sigma$	TUNNEL SPEED V	COMMENTS
1	22	620FPS	0	Range	-	0	Baseline hover performance and lift limit.
	23	620FPS	0	Range	-	0	
	24	620FPS	0	Range	-	0	
2	25	620FPS	.10	Range	.05	62FPS	Baseline cruise performance.
	27	620FPS	.20	Range	.05	124FPS	
	28	620FPS	.20	Range	.05	124FPS	
	29	620FPS	.30	Range	.05	186FPS	
	30	620FPS	.40	Range	.05	248FPS	
3	32	620FPS	.40	Range	.01	248FPS	
	30	620FPS	.40	Range	.05	248FPS	
	33	620FPS	.40	Range	.10	248FPS	
	34	620FPS	.40	Range	.20	248FPS	
4	35	620FPS	.45	Range	.01	279FPS	
	36	620FPS	.45	Range	.05	279FPS	
	37	620FPS	.45	Range	.10	279FPS	
	38	620FPS	.45	Range	.20	279FPS	
5	40	620FPS	.50	Range	.025	310FPS	
	39	620FPS	.50	Range	.05	310FPS	
	41	620FPS	.50	Range	.10	310FPS	
	42	620FPS	.50	Range	.20	310FPS	

TABLE A-1 DATA PLOTTING SUMMARY FOR LIFT LIMIT TESTING
(Continued)

PLOT SET	RUN NO.	ROTOR TIP SPEED V_T	ADVANCE RATIO μ	ROTOR LIFT COEFF. G_L/σ	ROTOR PROPULSIVE FORCE COEFF. $X/qd^2\sigma$	TUNNEL SPEED V	COMMENTS
7	51	620FPS	.53	Range	.025	329FPS	Baseline cruise performance and lift limit.
	50	620FPS	.53	Range	.05	329FPS	
	52	620FPS	.53	Range	.10	329FPS	
	53	620FPS	.53	Range	.20	329FPS	
34	227	620FPS	.45	Range	.05	279FPS	Check & verification runs to insure compatibility of data from Part 1 and Part 2. Runs 225 & 227 are operating with tip stall.
	36	620FPS	.45	Range	.05	279FPS	
35	225	620FPS	.50	Range	.05	310FPS	
	39	620FPS	.50	Range	.05	310FPS	
36	225	620FPS	.50	Range	.05	310FPS	Check runs to define repeatability. Rotor operating with tip stall.
	261	620FPS	.50	Range	.05	310FPS	
	226	620FPS	.50	Range	.10	310FPS	
37	224	620FPS	.53	Range	.05	328FPS	Check runs.
	220	620FPS	.53	Range	.05	328FPS	
	221	620FPS	.53	Range	.05	328FPS	
	222	620FPS	.53	Range	.05	328FPS	
38	246	620FPS	.57	Range	.025	353FPS	Baseline cruise performance and lift limit.
	249	620FPS	.57	Range	.025	353FPS	
	228	620FPS	.57	Range	.05	353FPS	
	245	620FPS	.57	Range	.10	353FPS	

TABLE A-1 DATA PLOTTING SUMMARY FOR LIFT LIMIT TESTING
(Continued)

PLOT SET	RUN NO.	ROTOR TIP SPEED V_T	ADVANCE RATIO μ	ROTOR LIFT COEFF. G_L/σ	ROTOR PROPULSIVE FORCE COEFF. $X/qd^2\sigma$	TUNNEL SPEED V	COMMENTS
39	229	620FPS	.61	Range	.05	378FPS	Baseline cruise performance and lift limit.
	248	620FPS	.61	Range	.075	378FPS	
40	250	570FPS	.40	Range	.05	228FPS	Baseline Cruise performance and lift limit at reduced tip speed. Comparison of operation with and without tip stall.
	256	570FPS	.40	Range	.05	228FPS	
41	251	570FPS	.45	Range	.05	256FPS	
	255	570FPS	.45	Range	.05	256FPS	
42	252	570FPS	.50	Range	.05	285FPS	
	254	570FPS	.50	Range	.05	285FPS	

Figure A-1

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47E ROTOR
 LIFT LIMIT TESTING

SYN RUN MU' X/00258 VTUN
 000 000 000

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT

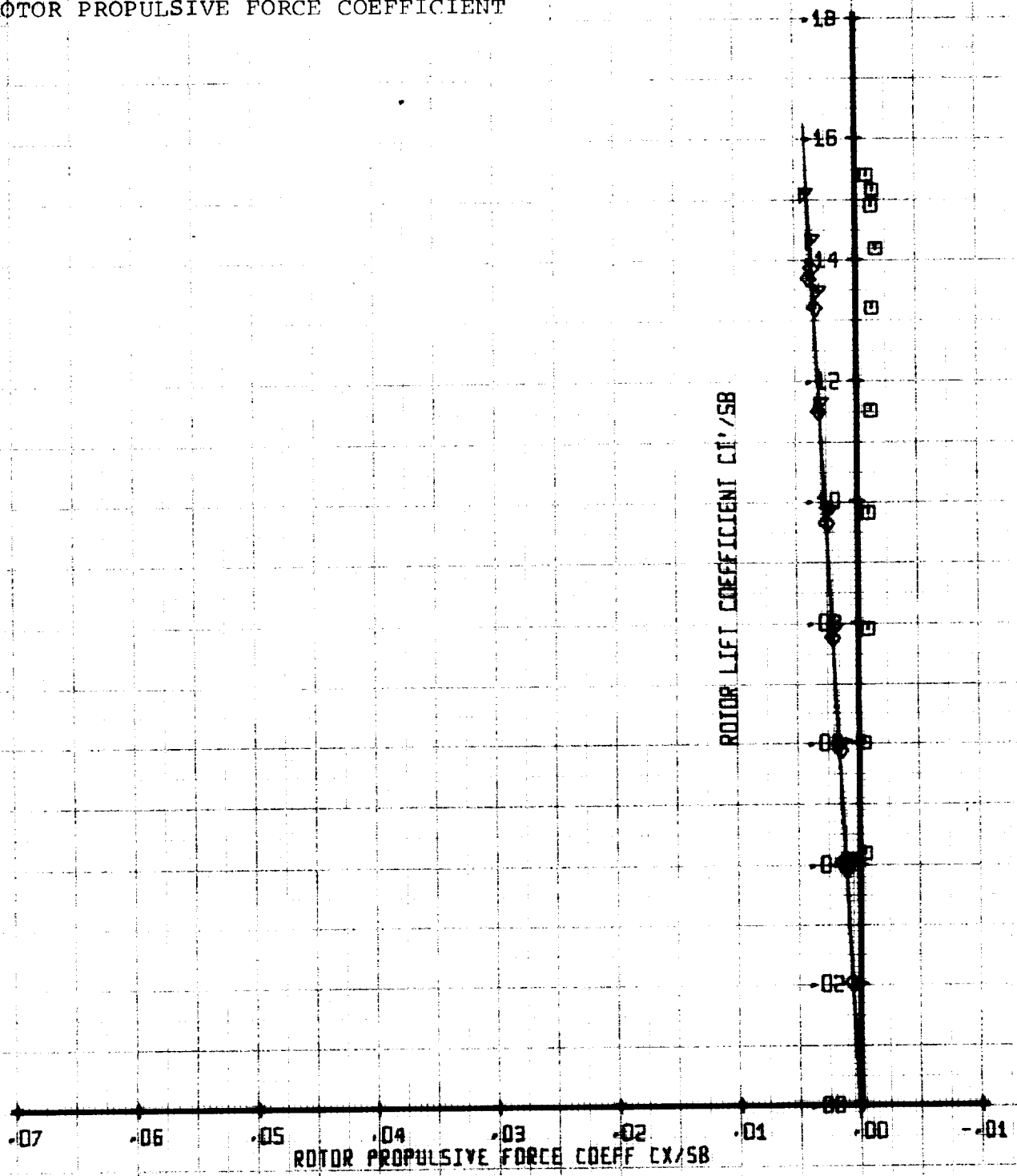
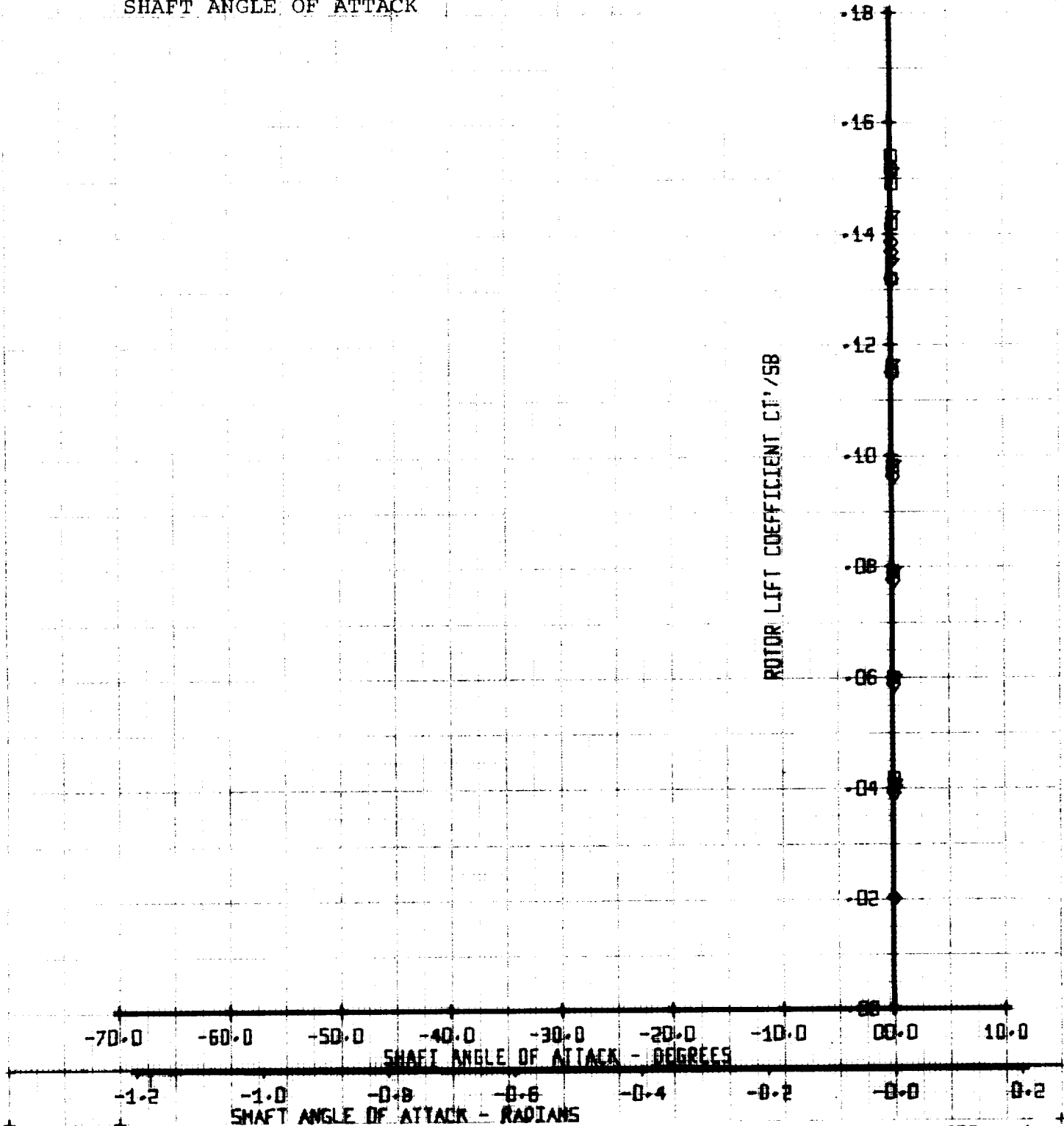


Figure A-2

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00298	VTUN
0	2	0	1	0
1	3	0	1	0
2	4	0	1	0

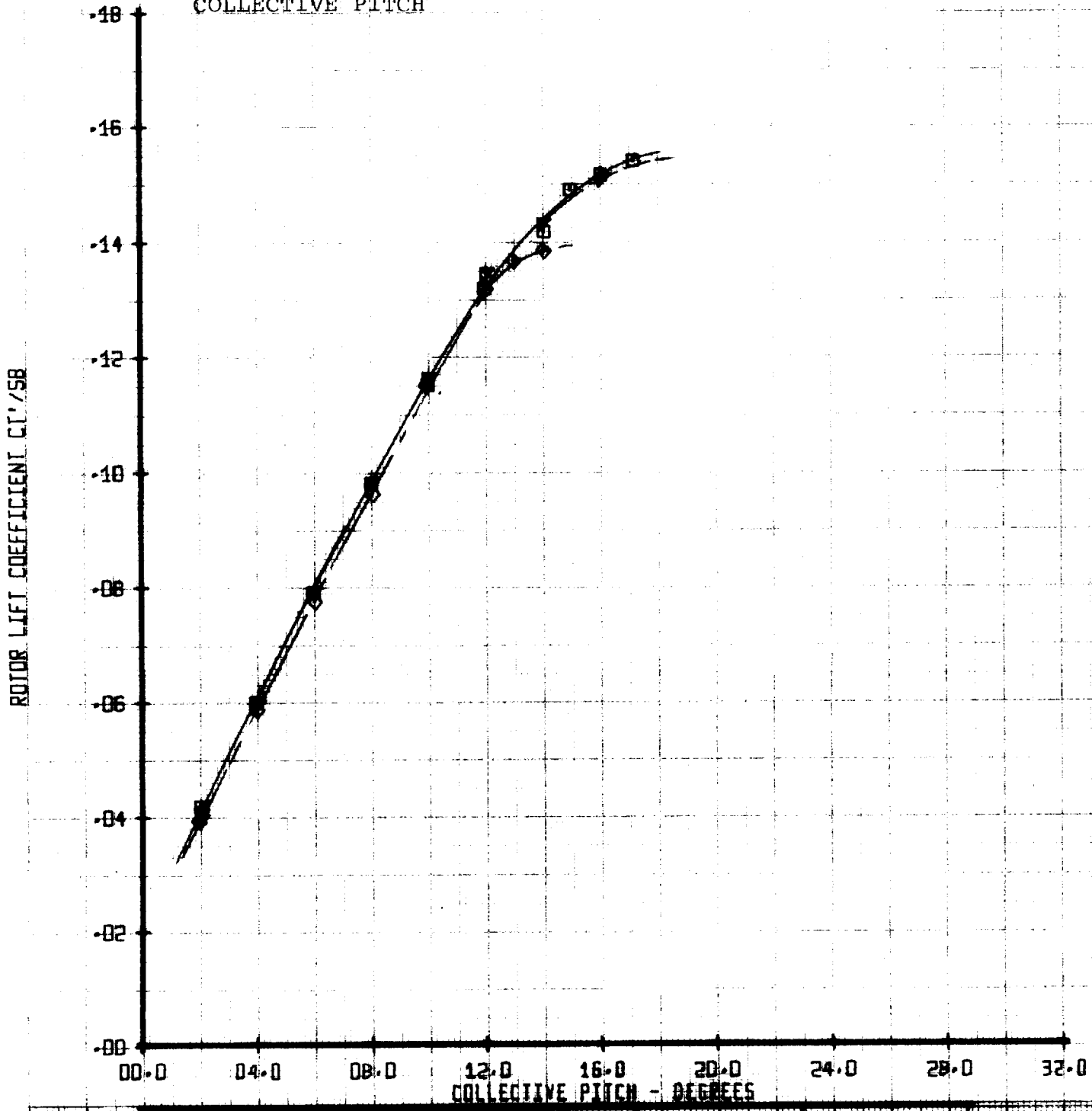
ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
040	2324	000	111	000

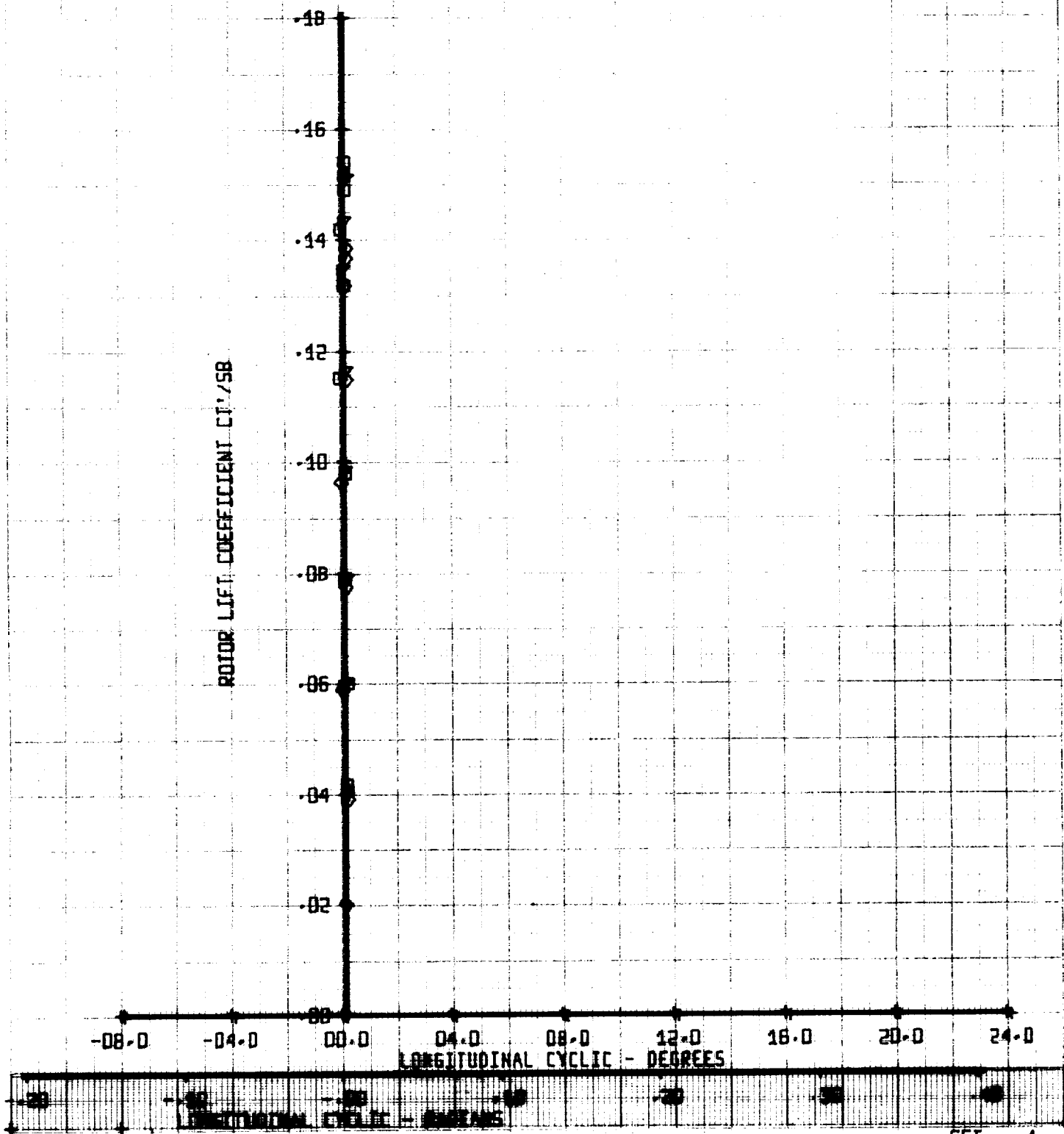
ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/DD25B	VTUN
▲	22	0	1	0
	23	0	1	0
	24	0	1	0

ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/DO258	VTUN
◇	22	00	+	00
□	23	00	+	00
△	24	00	+	00

ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC

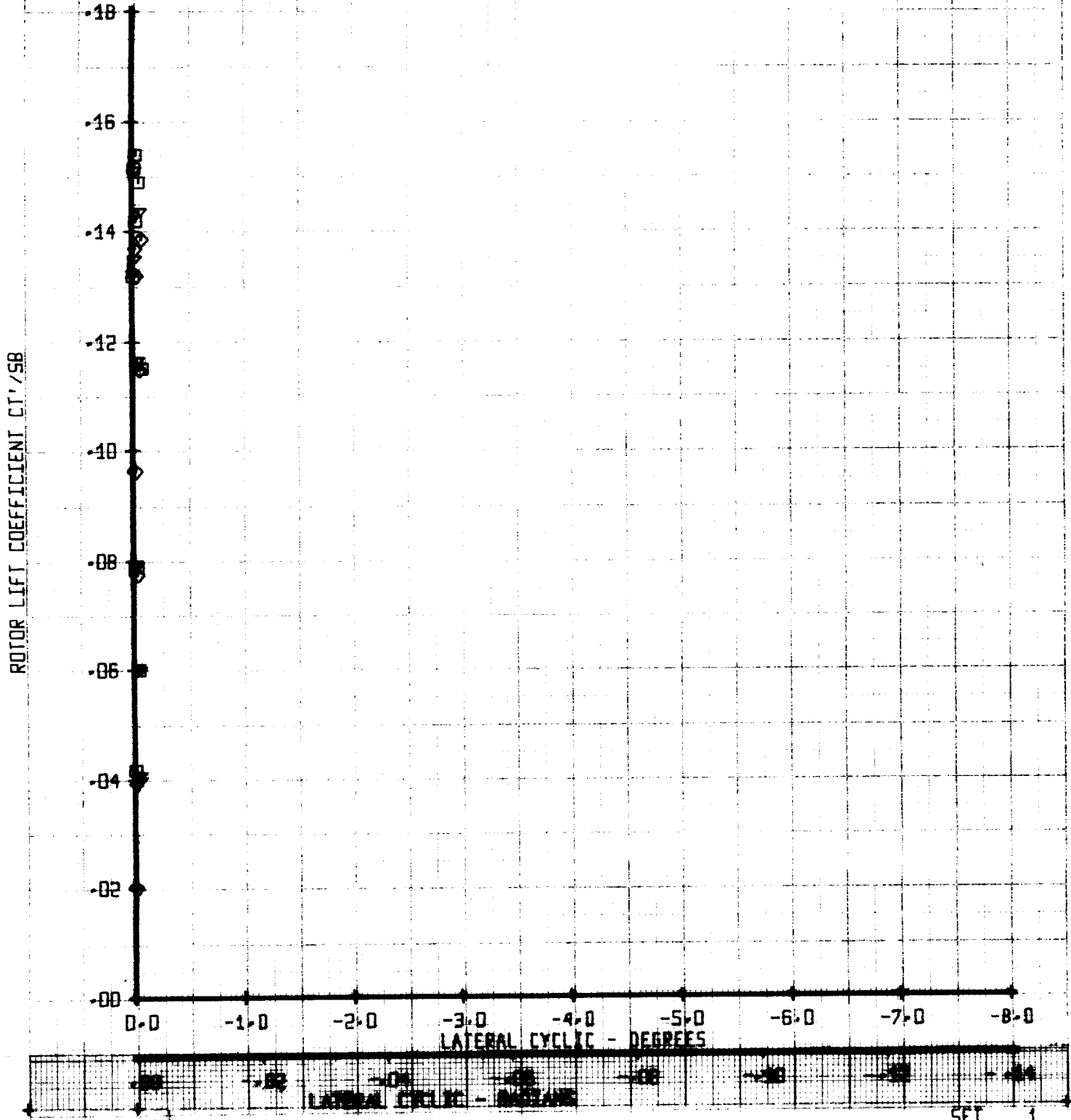


Figure A-6

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	232	0	1	0
△	233	0	1	0
◇	234	0	1	0

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT

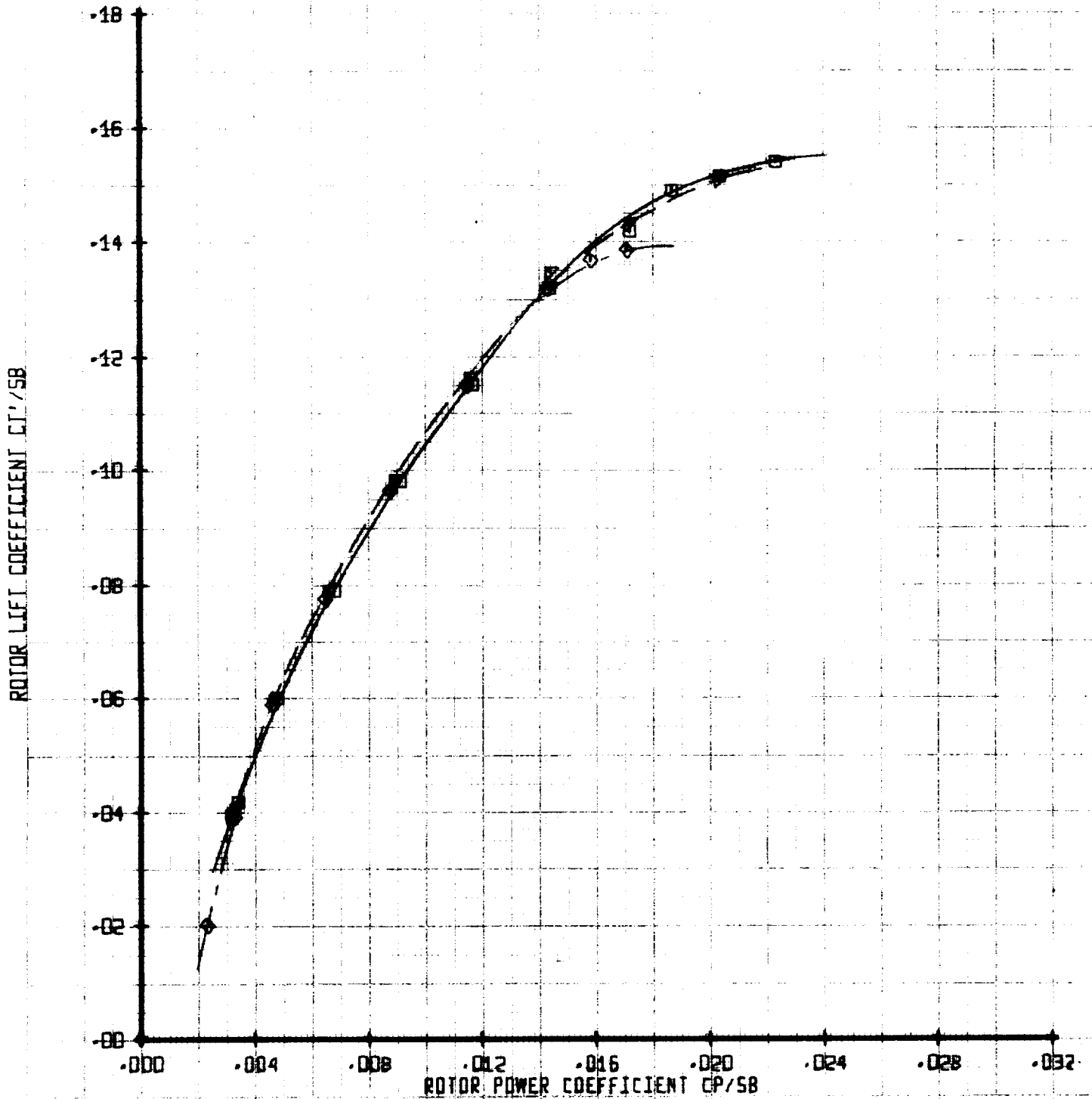
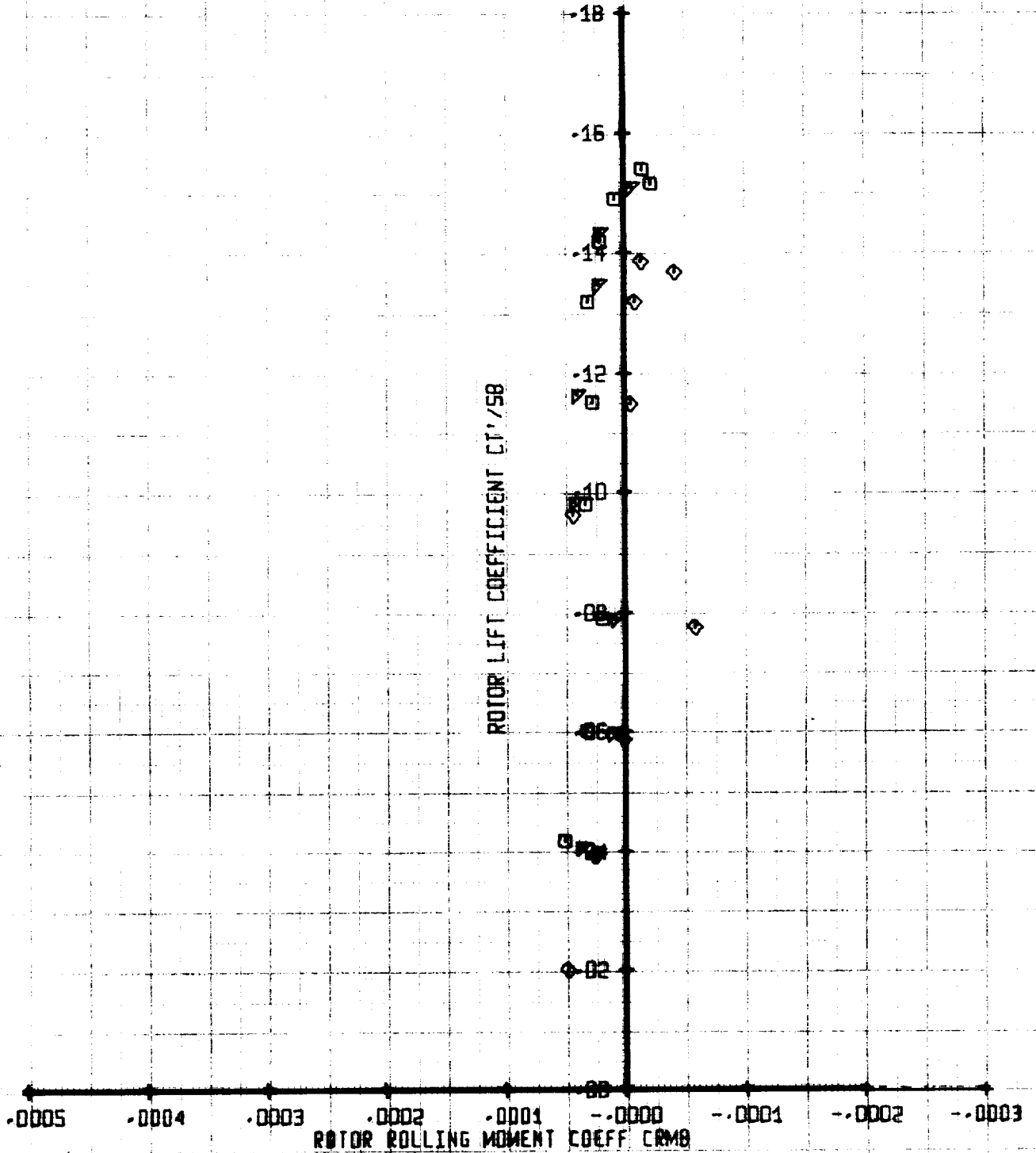


Figure A-8

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00298	VTUN
□	22	0	-	000
▴	23	0	-	000
◇	24	0	-	000

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MLI	X/00258	VTUN
△	22	0	-	0
▽	23	0	-	0
○	24	0	-	0

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT

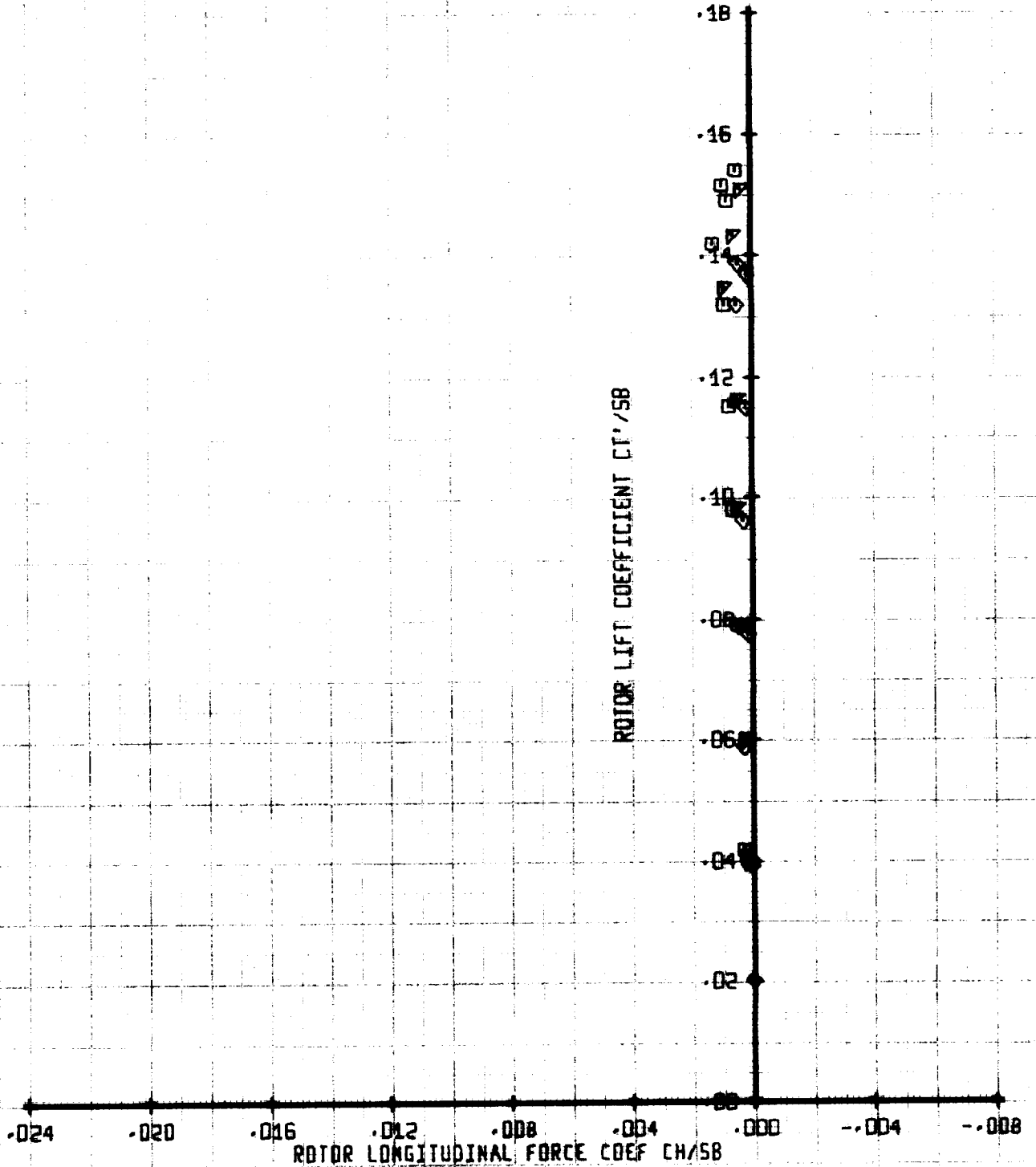
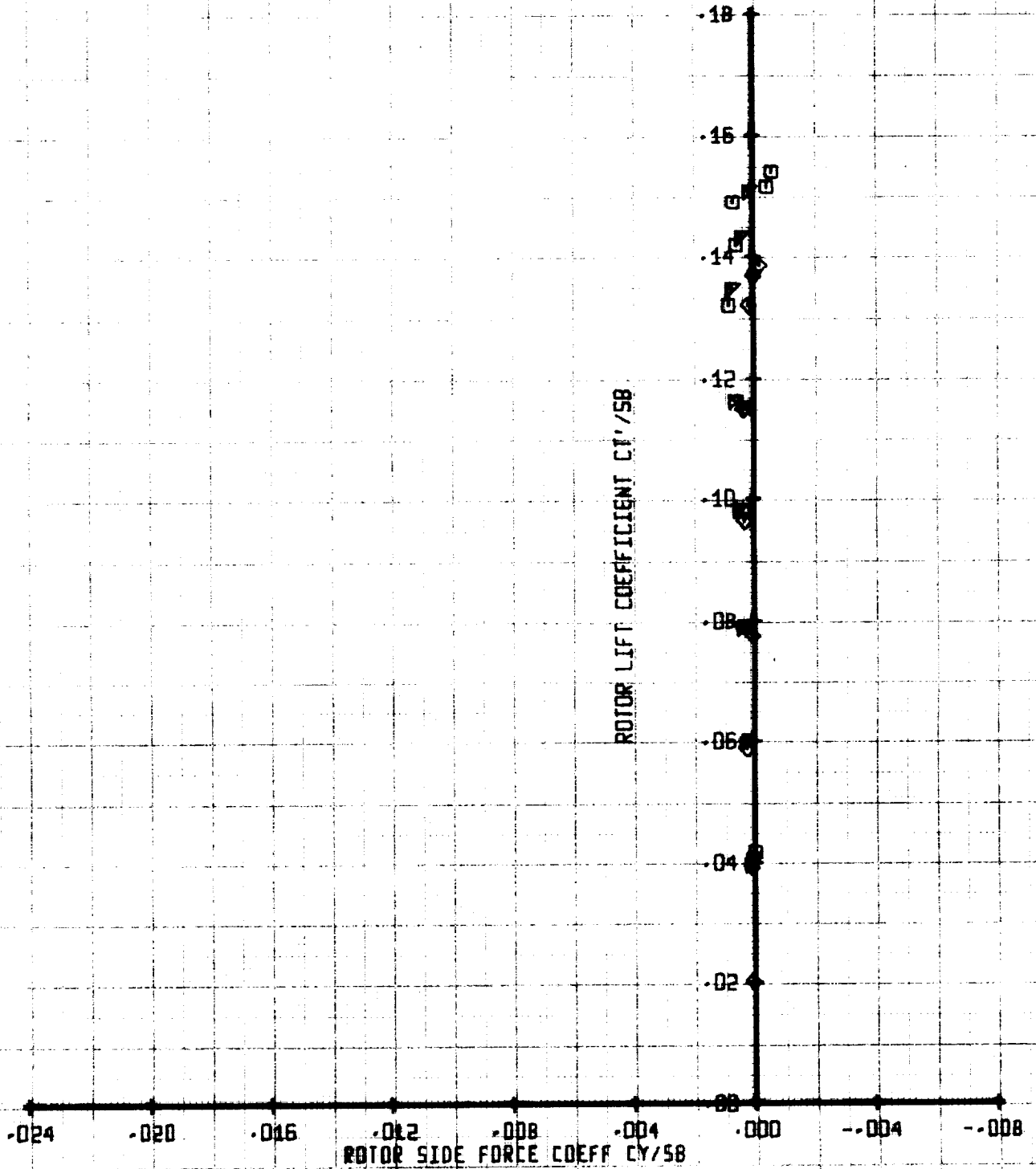


Figure A-10

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU	X/DO258	VTUN
SYM	RUN			
○	22	0	+	0
△	23	0	+	0
◇	24	0	+	0

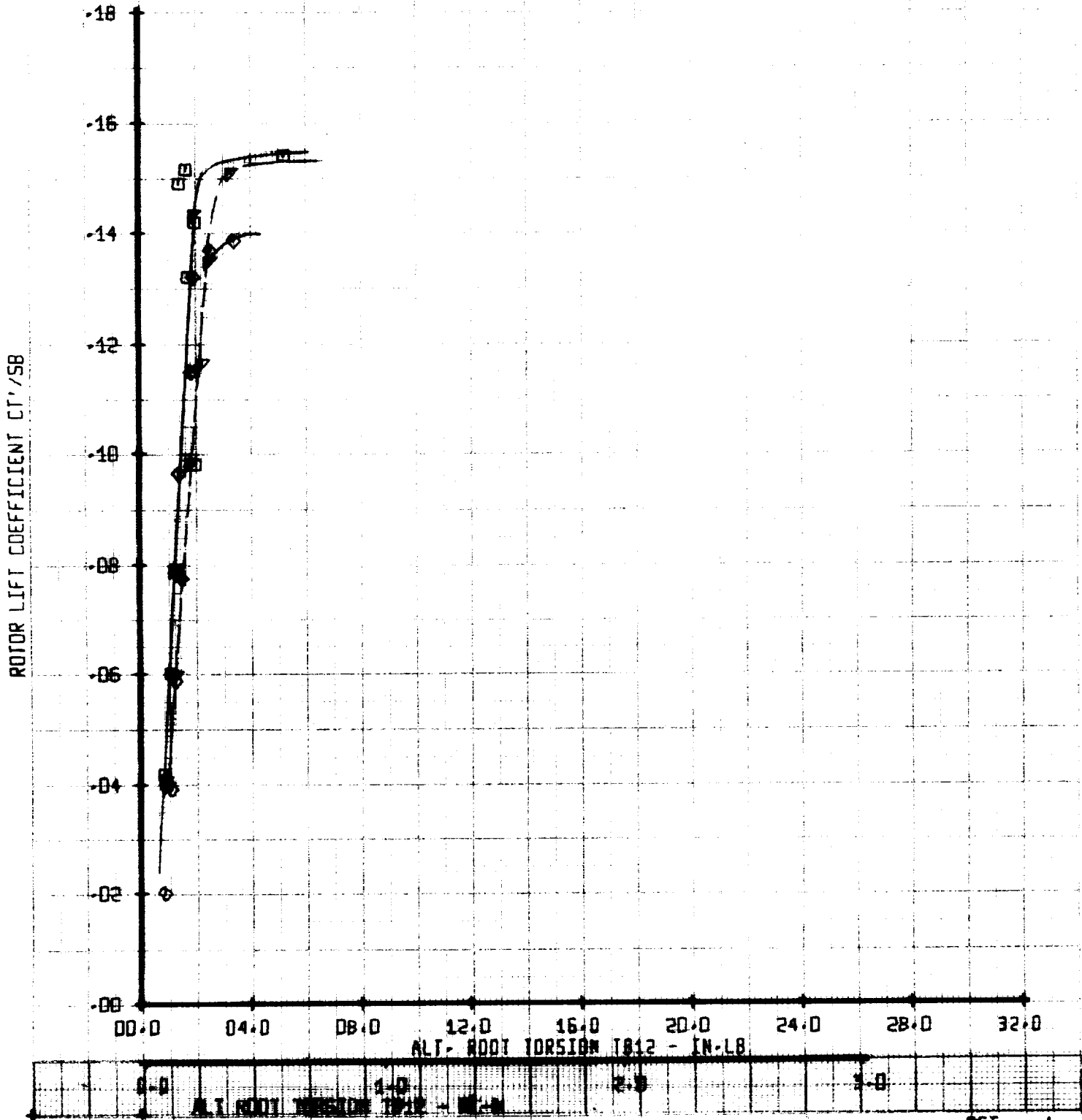
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	ML	X/00250	VTUN
0A0	202	000	1	000
		000	1	000
		000	1	000

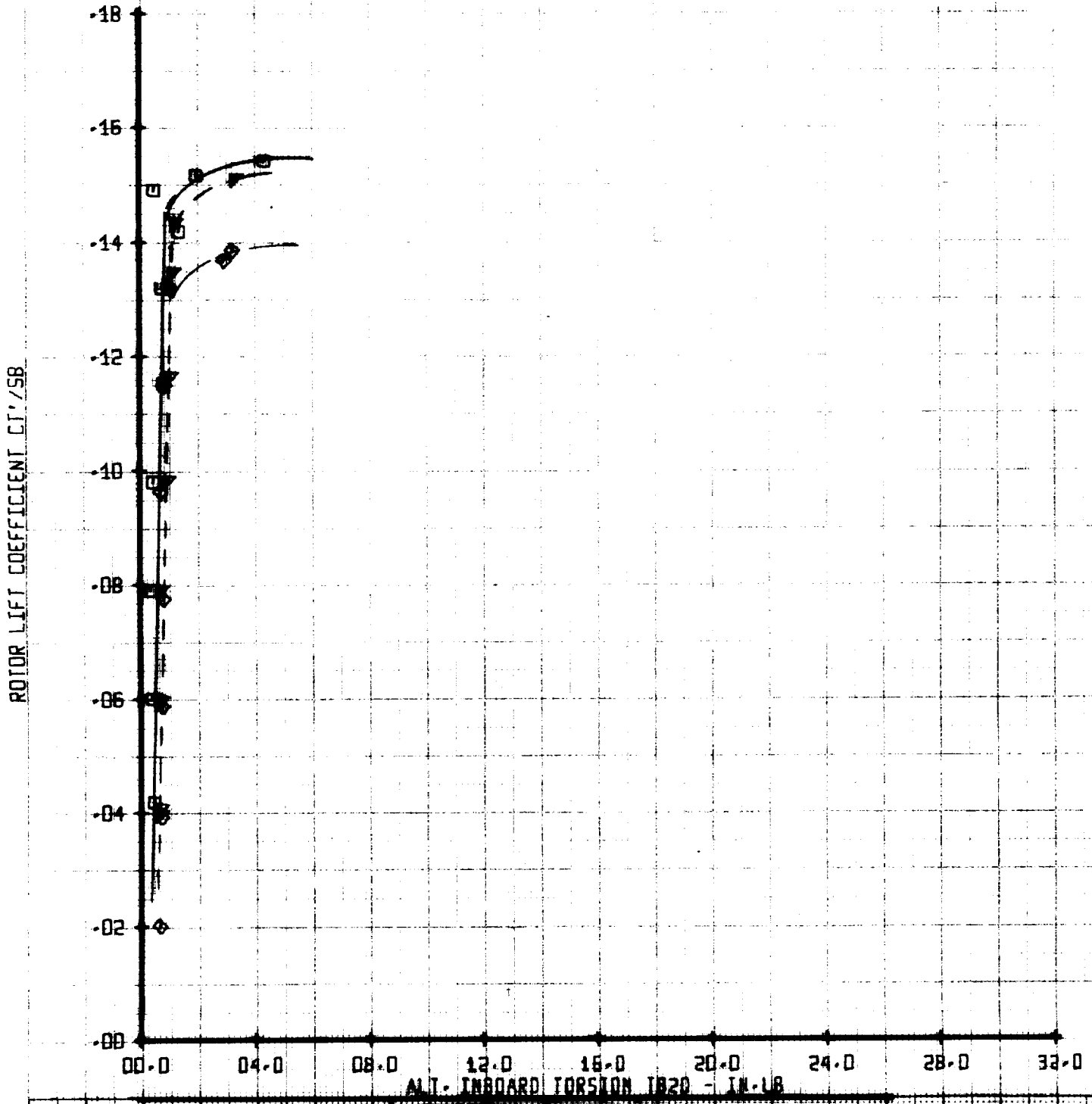
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
0	22	0	-	0
0	23	0	-	0
0	24	0	-	0

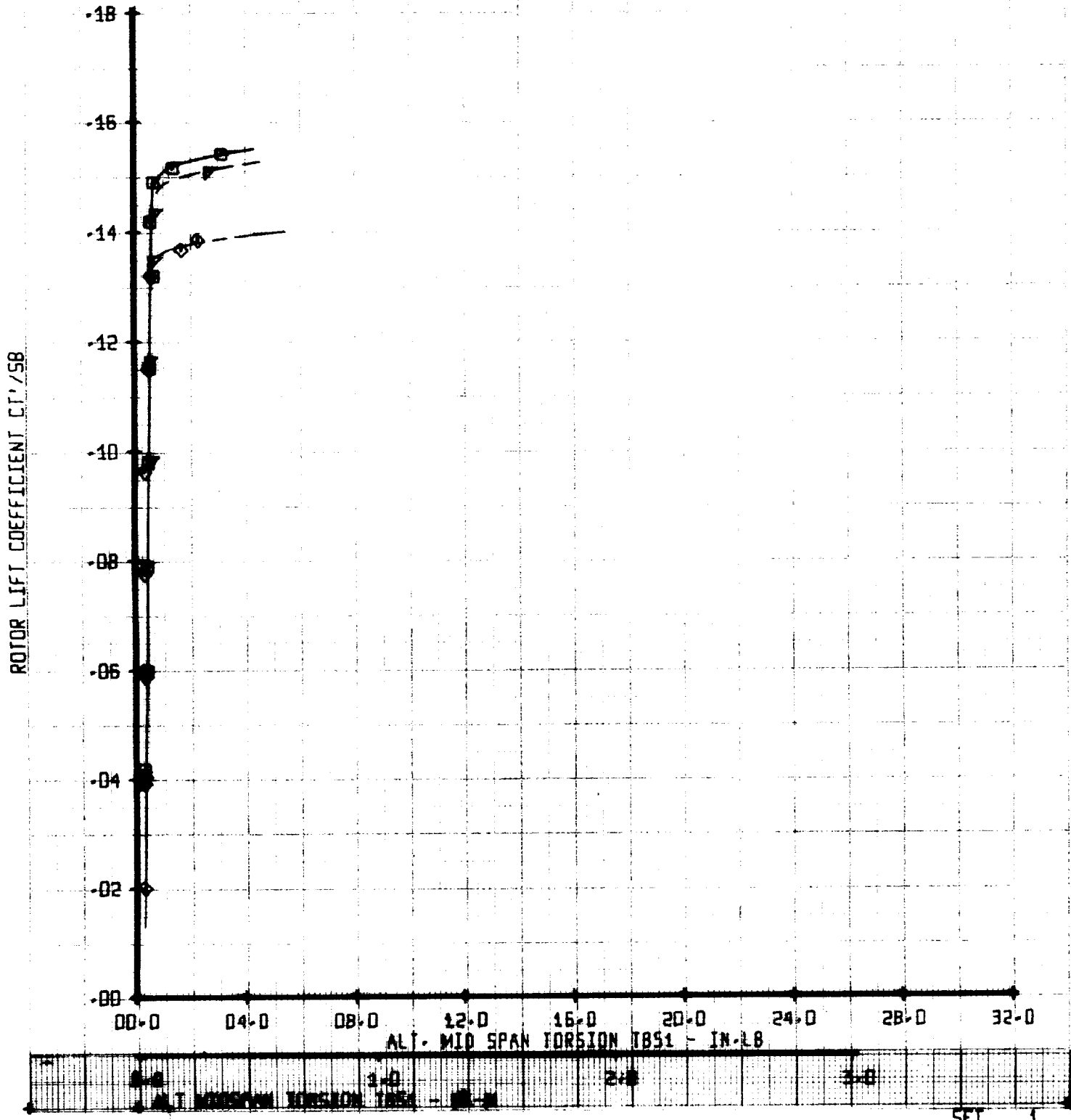
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING INBOARD TORSION TB20



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/DD25B	Y/TUN
□	22	0	-	0
△	23	0	-	0
○	24	0	-	0

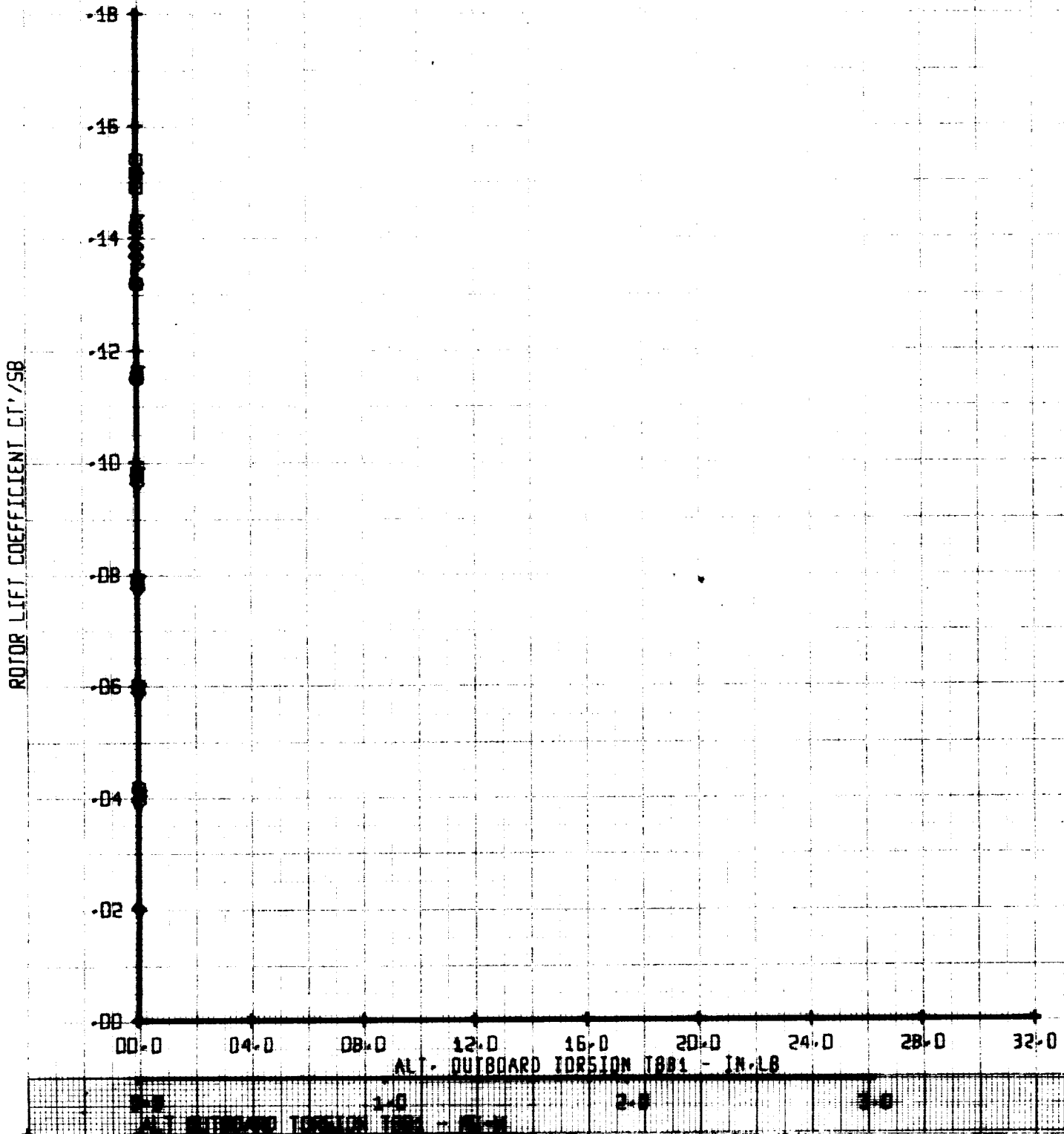
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB51



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU	X/00258	VIUN
□	22	0	-	0
▽	23	0	-	0
○	24	0	-	0

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB81



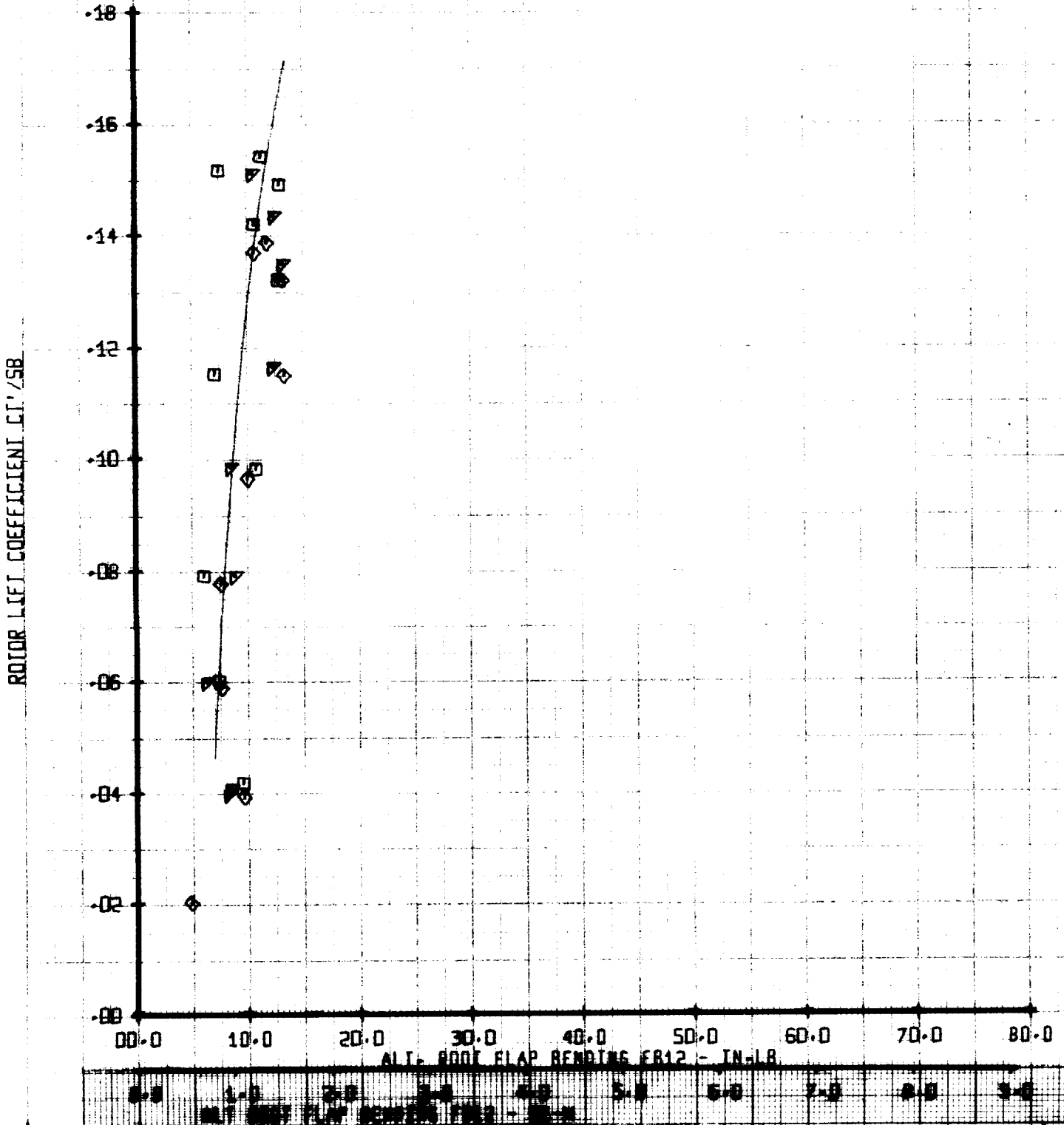
ET 1
 WT 187

SET 1
 BYWT 187

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU	X/00258	VTUN
□	22	0	-	0
△	23	0	-	0
◇	24	0	-	0

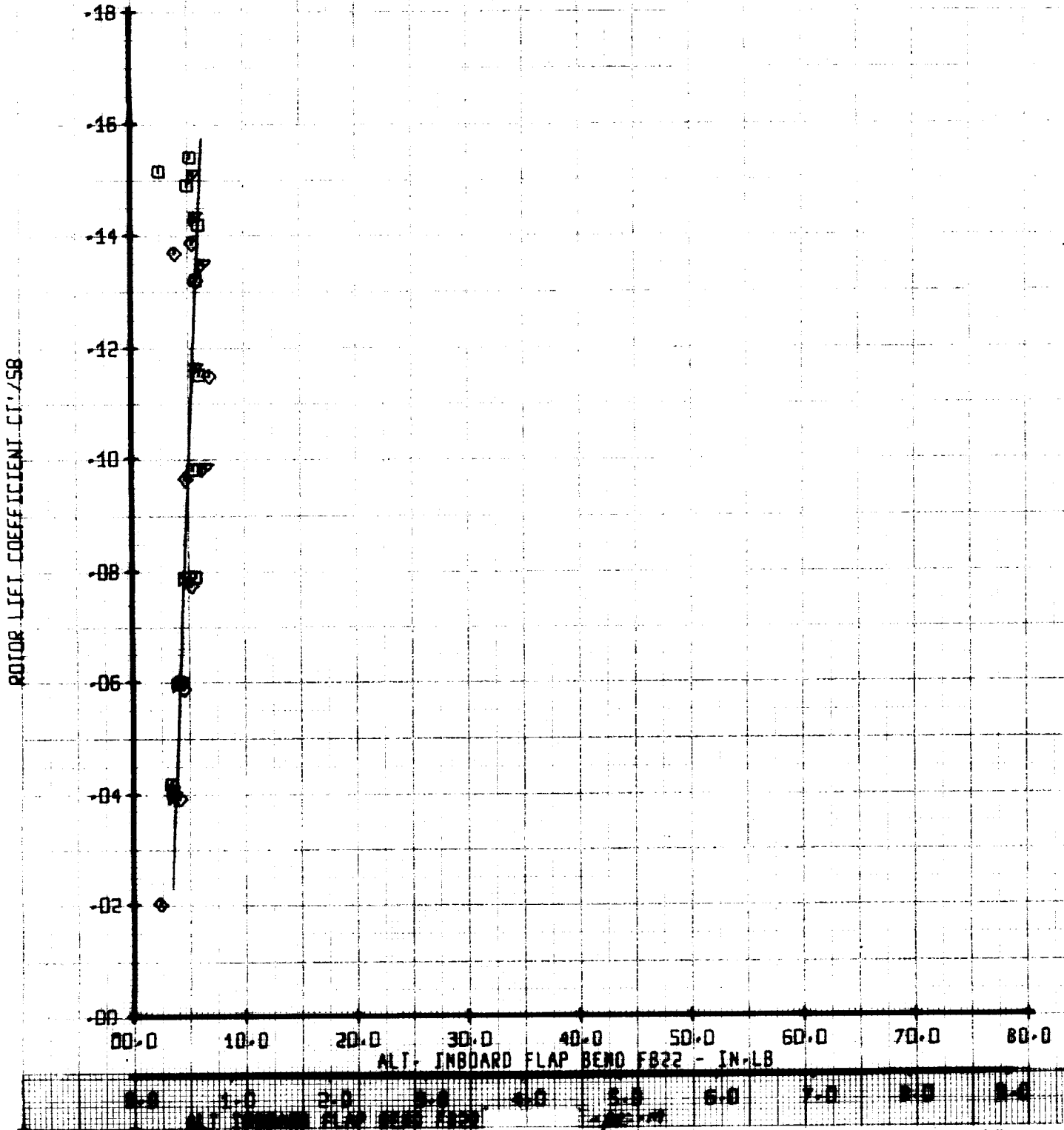
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU	X/00258	XTUN	
□	232	0	-	0	
△	232	0	-	0	
○	0	0	-	0	

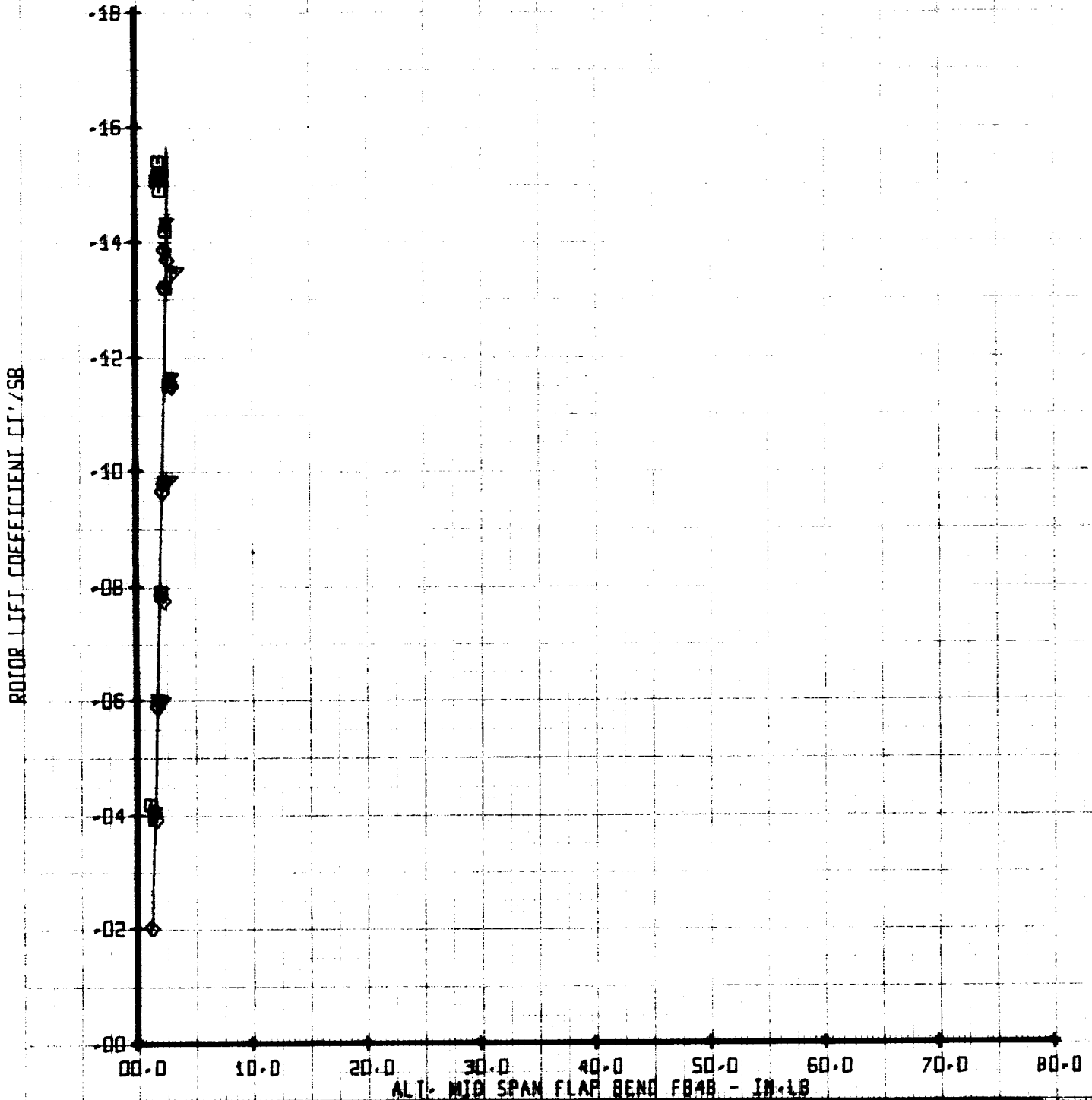
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING INBOARD FLAP BENDING FB22



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/DD258	VTUN	
□	22	0	-	0	
△	23	0	-	0	
◇	24	0	-	0	

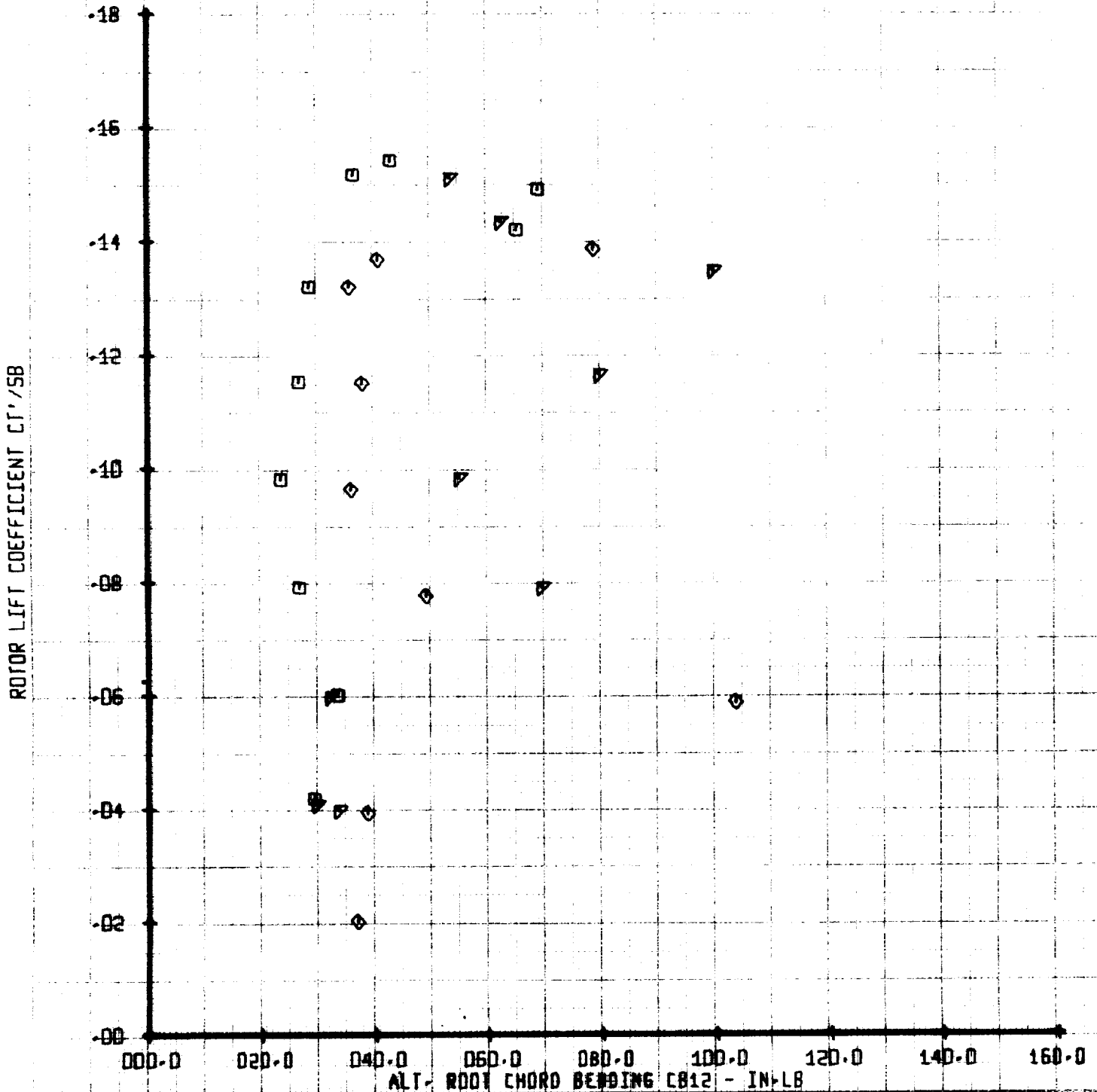
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BENDING FB48



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/0025B	VTUN
□	2232	0	-	0
▽	2233	0	-	0
◇	2234	0	-	0

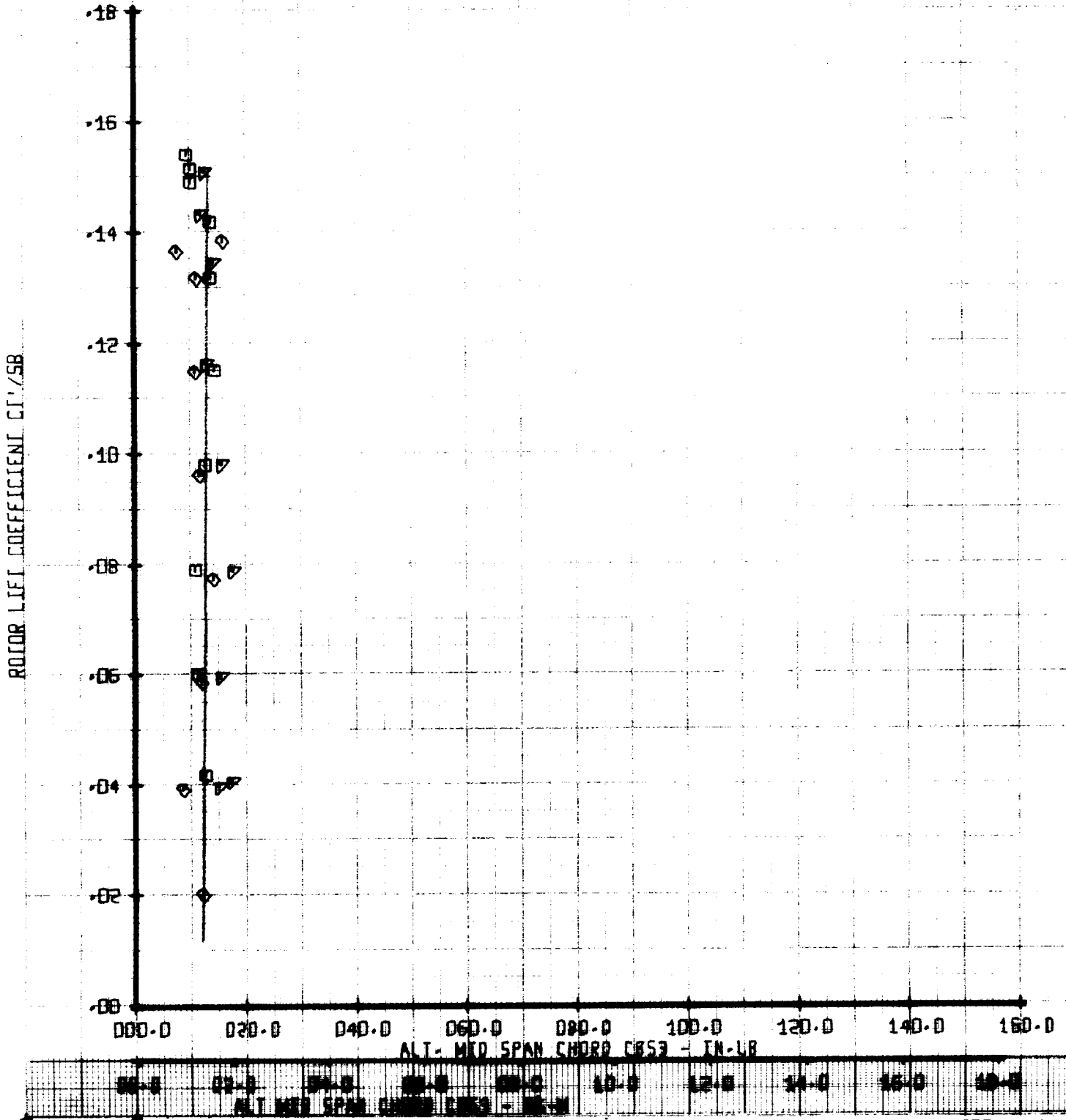
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU	X/DD2SB	KTUN
□	22	0	-	0
△	23	0	-	0
◇	24	0	-	0

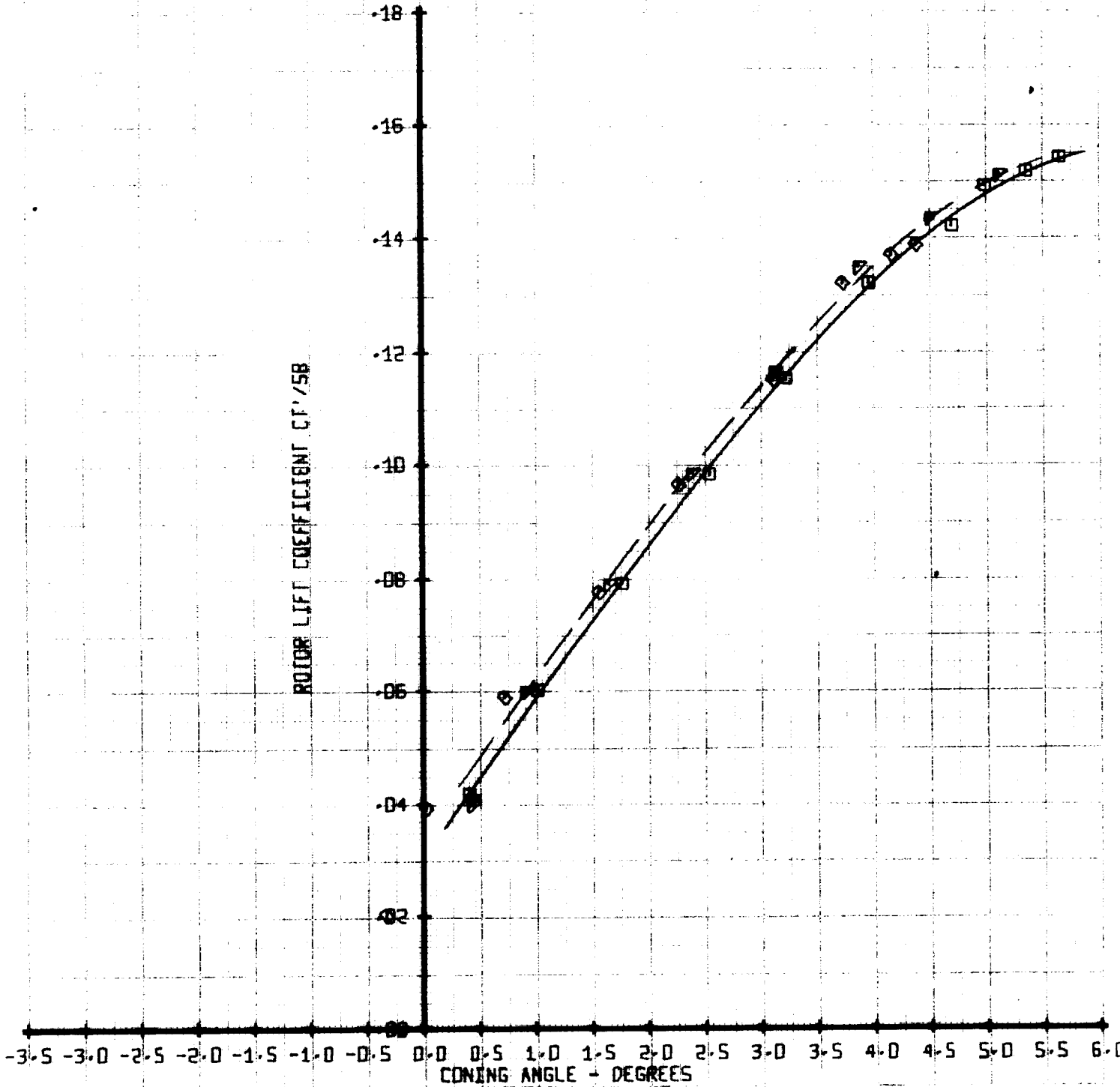
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN CHORD CB53



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/40 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU	X/00258	VTUN
□	22	0	-	0
△	23	0	-	0
◇	24	0	-	0

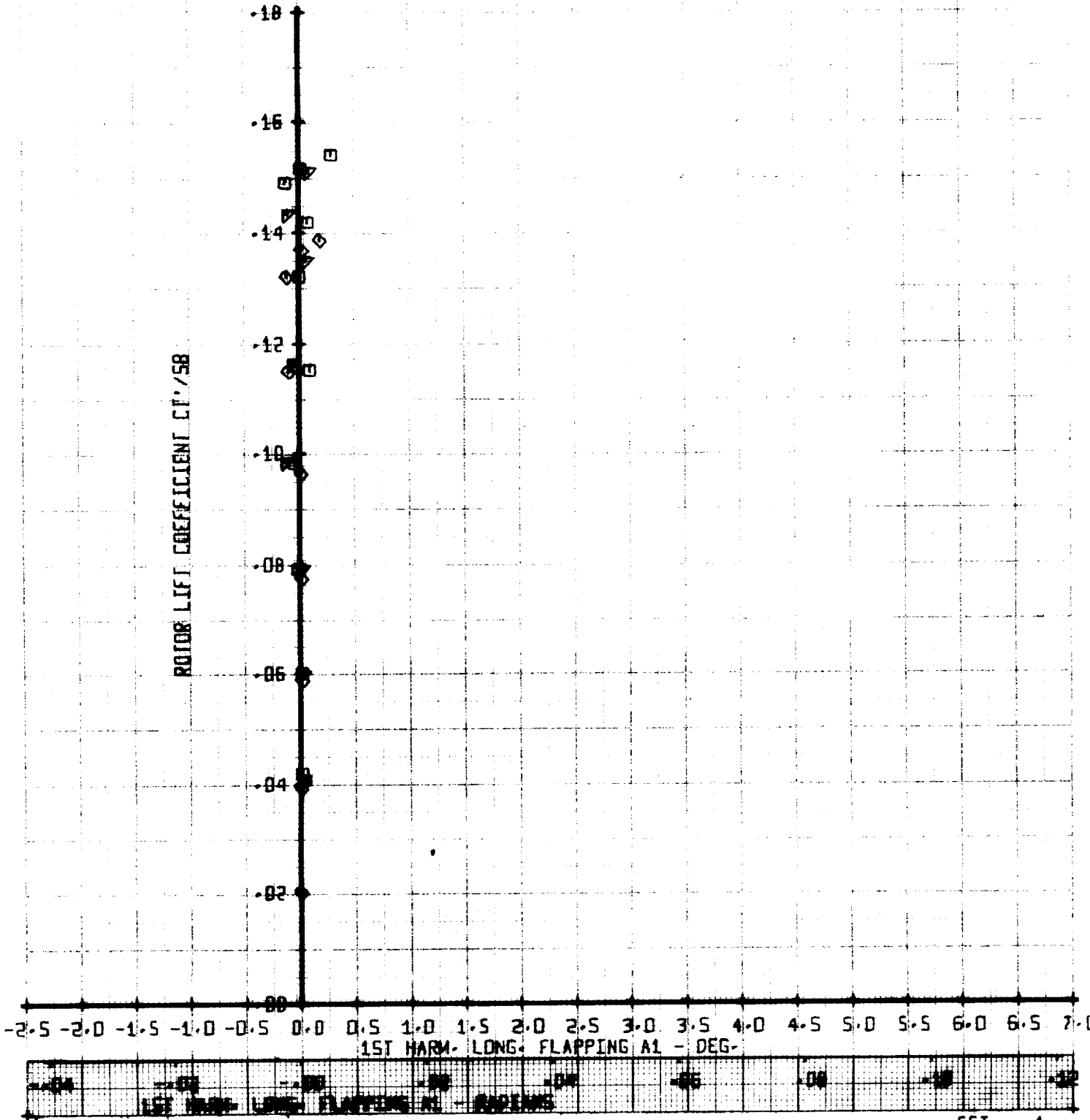
ROTOR LIFT COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/QD2SB	YIUN
□	22	0	-	0
▽	23	0	-	0
◇	24	0	-	0

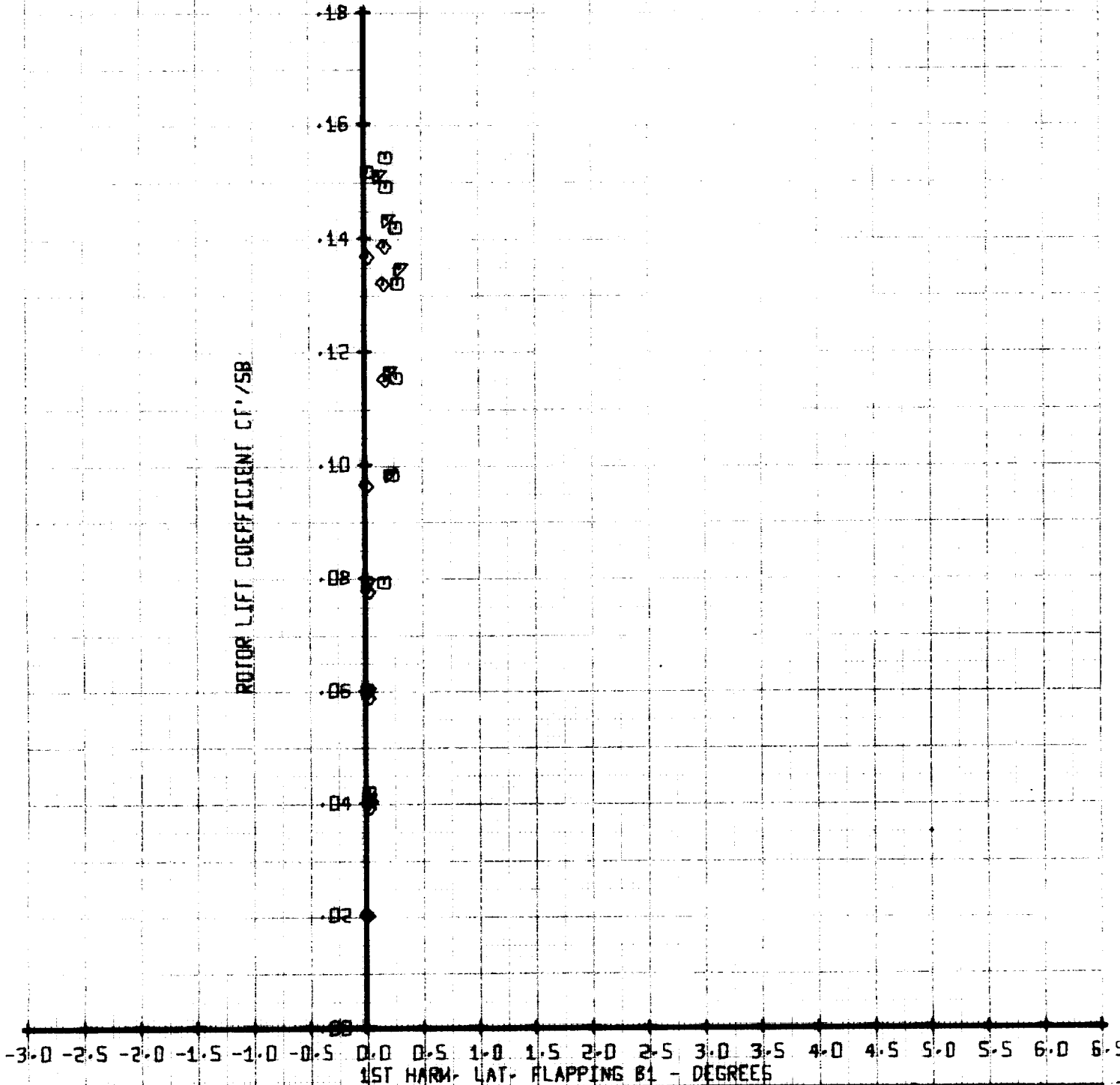
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU	X/QD258	VTUN
□	22	0	-	0
▽	23	0	-	0
◇	24	0	-	0

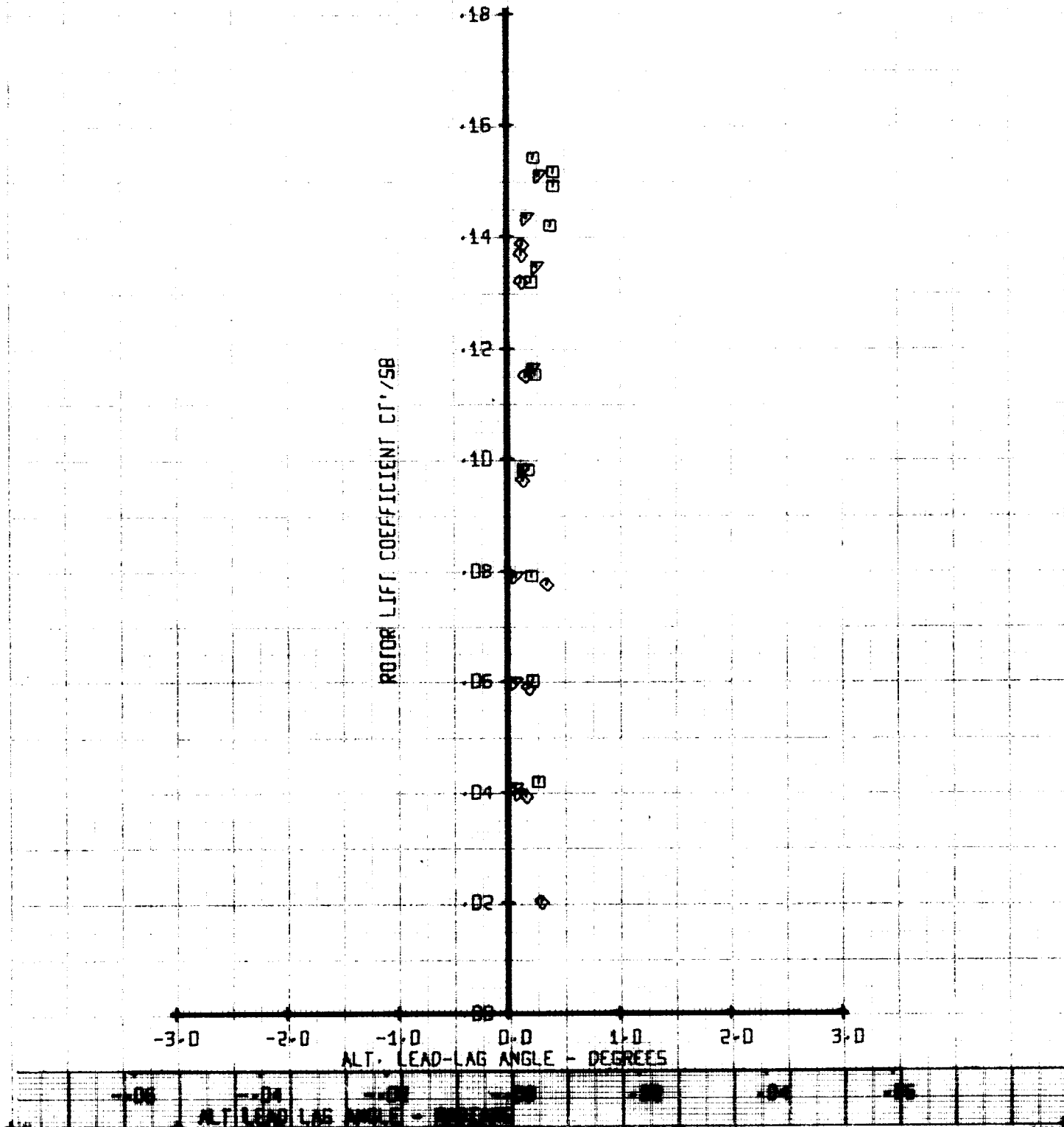
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU	X/00258	VTUN	
□	22	0	-	0	
▽	23	0	-	0	
◇	24	0	-	0	

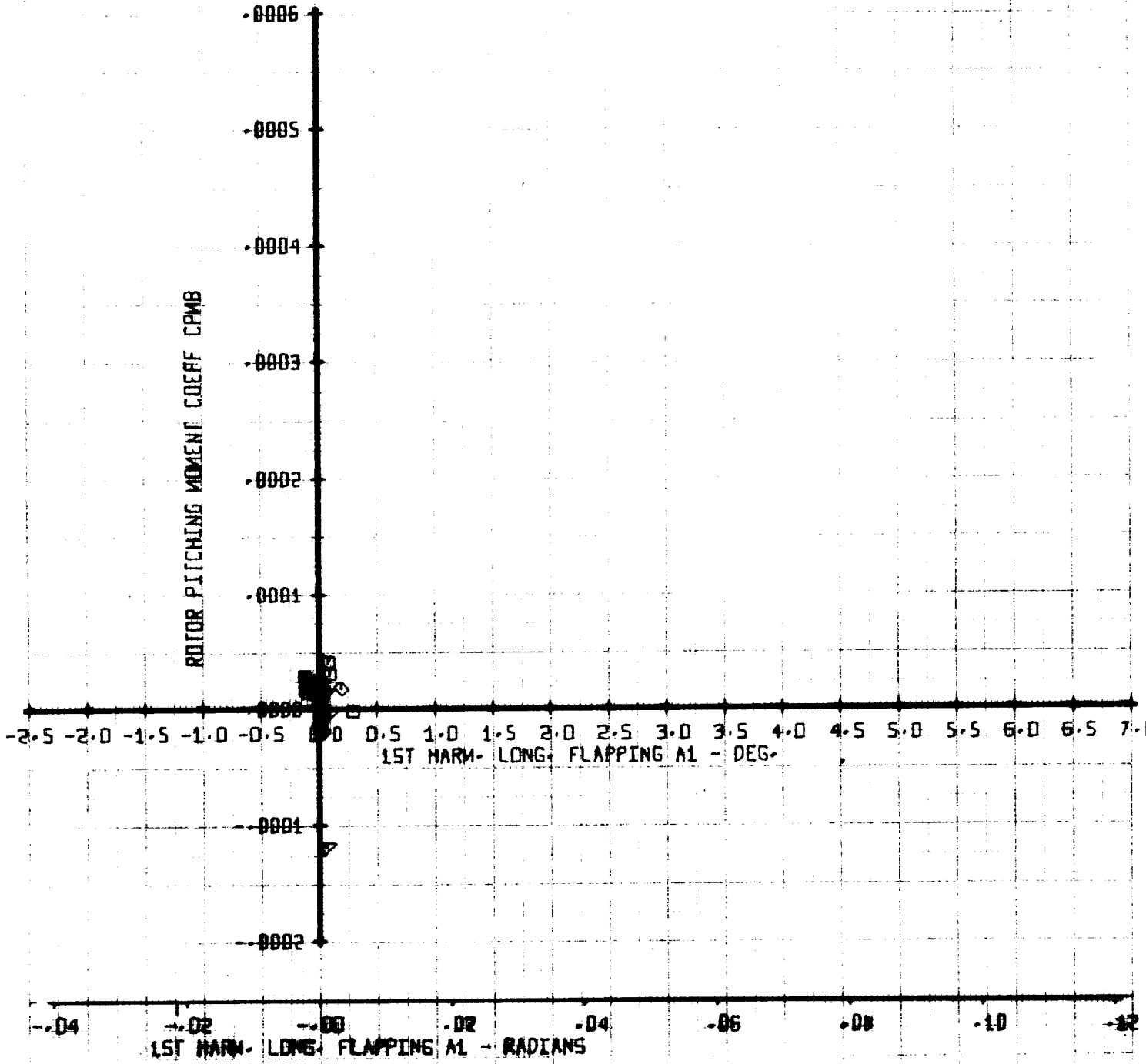
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU	X/00258	VTUN
□	22	0	-	00
△	23	0	-	00
◇	24	0	-	00

ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU	X/0025B	VTUN	
□	22	0	1	0	
△	23	0	1	0	
◇	24	0	1	0	

ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1

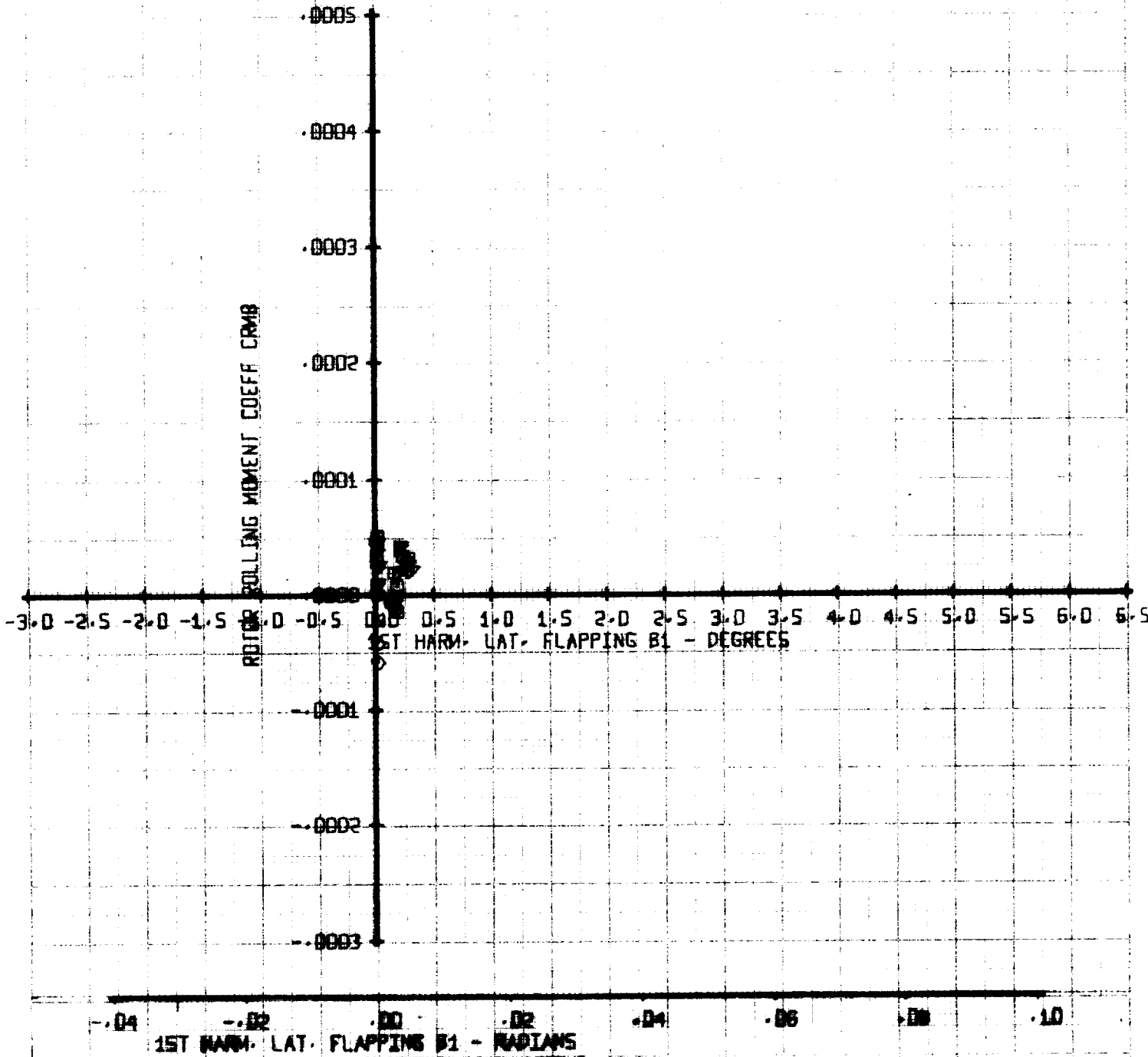


Figure A-26

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
A4890	25	.10	.05	62
	27	.20	.05	124
	28	.20	.05	124
	29	.30	.05	186
	30	.40	.05	248

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT

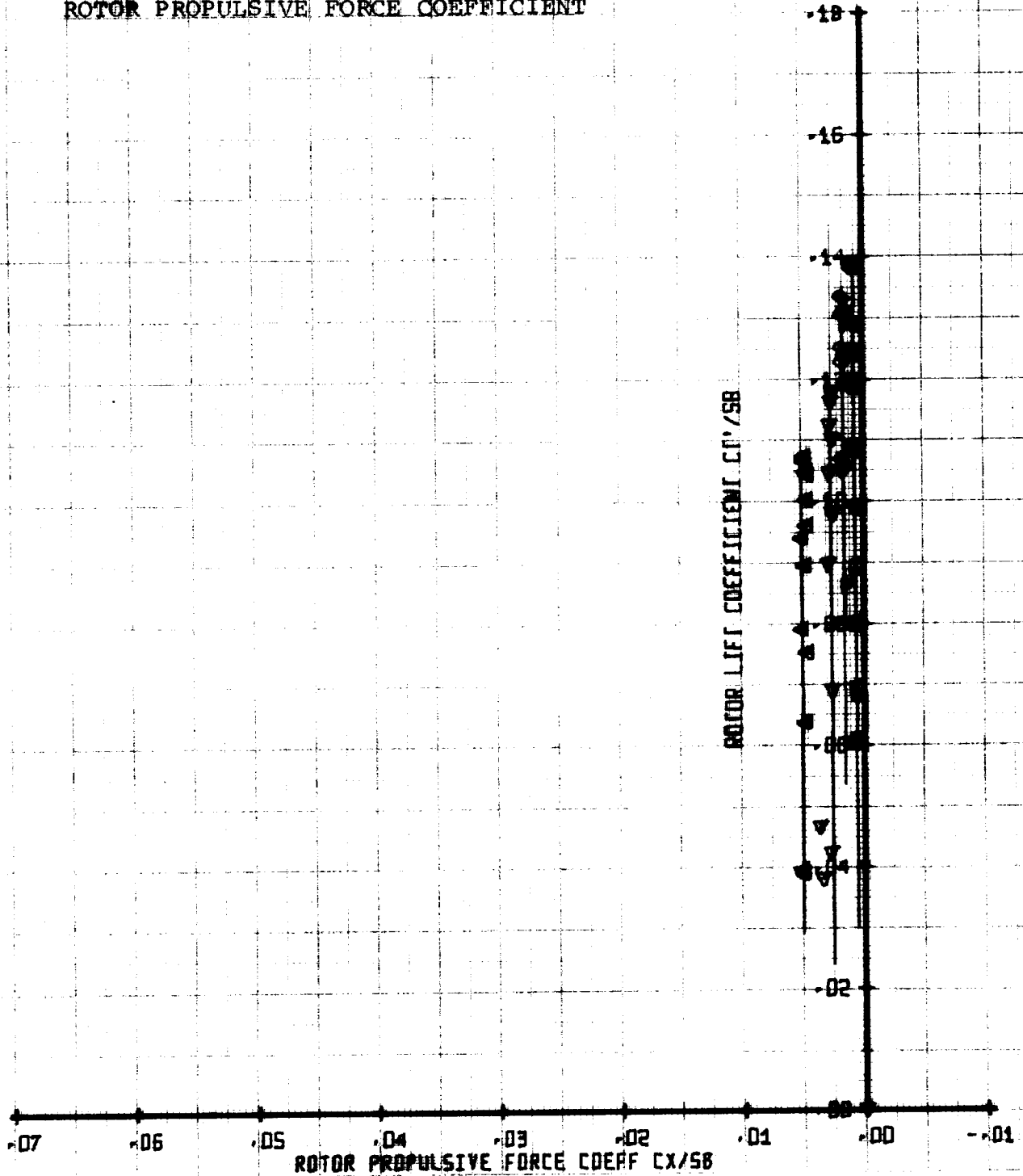
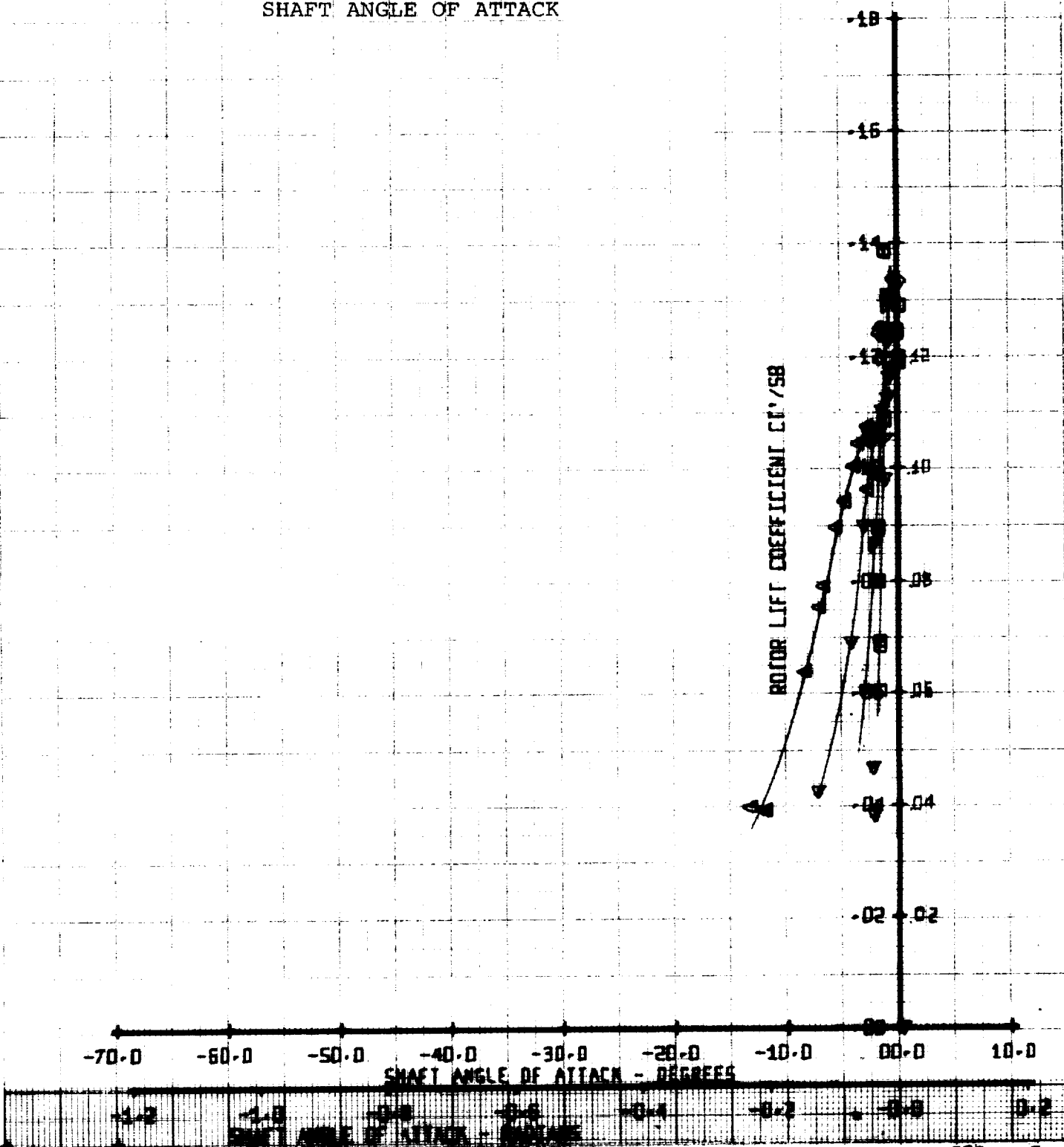


Figure A-27

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-478 ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU'	X/00258	VTUN
▲	25	.10	.05	62
▼	27	.20	.05	124
◆	28	.20	.05	124
▲	29	.30	.05	186
▼	30	.40	.05	248

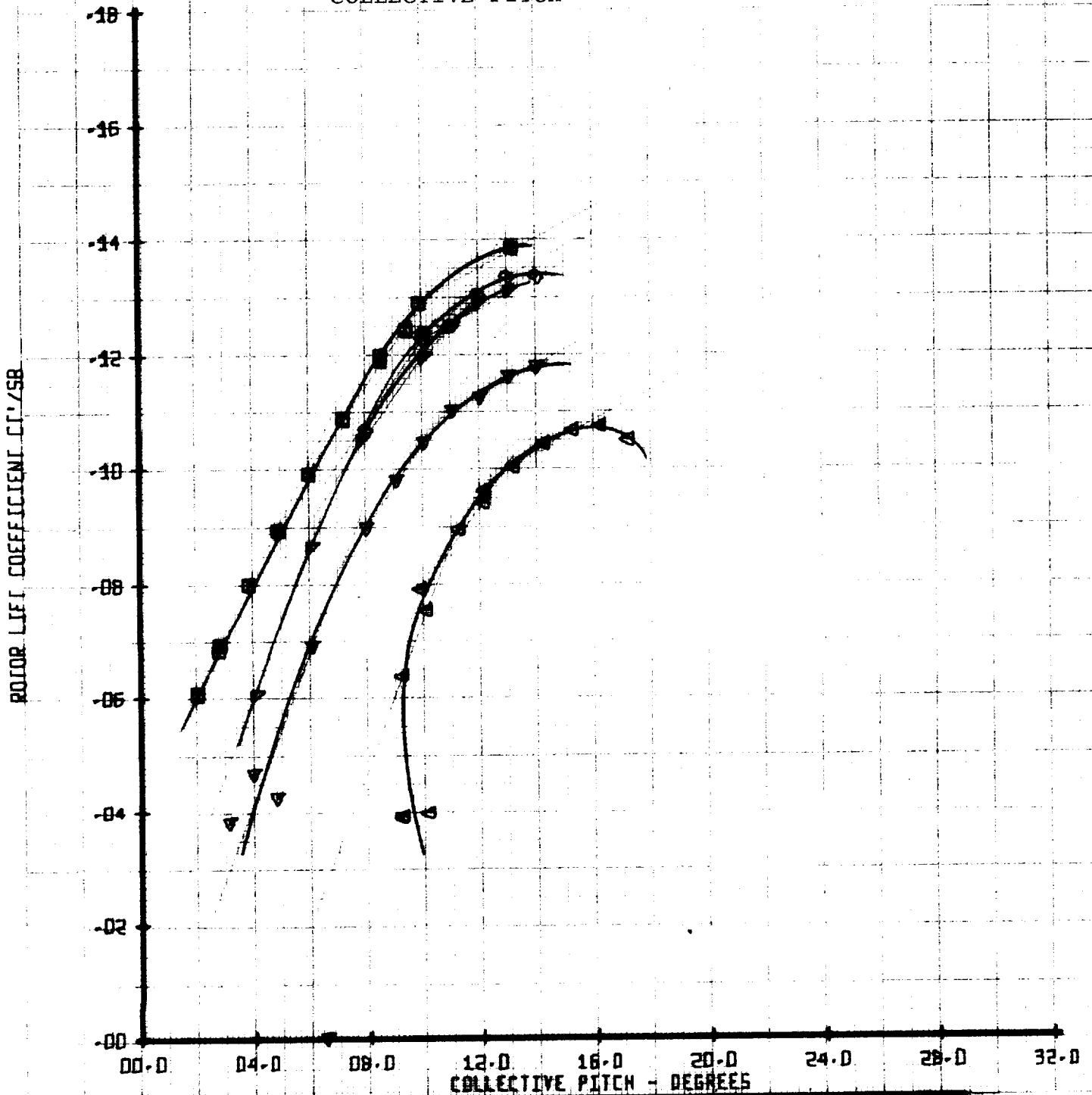
ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI' X/DO258	VTUN
□	25	.10	62
○	27	.20	124
△	28	.20	124
◇	29	.30	186
▽	30	.40	248

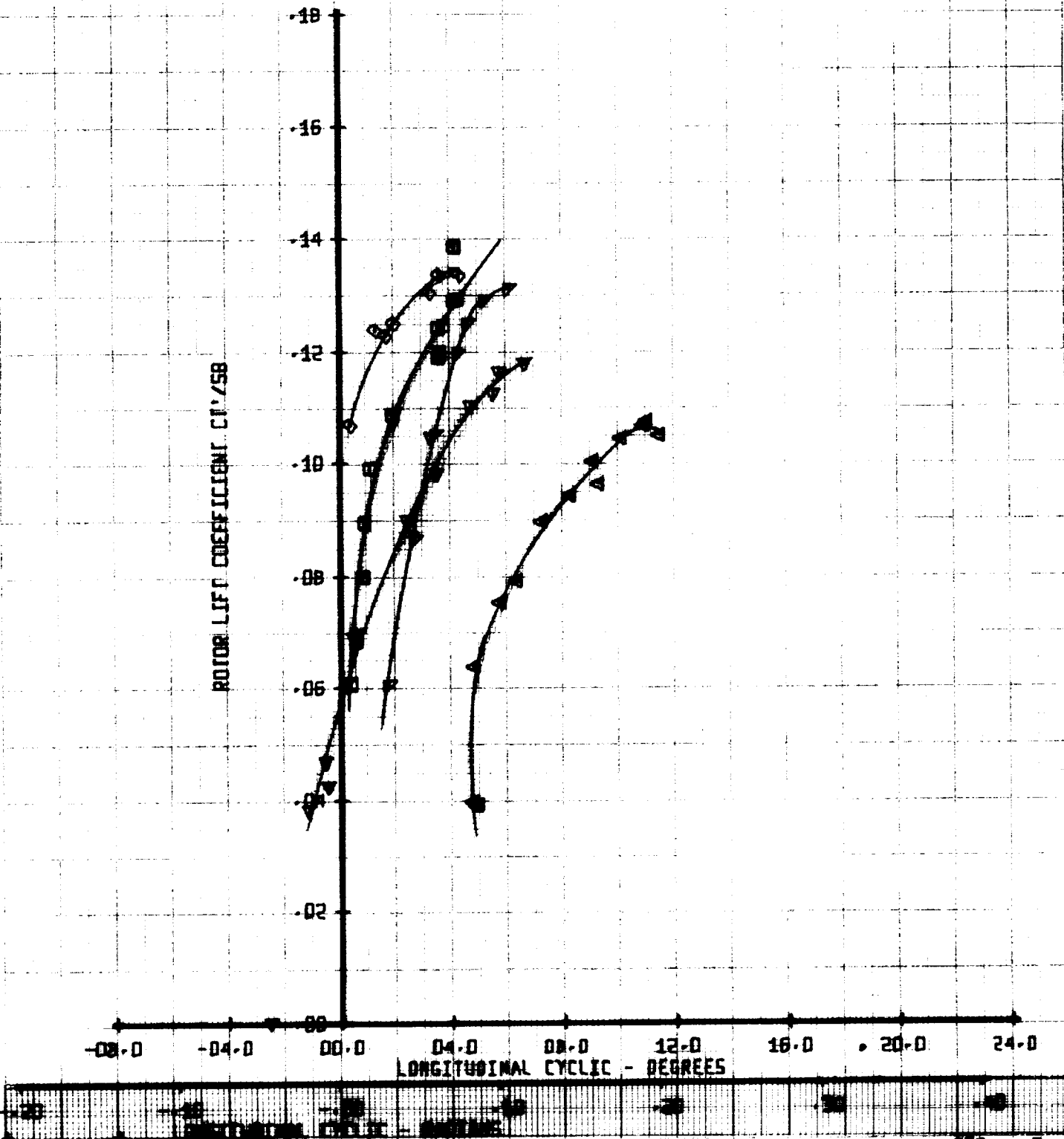
ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI' X/00258	VTUN
◇	25	.10	62
□	27	.20	124
○	28	.20	124
▽	29	.30	186
△	30	.40	248

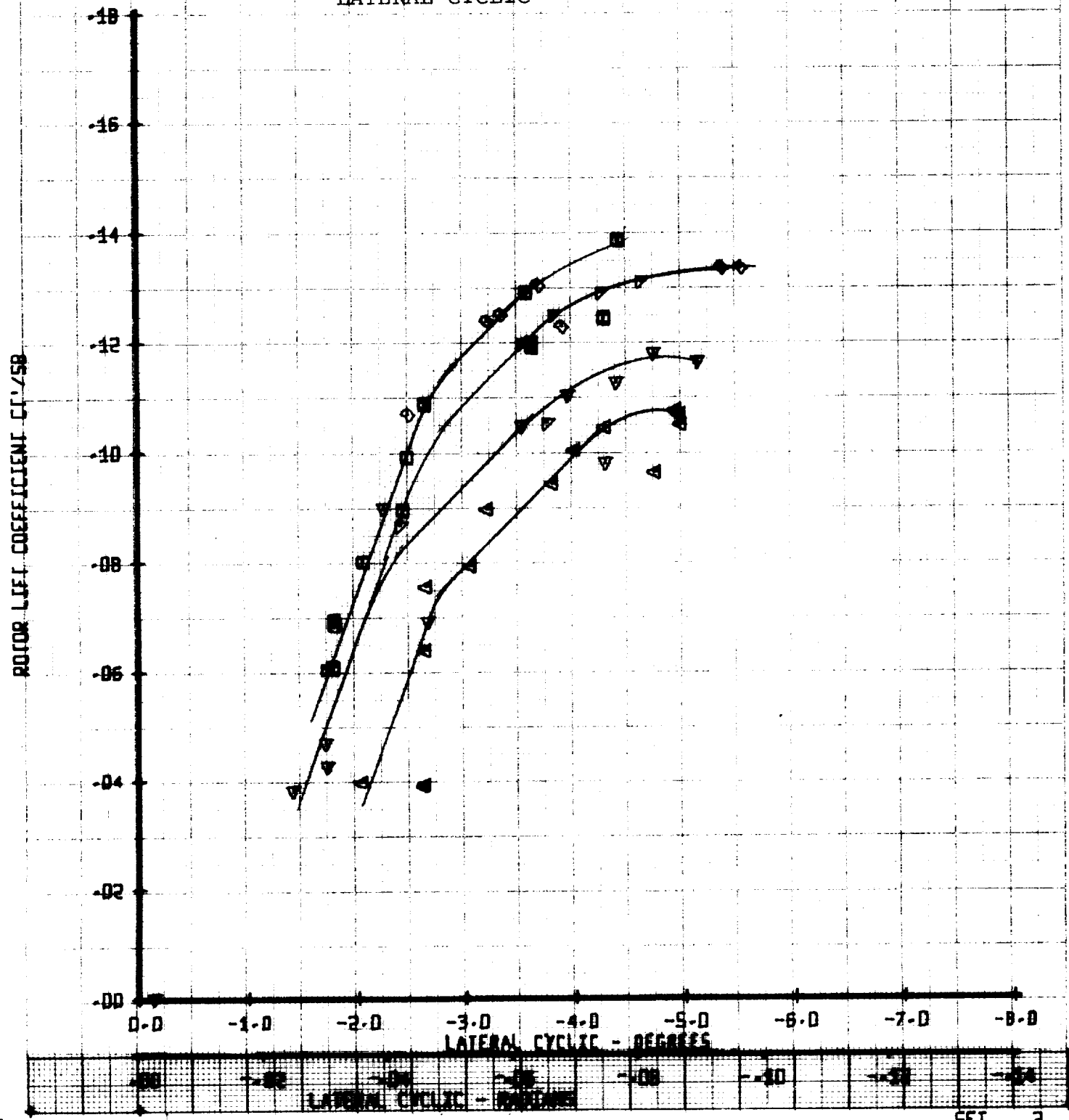
ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	M.I.	X/00258	VTUN
□	25	.10	.05	62
◇	27	.20	.05	124
○	28	.30	.05	124
△	29	.30	.05	186
▲	30	.40	.05	248

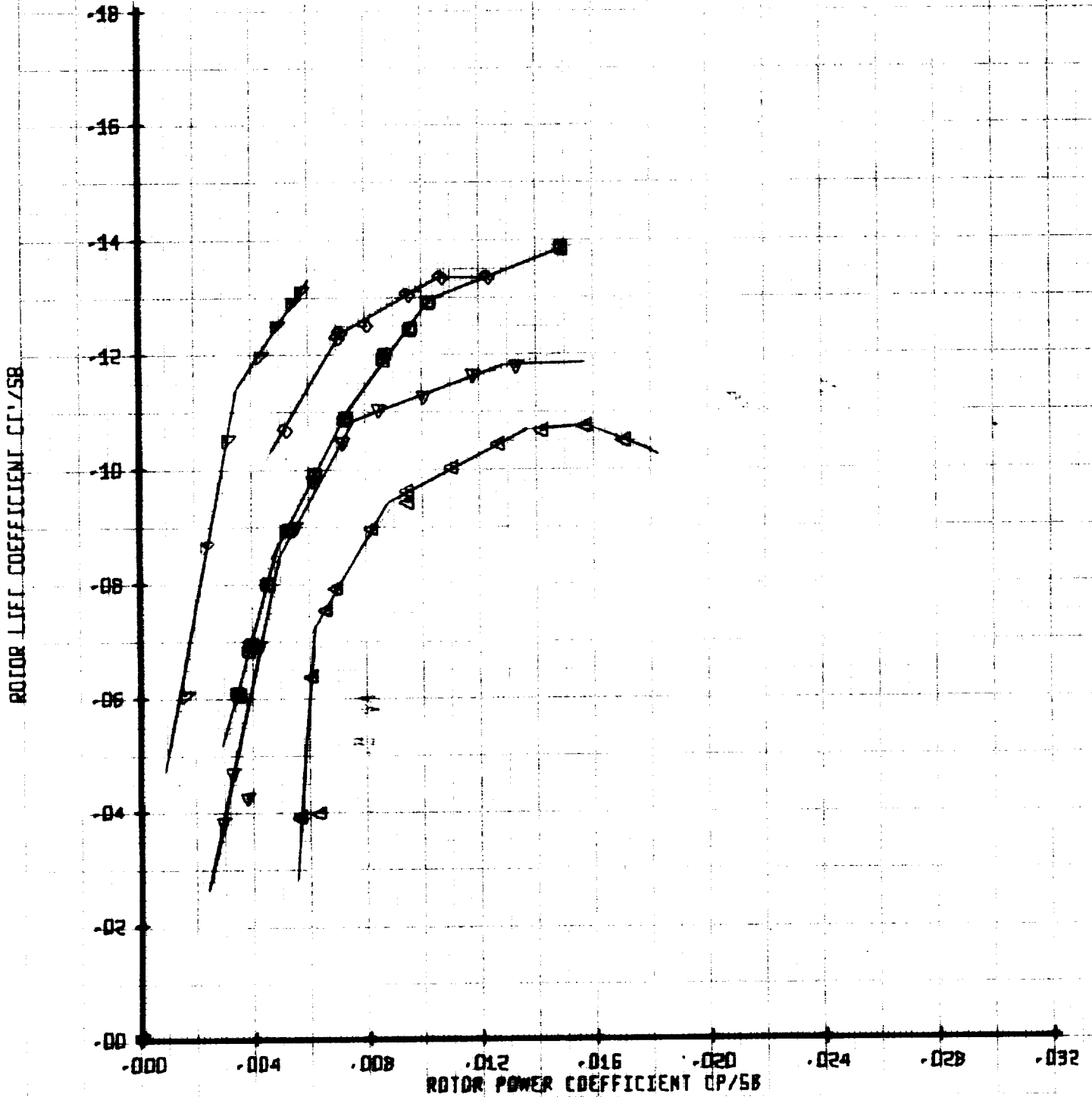
ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
△	25	.10	.05	62
▽	27	.20	.05	124
○	28	.20	.06	124
□	29	.30	.05	186
◇	30	.40	.05	248

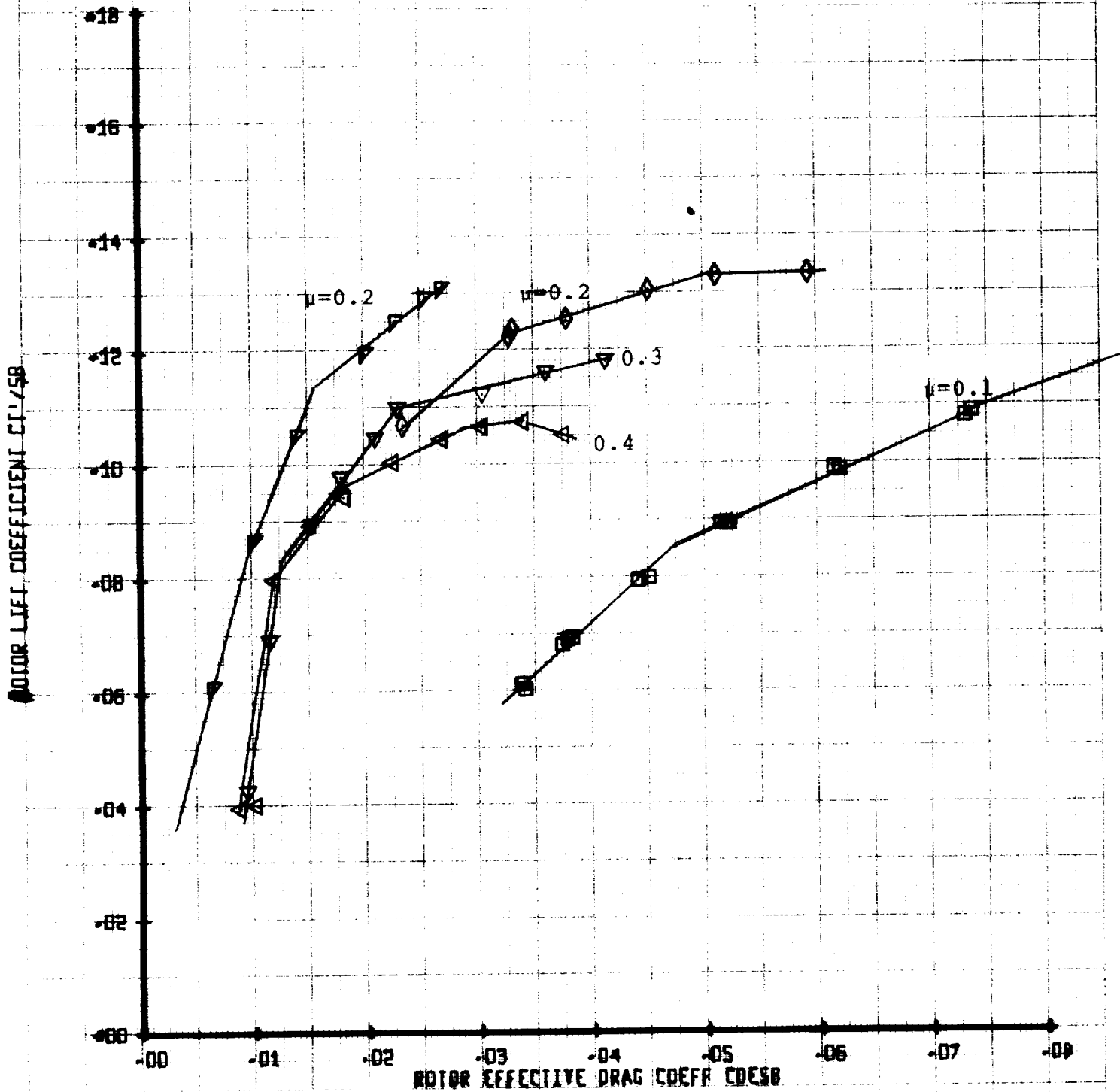
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MY	X/CD250	VTUN
□	25	.10	.05	62
○	27	.20	.05	124
◇	28	.20	.05	124
△	29	.30	.05	186
▽	30	.40	.05	248

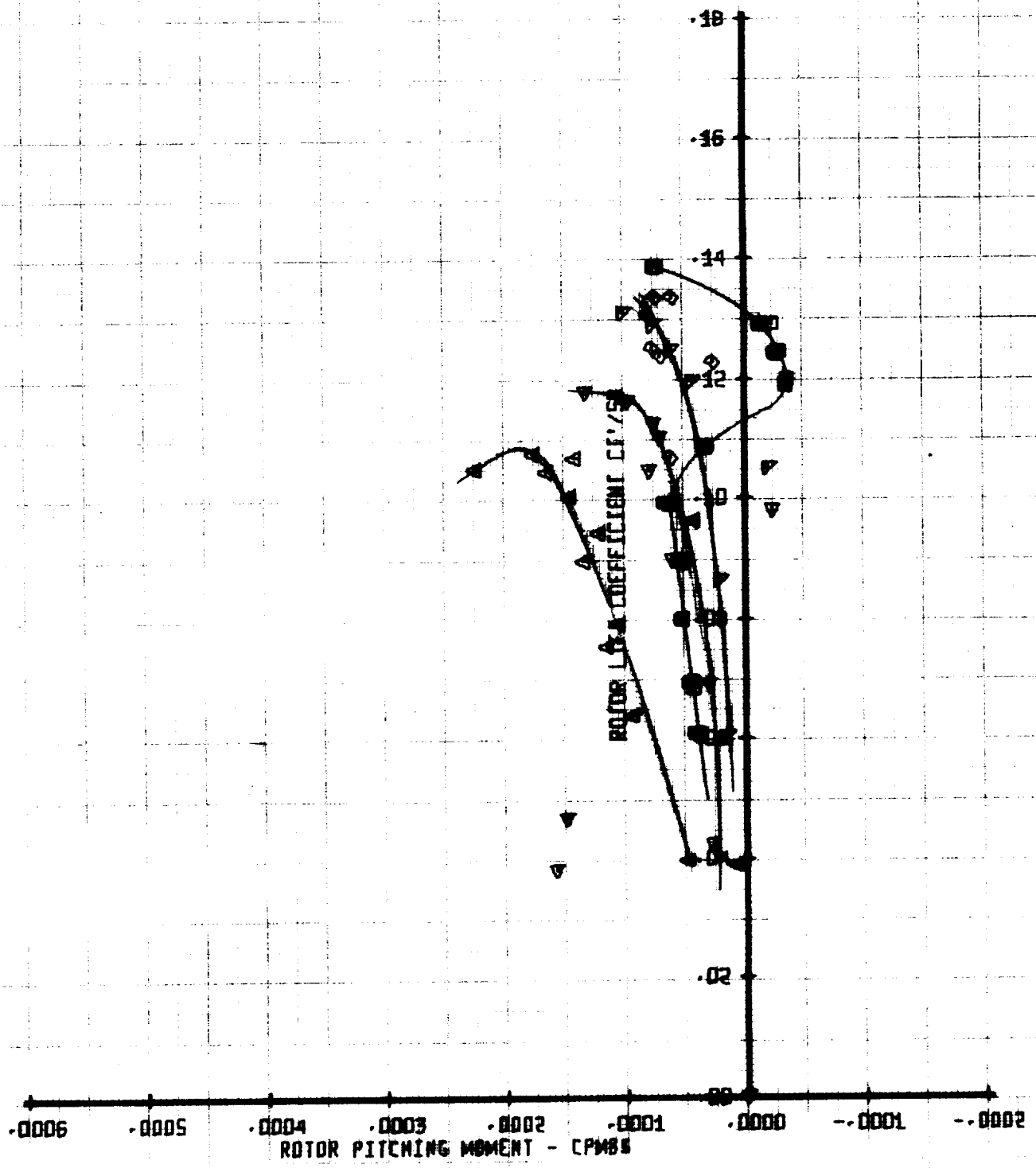
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MLP	X/00258	VTUN
△	25	.10	.05	62
▽	27	.20	.05	124
◇	28	.20	.05	124
○	29	.30	.05	186
□	30	.40	.05	248

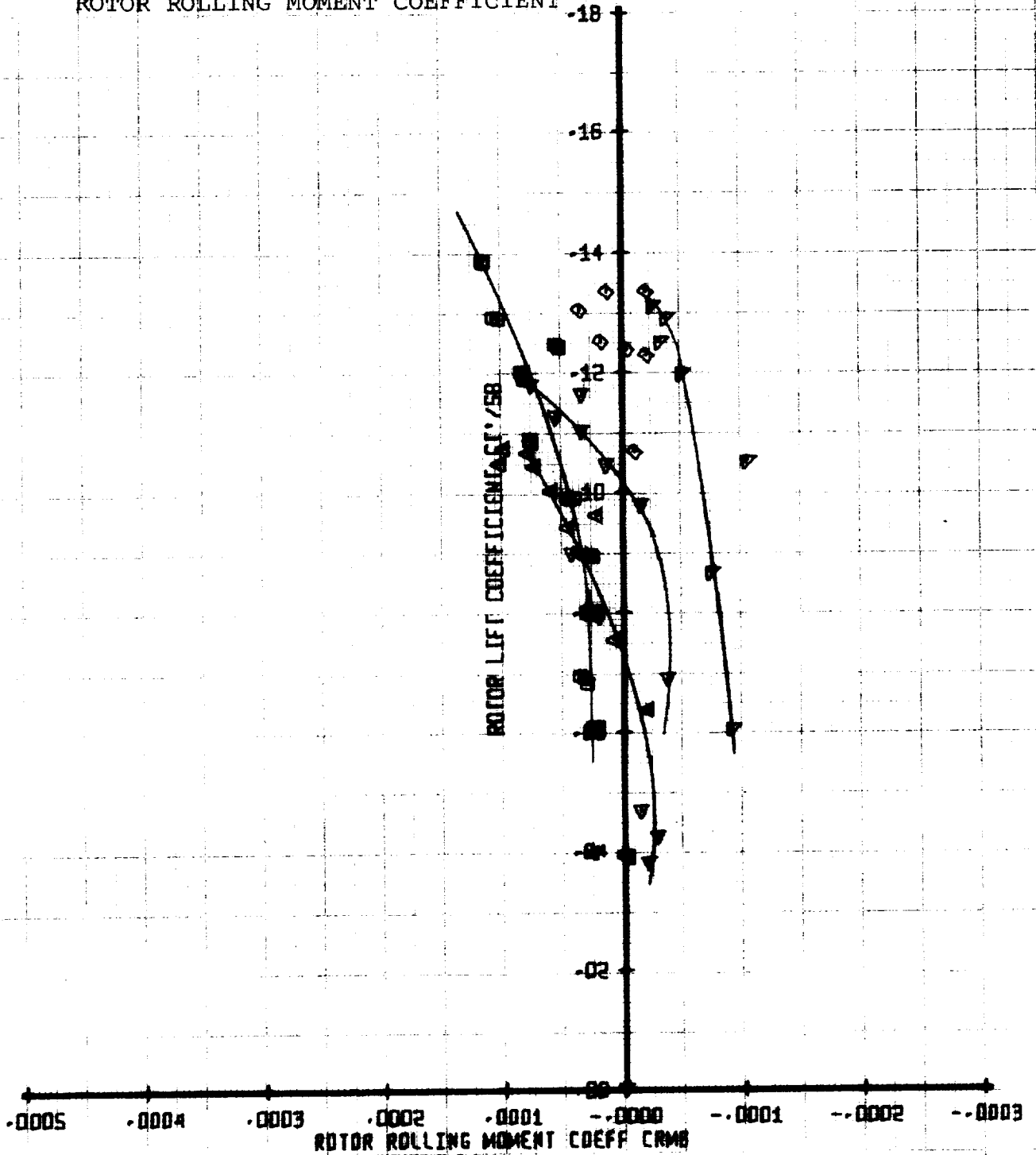
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	ML'	X/00258	VTUM
◇	25	.10	.05	62
◇	27	.20	.05	124
◇	28	.20	.05	124
◇	29	.30	.05	186
△	30	.40	.05	248

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
□	25	.10	.05	62
◇	27	.20	.05	124
△	28	.30	.05	124
▽	29	.30	.05	186
▲	30	.40	.05	248

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT

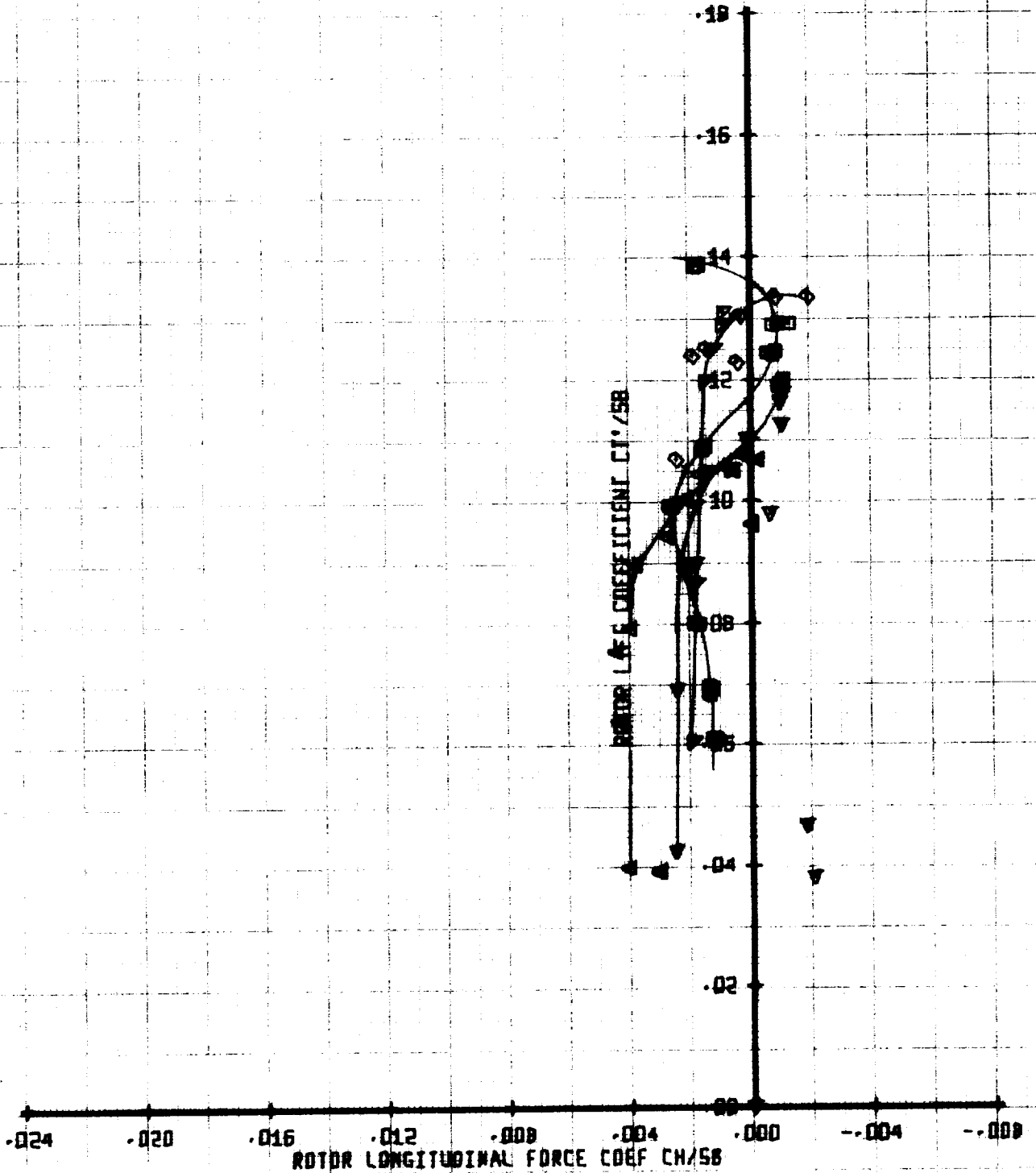
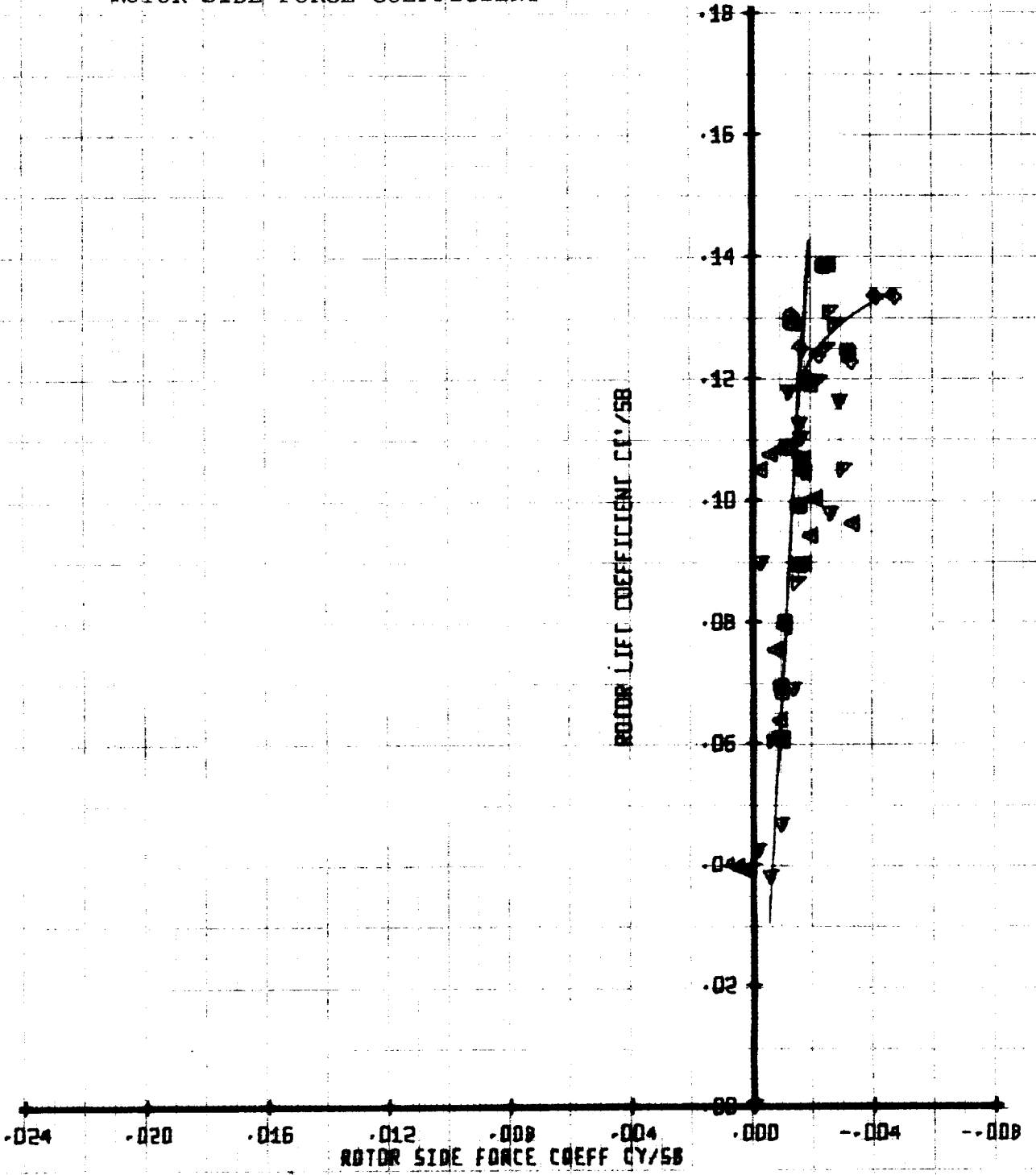


Figure A-36

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	ML	X/00258	VTUN
△	25	.10	.05	62
◇	27	.20	.05	124
▽	28	.30	.05	124
○	29	.30	.05	186
△	30	.40	.05	248

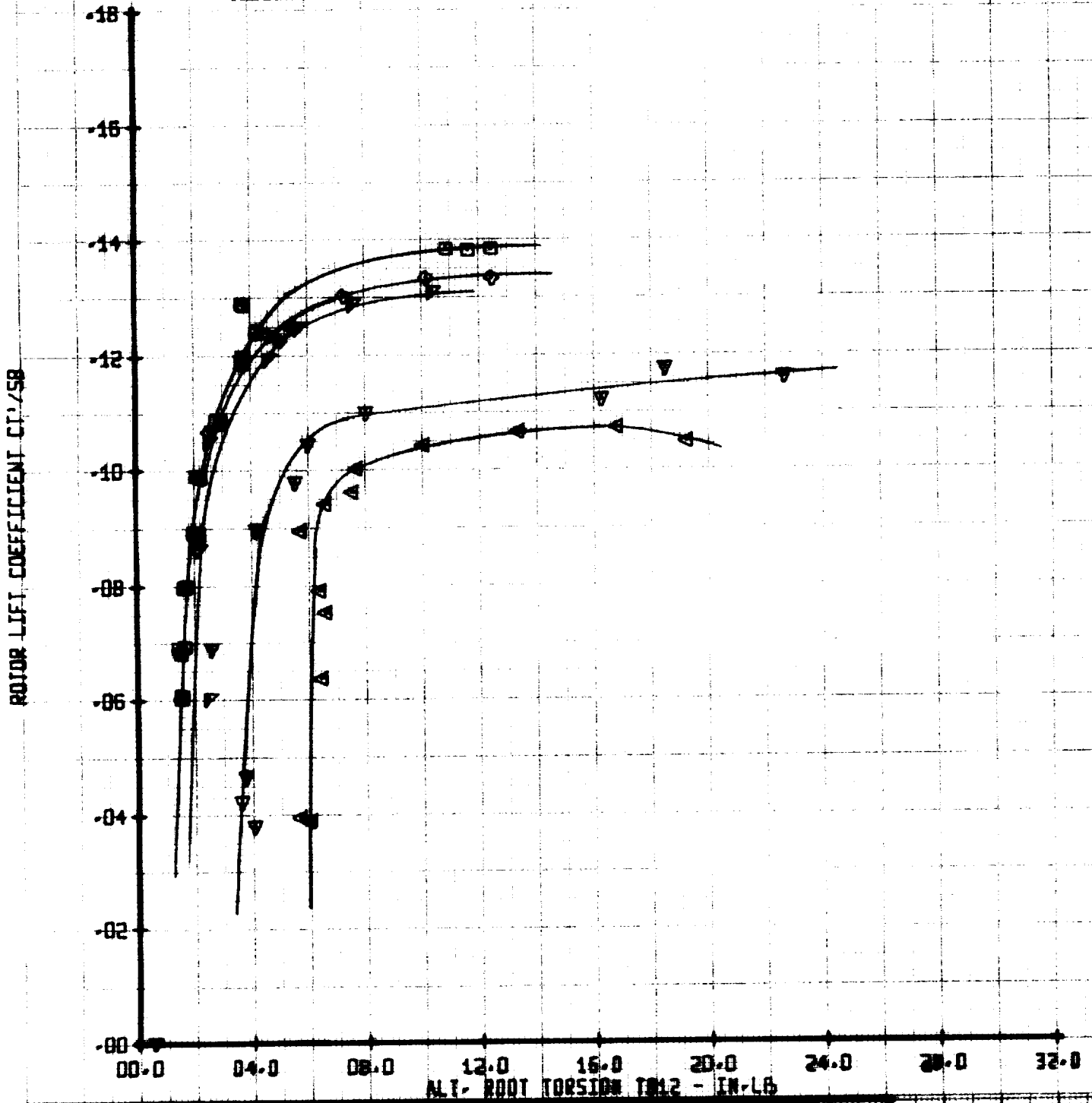
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU*	X/00250	WTUN
▲	25	.10	.05	82
▼	27	.20	.05	124
◆	28	.30	.05	174
▲	29	.30	.05	186
▼	30	.40	.05	248

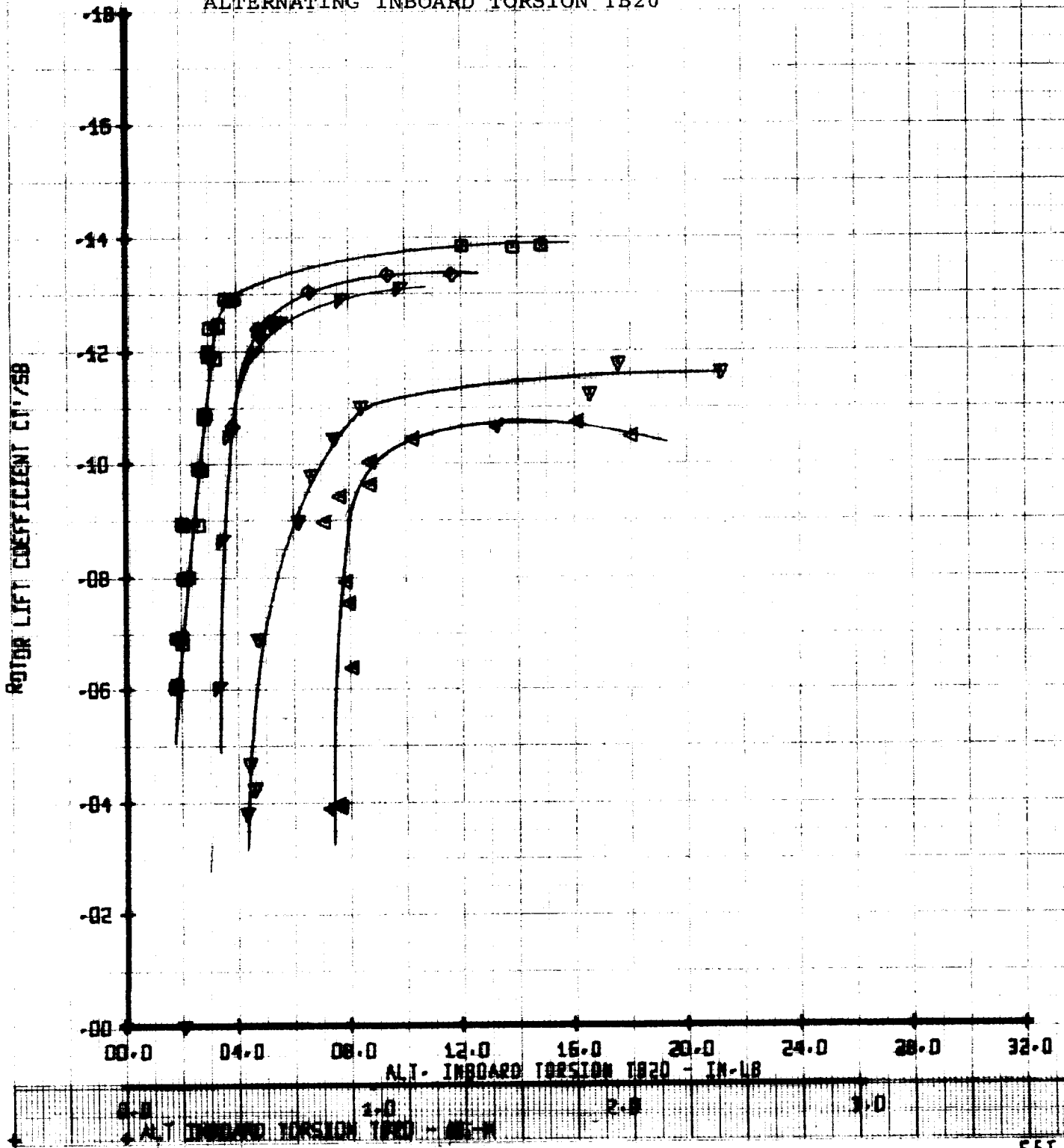
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	25	.10	.05	92
○	27	.20	.05	124
△	28	.20	.05	124
▽	29	.30	.05	186
◇	30	.40	.05	248

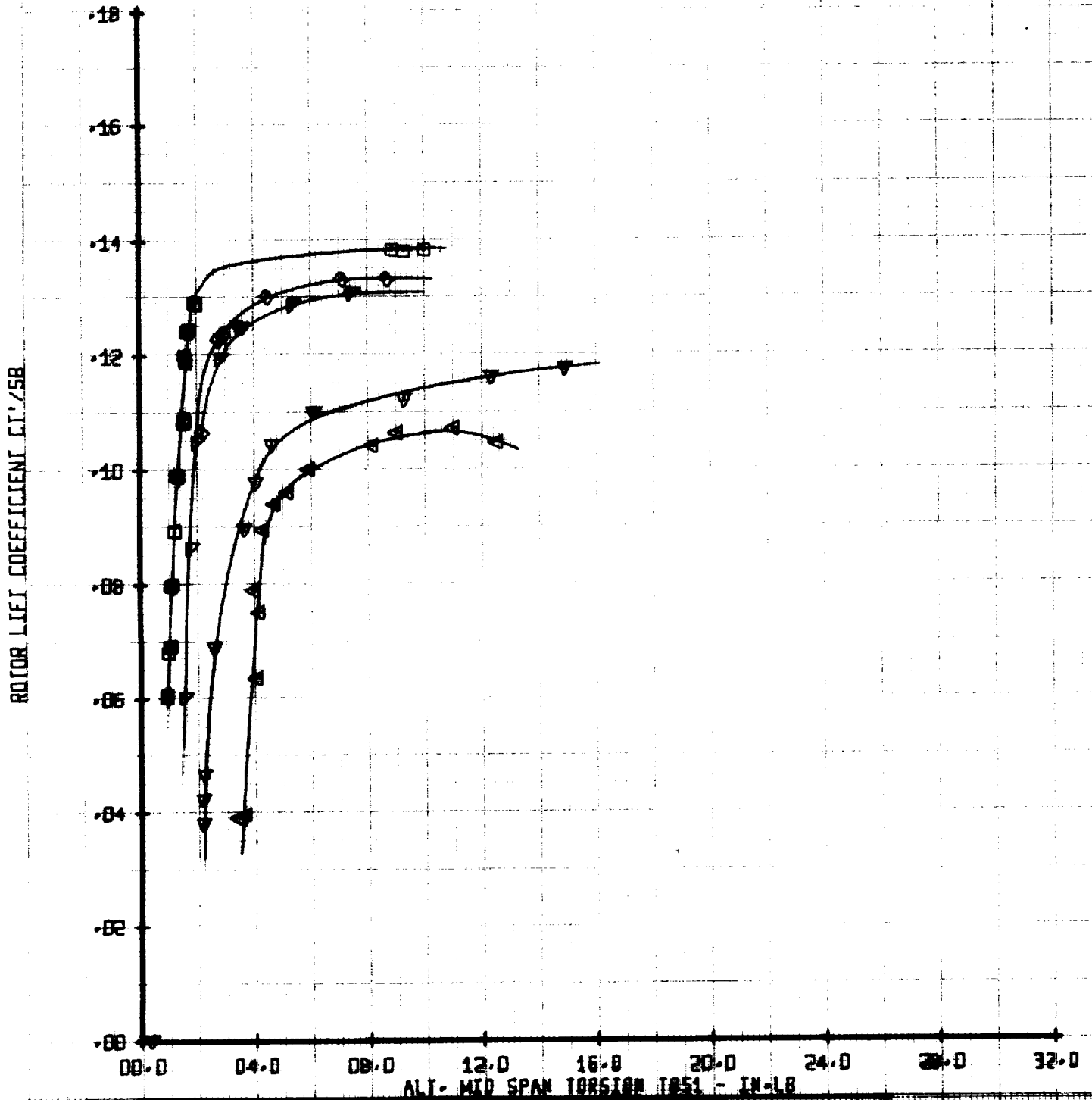
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING INBOARD TORSION TB20



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	25	.10	.05	62
○	27	.20	.05	124
◇	28	.28	.05	124
▽	29	.30	.05	186
△	30	.40	.05	248

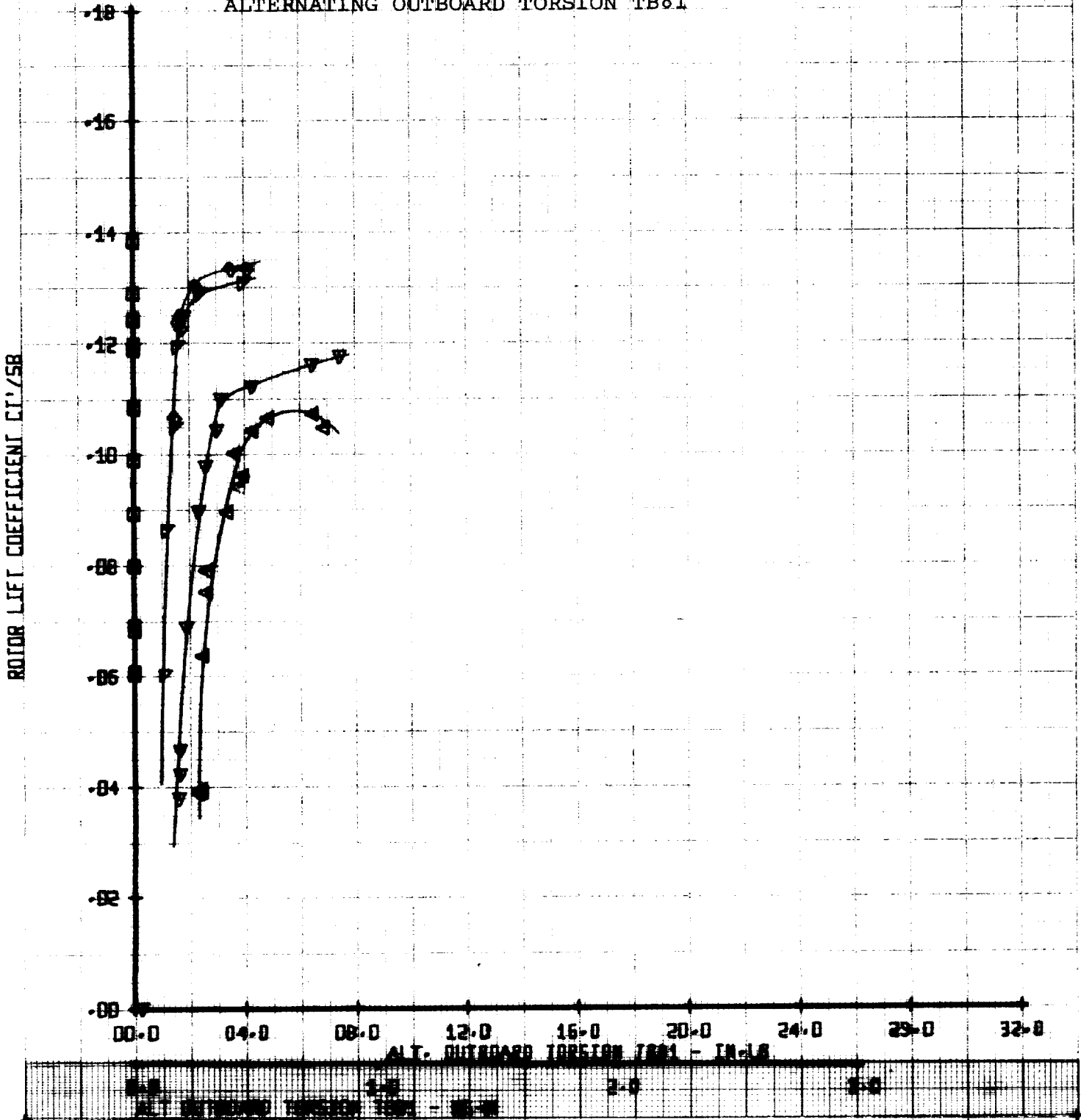
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB51



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/OD258	NTUN
□	25	.10	.05	62
○	27	.20	.05	124
△	28	.28	.05	124
▽	29	.30	.05	186
▲	30	.40	.05	248

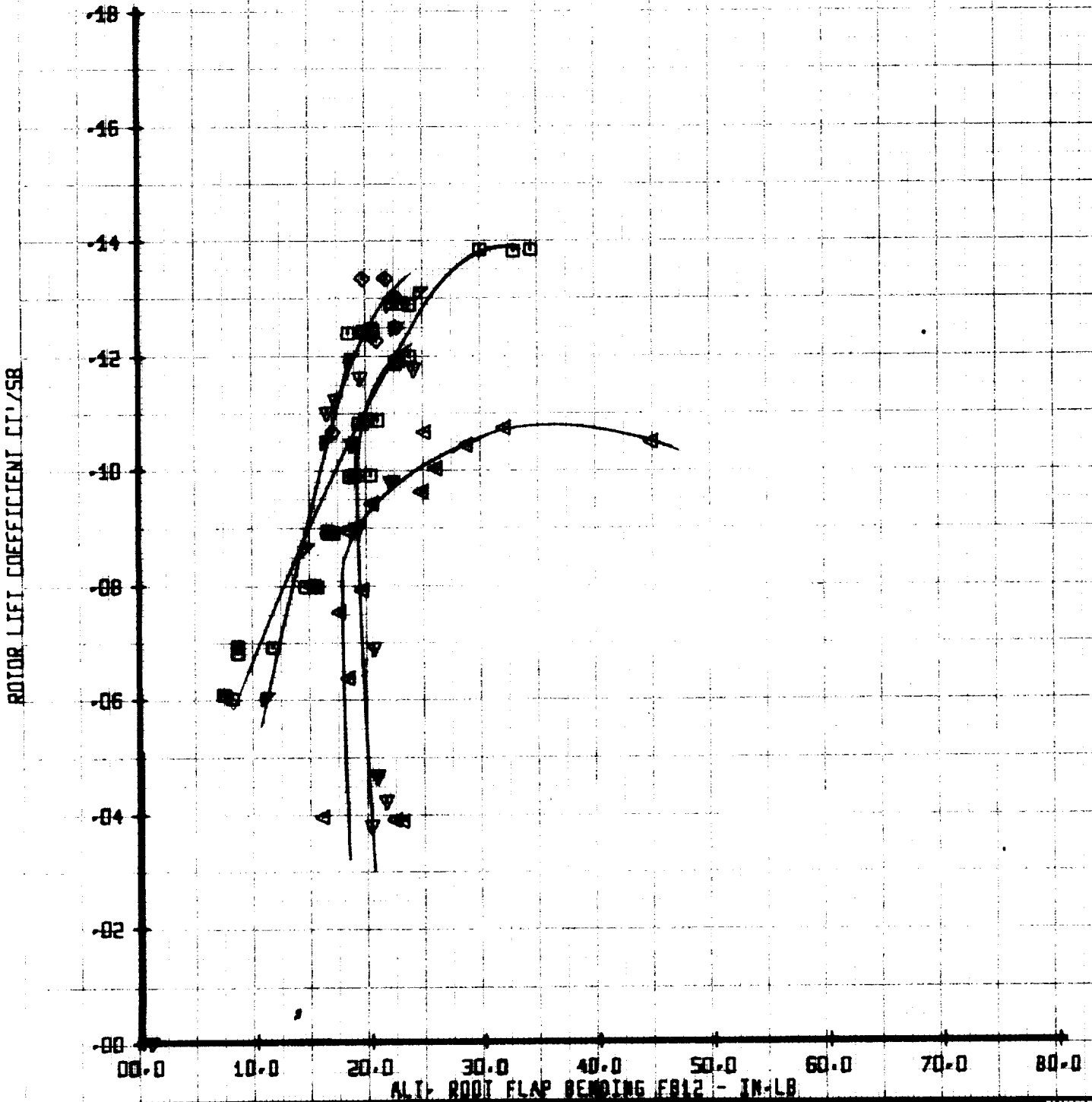
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB81



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/DO	VTUN
□	1	.10	.00758	62
○	2	.10	.00758	124
△	3	.10	.00758	186
▽	4	.10	.00758	248

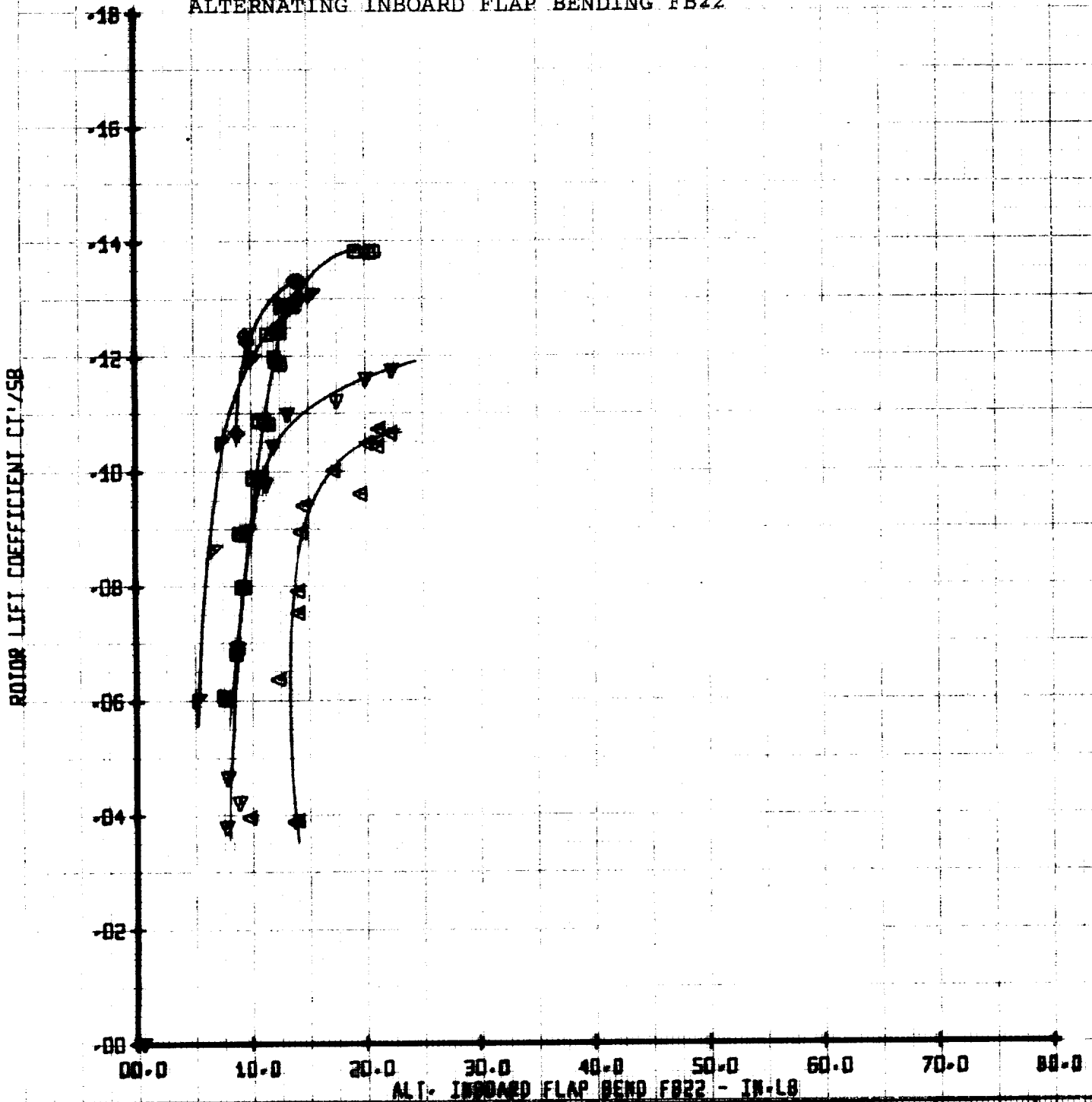
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	M ²	X/00258	VTUN
○	25	.10	.010	62
△	27	.20	.020	124
▽	28	.30	.030	186
◇	29	.40	.040	248

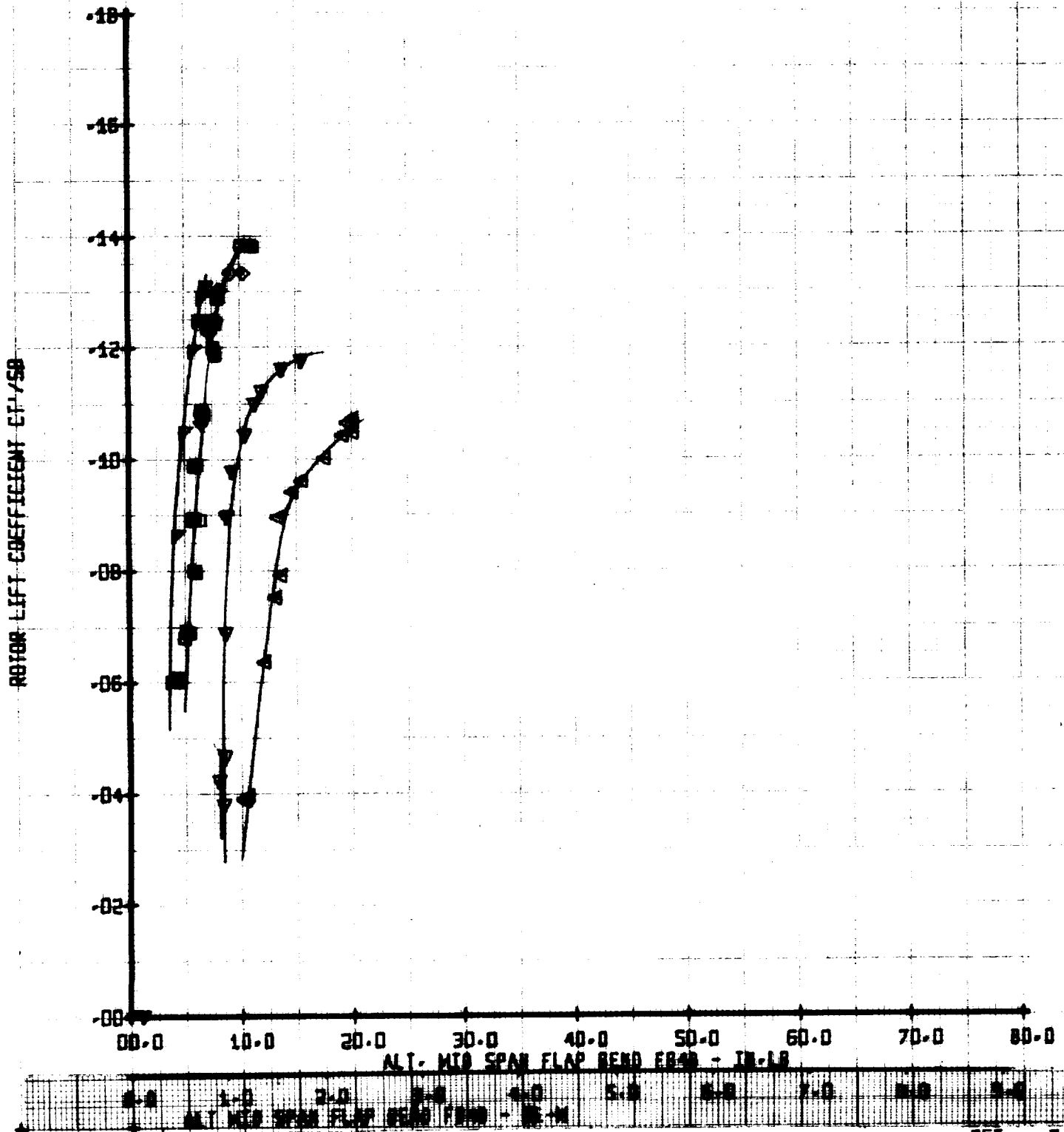
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING INBOARD FLAP BENDING FB22



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI	X/1000	VTUN
44	25	.10	124	62
45	27	.20	124	124
46	28	.30	124	186
47	29	.40	124	248
48	30	.40	124	248

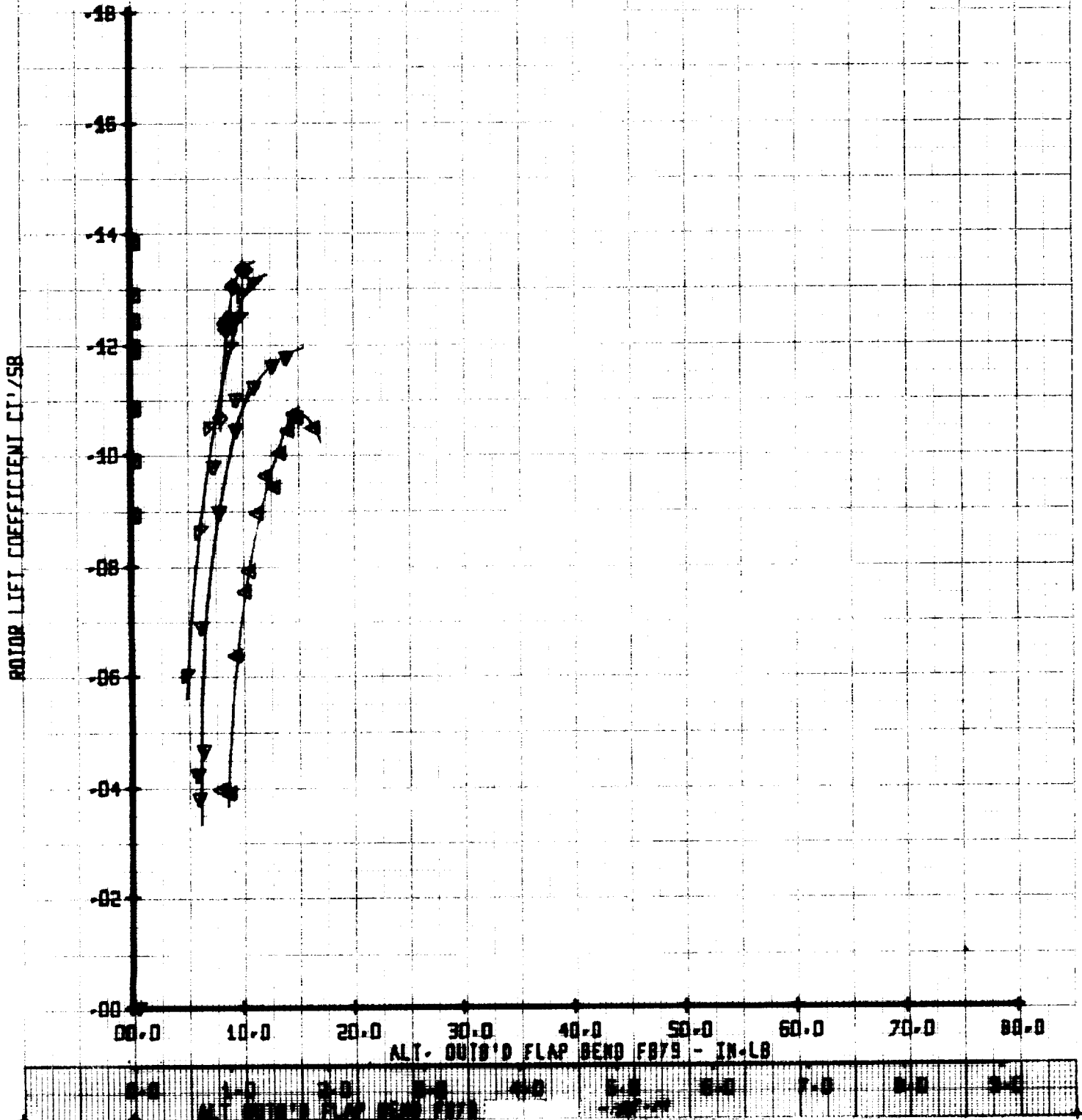
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BENDING FB48



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND
 5.0
 10.0
 15.0
 20.0
 25.0
 30.0
 35.0
 40.0
 45.0
 50.0
 55.0
 60.0
 65.0
 70.0
 75.0
 80.0
 85.0
 90.0

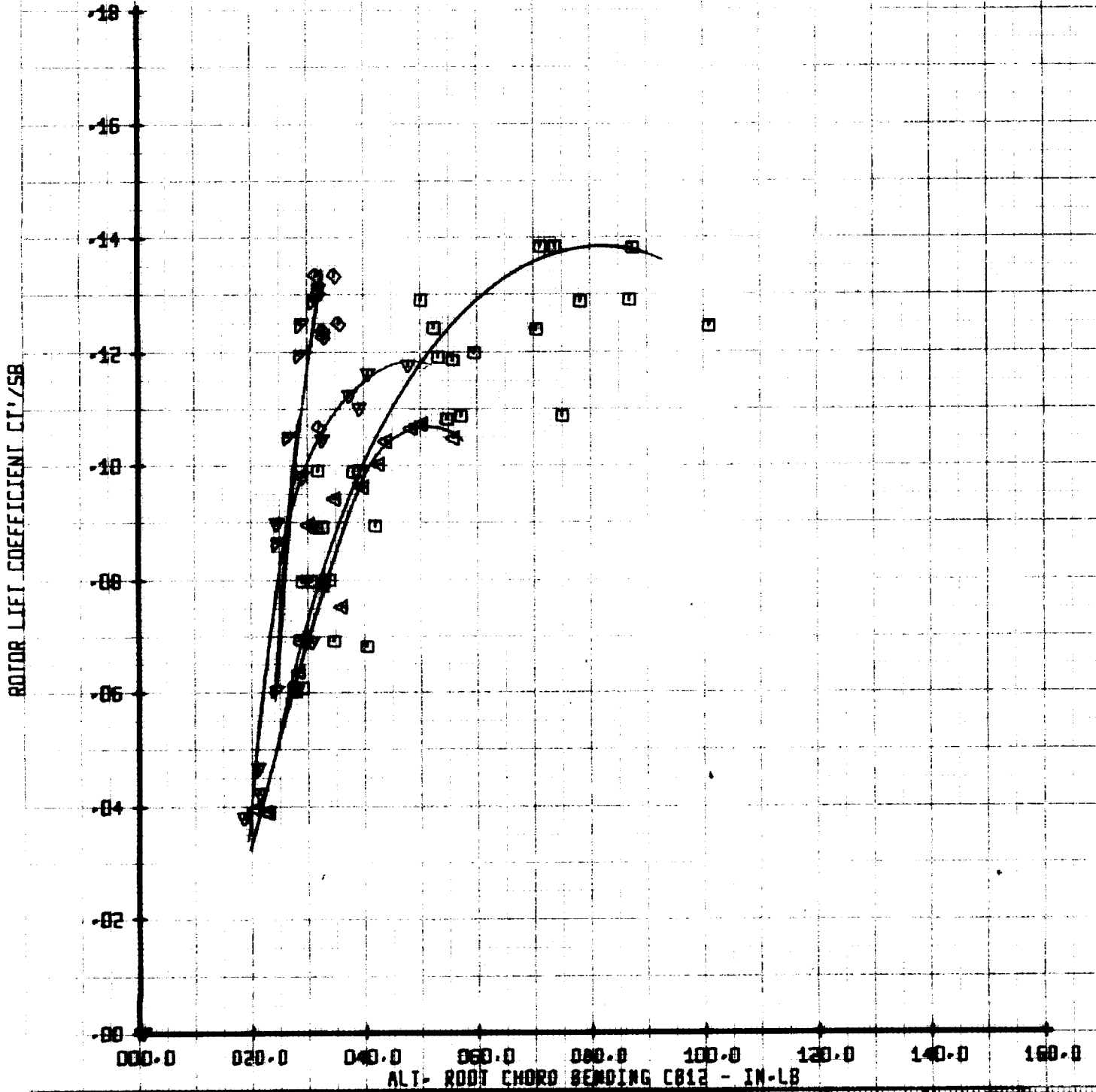
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB79



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/DD2SB	VTUN
▲	25	.10	.05	62
■	27	.20	.05	124
▲	28	.20	.05	124
■	29	.30	.05	186
■	30	.40	.05	248

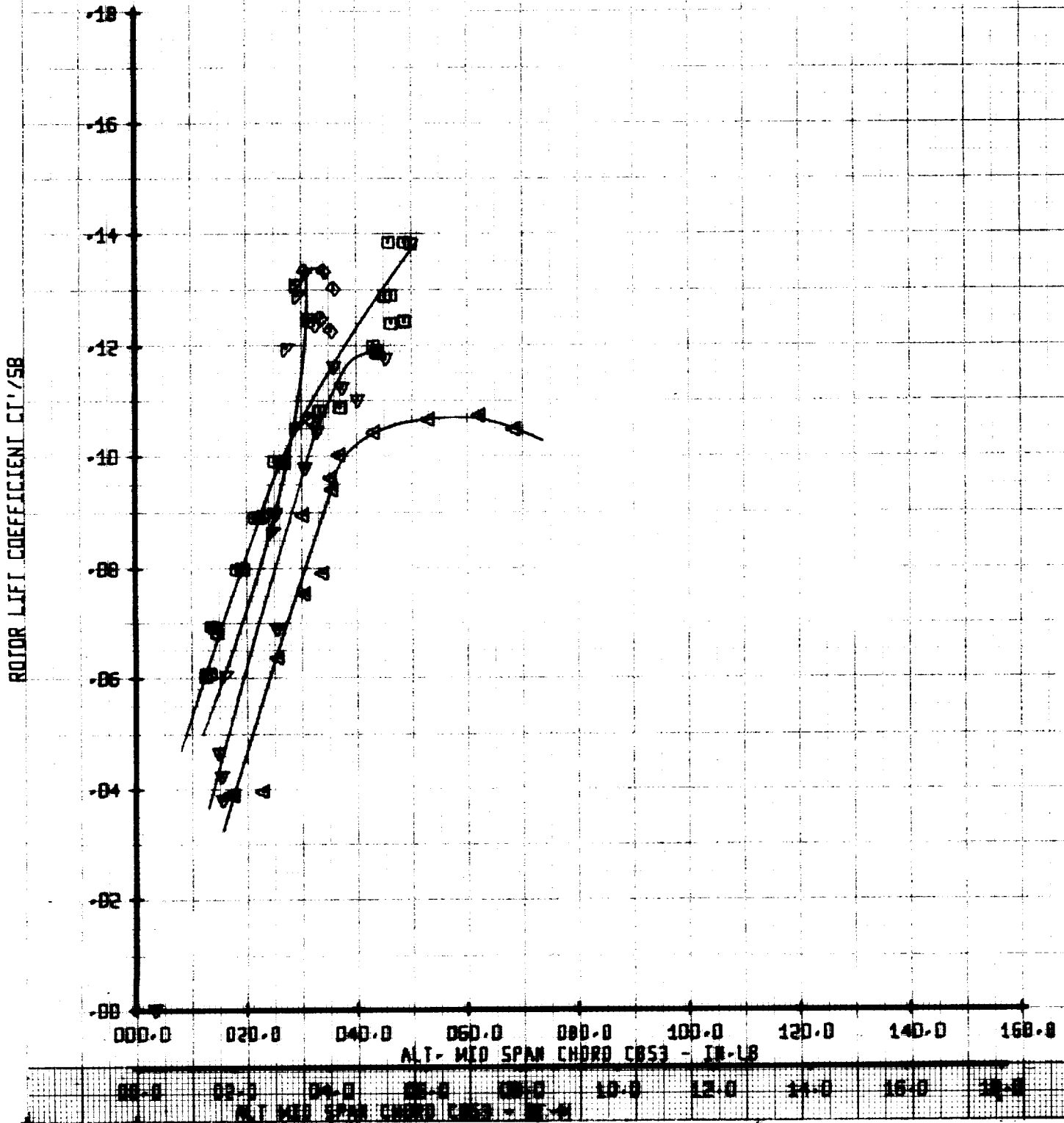
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/DD2SB	VTUN
□	25	.10	.05	62
△	27	.20	.05	124
◇	28	.20	.05	124
▽	29	.30	.05	186
▲	30	.40	.05	248

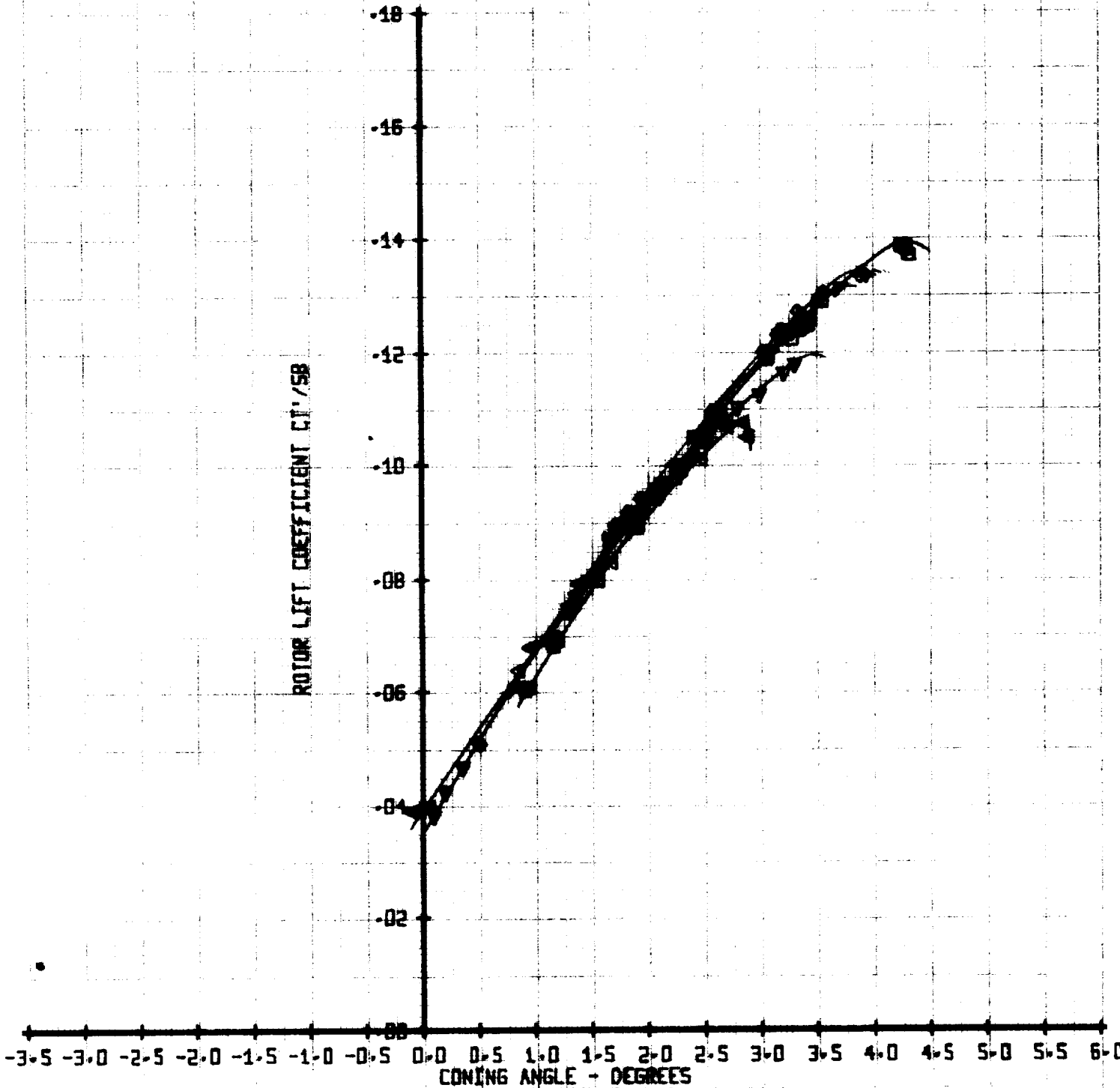
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN CHORD CB53



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/100258	VTUN
A497G	27	.15	.05	62
	28	.20	.05	124
	29	.25	.05	124
	30	.30	.05	186
	31	.35	.05	248

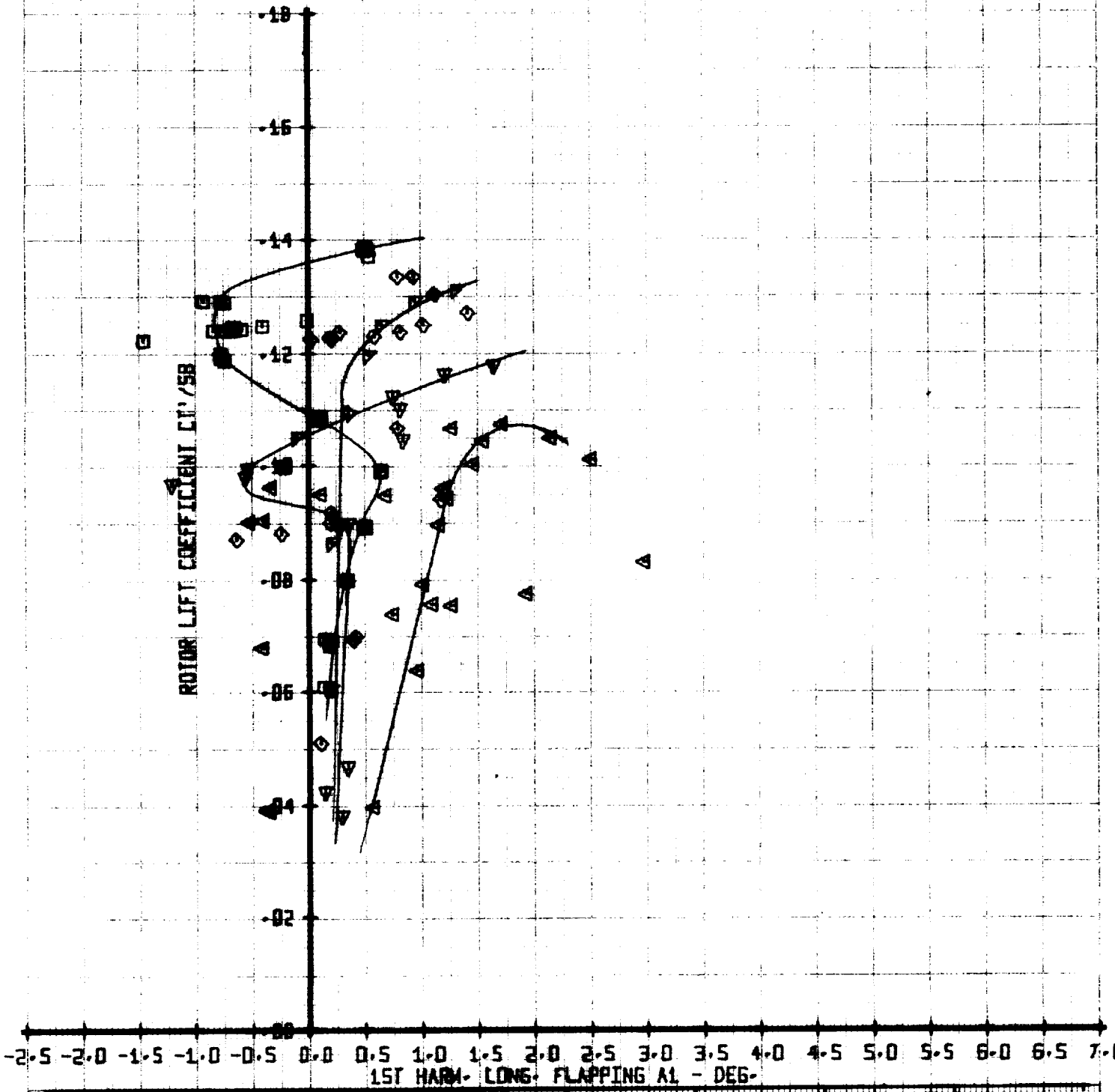
ROTOR LIFT COEFFICIENT
 VERSUS
 CONING ANGLE



LEFT-PROPULSIVE FORCE LIMIT TEST
1/10 SCALE OH-47B ROTOR
LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
□	25	.10	.15	62
△	27	.20	.15	124
◇	28	.30	.15	174
▽	29	.30	.15	186
▲	30	.40	.15	248

ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
□	25	.10	.05	62
▽	27	.20	.05	124
◊	28	.30	.05	124
◀	29	.30	.05	186
▲	30	.40	.05	248

ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1

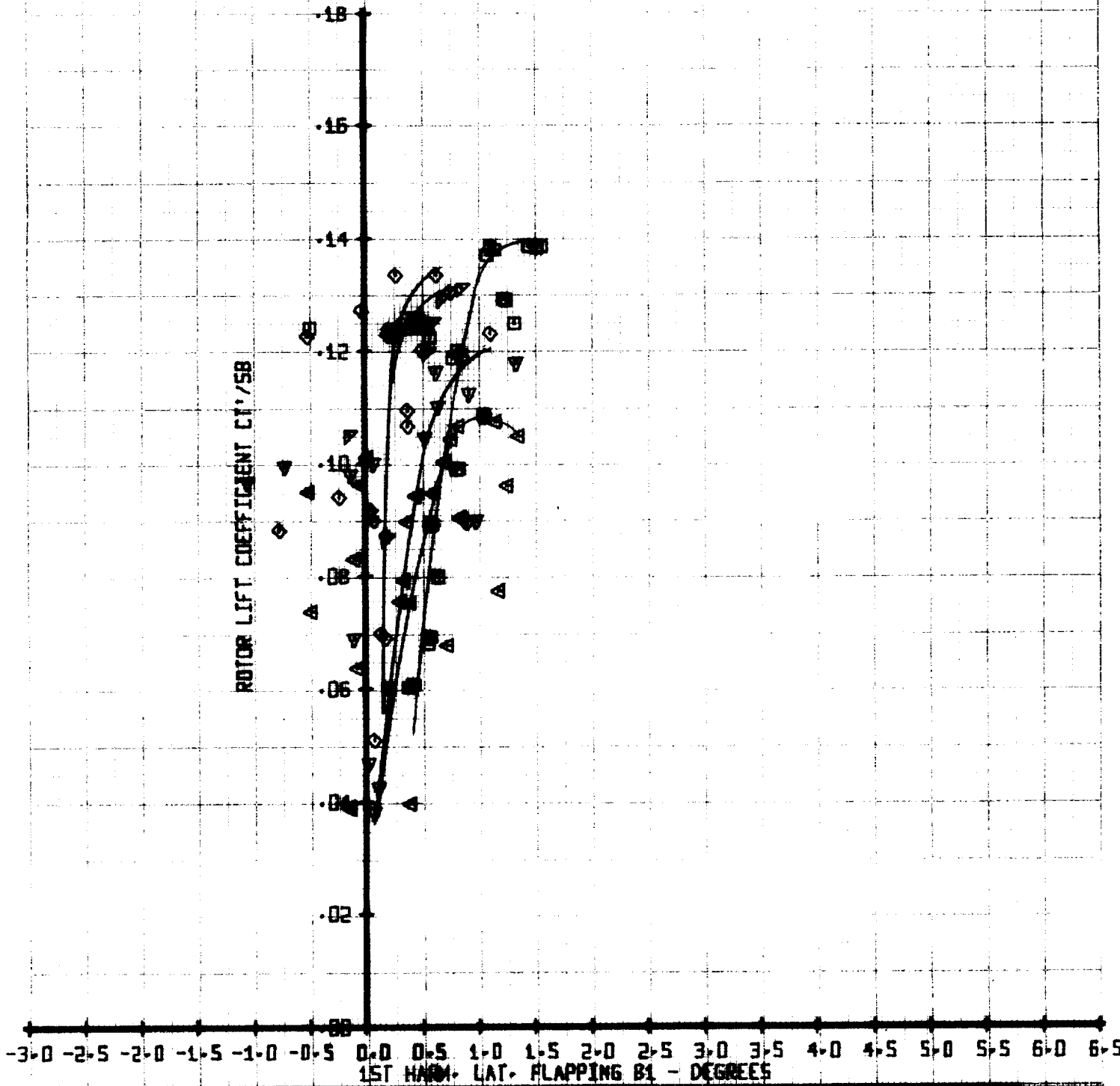
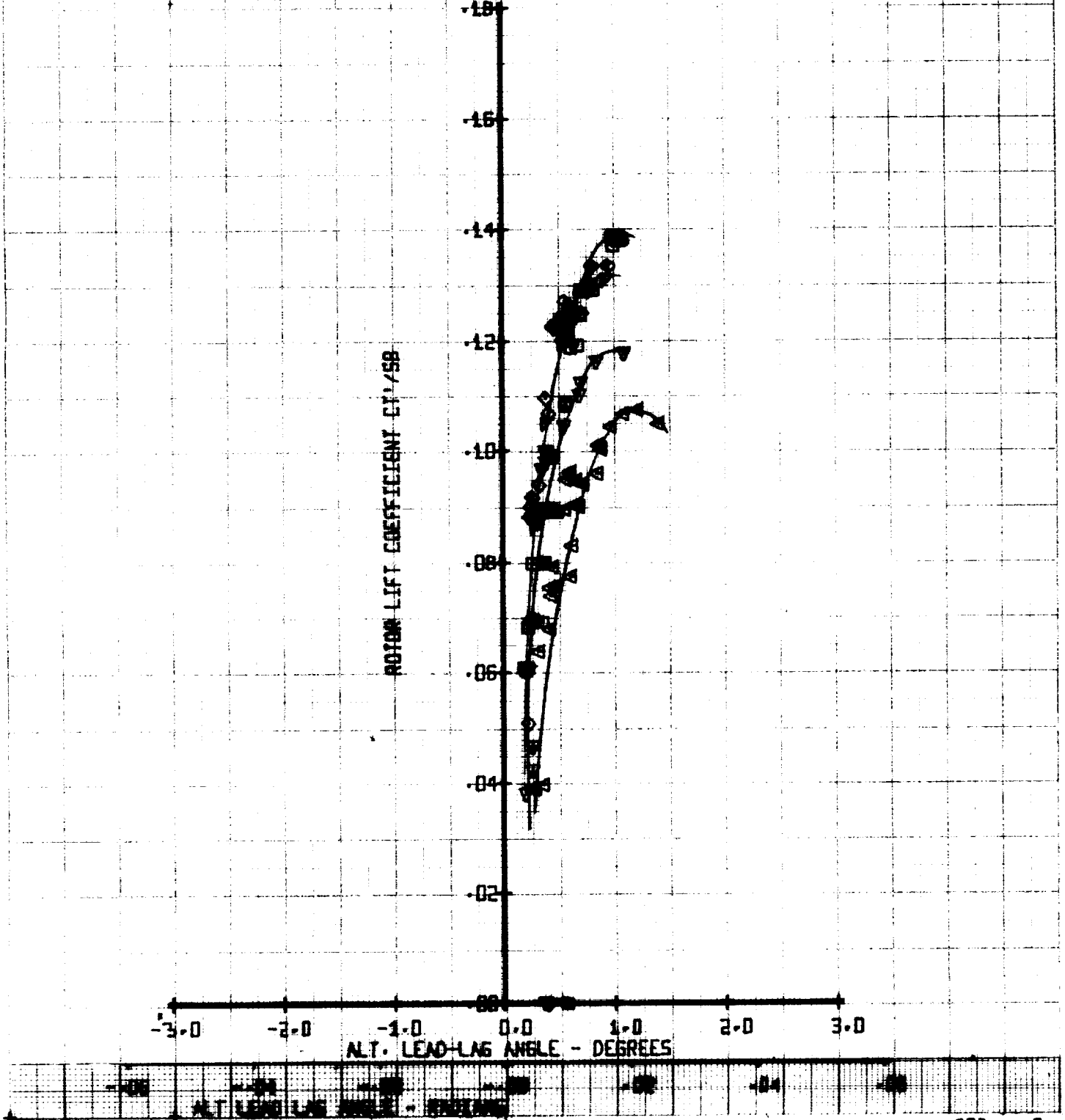


Figure A-50

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
▲	62	.10	.05	62
△	124	.20	.05	124
□	186	.30	.05	186
○	248	.40	.05	248

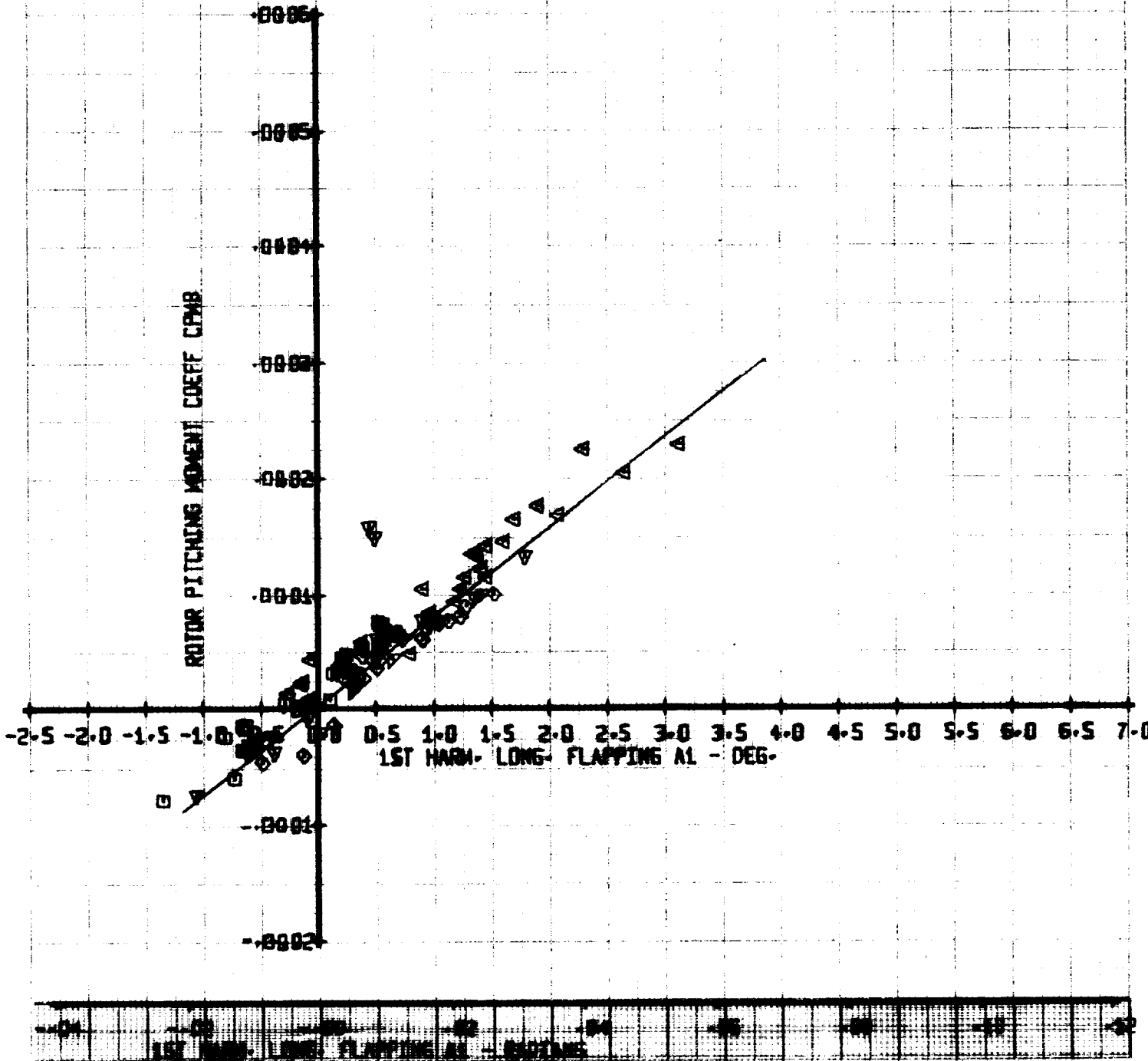
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND
 57M
 124
 126
 248

ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MI' X/00258	YTUN	
□	25	.10	.05	62
▲	27	.20	.05	124
◆	28	.20	.05	124
▲	29	.30	.05	186
▲	30	.40	.05	248

ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1

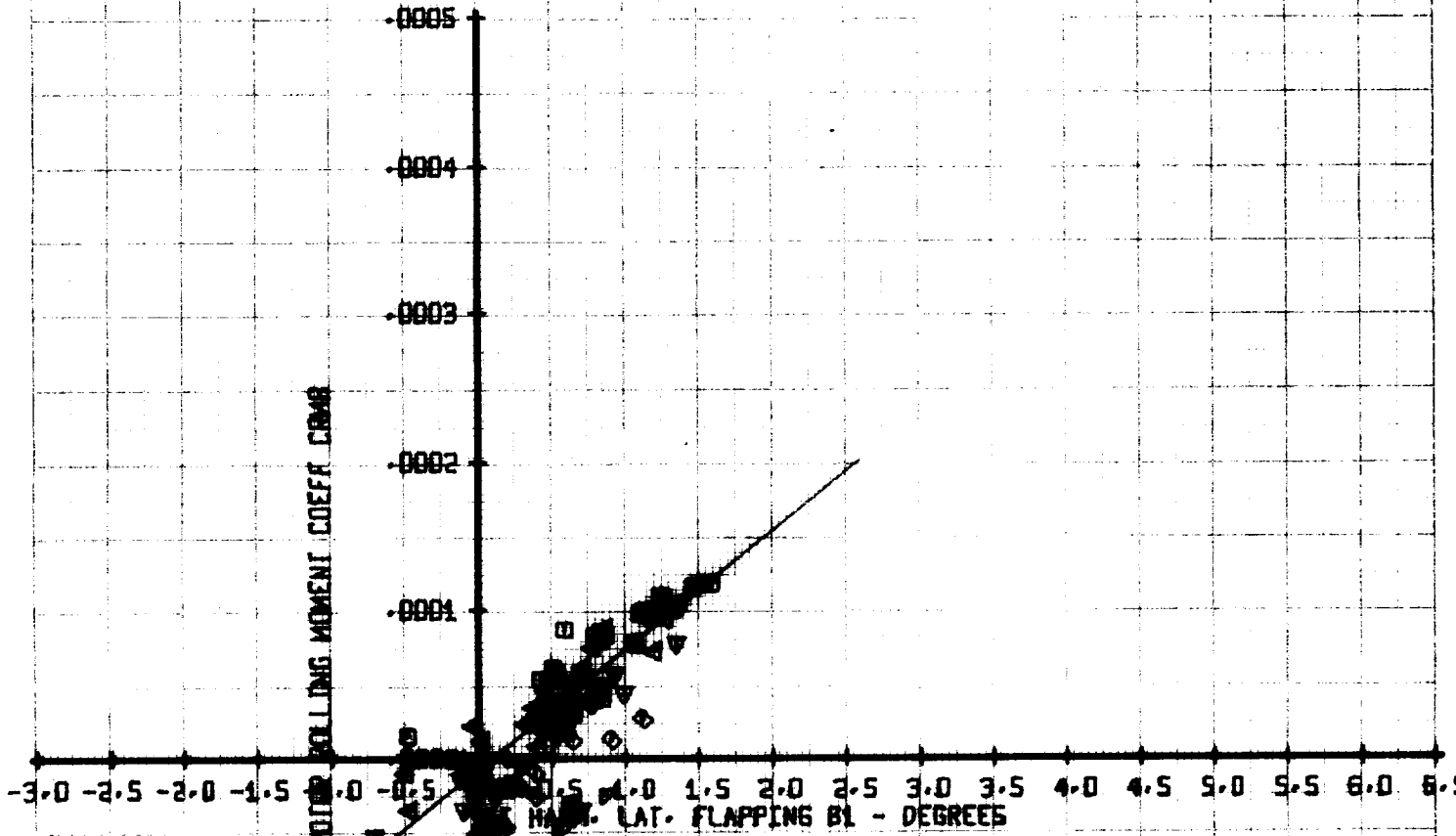


Figure A-53

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI'	X/00258	VTIIN
32	32	.40	.01	248
30	30	.40	.05	248
33	33	.40	.10	248
34	34	.40	.20	248

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT

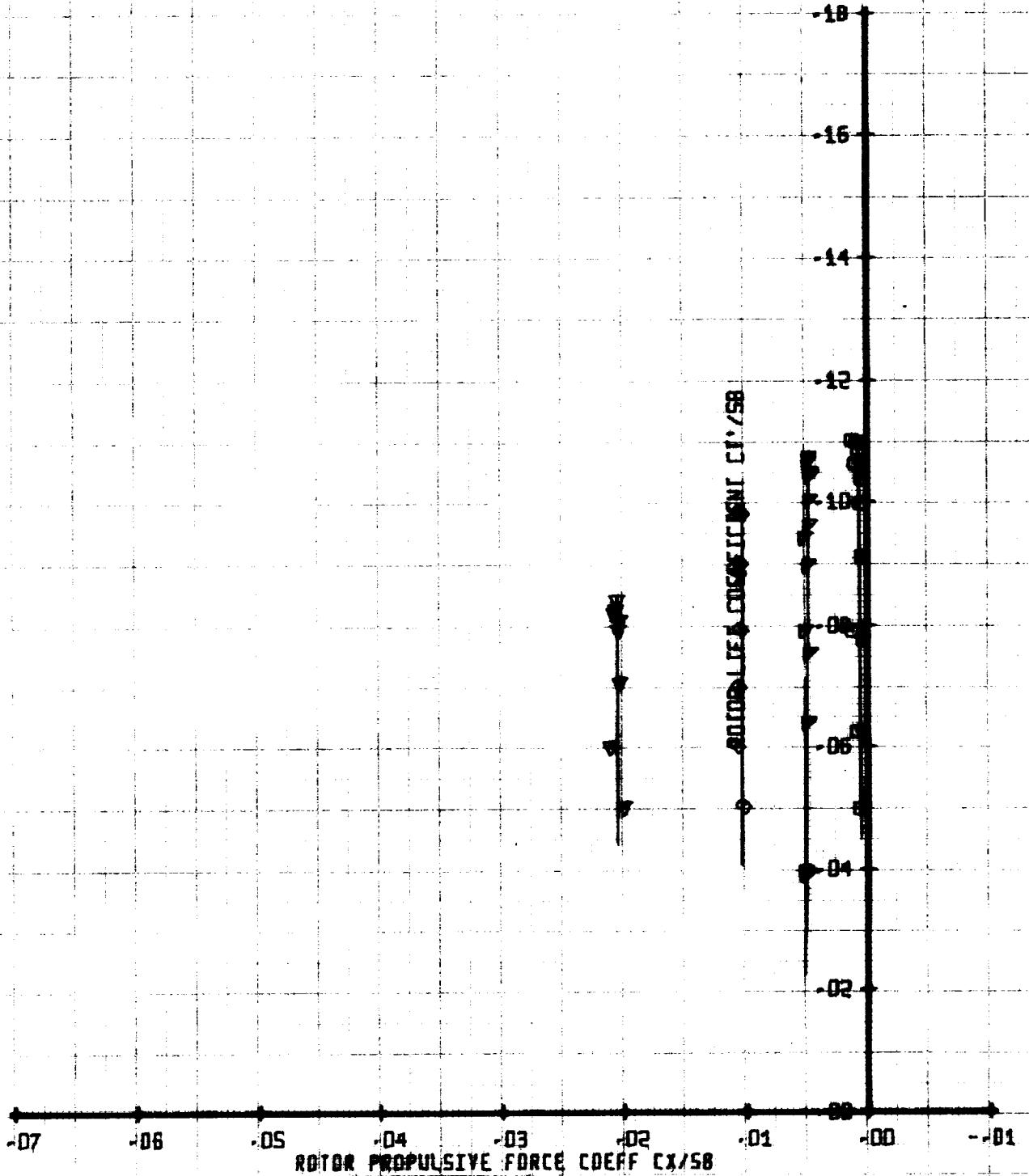
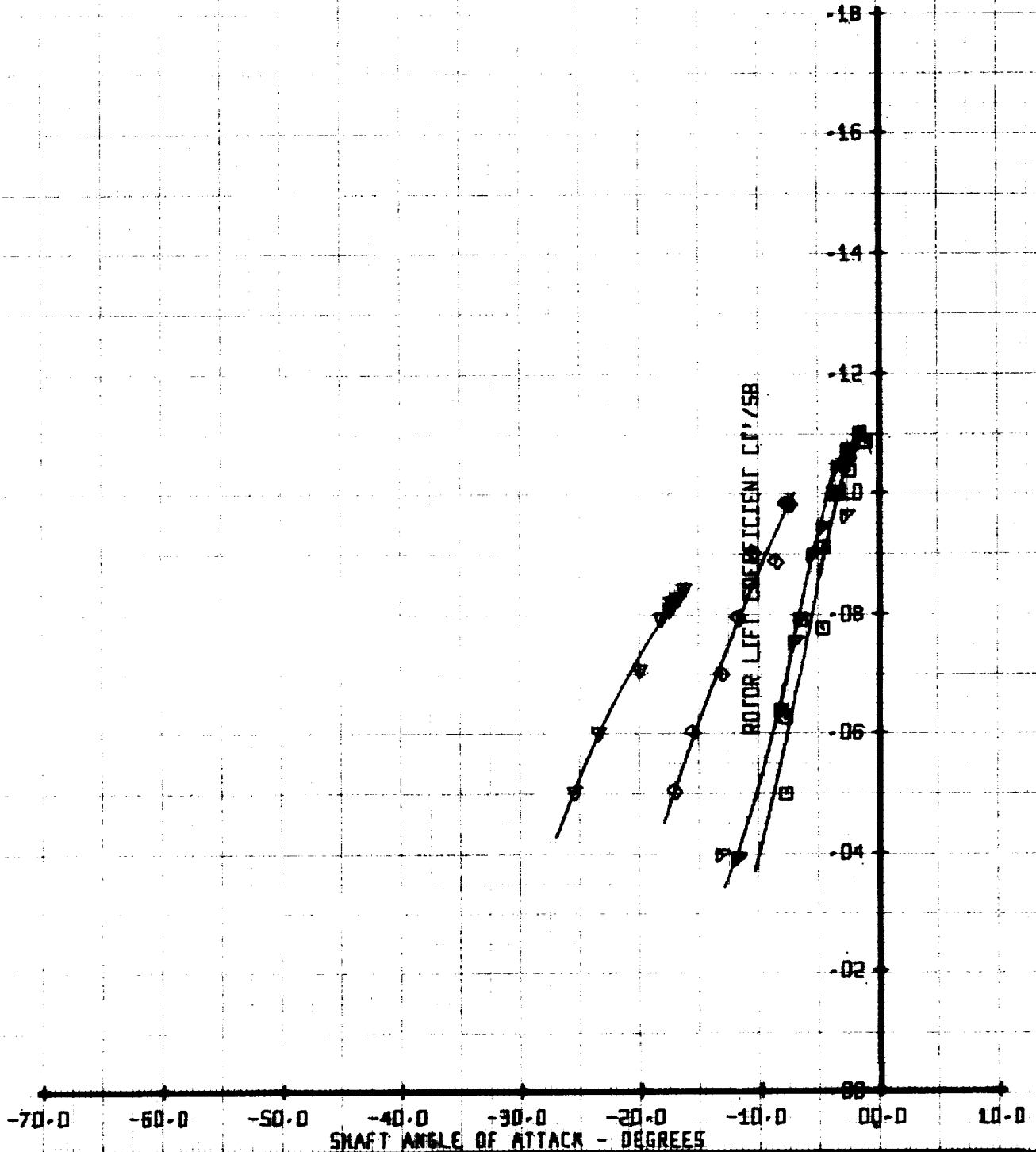


Figure A-54

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU'	X/00258	VTUN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

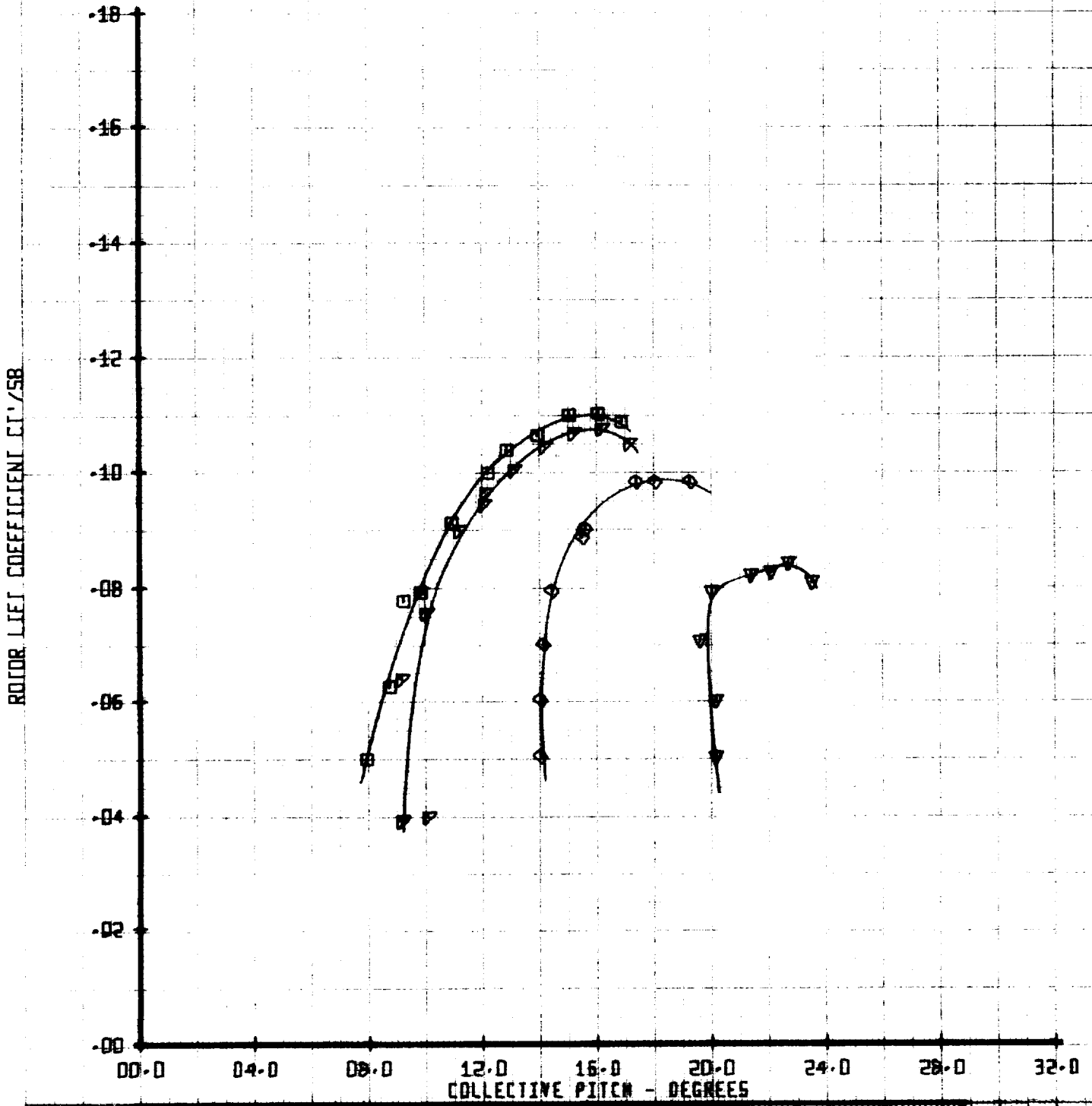
ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/DD2SB	VTLN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

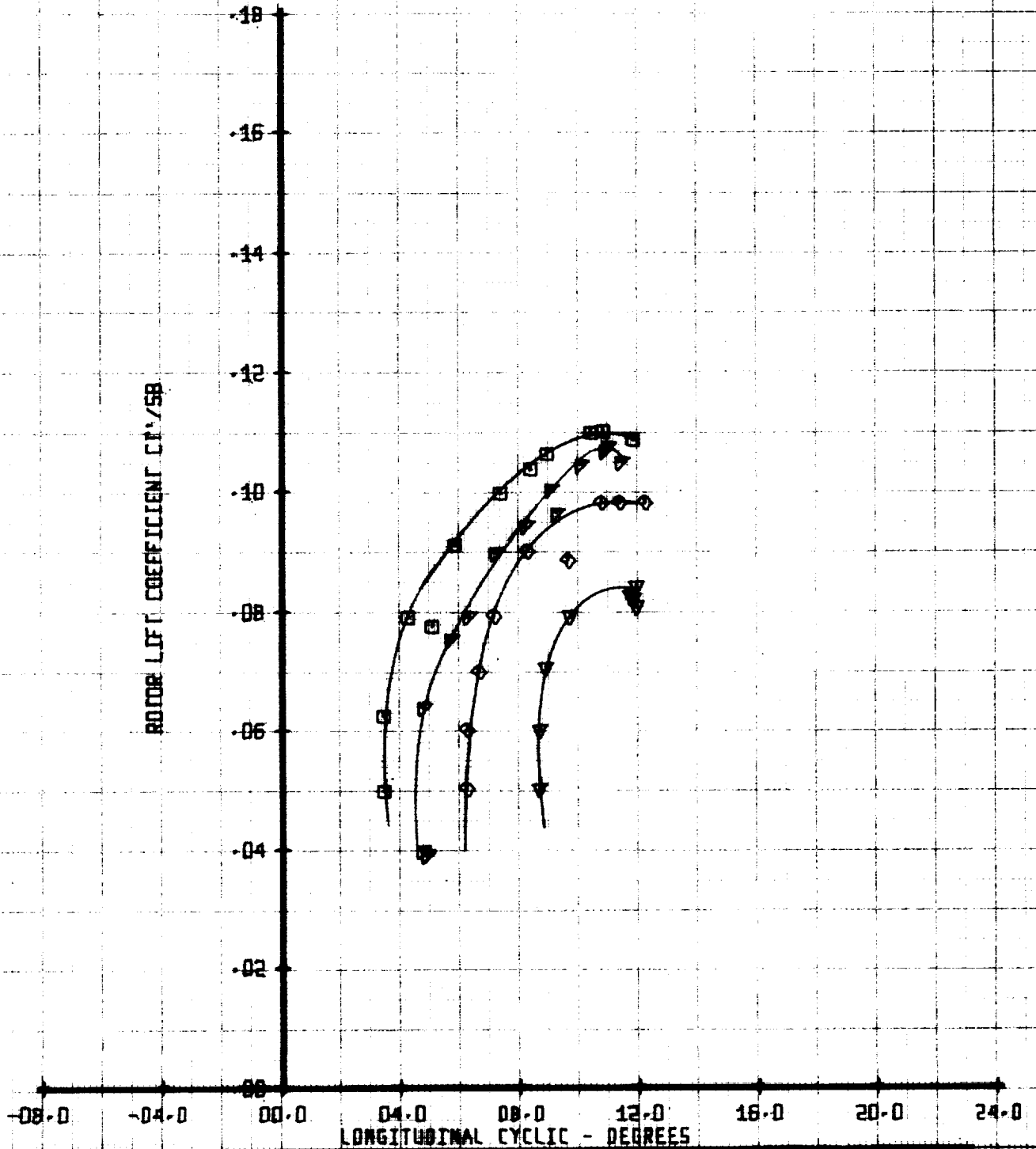
ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI' X/00258	VTUN
□	32	.40	.01
△	30	.40	.05
◇	33	.40	.10
▽	34	.40	.20

ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/100258	VTUN
□	32	.40	.01	248
○	30	.40	.05	248
△	33	.40	.10	248
▽	34	.40	.20	248

ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC

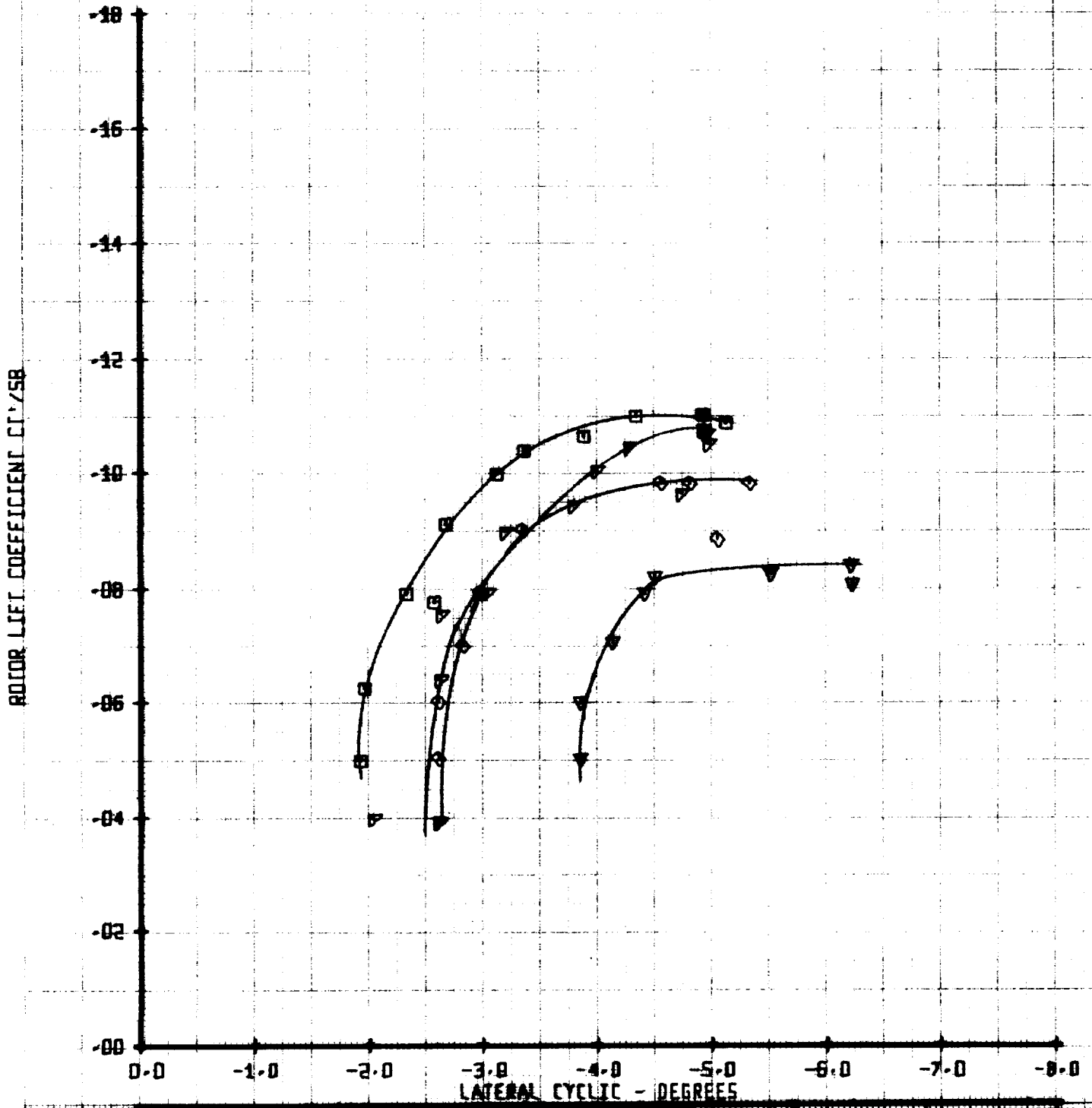


Figure A-58

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU' X/00258	VTUN
□	32	.40	.01
▽	30	.40	.05
◇	33	.40	.10
▽	34	.40	.20

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT

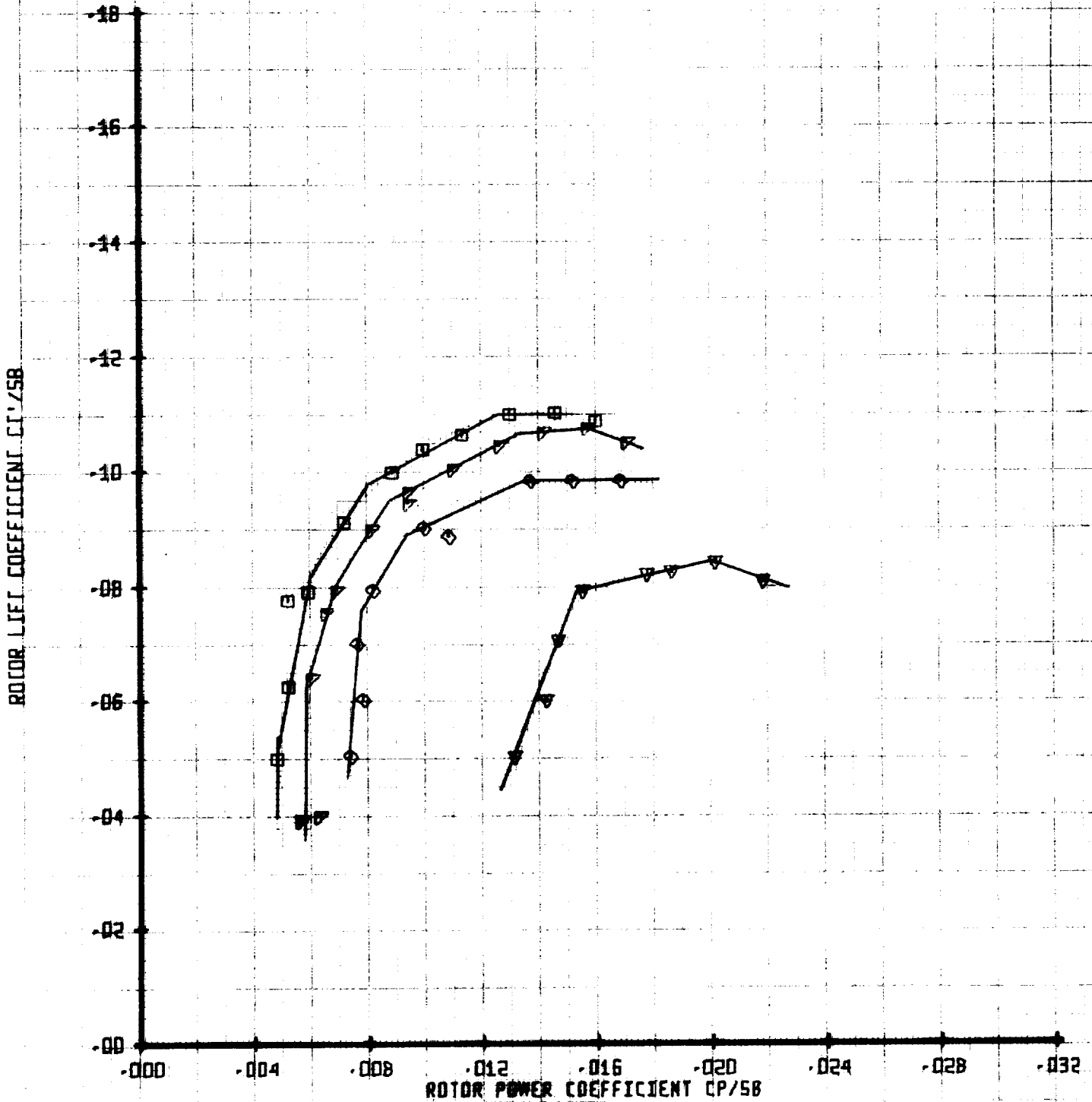
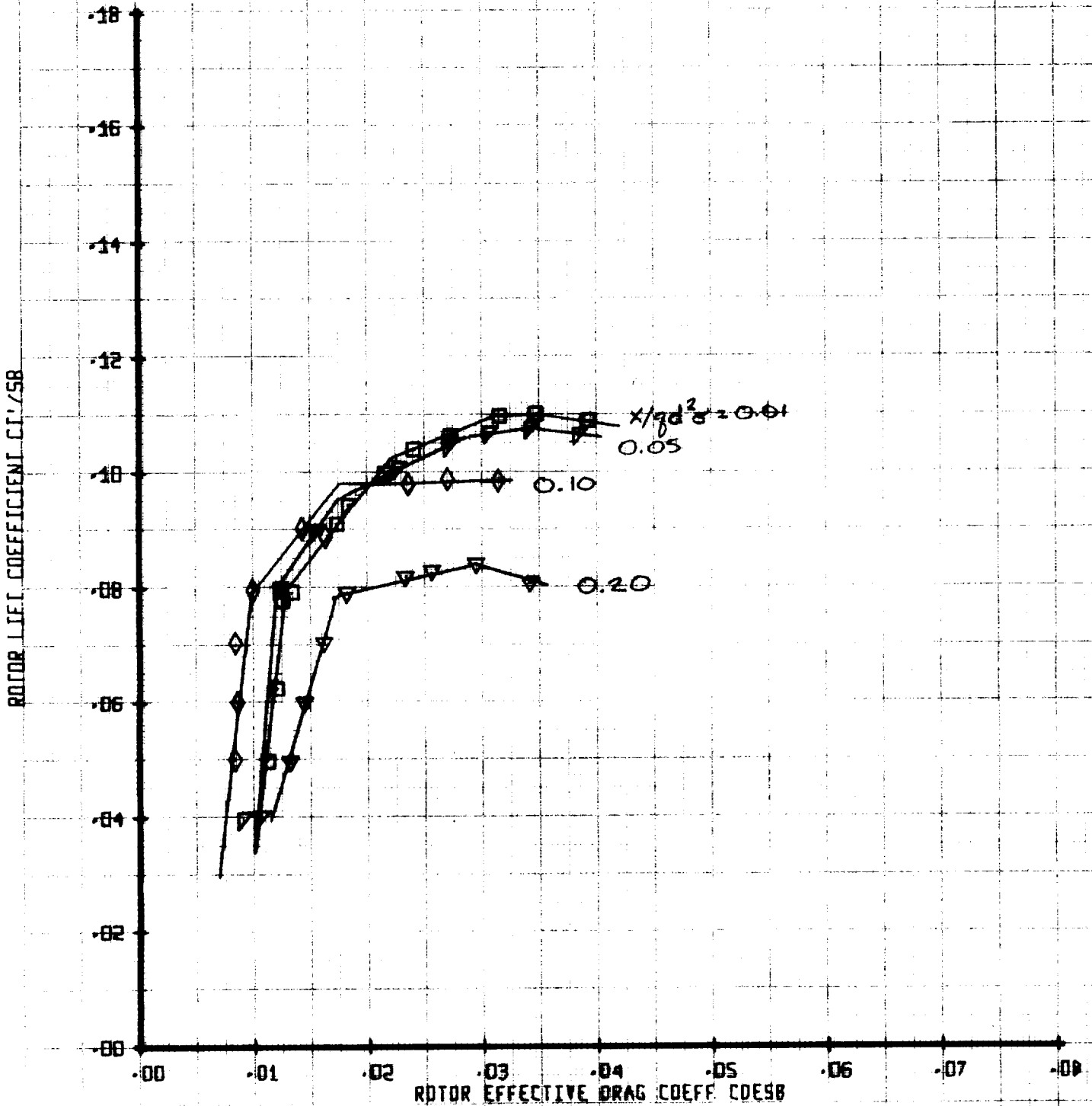


Figure A-59

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/DD2SB	VTUN
○	32	.40	.01	248
□	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT



LIFT-PROPLUSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.16	248
▽	34	.40	.20	248

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT

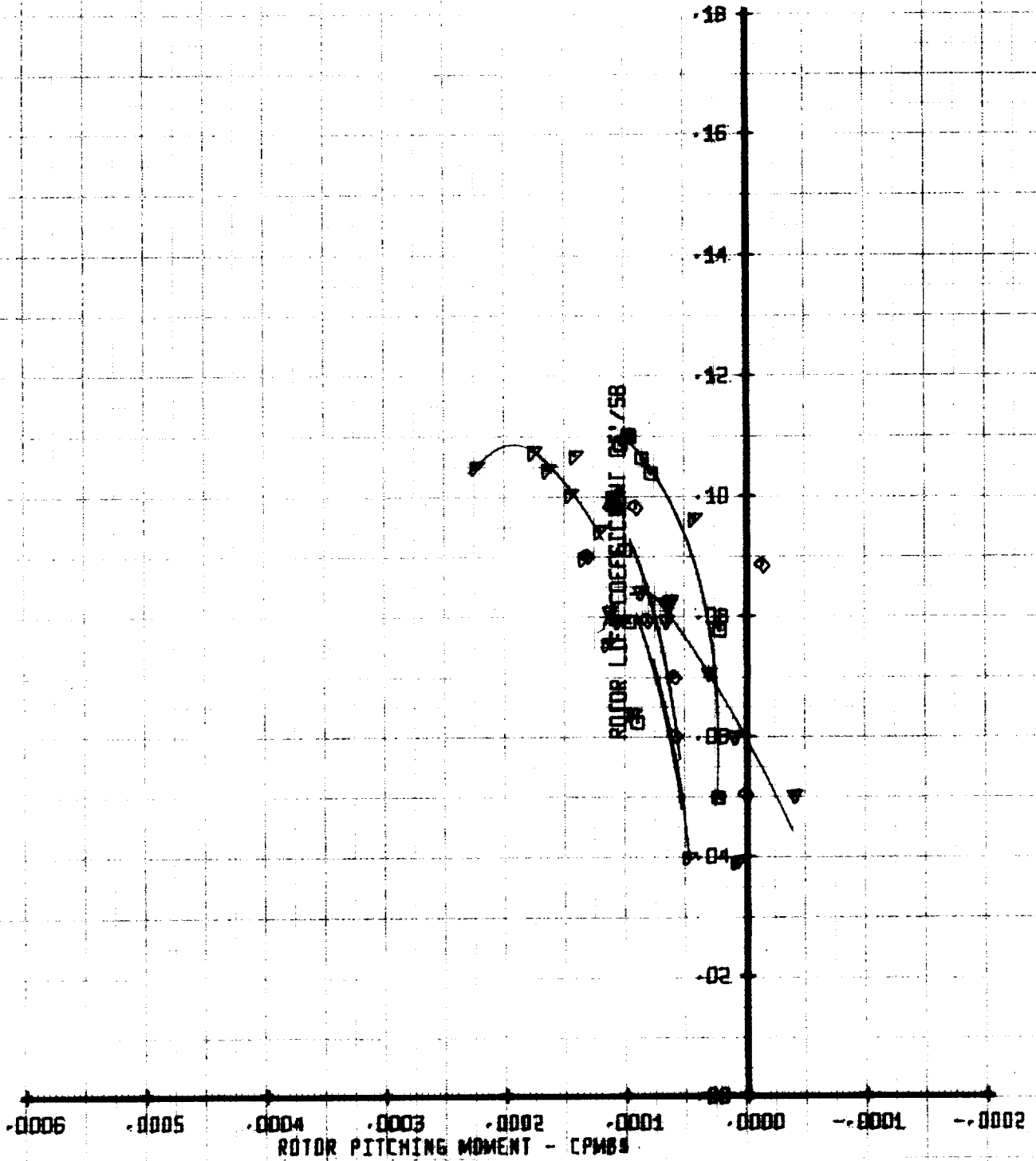
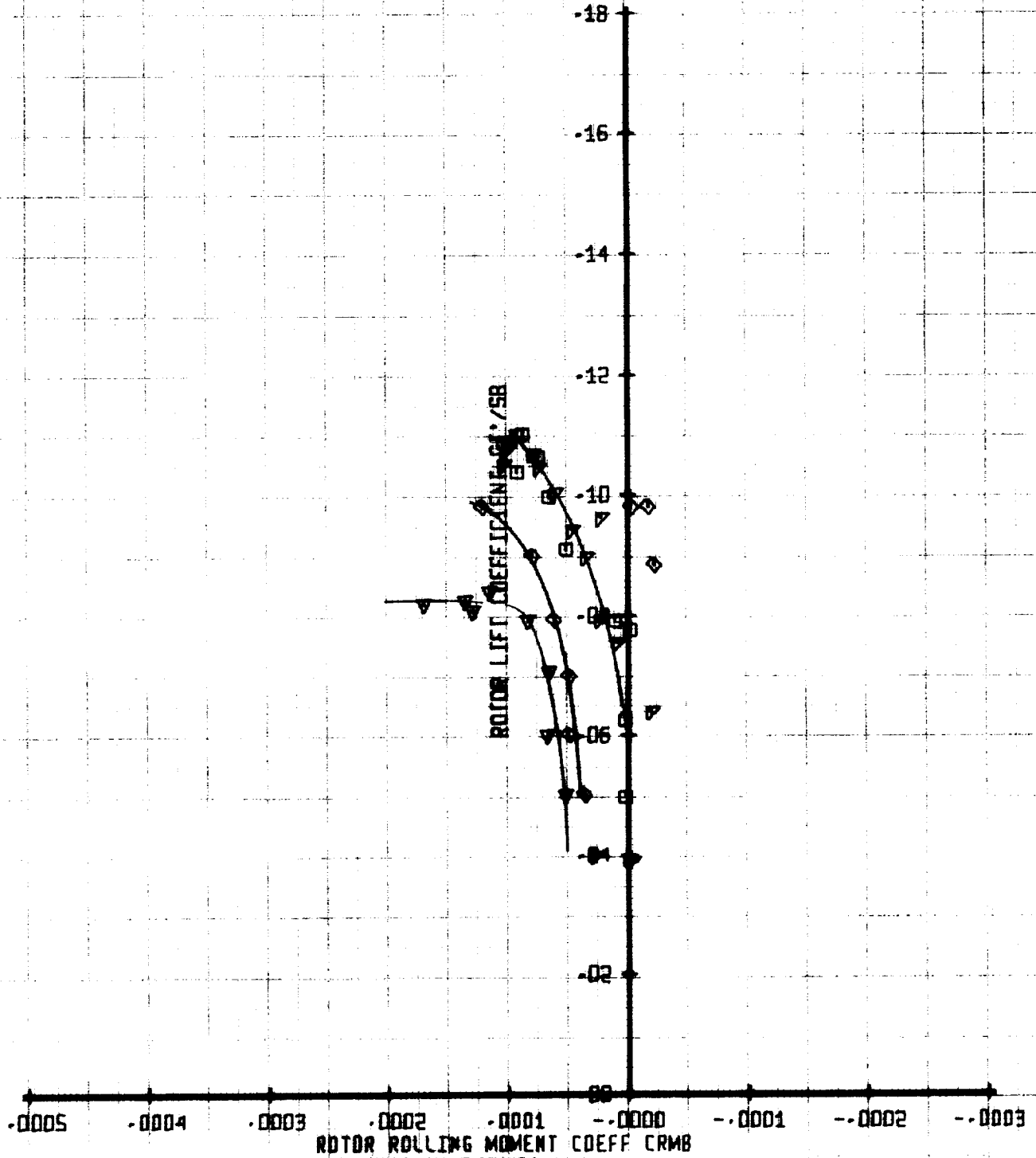


Figure A-61

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

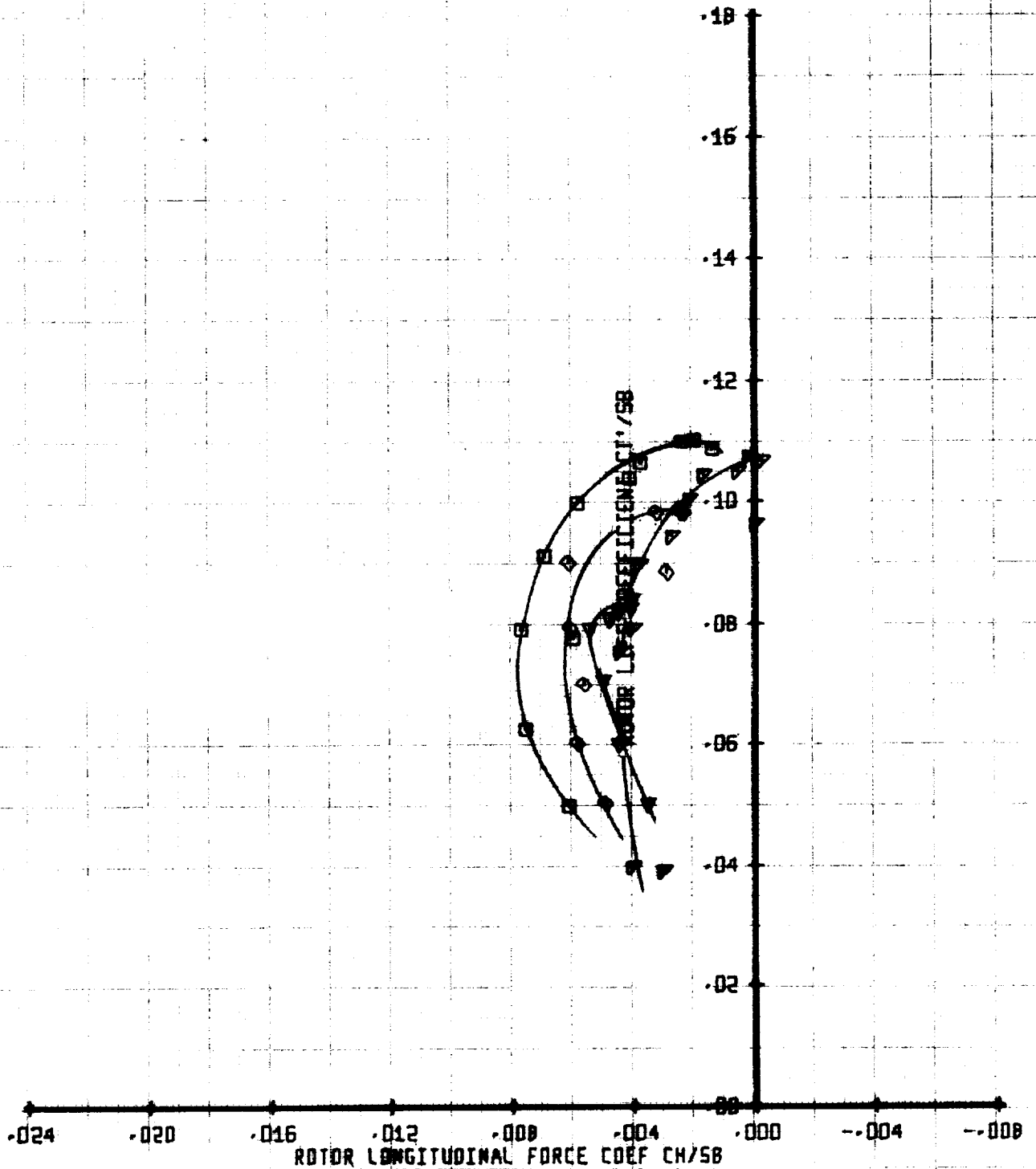
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI'	X/00258	VTUN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

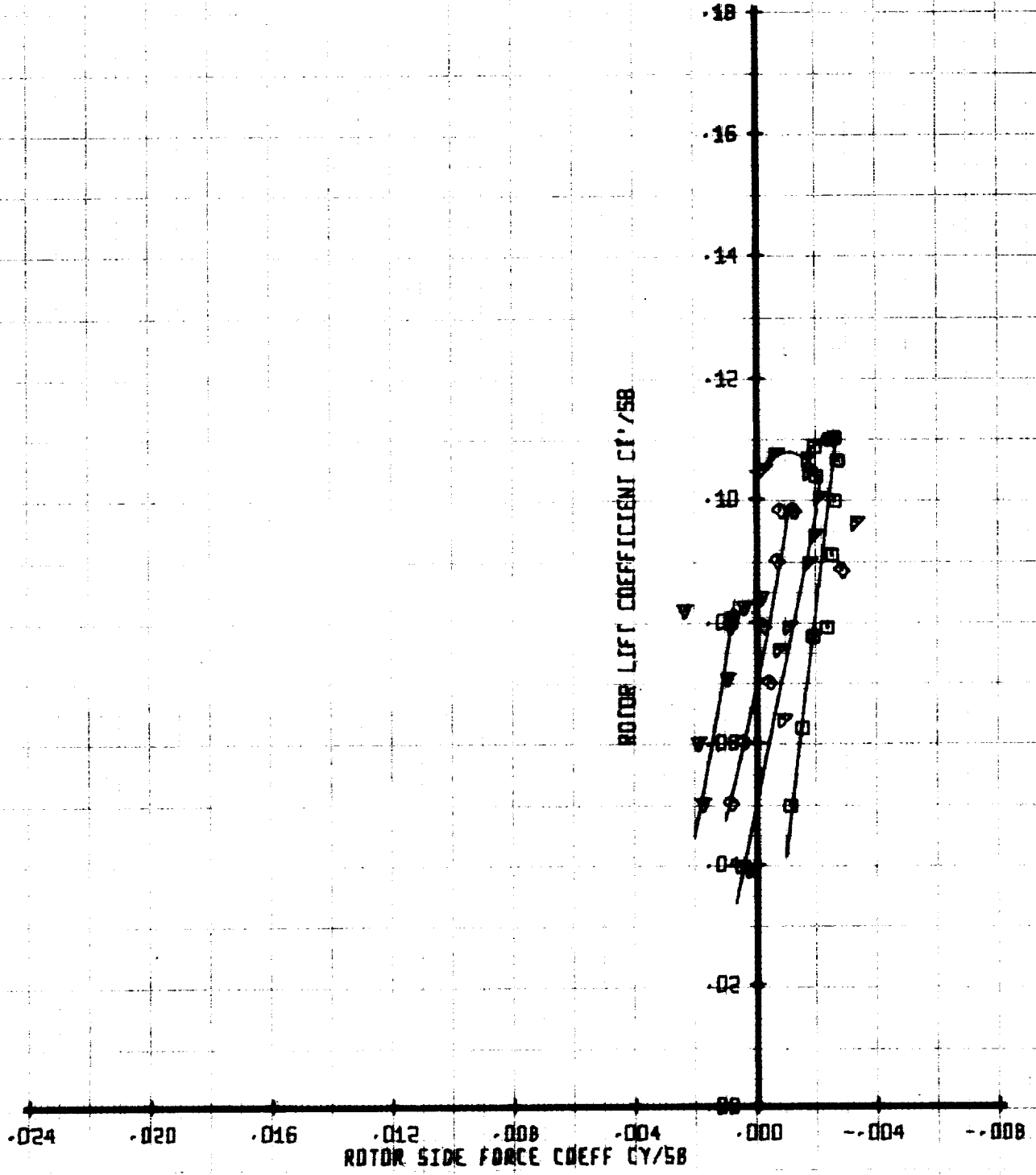
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI'	X/00258	VTUN
○	32	.40	.01	248
◇	30	.40	.05	248
△	33	.40	.10	248
▽	34	.40	.20	248

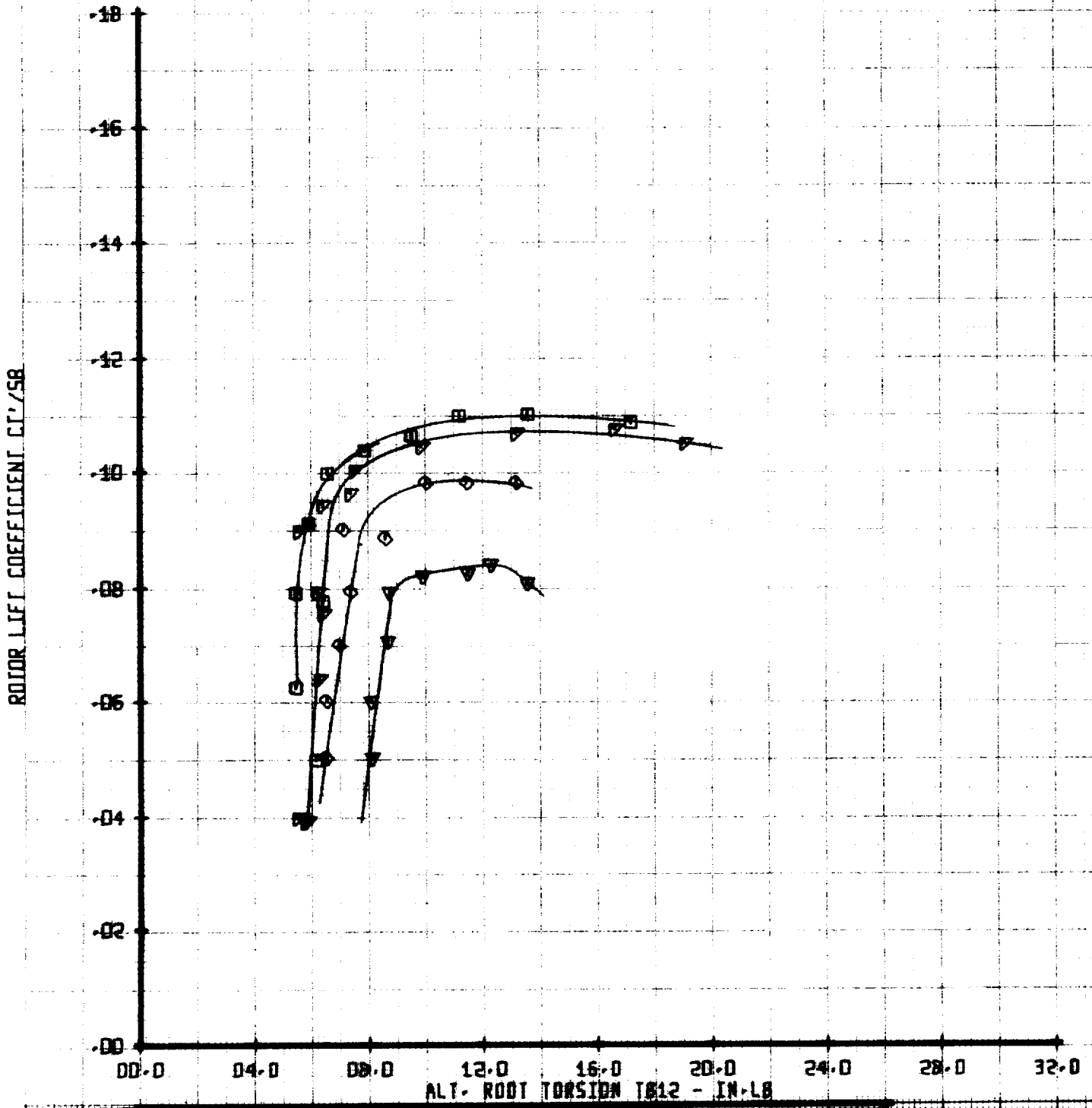
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	Y/TUN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

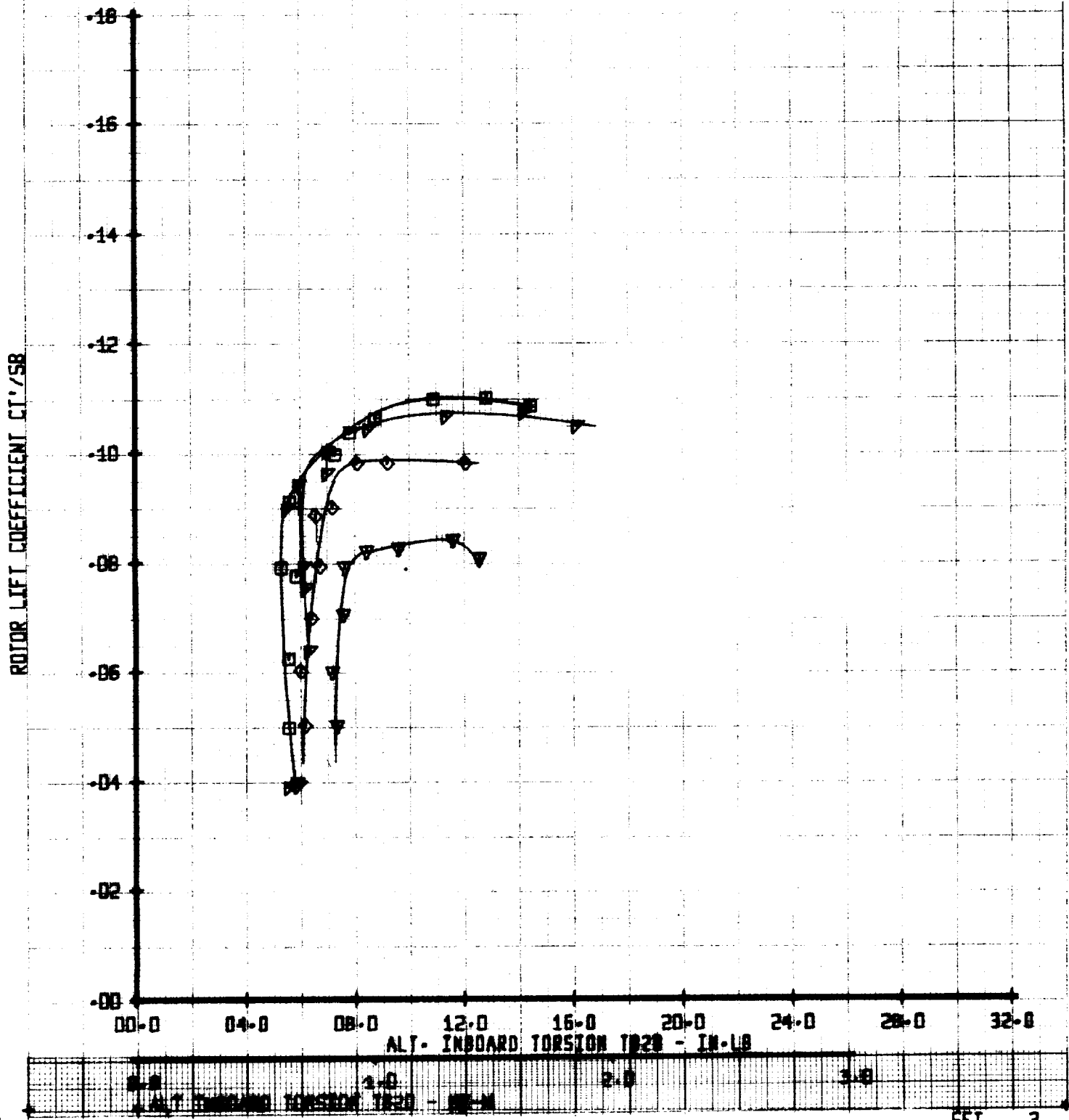
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

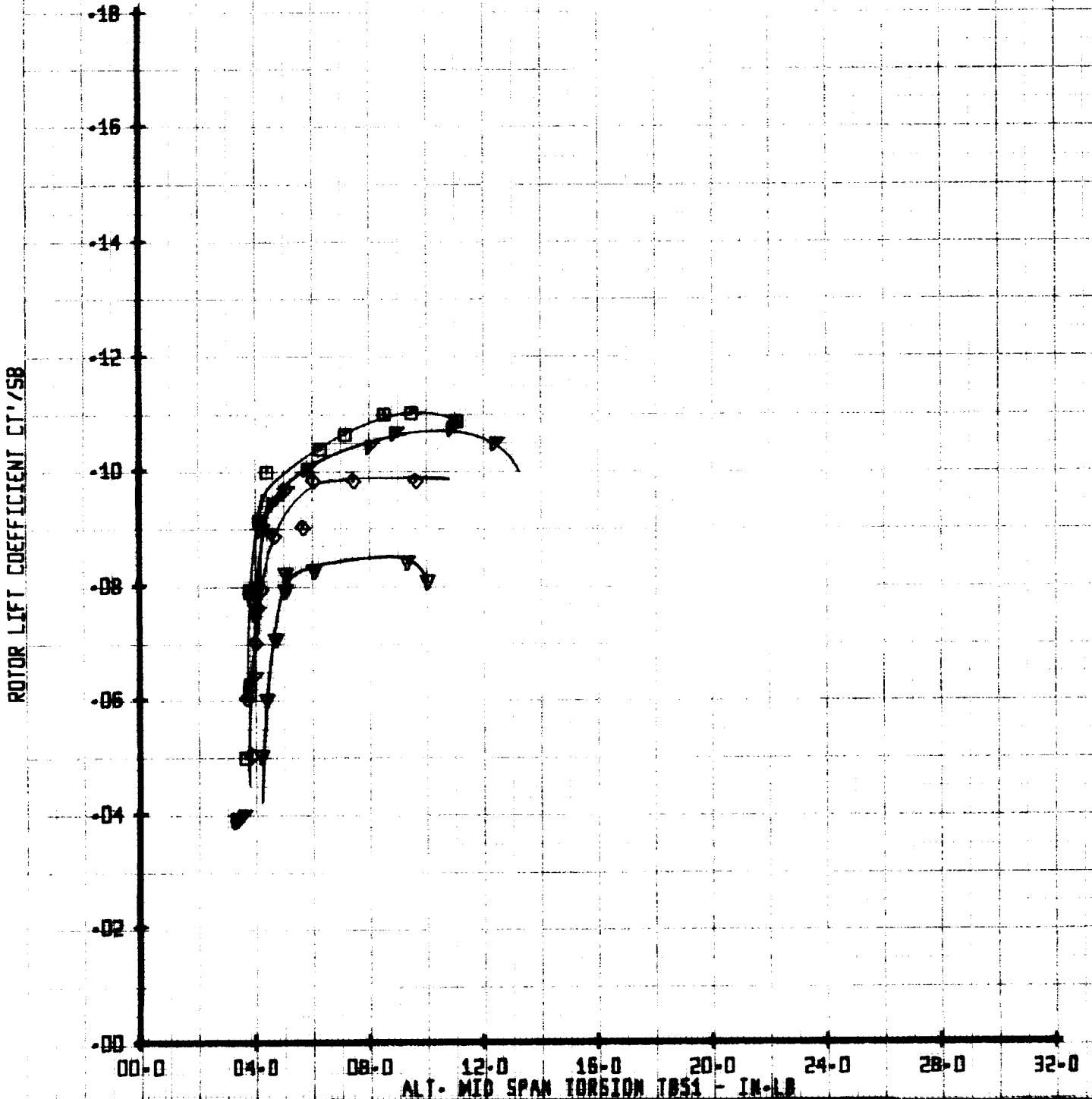
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING INBOARD TORSION TB20



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU	X/0025B	VTUN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

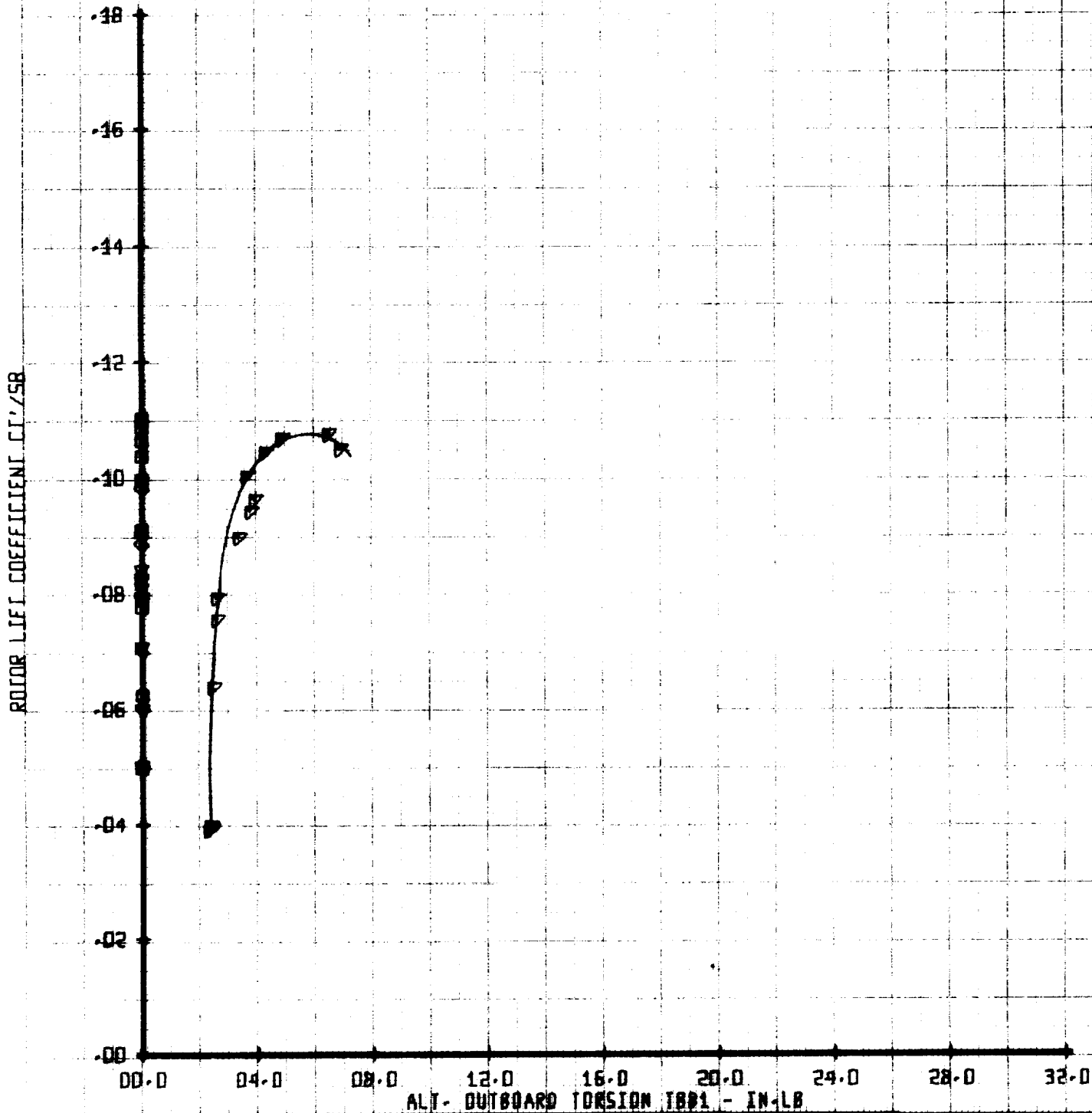
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB51



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU'	X/00258	VTUN
○	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

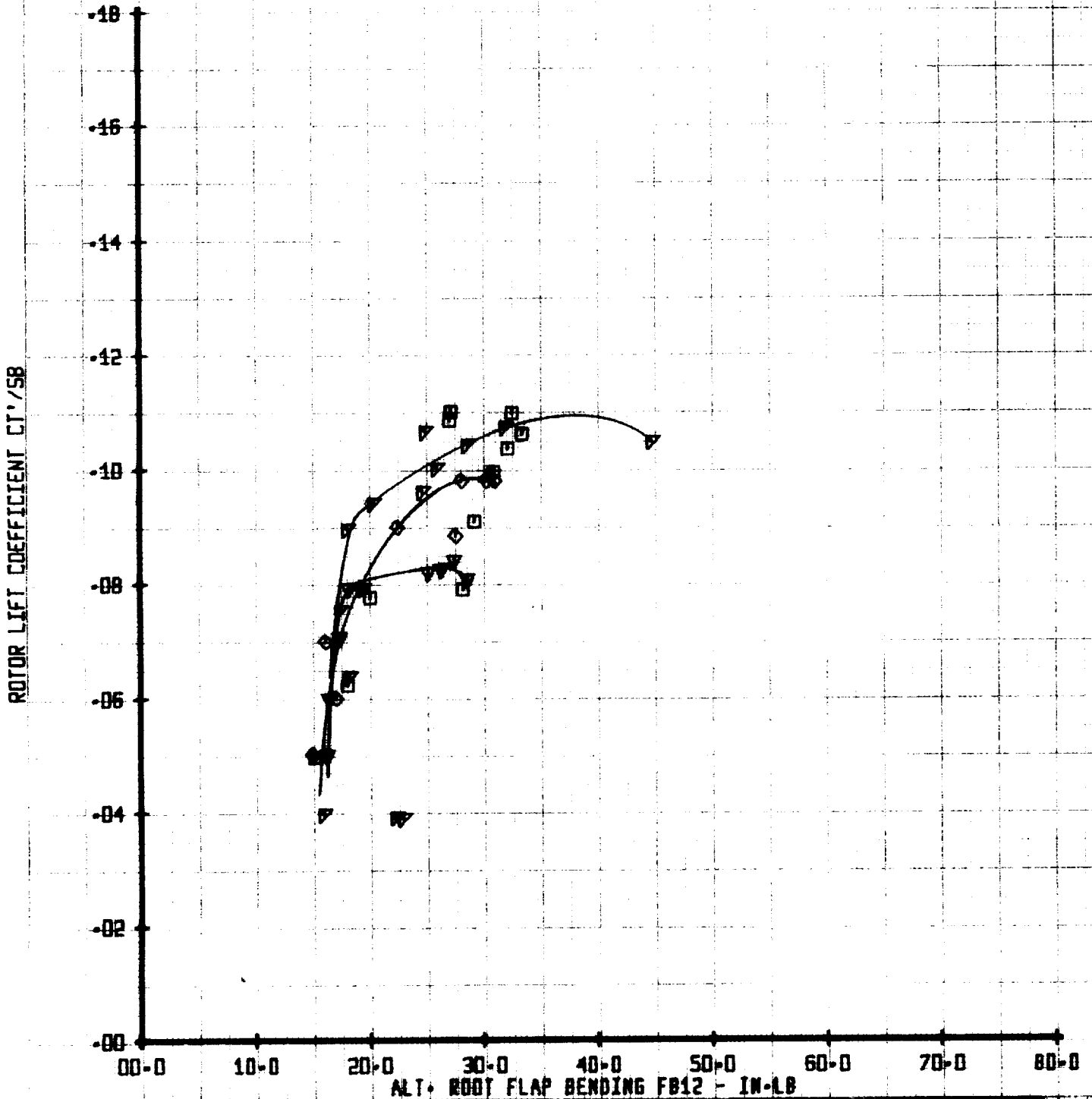
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB81



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU	X/00258	VTUN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

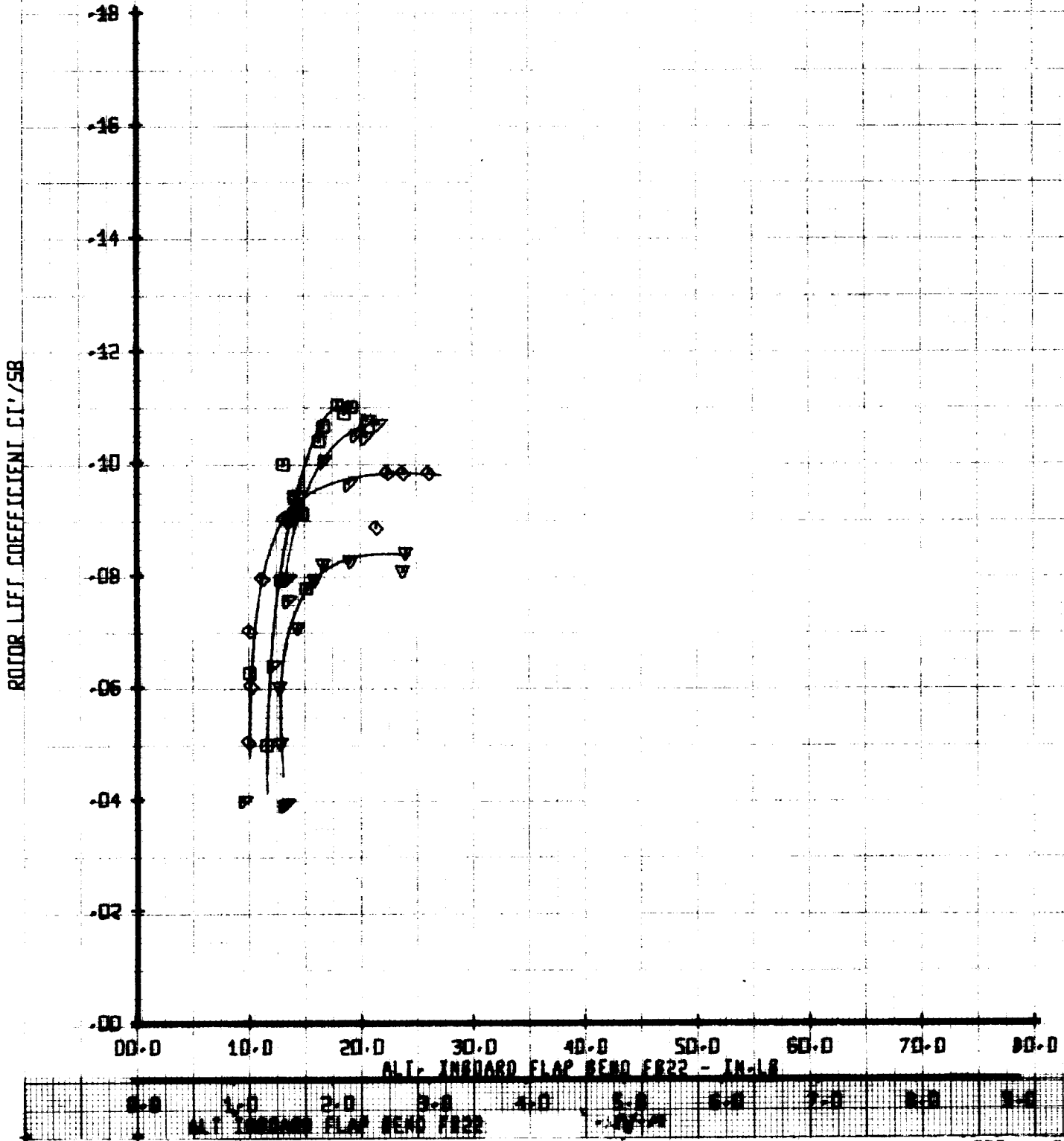
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47E ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU ²	X/OO258	YTUN
□	32	.40	.01	248
▲	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

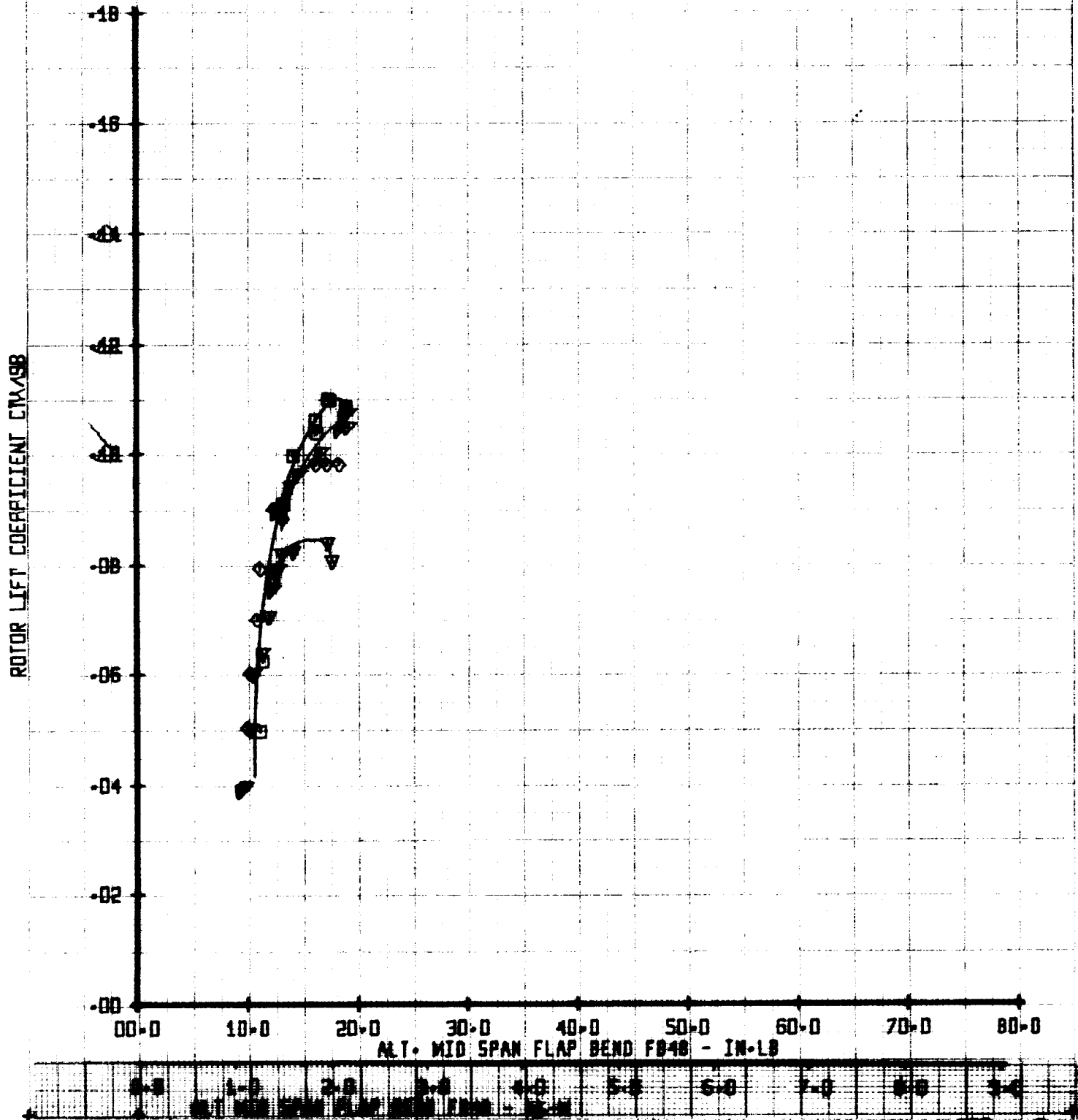
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING INBOARD FLAP BENDING FB22



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU'	X/00258	VTUN
○	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

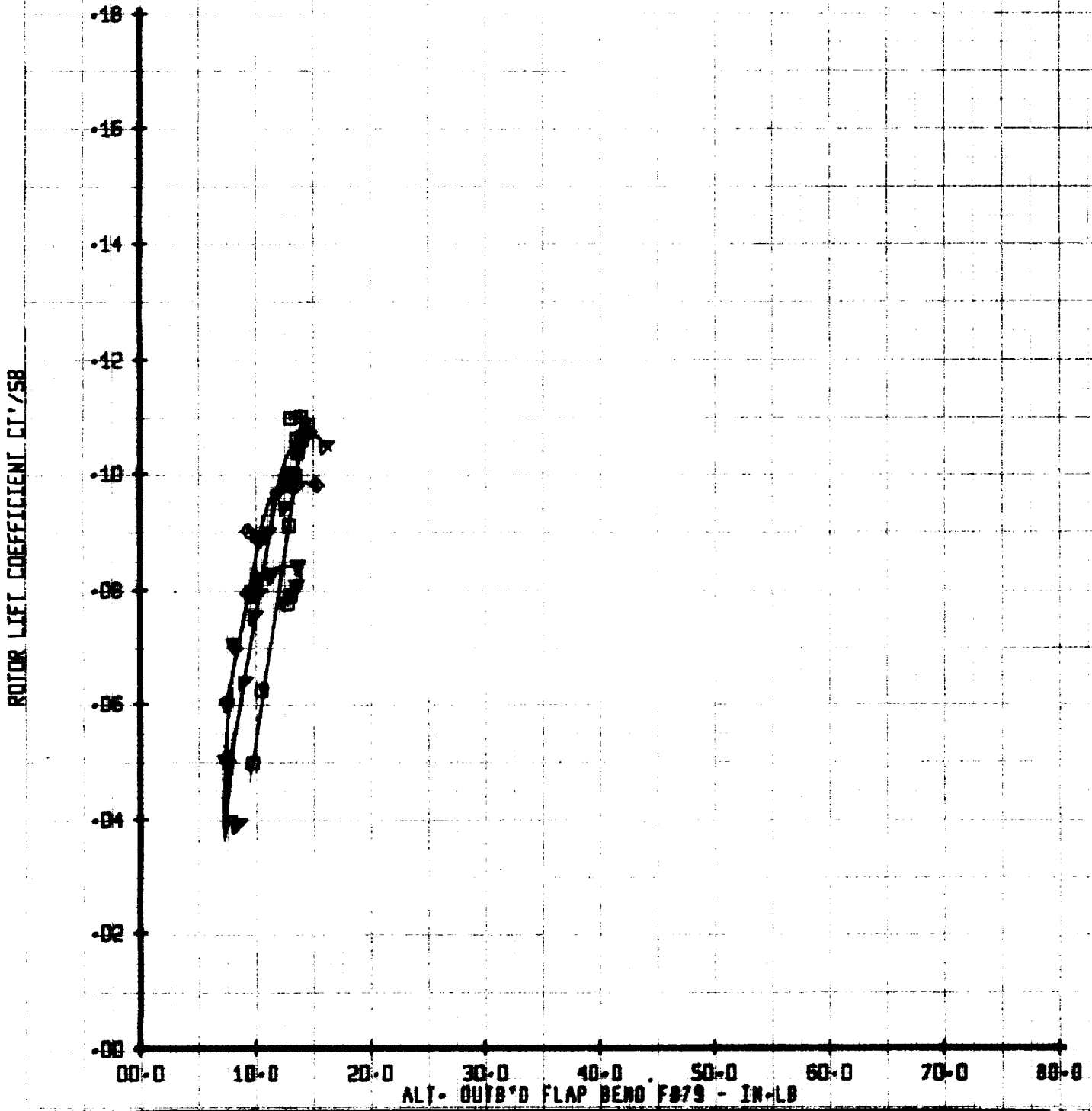
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BENDING FB48



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	ML	X/00258	VTUN
□	32	.40	.01	248
○	30	.40	.05	248
△	33	.40	.10	248
▽	34	.40	.20	

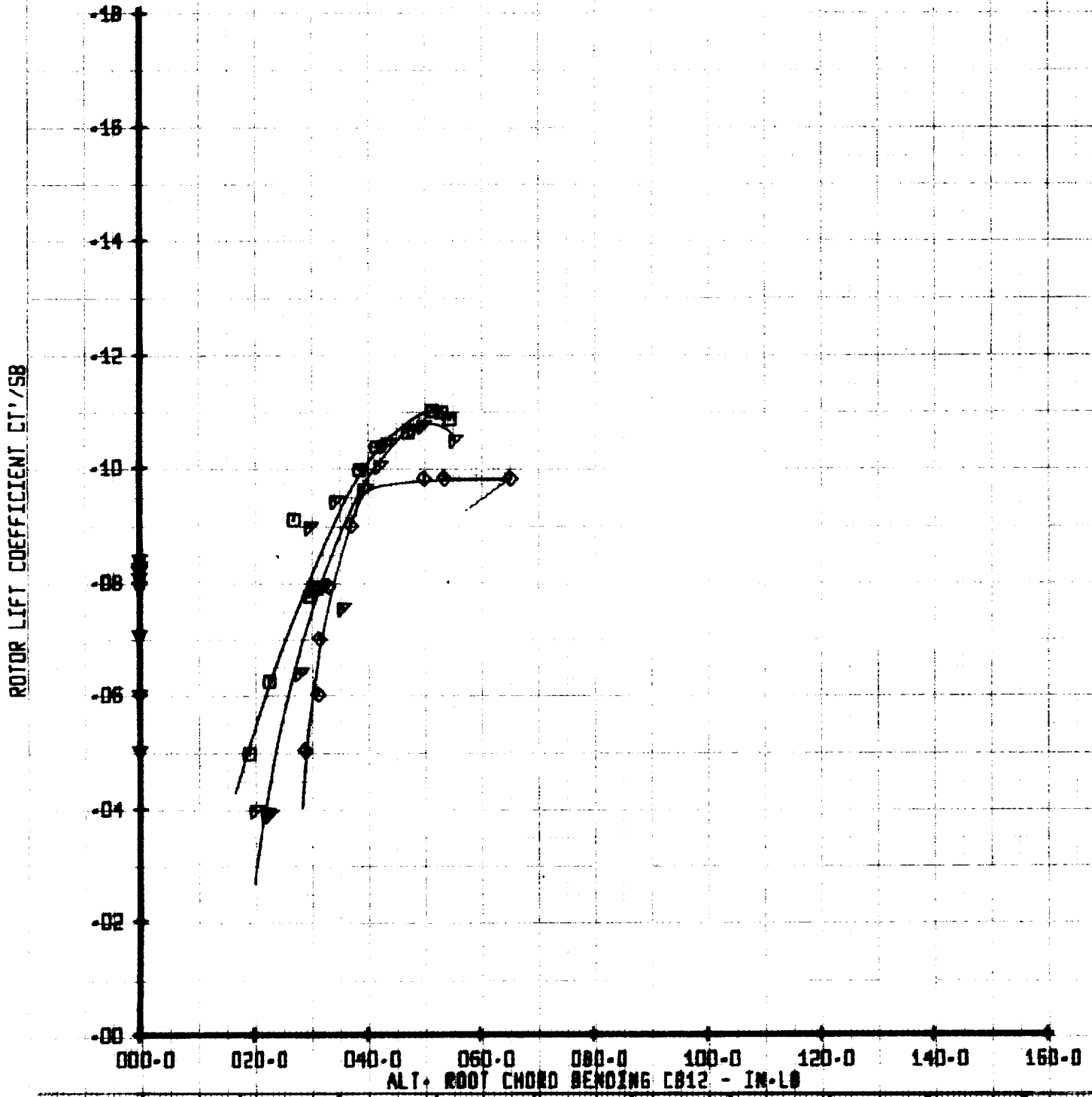
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB79



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU'	X/00258	VTUN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	
▽	34	.40	.20	248

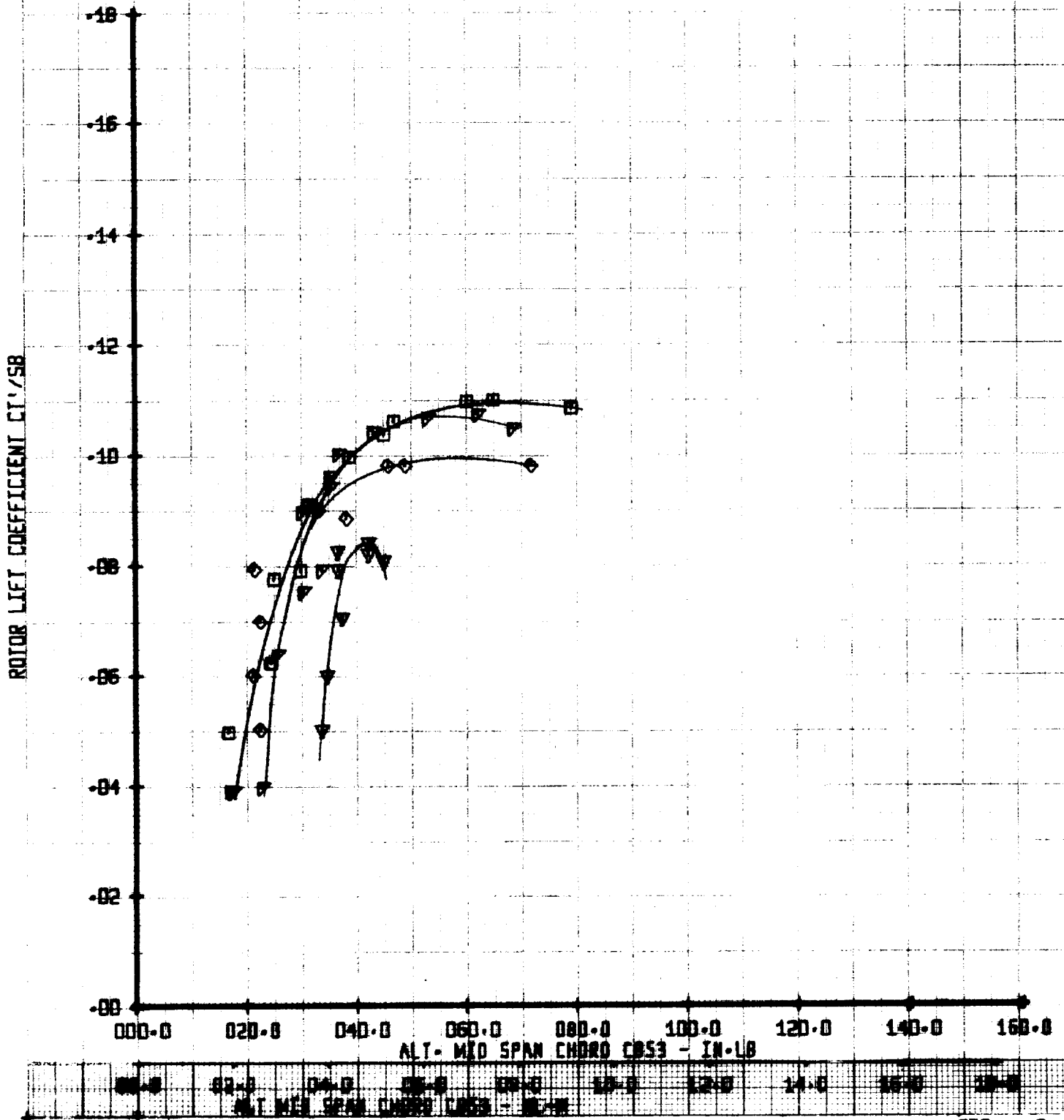
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

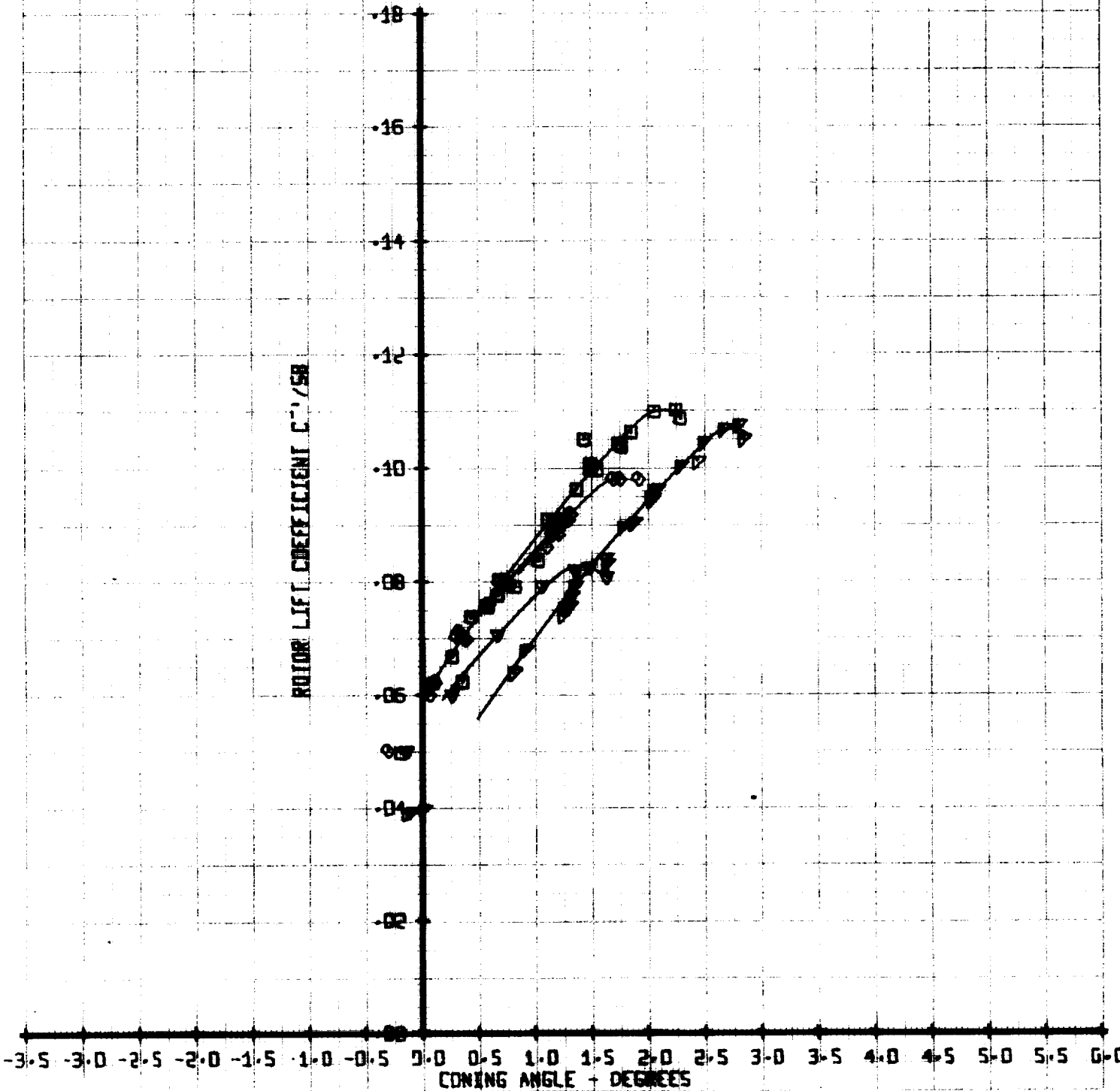
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN CHORD CB53



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU	X/00258	YTUN
○	32	.40	.01	248
△	30	.40	.05	248
◇	33	.48	.10	248
▽	34	.40	.20	248

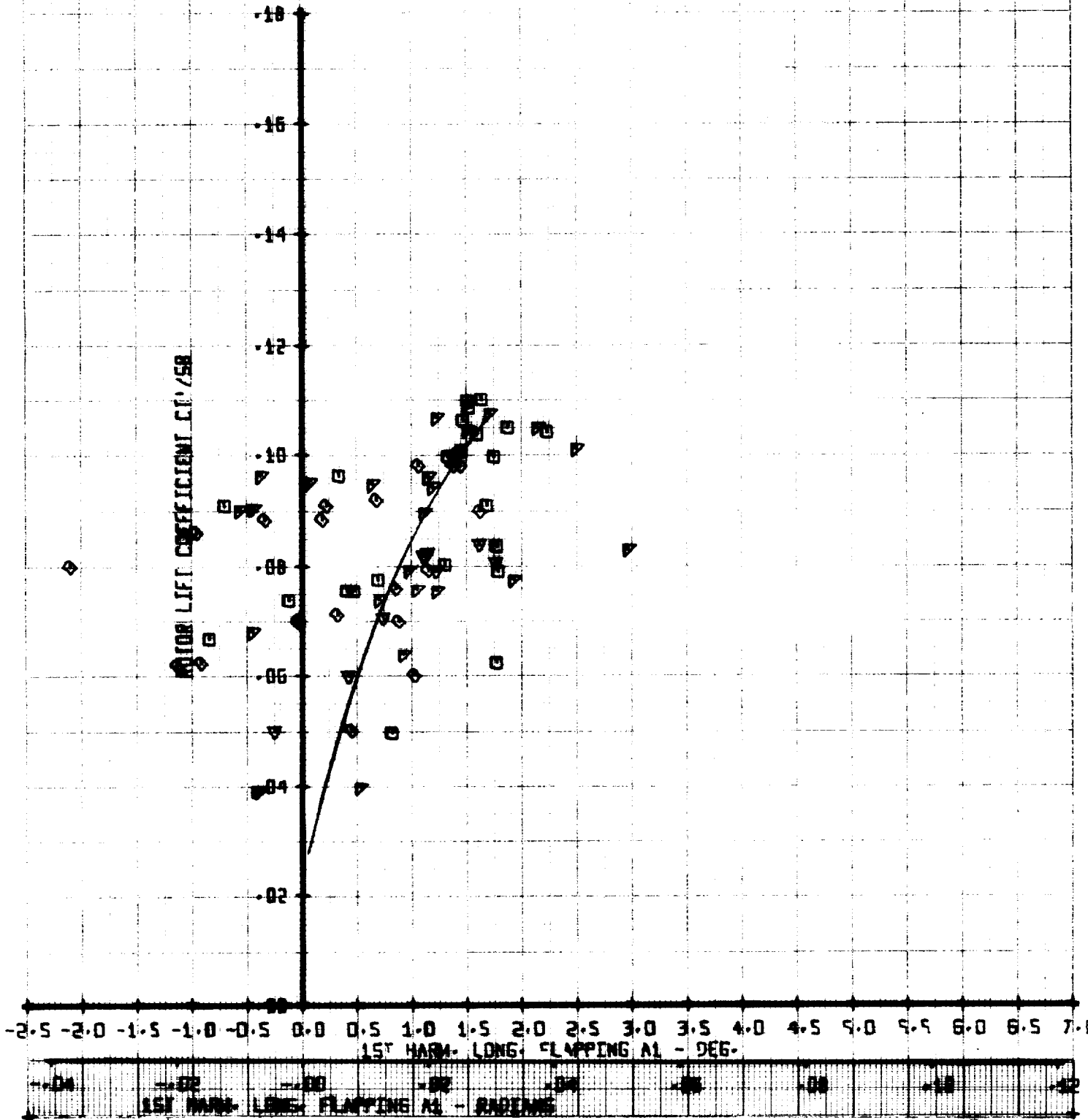
ROTOR LIFT COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	Y/TIN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

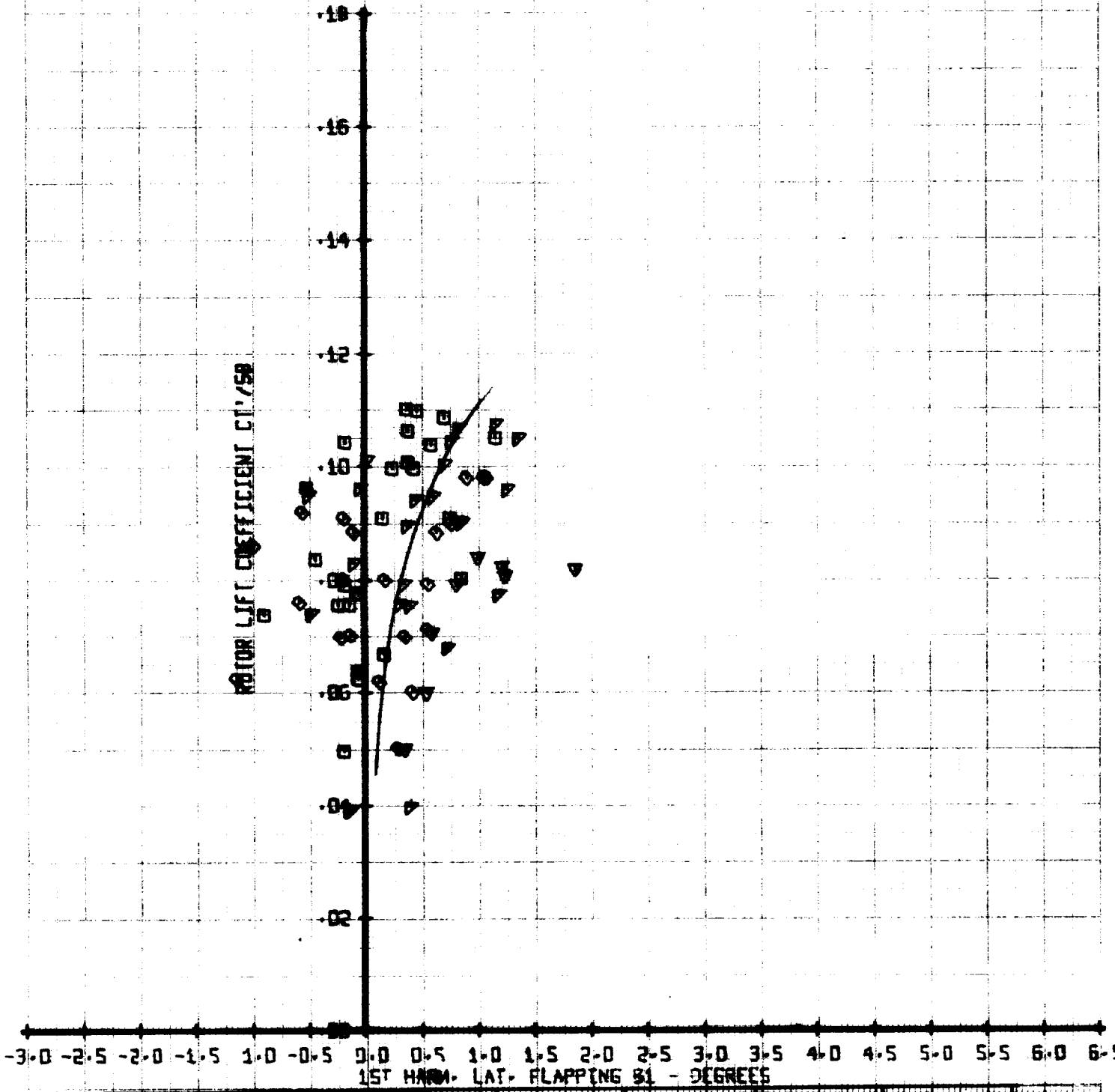
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/0025B	Y/TUN
□	32	.40	.01	248
▲	30	.40	.05	248
◆	33	.40	.10	248
▼	34	.40	.20	248

ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU*	X/DD258	YTUN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE

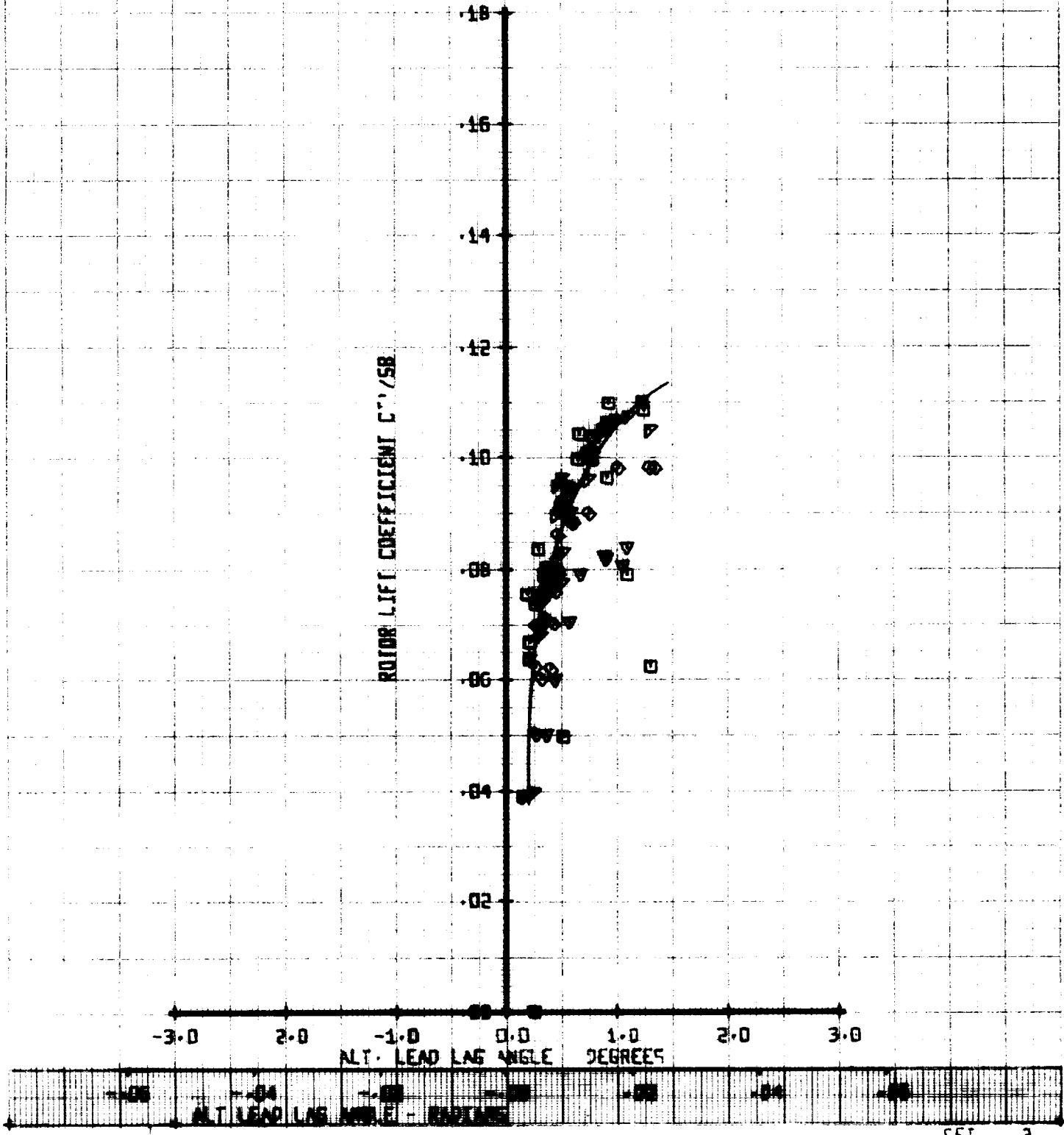
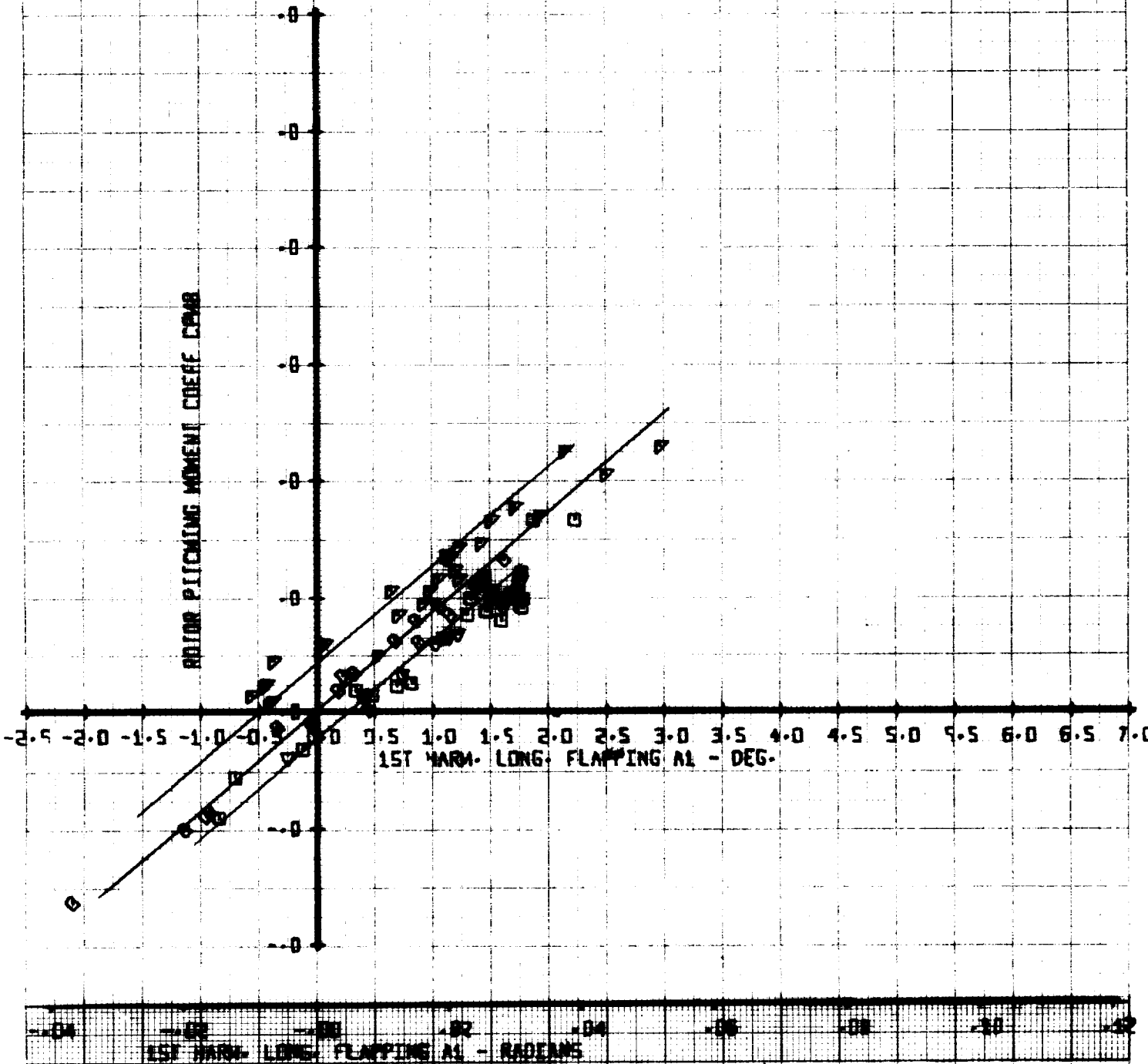


Figure A-78

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	Y/TIN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU'	X/00258	VTUN
□	32	.40	.01	248
△	30	.40	.05	248
◇	33	.40	.10	248
▽	34	.40	.20	248

ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1

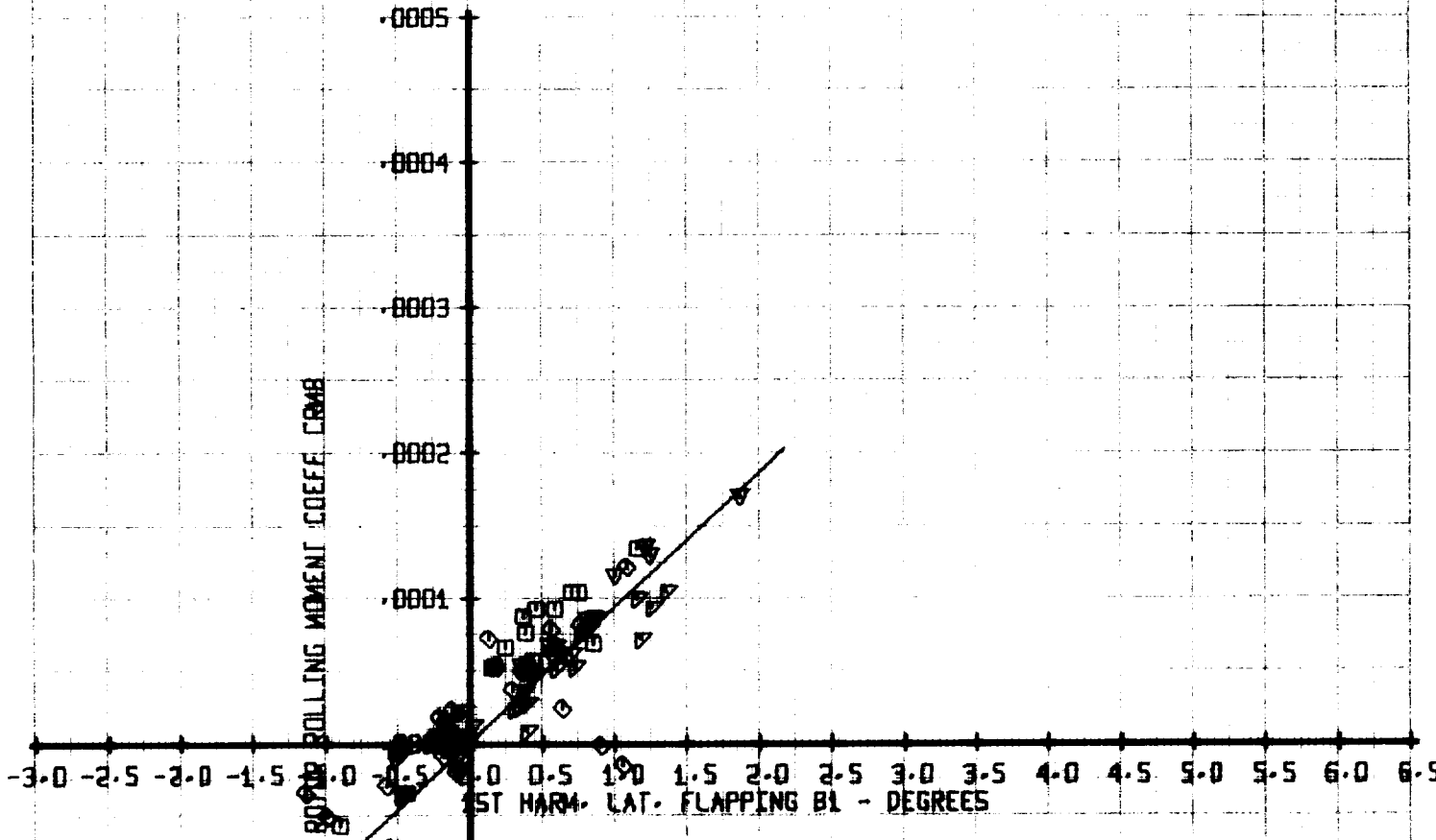


Figure A-80

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/DD258	VTUN
□	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	279

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT

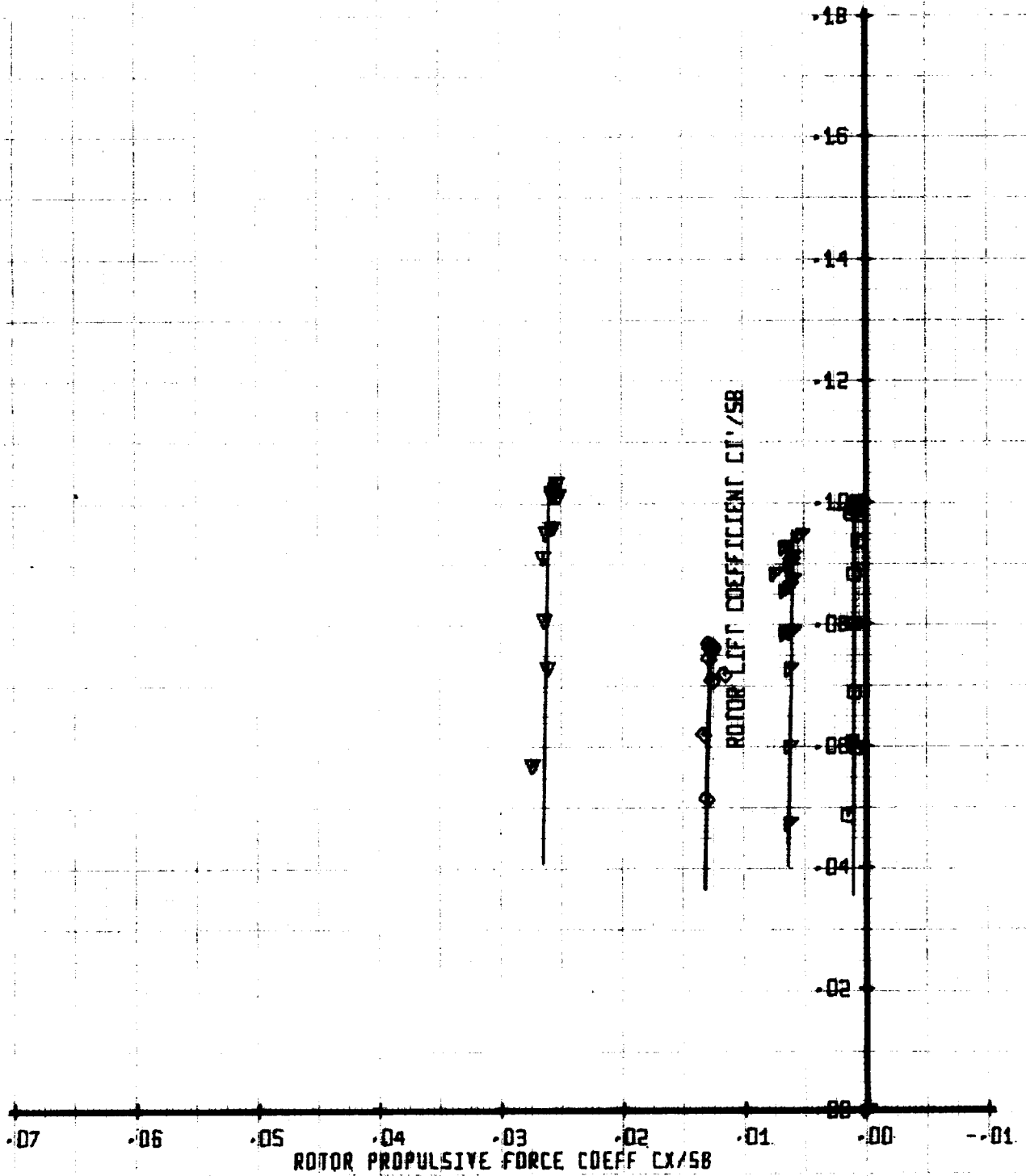
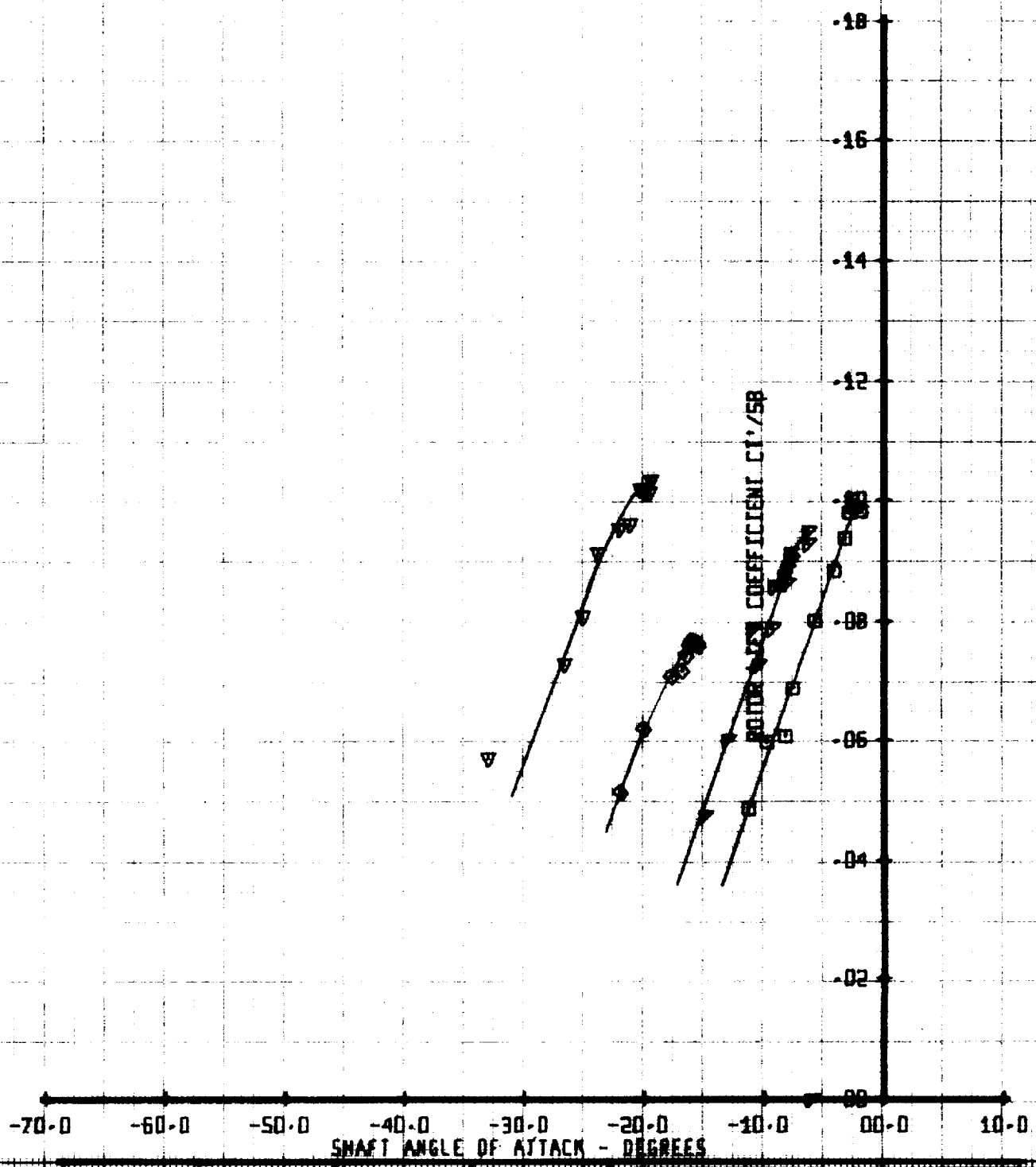


Figure A-81

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
○	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	279

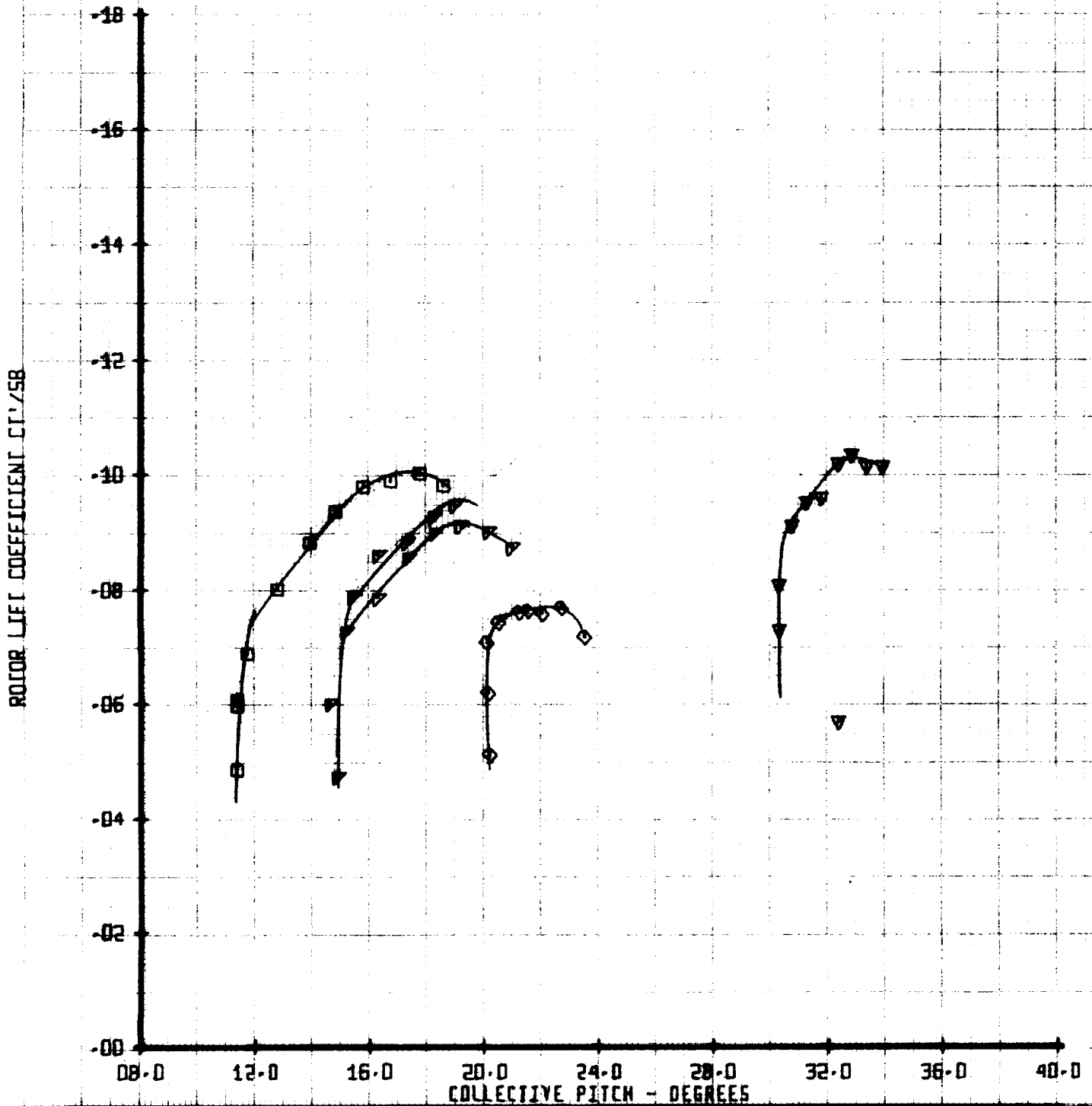
ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU ²	X/DO258	VTUN
□	35	.45	.01	279
▲	36	.45	.05	279
◆	37	.45	.10	279
▼	38	.45	.20	279

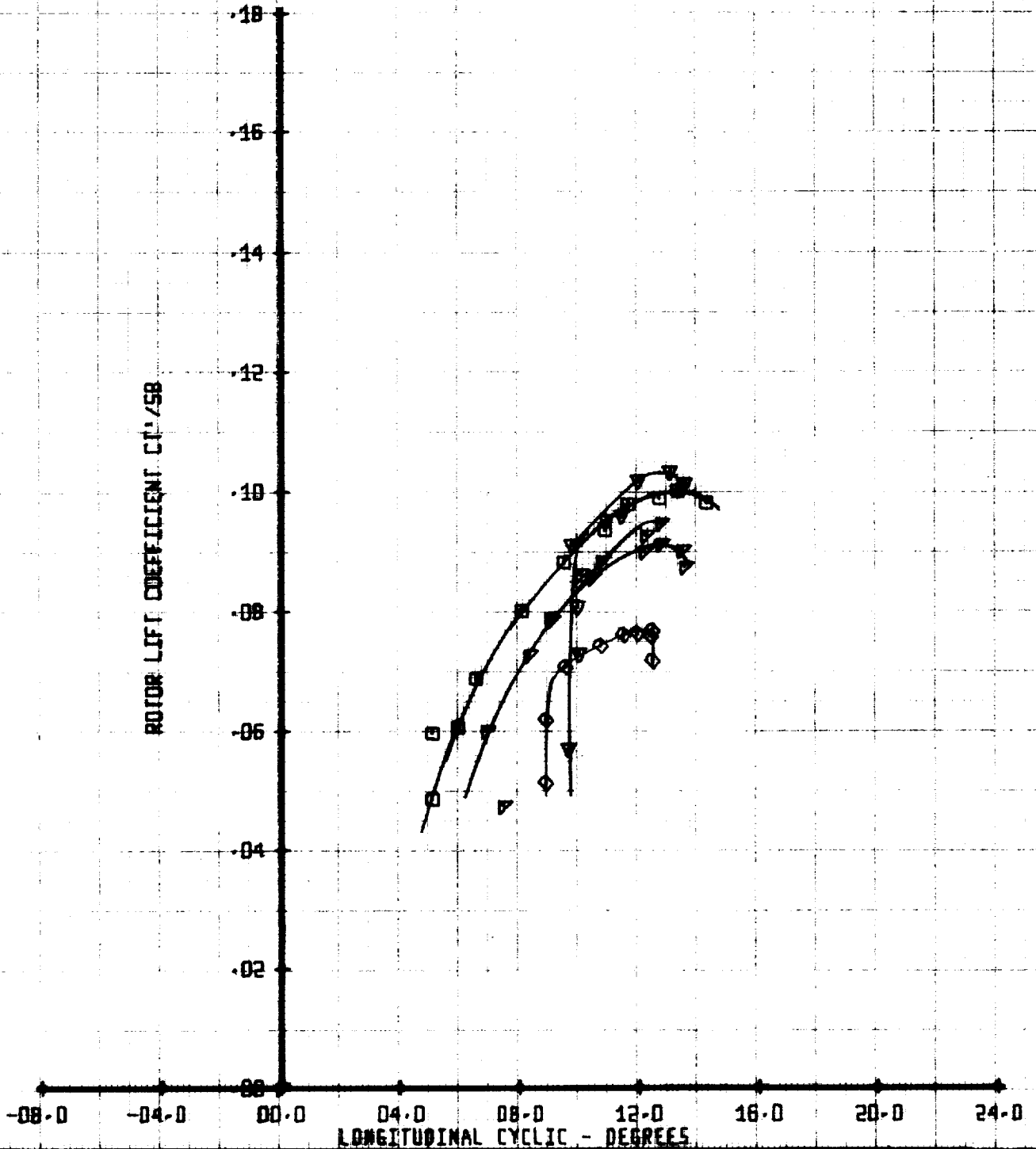
ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI' X/00258	VTUN
□	35	.45	.01
▽	36	.45	.05
◇	37	.45	.10
▼	38	.45	.20

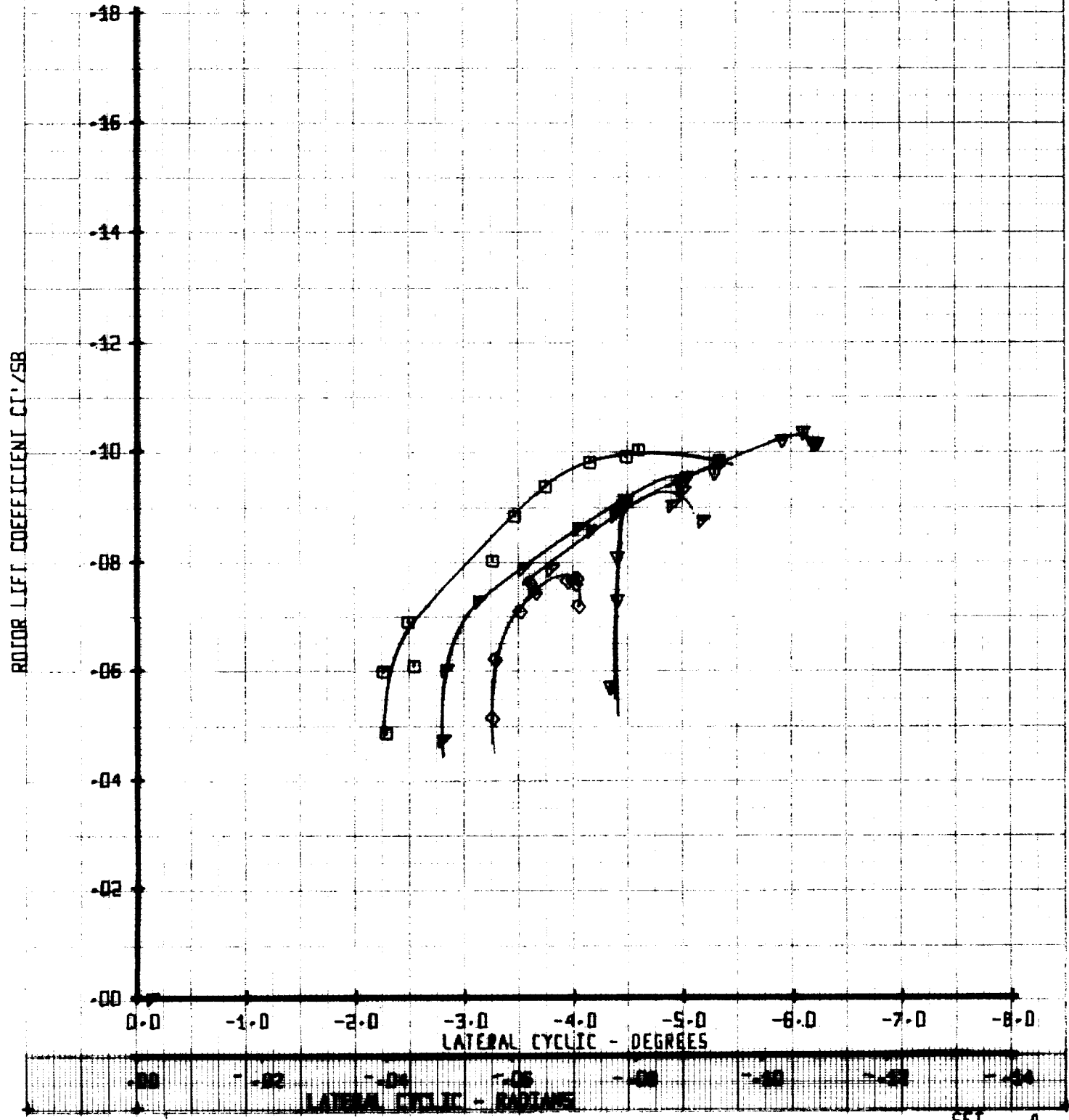
ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
○	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	279

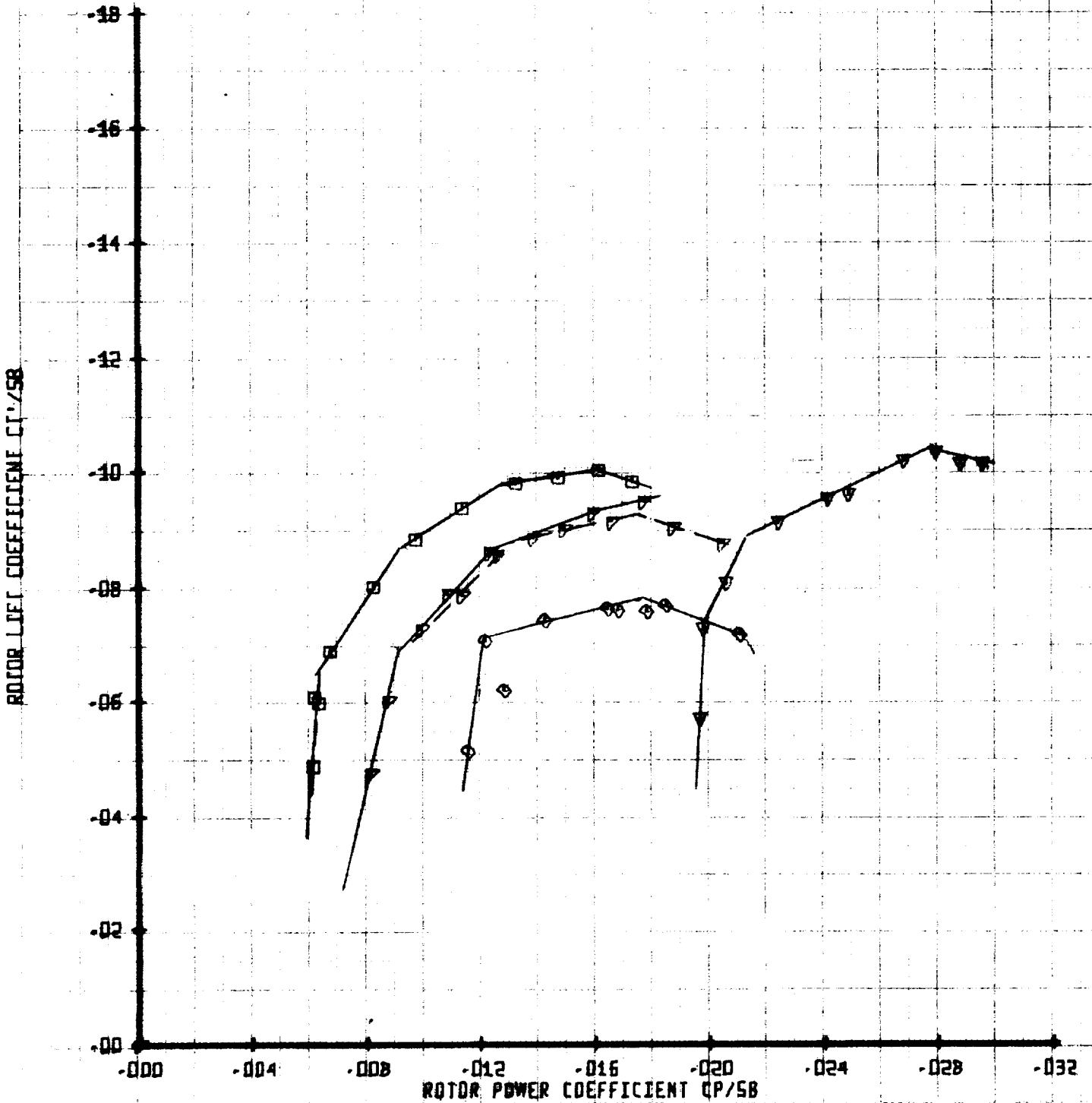
ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI' X/00258	VIUN
□	35	.45	.01
○	36	.45	.05
◇	37	.45	.10
▽	38	.45	.20

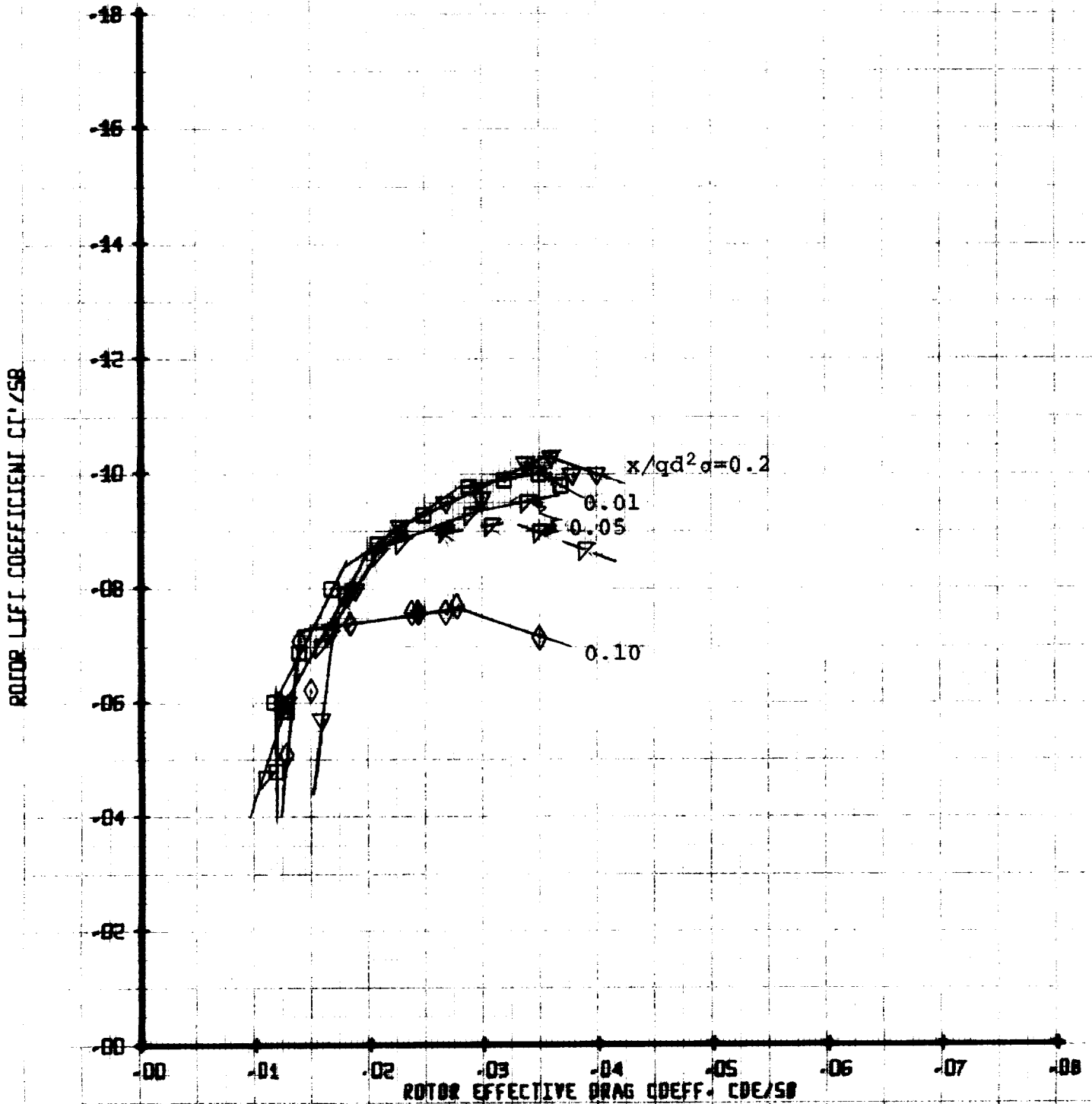
• ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MA'	X/RO258	VTW
□	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	279

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT

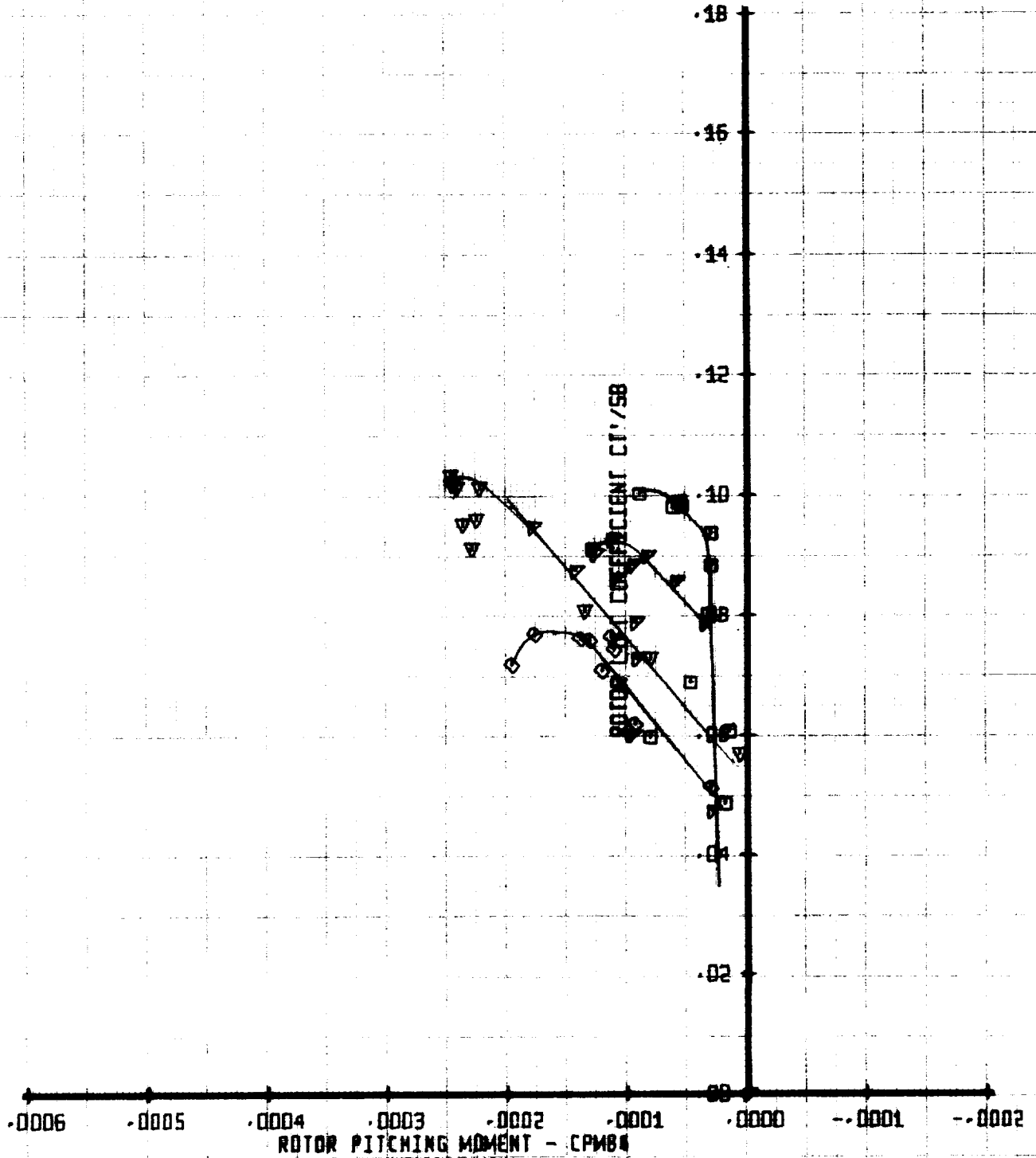


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU' X/00258	VTUM
△	35	.45	.01
▽	36	.45	.05
◇	37	.45	.10
□	38	.45	.20

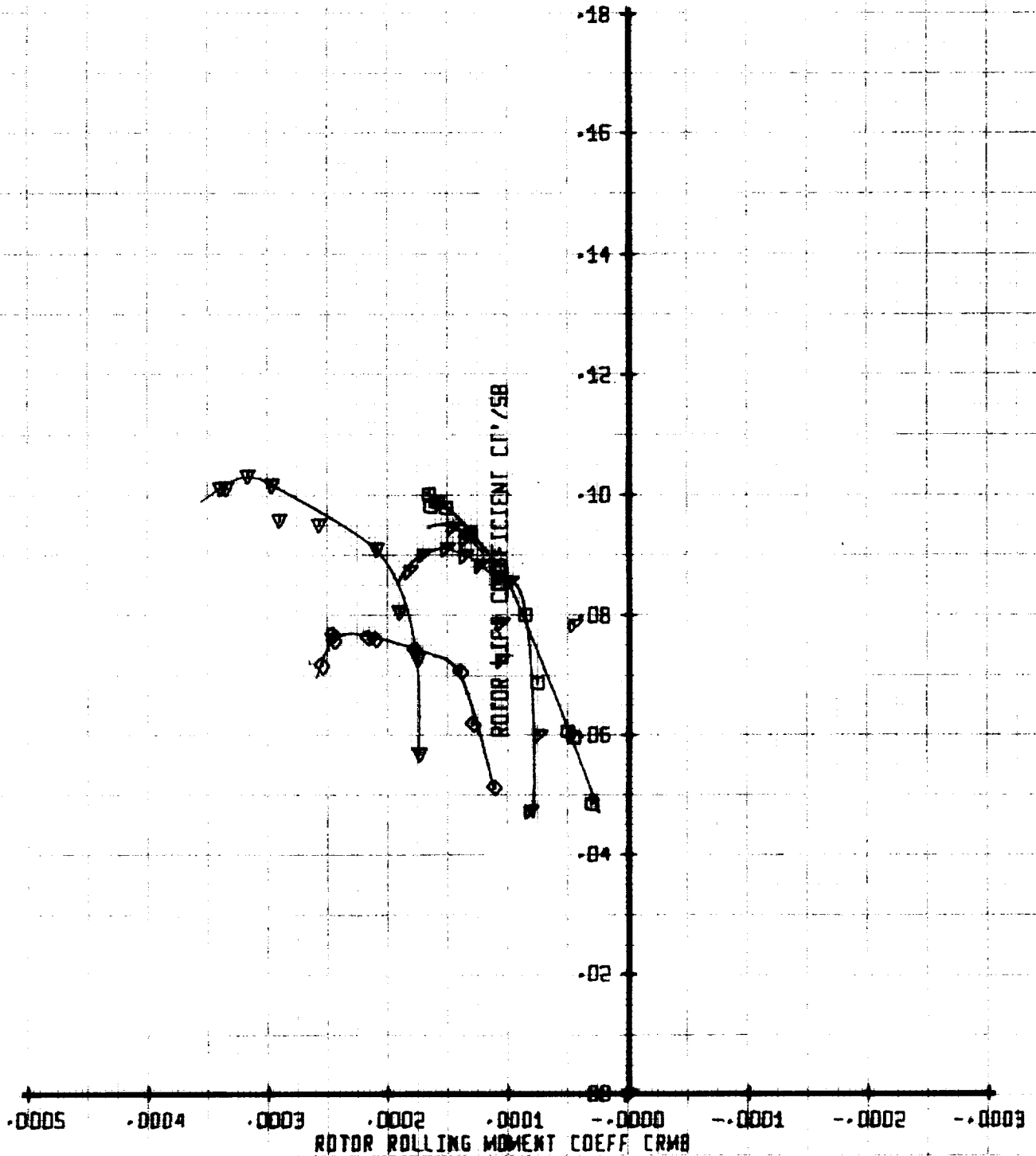
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/DD25B	VTUN
○	35	.45	.01	279
△	36	.45	.05	279
▽	37	.45	.10	279
◊	38	.45	.20	279

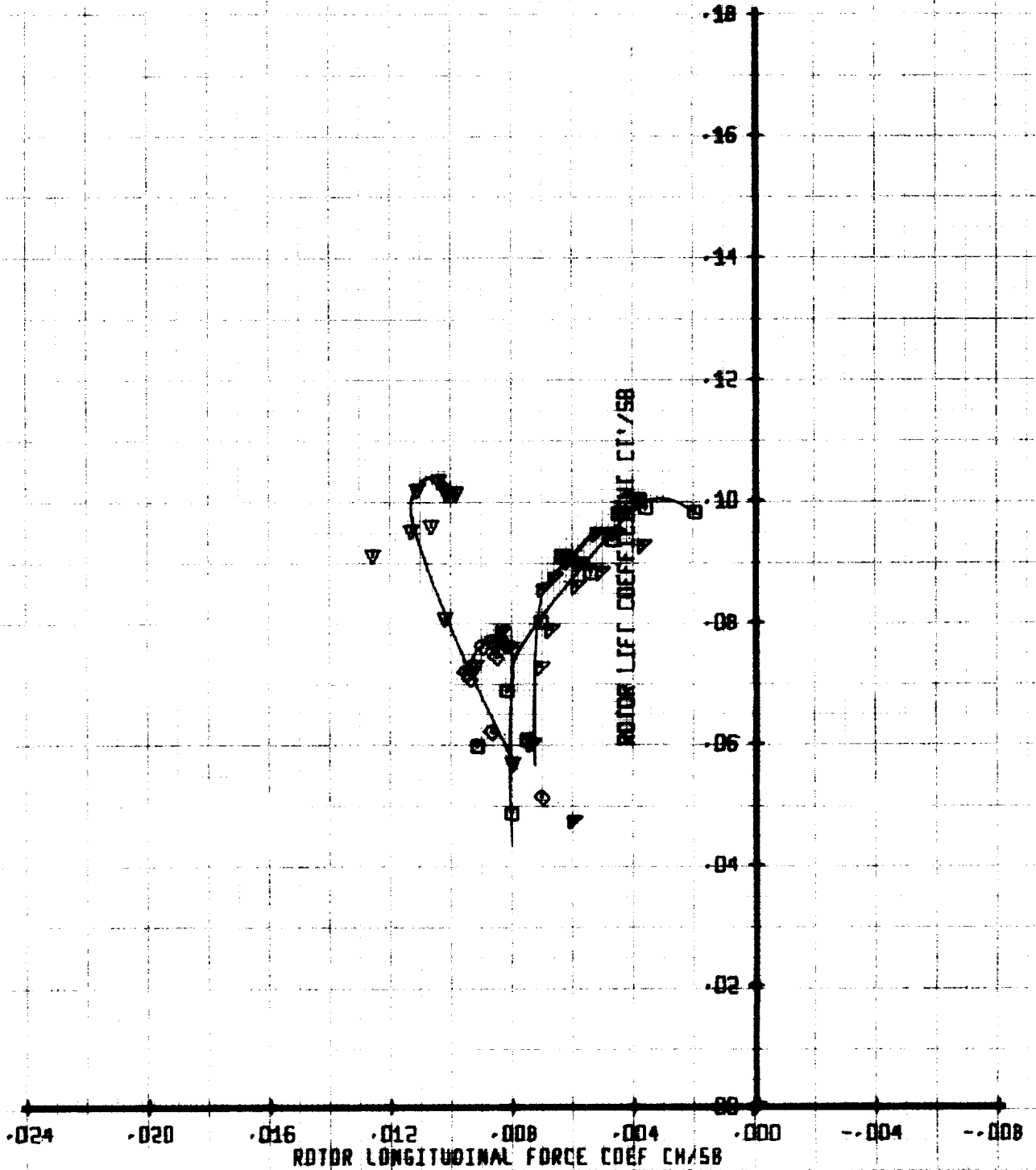
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI' X/00258	VTUN
○	35	.45	.01
△	36	.45	.05
◇	37	.45	.10
▽	38	.45	.20

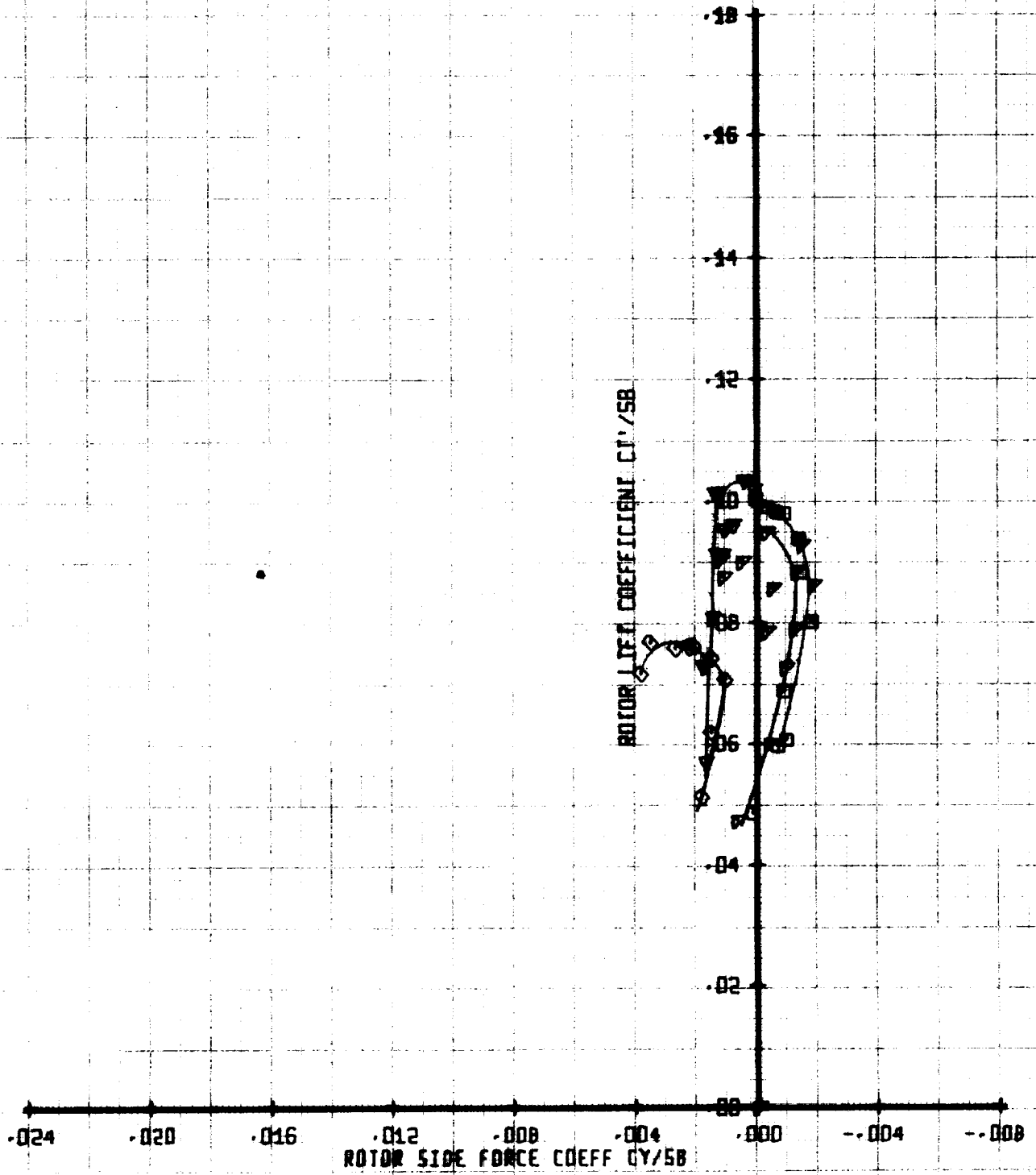
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPLUSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUM
□	35	.45	.01	279
○	36	.45	.05	279
◇	37	.45	.10	279
△	38	.45	.20	279

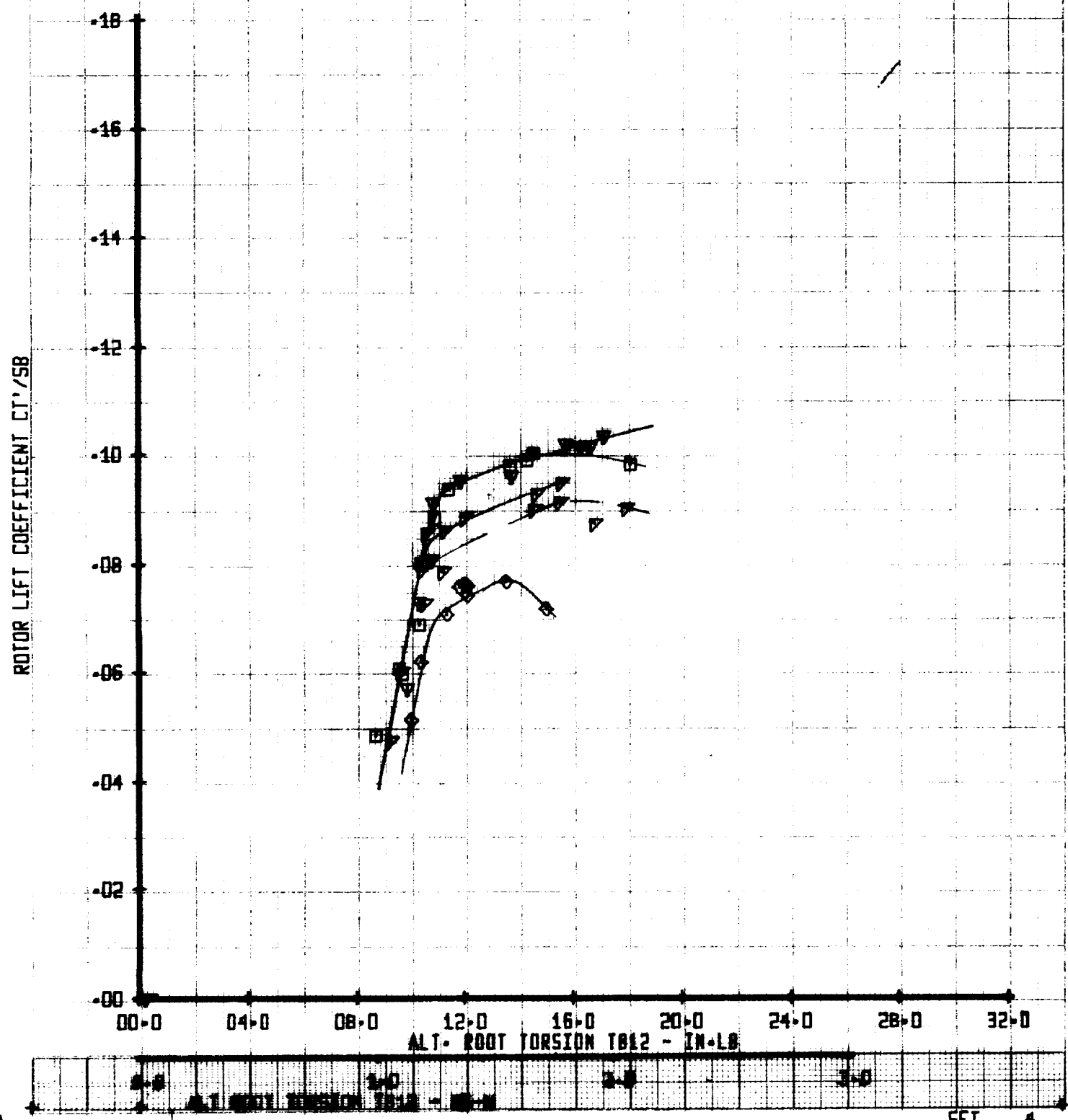
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU	X/00250	VTUN
□	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	279

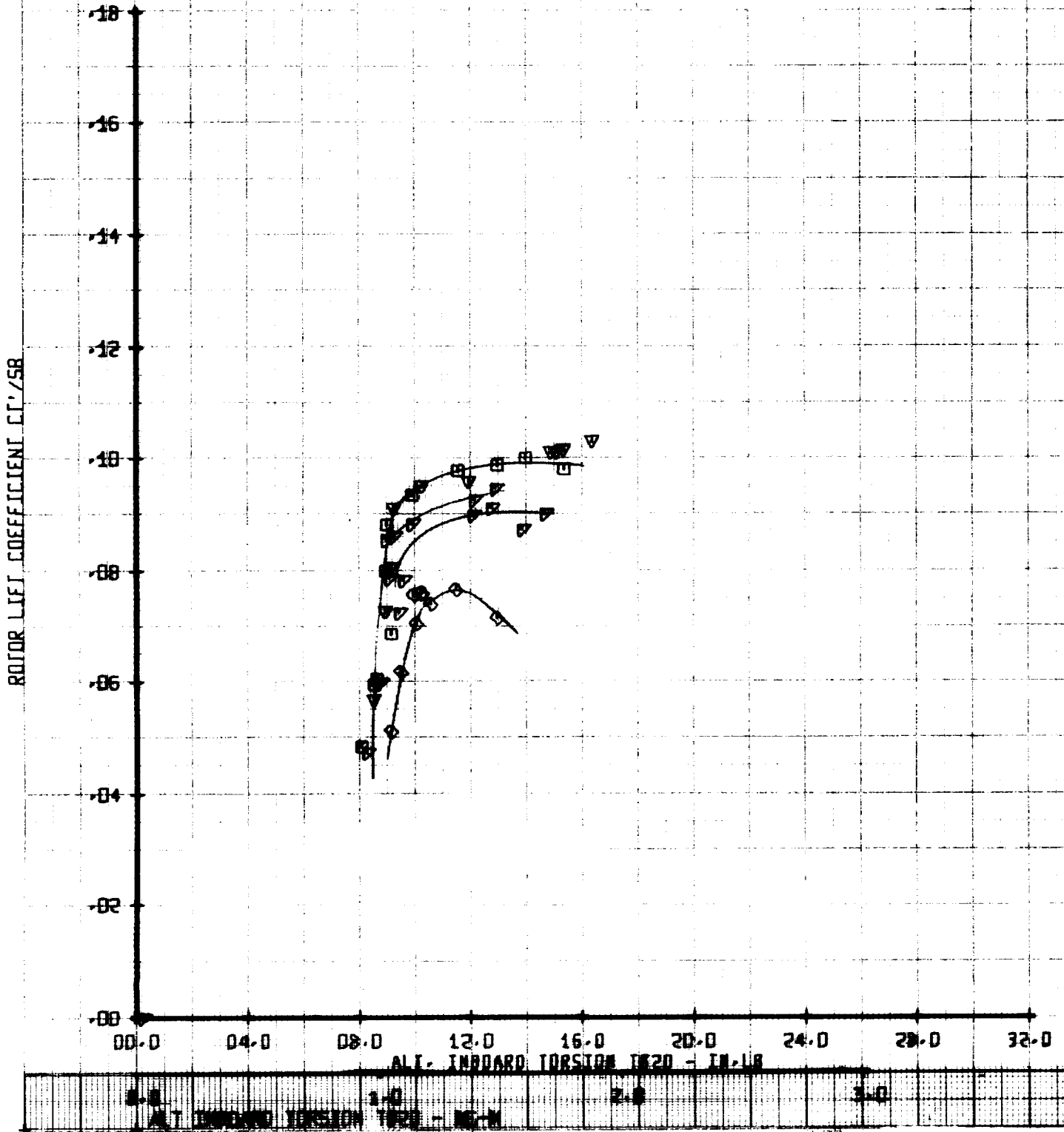
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB 12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/DD25B	NTUN
□	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	279

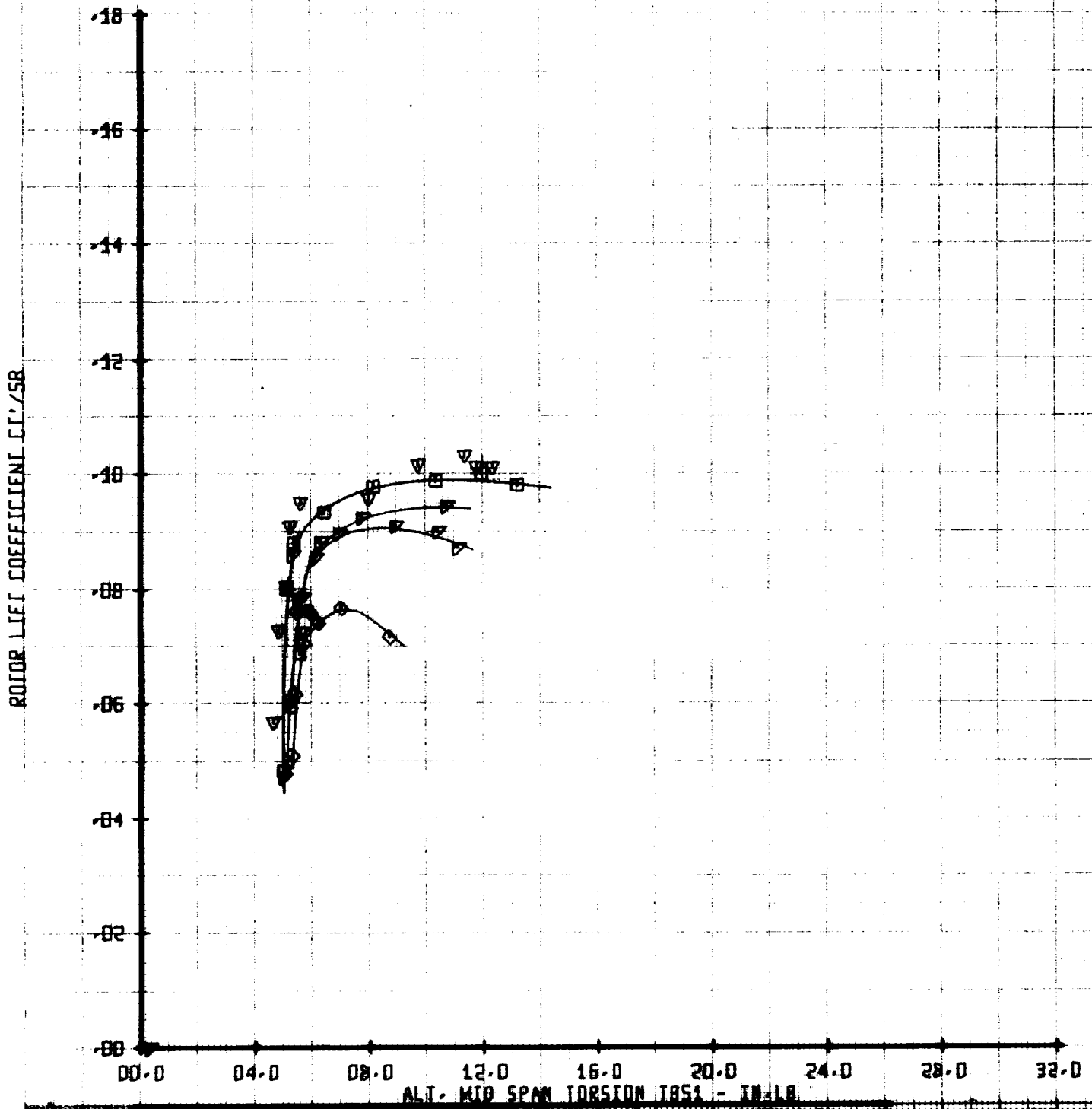
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING INBOARD TORSION TB20



LIFT-PROPUISIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/100258	VTUN
○	35	.45	.01	279
□	36	.45	.05	279
△	37	.45	.10	279
▽	38	.45	.20	279

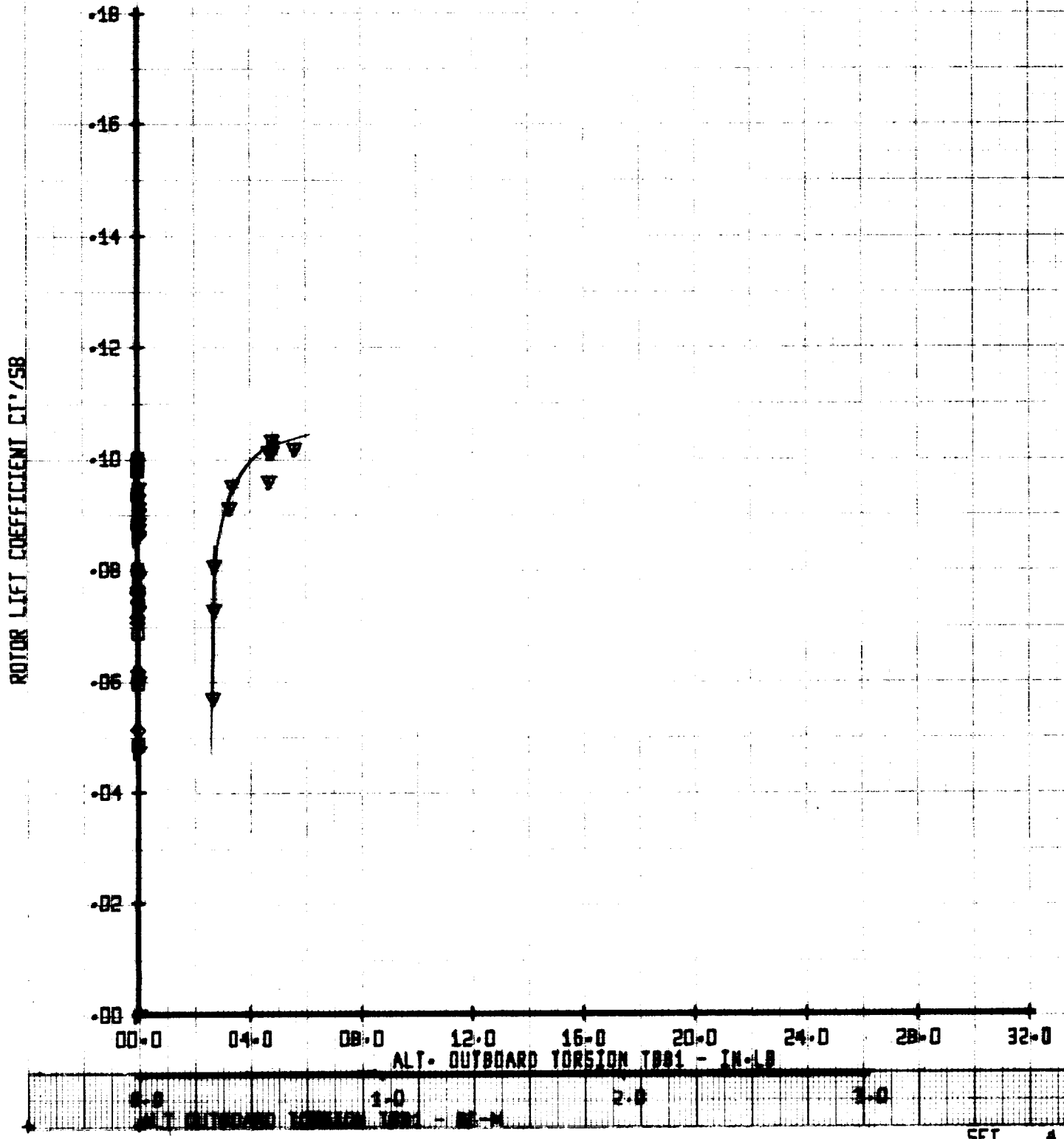
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB51



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU	X/00258	VTUN
□	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	

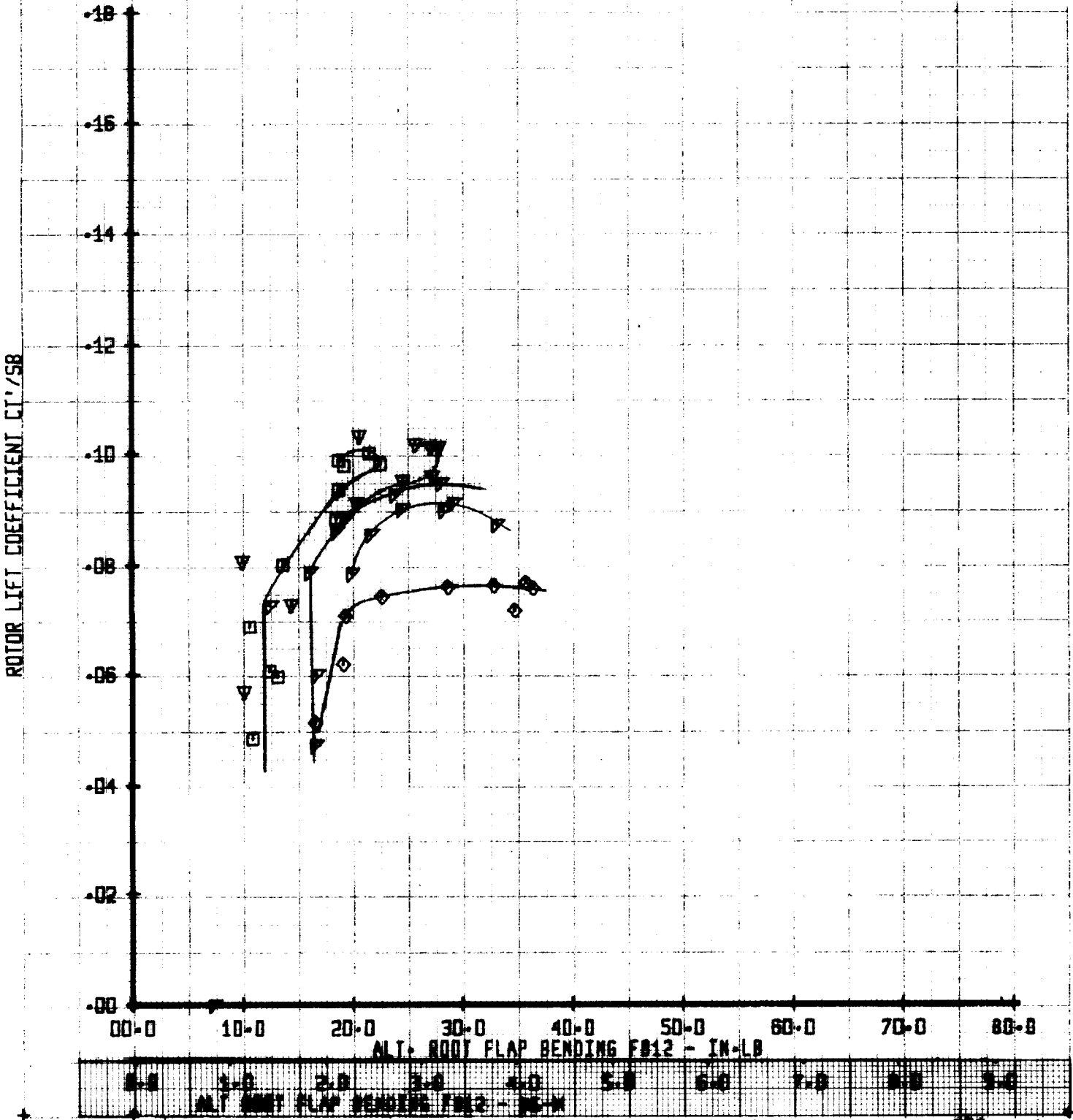
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB81



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI	X/00258	VTUN
□	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	279

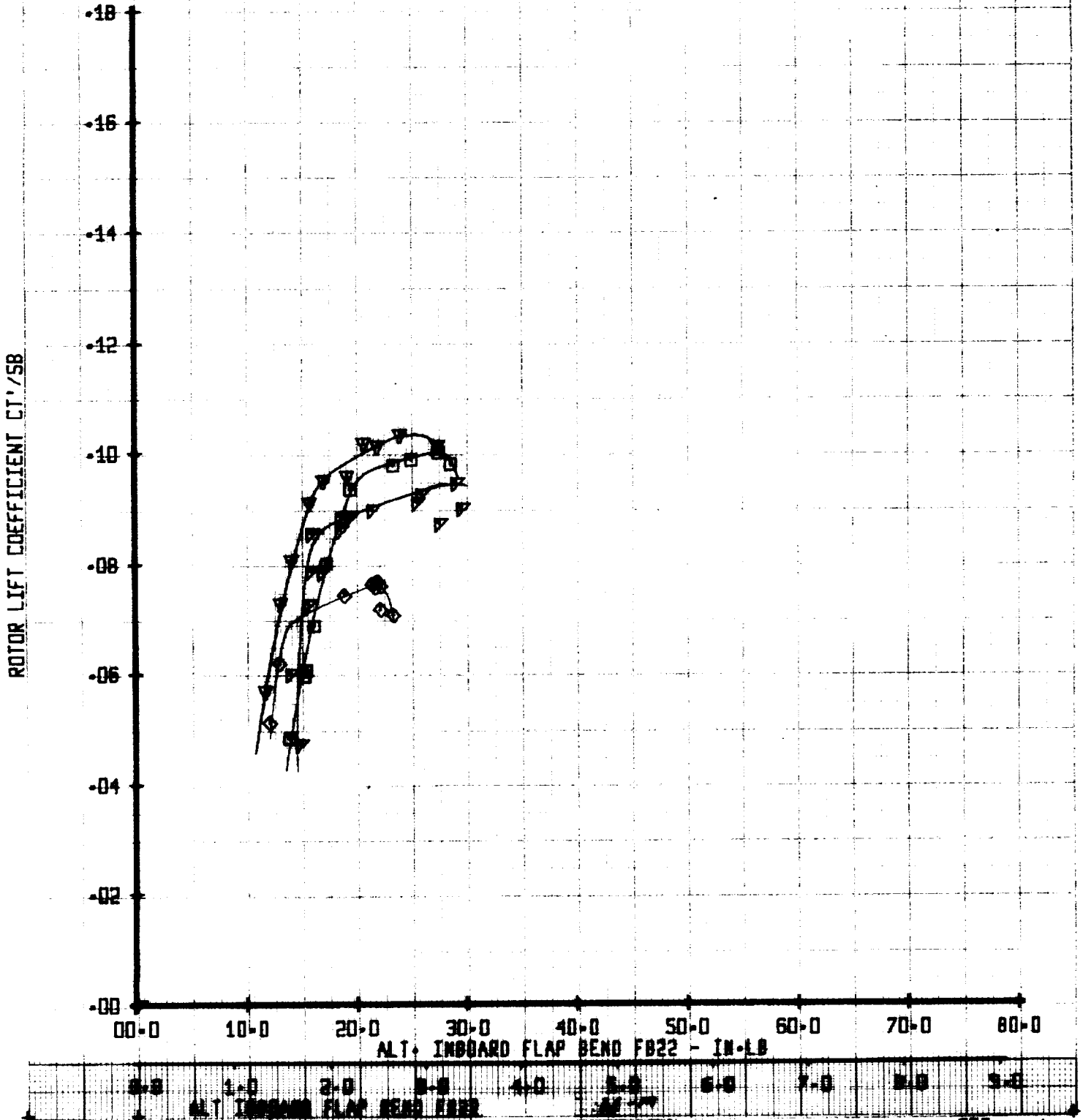
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MLI	X/0025B	VIUN
○	35	.45	.01	279
▽	36	.45	.05	279
◇	37	.45	.10	279
▼	38	.45	.20	279

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING INBOARD FLAP BENDING FB22



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/DD258	VTUN
□	35	.45	.01	279
△	36	.45	.05	279
▽	37	.45	.10	279
◇	38	.45	.20	279

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BENDING FB48

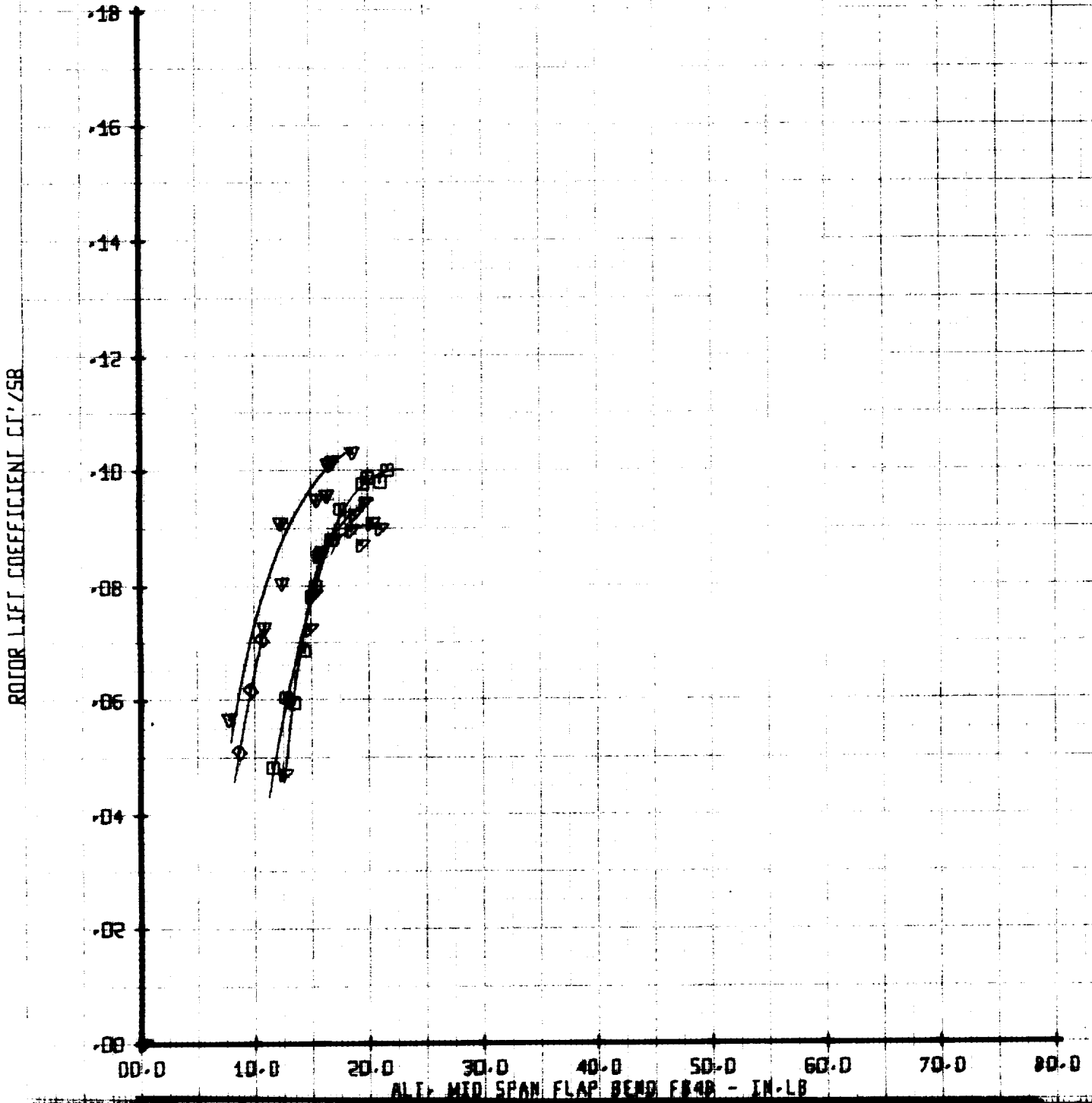
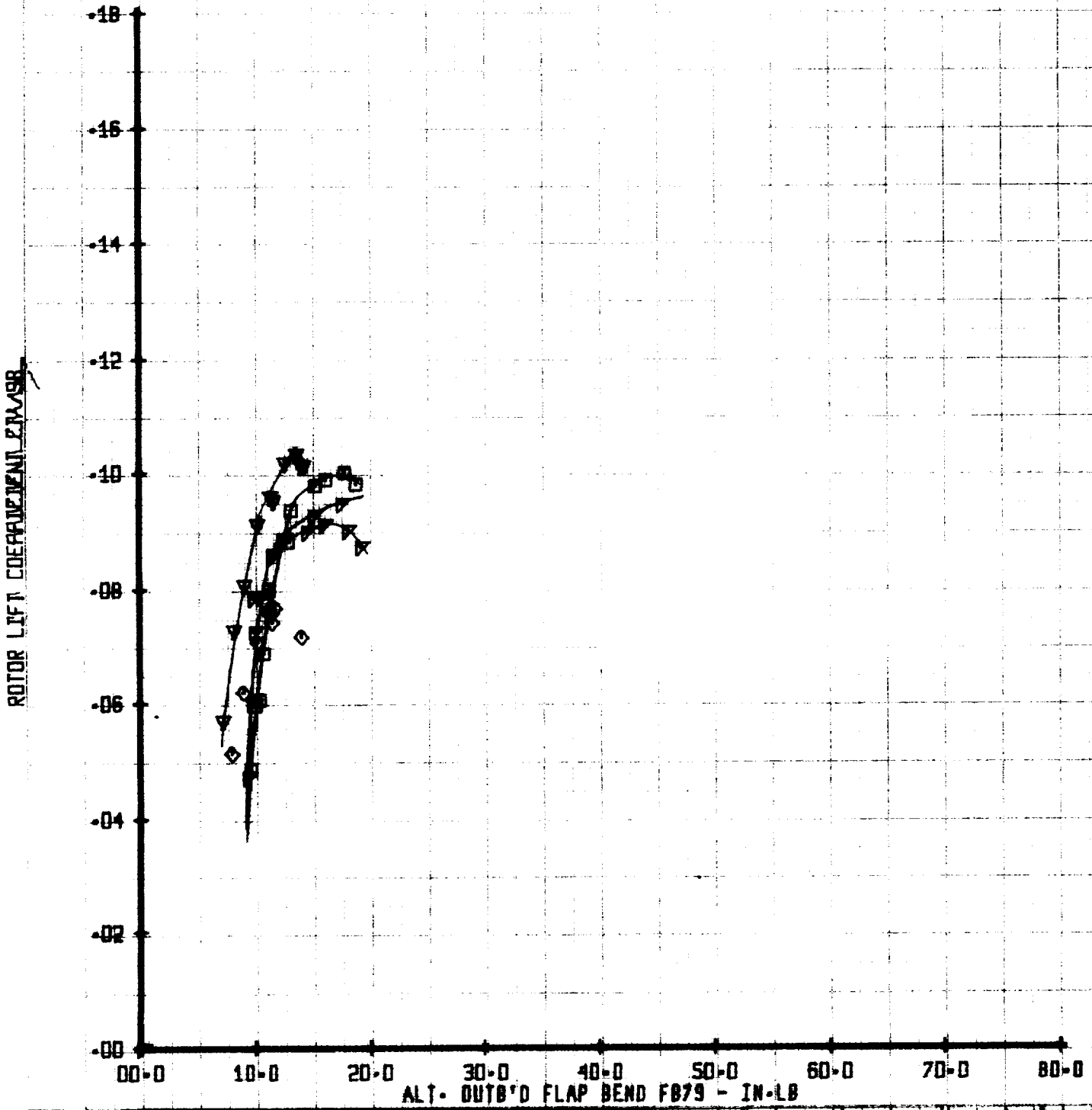


Figure A-98

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MI'	X/00258	VTUN
□	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	

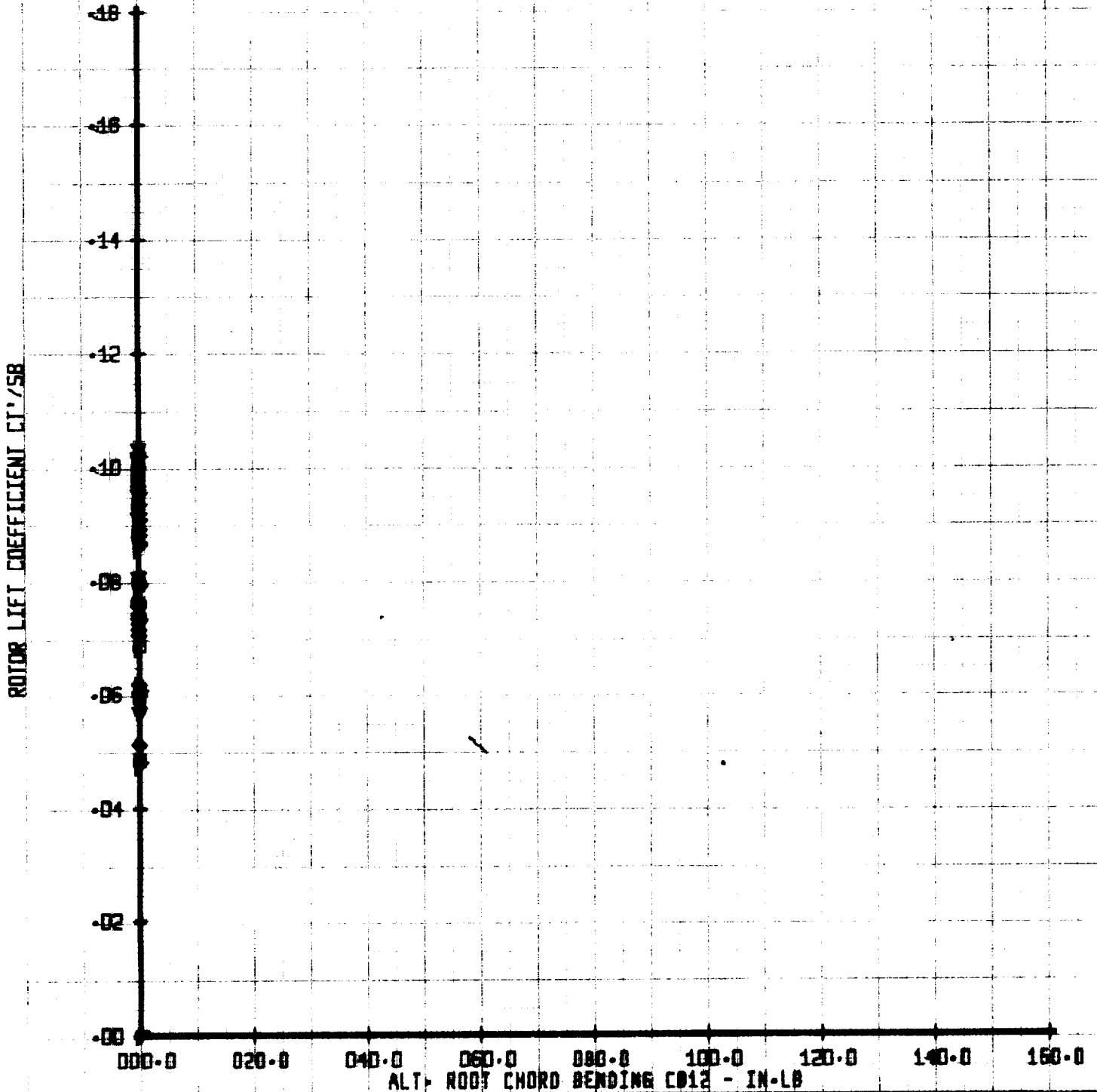
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB79



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	279

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12

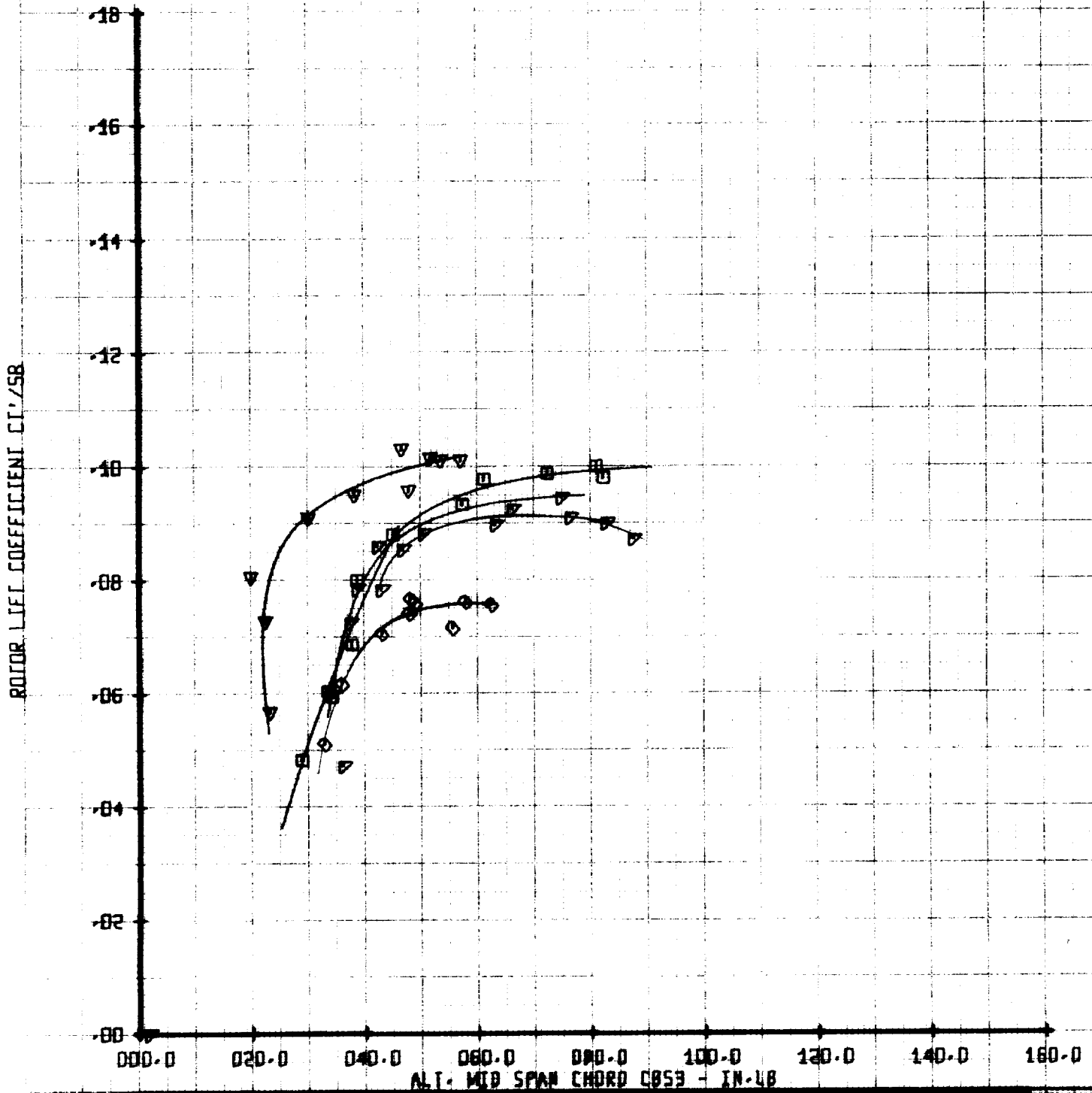


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU	X/00258	VTUN
○	35	.45	.01	279
□	36	.45	.05	279
△	37	.45	.18	279
▽	38	.45	.20	279

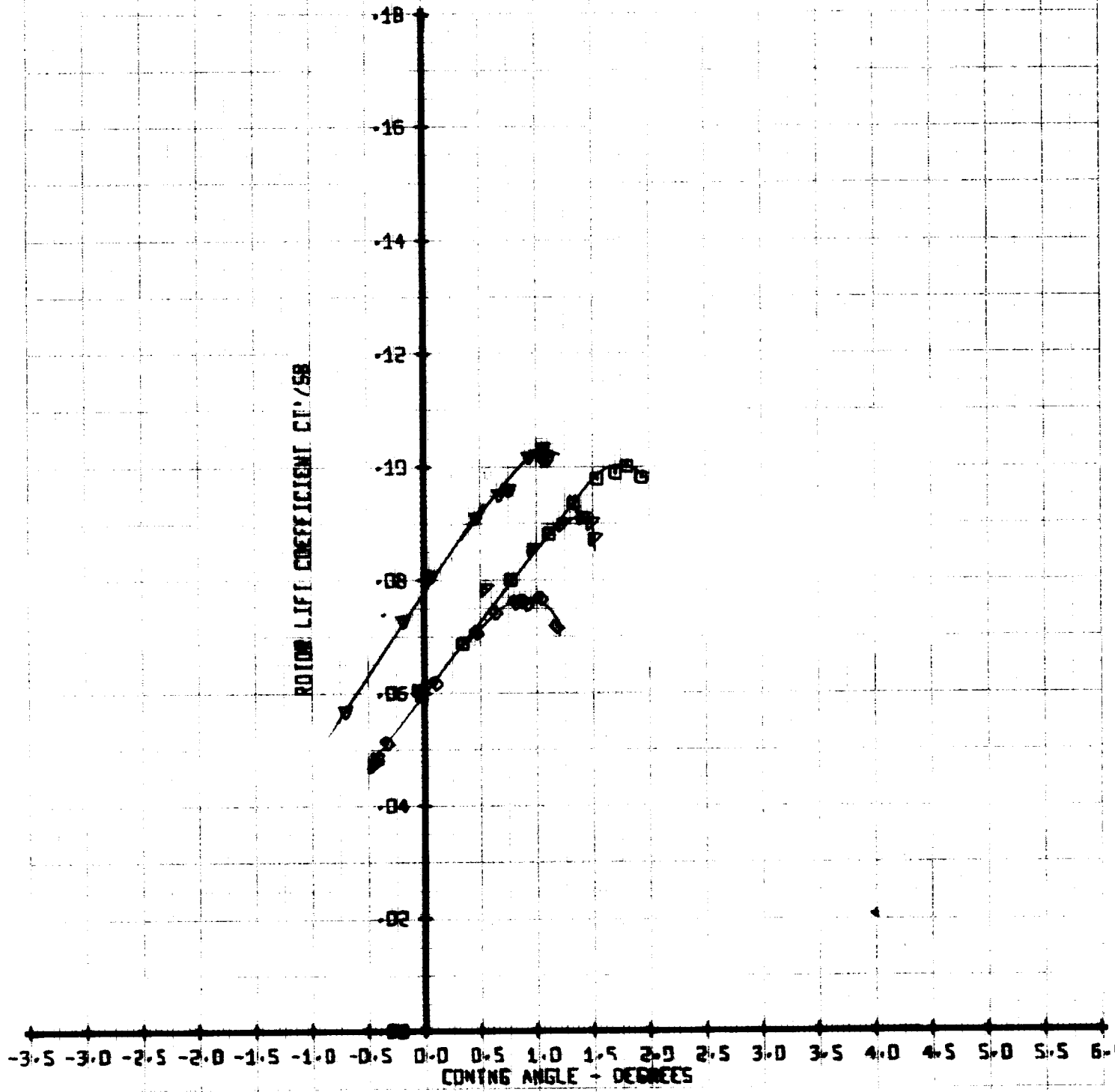
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN CHORD CB53



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-470 ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	YTUM
□	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	279

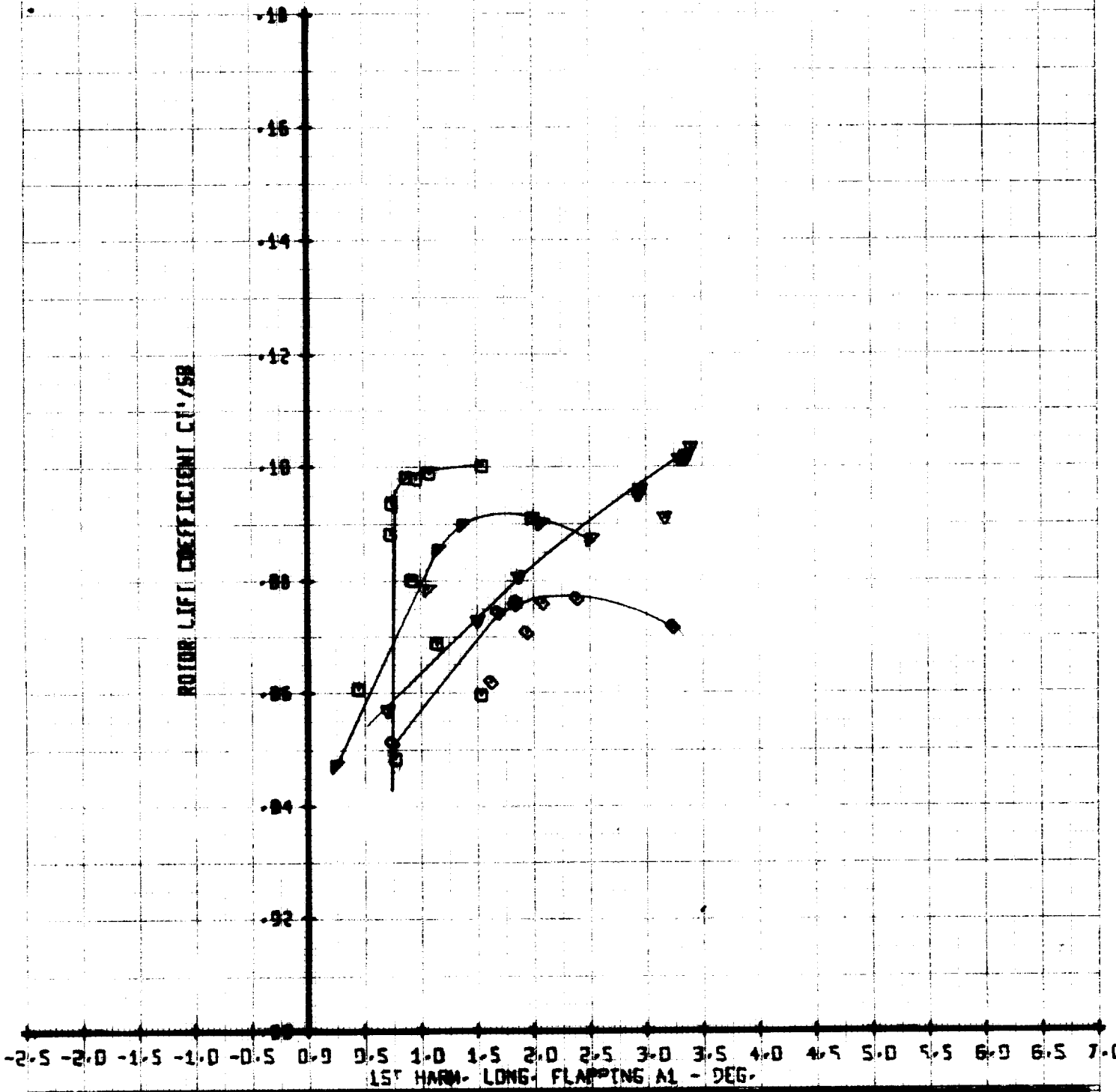
ROTOR LIFT COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
1/10 SCALE OH-47D ROTOR
LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	YTUN
□	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
○	38	.45	.20	279

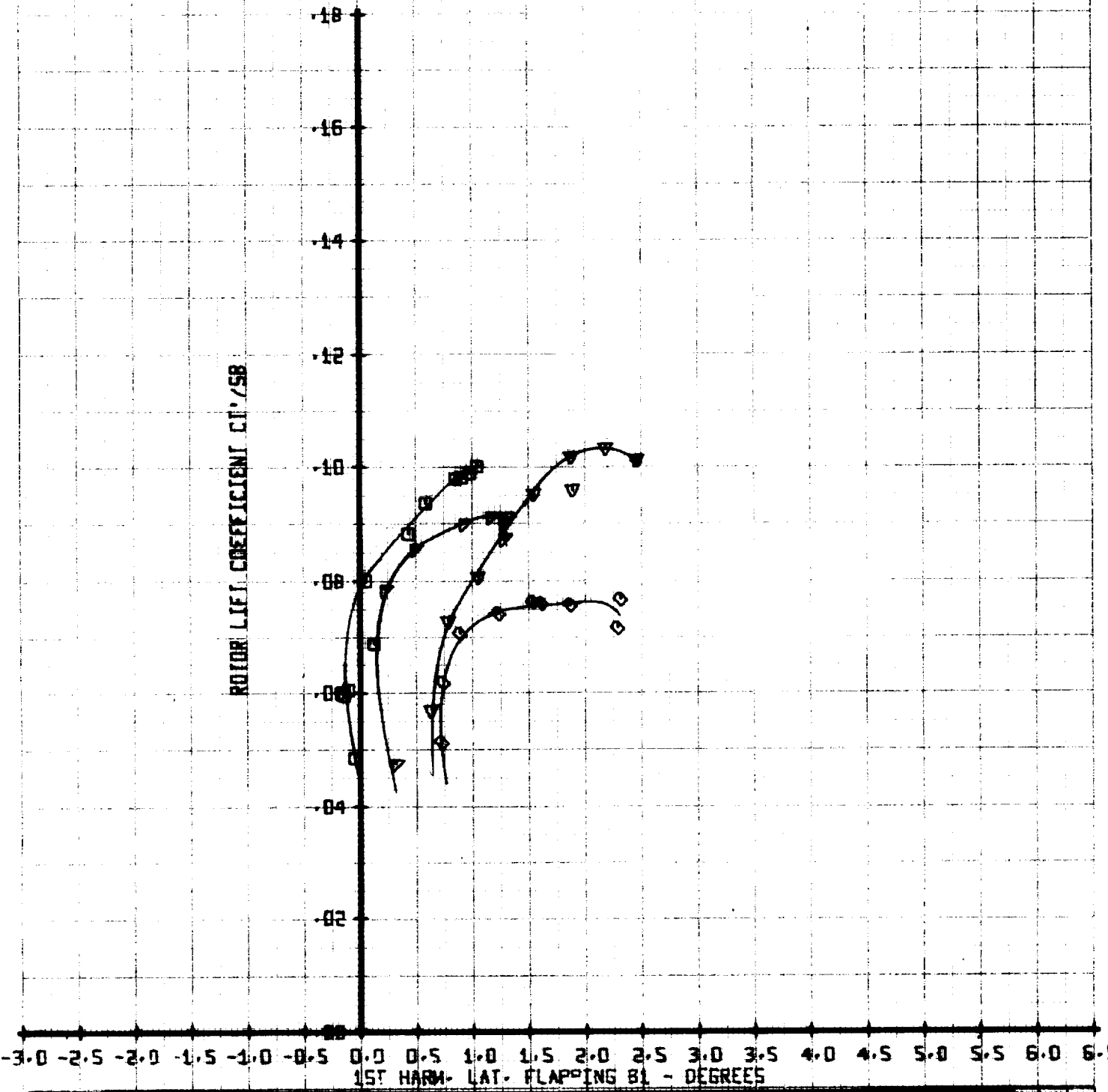
ROTOR LIFT COEFFICIENT
VERSUS
1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU	X/0025B	YTUN
□	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	279

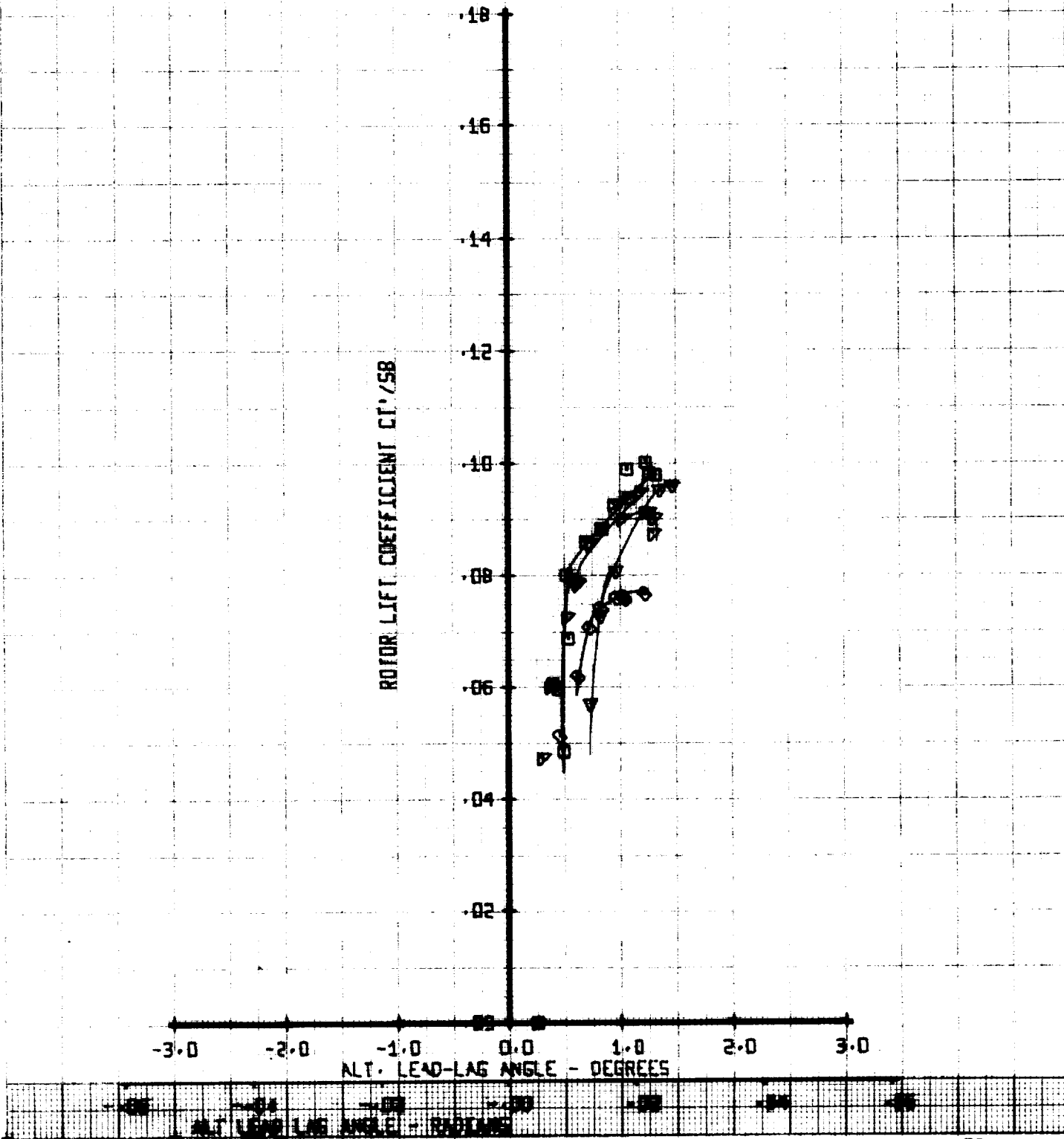
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	Y/TUN
□	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	279

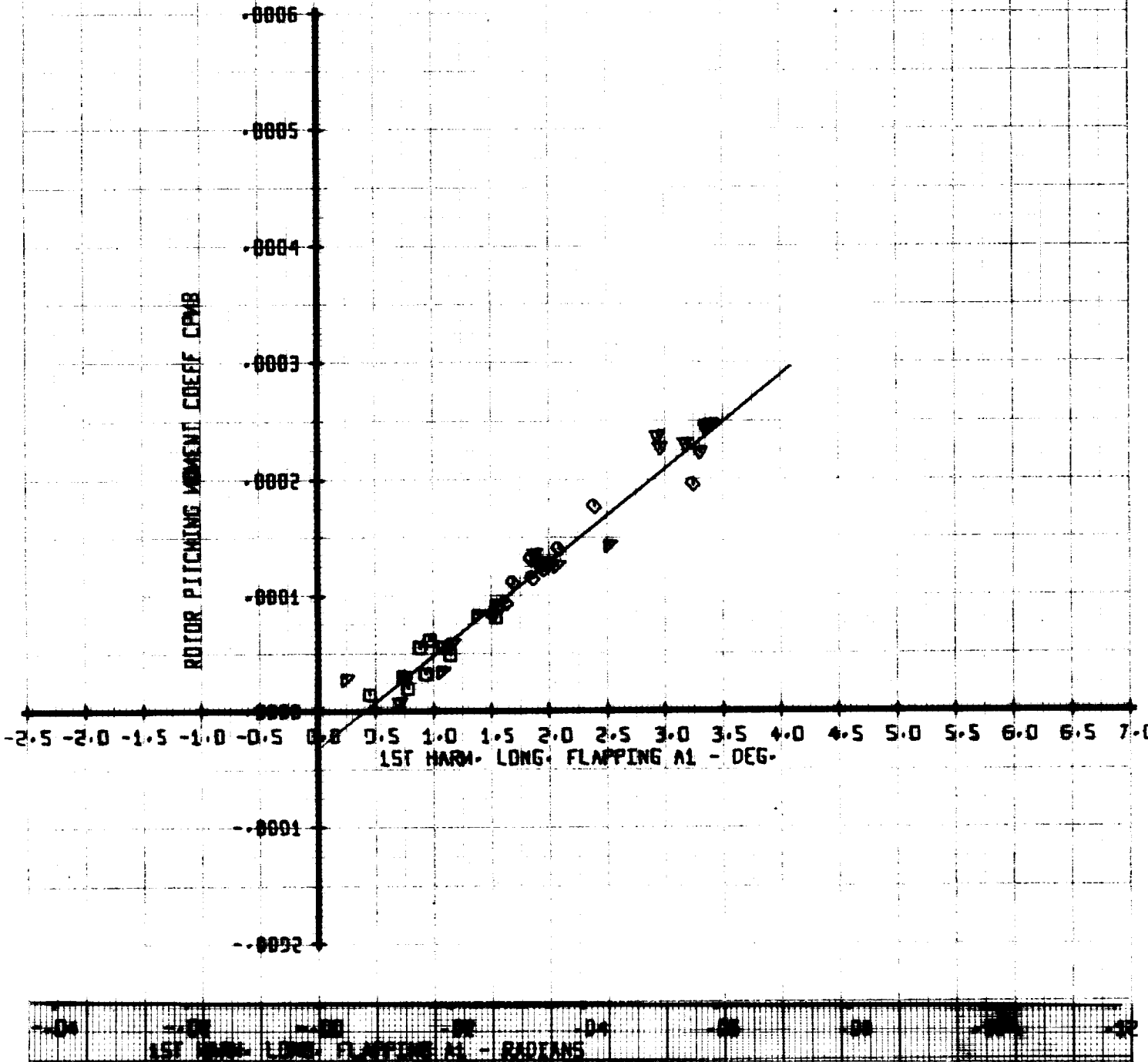
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/BD25B	YTUN
□	35	.45	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	279

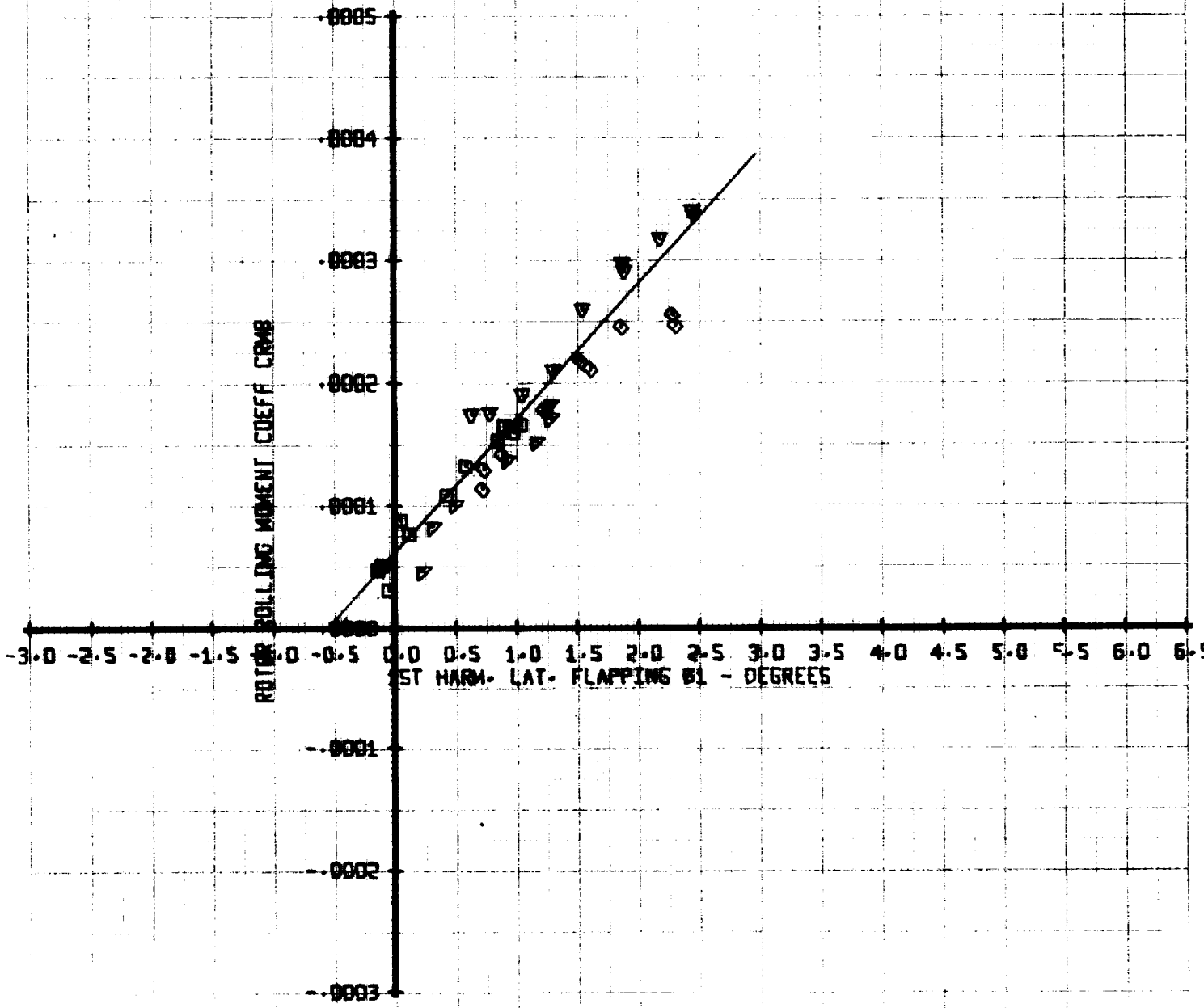
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-470 ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUM
□	35	.15	.01	279
△	36	.45	.05	279
◇	37	.45	.10	279
▽	38	.45	.20	279

ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VIUN
○	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT

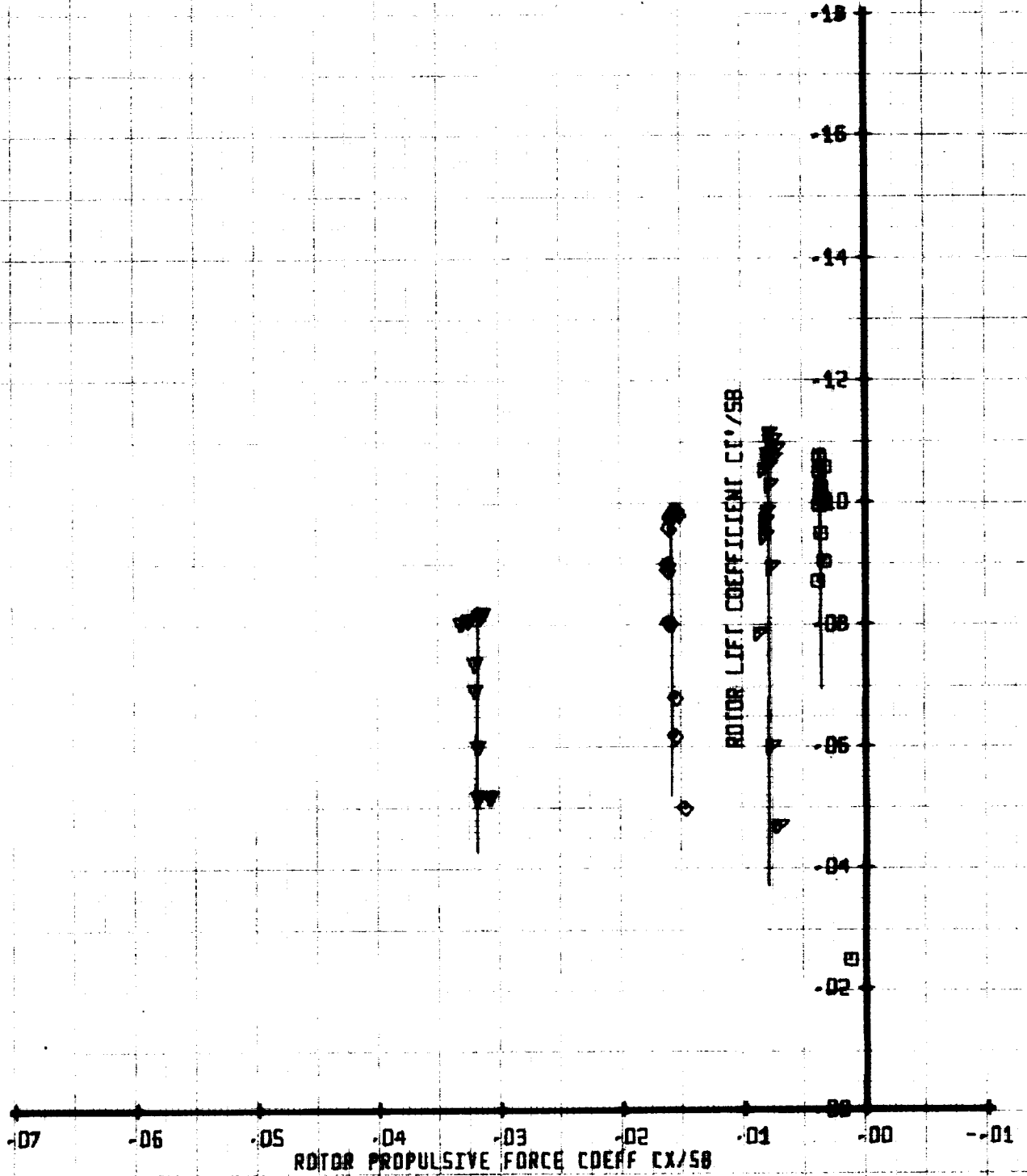
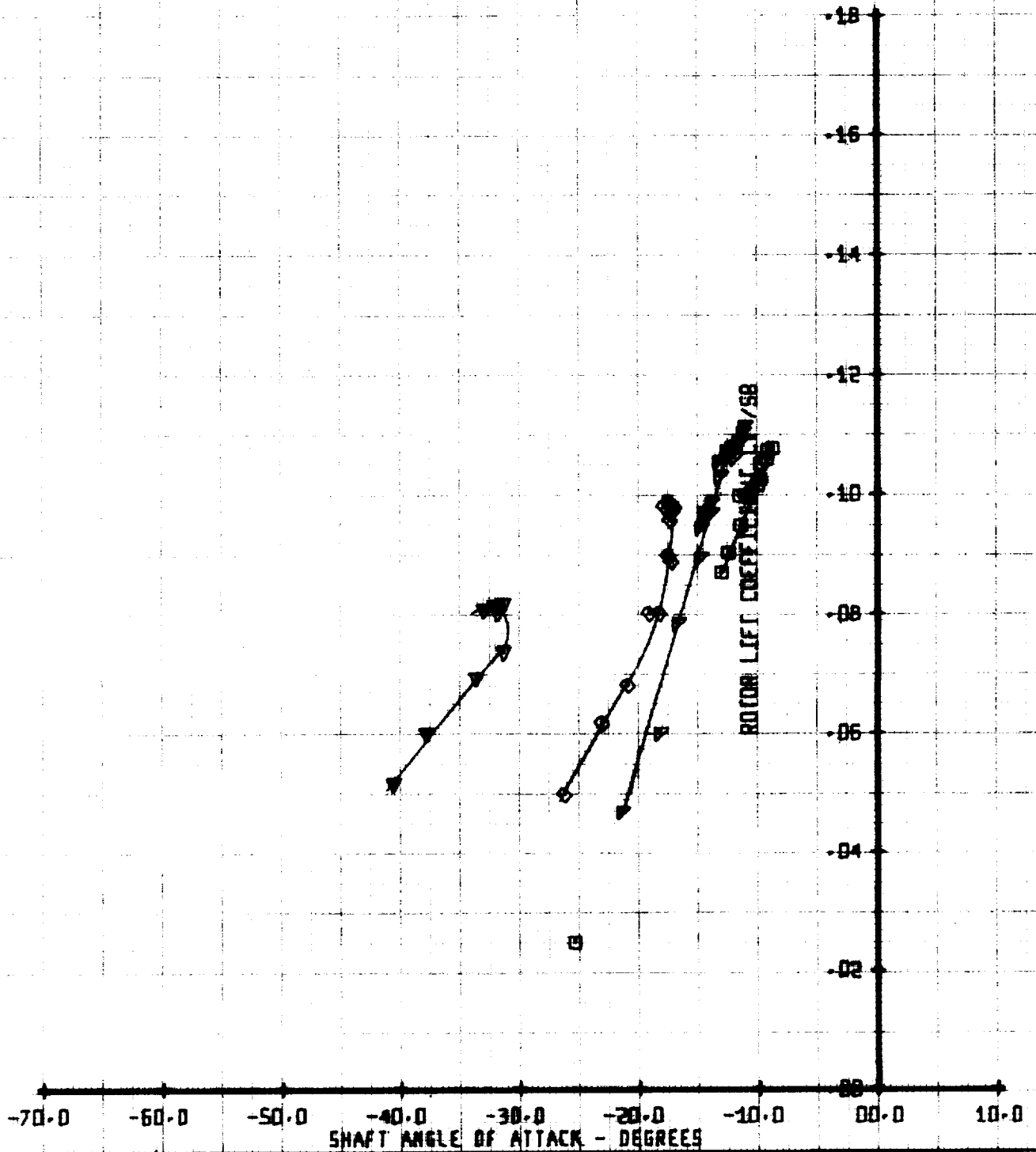


Figure A-108

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/DD258	VTUN
○	40	.50	.025	310
▲	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

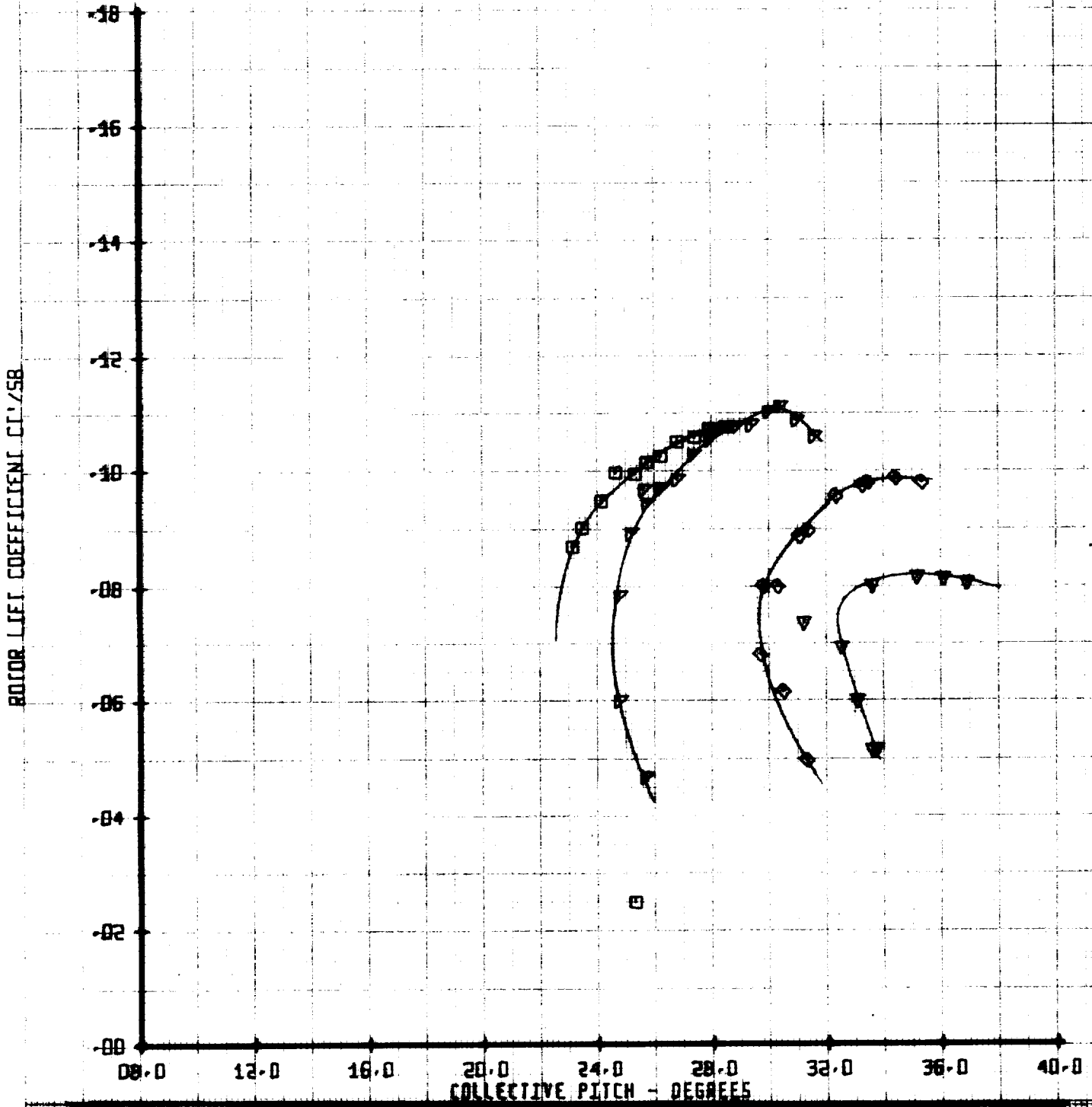
ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
□	40	.50	.025	310
○	39	.50	.05	310
△	41	.50	.10	310
▽	42	.50	.20	310

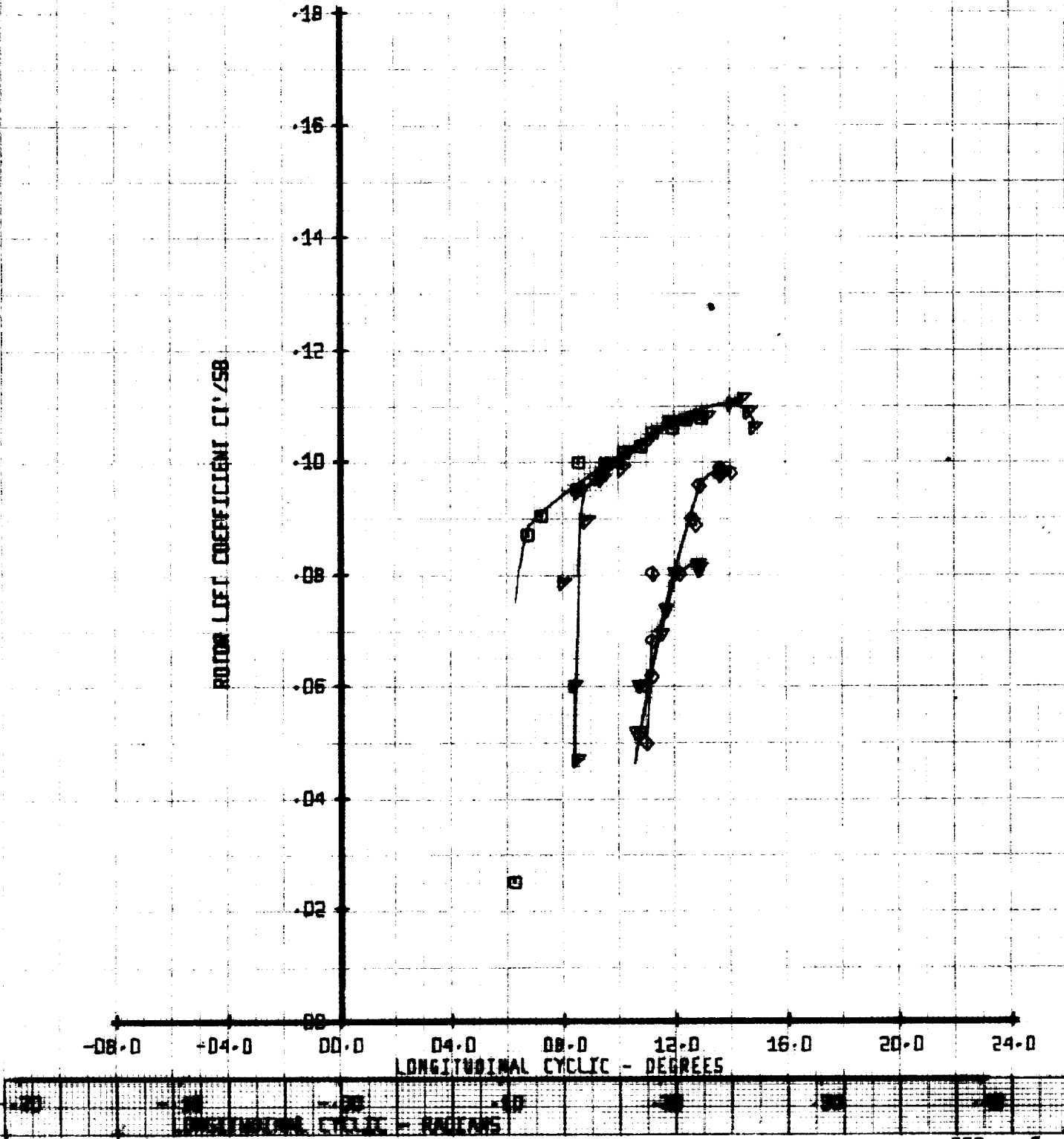
ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
○	40	.50	.075	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

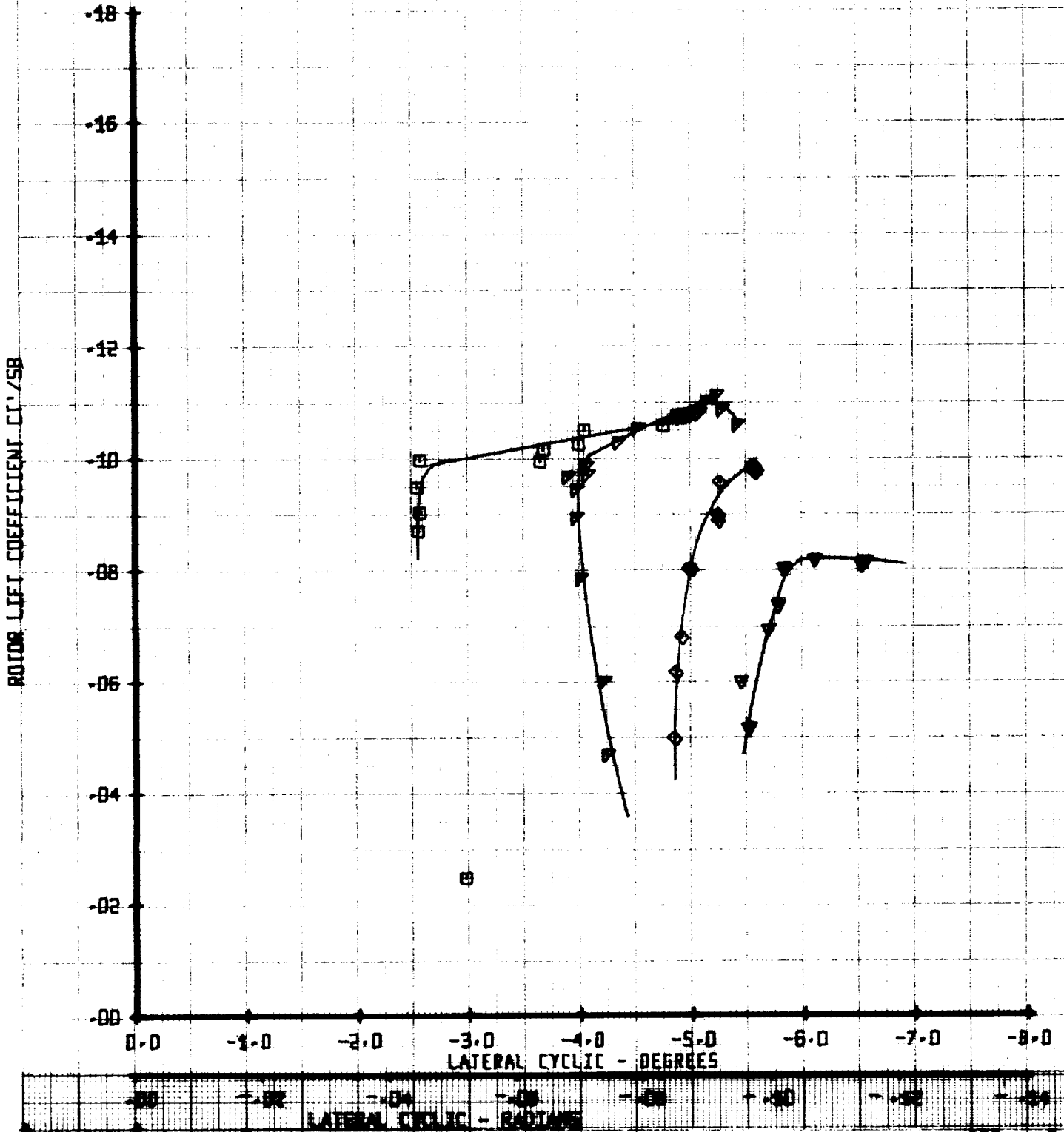
ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
◇	40	.50	.025	310
◇	39	.50	.05	310
◇	41	.50	.10	310
◇	42	.50	.20	310

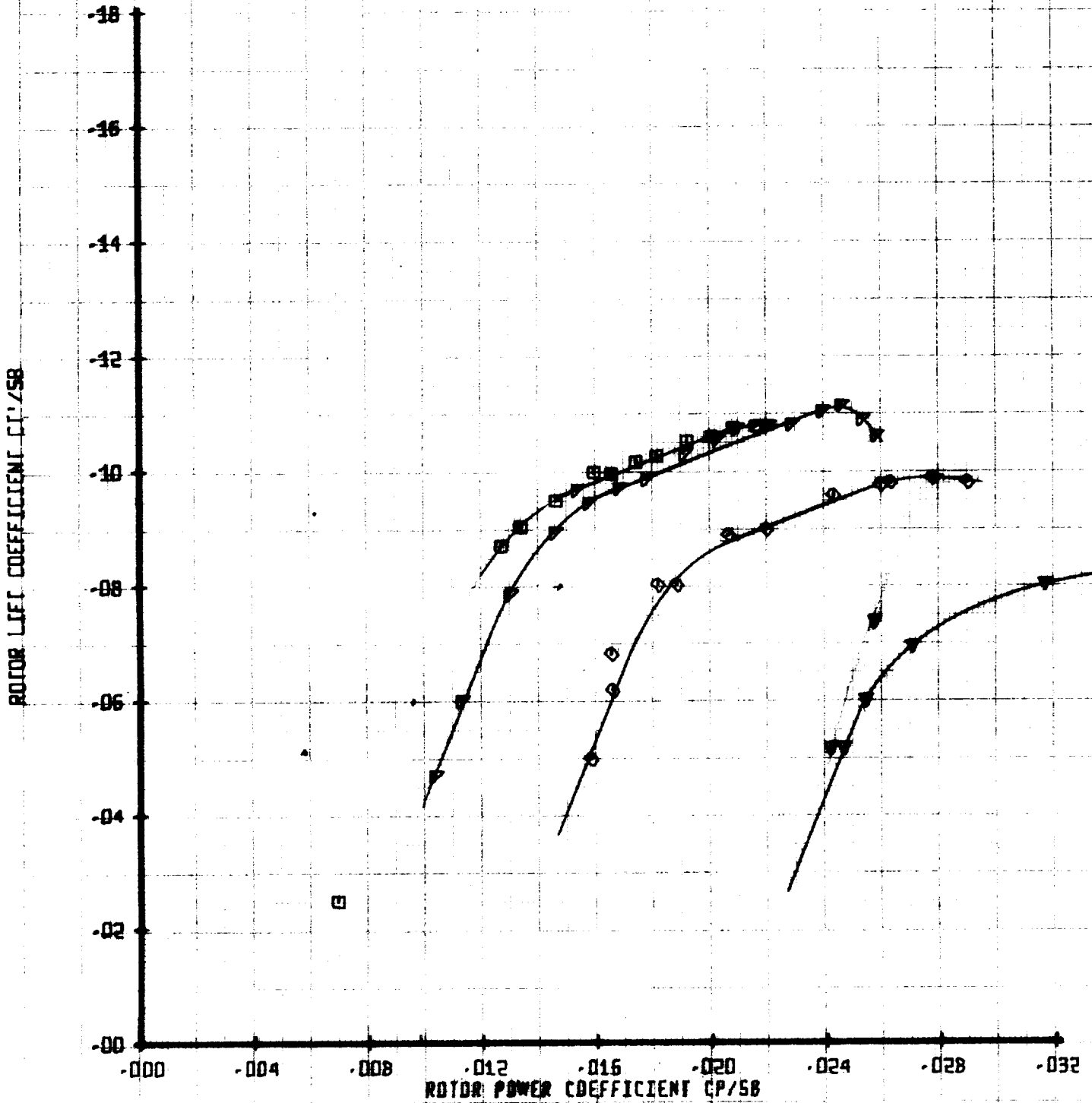
ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI'	X/00258	VTUN
◇	40	.50	.025	310
◇	39	.50	.05	310
◇	41	.50	.10	310
◇	42	.50	.20	310

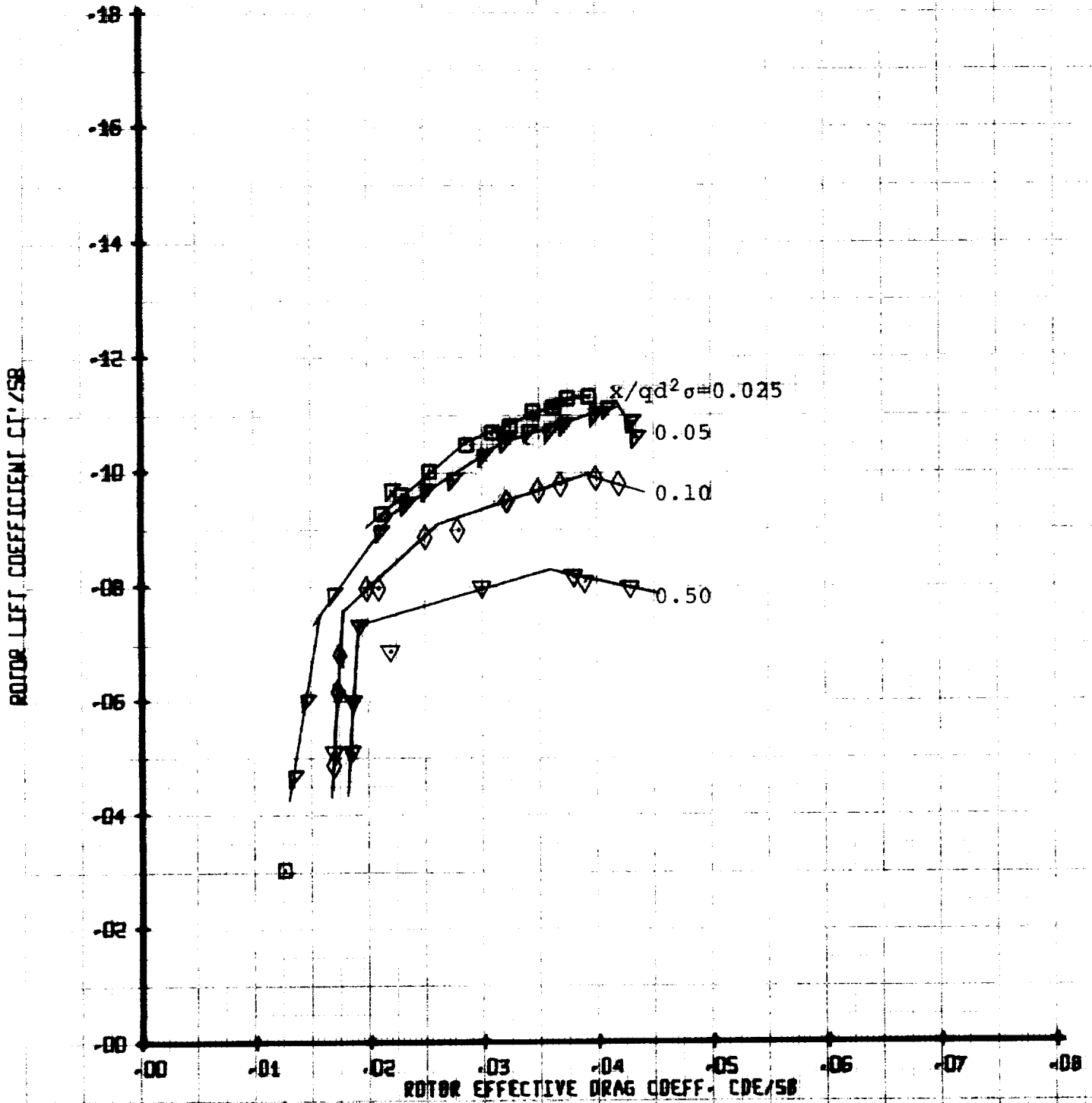
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/QR298	YTUN
□	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

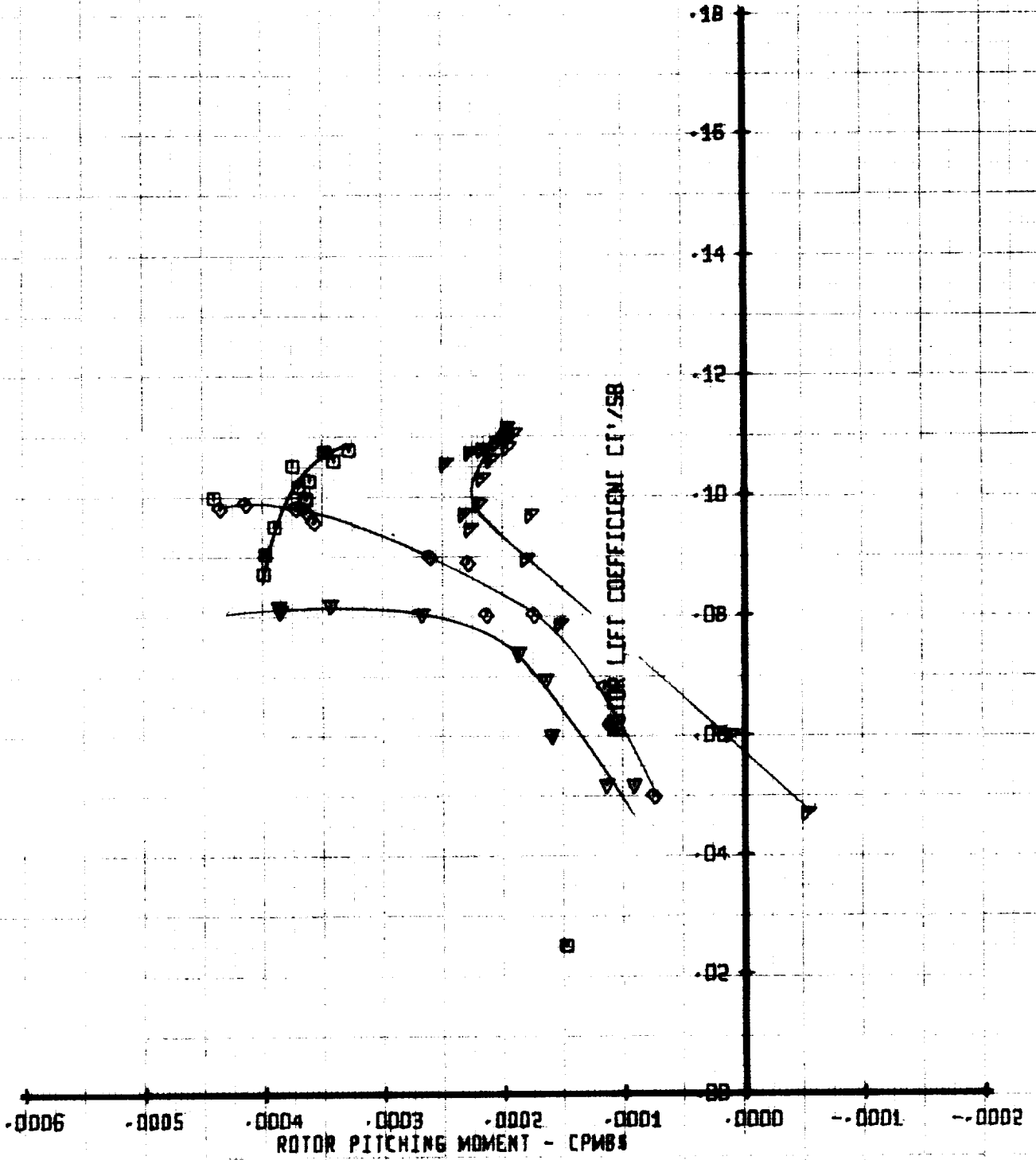
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
□	40	.50	.025	310
◇	39	.50	.05	310
△	41	.50	.10	310
▽	42	.50	.20	310

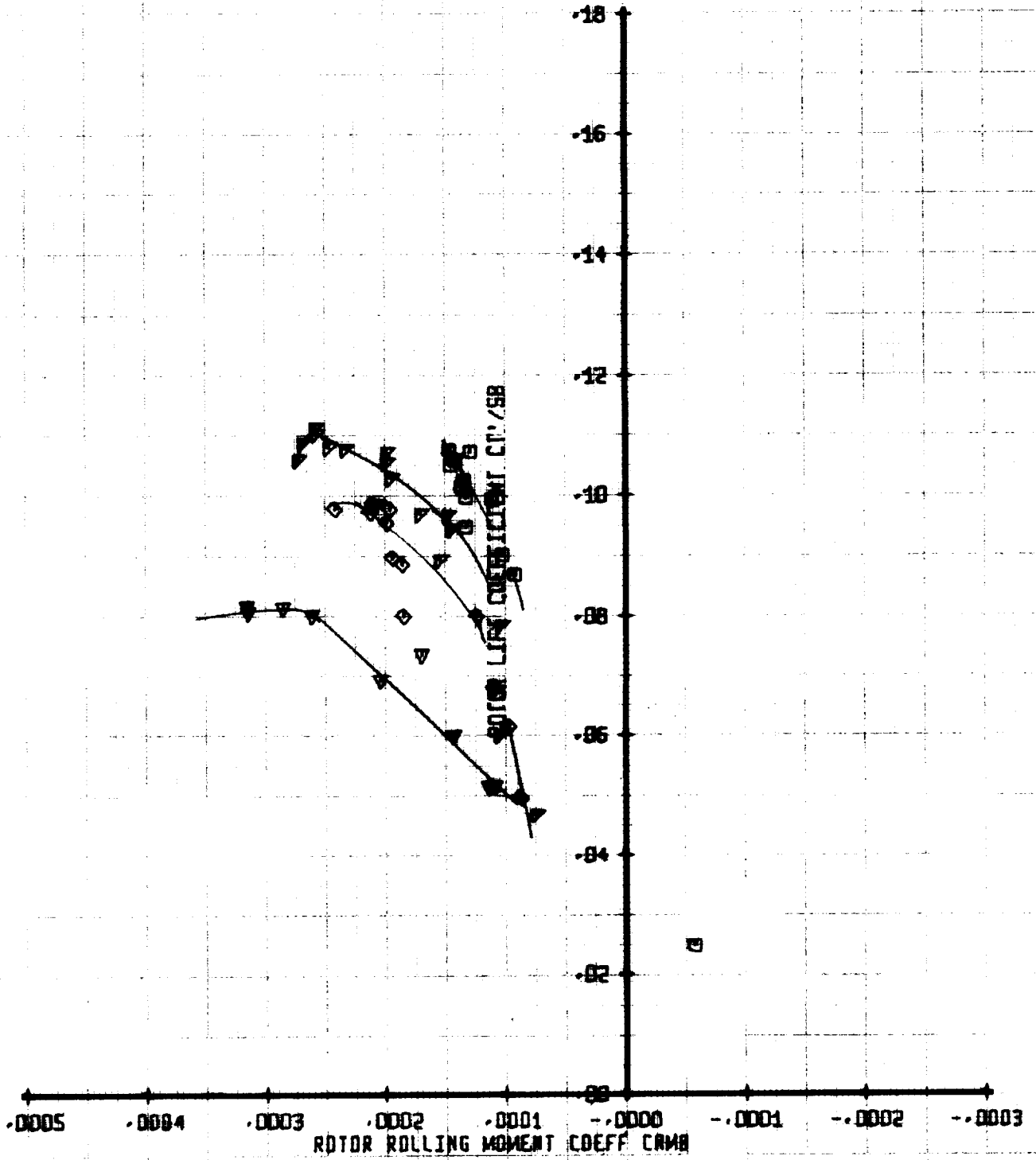
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/0025B	VTUN
□	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

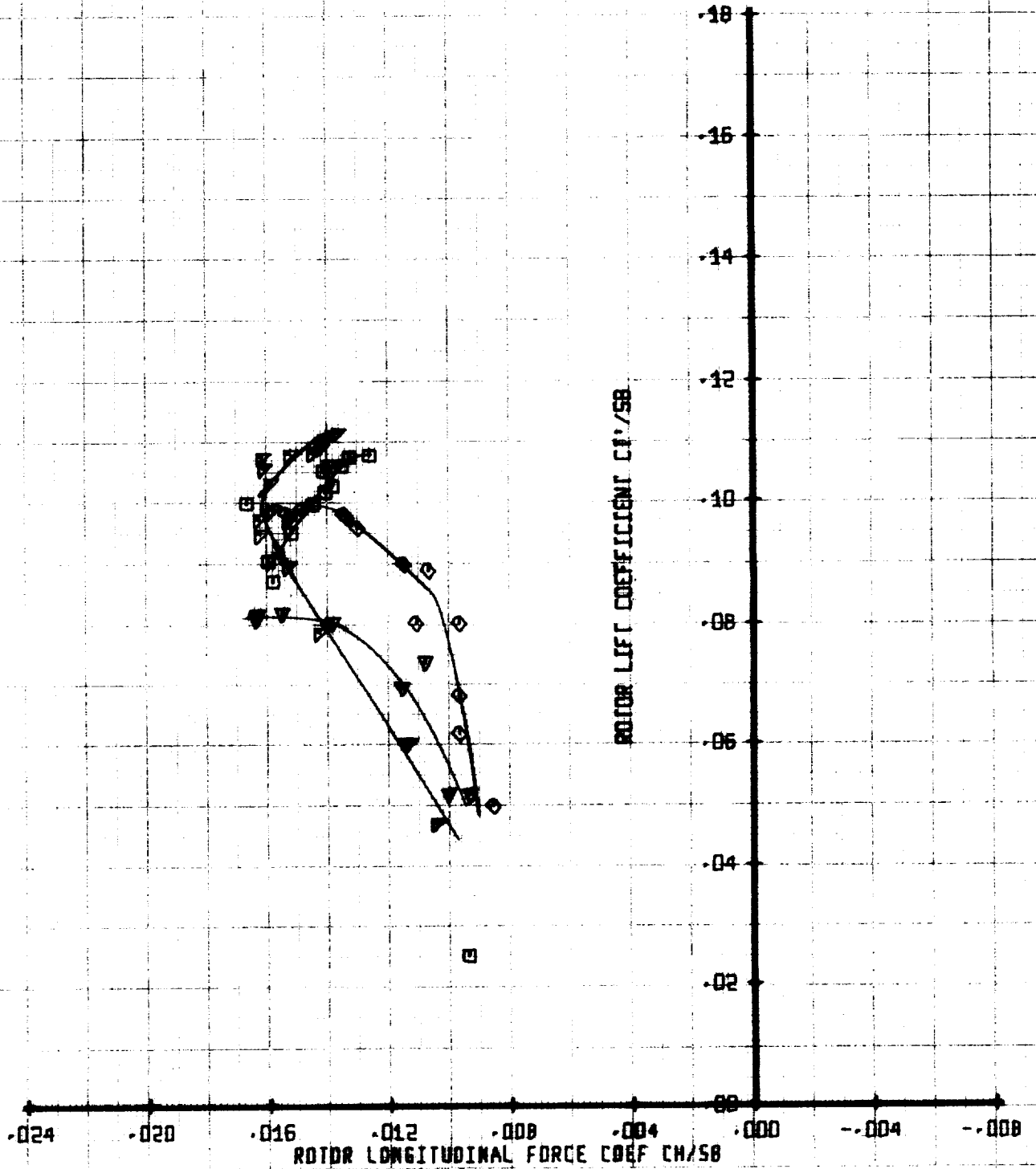
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI	X/00258	VTUN
○	40	.50	.025	310
□	39	.50	.05	310
△	41	.50	.10	310
▽	42	.50	.20	310

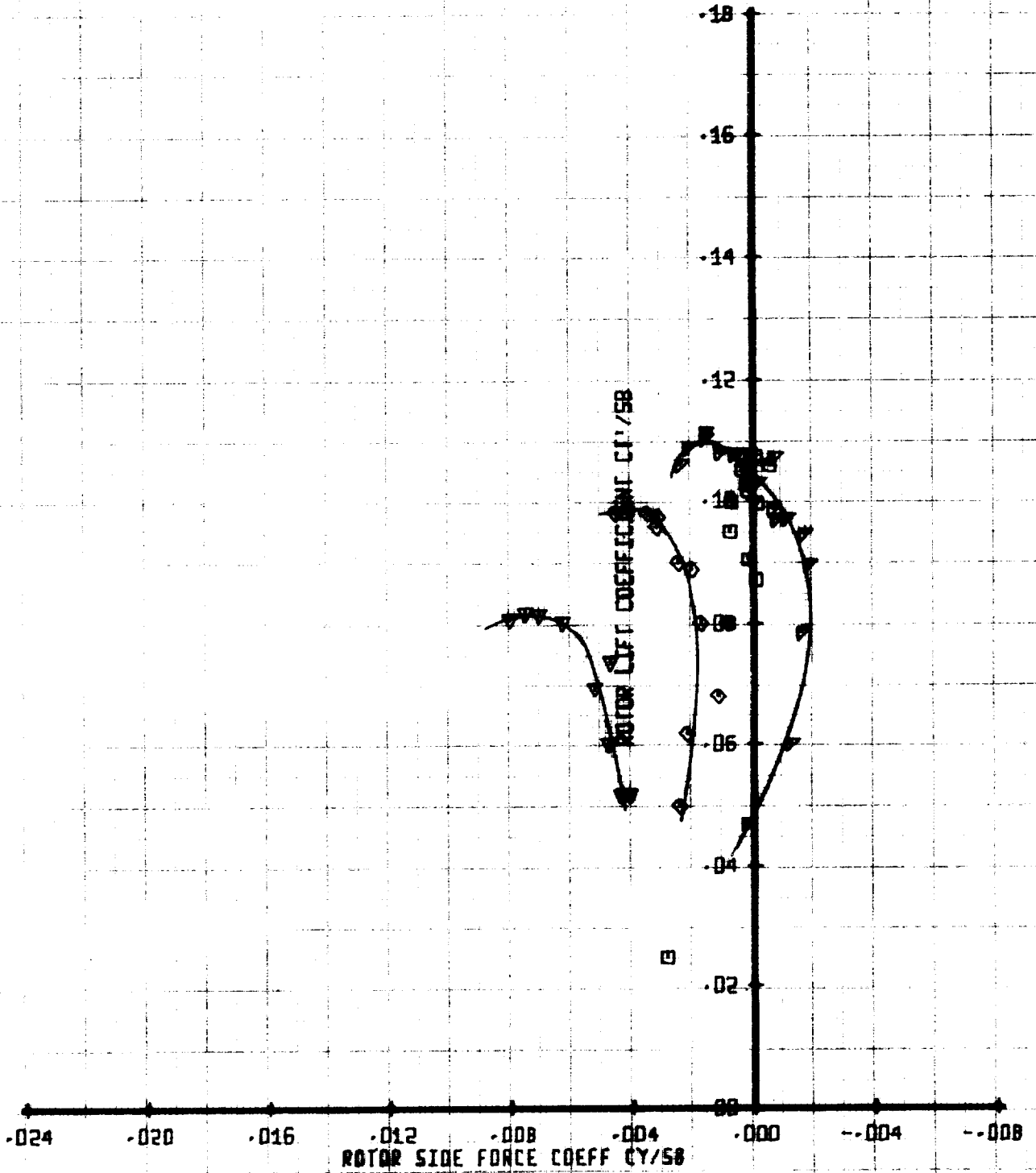
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	MIN	ML'	X/00258	VTUN
40	40	.50	.025	310
39	39	.50	.05	310
41	41	.50	.10	310
42	42	.50	.20	310

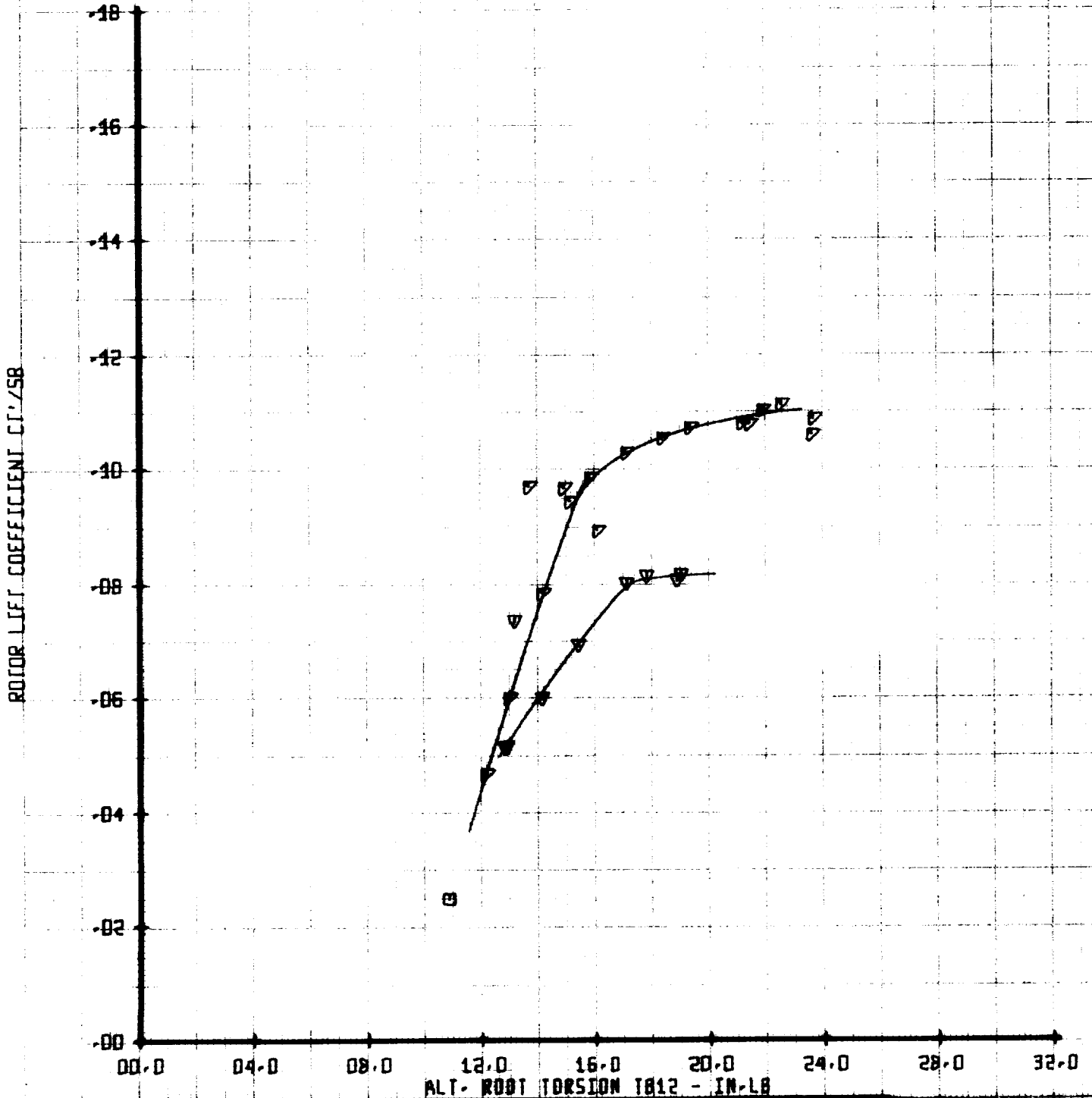
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU	X/00258	VTUN
○	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/100258	VTUN
□	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING INBOARD TORSION TB20

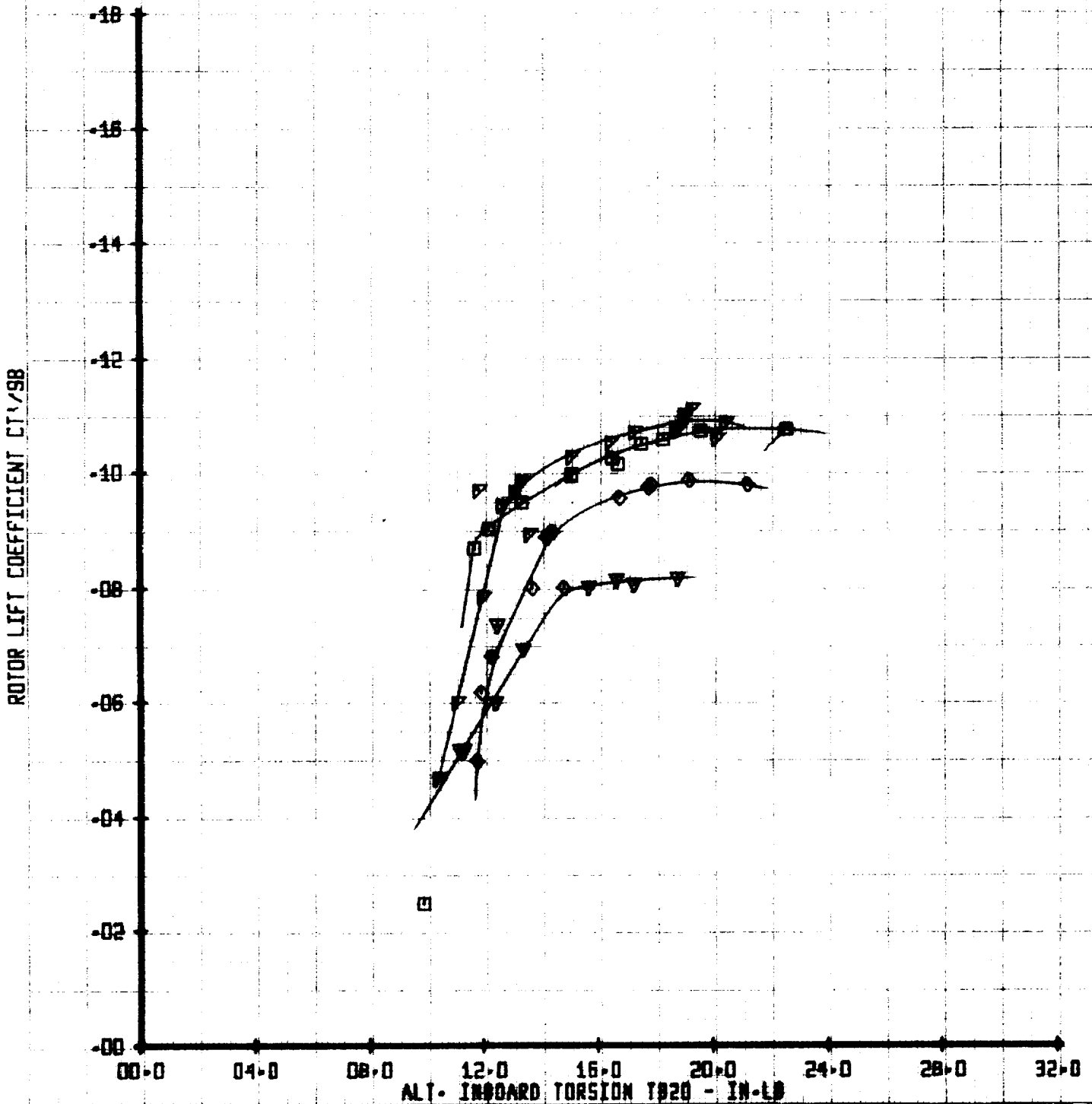
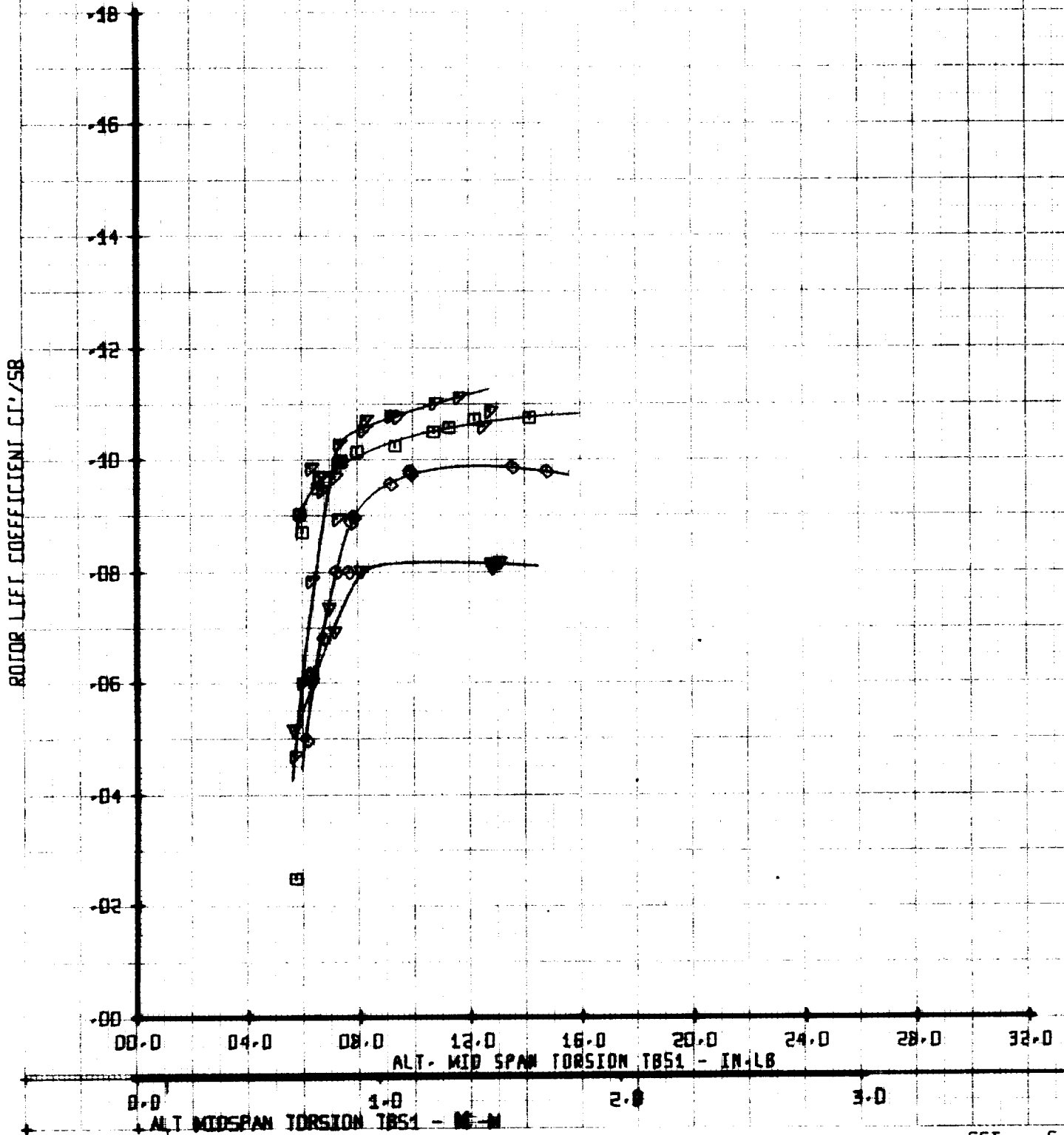


Figure A-120

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	40	.50	.025	310
○	39	.50	.05	310
△	41	.50	.10	310
▽	42	.50	.20	310

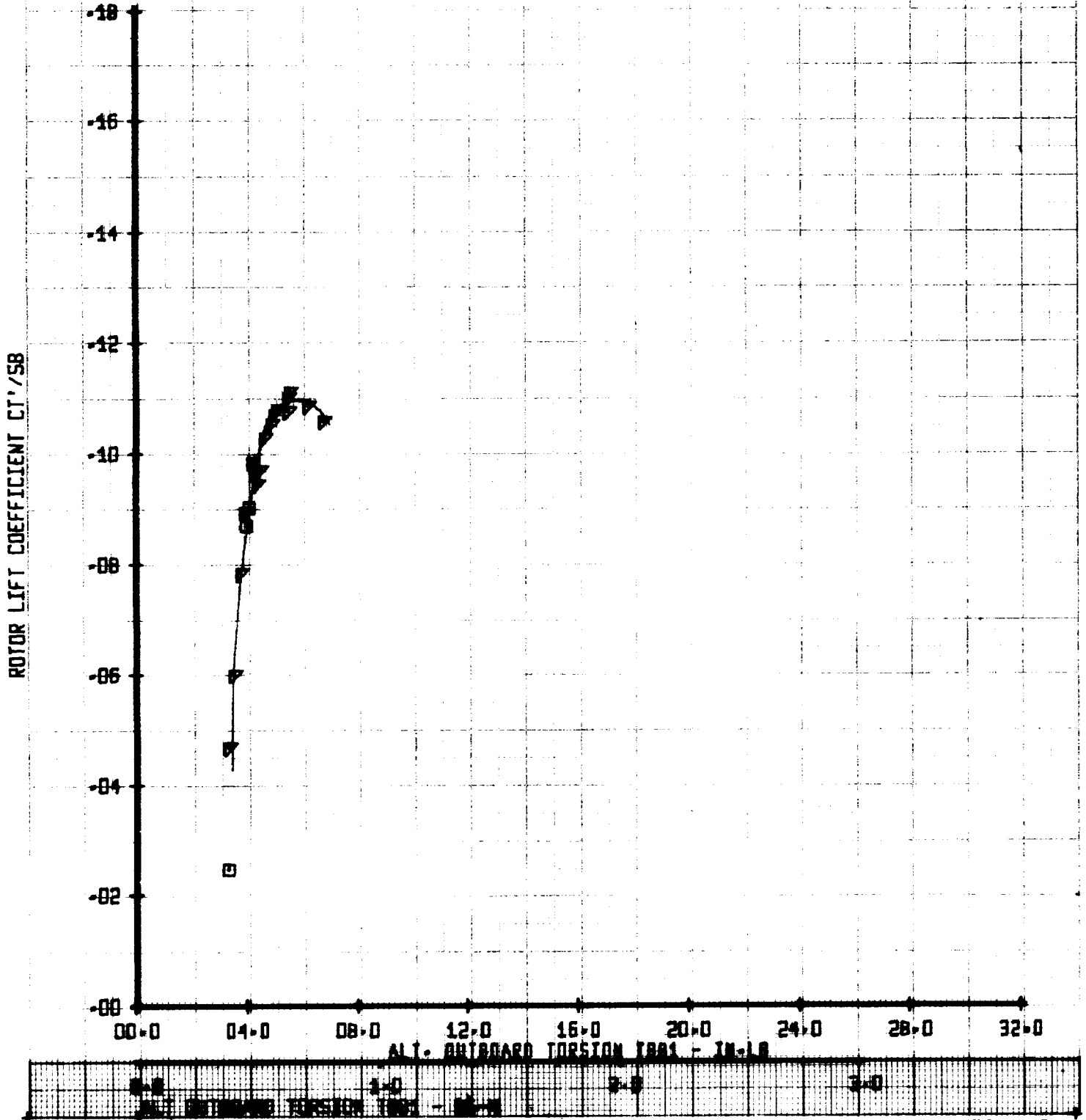
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB51



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/002SB	VTUN
○	40	.50	.025	310
△	39	.50	.05	310
▽	41	.50	.10	310
◇	42	.50	.20	310

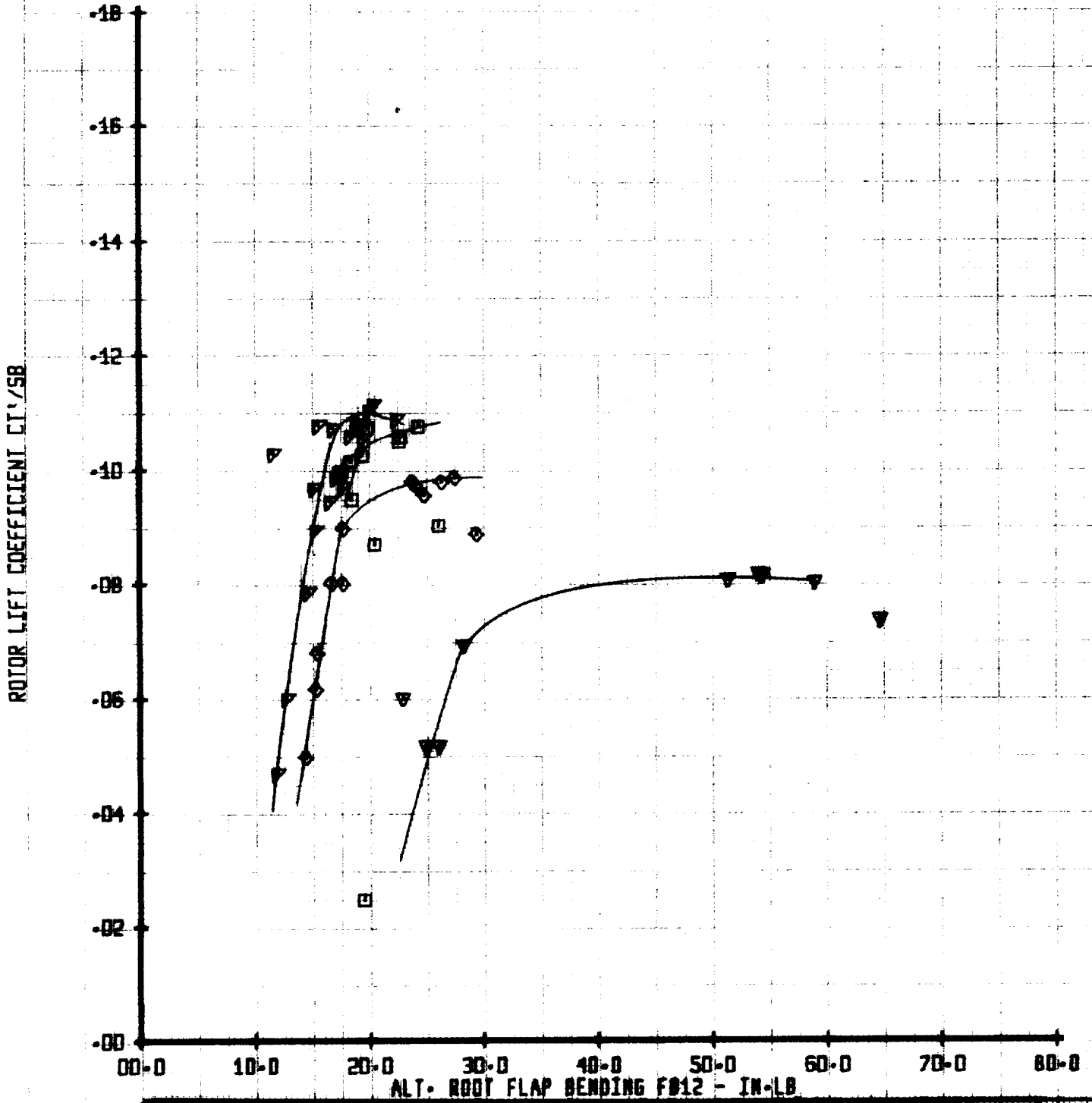
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB81



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	40	.50	.025	310
▲	39	.50	.05	310
◆	41	.50	.10	310
▼	42	.50	.20	310

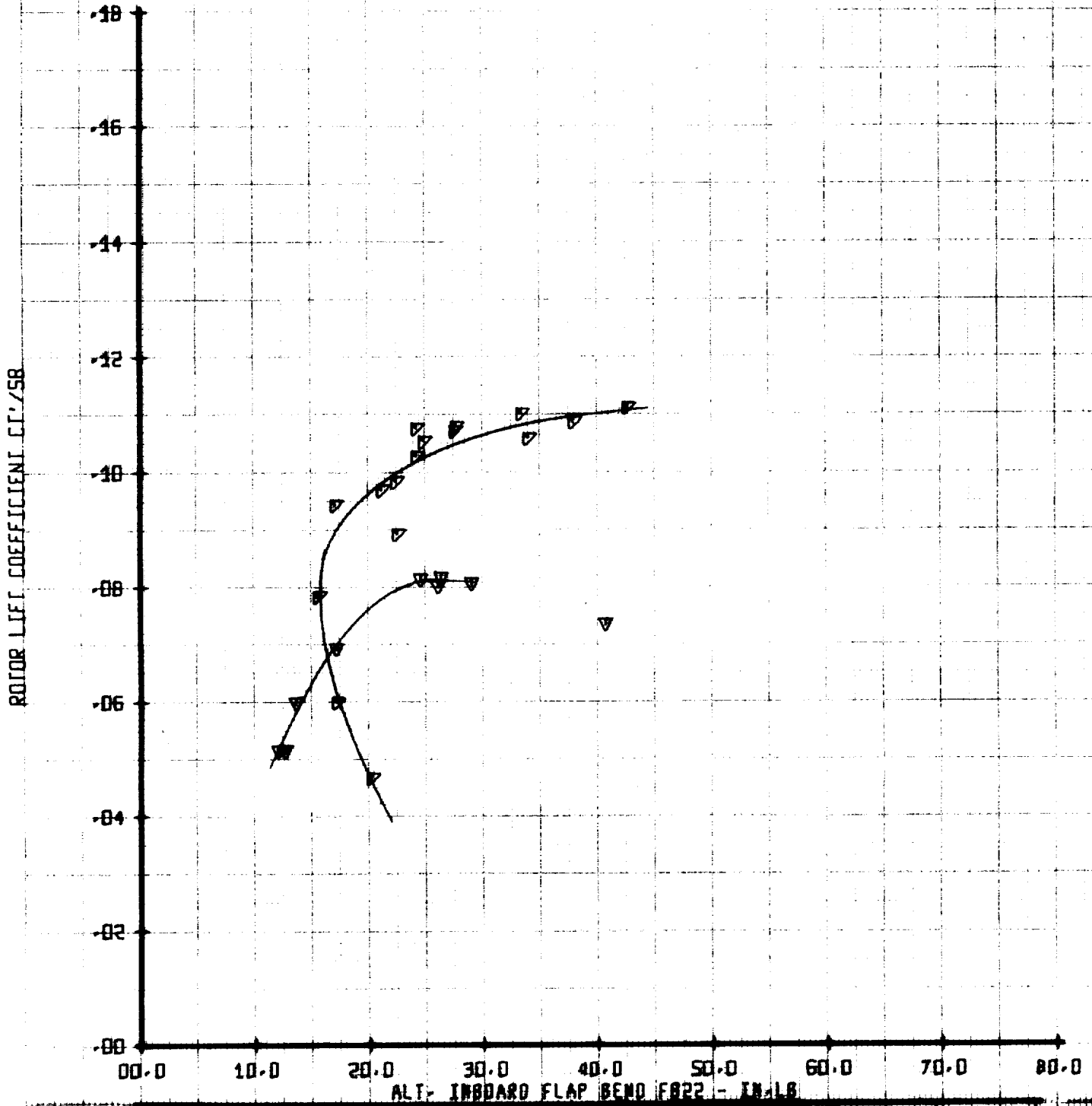
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
□	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

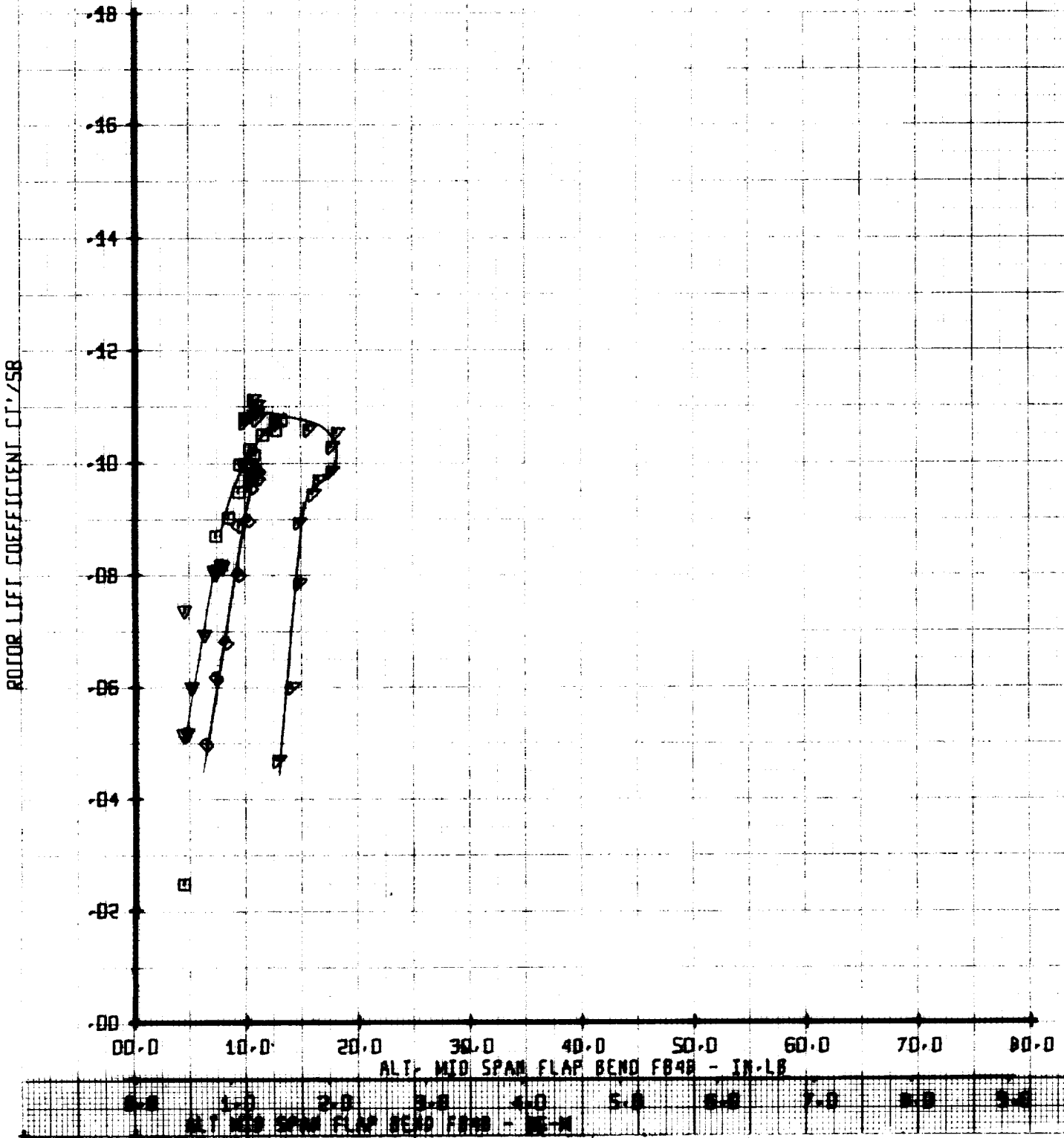
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING INBOARD FLAP BENDING FB22



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-42B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUM
○	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

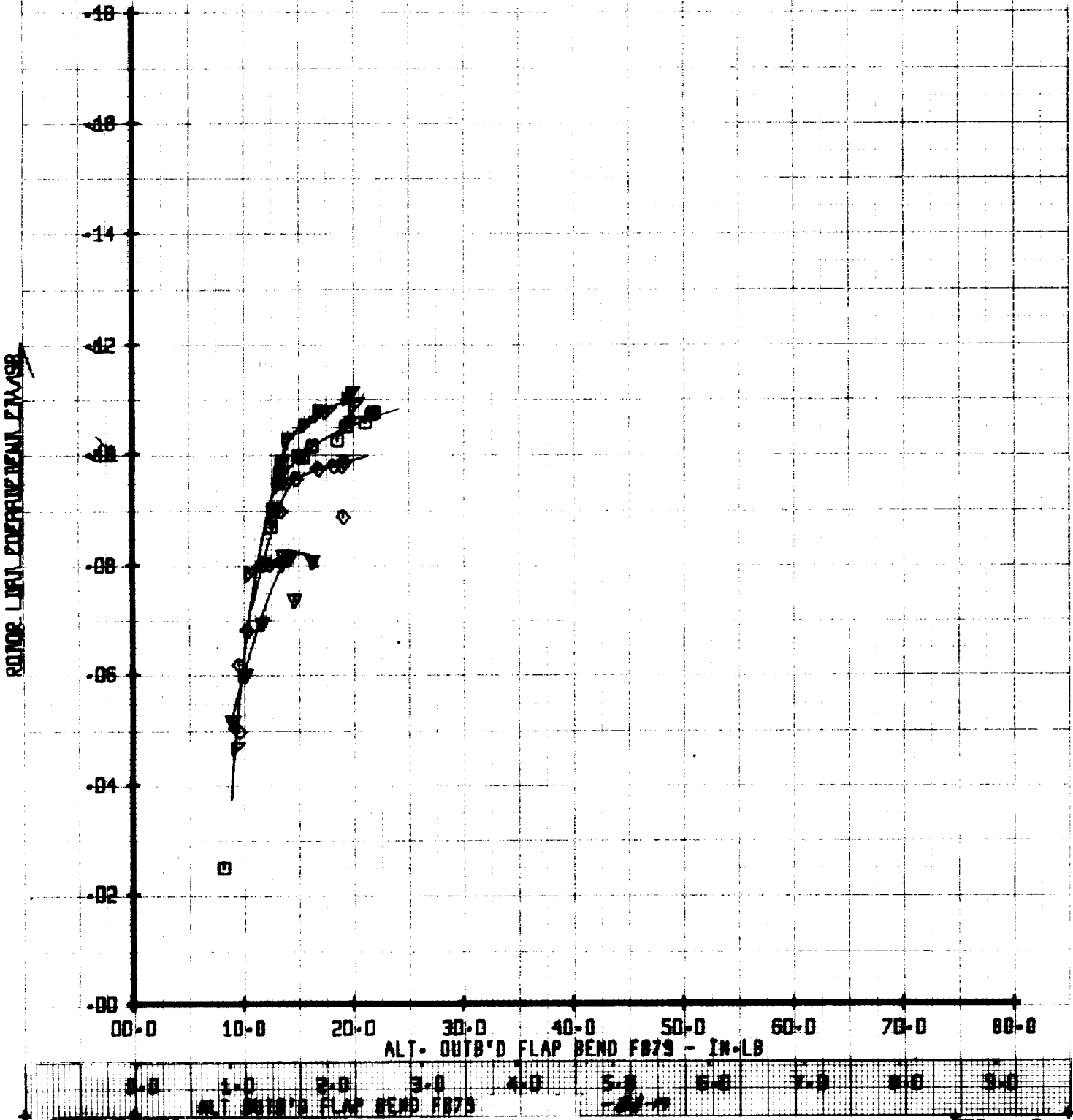
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BENDING FB48



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MI	X/00258	VTUN
□	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

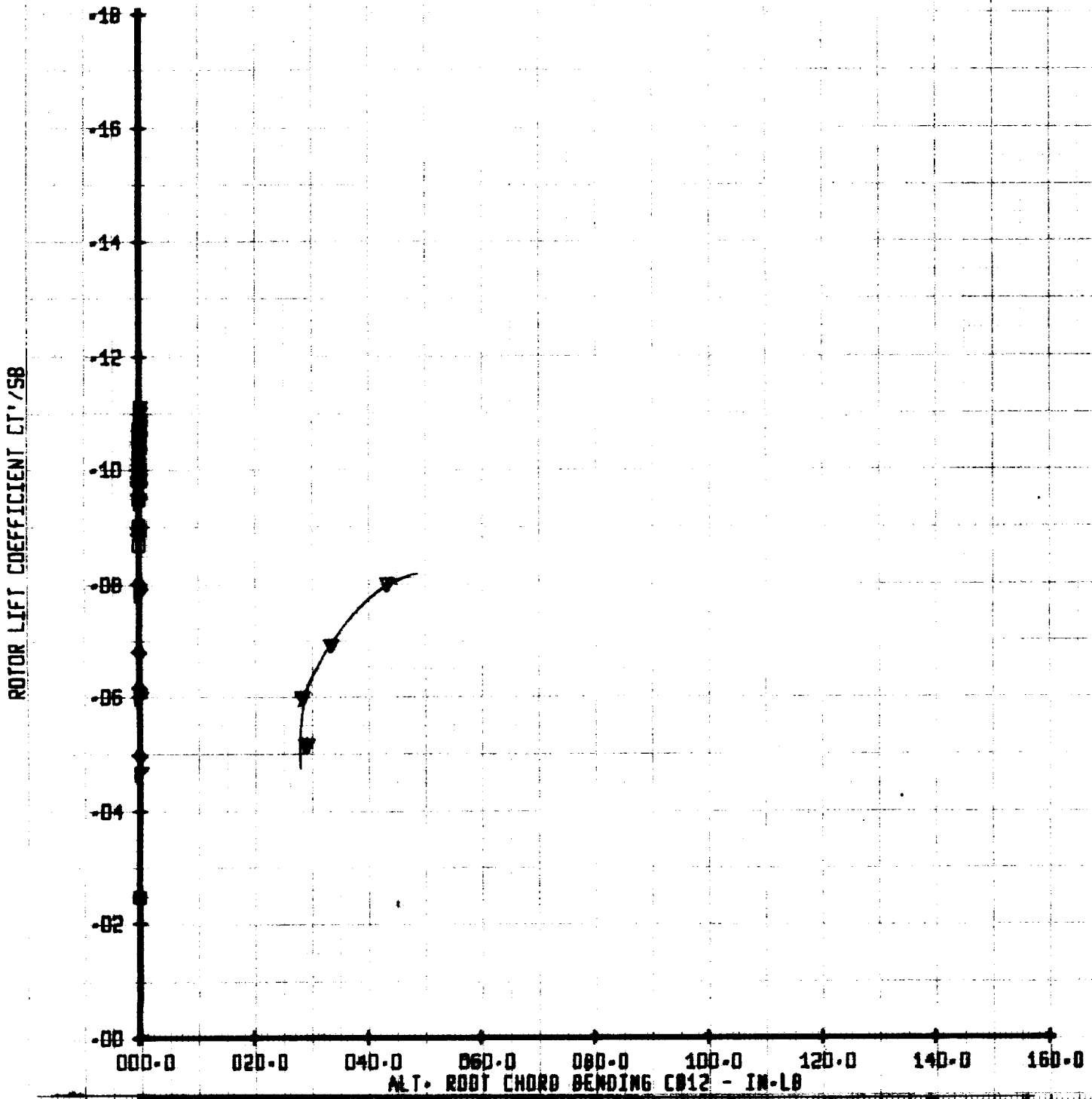
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB79



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU	X/00258	VTUN
□	40	.50	.025	310
▲	39	.50	.05	310
◆	41	.50	.10	310
▼	42	.50	.20	310

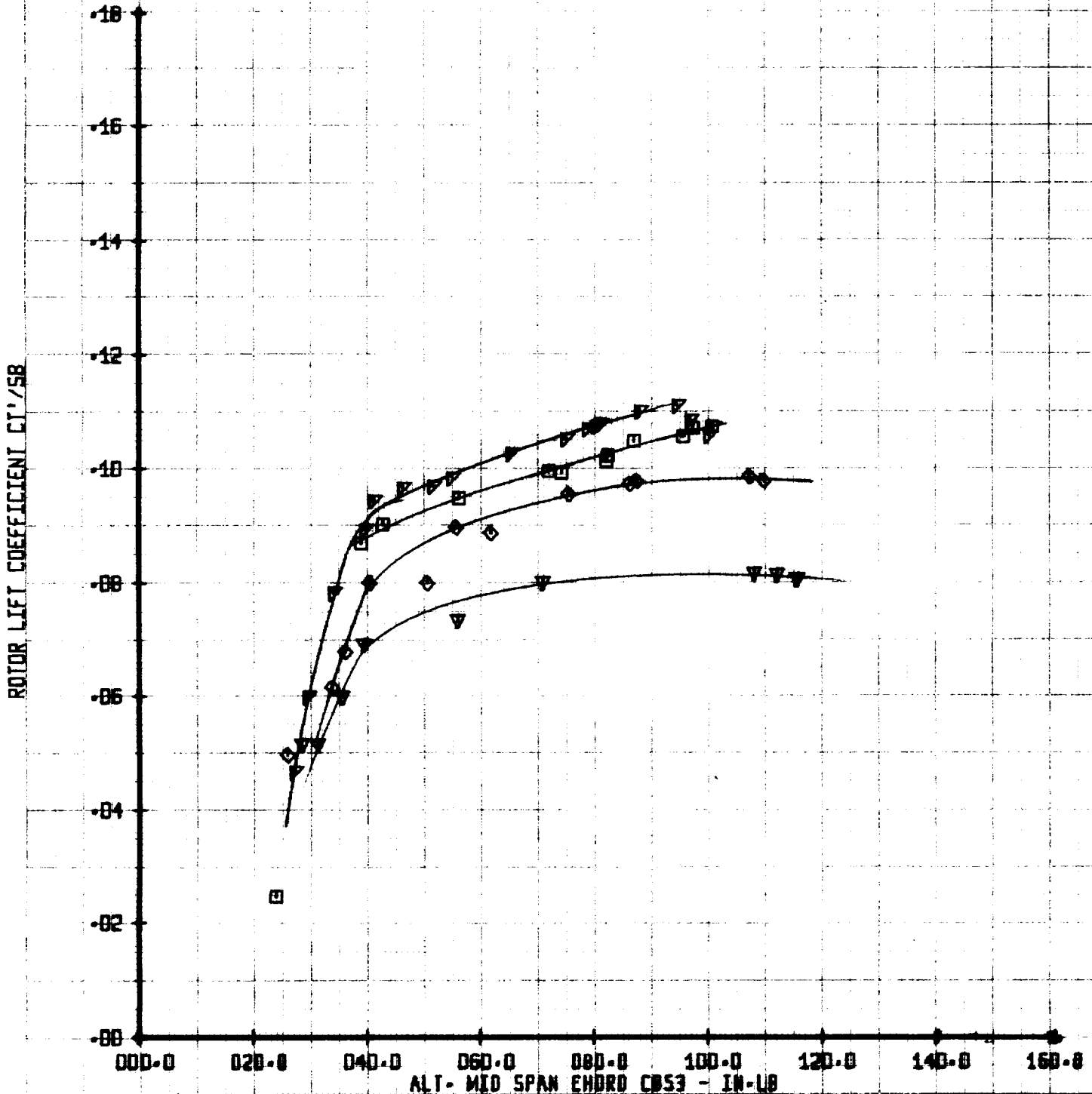
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/DO2SB	VTUN
□	40	.50	.025	310
▽	39	.50	.05	310
◇	41	.50	.10	310
▼	42	.50	.20	310

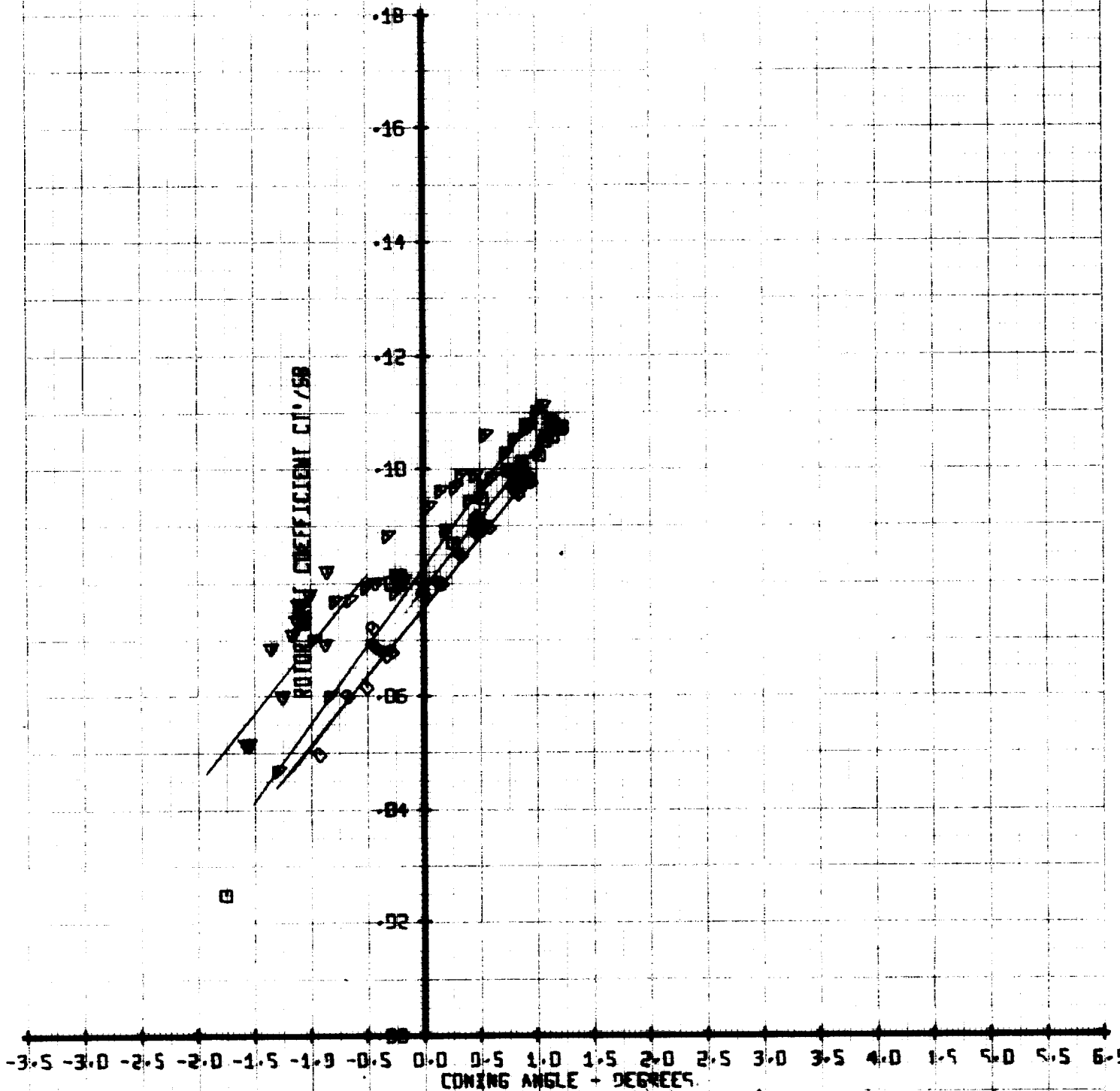
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN CHORD CB53



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/DD258	VTUN
□	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

ROTOR LIFT COEFFICIENT
 VERSUS
 CONING ANGLE

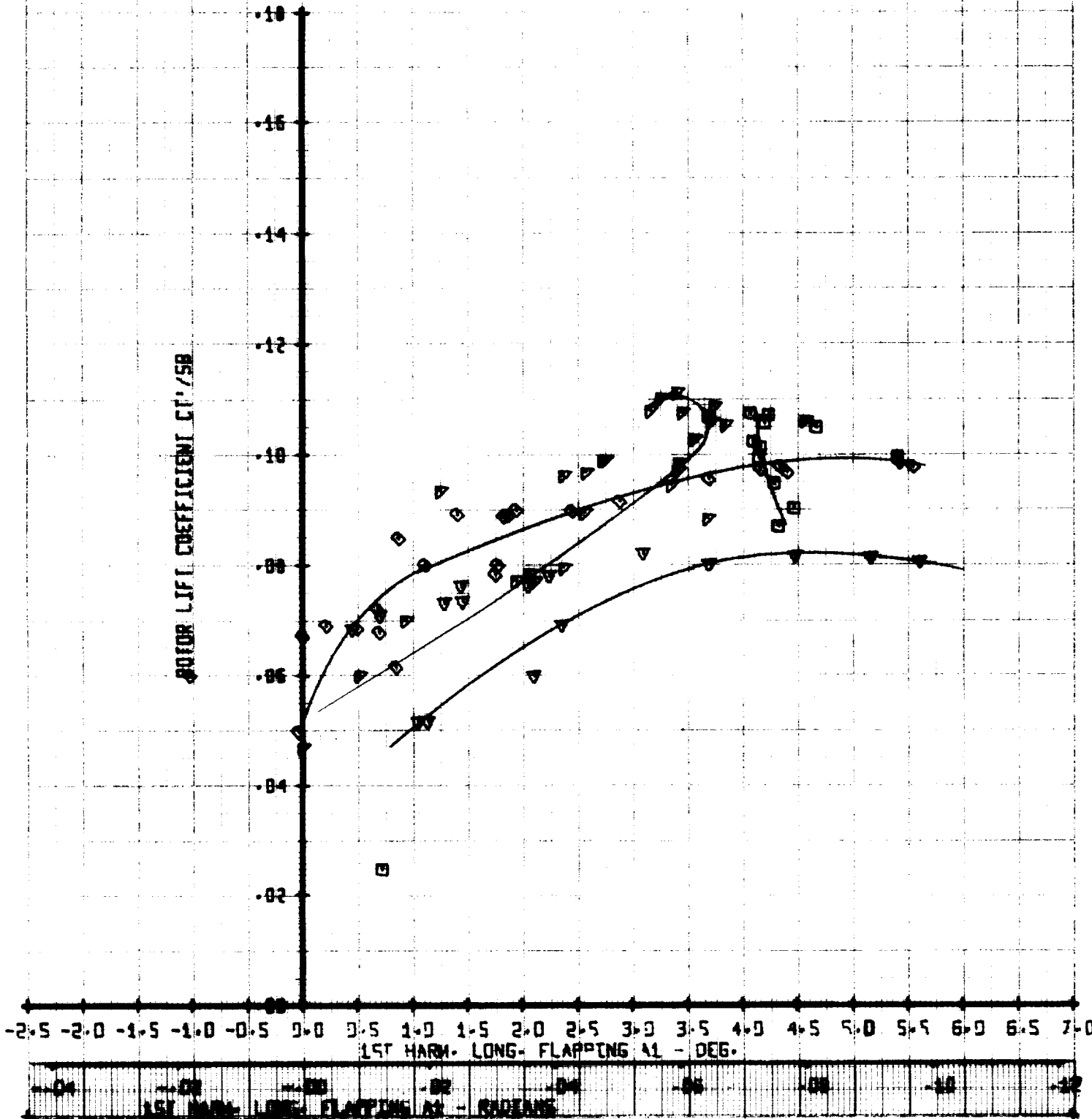


LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU	X/00258	VTUN
□	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

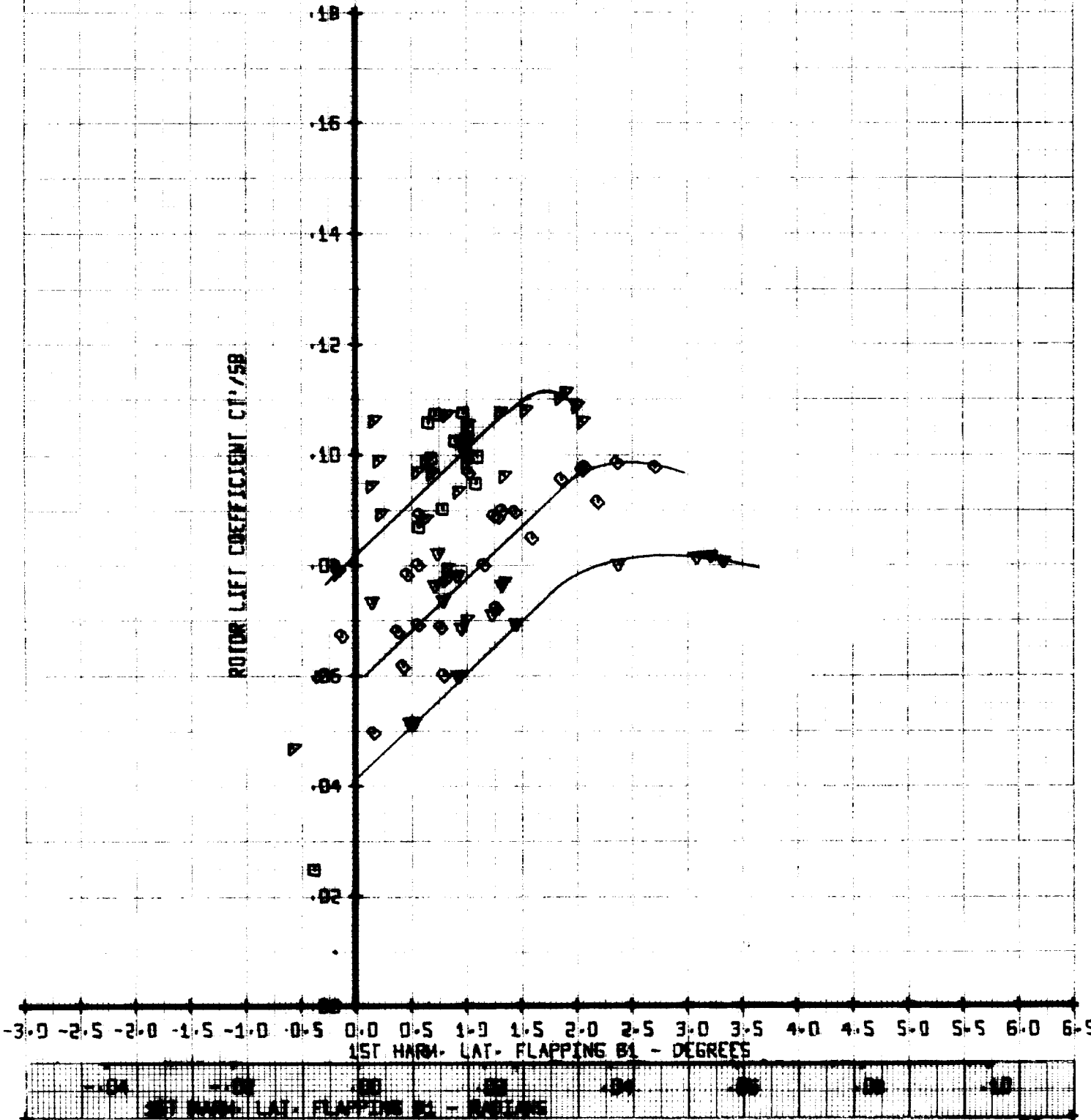
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUM
○	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

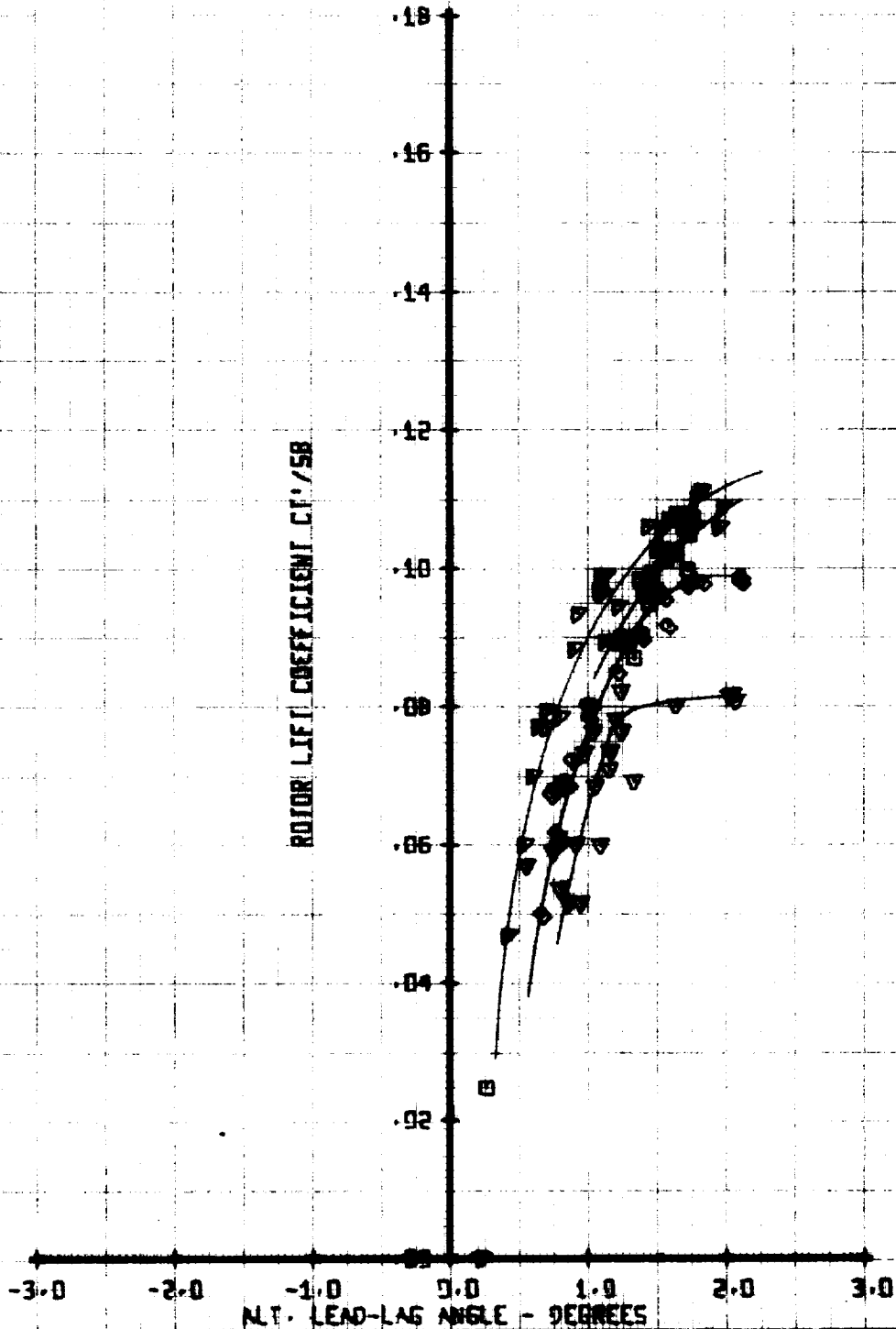
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-470 ROTOR
 LIFT LIMIT TESTING

S/M	RUN	MU*	X/DD258	Y/TUM
□	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

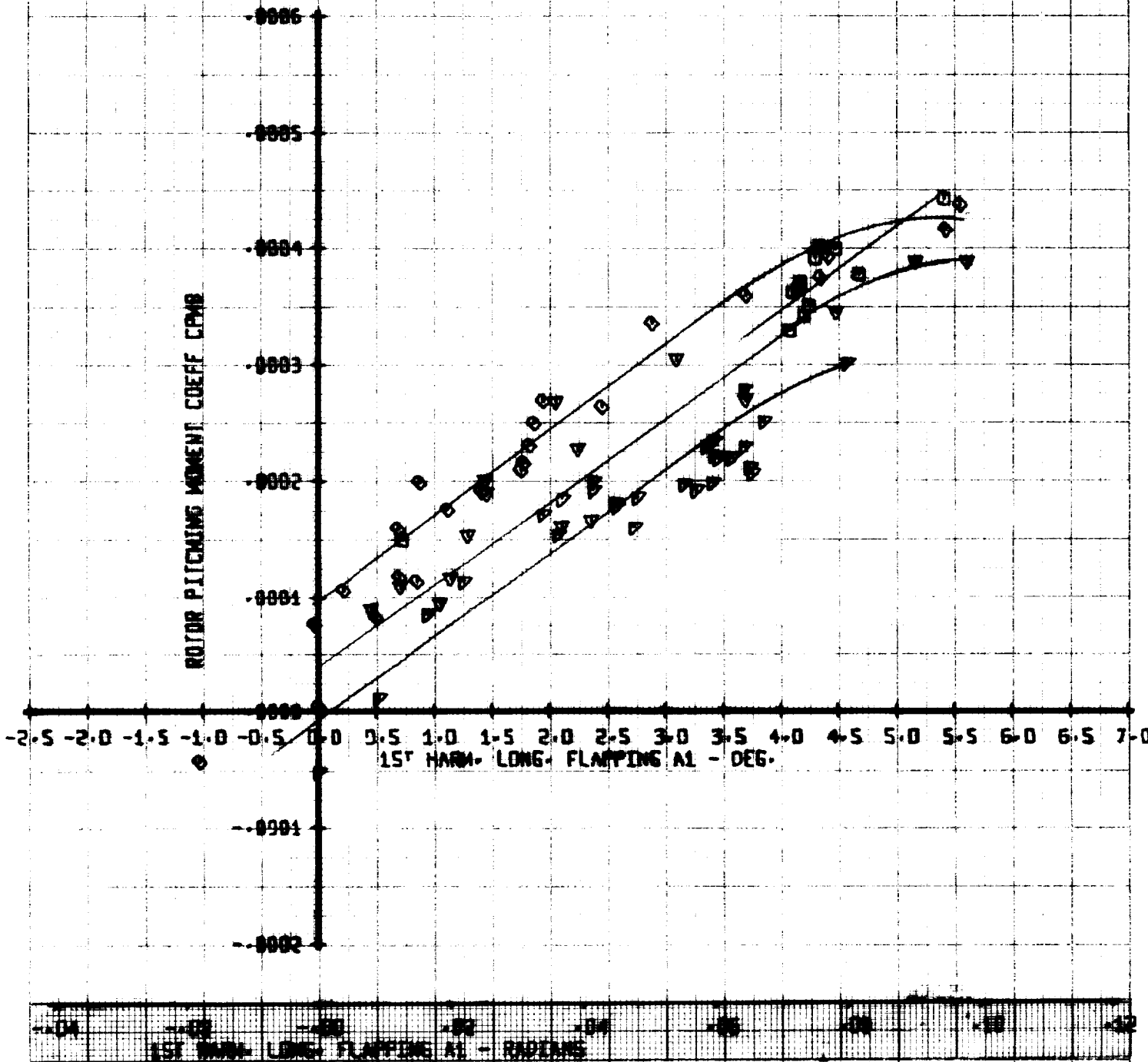
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/19 SCALE OH-470 ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUM
□	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

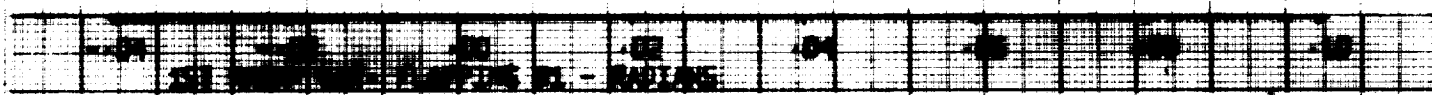
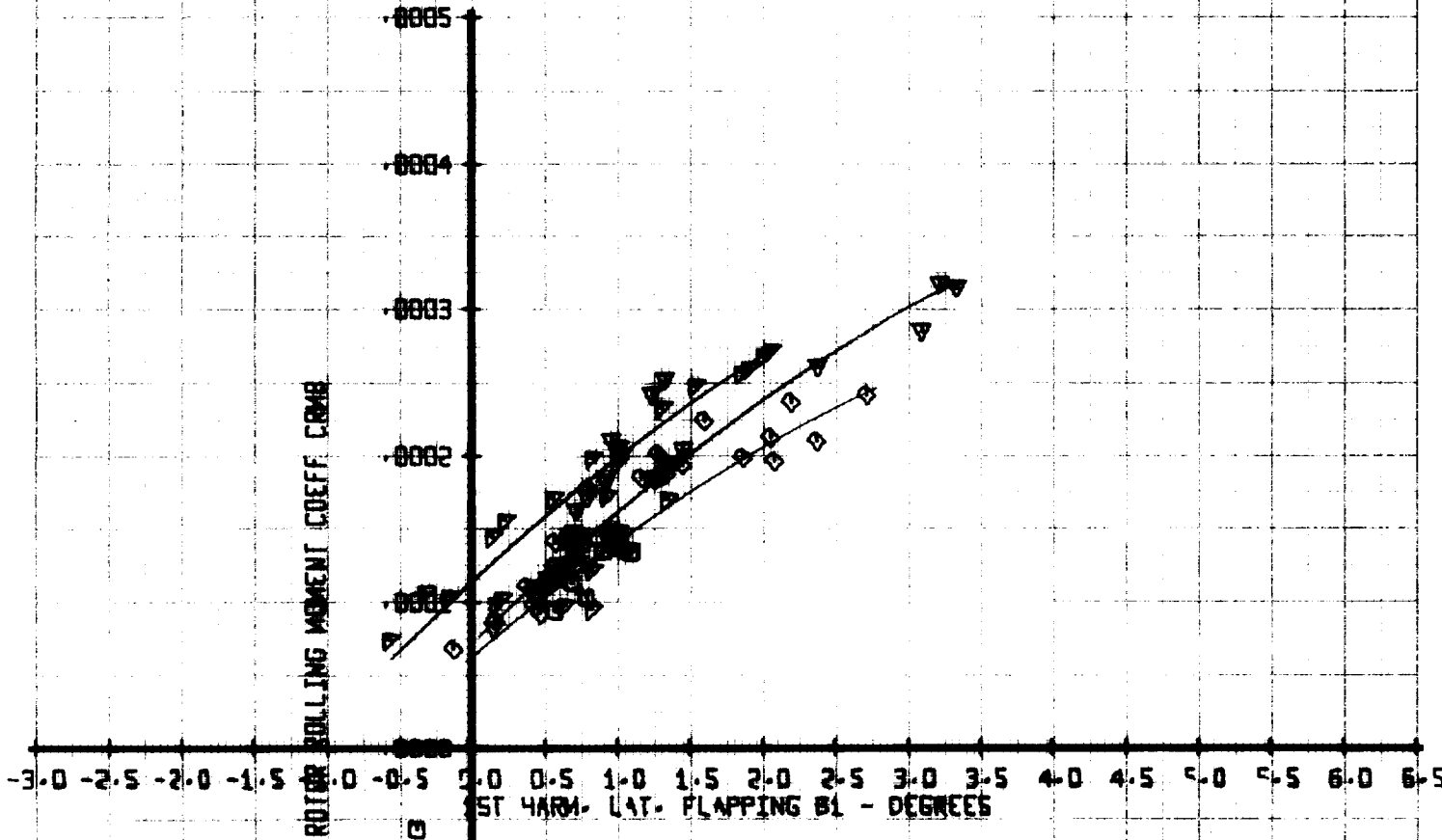
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1:10 SCALE OH-47D ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
□	40	.50	.025	310
△	39	.50	.05	310
◇	41	.50	.10	310
▽	42	.50	.20	310

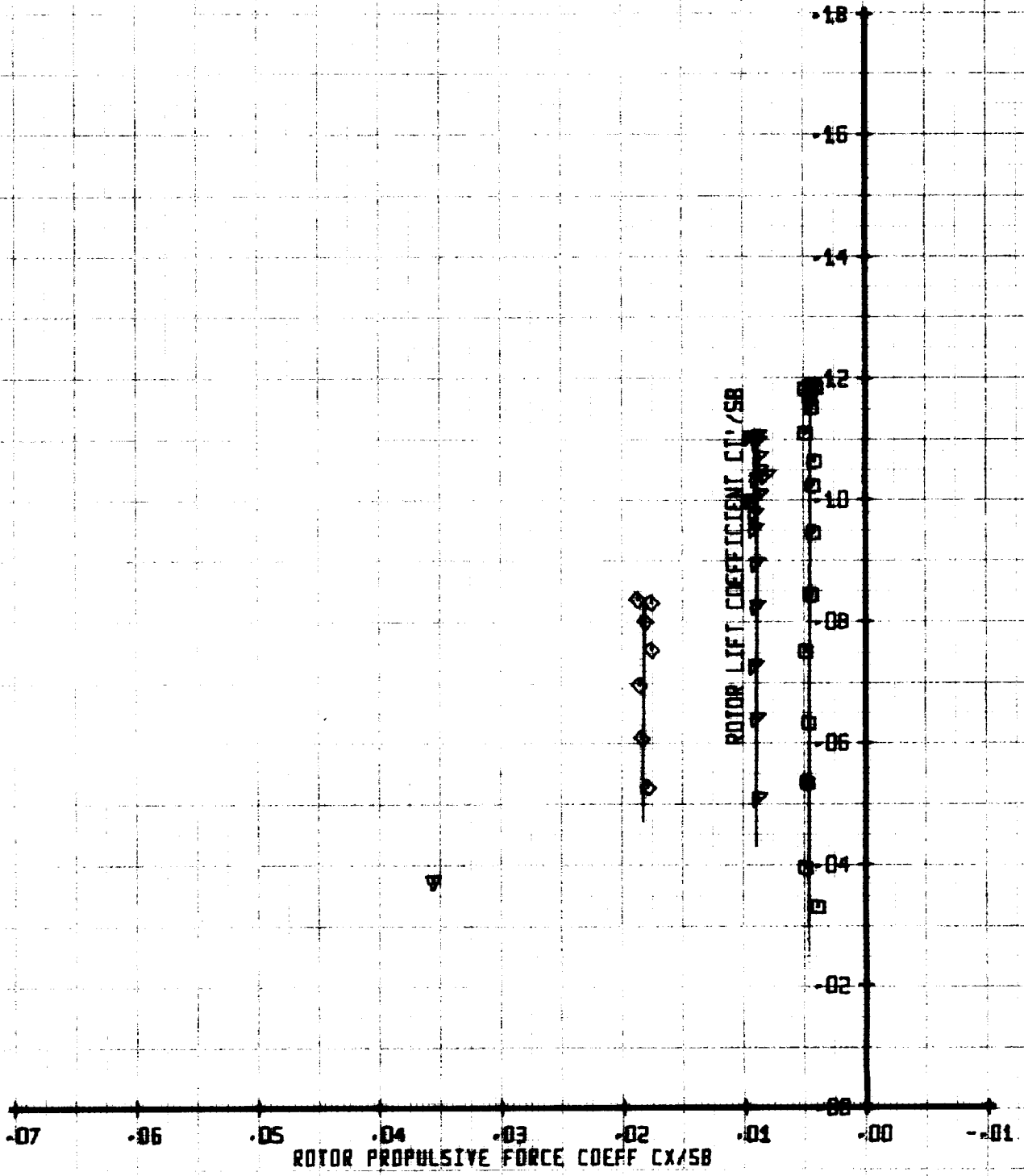
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47E ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
□	51	.58	.025	329
△	50	.58	.05	329
◇	52	.58	.10	329
▽	53	.58	.20	329

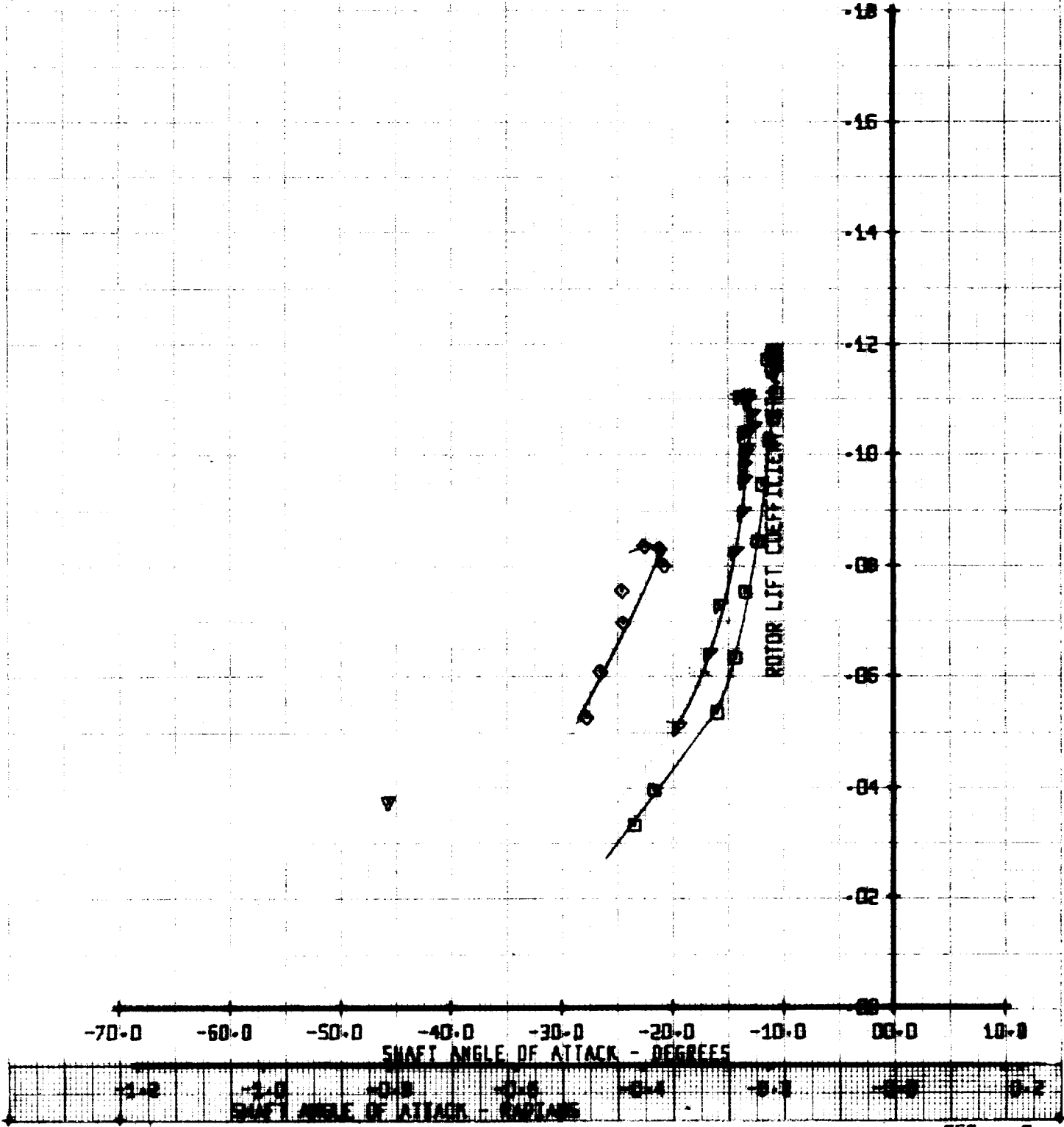
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	WIND	X/D0258	VTUN
○	1	5.0	0.25	329
△	2	5.0	0.25	329
◇	3	5.0	0.25	329
▽	4	5.0	0.25	329

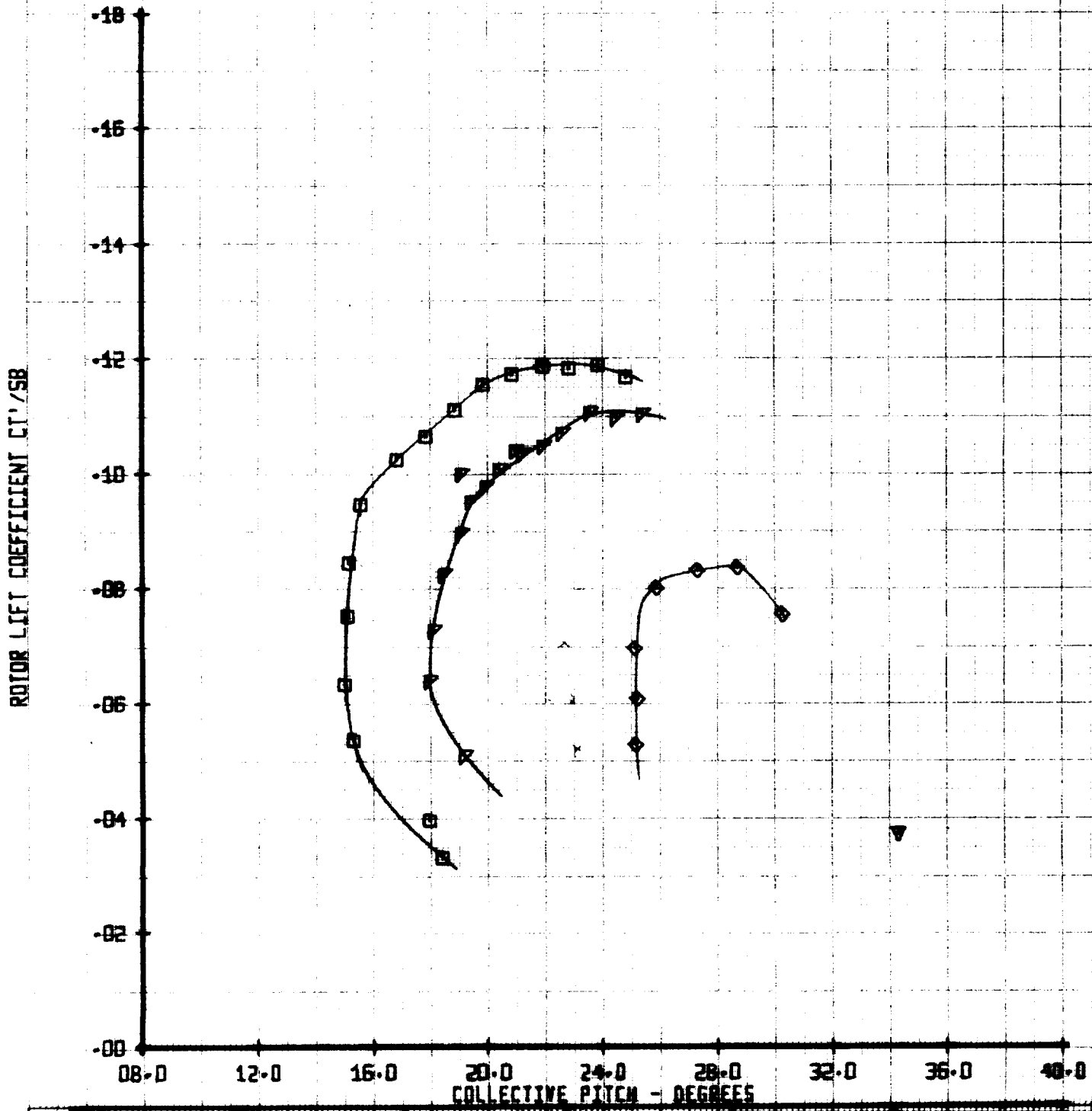
ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND
 5.0M 8.0M 10.0M 12.0M 14.0M
 15.0M 17.0M 19.0M 21.0M 23.0M
 25.0M 27.0M 29.0M 31.0M 33.0M
 35.0M 37.0M 39.0M 41.0M 43.0M

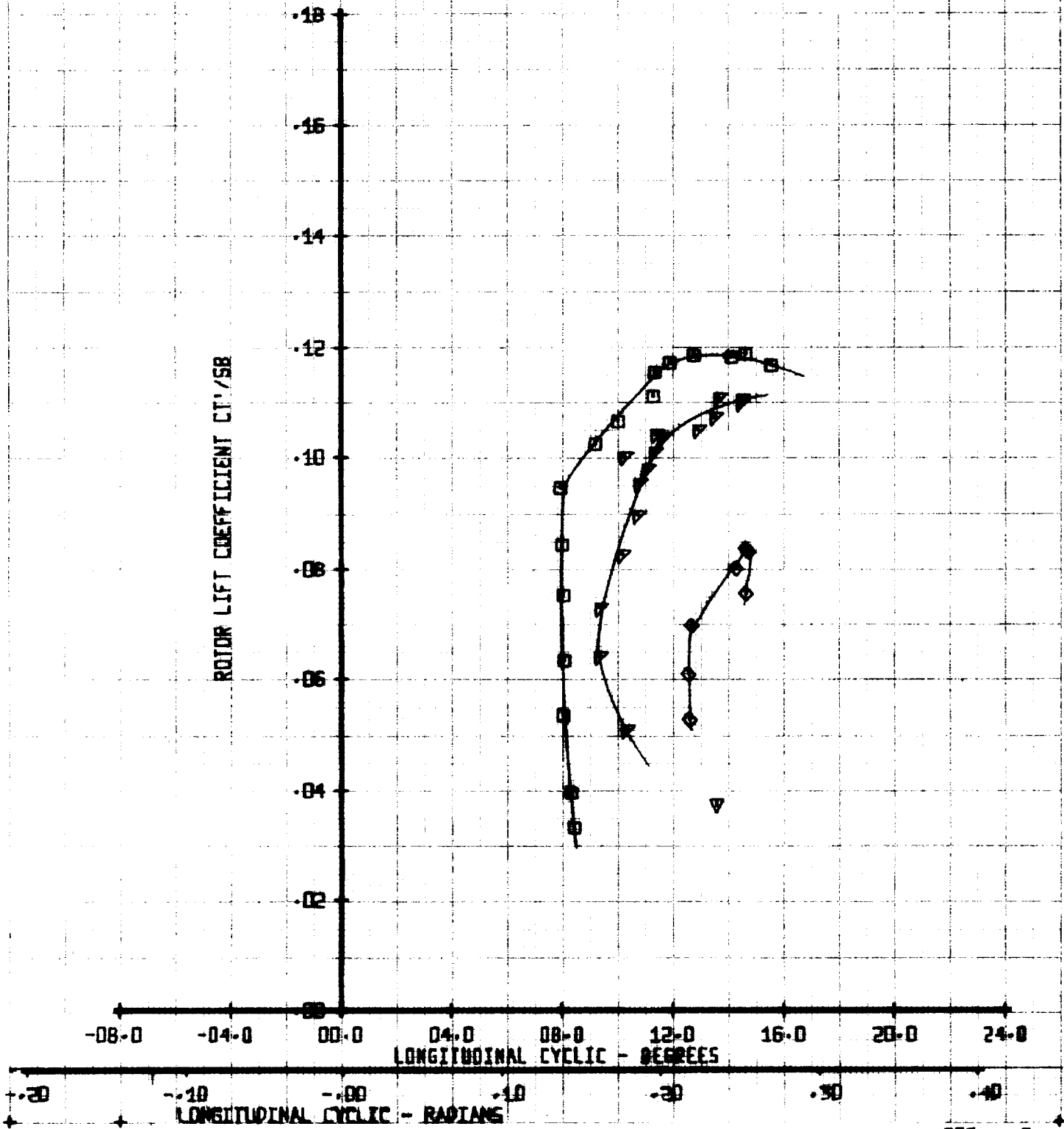
ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	51	.59	.025	328
△	52	.59	.05	328
◇	53	.59	.10	328
▽	53	.59	.20	328

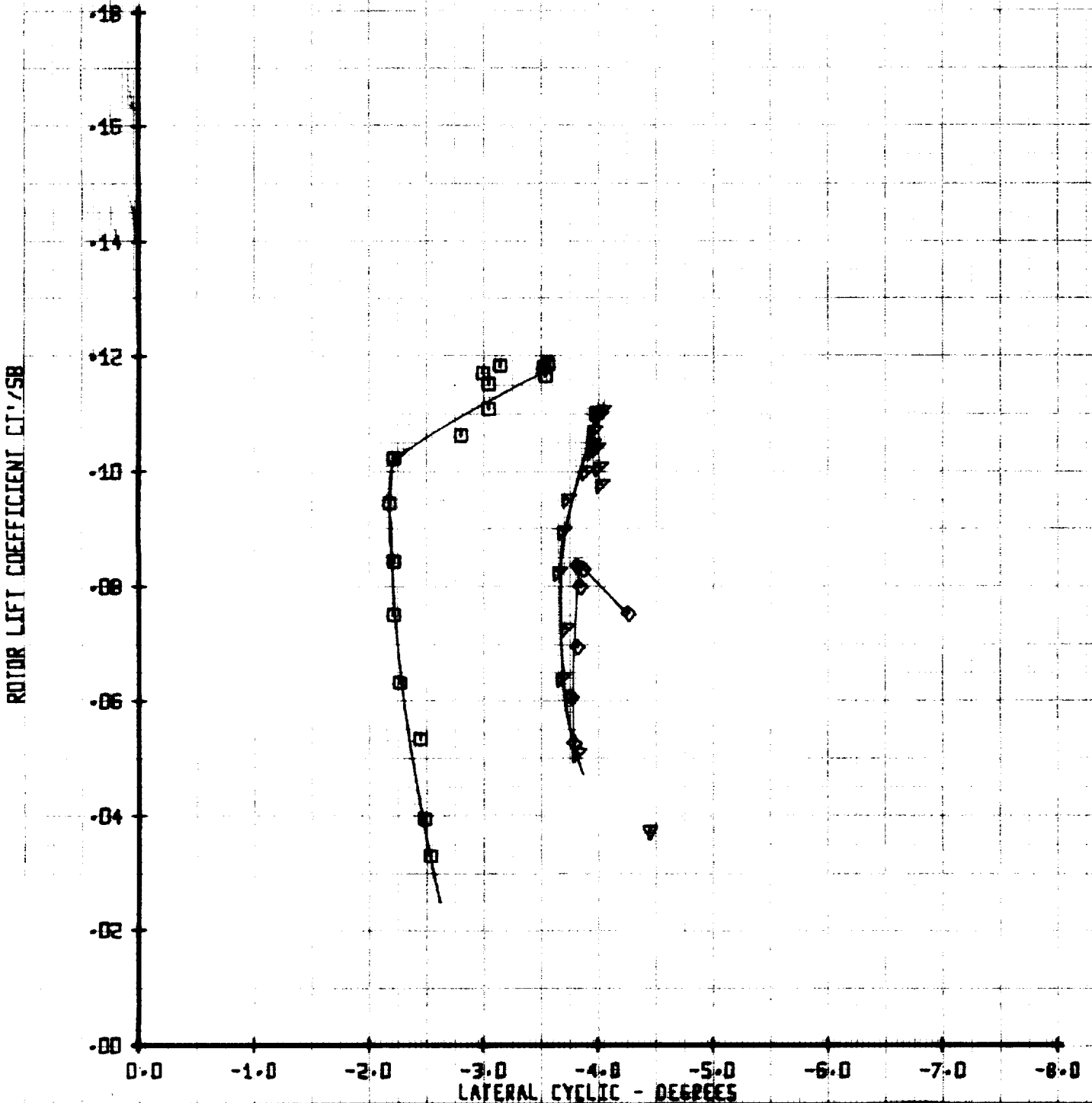
ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	51	.55	.025	329
△	51	.55	.05	329
◇	25	.55	.10	329
▽	53	.55	.20	329

ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC

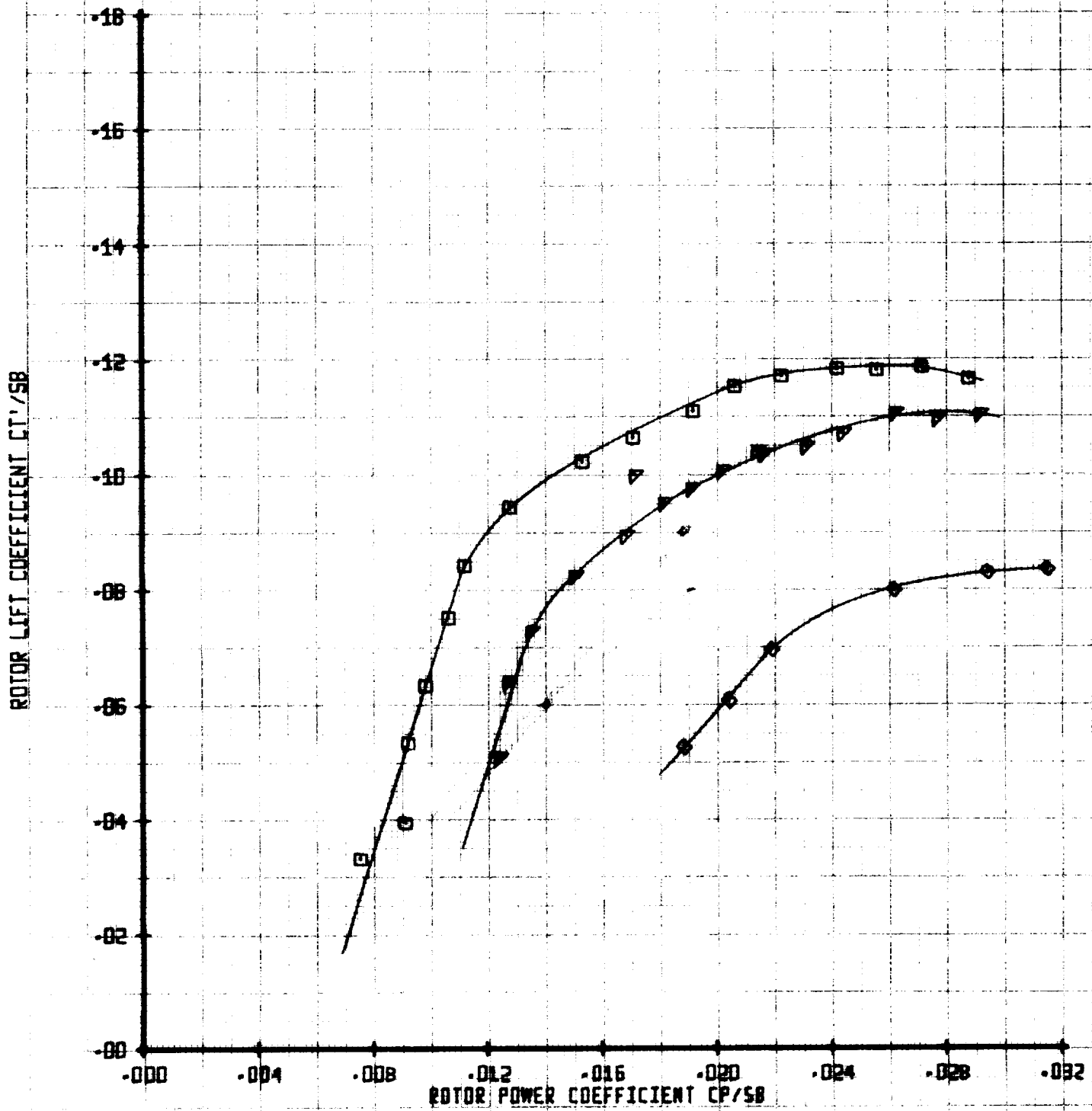


LATERAL CYCLIC - RADIANS

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	51	.53	.025	329
△	50	.53	.05	329
◇	52	.53	.10	329
▽	53	.53	.20	329

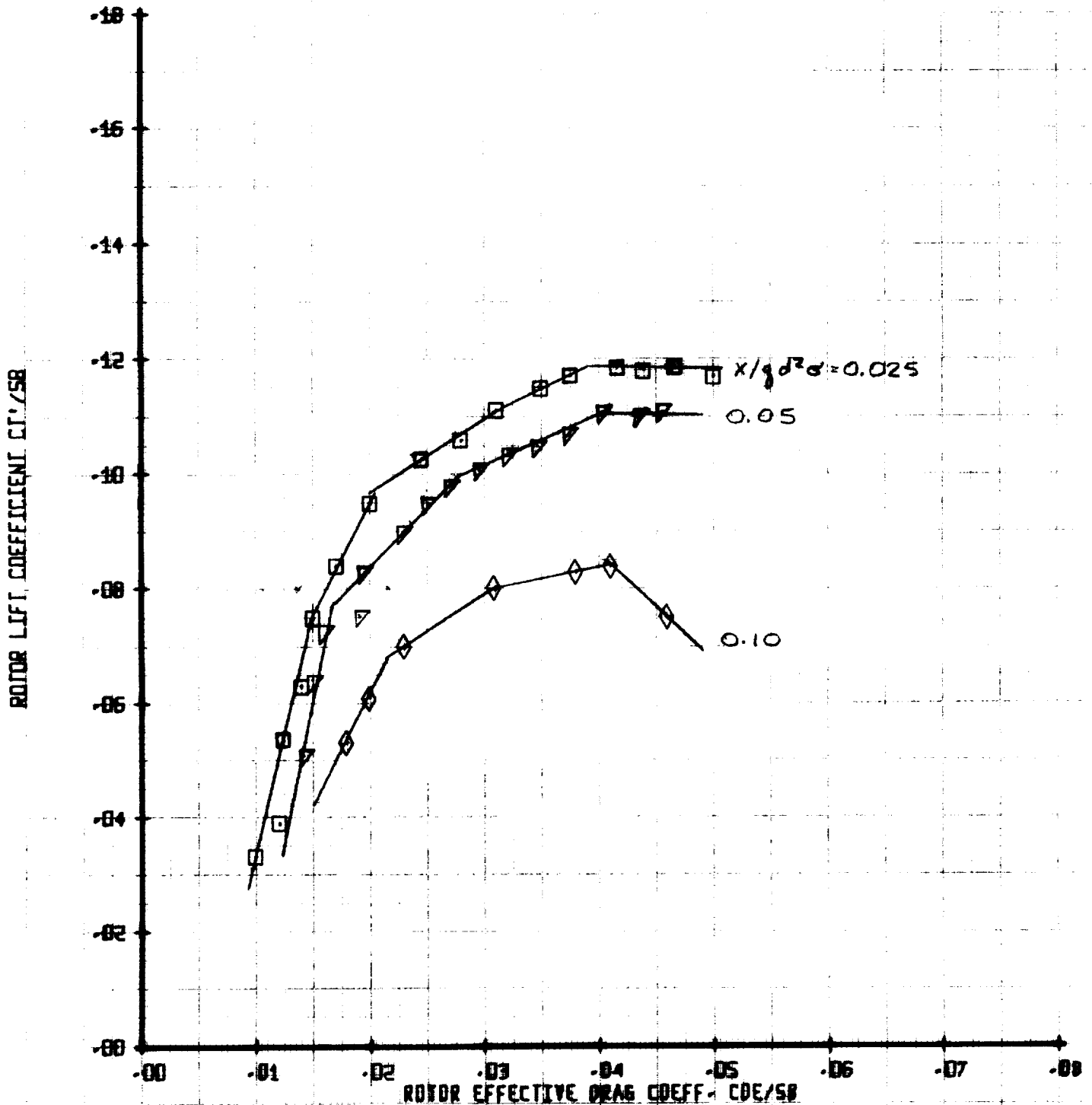
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47R ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/100250	VTUN
□	51	.58	.025	329
△	50	.58	.05	329
◇	52	.58	.10	329
▽	53	.58	.20	329

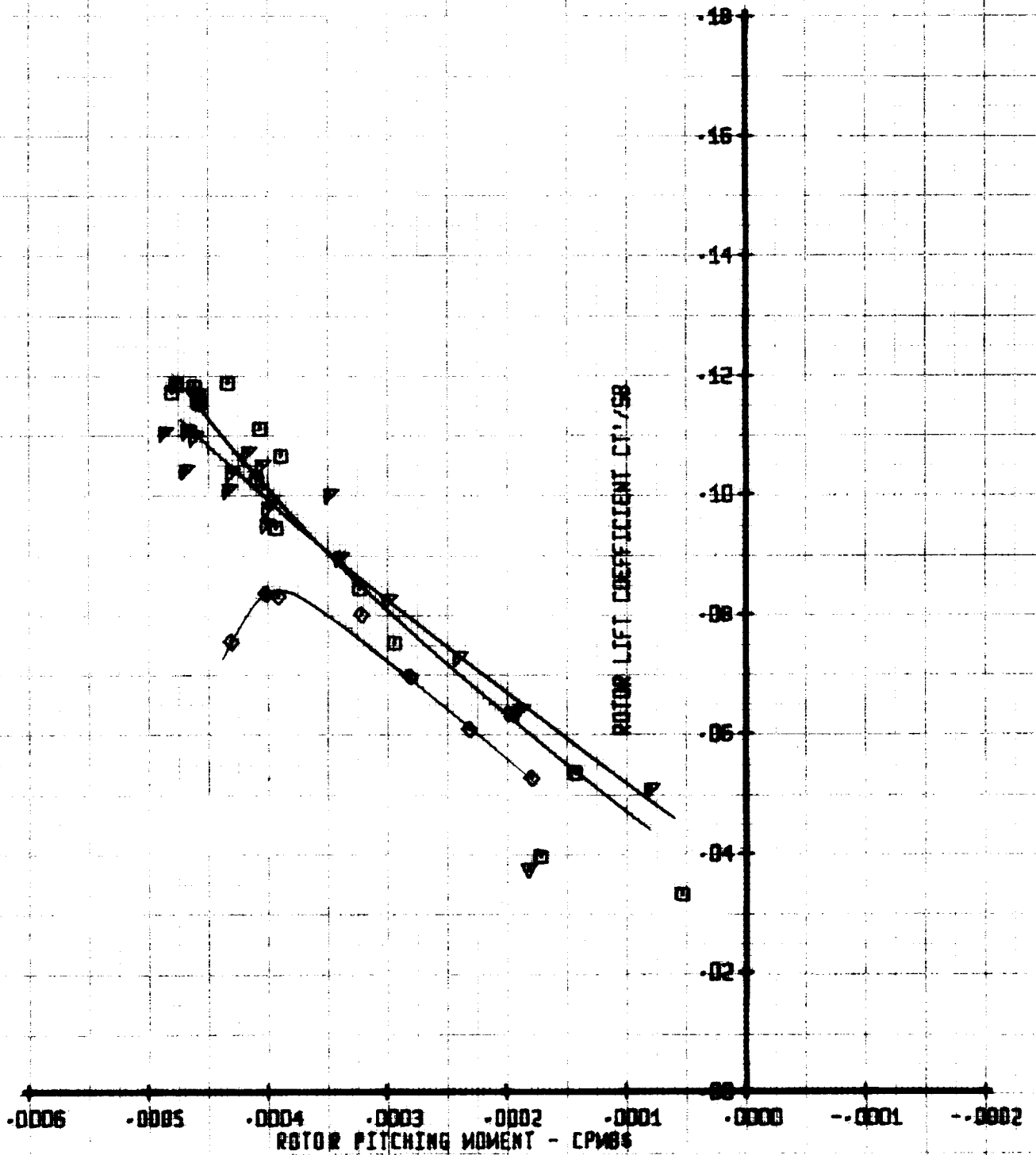
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MP	X/00258	Y/TUN
□	51	0.025	0.025	328
△	50	0.05	0.05	328
◇	52	0.10	0.10	328
▲	53	0.20	0.20	328

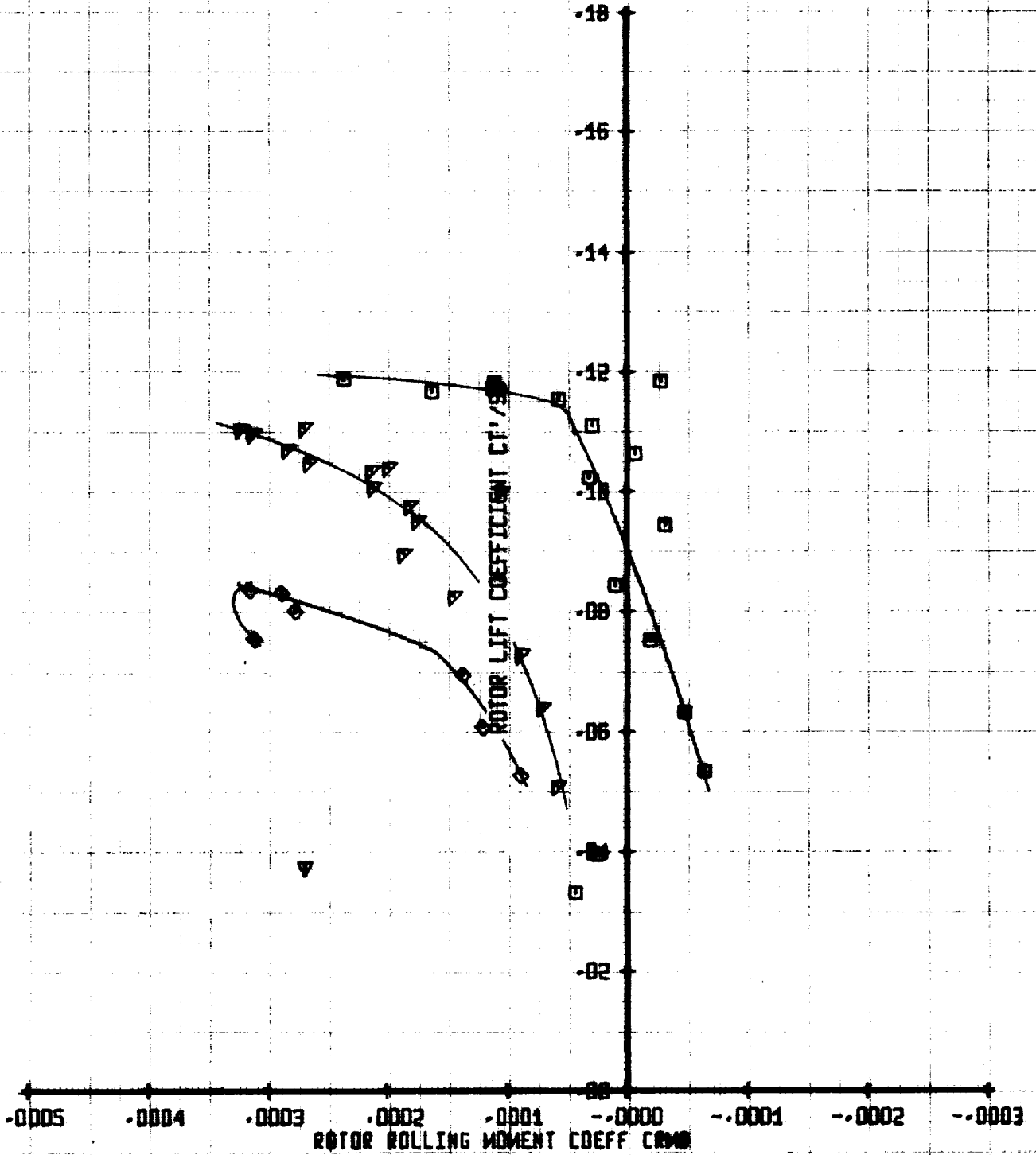
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00750	VTUN
□	51	.52	.025	328
△	50	.53	.025	328
◇	52	.53	.025	328
▲	53	.53	.025	328

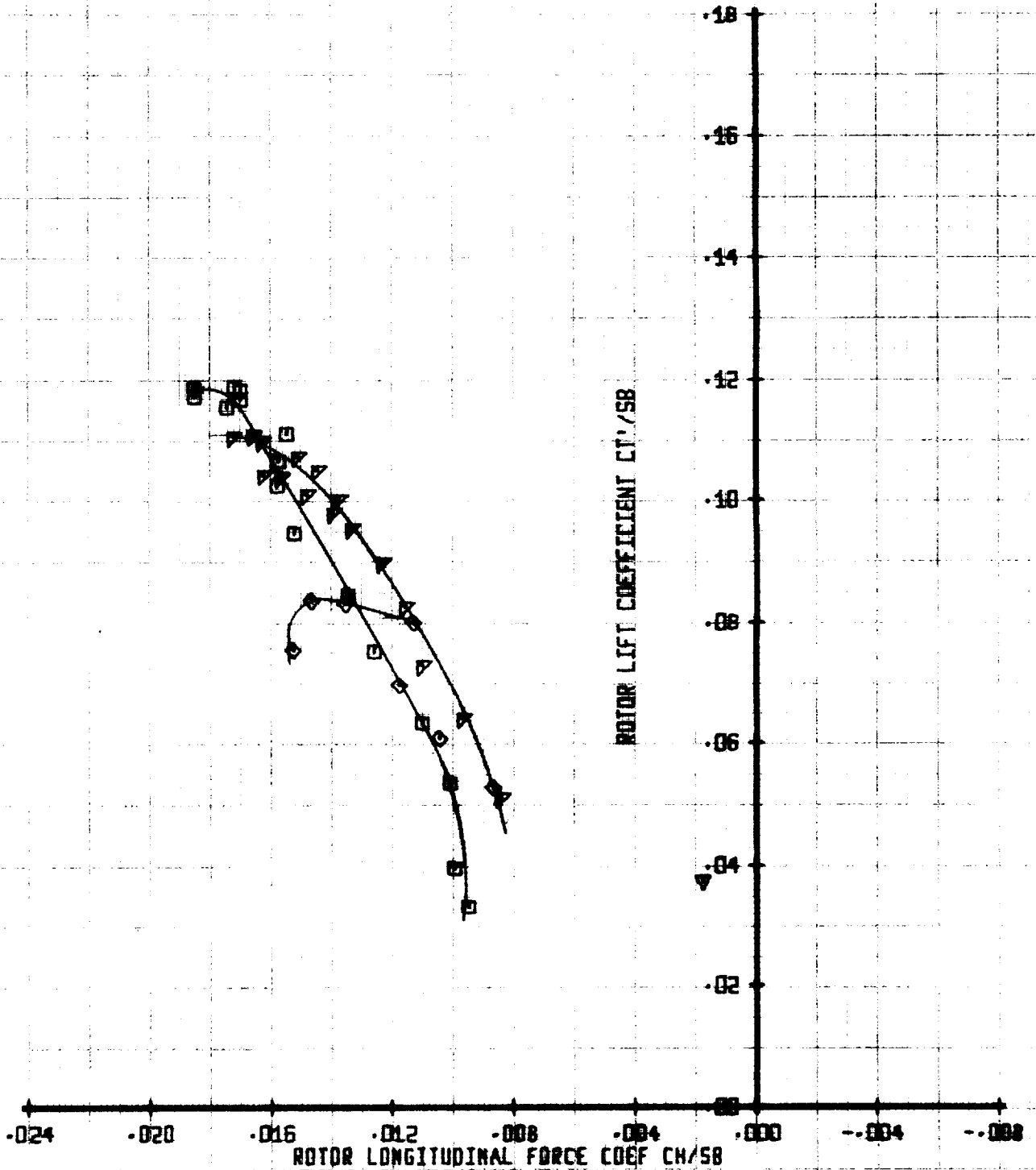
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUM
□	51	.58	.025	329
△	50	.58	.05	329
◇	52	.58	.10	329
▽	53	.58	.20	329

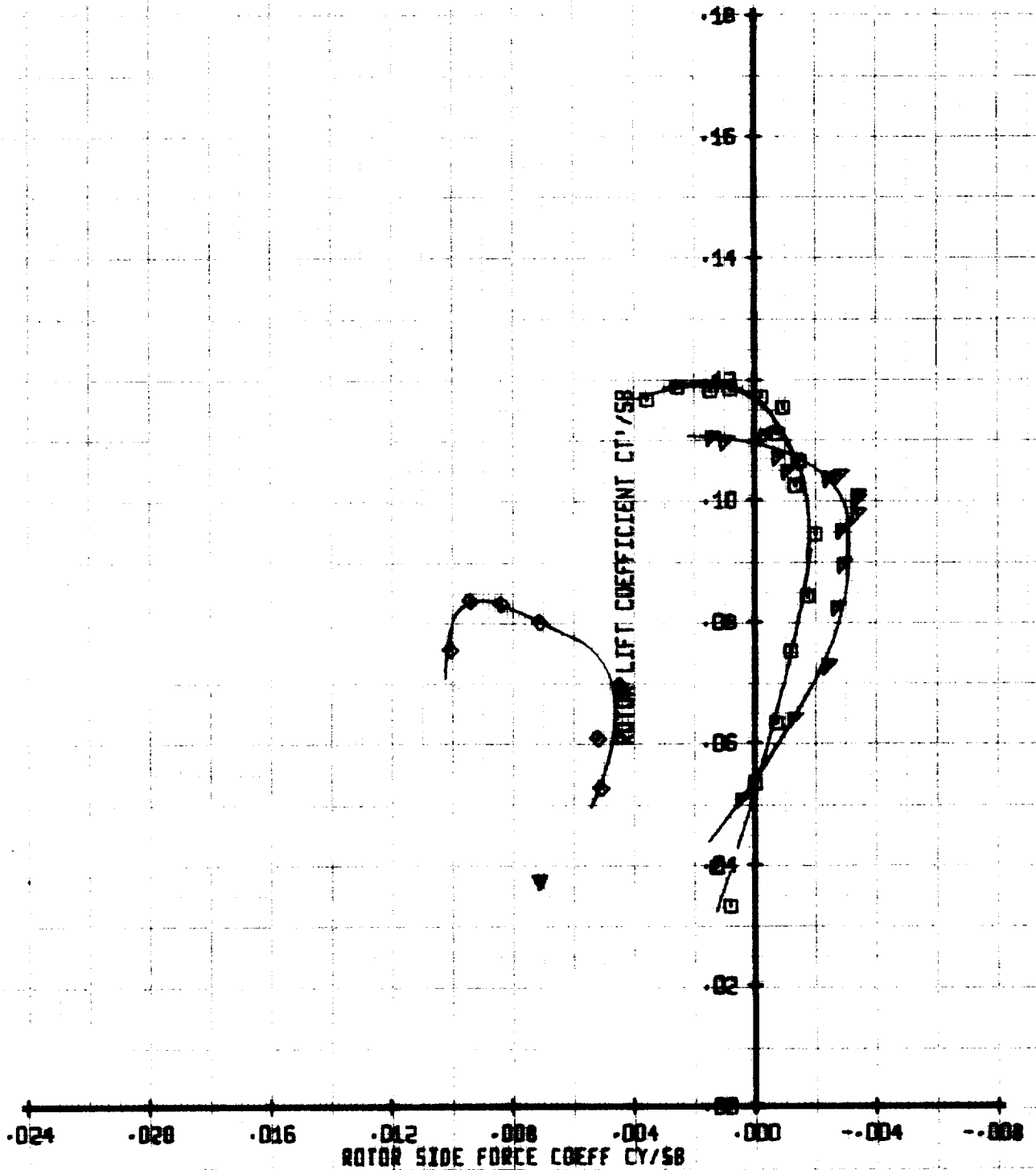
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI	X/00258	VTUN
□	1	0.025	0.025	329
△	2	0.025	0.025	329
◇	3	0.025	0.025	329
▽	4	0.025	0.025	329

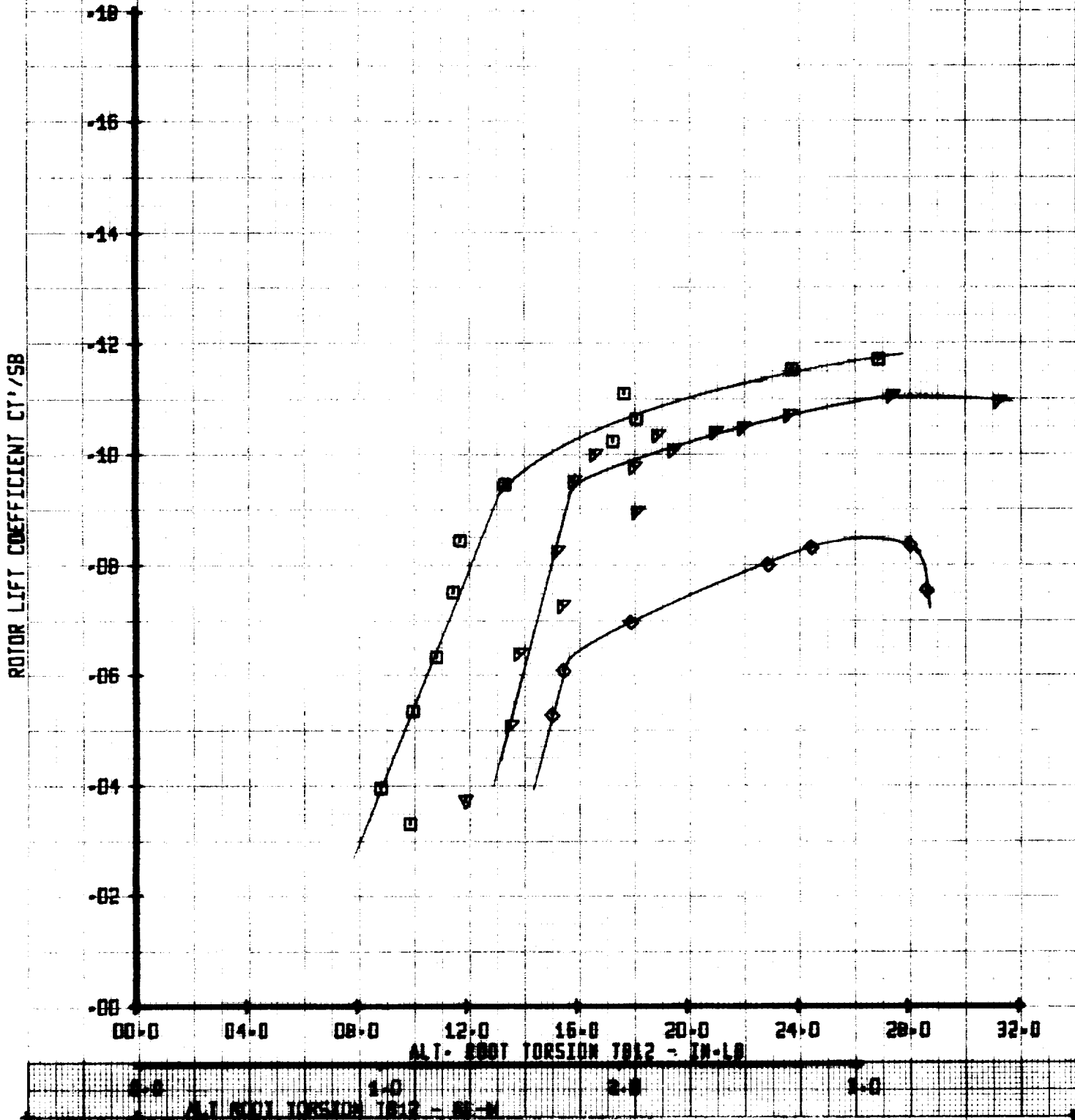
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	ML	X/00258	VTUN
□	51	.53	.025	329
△	50	.53	.025	329
◆	53	.53	.025	329

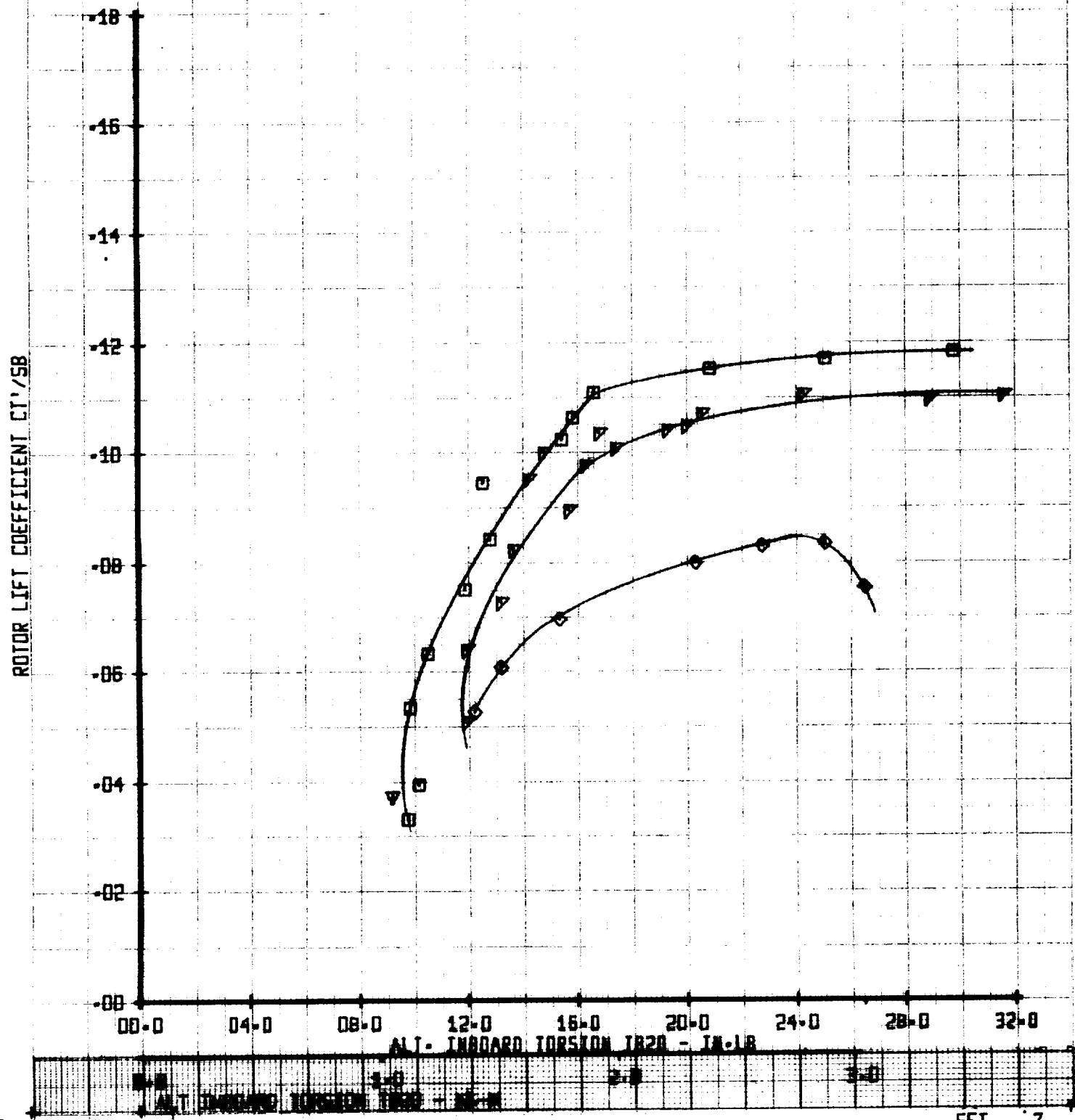
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	51	.53	.025	329
△	50	.53	.05	329
◇	52	.53	.10	329
▽	53	.53	.20	329

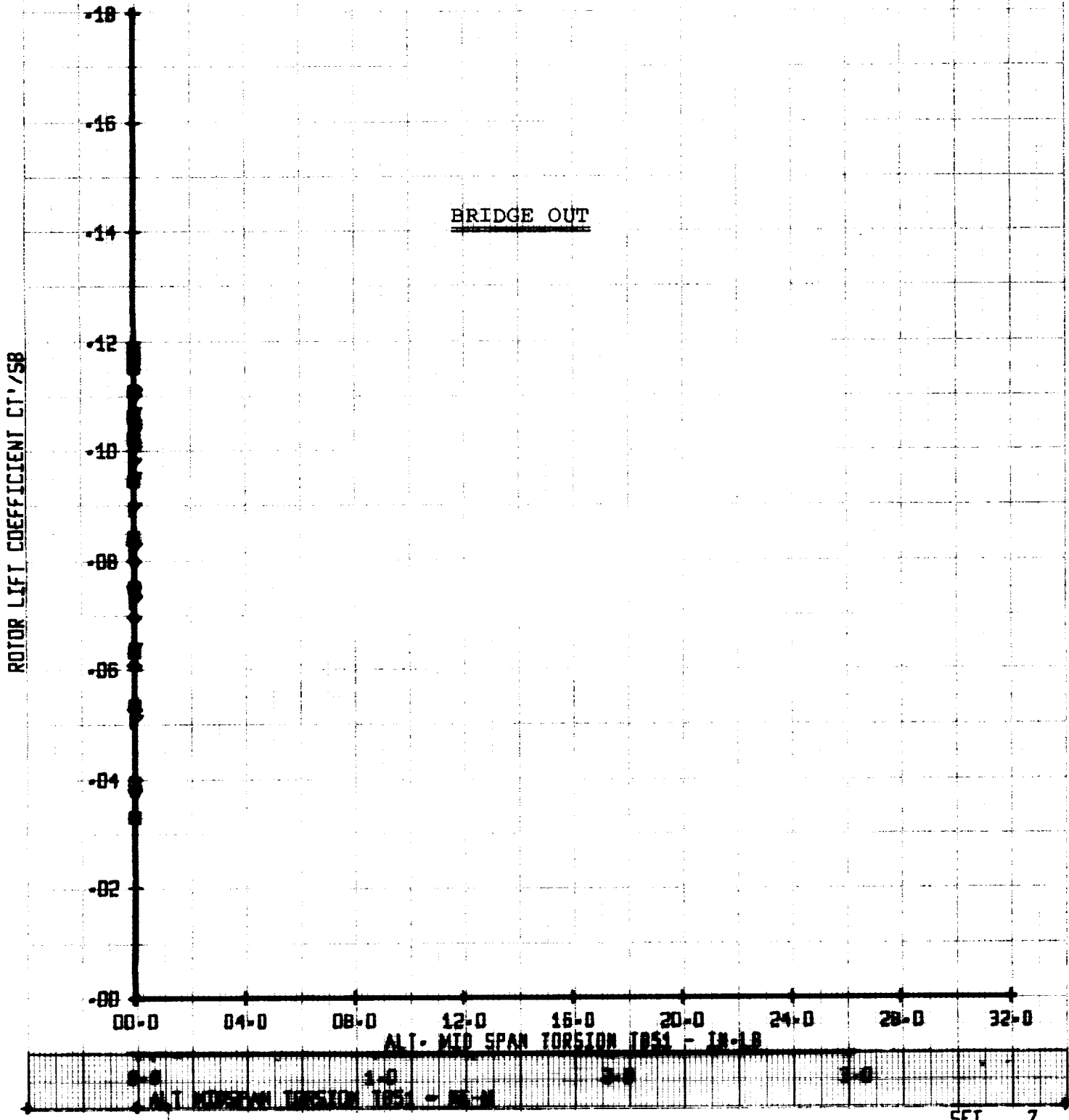
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING INBOARD TORSION TB20



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	ML	X/00258	VTUN
□	51	.53	.025	329
△	52	.53	.05	329
◇	53	.53	.10	329
▲	53	.53	.20	329

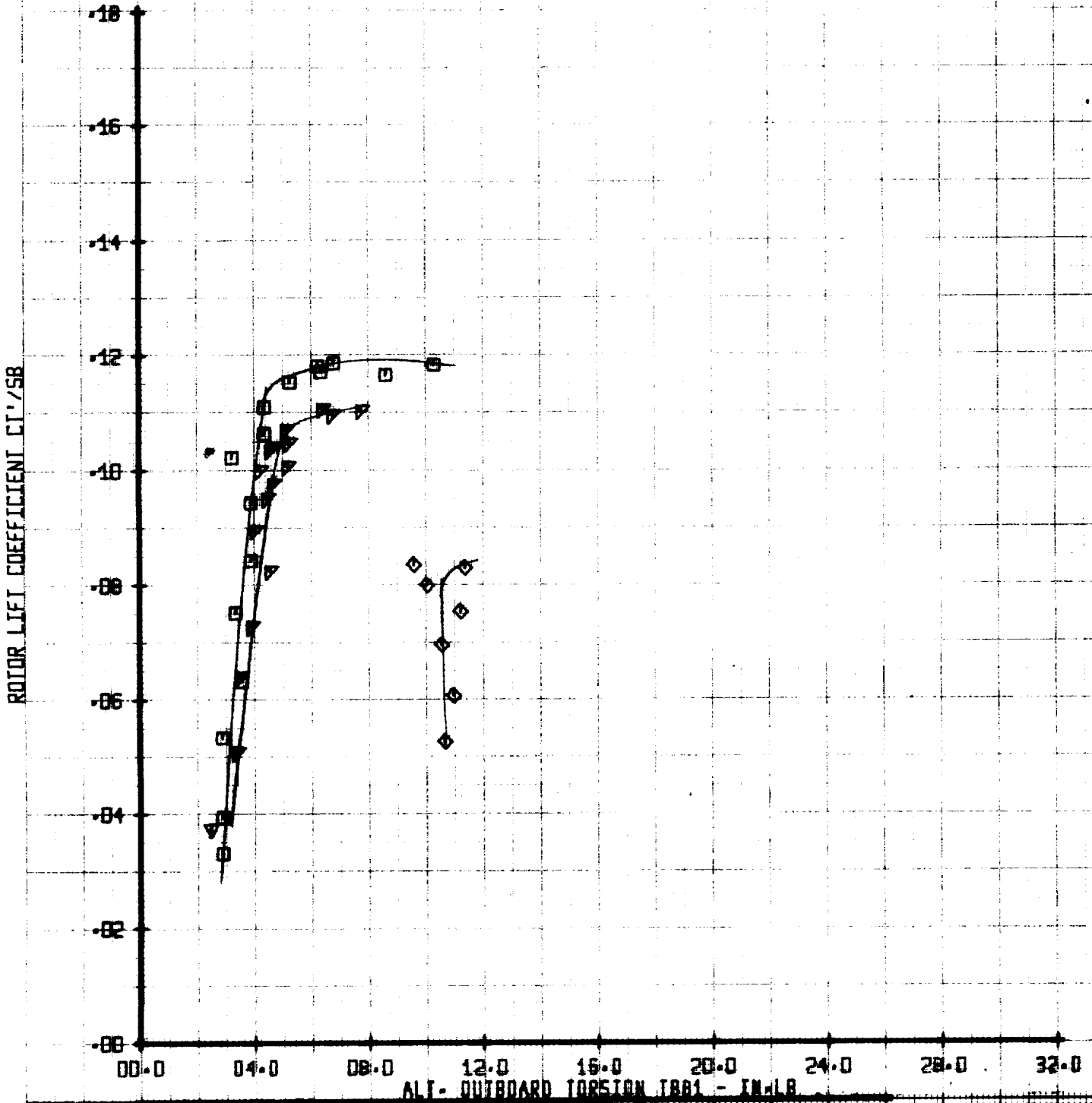
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB51



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/0025B	VTIM
□	51	.58	.025	32.0
▲	50	.58	.05	32.0
◆	52	.58	.10	32.0
▼	53	.58	.20	32.0

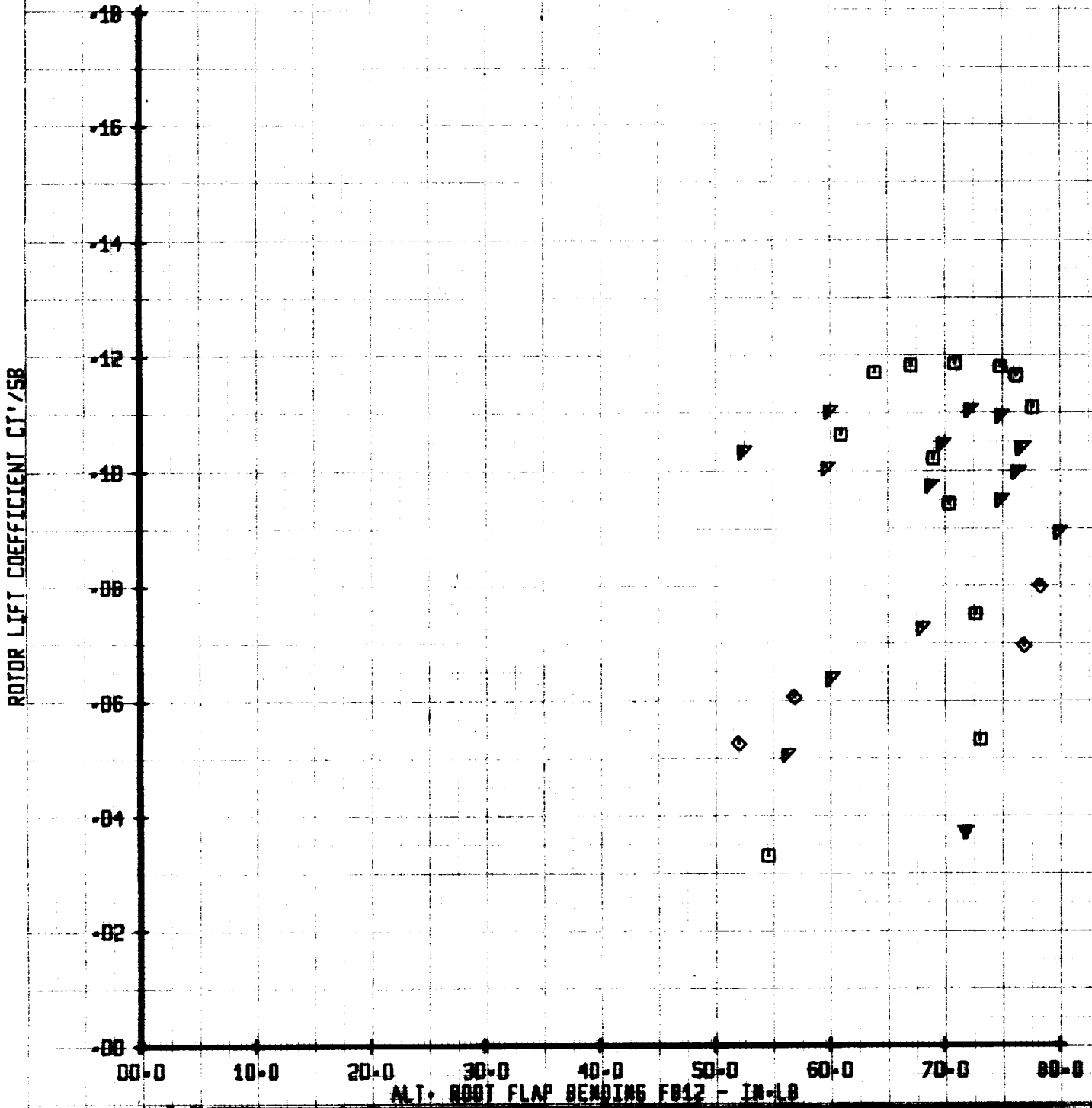
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB81



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MD	X/00258	VTUN
□	51	0.025	329	
△	52	0.05	329	
◆	53	0.10	329	

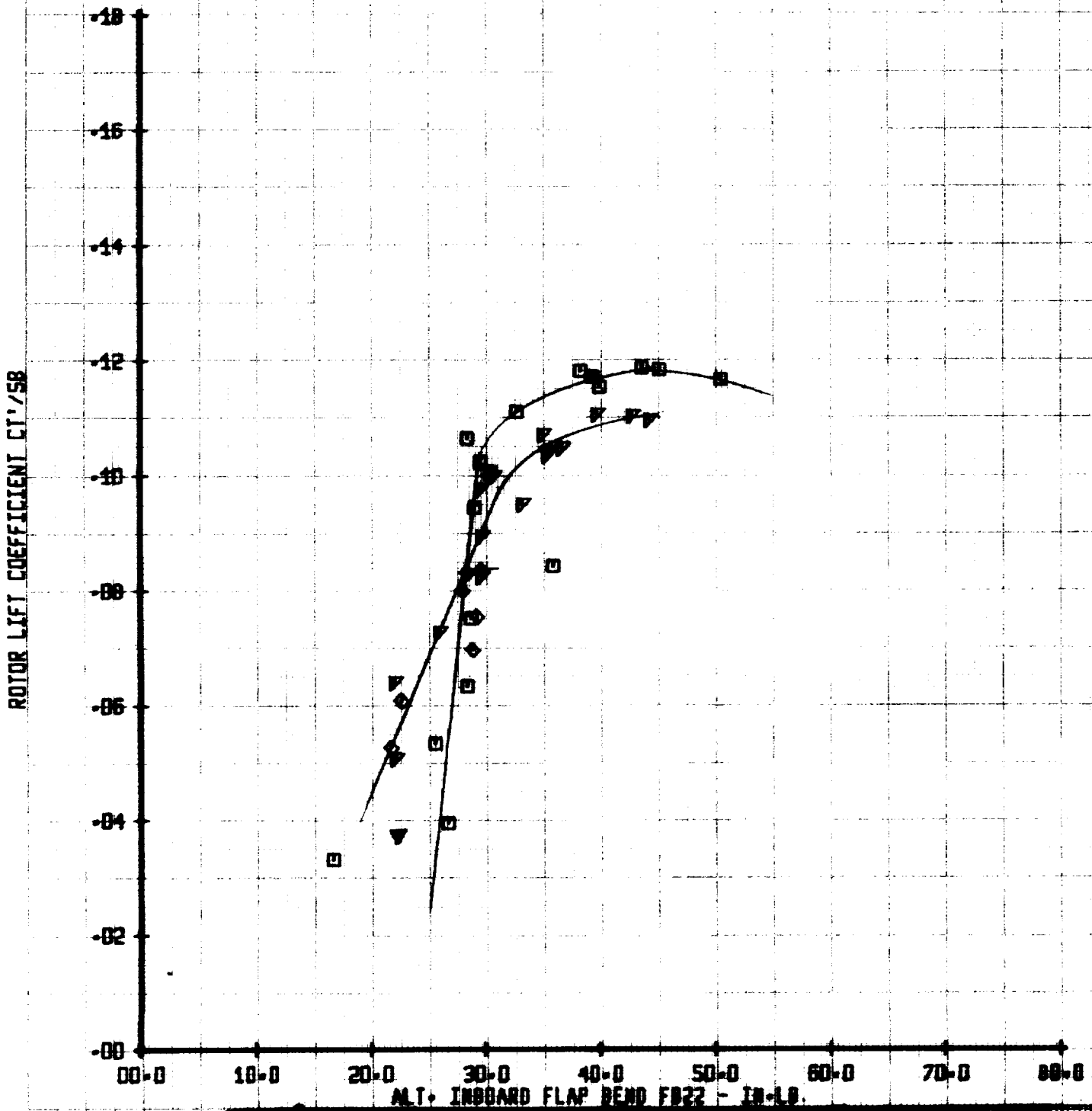
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D MOTOR
 LIFT LIMIT TESTING

LEGEND
 574 31 33
 31 33 33
 33 33 33
 33 33 33
 33 33 33

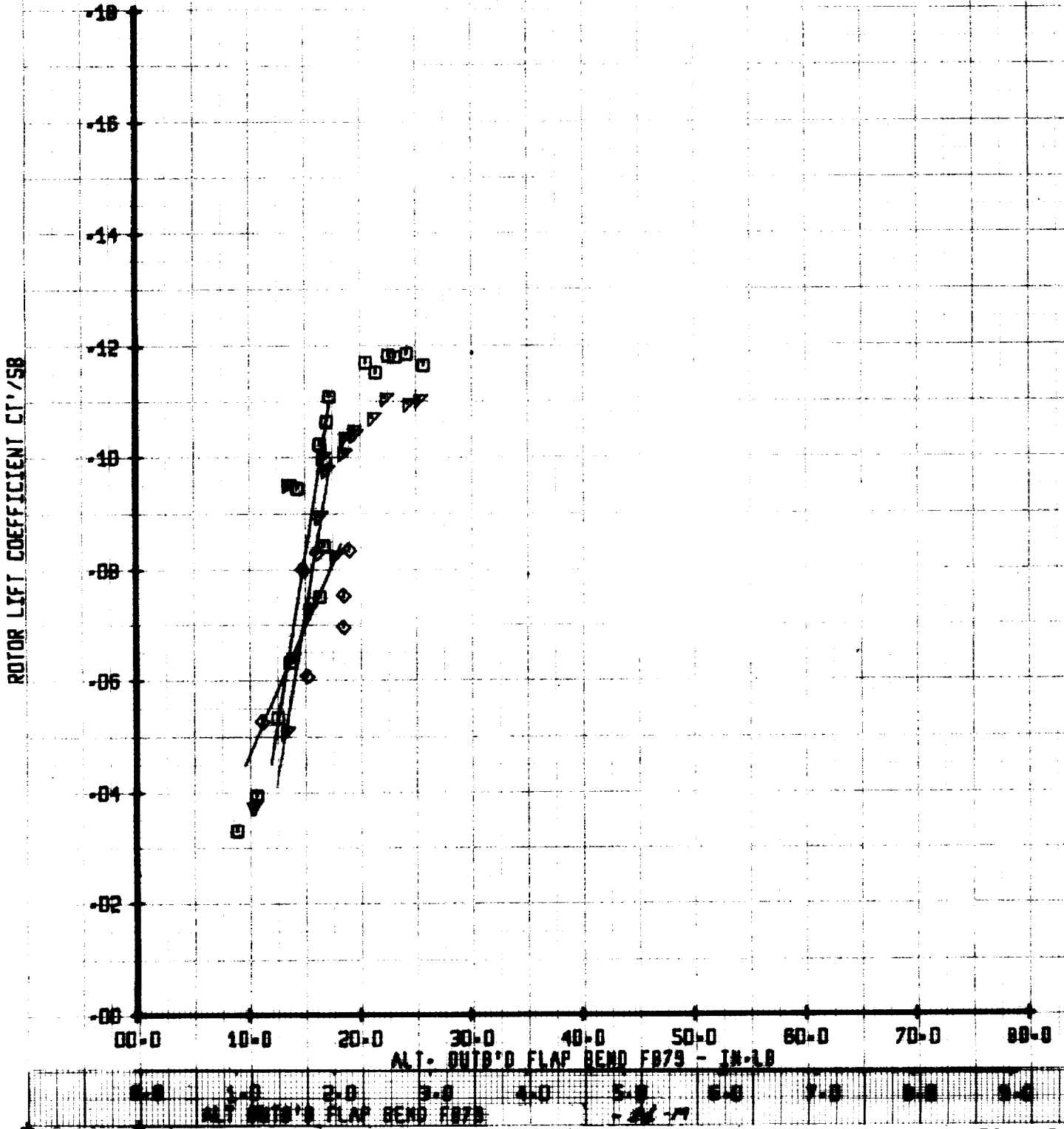
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING INBOARD FLAP BENDING FB22



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/100258	VTUN
□	51	.53	.025	329
△	52	.53	.05	329
◇	53	.53	.10	329
▽	54	.53	.20	329

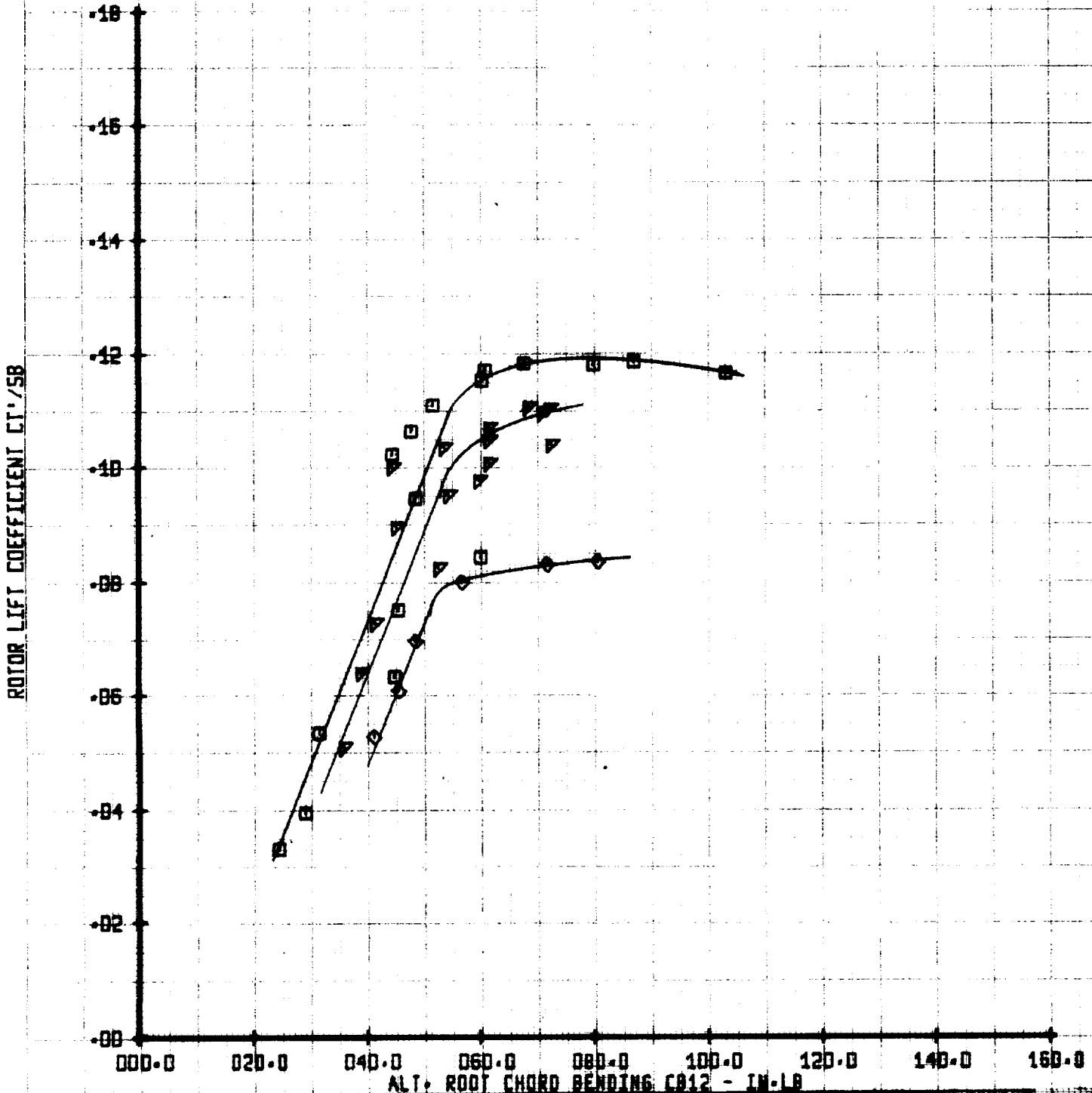
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB79



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	51	.58	.025	328
△	52	.58	.05	328
◇	53	.58	.10	328
▽	54	.58	.20	328

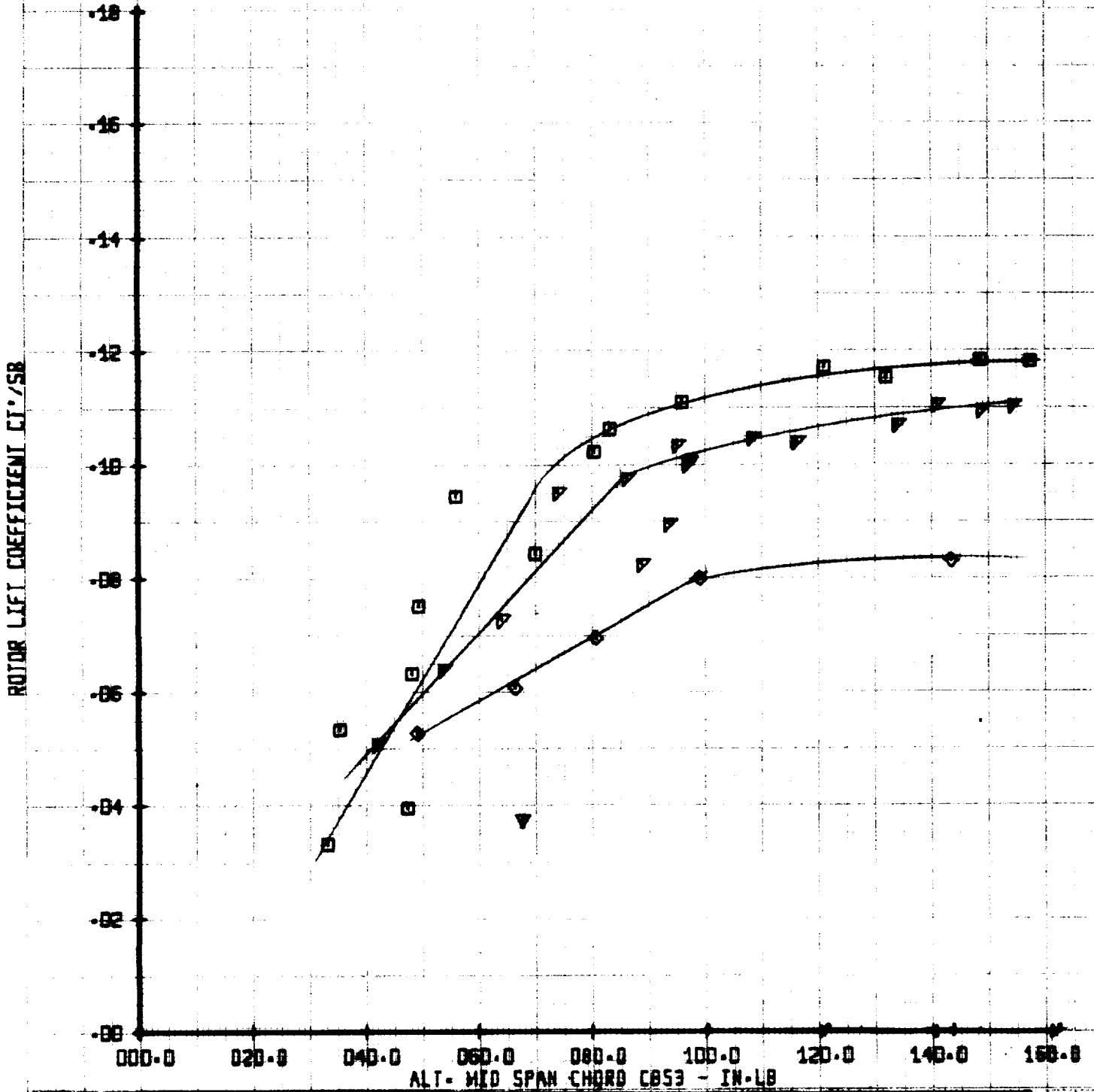
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUN
□	51	.58	.025	329
▲	50	.58	.05	329
◇	52	.58	.10	329
▽	53	.58	.20	329

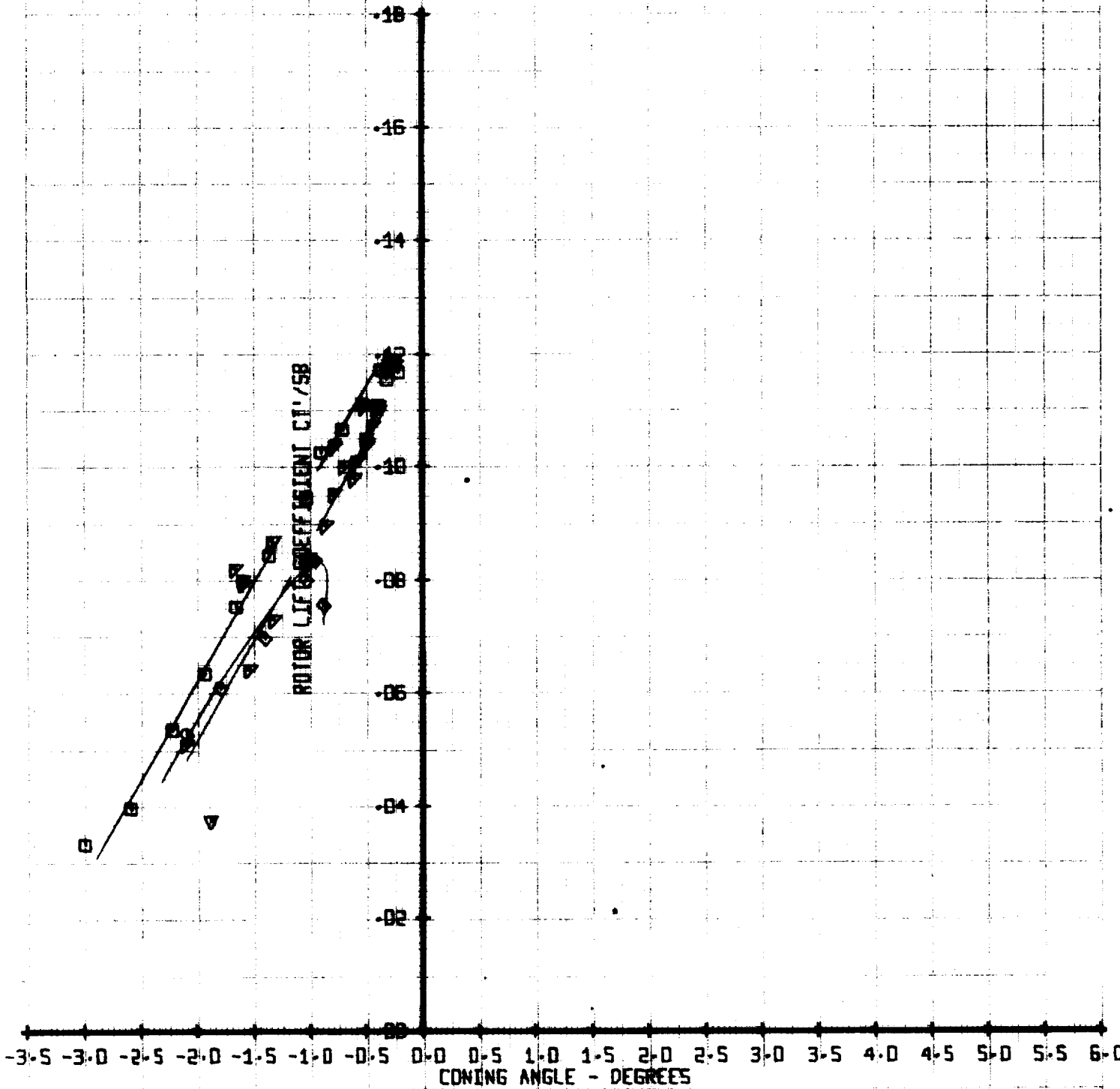
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN CHORD CB53



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47E ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	51	.58	.025	329
○	52	.58	.05	329
△	53	.58	.10	329
◇	53	.58	.20	329

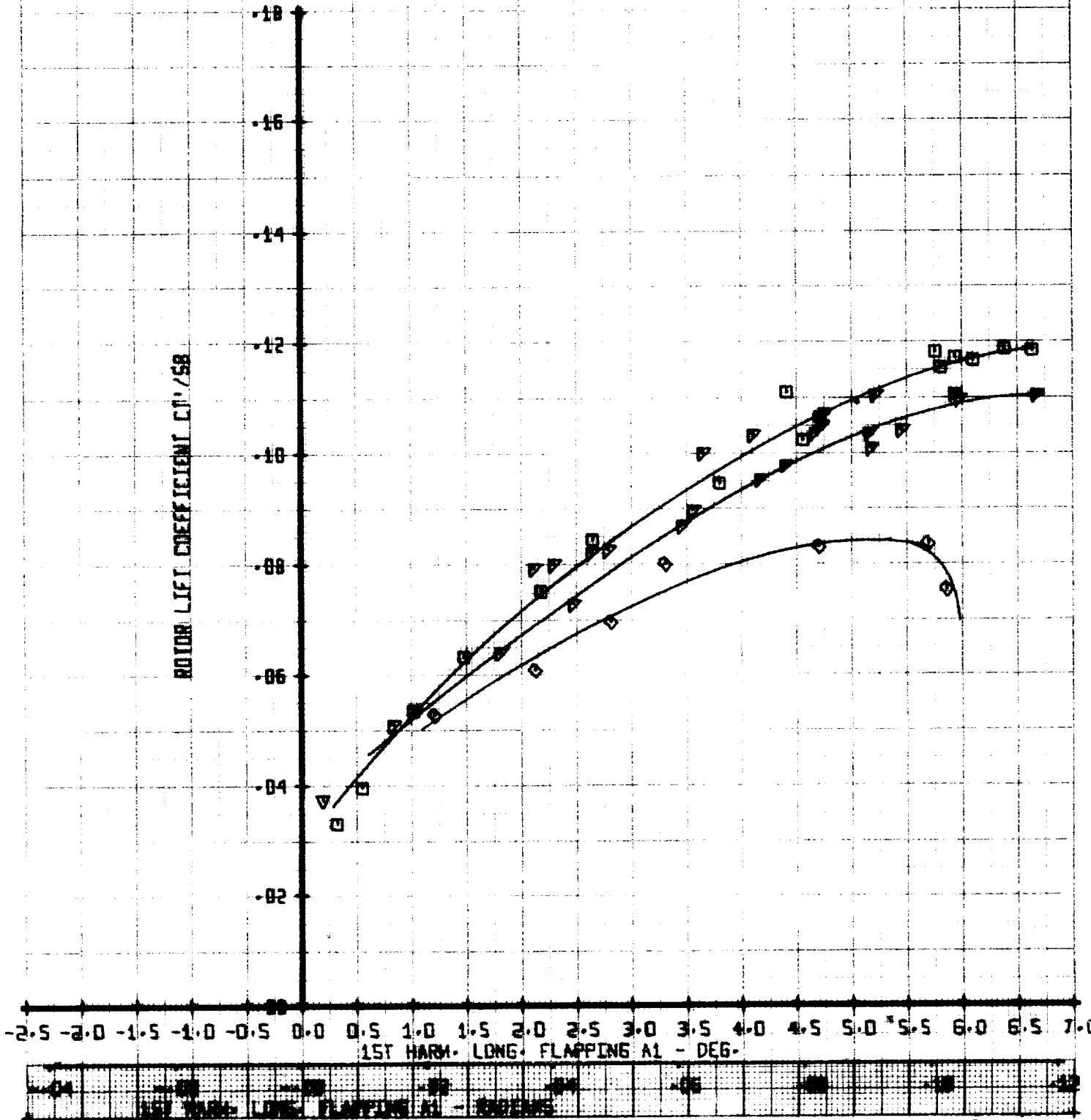
ROTOR LIFT COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-42B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	KTUN
□	51	.58	.025	329
△	50	.58	.05	329
◇	52	.58	.10	329
▽	53	.58	.20	329

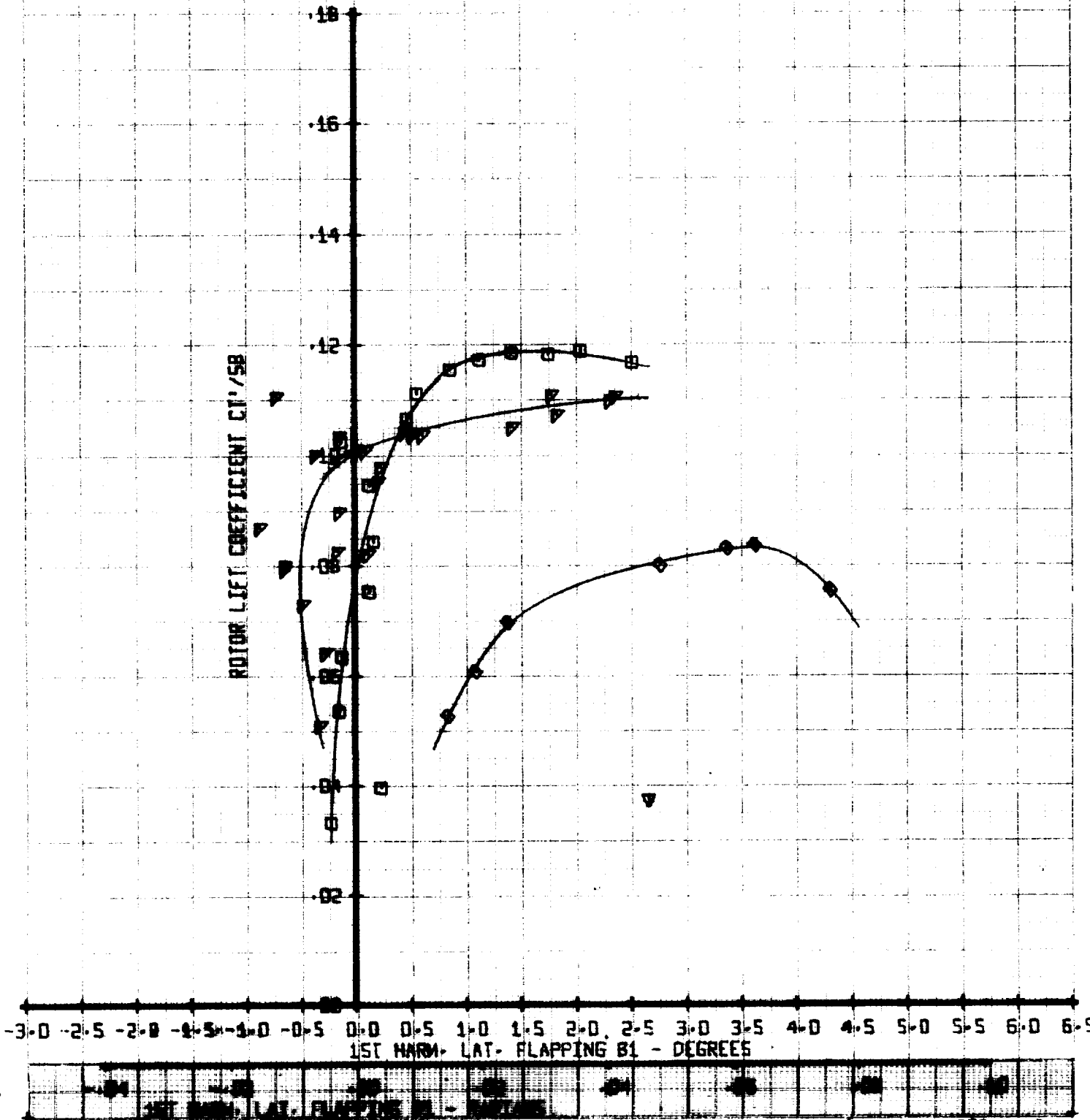
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPELLIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	YTUM
□	51	.58	.025	329
△	50	.58	.05	329
◇	52	.58	.10	329
●	53	.58	.20	329

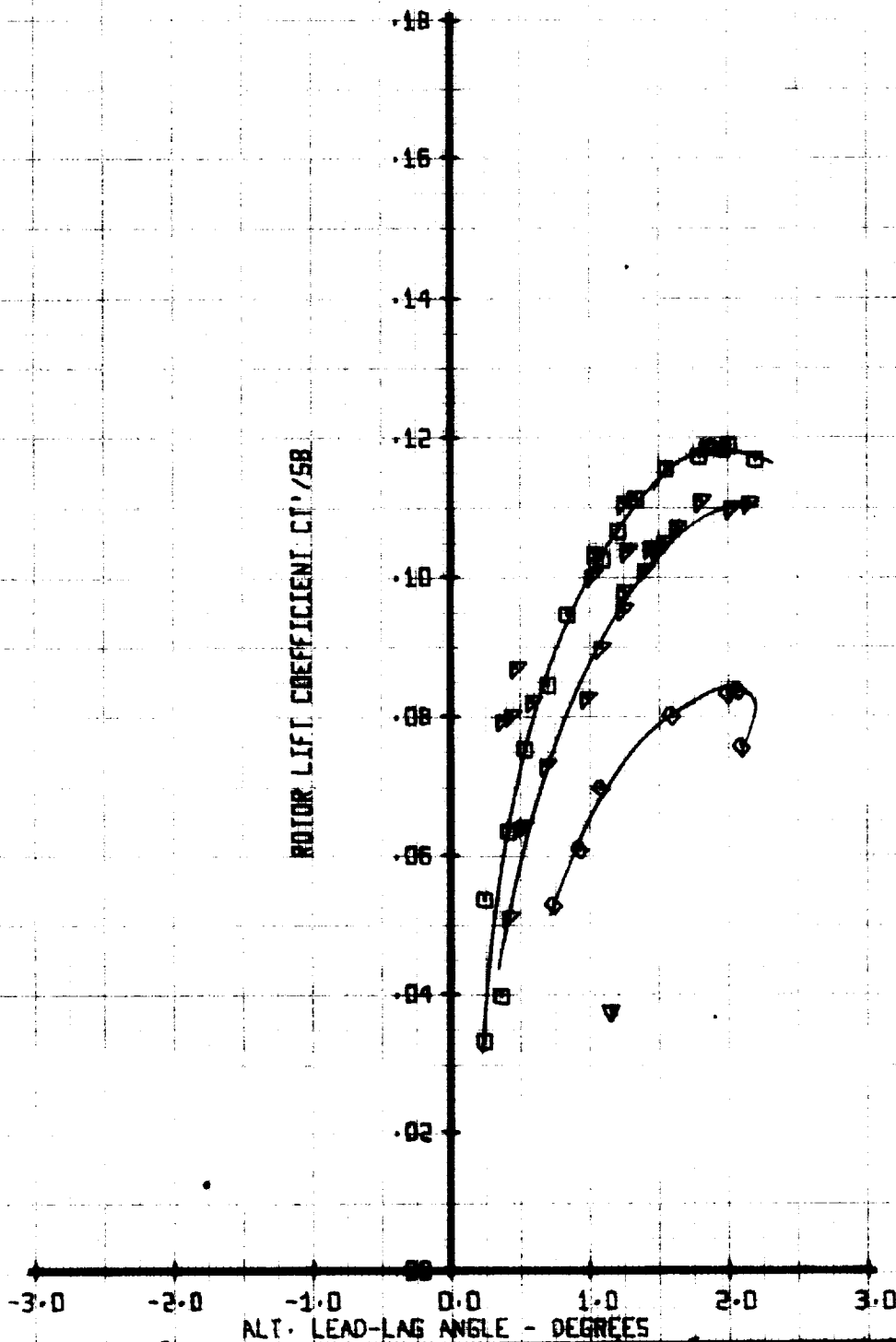
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	Y/TIN
□	51	.58	.025	329
△	50	.58	.05	329
◇	52	.58	.10	329
▽	53	.58	.20	329

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE

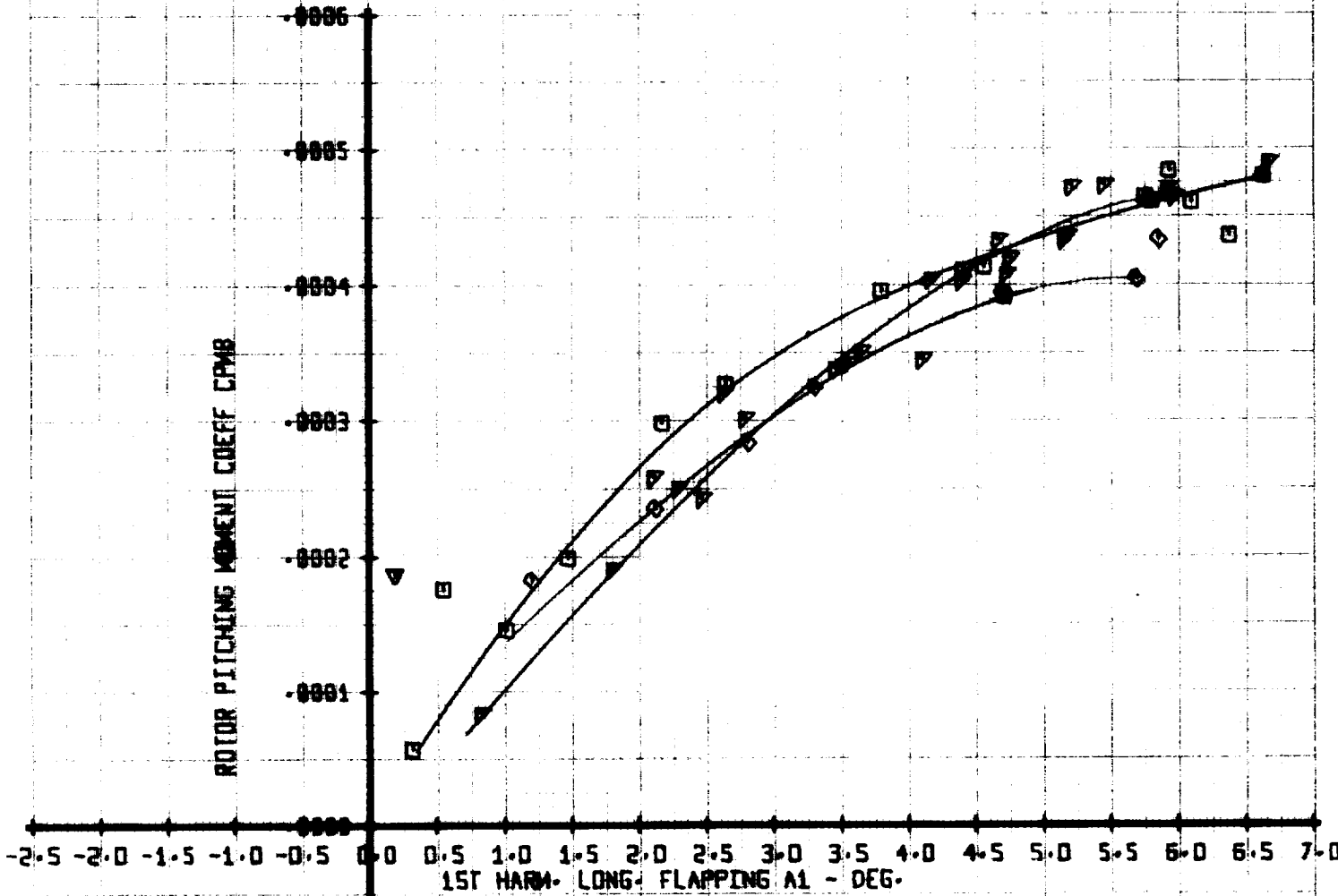


ALT. LEAD-LAG ANGLE - RADIANS

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	VTUN
□	51	.58	.025	329
△	52	.58	.05	329
◇	53	.58	.10	329
▽	54	.58	.20	329

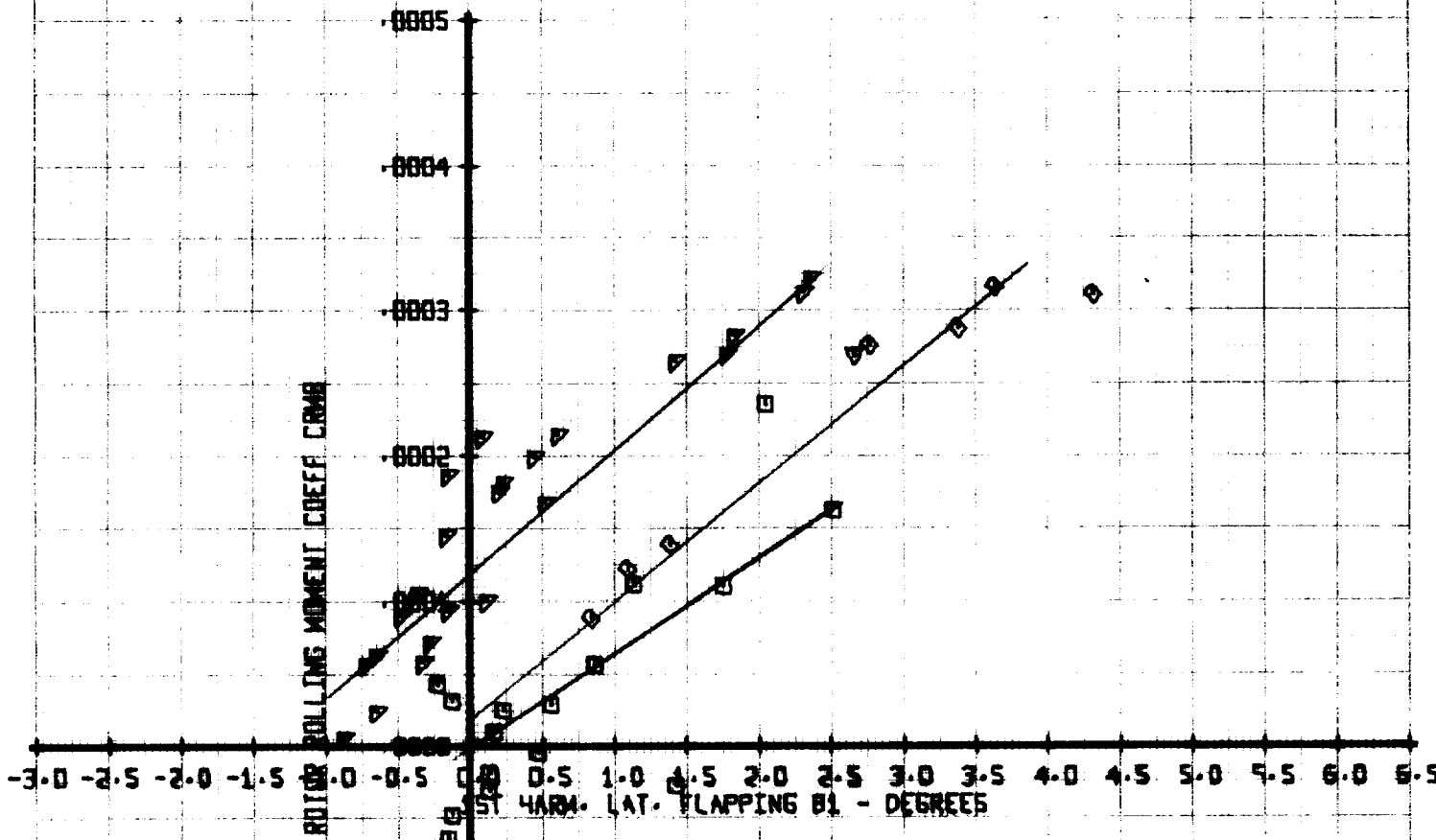
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-470 ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	Y/TIN
□	51	.58	.025	329
△	50	.58	.05	329
◇	52	.58	.10	329
▲	53	.58	.20	329

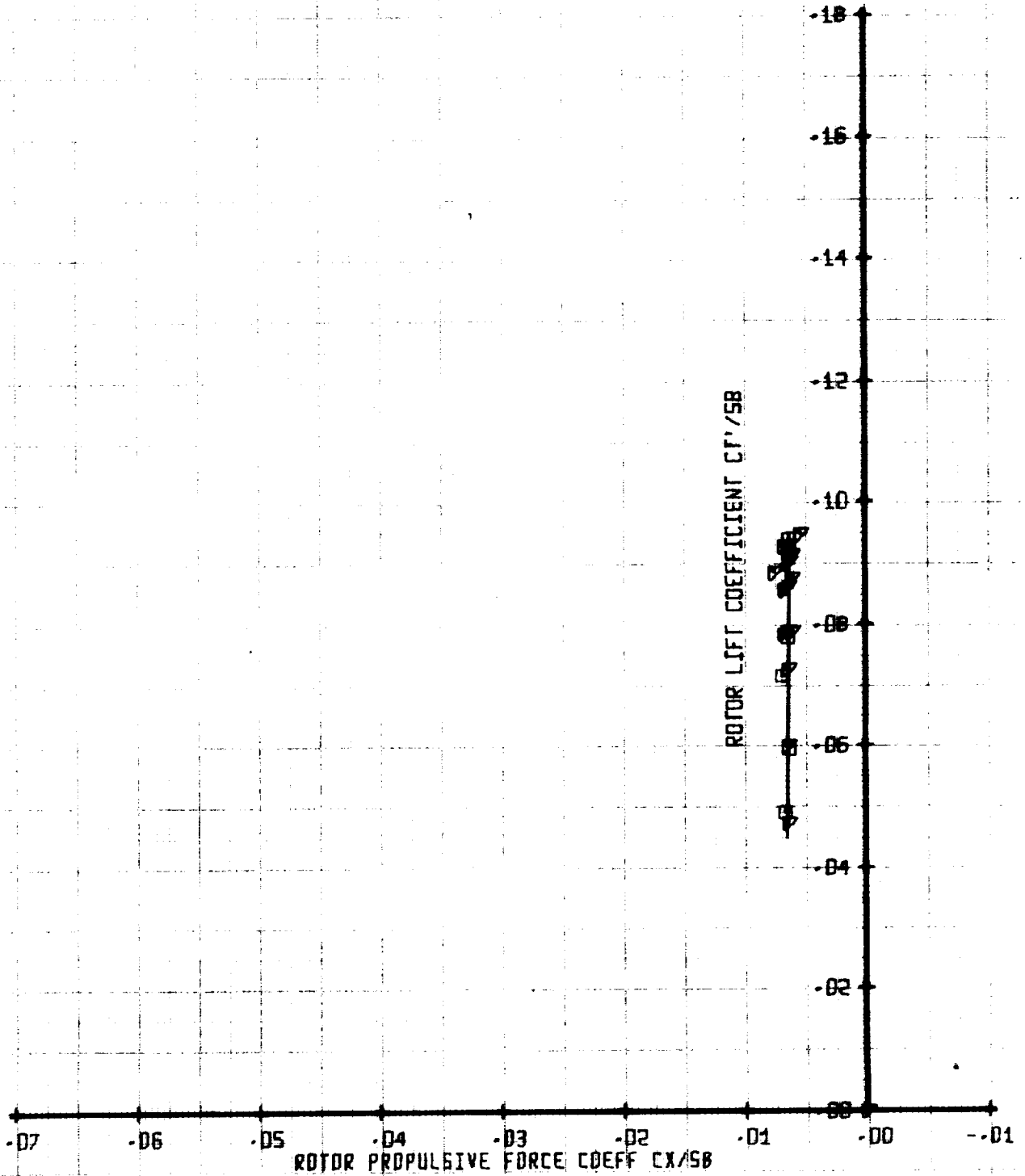
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	ML'	X/DD2SB	VTUN	
□	227	.45	.05	279	
▣	36	.45	.05	279	

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT

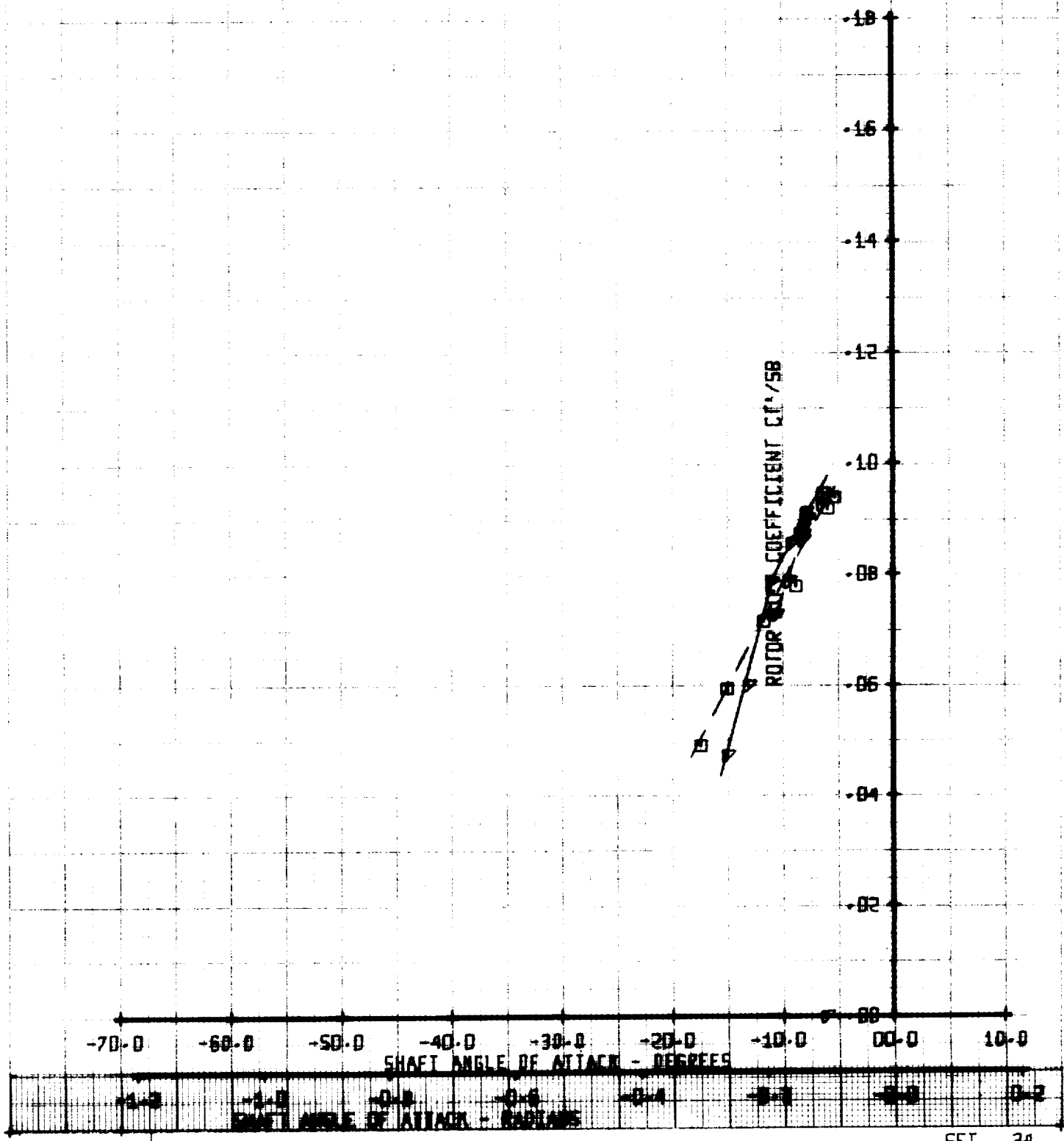


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/DD2SB	Y/TUN
□	227	.45	.05	279
▽	36	.45	.05	279

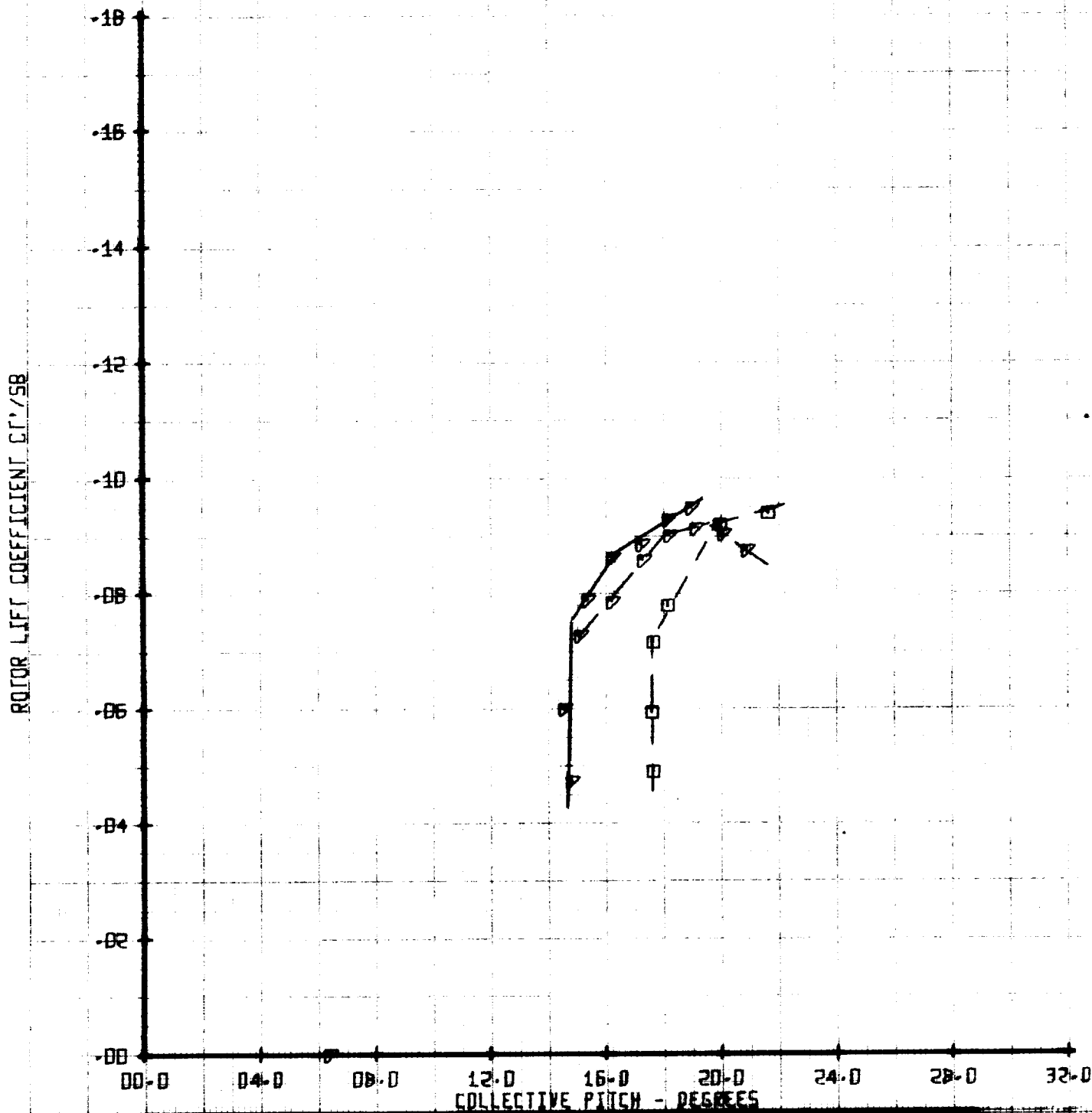
ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	ML'	X/DD2SB	VTUN
□	227	.45	.05	279
▽	36	.45	.05	279

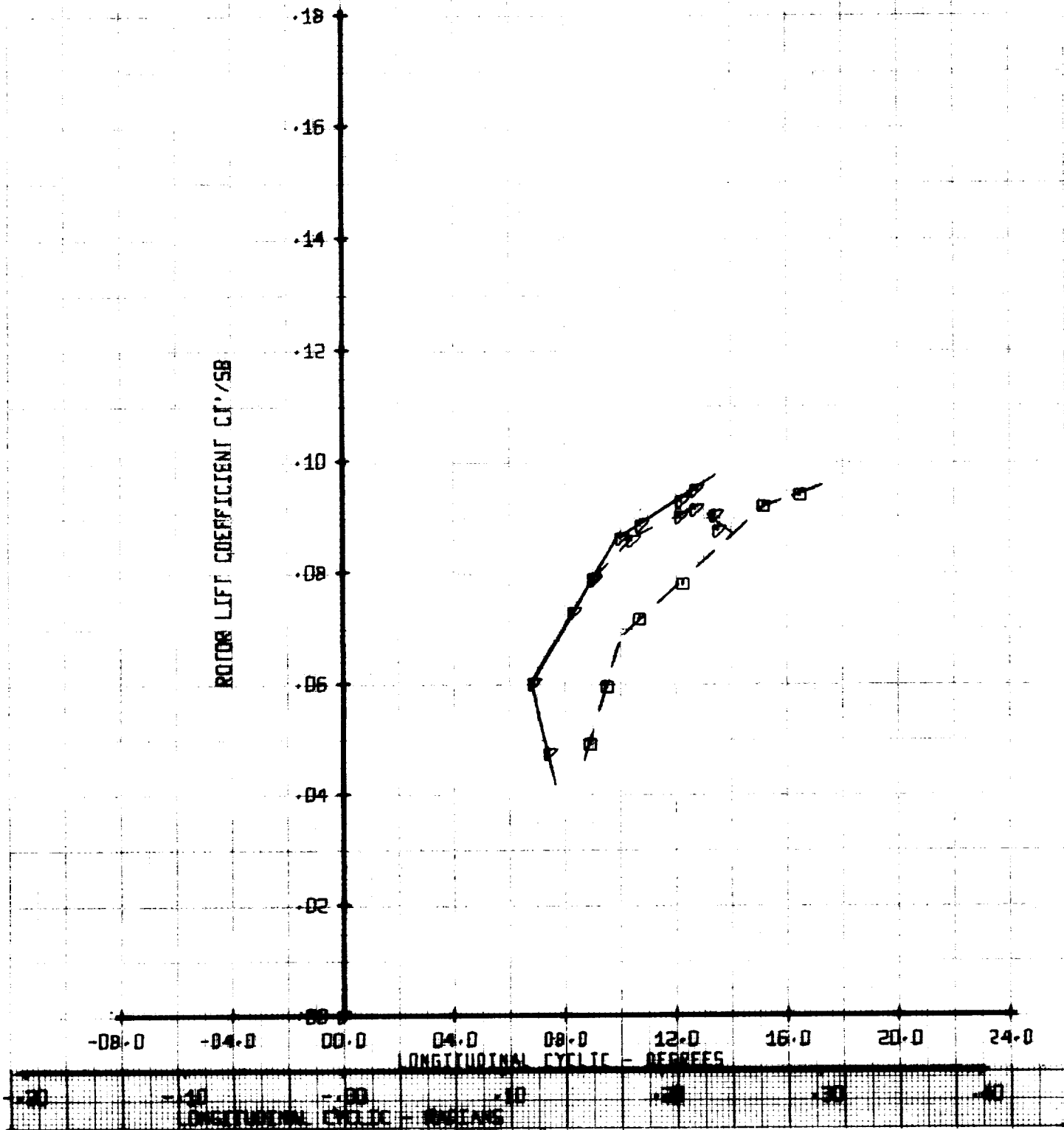
ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	ML'	X/QD2SB	Y/LIN	
□	227	.45	.05	279	
▽	36	.45	.05	279	

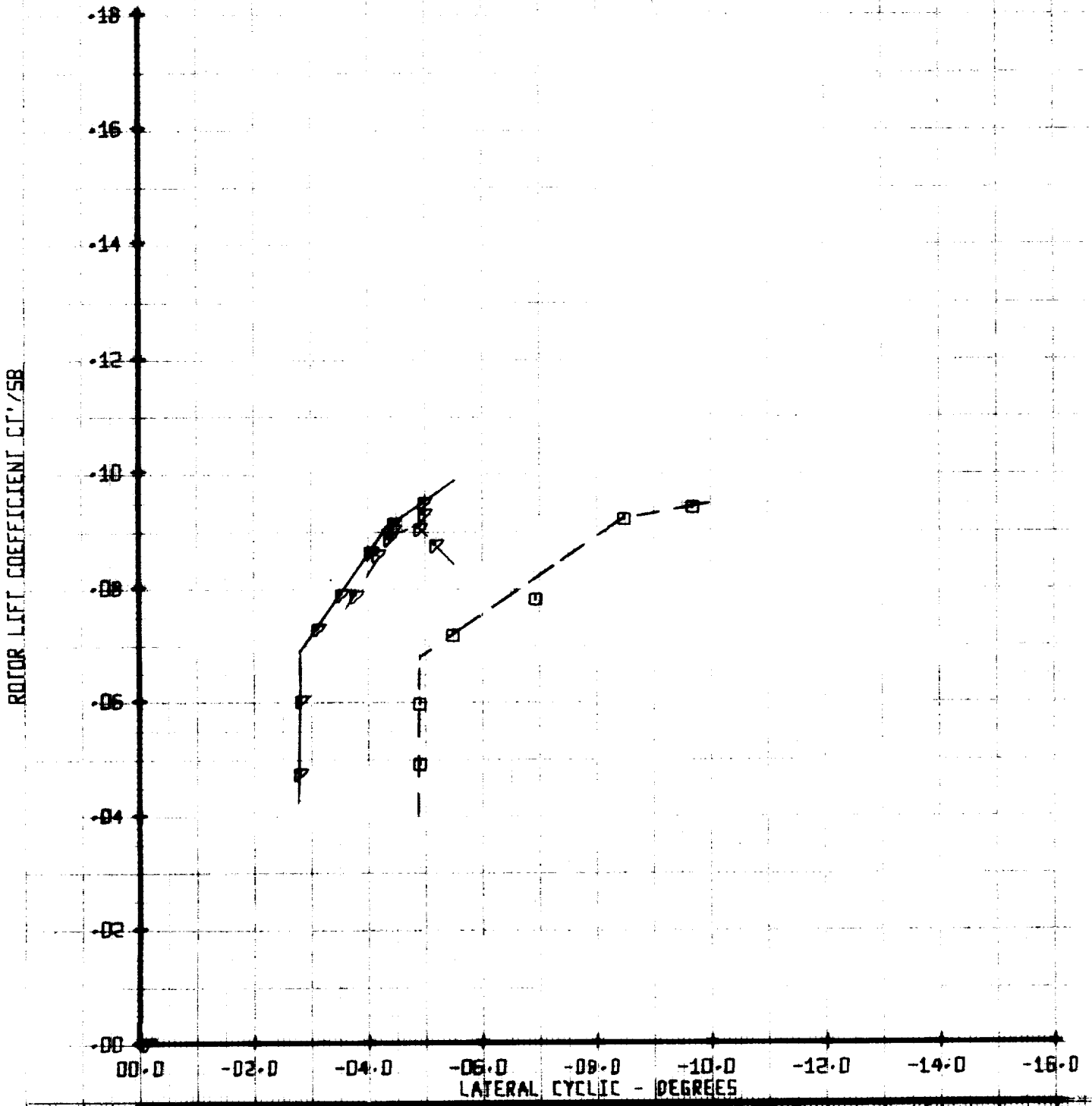
ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		LEGEND			
□	RUN 227	MU'	X/DD258	Y/TUN	
▽	36	.45	.05	279	
		.45	.05	279	

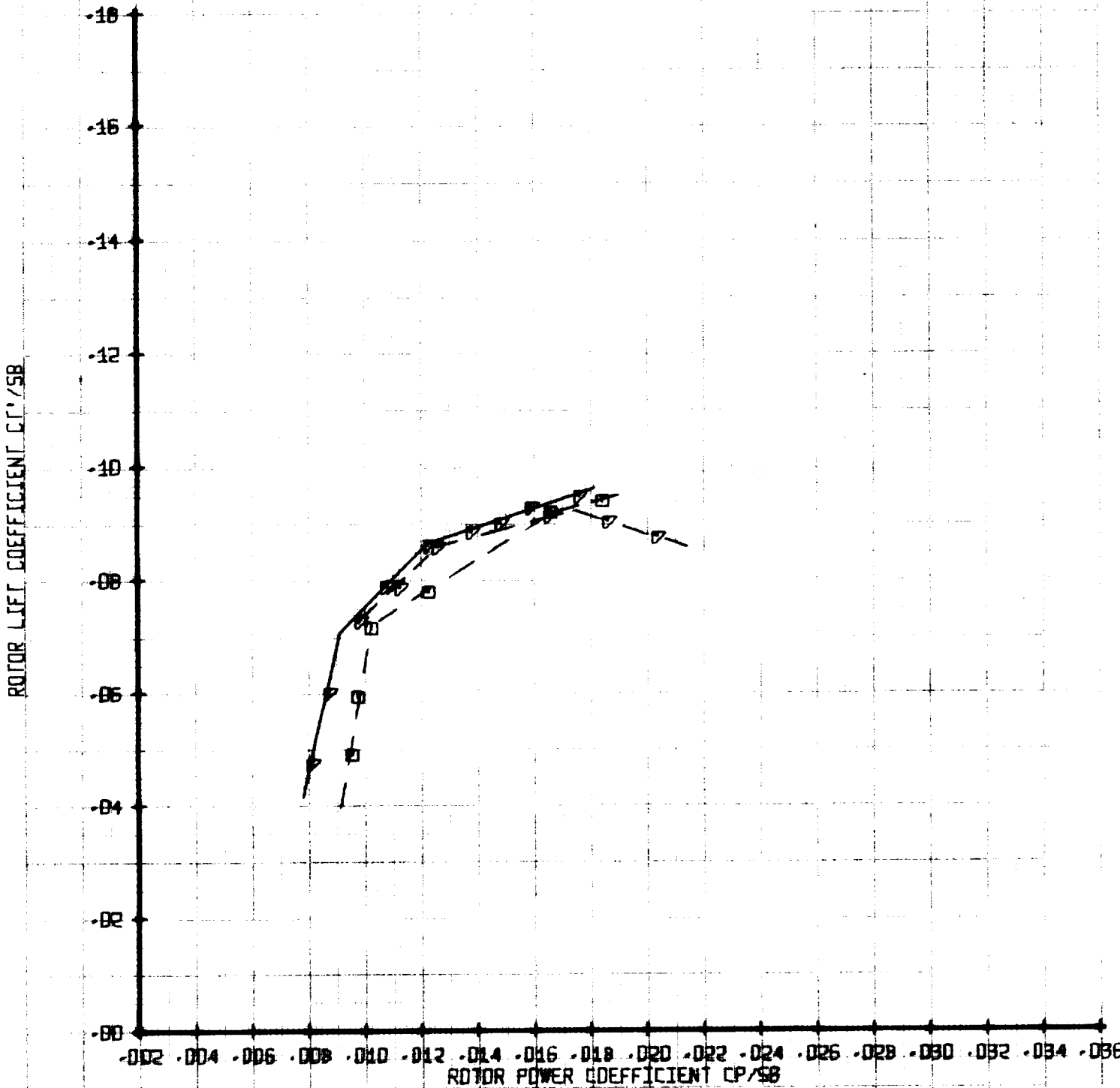
ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/002SB	VTUN
□	227	.45	.05	279
▽	36	.45	.05	279

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT

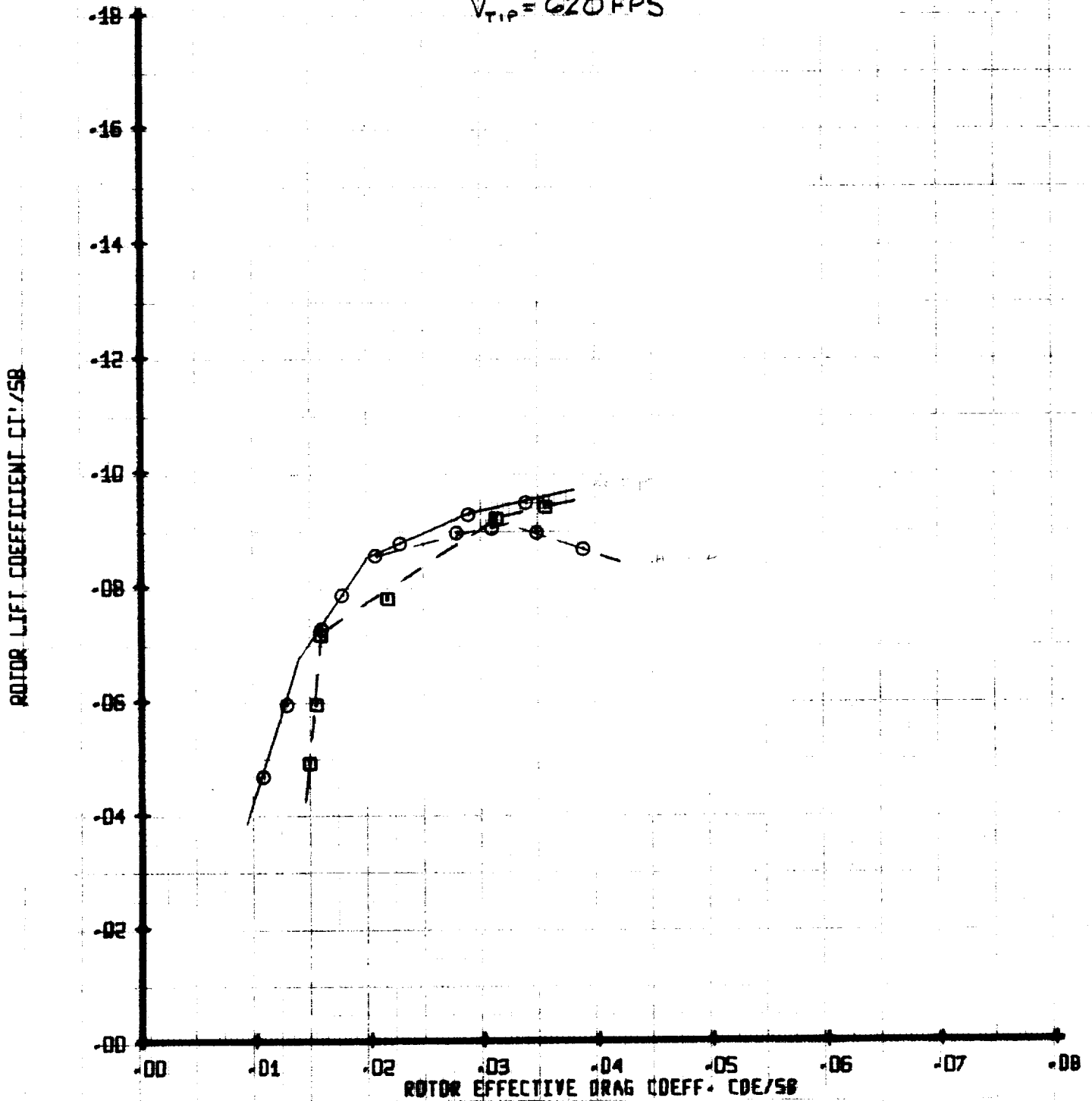


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/00258	VTUN
□	227	.45	.05	279
○	36	.45	.05	279

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT

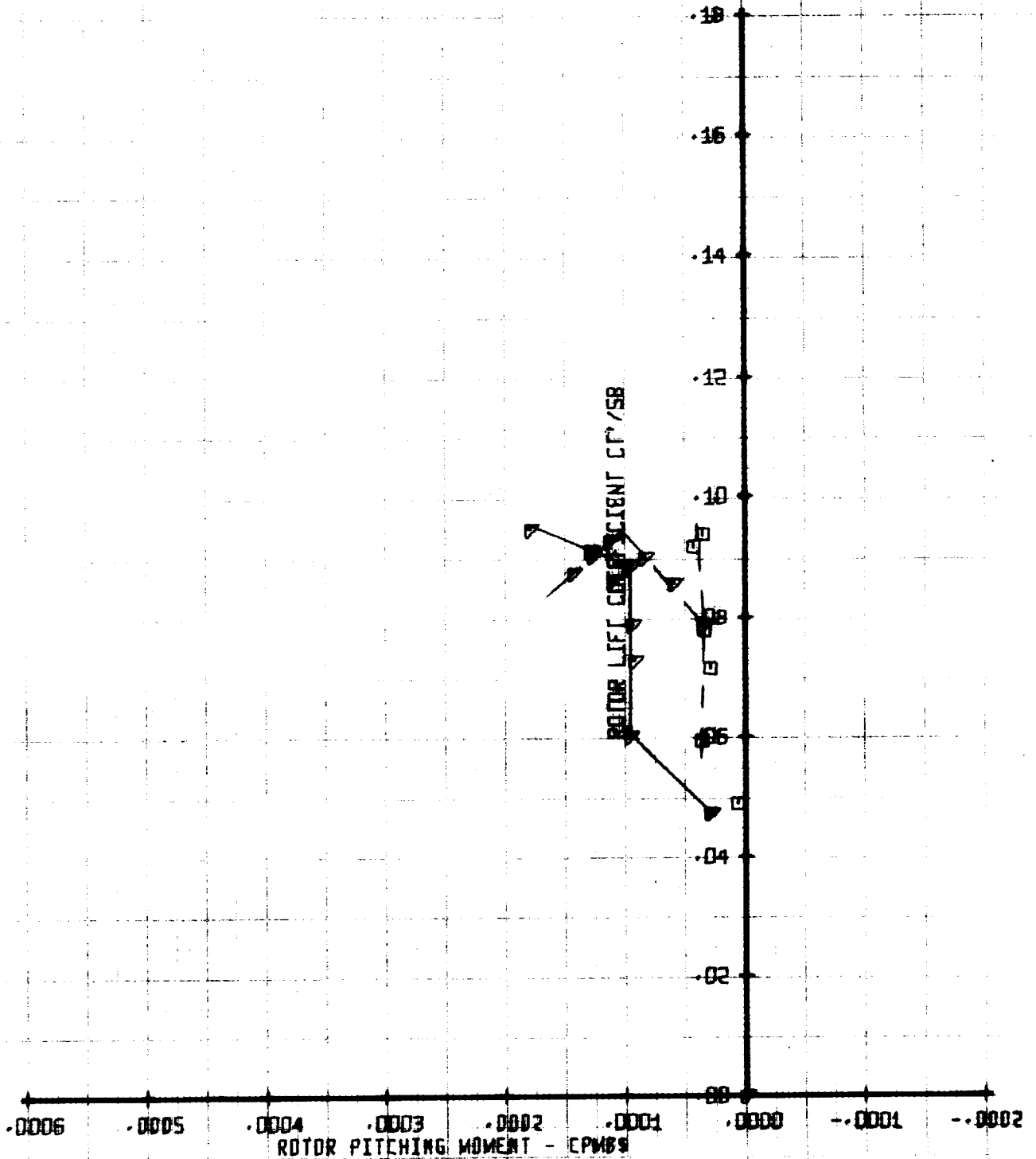
$V_{TIP} = 620 \text{ FPS}$



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/OD258	Y/TUN
□	227	.45	.05	279
▽	36	.45	.05	279

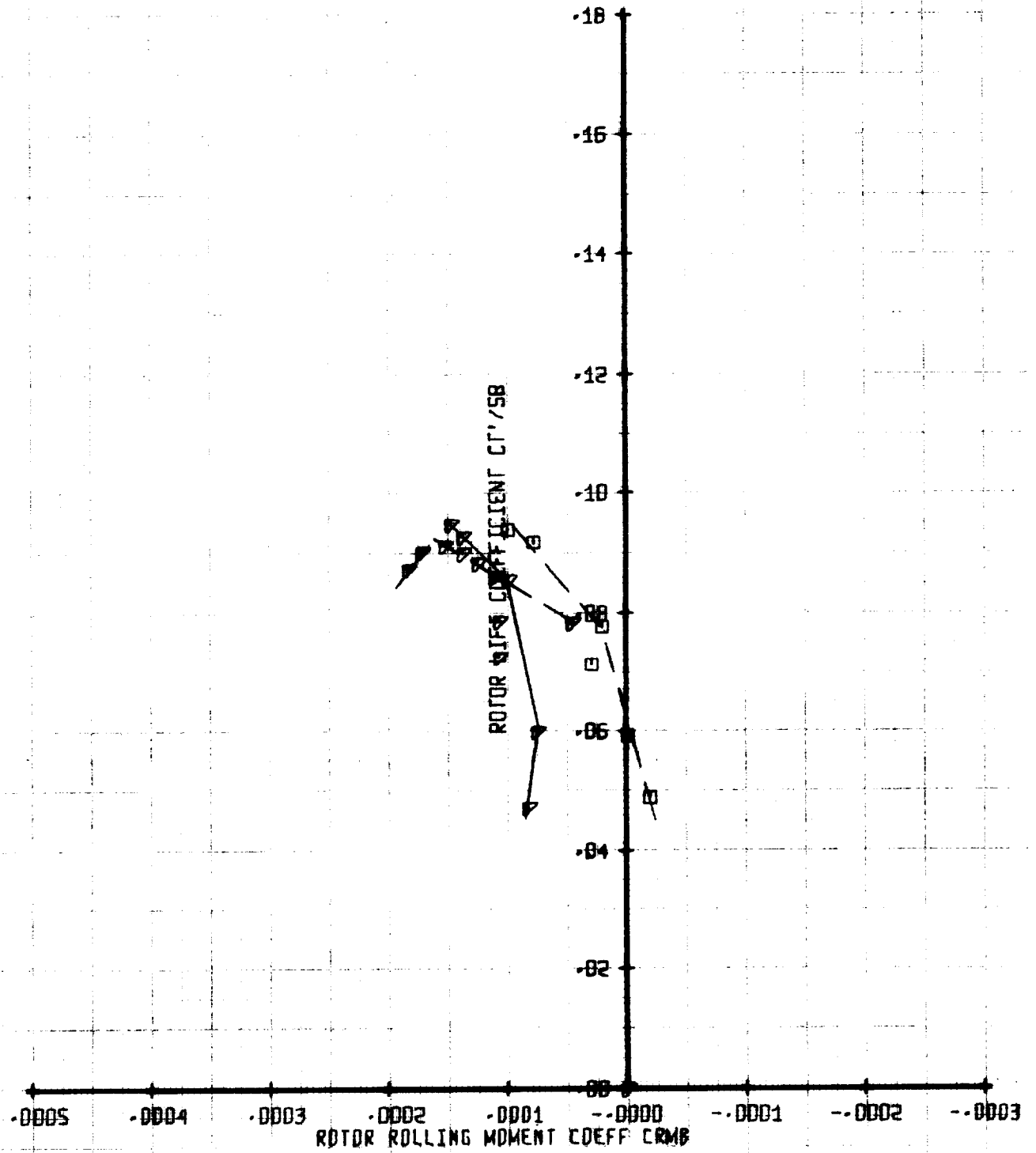
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MU		X/00258		VTUN	
□	227	.45	.05	279	.45	.05	279		
△	36	.45	.05	279					

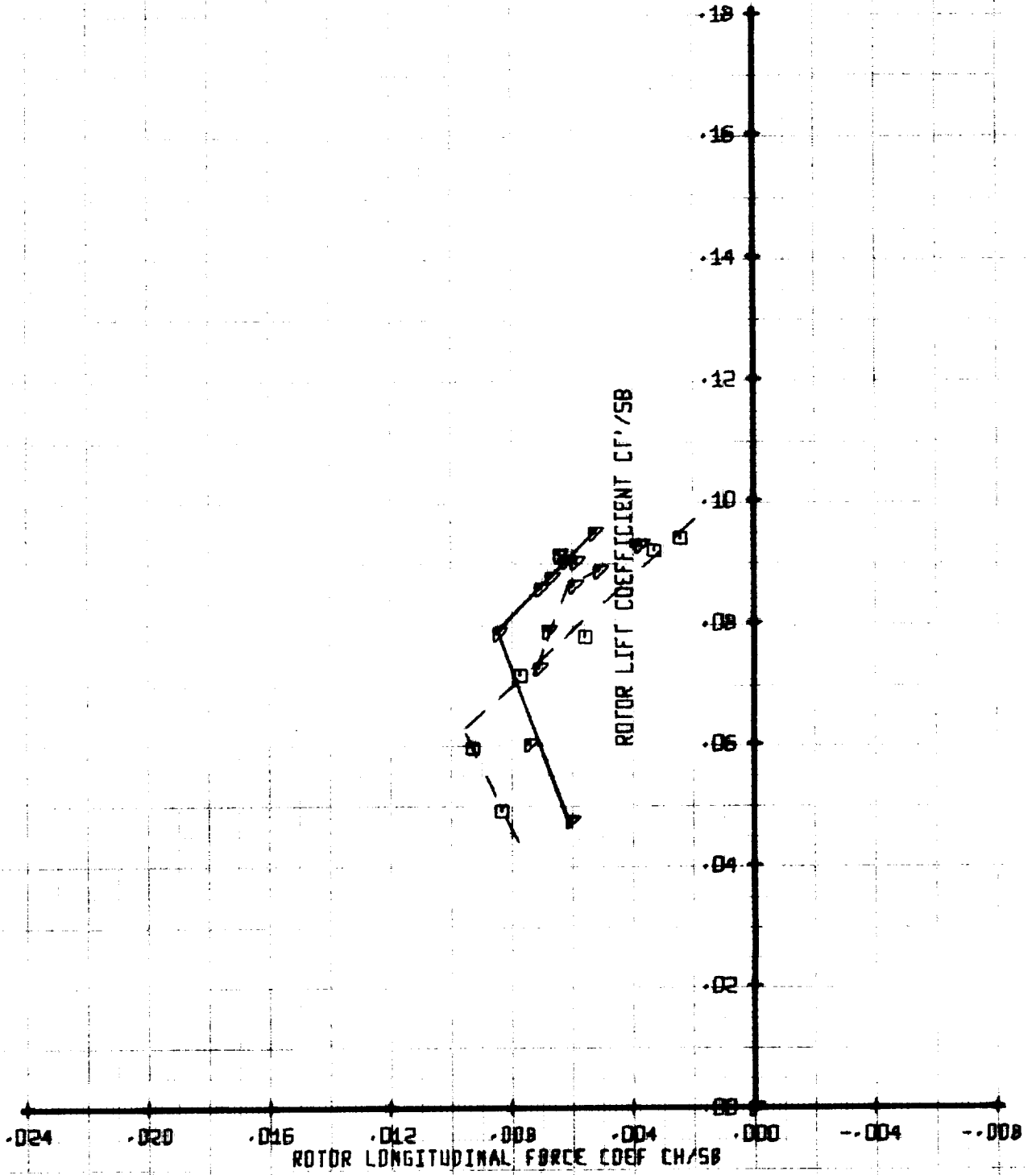
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/OD2SB	Y/TUN
□	227	.45	.05	279
▽	36	.45	.05	279

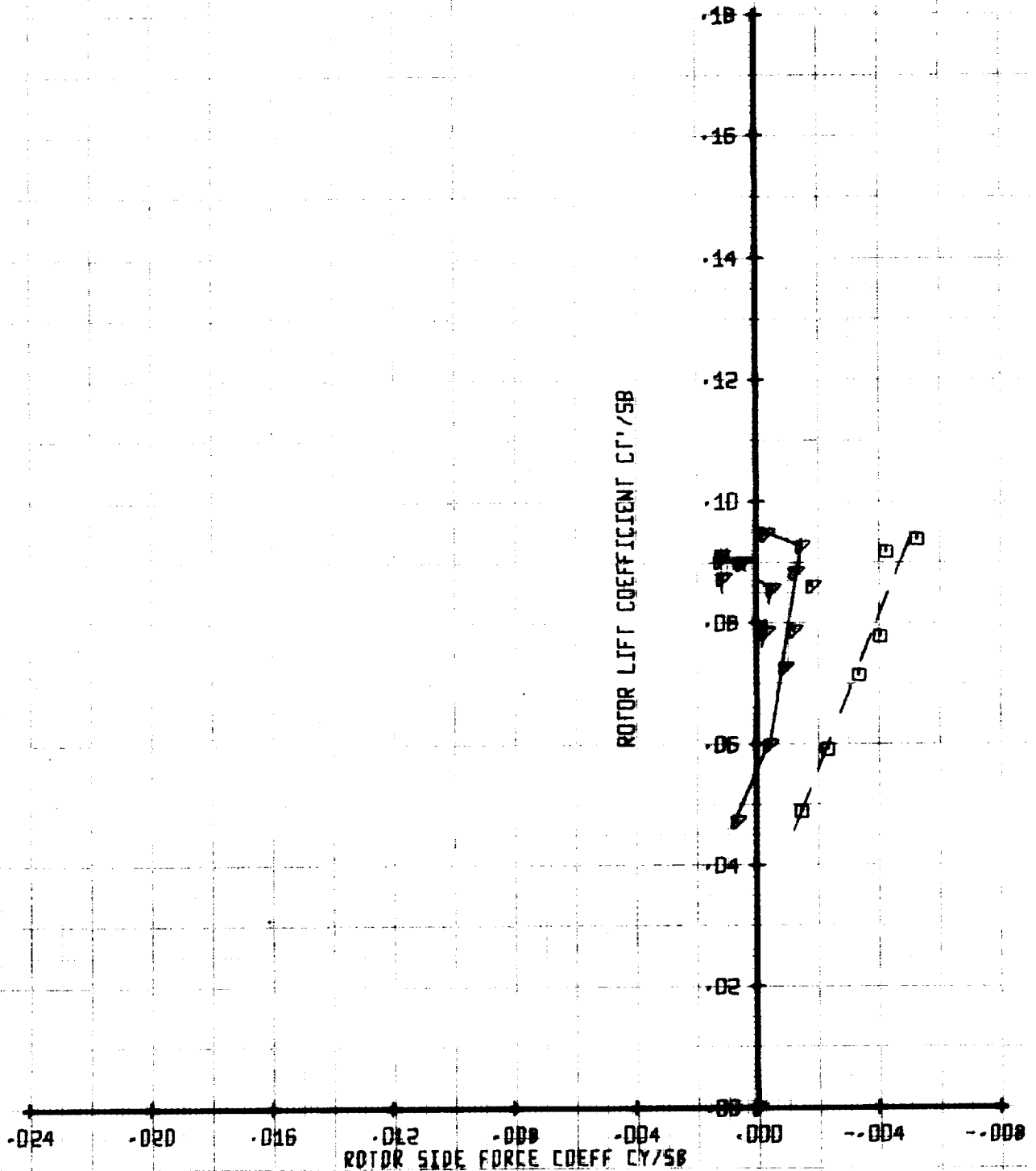
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		ML'	X/00258	VTUN
SYM	RUN	.45	.05	279
□	227	.45	.05	279
○	36			

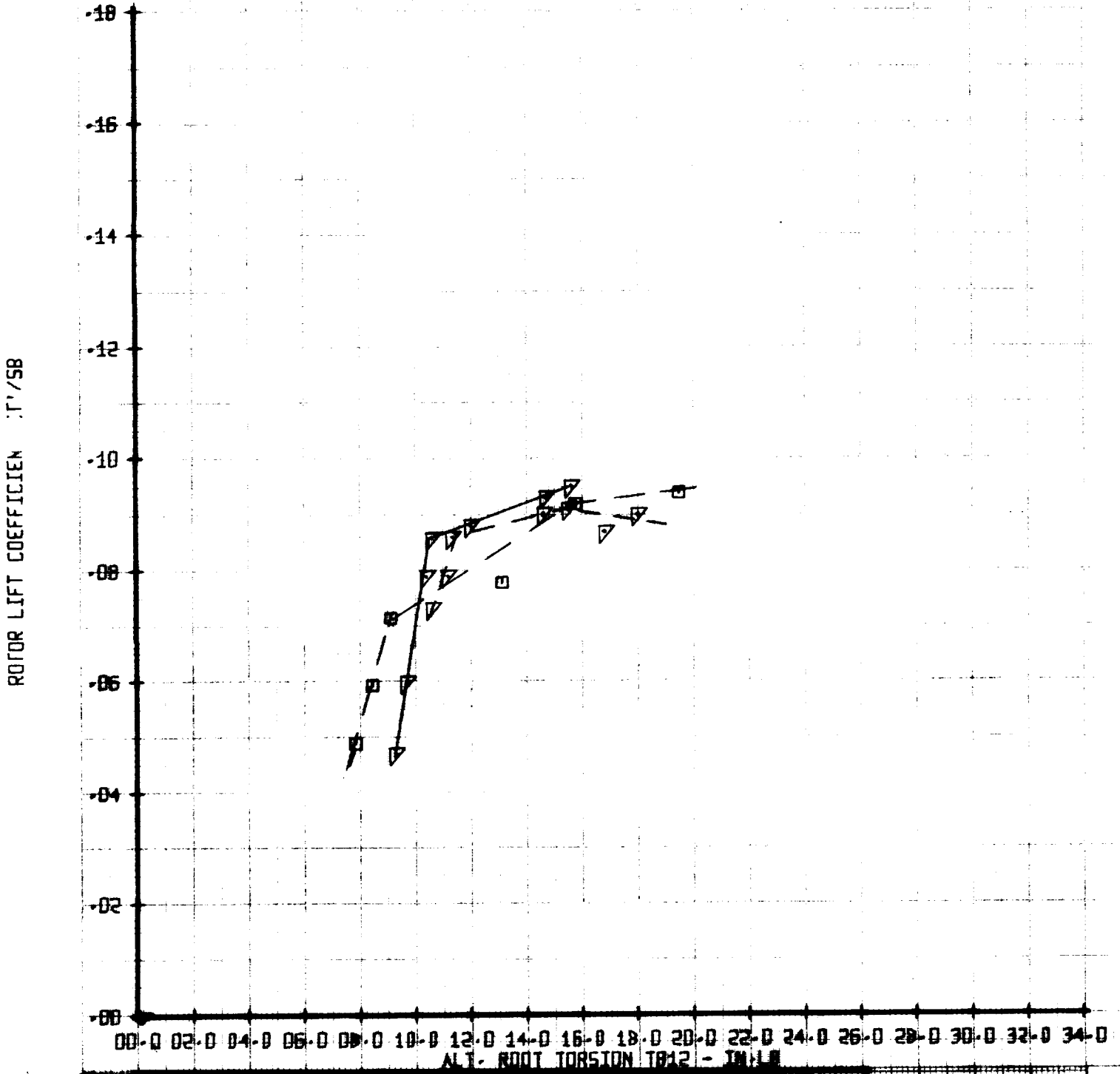
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/00258	VTUN	
□	227	.45	.05	279	
▽	36	.45	.05	279	

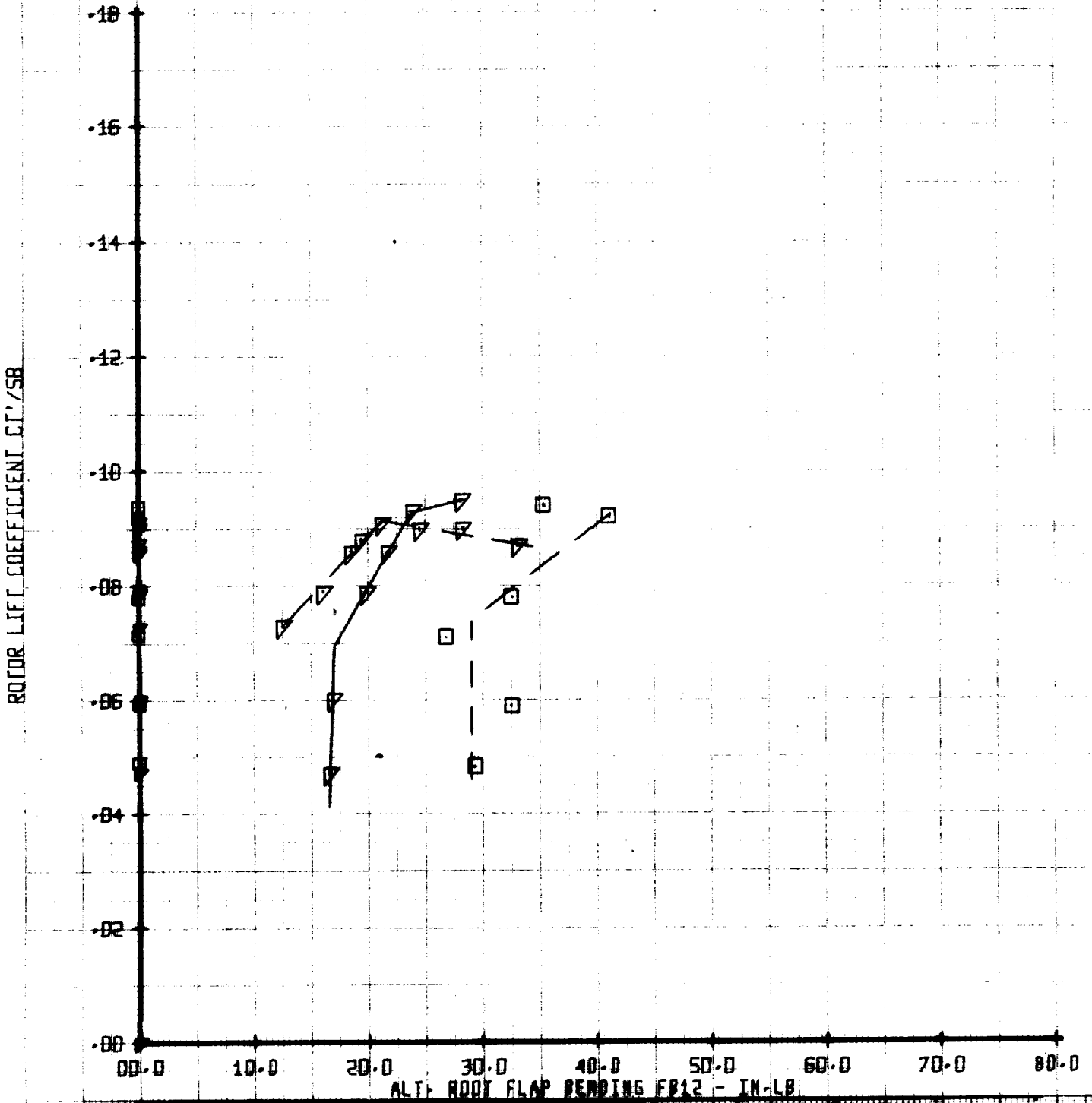
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		LEGEND			
□	RUN 227	MU	X/DD2SB	Y/DLN	279
▽	36	.45	.05	279	
		.45	.05		

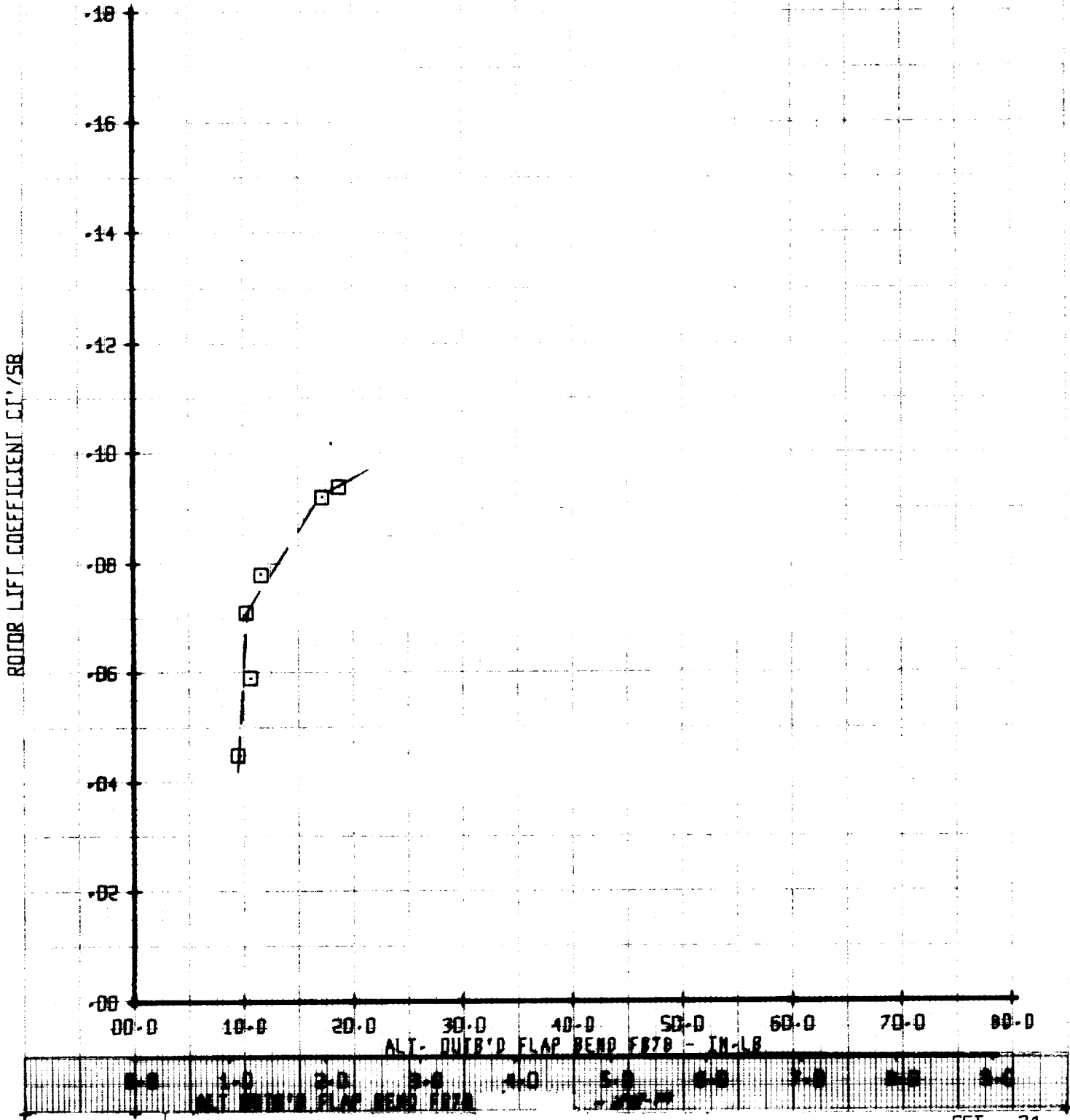
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/OD2SB	YTUN
□	227	.45	.05	279
○	36	.45	.05	279

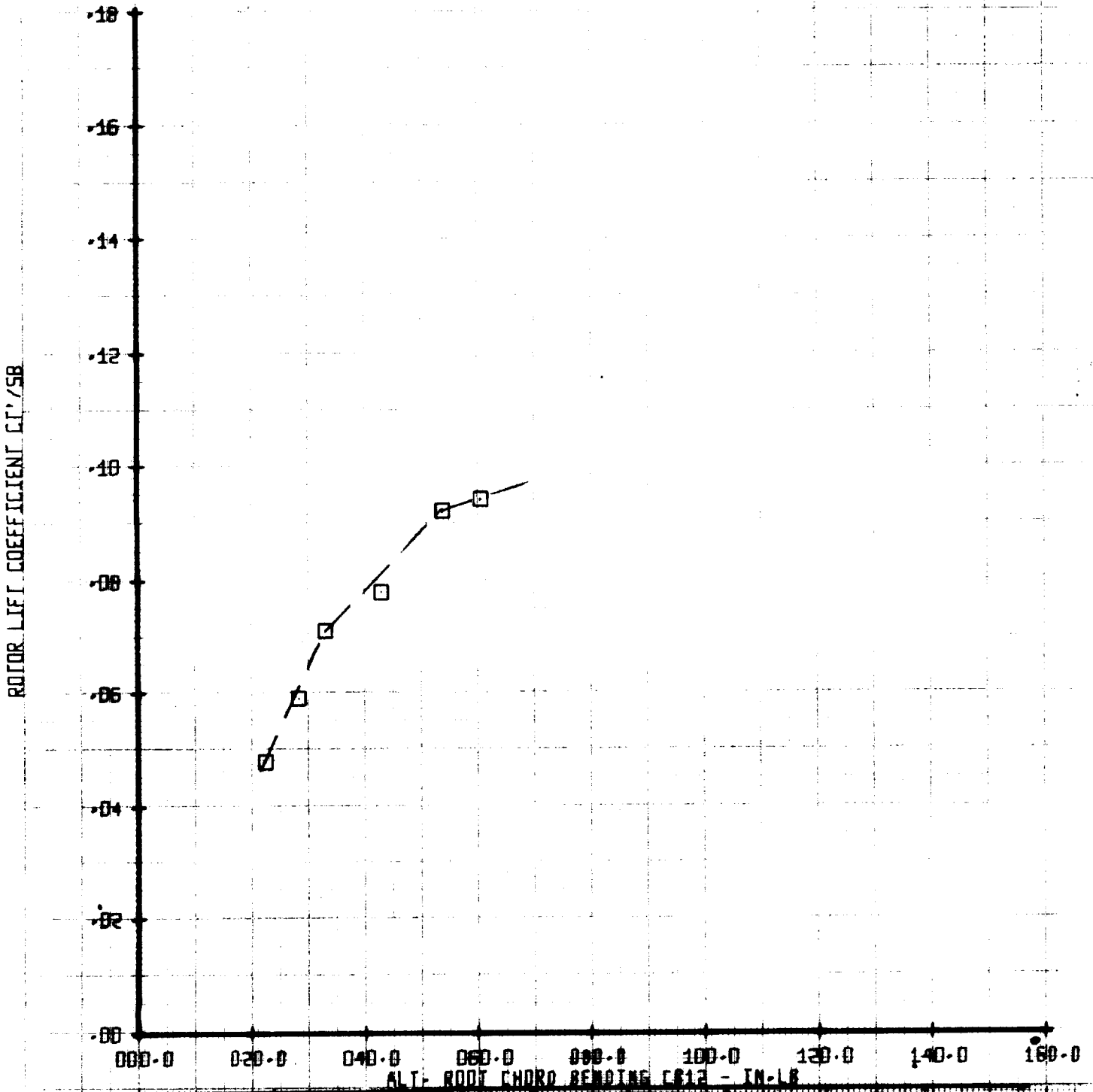
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB78



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/OD258	VTUN
□	227	.45	.05	279
▽	36	.45	.05	279

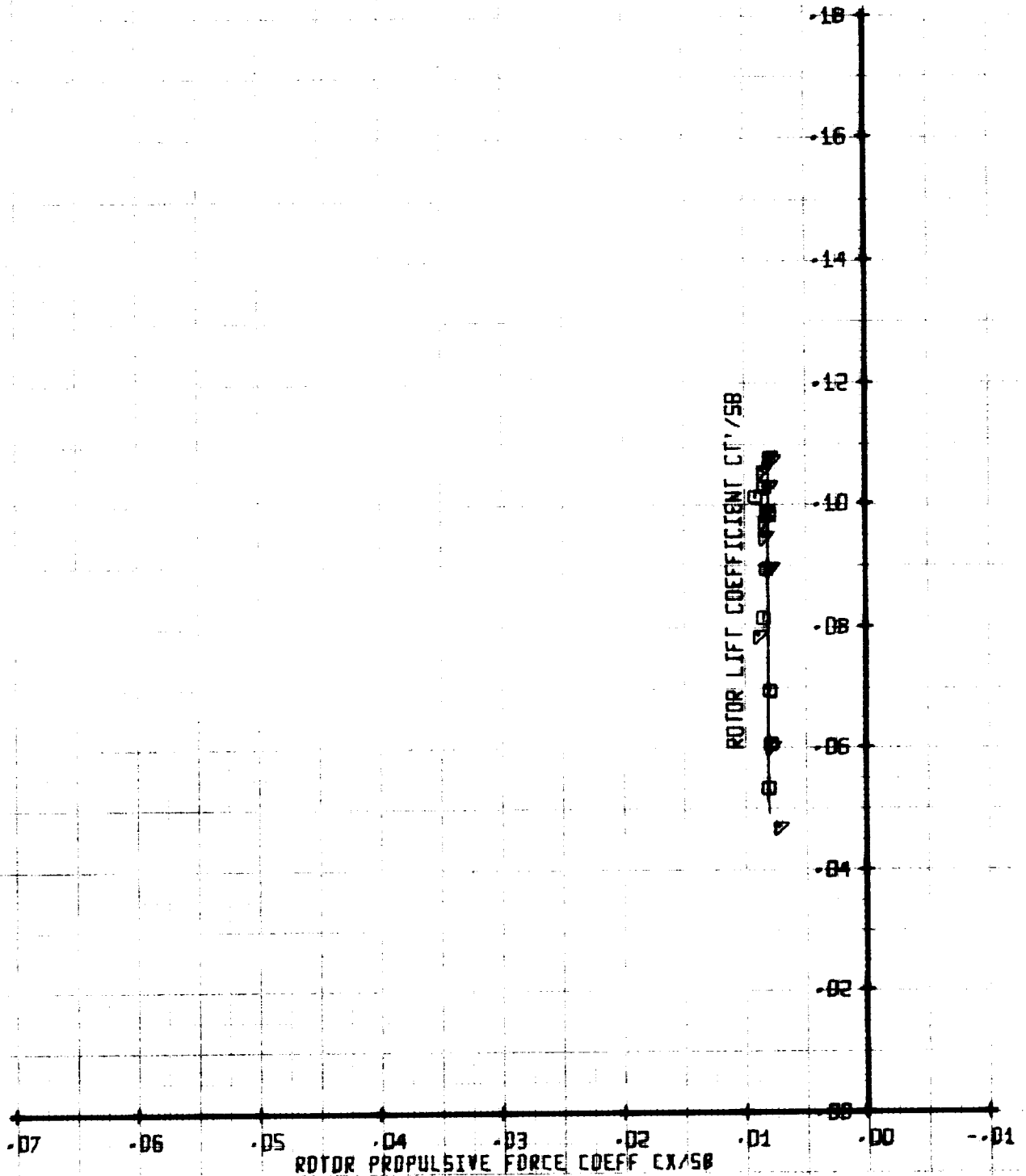
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/00258	VTUN
□	225	.50	.05	31D
▽	39	.50	.05	31D

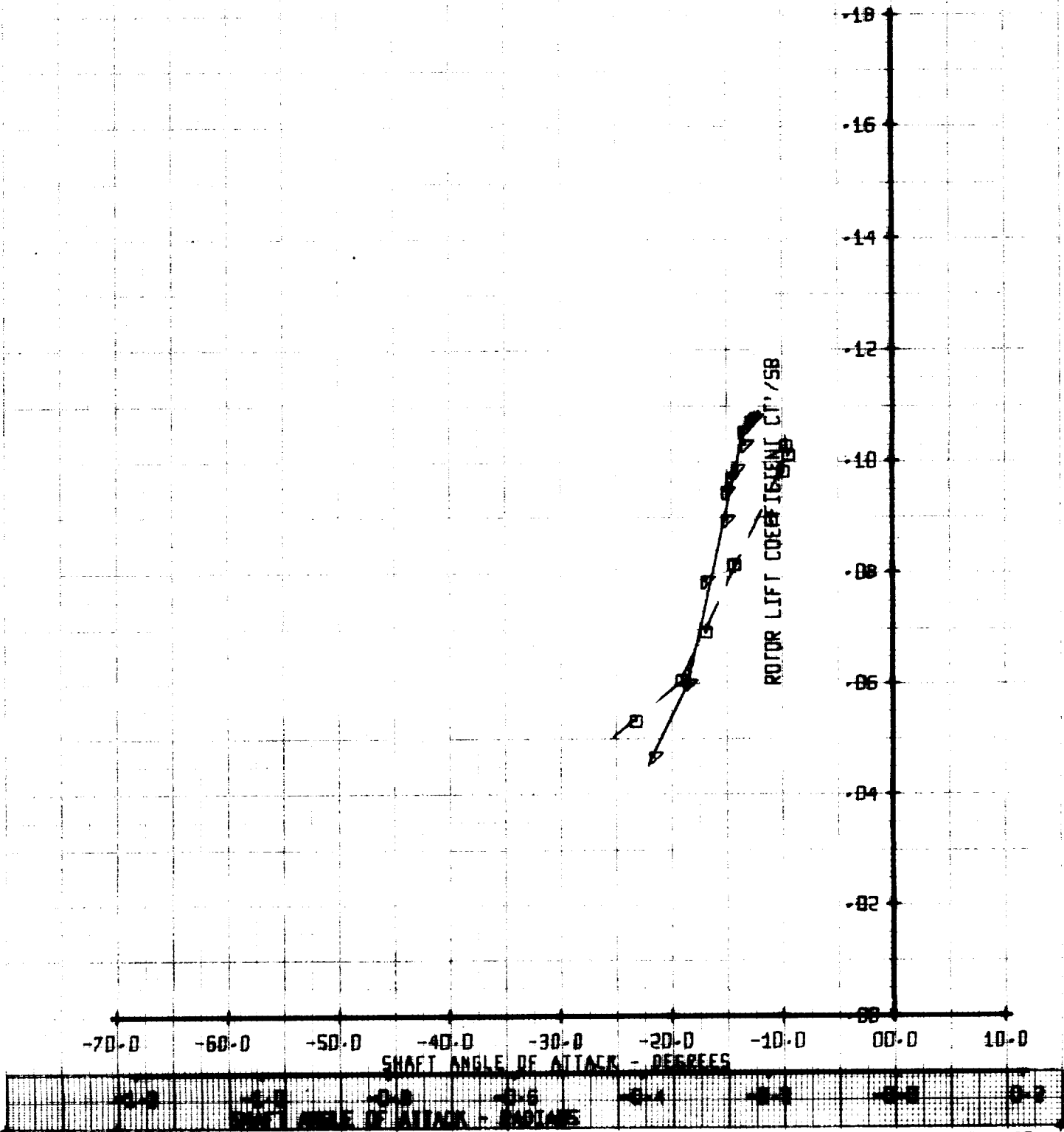
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MI'	X/00258	VTUN
SYM	RUN	.50	.05	310
□	225	.50	.05	310
○	39			

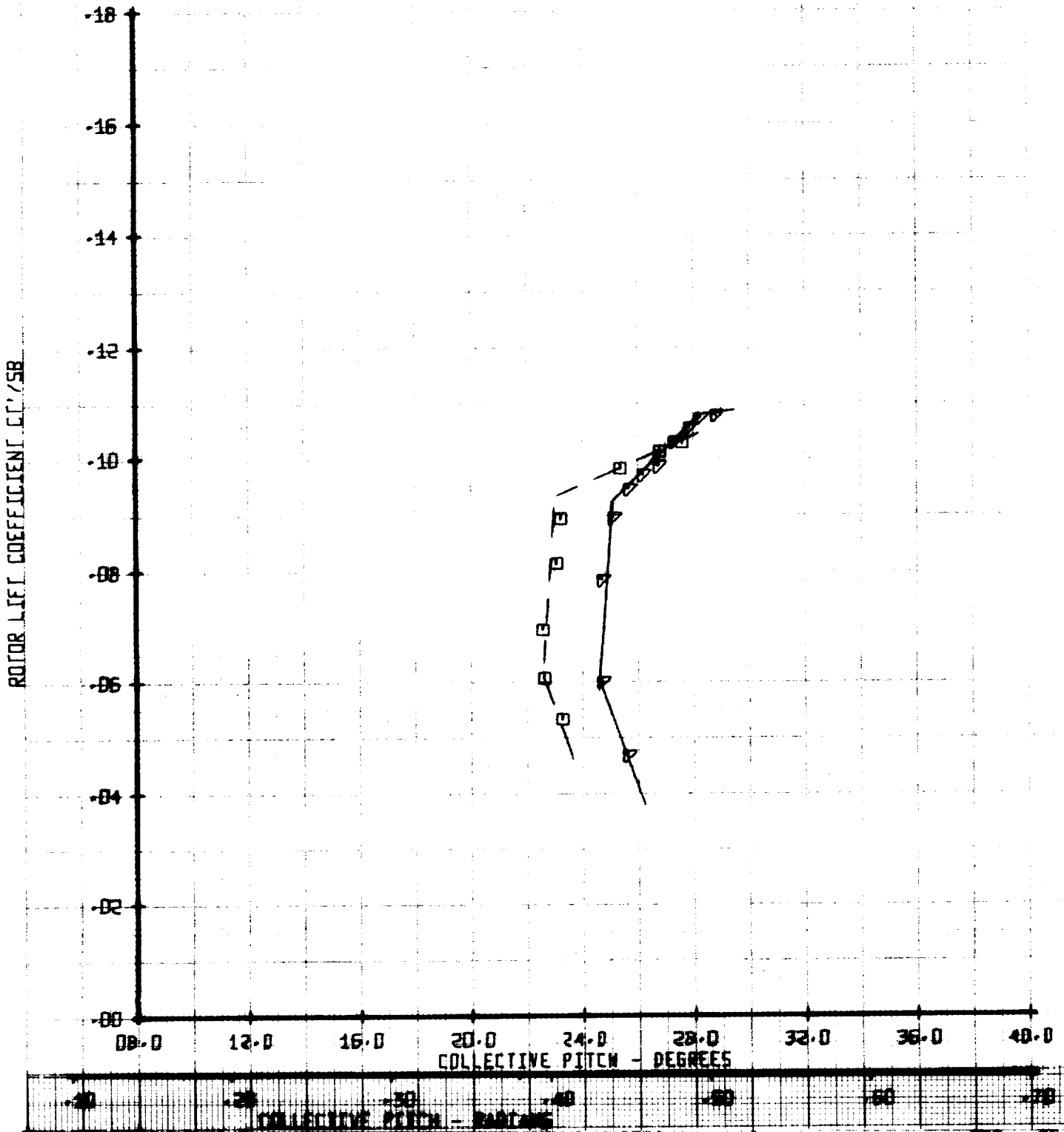
ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/QD2SB	YTUN	
□	225	.50	.05	310	
△	39	.50	.05	310	

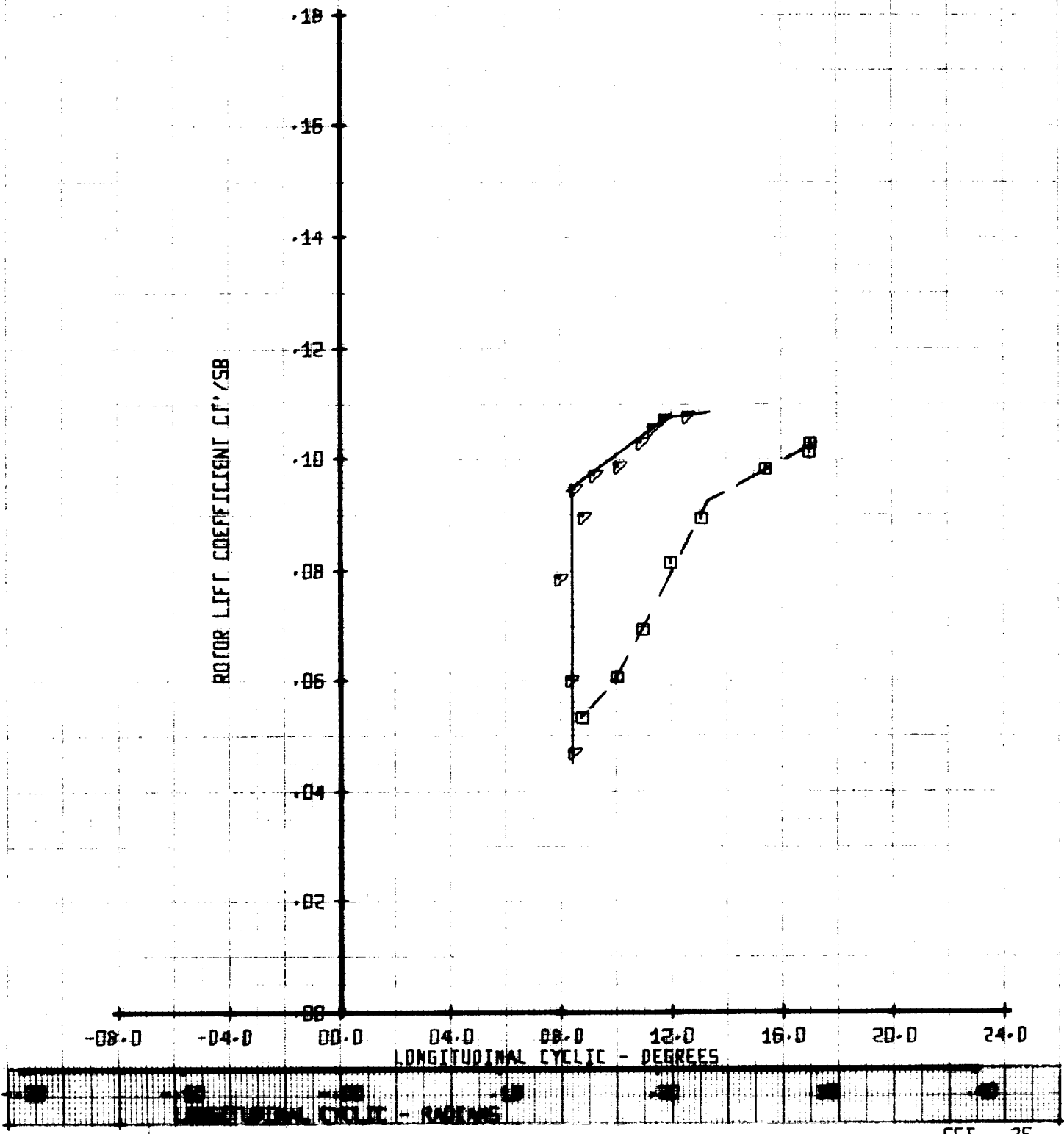
ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU'	X/OD2SB	VTUN
SYM	RUN	.50	.05	310
□	225	.50	.05	310
▽	39	.50	.05	310

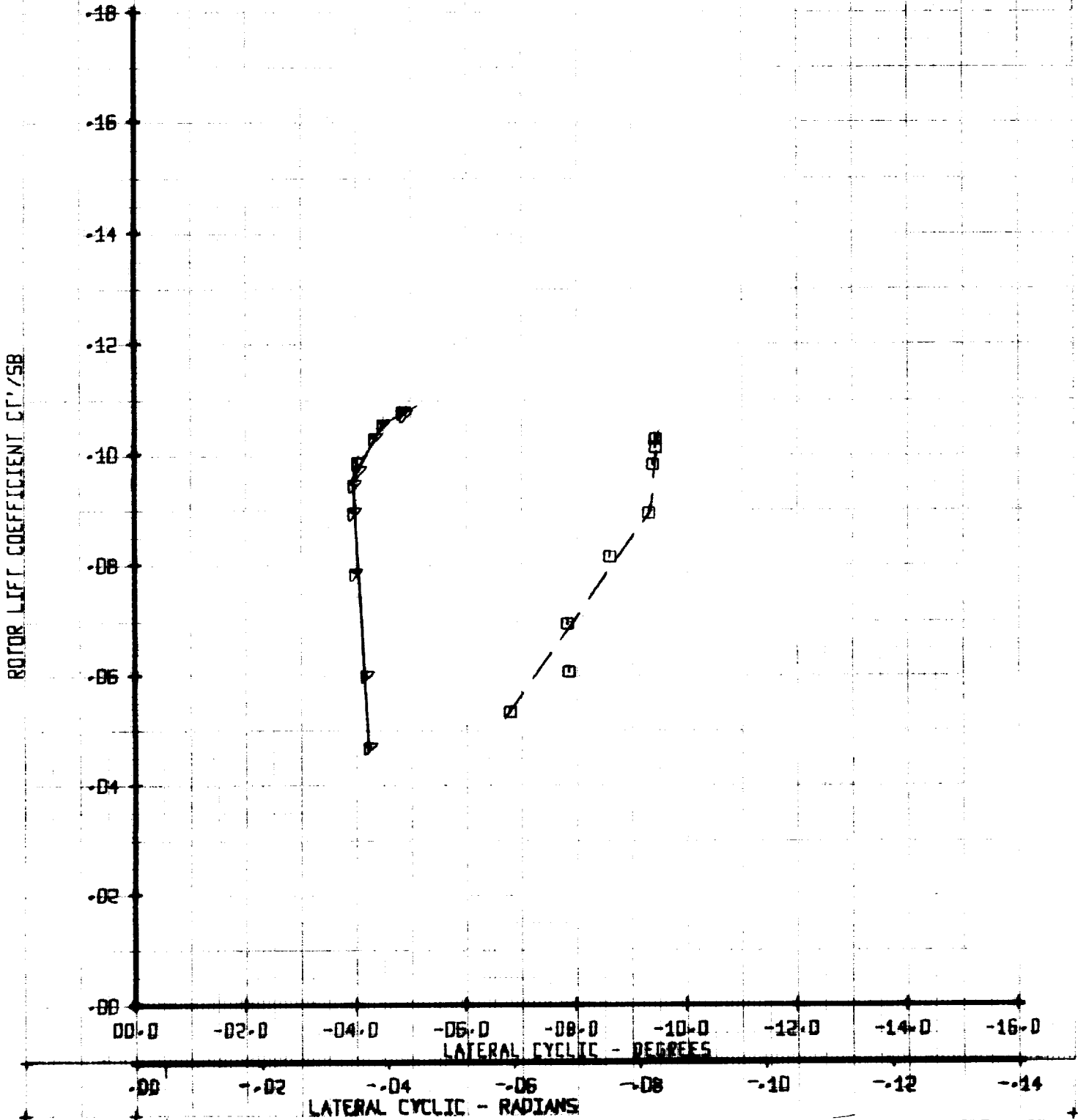
ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN	MU'	X/00258	VTUN
□	▽	225	.50	.05	310
		39	.50	.05	310

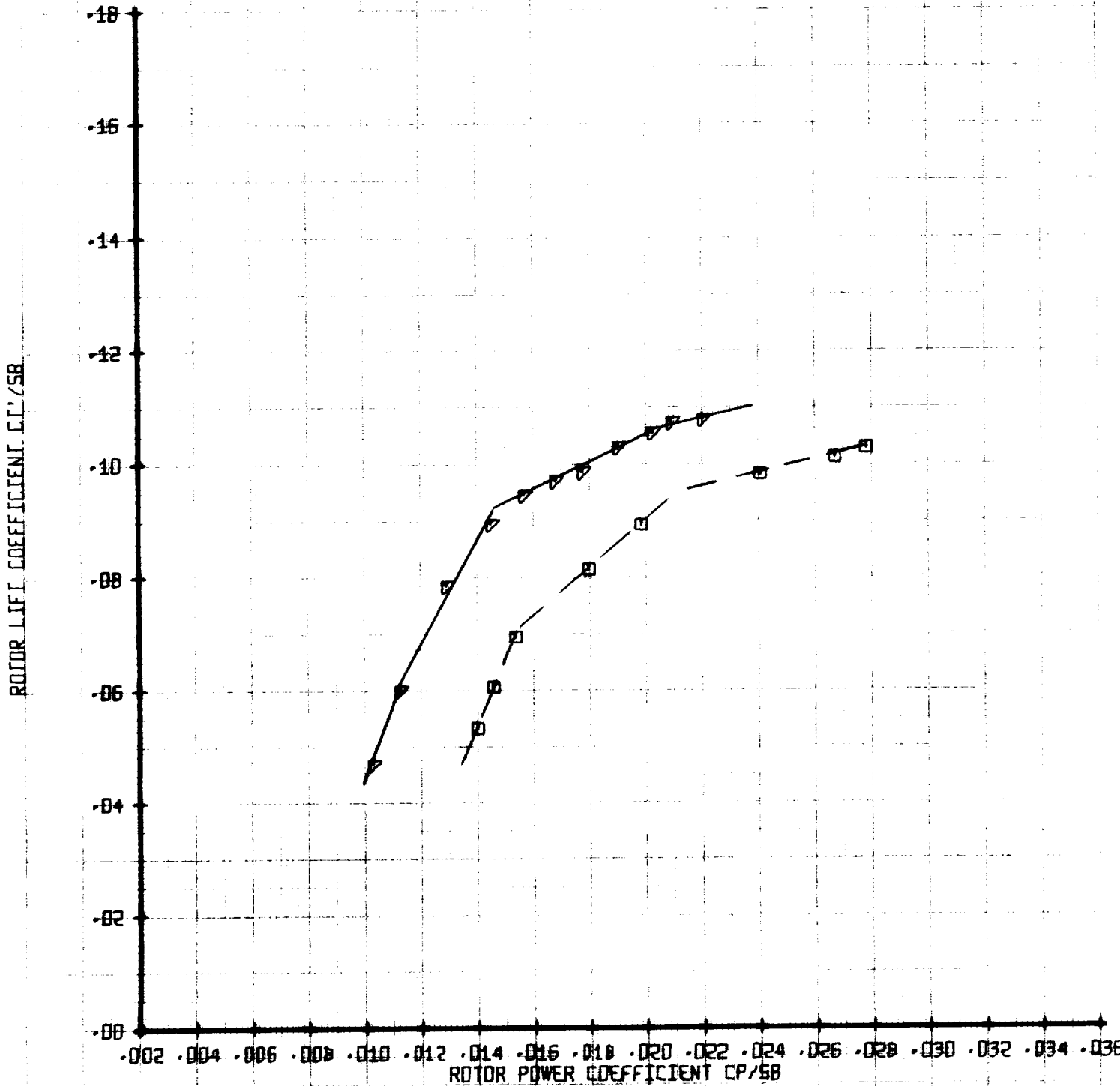
ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	Y/TUN
0	225	.50	.05	310
7	39	.50	.05	310

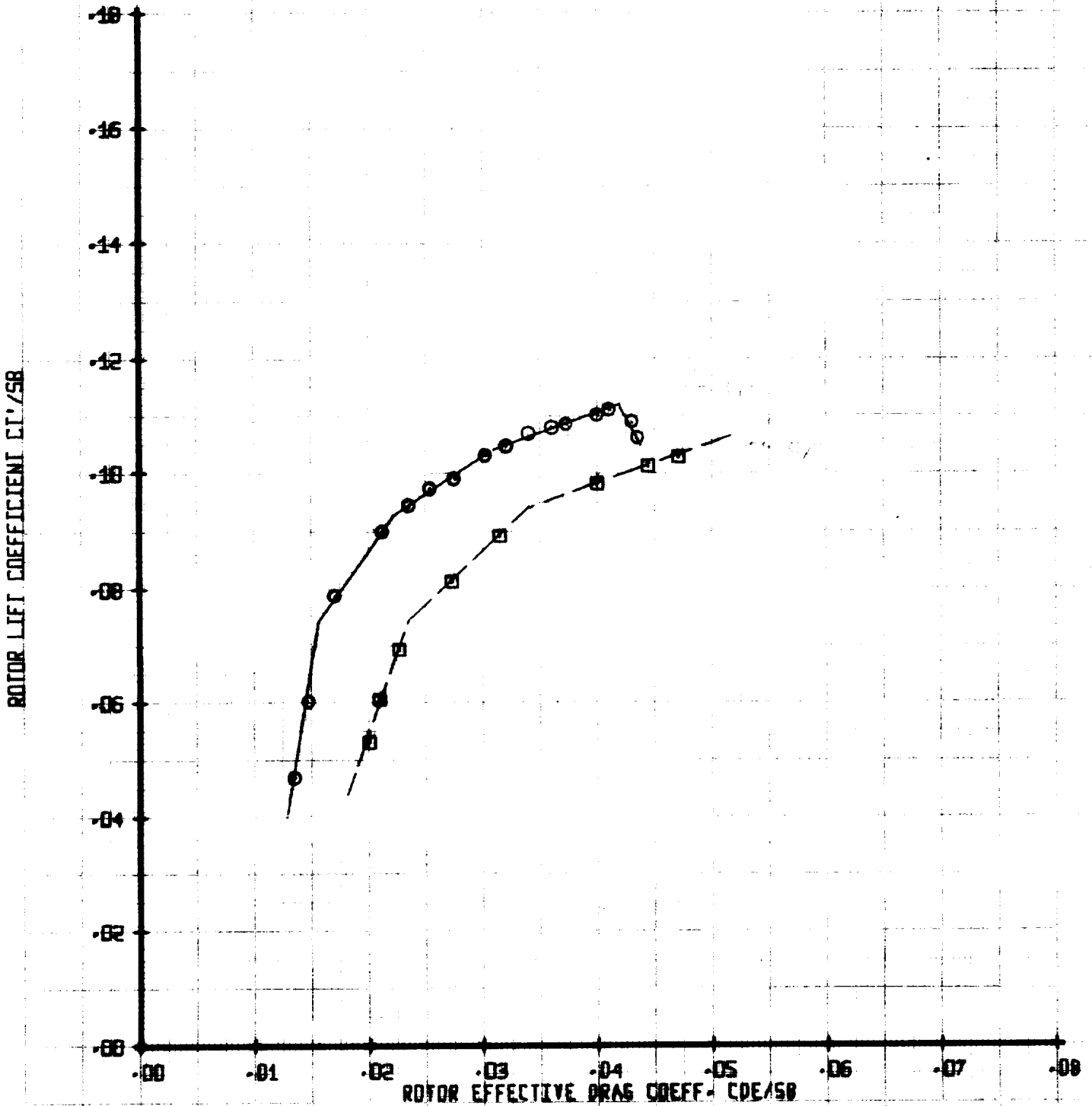
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/DD2SB	YTUN
○	225	.50	.05	310
○	39	.50	.05	310

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT

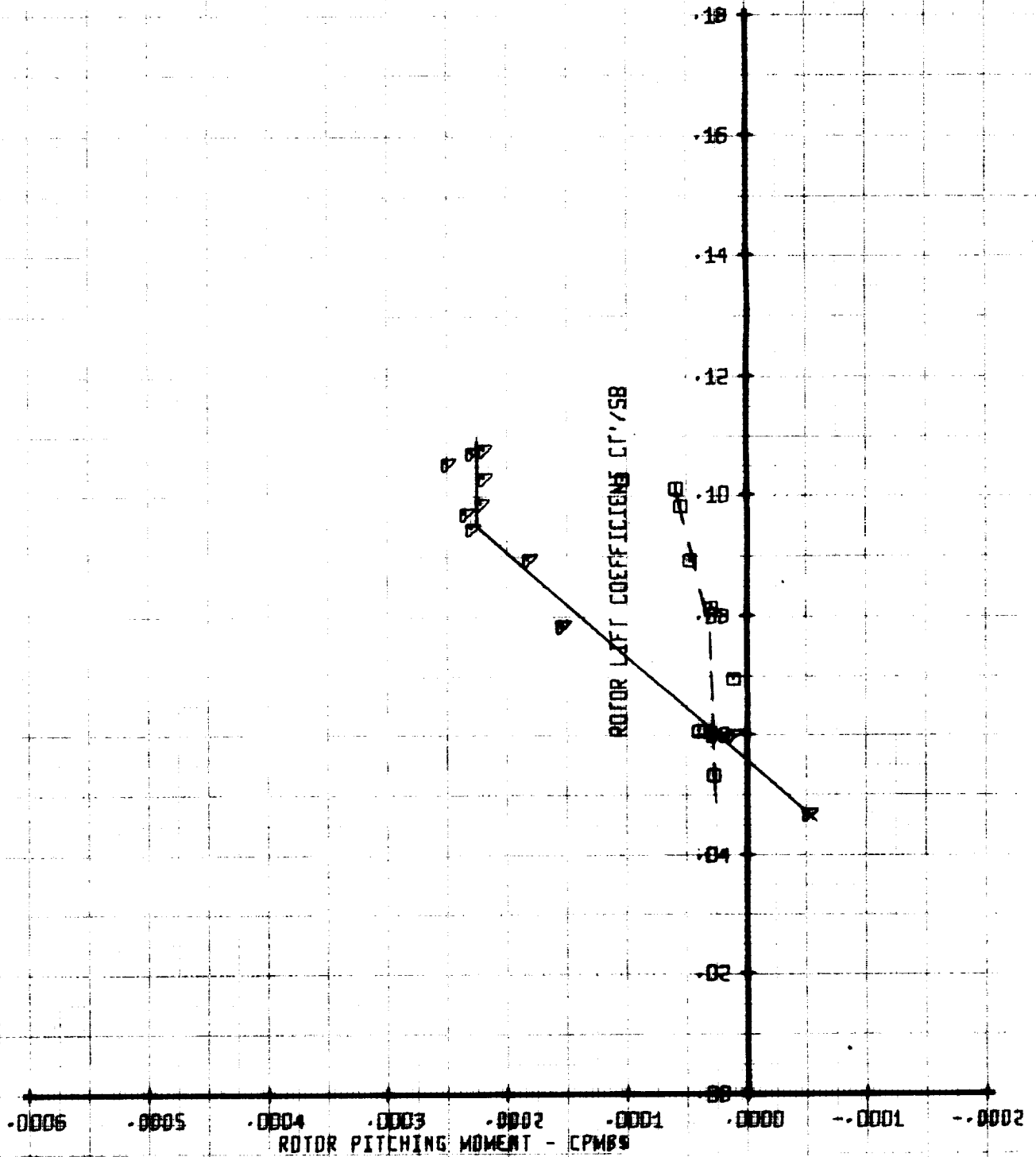


LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/00258	VTUN
□	225	.50	.05	310
△	39	.50	.05	310

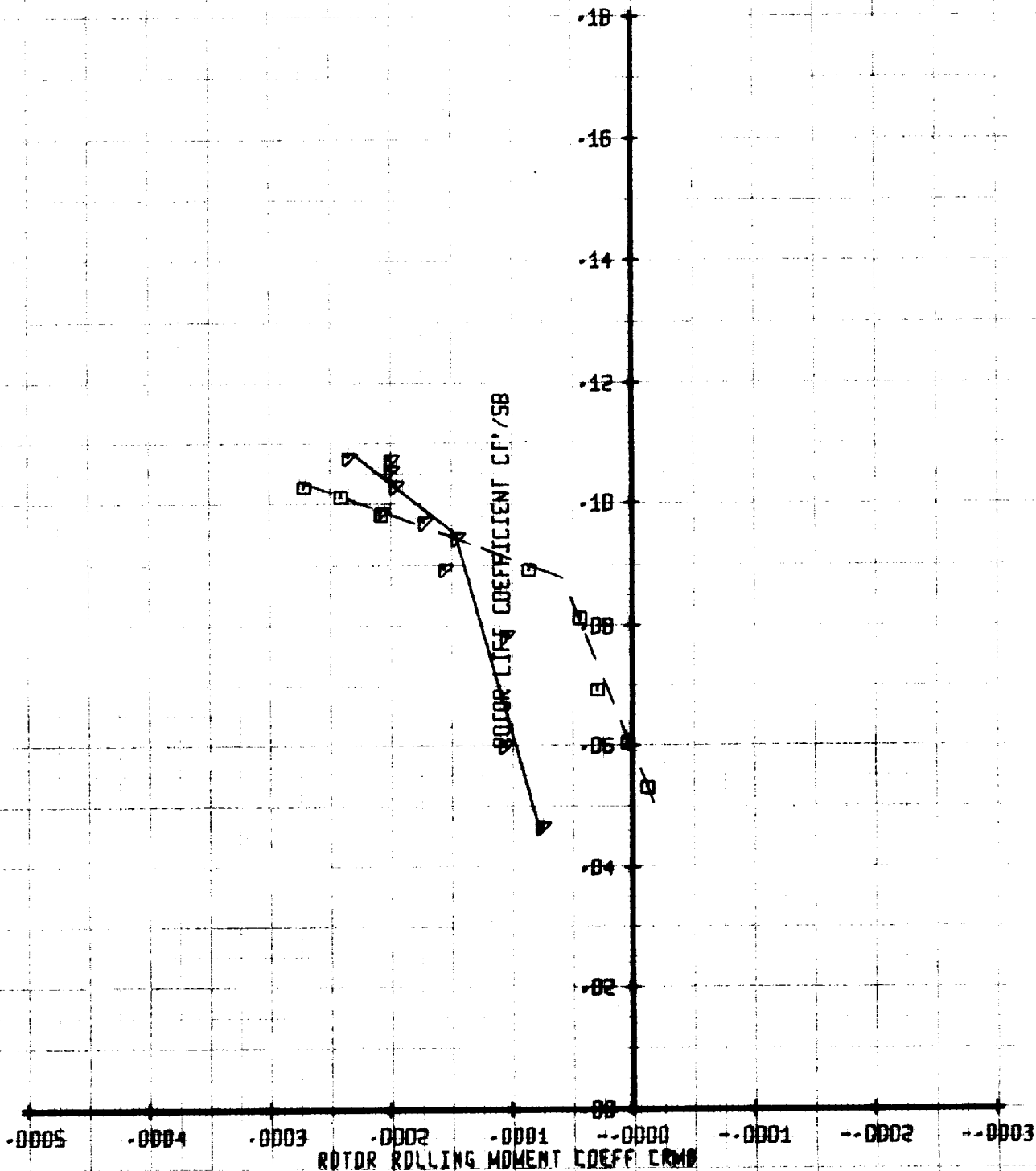
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	ML'	X/00258	VTUN
□	225	.50	.05	310
△	39	.50	.05	310

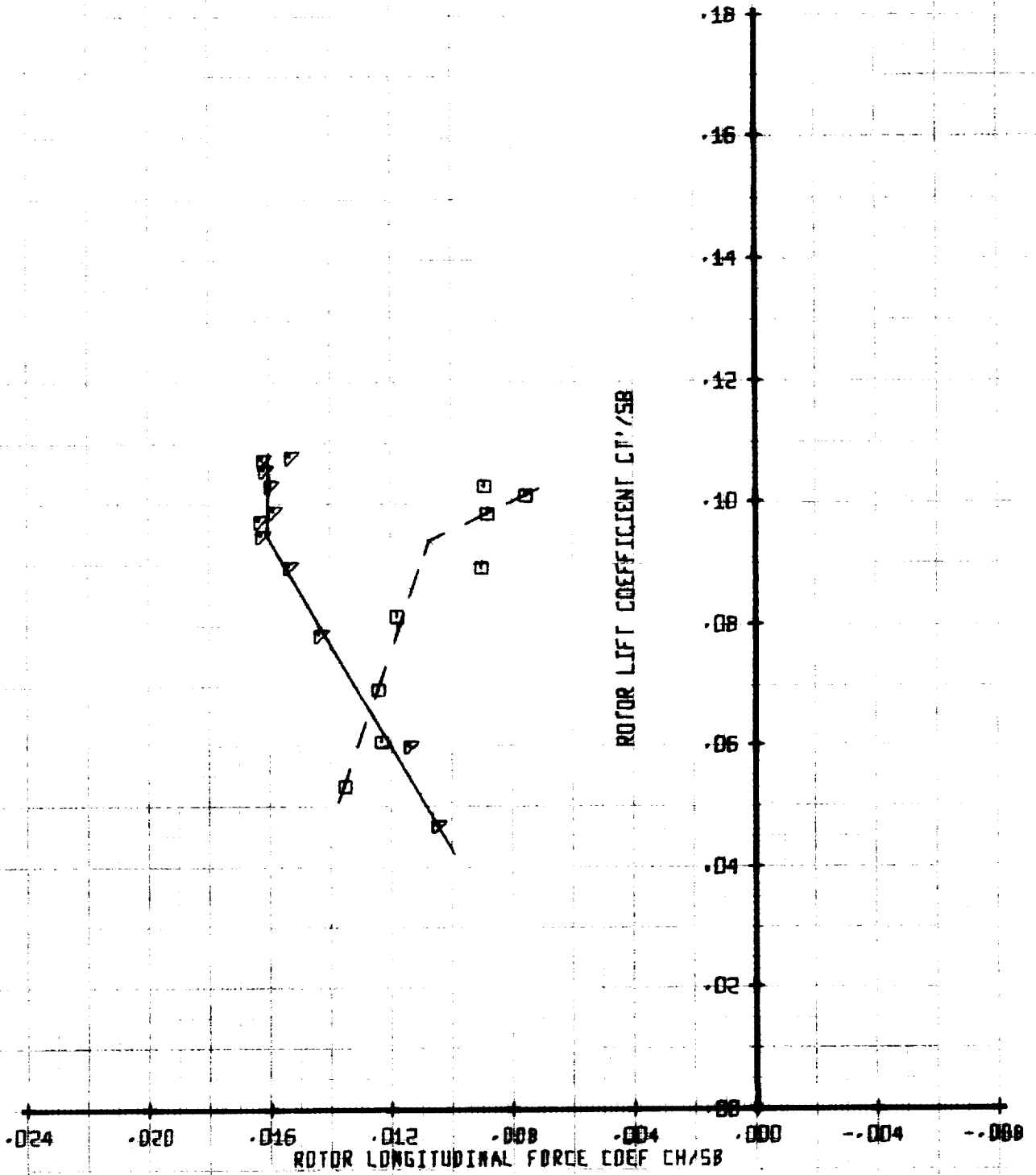
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU'	X/OD2SB	VTUN
□	RUN	.50	.05	310
△	225	.50	.05	310
▽	39			

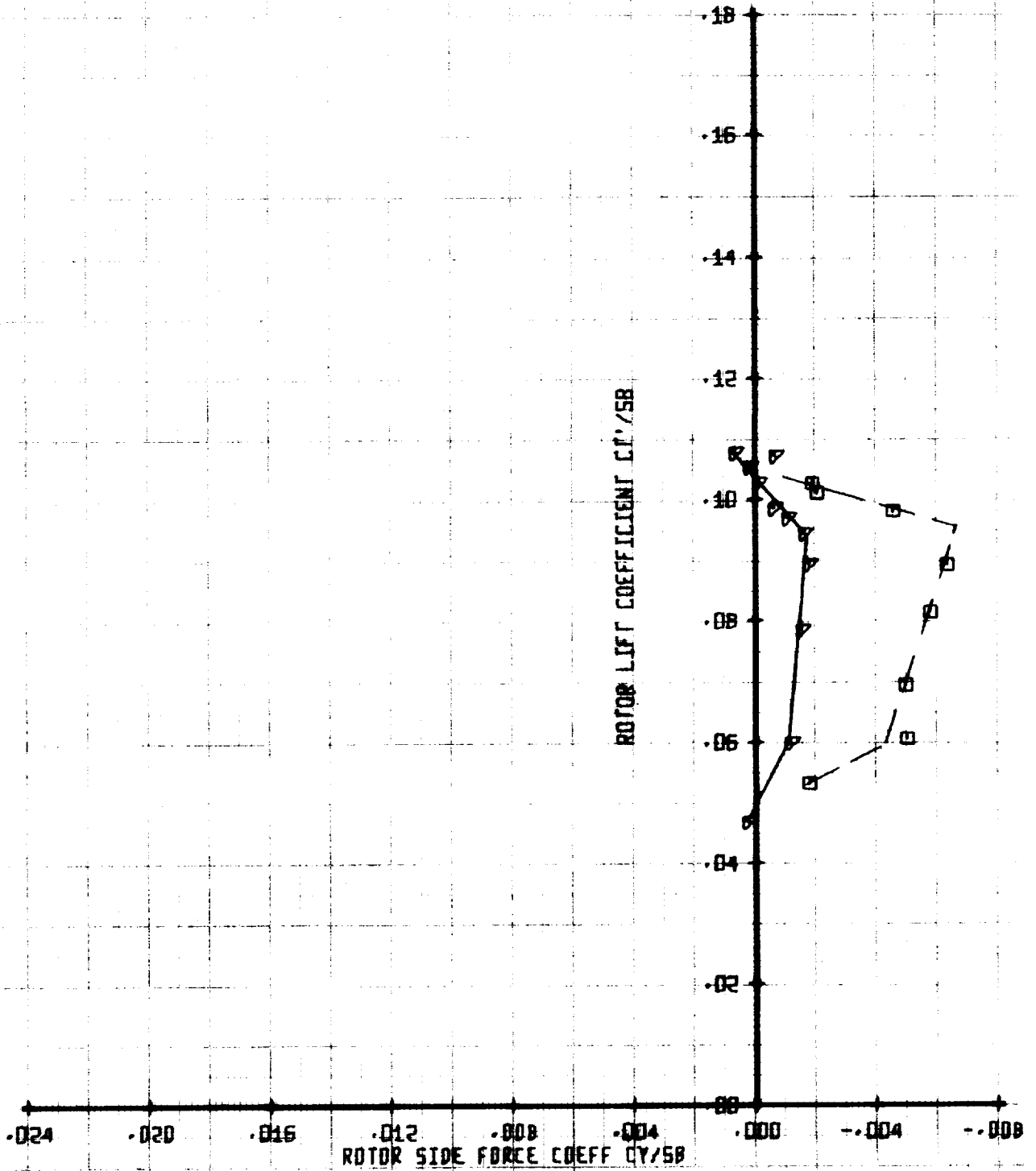
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU	Y/00258	VTUN
□	225	.50	.05	310
△	39	.50	.05	310

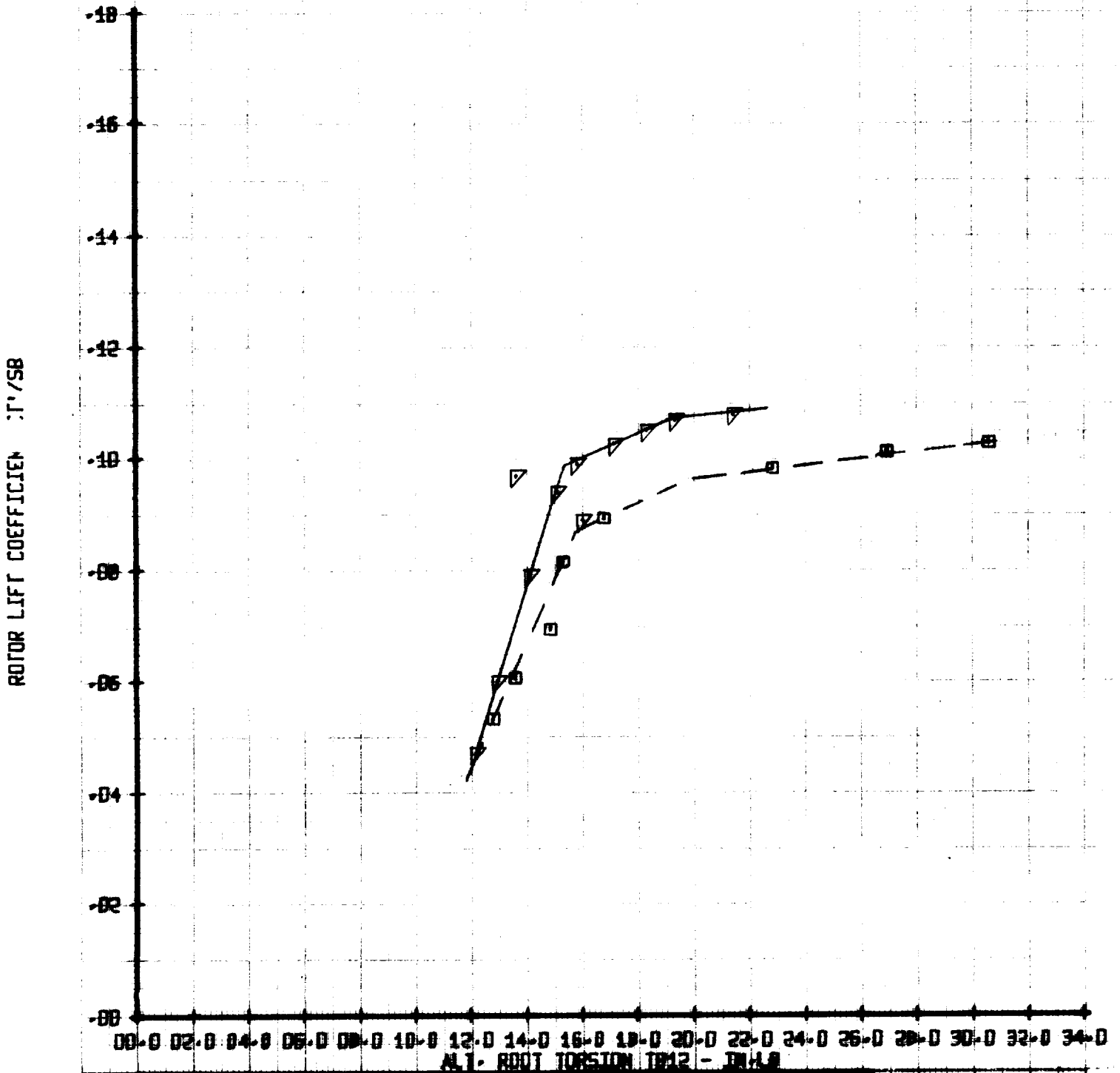
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CM-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MI'	X/00258	VTUN
SYM	RUN	.50	.05	310
0	225	.50	.05	310
7	39			

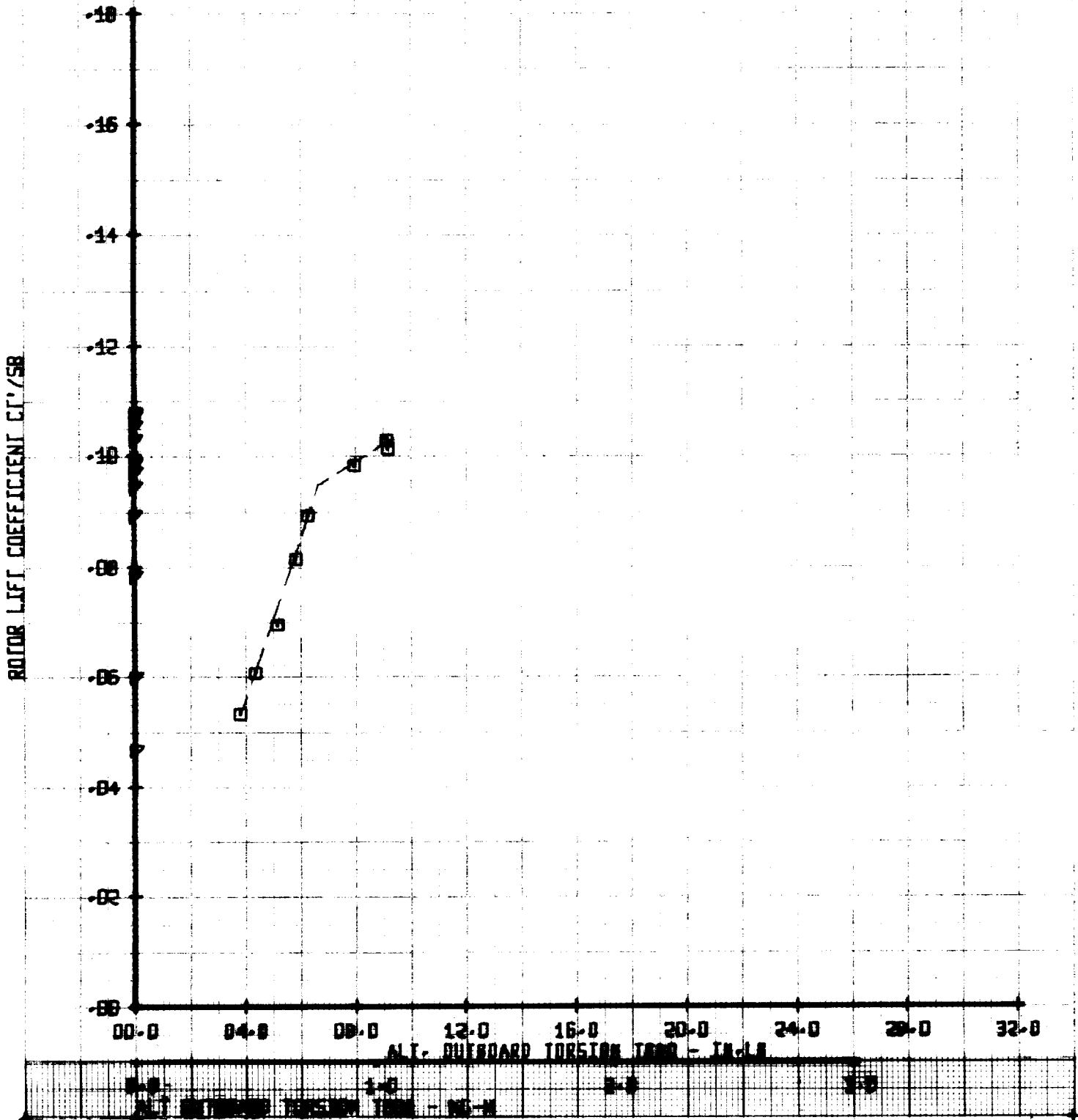
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUM		MIL		X/00258		YTUM	
0	7	225	39	.50	.50	.05	.05	310	310

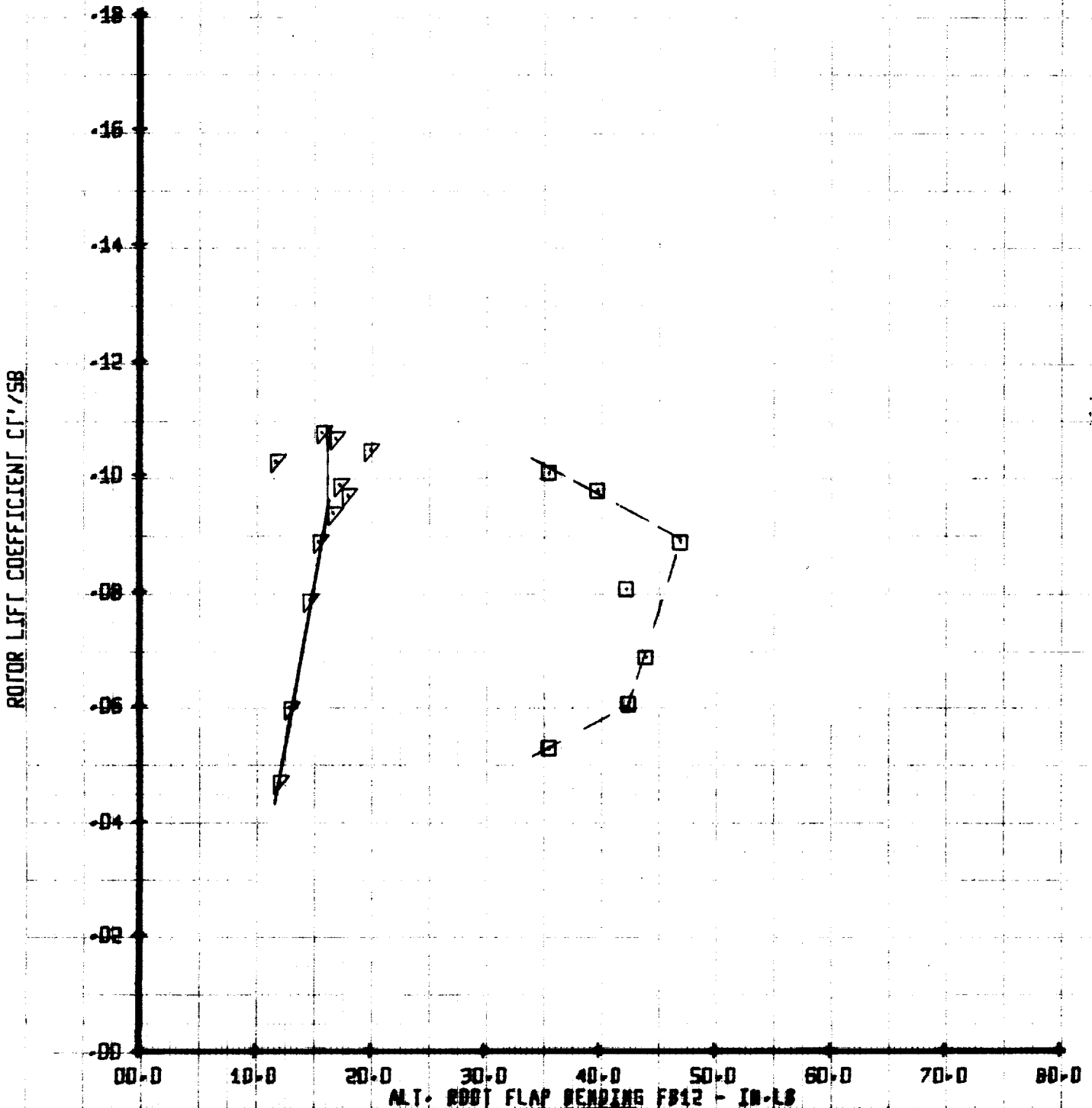
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB80



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MU'		X/002SB		VTUN	
□	▲	225	39	.50	.50	.05	.05	310	310

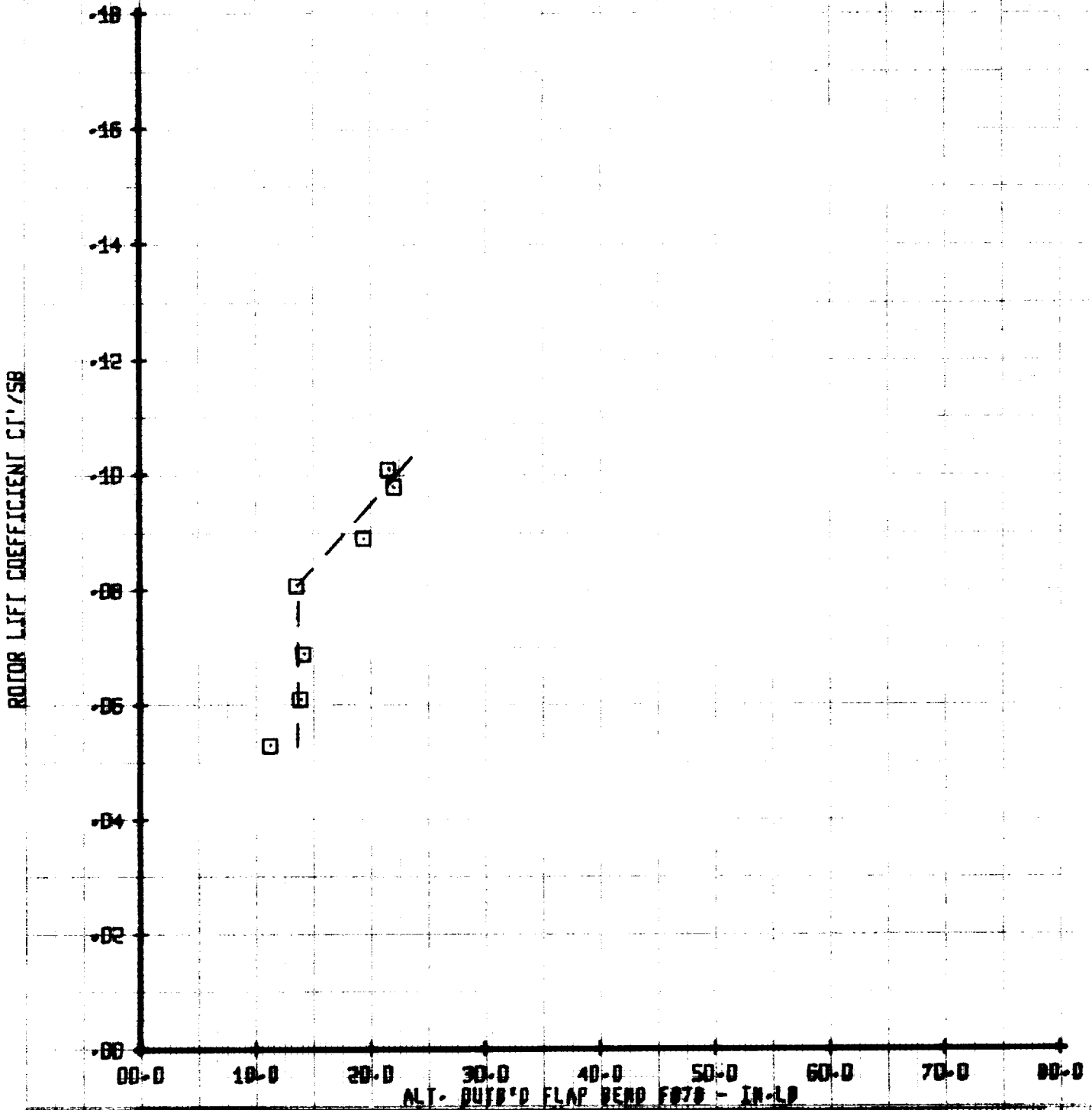
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MI	X/00258	Y/TUN
□	225	.50	.05	31D
▽	39	.50	.05	31D

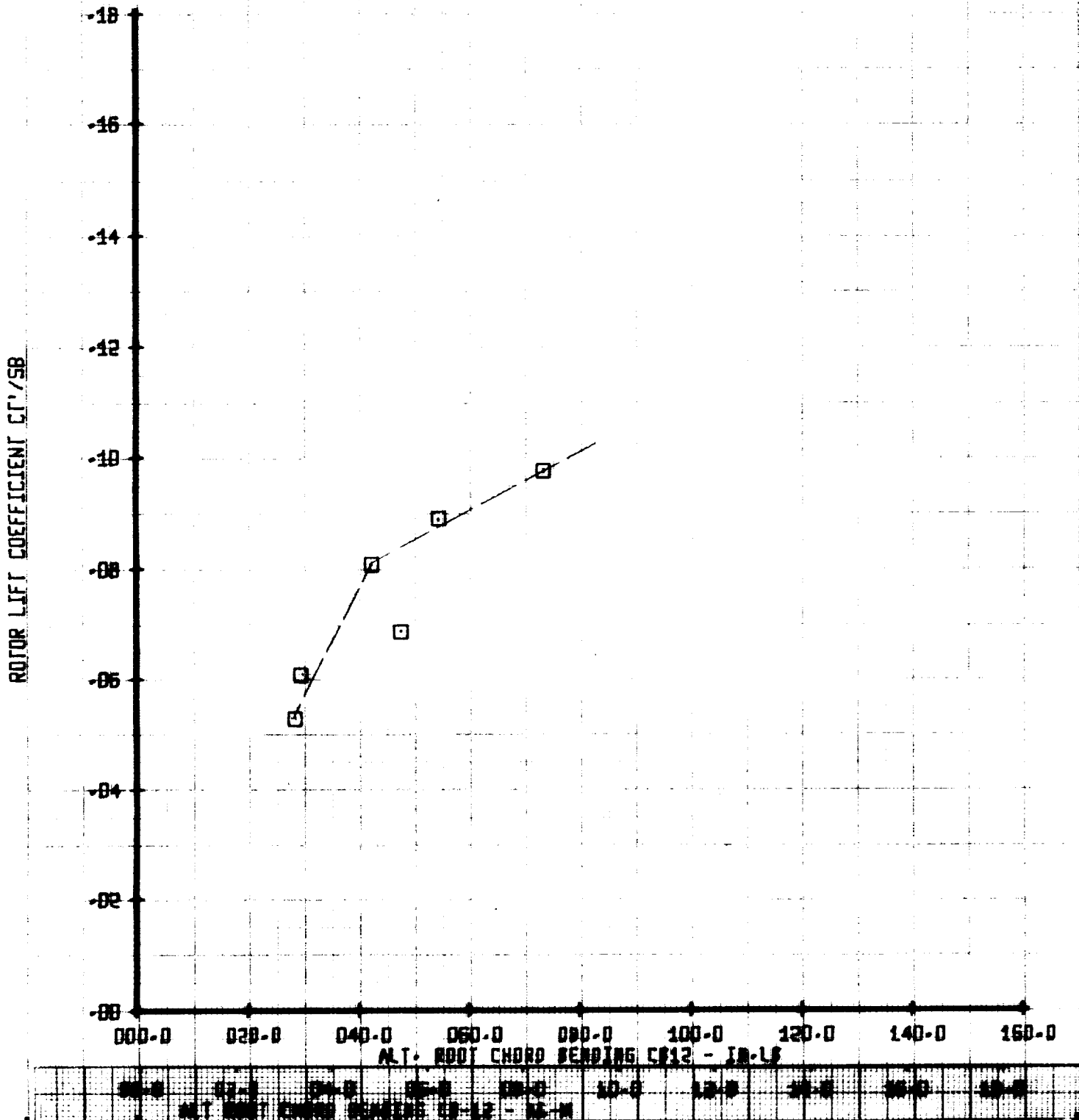
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB78



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MU'		X/00258		YTUN	
0	7	225	39	.50	.50	.05	.05	310	310

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/DD258	YTUN
□	225	.50	.05	310
◇	261	.50	.05	310
◇	226	.50	.10	310

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT

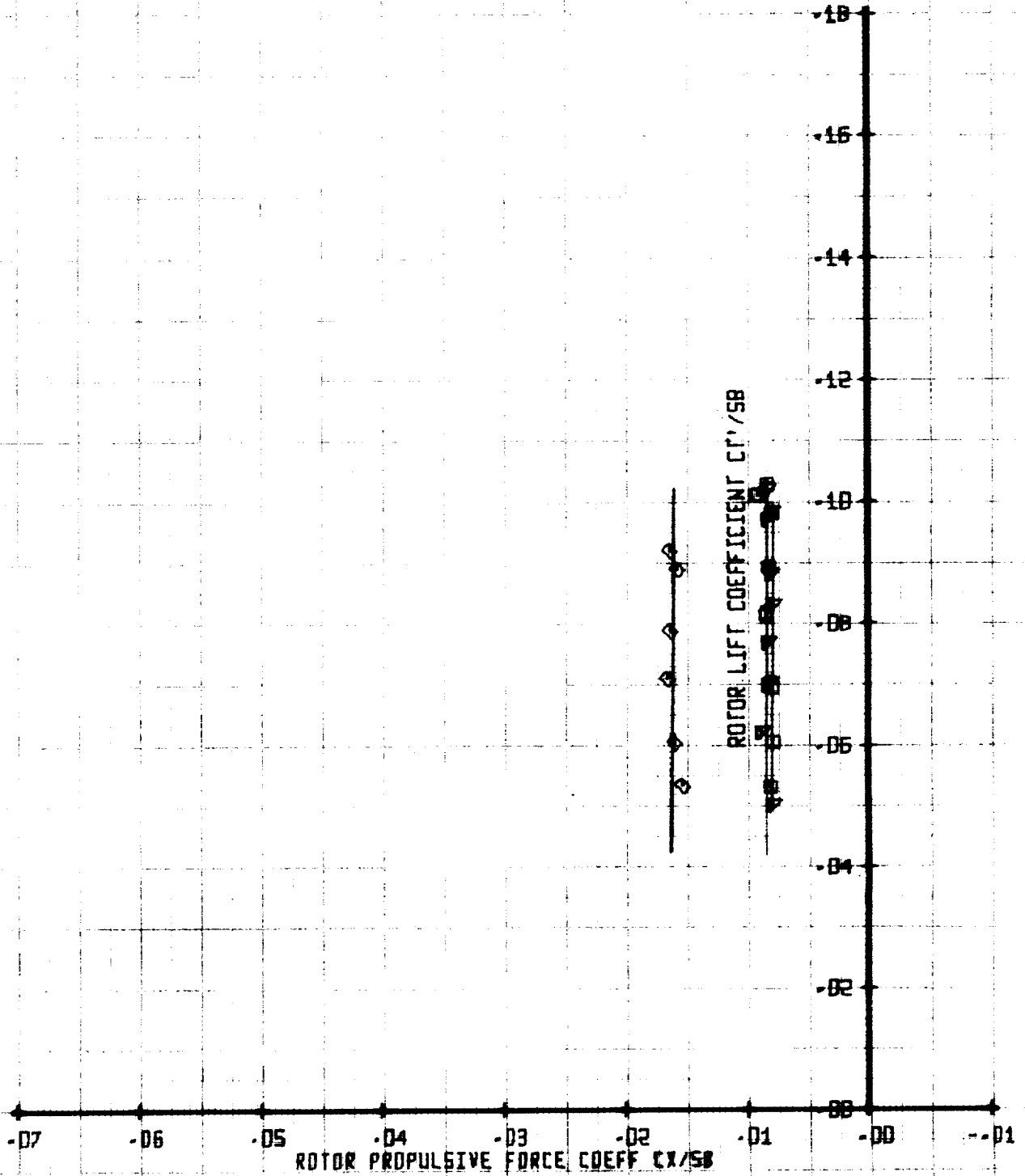
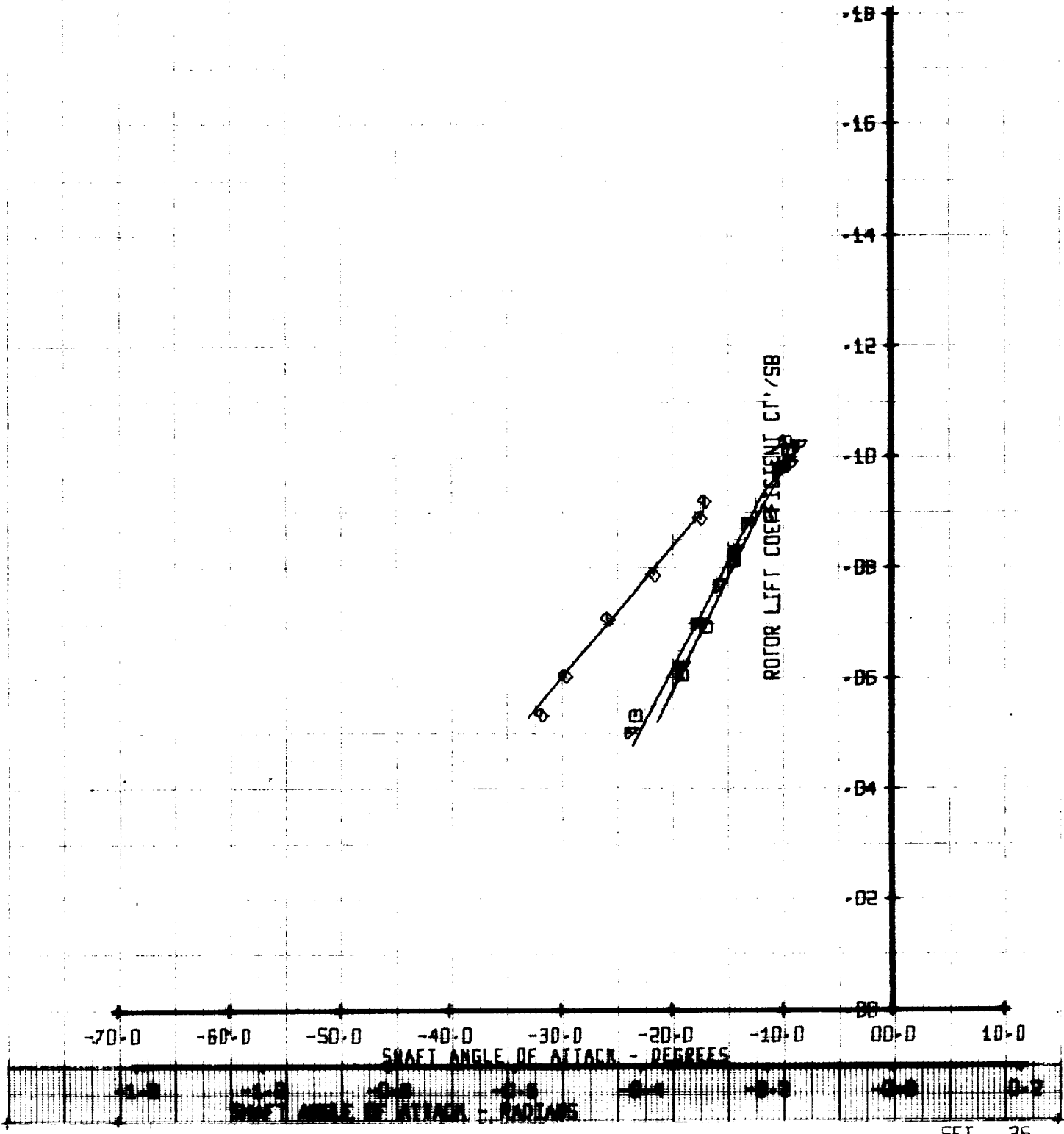


Figure A-189

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU'	X/00258	VTUN
□	225	.50	.05	310
▽	261	.50	.05	310
◇	226	.50	.10	310

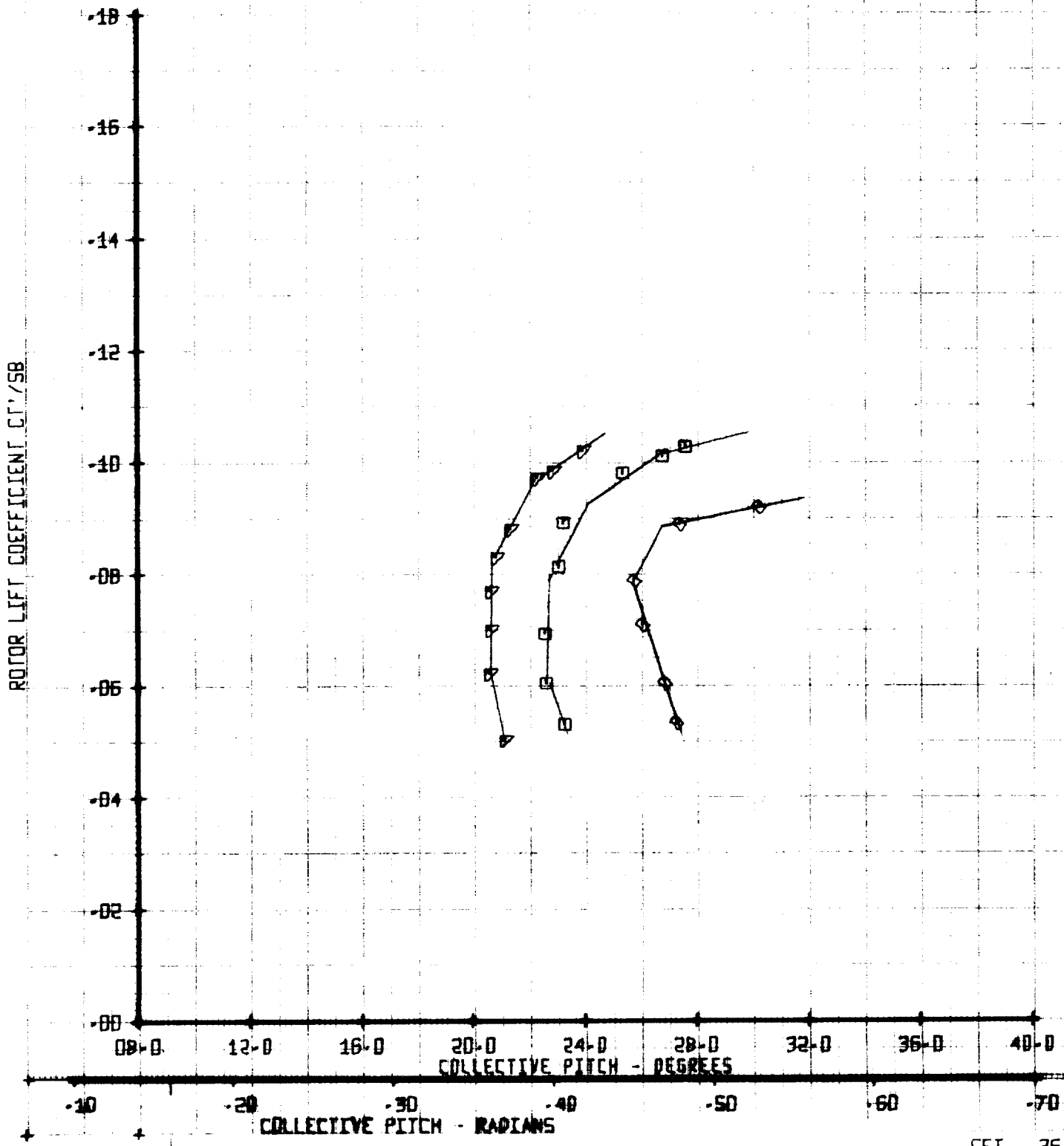
ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU'	X/00258	VTUN
□	RUN 225	.50	.05	310
▽	261	.50	.05	310
◇	226	.50	.10	310

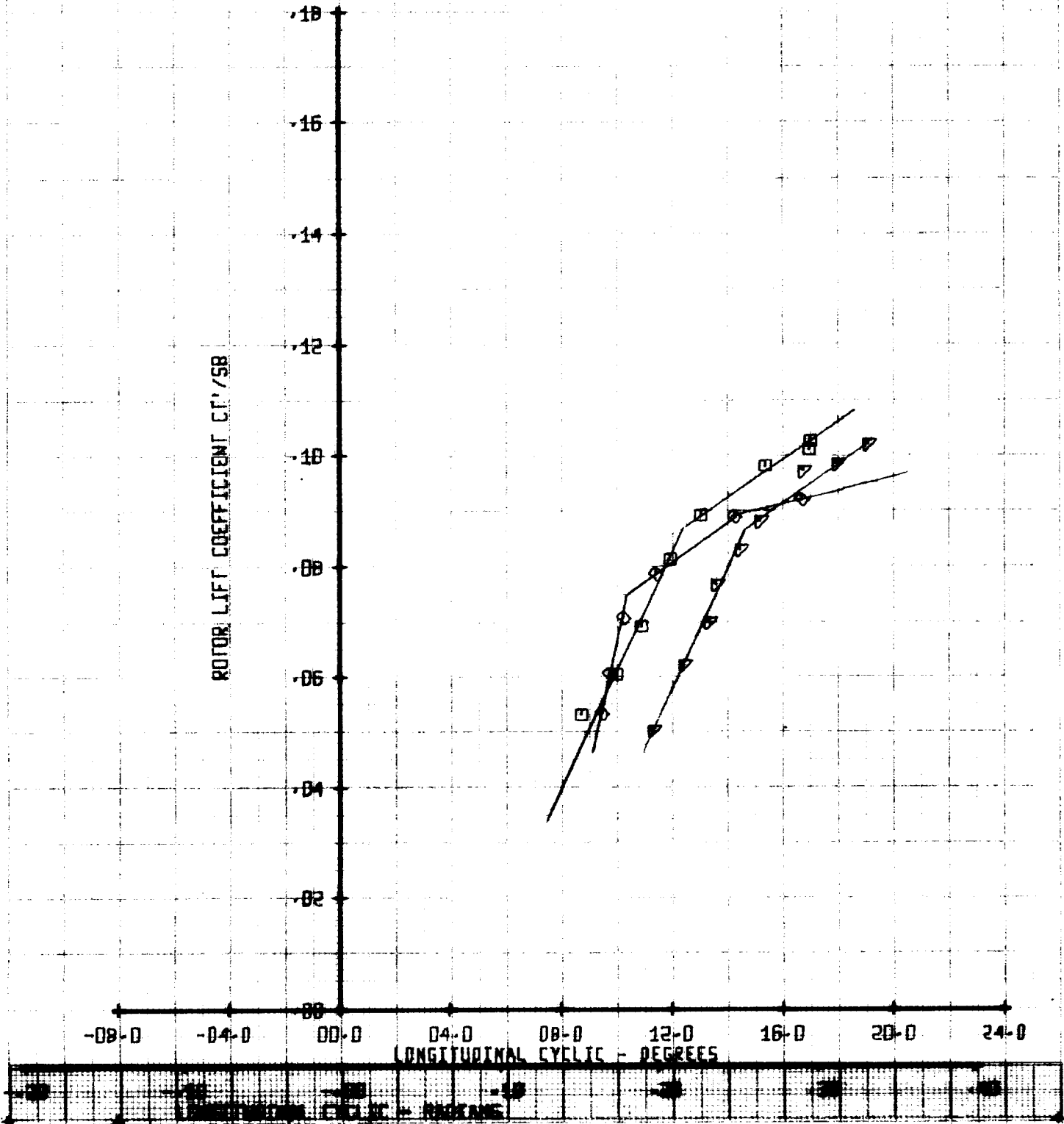
ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU'	X/00258	VTUN
□	RUN 225	.90	.05	310
△	261	.50	.05	310
◇	226	.50	.10	310

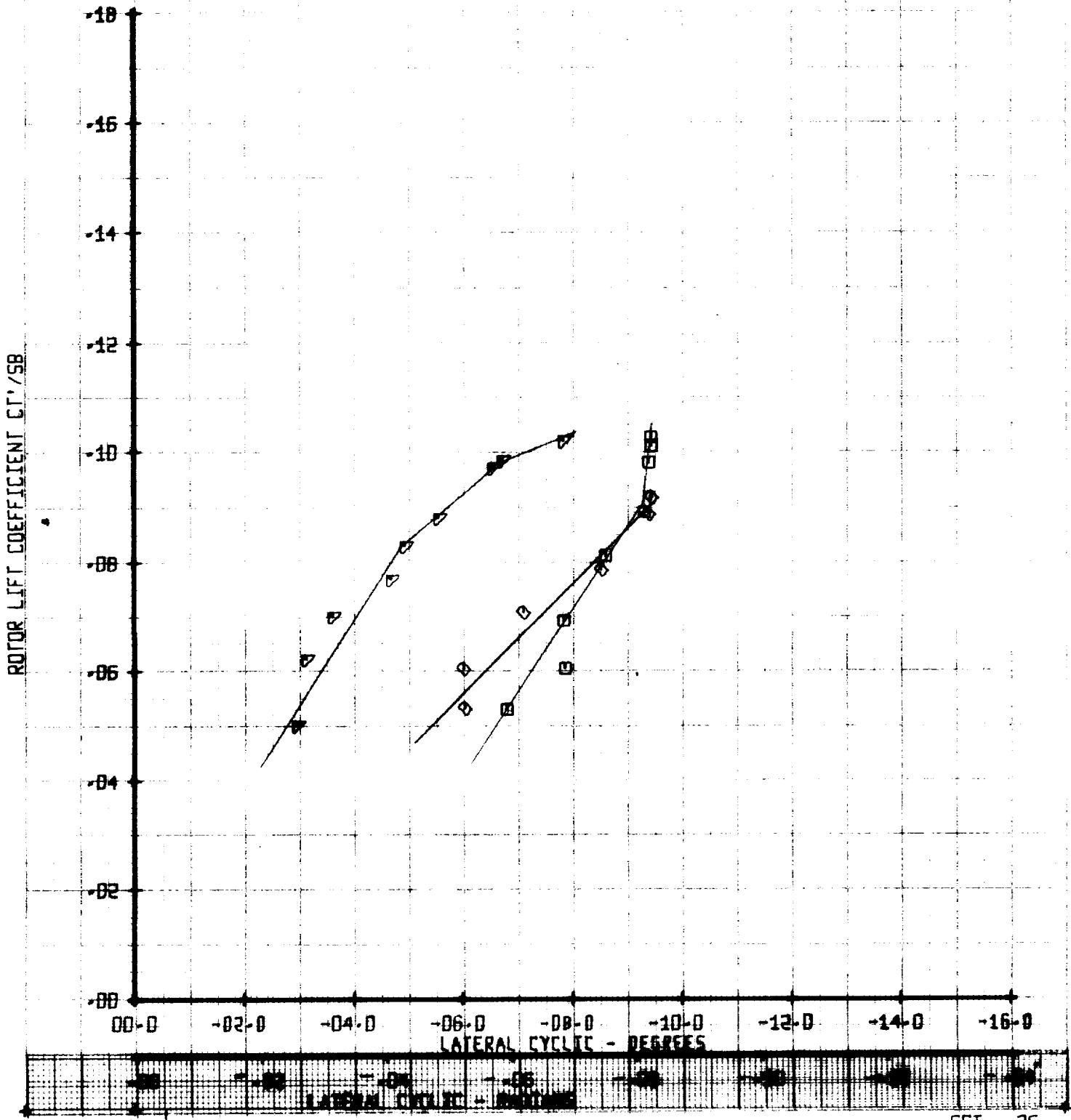
ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU'	X/DD2SB	VTUN
□	RUN 225	.50	.05	310
▽	261	.50	.05	310
◇	226	.50	.10	310

ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC

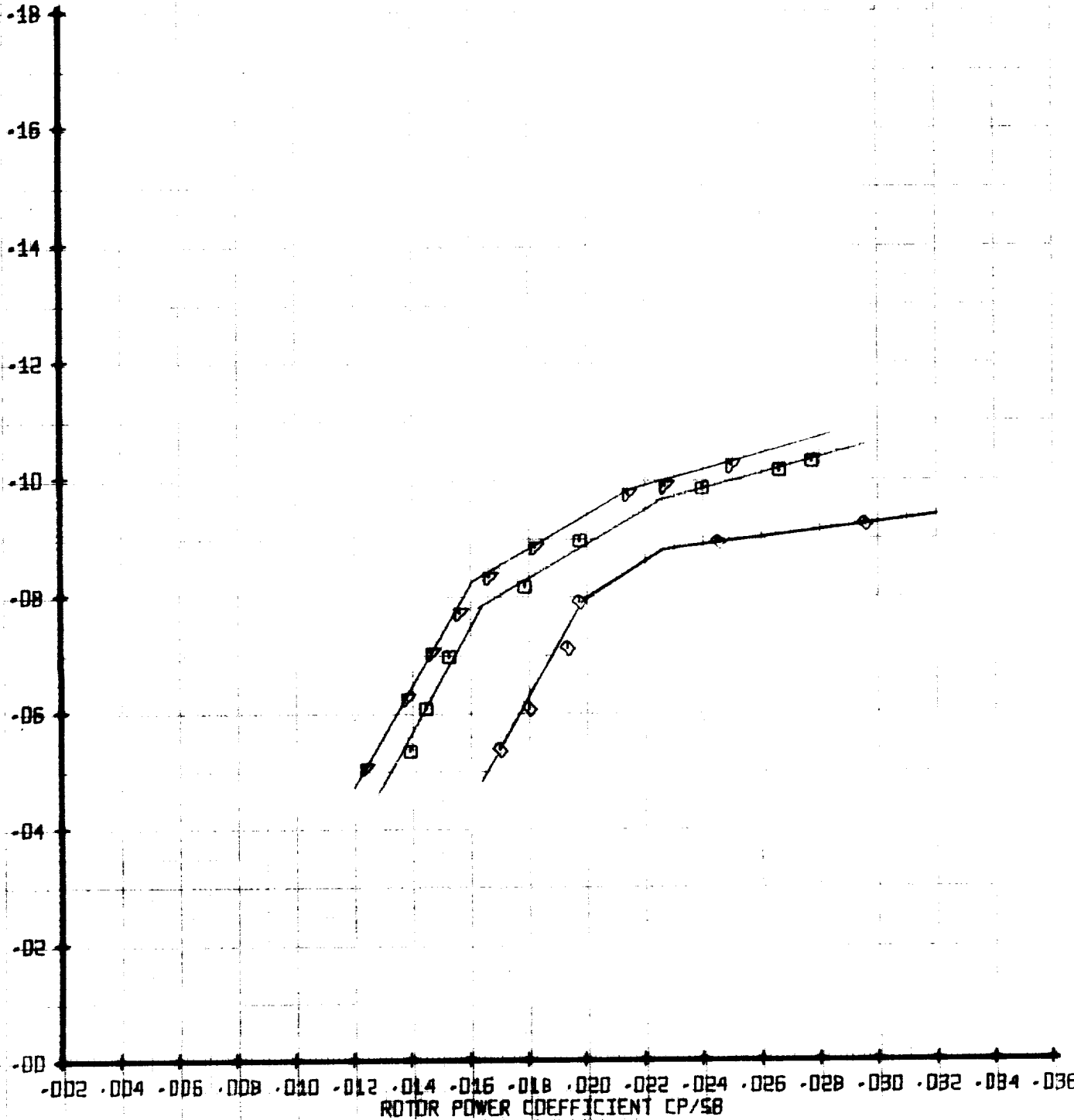


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/00258	VTUN
□	225	.50	.05	310
△	261	.50	.05	310
◇	226	.50	.10	310

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT

ROTOR LIFT COEFFICIENT $C_T'/58$

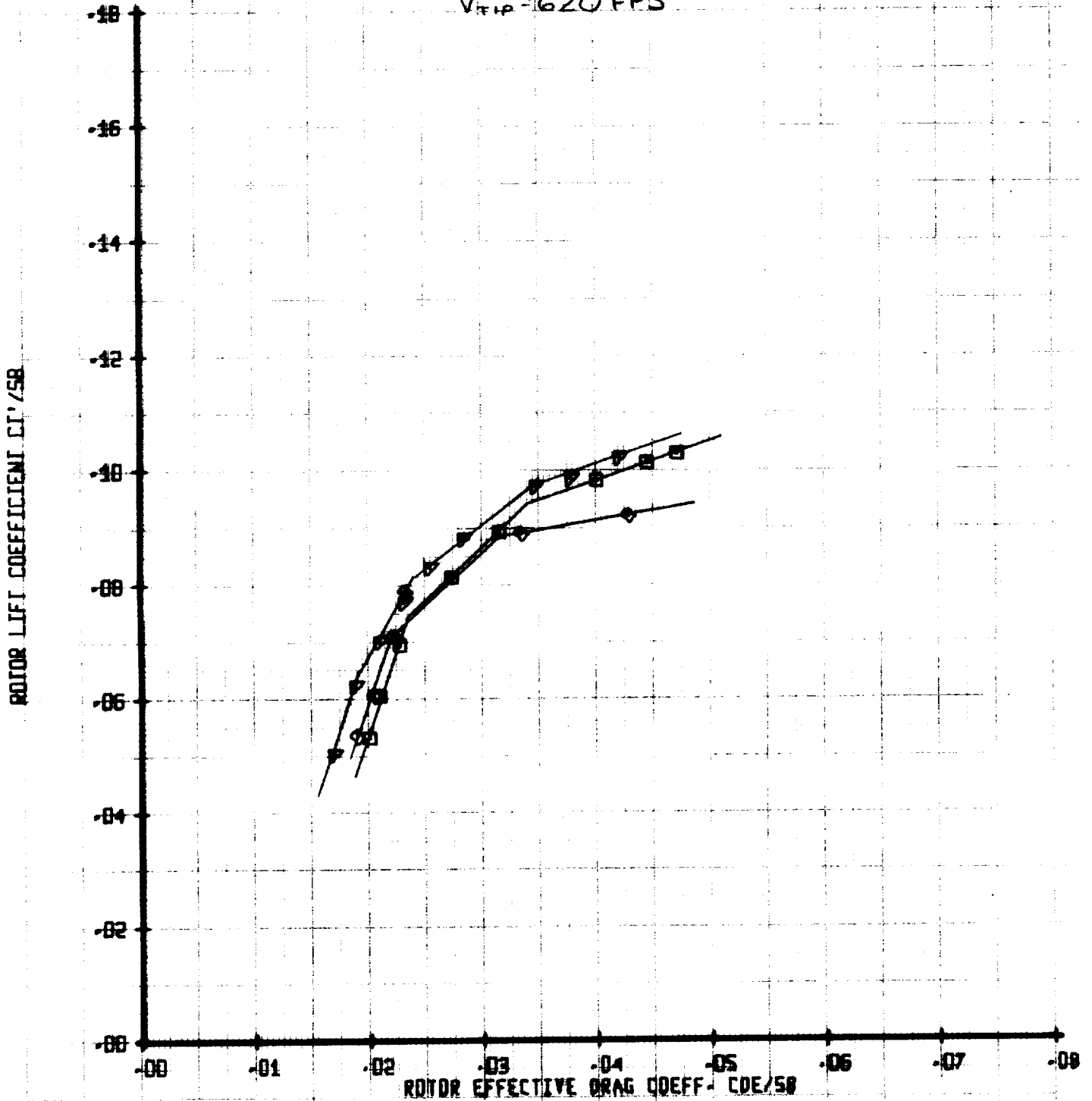


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	Y/TUM
□	225	.50	.05	310
△	261	.50	.05	330
◇	336	.50	.10	330

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT

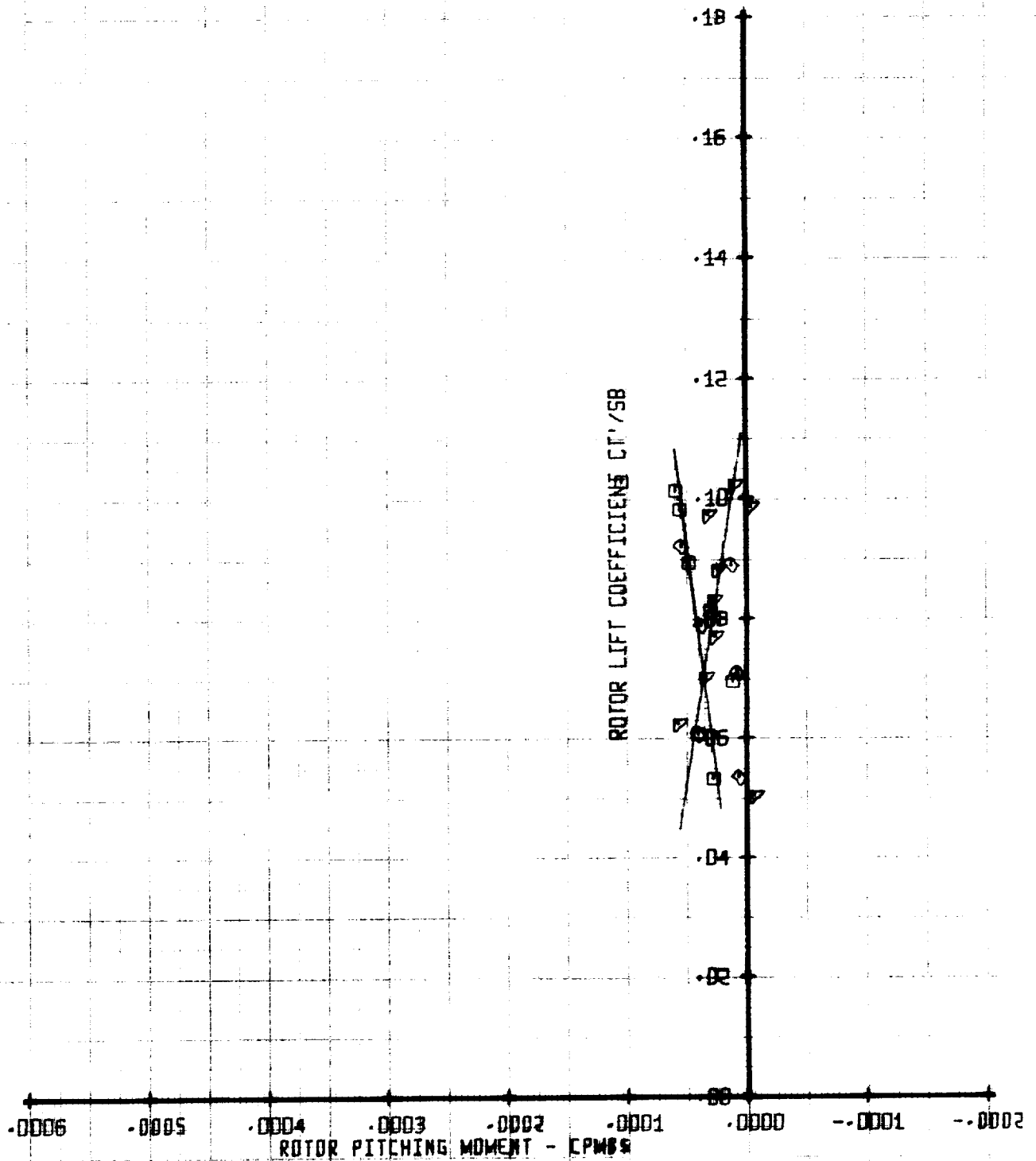
$V_{TIP} = 620 \text{ FPS}$



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/DD2SB	YTLN
□	225	.50	.05	310
▽	261	.50	.05	310
◇	226	.50	.10	310

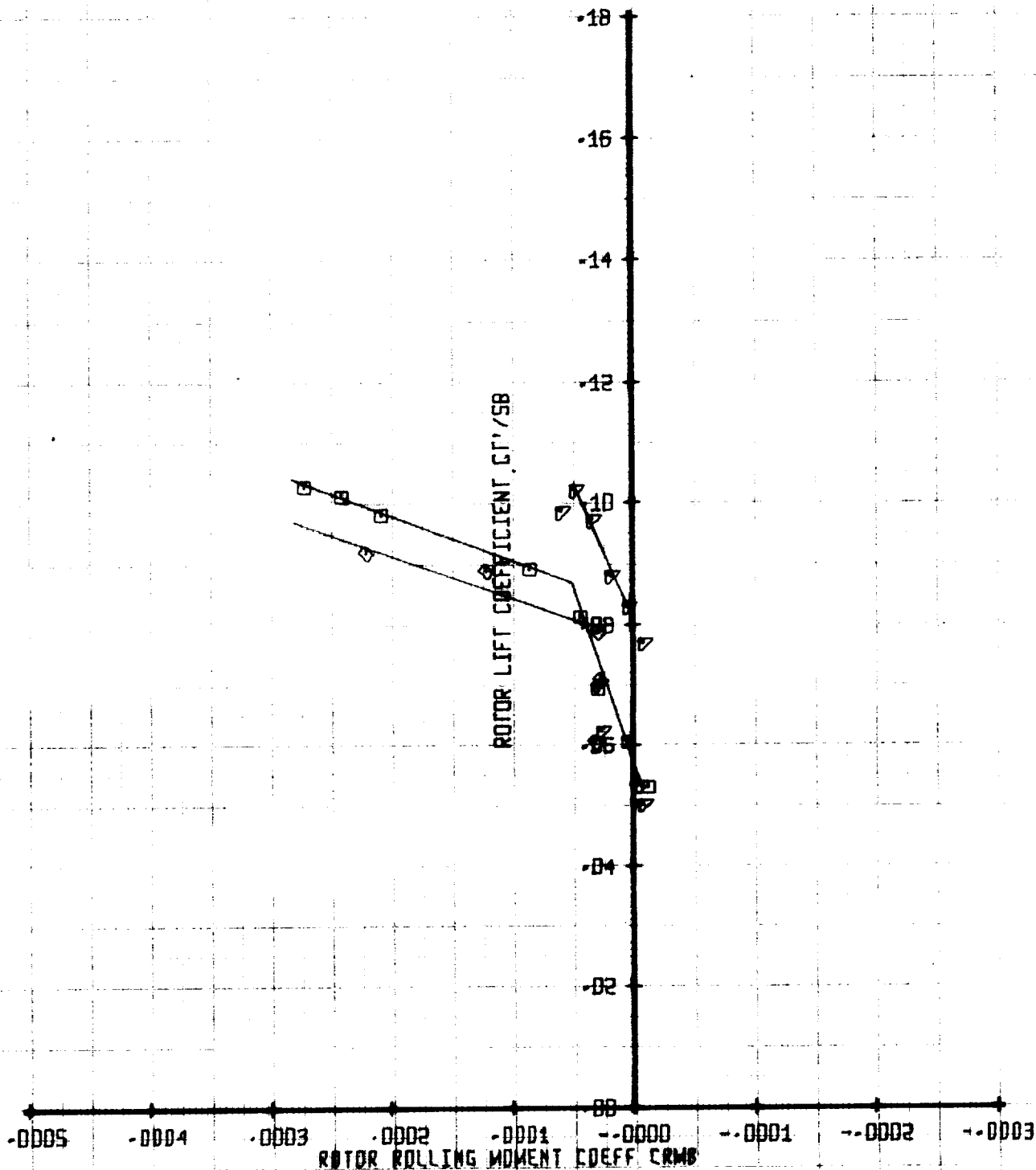
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU'	X/00258	VTUN
□	225	.50	.05	310
▽	261	.50	.05	310
◇	226	.50	.10	310

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/DD258	VTUN
□	225	.50	.05	310
△	261	.50	.05	310
◇	226	.50	.10	310

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT

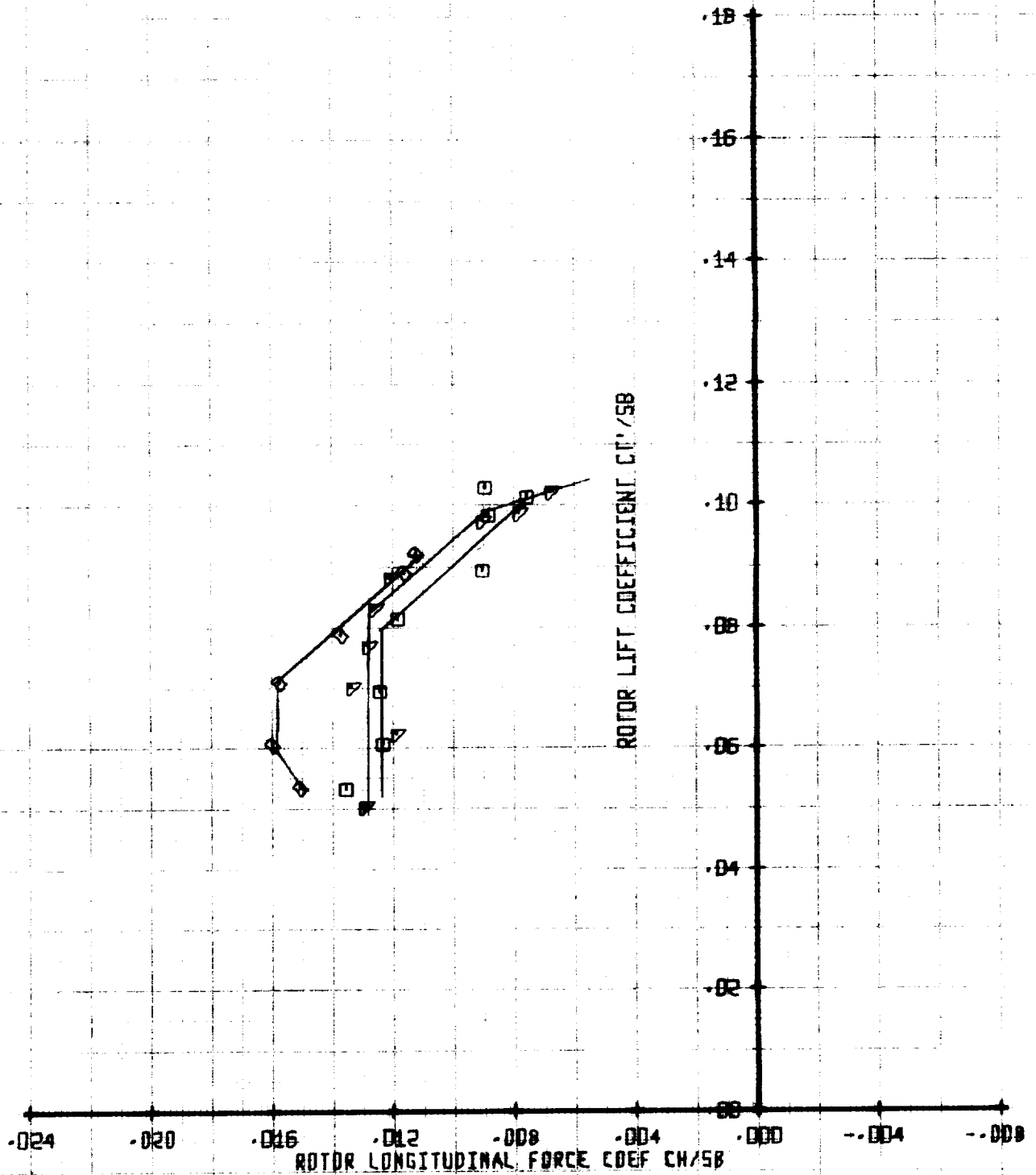


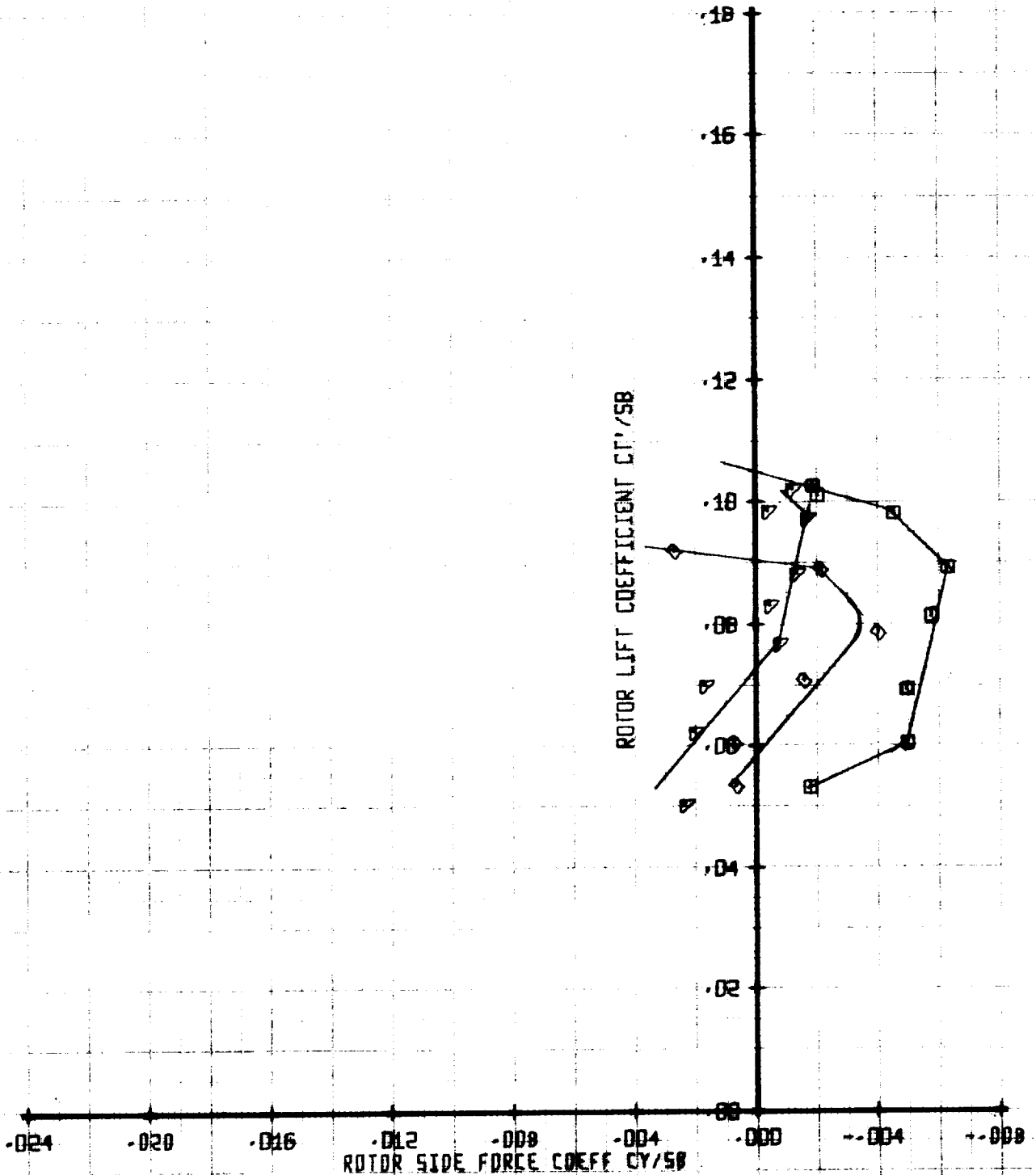
Figure A-198

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/DD258	VTUN
□	225	.50	.05	310
△	261	.50	.05	310
◇	226	.50	-.10	310

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT

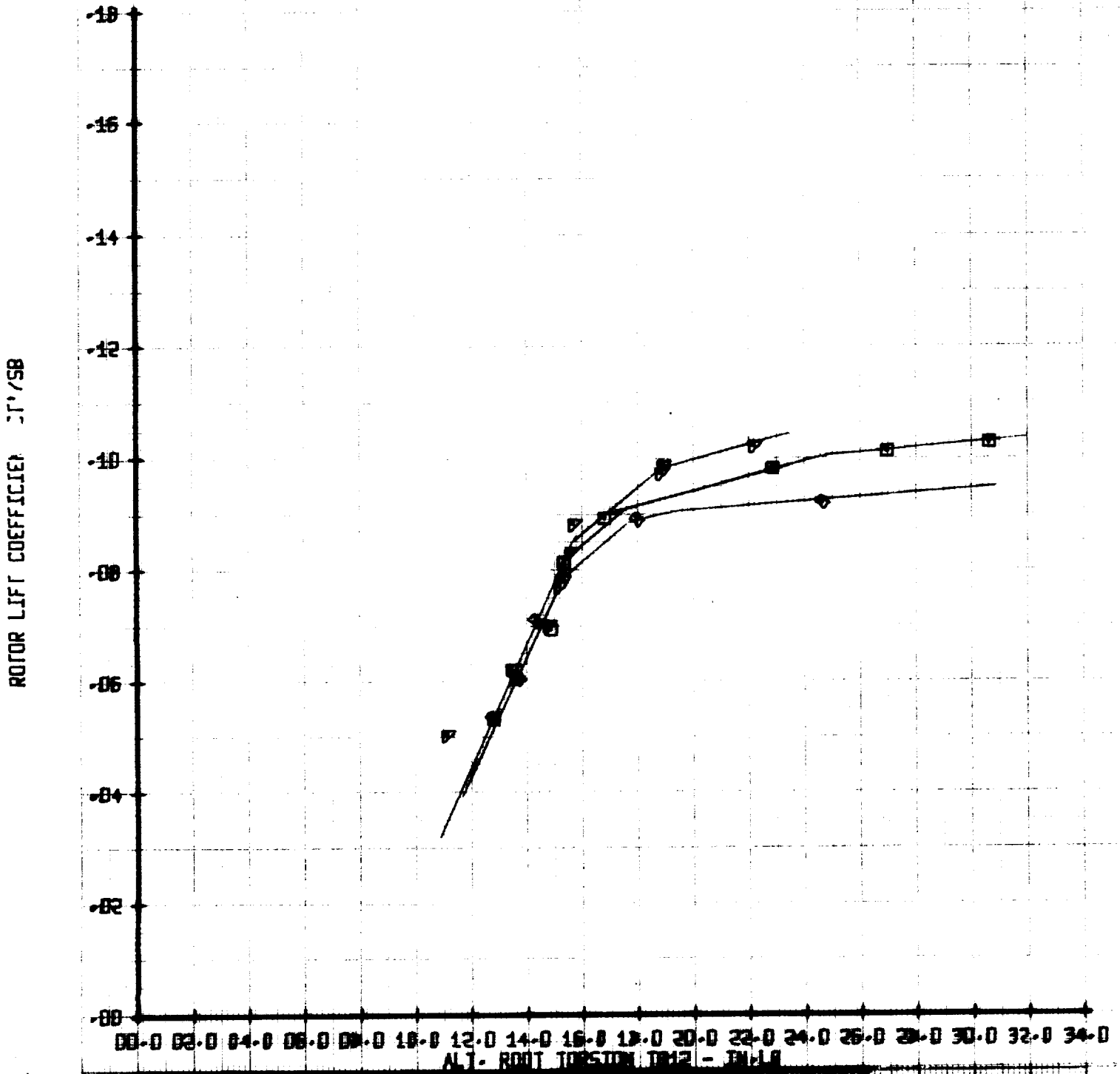


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	ML'	X/00258	Y/TUN
○	225	.50	.05	310
△	261	.50	.05	310
◇	226	.50	.10	310

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12

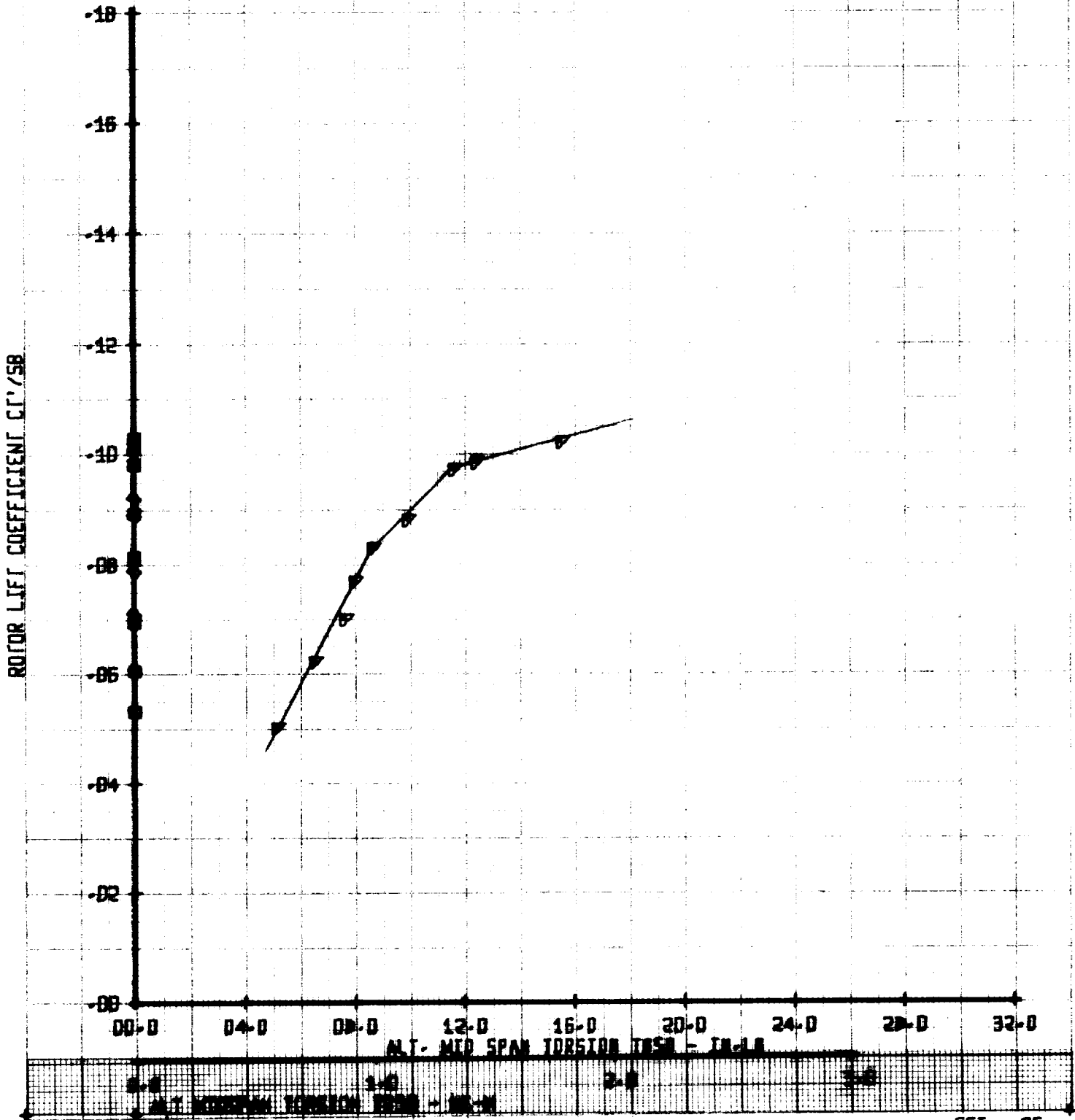


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	ML'	X/00298	VTUN
□	225	.50	.05	310
△	251	.50	.05	310
◆	226	.50	.10	210

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50

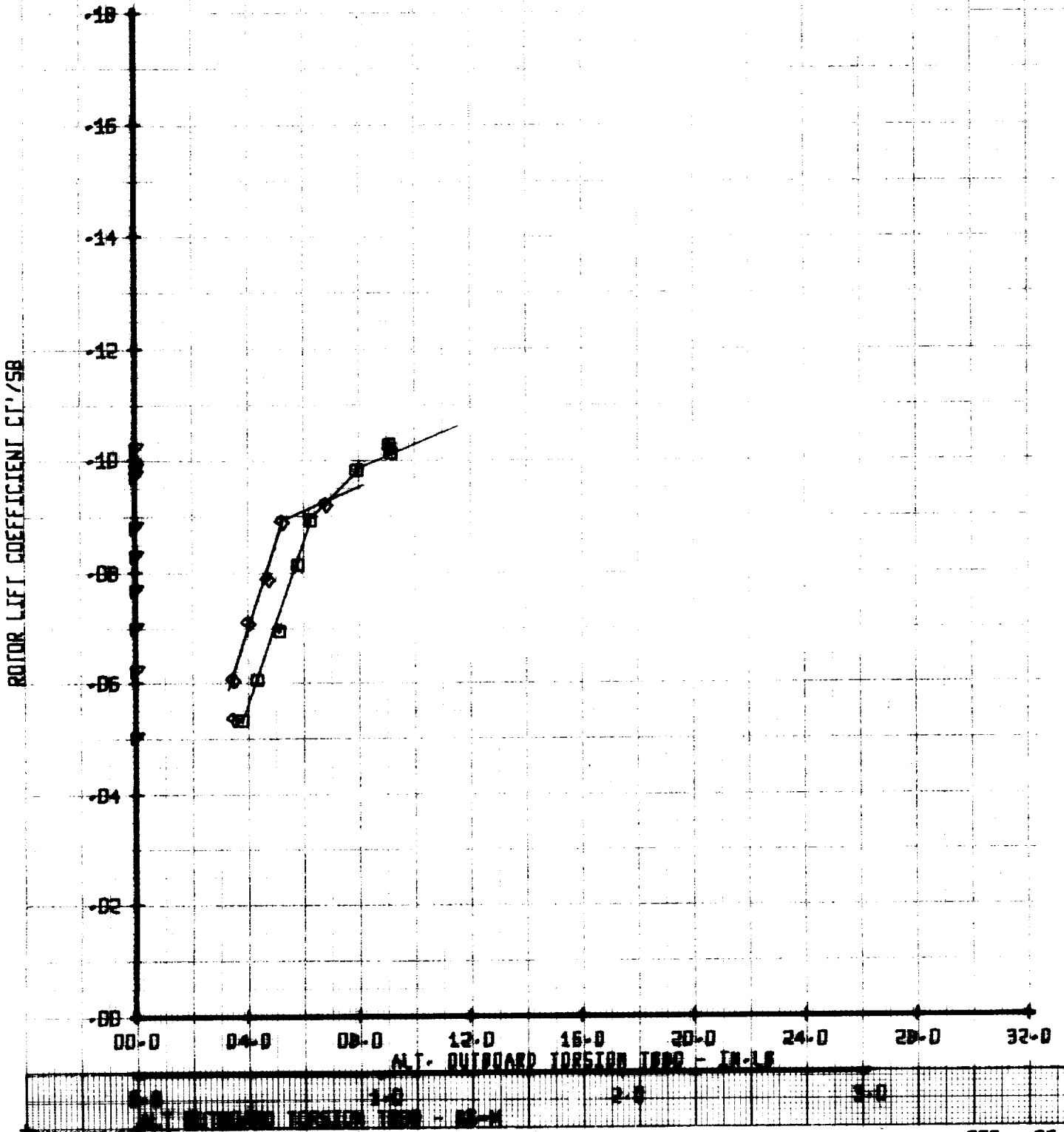


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	ML'	X/D02SB	VILM
○	225	.50	.05	310
□	261	.50	.05	310
△	226	.50	.10	310

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB50

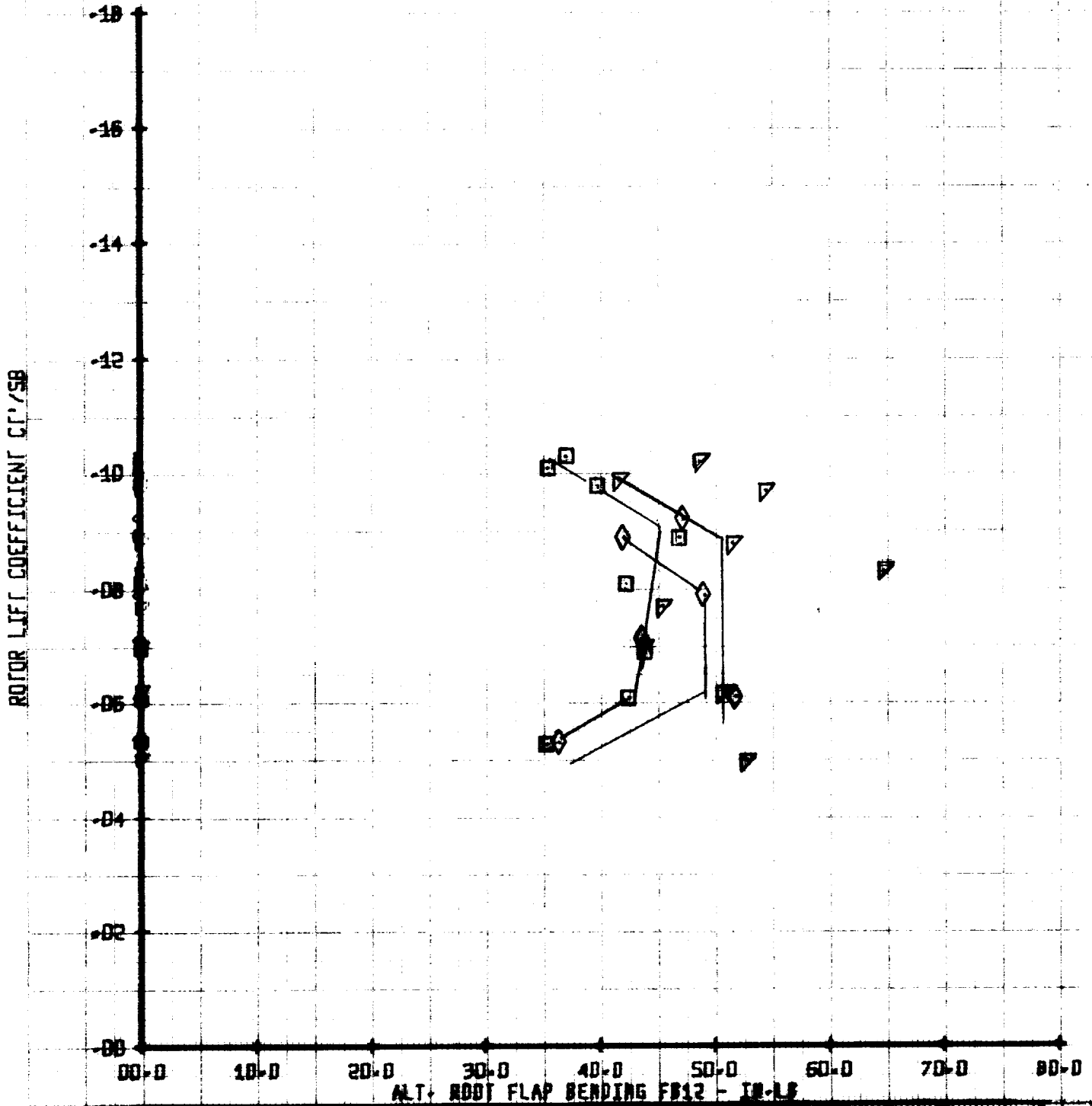


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MLI'	1/002SB	YTLIN
□	225	.50	.05	310
▽	281	.50	.05	310
◇	226	.50	.10	310

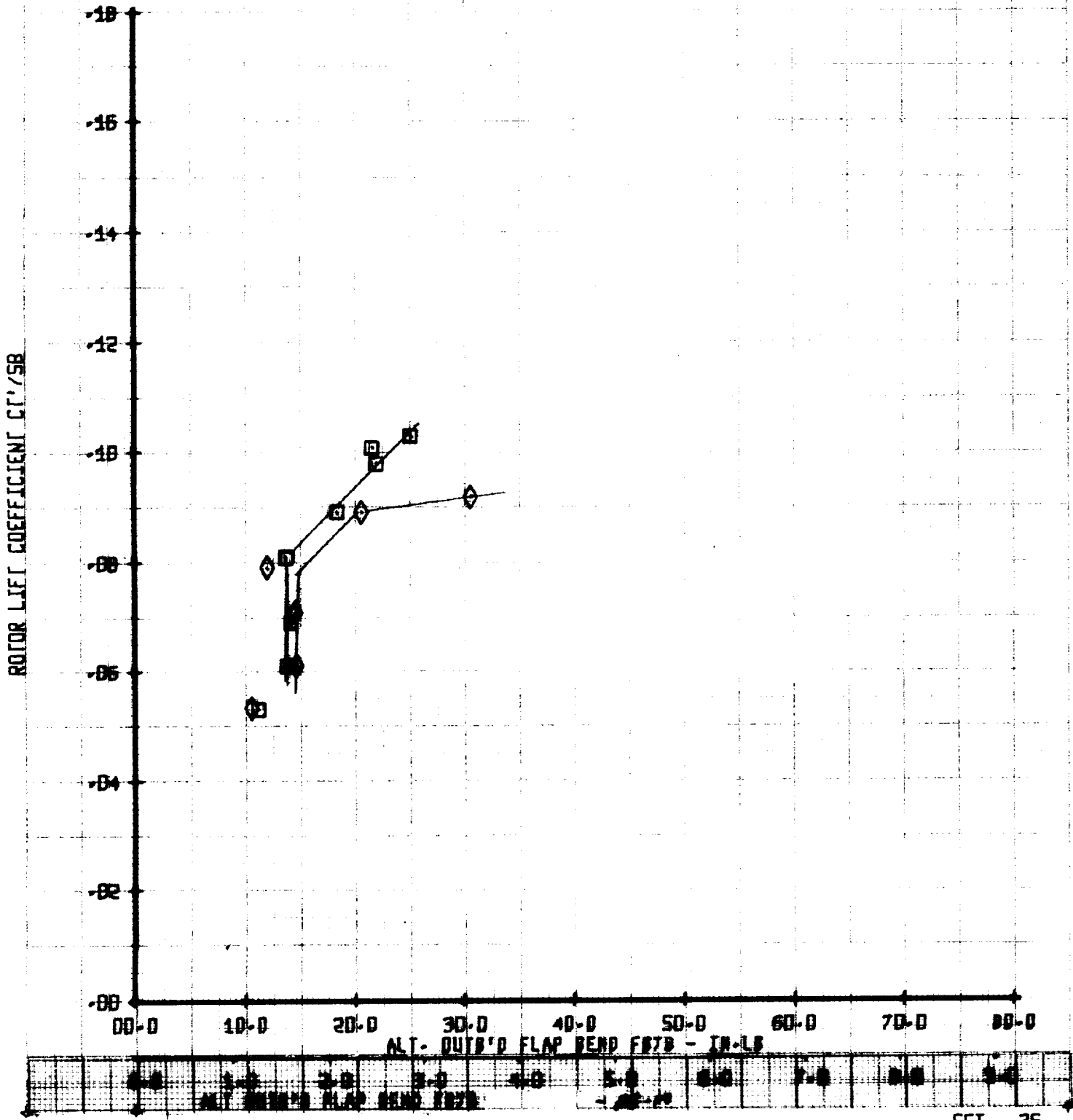
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D ROTOR
 LIFT LIMIT TESTING

LEGEND		MLI	X/002SB	VTUN
SYM	RUN			
□	235	.50	.05	310
○	261	.50	.05	310
◇	226	.50	.10	310

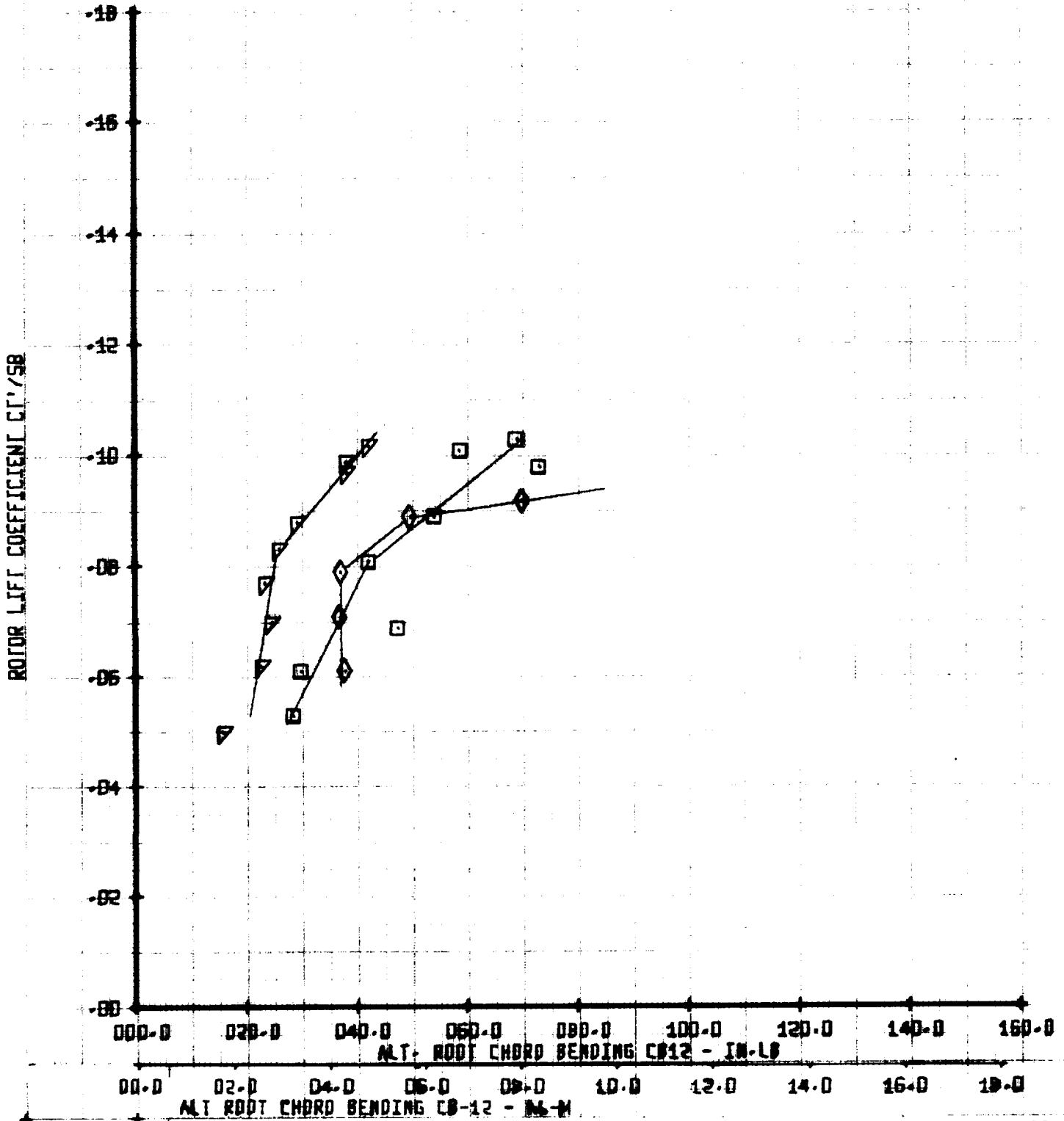
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB78



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MLI	X/00298	Y/TUN
□	225	.50	.05	310
△	261	.50	.05	310
◇	226	.50	.10	310

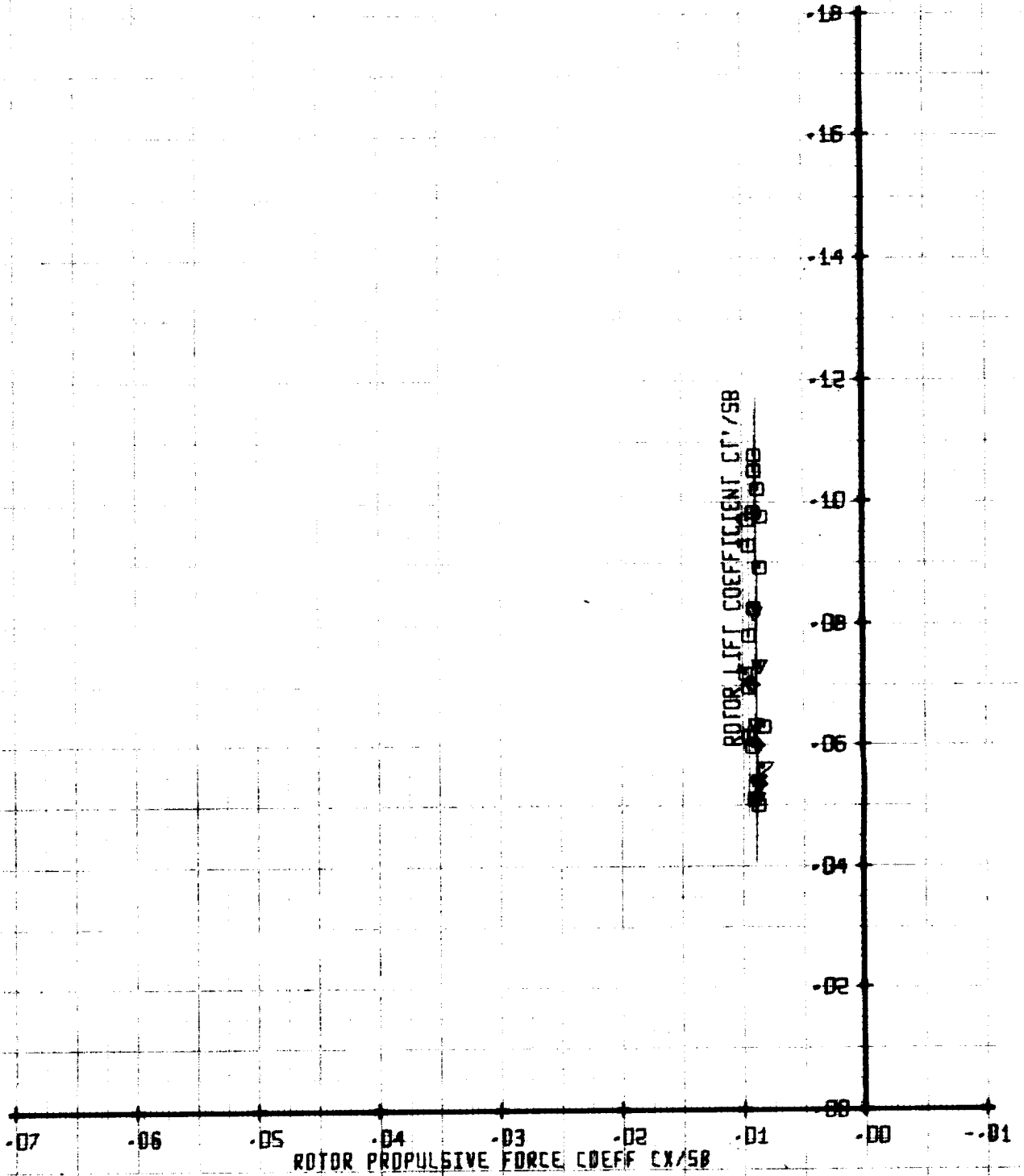
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU'	X/00258	VTUN
SYM	RUN	.53	.05	328
□	224	.53	.05	328
◇	221	.53	.05	328
△	222	.53	.05	328

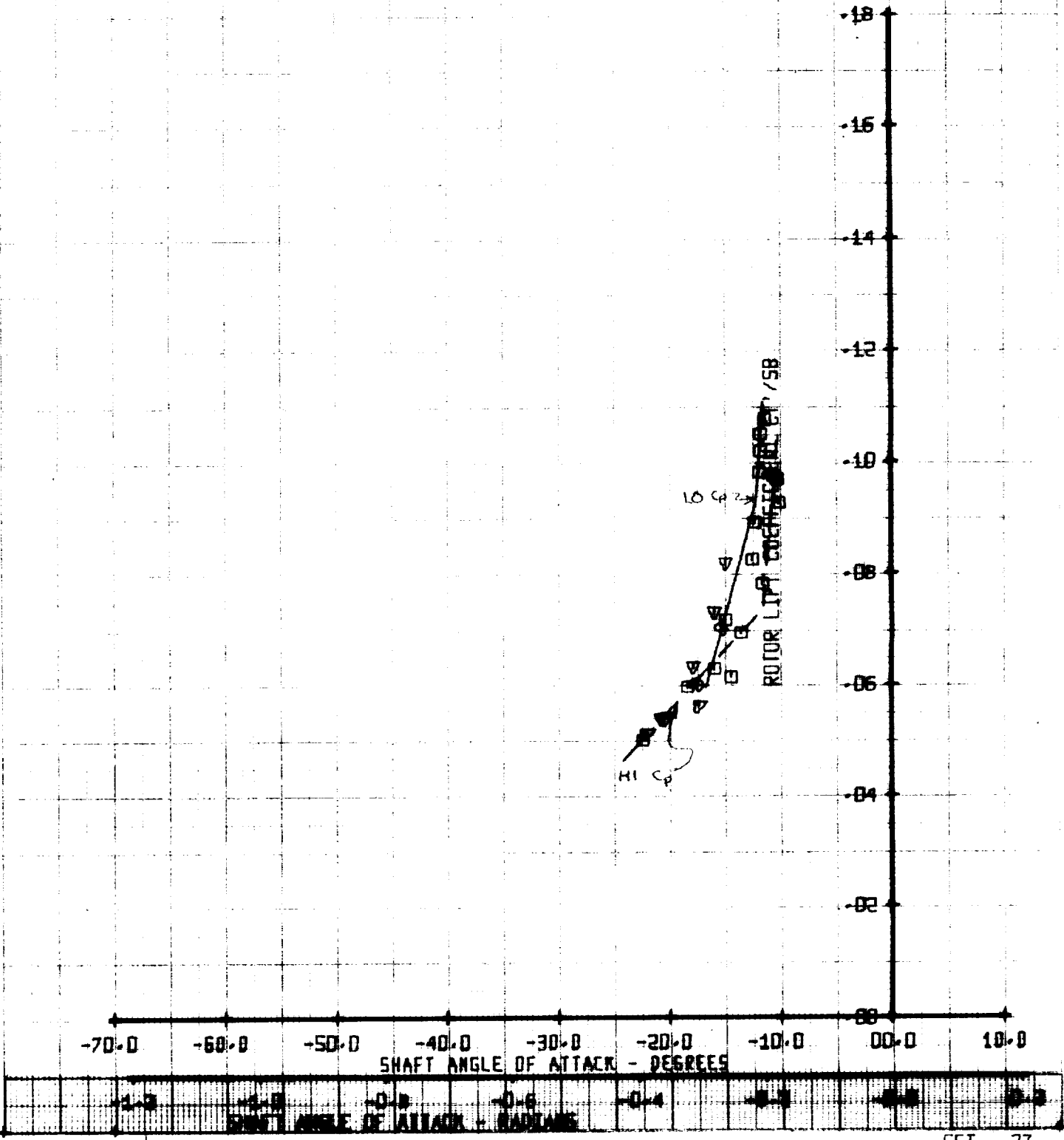
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU'	X/DD258	VTUN
□	RUN 224	.53	.05	328
▽	220	.53	.05	328
◇	221	.53	.05	328
▽	222	.53	.05	328

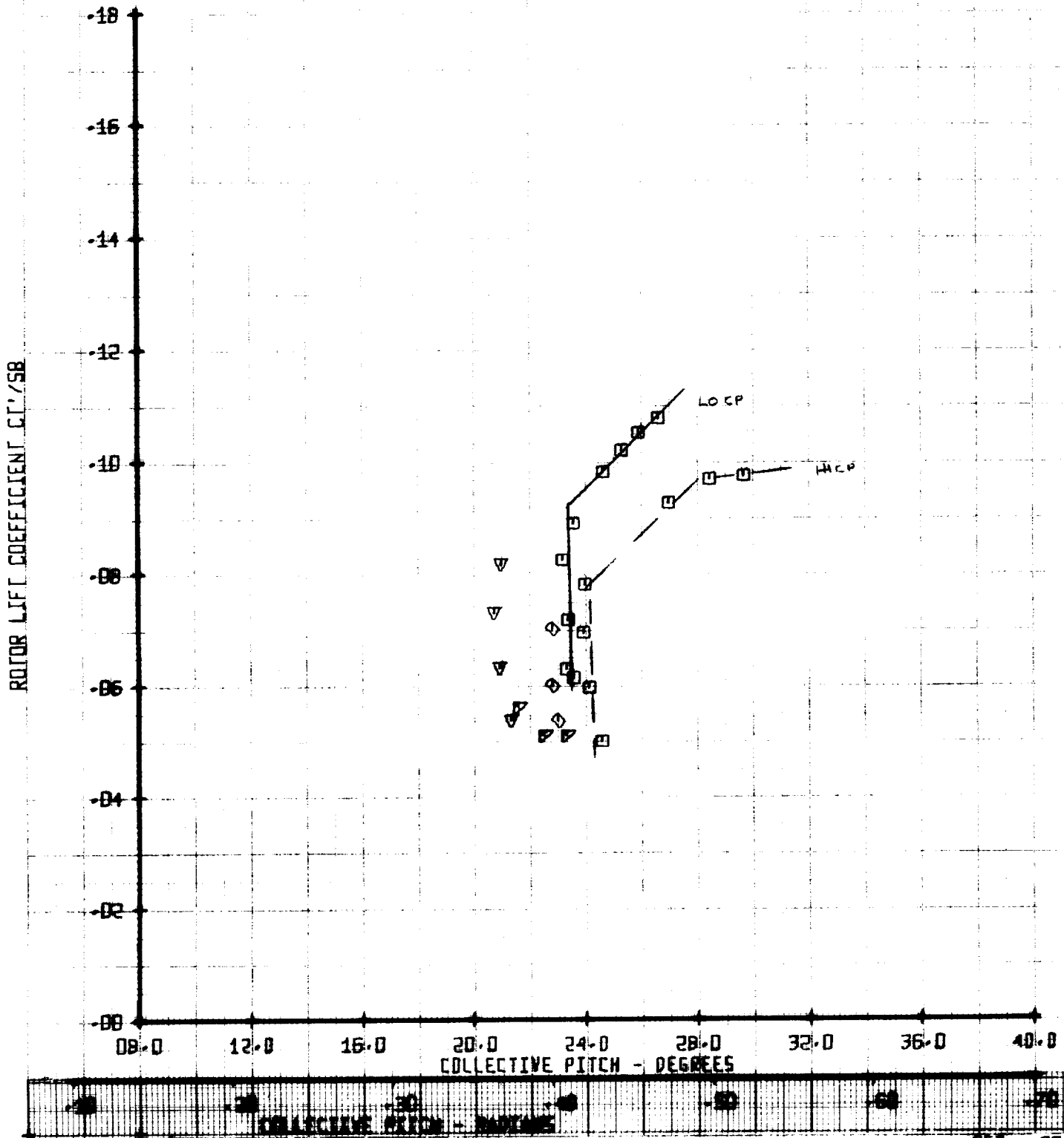
ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	ML'	X/DD2SB	VTLN
□	224	.53	.05	328
▴	220	.53	.05	328
◇	221	.53	.05	328
▽	222	.53	.05	328

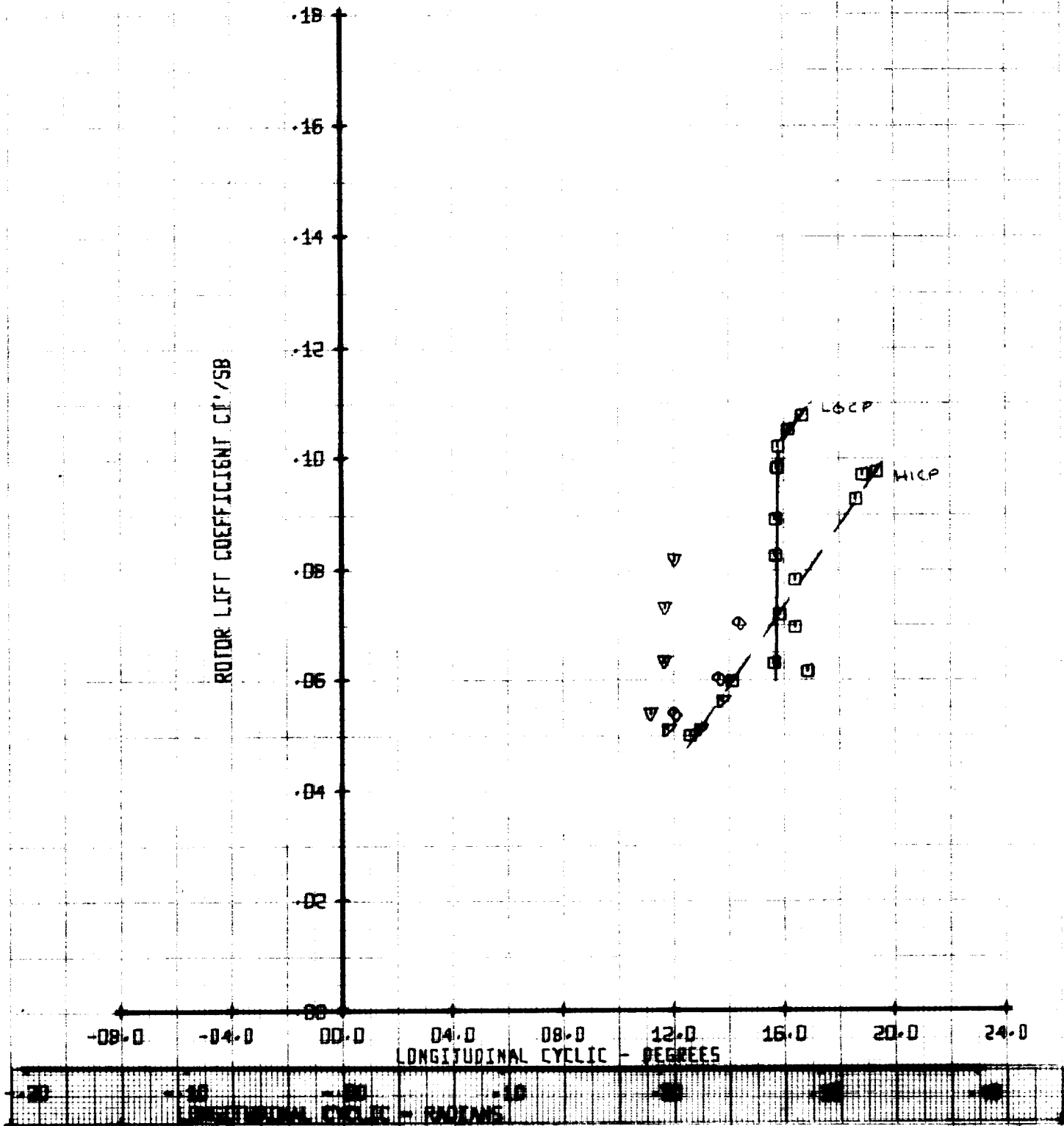
ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU'	X/00258	VTUN
□	224	.53	.05	328
▽	220	.53	.05	328
◇	221	.53	.05	328
▽	222	.53	.05	328

ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC

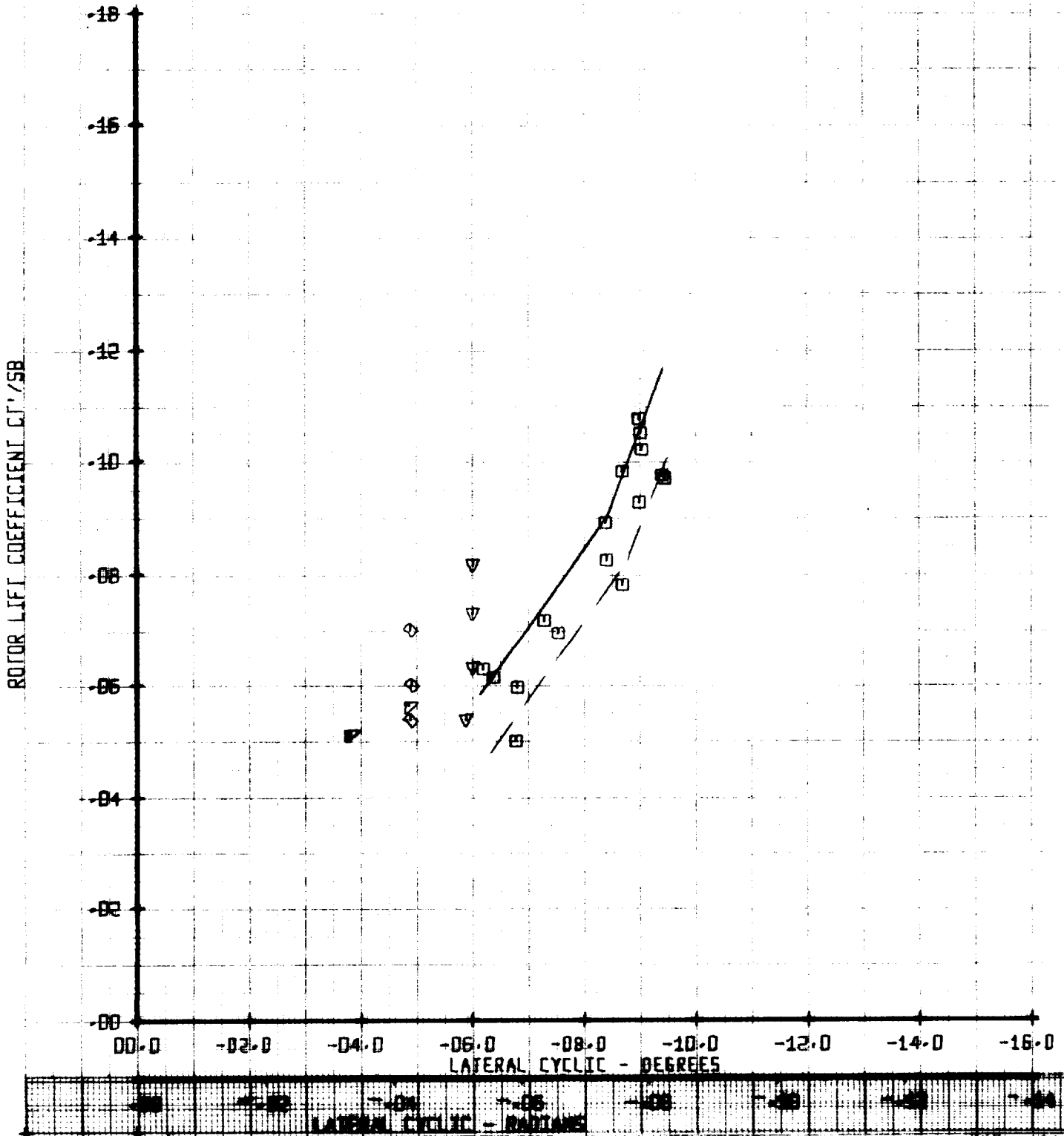


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/QD258	Y/TUN
□	224	.53	.05	328
▽	220	.53	.05	328
◇	221	.53	.05	328
▽	222	.53	.05	328

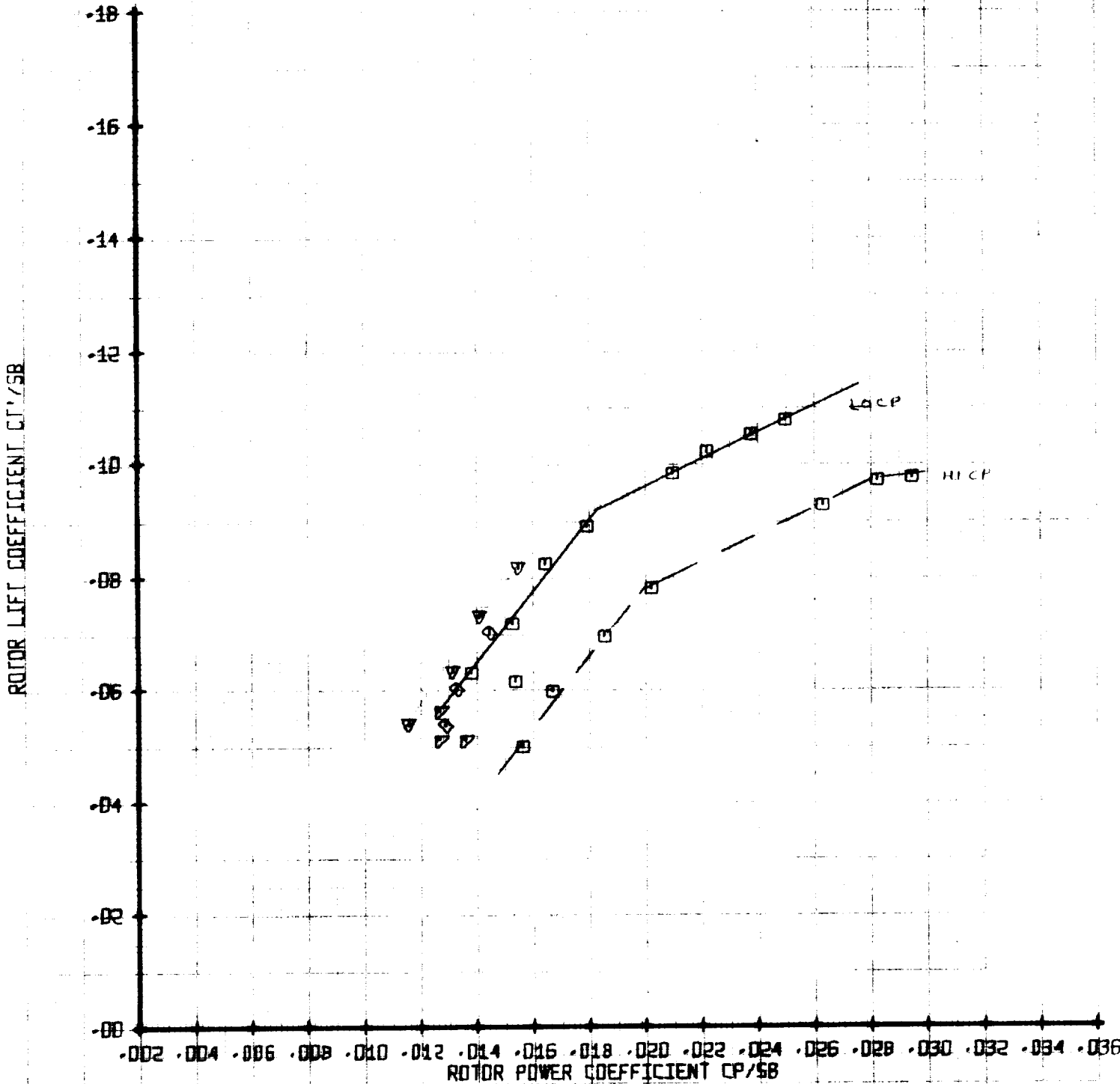
ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MLI'	X/DD2SB	YILN
□	224	.53	.05	328
▴	220	.53	.05	328
◊	221	.53	.05	328
▾	222	.53	.05	328

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI'	X/00250	Y/TUN
□	224	.53	.55	320
▲	220	.53	.55	328
◆	221	.53	.55	328
△	222	.53	.55	328

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT

$V_{Tip} = 620 \text{ FPS}$

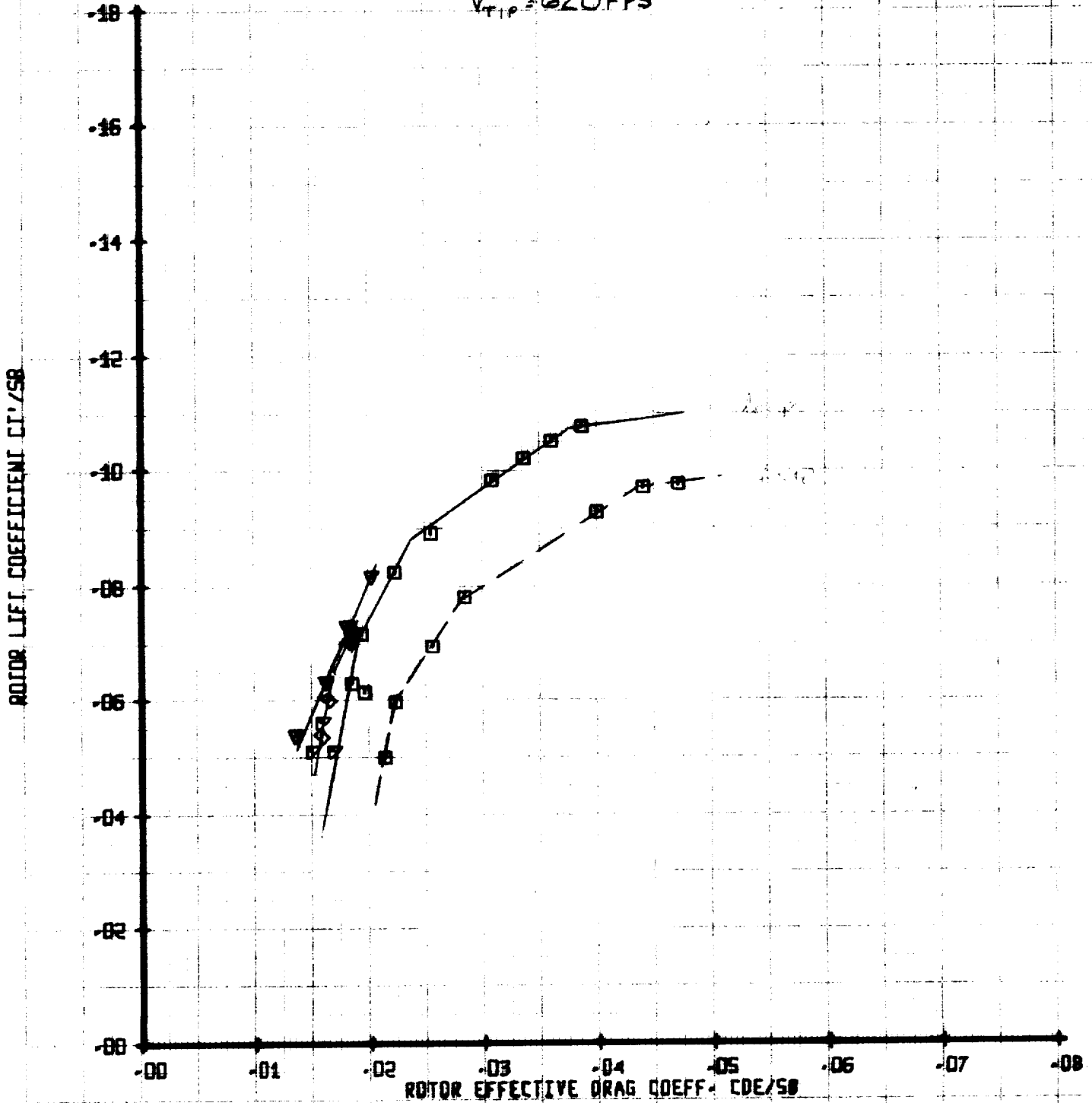
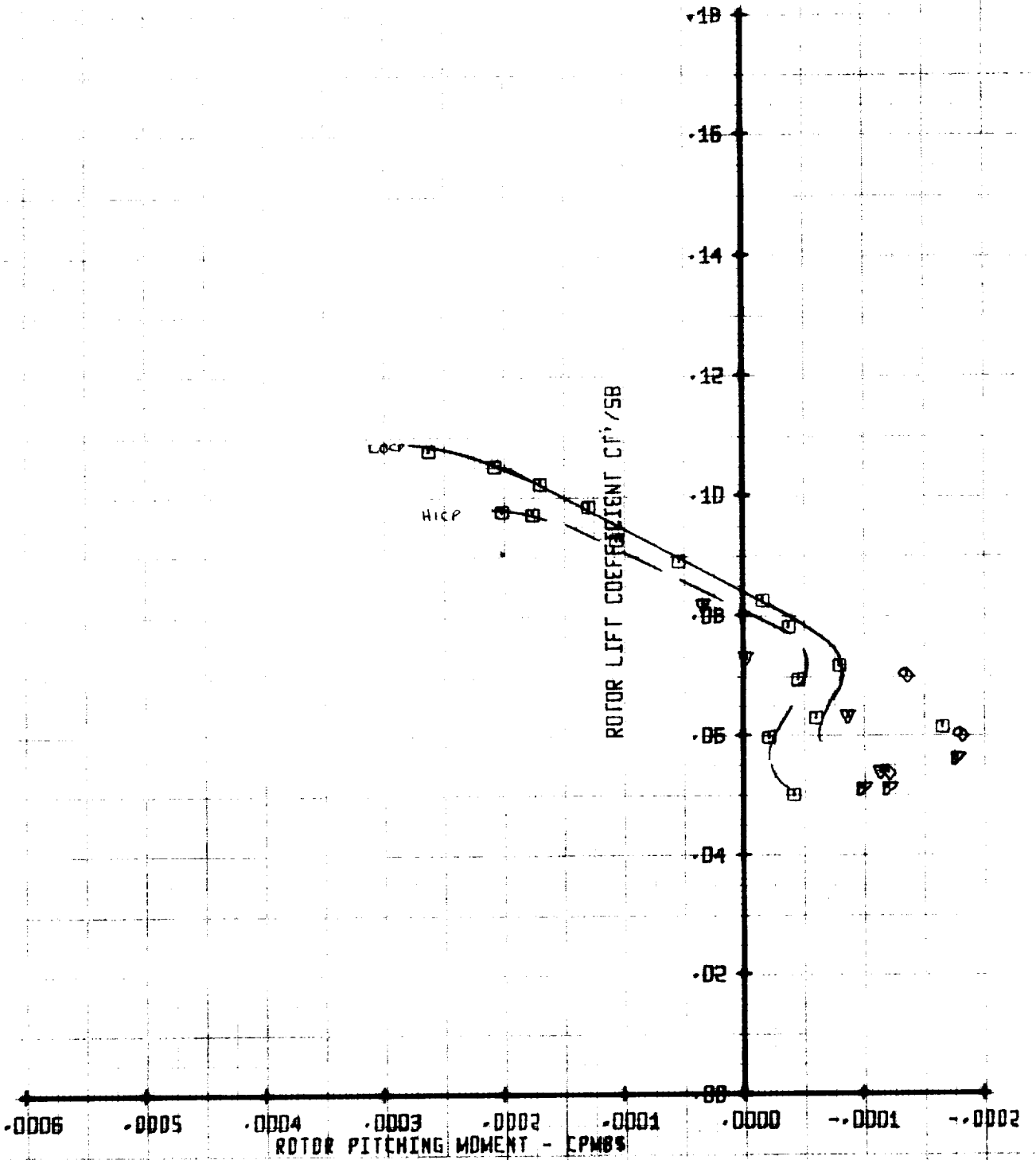


Figure A-211

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU'	X700258	VTUN
SYM	RUN	.53	.05	328
□	224	.53	.05	328
◊	220	.53	.05	328
◇	221	.53	.05	328
▽	222	.53	.05	328

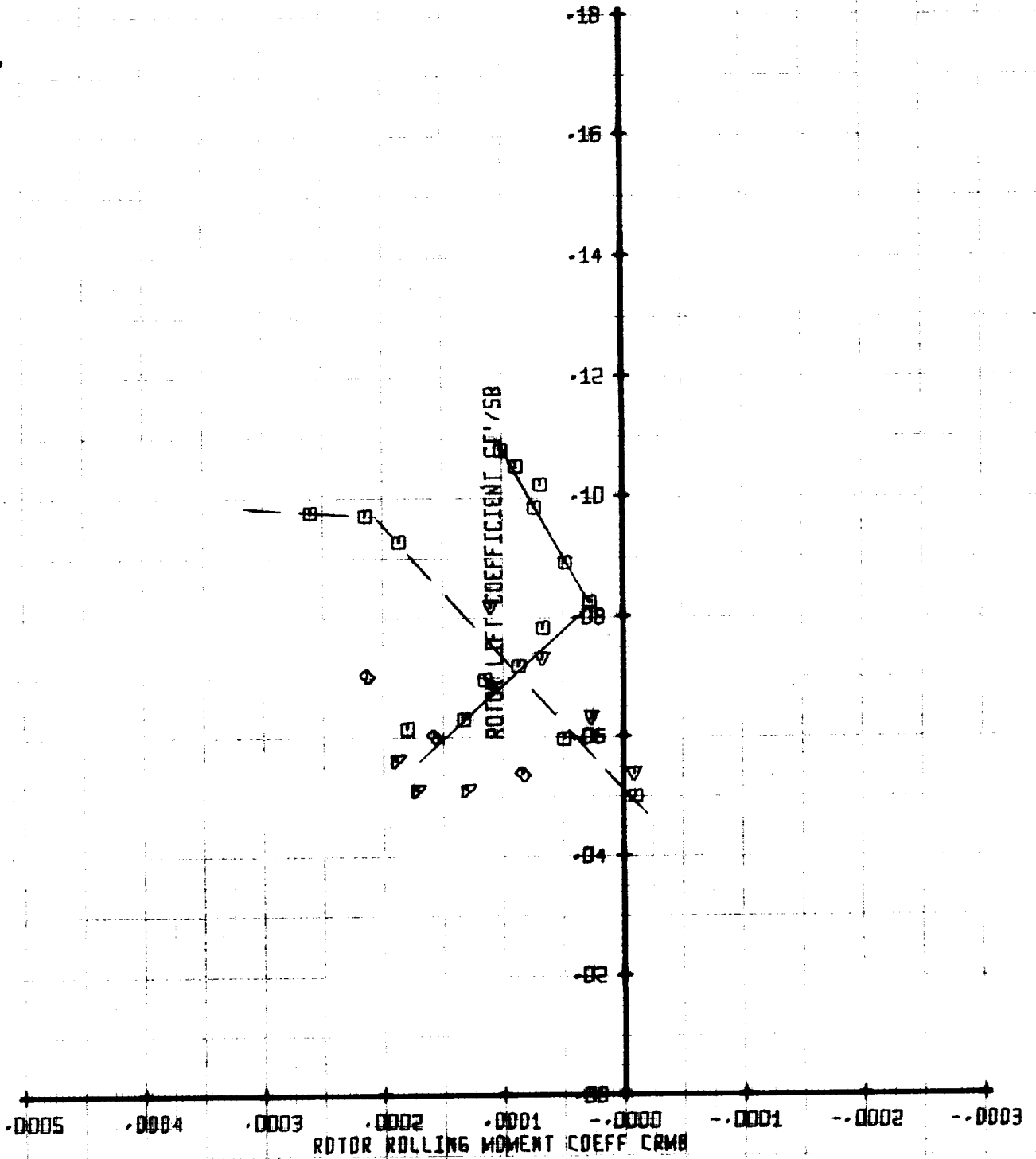
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/OD2SB	Y/LIN
□	224	.53	.05	320
◇	220	.53	.05	320
◇	221	.53	.05	320
▽	222	.53	.05	320

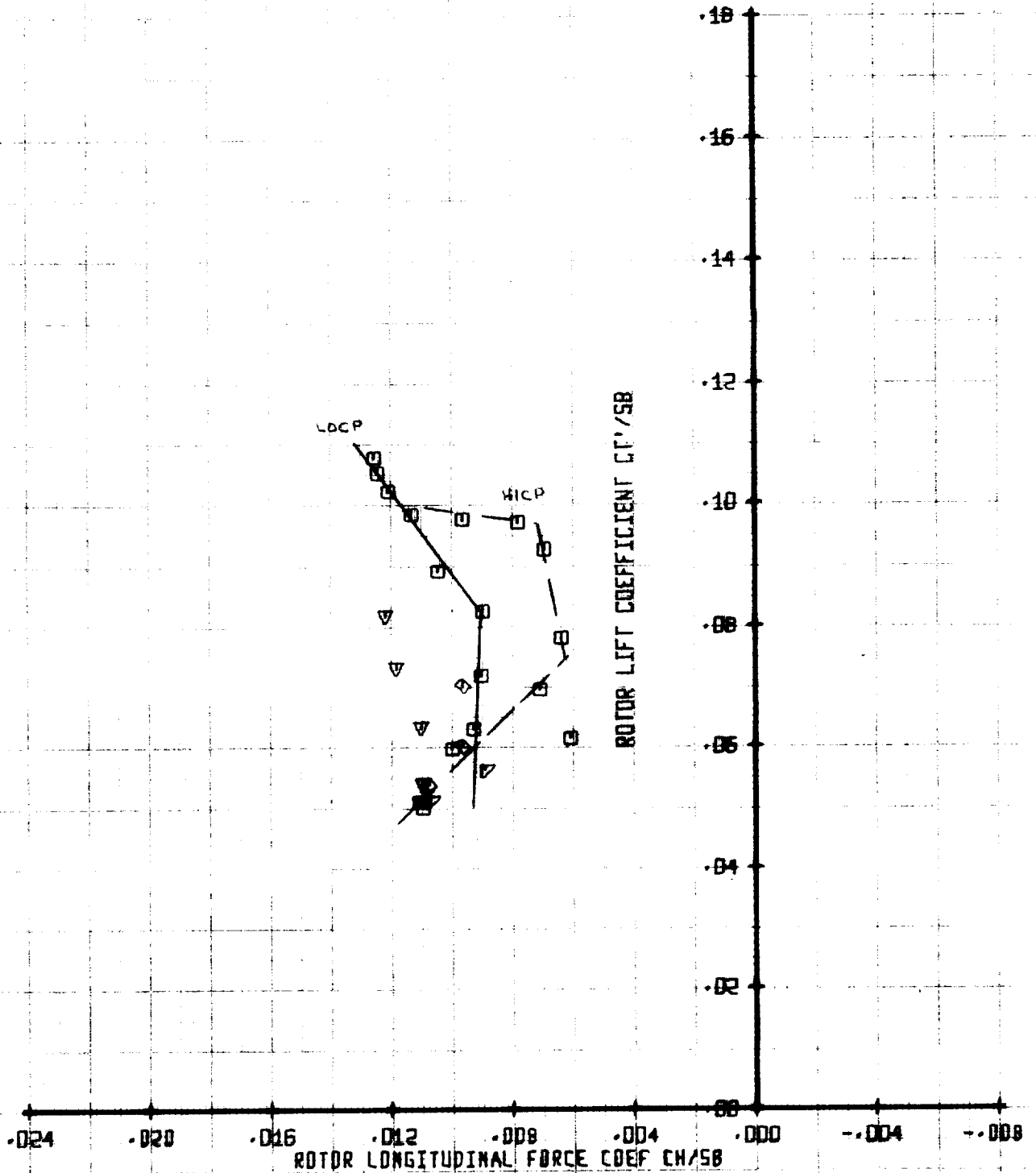
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU'	X/DD2SB	VTUN
□	224	.53	.05	328
▽	220	.53	.05	328
◇	221	.53	.05	328
▽	222	.53	.05	328

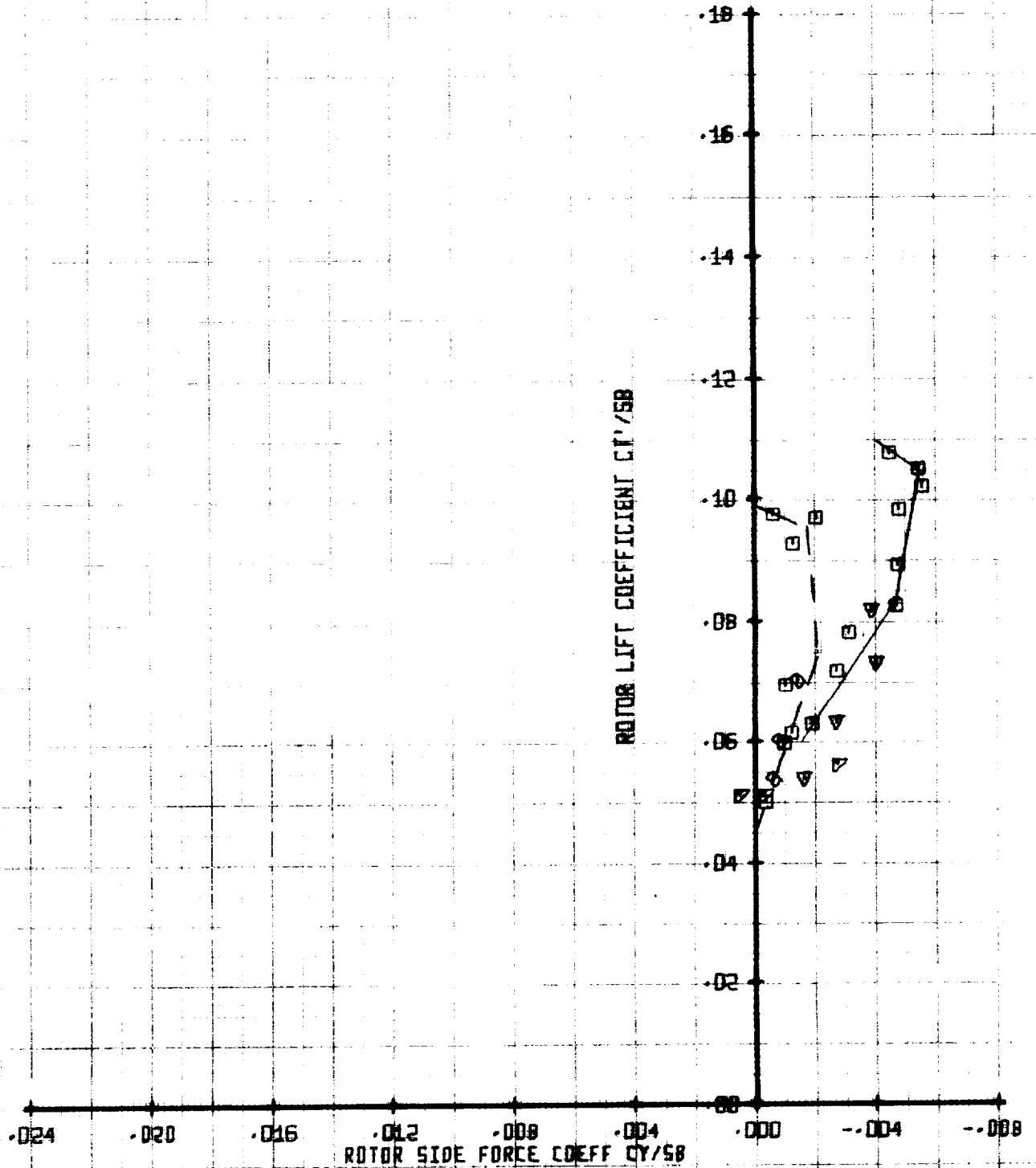
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		ML'	X/DD258	VTUN
SYM	RUN			
□	224	.53	.05	328
△	220	.53	.05	328
◇	221	.53	.05	328
▽	222	.53	.05	328

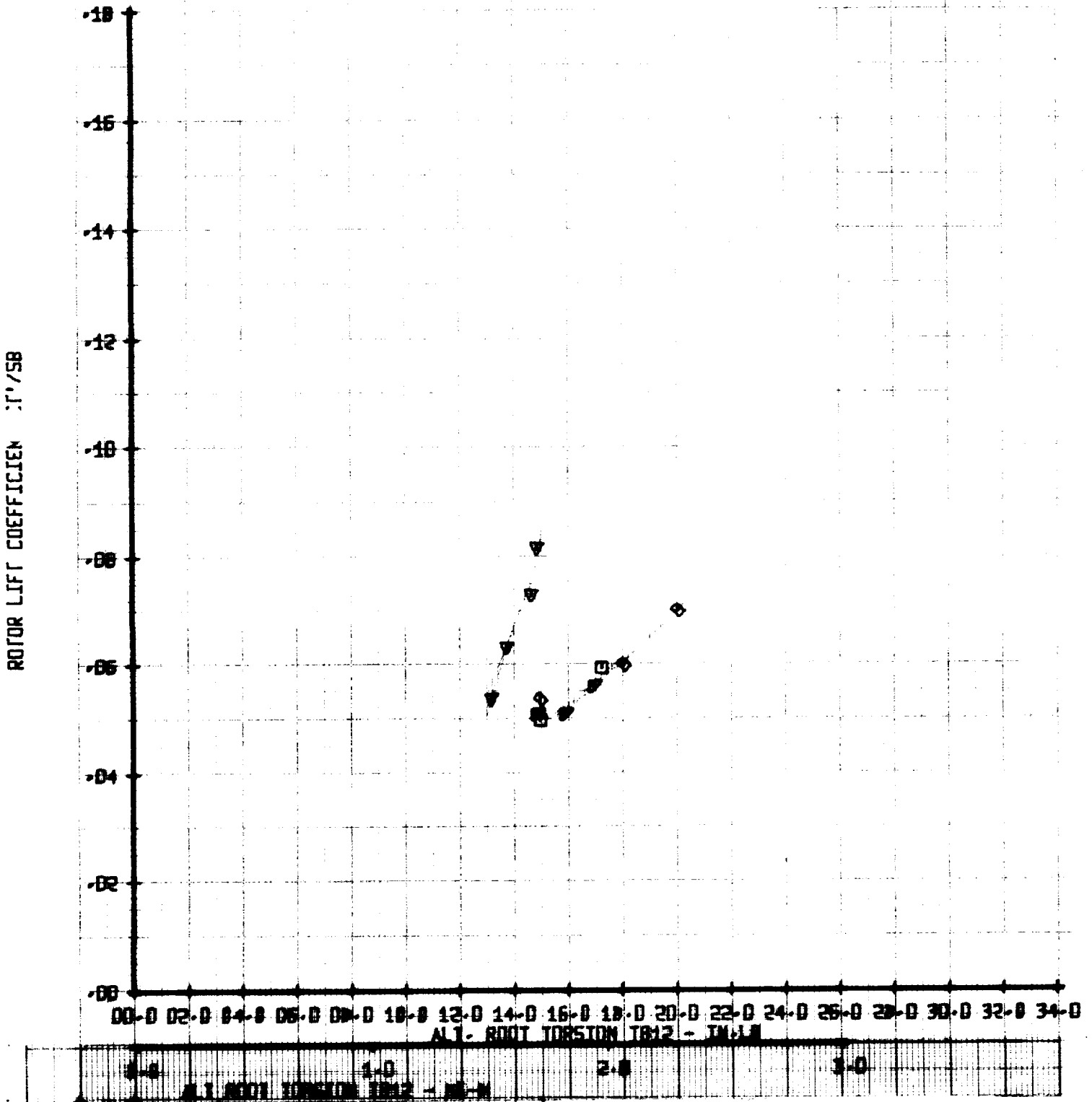
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYN		RUN		MU'		X/00258		VTUN	
□	224	□	224	□	.53	□	.05	□	328
○	220	○	220	○	.53	○	.05	○	328
△	221	△	221	△	.53	△	.05	△	328
▽	222	▽	222	▽	.53	▽	.05	▽	328

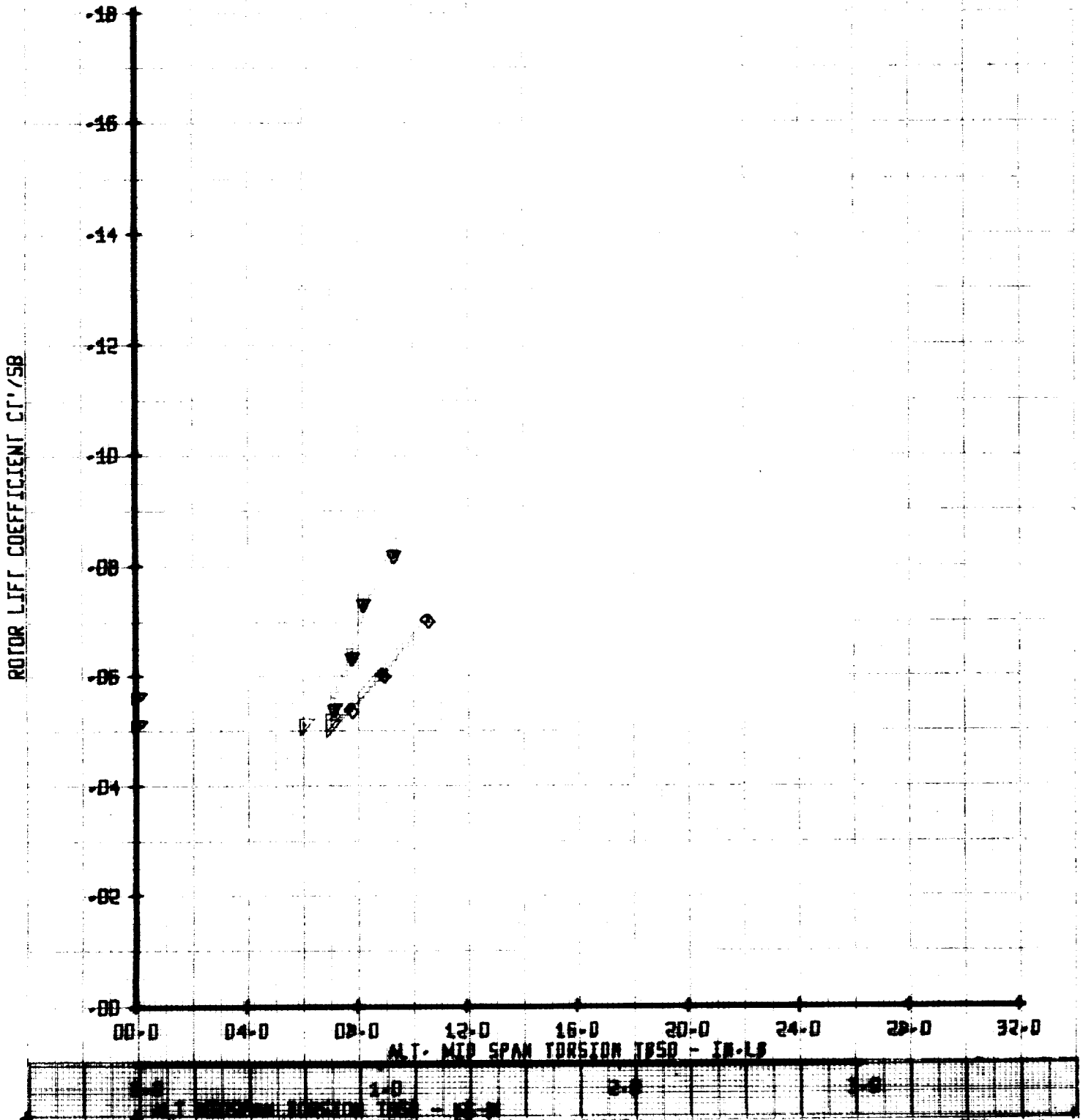
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MLP	X/00298	VTUN
○	RUN 224	.53	.05	320
△	220	.53	.05	320
◆	221	.53	.05	320
▼	222	.53	.05	320

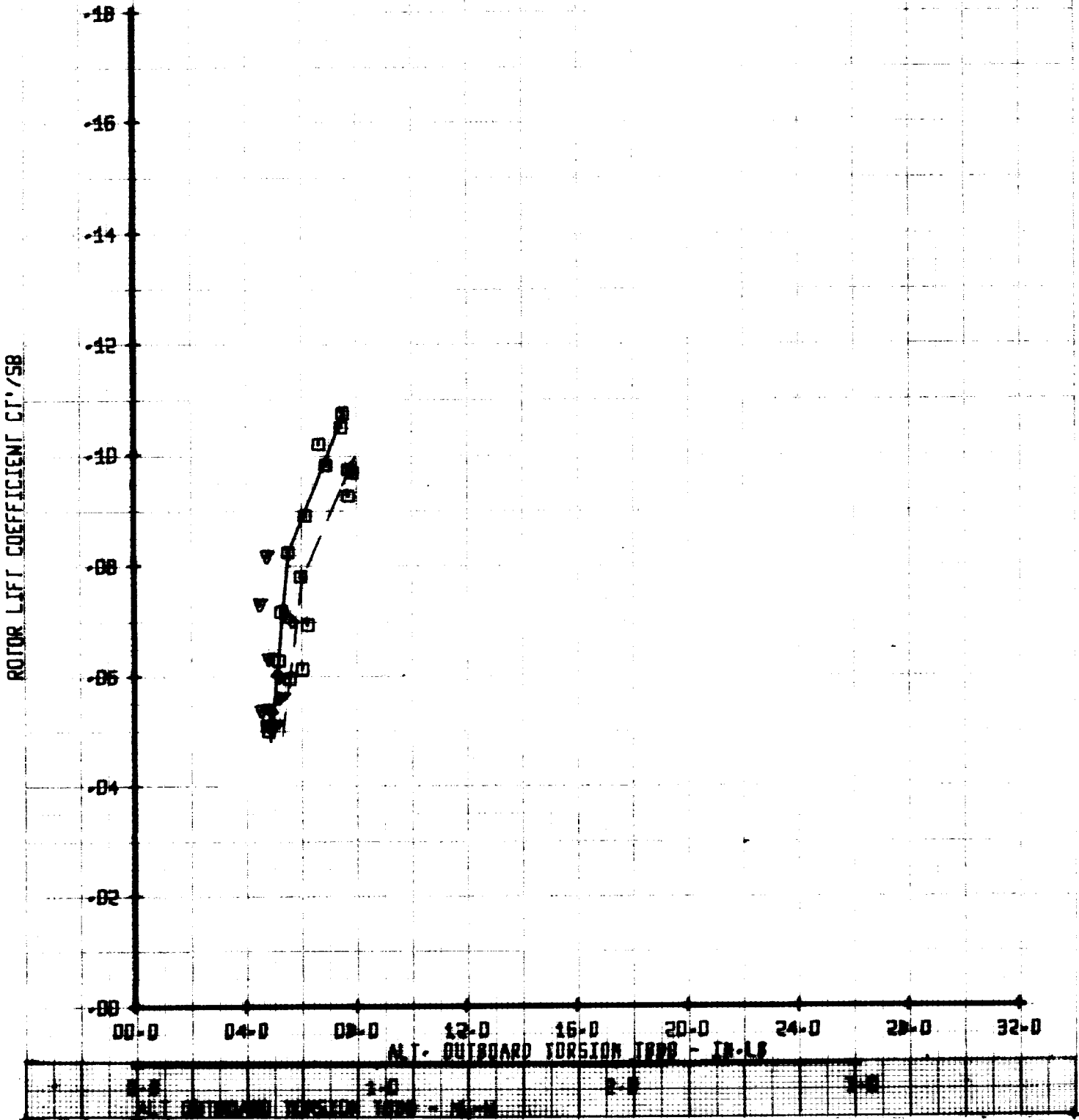
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MLT	X/00298	VTUN
○	224	.53	.05	320
△	220	.53	.05	320
◇	221	.53	.05	320
▽	222	.53	.05	320

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB80



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/DB2SB	Y/DIN	
□	224	.53	.05	3.0	
▽	220	.53	.05	3.0	
◇	221	.53	.05	3.0	
▼	222	.53	.05	3.0	

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12

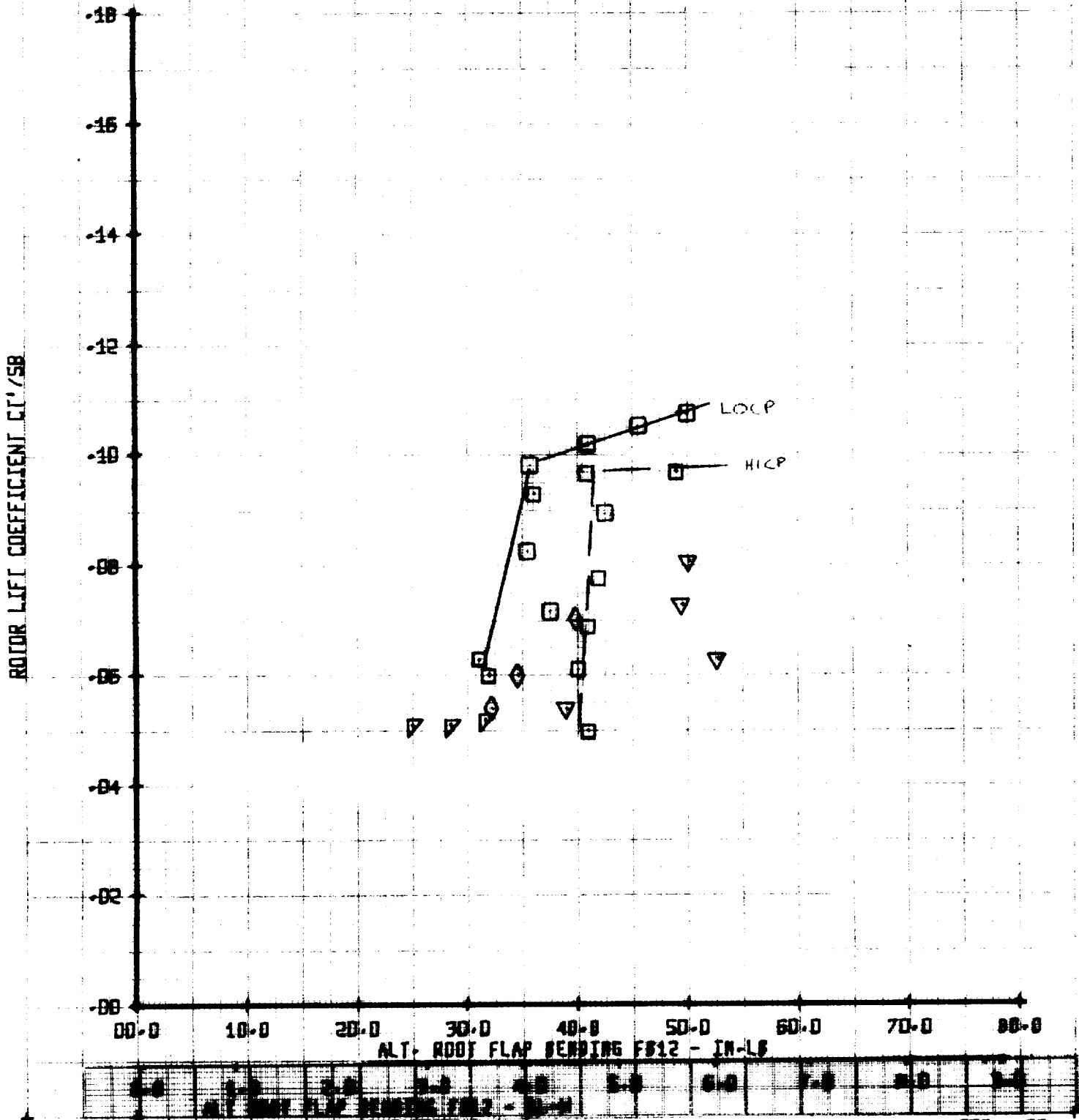
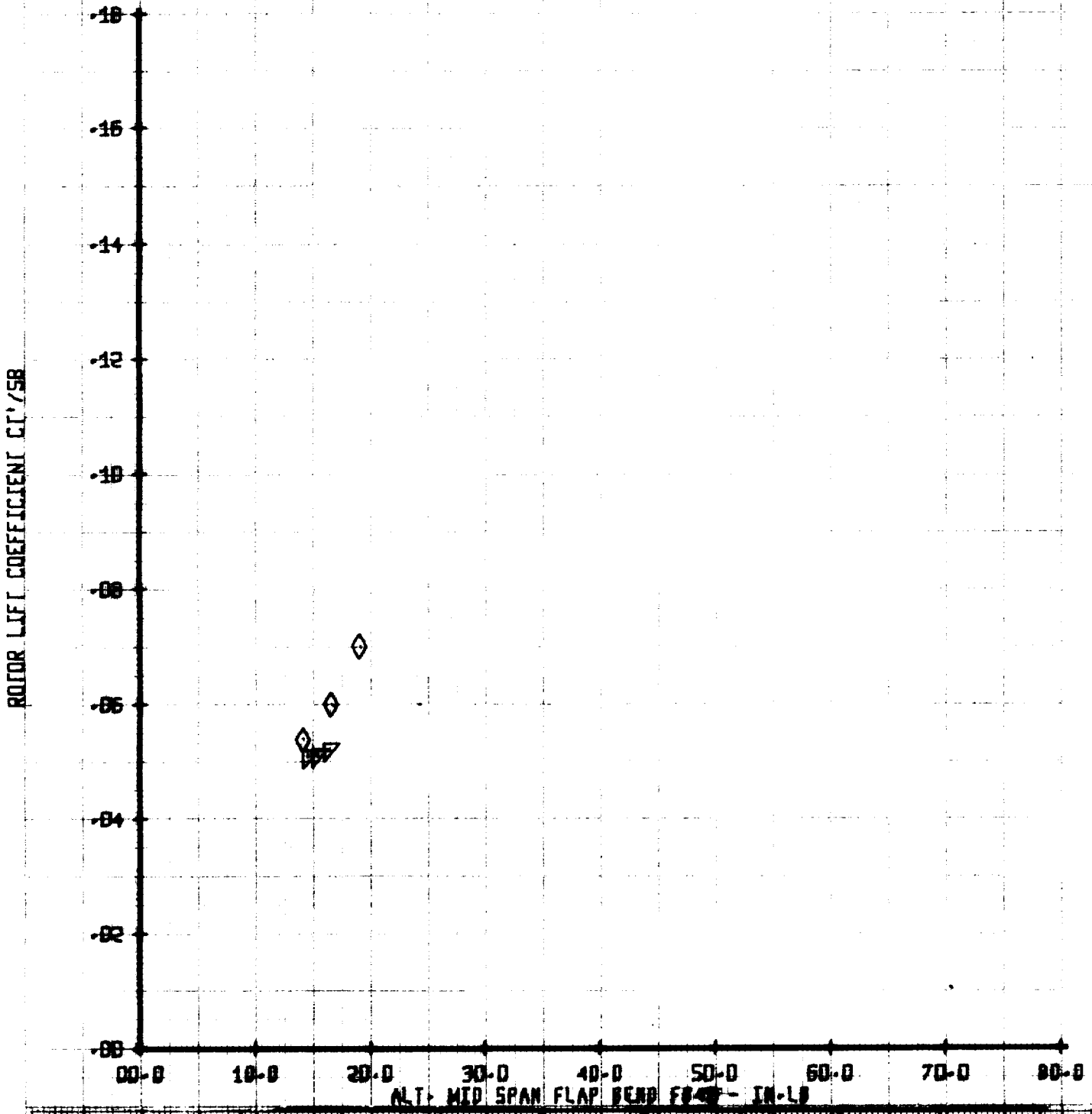


Figure A-219

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	Y/TUN
□	224	.53	.05	328
△	220	.53	.05	328
◇	221	.53	.05	328
▲	222	.53	.05	328

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BENDING FB4

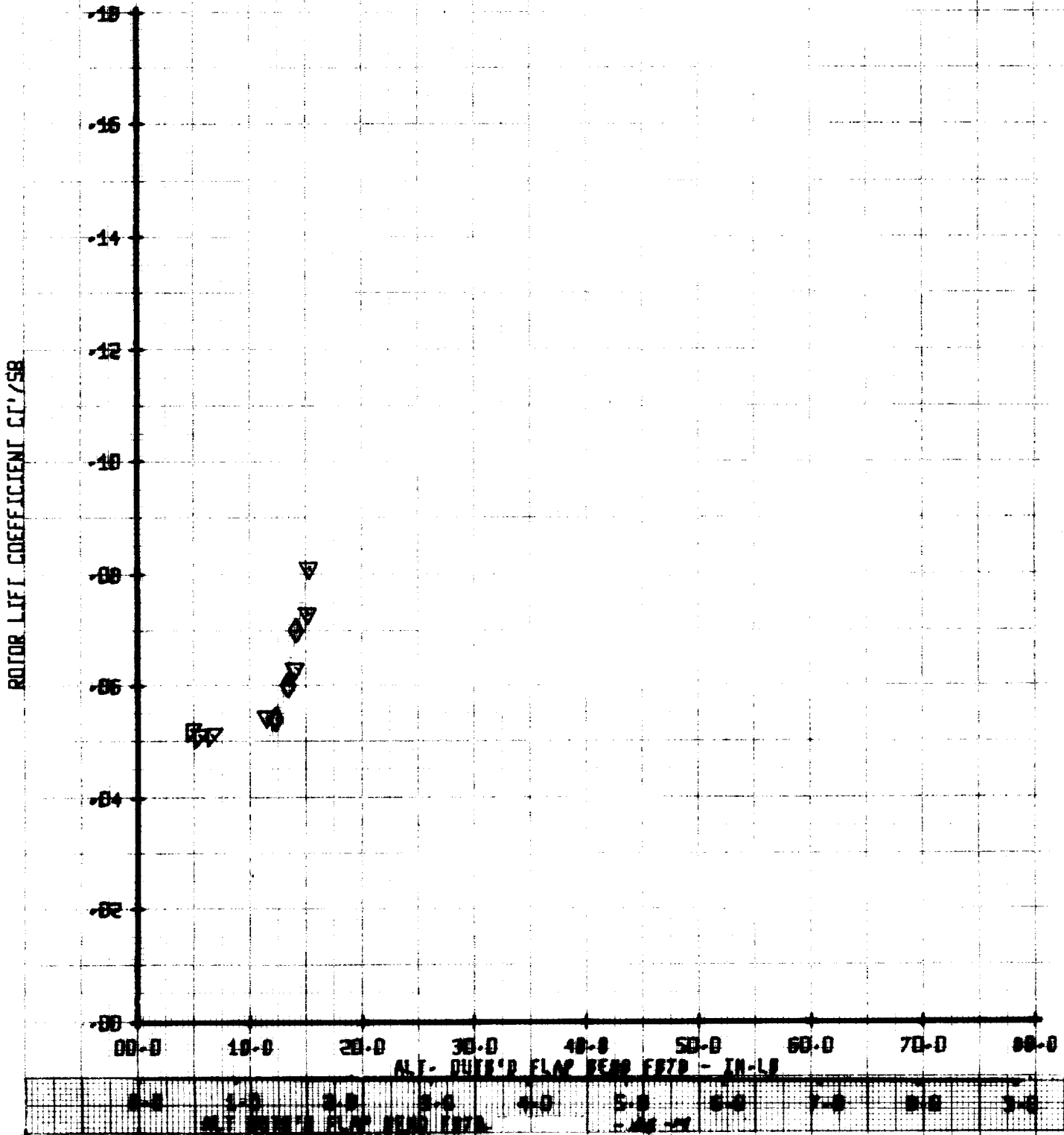


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/00258	VTUN
□	224	.53	.05	320
△	220	.53	.05	320
◇	221	.53	.05	320
▽	222	.53	.05	320

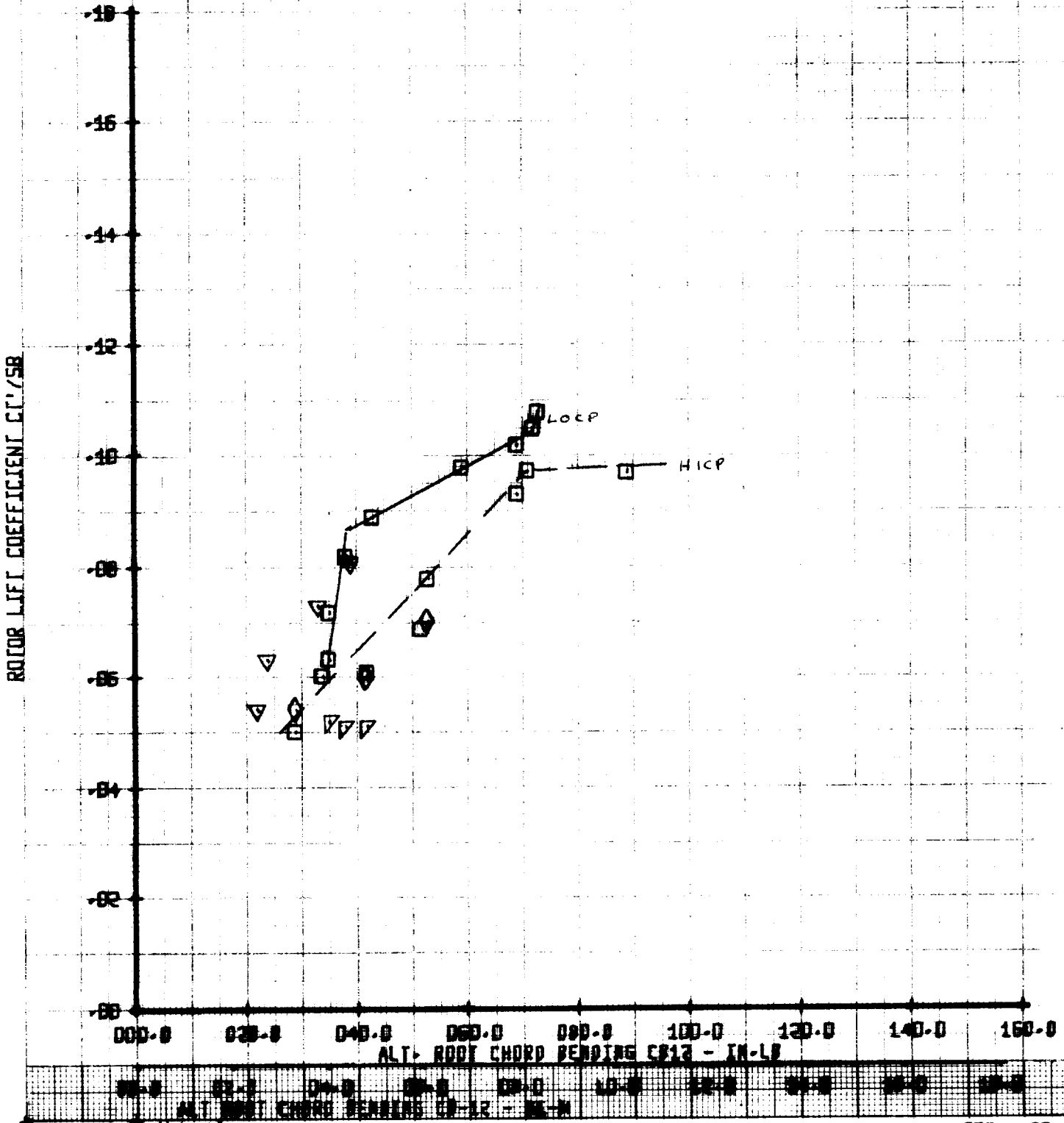
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB78



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MLI	X/D0298	Y/TIN
□	224	.53	.05	320
△	220	.53	.05	320
◇	221	.53	.05	320
▽	222	.53	.05	320

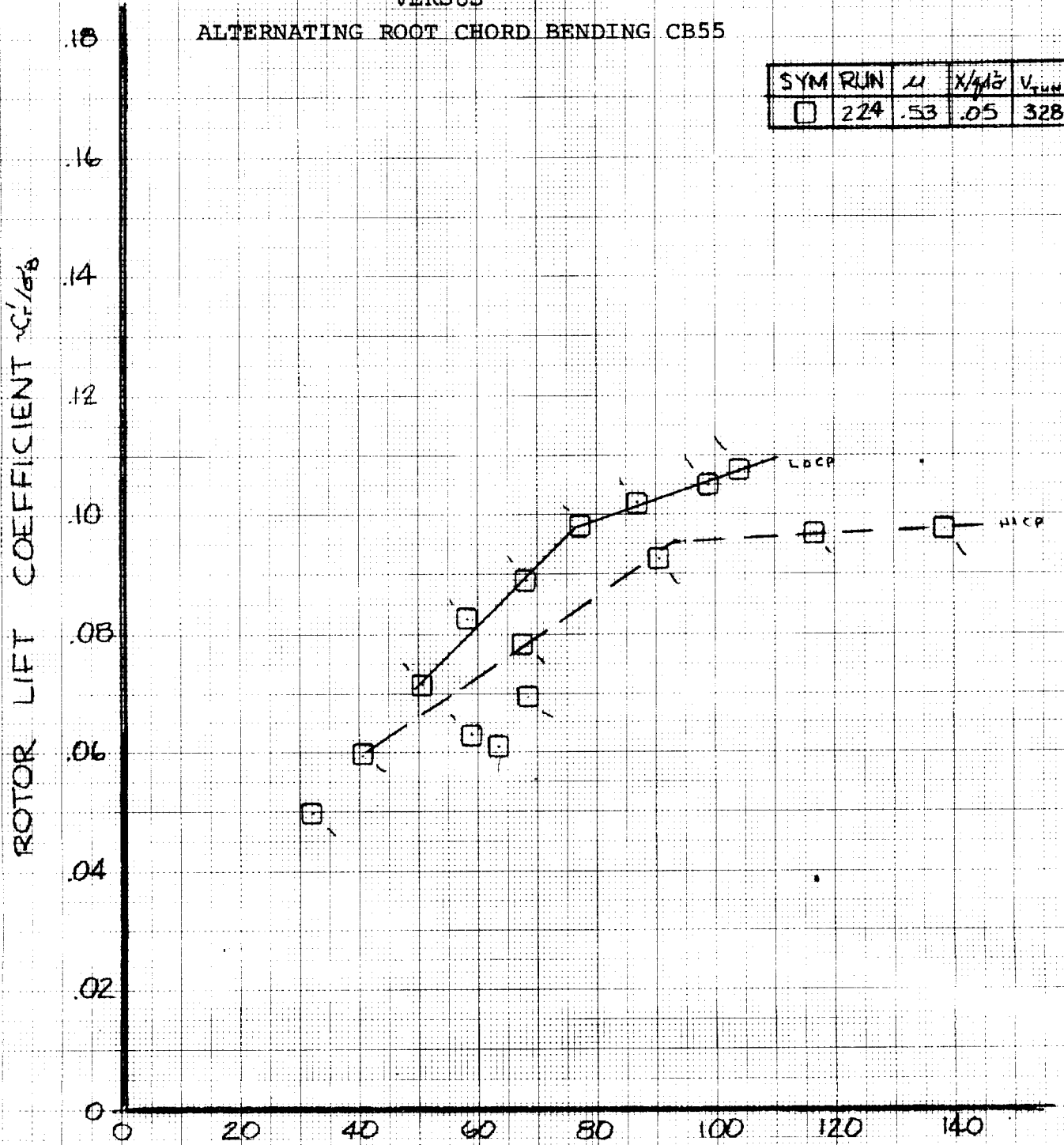
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
1/10 SCALE CH-47B ROTOR
LIFT LIMIT TESTING

ROTOR LIFT COEFFICIENT
VERSUS
ALTERNATING ROOT CHORD BENDING CB55

SYM	RUN	U	X/MR	V _{run}
□	224	.53	.05	328



DIETZGEN CORPORATION
MADE IN U.S.A.

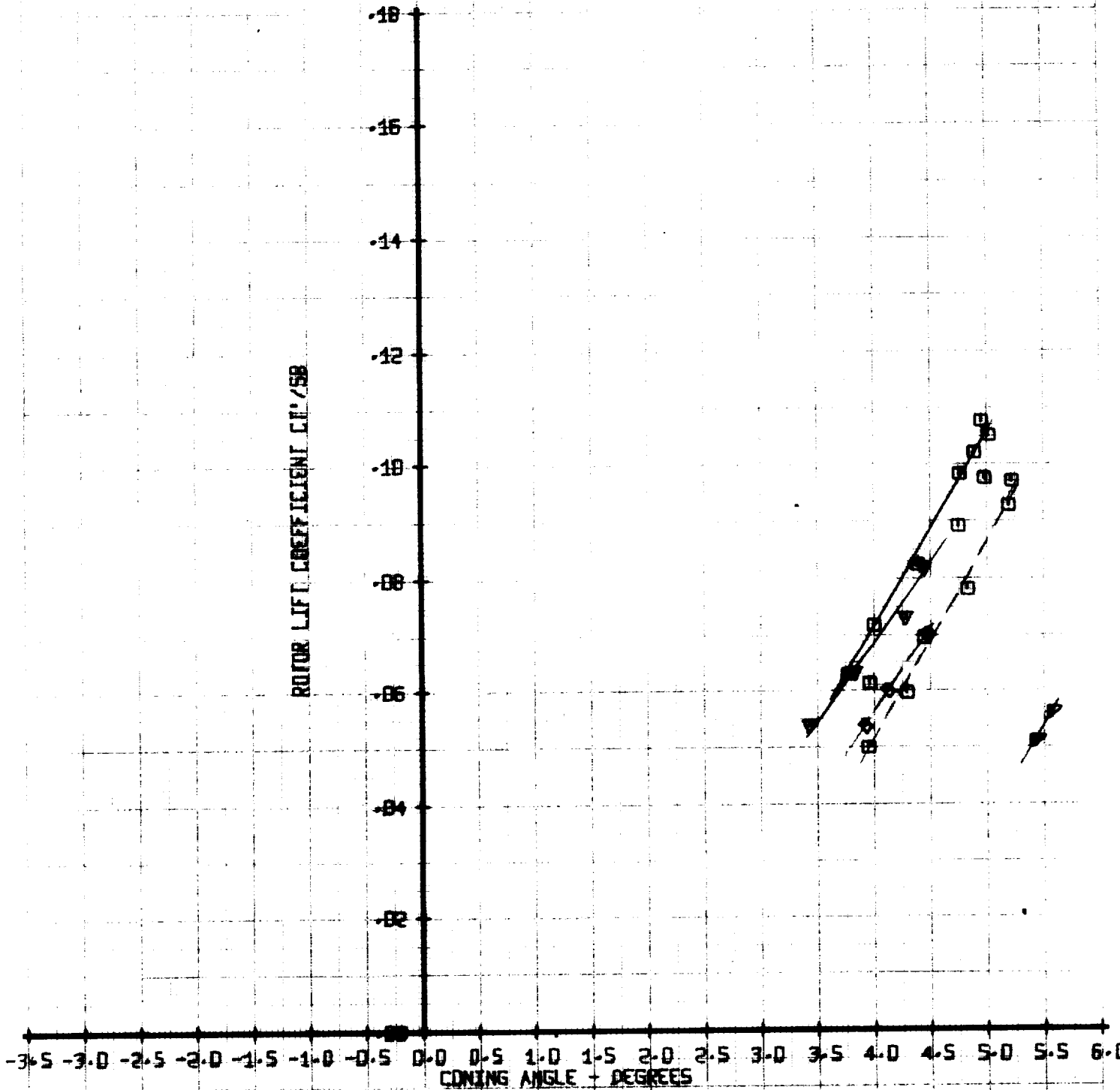
NO. 340R-MP DIETZGEN GRAPH PAPER
MILLIMETER

ALY CHORD BENDING CB55 - INCH									
00.0	02.0	04.0	06.0	08.0	10.0	12.0	14.0	16.0	18.0
ALY MID SPAN CHORD CB55 - INCH									
SHEET									

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	ML'	X/00258	YTUN
▲	222	.53	.05	320
◆	221	.53	.05	320
◇	224	.53	.05	320
□	222	.53	.05	320

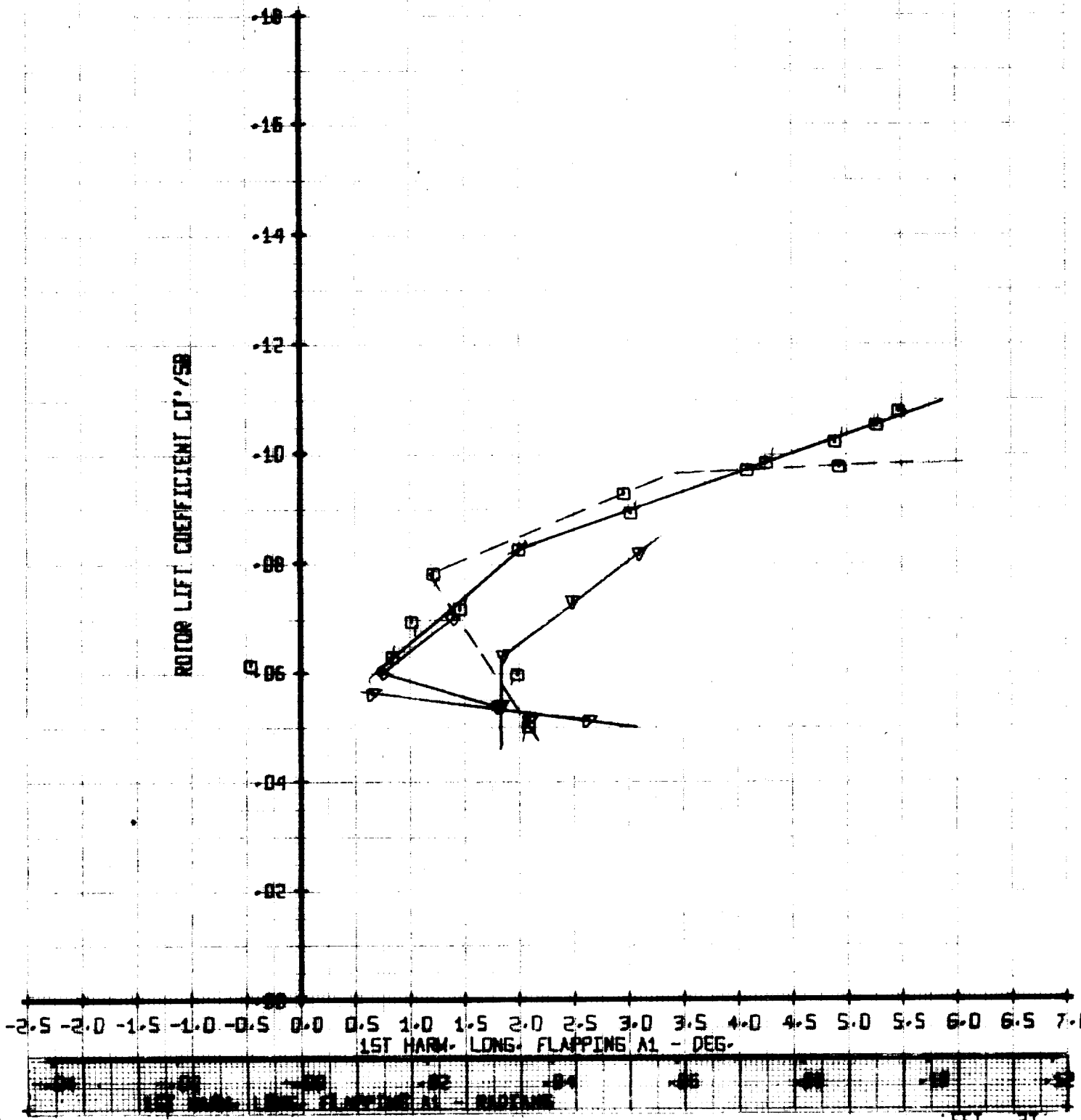
ROTOR LIFT COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/RO258	YTLN
□	224	.53	.05	328
△	220	.53	.05	328
◇	221	.53	.05	328
▽	222	.53	.05	328

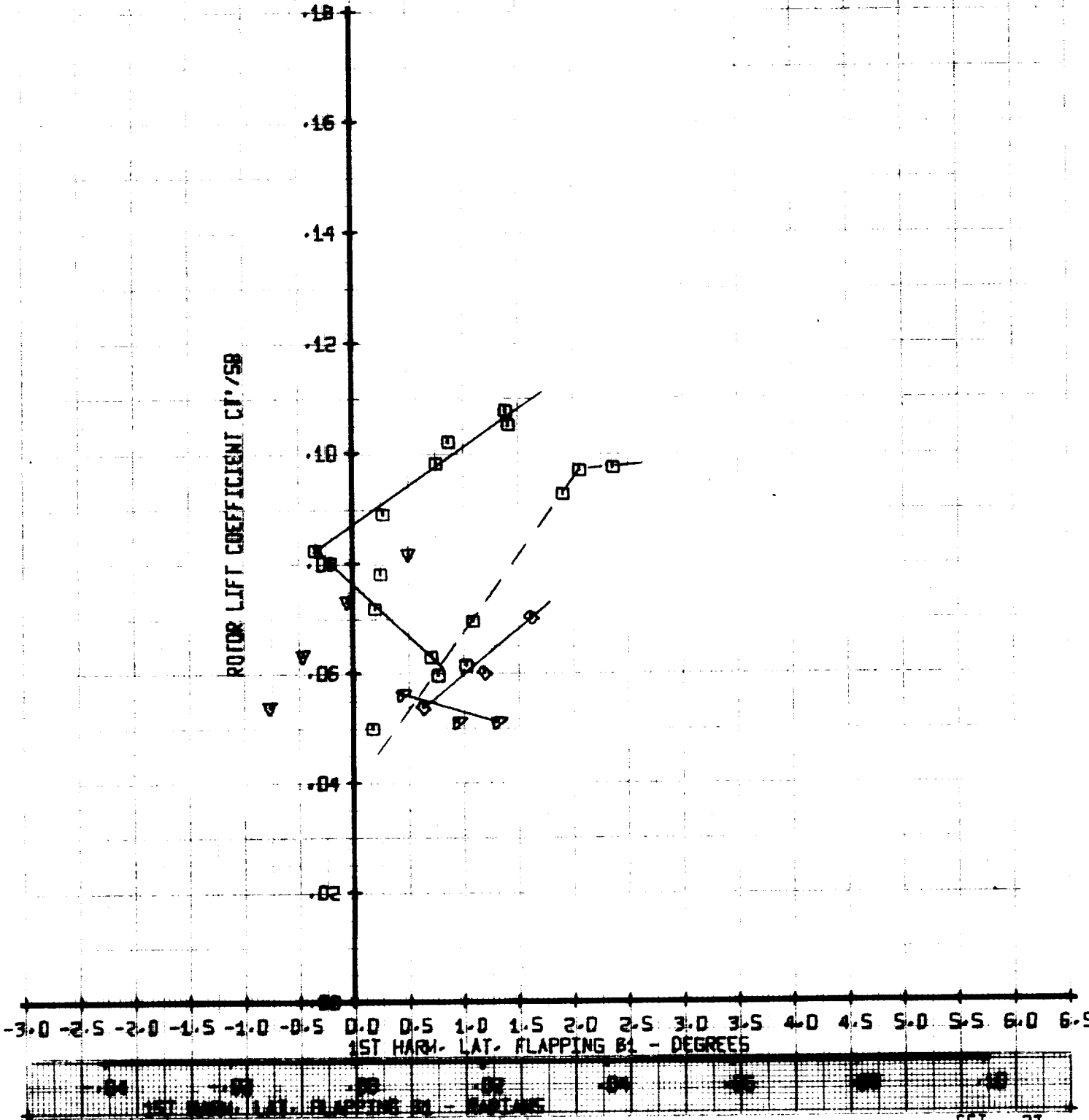
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	REV	MLI'	X/DD2SB	YTLIN
□	224	.53	.05	328
◇	220	.53	.05	328
△	221	.53	.05	328
▽	222	.53	.05	328

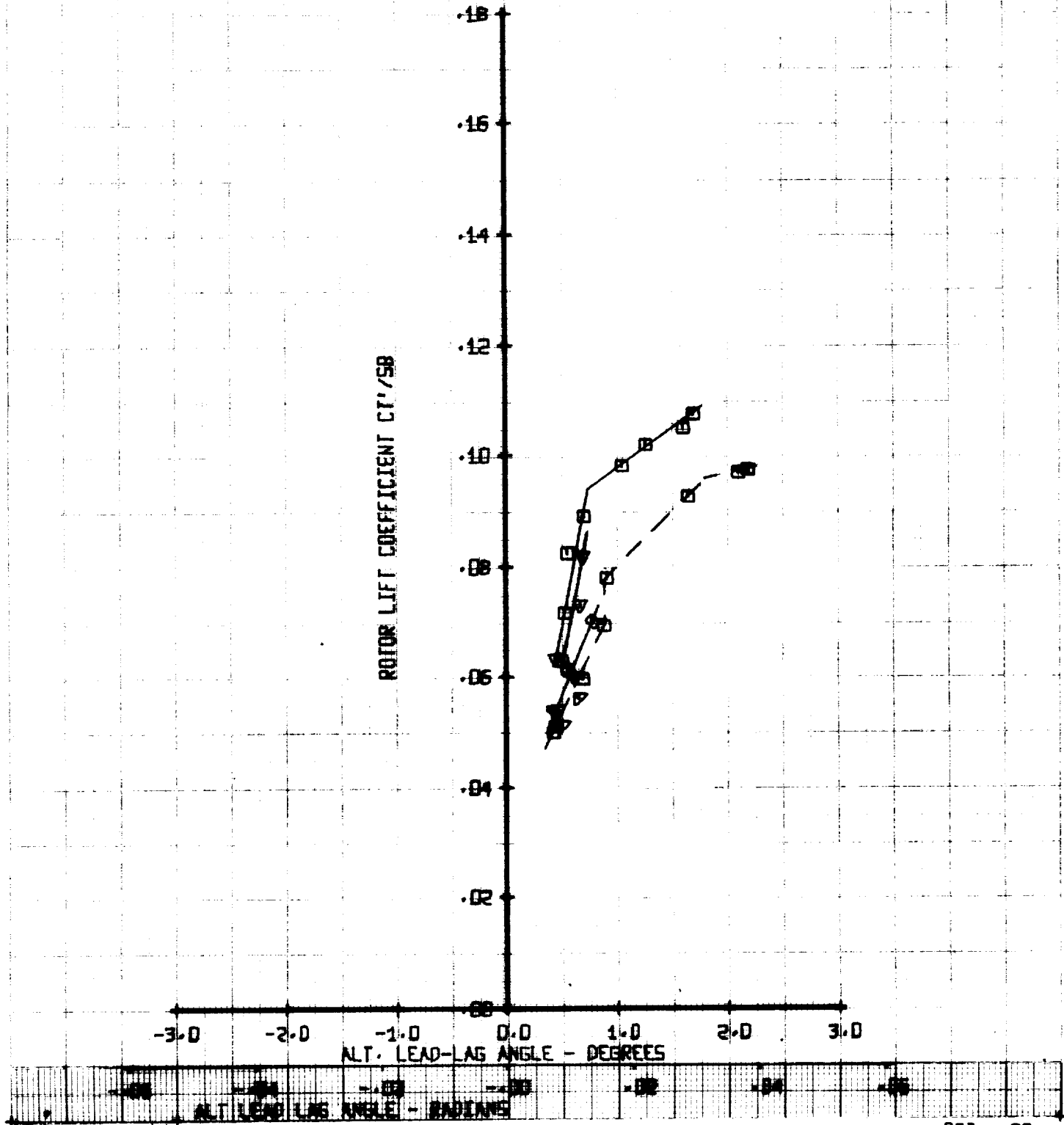
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	Y/TUN
□	224	.53	.05	330
△	220	.53	.05	330
◇	221	.53	.05	330
▽	222	.53	.05	330

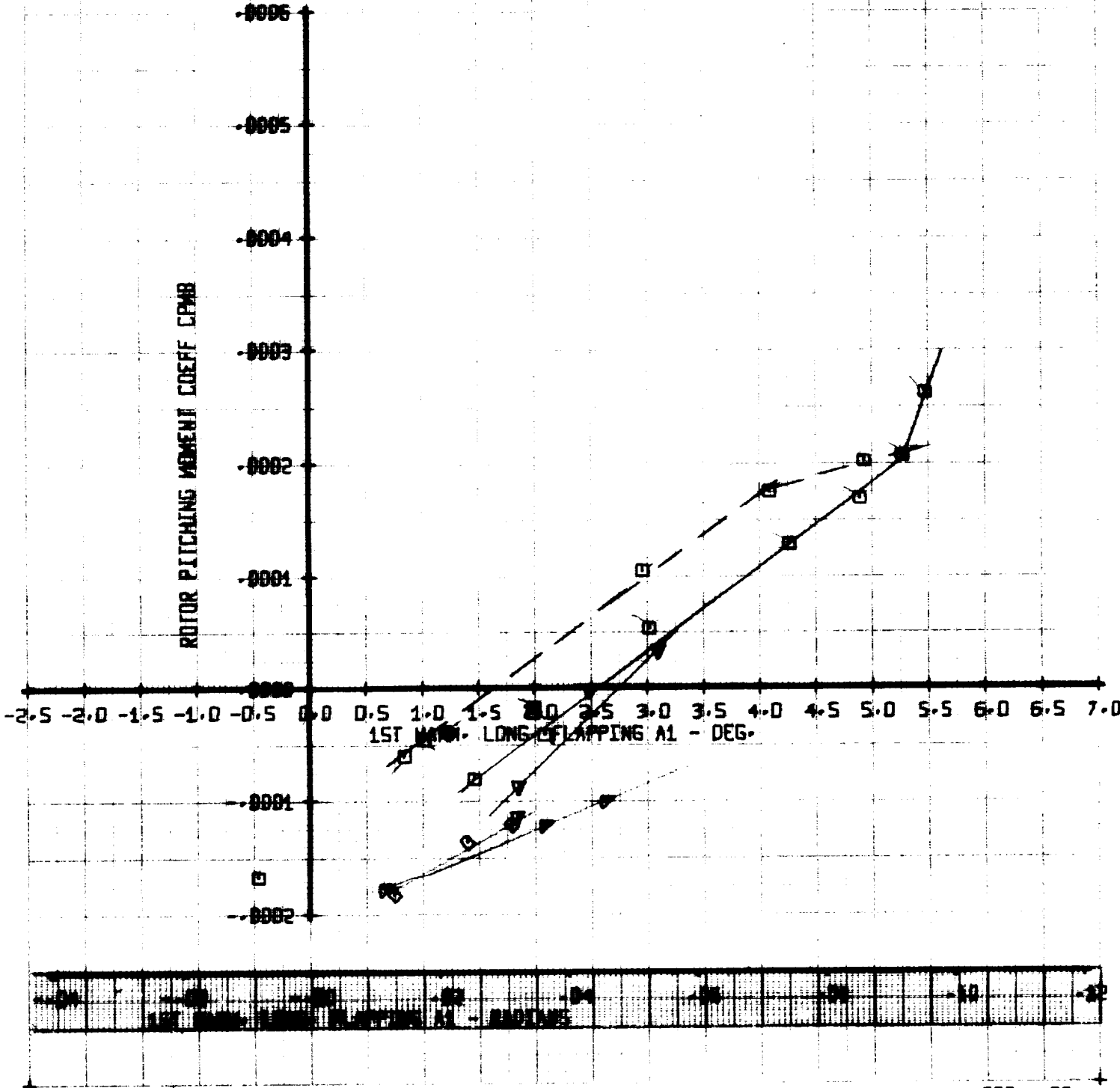
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	BLIN	MLI'	X/DD258	YTLIN
□	224	.53	.05	328
△	220	.53	.05	328
◇	221	.53	.05	328
▽	222	.53	.05	328

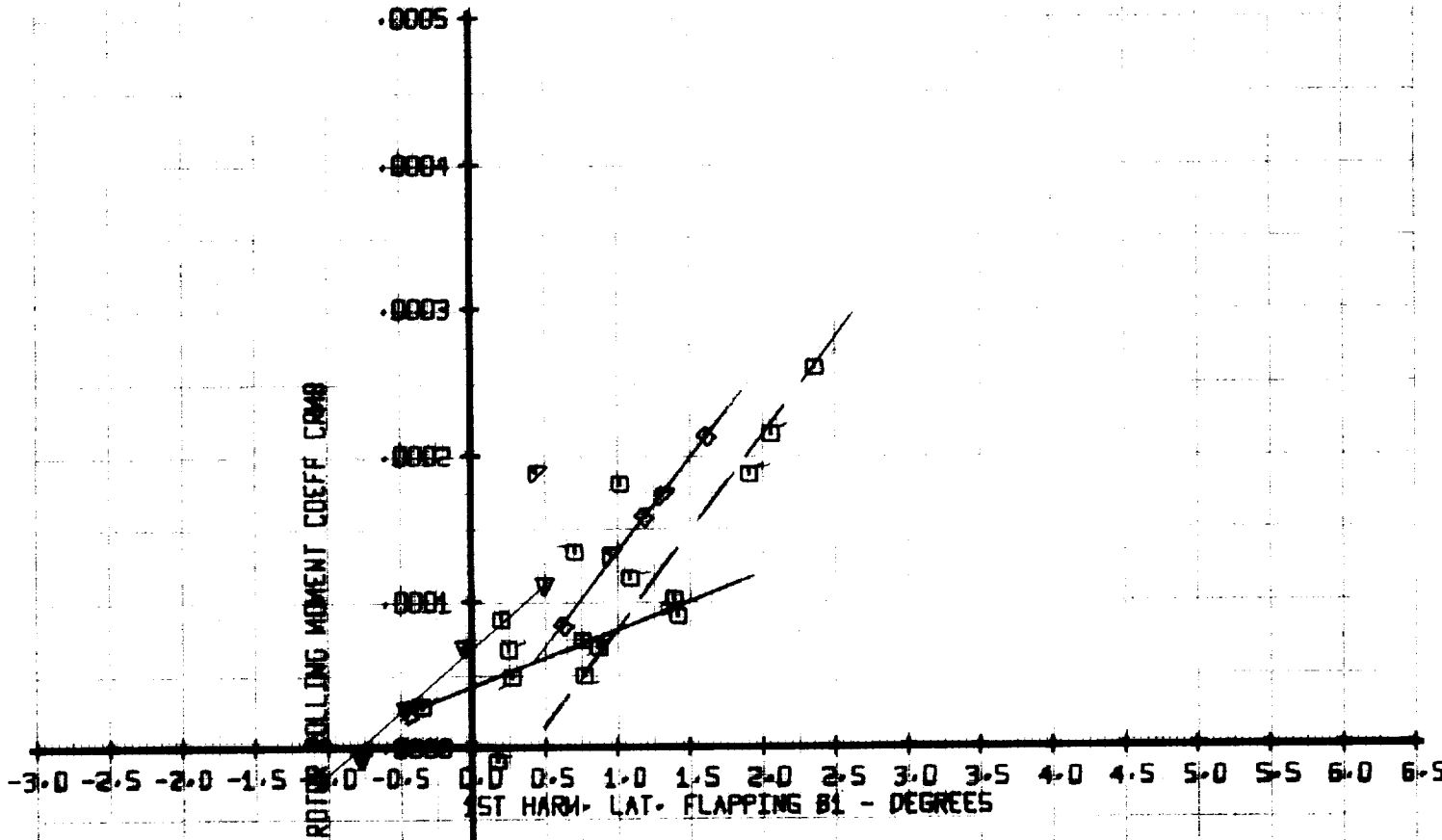
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MLI'	X/QD2SB	YTLN
SYM	BLN	.53	.05	328
□	222	.53	.05	328
△	222	.53	.05	328
◇	222	.53	.05	328
▽	222	.53	.05	328

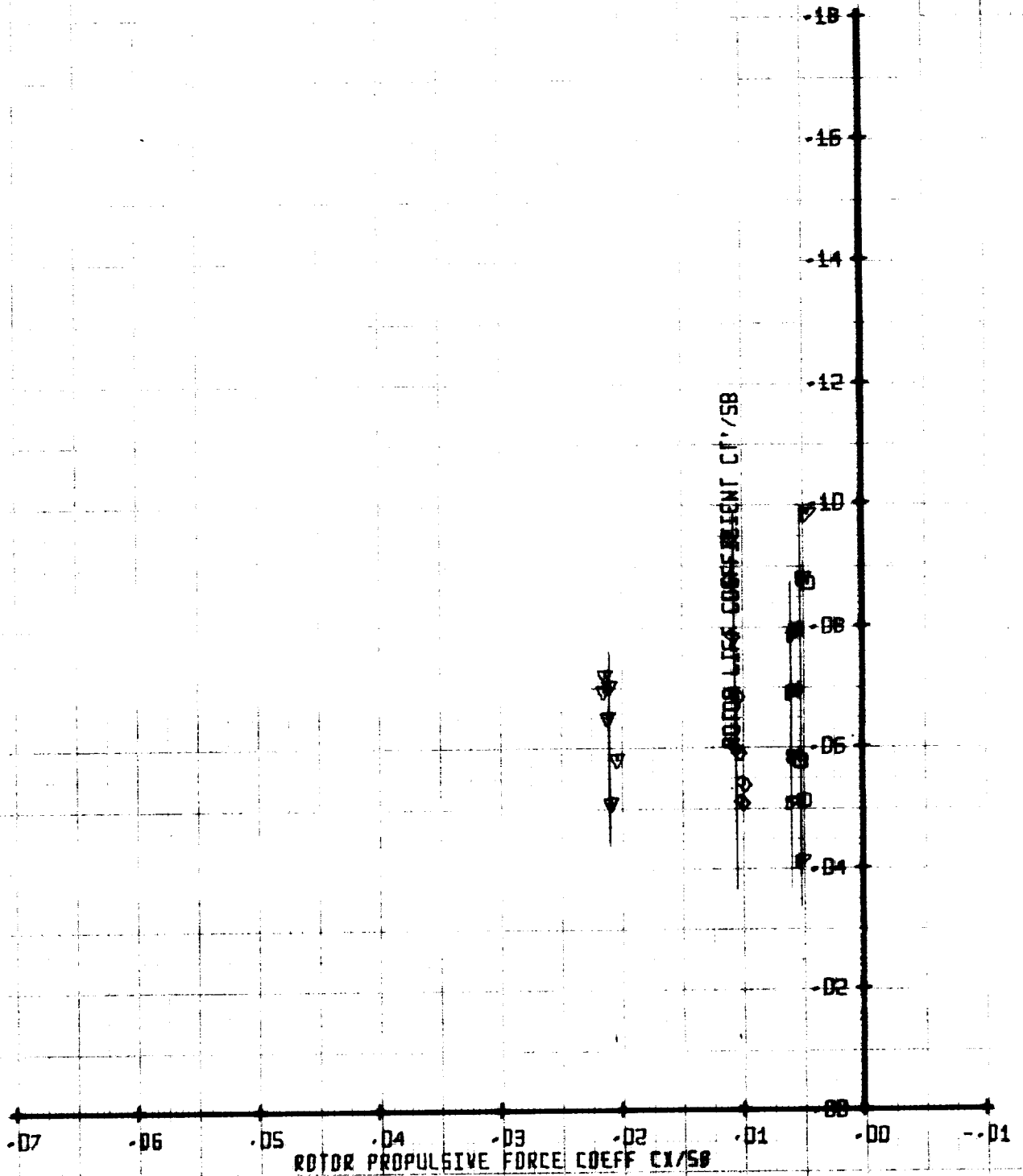
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MJ'	X/00258	VTIN
□	246	.57	.025	358
▽	249	.57	.025	358
◇	228	.57	.05	358
△	245	.57	.10	358

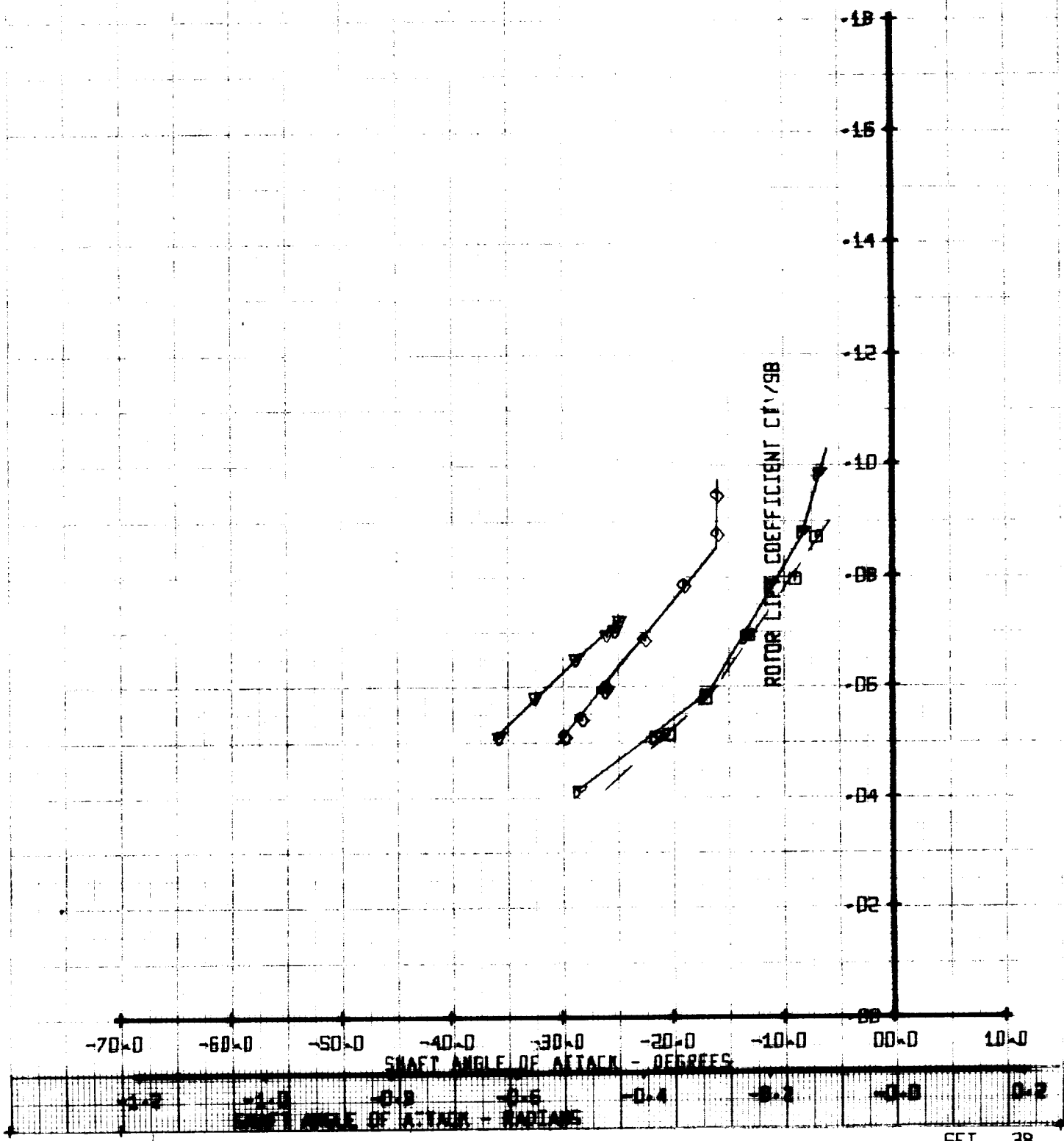
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	ML'	X/00298	VLIN	
○	246	.57	.025	353	
△	249	.57	.025	353	
◇	228	.57	.05	353	
▽	245	.57	.10	353	

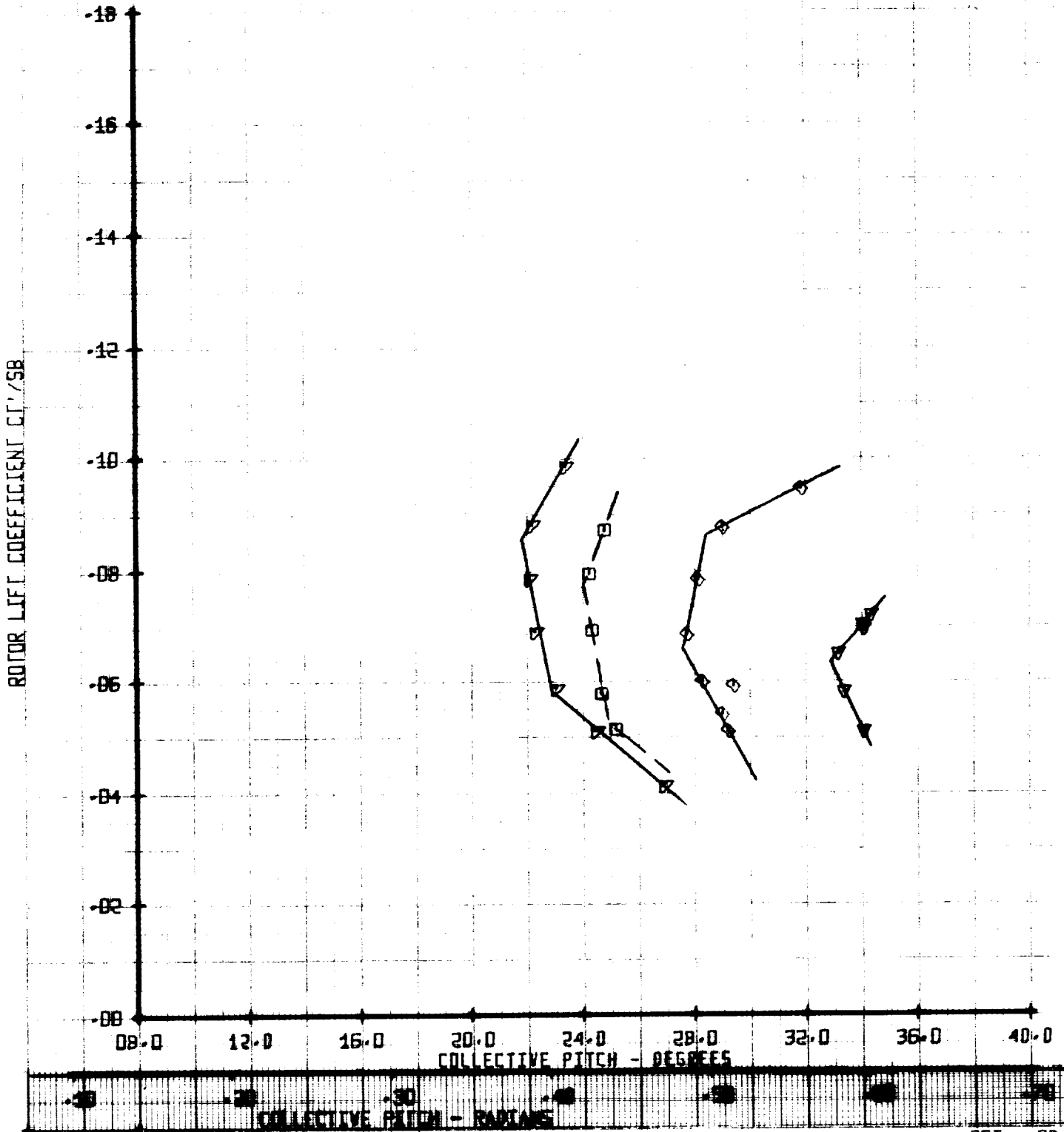
ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10-SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	ML'	X/OD2SB	VTUN
□	246	.57	.025	353
▽	249	.57	.025	353
◇	228	.57	.05	353
▽	245	.57	.10	353

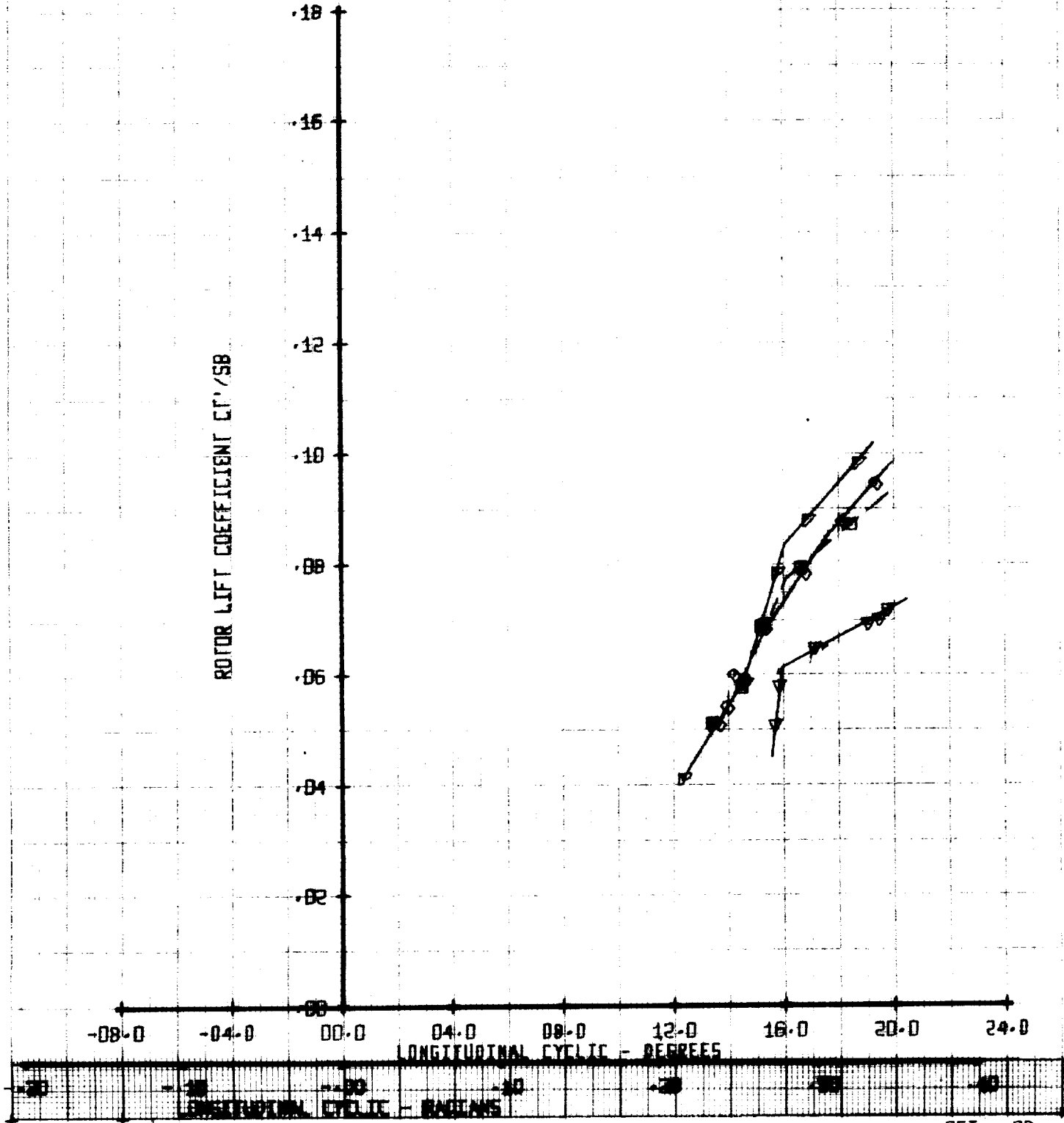
ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MU'	X/DD298	VTUN
□	246	.57	.025	353
△	249	.57	.025	353
◇	228	.57	.05	353
▽	245	.57	.10	353

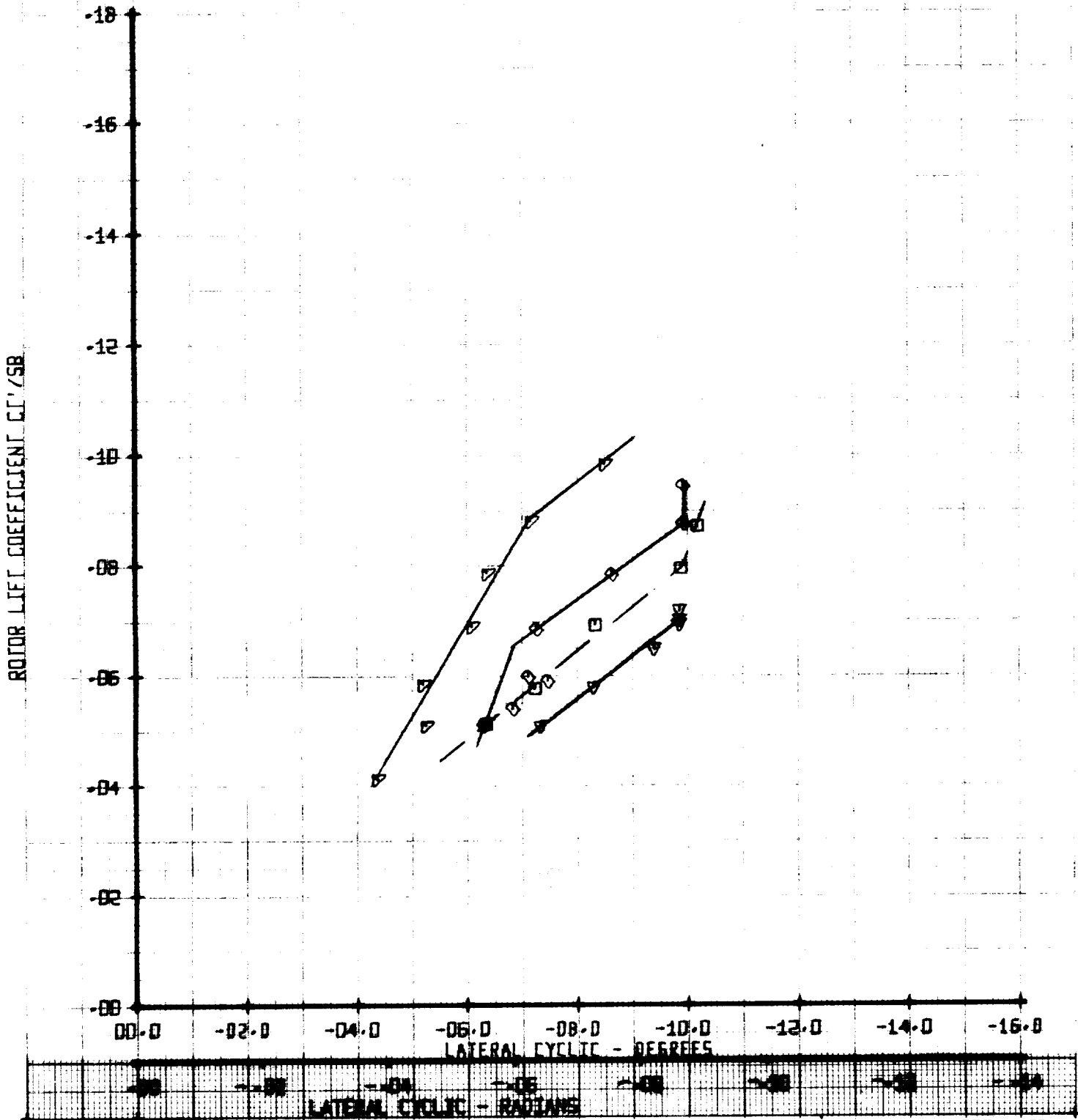
ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		ML'	X/DD258	YTUN
SYM	RUN			
□	246	.57	.025	353
▤	249	.57	.025	353
◊	228	.57	.05	353
▽	245	.57	.10	353

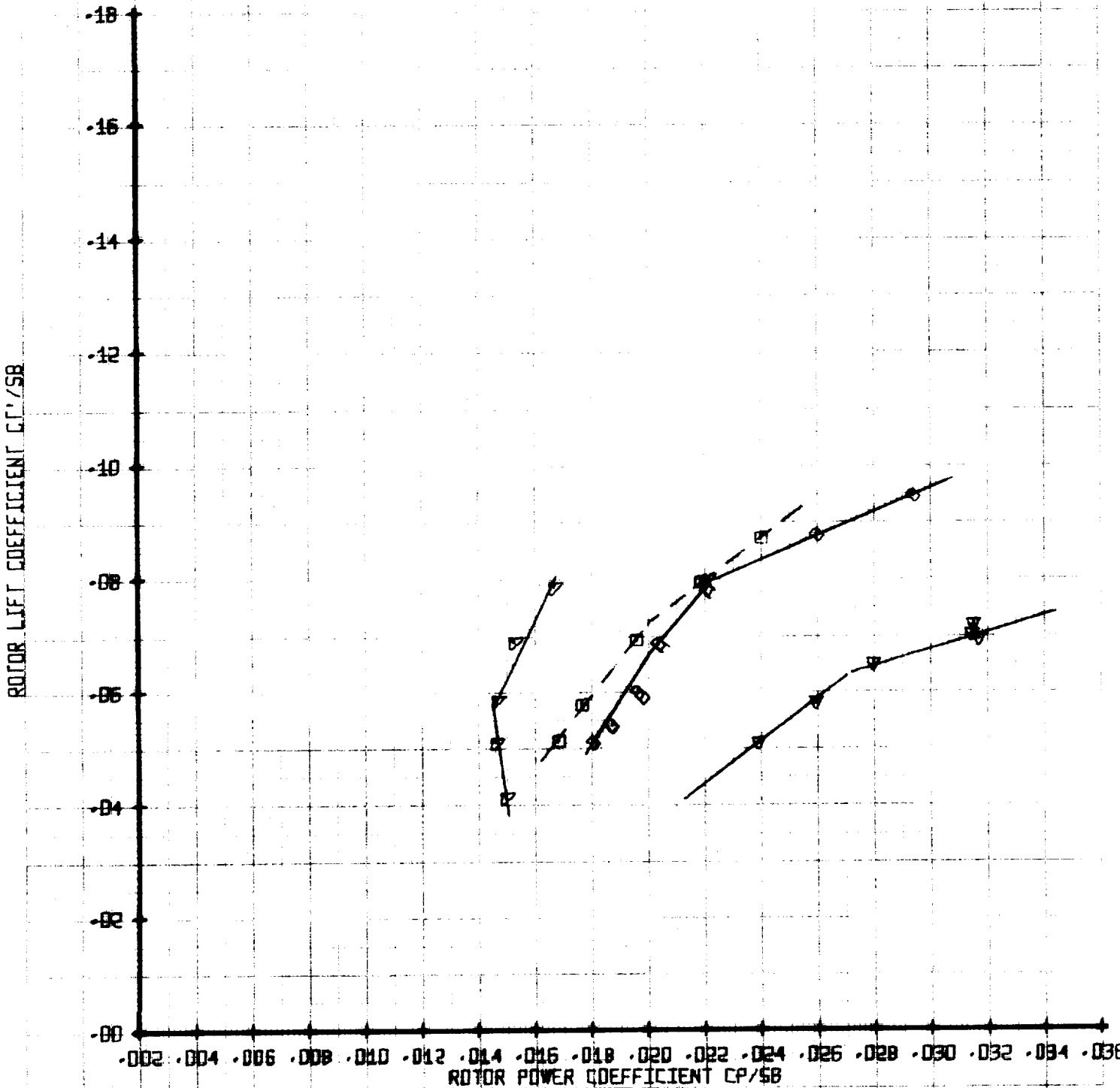
ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	YTUN
□	246	.57	.025	353
▽	249	.57	.025	353
◇	228	.57	.05	353
▽	245	.57	.10	353

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT

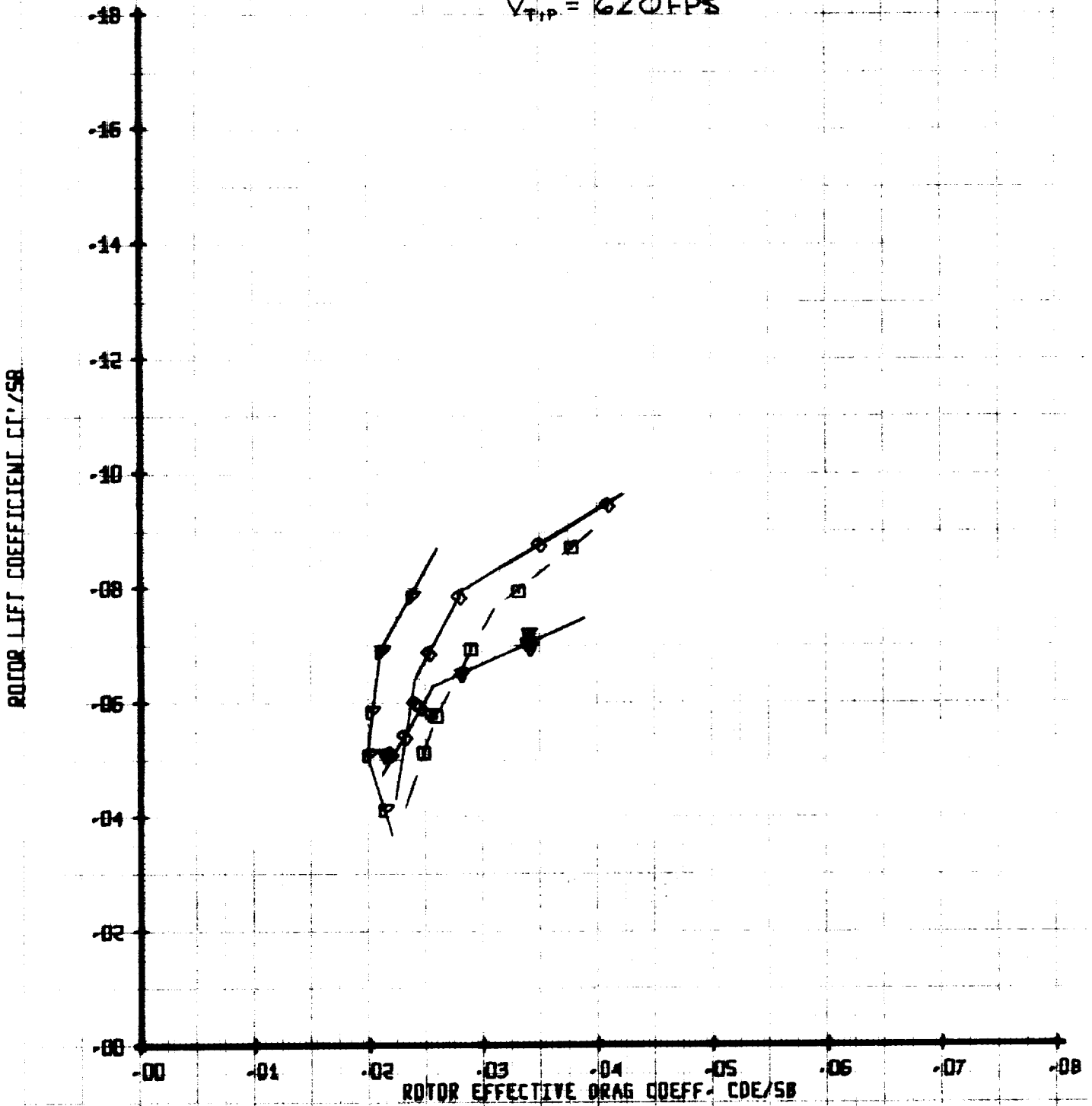


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/00258	YTUN
□	246	.57	.025	353
▲	249	.57	.025	353
◇	248	.57	.05	353
△	245	.57	.10	353

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT

$V_{TIP} = 620 \text{ FPS}$



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/00258	VIUN
□	246	.57	.025	353
▽	249	.57	.025	353
◇	228	.57	-.05	353
▽	245	.57	.10	353

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT

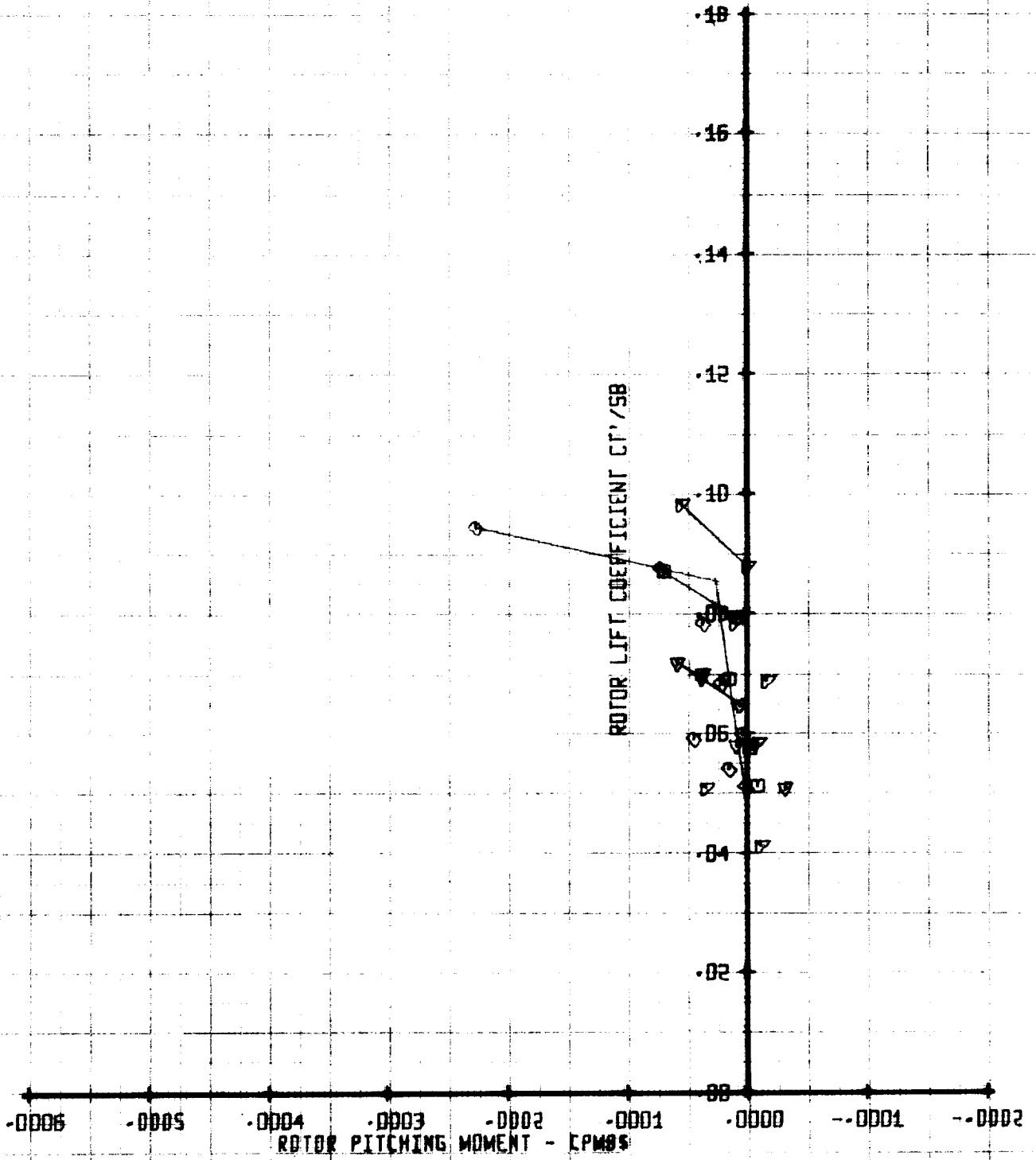
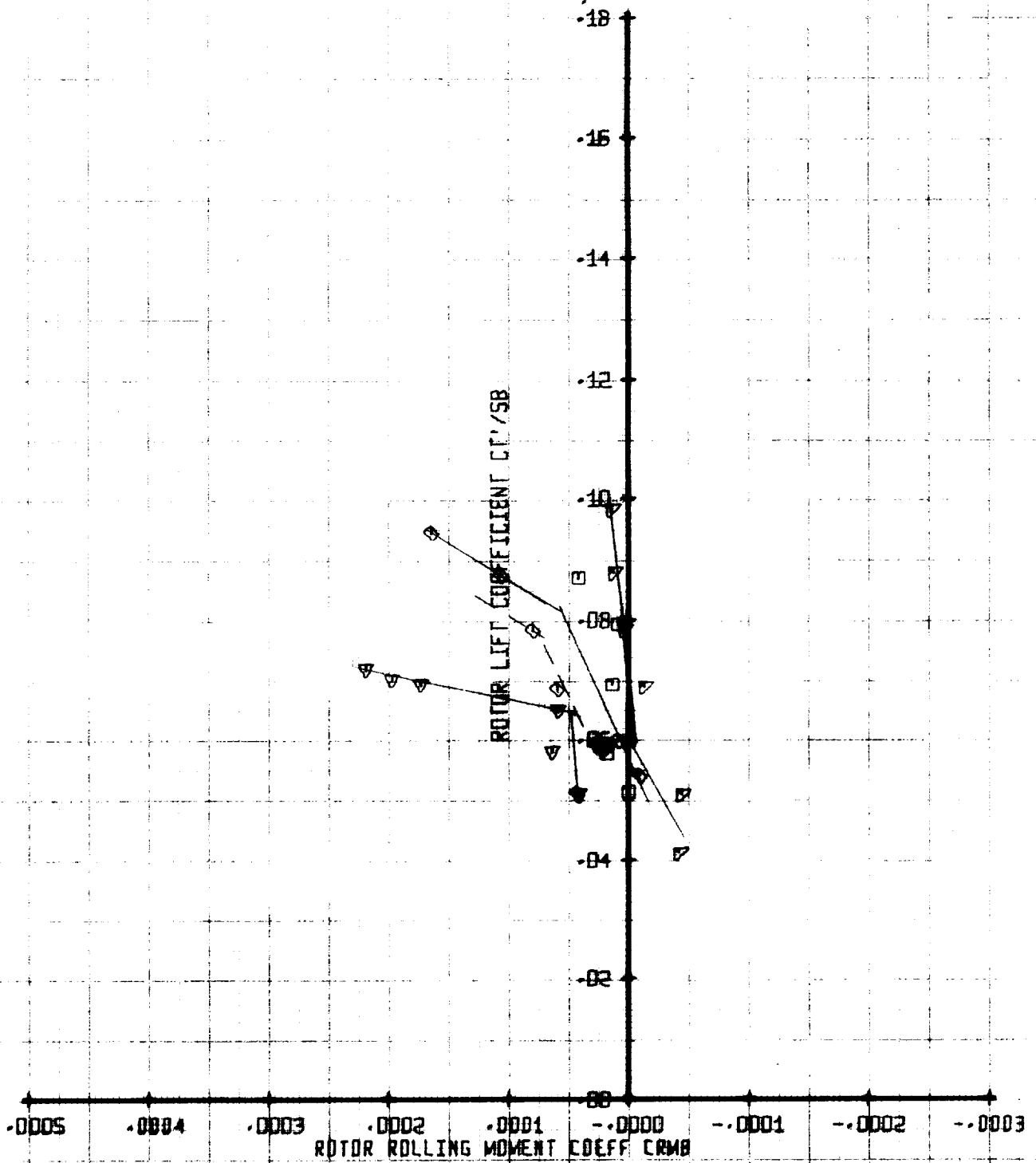


Figure A-234

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47A ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/OD258	VTUN
□	246	.57	.025	353
△	249	.57	.025	353
◇	228	.57	.05	353
▽	245	.57	.10	

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU'	X/00258	VTUN
□	RUN 246	.57	.025	353
◊	249	.57	.025	353
◇	229	.57	.05	353
▽	245	.57	.10	353

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT

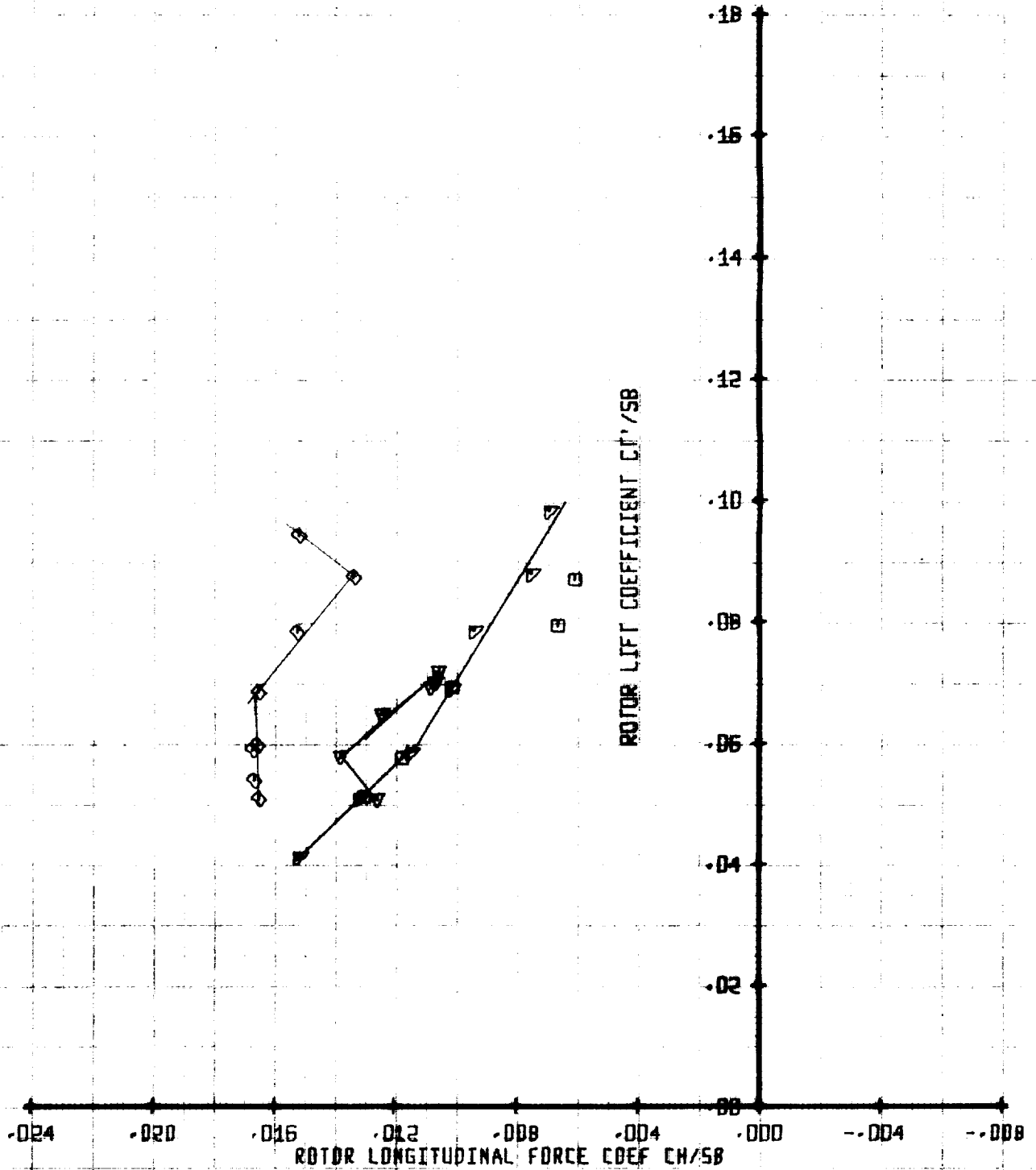
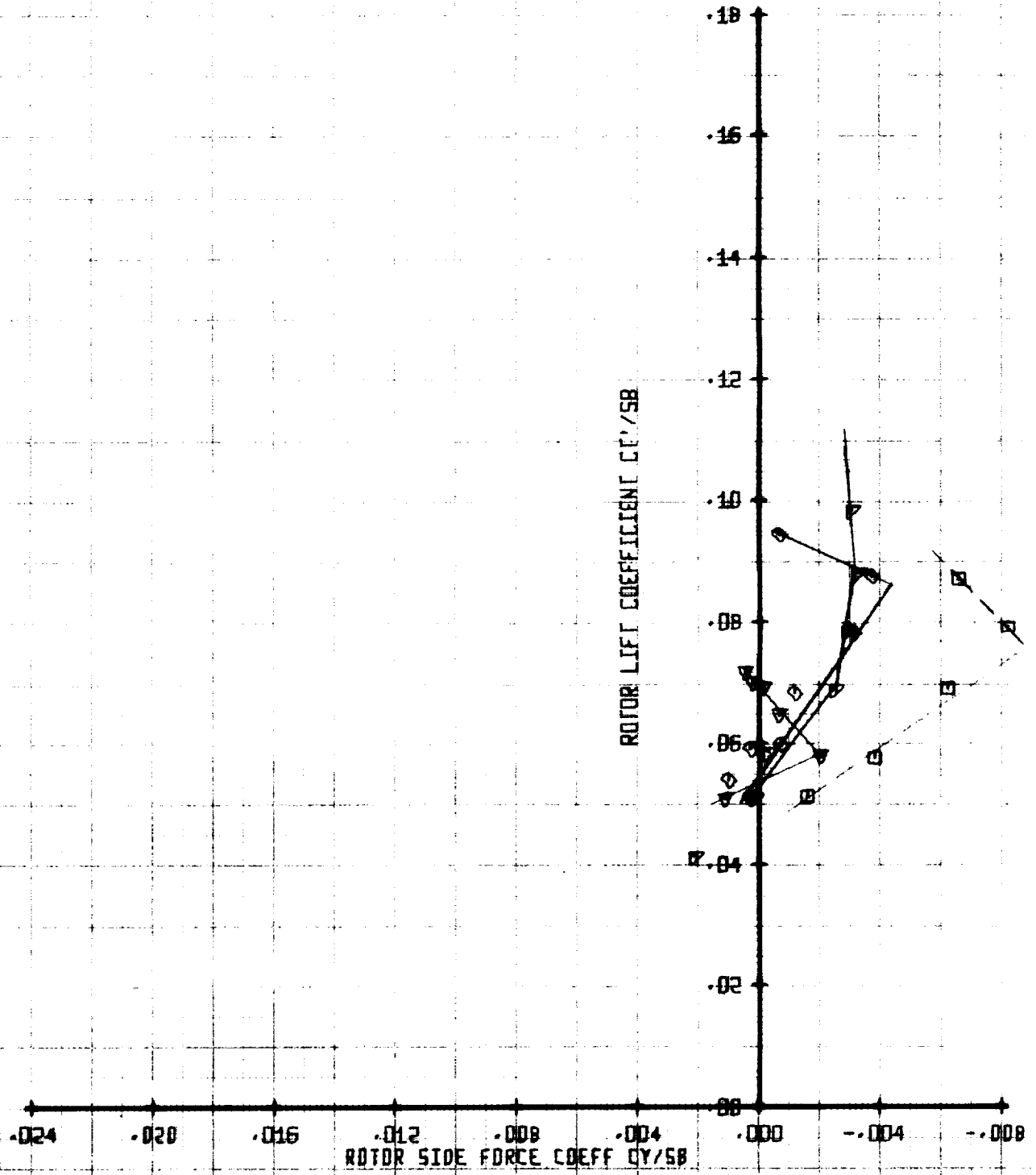


Figure A-236

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/DD2SB	VTUN
○	246	.57	.025	353
△	249	.57	.025	353
◇	228	.57	.05	353
▽	245	.57	.10	353

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT

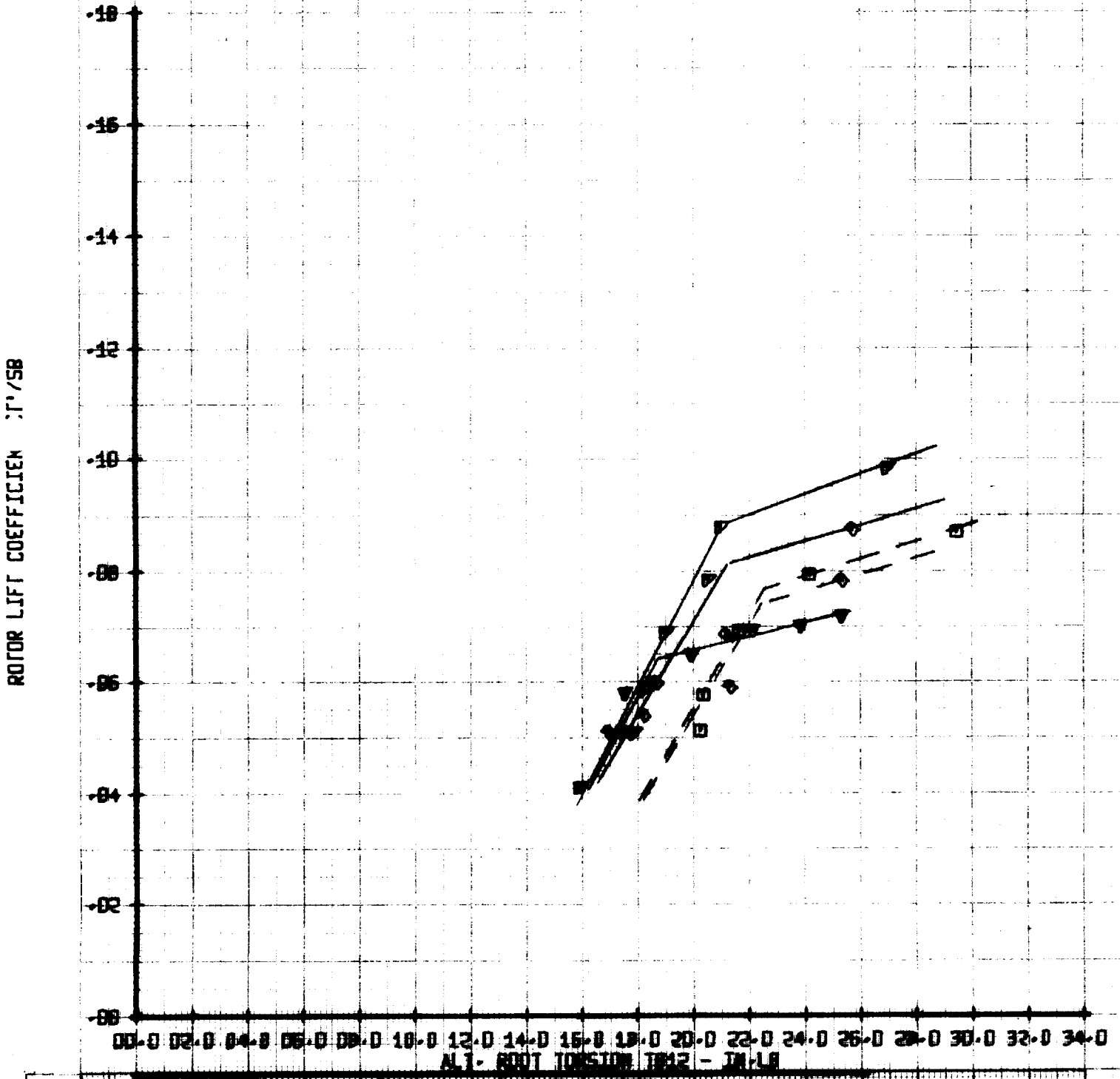


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	BLN	ML'	X/00258	Y/TUN
□	246	.57	.025	353
△	249	.57	.025	353
◆	248	.57	.05	353
▲	245	.57	.10	353

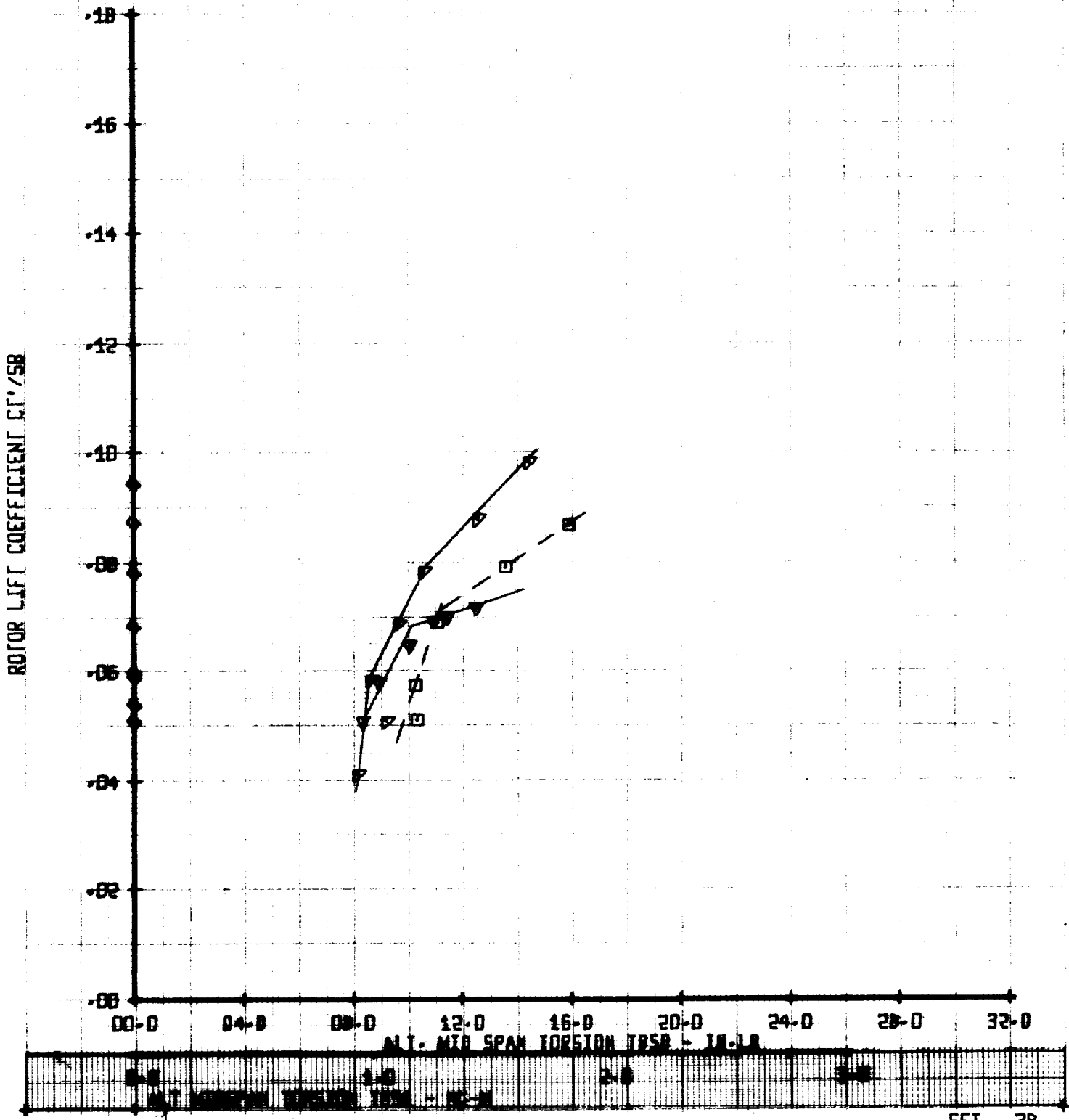
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MI'	X/00258	YTON
○	246	.57	.025	358
△	249	.57	.025	358
◇	238	.57	.05	358
▽	245	.57	.10	358

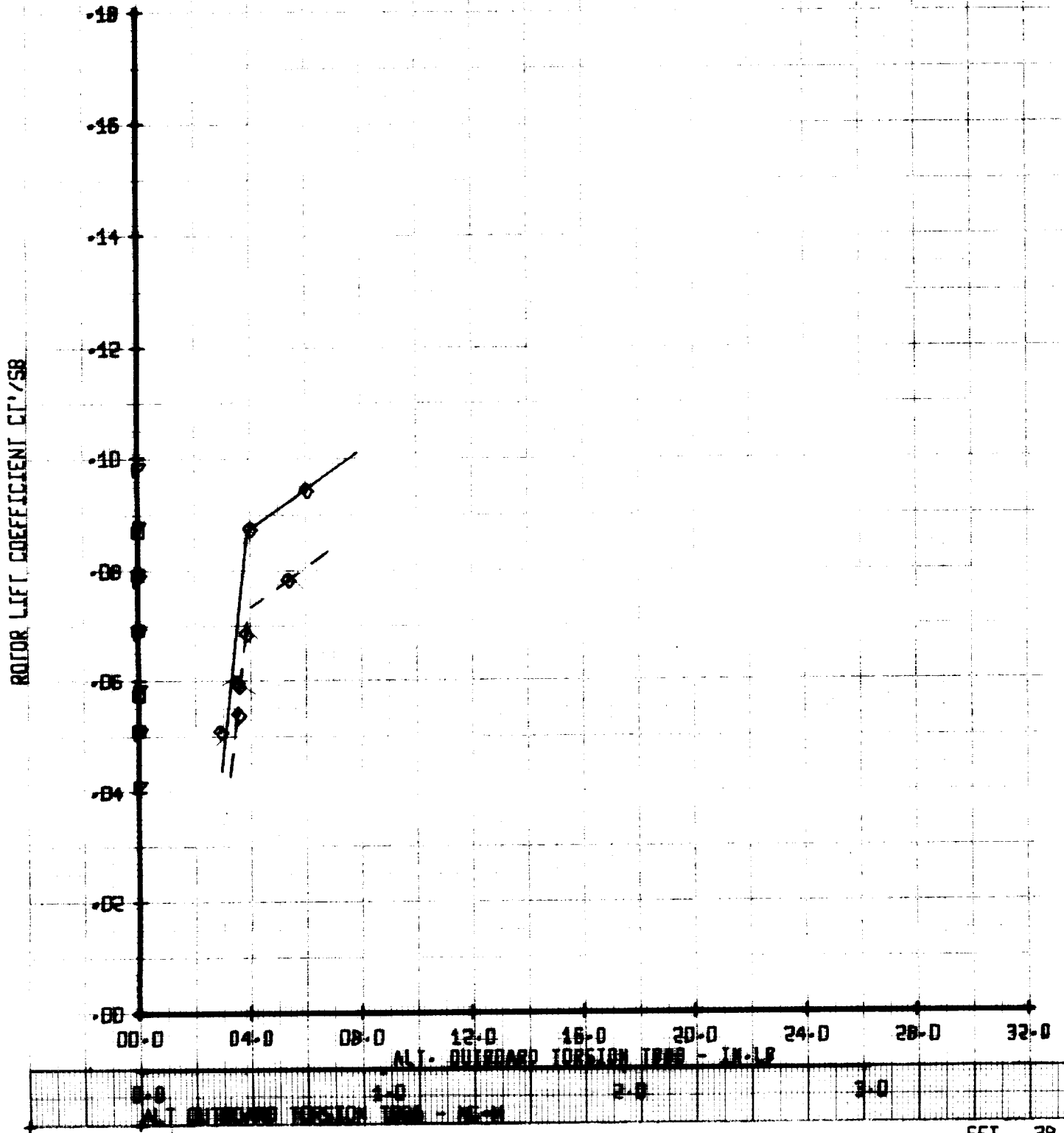
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		LEGEND			
○	246	MU'	.57	X/DD268	VTIN
△	249		.57	.025	353
◇	220		.57	.025	353
▽	245		.57	.05	353
			.57	.10	353

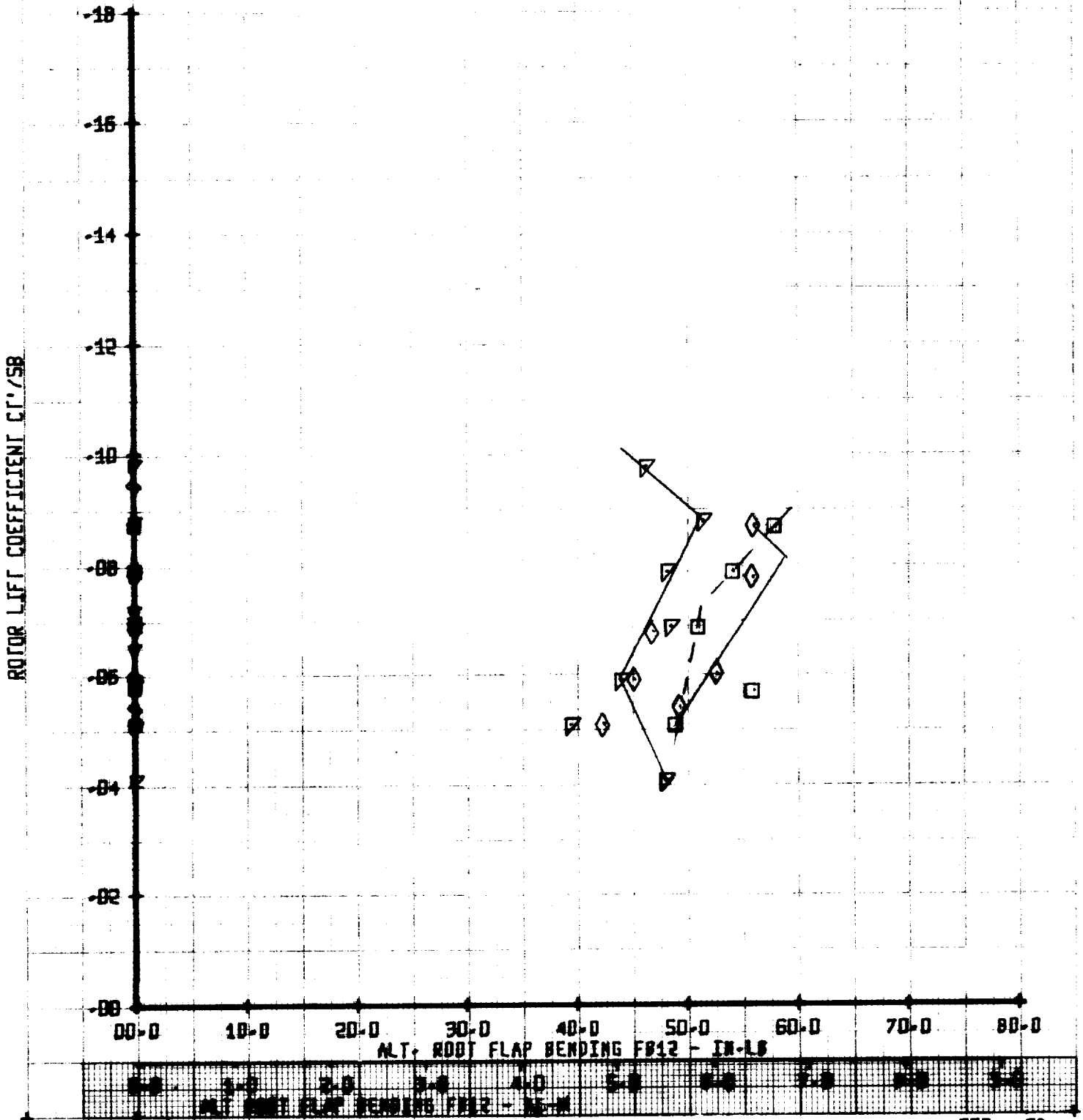
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB80



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MLI	X/D0258	VTIM
□	246	.57	.025	358
△	249	.57	.025	358
◇	238	.57	.05	358
▽	245	.57	.10	358

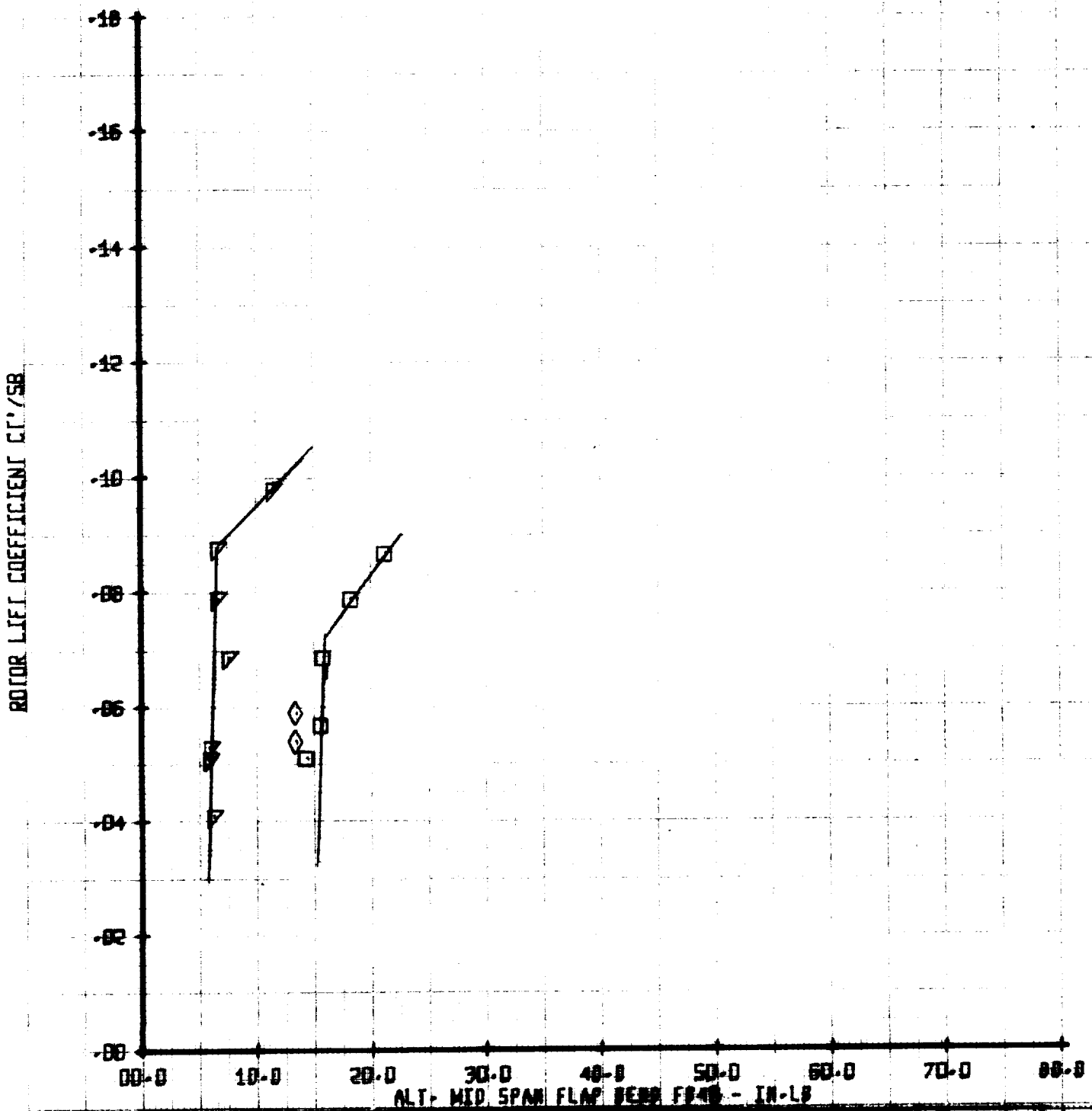
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MLP	X/00258	YTLN
□	246	.57	.025	353
△	249	.57	.025	353
◇	238	.57	.05	353
▽	245	.57	.10	353

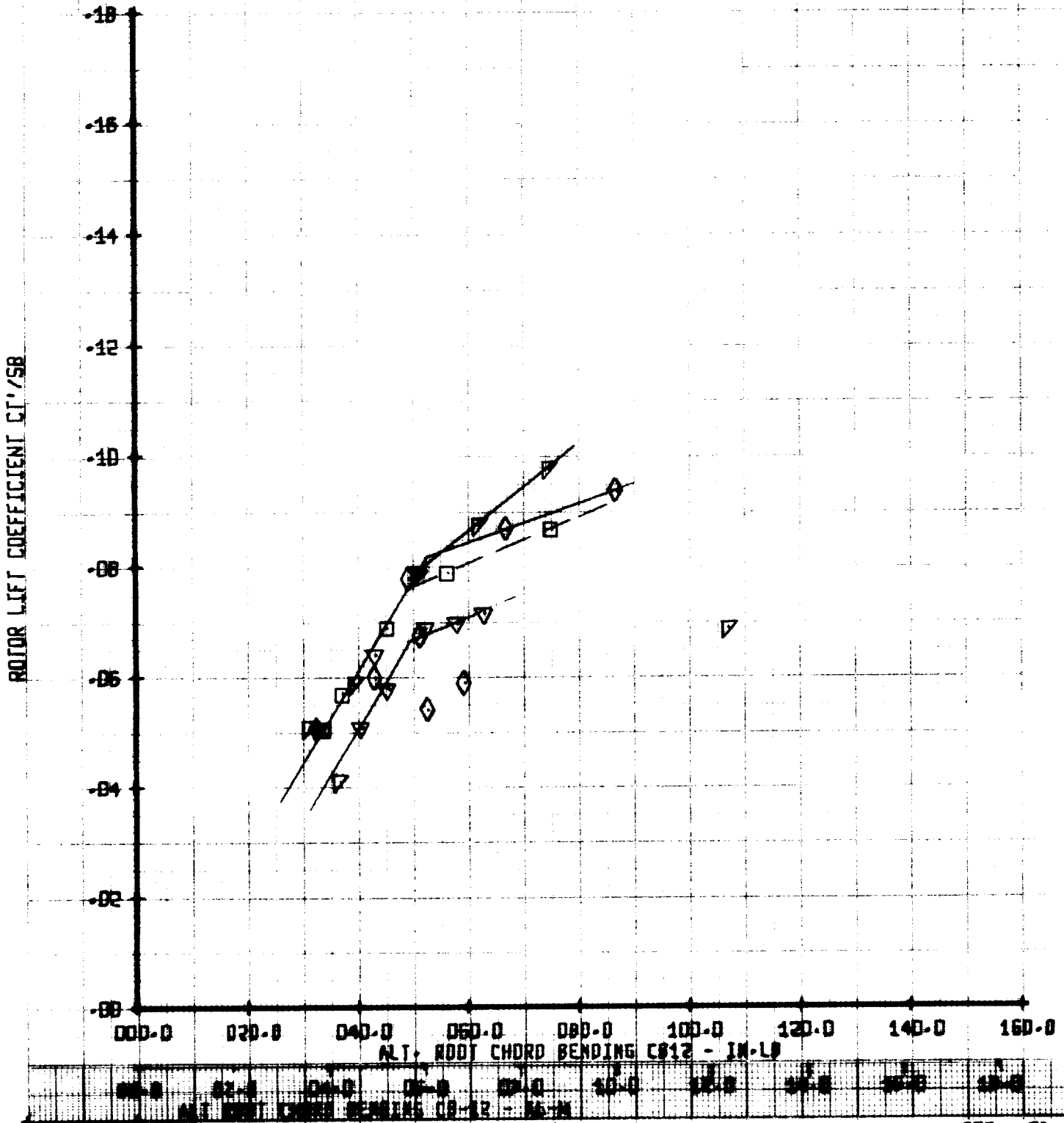
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BEND FB48



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RM	ML	X/D0258	Y/TIN
□	246	.57	.025	358
△	249	.57	.025	358
◇	248	.57	.05	358
▽	245	.57	.10	358

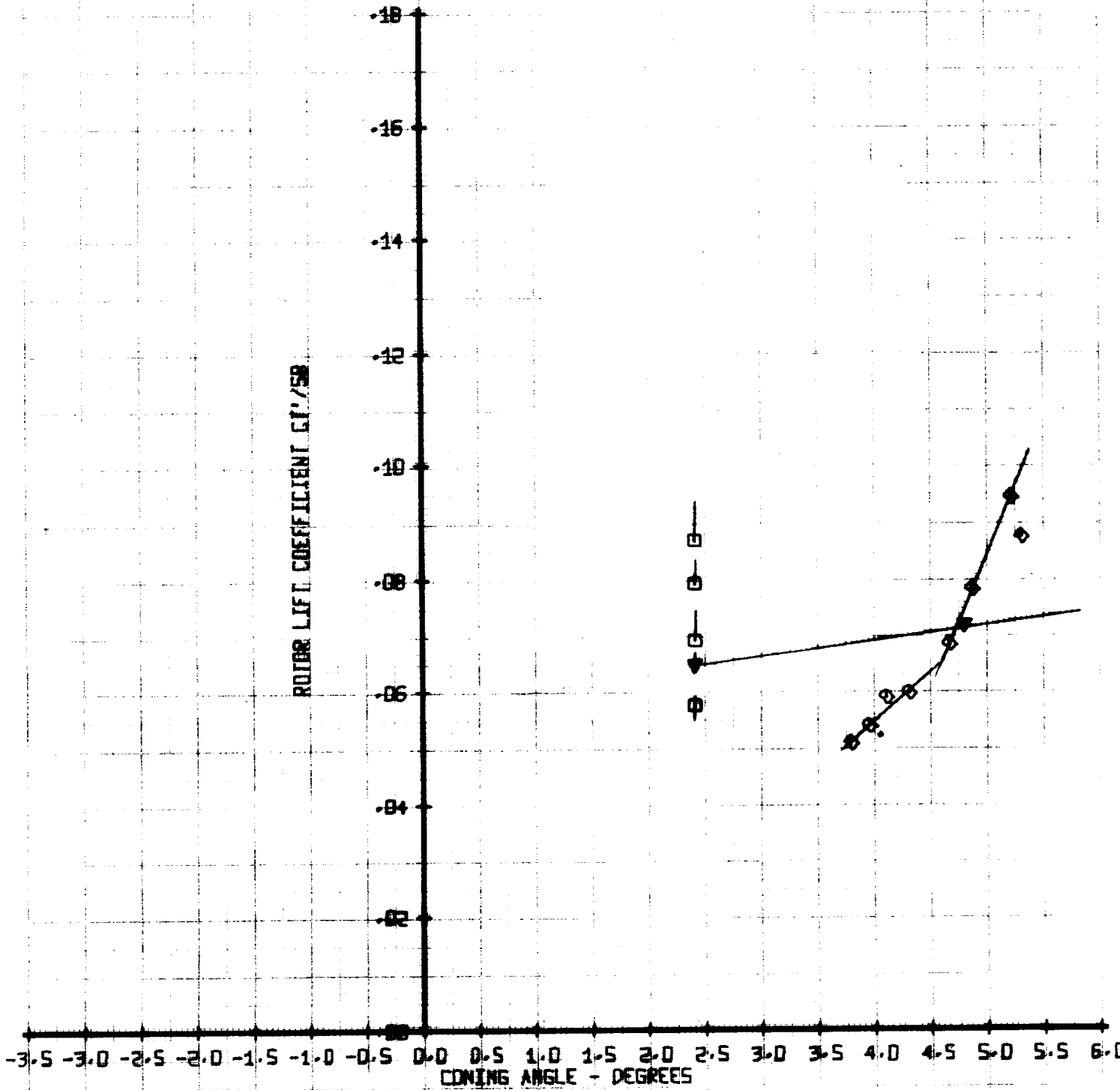
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CBI2



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	BLIN	MLI'	X/QD2SB	YDIN
□	246	.57	.025	353
△	249	.57	.025	353
◇	248	.57	.05	353
▽	245	.57	.10	353

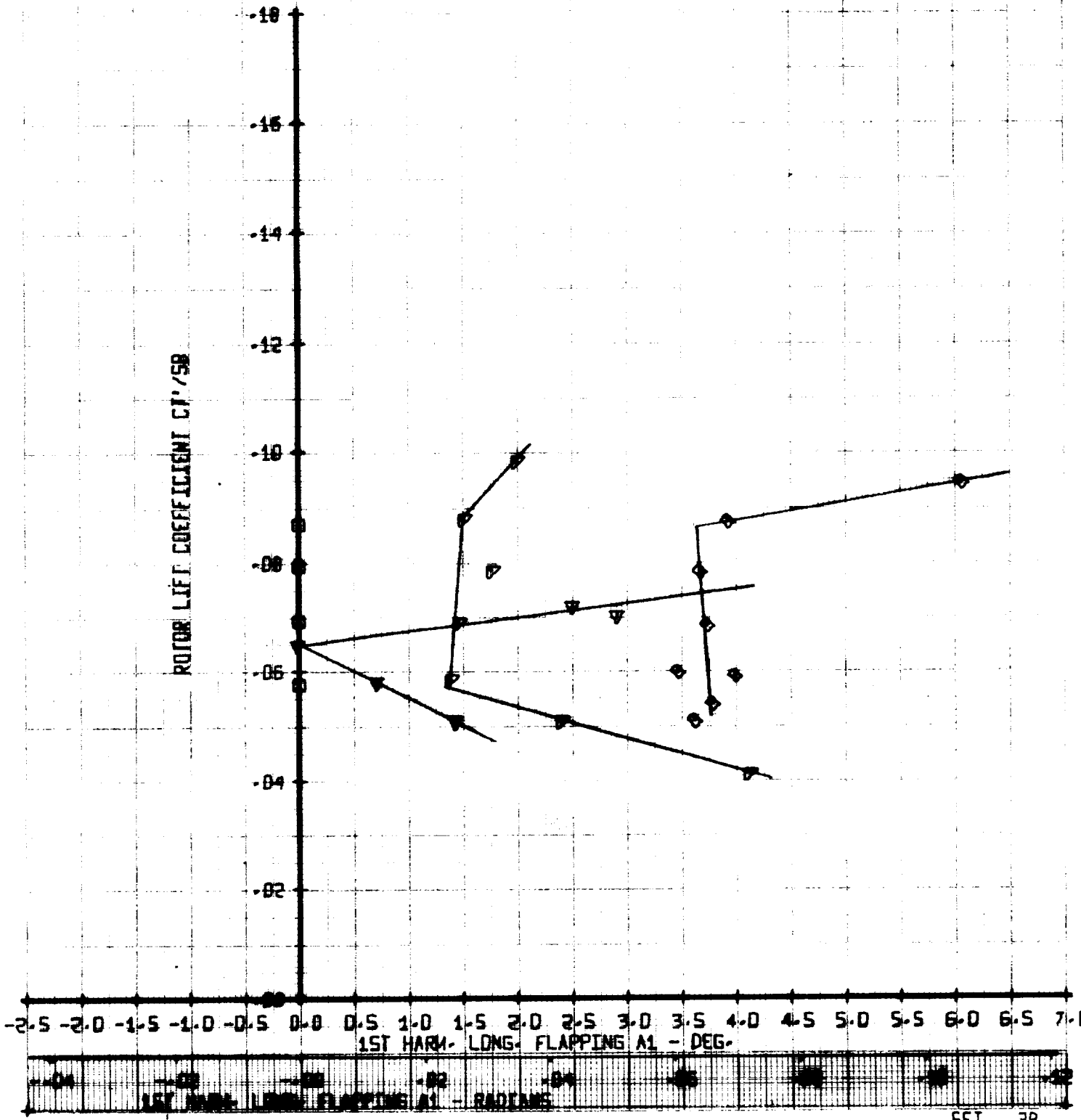
ROTOR LIFT COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	BLIN	MU'	X/DD258	YTLIN
○	246	.57	.025	353
△	249	.57	.025	353
◇	248	.57	.05	353
▽	245	.57	.10	353

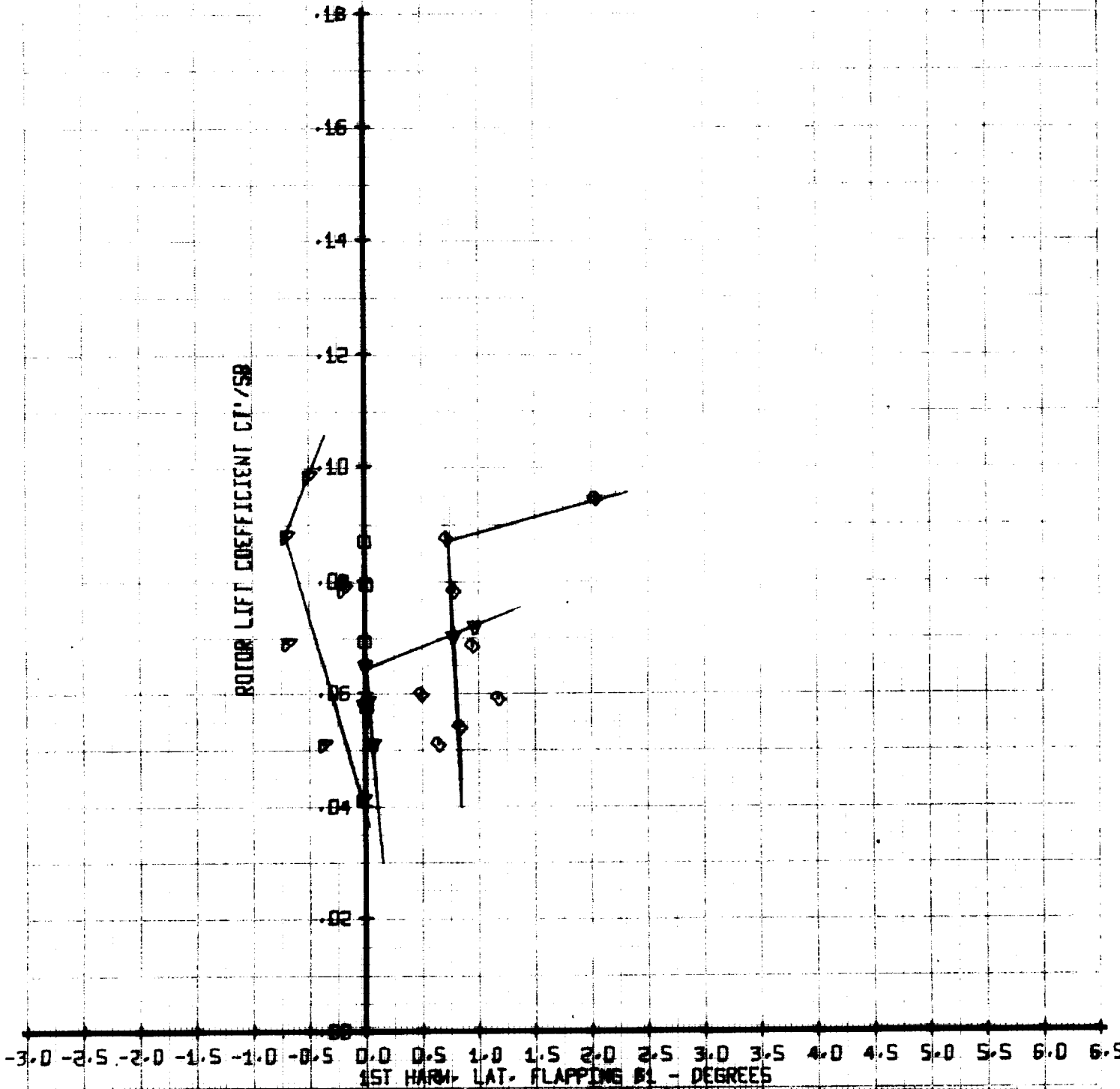
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	BLIN	MLI'	X/OD2SR	YTLIN
○	246	.57	.025	353
△	249	.57	.025	353
◇	245	.57	.05	353
▽	245	.57	.10	353

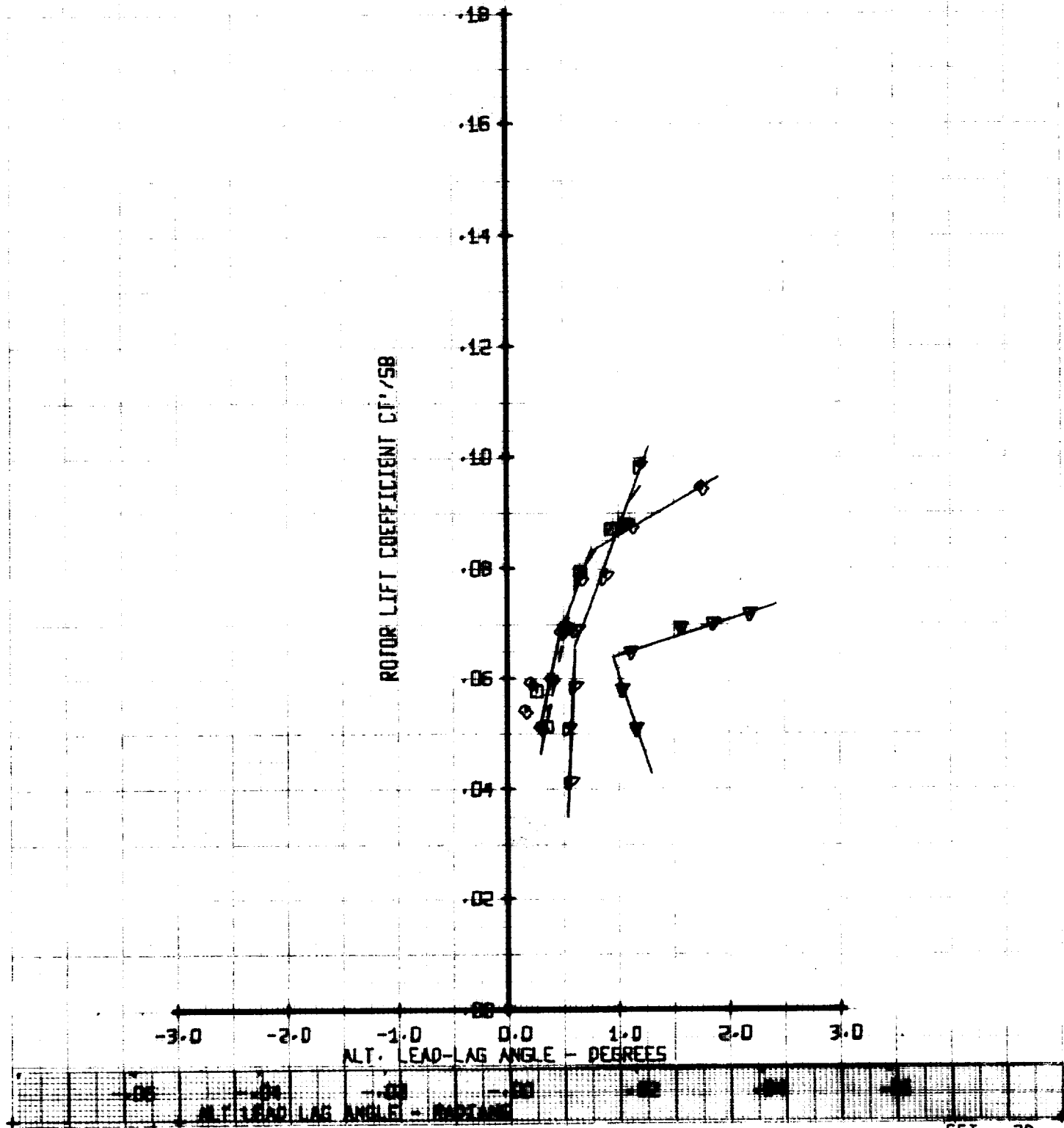
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MLP	X/DB2SB	Y/TUN
○	246	.57	.025	353
△	249	.57	.025	353
◇	238	.57	.05	353
▽	245	.57	.10	

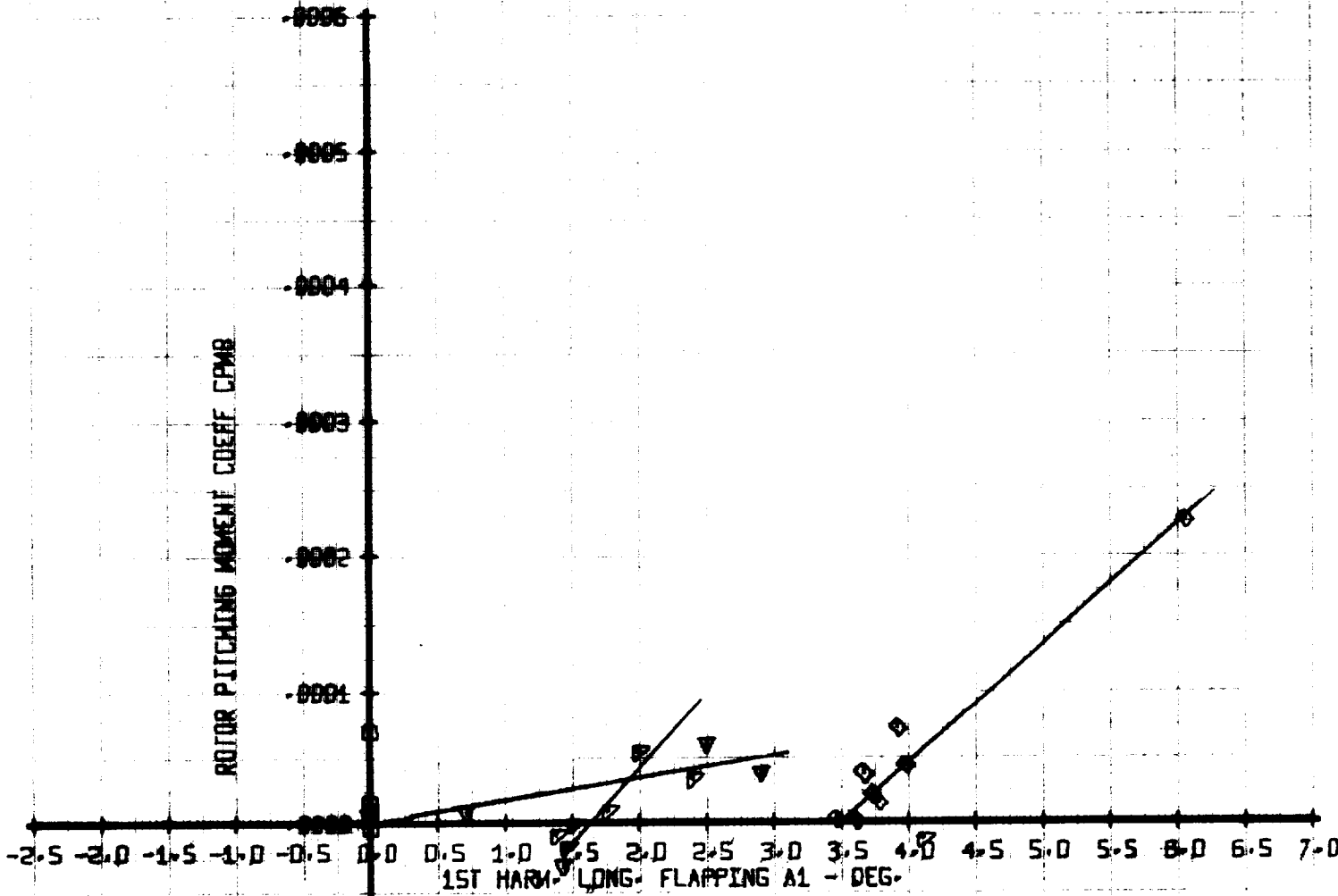
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/DD258	Y/TUM	
□	246	.57	.025	353	
△	249	.57	.025	353	
◆	238	.57	.05	353	
▽	245	.57	.10	353	

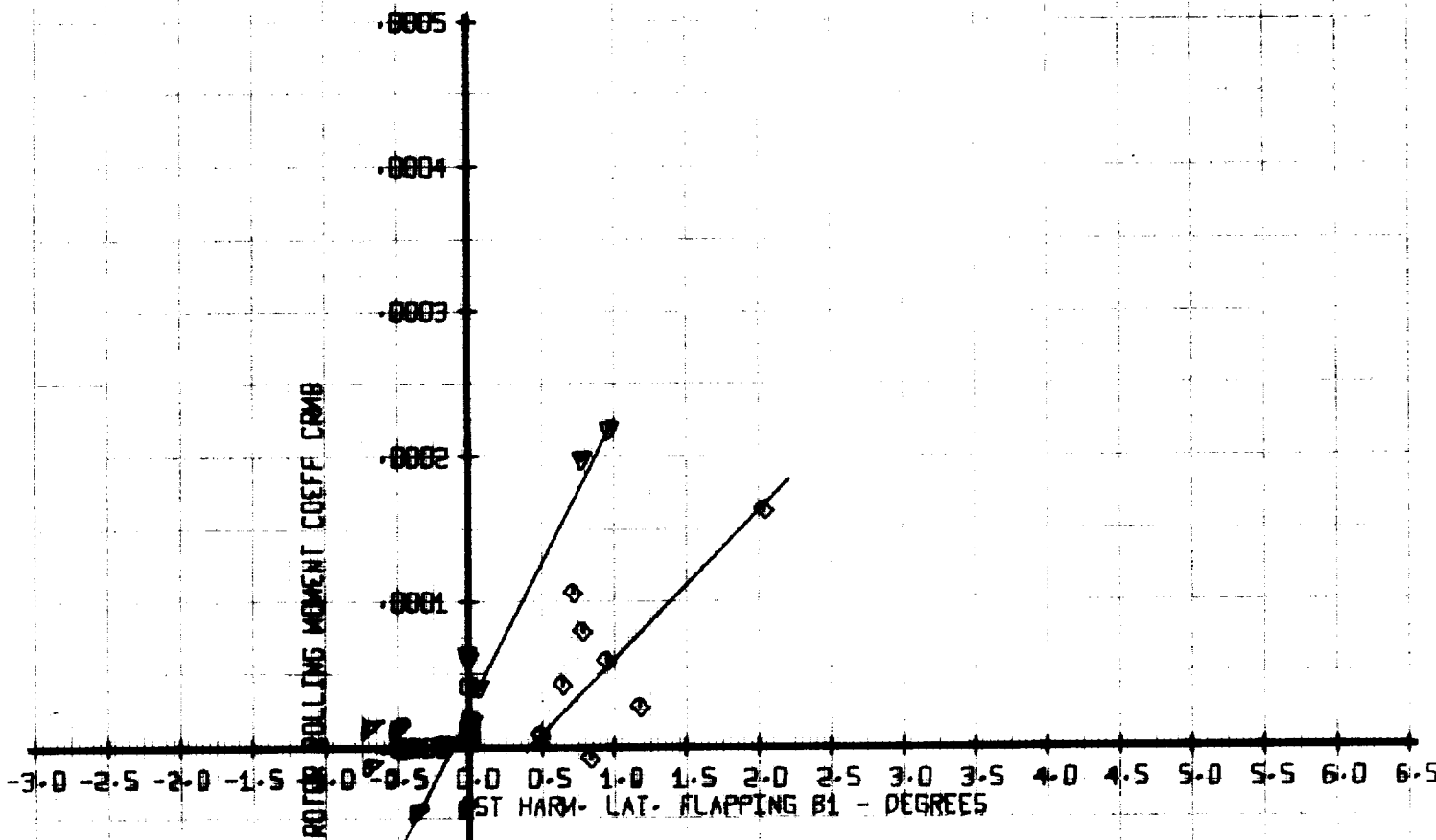
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	YTUN
○	246	.57	.025	353
△	249	.57	.025	353
◇	248	.57	.05	353
▽	245	.57	.10	353

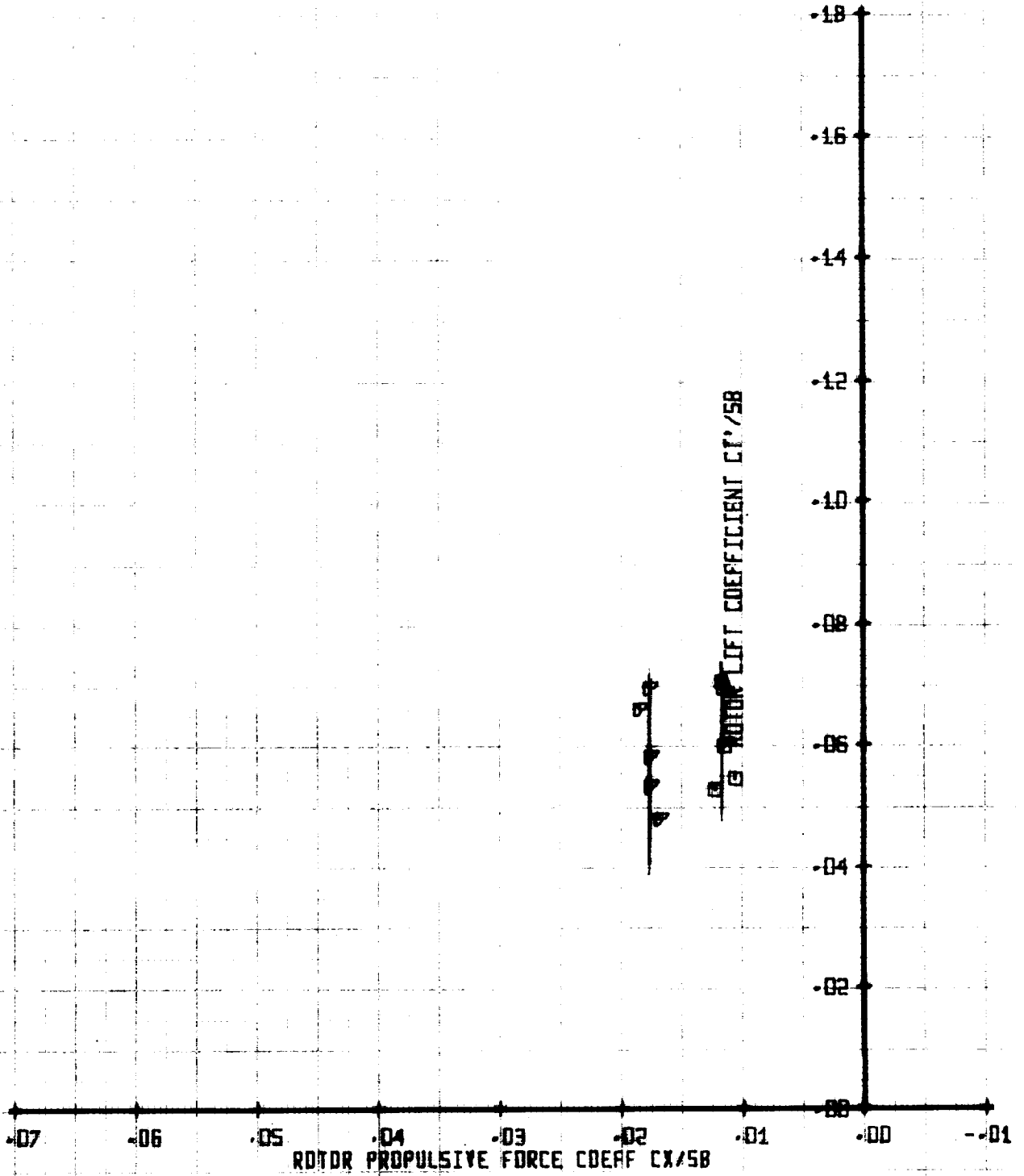
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MI*	X/00258	VTUN
SYM	RUN	.61	.05	378
□	229	.61	.075	378
▽	248	.61		

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT

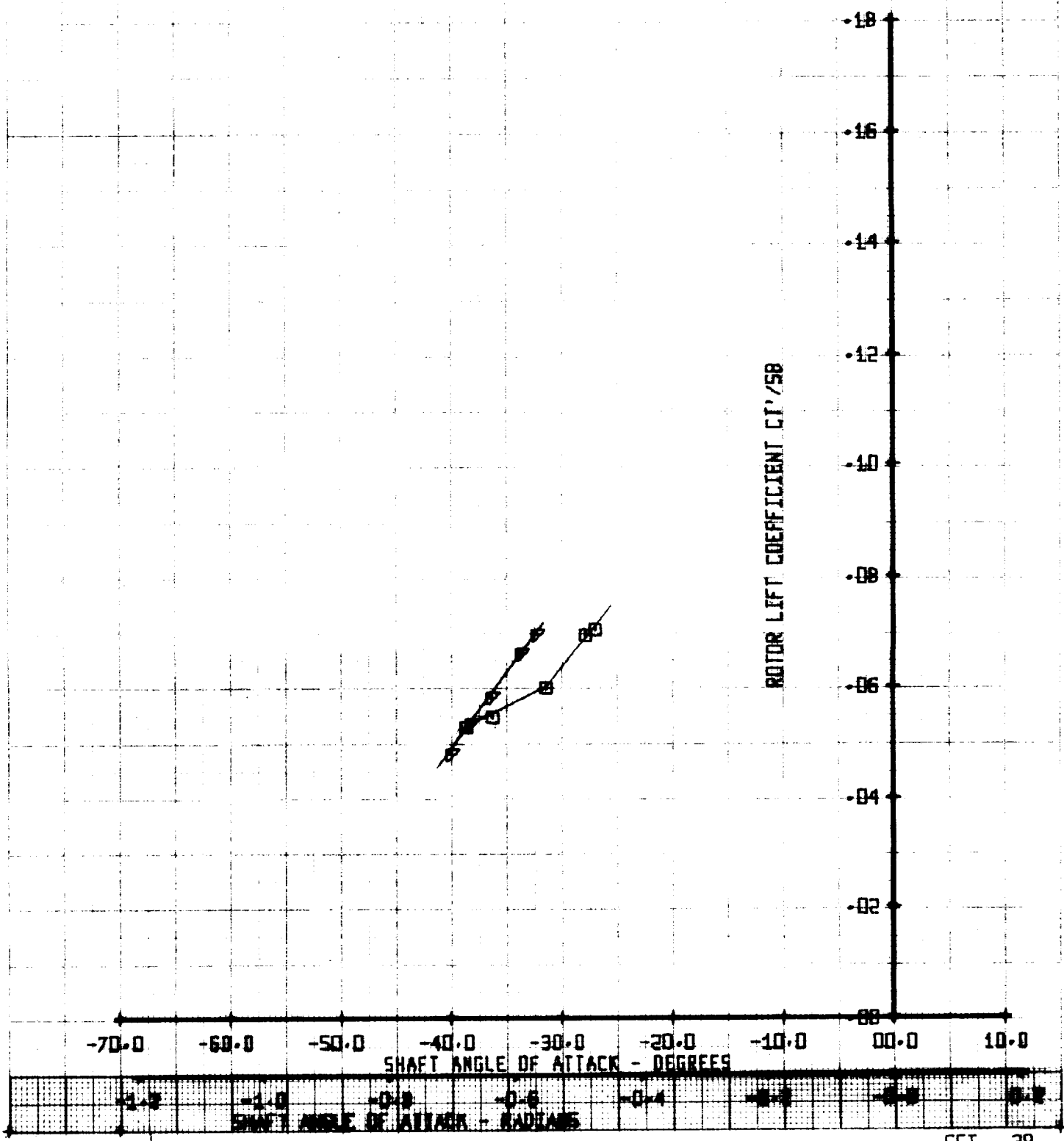


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/00258	Y/TUM
□	229	.61	.05	378
△	248	.61	.075	378

ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK

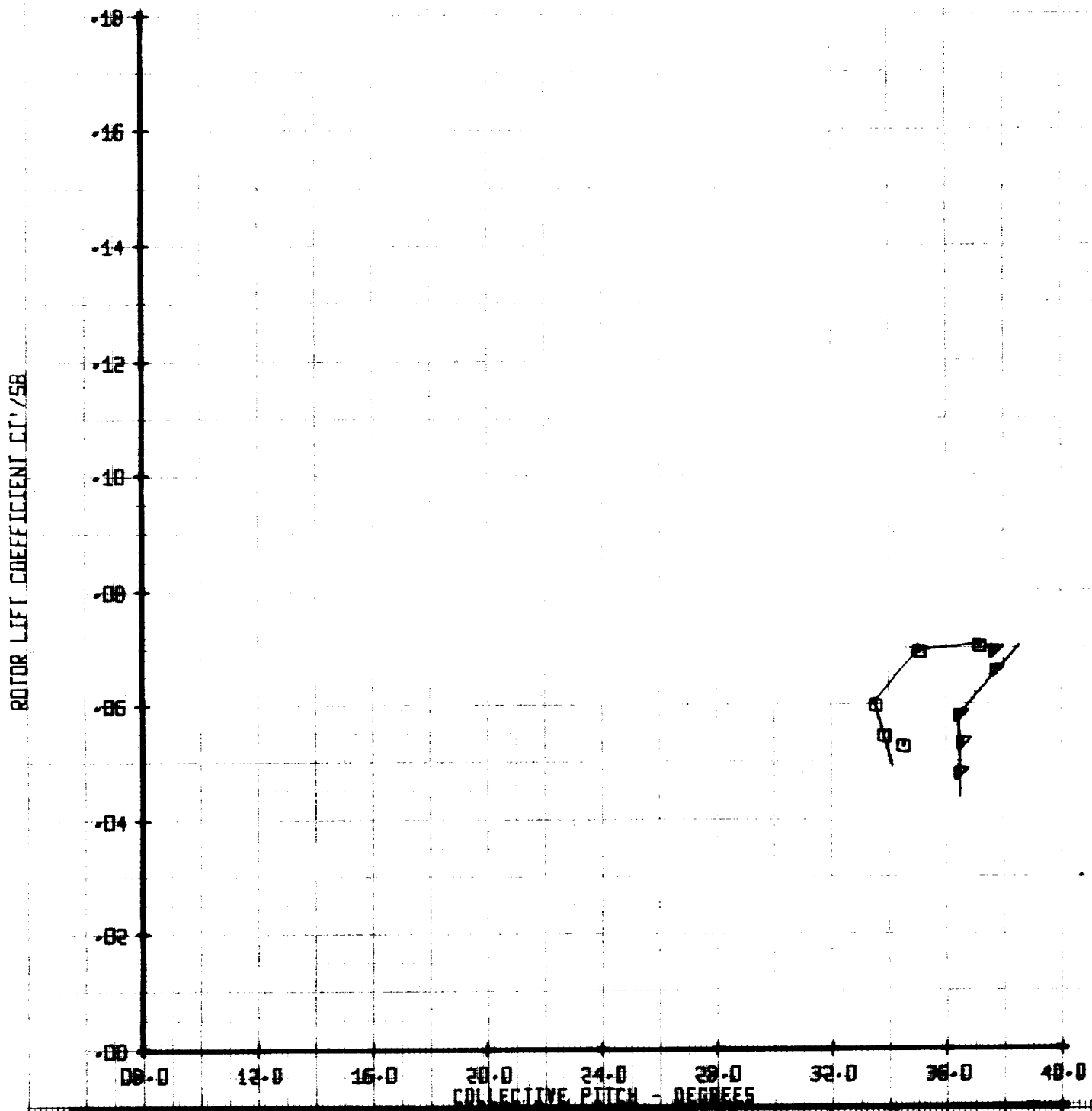


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/DD258	YTUN
□	229	.61	.05	378
△	248	.61	.075	378

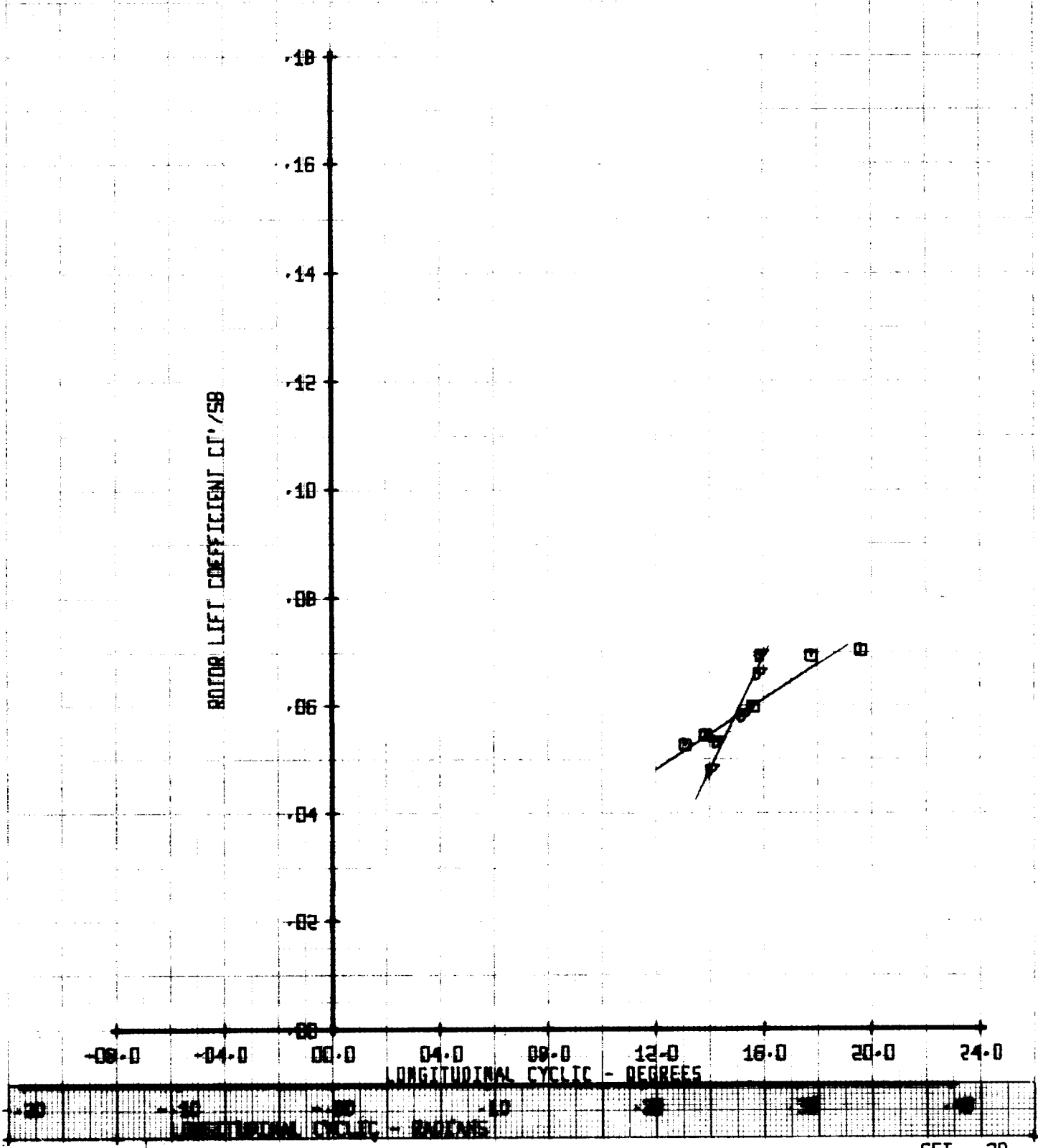
ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPELLSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MU		X/00258		YTUN	
0	4	229	248	.61	.61	.05	.075	378	378

ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC

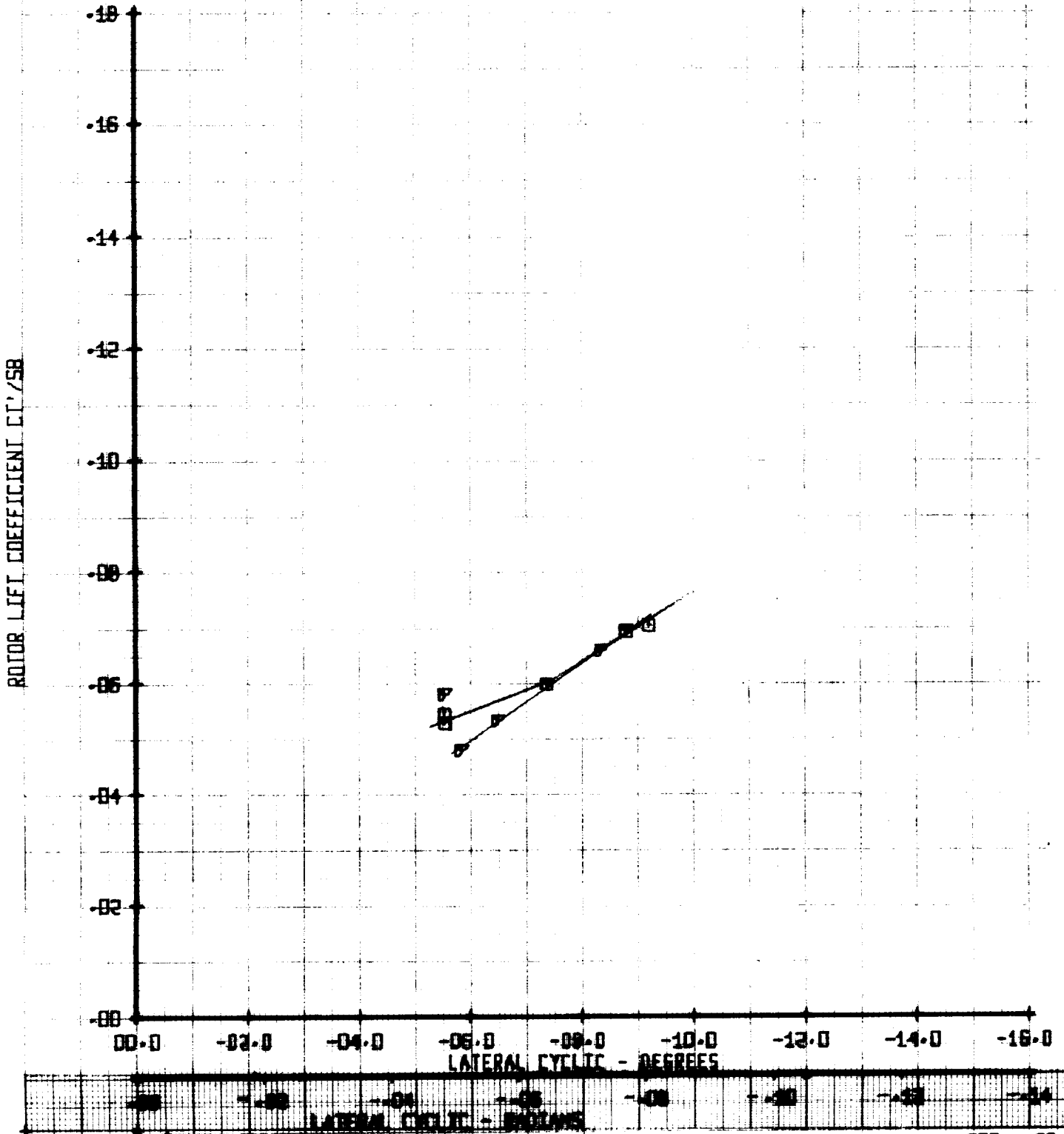


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/00258	YTUN
□	229	.61	.05	378
△	248	.61	.075	378

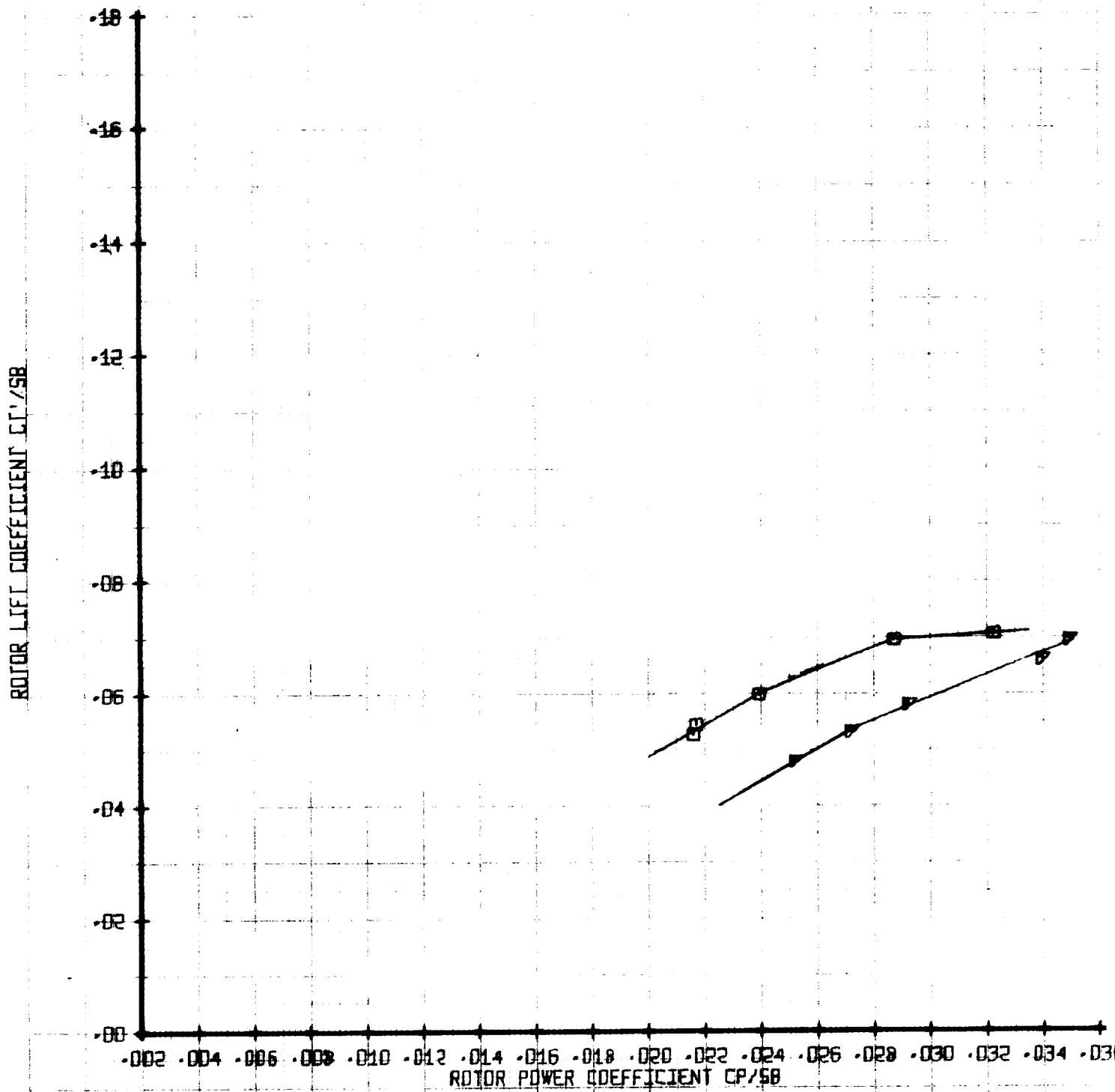
ROTOR LIFE COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/DD258	VTUN	
□	229	.61	.05	378	
▽	248	.61	.075	378	

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT

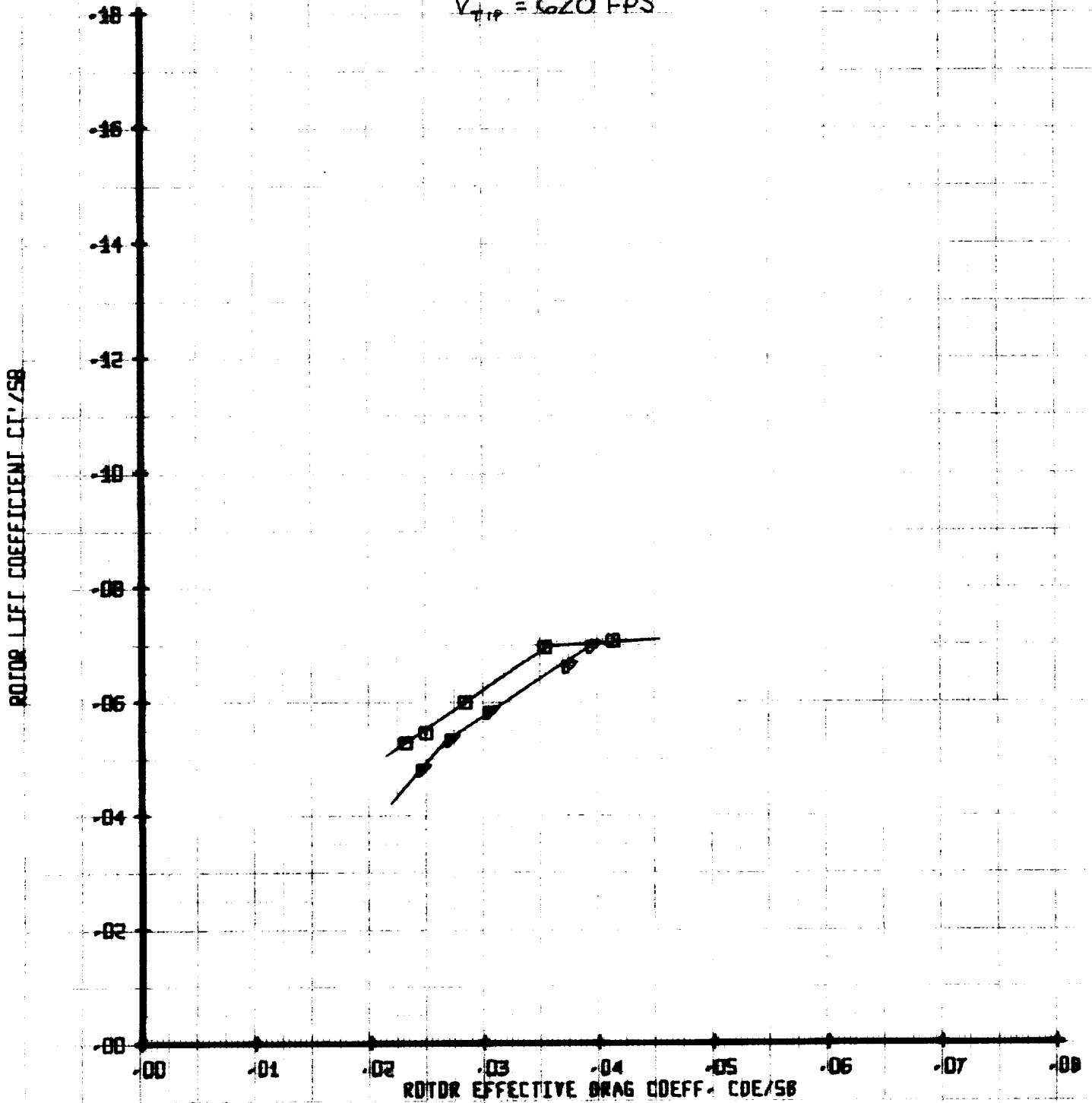


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-17B ROTOR
 LIFT LIMIT TESTING

SYM		RUM		MUI'		X/100250		VTUM	
0	229	.61	.05	378					
7	248	.61	.075	378					

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT

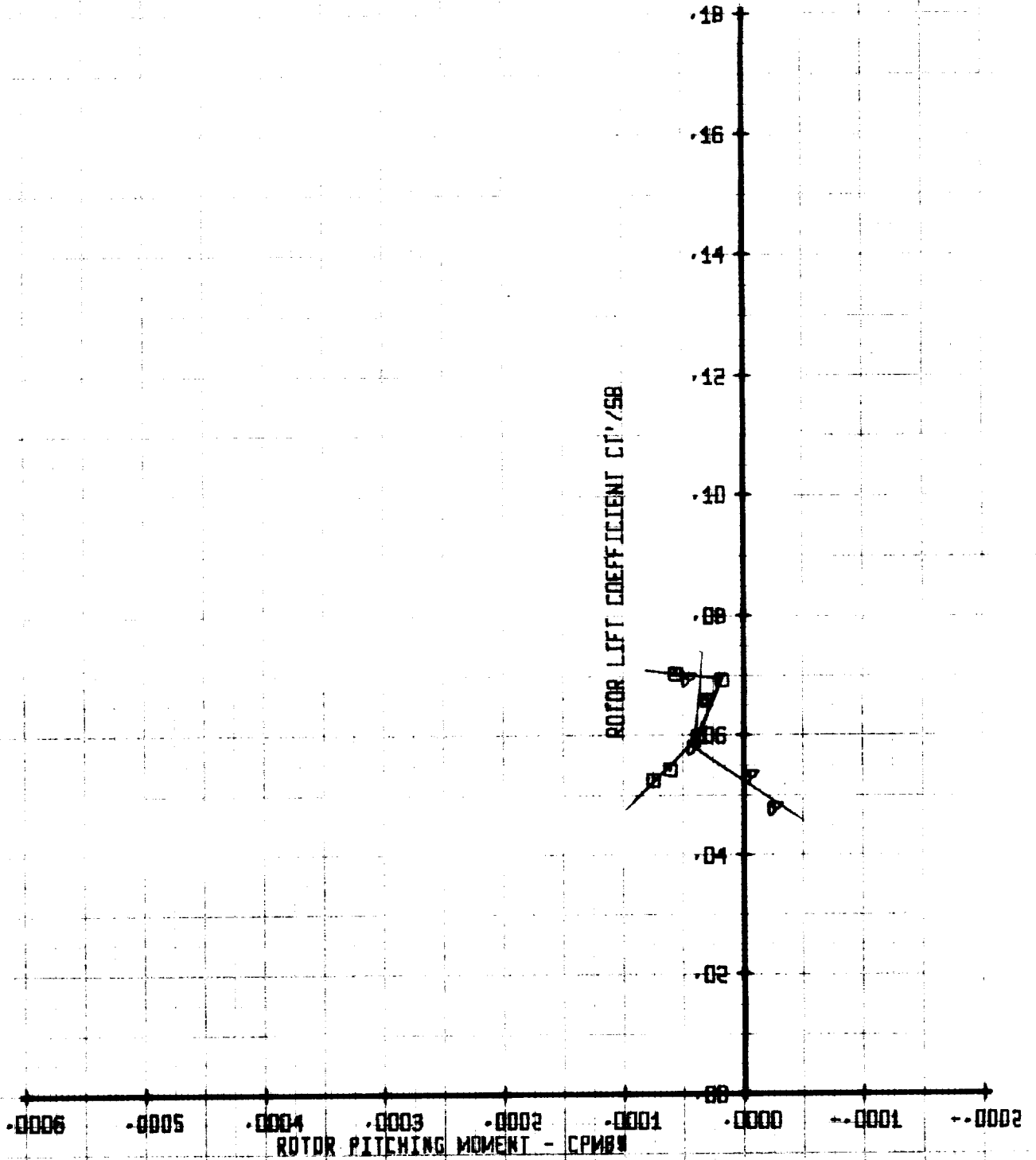
$V_{tip} = 620$ FPS



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYN		RUN		LEGEND		MU		X/00258		VTUN	
0	0	229	248	·61	·61	·05	·05	·075	·075	378	378
0	0										

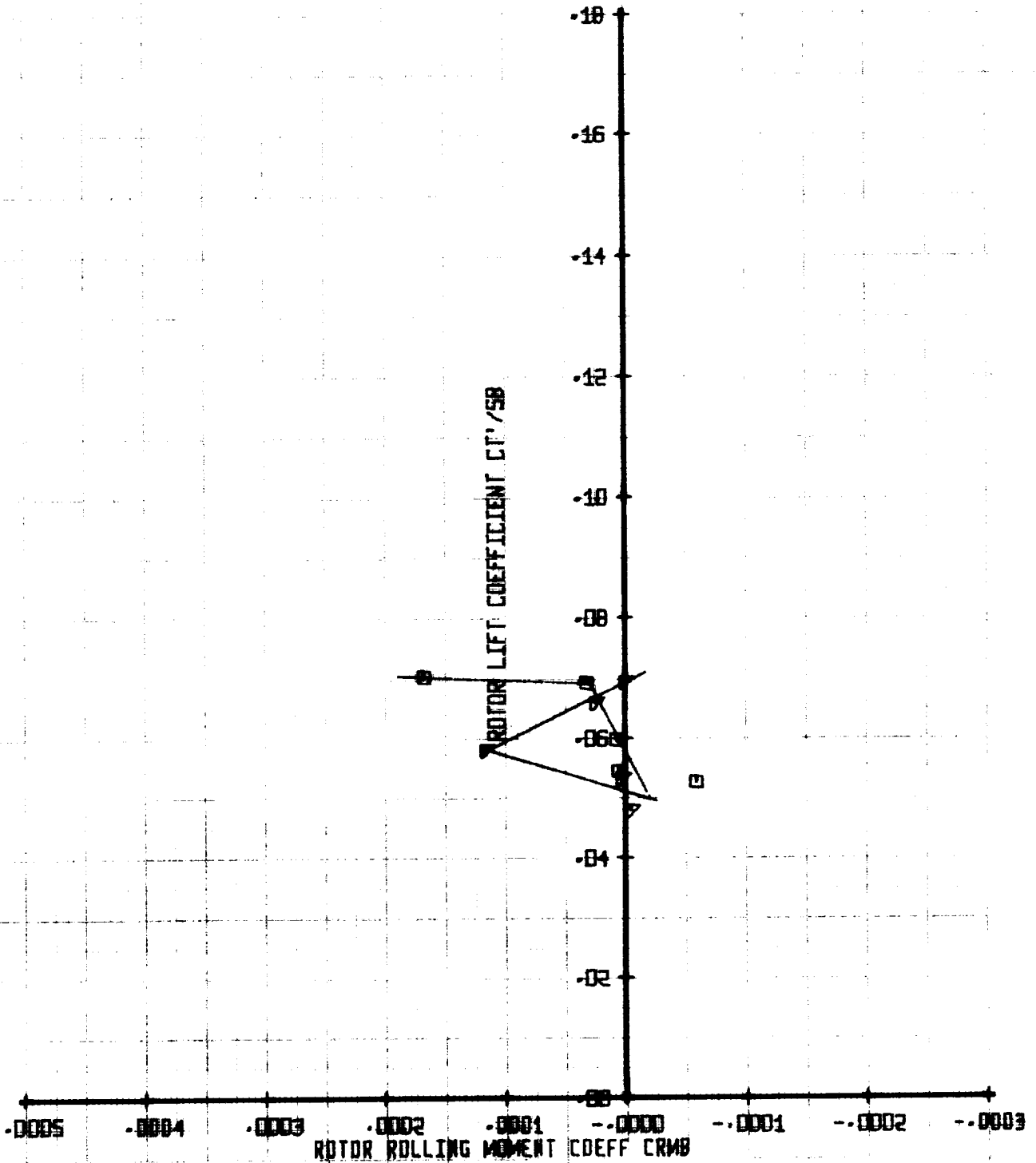
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU'	X/00258	Y/TUN
SYM	RUN	.61	.05	378
□	229	.61	.075	378
△	248			

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT

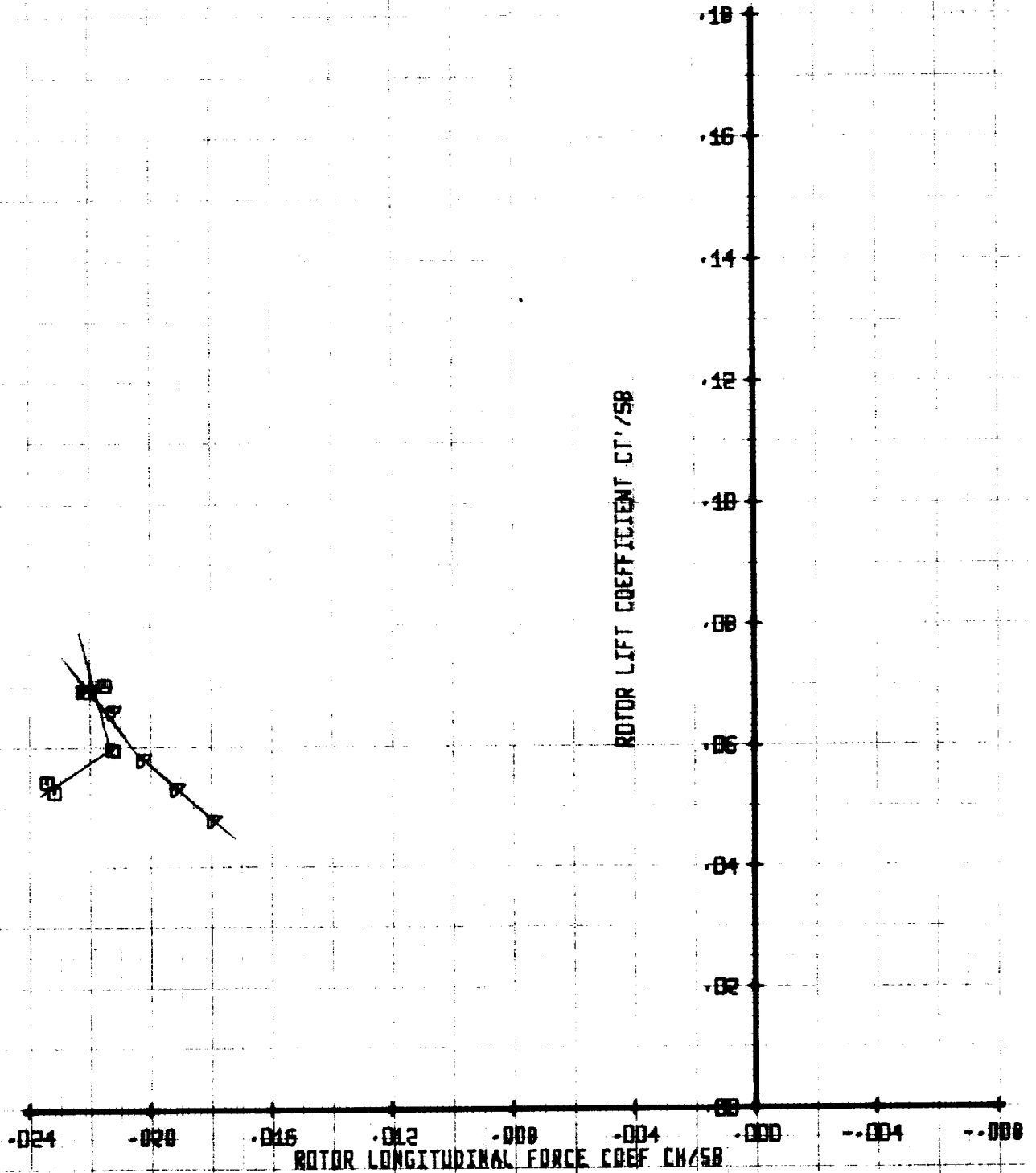


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/OD258	VTUN
□	229	.61	.05	378
▽	248	.61	.075	378

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT

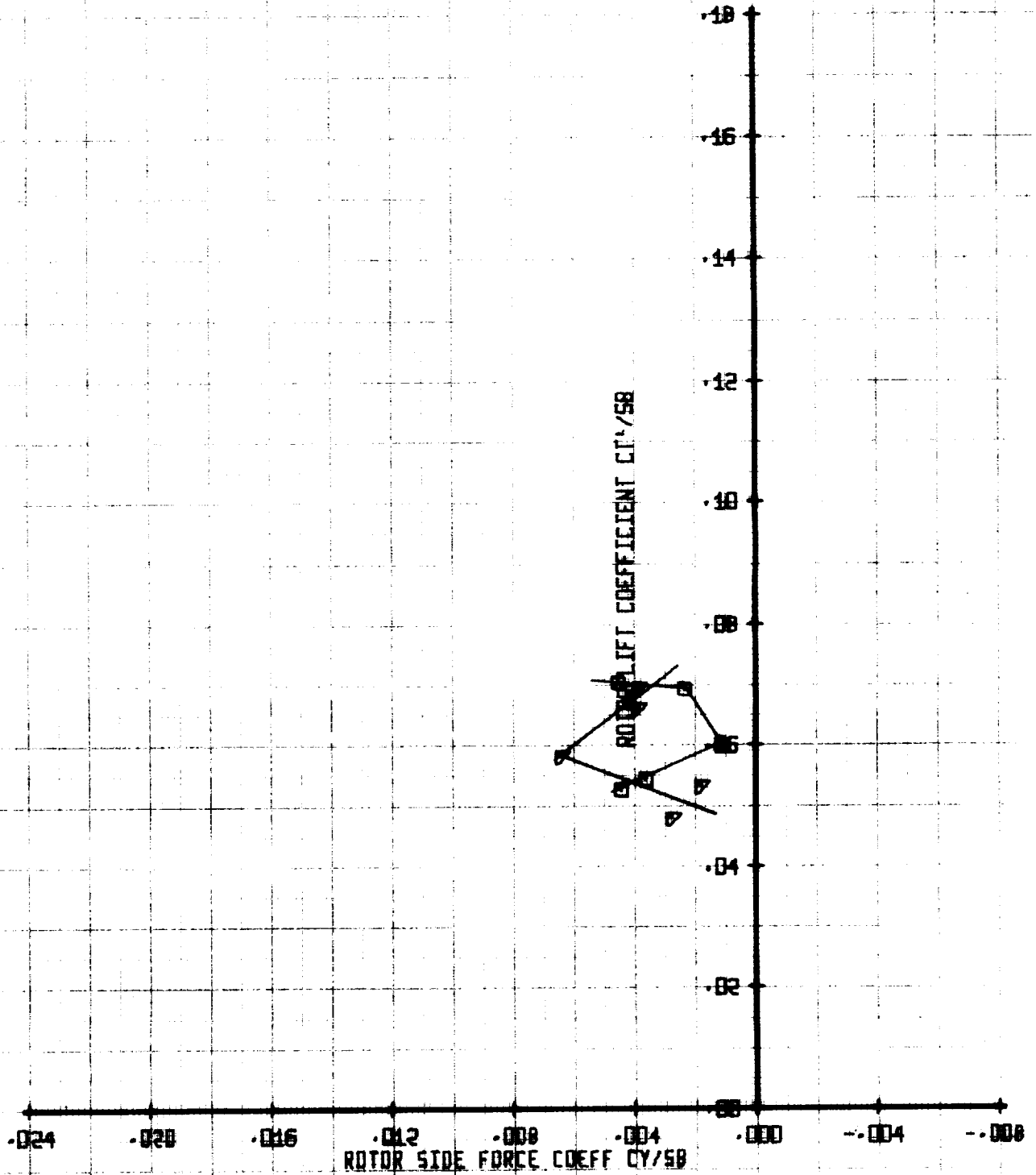


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/00258	Y/TUN
□	229	.61	.05	379
△	248	.61	.075	379

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT

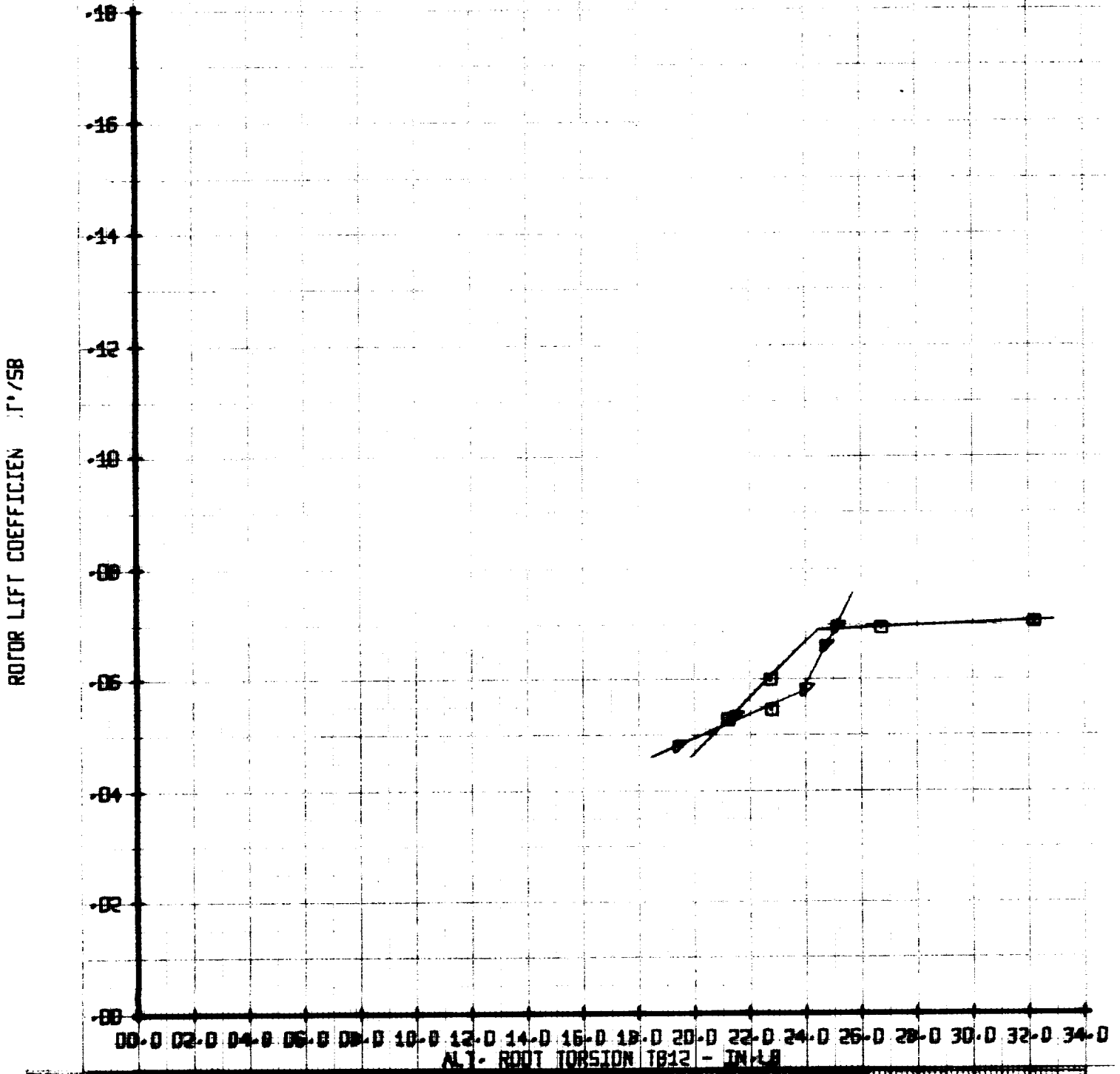


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	ML'	X/00258	VTLN
□	229	-61	-05	37B
▽	248	-61	-075	37B

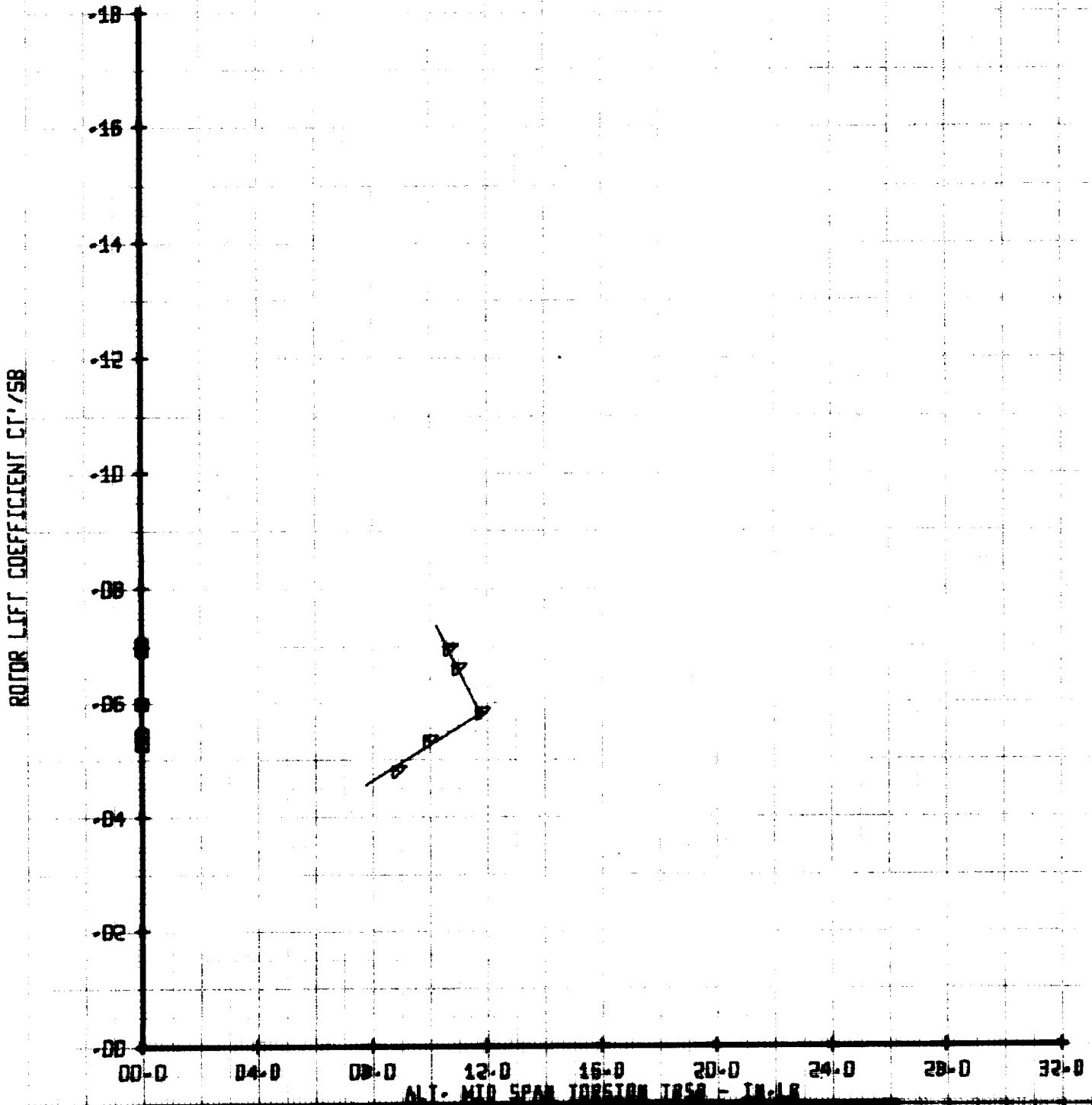
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MLI	X/00298	Y/TUN
0	229	.61	.05	37B
7	248	.61	.075	37B

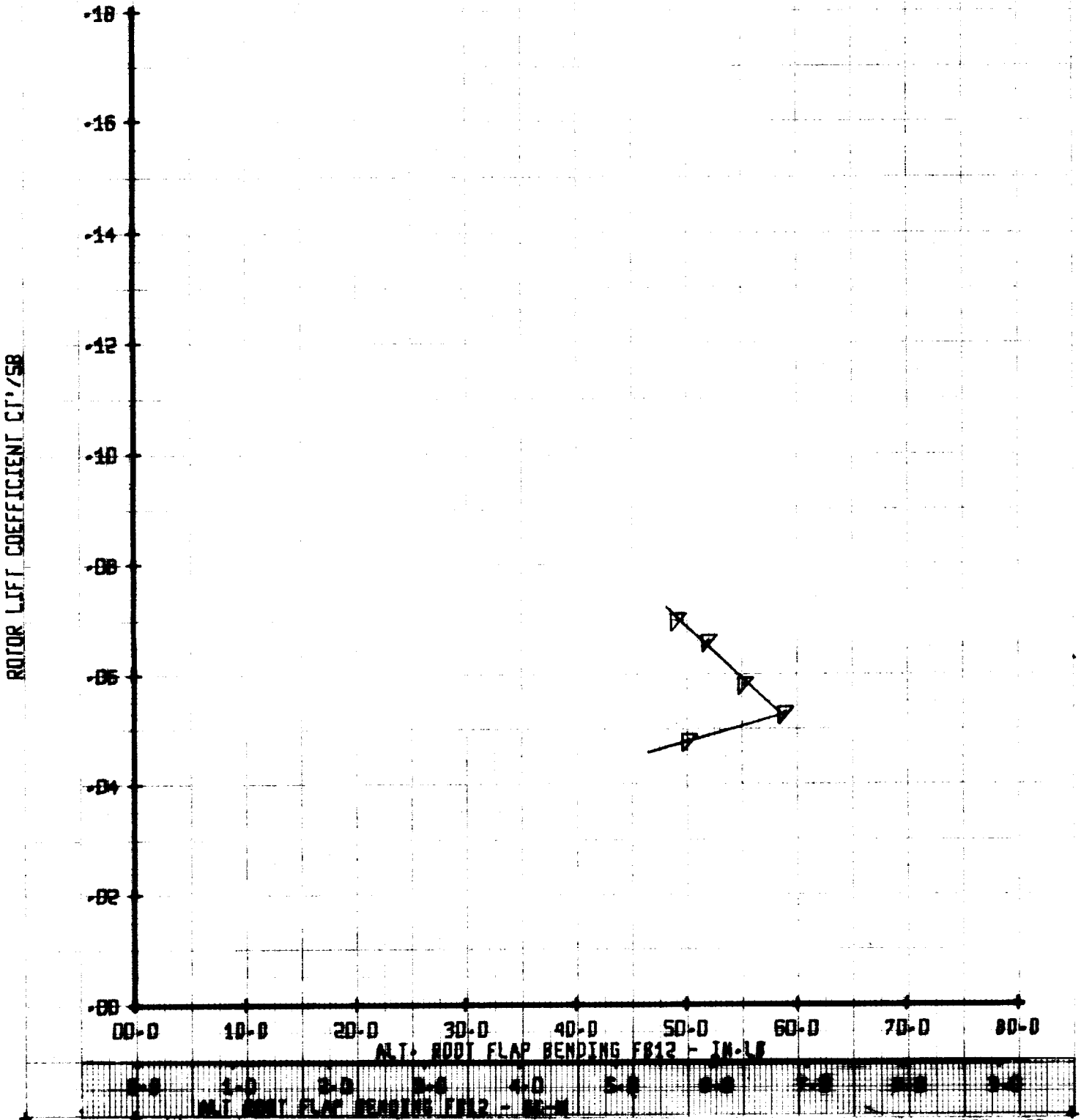
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MLI'	X/00258	VTIN	
0	229	.61	.05	370	
0	248	.61	.075	370	

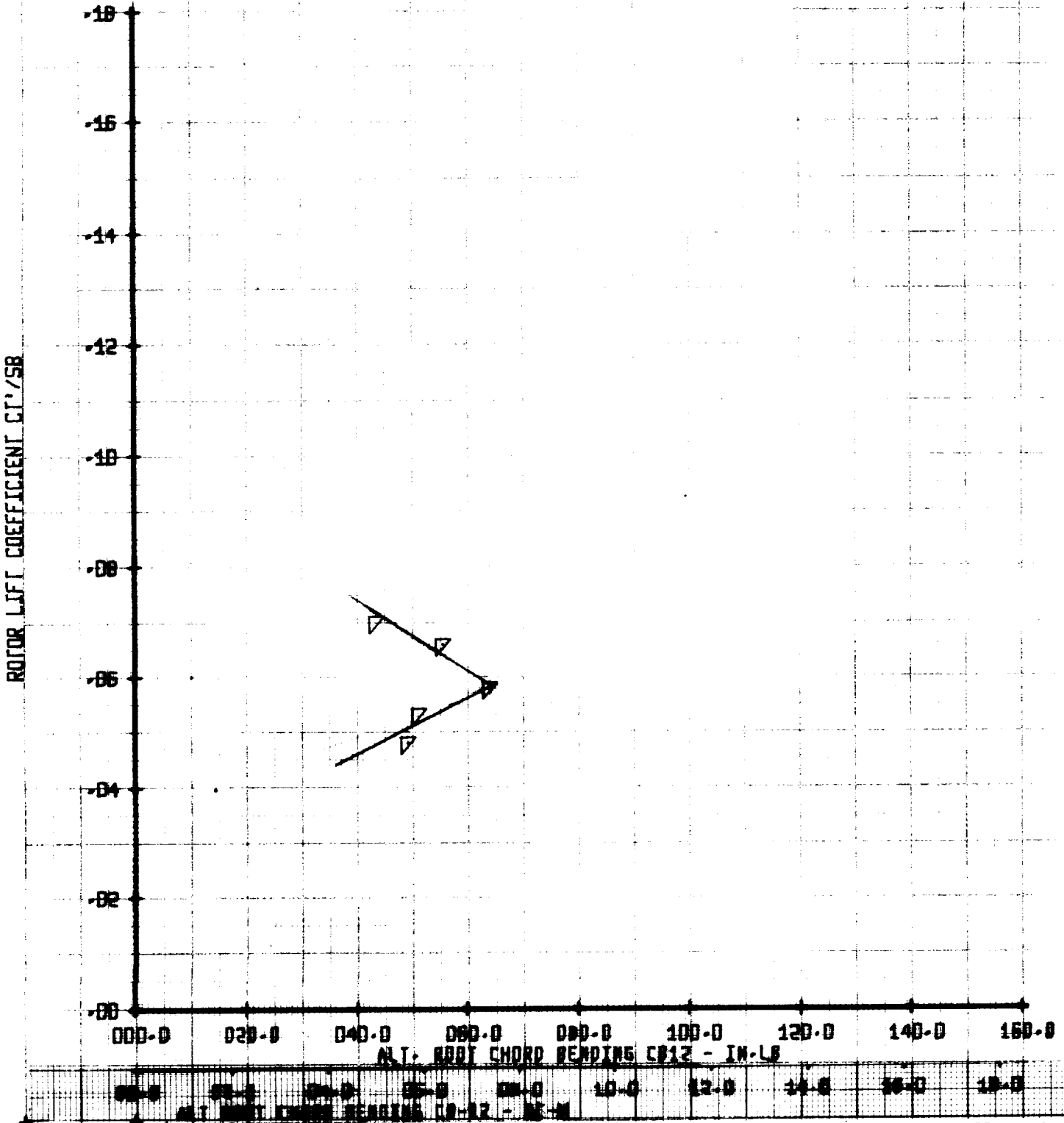
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MJI		X/00258		VTUN	
0	0	229	248	.61	.61	.05	.075	37B	37B

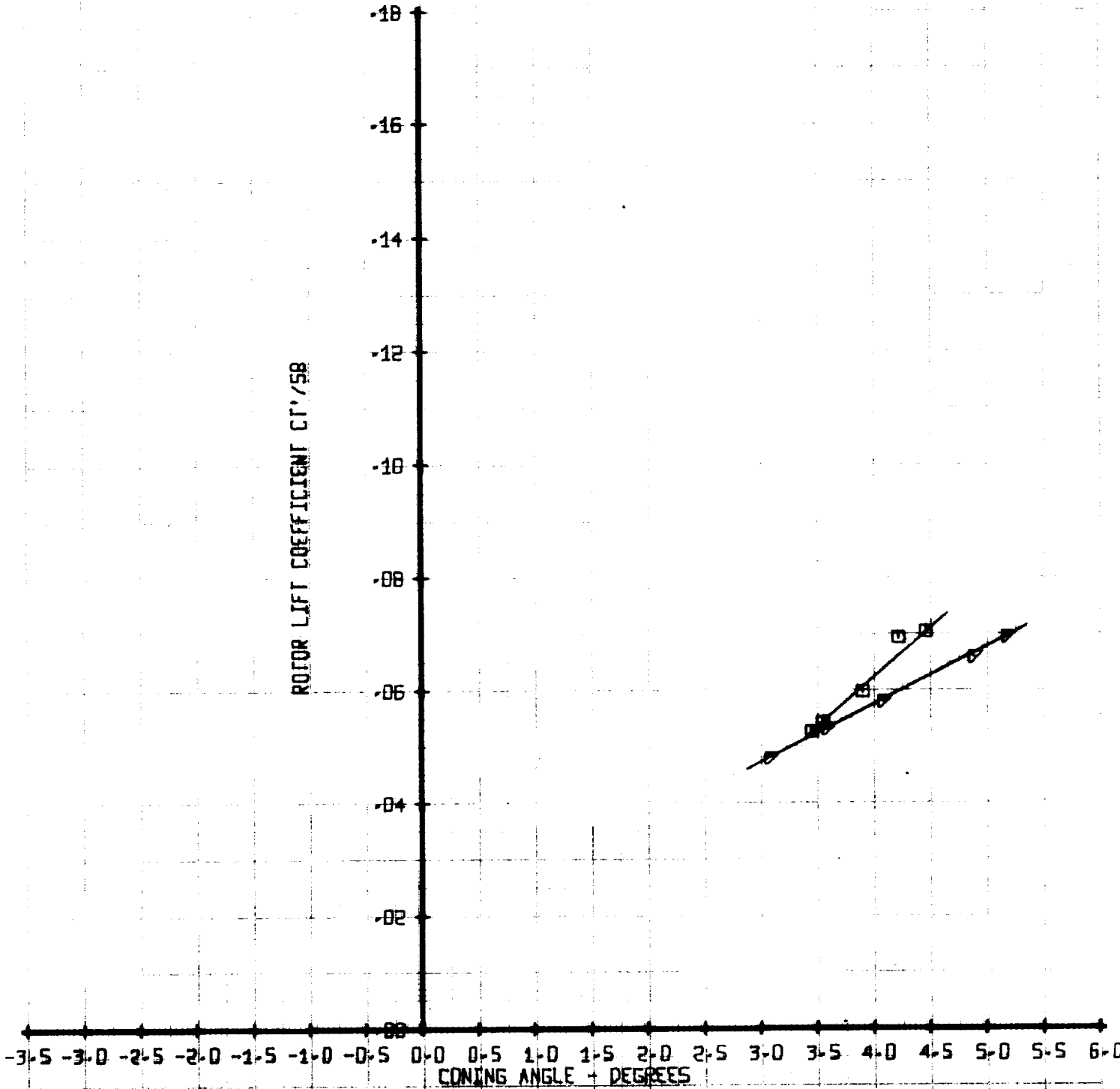
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/QD25B	VTUN
□	229	.61	.05	37B
△	248	.61	.075	37B

ROTOR LIFT COEFFICIENT
 VERSUS
 CONING ANGLE

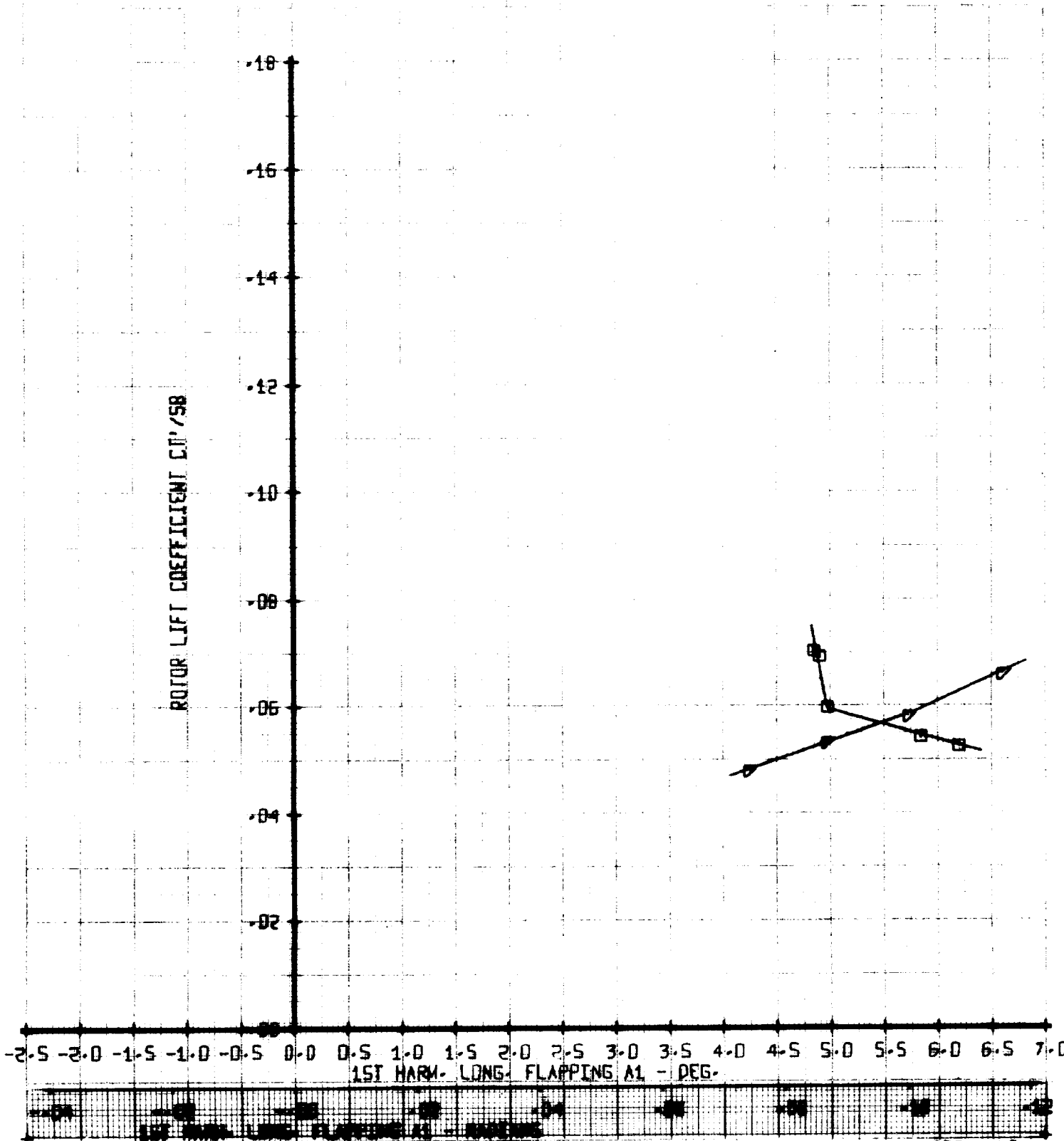


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/OD258	YTUN
0	229	.61	.05	37B
8	248	.61	.075	37B

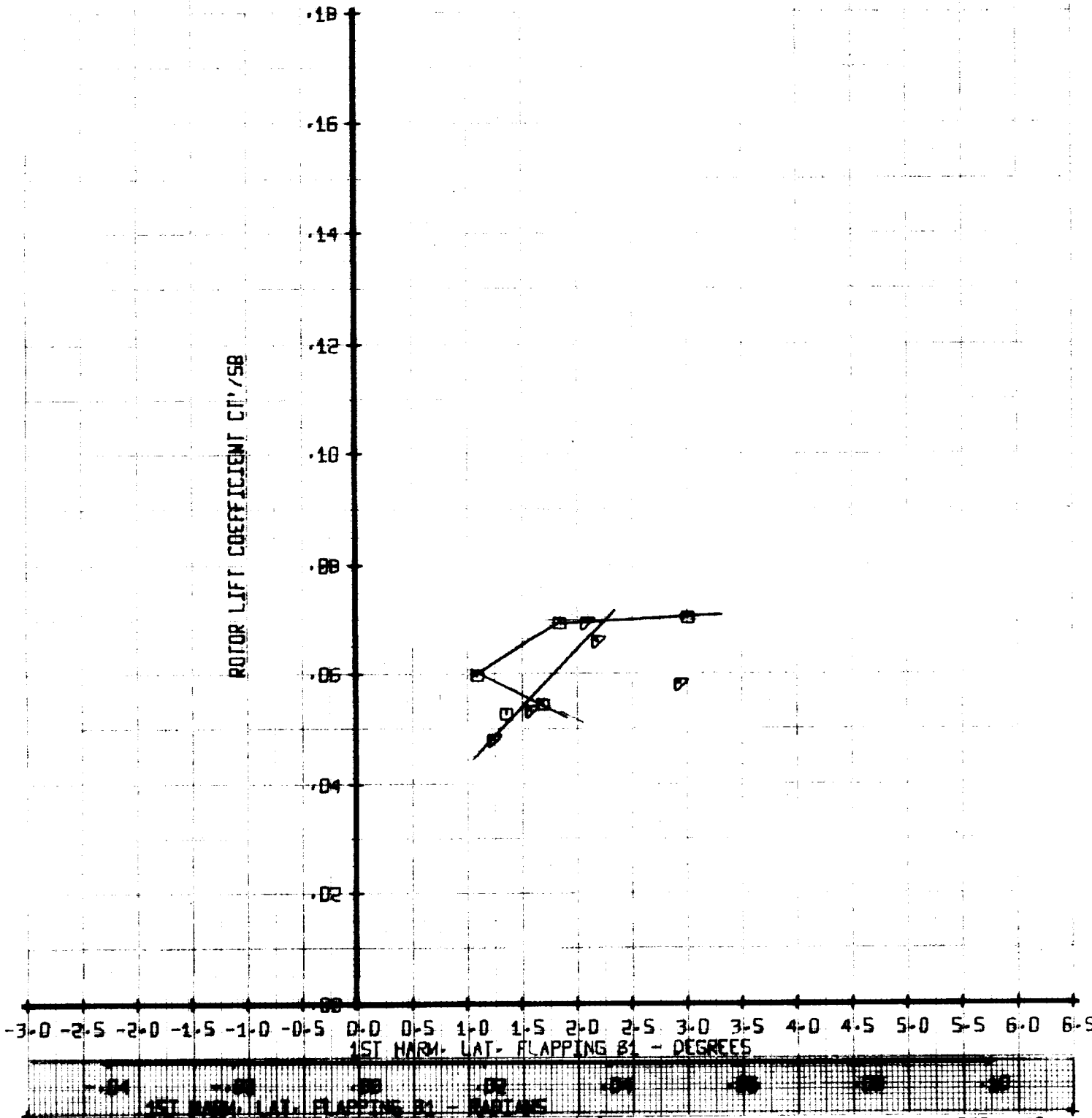
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/DD258	YILIN
□	229	.61	.05	37B
▽	248	.61	.075	37B

ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1

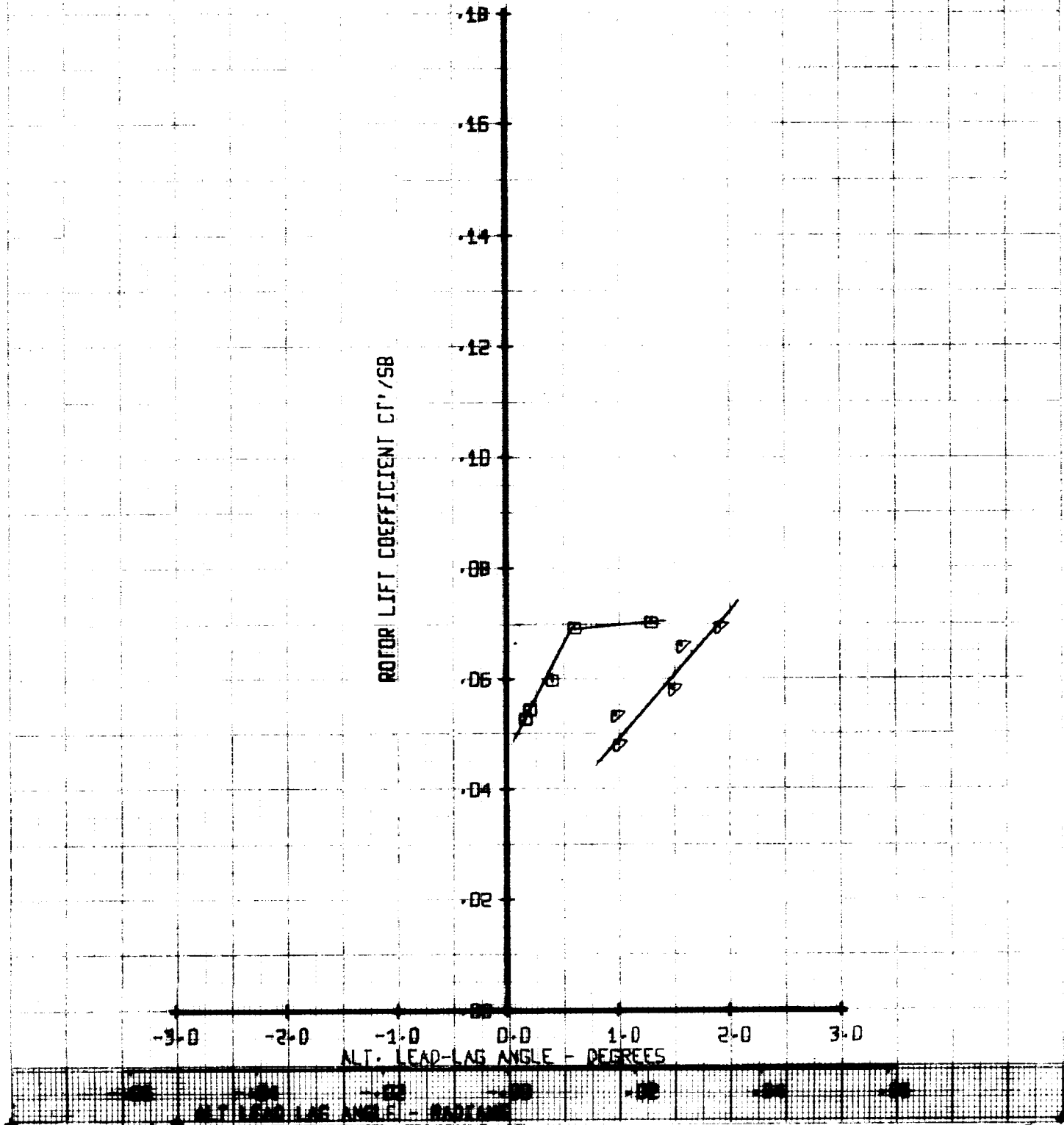


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/00258	VTUN
□	229	.61	.05	37B
△	248	.61	.075	37B

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE

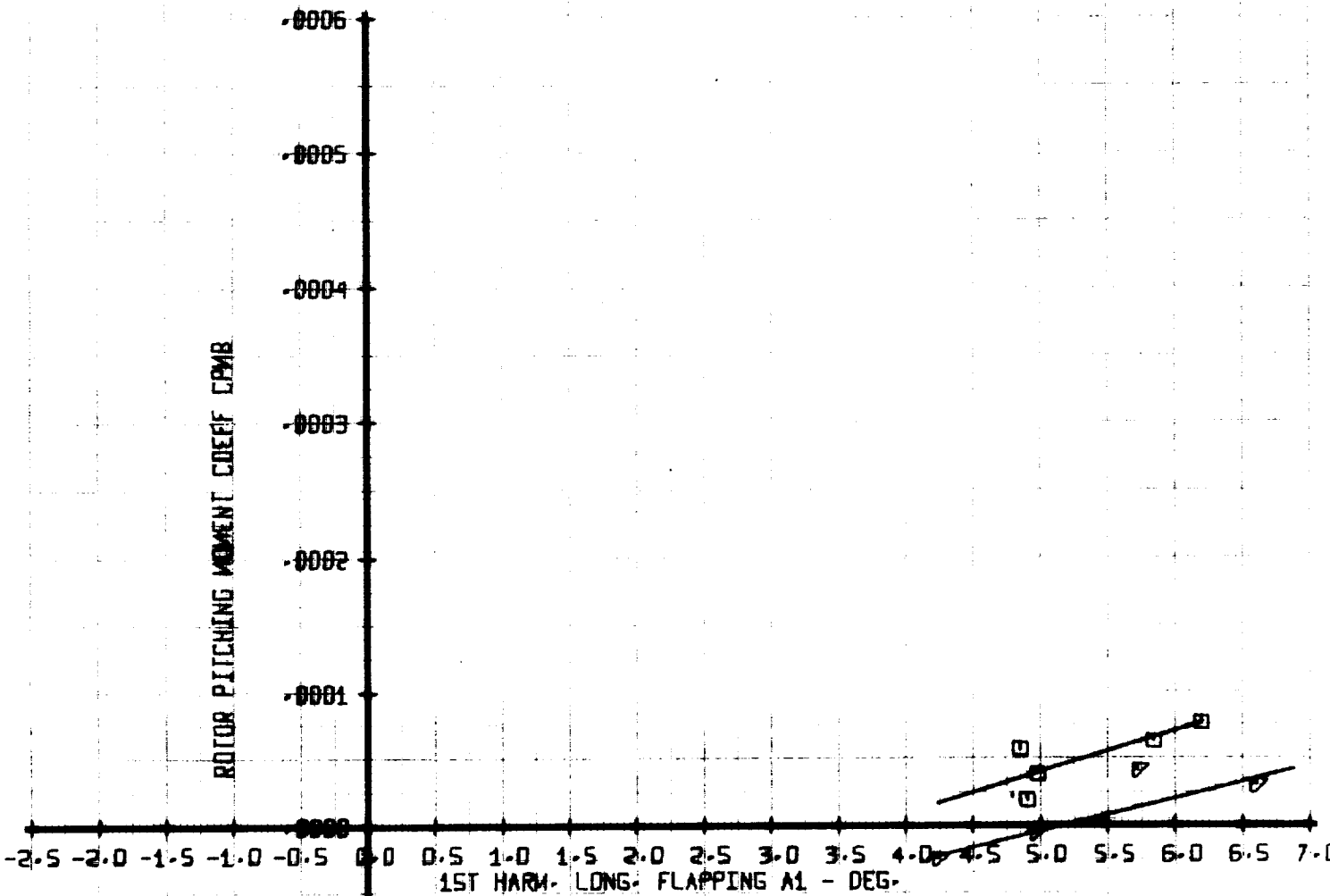


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/OD258	Y/TUN
□	229	.61	.05	37B
△	248	.61	.075	37B

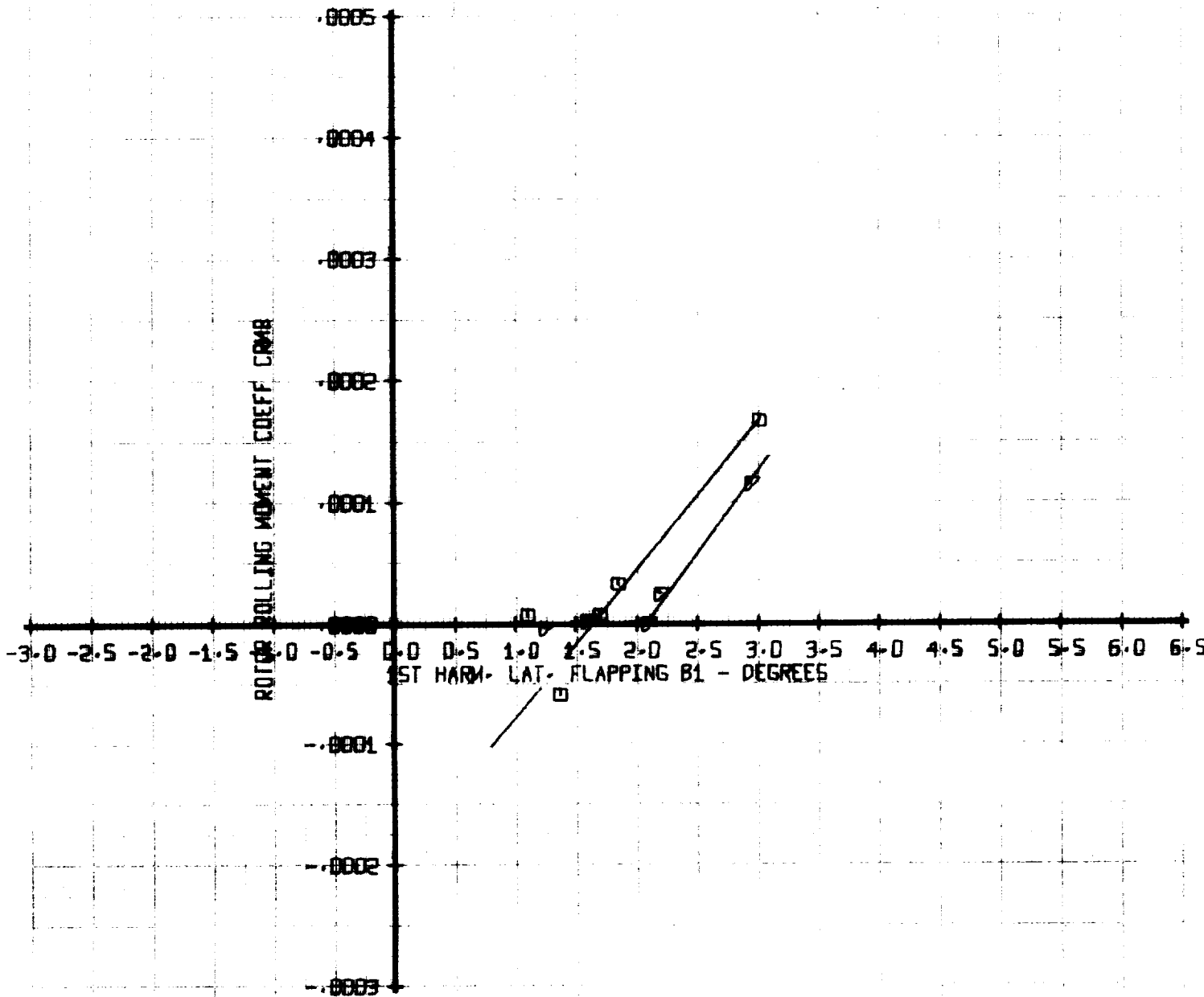
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYMBOL		LEGEND		
□	RUN 229	MU'	X/DD25B	YTUN
▽	RUN 248	-61	-05	37B
		-61	-075	37B

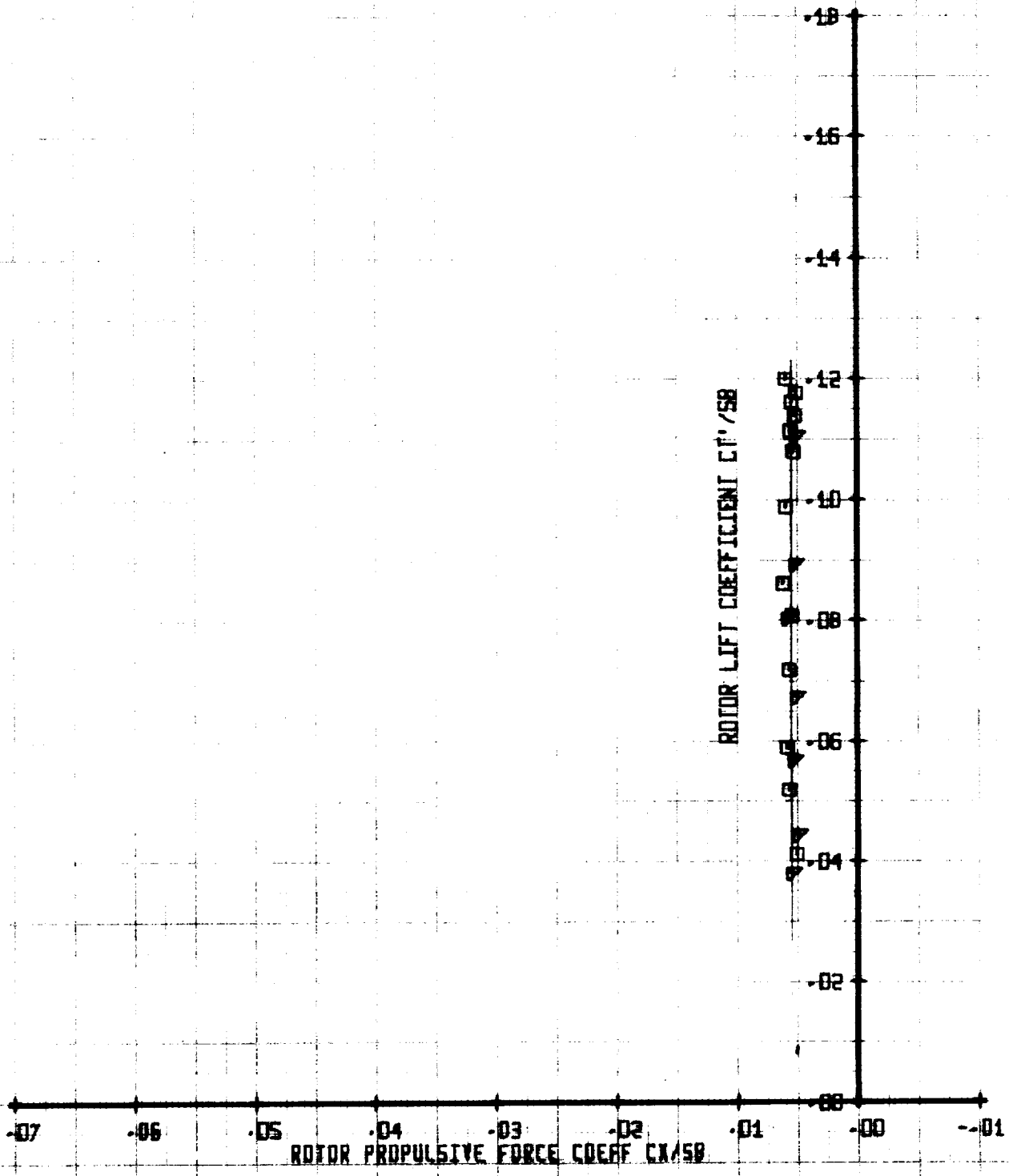
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MU'		X/00258		VTUN	
□	○	250	256	.40	.40	.05	.05	238	238
△				.40					

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT
 REDUCED TIP SPEED

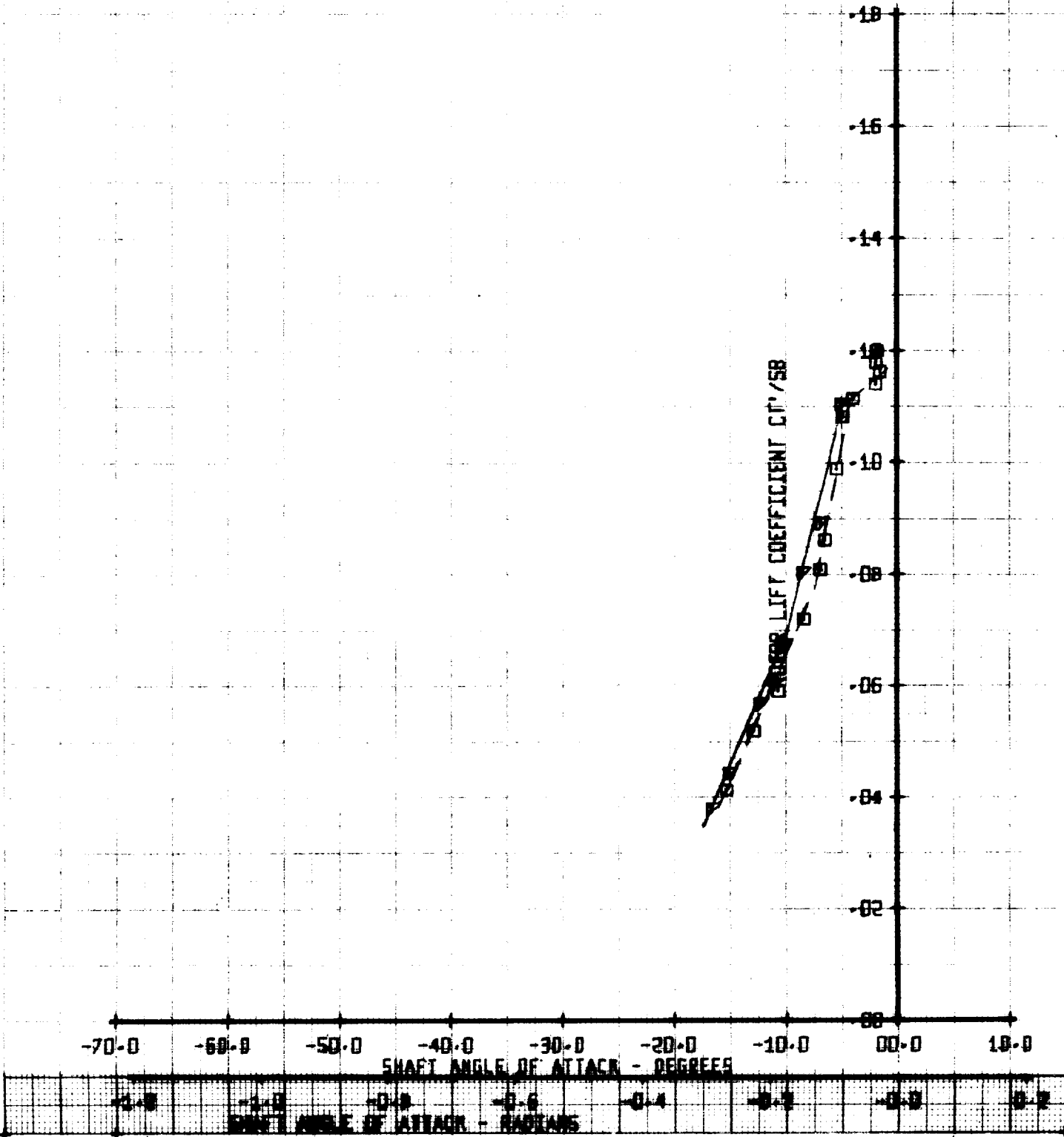


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/00258	YTUN
□	250	.40	.05	228
△	256	.40	.05	228

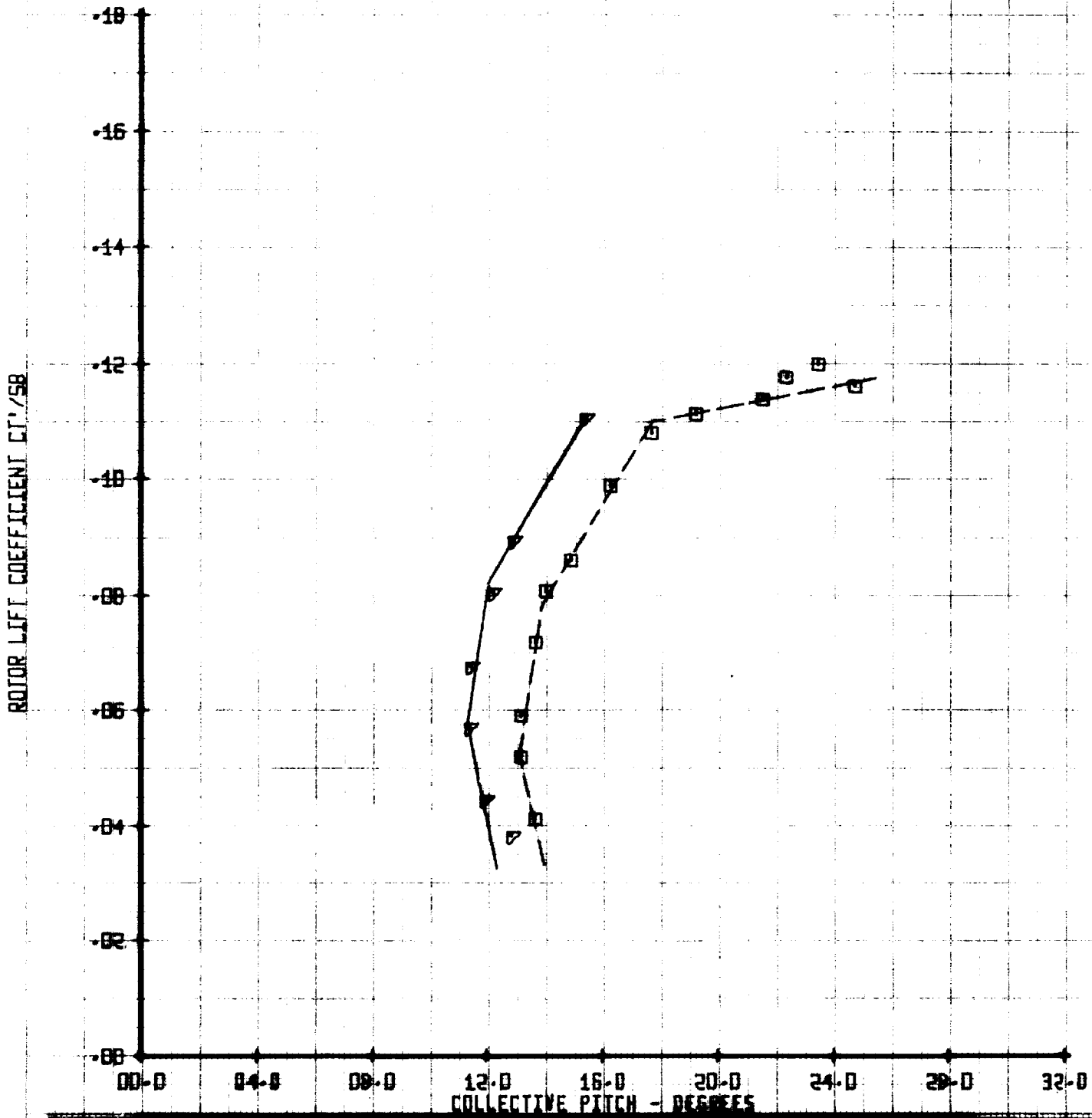
ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK
 REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47A ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MU'		X/00258		VTUM	
□	256	□	256	.40	.40	.05	.05	228	228
△	256	△	256	.40	.40	.05	.05	228	228

ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH
 REDUCED TIP SPEED

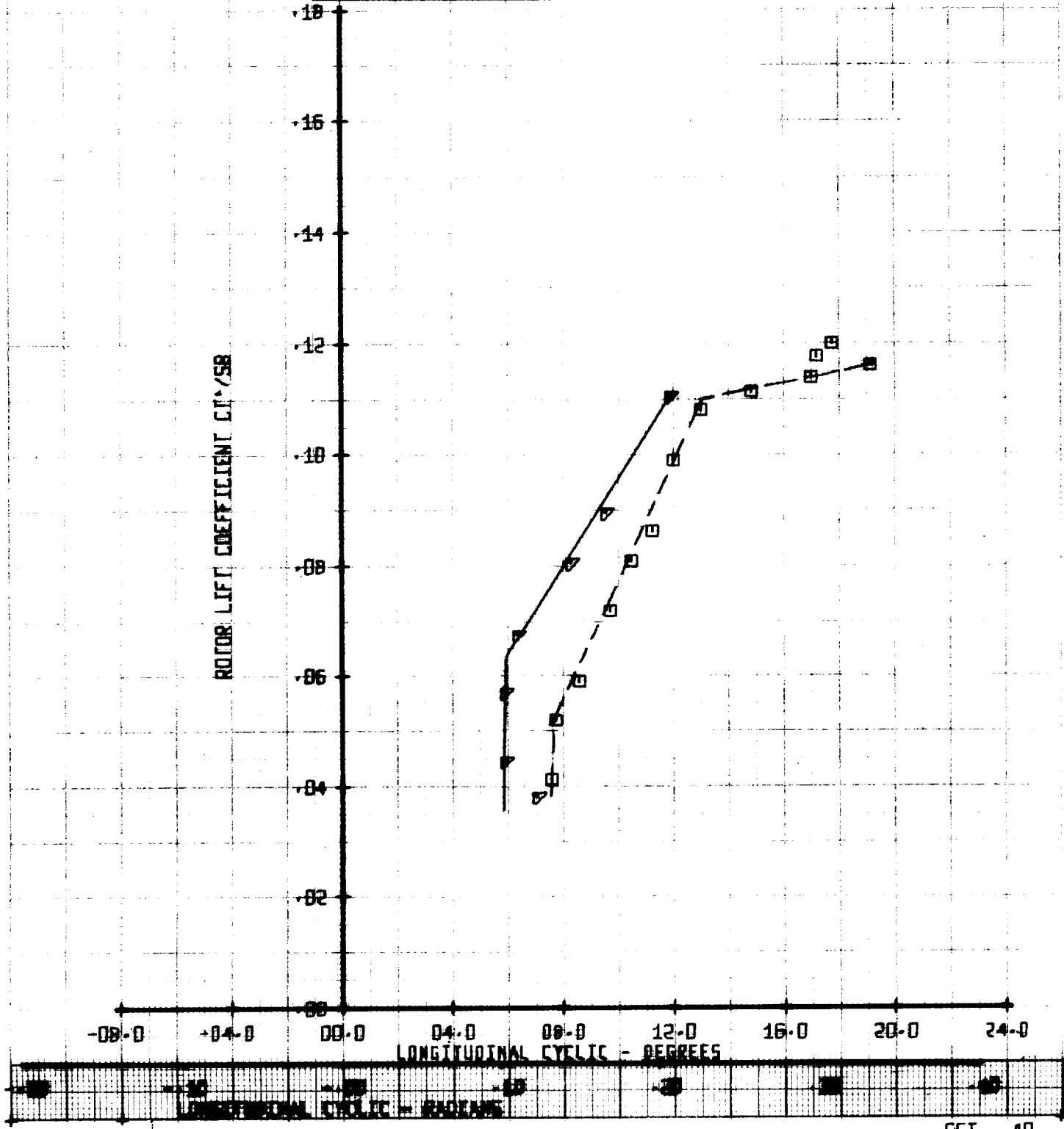


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN	MU'	X/DD258	YTUN
□		250	.40	.05	228
△		256	.40	.05	228

ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC

REDUCED TIP SPEED

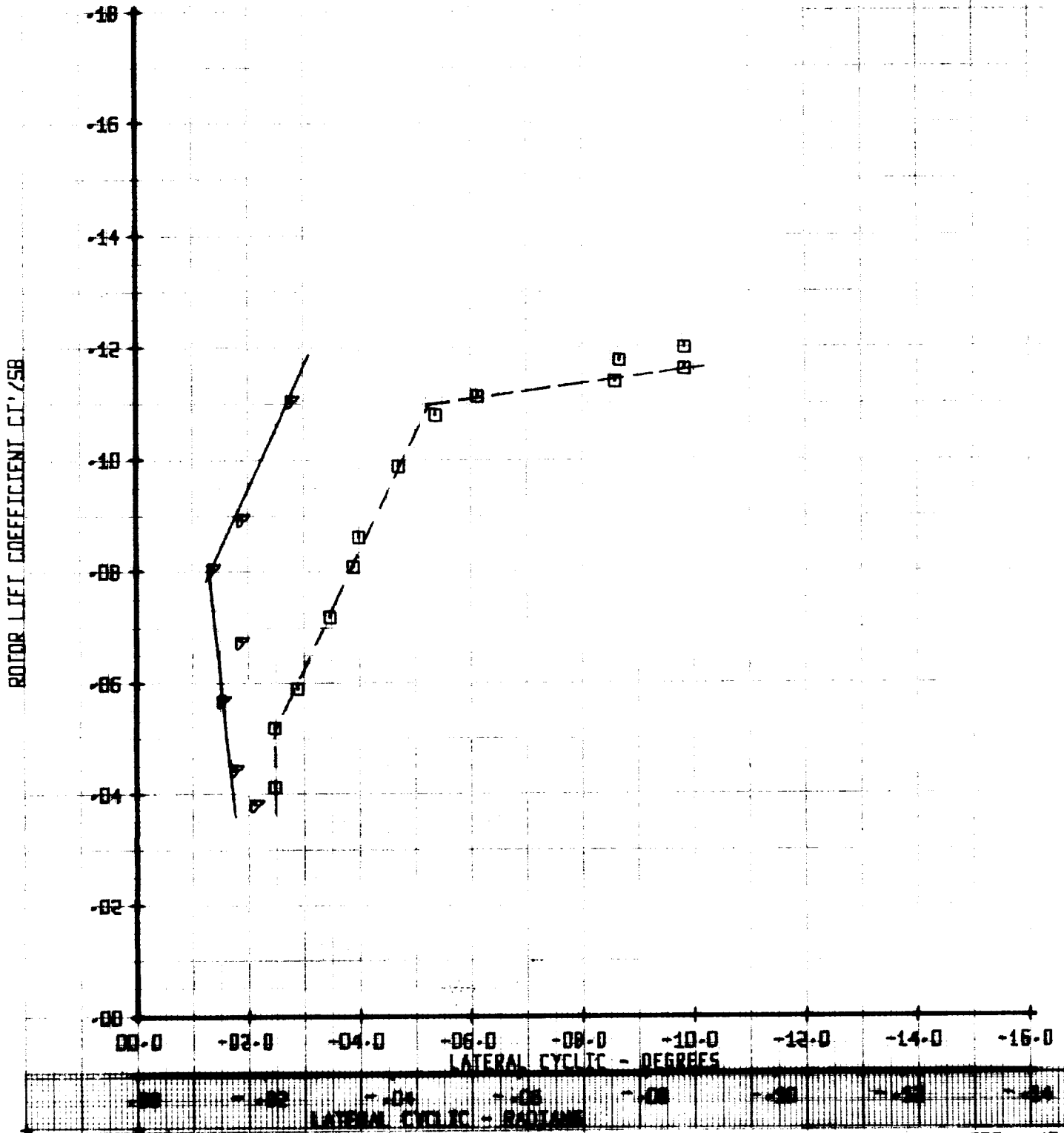


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		LEGEND		MU'		X/00258		VTUN	
□	▽	250	256	□	▽	.40	.40	.05	.05	230	220

ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC

REDUCED TIP SPEED

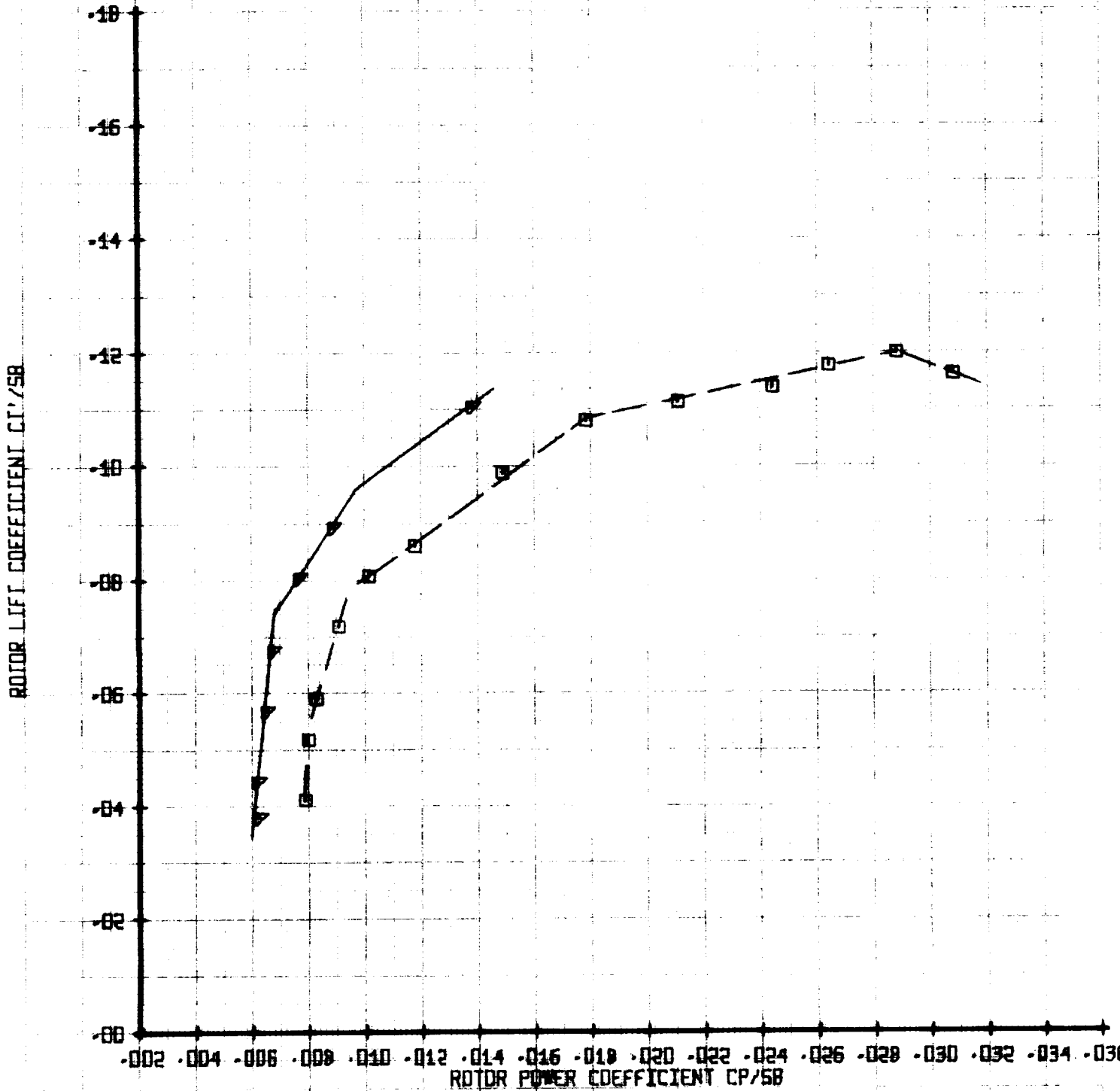


LIFT-PROPELLIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	VTUM
0	250	.40	.05	230
Δ	256	.40	.05	220

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT

REDUCED TIP SPEED

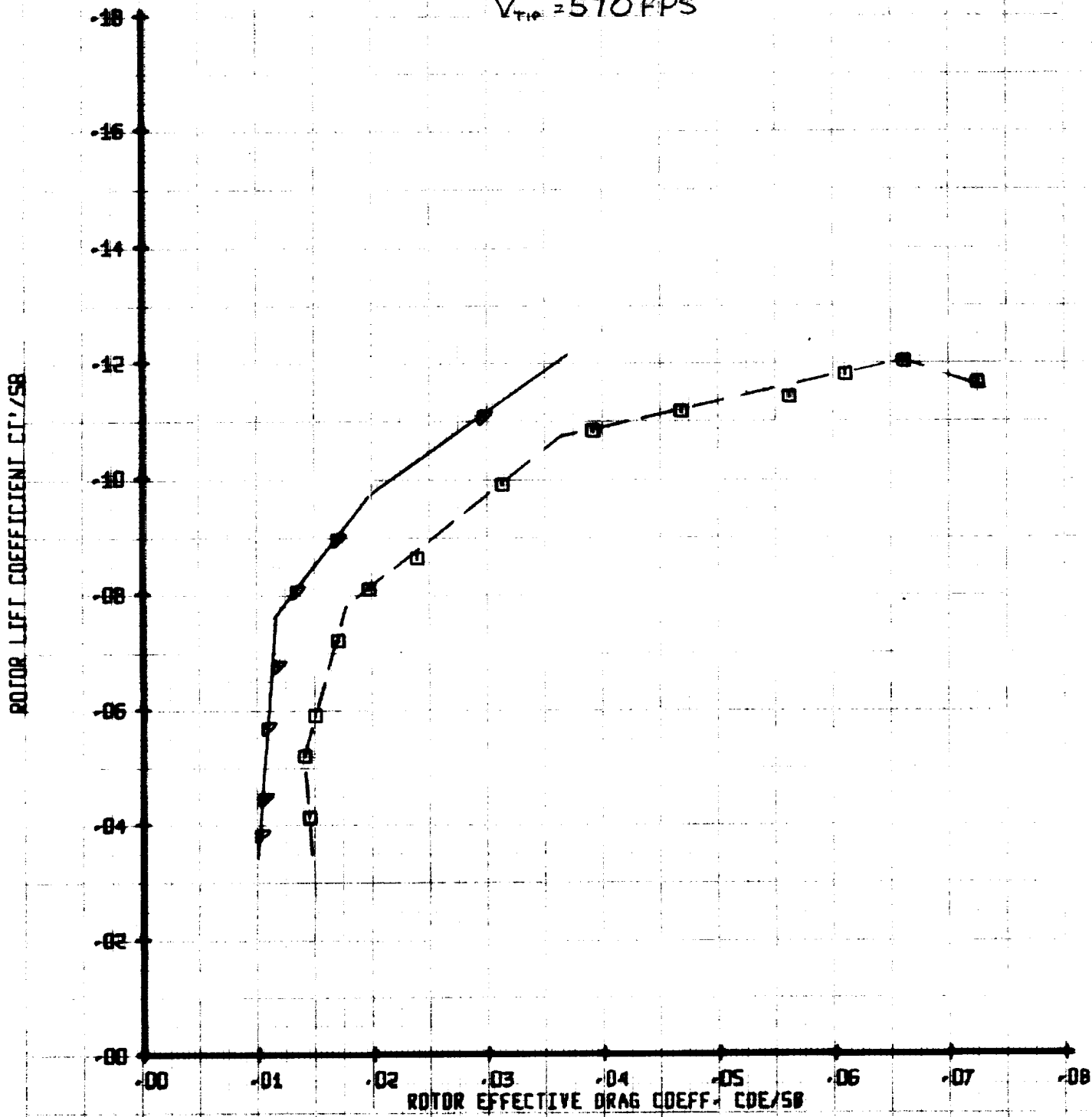


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MI'	X/DO250	V/TM	
□	250	.40	.05	228	
△	256	.40	.05	228	

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT
REDUCED TIP SPEED

$V_{Tip} = 570 \text{ FPS}$

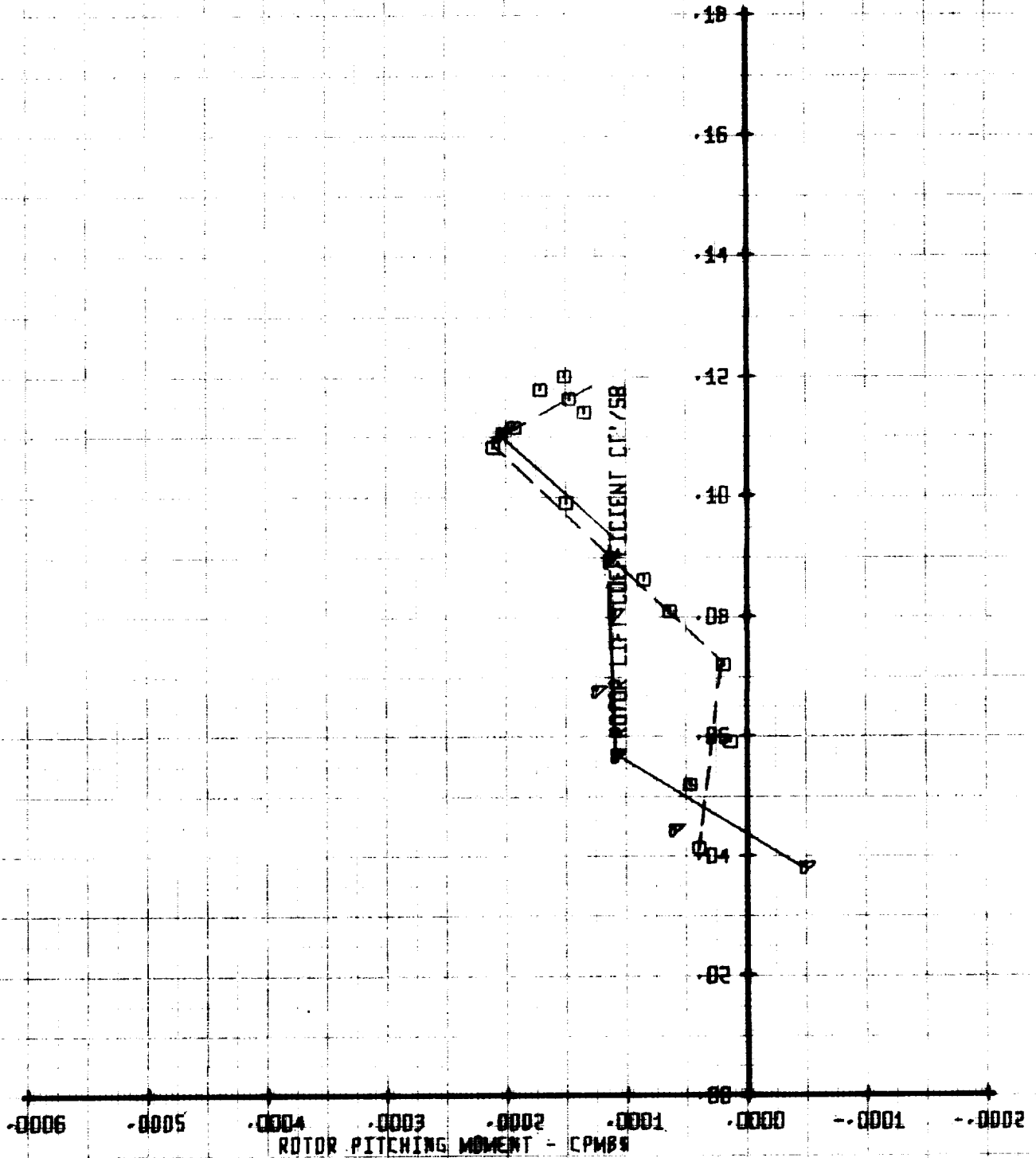


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/00258	VTUN	
□	250	.40	.05	238	
△	256	.40	.05	228	

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT

REDUCED TIP SPEED

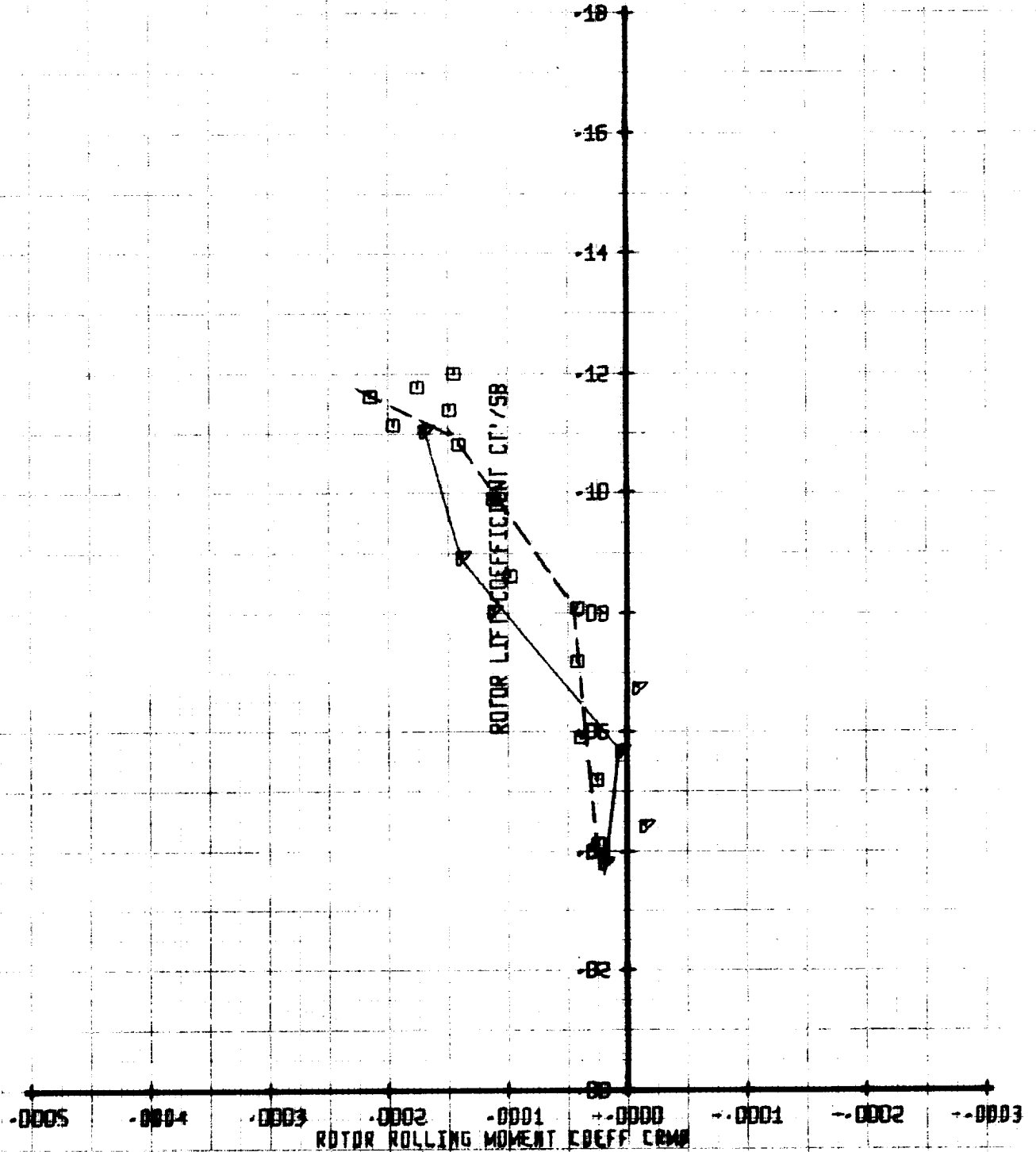


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		LEGEND	
□	250	MU	X/00258	YTLIN	230
△	256		.40		220
			.40		220

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT

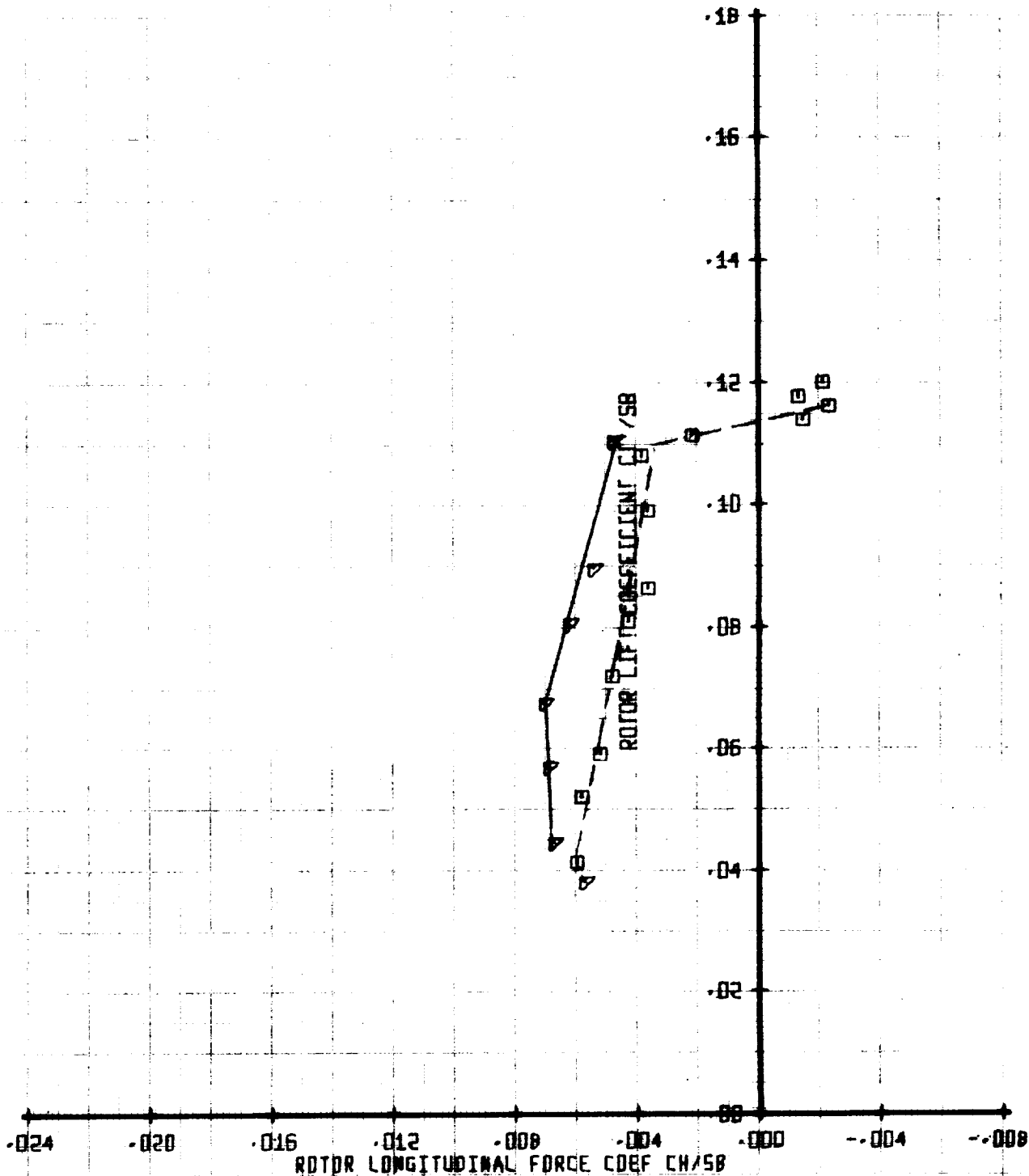
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYMBOL		LEGEND	MU'	X/00258	VTUN
□	▲	RUN 250	.40	.05	228
□	▲	RUN 256	.40	.05	228

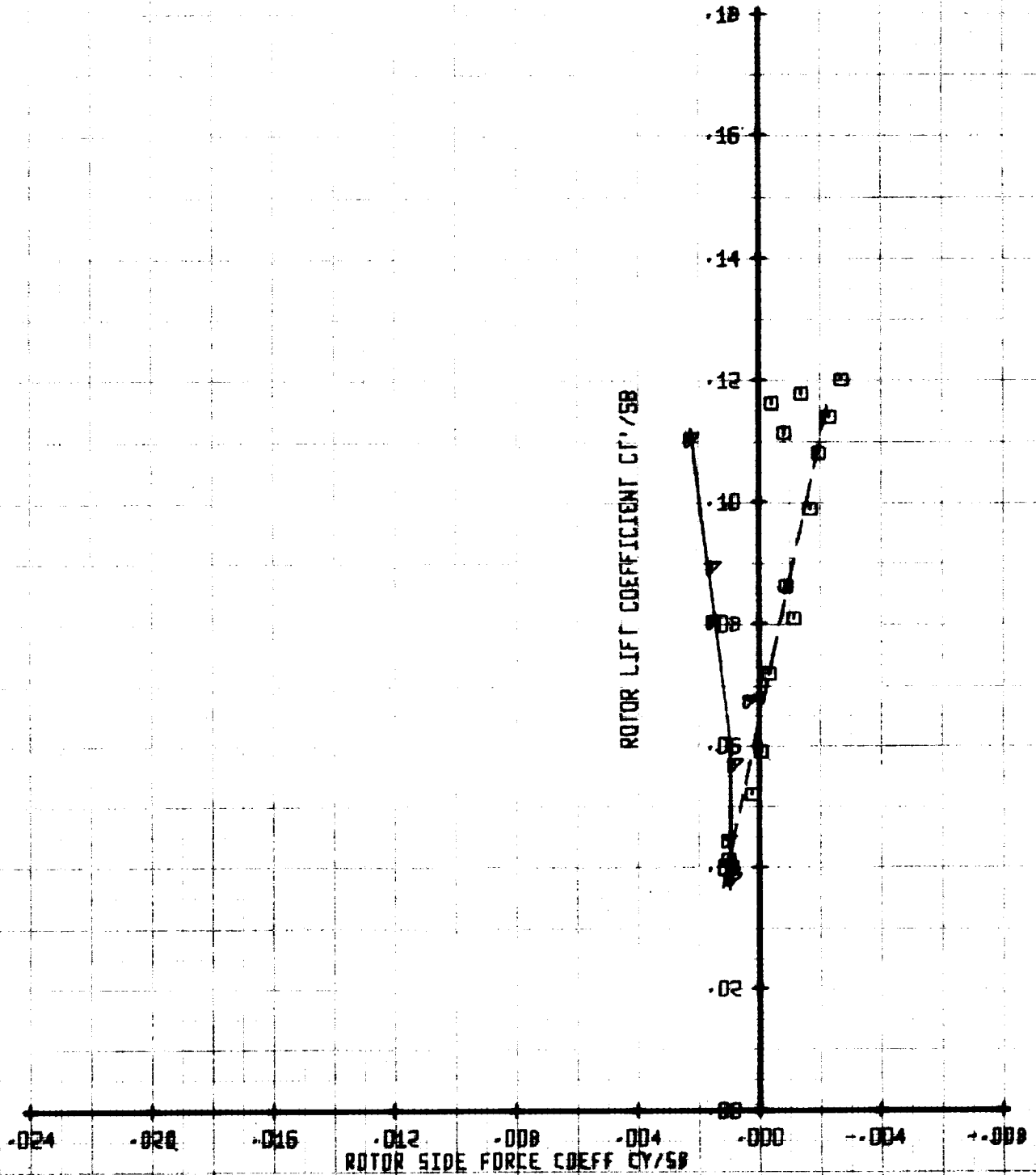
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYMBOL		RUN	MU'	X/00258	Y/TUN
□	○	250	.40	.05	228
△	○	256	.40	.05	228

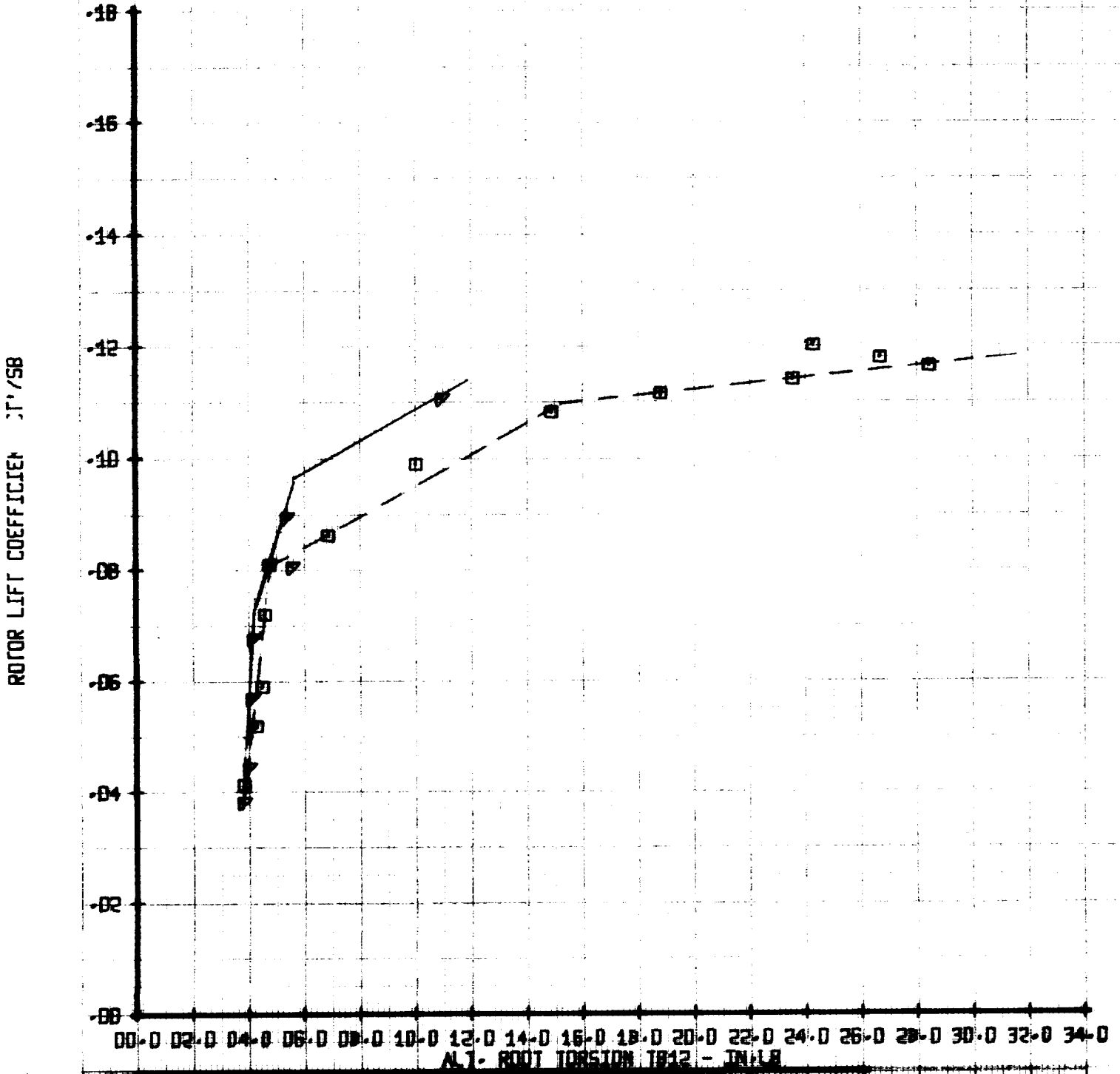
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/00298	VTUM	
□	250	.40	.05	228	
▽	256	.40	.05	228	

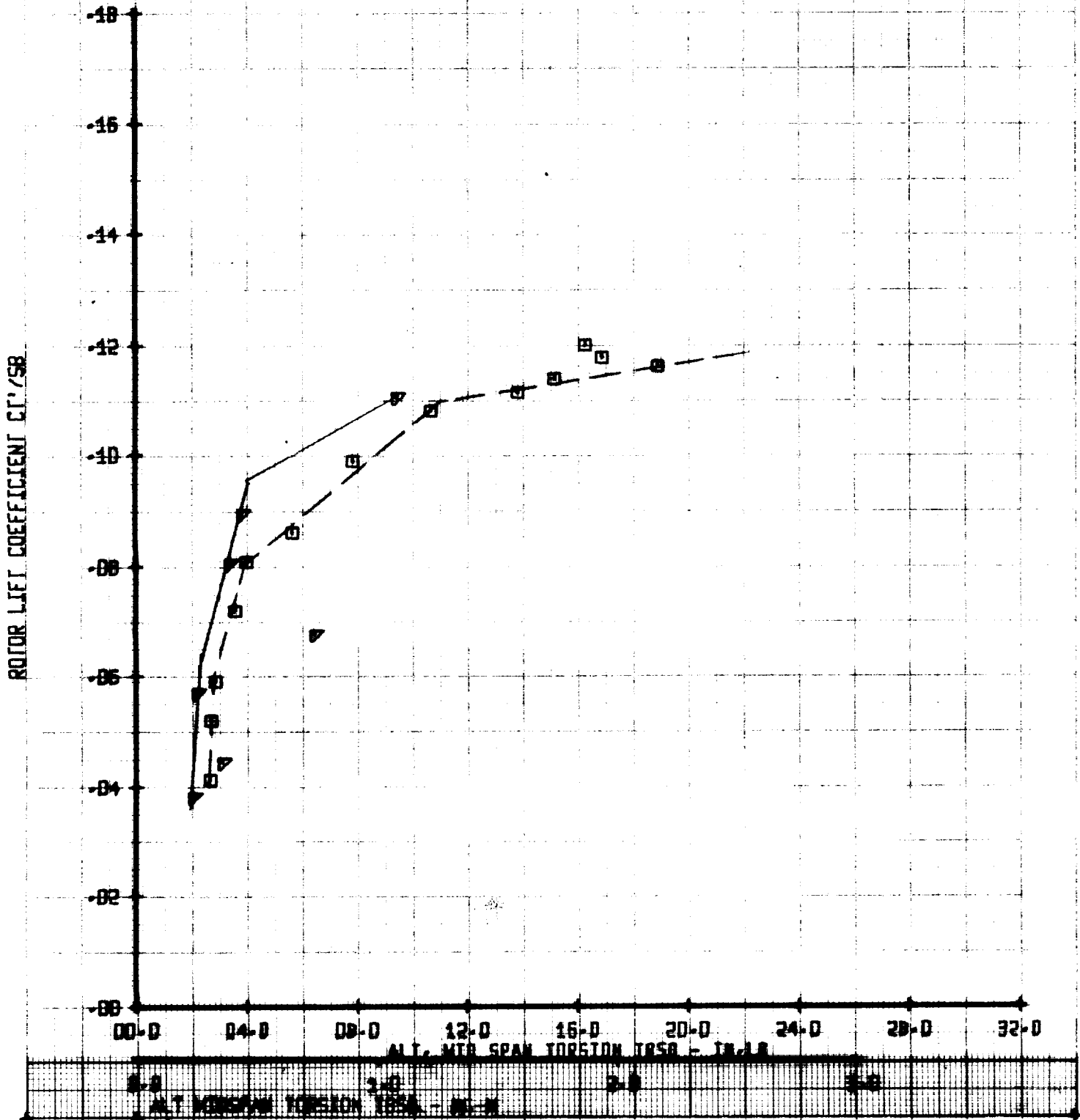
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CM-47M ROTOR
 LIFT LIMIT TESTING

LEGEND		MI'	X/00298	Y/TUN
SYM	RUN			
□	250	.40	.05	229
▽	256	.40	.05	229

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50
 REDUCED TIP SPEED



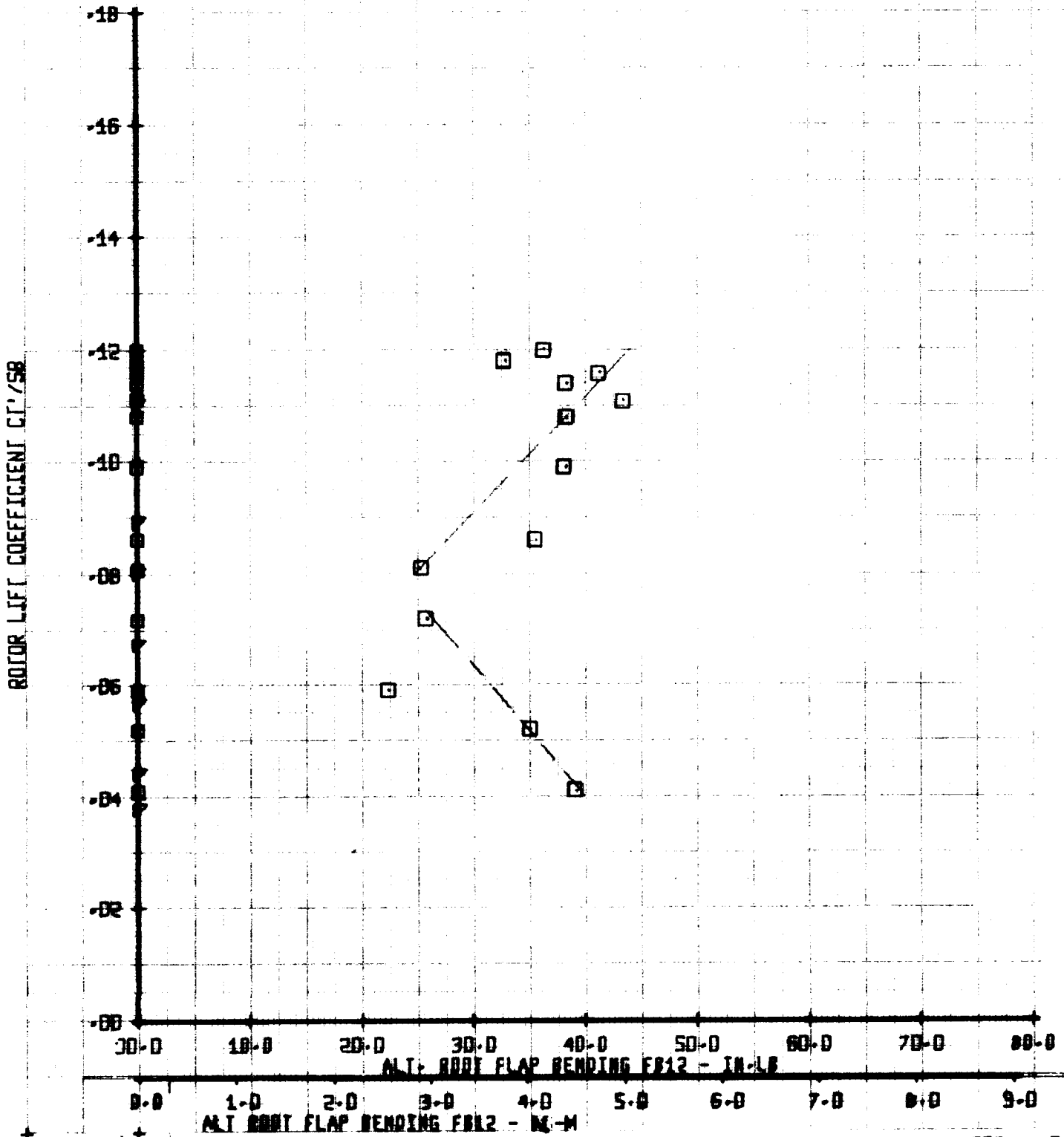
ET 40
 WT 193

SET 40
 BVWT 193

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYN		RUN		MU'		X/00298		VTUN	
□	□	250	250	.40	.40	.05	.05	220	220
○	○	250	250	.40	.40	.05	.05	220	220

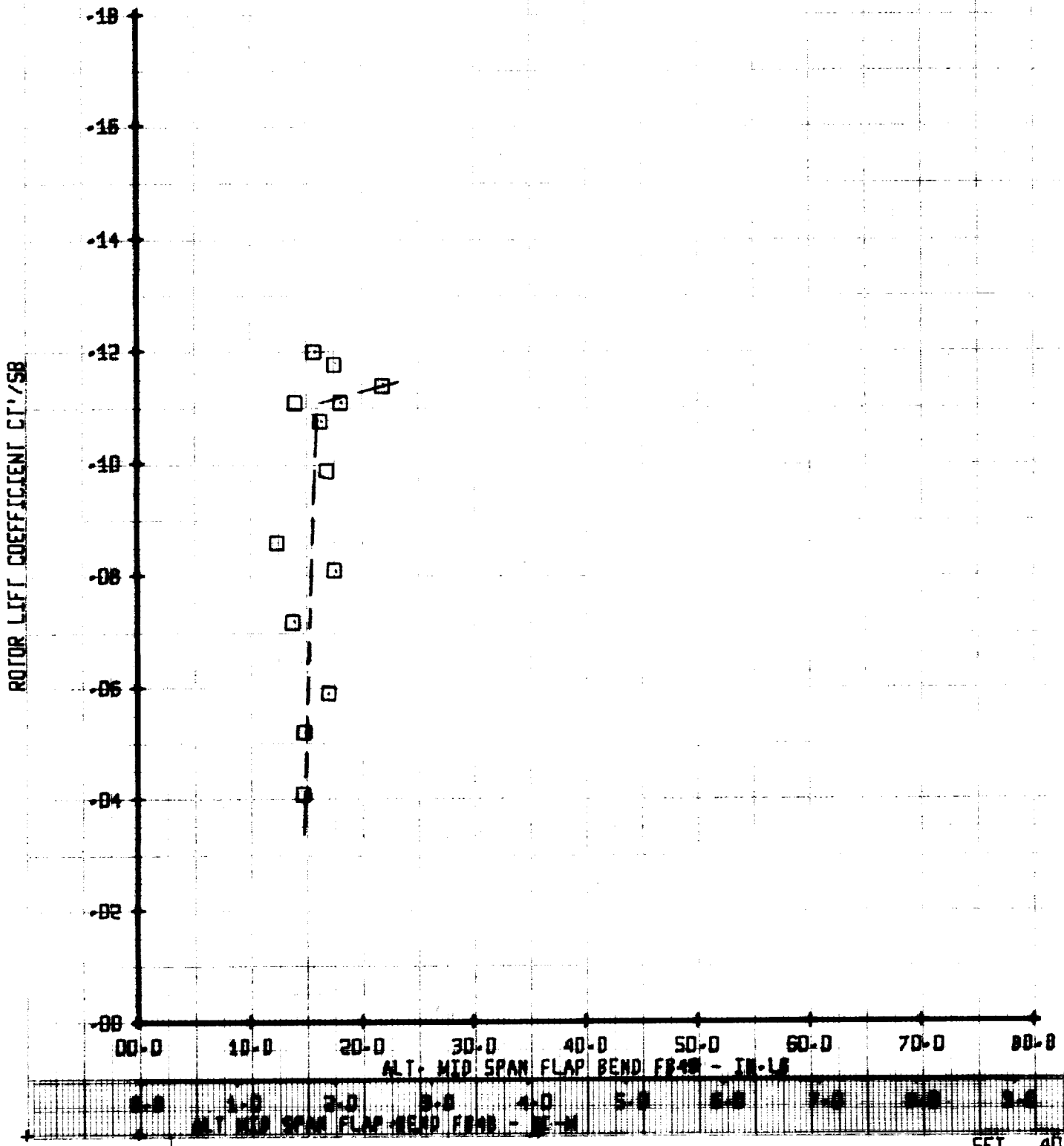
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MLI'	X/00298	Y/TUN	
□	250	.40	.05	228	
○	256	.40	.05	228	

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BENDING FB40
REDUCED TIP SPEED



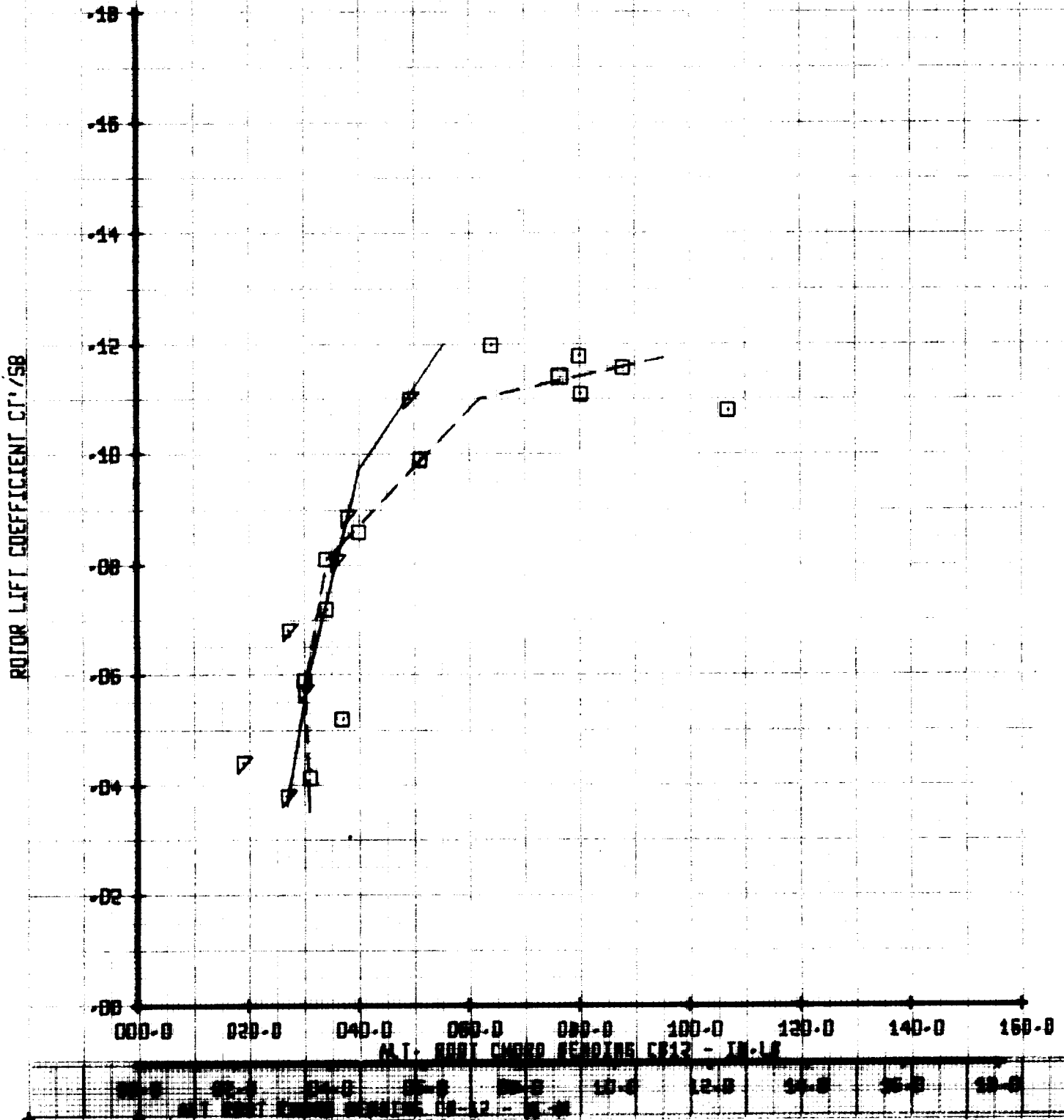
ET 40
 WT 193

SET 40
 BVWT 193

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MLI	X/00298	Y/TUN
□	250	.40	.05	220
▽	256	.40	.05	220

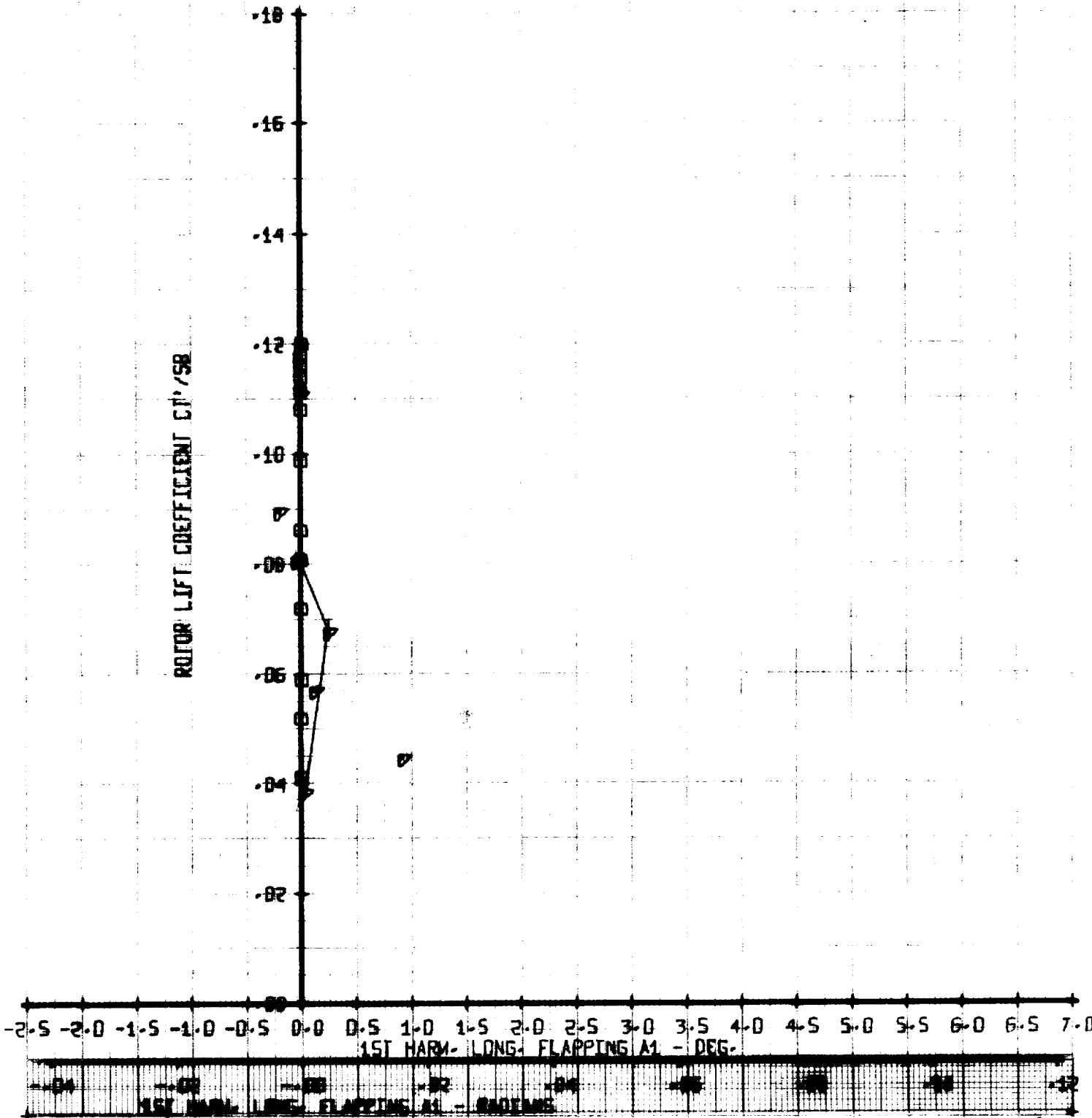
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/OD2SB	Y/TUN	
□	250	.40	.05	22B	
▽	256	.40	.05	22B	

ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1
REDUCED TIP SPEED

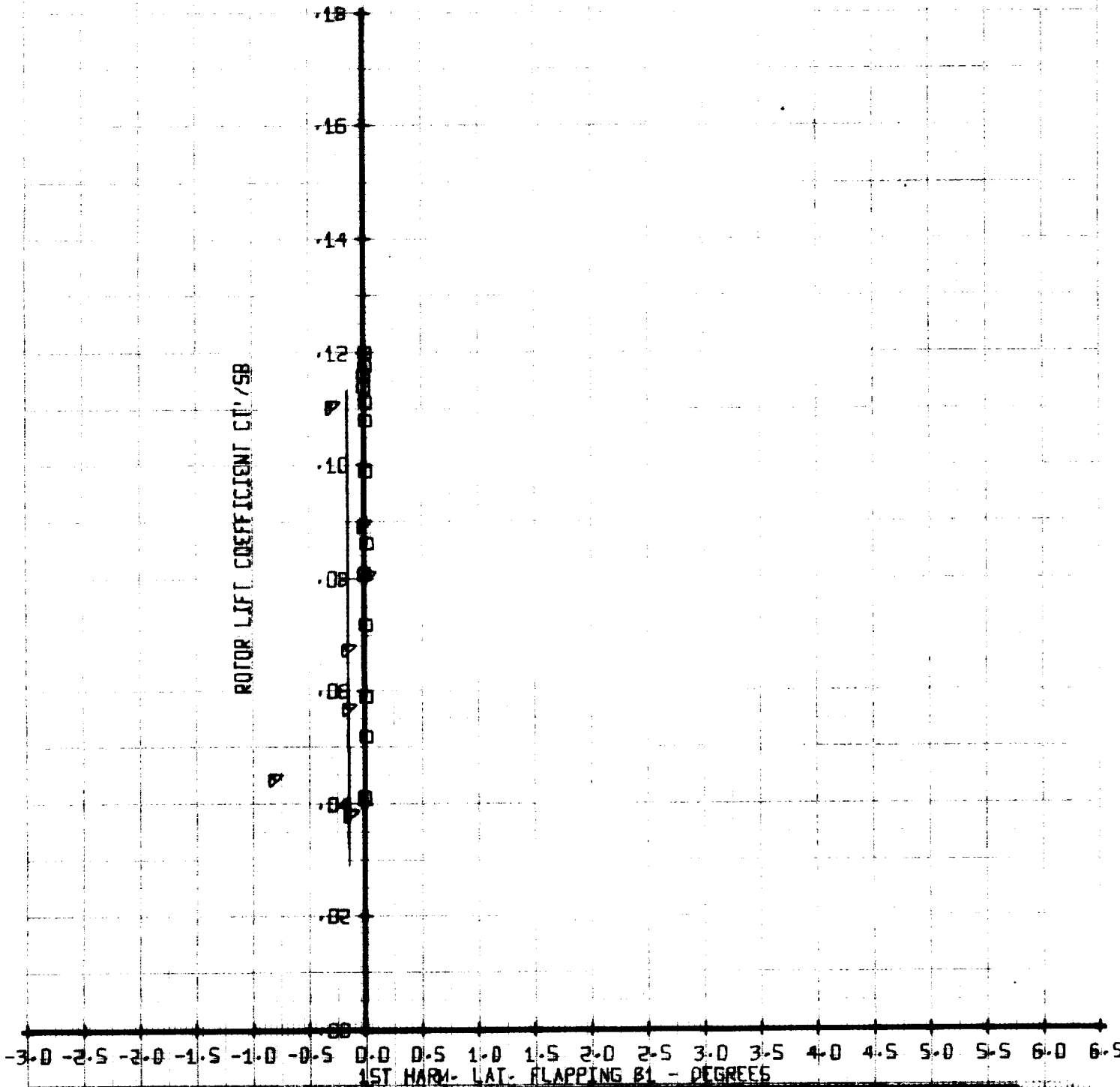


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/DD258	Y/TUN
□	250	.40	.05	228
▽	256	.40	.05	228

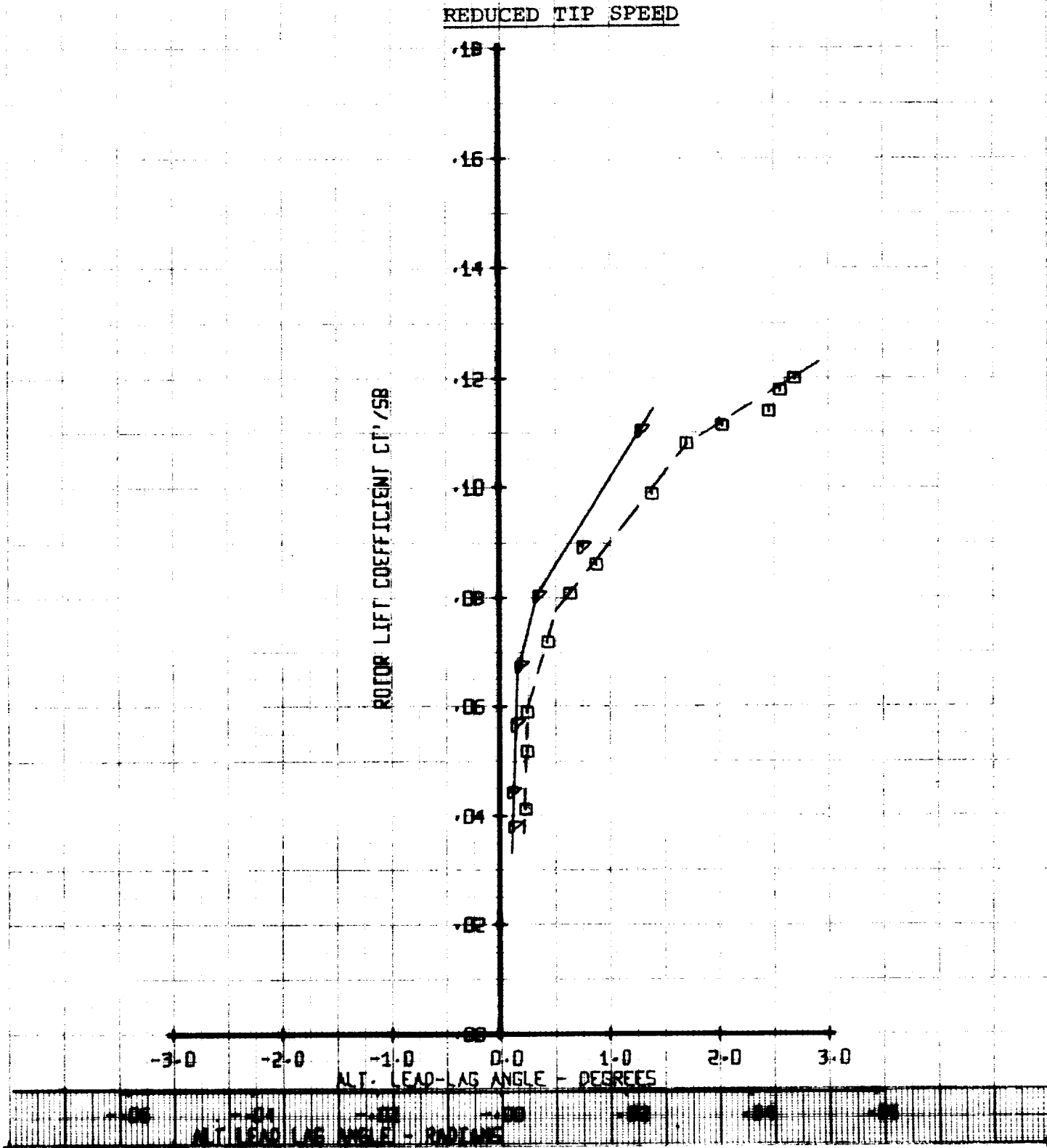
ROTOR LIFT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYMBOL		LEGEND			
□	○	RUN	MU'	X/0025B	YTUN
□	○	250	.40	.05	228
◊	○	256	.40	.05	228

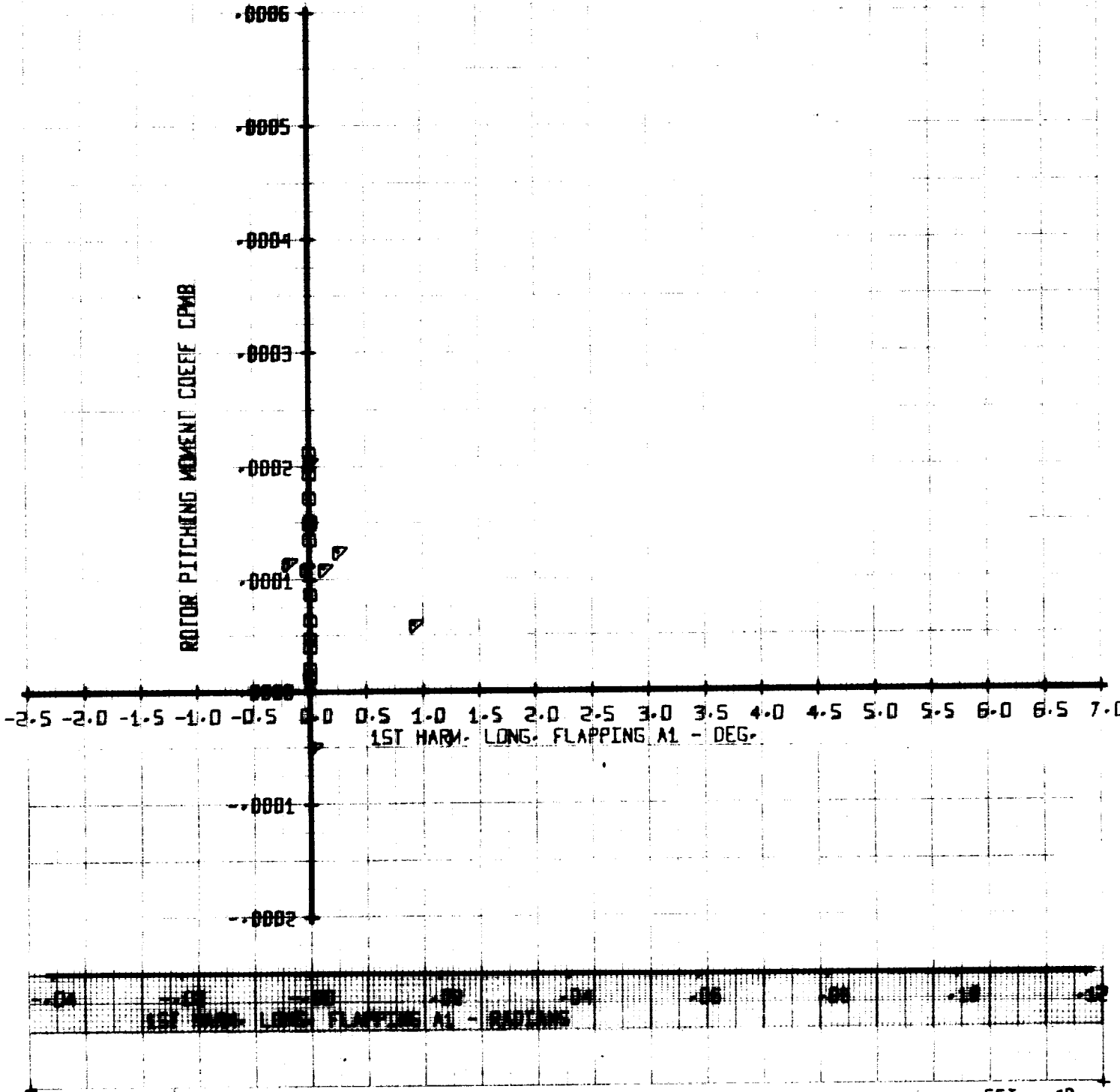
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/DD2SB	YTUN	
○	250	.40	.05	238	
◻	256	.40	.05	238	

ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND					
SYM	RUN	MLI'	X/00258	Y/00258	Y/00258
□	250	-40	.05		228
▽	256	-40	.05		228

ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1
REDUCED TIP SPEED

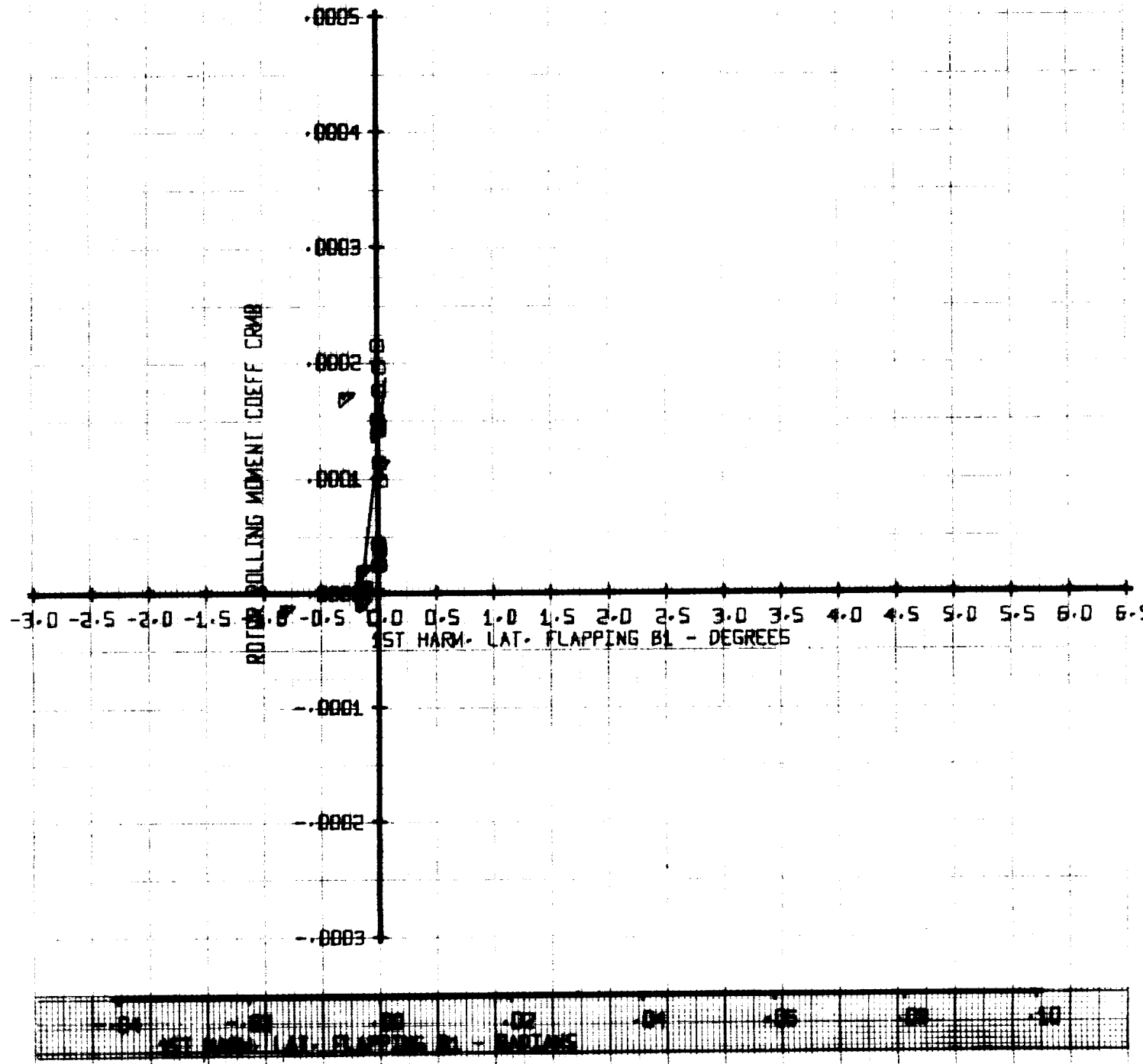
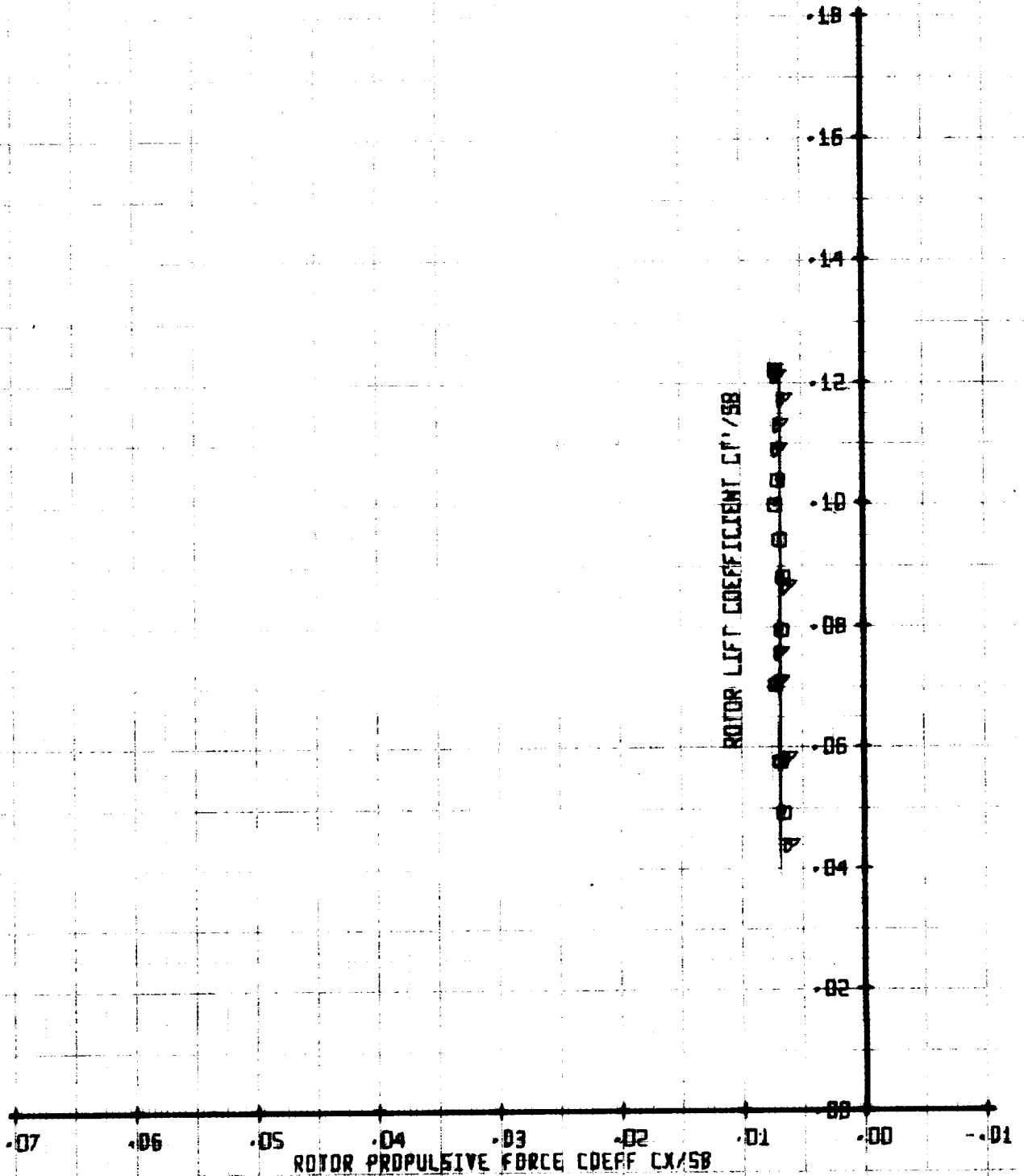


Figure A-290

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		X/OD258	Y/TUN
SYM	ALIN		
□	251	.05	256
▽	255	.05	256

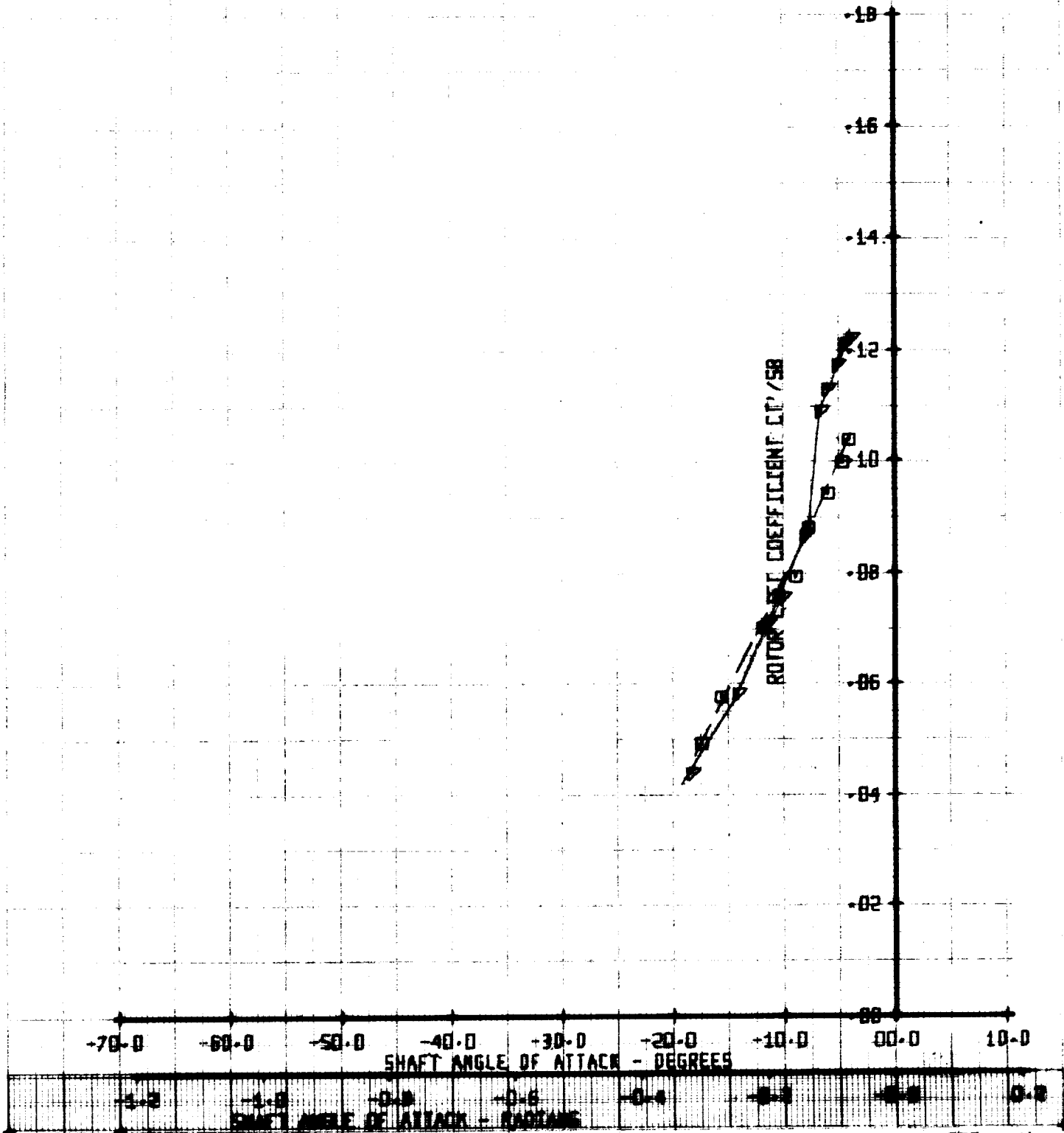
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT
 REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU'	X/00258	VTUN
□	RUN 251	.45	.05	296
▽	RUN 255	.45	.05	296

ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK
REDUCED TIP SPEED

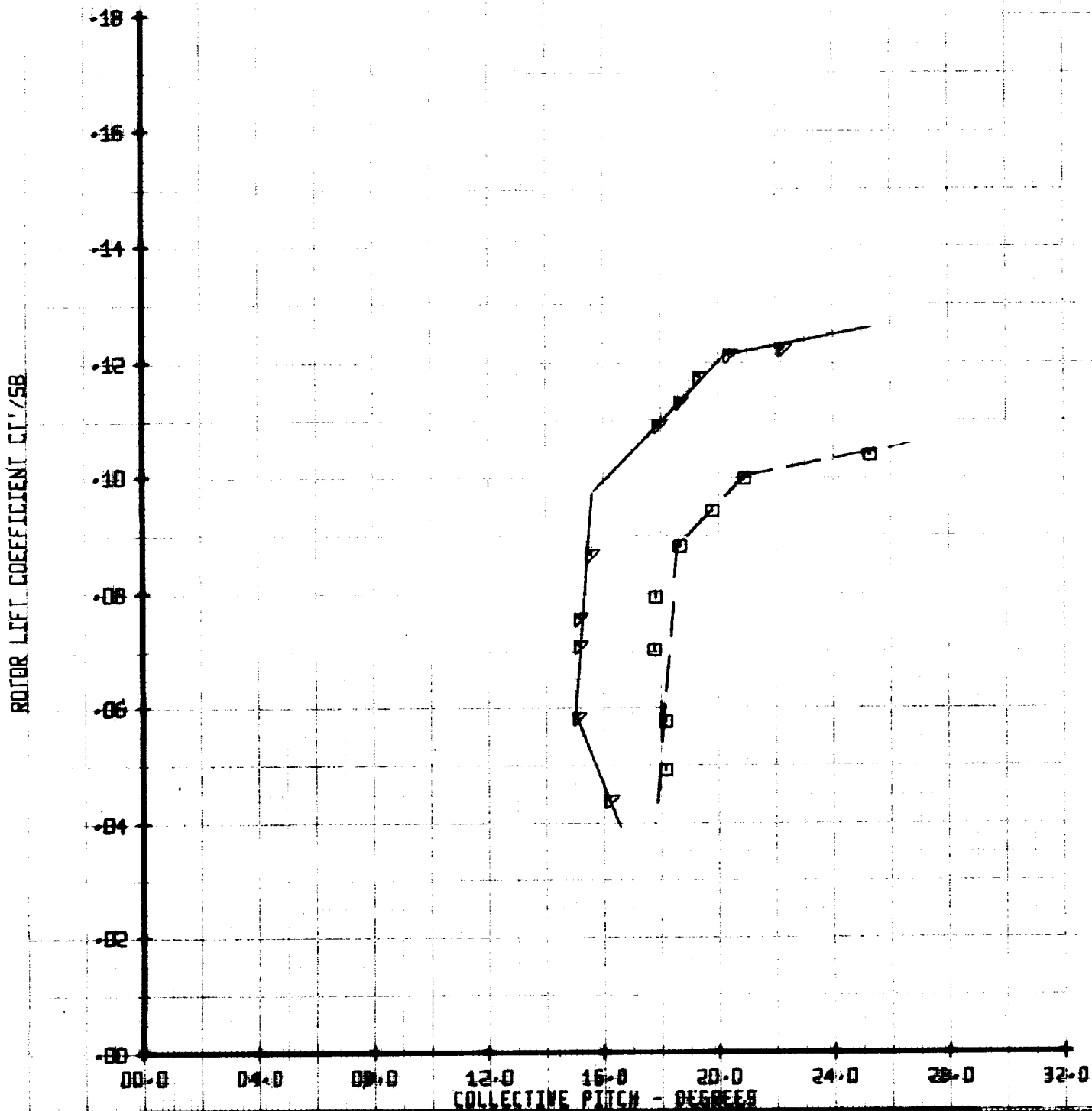


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/DD258	Y/DUN	
□	251	.45	.05	256	
▽	255	.45	.05	256	

ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH

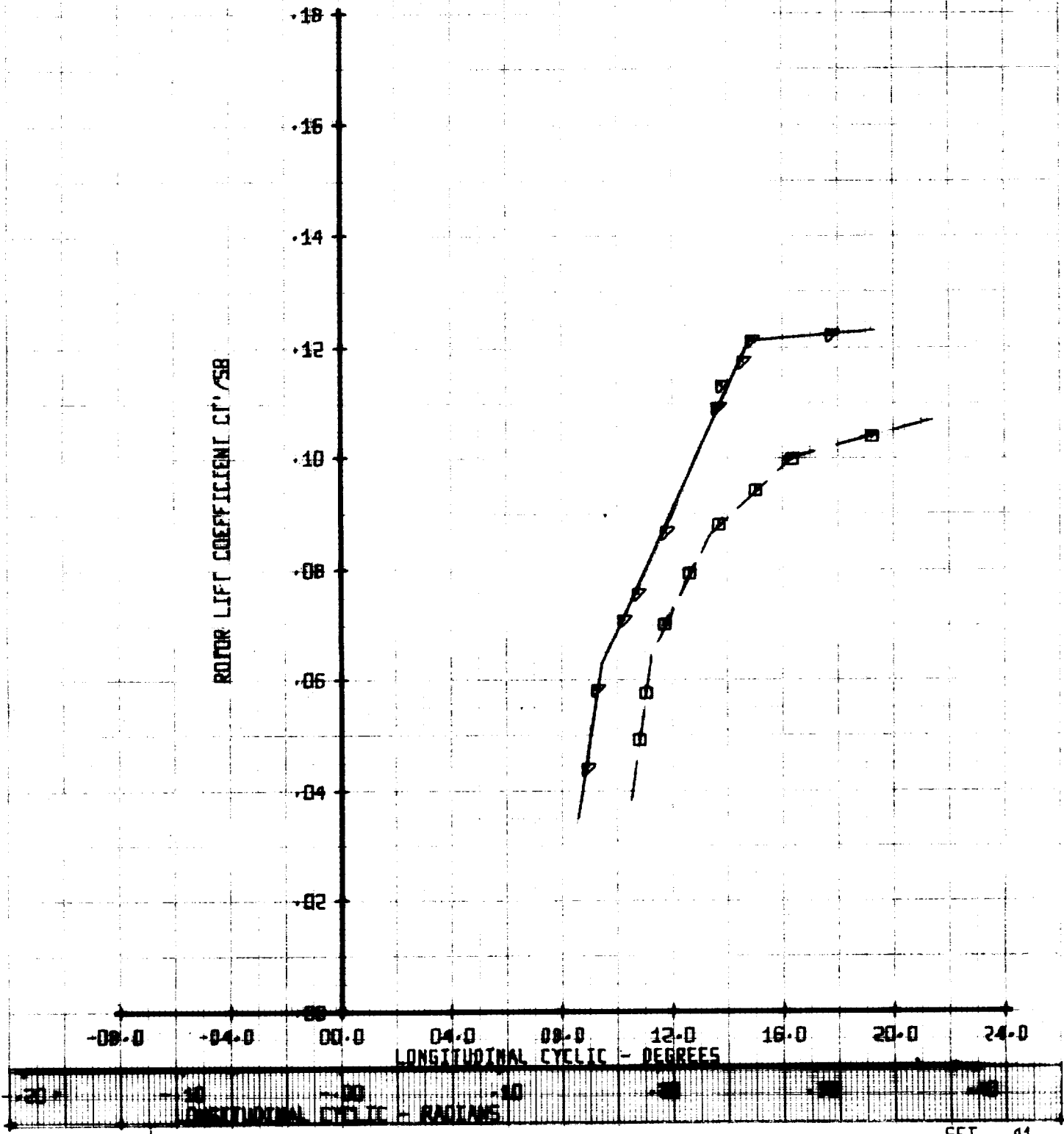
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	X/00258	Y/TUN
□	251	.45	.05	256
▽	255	.45	.05	256

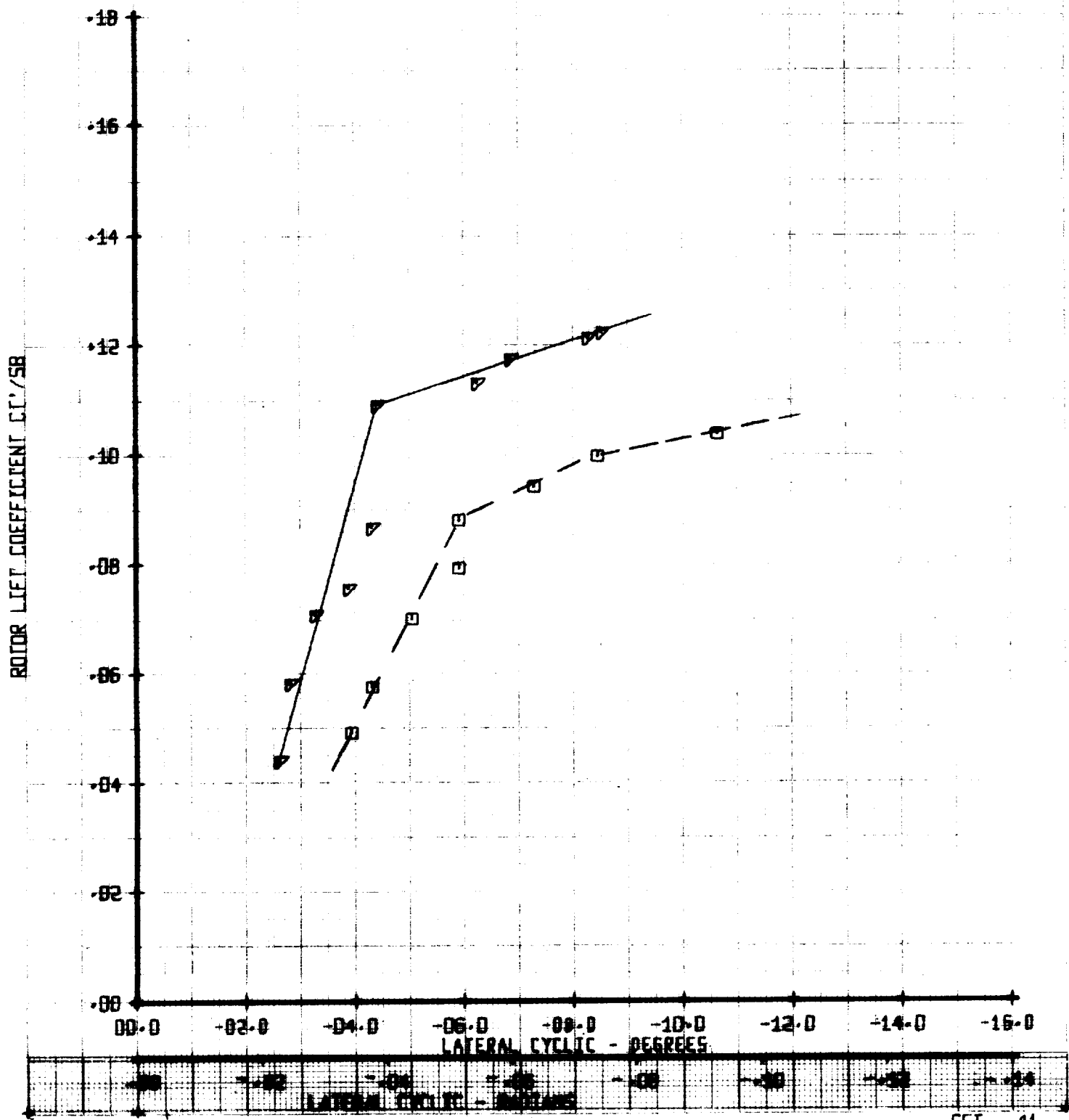
ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-17B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU	X/00258	VTUN
SYM	RUN	.45	.05	256
□	251	.45	.05	256
▽	255	.45	.05	256

ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC
REDUCED TIP SPEED

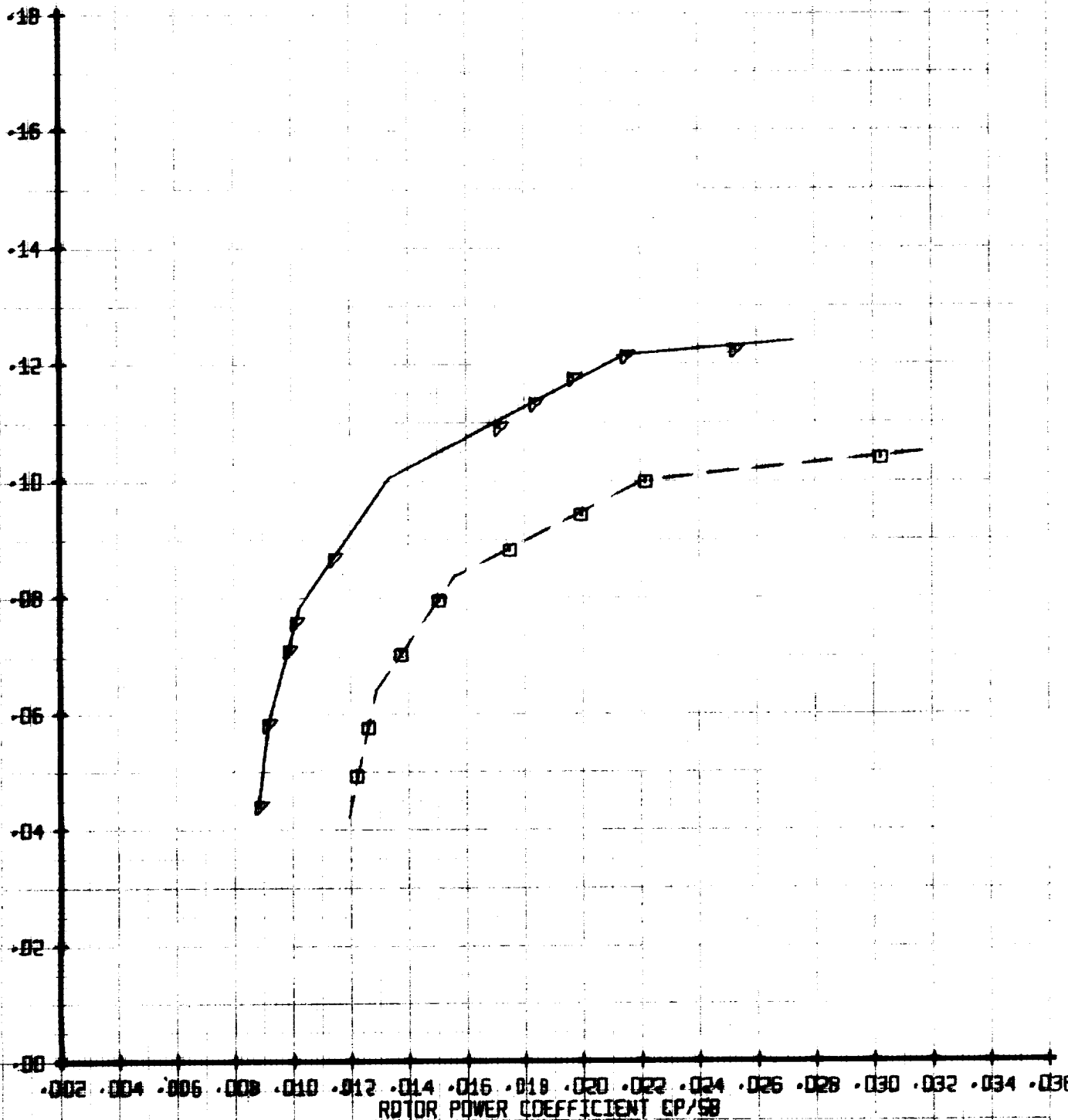


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	MIN	ML'	X/00258	VTUN	
□	251	.45	.05	256	
▽	255	.45	.05	256	

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT
REDUCED TIP SPEED

ROTOR LIFT COEFFICIENT CP/58

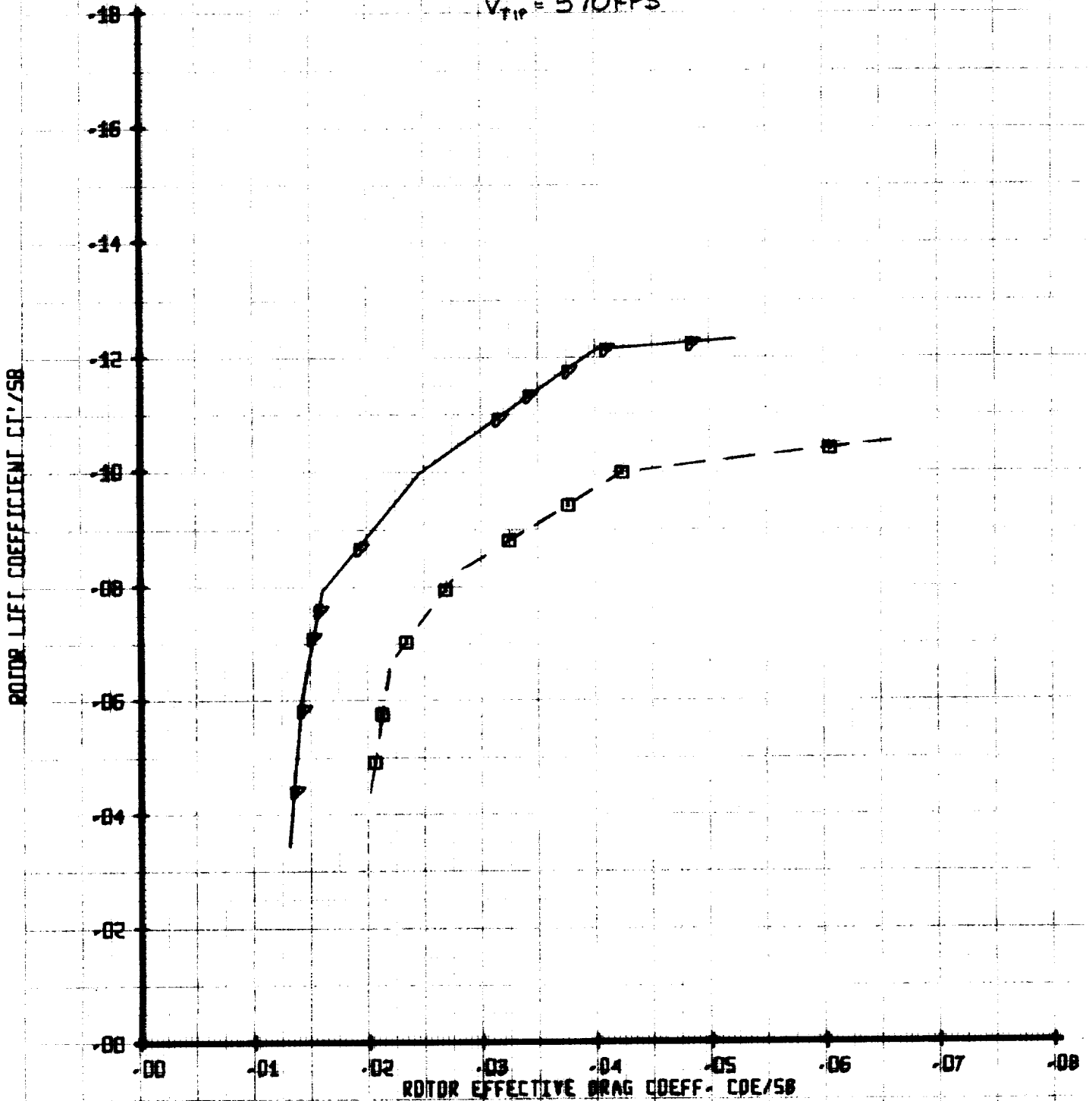


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	ML'	X/100	Y/TUN
□	251	.45	.05	256
▽	255	.45	.05	256

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT
 REDUCED TIP SPEED

$V_{TIP} = 570 \text{ FPS}$

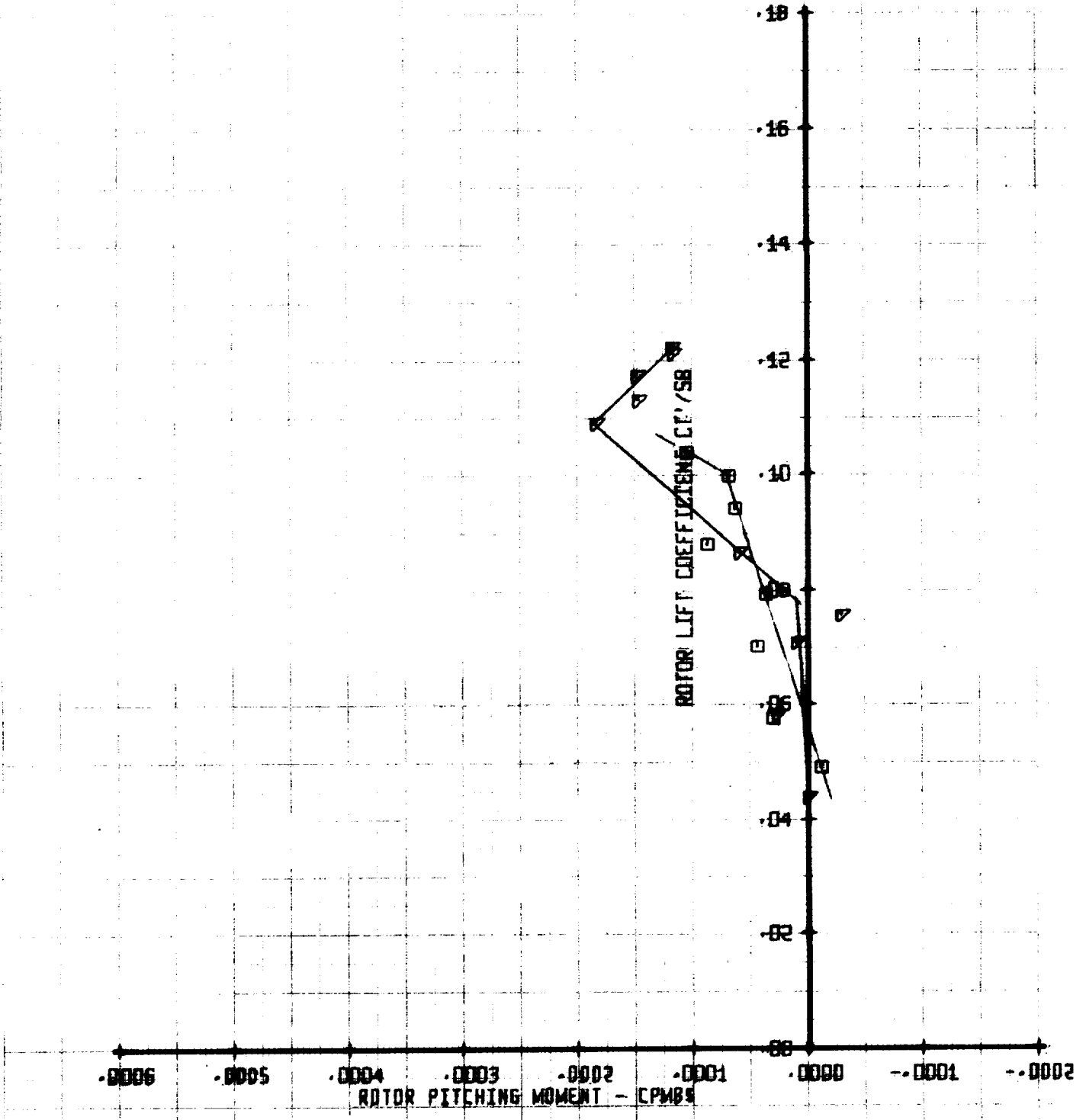


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	ML'	X/00258	VTUN
□	251	.45	.05	256
▽	255	.45	.05	256

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT

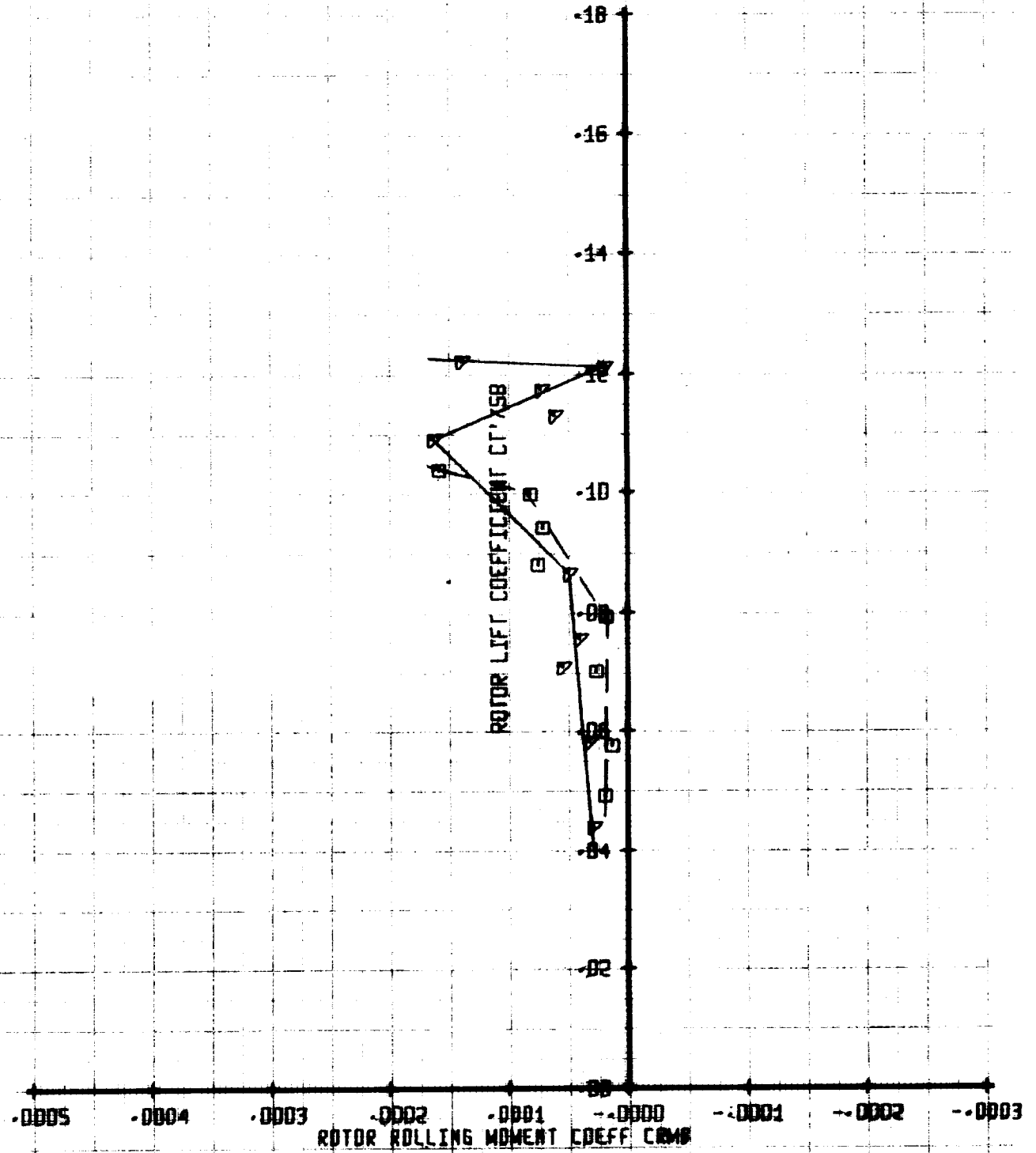
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MLI'		X/00258		VTUN	
□	○	251	255	.45	.45	.05	.05	256	256

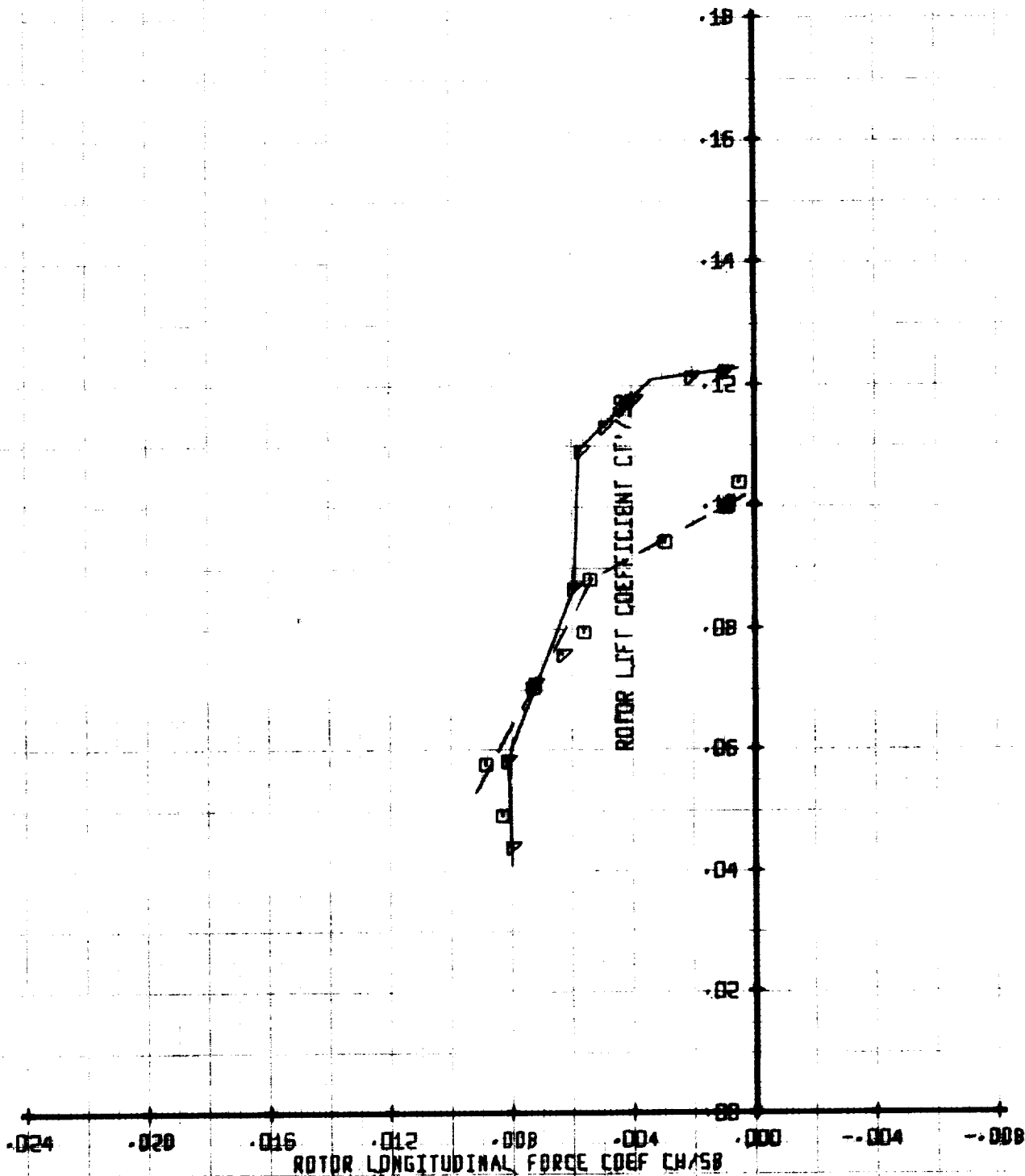
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT
 REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/DD258	VTUN	
□	251	.45	.05	256	
△	255	.45	.05	256	

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT
REDUCED TIP SPEED

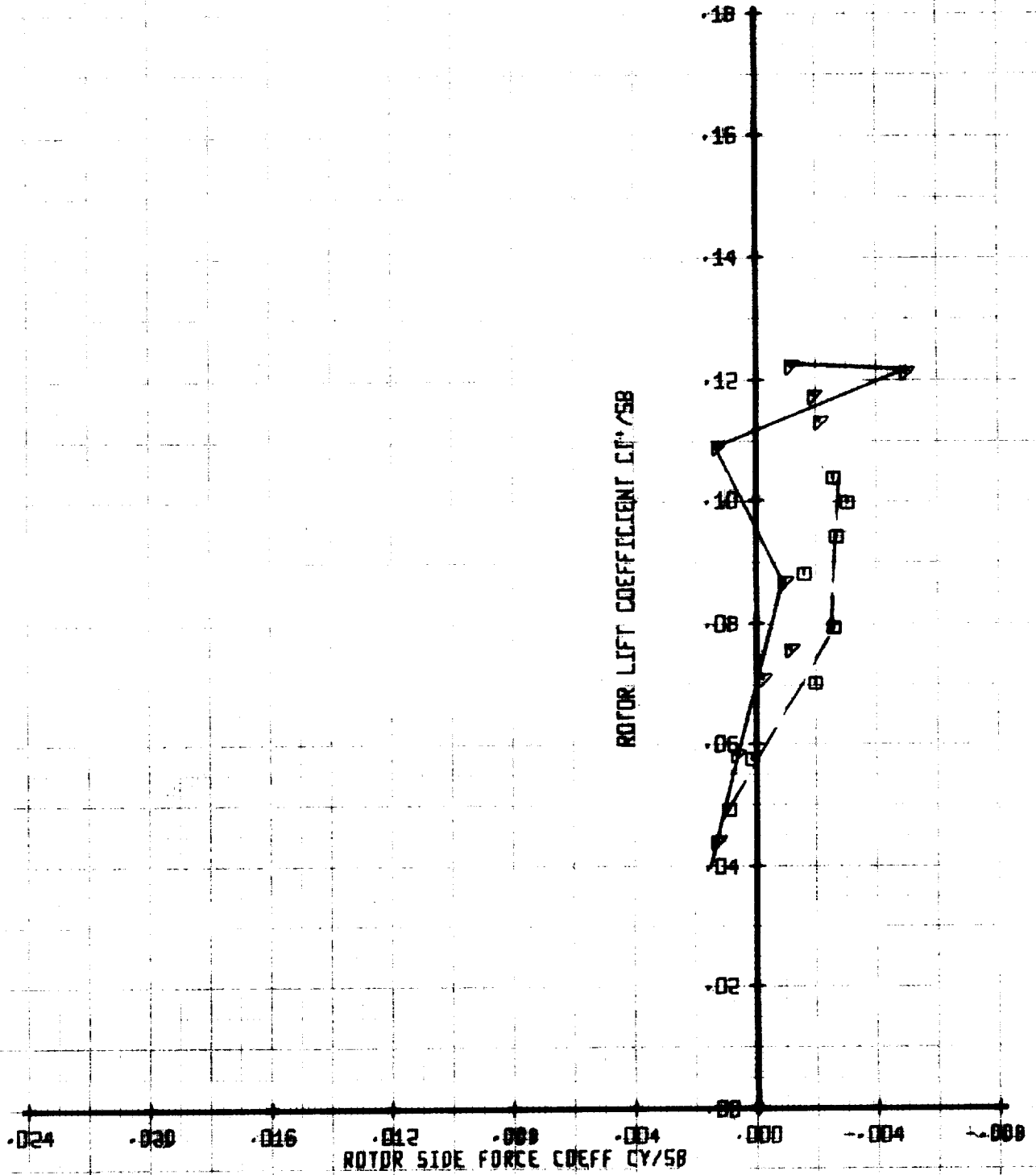


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MU'	
□	251	□	251	□	.45
△	255	△	255	△	.45

X/00258		Y/TUN	
□	.05	□	256
△	.05	△	256

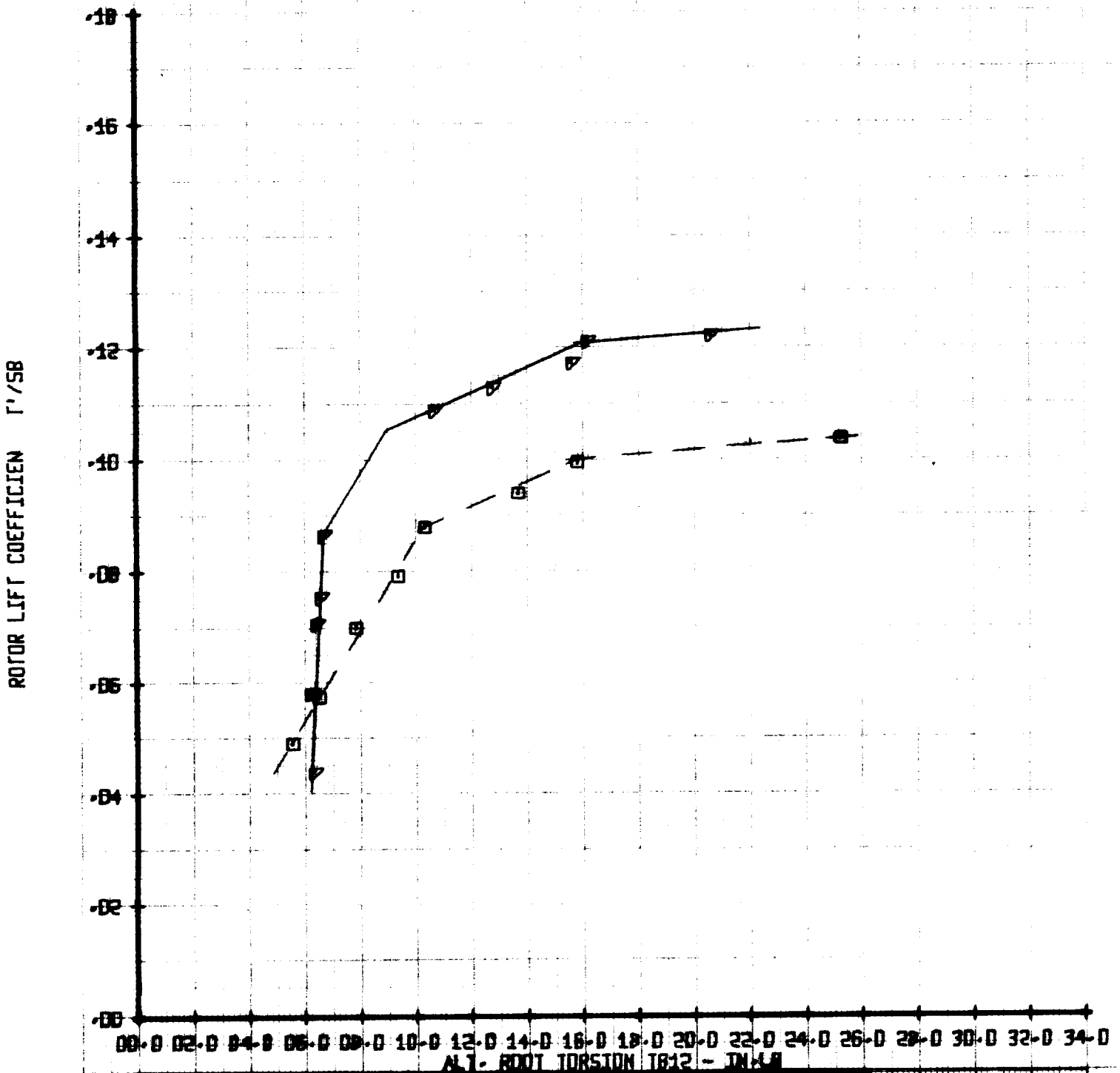
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYN		LEGEND		VILIN	
□	251	▲	X/00258	256	
○	255	●		256	

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12
REDUCED TIP SPEED

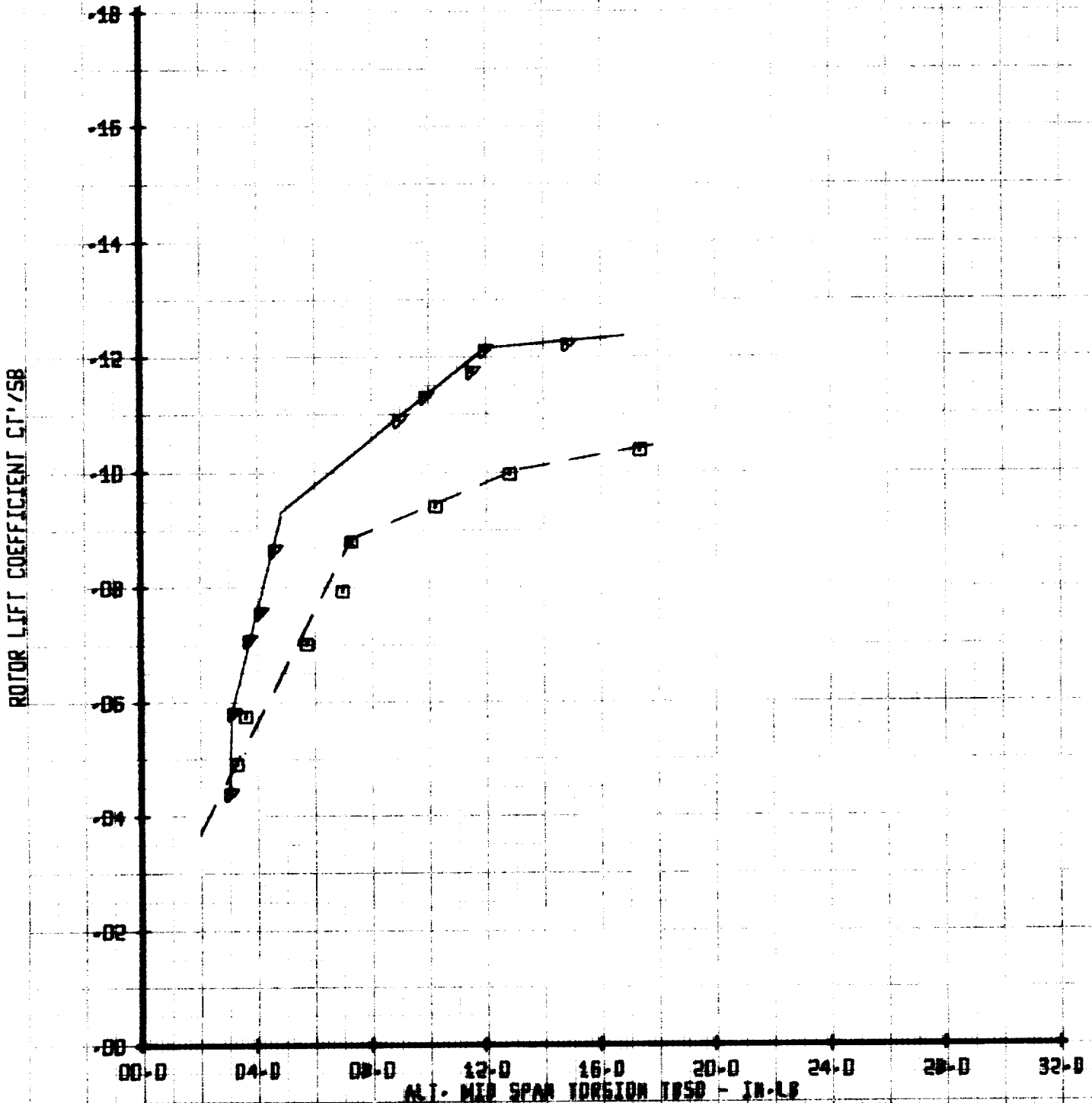


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MU'		X/00298		VTUN	
0	0	251	255	.45	.45	.05	.05	256	256

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50

REDUCED TIP SPEED

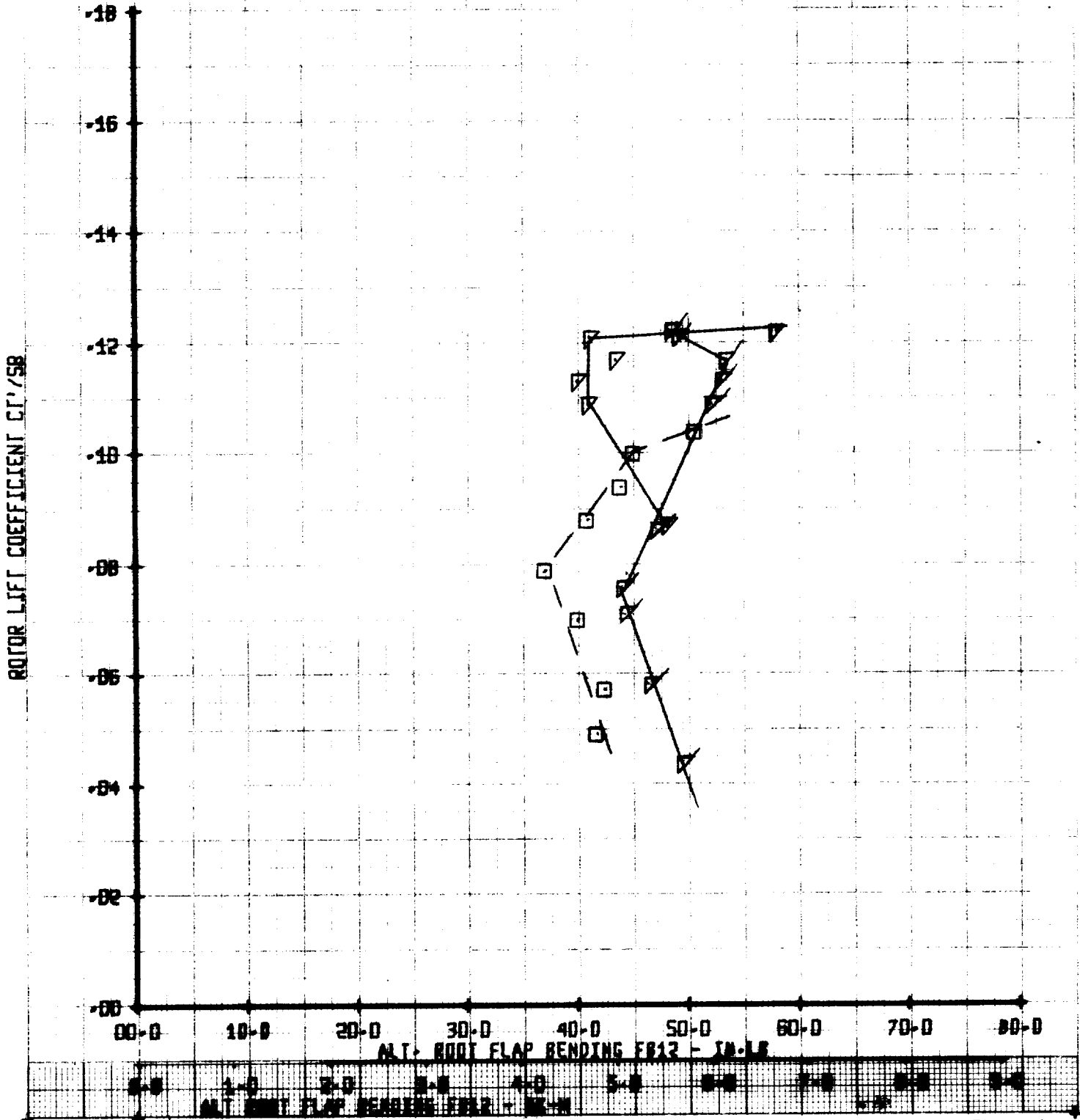


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MULT		X/00298		VTUN	
0	9	251	255	.45	.45	.05	.05	256	256

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12

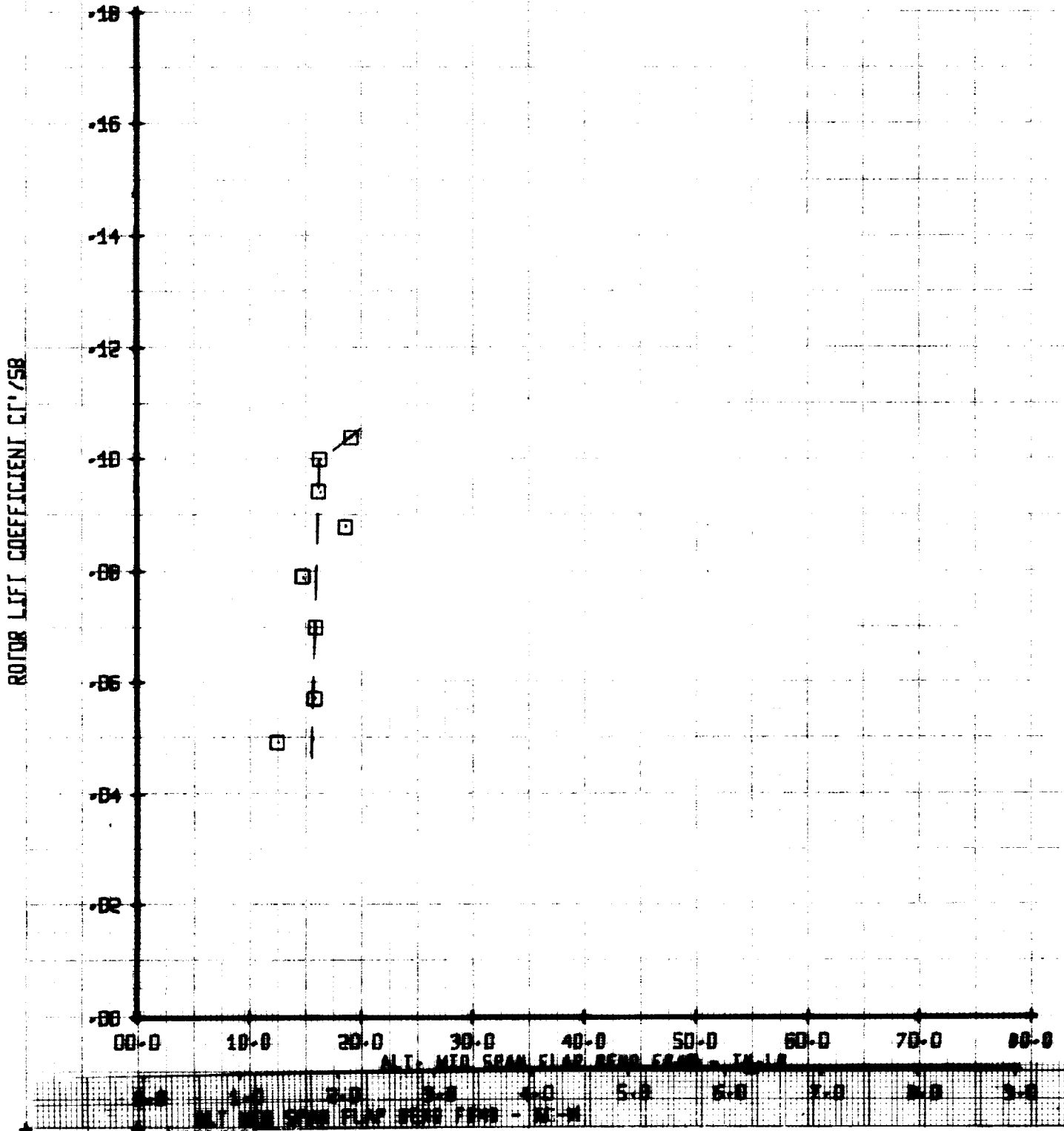
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OA-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MU'		X/00258		VTUN	
□	○	251	255	.45	.45	.05	.05	256	256

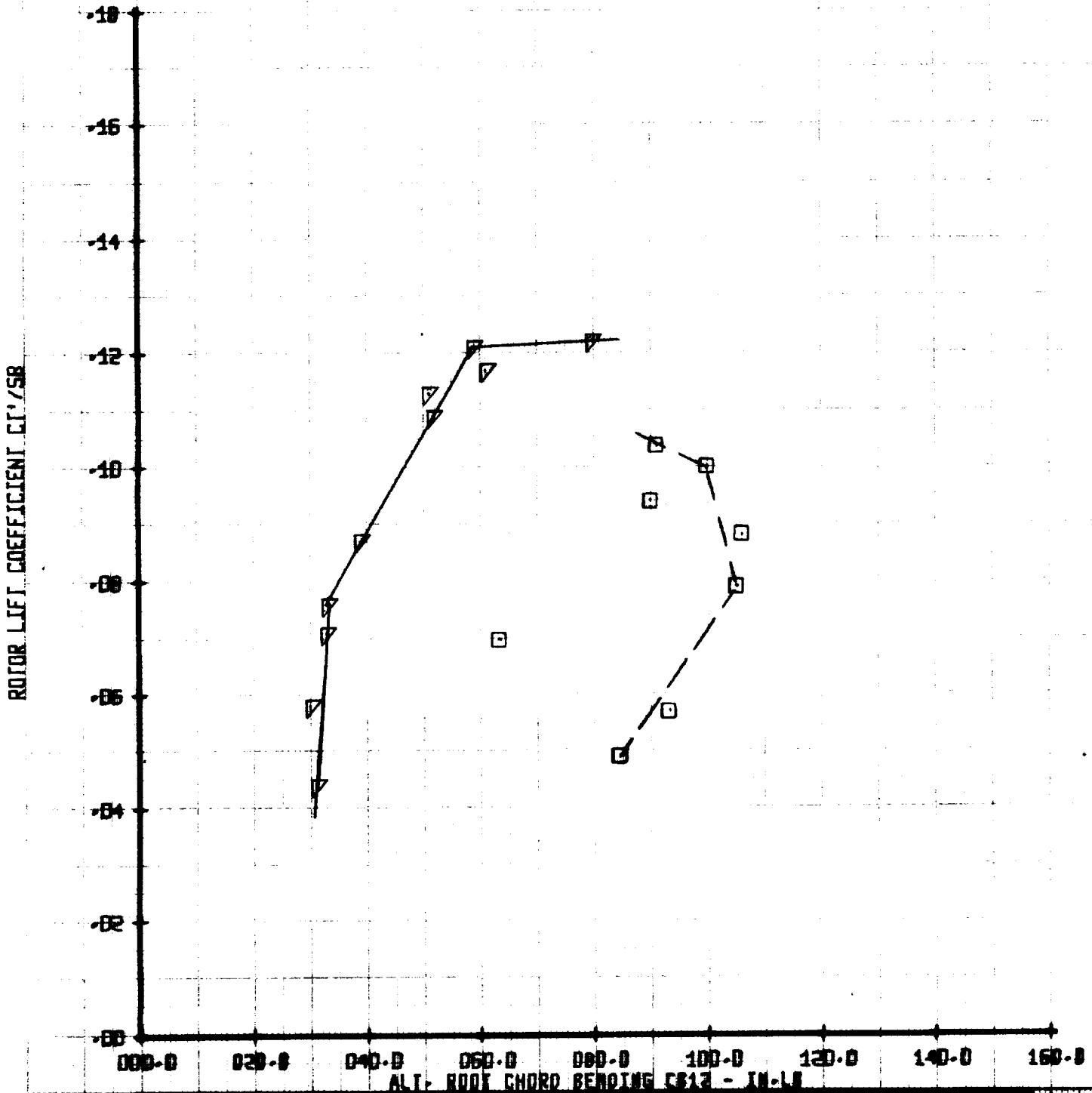
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BENDING FB40
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MLI	X/00258	Y/TUN	
□	251	.45	.05	256	
▽	255	.45	.05	256	

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12
REDUCED TIP SPEED

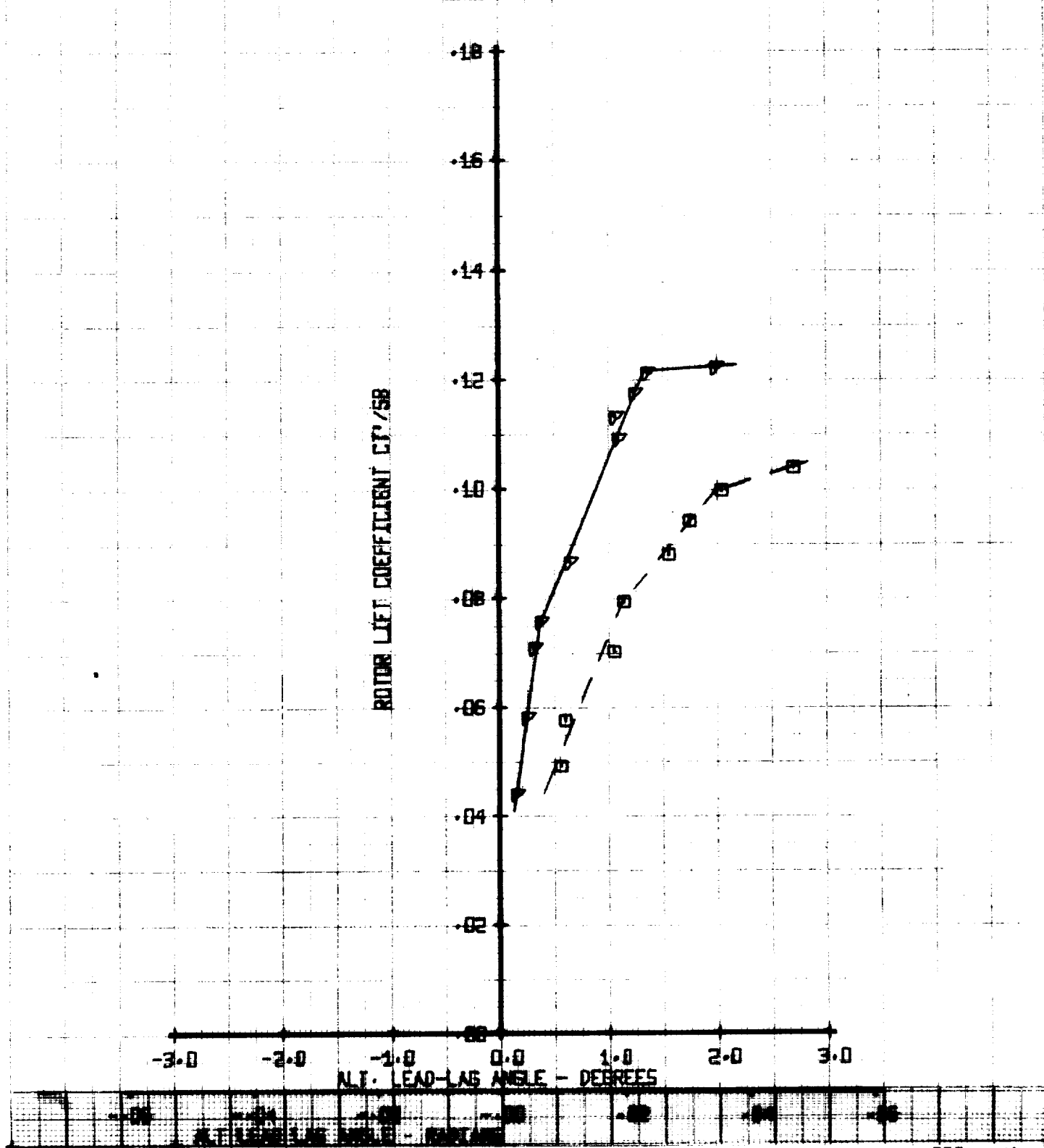


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	MIN	YU'	Y/00258	YUW
□	251	.45	.05	256
▽	255	.45	.05	256

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE

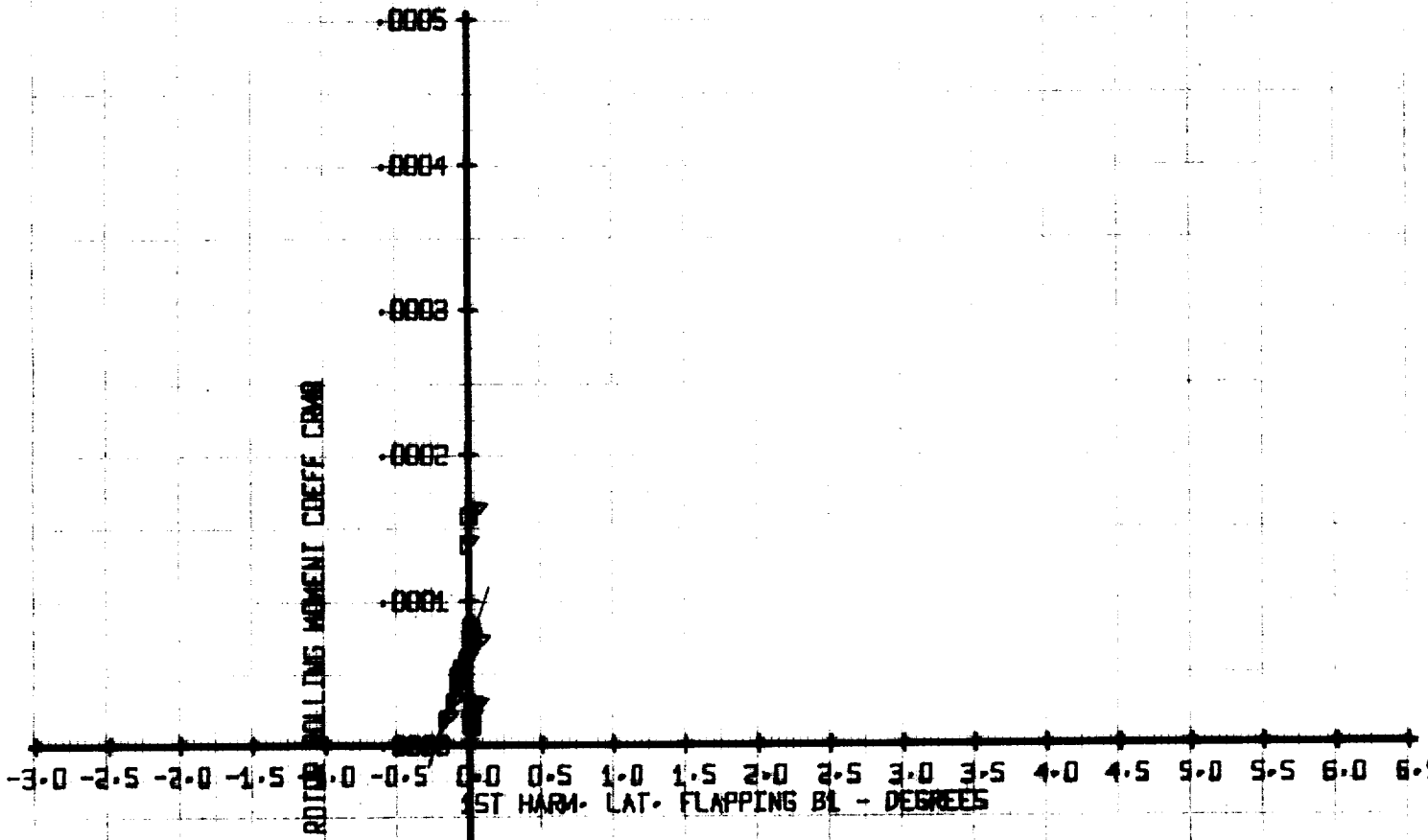
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MLP	X/OD2SB	Y/OD2SB
0	251	.45	.05	236
7	255	.45	.05	236

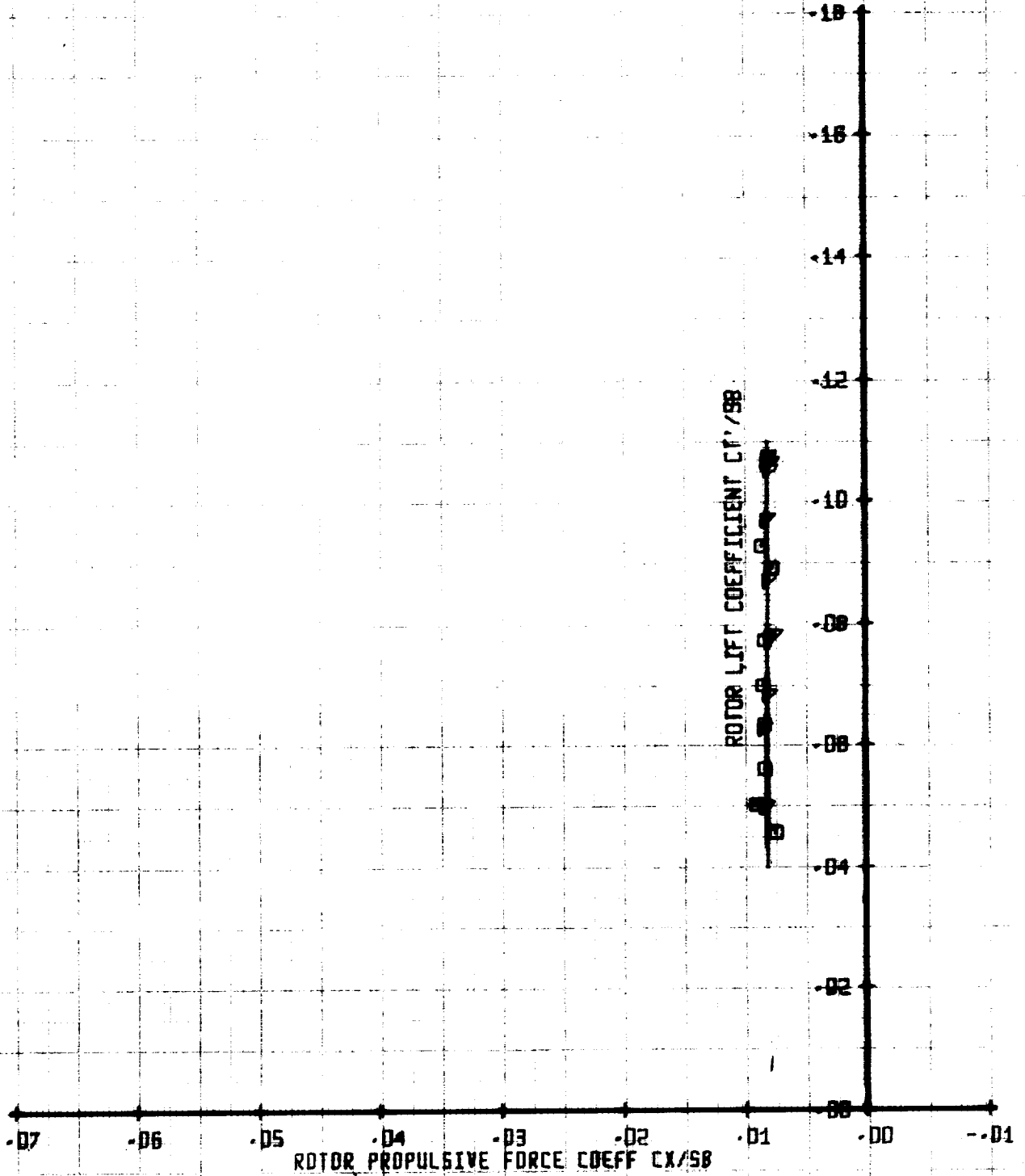
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND		
SYM	RUN	MLI	X/00298	VILM
□	252	.50	.05	285
○	254	.50	.05	285

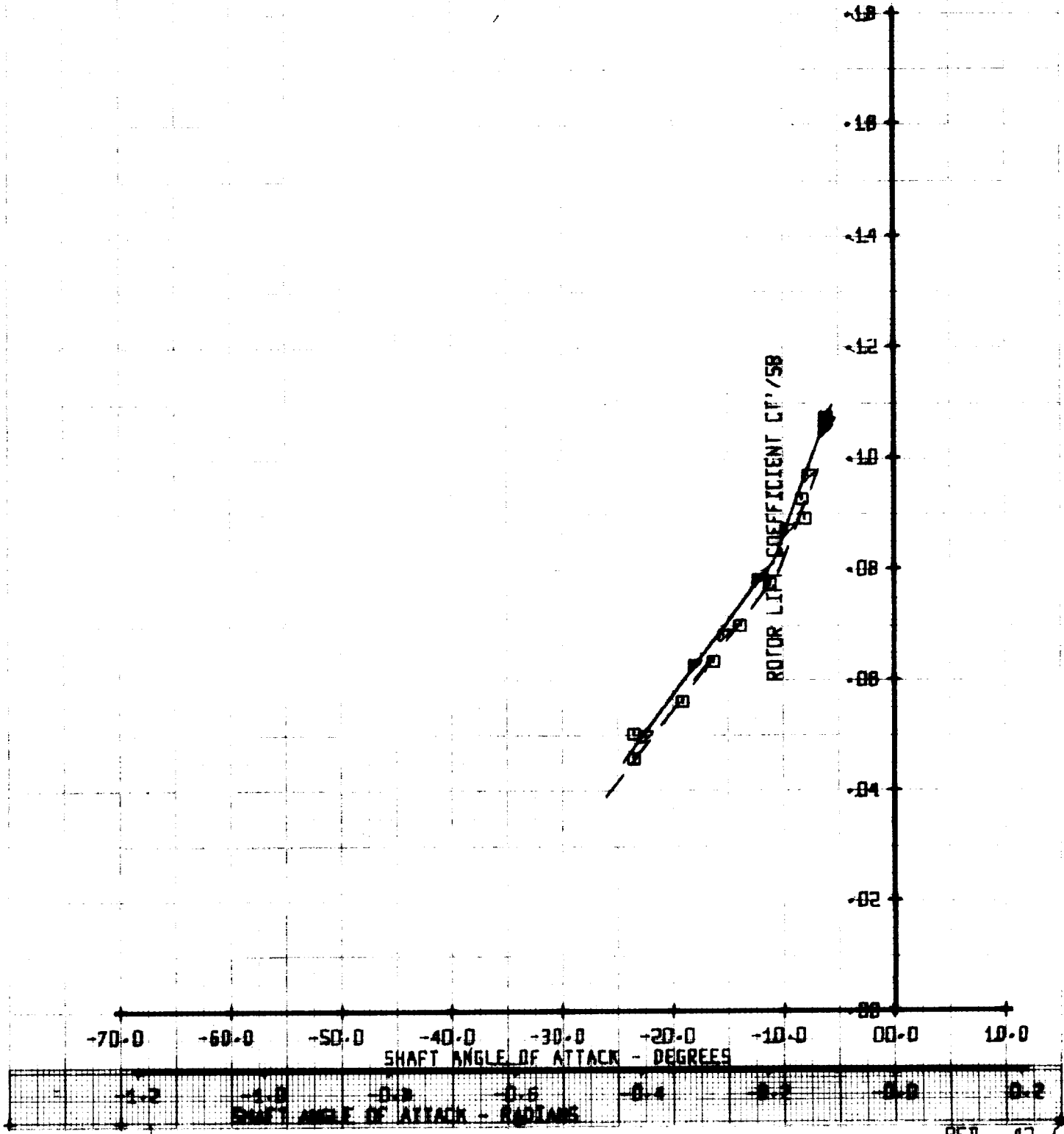
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT
 REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND		MU'	X/00258	Y/TUN
□	RUN 252	.50	.05	285
○	RUN 254	.50	.05	285

ROTOR LIFT COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK
REDUCED TIP SPEED

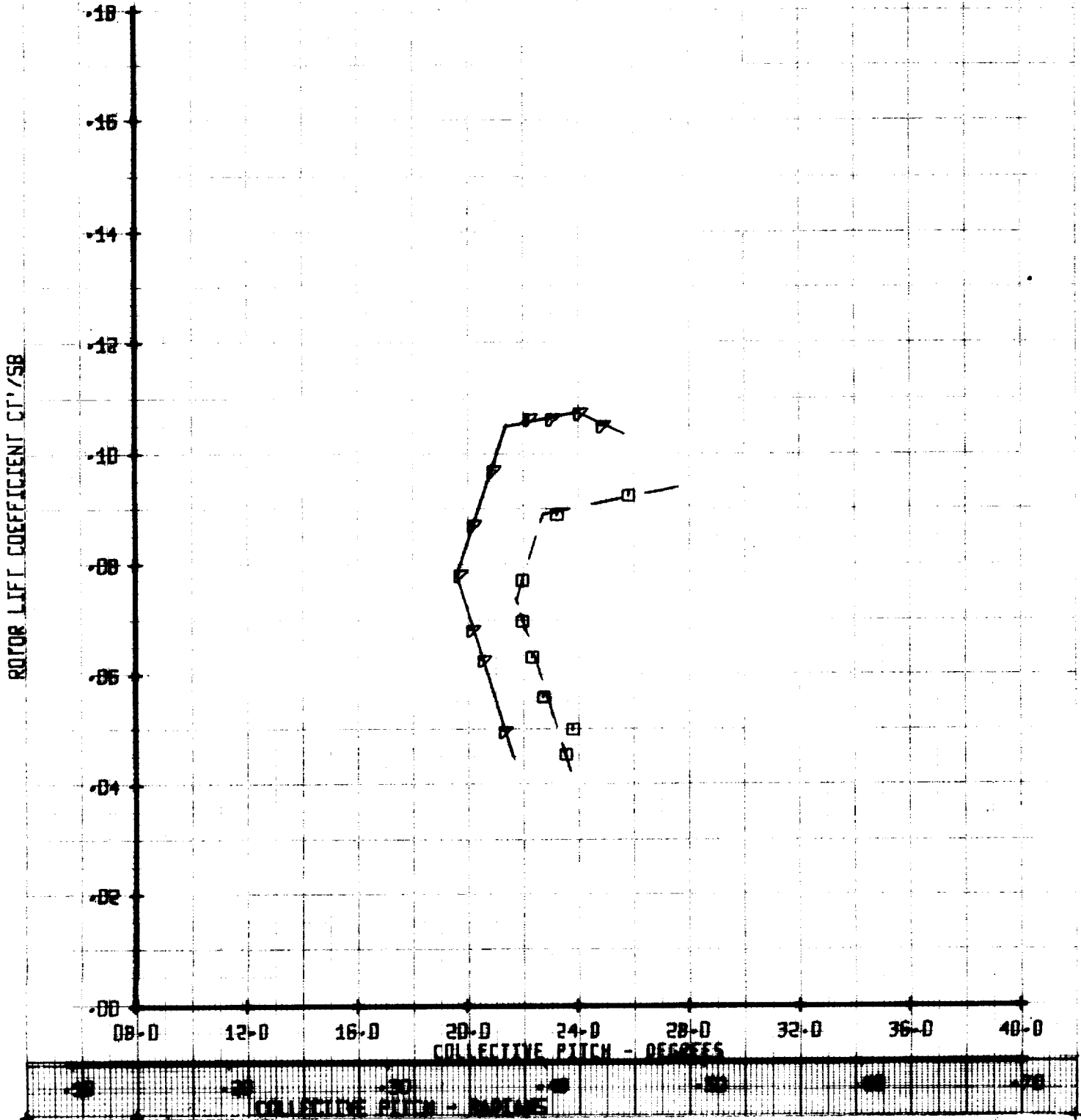


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU'	X/002SB	VTUN
□	252	.50	.05	285
△	254	.50	.05	285

ROTOR LIFT COEFFICIENT
 VERSUS
 COLLECTIVE PITCH
REDUCED TIP SPEED

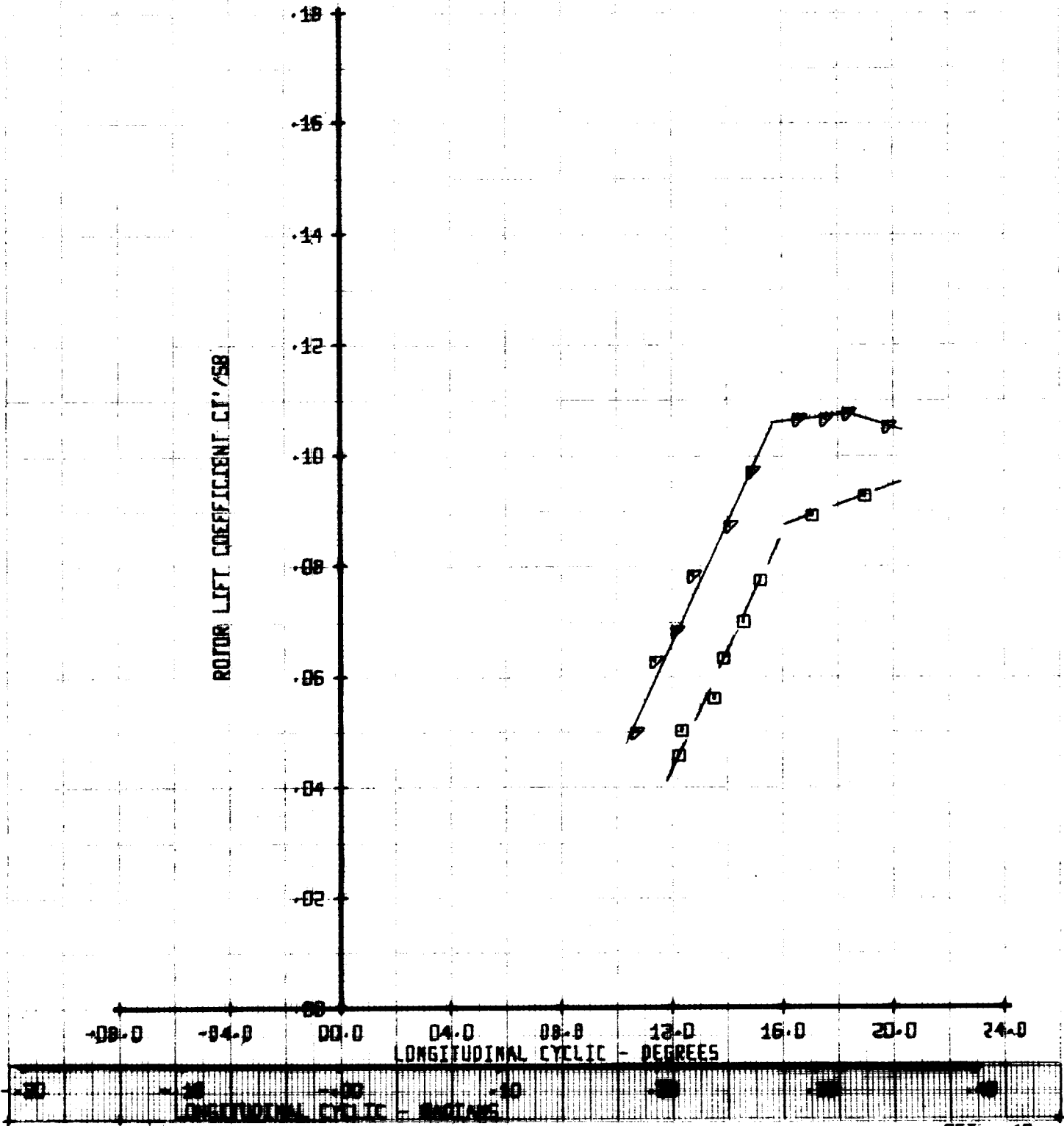


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/DD258	Y/TUN	
□	252	.50	.05	285	
▽	254	.50	.05	285	

ROTOR LIFT COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC

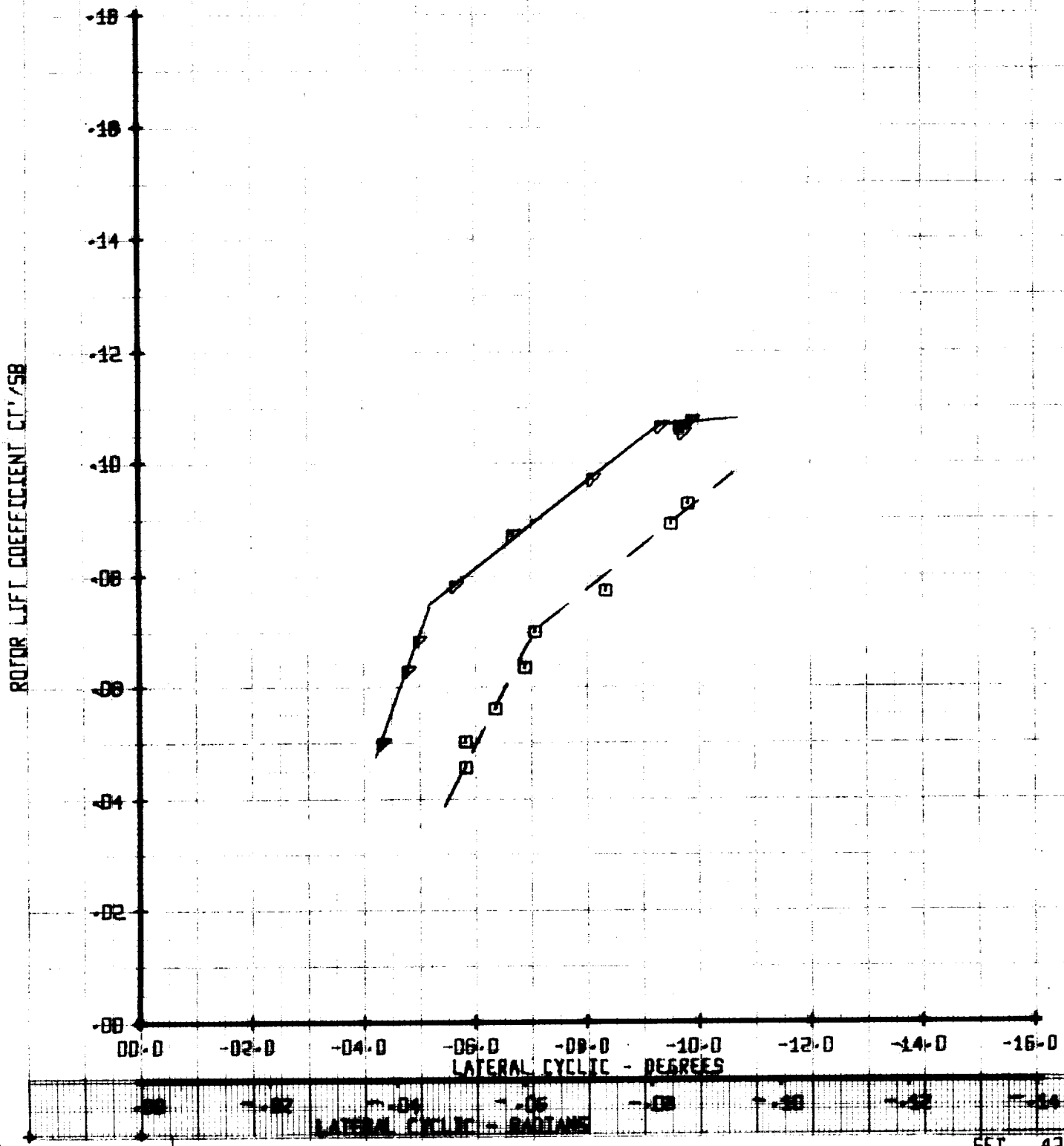
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU'	X/00258	Y/LIN
□	252	.50	.05	285
▽	254	.50	.05	285

ROTOR LIFT COEFFICIENT
 VERSUS
 LATERAL CYCLIC
REDUCED TIP SPEED

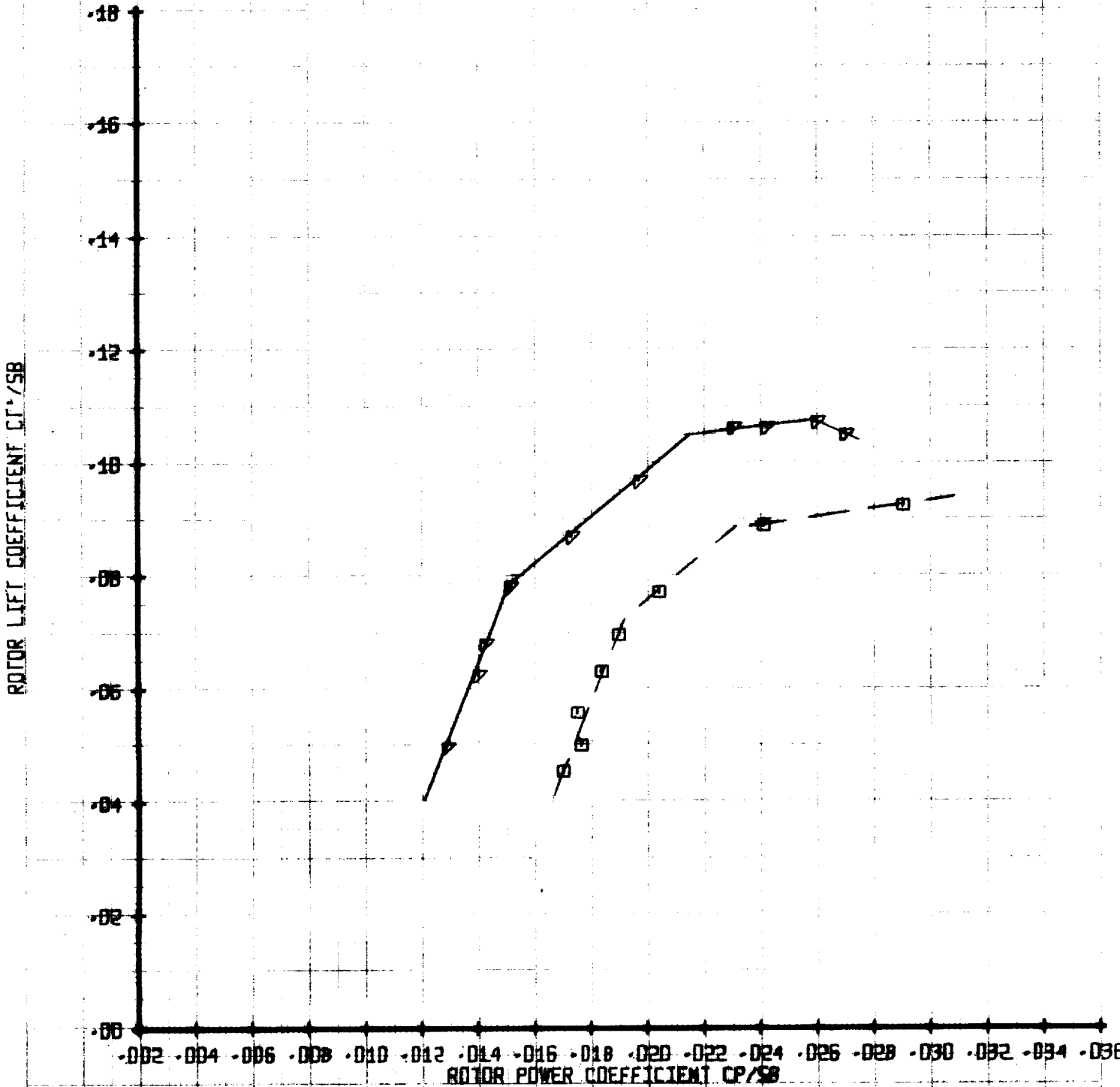


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	X/00258	VTUN	
□	252	.50	.05	285	
▽	254	.50	.05	285	

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT

REDUCED TIP SPEED

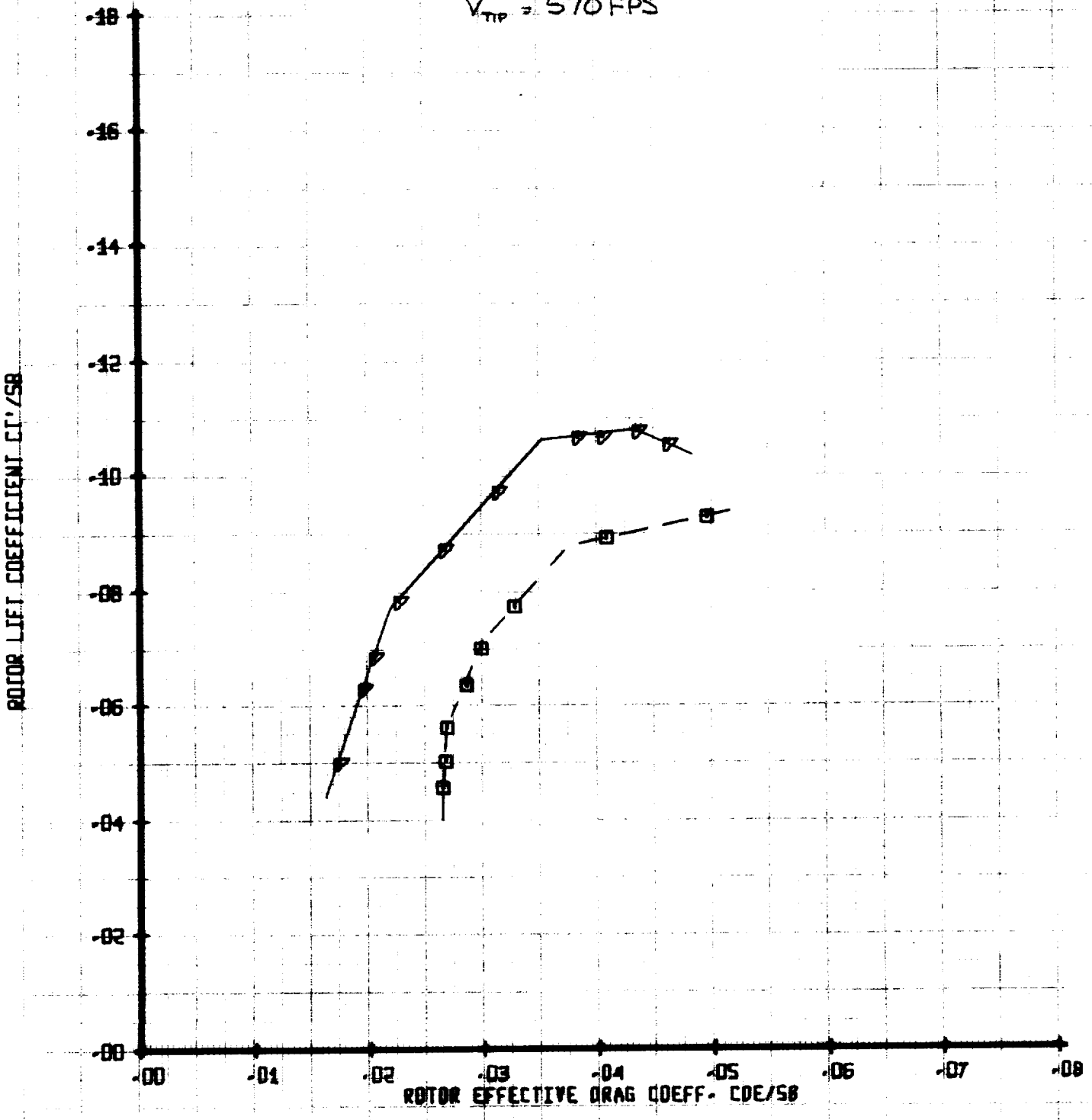


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM	BLN	ML'	X/100250	VTLM
9	252	.50	.65	285
7	254	.50	.65	285

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR EFFECTIVE DRAG COEFFICIENT
 REDUCED TIP SPEED

$V_{TIP} = 570 \text{ FPS}$



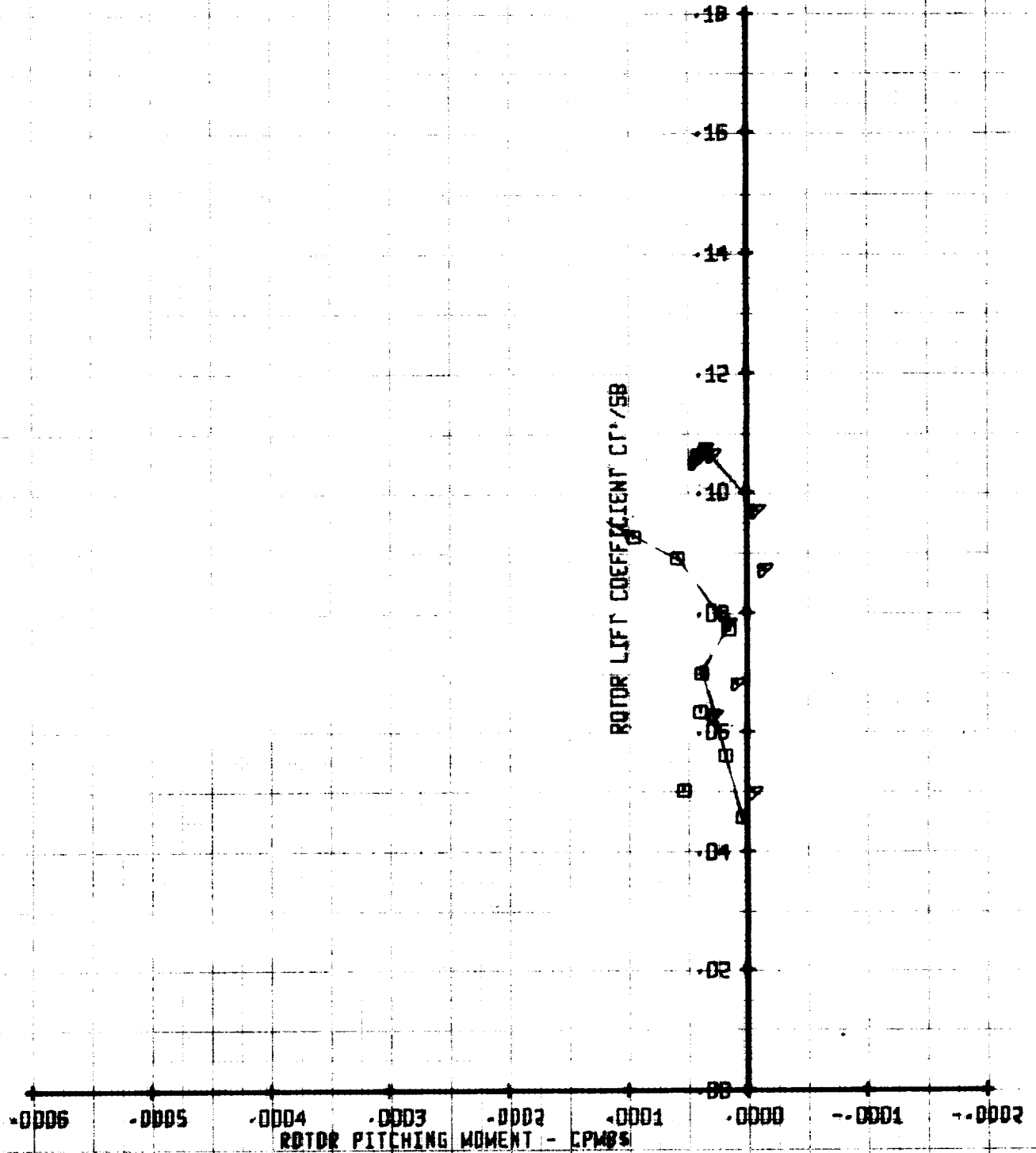
LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	ML'	1/00258	VTUR
□	252	.50	.05	285
△	254	.50	.05	285

ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT

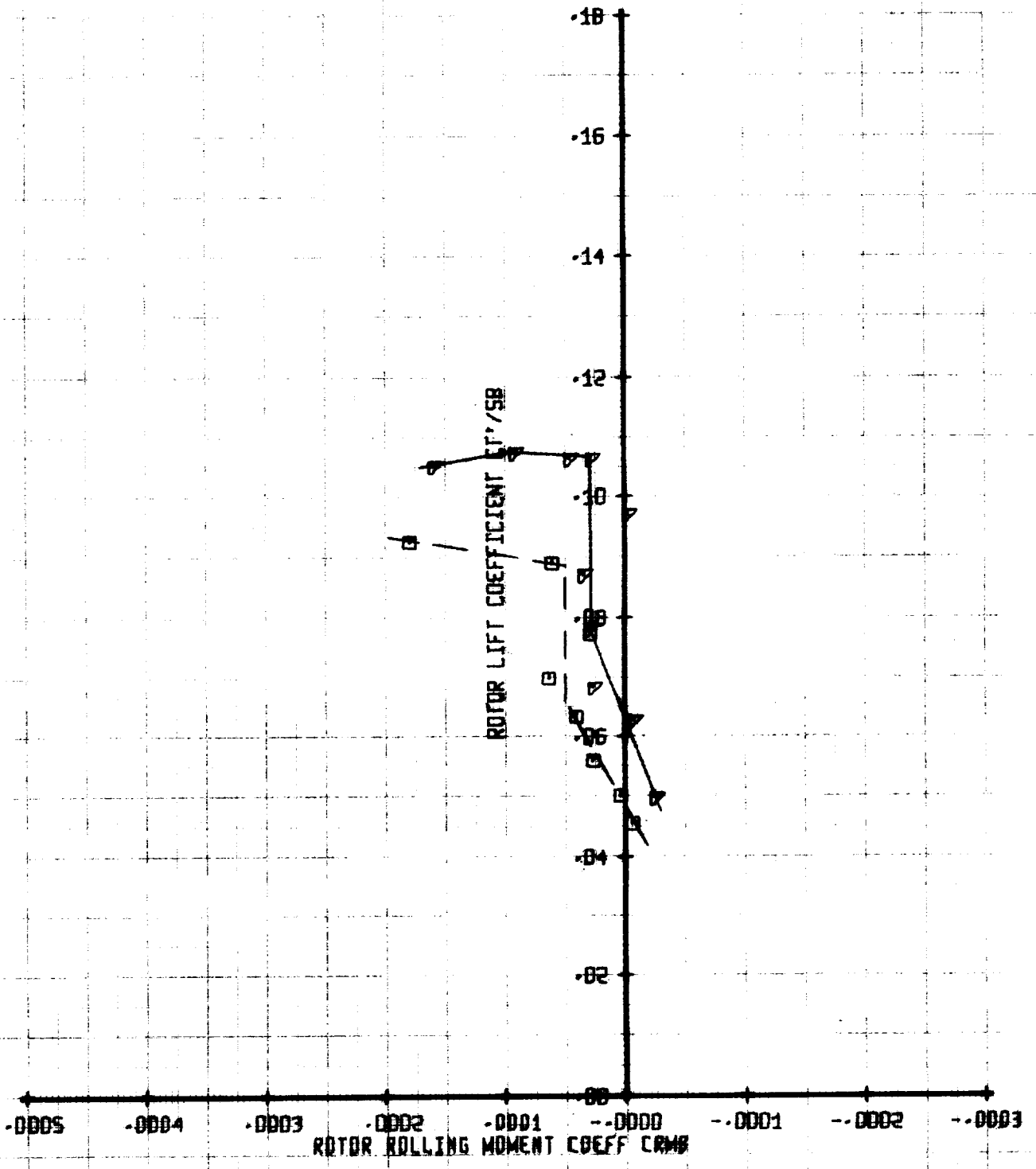
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/80 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MLI		X/00258		VTUN	
9A	254	253	254	.50	.50	.05	.05	285	285

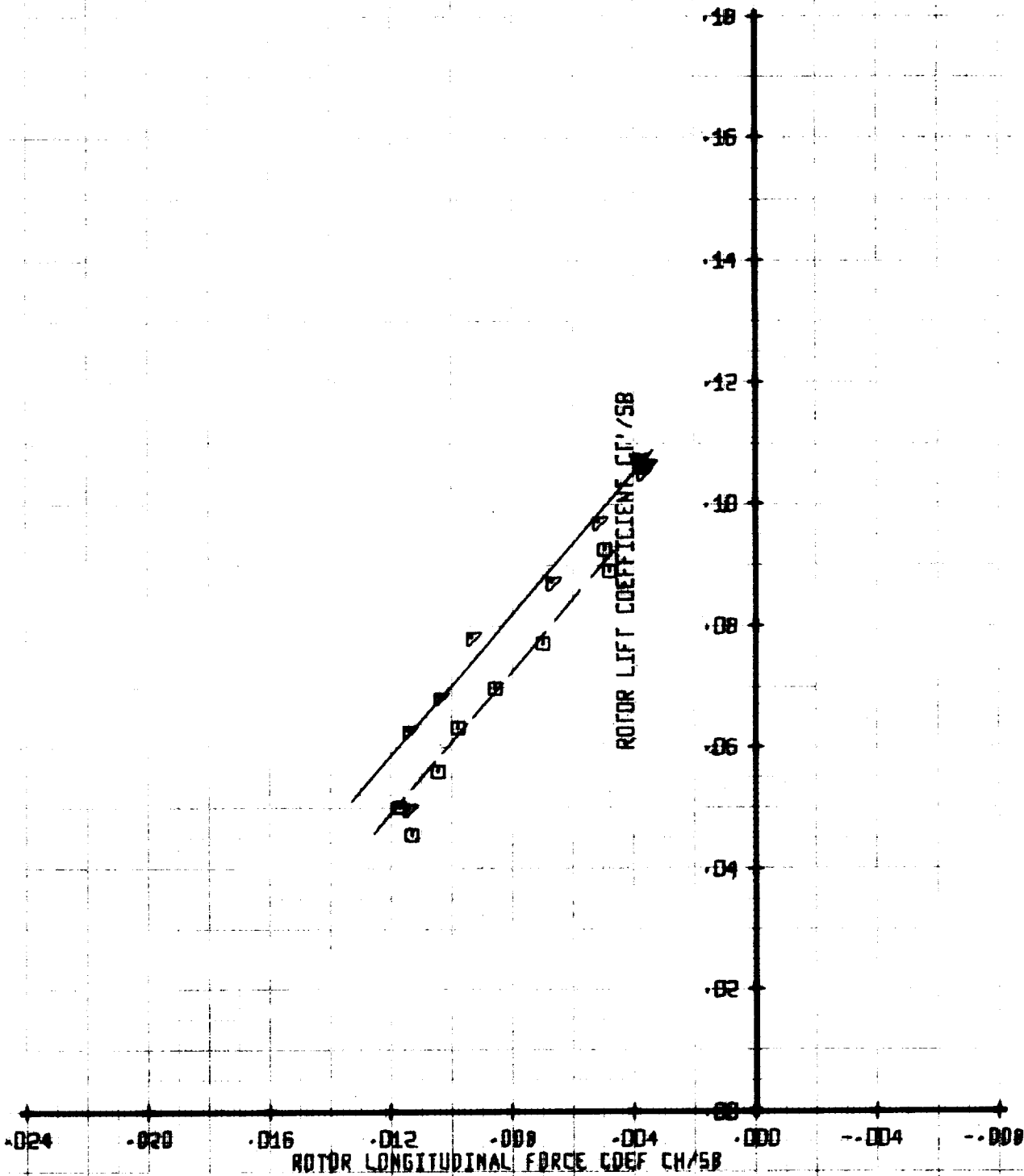
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT
 REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYMBOL		LEGEND		
□	○	RUN	MU*	X/00258
△	○	252	.50	.05
	○	254	.50	.05
				VTUN
				285
				285

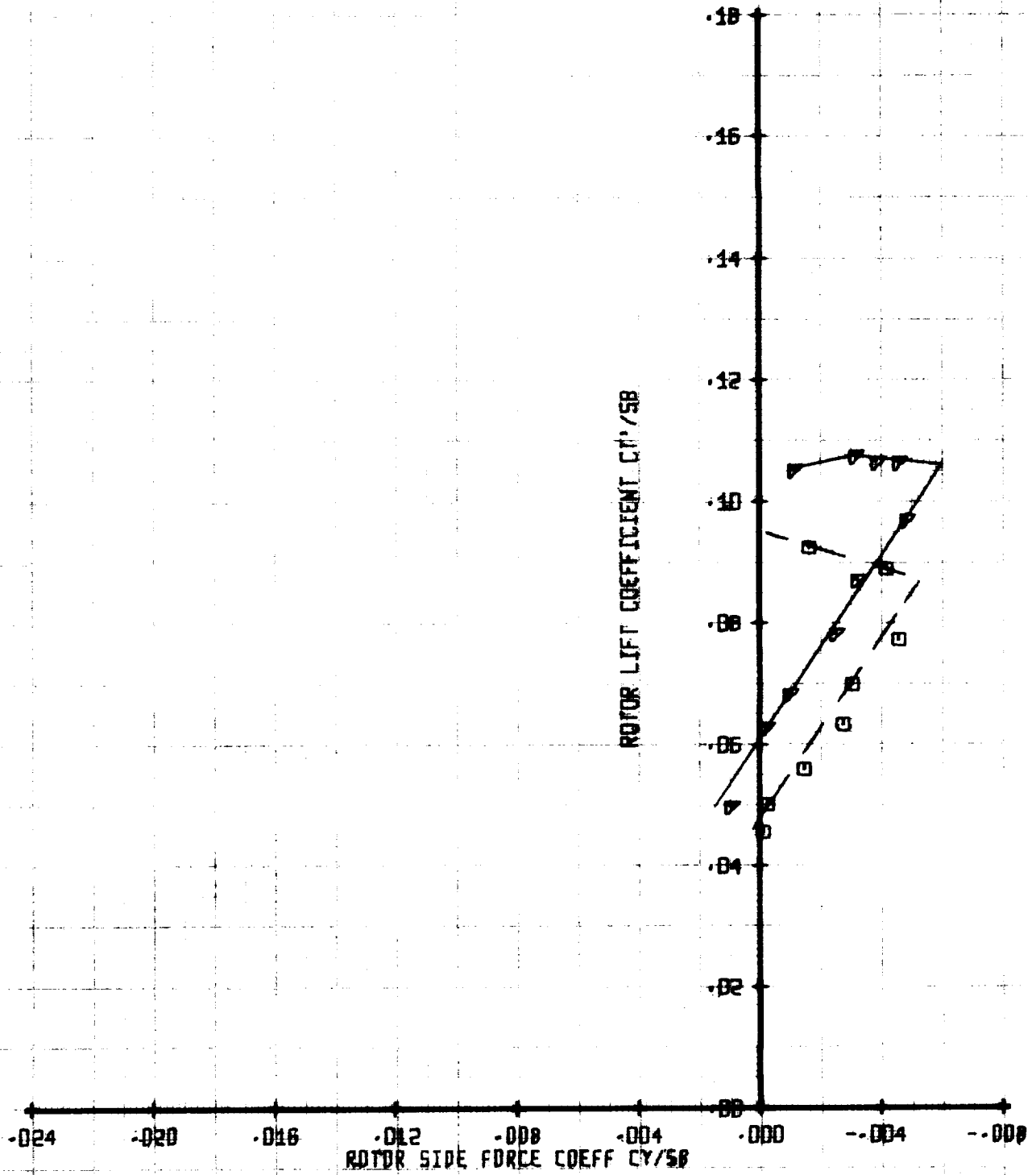
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		RUN		MU		X/00298		VTUN	
□	○	252	254	.50	.50	.05	.05	285	285

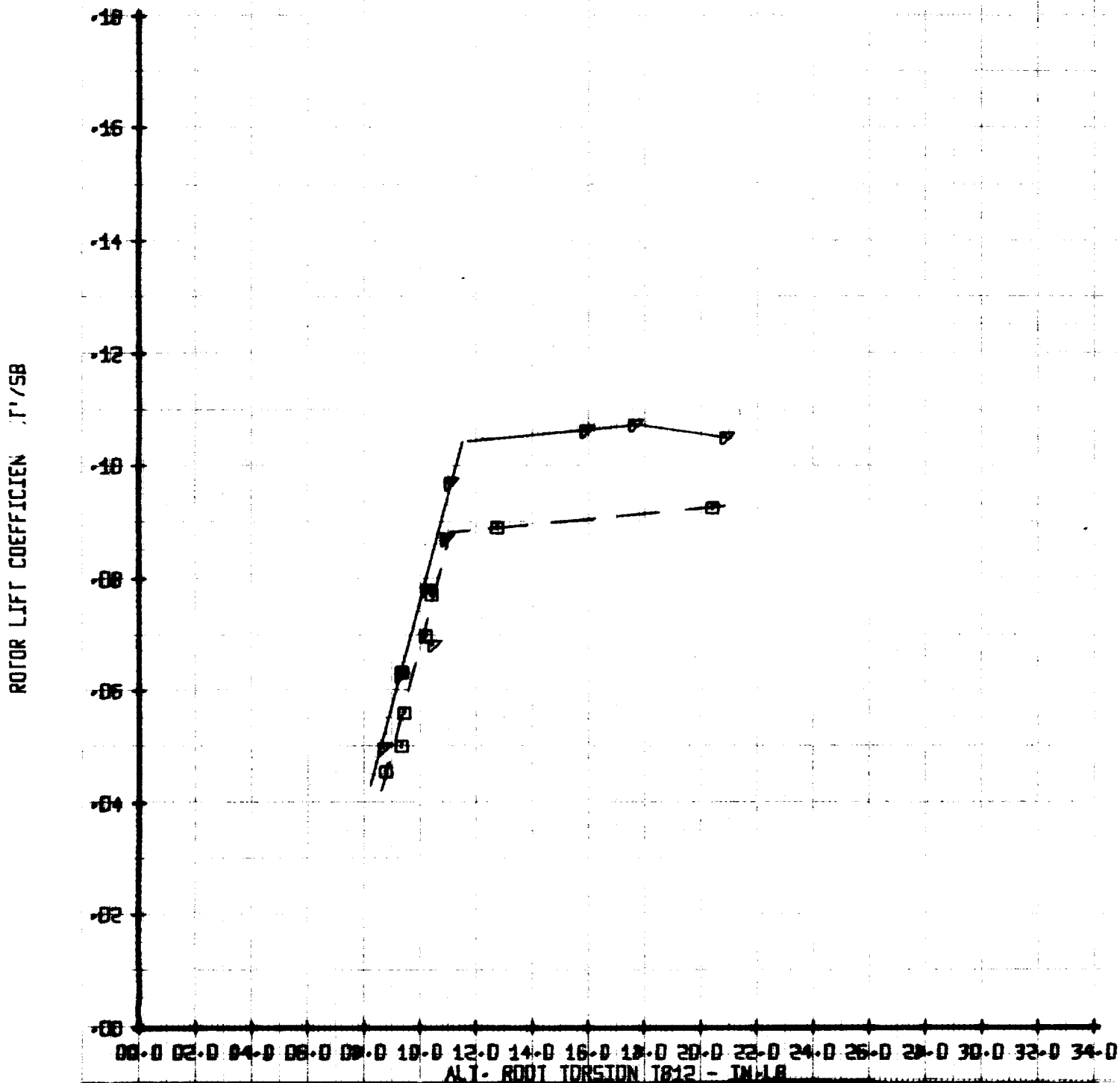
ROTOR LIFT COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYN		RUN		LEGEND	
0	4	252	254	MI'	X/00258
				.90	.05
				.90	.05
					VTUN
					285
					285

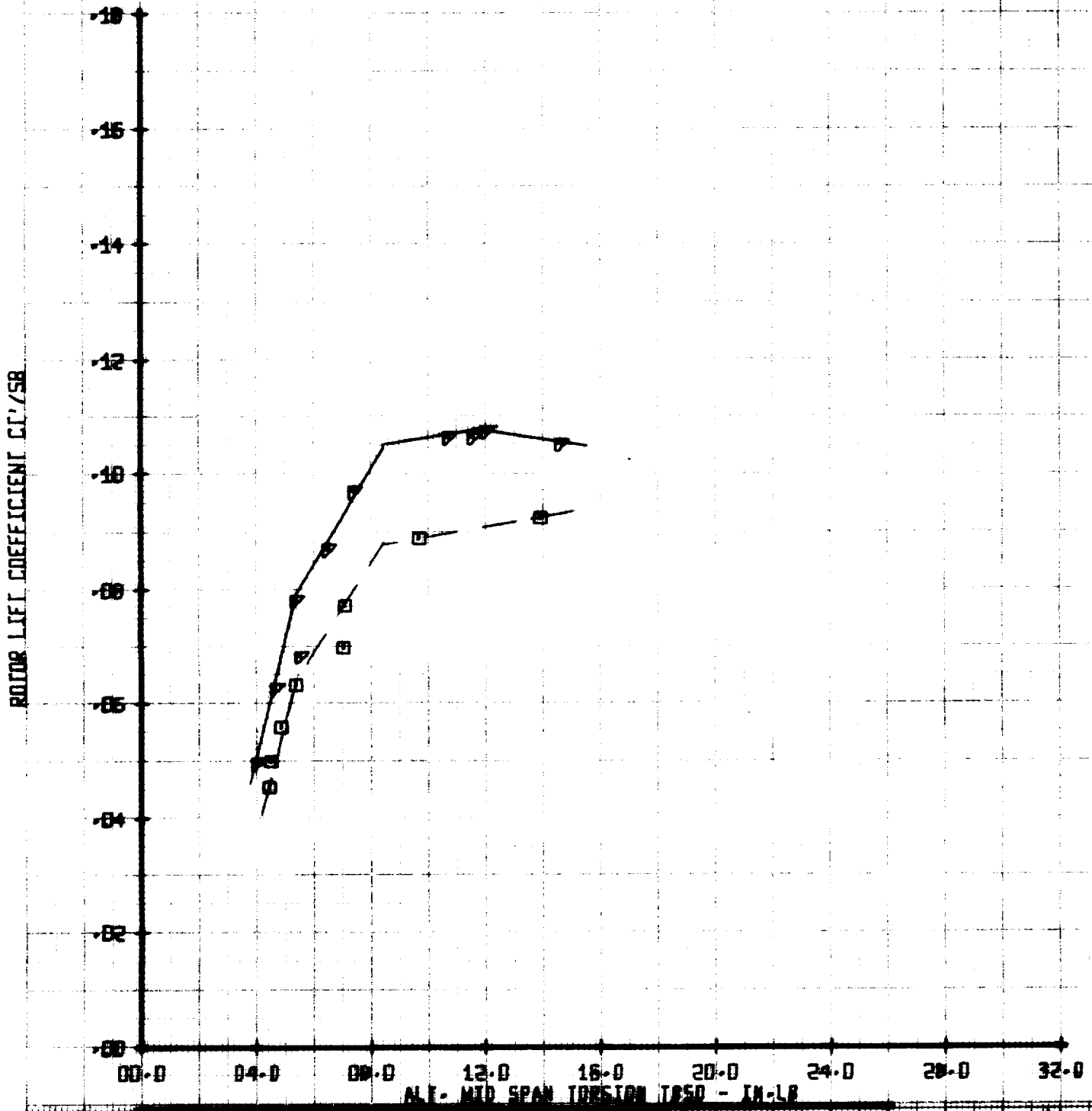
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 LIFT LIMIT TESTING

SYM	RUN	MU	X/00258	Y/TUN
0	252	.50	.05	205
1	254	.50	.05	205

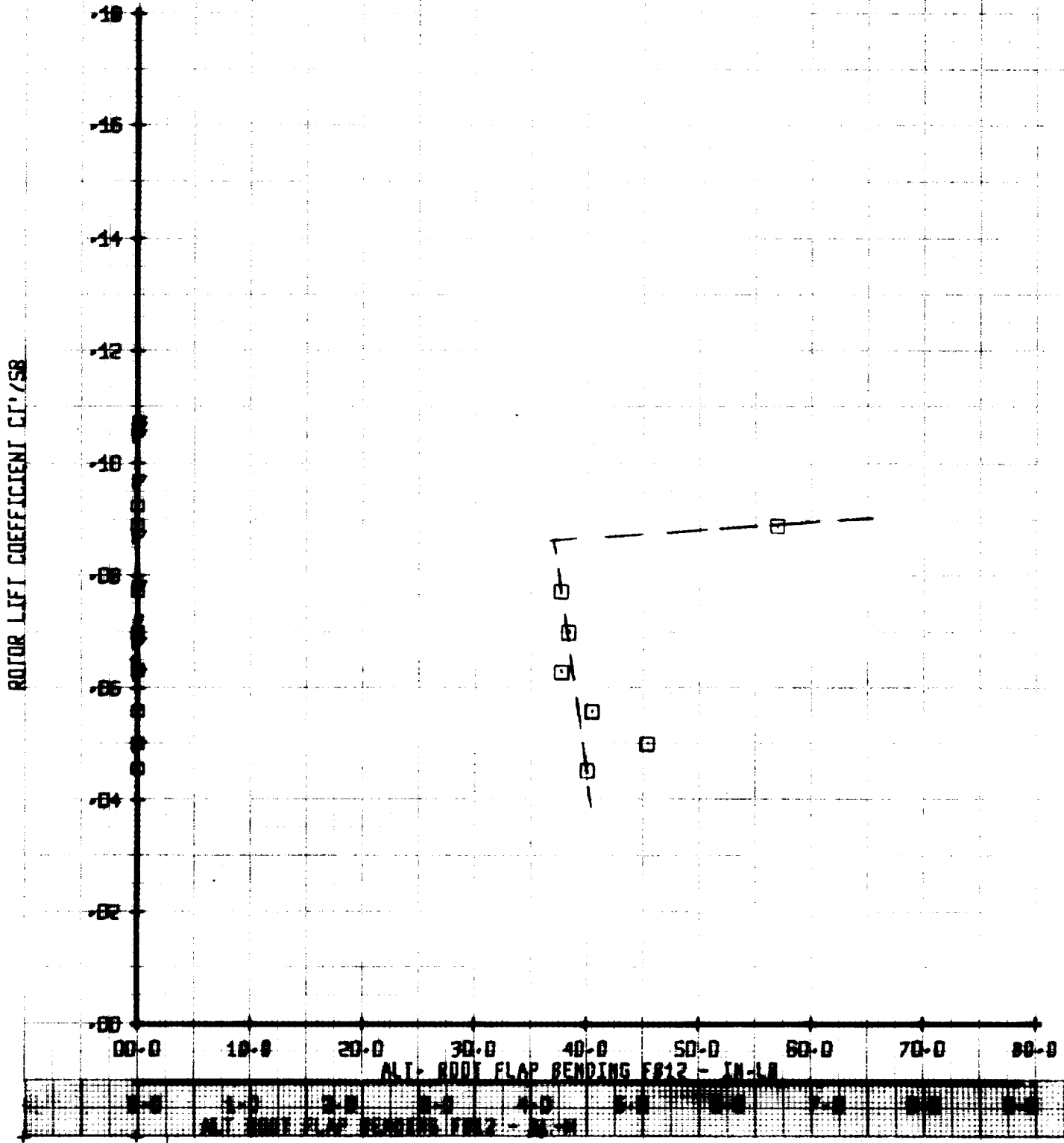
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D ROTOR
 LIFT LIMIT TESTING

LEGEND				
SYM	RUN	MLA	X/00258	YTUN
□	252	.90	.05	285
△	254	.50	.05	285

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12
REDUCED TIP SPEED

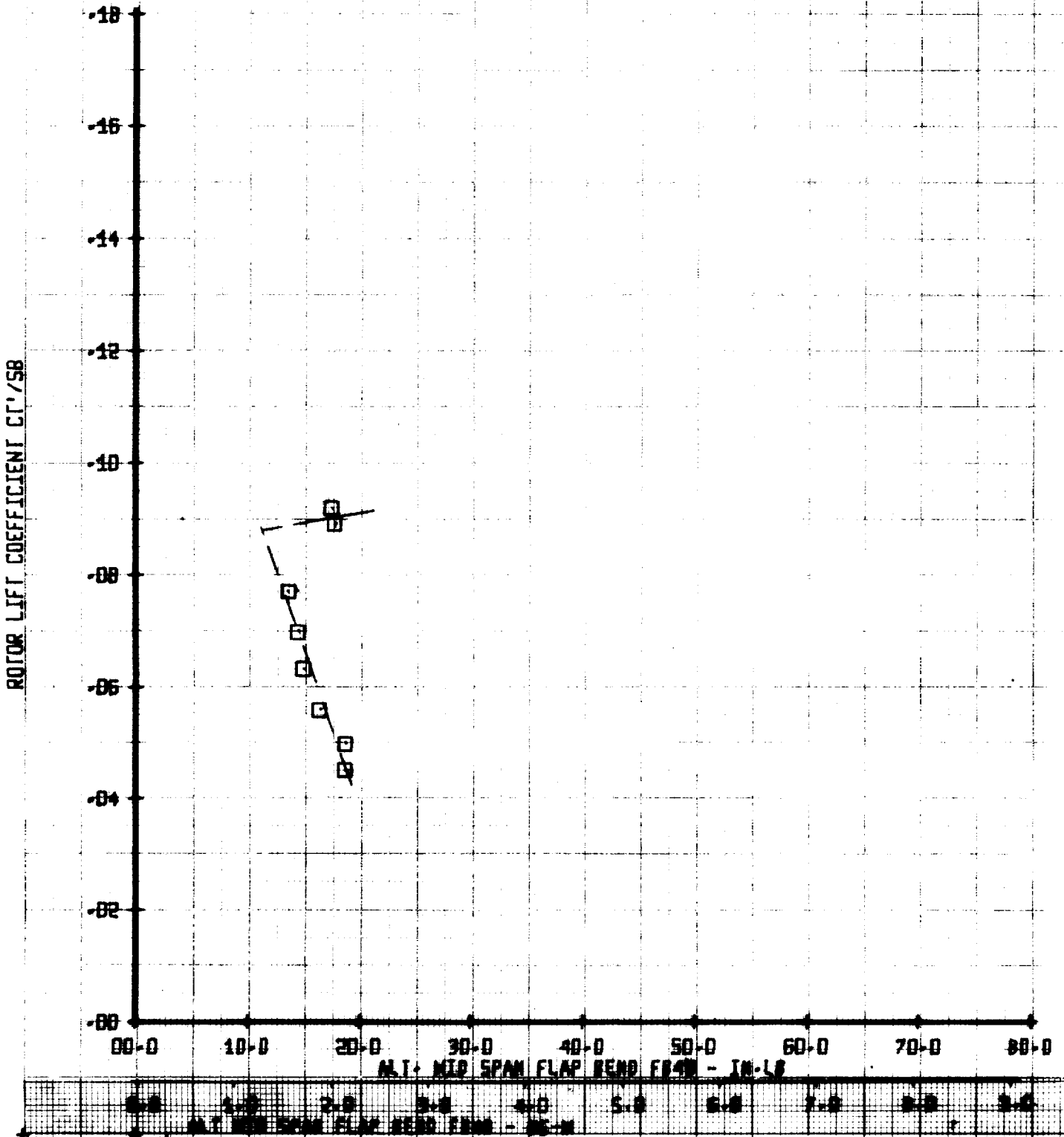


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

LEGEND

SYM	RUN	MU	X/00258	VTUN
0	252	.50	.05	285
7	254	.50	.05	285

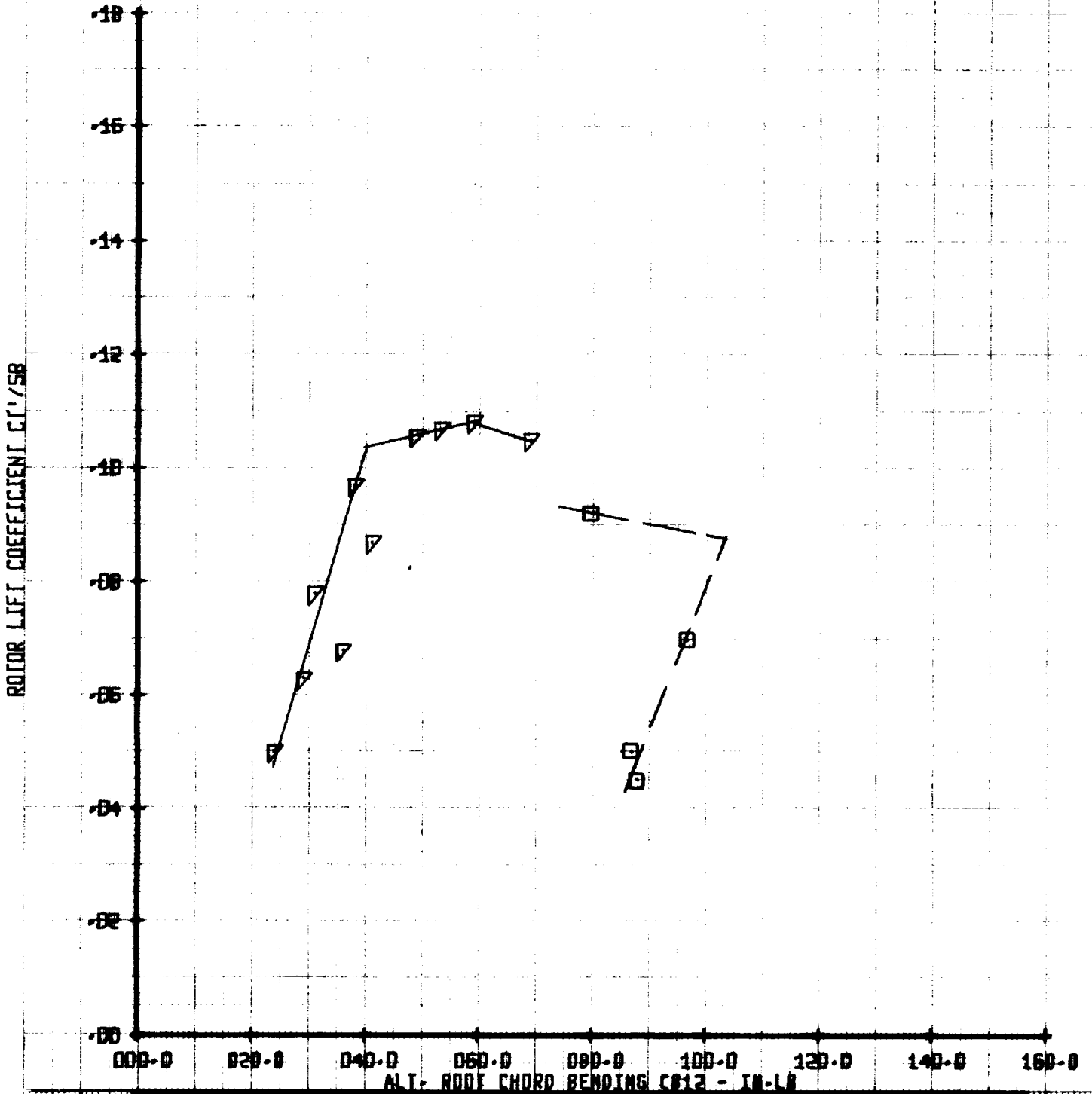
ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BENDING FB40
REDUCED TIP SPEED



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 LIFT LIMIT TESTING

SYM		LEGEND		X/00258		Y/TUN	
□	202	MU'	.50	.05	295		
△	254		.50	.05	295		

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12
REDUCED TIP SPEED

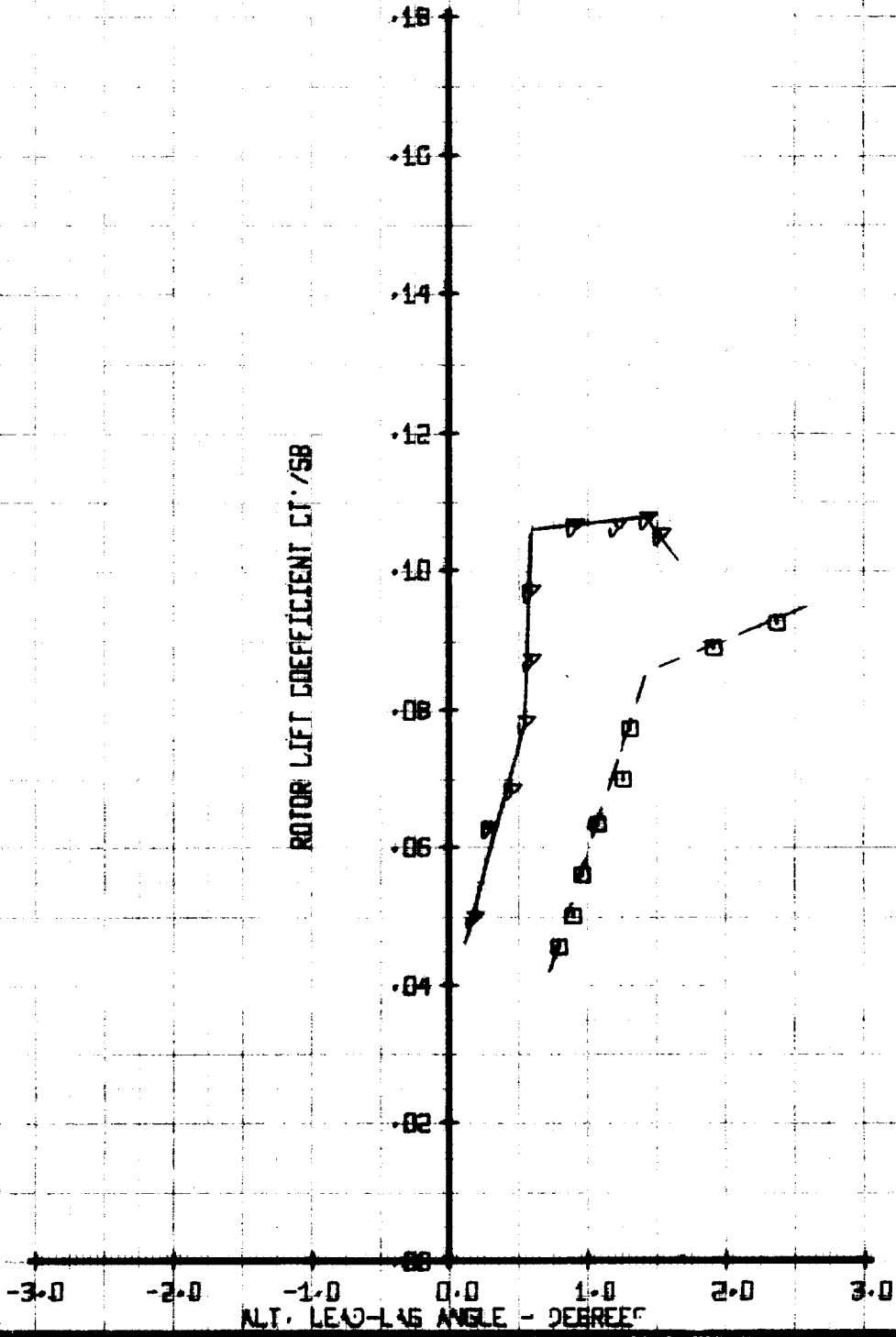


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OY-475 ROTOR
 LIFT LIMIT TESTING

SYMBOL		LEGEND	
□	0.90	MU'	X/00258
△	0.95	Y/TUN	285

ROTOR LIFT COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE

REDUCED TIP SPEED



B. Basic Test Data from Propulsive Force Limit Testing

As indicated in Section 5 of the main report, the propulsive force limit testing was conducted at fixed levels of rotor lift by increasing the collective pitch, decreasing the rotor shaft angle of attack and trimming the hub moments to zero with longitudinal and lateral cyclic. This was repeated at each level of rotor lift level and advance ratio for the basic rotor tip speed of 620 ft/sec. A limited amount of testing was also accomplished at a tip speed of 665 ft/sec.

The test data obtained for each of these test runs has been combined to show the impact of rotor lift at a fixed advance ratio. The combinations identified as plot sets, are defined in Table B-1 and are marked on the bottom of each sheet. Within each plot set area series of graphs presenting the variation of each component of measured data with rotor propulsive force coefficient. The sequence of these graphs are as follows:

Propulsive Force Coefficient versus Rotor Propulsive Force Coefficient

Propulsive Force Coefficient versus Shaft Angle of Attack

Propulsive Force Coefficient versus Collective Pitch

Propulsive Force Coefficient versus Longitudinal Cyclic

Propulsive Force Coefficient versus Lateral Cyclic

Propulsive Force Coefficient versus Rotor Power Coefficient

Propulsive Force Coefficient versus Rotor Pitching Moment

Propulsive Force Coefficient versus Rotor Rolling Moment Coefficient

Propulsive Force Coefficient versus Rotor Longitudinal Force Coefficient

Propulsive Force Coefficient versus Rotor Side Force Coefficient

Propulsive Force Coefficient versus Alternating Root Torsion TB12

Propulsive Force Coefficient versus Alternating Mid Span Torsion TB50

Propulsive Force Coefficient versus Alternating Outboard Torsion TB80

Propulsive Force Coefficient versus Alternating Root Flap Bending FB12

Propulsive Force Coefficient versus Alternating Mid Span Flap Bending FB47

Propulsive Force Coefficient versus Alternating Outboard Flap Bending FB78

Propulsive Force Coefficient versus Alternating Root Chord Bending CB12

Propulsive Force Coefficient versus Coning Angle

Propulsive Force Coefficient versus 1st Harmonic Longitudinal Flapping A1

Propulsive Force Coefficient versus 1st Harmonic Lateral Flapping B1

Propulsive Force Coefficient versus Alternating Lead-Lag Angle

Rotor Pitching Moment Coefficient versus 1st Harmonic Longitudinal Flapping A1

Rotor Rolling Moment Coefficient versus 1st Harmonic Lateral Flapping B1

TABLE B-1 DATA PLOTTING SUMMARY FOR PROPULSIVE FORCE LIMIT TESTING

PLOT SET	RUN NO.	ROTOR TIP SPEED V_T	ADVANCE RATIO μ	ROTOR LIFT COEFF. C_L/σ	ROTOR PROPULSIVE FORCE COEFF. $X/qd^2\sigma$	TUNNEL SPEED V	COMMENTS
47	230	620FPS	.40	.06	Range	248FPS	Cruise performance and propulsive force limit.
	231	620FPS	.40	.09	Range	248FPS	
48	243	620FPS	.45	.06	Range	279FPS	
	244	620FPS	.45	.076	Range	279FPS	
49	232	620FPS	.50	.06	Range	311FPS	
	233	620FPS	.50	.06	Range	311FPS	
	234	620FPS	.50	.08	Range	311FPS	
	235	620FPS	.50	.08	Range	311FPS	
50	269	620FPS	.50	.06	Range	311FPS	
	270	620FPS	.50	.07	Range	311FPS	
	271	620FPS	.50	.09	Range	311FPS	
	272	620FPS	.50	.10	Range	311FPS	
51	268	620FPS	.53	.05	Range	328FPS	
	240	620FPS	.53	.06	Range	328FPS	
	266	620FPS	.53	.08	Range	328FPS	
	241	620FPS	.53	.09	Range	328FPS	
	242	620FPS	.53	.09	Range	328FPS	
	267	620FPS	.53	.10	Range	328FPS	
52	264	620FPS	.53	.05	Range	328FPS	
	265	620FPS	.53	.07	Range	328FPS	

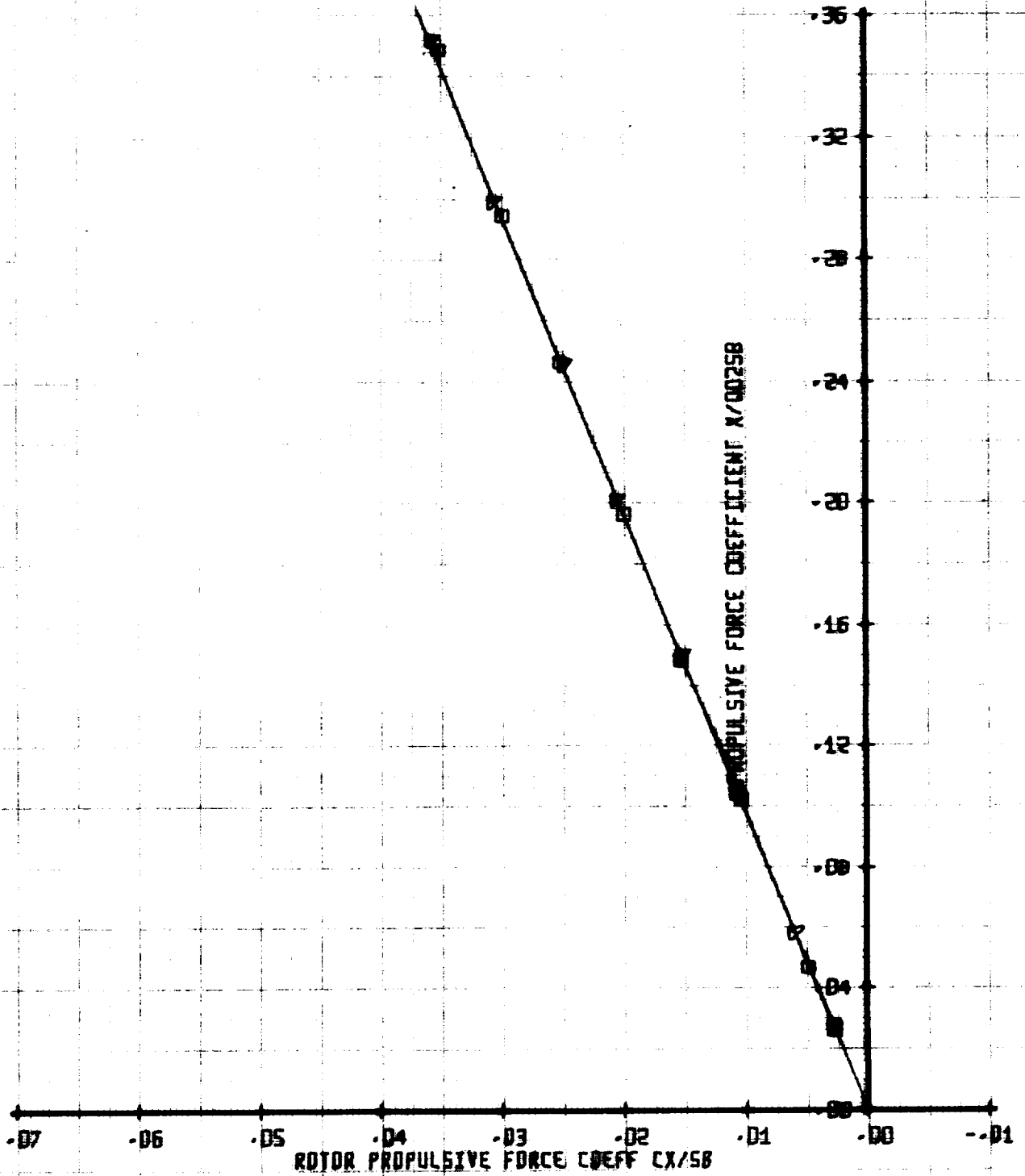
TABLE B-1 DATA PLOTTING SUMMARY FOR PROPULSIVE FORCE LIMIT TESTING
(Continued)

PLOT SET	RUN NO.	ROTOR TIP SPEED V_T	ADVANCE RATIO μ	ROTOR LIFT COEFF. G_T/σ	ROTOR PROPULSIVE FORCE COEFF. $X/qd^2\sigma$	TUNNEL SPEED V	COMMENTS
53	236	620FPS	.57	.06	Range	353FPS	Cruise performance and propulsive force limit.
	237	620FPS	.57	.076	Range	353FPS	
54	239	620FPS	.61	.04	Range	378FPS	
	238	620FPS	.61	.055	Range	378FPS	
55	276	665FPS	.53	.06	Range	352FPS	Cruise performance and force limit at increased tip speed.
	277	665FPS	.53	.08	Range	352FPS	

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/58	VTUN
□	230	.40	.06	248
▽	231	.40	.09	248

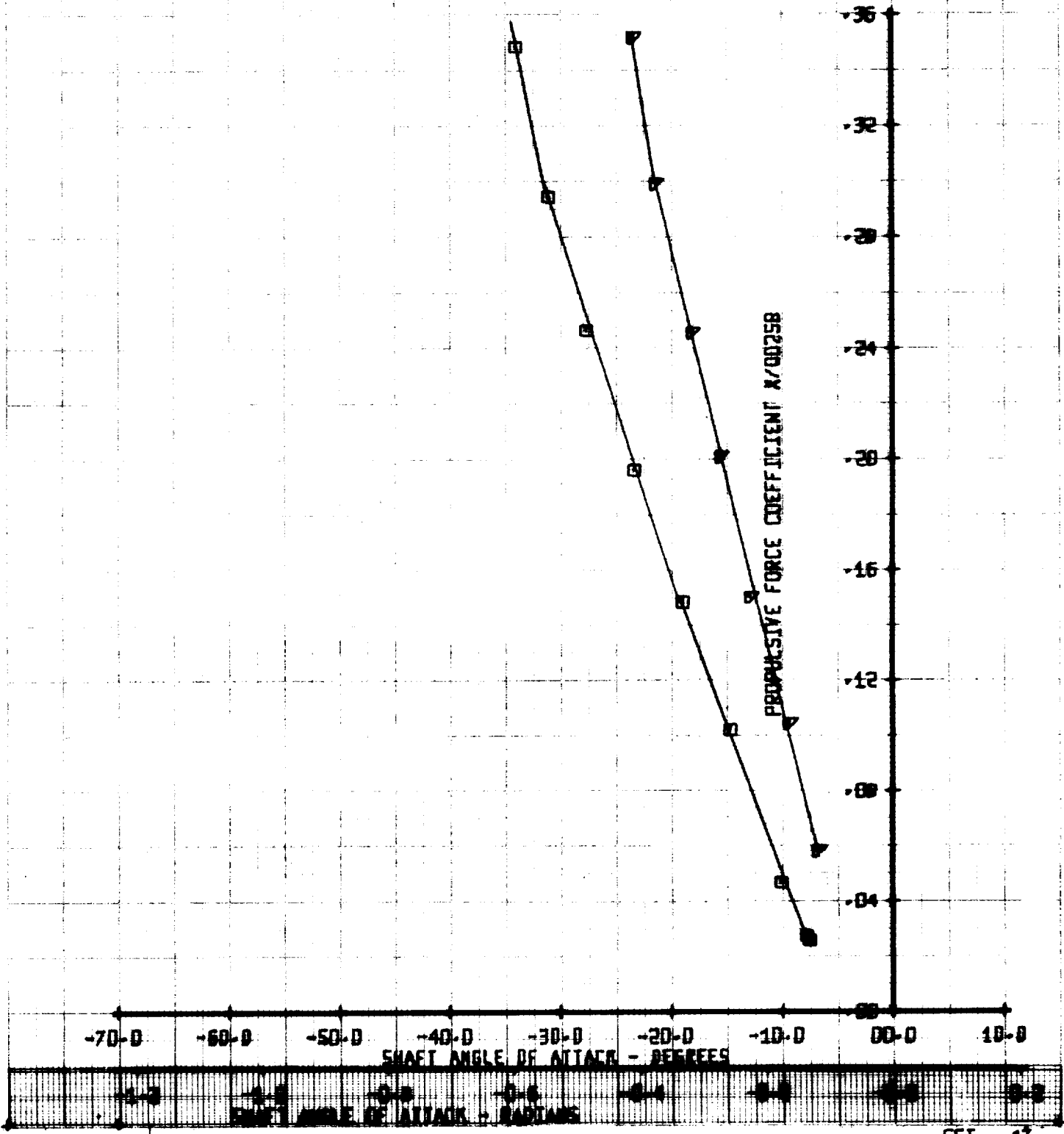
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/SB	VTUN
□	230	.40	.06	248
▽	231	.40	.09	248

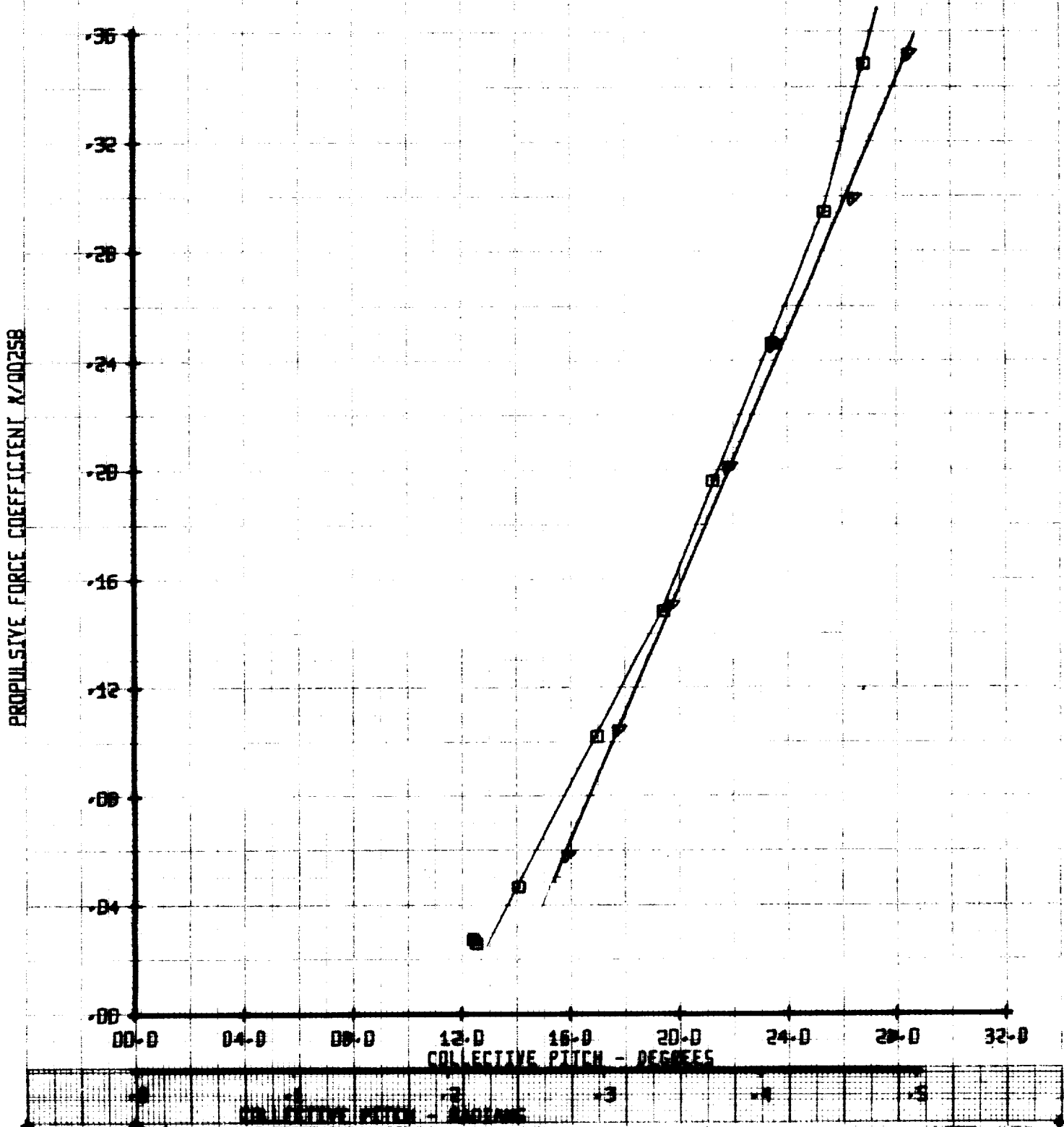
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'Y58	VTUN
□	230	.40	.06	248
▲	231	.40	.09	248

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT/58	VTUN	
□	230	.40	.06	240	
▴	231	.40	.09	240	

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC

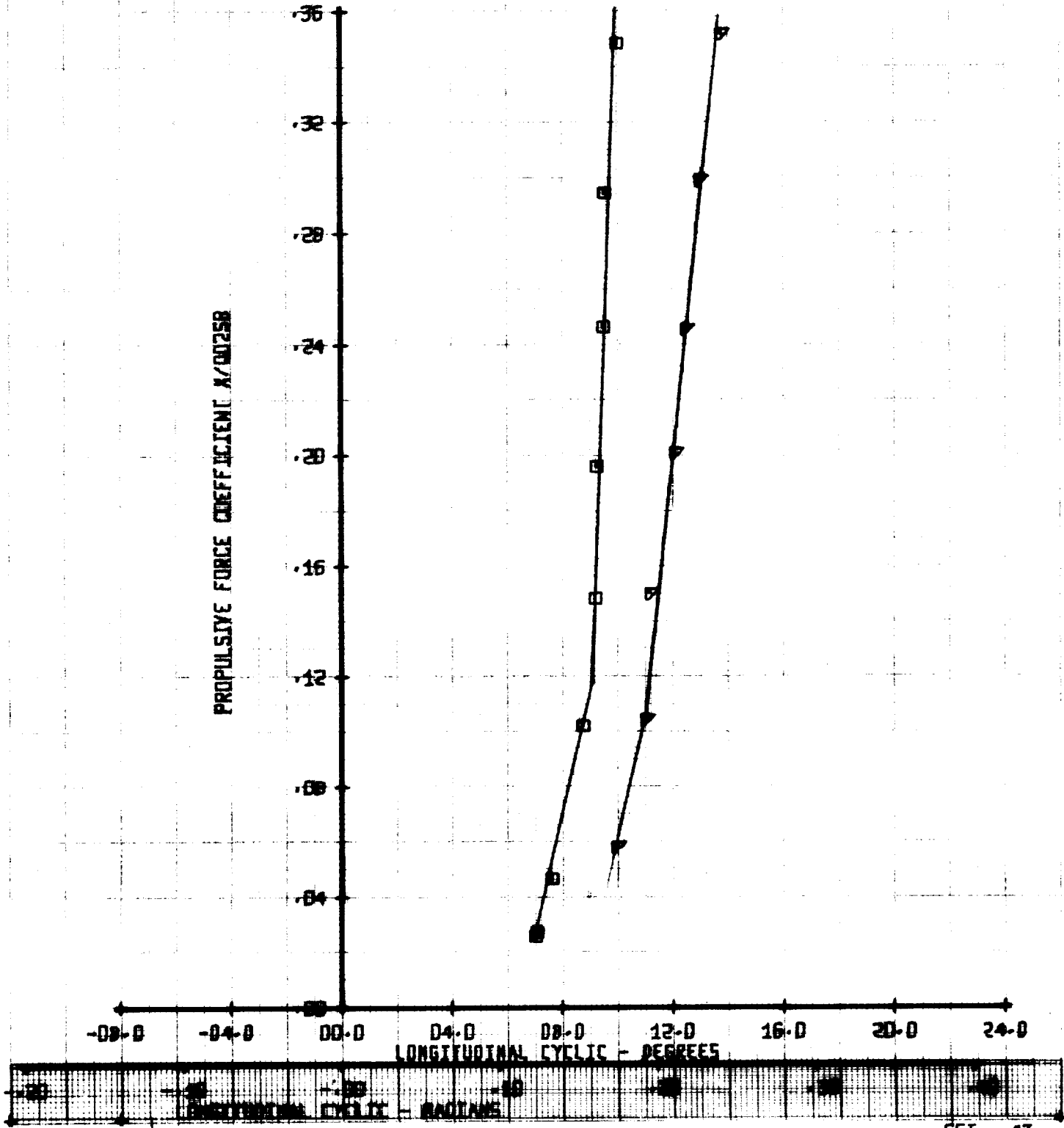
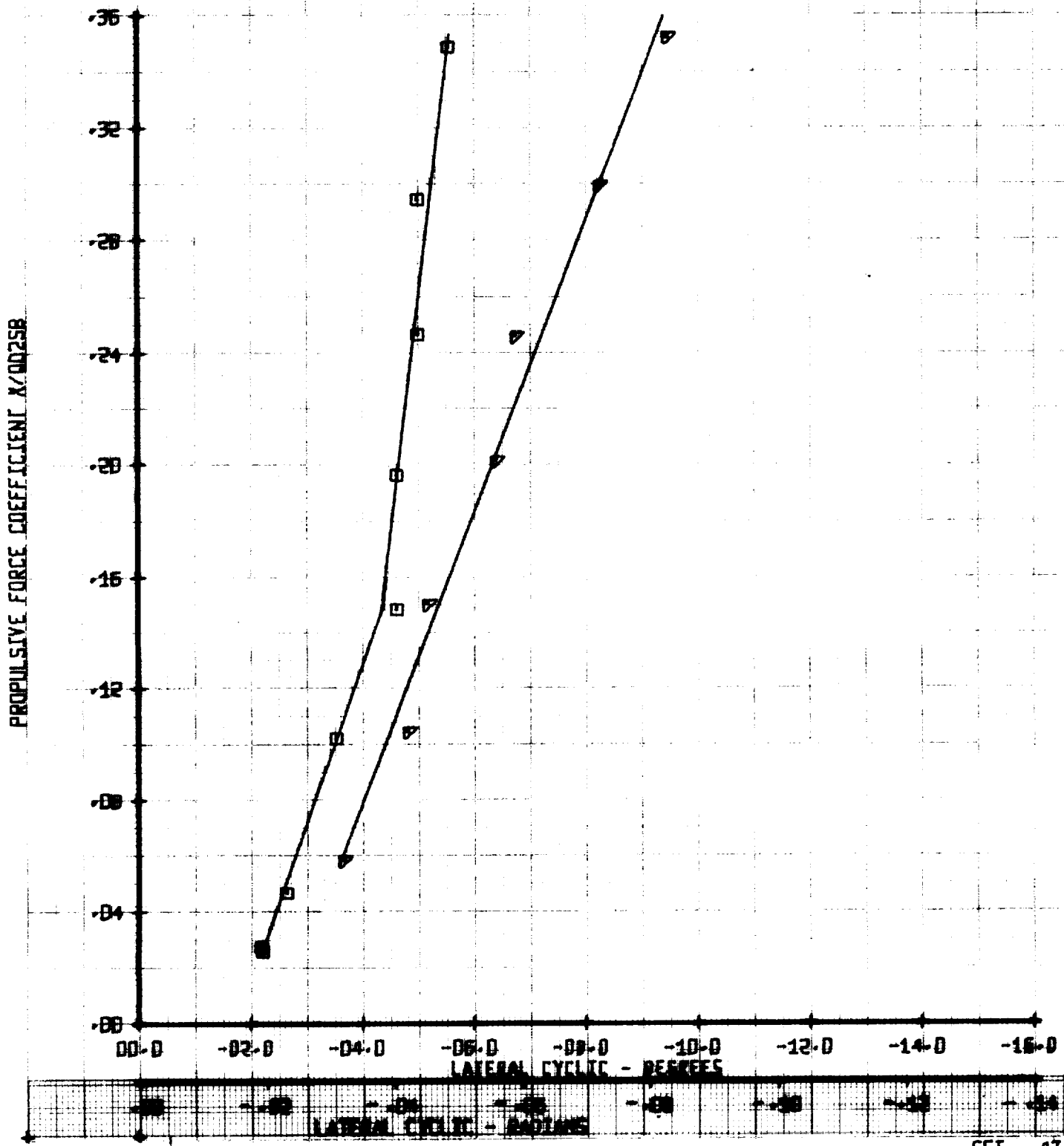


Figure B-5

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYN		RUN		MU		CT/YSB		VTUN	
0	0	230	231	.40	.40	.06	.09	240	240

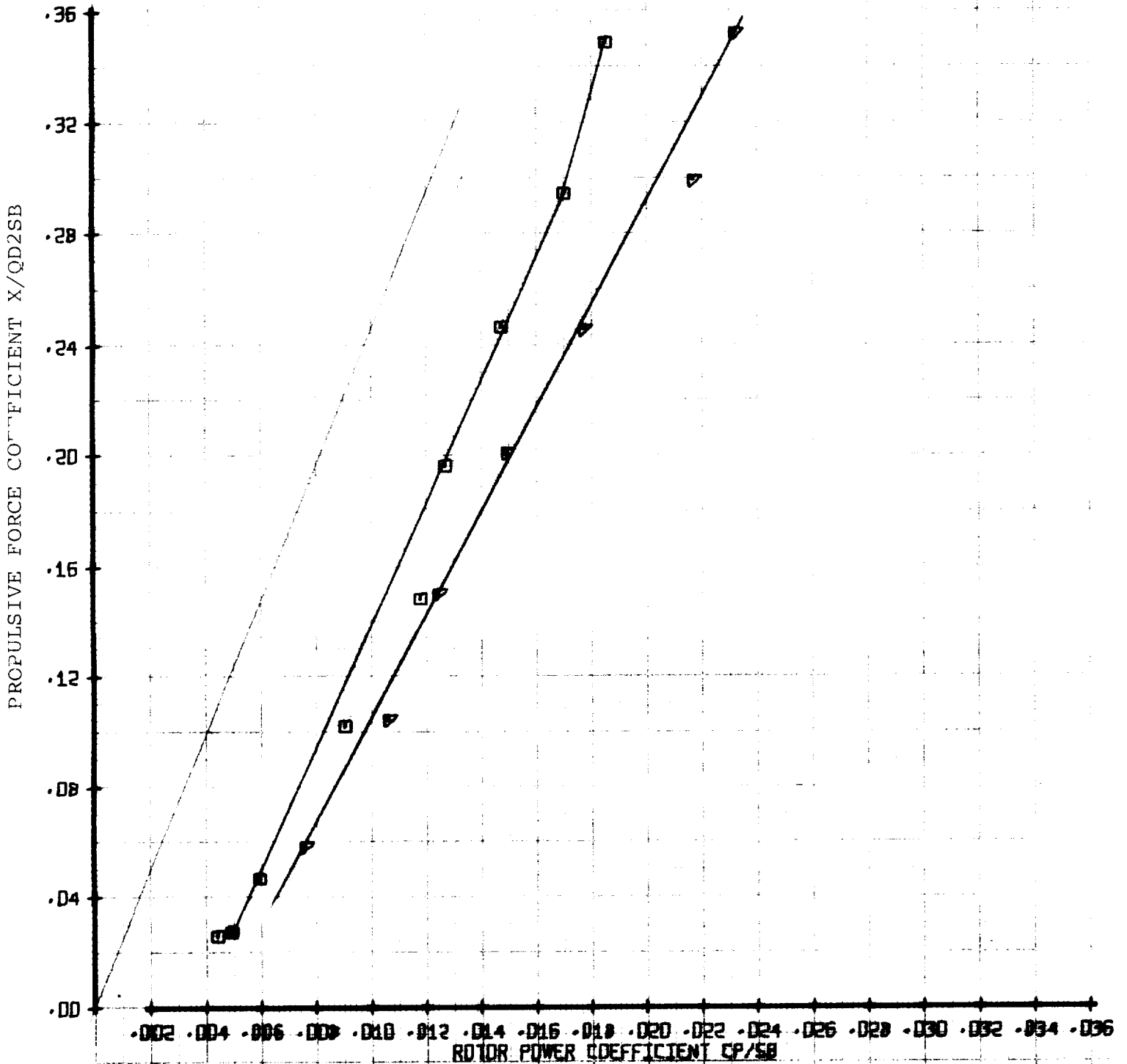
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/58	VTUN
□	230	.40	.06	248
▽	231	.40	.09	248

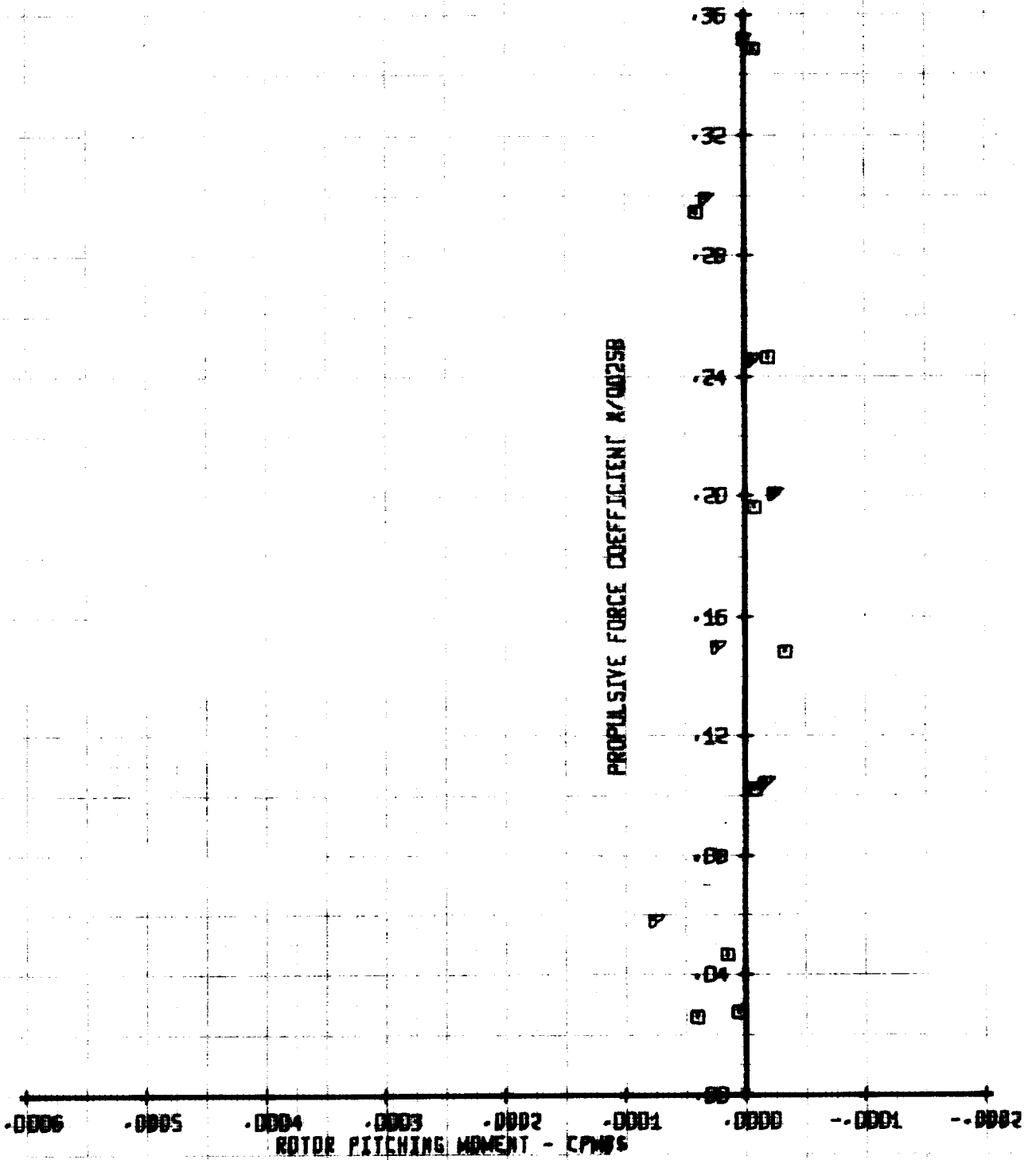
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU	CT/58	VTUN	
□	230	.40	.06	248	
▽	231	.40	.09	248	

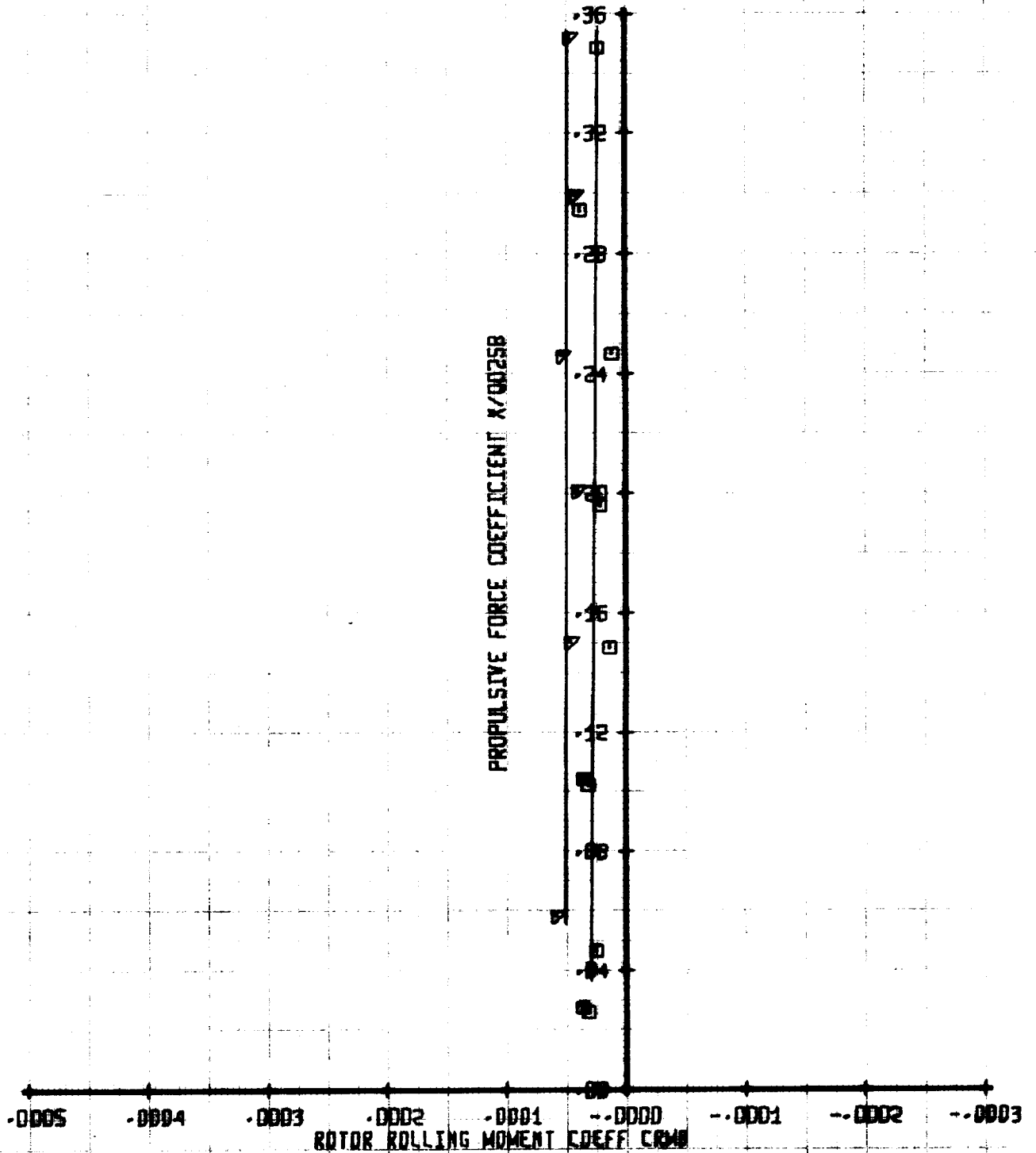
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU	CT/2SB	VTUN
□	230	.40	.06	240
△	231	.40	.09	240

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU	CT/58	VTUN
□	230	.40	.06	248
△	231	.40	.09	248

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT

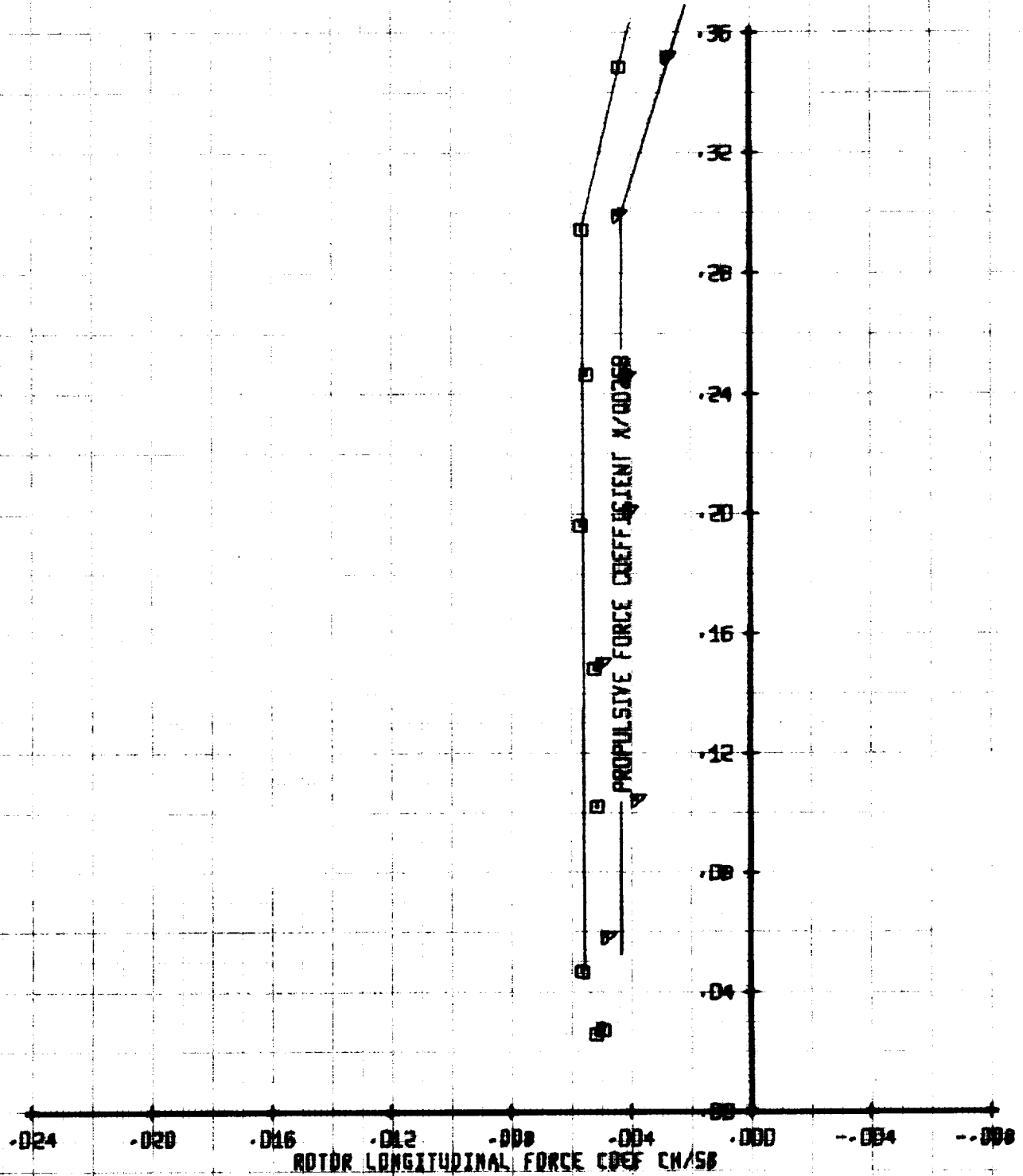
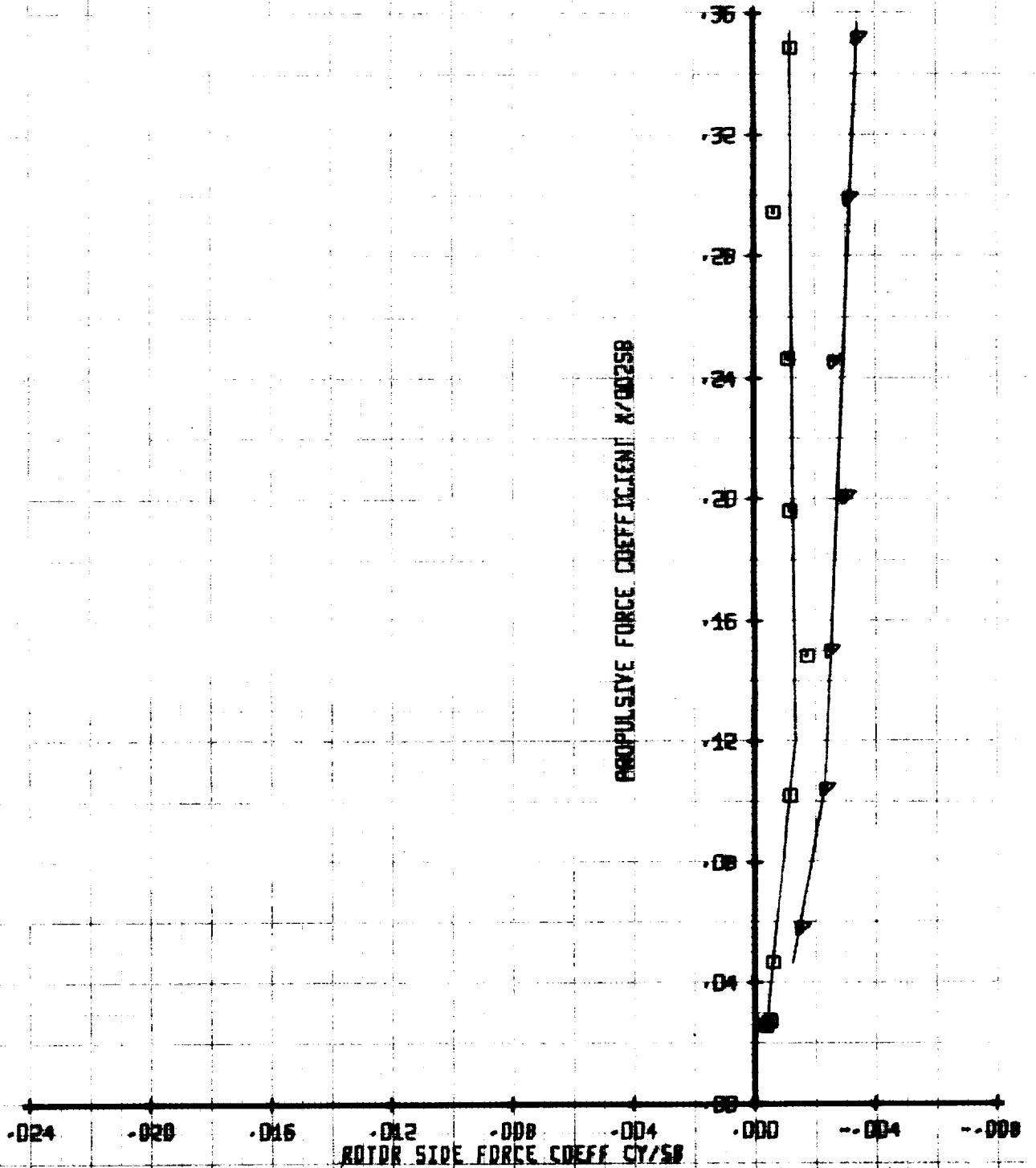


Figure B-10

LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MU	CT/58	VTUM
SYM	RUN	.40	.06	248
□	230	.40	.09	248
△	231			

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT

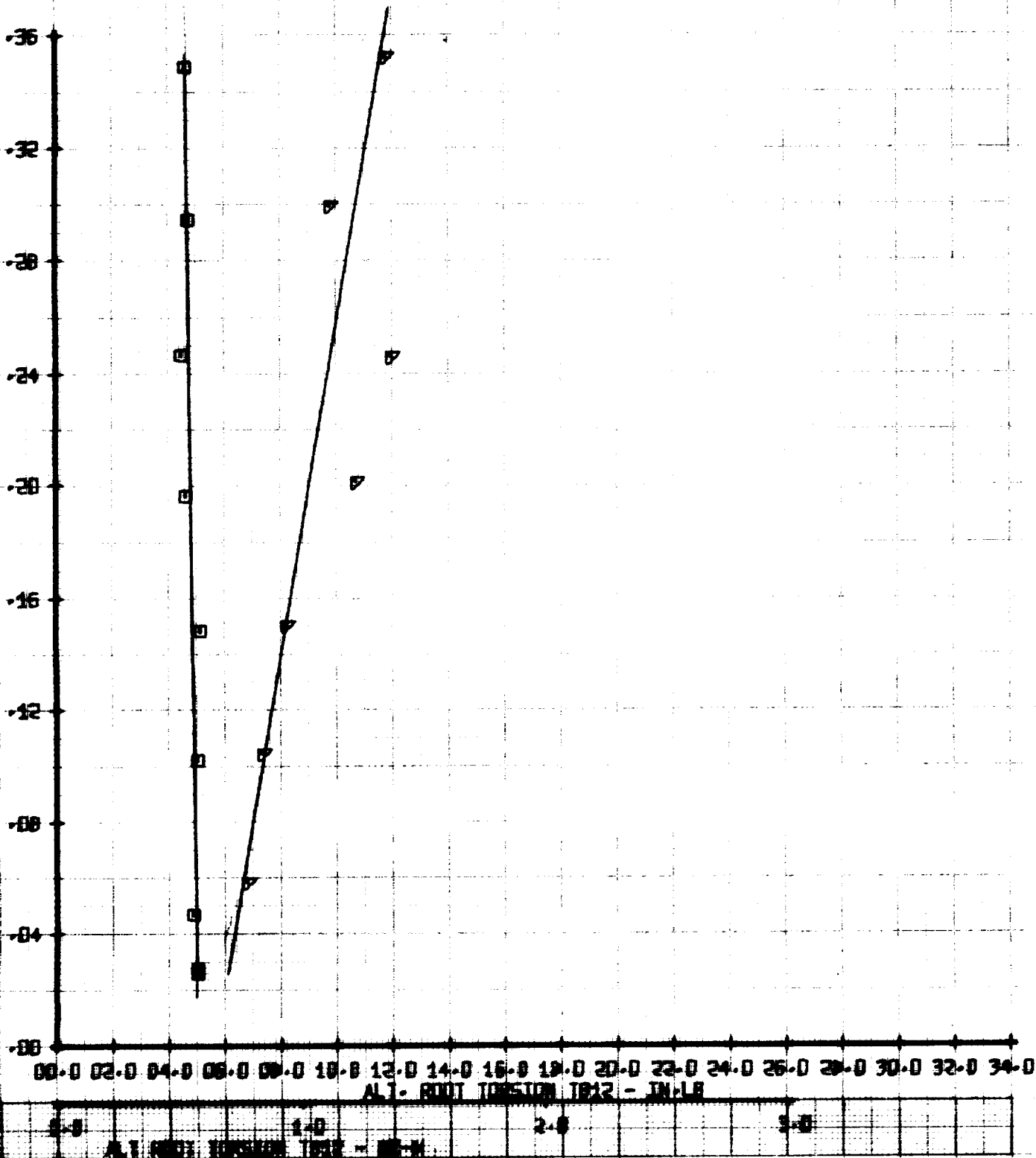


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYN		LEGEND		
□	230	MU'	CT'/58	YTLN
○	231	.40	.06	248
○	231	.40	.09	248

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12

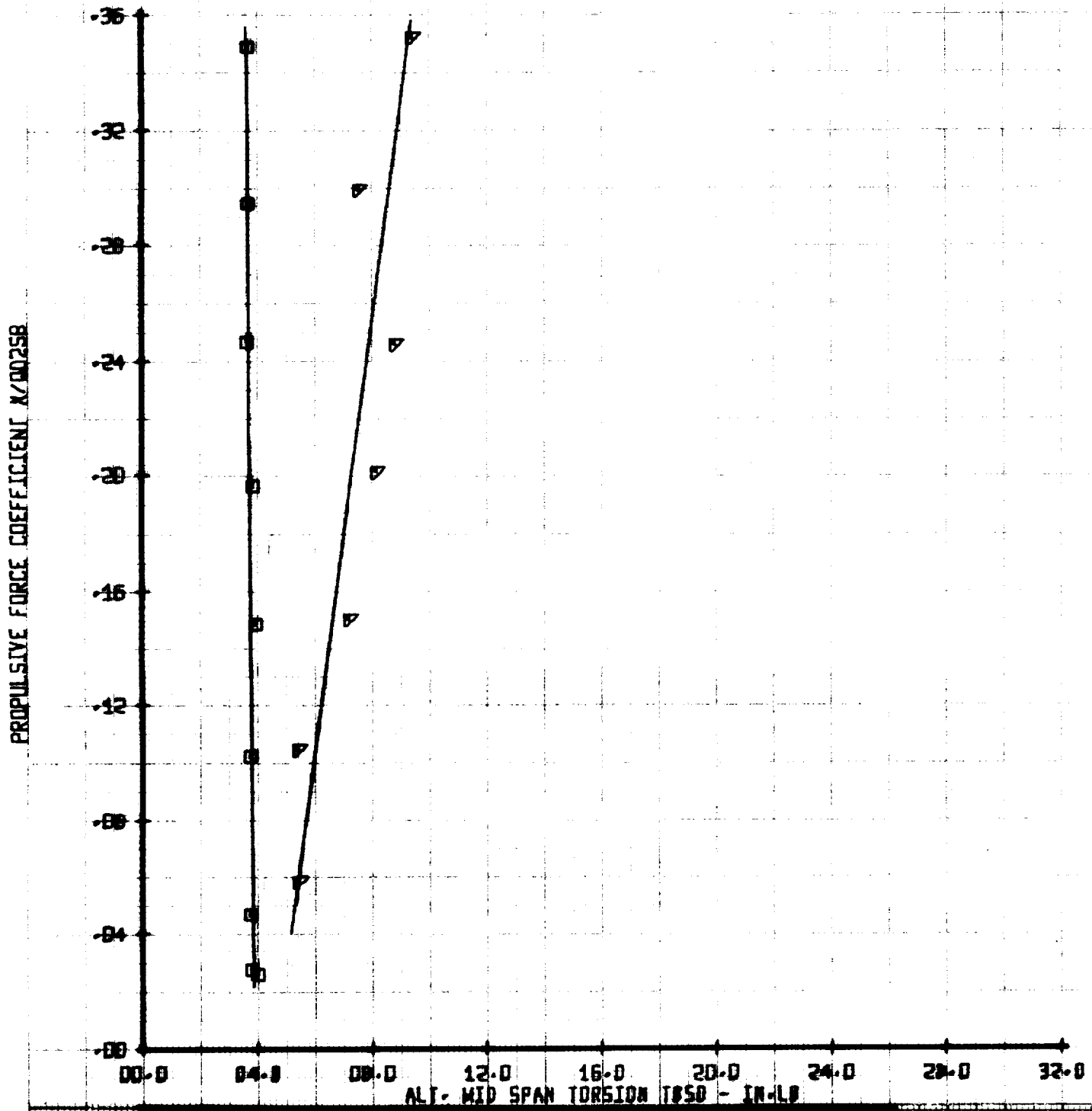
PROPULSIVE FORCE COEFFIC T X/00258



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYN		LEGEND		
SYM	MIN	MI'	CT'Y58	Y1LN
□	230	.40	.06	248
▽	231	.40	.09	248

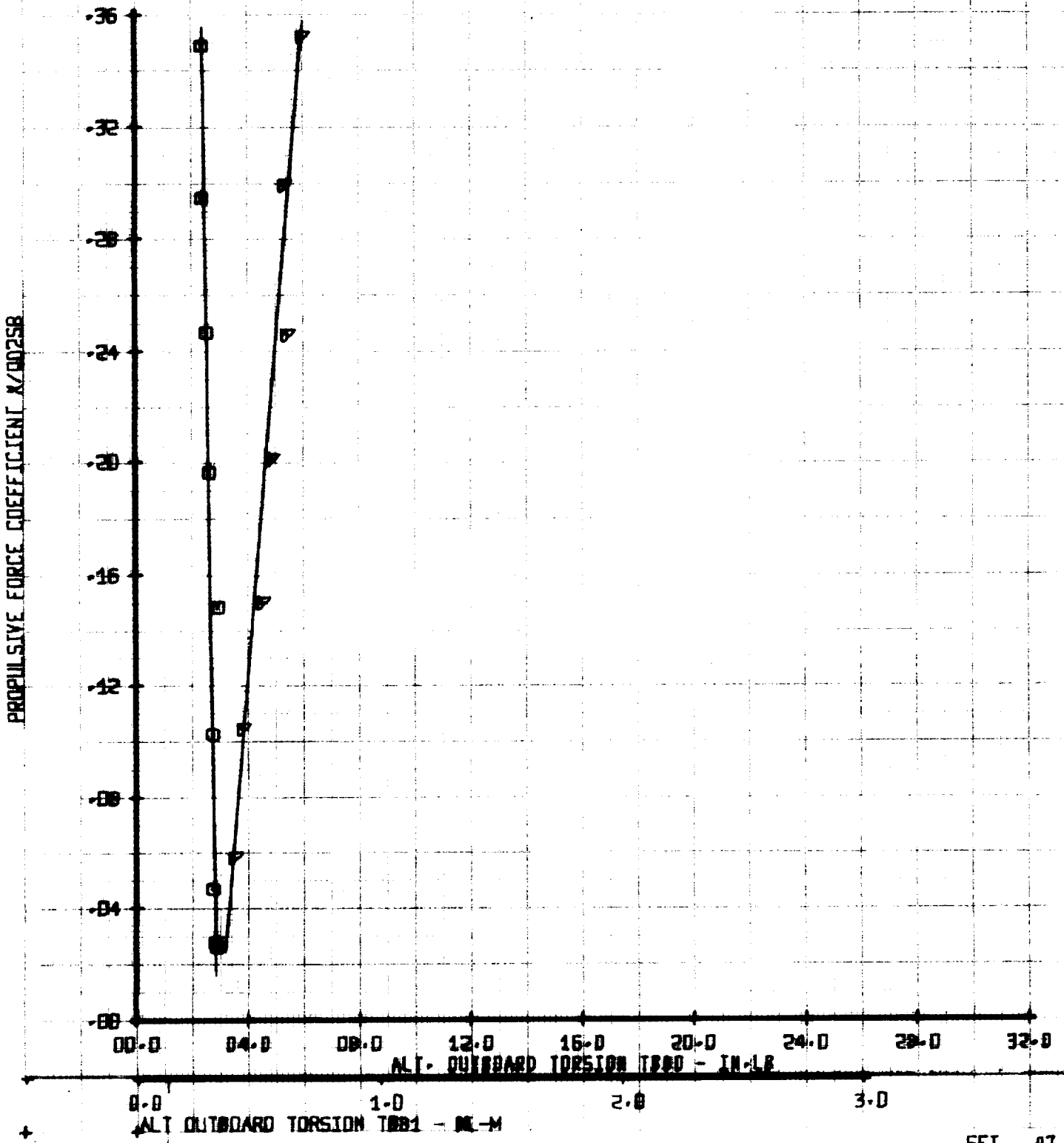
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	BLN	MU'	CT' / SB	YTLN
□	230	.40	.06	248
▽	231	.40	.09	248

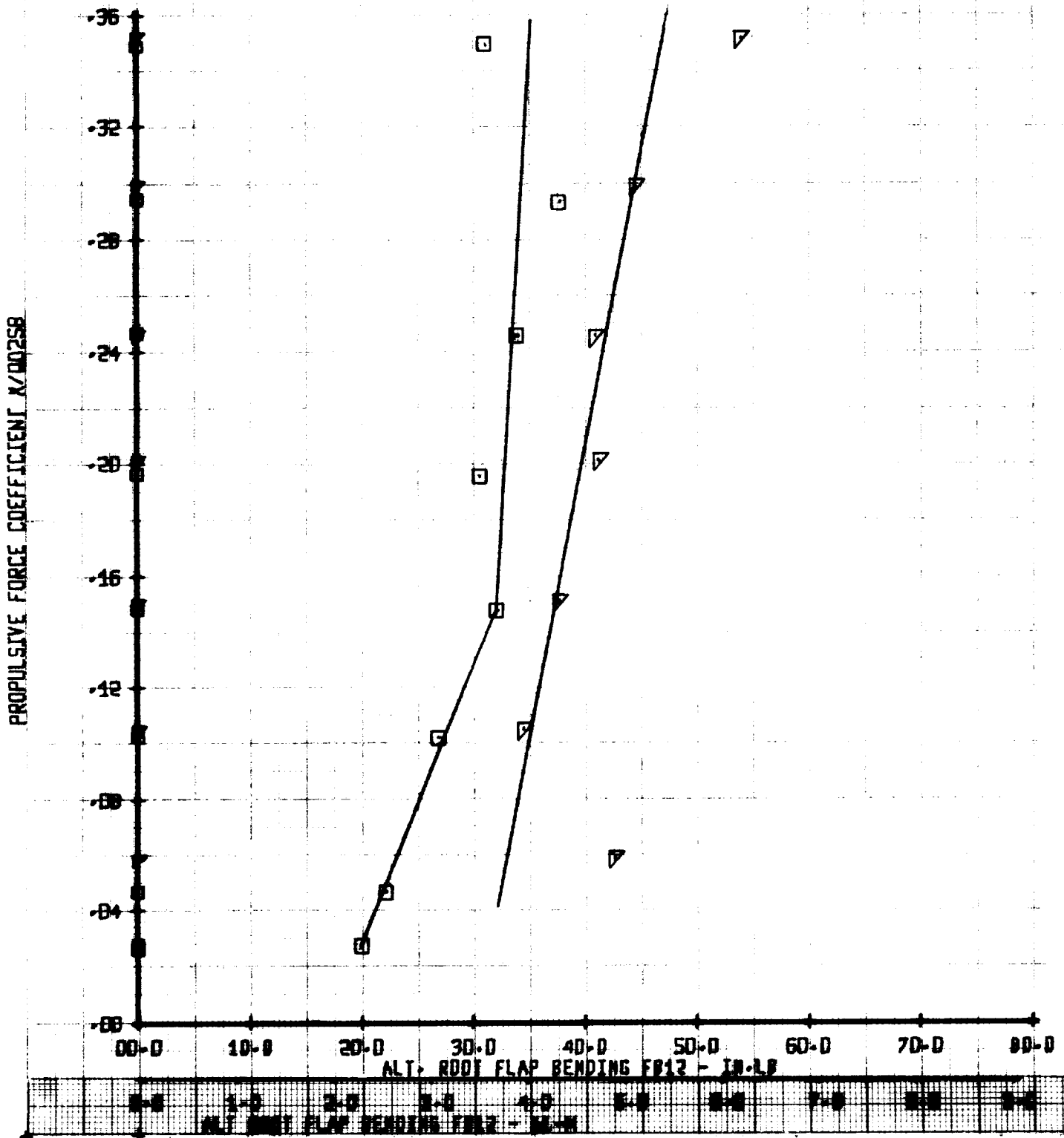
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB80



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT' / SB	YDIN	
□	230	.40	.06	248	
▽	231	.40	.09	248	

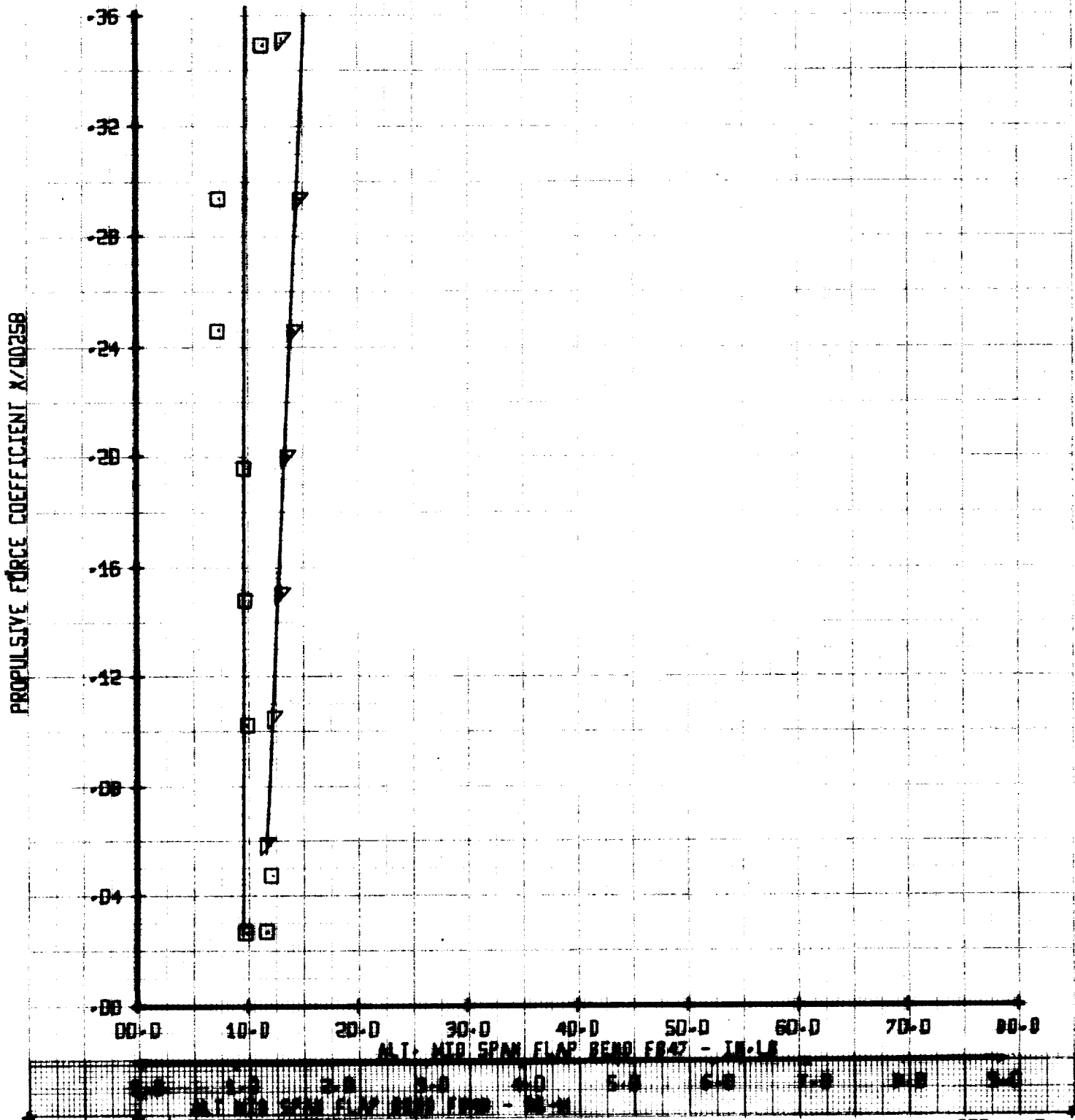
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	Y/TUN	
□	230	.40	.06	248	
▽	231	.40	.09	248	

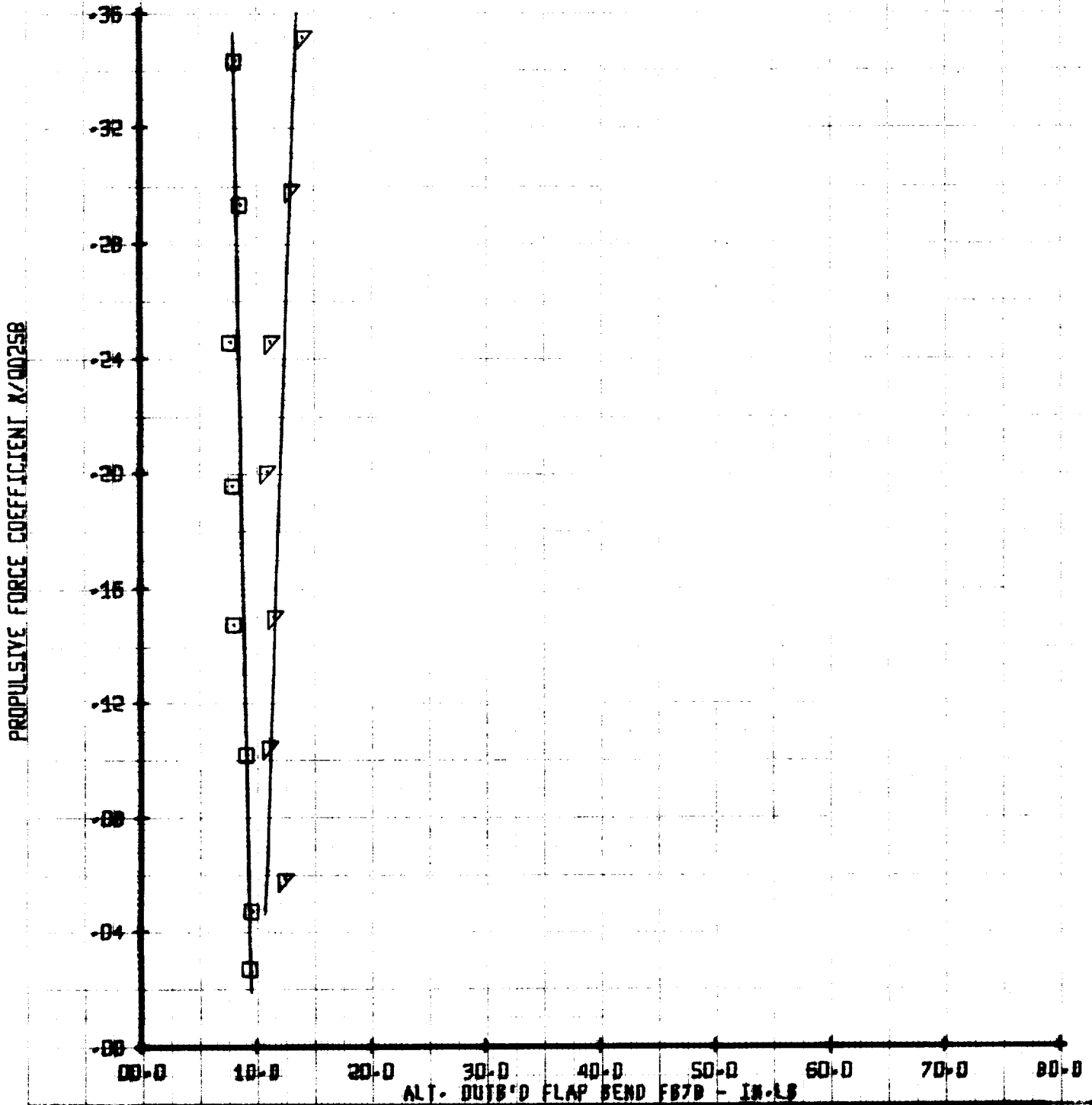
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BENDING FB47



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47D ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MI'	CT'/SB	VTUN	
□	230	.40	.06	248	
▽	231	.40	.09	248	

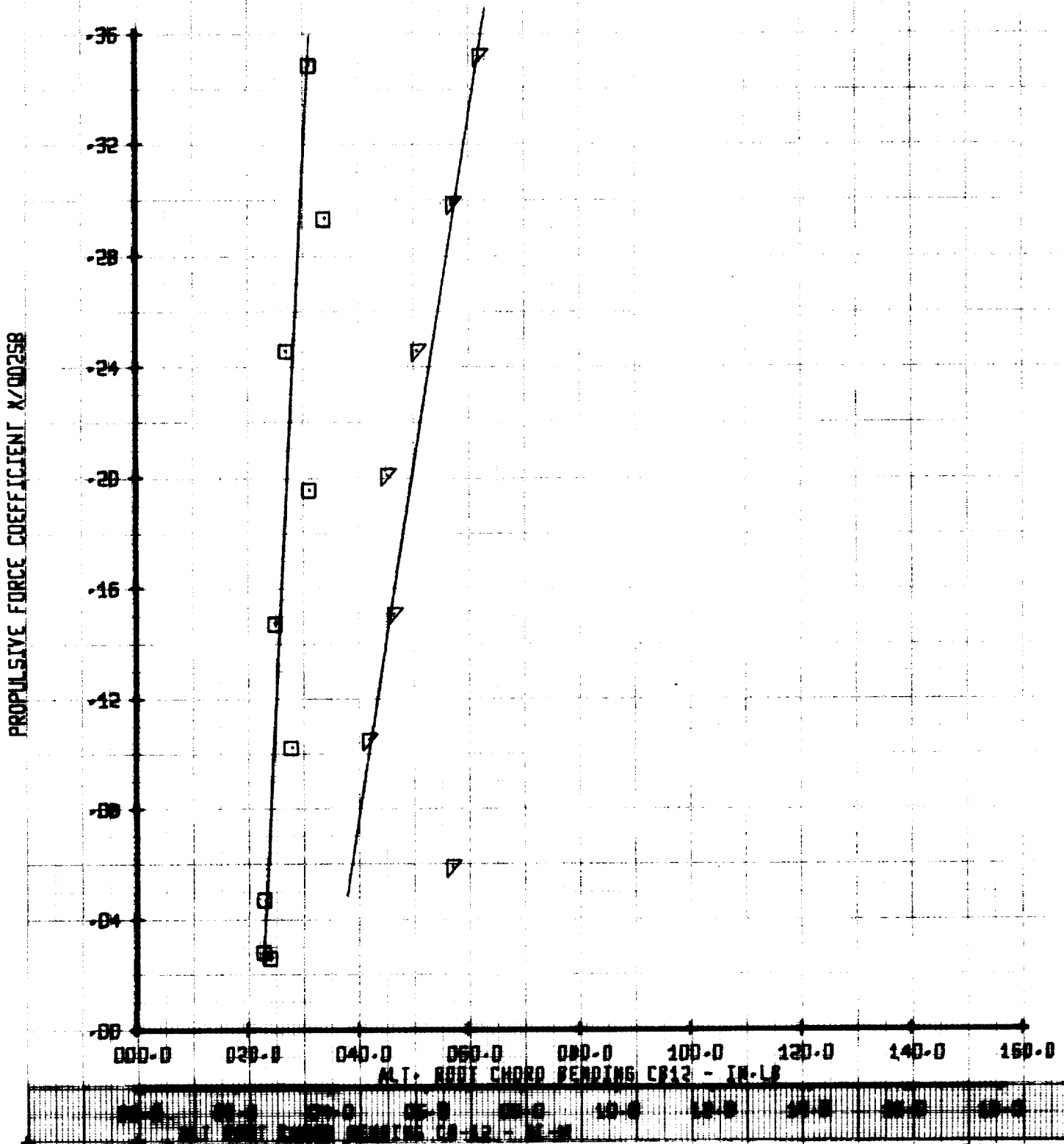
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB78



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47E ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		LEGEND		YMIN	
□	230	MJ'	CT'58	248	
△	231	.40	.06	248	
		.40	.09		

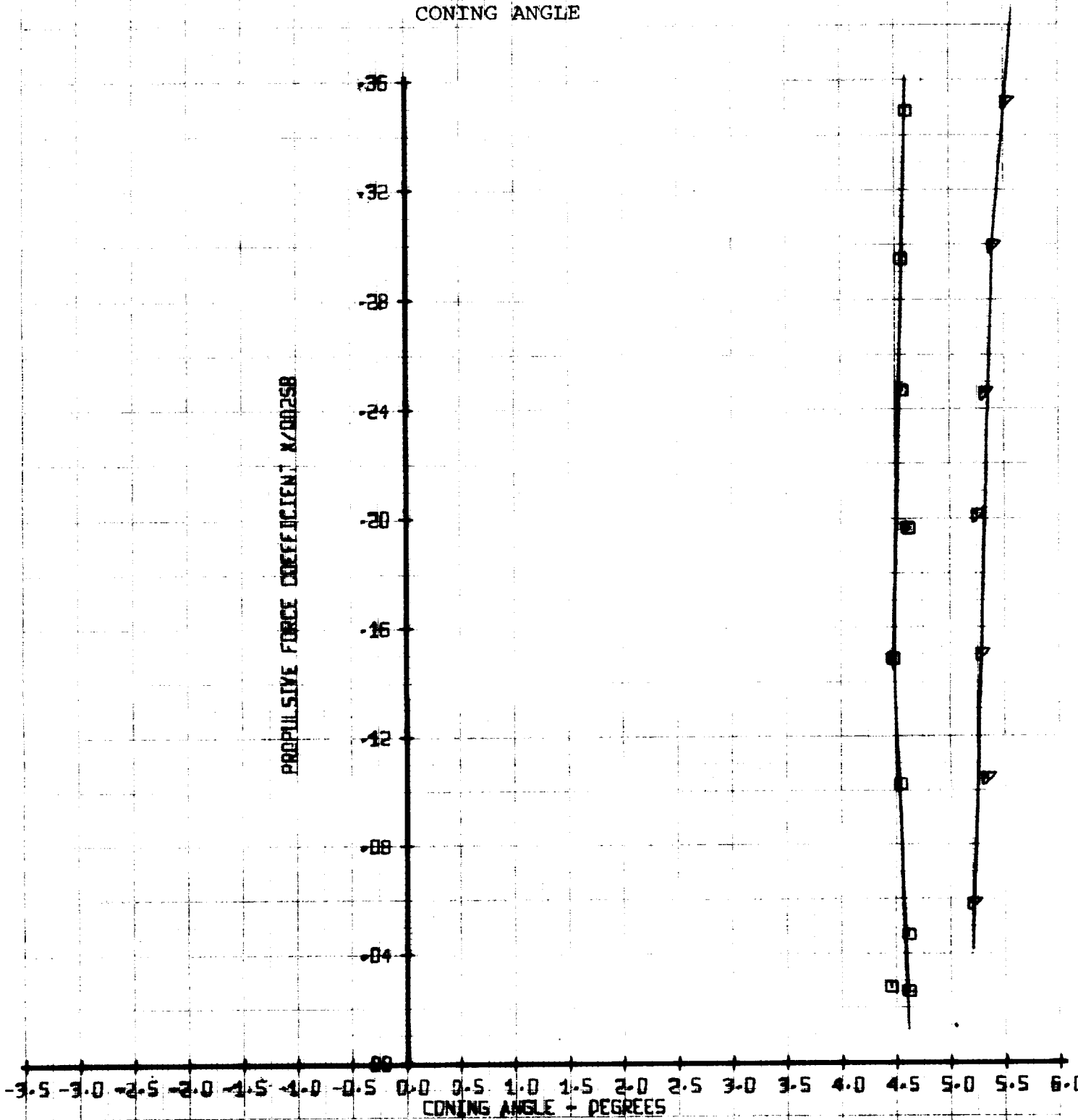
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND				
SYM	BLN	MU'	CT'/2SB	YDIN
□	230	.40	.06	248
△	231	.40	.09	248

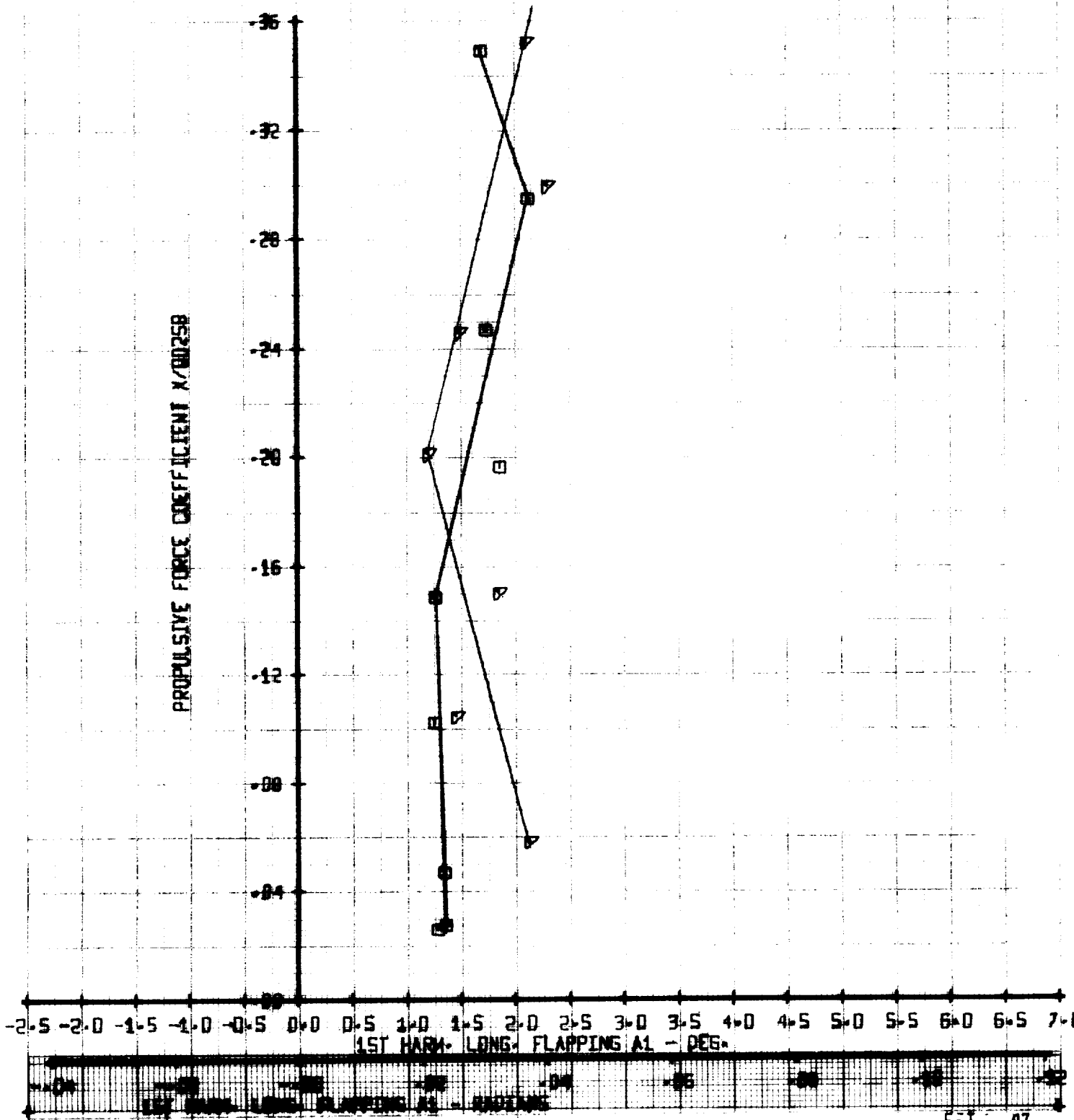
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND				
SYM	RUN	MU'	CT' / 58	YIUM
□	230	.40	.06	248
▽	231	.40	.09	248

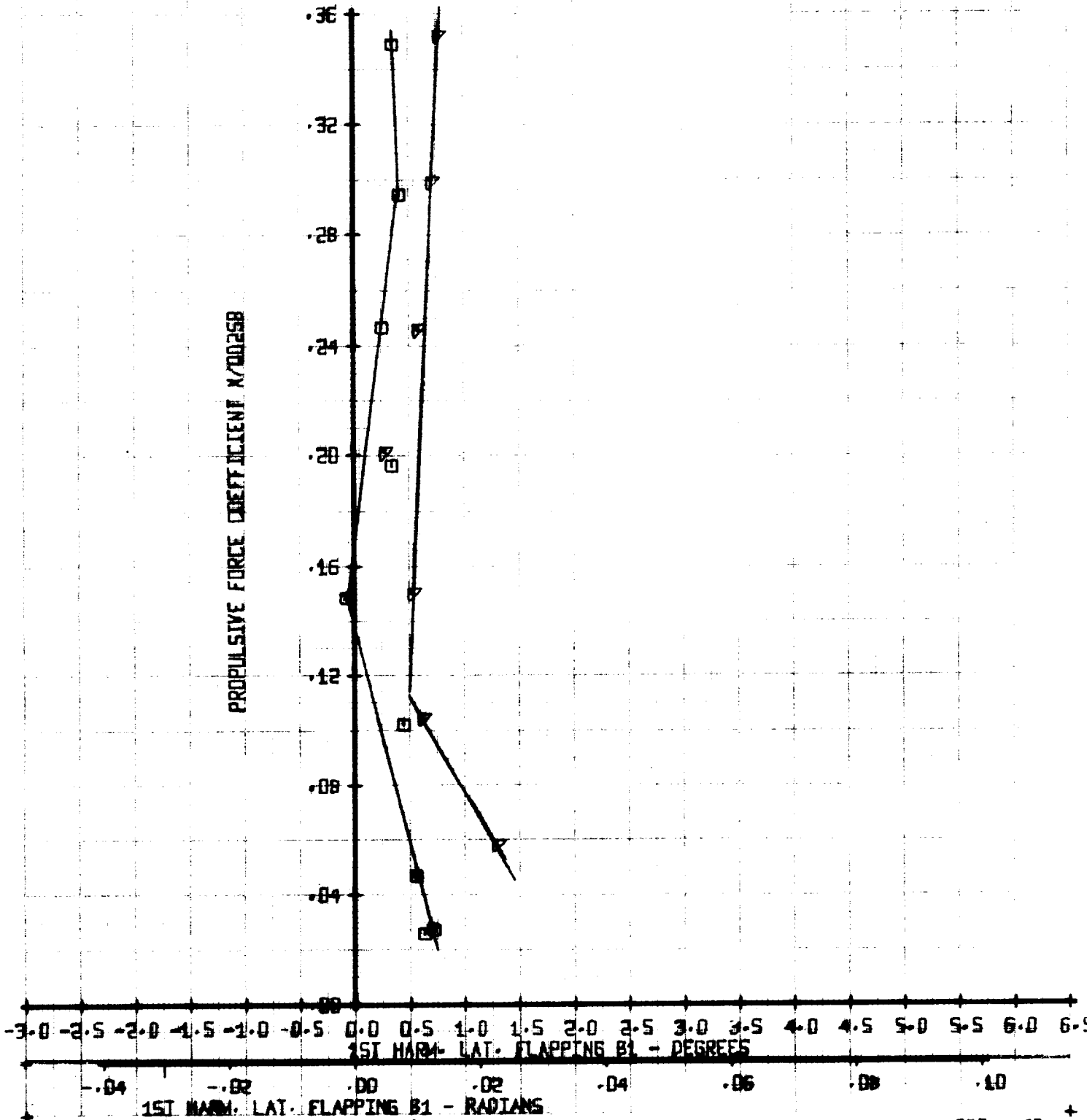
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	YIUM	
□	230	.40	.06	248	
△	231	.40	.09	248	

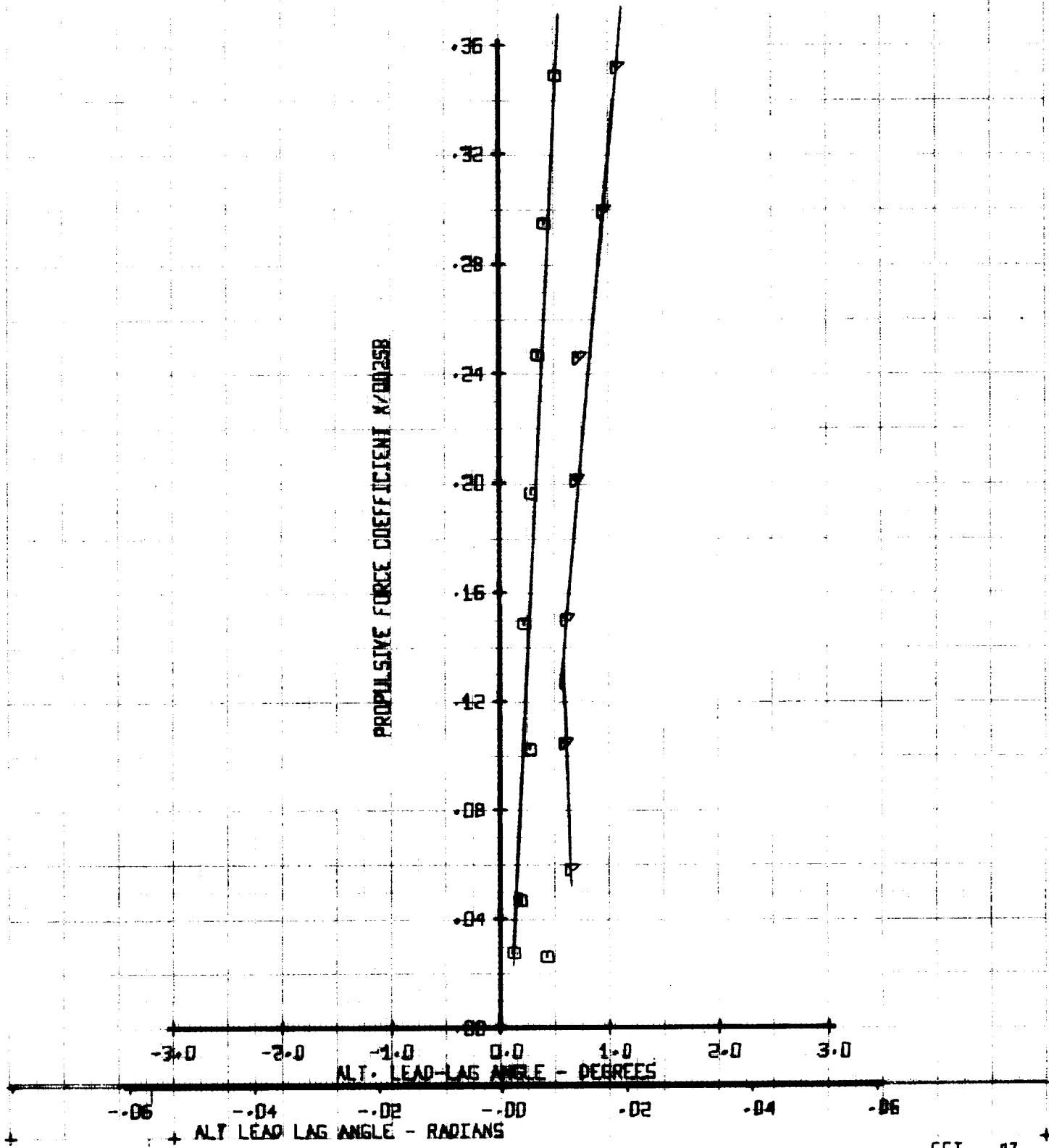
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	MIN	MLI°	CF°/58	YTLN
□	230	.40	.06	248
△	231	.40	.09	248

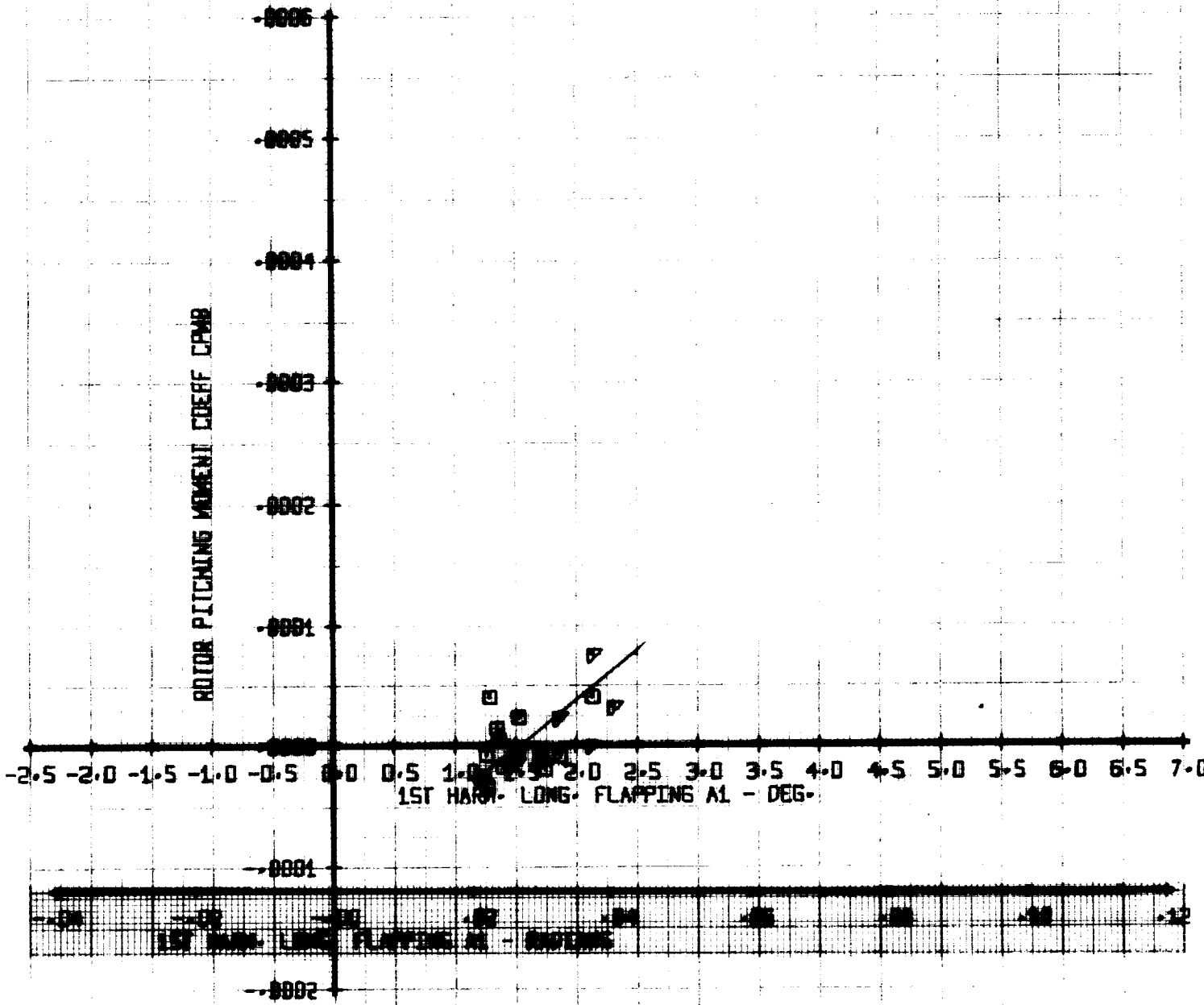
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	YTLN	
□	230	.40	.06	248	
▽	231	.40	.09	248	

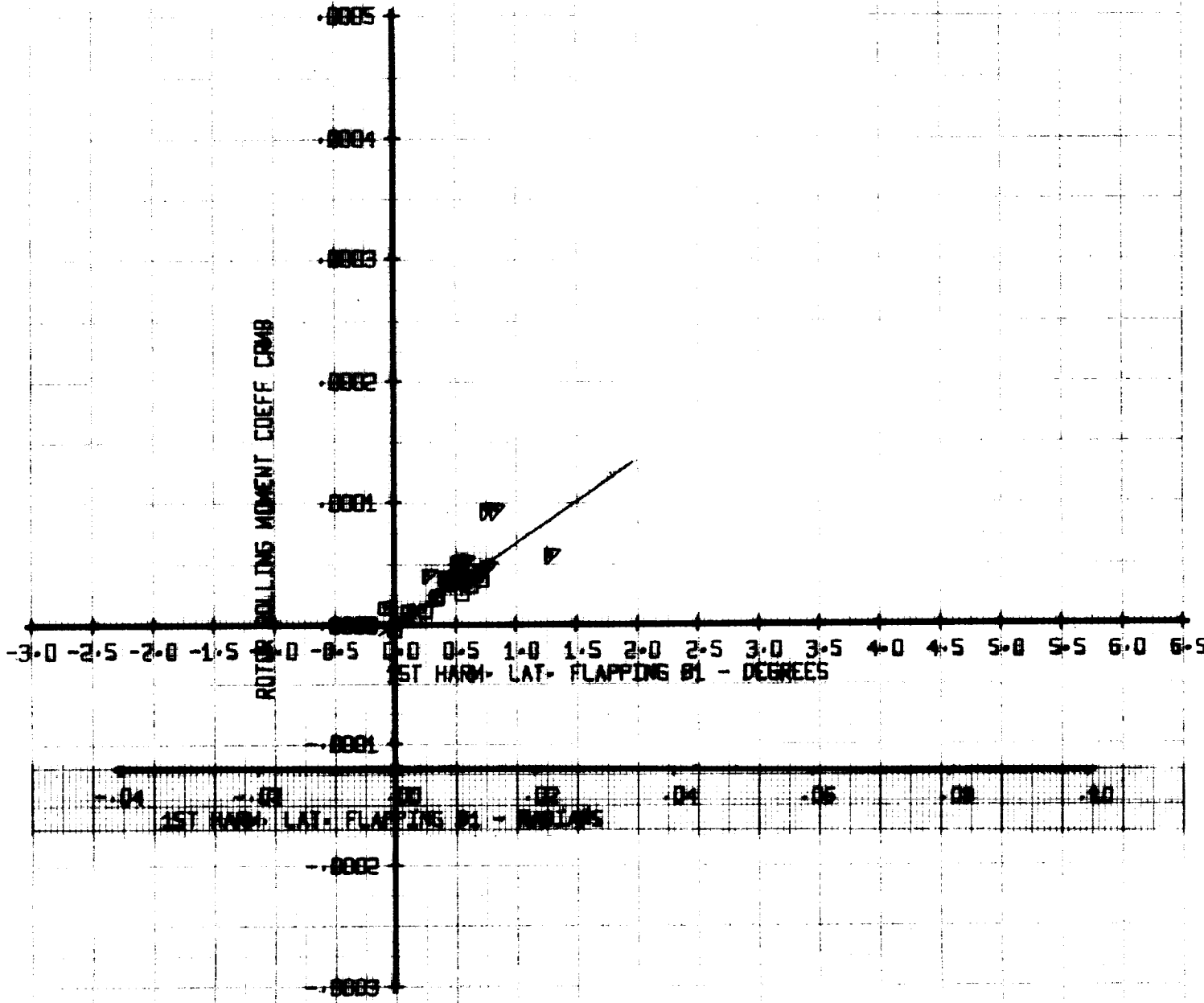
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	BLIN	MU'	GT' / SB	YTUN	
□	230	.40	.06	24B	
△	231	.40	.09	24B	

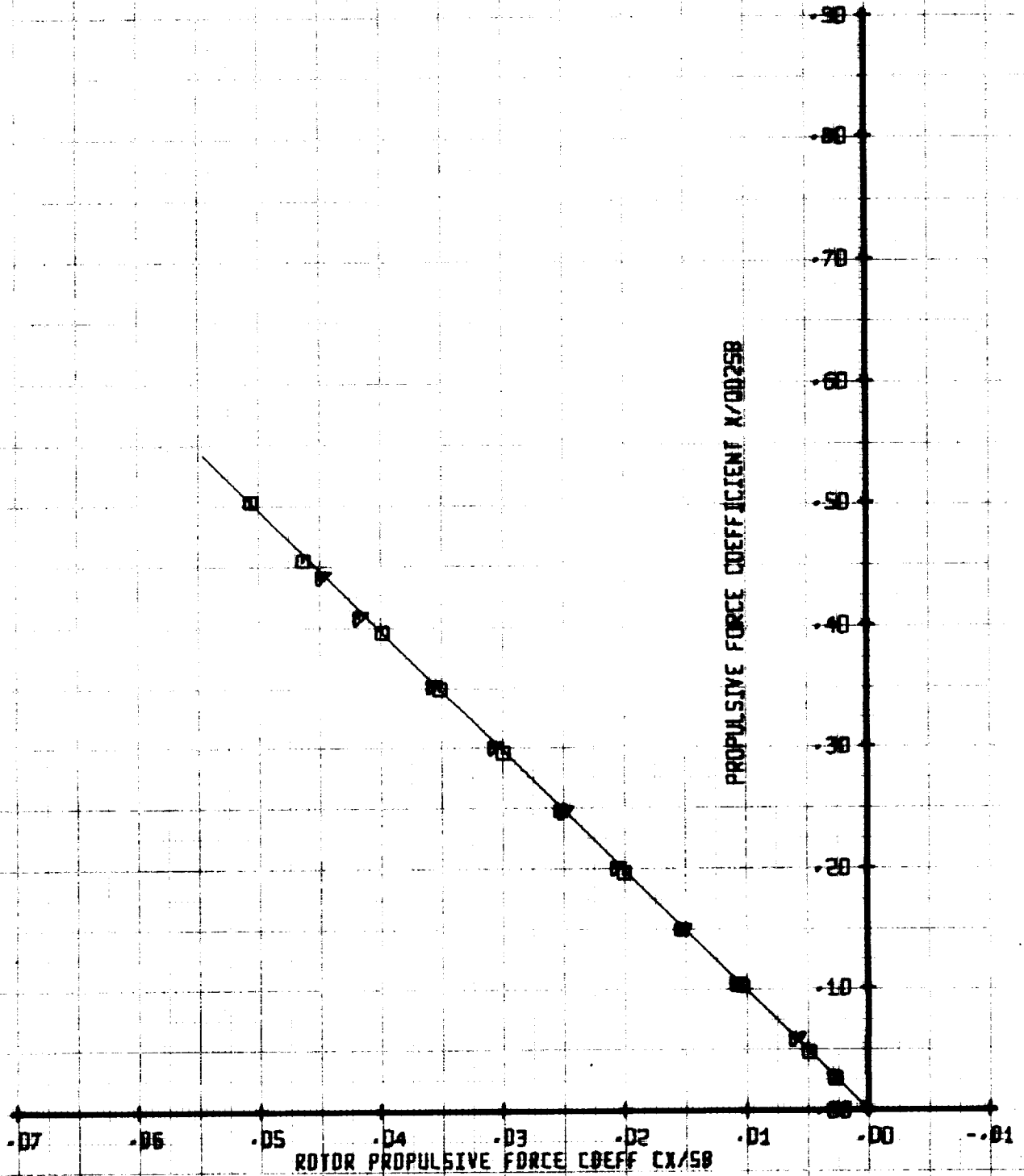
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47H ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MI'	CT'/58	VTUN	
□	230	.40	.06	248	
△	231	.40	.09	248	

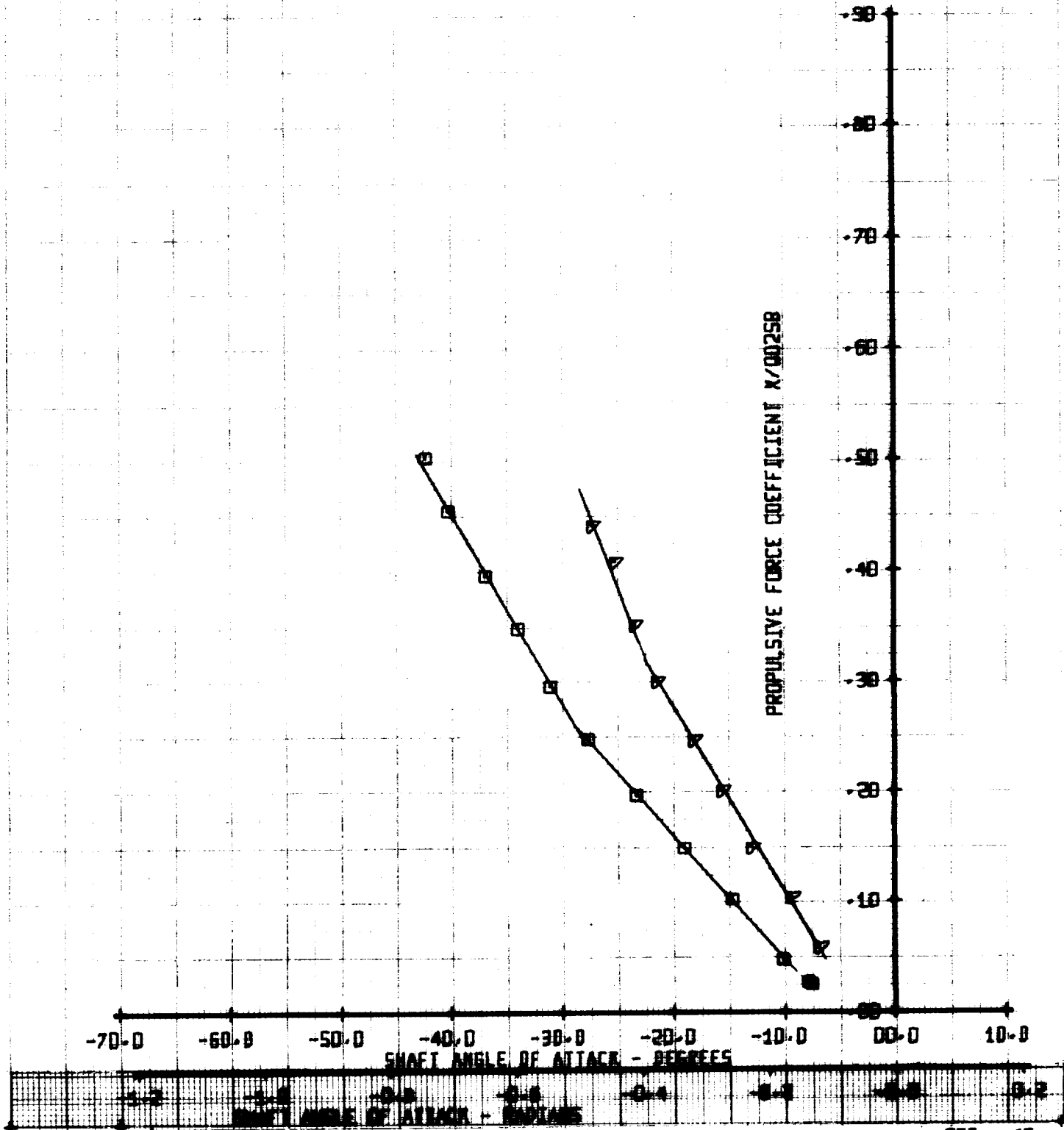
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CN-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MU'	CT'/SB	VTUN
SYM	RUN	.40	.06	248
□	230	.40	.09	248

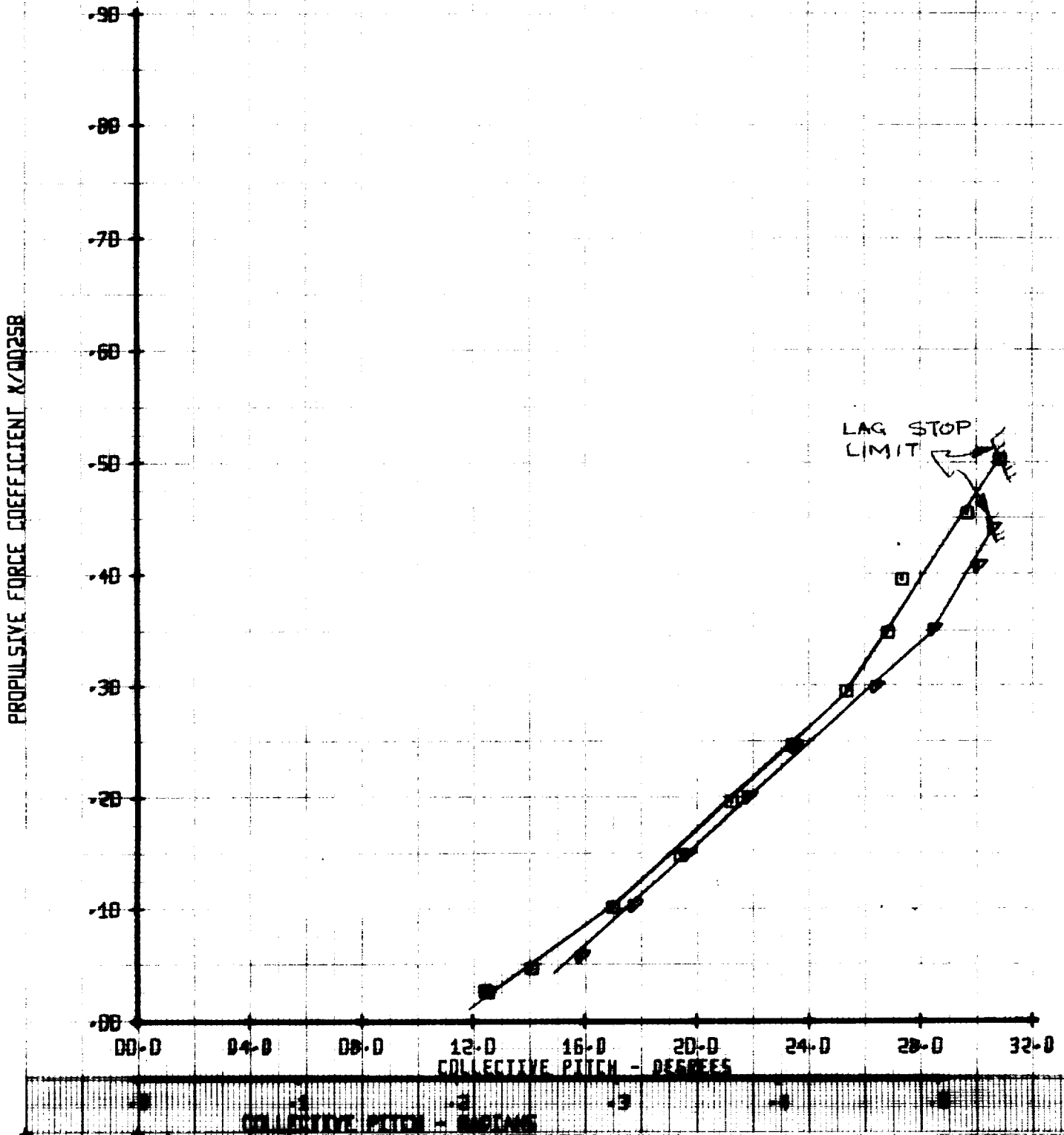
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MLI'	CT'258	VTUN	
□	230	.40	.06	248	
●	231	.40	.09	248	

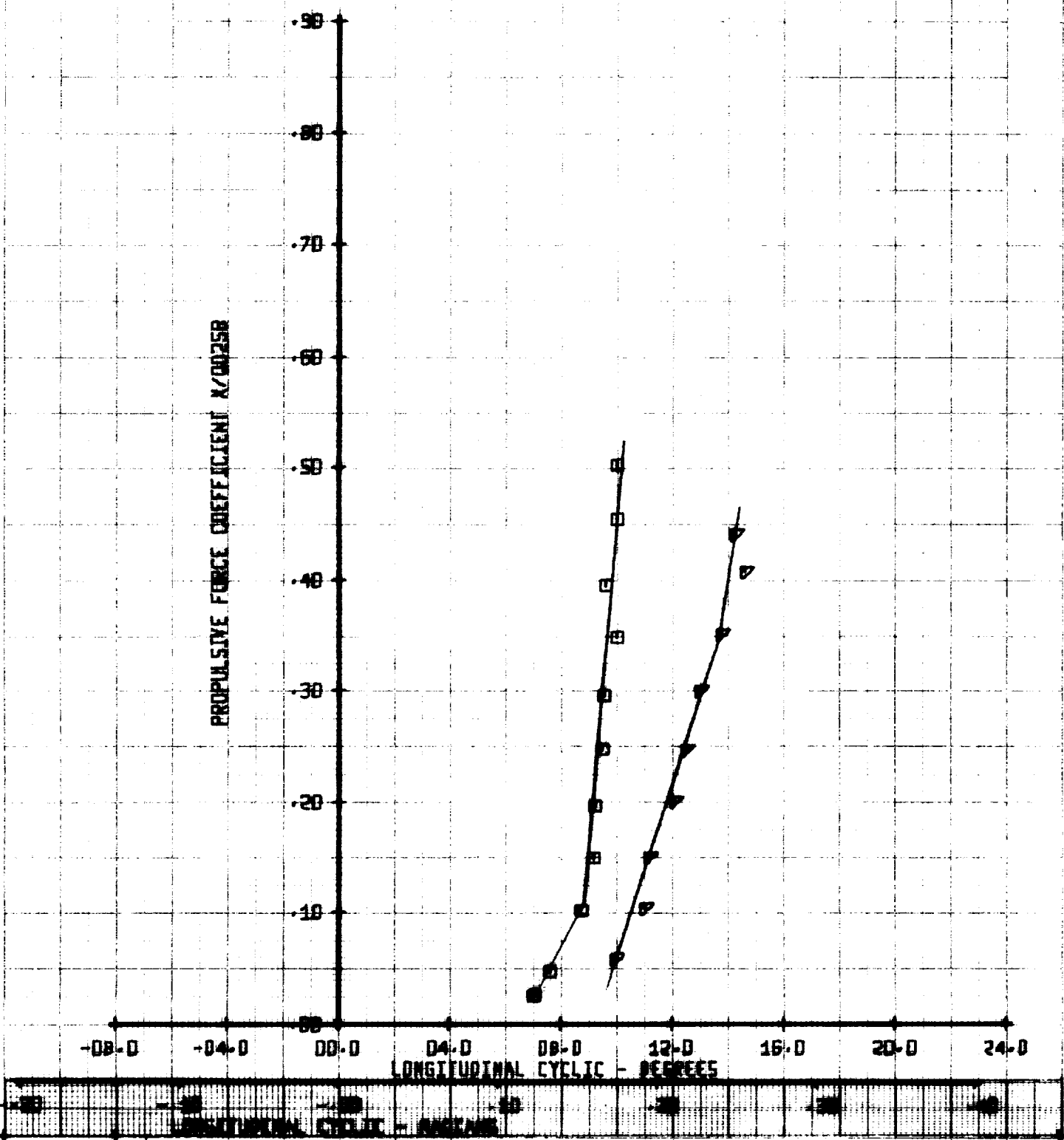
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MI'	CT'/SB	VTUN
□	230	.40	.06	24B
▽	231	.40	.09	24B

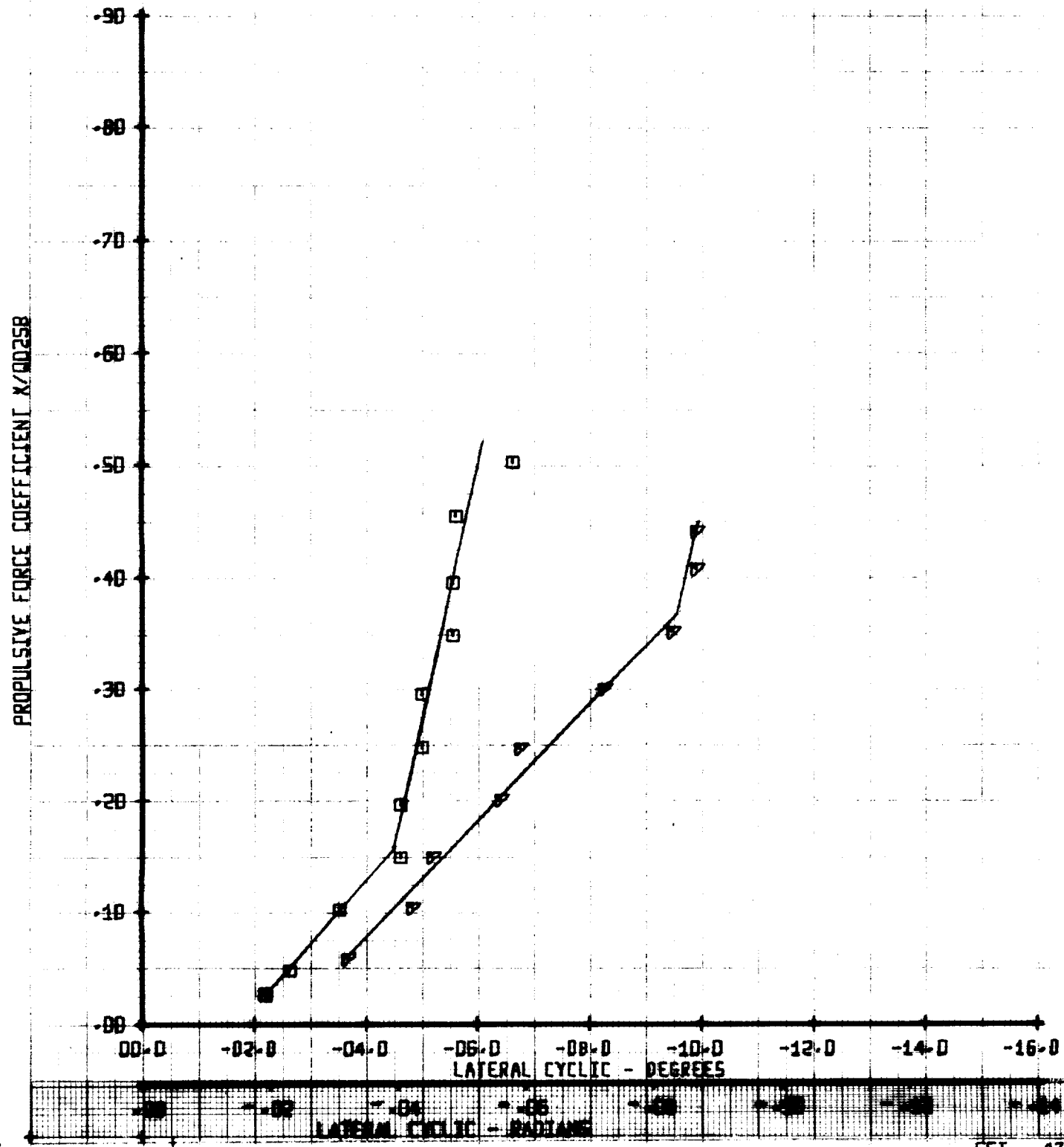
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MI'	CT' / SB	VTUN
SYM	RUN	.40	.06	24B
□	230	.40	.09	24B
▽	231			

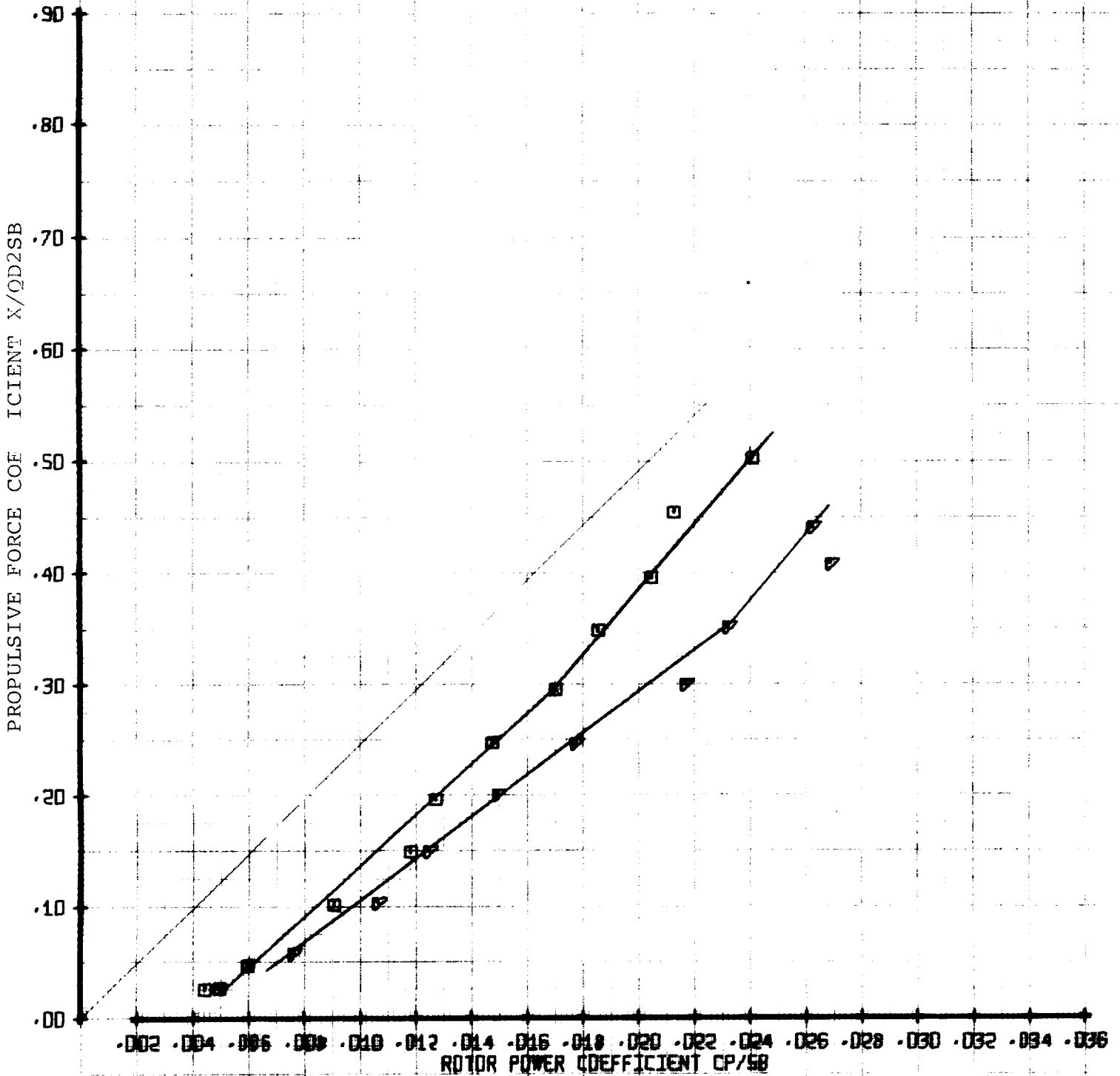
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MI'	CI' / 58	VTUN
SYM	RUN	.40	.06	248
□	230	.40	.09	248
▽	231	.40	.09	248

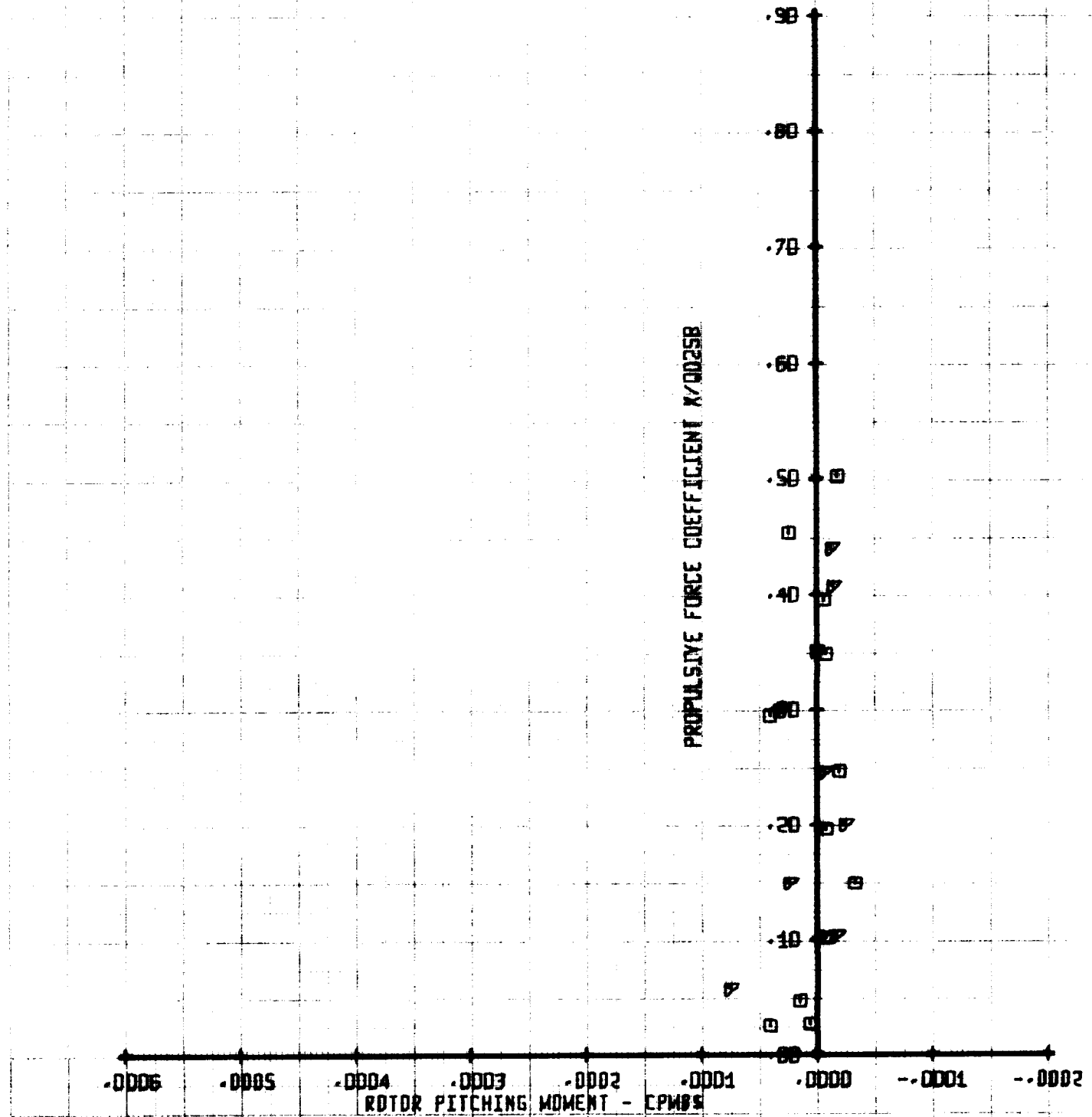
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	ML'	CT' / SB	VTUN
□	230	.40	.06	24B
▽	231	.40	.09	24B

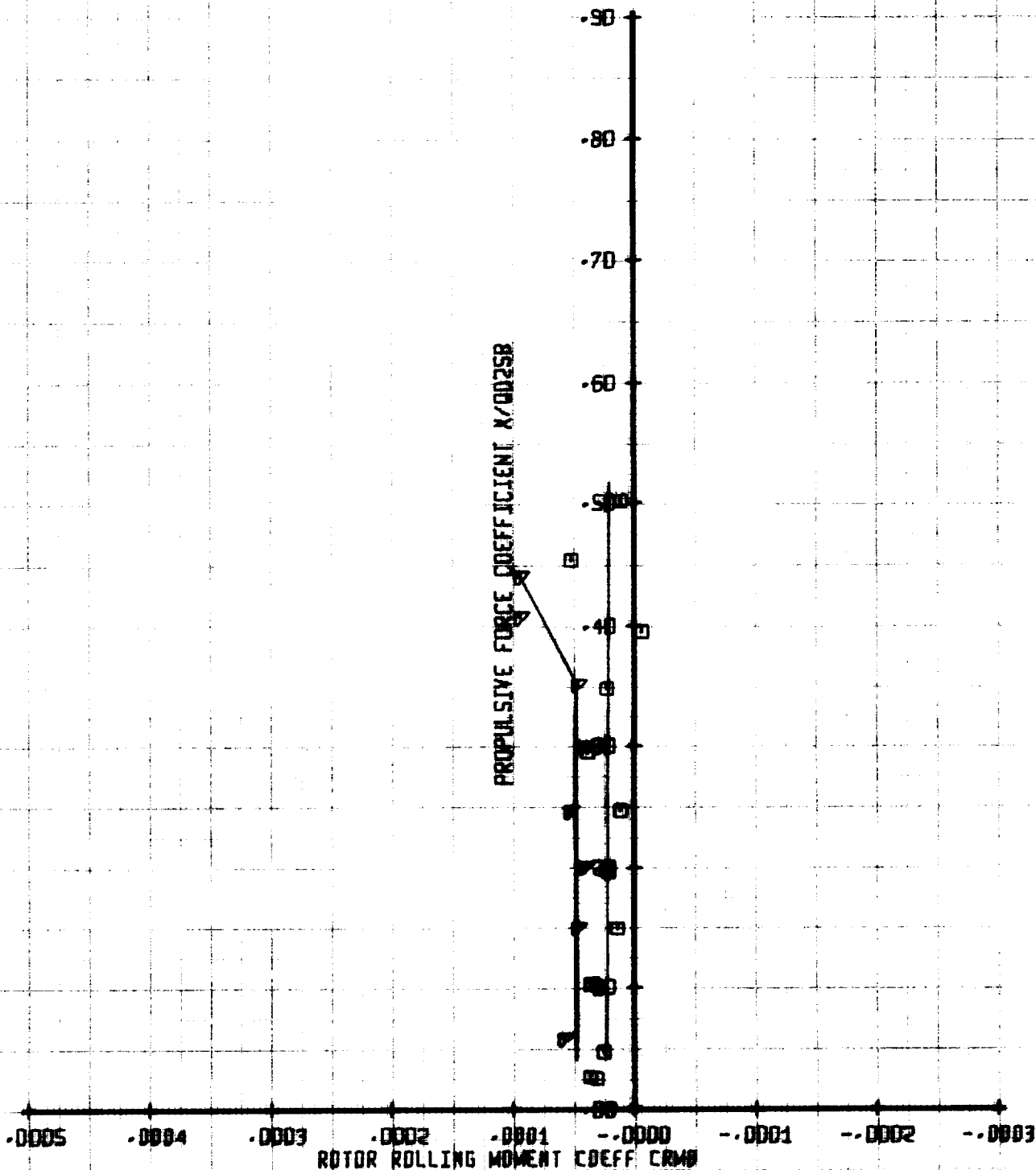
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUN		ML'		CT'/58		VTLN	
□	○	230	231	.40	.40	.06	.09	248	248

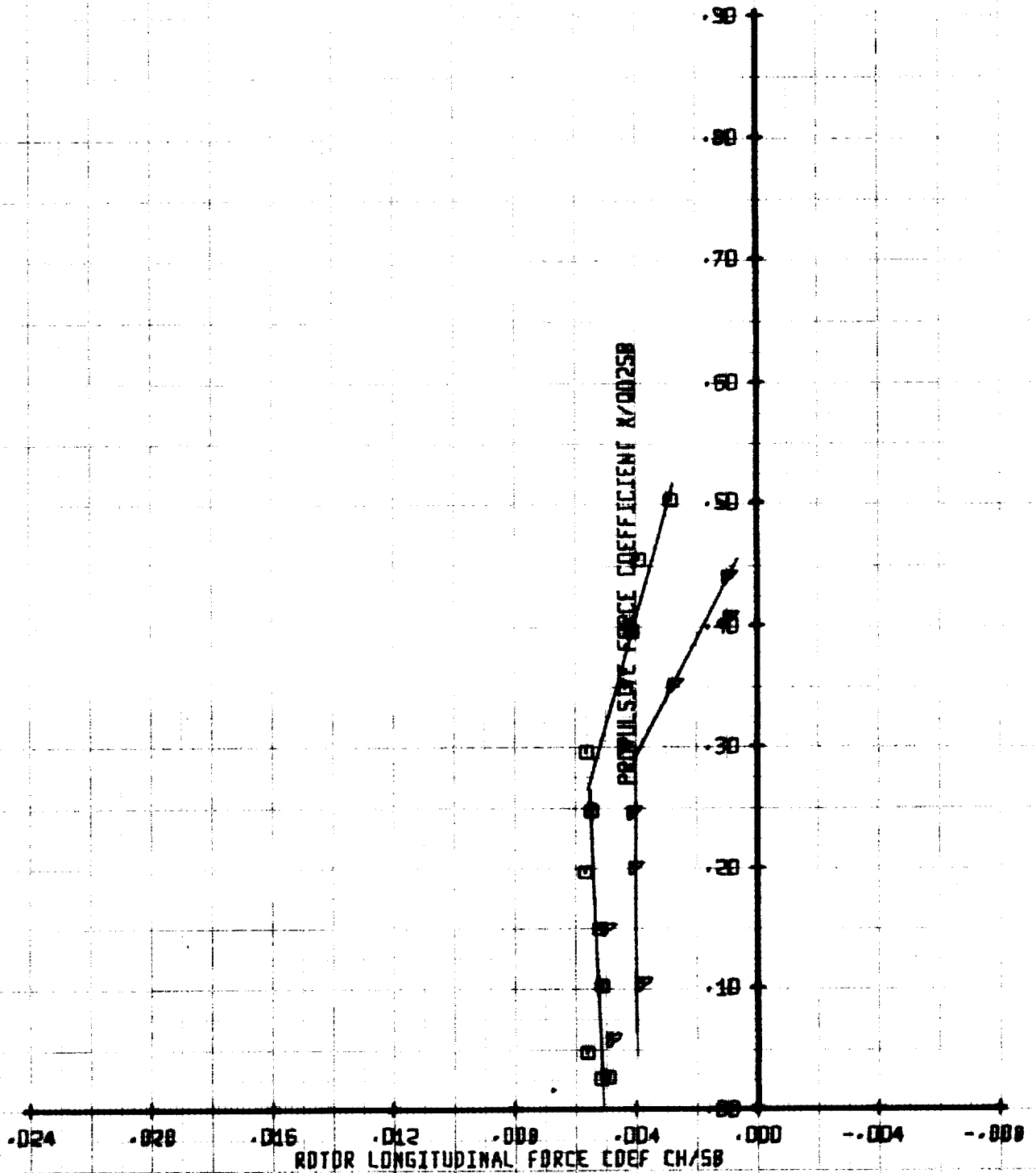
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND				
SYM	MIN	ML'	CT'258	YTLN
□	230	.40	.06	248
▽	231	.40	.09	248

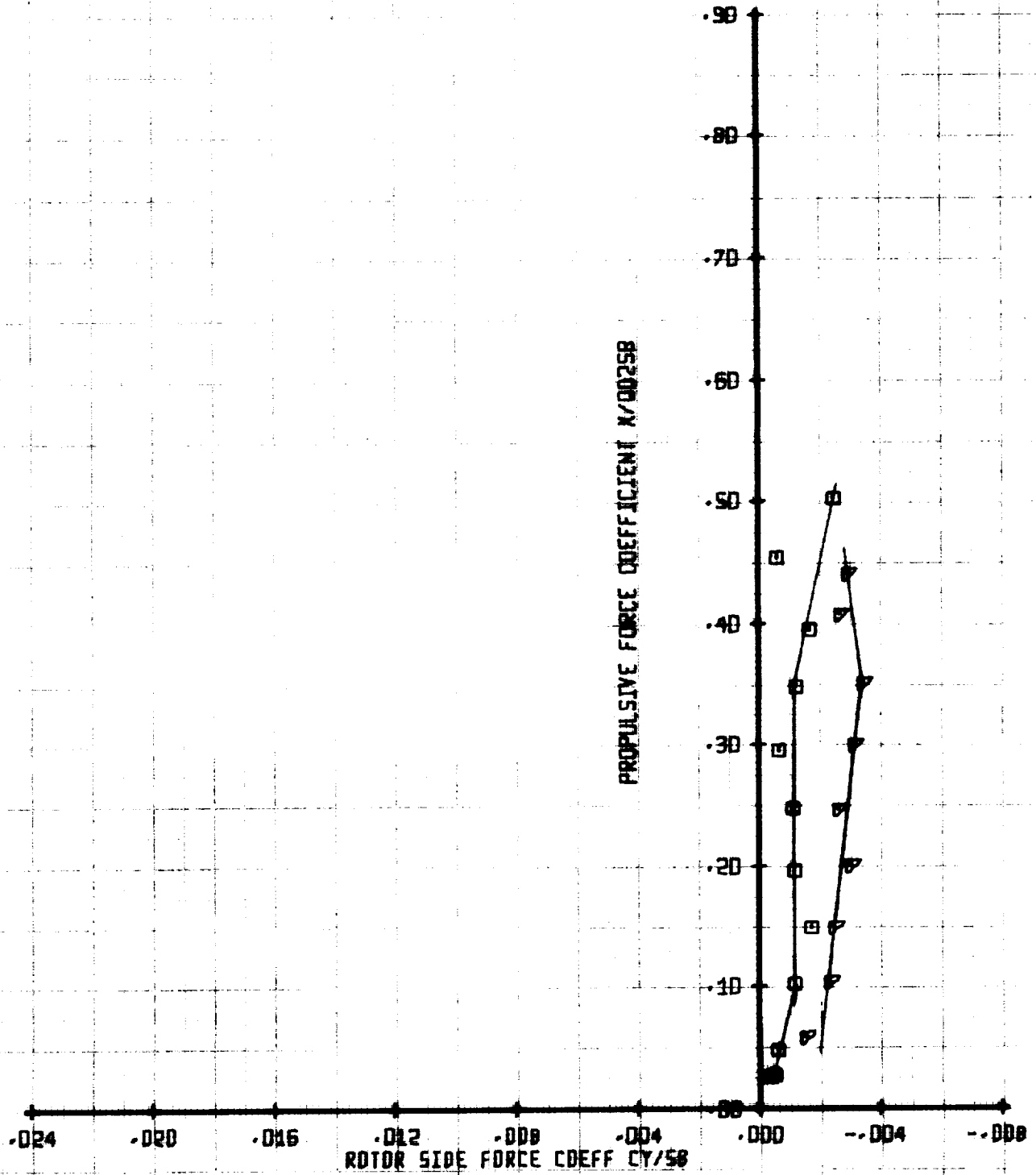
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/58	VTLM
□	230	.40	.06	24B
△	231	.40	.09	24B

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT

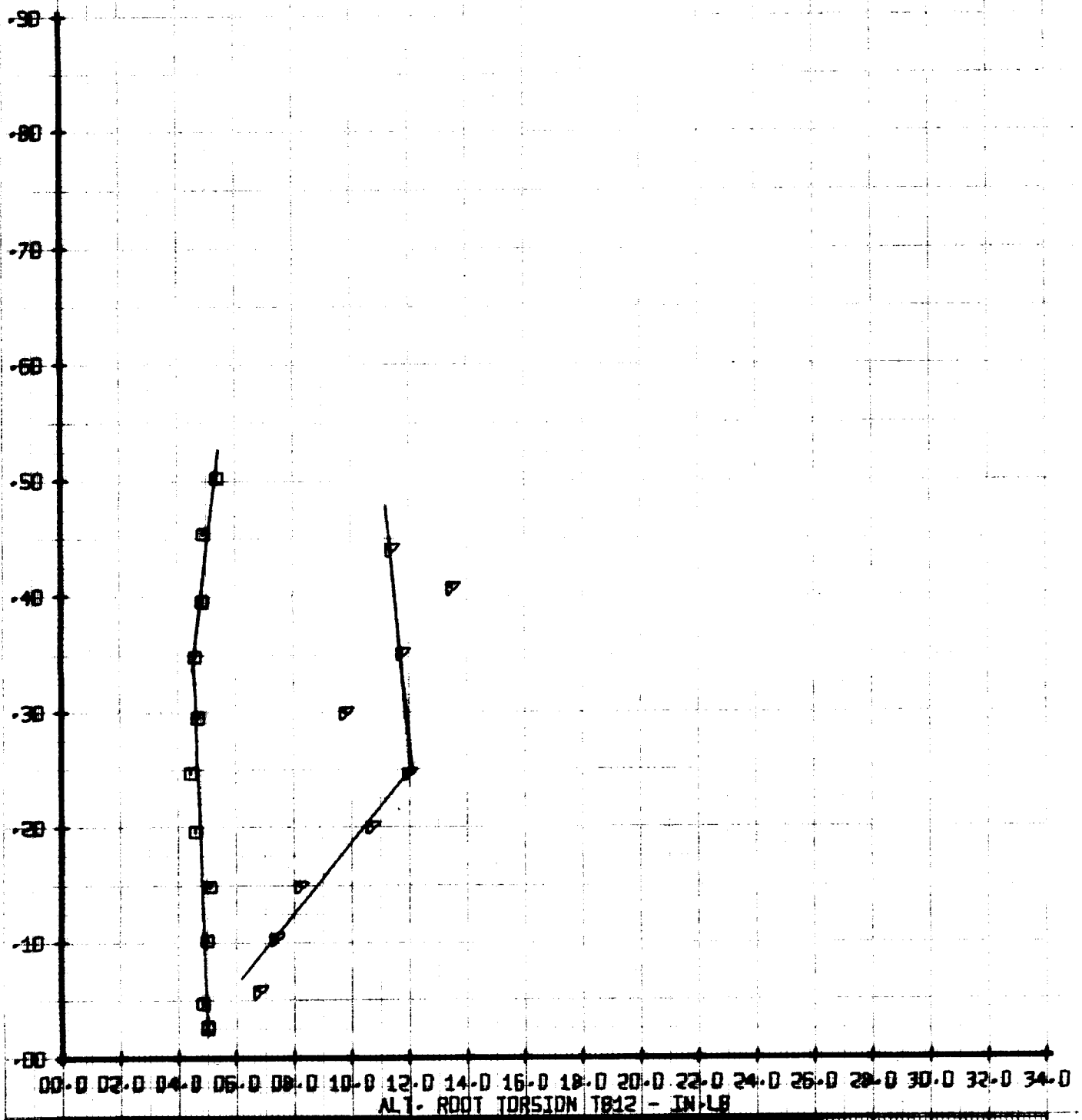


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MI'	CT'Y58	YTLN	
□	230	-40	.06	248	
△	231	-40	.09	248	

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12

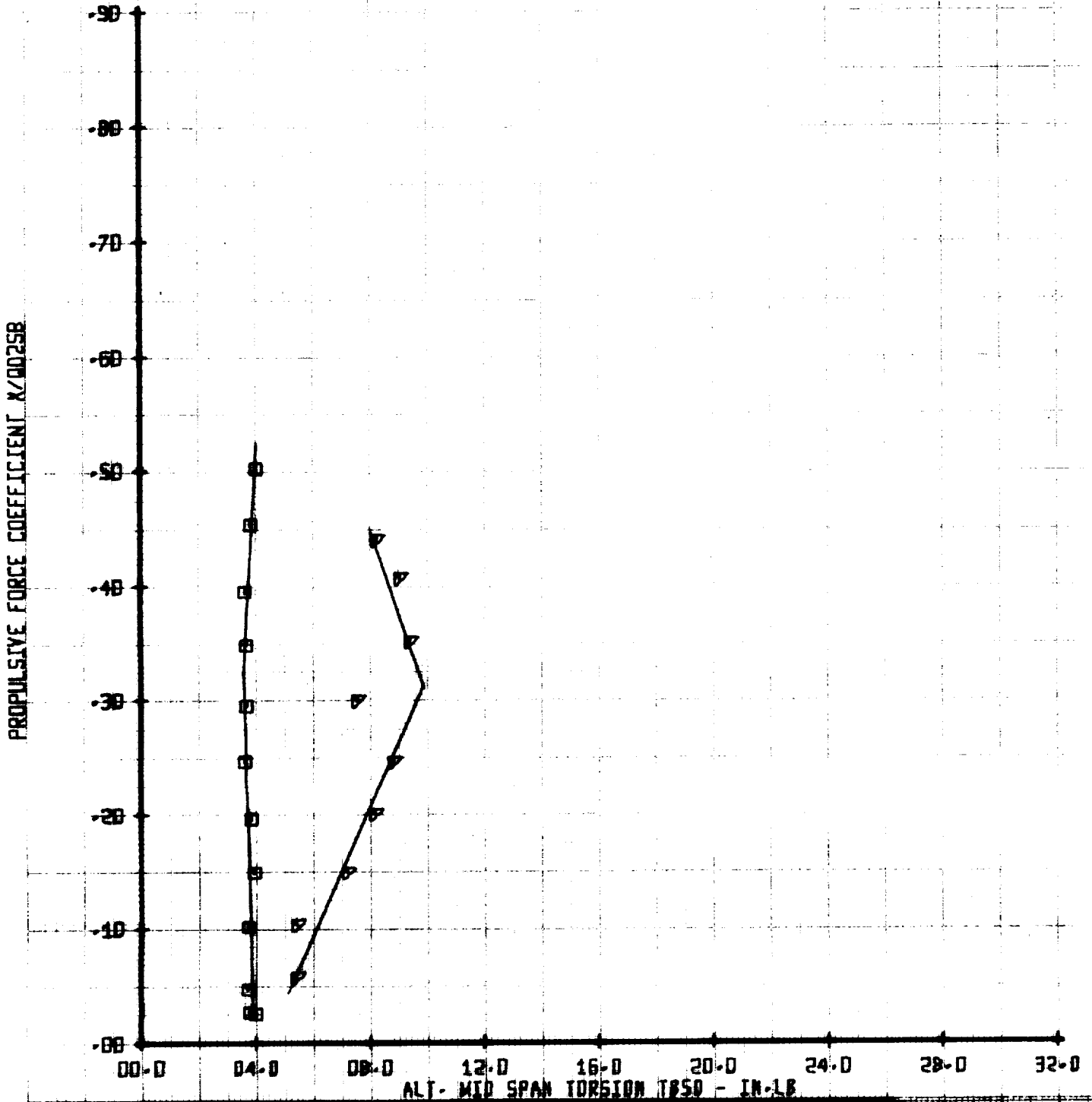
PROPULSIVE FORCE COEFFIC IT X/00258



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	ML'	CT'ZSB	VTUN	
□	230	.40	.06	248	
△	231	.40	.09	248	

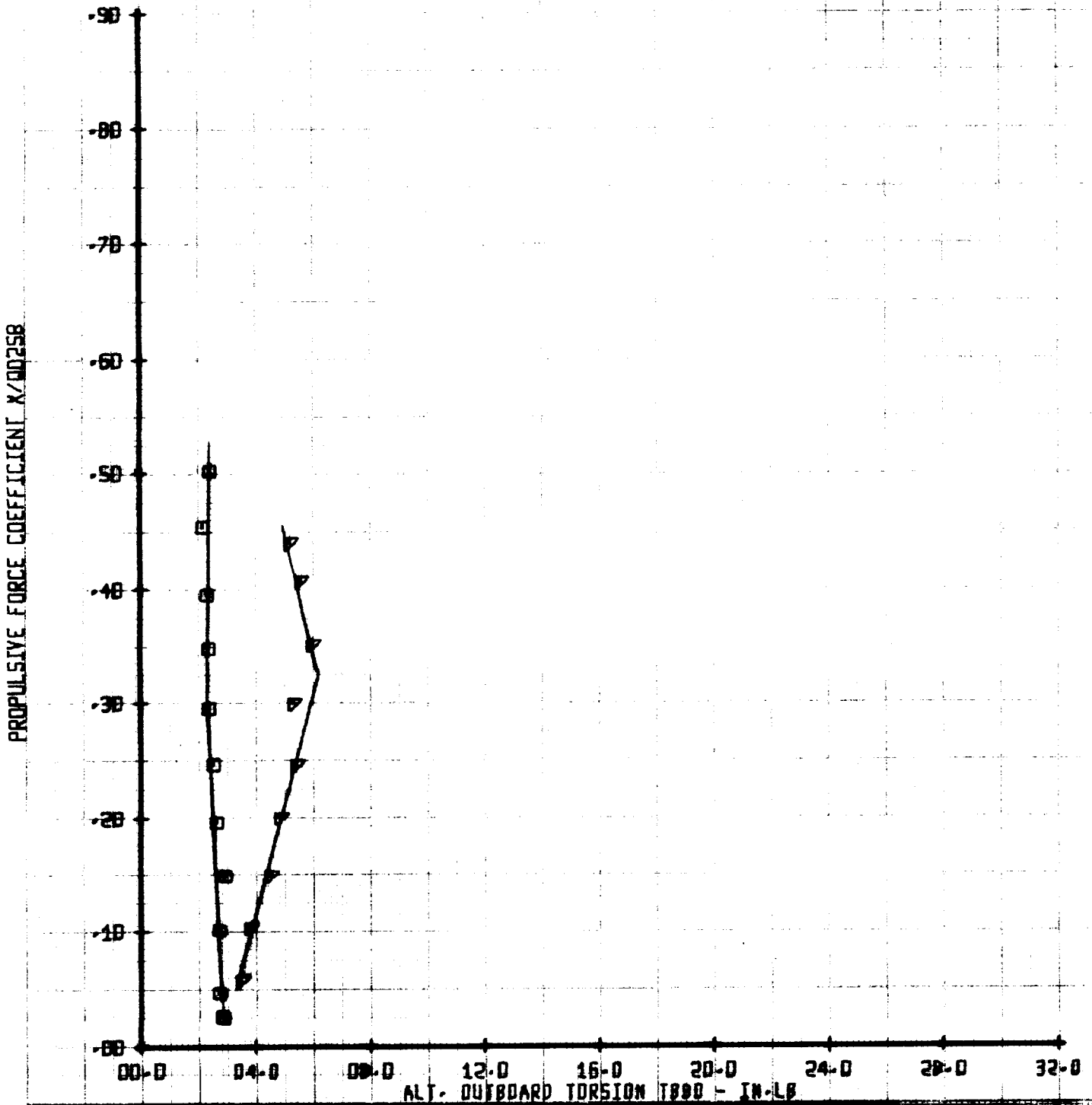
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/SB	VTUN
□	230	.40	.06	24B
△	231	.40	.09	24B

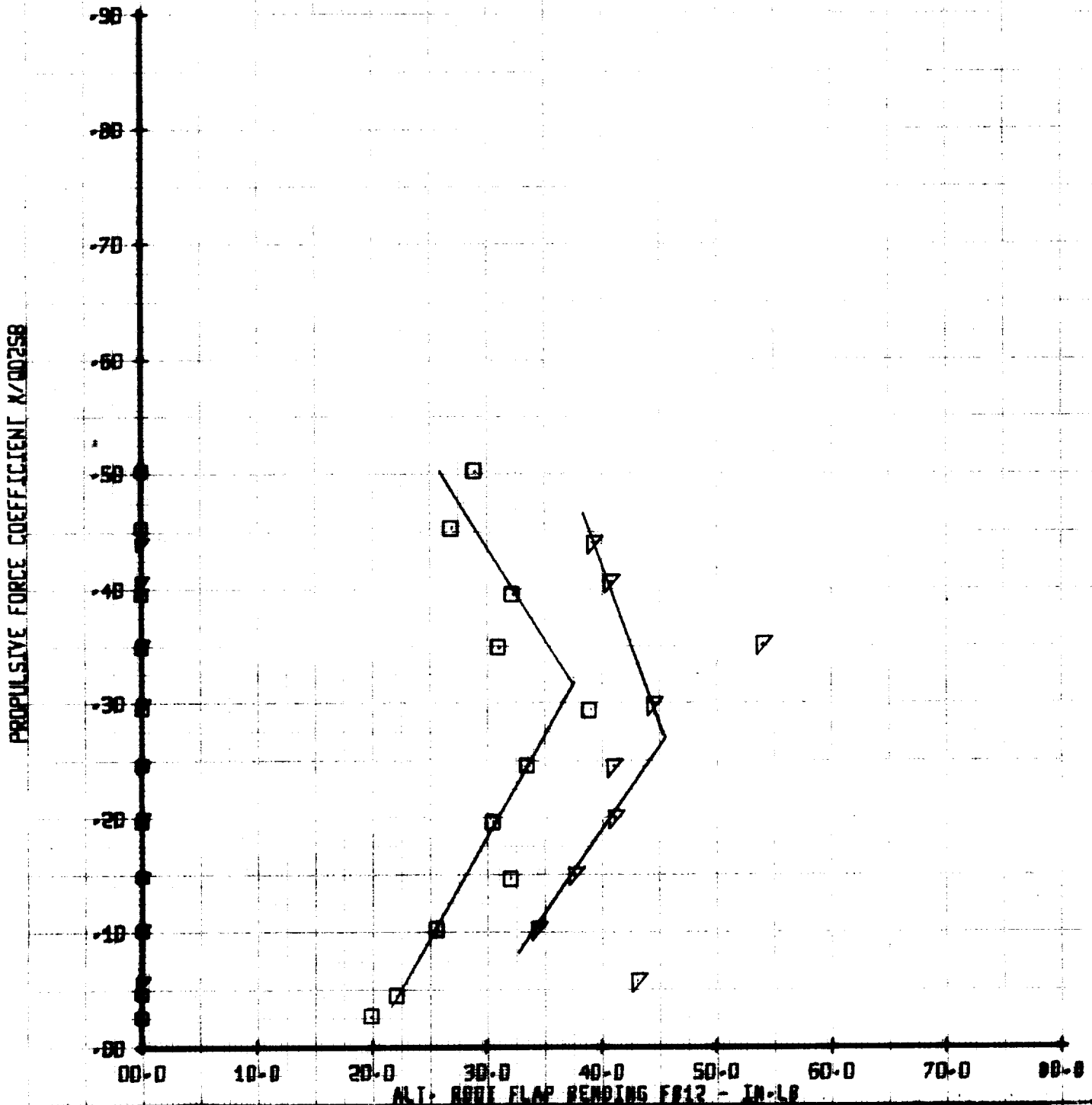
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB80



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MLI	CT'/SB	YTIM	
□	230	.40	.06	248	
▽	231	.40	.09	248	

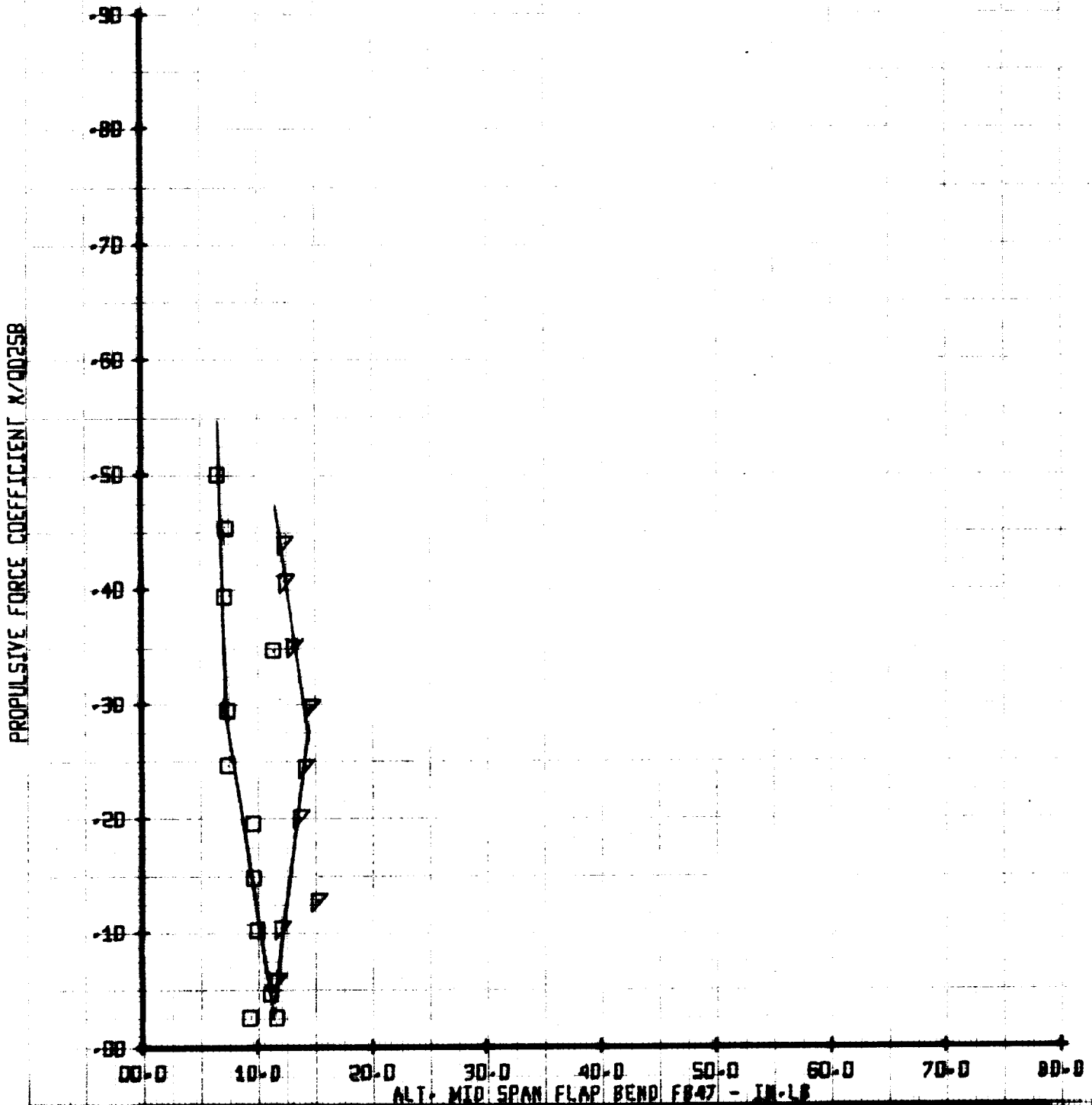
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B MOTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/SB	VTUN
□	230	.40	.06	240
▽	231	.40	.09	240

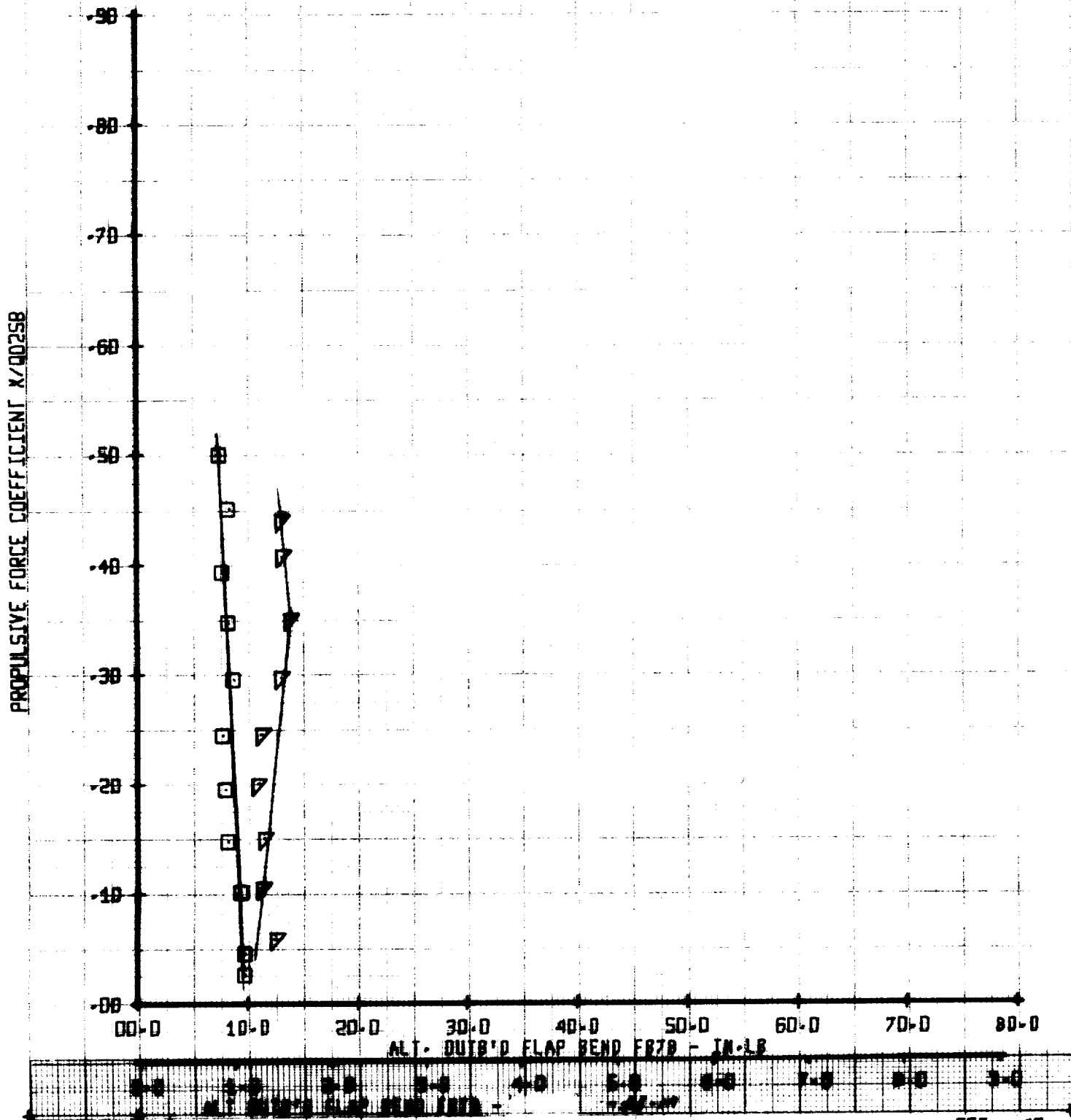
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BENDING FB47



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	ML'	CT'/SB	VTUN
□	230	.40	.06	248
▽	231	.40	.09	248

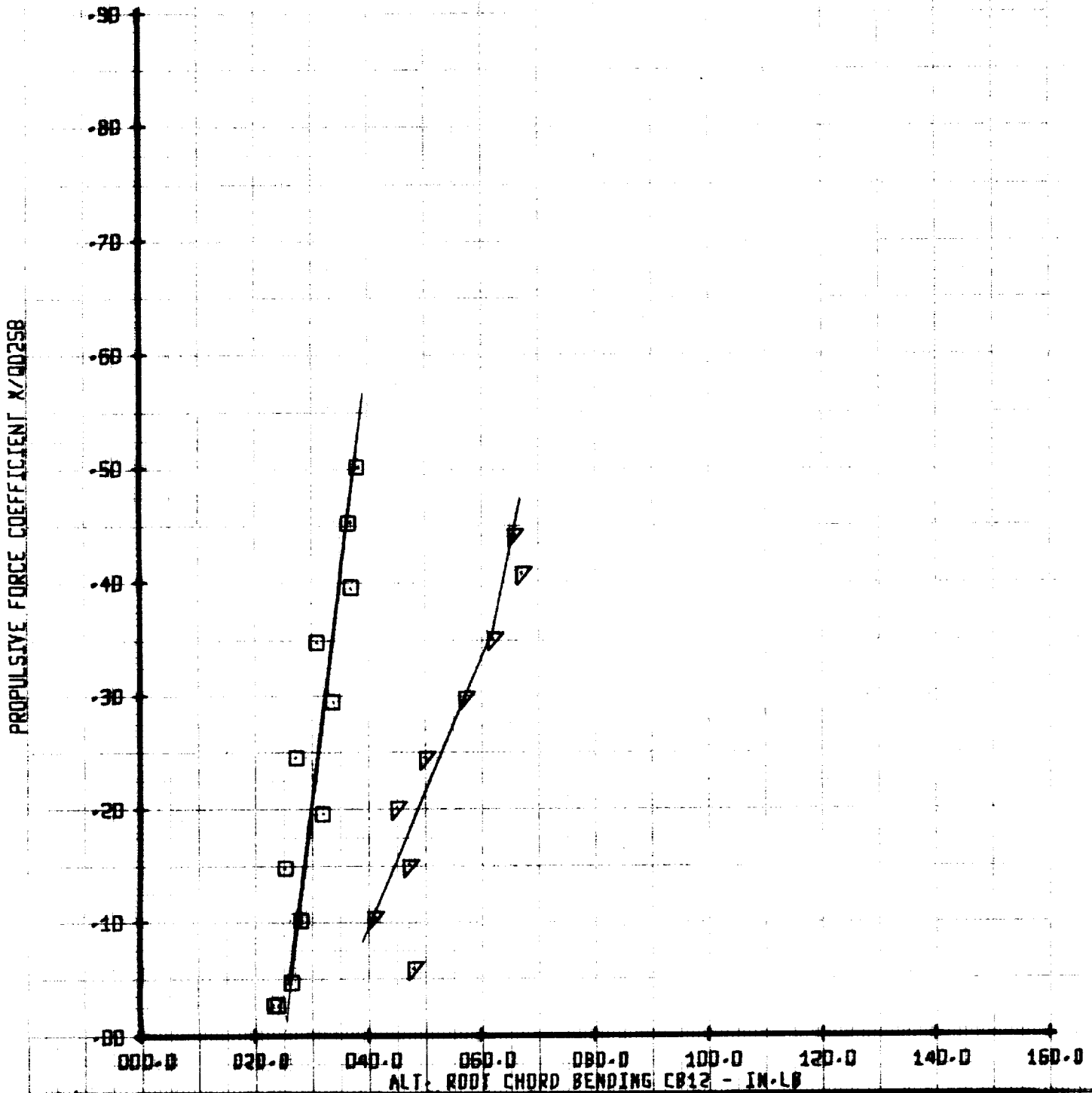
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB78



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MLI'	CT'2SB	YTLN
SYM	RUN			
□	230	.40	.06	24B
▽	231	.40	.09	24B

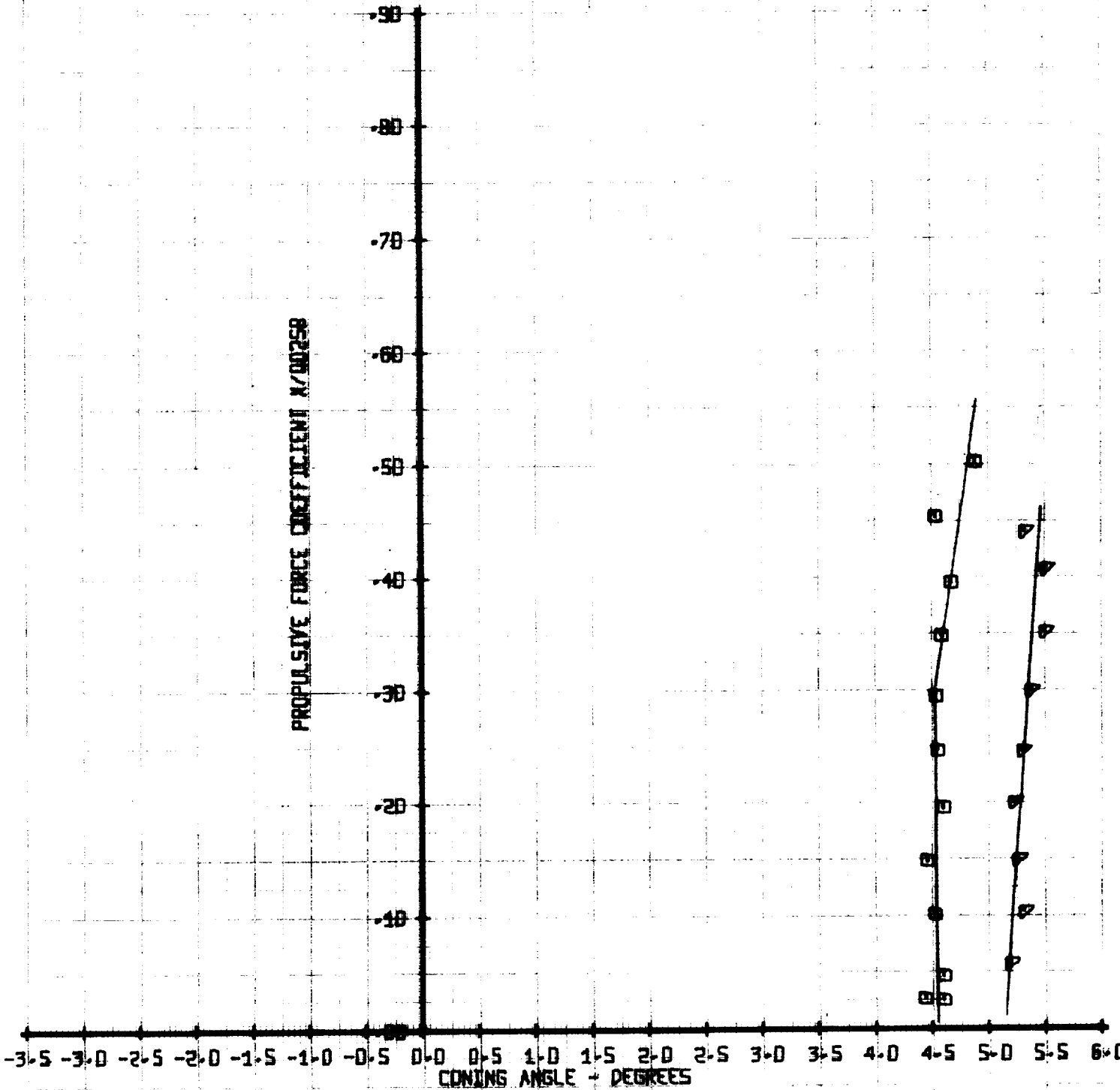
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT' / 258	Y/TUN	
□	230	.40	.06	248	
△	231	.40	.09	248	

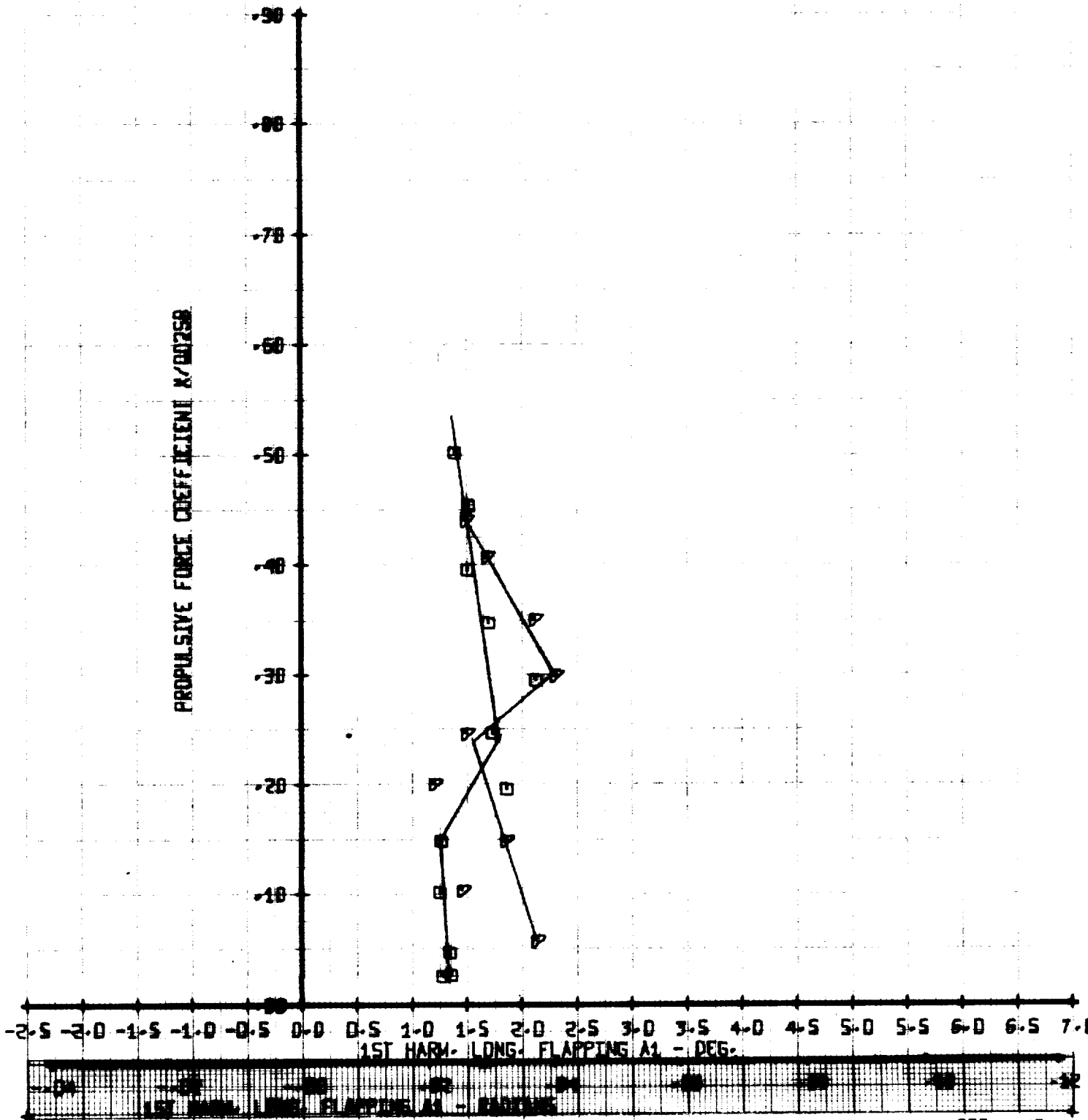
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUN		MU'		CT'Y58		YTUN	
□	○	230	231	.40	.40	.06	.09	248	248

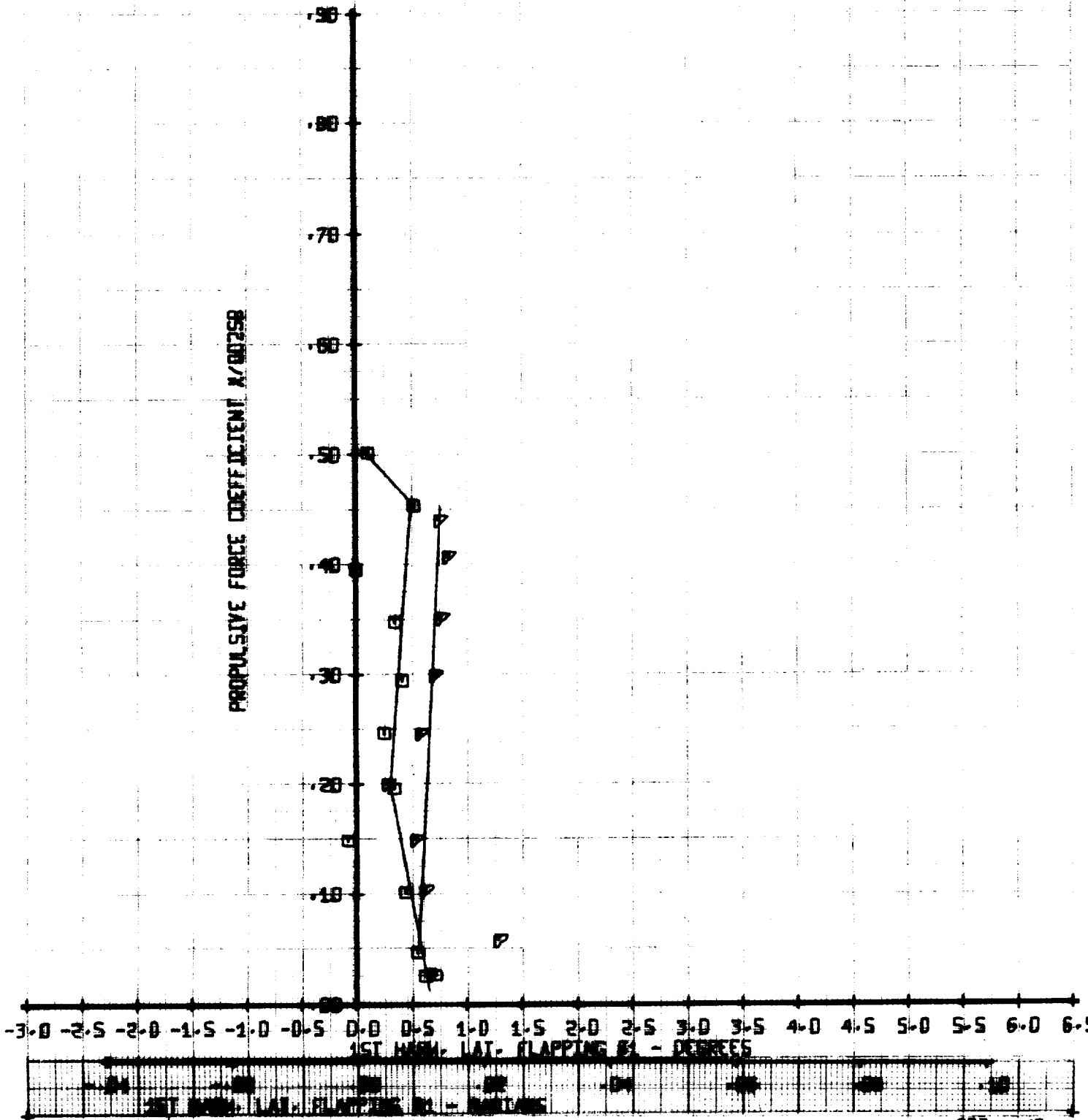
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OA-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYN		LEGEND		VTUN	
□	RUN 230	MU'	CT'/58	2.48	
△	RUN 231	.40	.06	2.48	
		.40	.09		

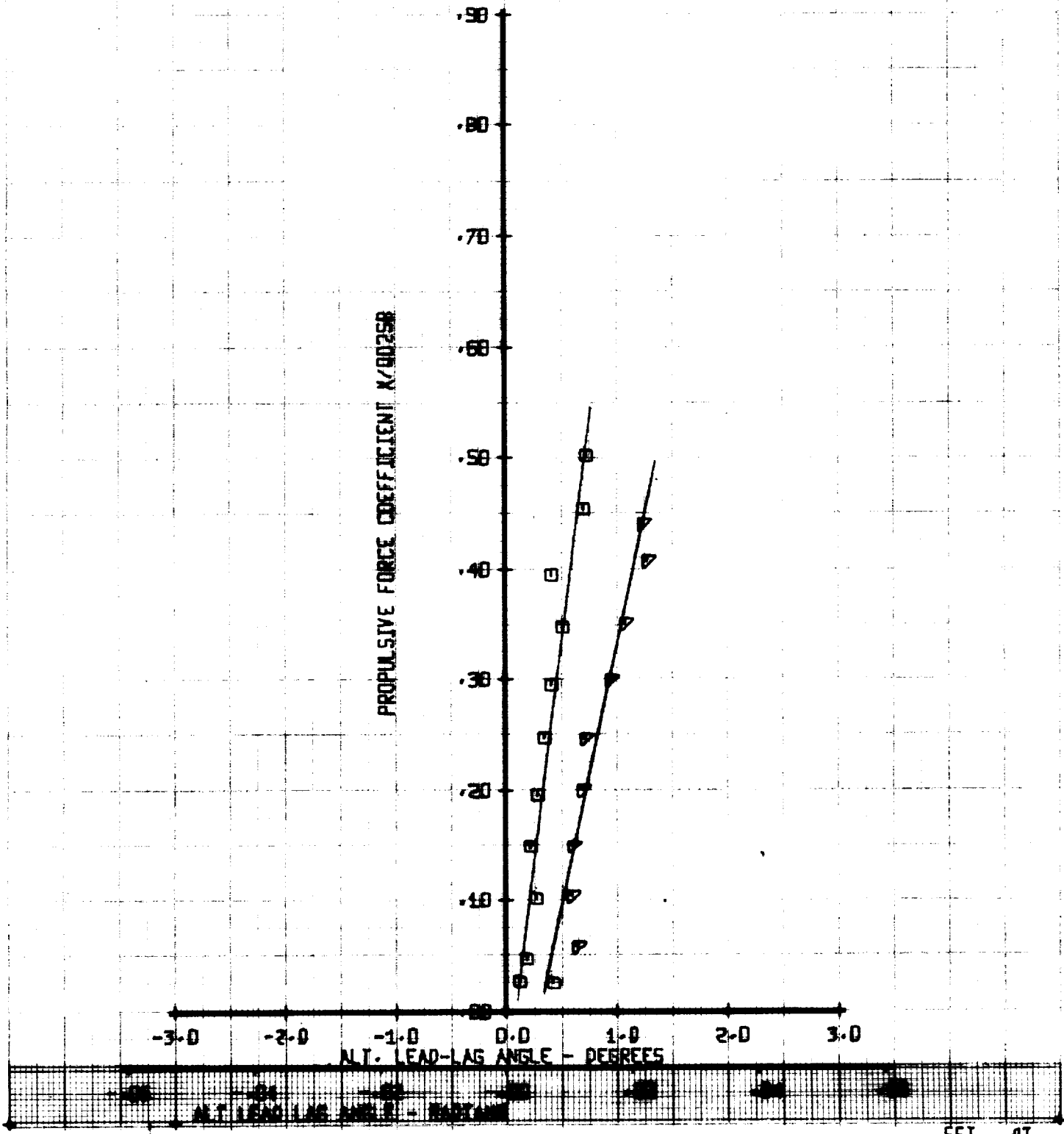
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MI'	CT' / 58	YTUN
□	230	.40	.06	248
△	231	.40	.09	248

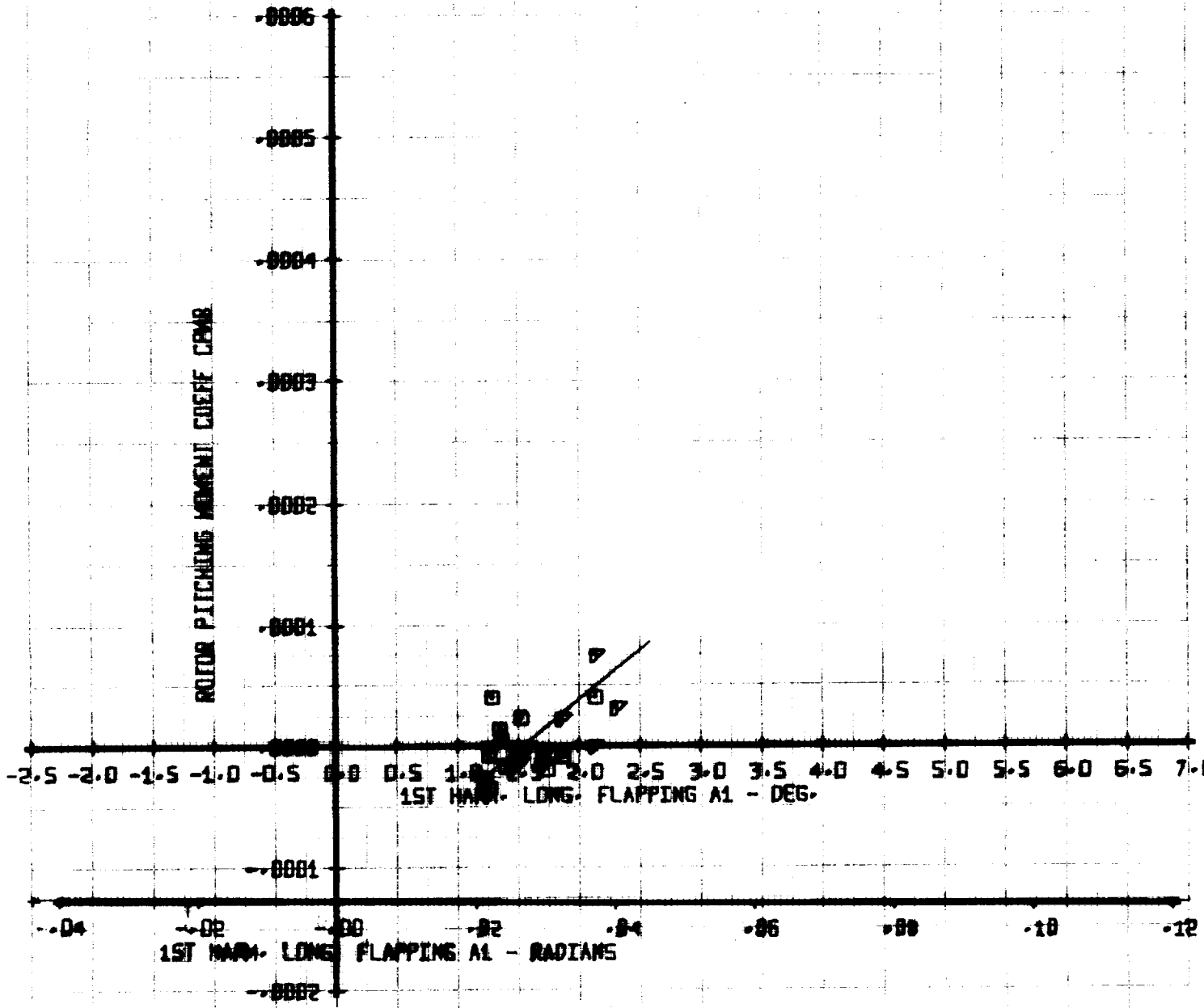
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND				
SYM	SUN	MU'	CT'/SB	Y/TUN
□	230	.40	.06	2.0
△	231	.40	.09	2.0

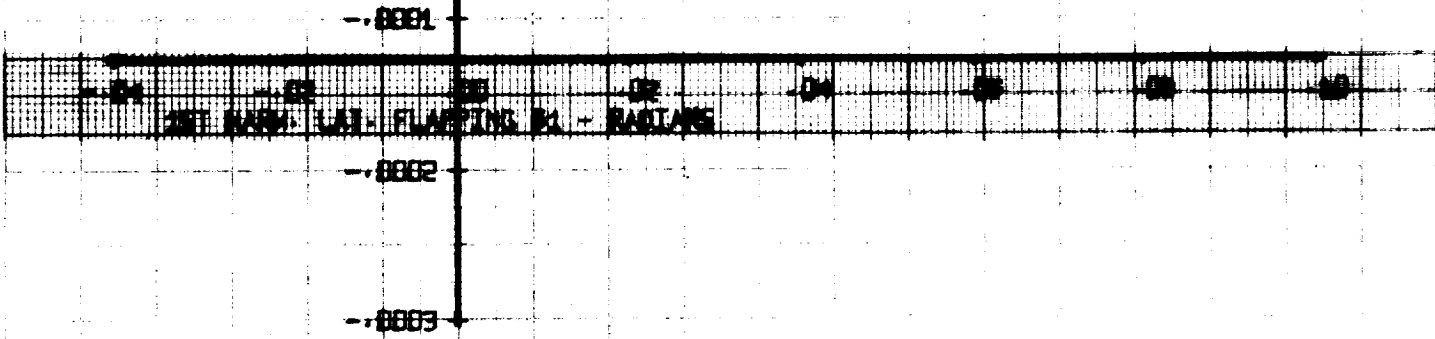
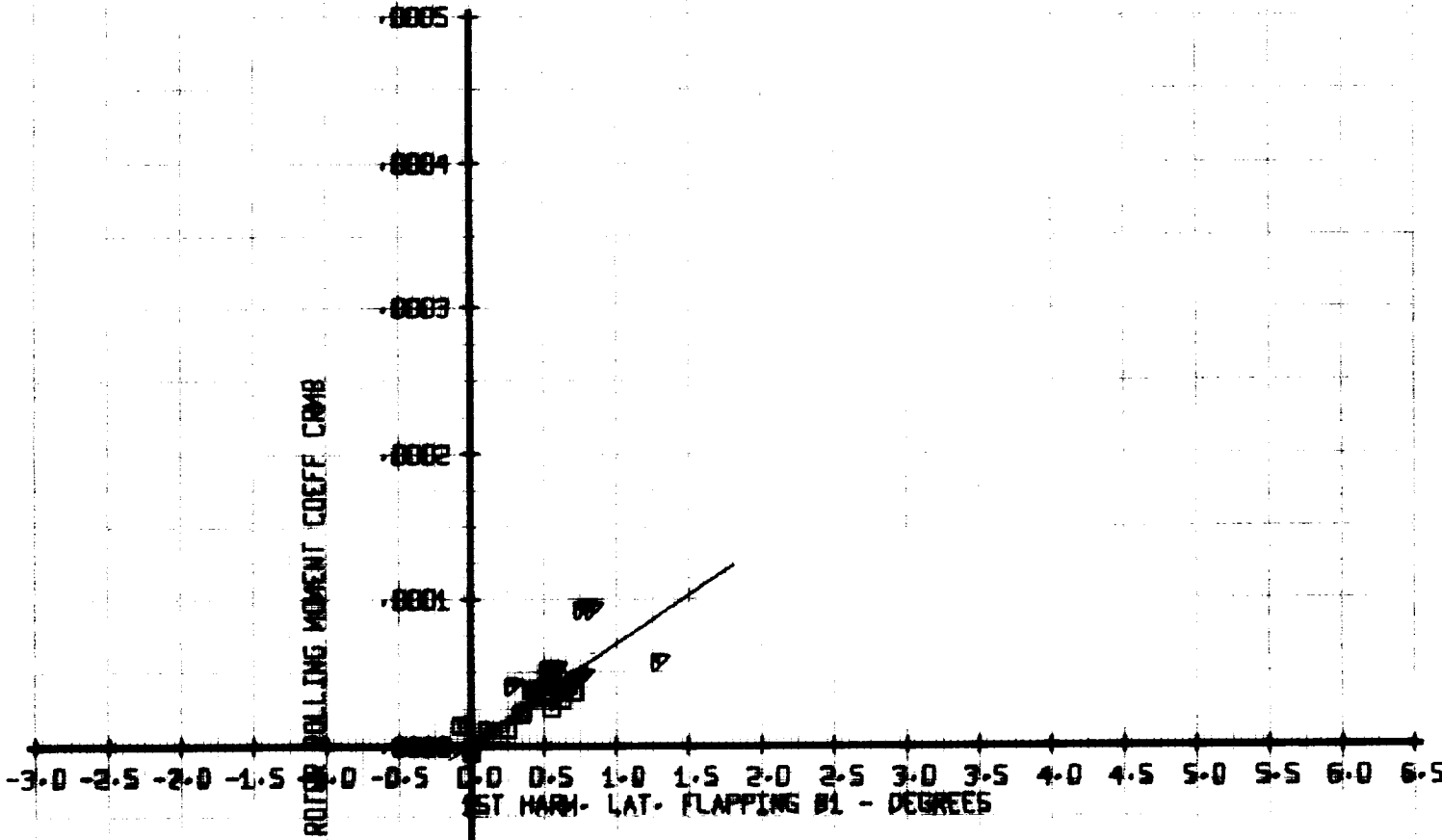
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	YTUN	
□	230	.40	.06	24B	
△	231	.40	.09	24B	

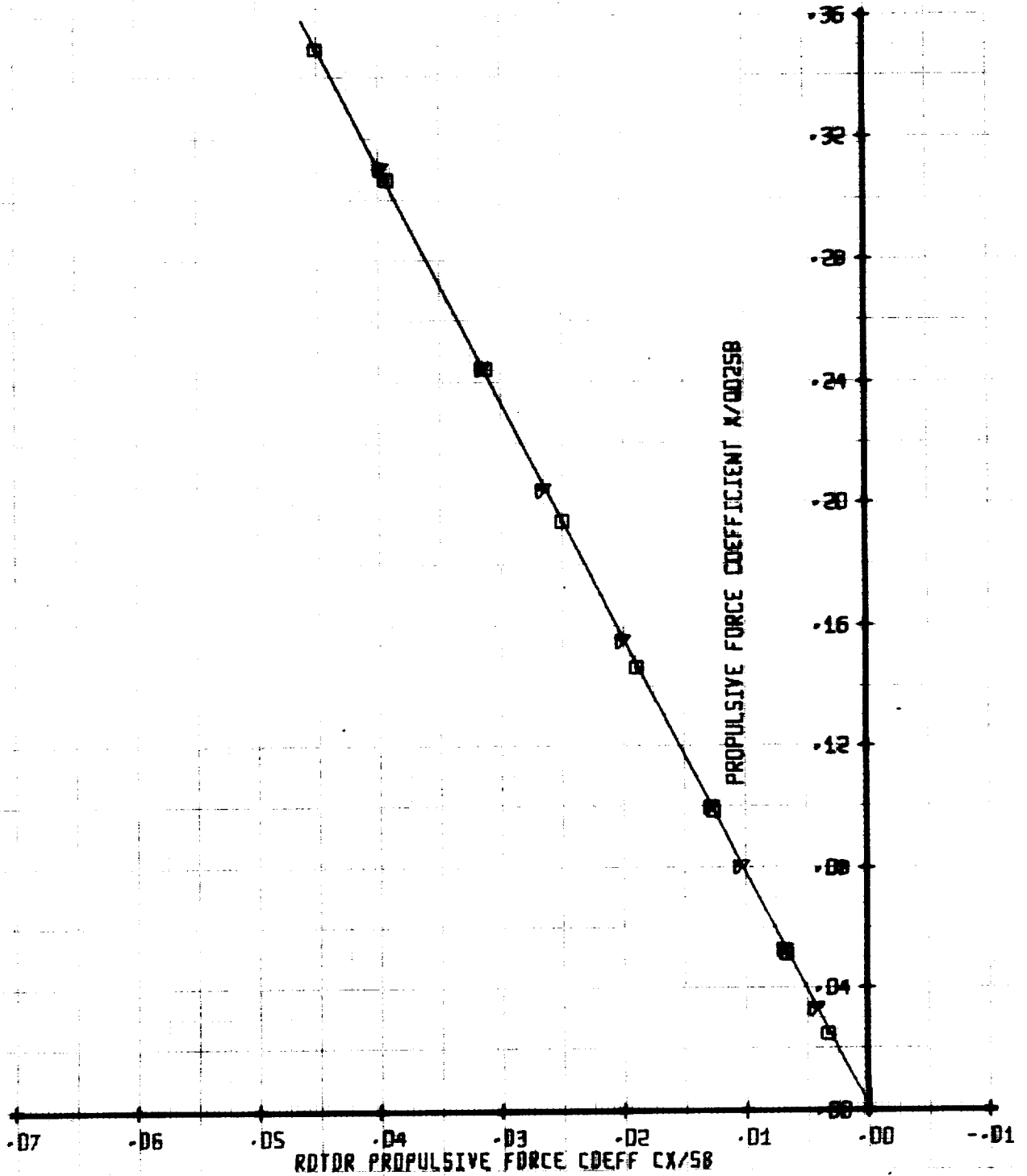
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/58	VTUN	
□	243	.45	.06	279	
▽	244	.45	.076	279	

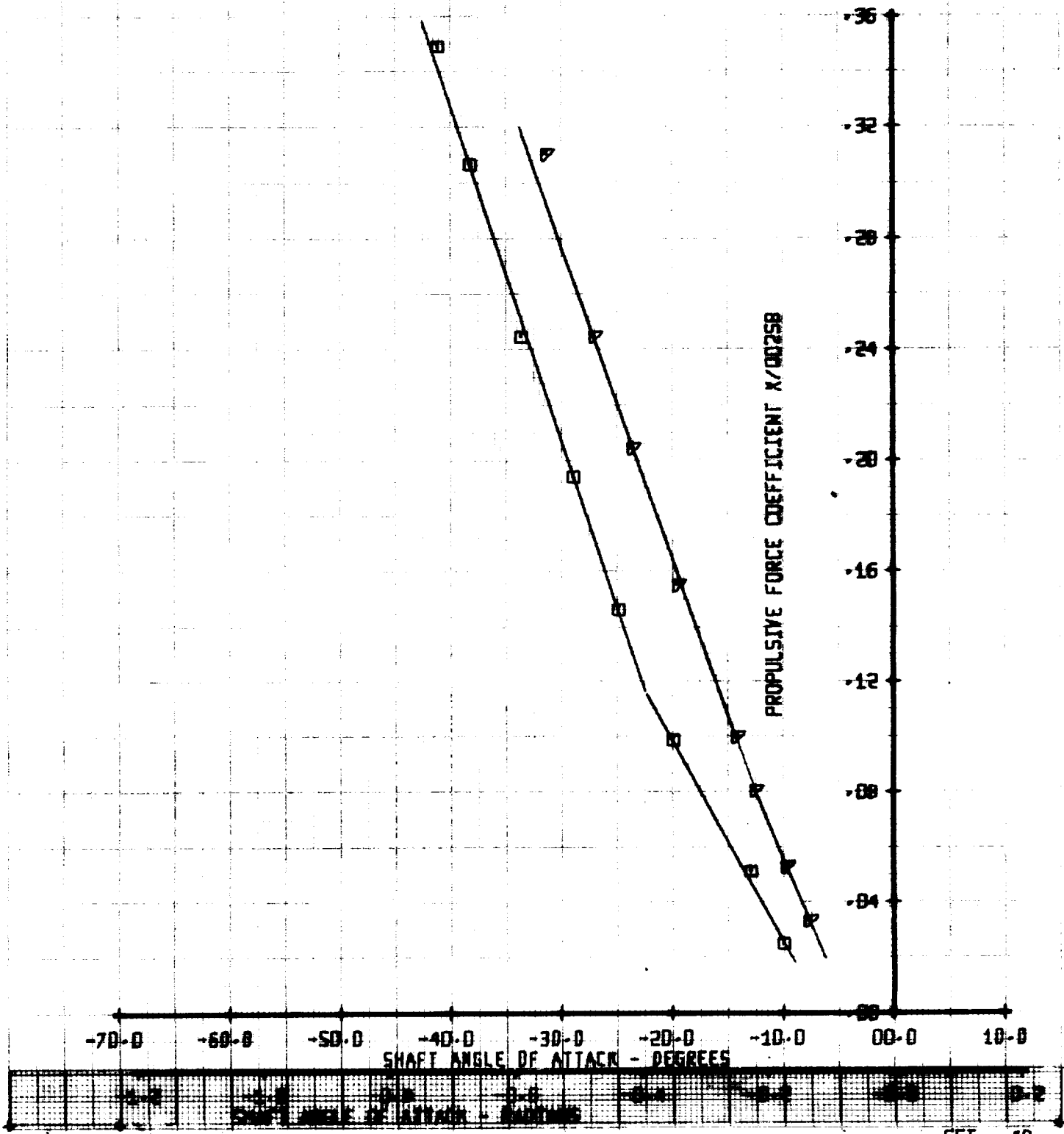
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MU	CT/58	VTUN
SYM	RUN			
□	243	.45	.06	279
△	244	.45	.076	279

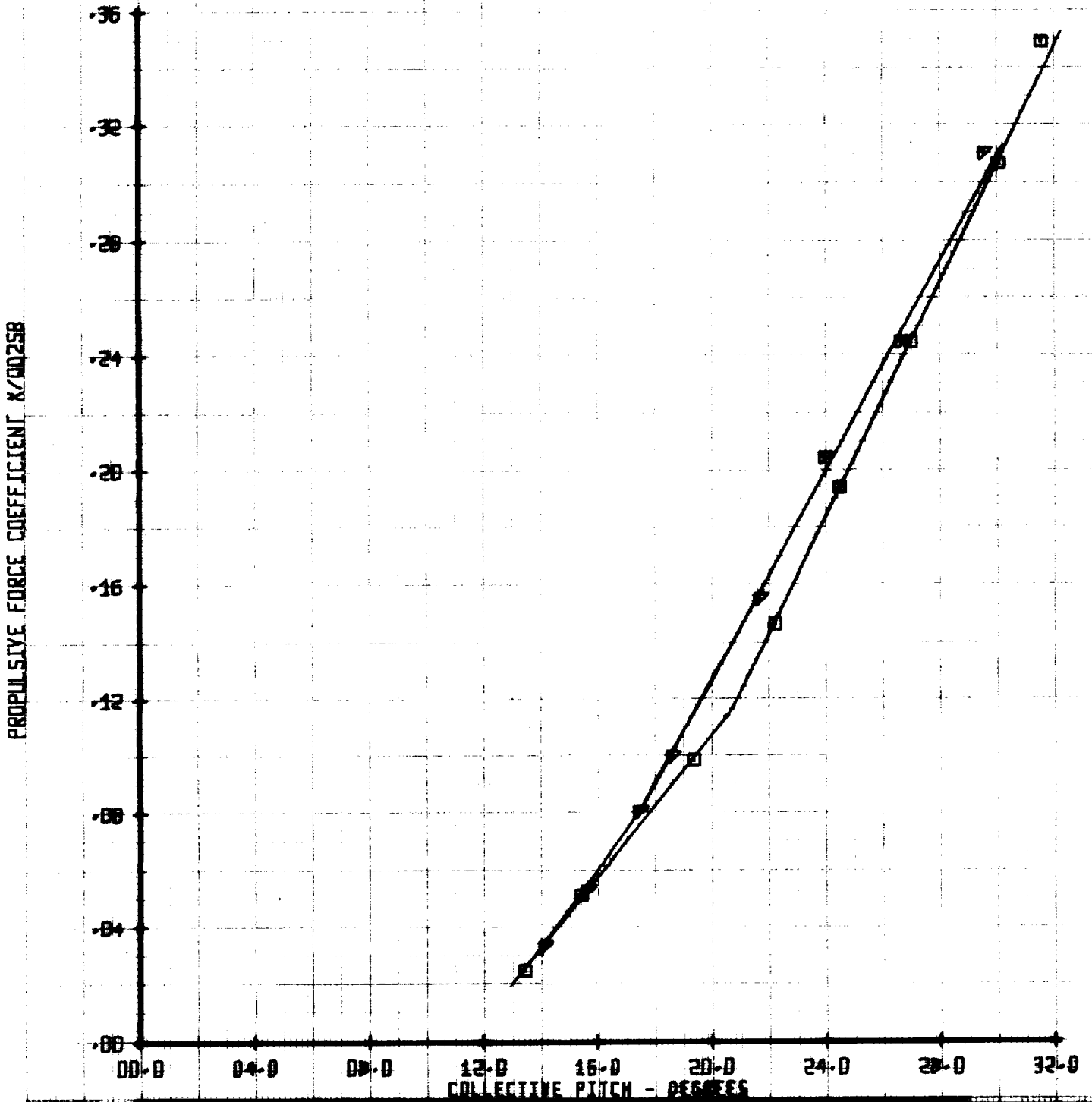
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47A ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU	CT/58	VTUN	
□	243	.45	.06	279	
●	244	.45	.076	279	

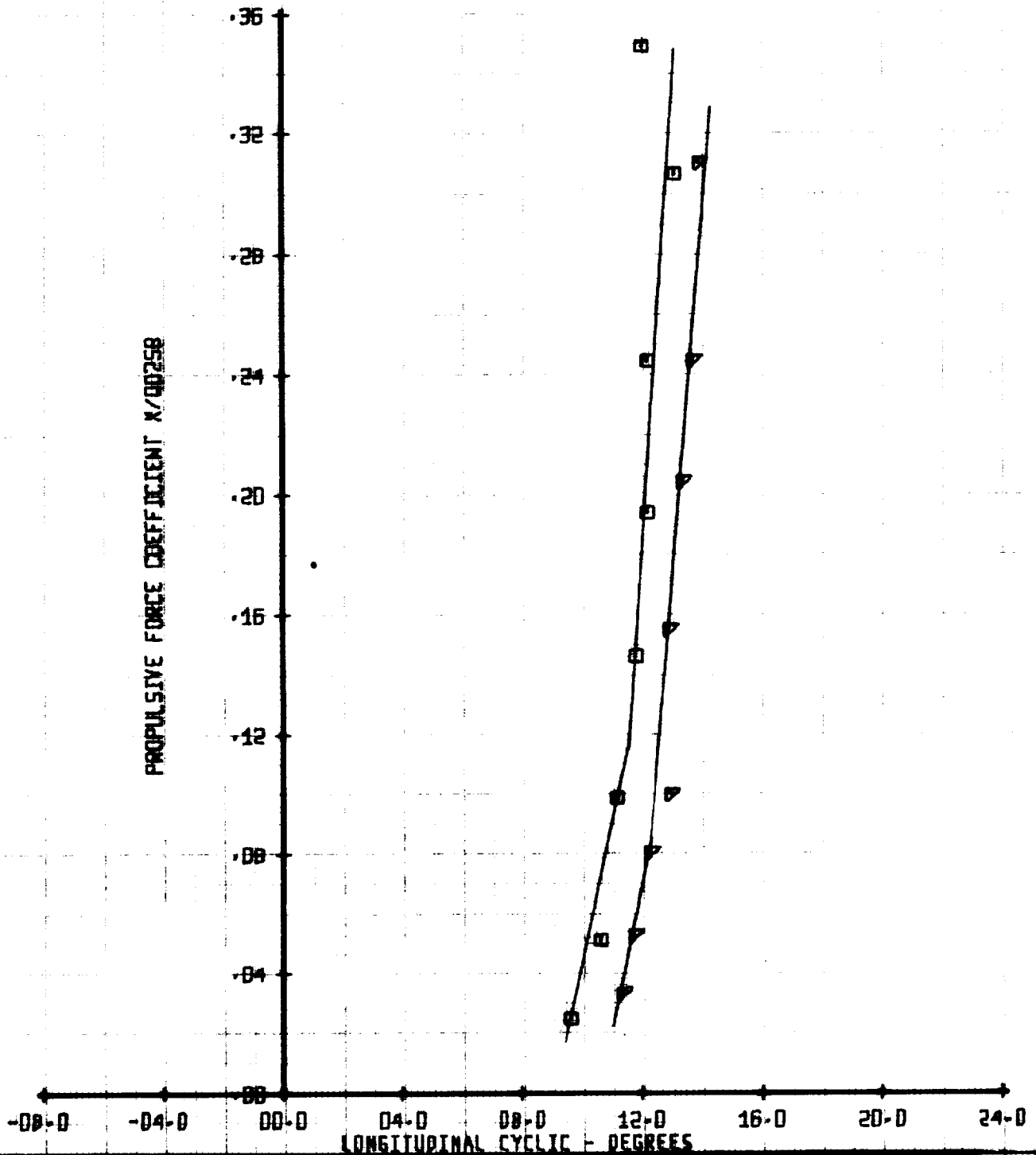
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MLI'	CT'75B	VTUN	
□	243	.45	.06	279	
▴	244	.45	.076	279	

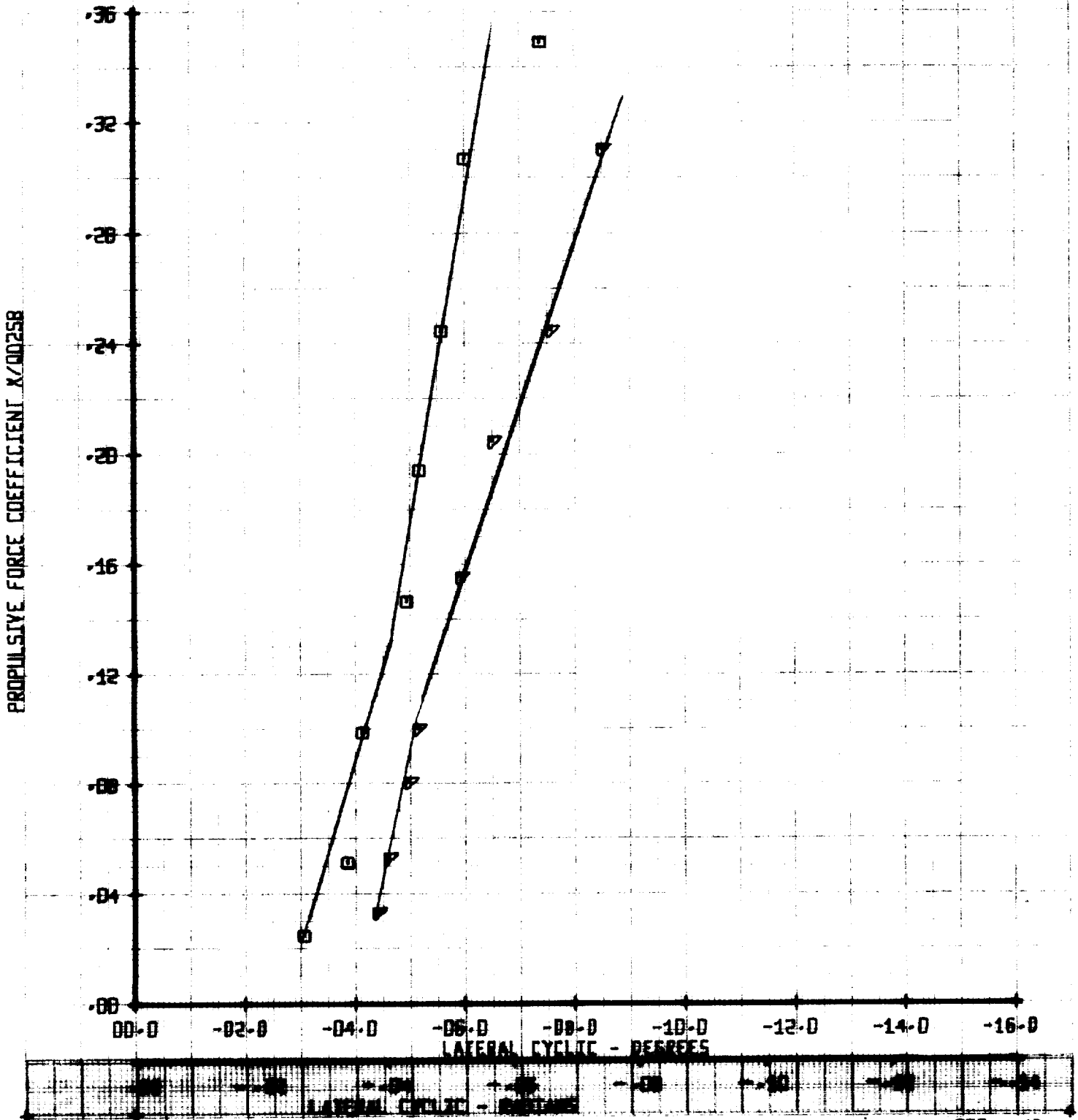
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'58	VTUN	
□	243	.45	.06	279	
△	244	.45	.076	279	

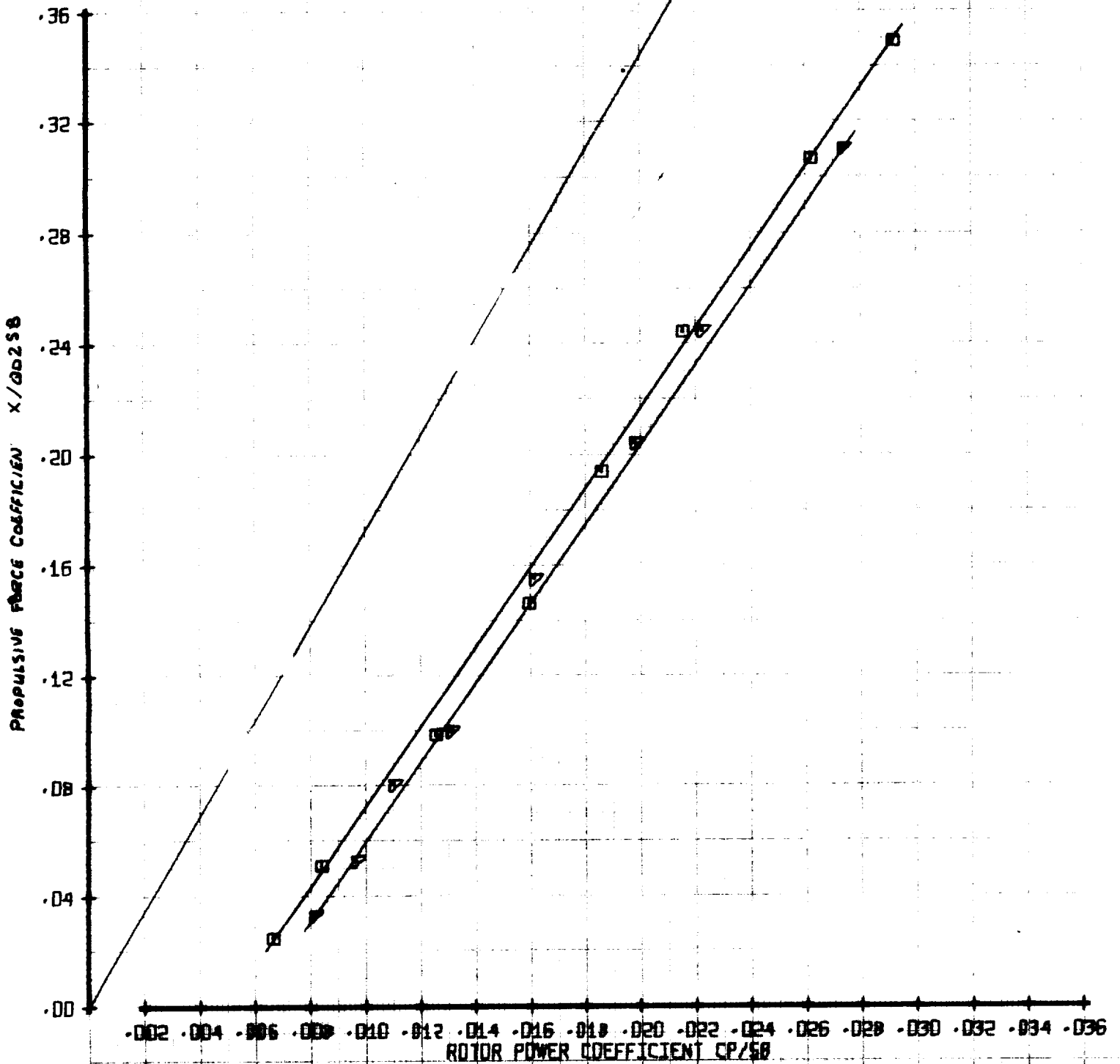
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	VTUN	
□	243	.45	.06	279	
▴	244	.45	.076	279	

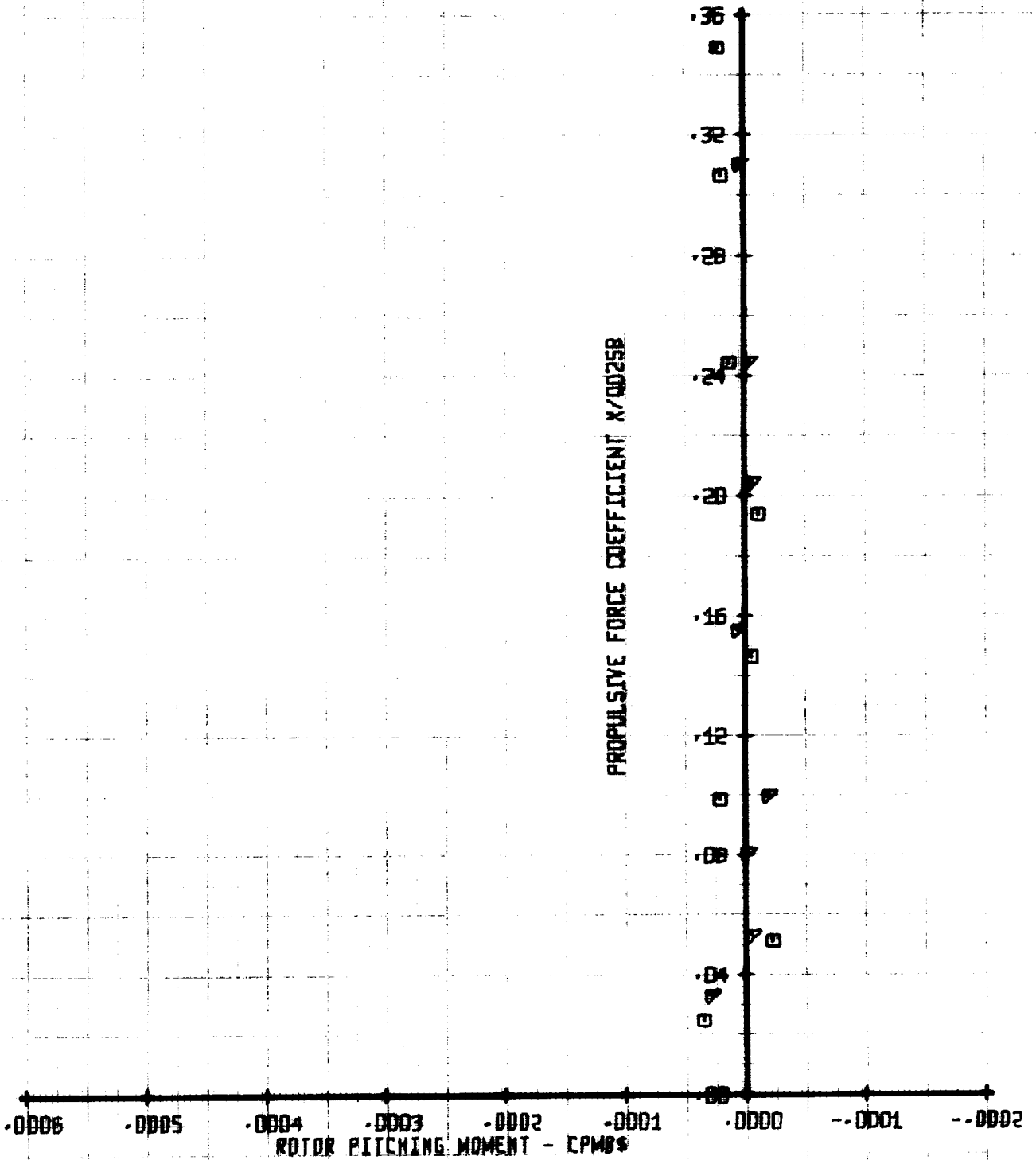
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		CT/2SB	VTUM
SYM	RUN	.06	279
□	243	.06	279
△	244	.076	279

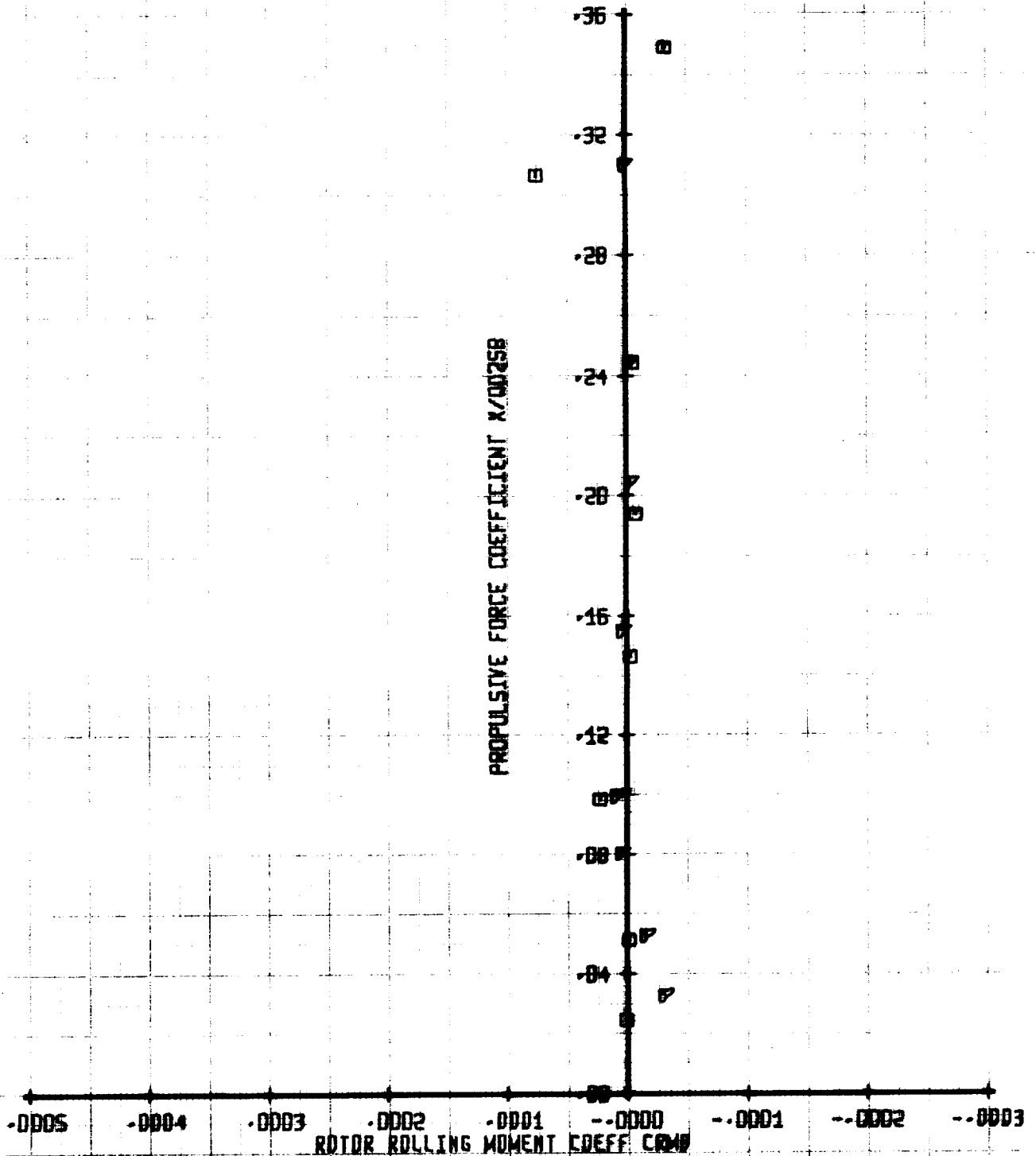
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFE-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		LEGEND			VTUN	
□	243	MJ'	CT'58	279		
△	244	.45	.06	279		
		.45	.076			

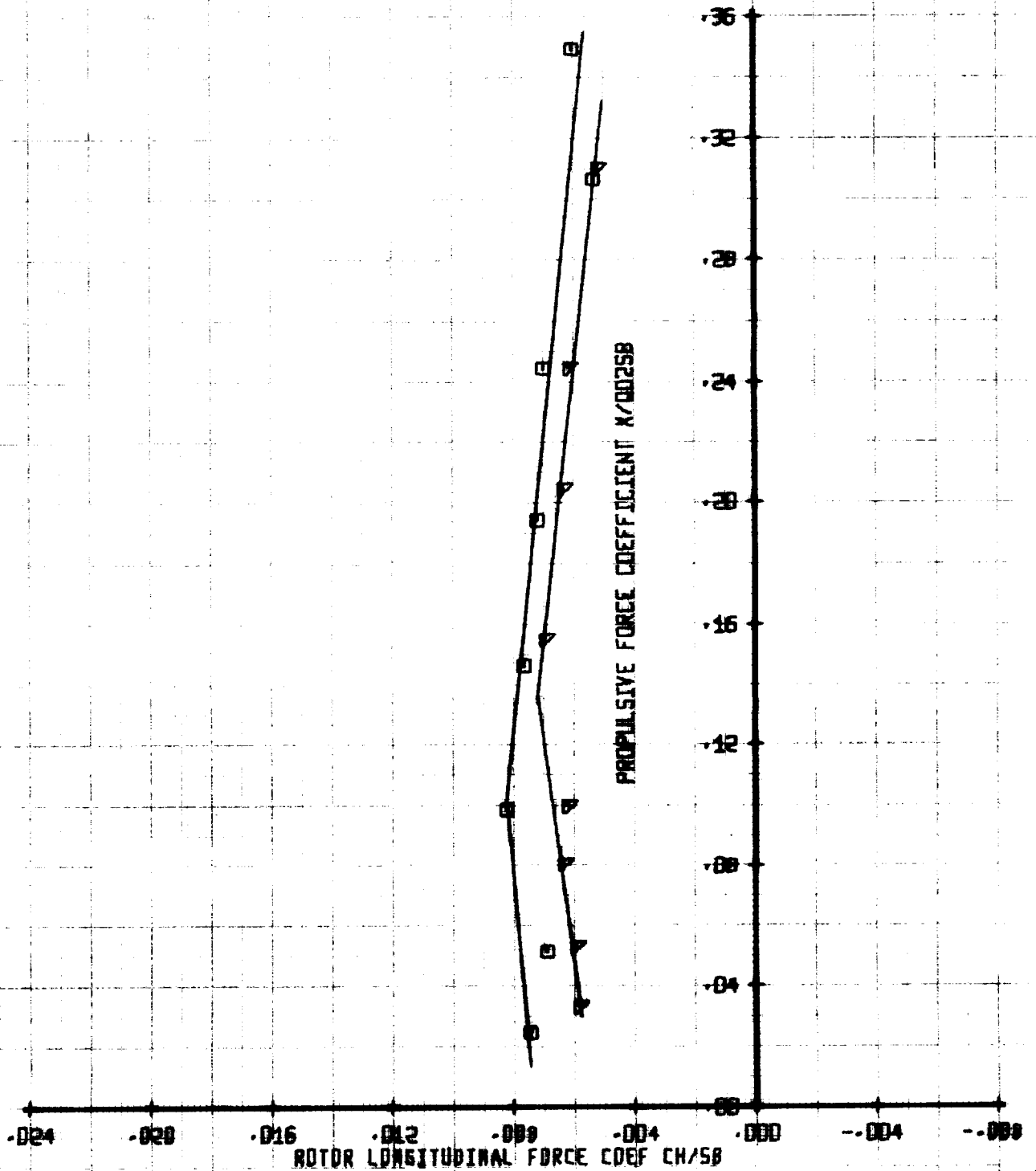
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUN		MU		CT/VS8		VTUN	
□	○	243	244	.45	.45	.06	.076	279	279

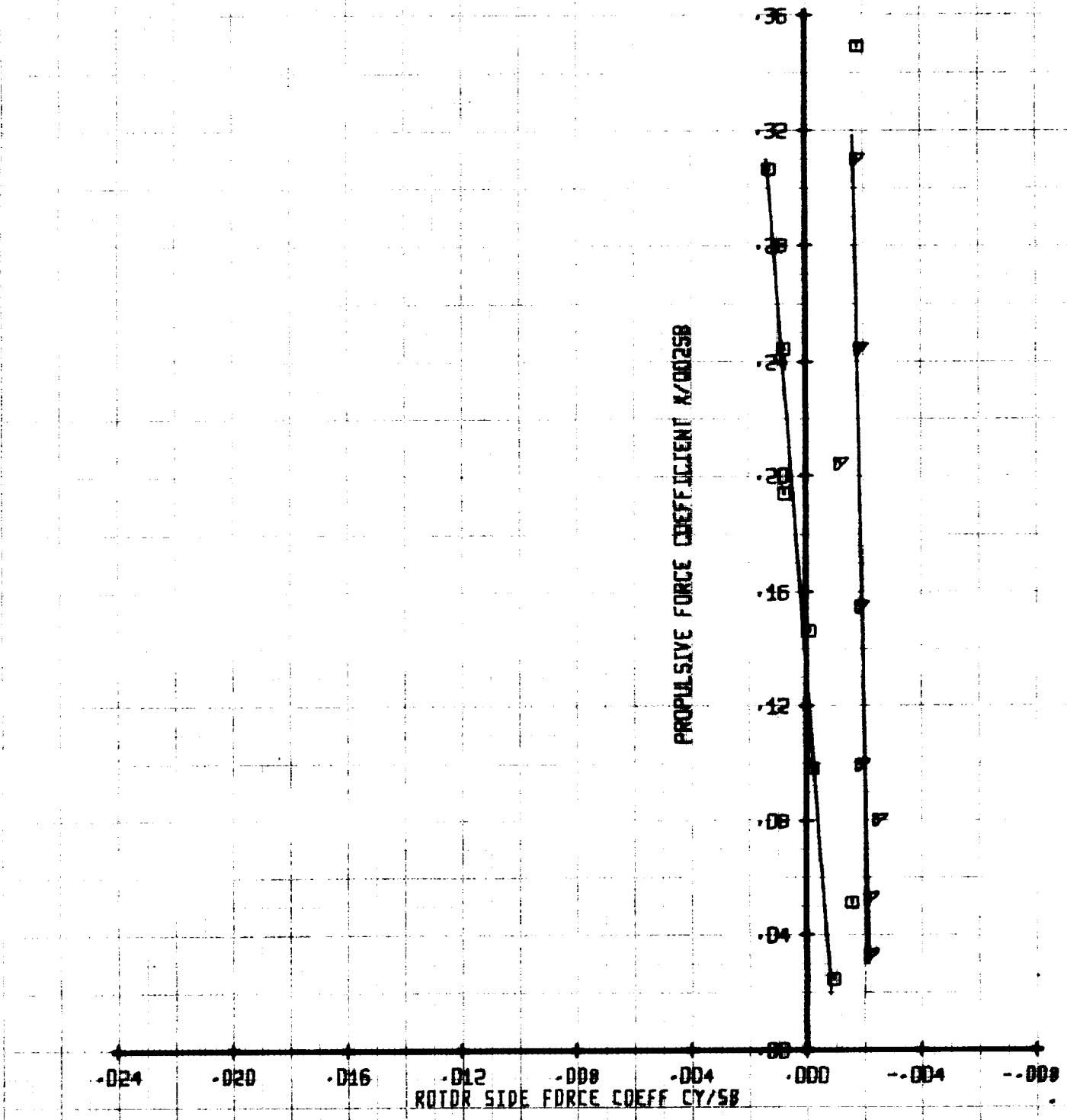
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU	CT/58	VTUN	
□	243	.45	.06	279	
△	244	.45	.076	279	

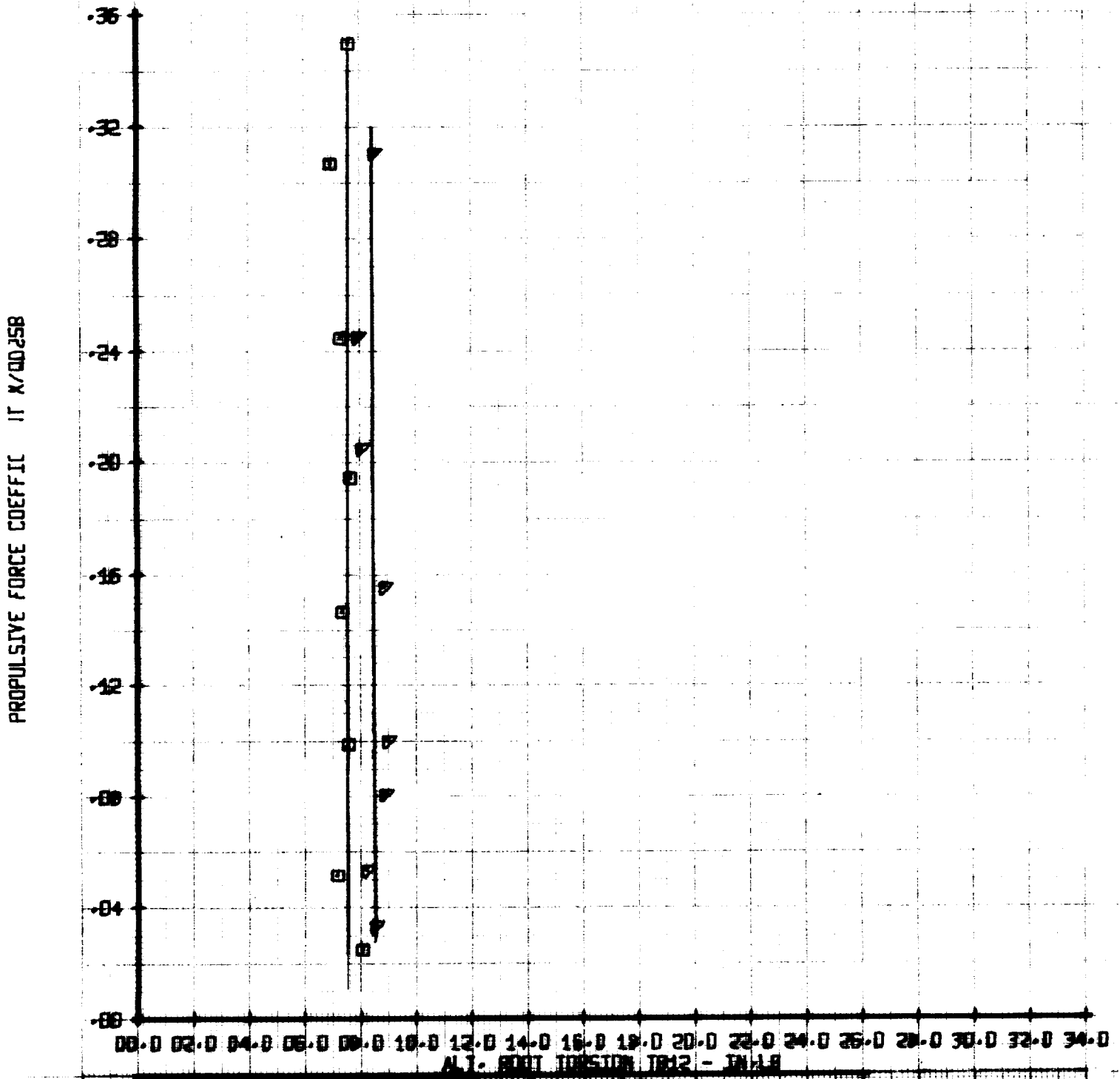
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MLT	CT'58	YTLN	
□	243	-45	-06	279	
▽	244	-45	-076	279	

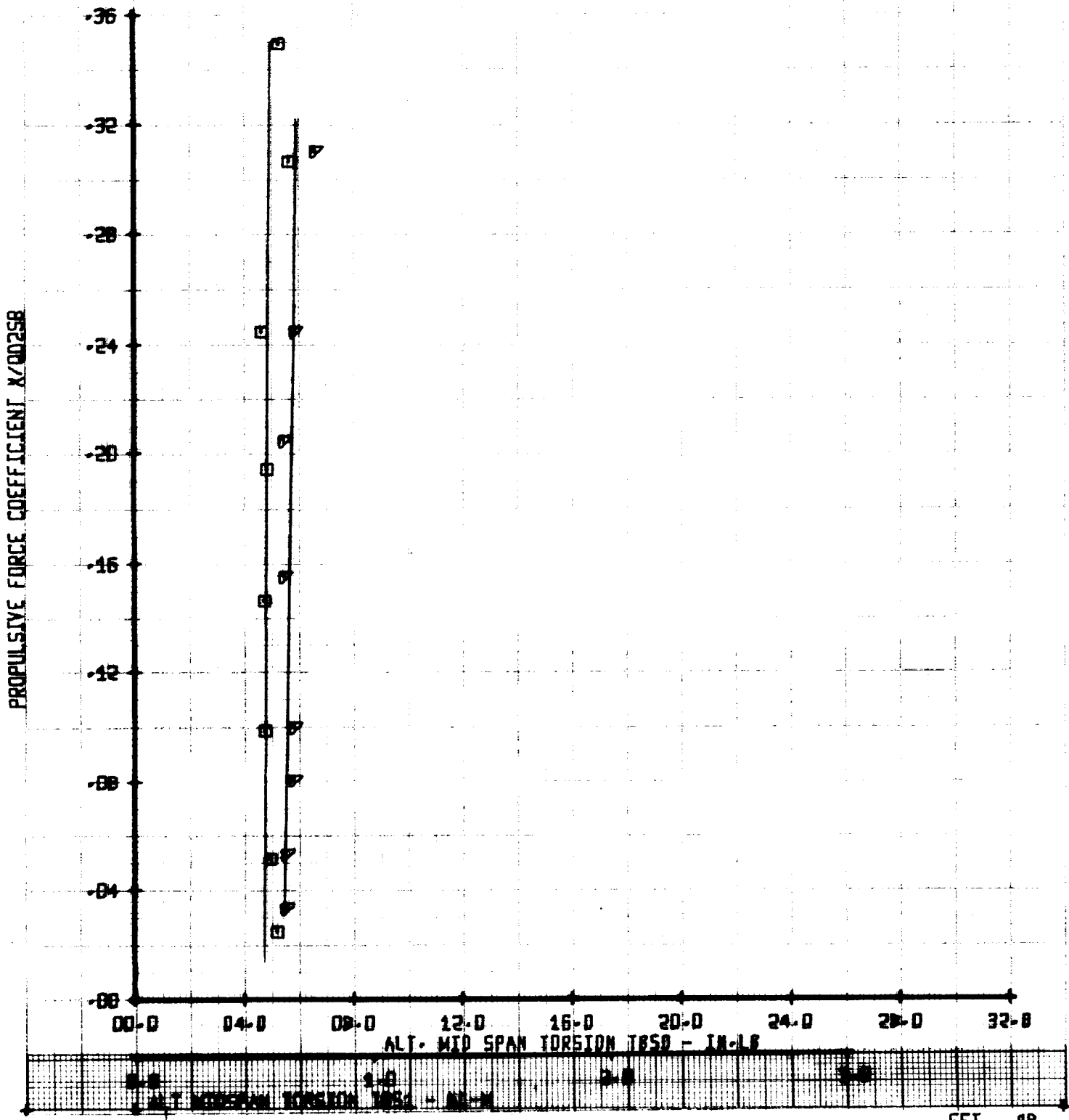
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT' / 58	VTUM	
□	243	.45	.06	279	
△	244	.45	.076	279	

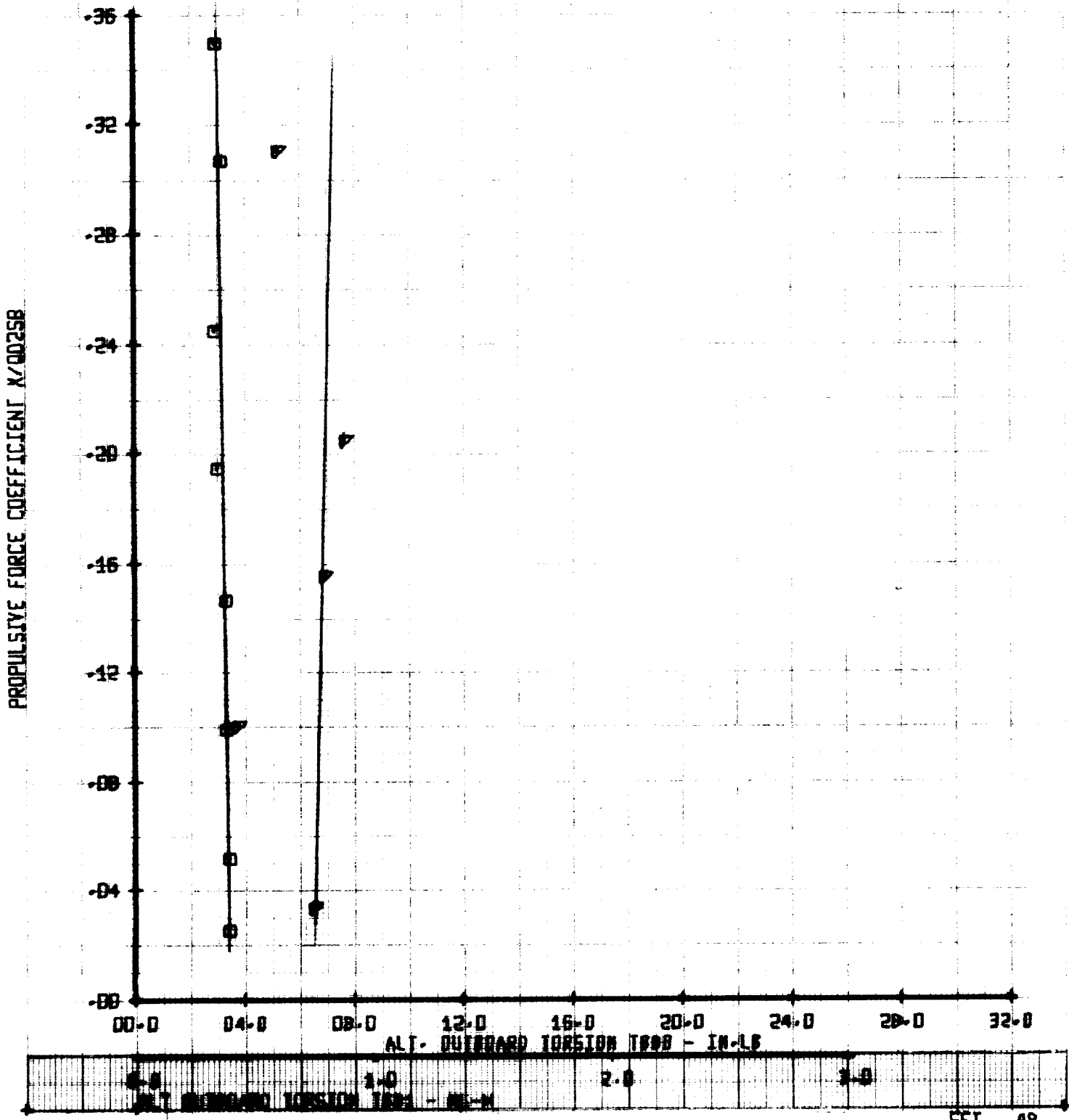
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	ML'	CT' / 58	VTLM
□	243	.45	.06	279
▴	244	.45	.076	279

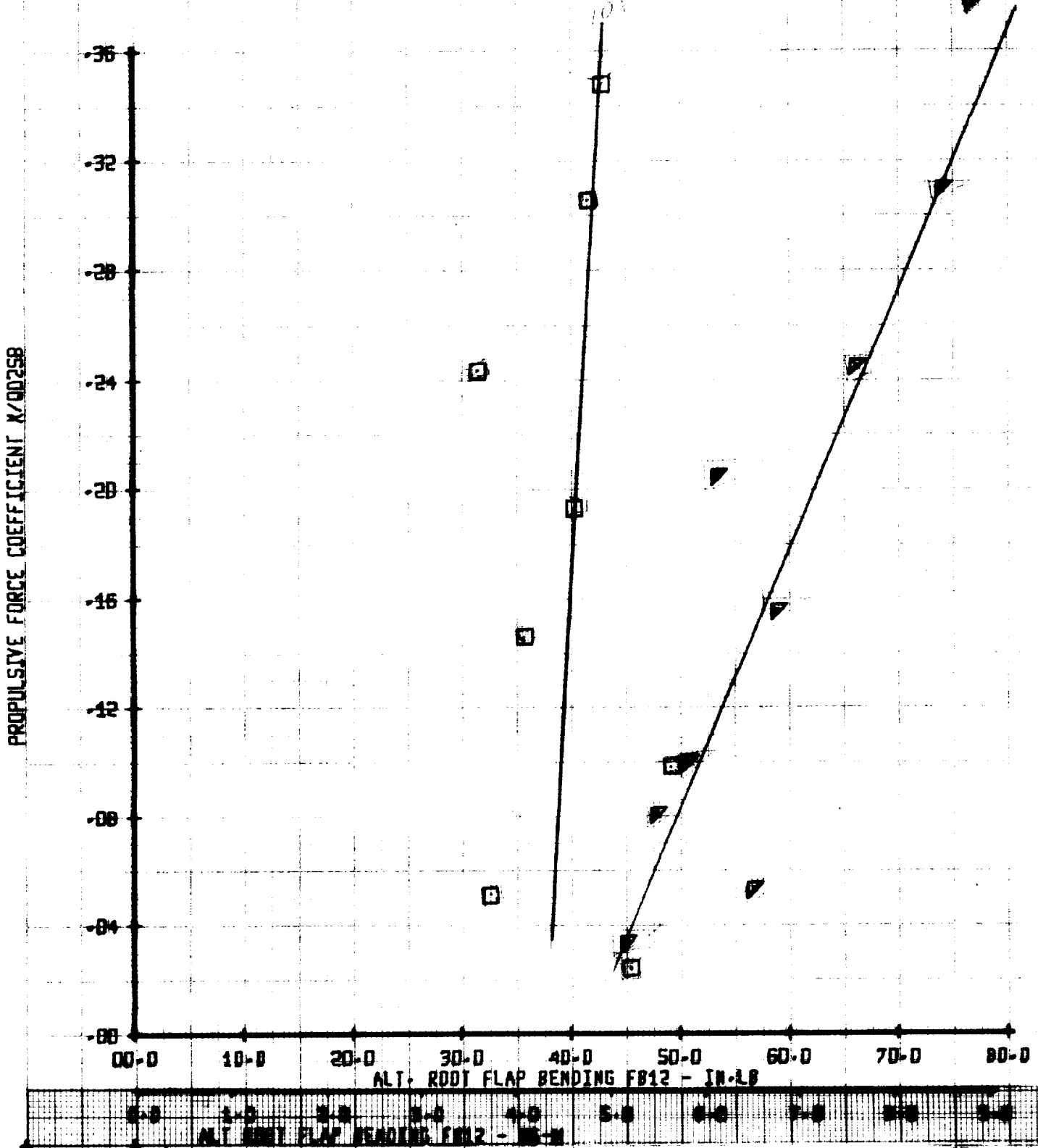
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB80



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MI'	CT'/SB	VTUN	
□	243	.45	.06	279	
▽	244	.45	.076	279	

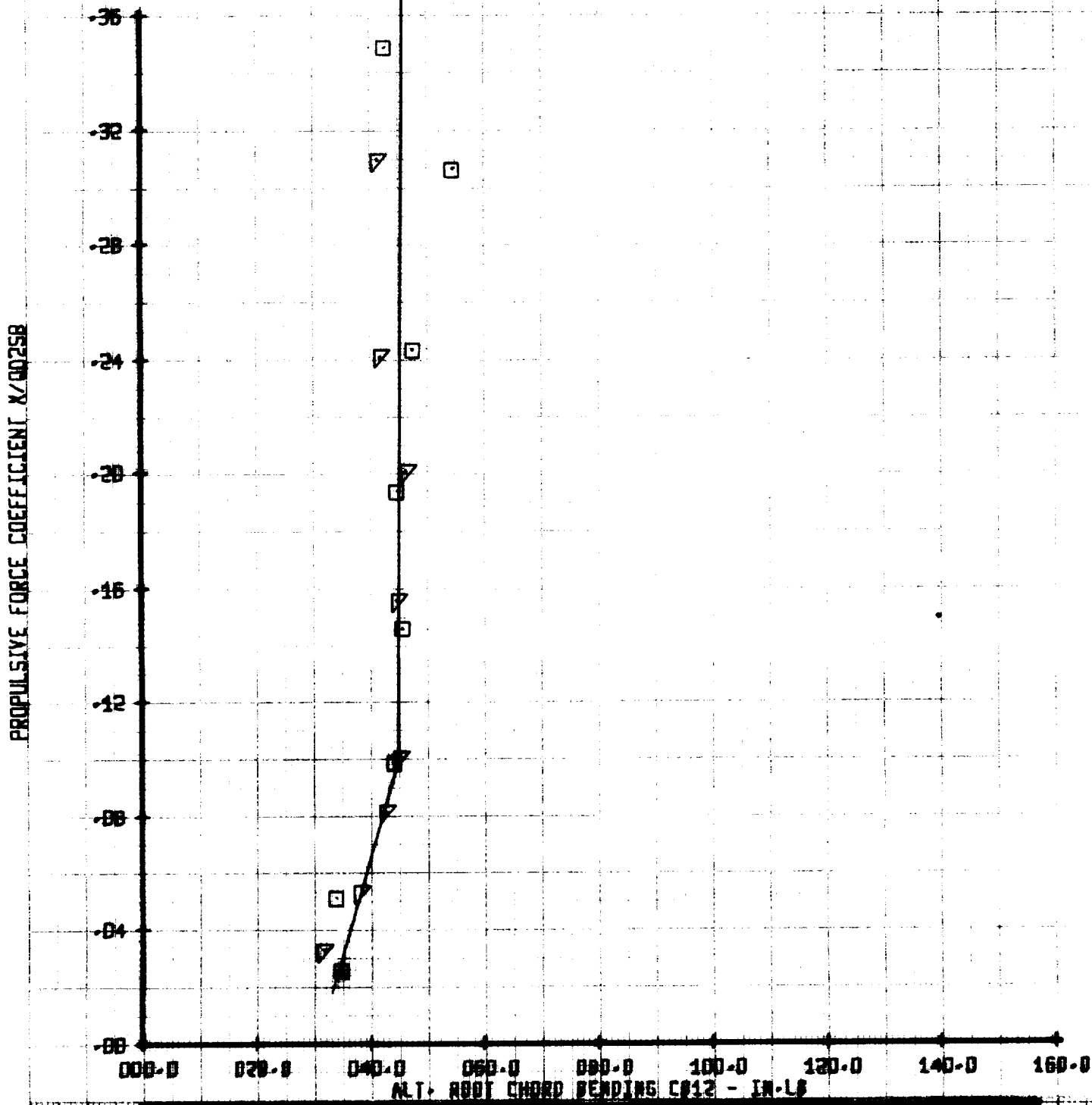
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	ML'	CT' / 58	Y/TUM	
□	243	.45	.06	279	
▽	244	.45	.076	279	

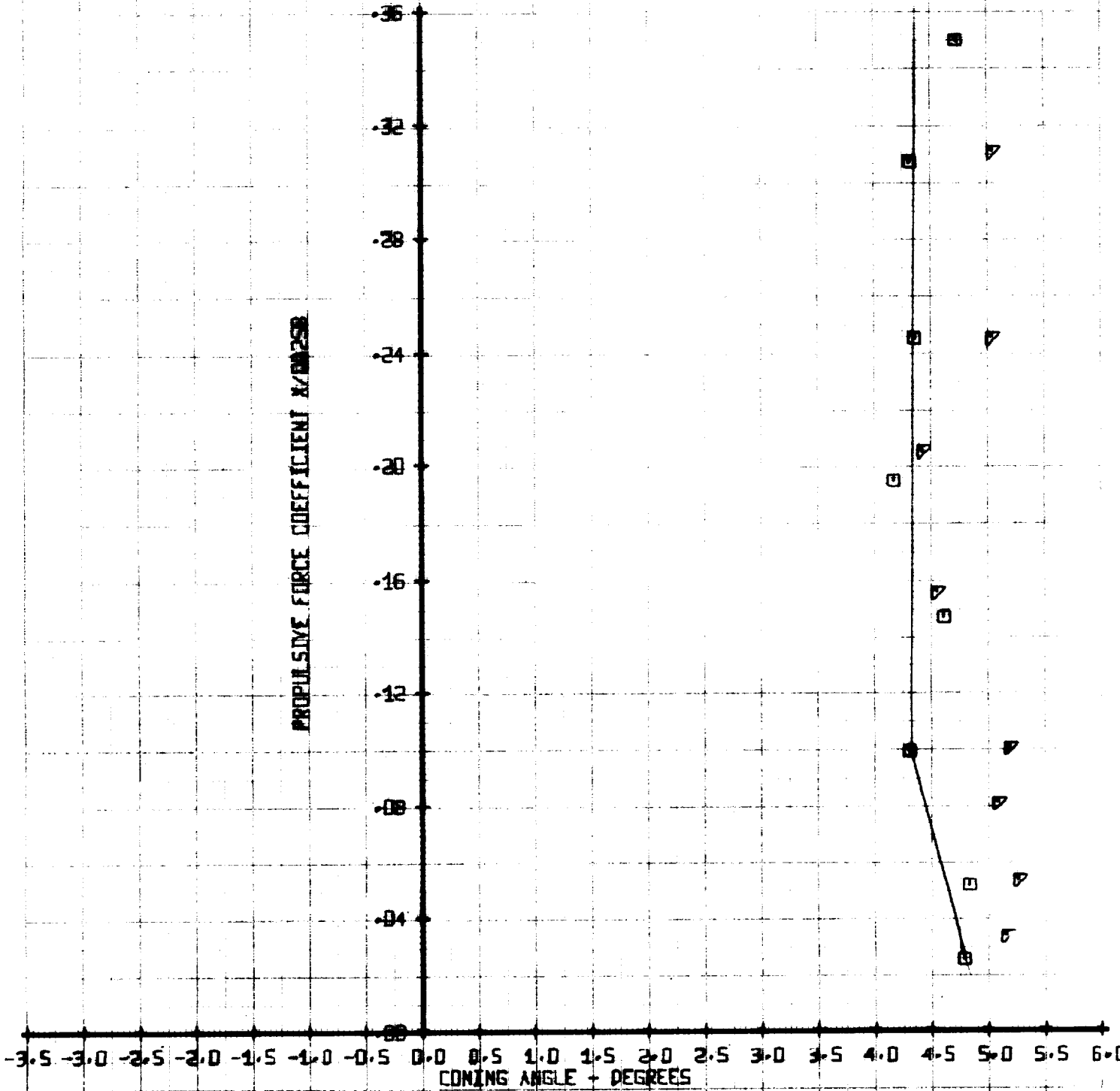
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT' / 50	Y/DUM
□	243	.45	.06	279
▽	244	.45	.076	279

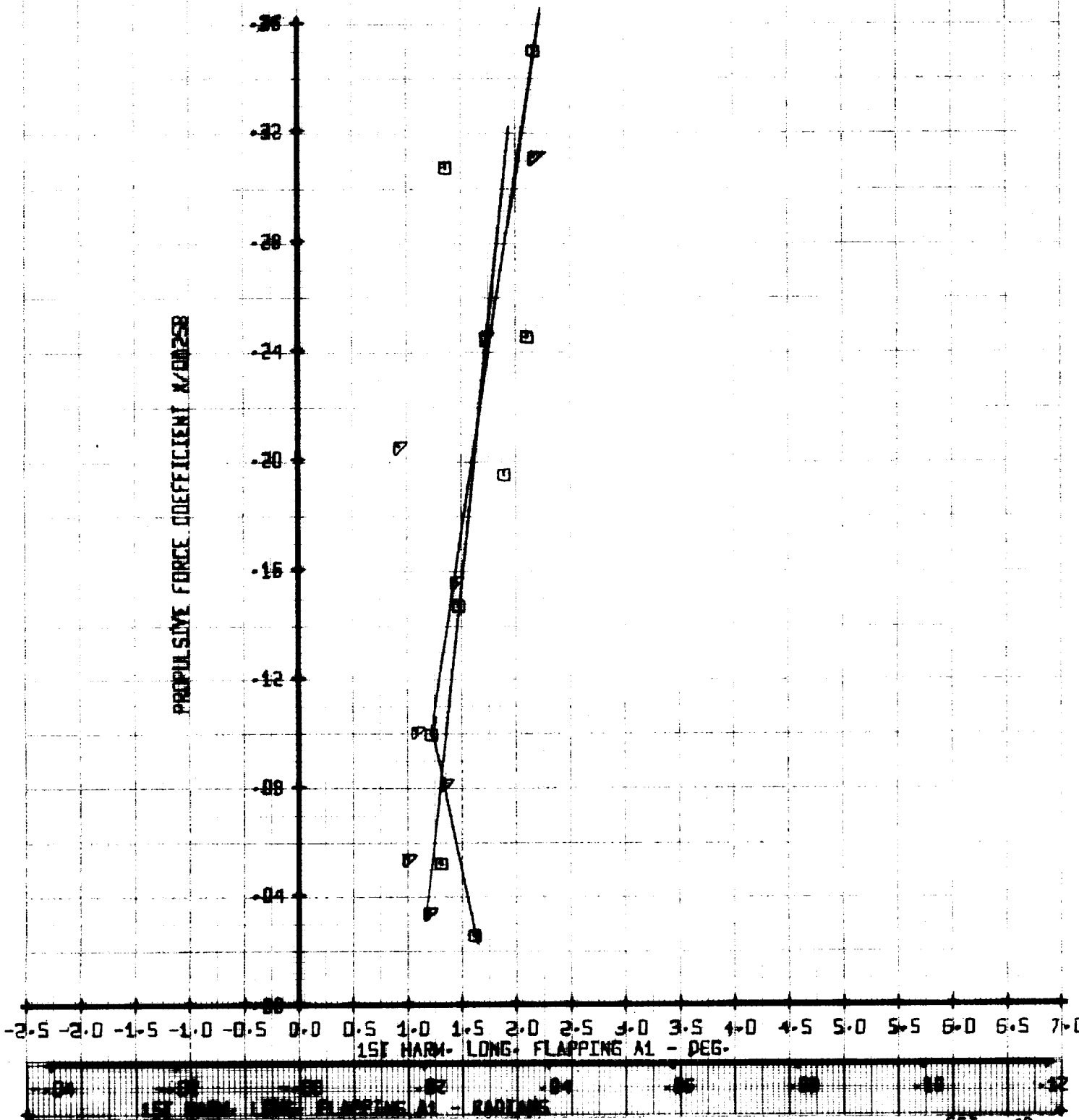
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT/VSB	VTUM	
□	243	.45	.06	279	
▽	244	.45	.076	279	

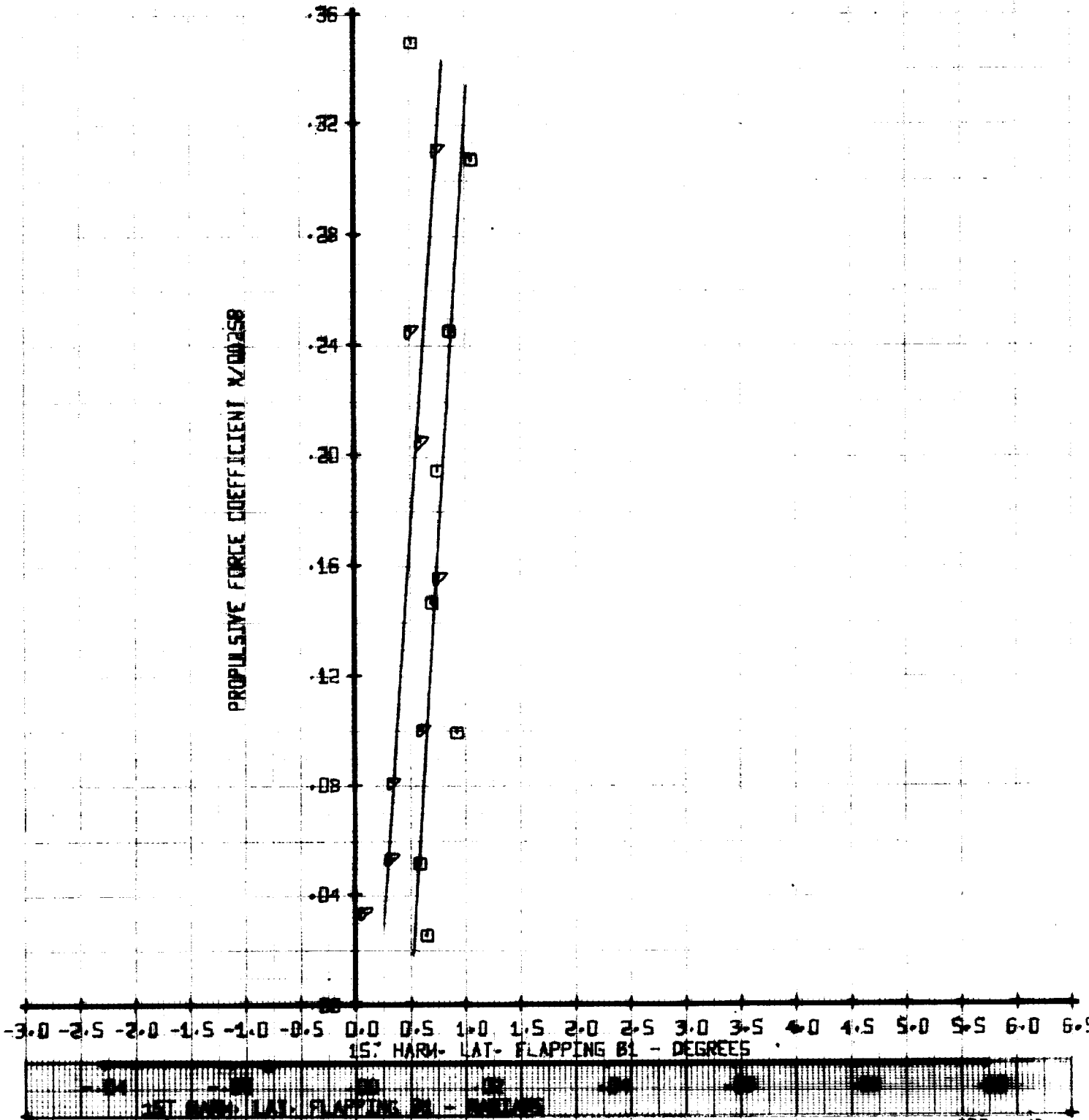
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/58	YIELD	
□	243	.45	.06	279	
▽	244	.45	.076	279	

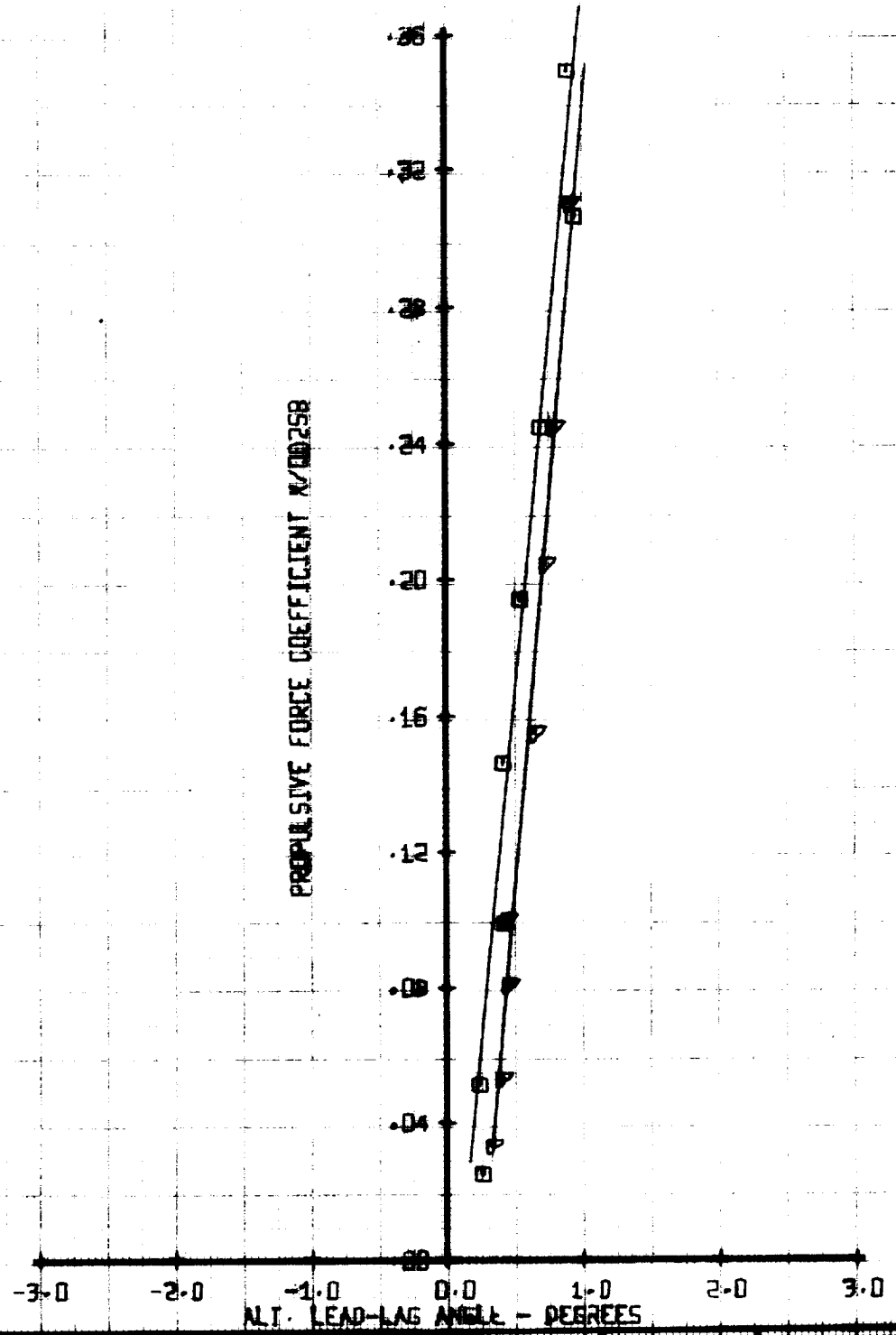
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-17B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/50	YOUN
□	243	-45	-06	279
△	244	-45	-076	279

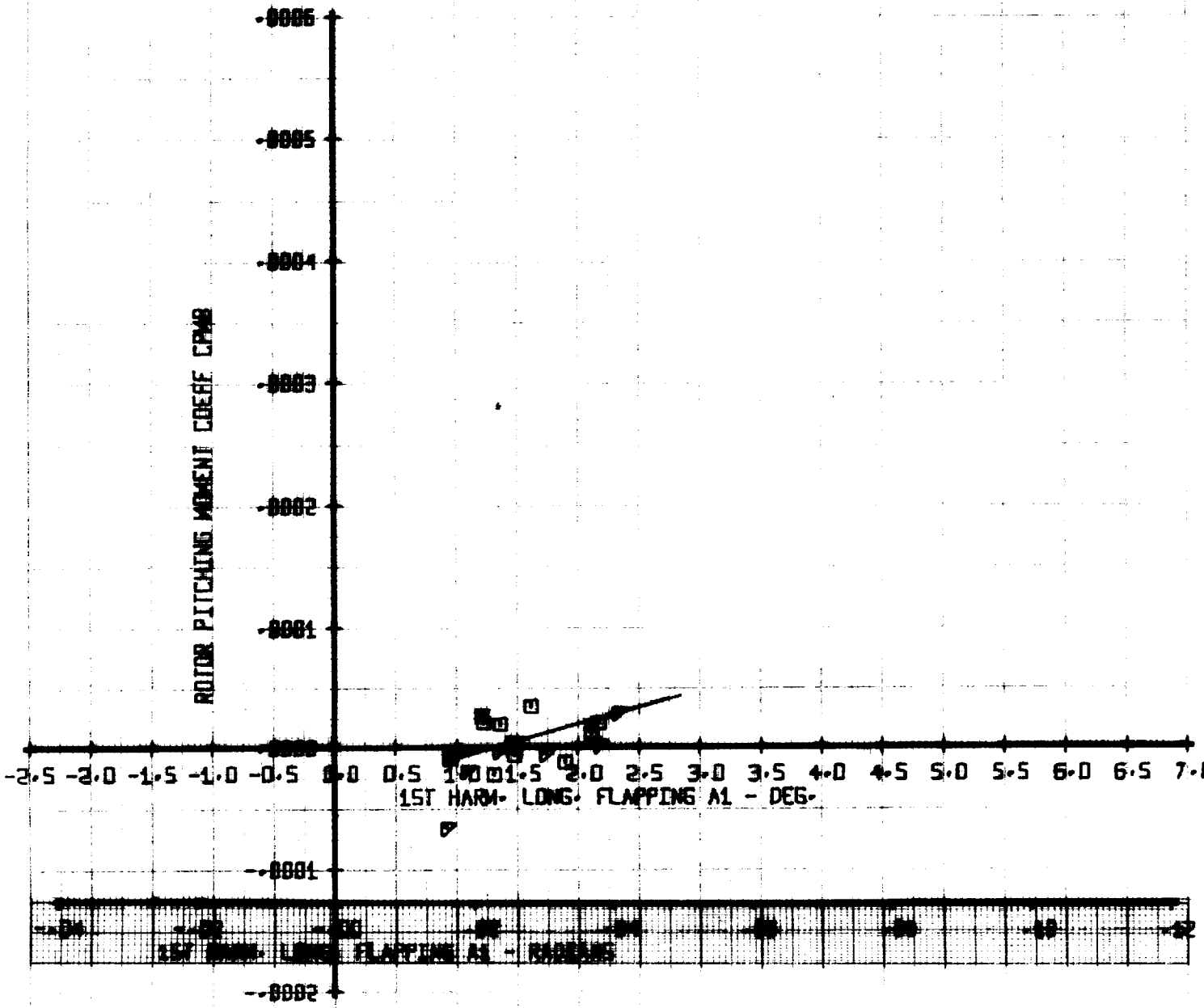
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-17B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/58	YTUN	
□	243	-45	-06	279	
△	244	-45	-076	279	

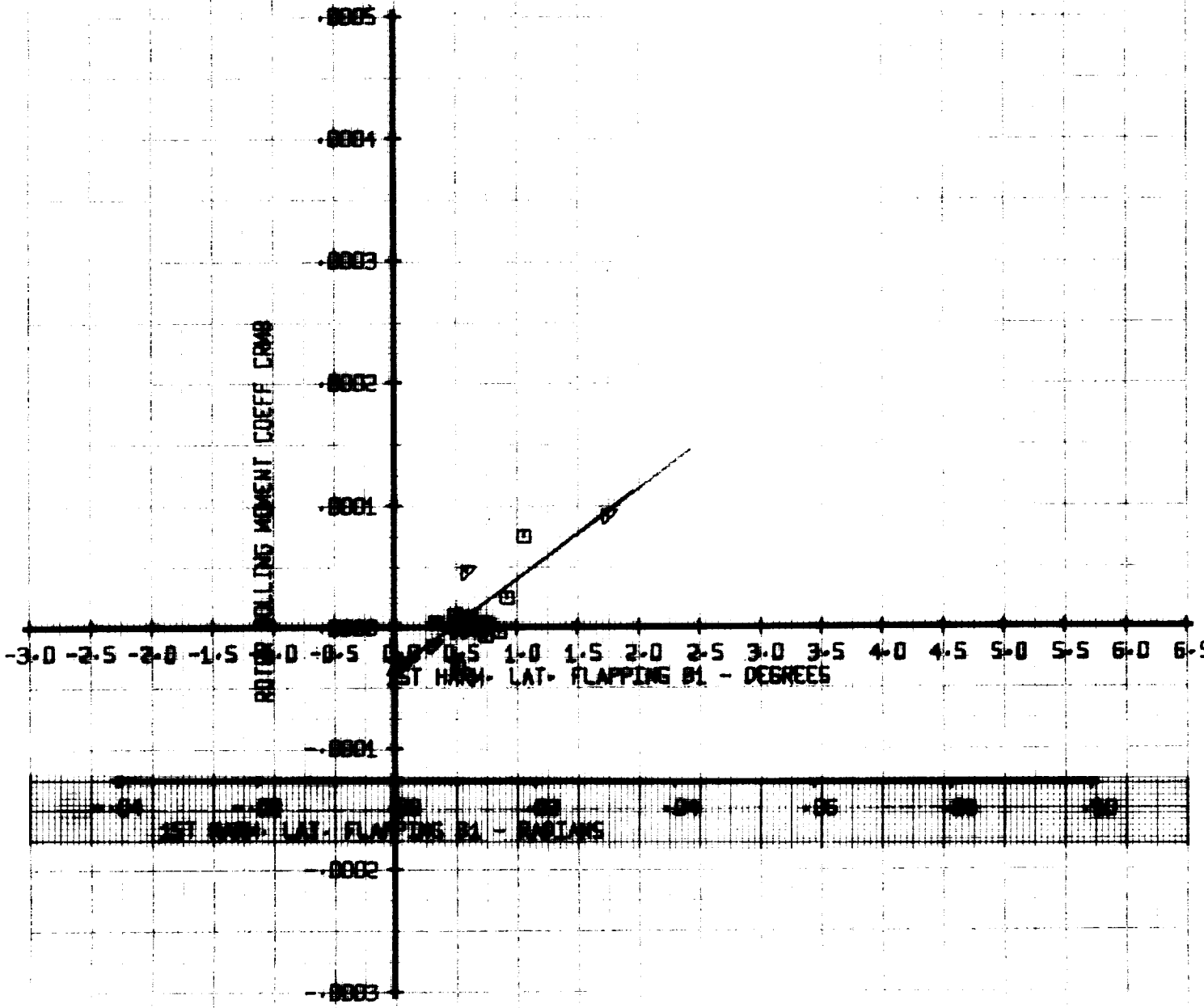
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/58	YOUN	
□	243	.45	.06	279	
○	244	.45	.076	279	

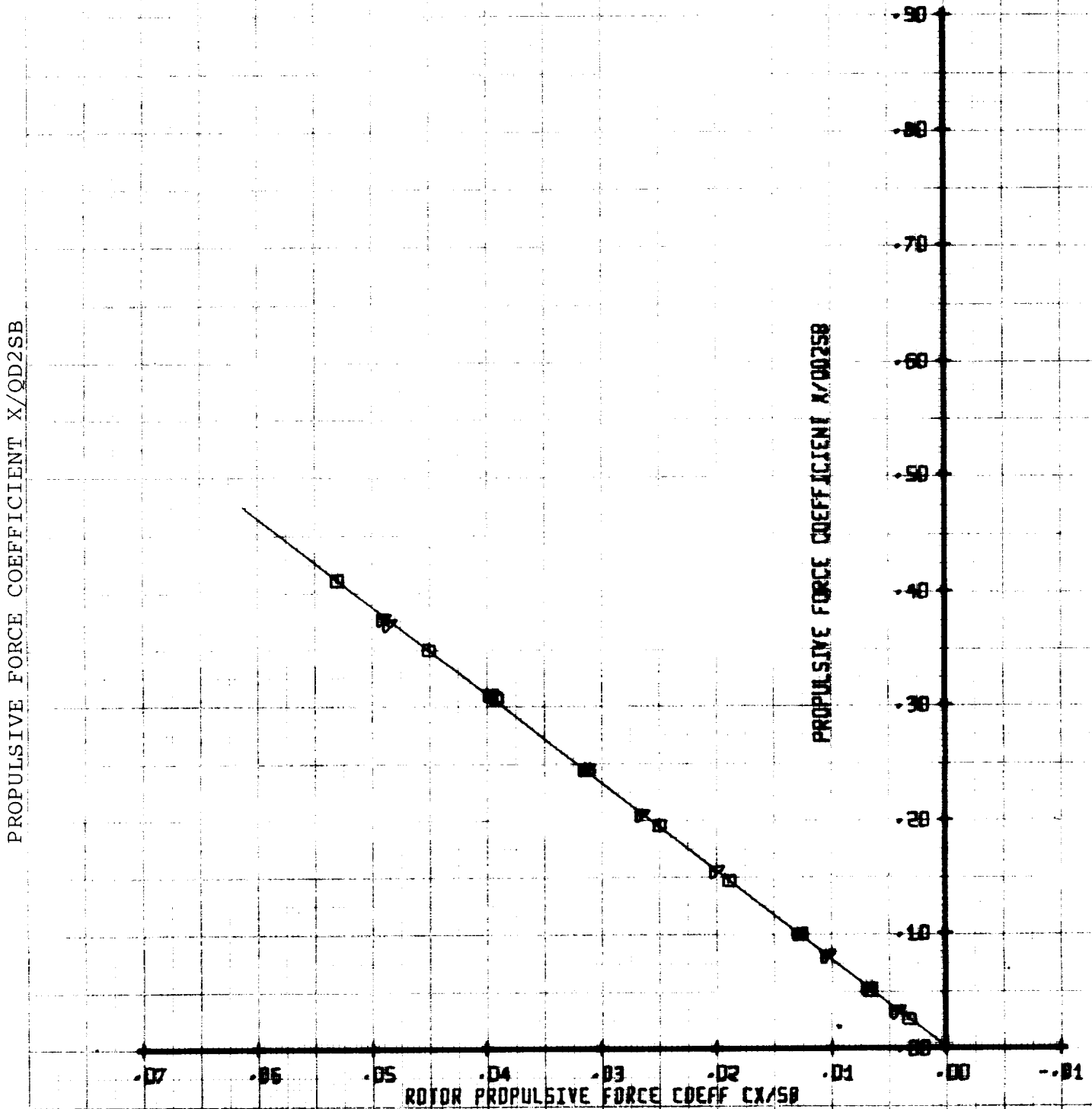
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/SB	YTDN
□	243	.45	.06	279
▣	244	.45	.076	279

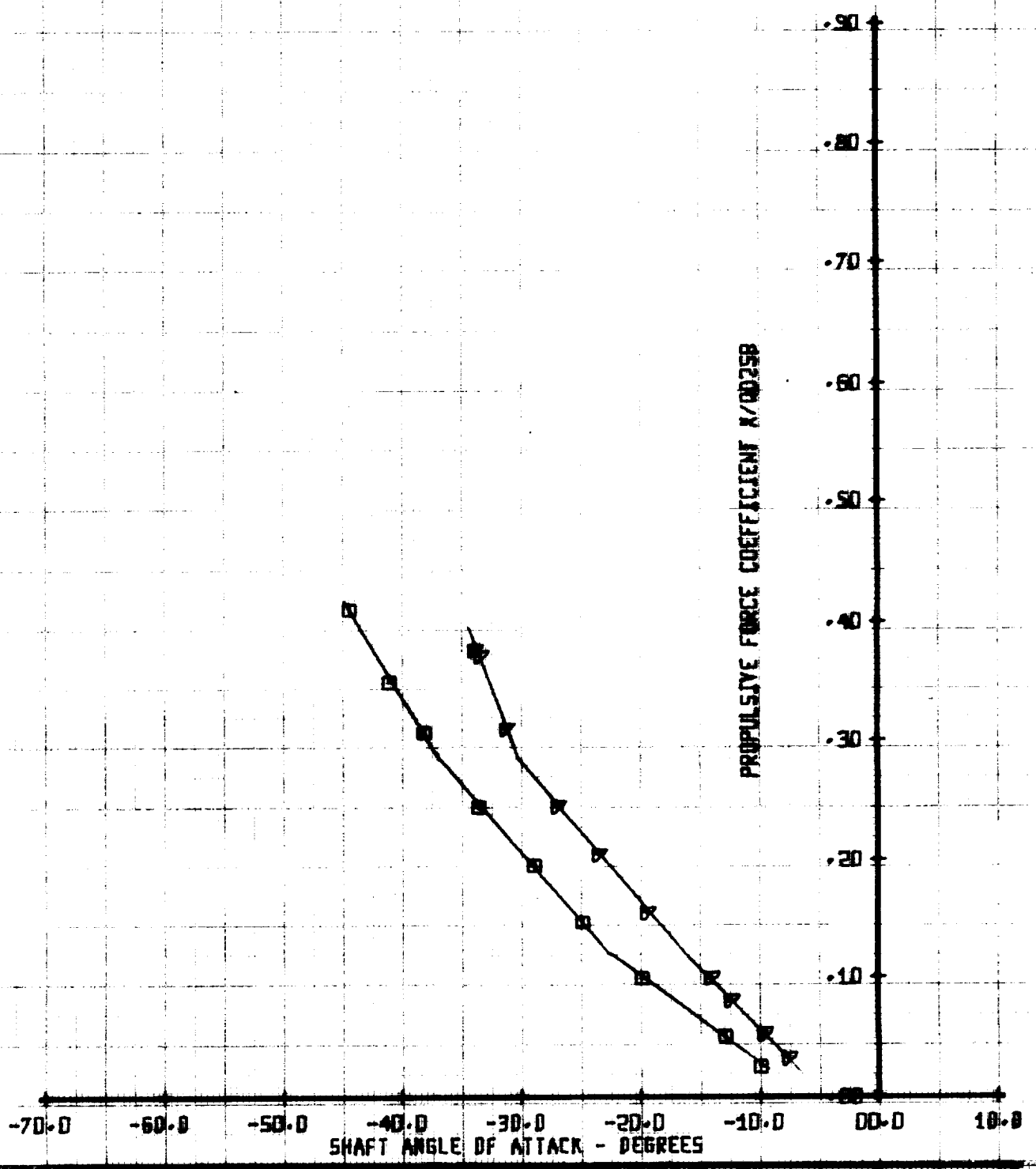
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RLIN	MU'	CT'/SB	VTUN
□	243	.45	.06	279
△	244	.45	.076	279

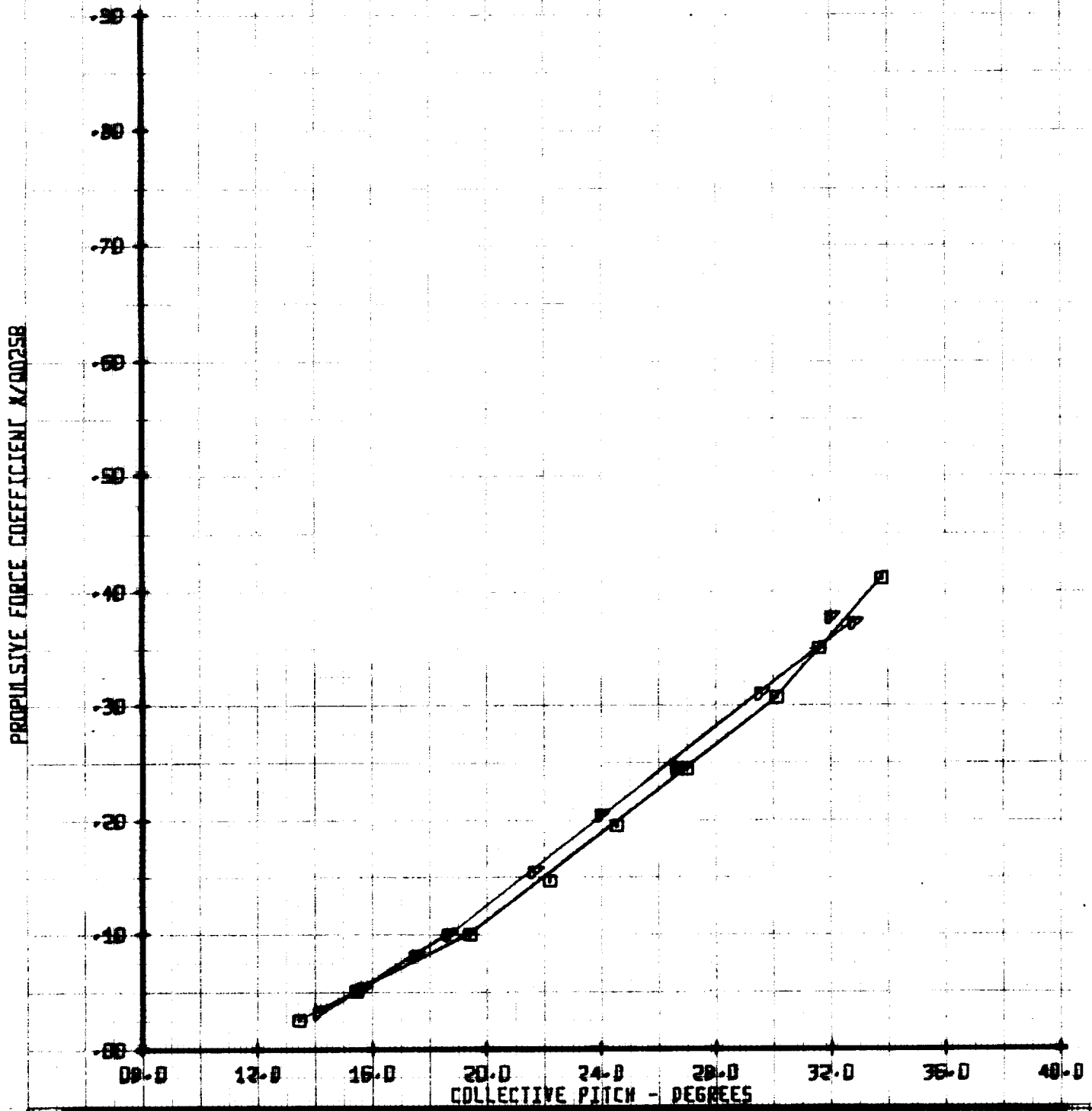
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUN		MU'		CT'258		YTLN	
□	○	243	244	.45	.45	.06	.076	279	279

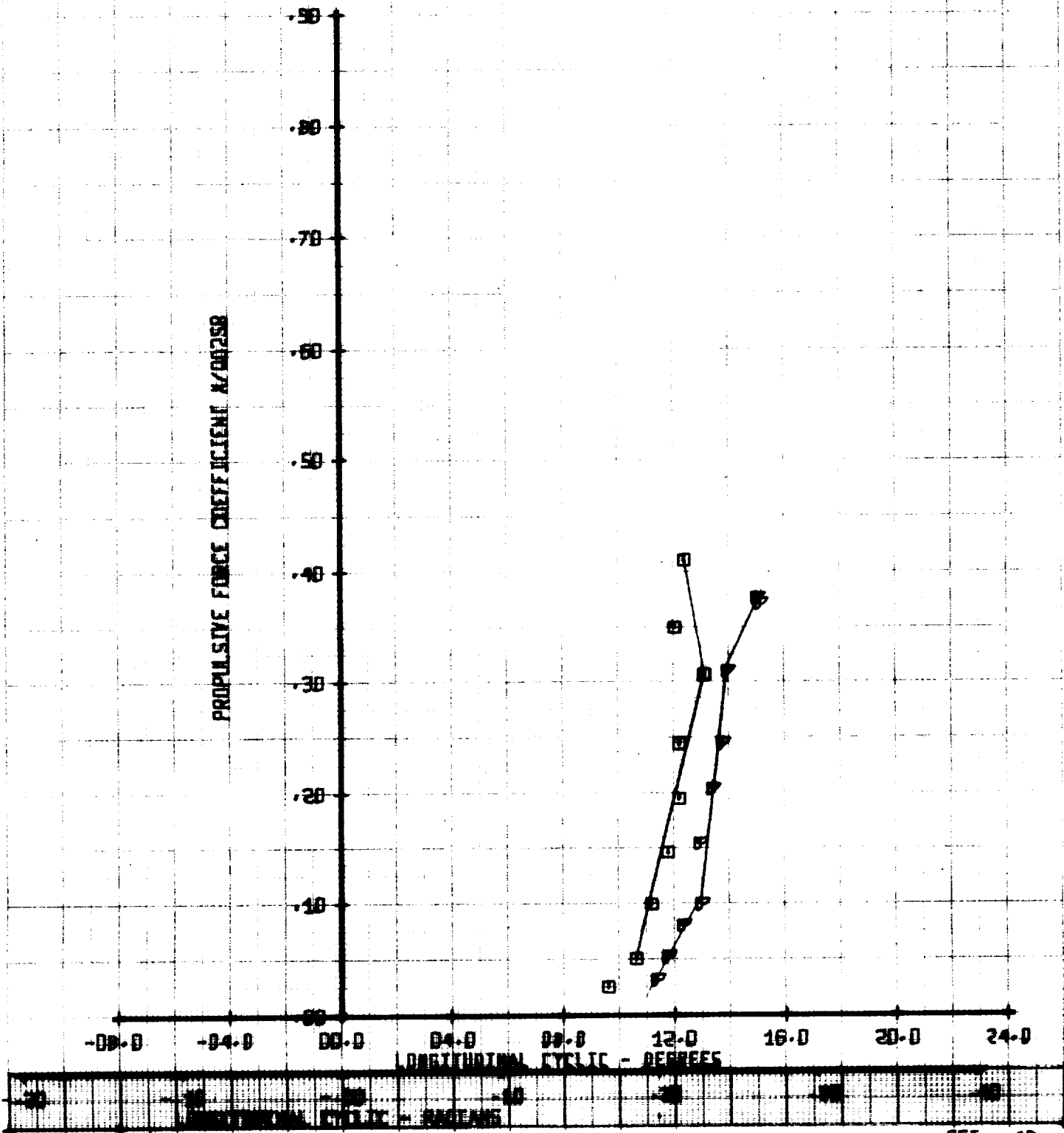
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	MIN	MI'	CT' / SB	VTUN	
□	243	.45	.06	279	
▴	244	.45	.076	279	

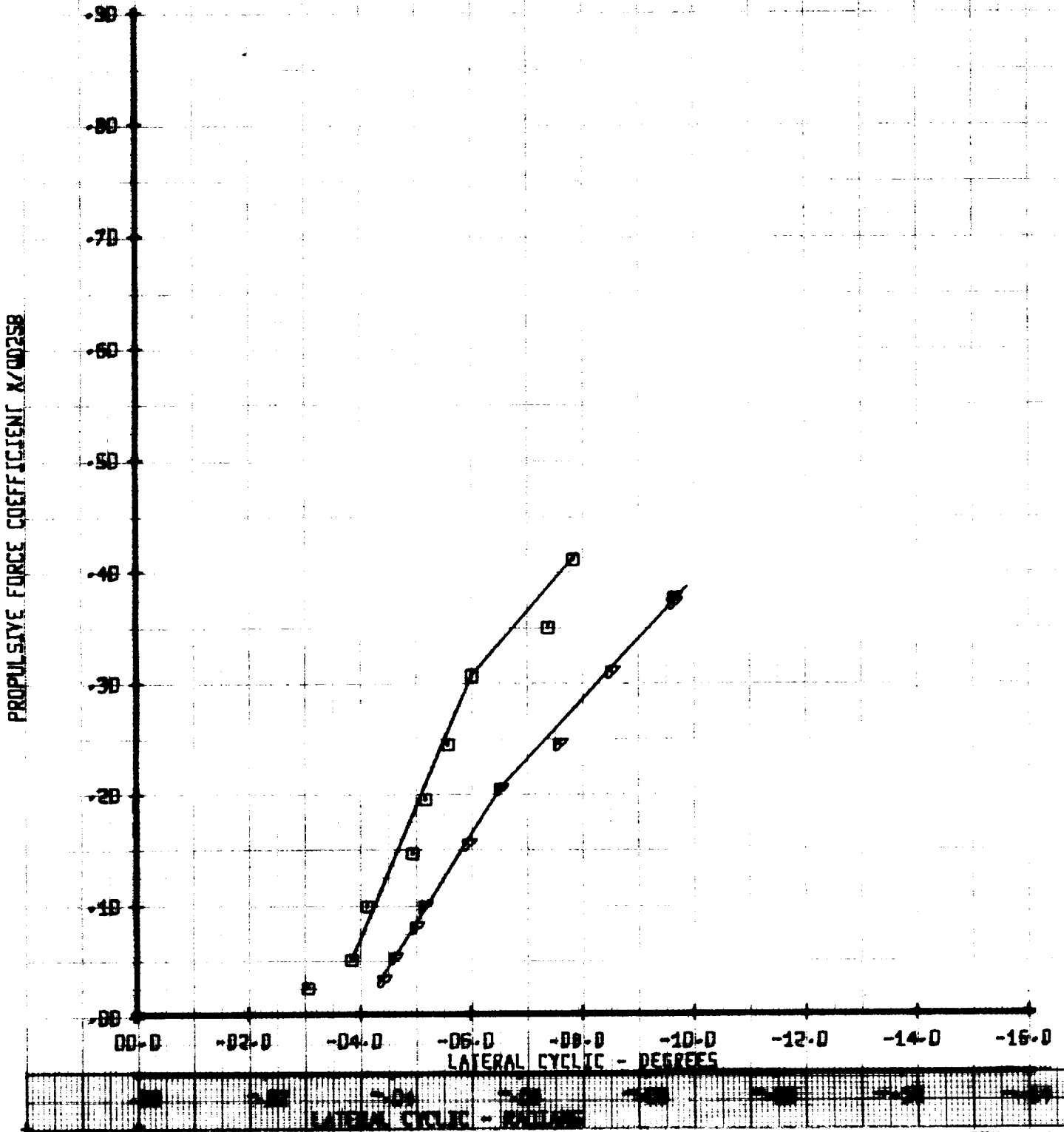
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT' / 258	VTUN	
□	243	.45	.06	279	
▽	244	.45	.076	279	

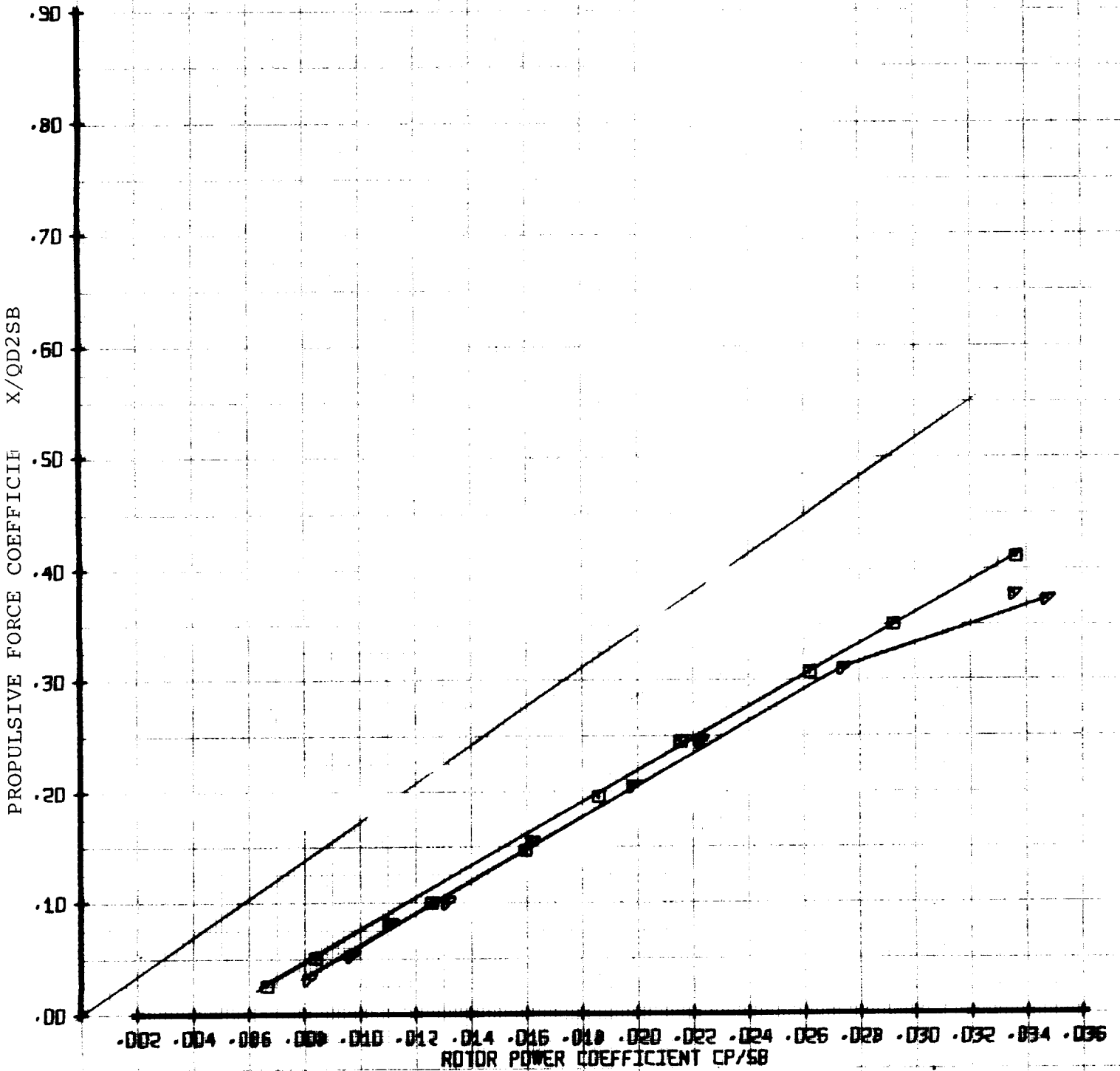
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MI'	CT' / SB	YTLN
SYM	RUN			
□	243	.45	.06	279
▽	244	.45	.076	279

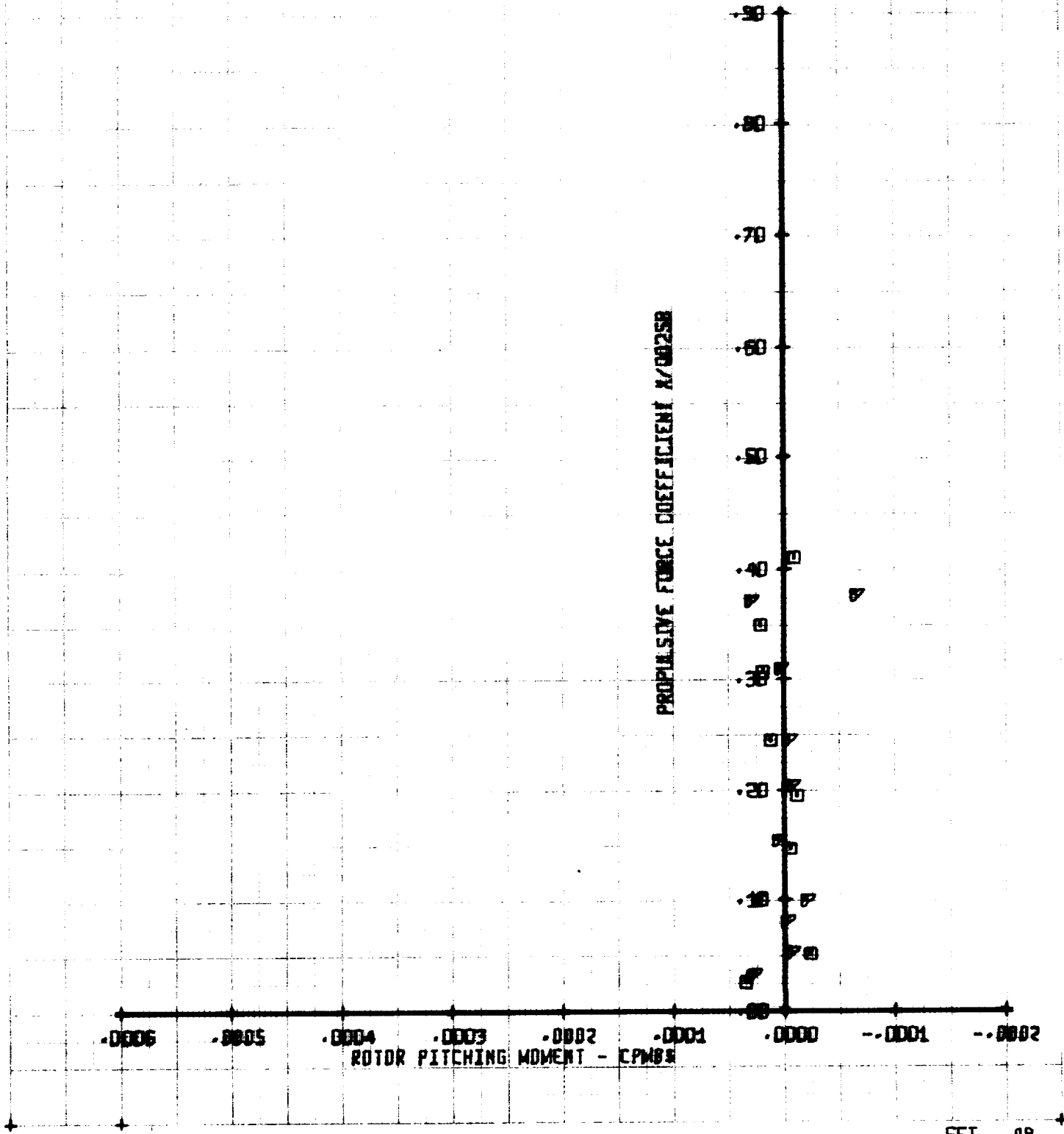
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUN		LEGEND		MU'		CT/58		YTLN	
□	▽	243	244	□	▽	.45	.45	.06	.076	279	279

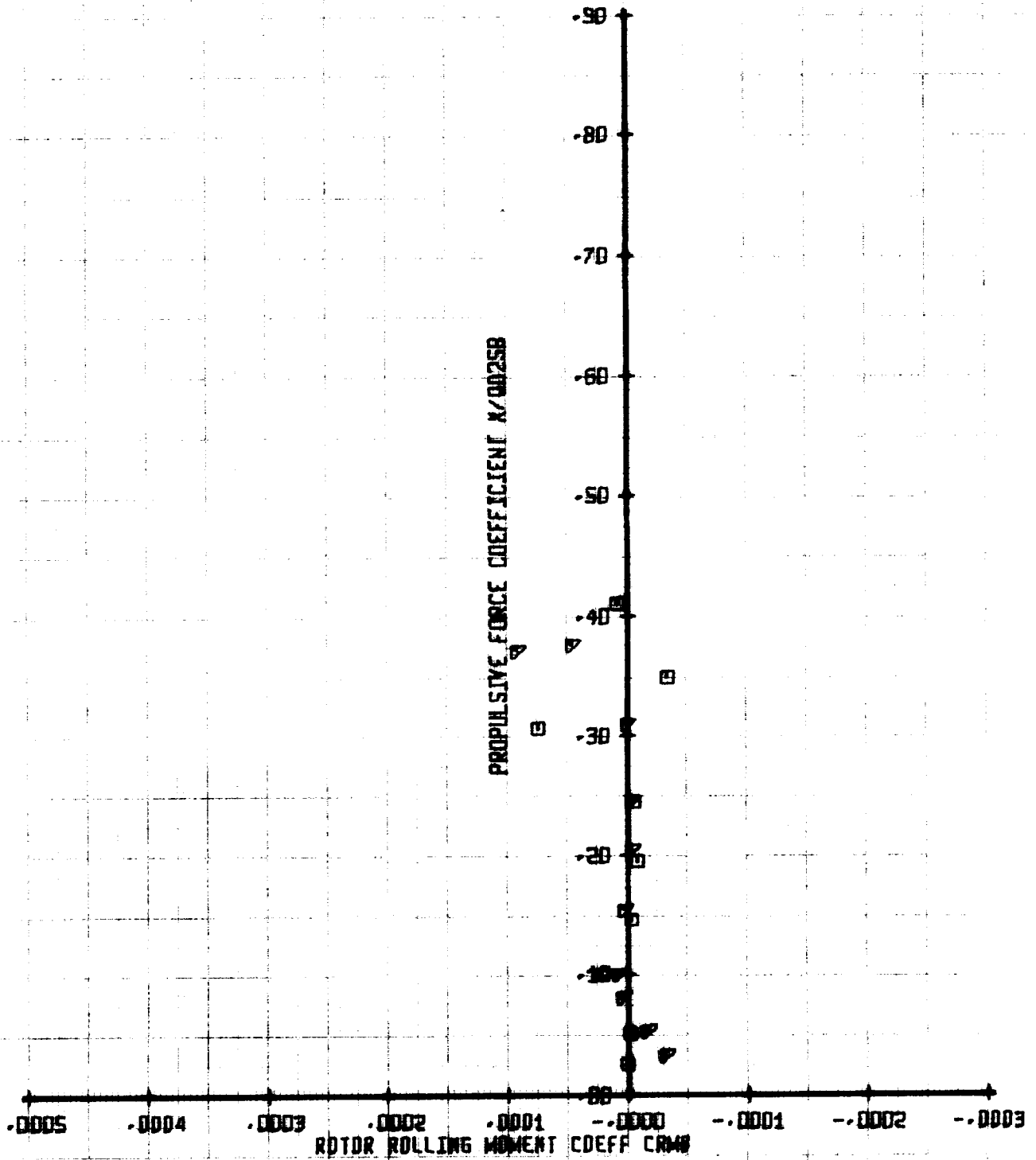
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	VRUN	
□	243	.45	.06	279	
△	244	.45	.076	279	

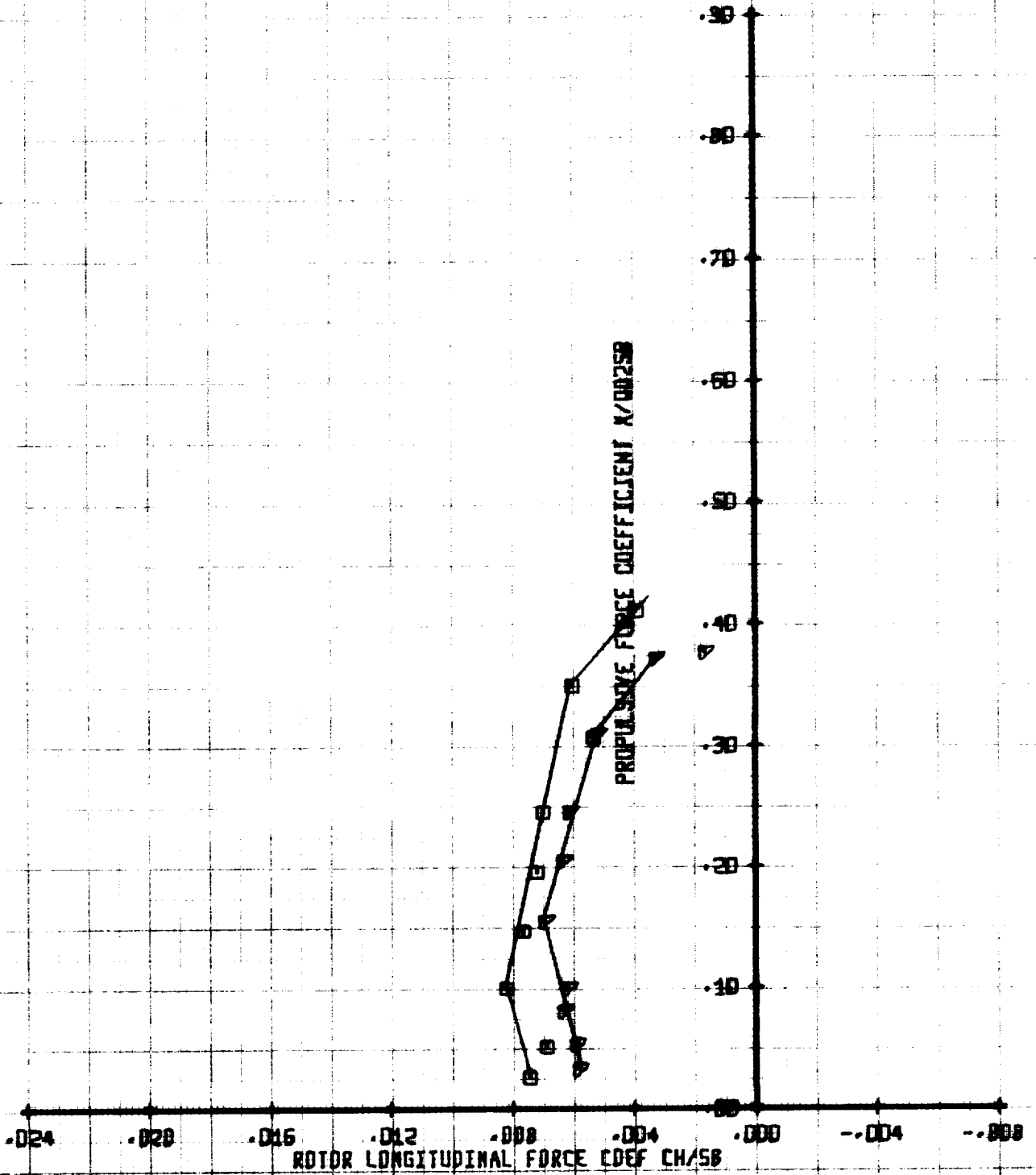
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MI'	CT/58	VILN
□	243	.45	.06	279
△	244	.45	.076	279

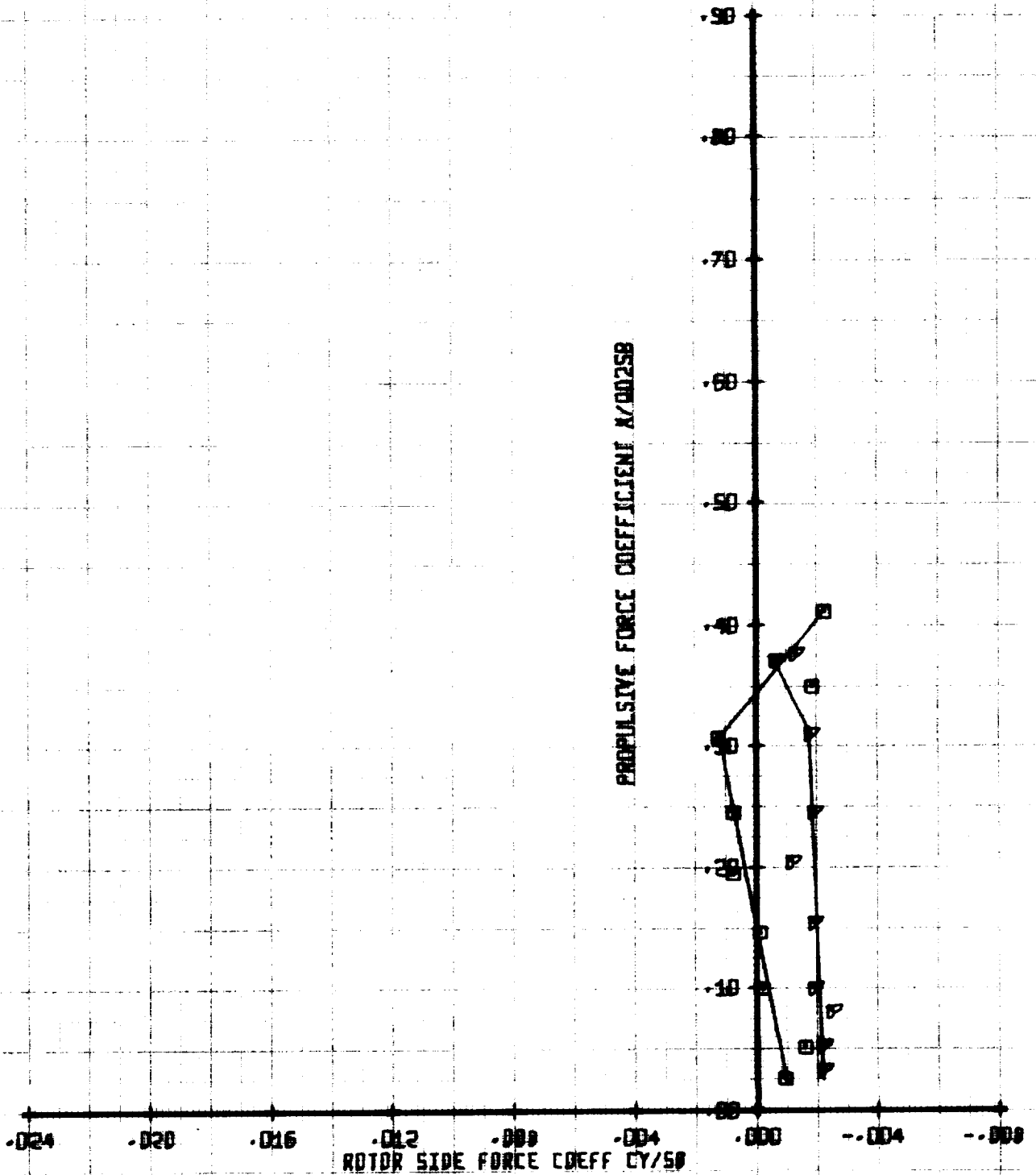
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-470 ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		LEGEND		
□	243	MU'	CT/50	Y/TUN
△	244	.45	.05	279
		.45	.076	279

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT

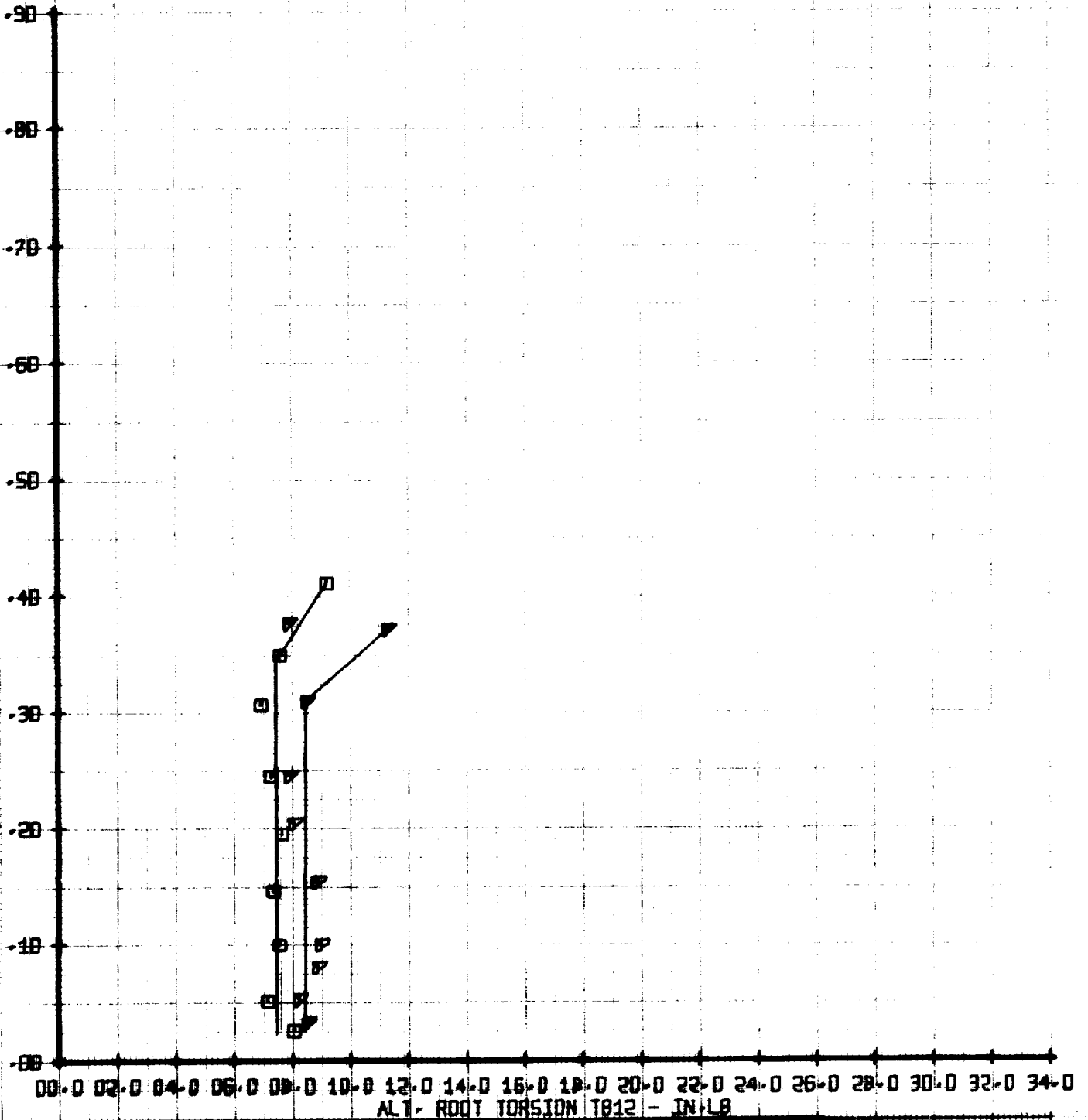


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MI'	CT'Y58	VTUN
SYM	RUN			
□	243	-45	-06	279
▽	244	-45	-076	279

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12

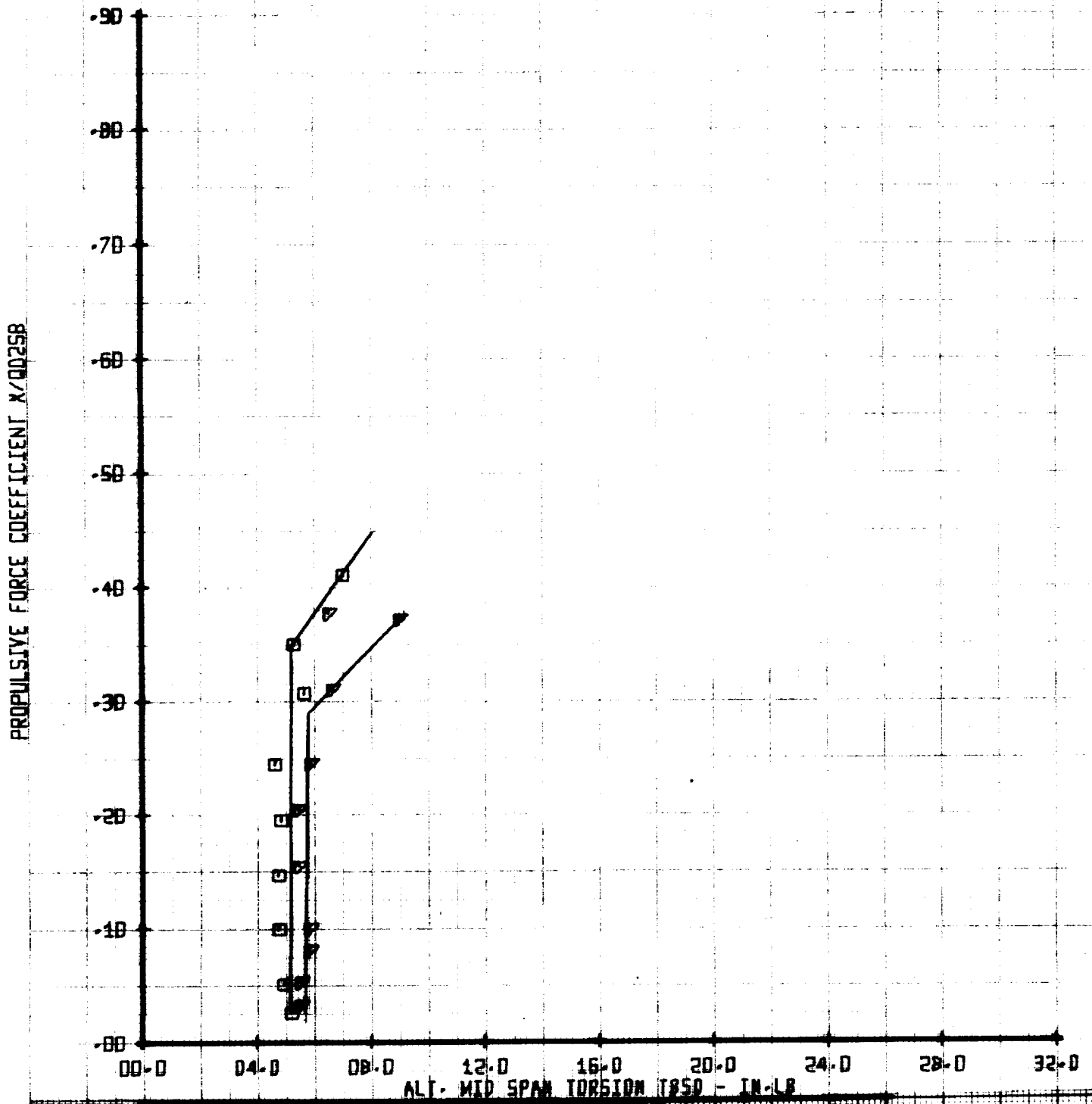
PROPULSIVE FORCE COEFFIC IT X/00258



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT' / SB	VTUN
□	243	.45	.06	279
▴	244	.45	.076	279

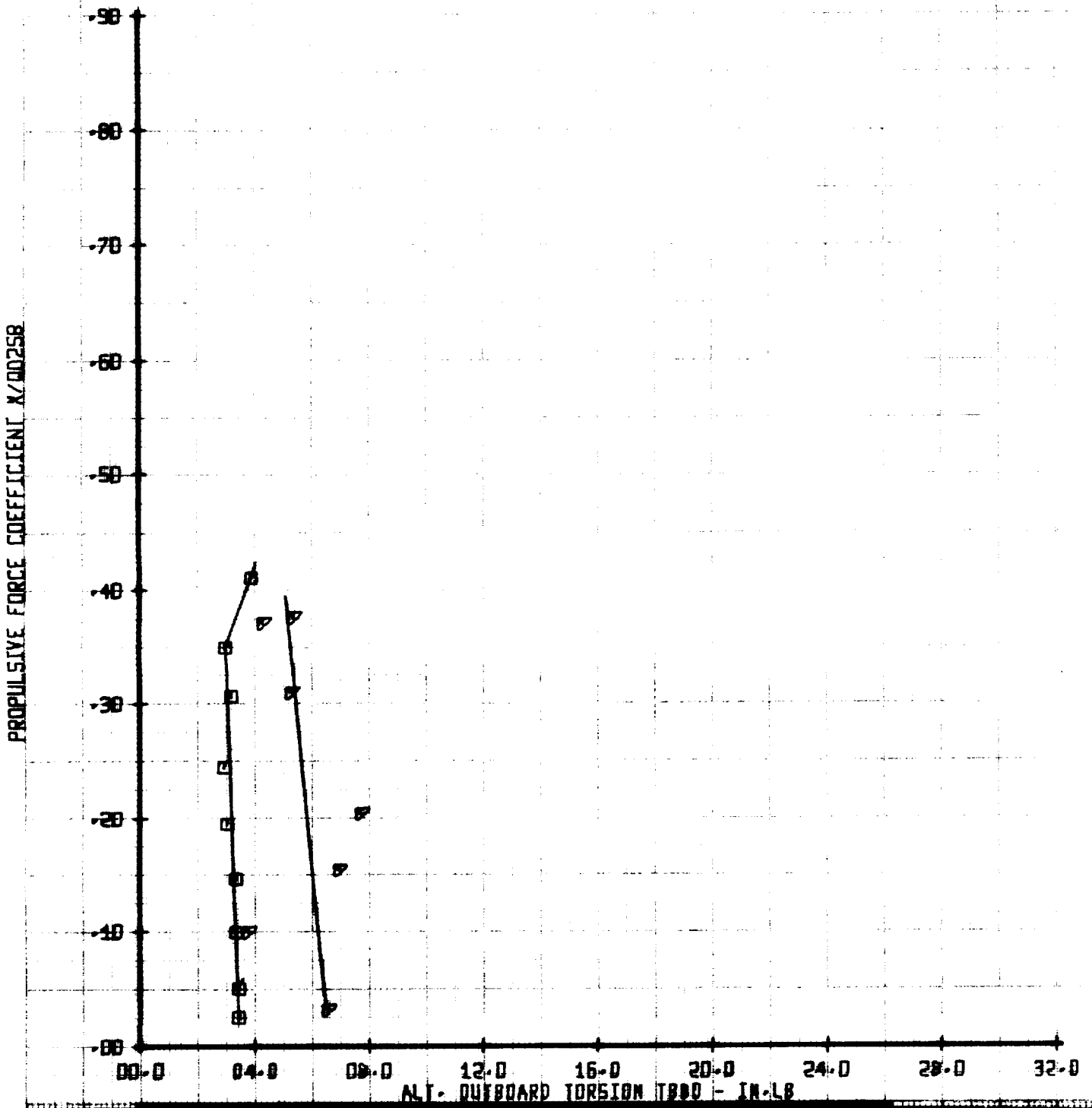
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT' / 58	VTUN
□	243	.45	.06	279
▽	244	.45	.076	279

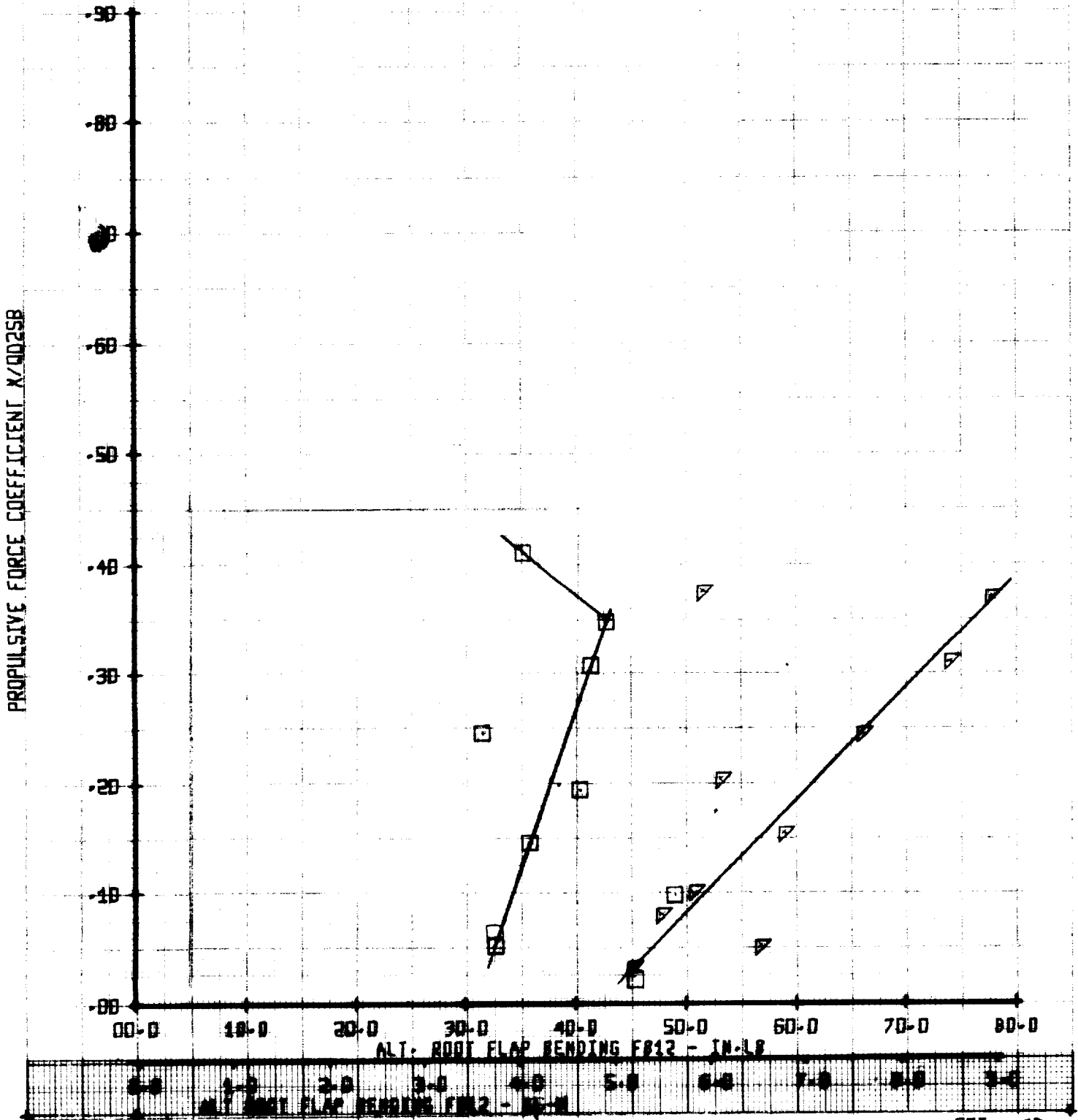
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB80



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	ML'	CT'YSB	VTUN	
□	243	.45	.06	279	
▽	244	.45	.076	279	

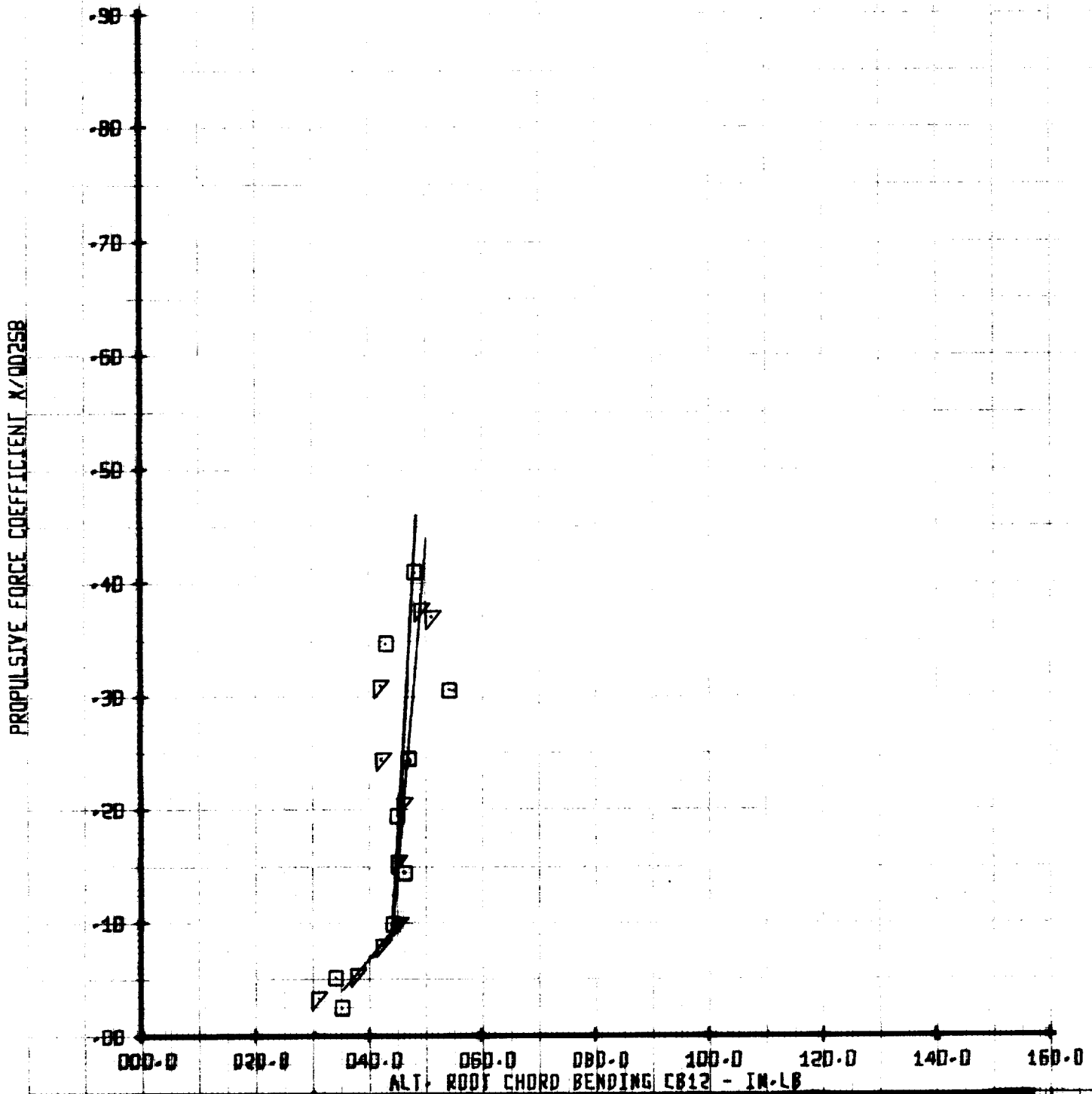
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	ML'	CT'/58	VTUN
□	243	.45	.06	279
▽	244	.45	.076	279

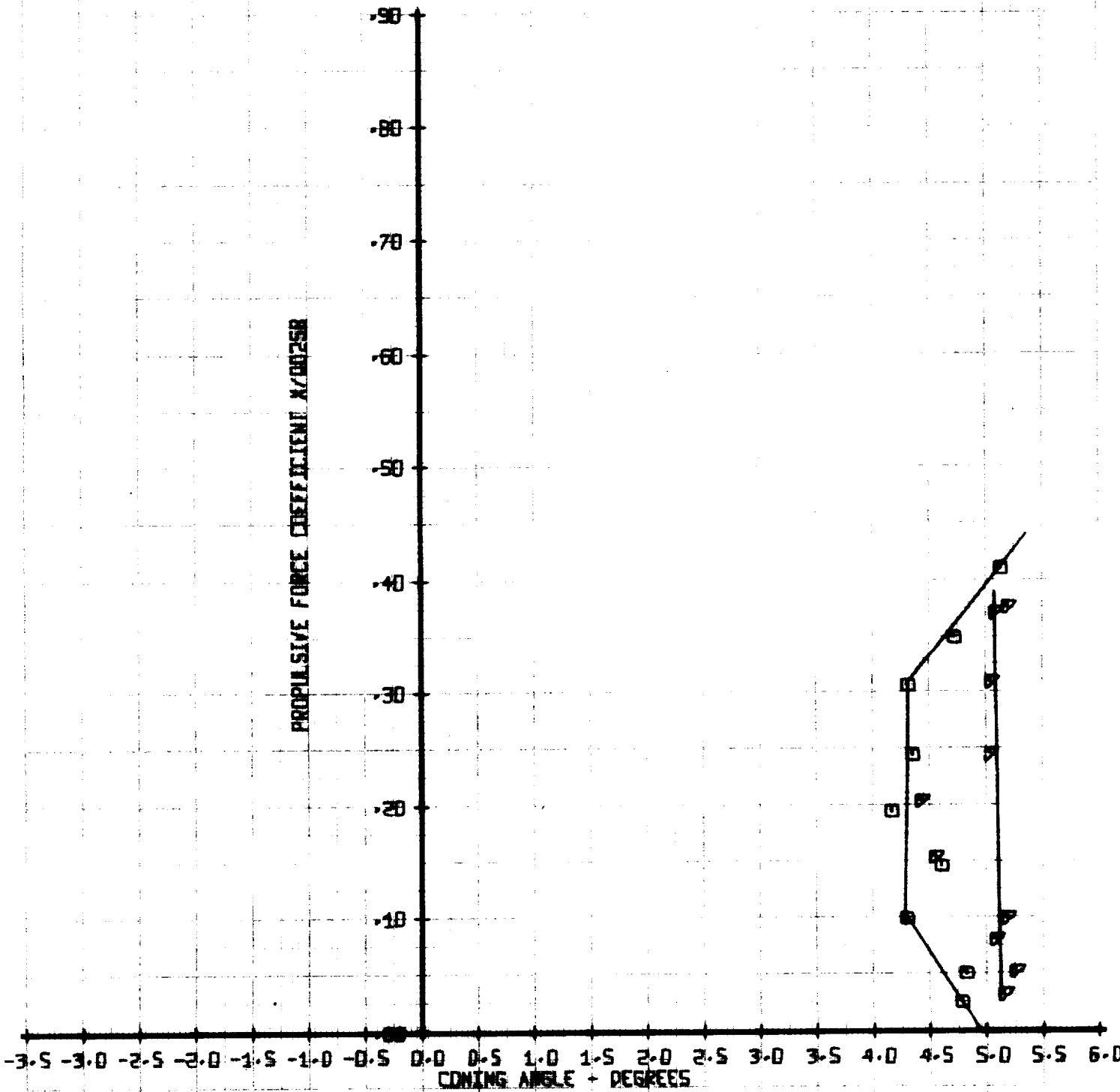
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MU'	CT' / SB	YTUN
SYM	RUN	.45	.06	279
9	243	.45	.076	279

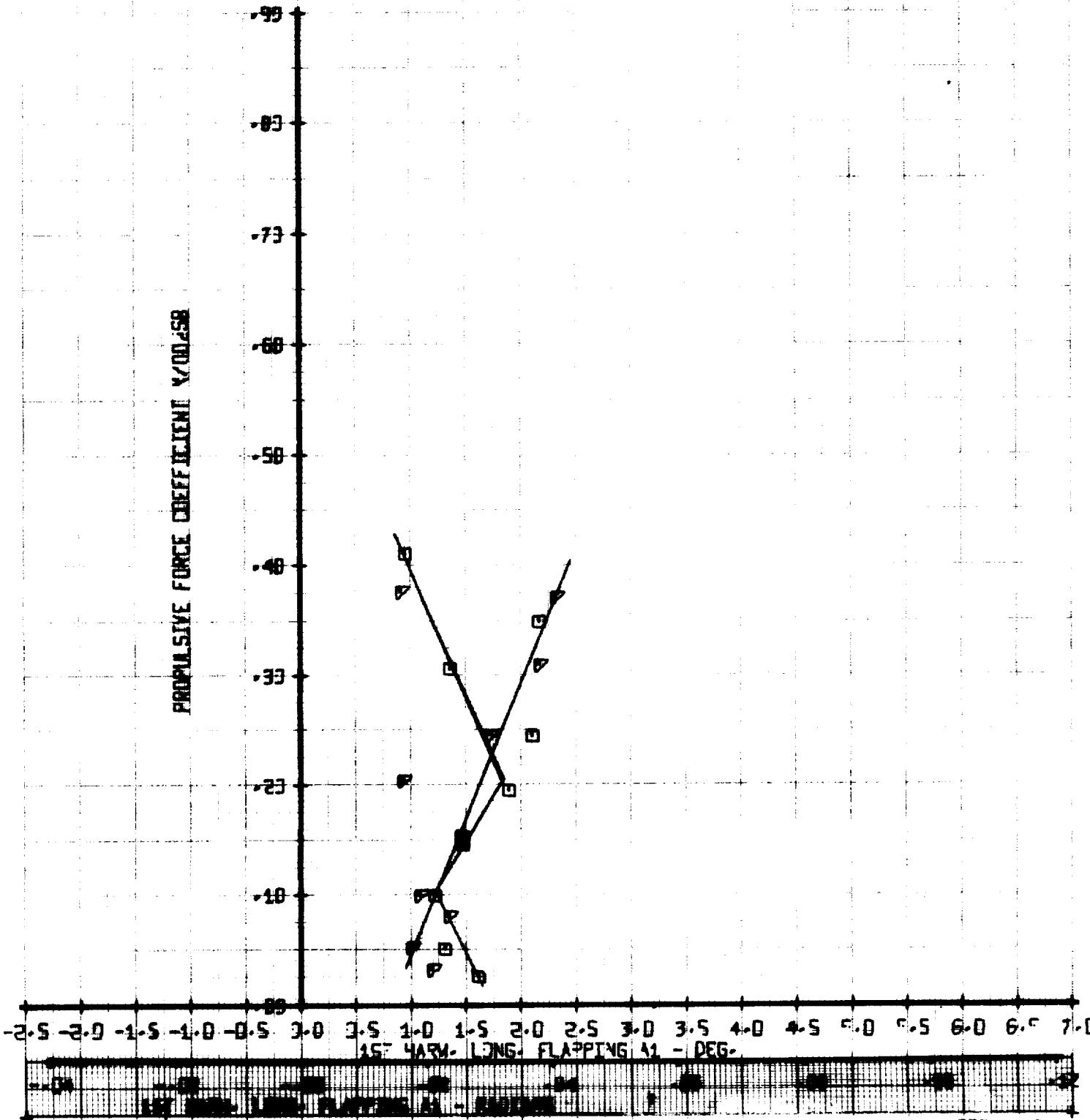
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 CONING ANGLE



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	L ² /58	YTUN	
□	243	.45	.06	279	
△	214	.45	.076	279	

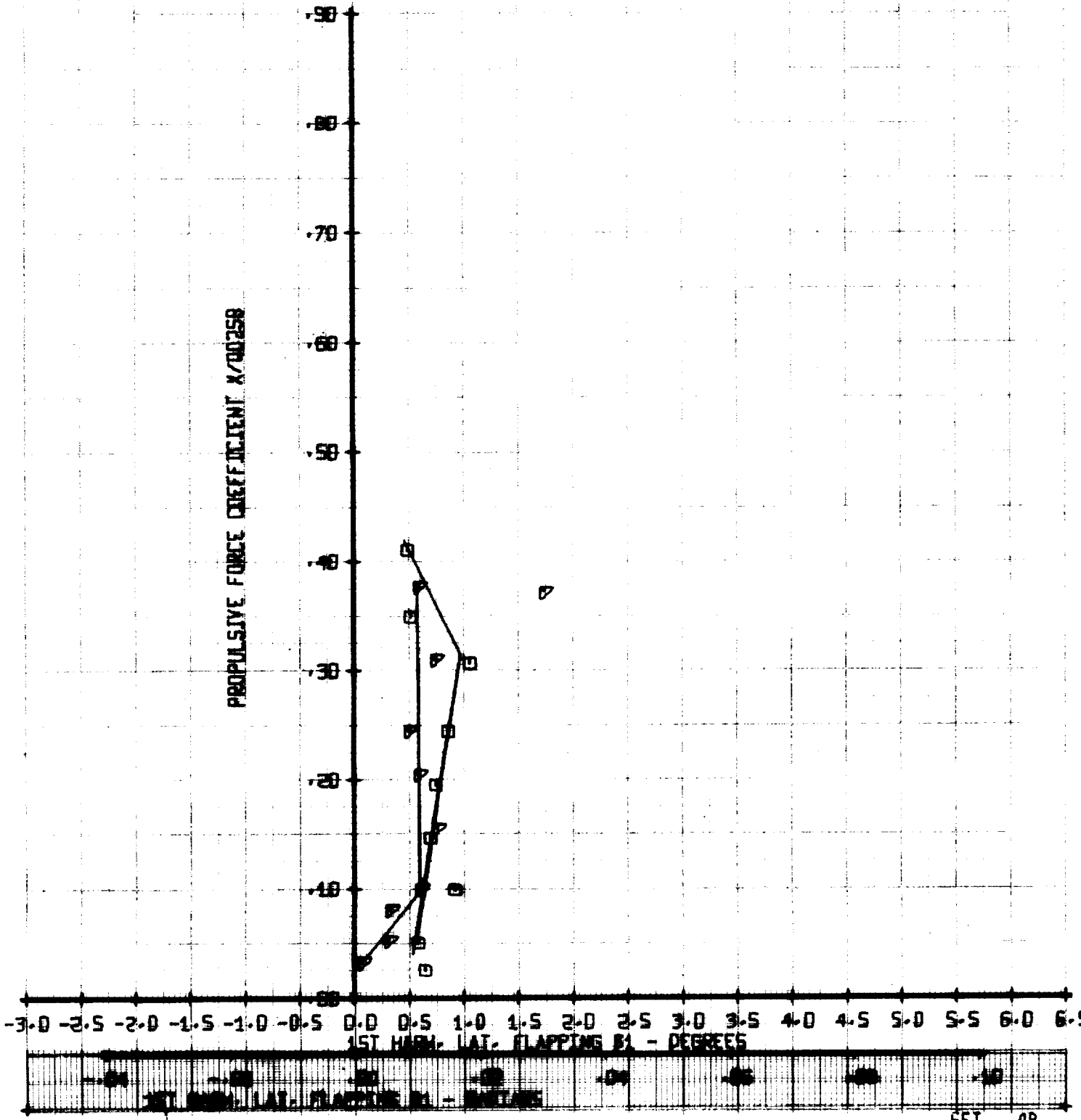
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYN		LEGEND		VTUN	
9	243	MU'	CT' / 58	279	
9	244	.45	.06	279	
		.45	.076		

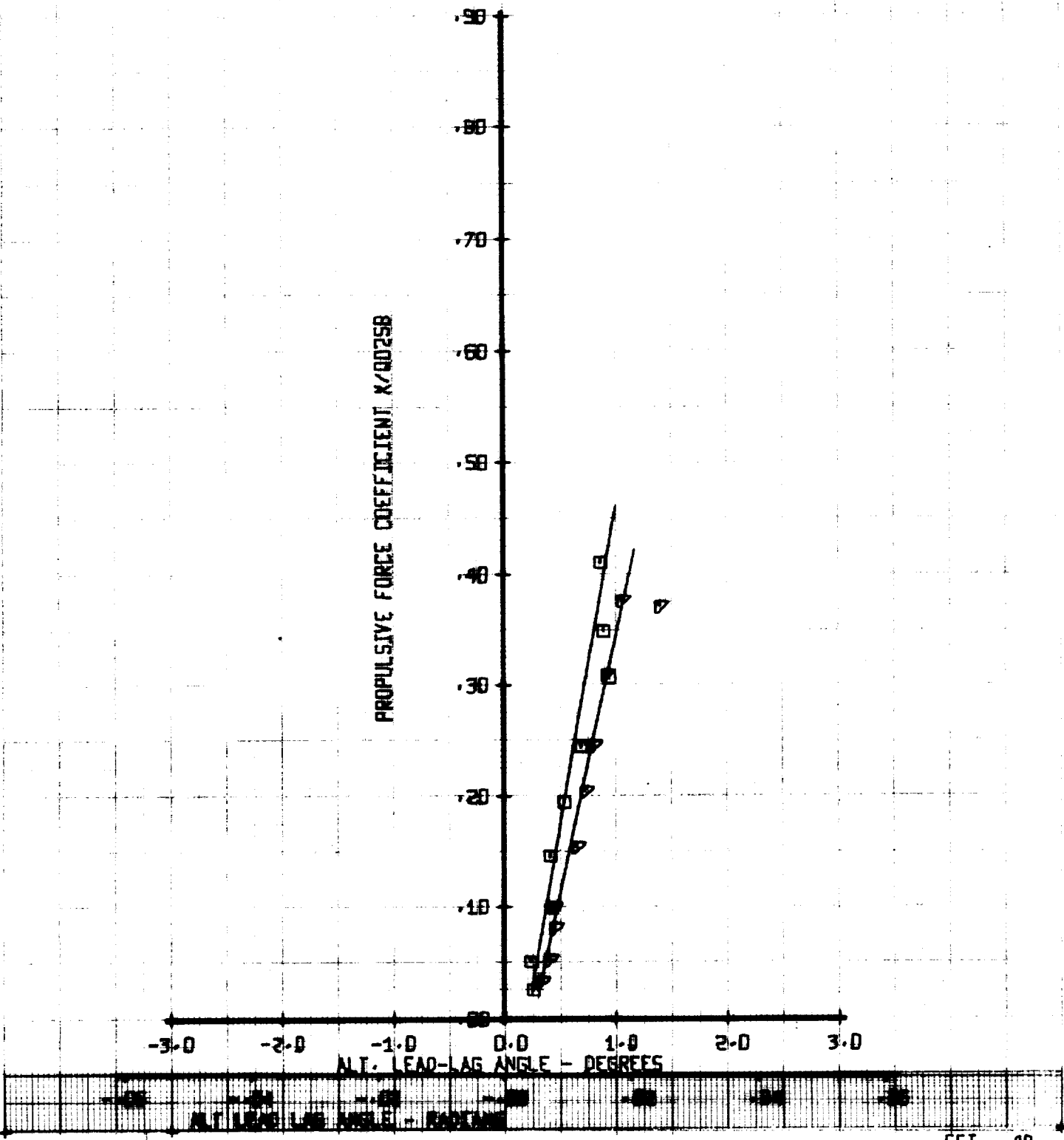
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND			
SYM	RUN	MLP	CT/58
□	243	.45	.06
△	244	.45	.076
			YOUNG
			279
			279

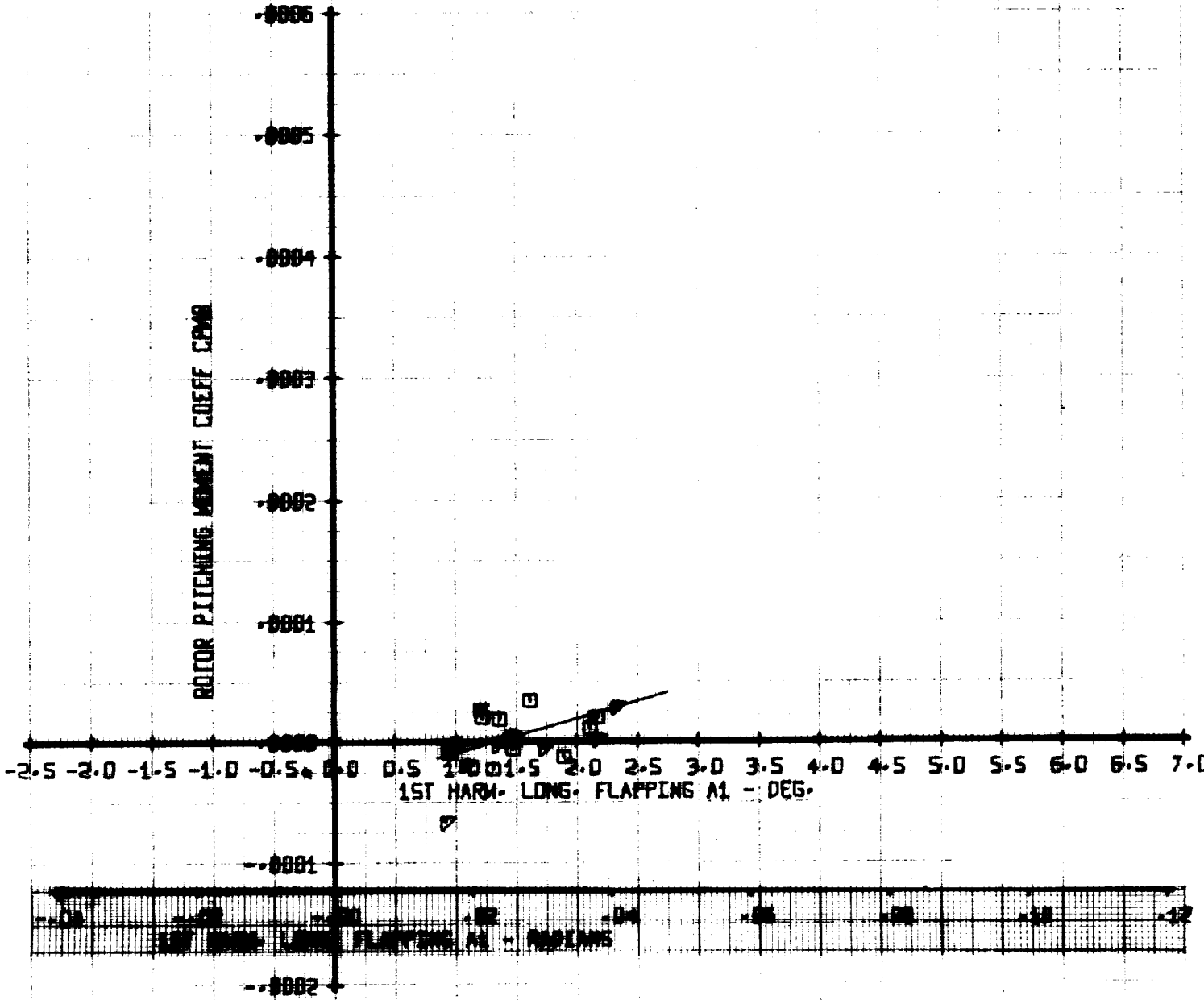
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYN		LEGEND		
SYM	RUN	MU'	CT' / SB	YTUN
□	243	.45	.06	279
▽	244	.45	.076	279

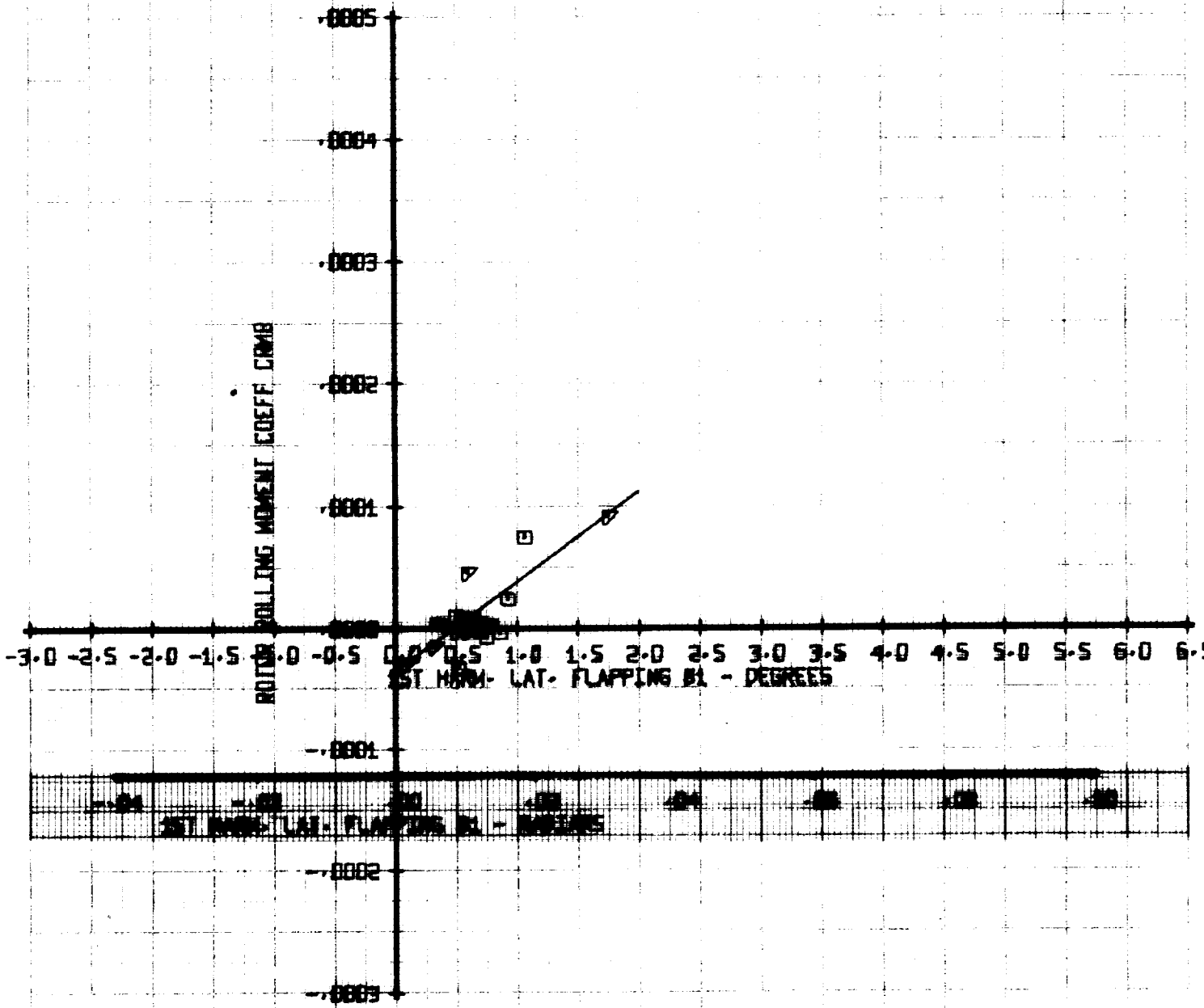
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/58	YTUN
□	243	.45	.06	279
△	244	.45	.076	279

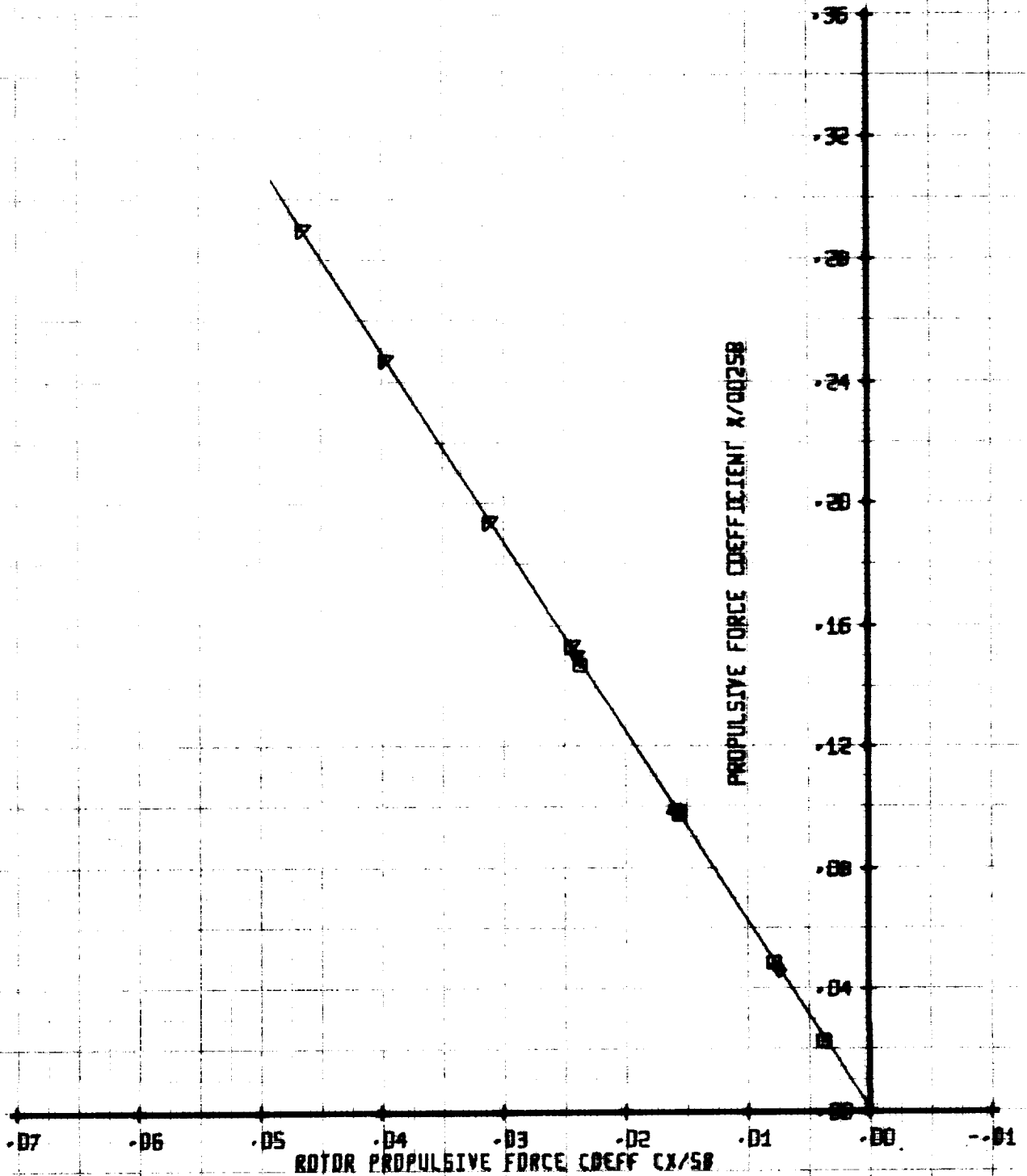
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MU'	CT'/SB	VTUN
SYM	RUN	.50	.06	311
□	232	.50	.06	311
△	233	.50	.06	311
◇	234	.50	.08	311
▽	235	.50	.08	311

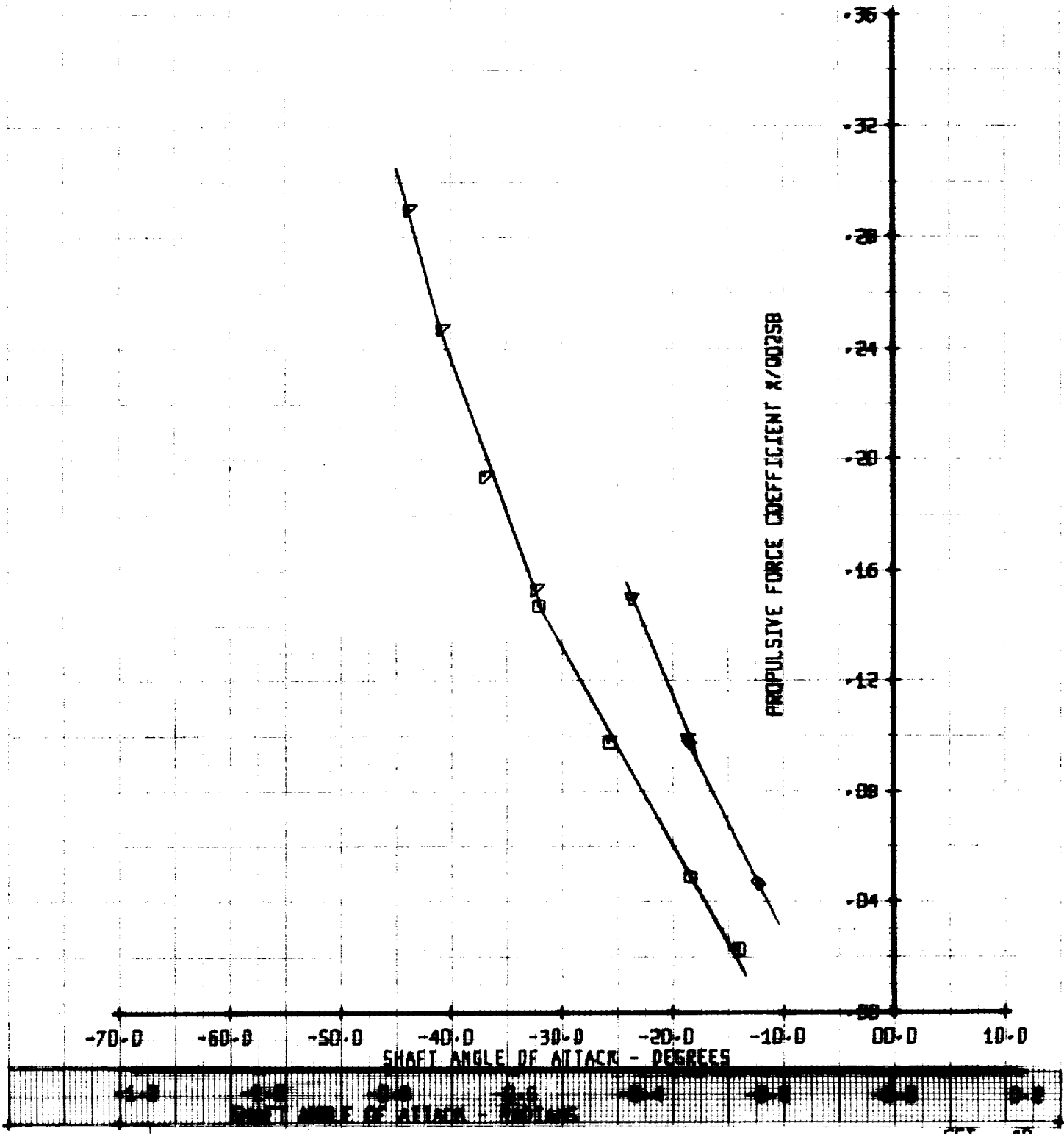
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MU'	CT'/SB	VTUM
□	232	.50	.06	311
△	233	.50	.06	311
◇	234	.50	.08	311
▽	235	.50	.08	311

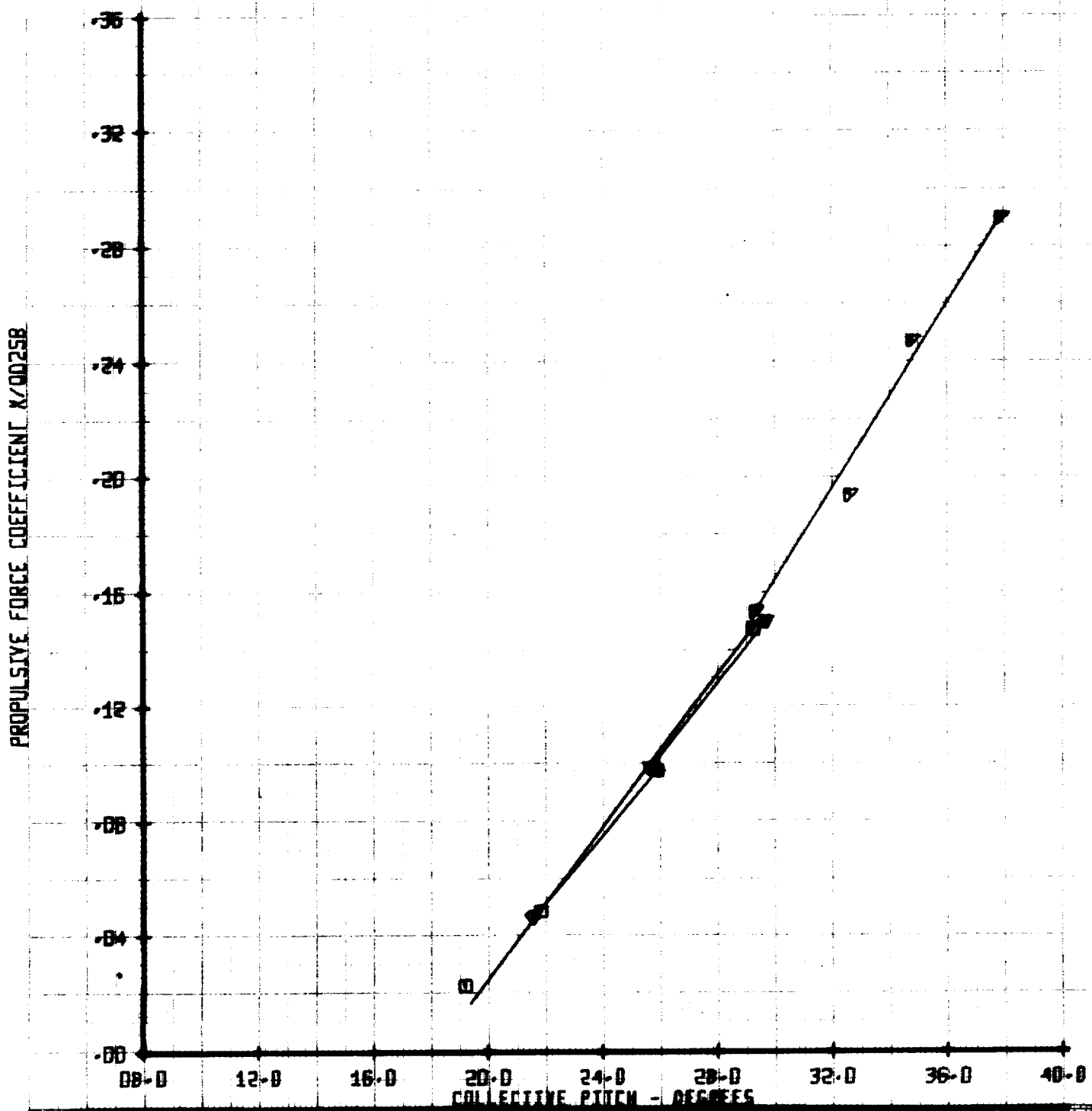
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MU'	CT/58	VTUN
□	232	.50	.06	311
△	233	.50	.06	311
◇	234	.50	.08	311
▽	235	.50	.08	311

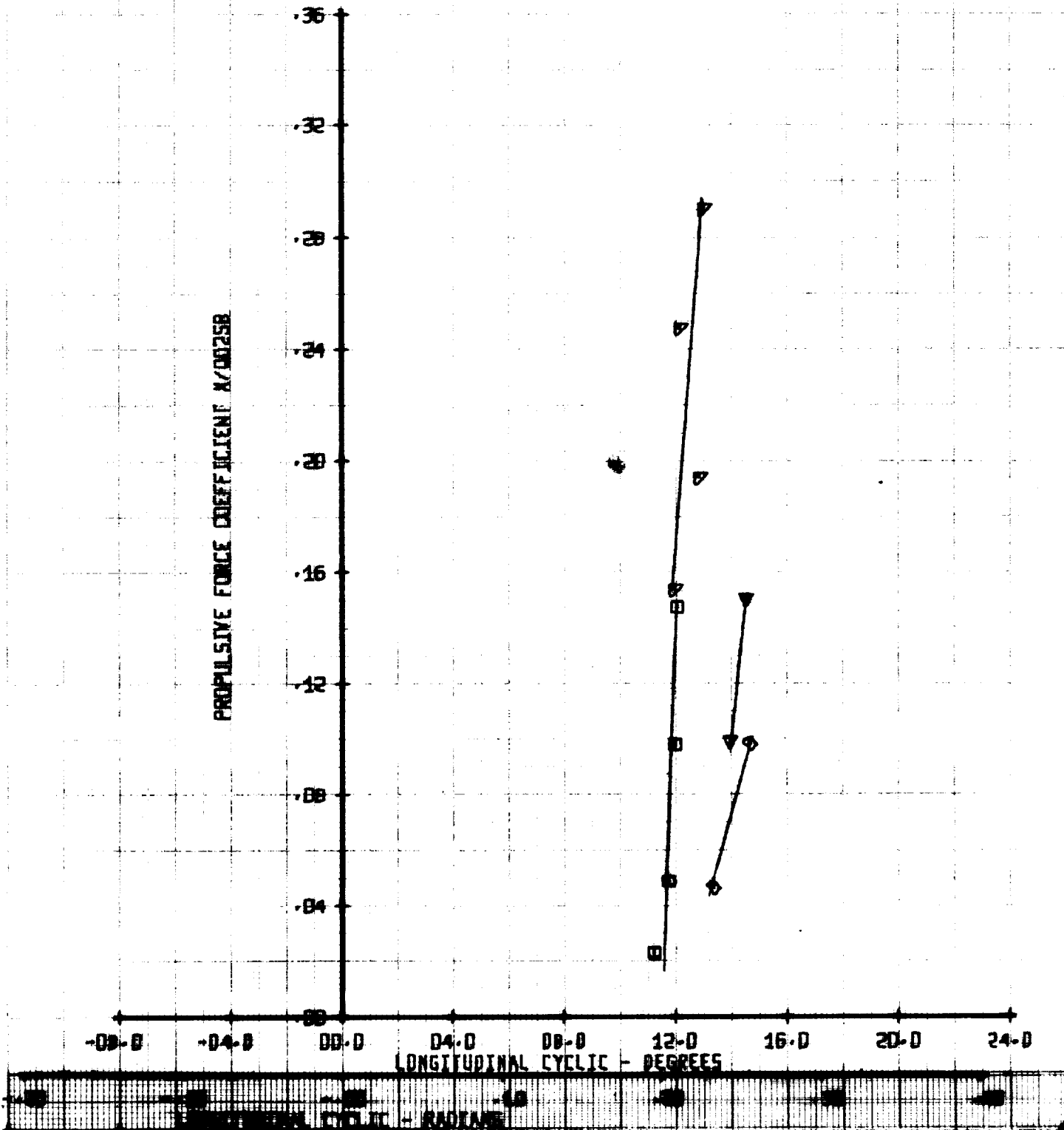
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND				
SYM	RUN	MU'	CT'/58	VTUN
□	232	.50	.06	311
△	233	.50	.06	311
◇	234	.50	.08	311
▽	235	.50	.08	311

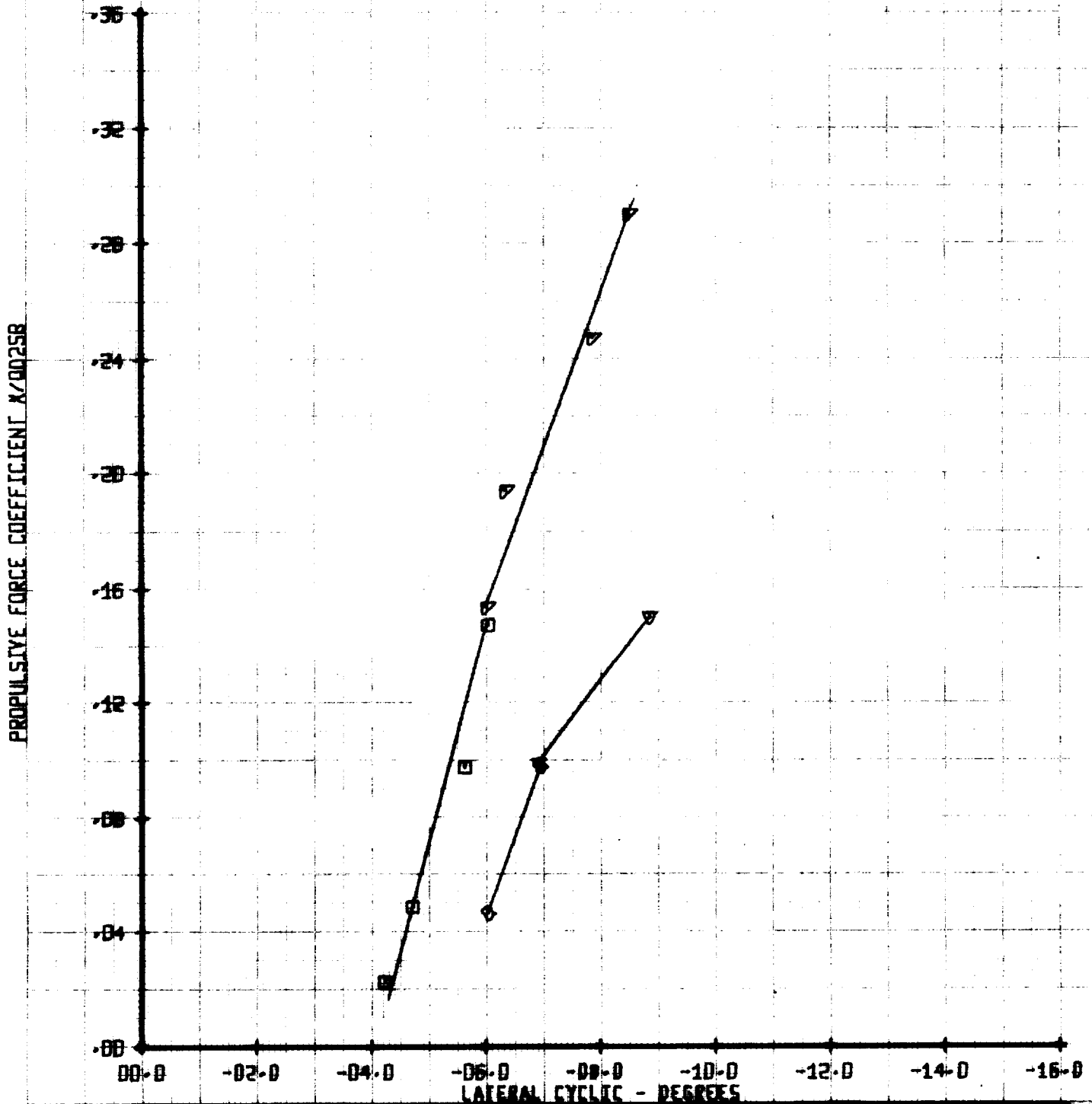
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MU	CT/58	VTUN
□	232	.50	.06	311
△	233	.50	.06	311
◇	234	.50	.08	311
▽	235	.50	.08	311

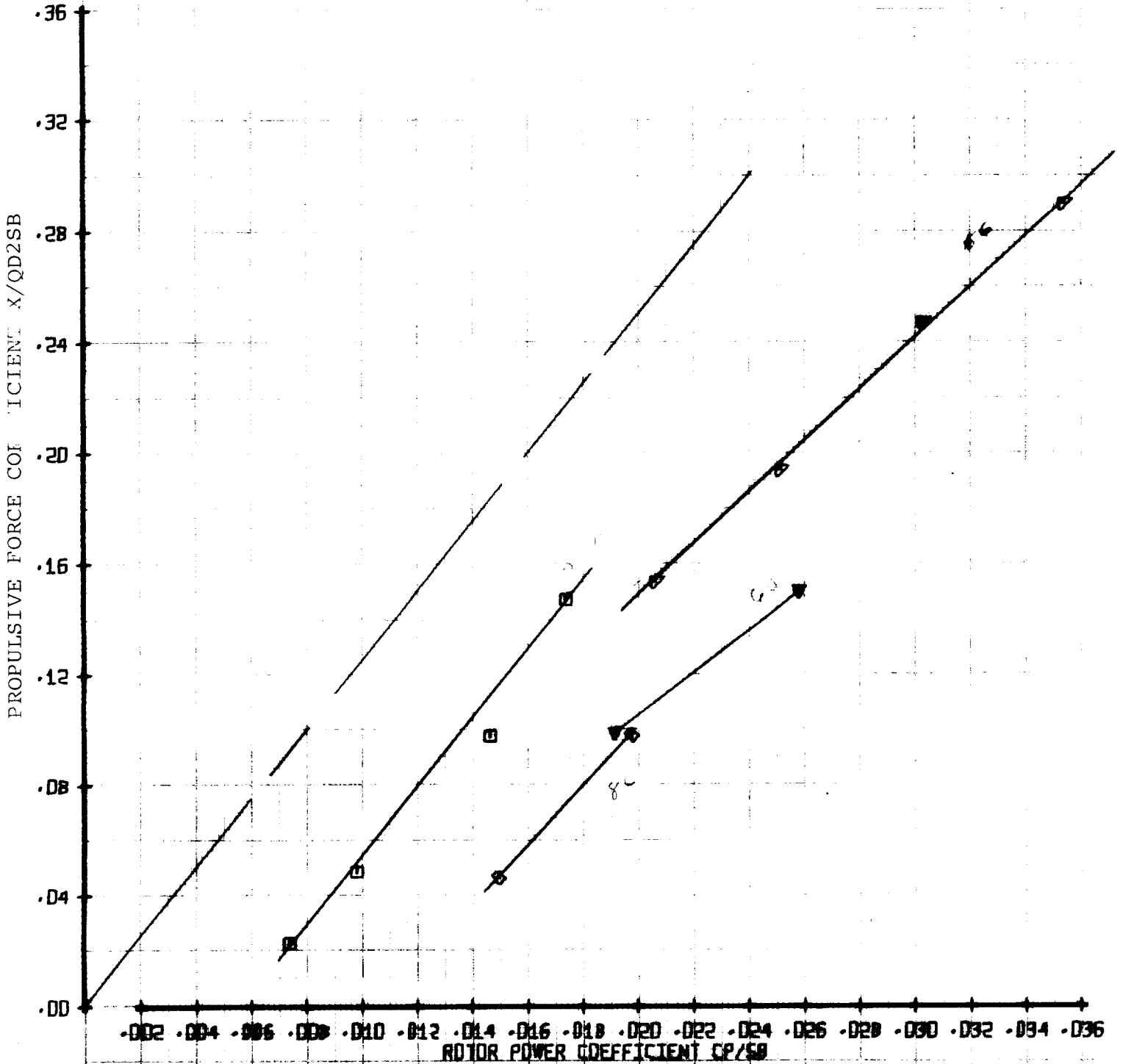
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	VTUN	
□	232	.50	.06	311	
△	233	.50	.06	311	
◇	234	.50	.08	311	
▽	235	.50	.08	311	

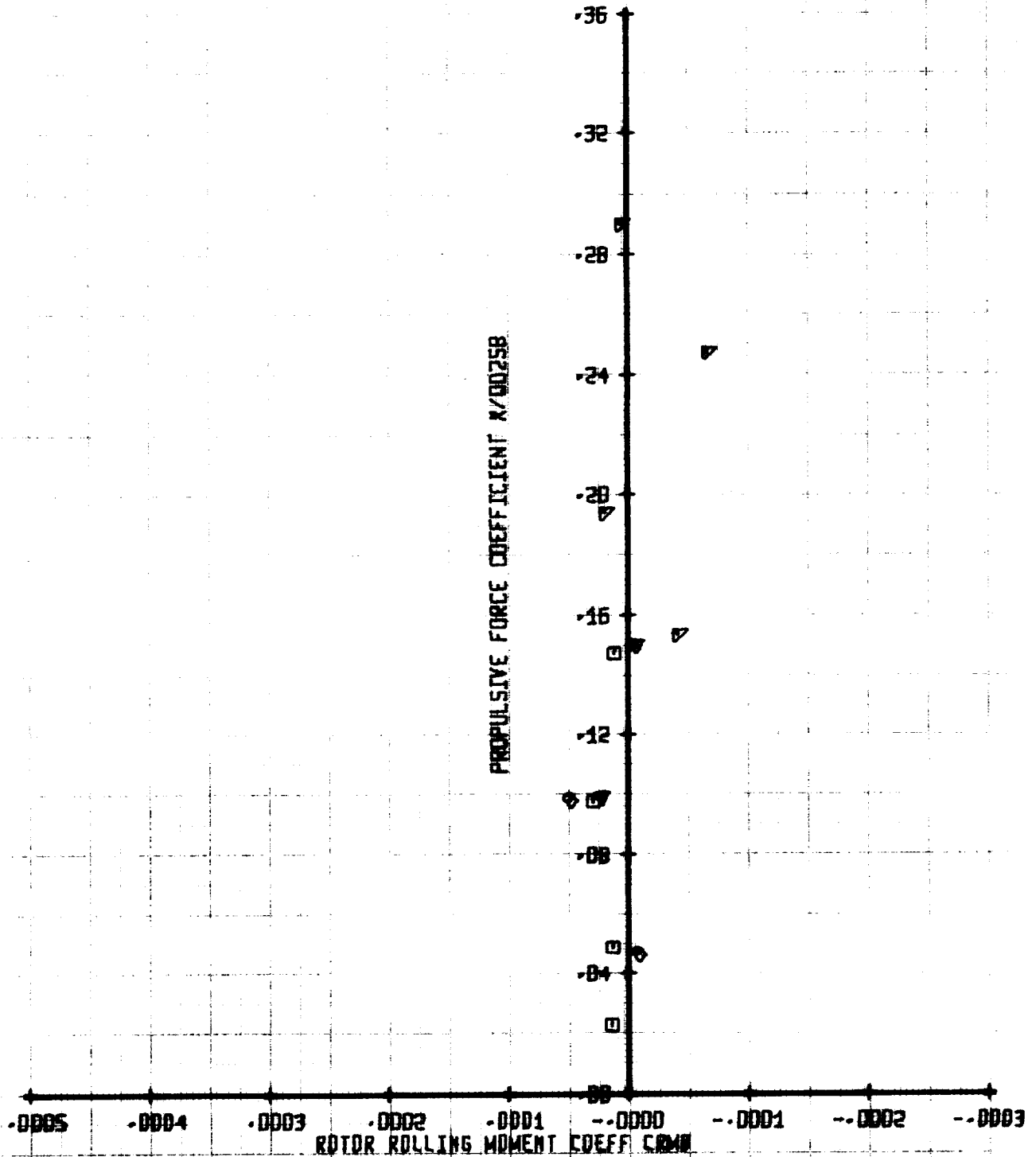
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUN		MULT		CT/YSB		VTUM	
□	□	232	232	.50	.50	.06	.06	311	311
◇	◇	234	234	.50	.50	.08	.08	311	311
▽	▽	235	235	.50	.50	.08	.08	311	311

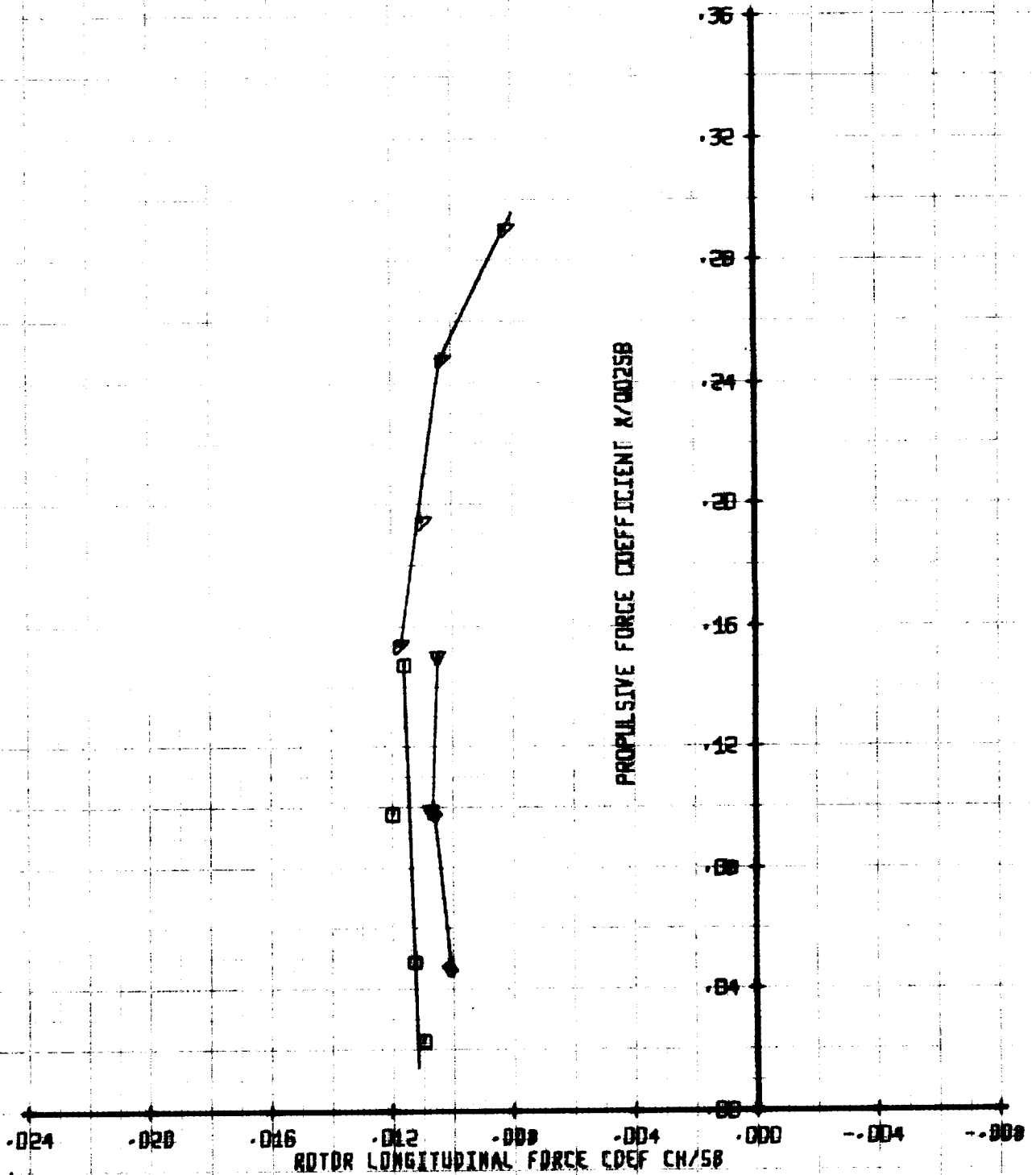
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	ML'	CT'/SB	VTUN
499B	232	.50	.06	311
	233	.50	.06	311
	234	.50	.08	311
	235	.50	.08	311

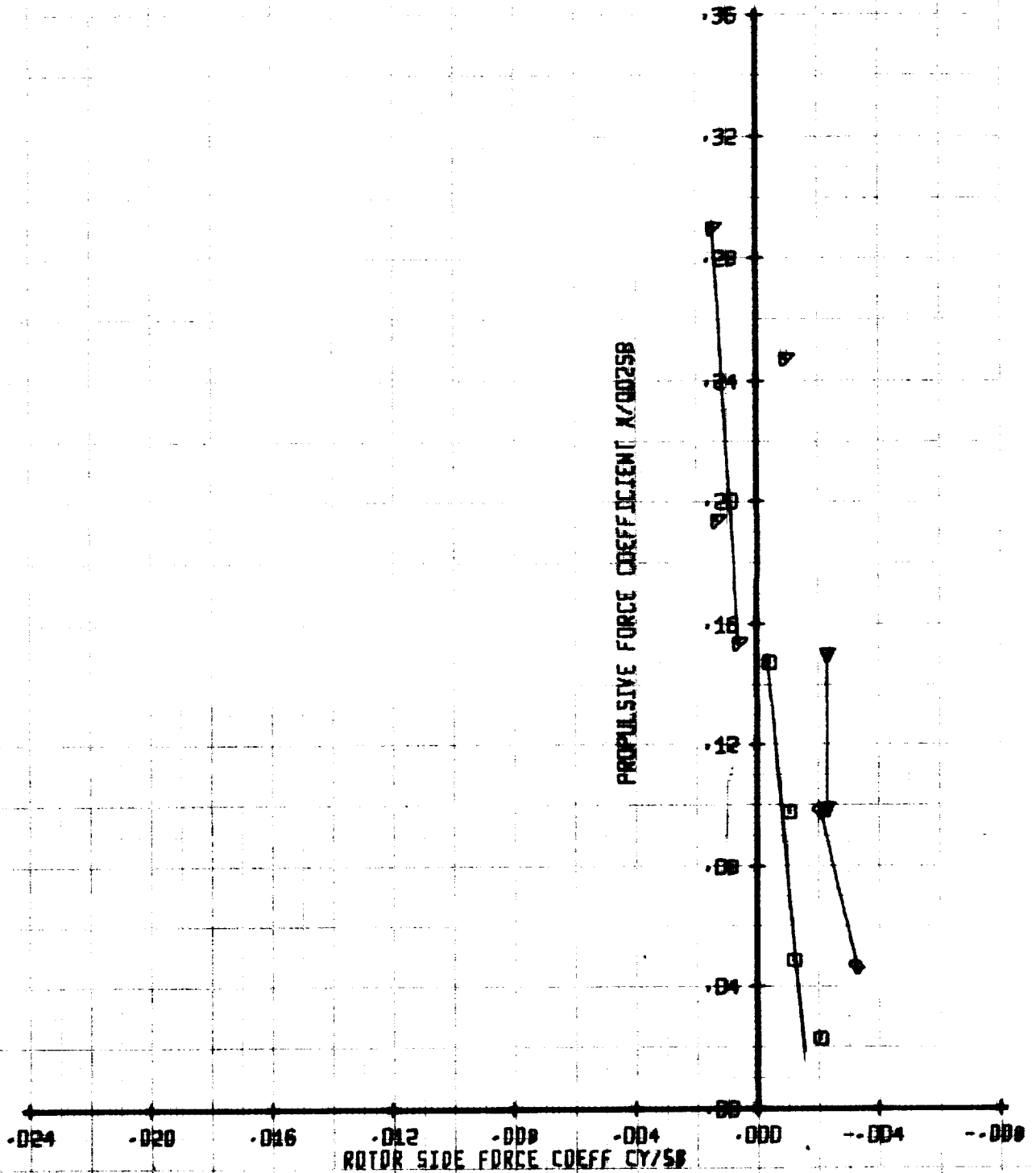
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MLI	CT/58	VTUN
□	232	.50	.06	311
◇	233	.50	.06	311
▽	234	.98	.08	311
△	235	.50	.08	311

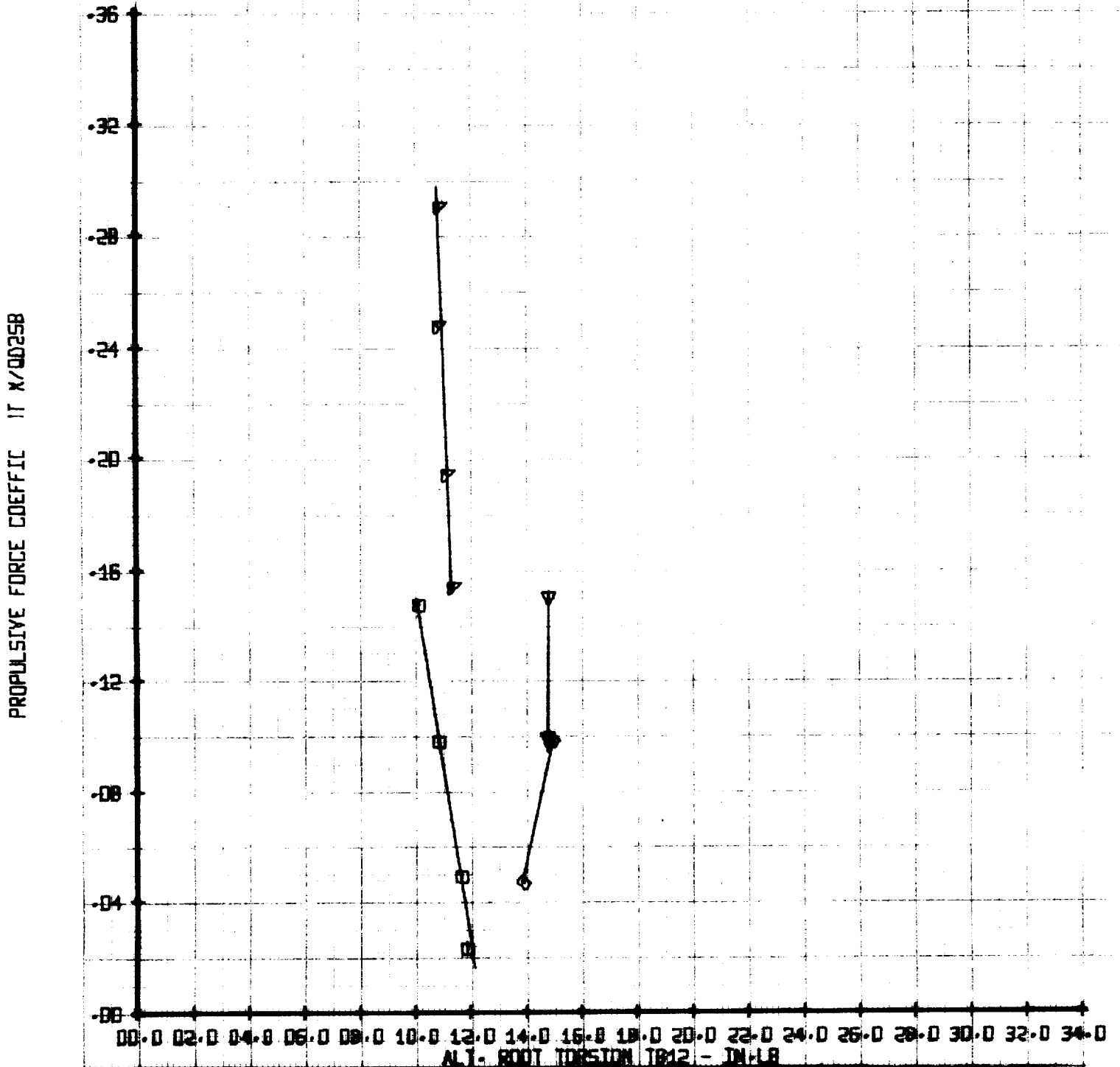
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MI'	CT'/58	YTLN
SYM	232	.50	.06	311
□	233	.50	.06	311
◇	234	.50	.08	311
▽	235	.50	.08	311

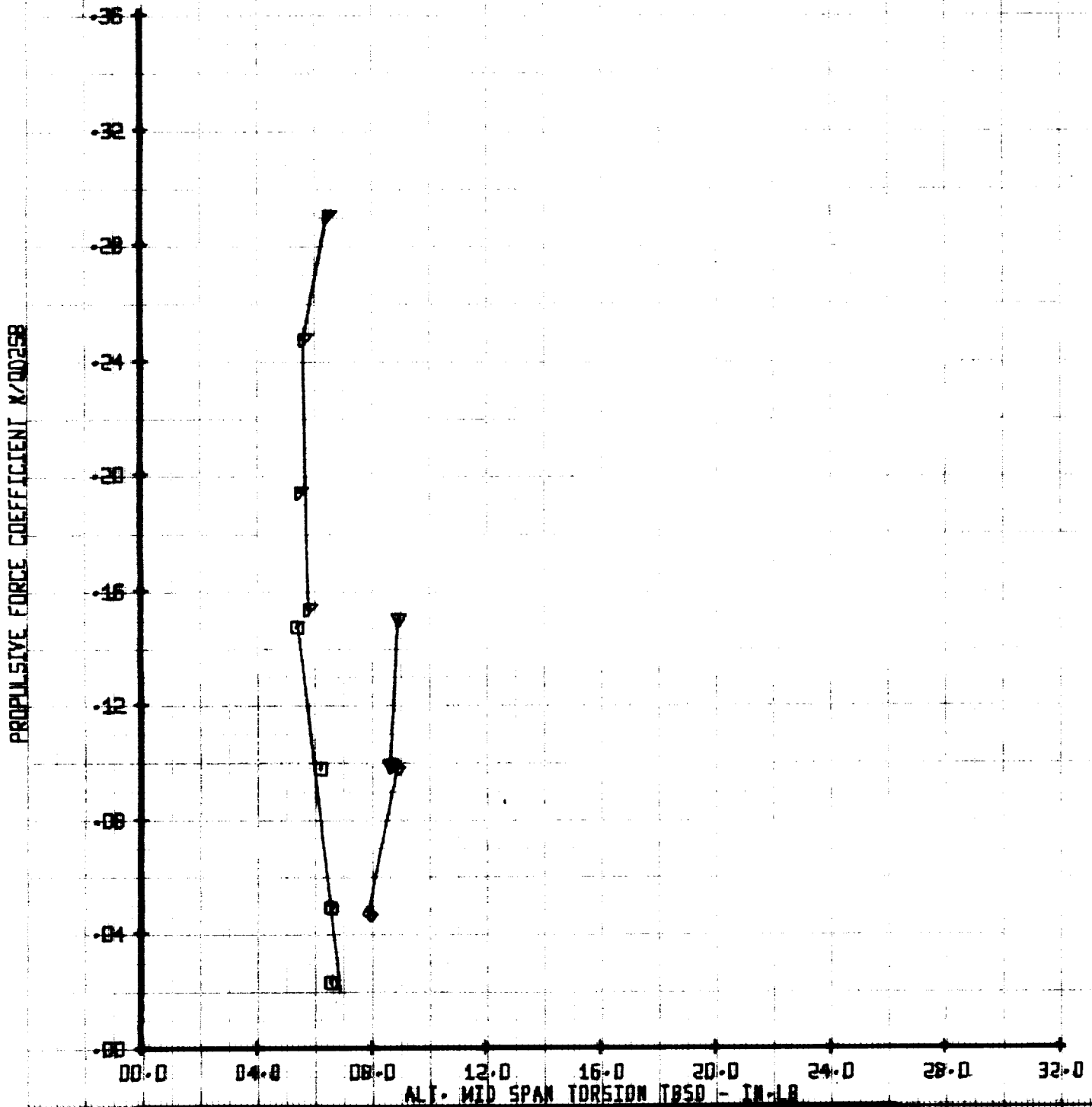
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MI	CT/58	YTIM	
□	232	.06	.06	311	
△	233	.06	.06	311	
◇	234	.08	.08	311	
▲	235	.08	.08	311	

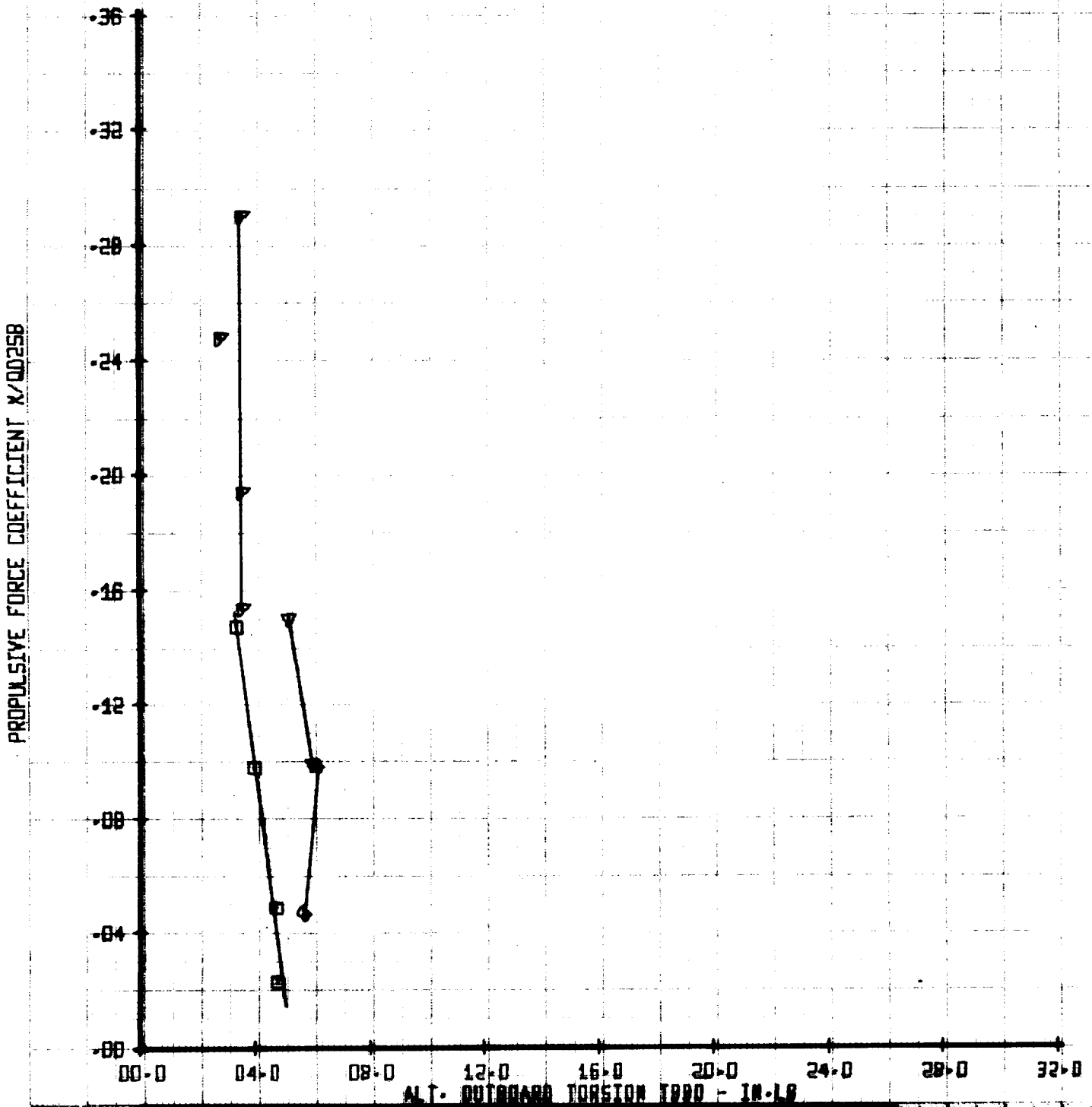
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYMBOL		LEGEND		
SYMBOL	RUN	MLT	CT/58	VTUM
□	232	.50	.06	311
△	233	.50	.06	311
◇	234	.50	.08	311
▽	235	.50	.08	311

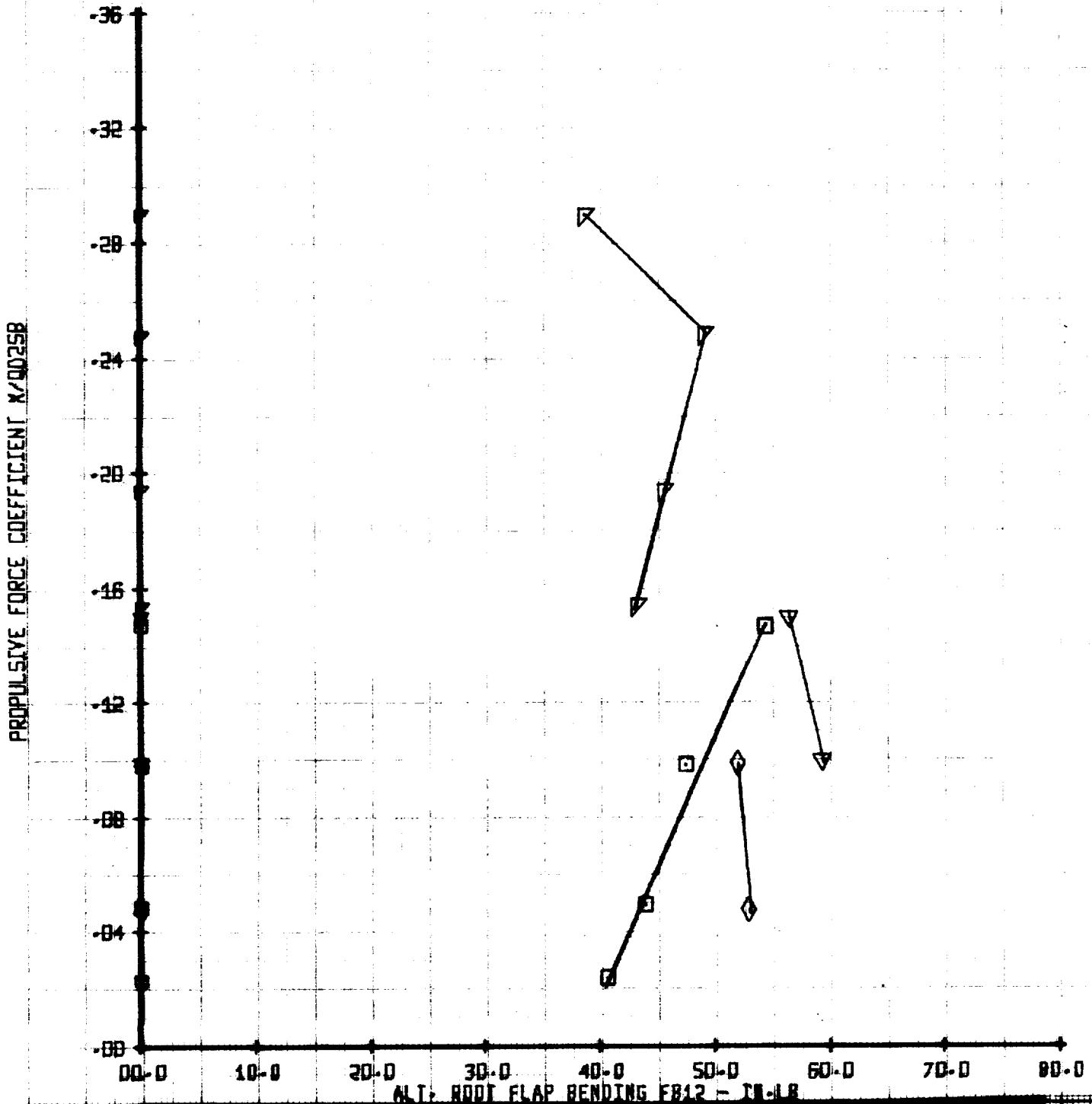
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB80



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MI'	CT'/SB	VTUN
□	232	.50	.06	311
▽	233	.50	.06	311
◇	234	.50	.08	311
▽	235	.50	.08	311

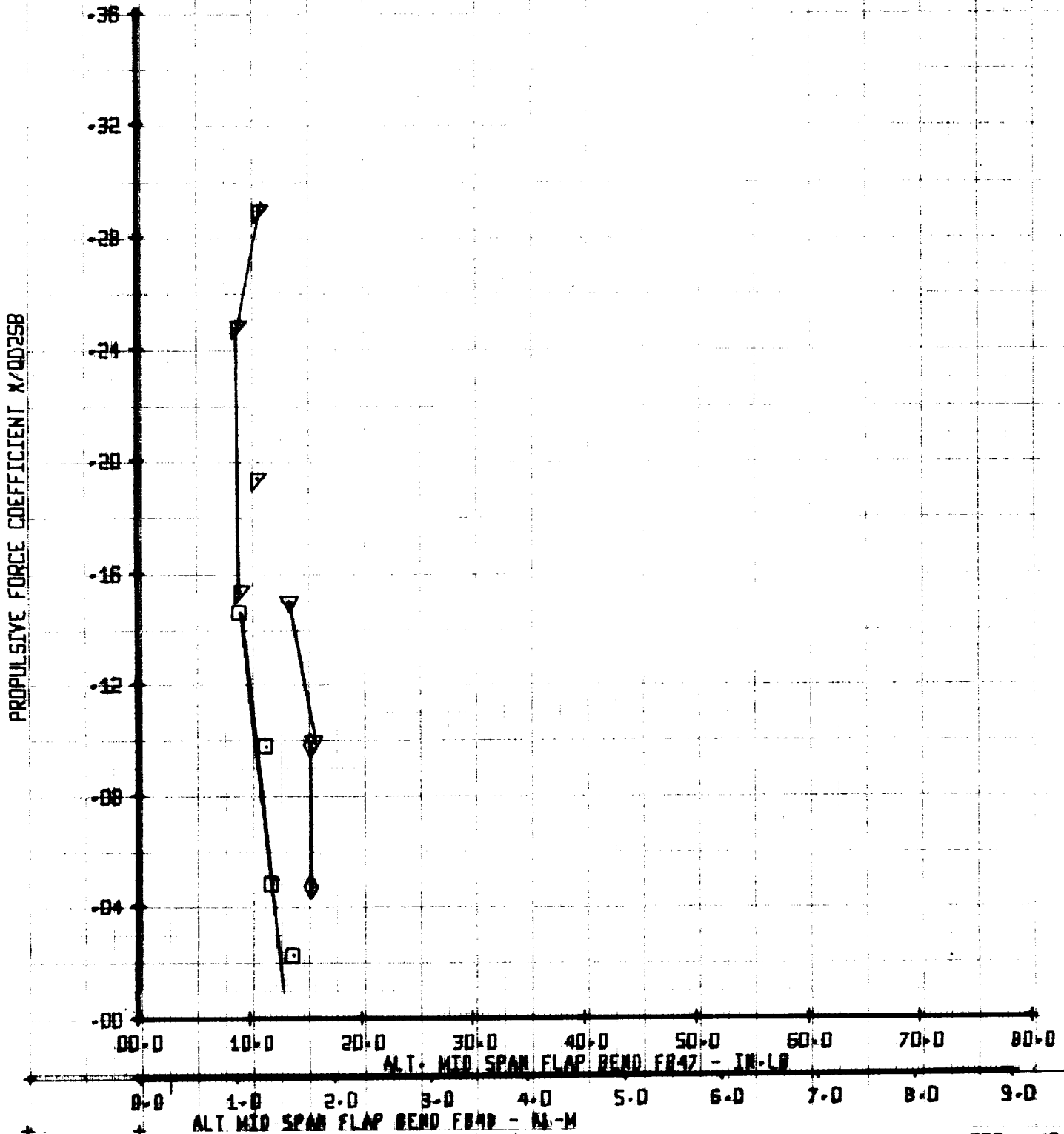
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FBI2



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SVM	RUN	ML'	CT'/58	VTUM
□	232	.50	.06	311
△	233	.50	.06	311
◇	234	.50	.08	311
▽	235	.50	.08	311

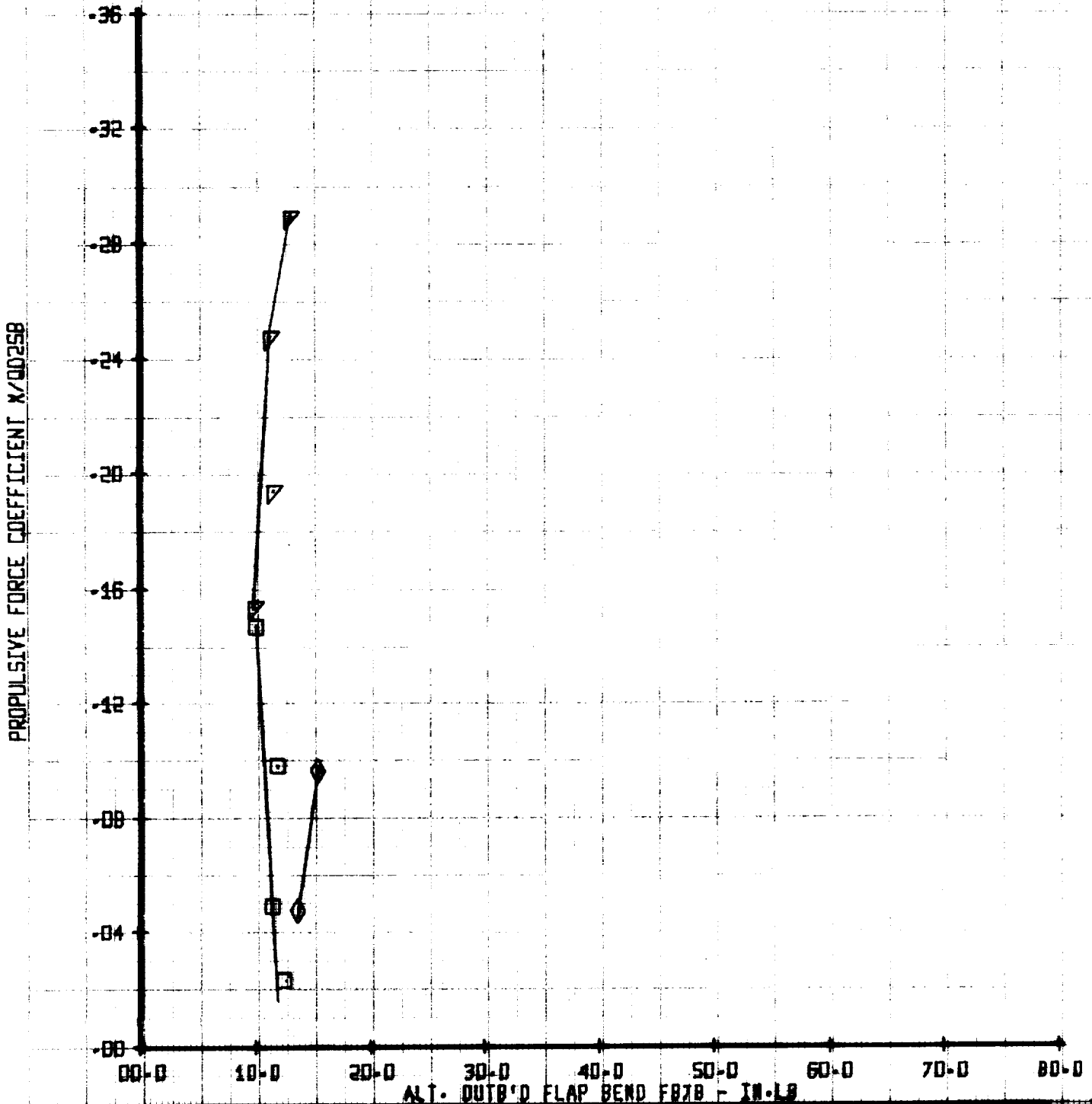
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BENDING FB47



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	ML'	CT'/SB	Y/TUN
□	232	.50	.06	311
△	233	.50	.06	311
◇	234	.50	.08	311
▽	235	.50	.08	311

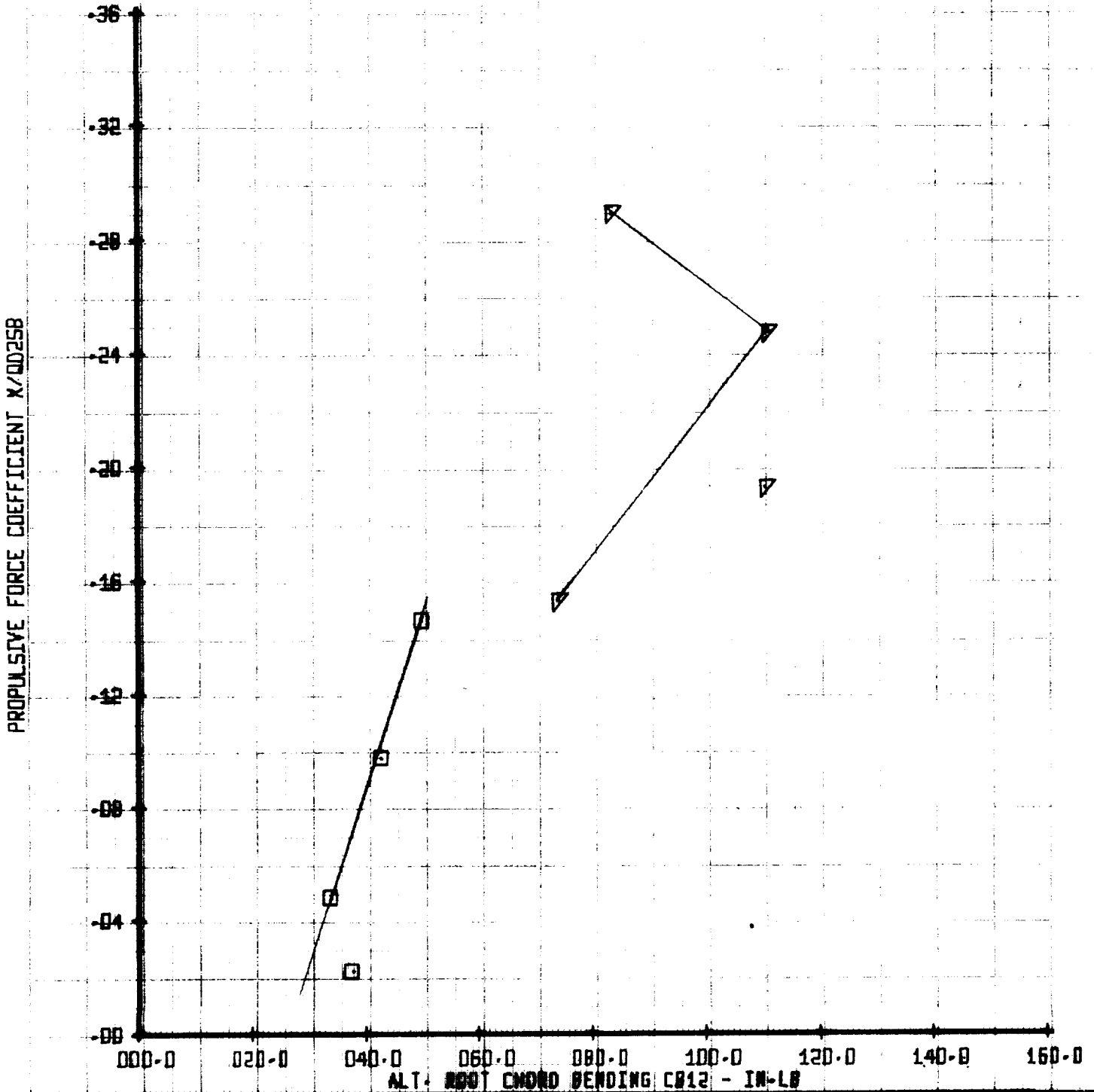
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB78



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	VTUN	
□	232	.50	.06	311	
▽	233	.50	.06	311	
◇	234	.50	.08	311	
▽	235	.50	.08	311	

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12

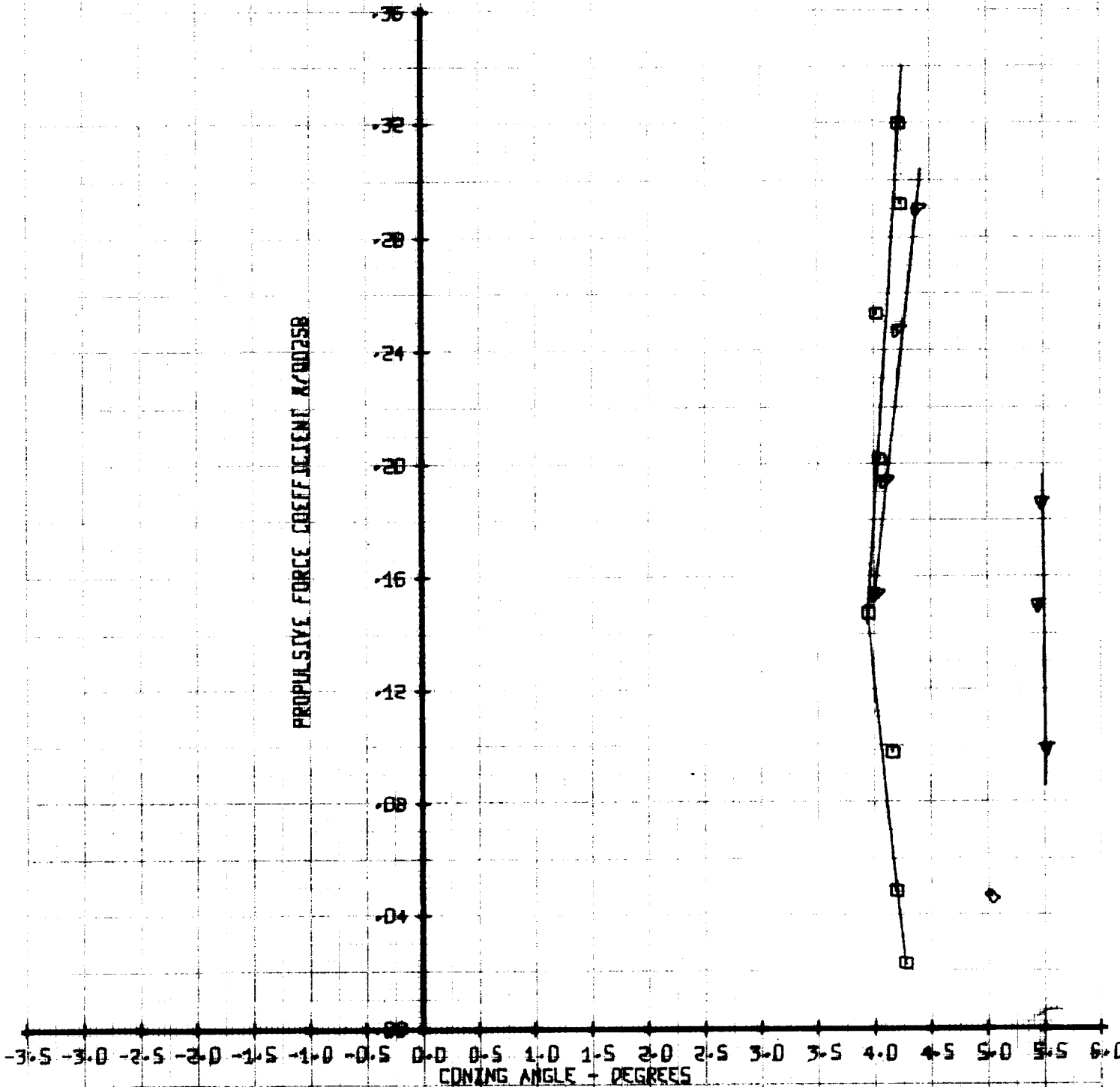


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND	
SYM	RUN
□	232
○	233
△	234
◇	235

MU'	CT'258	VTUN
.50	.06	311
.50	.06	311
.50	.08	311
.50	.08	311

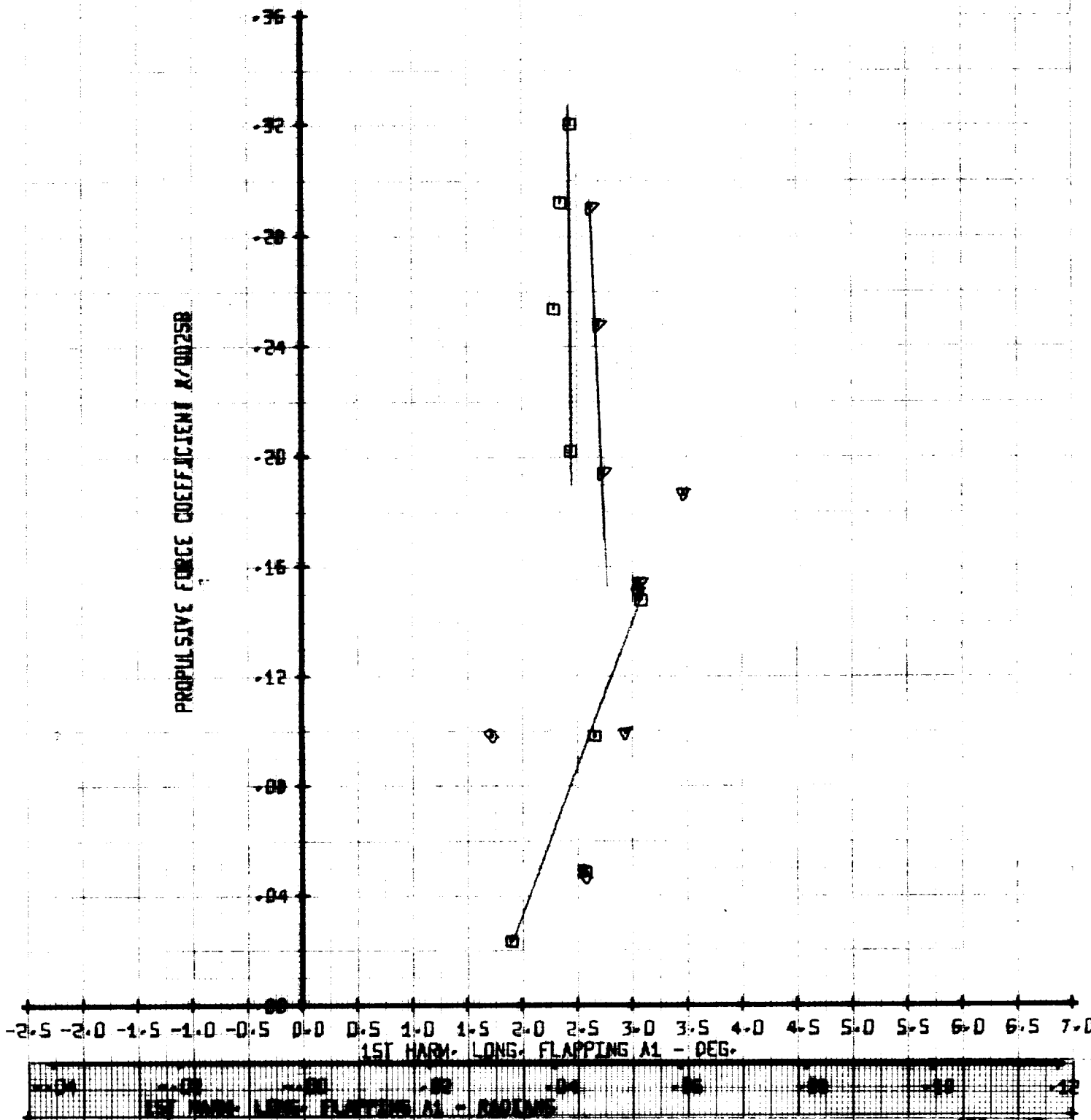
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MU'	CT' / 258	YTLN
SYM	RUN	.90	.06	311
○	232	.90	.06	311
△	233	.90	.06	311
◇	234	.90	.08	311
▽	235	.90	.08	311

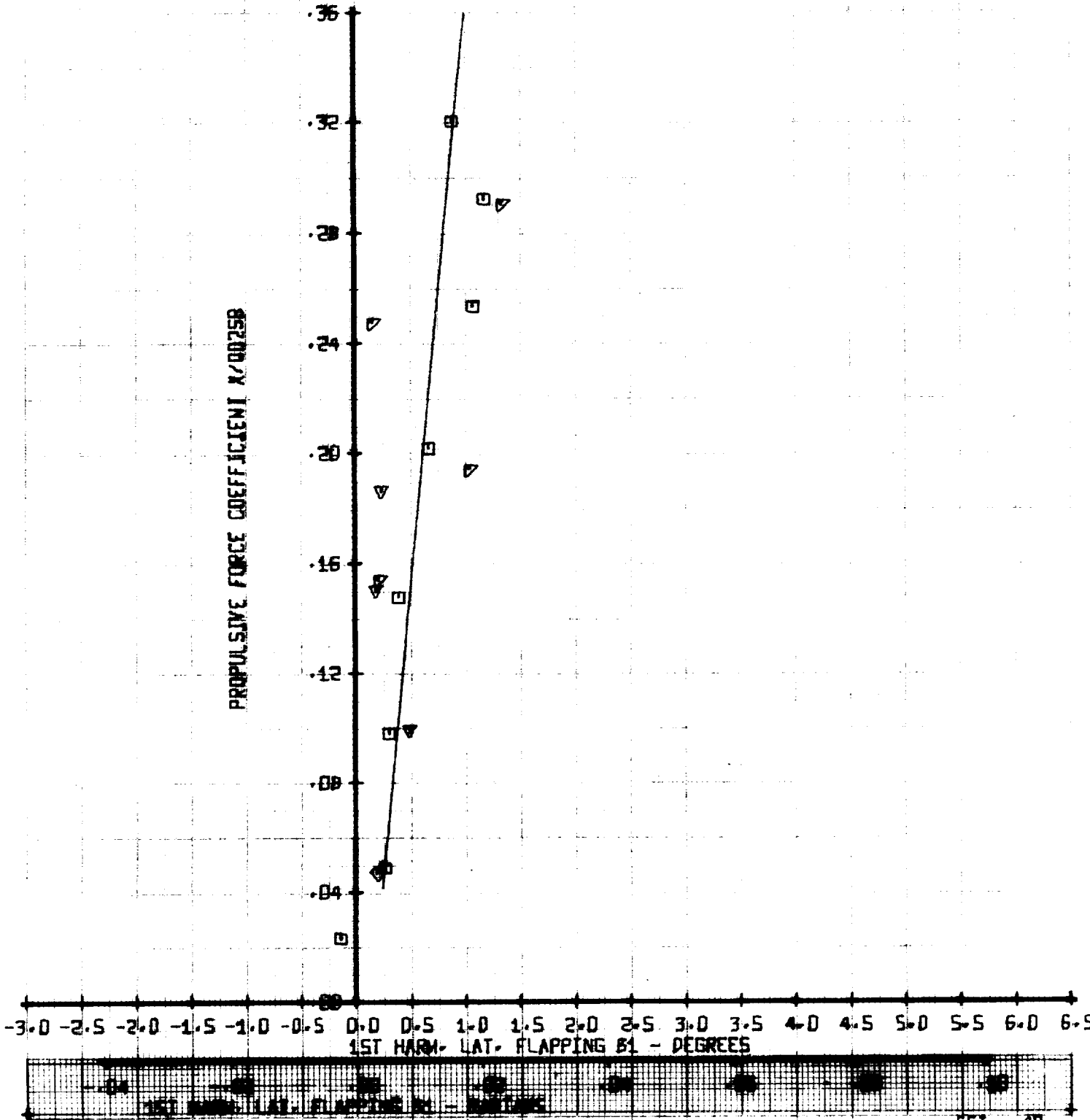
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/SB	YTLN
□	232	.50	.06	311
△	233	.50	.06	311
◇	234	.50	.08	311
▽	235	.50	.08	311

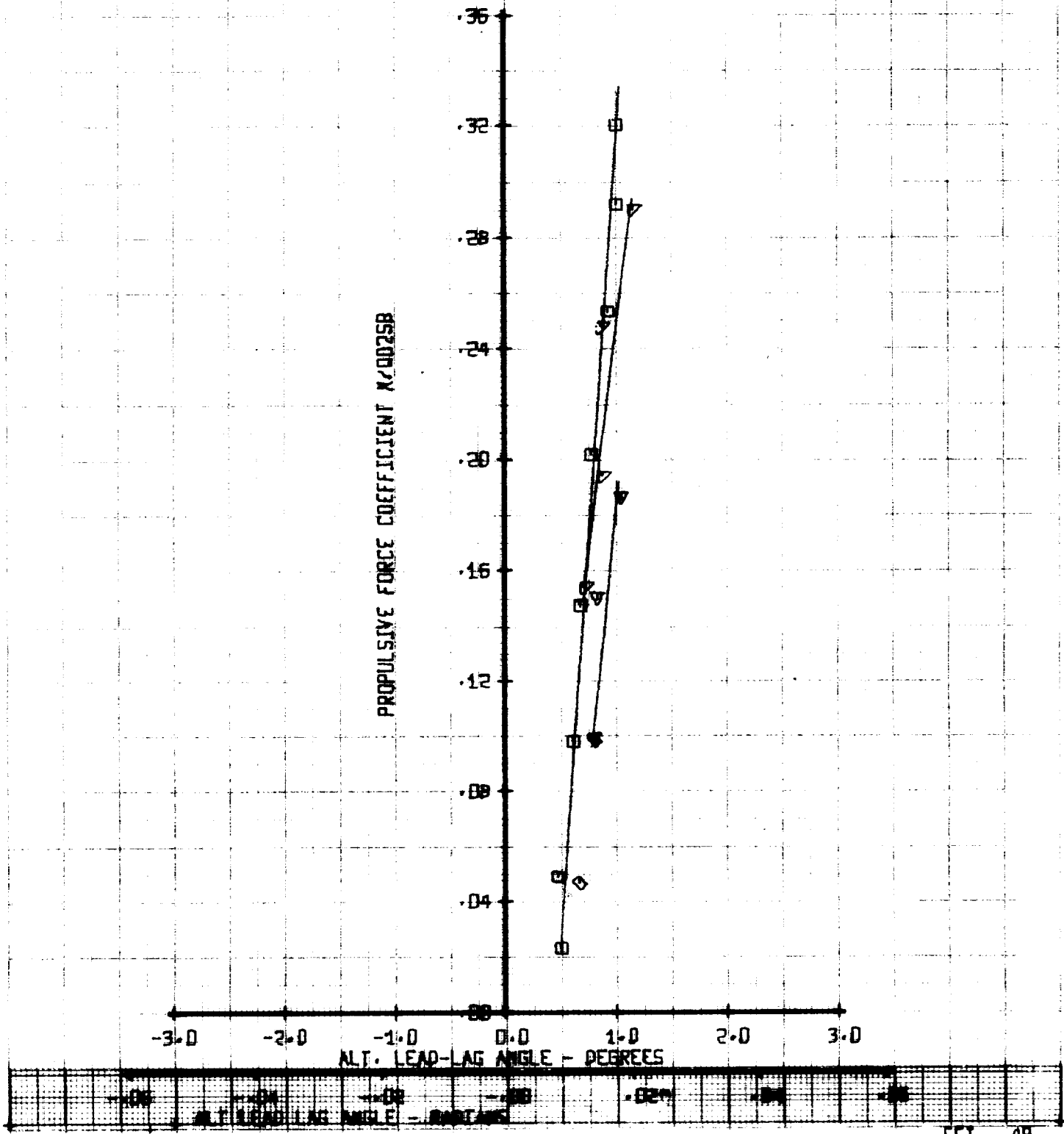
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	REYN	MLI	CT'Y58	YTUN
□	232	.50	.06	311
△	233	.50	.06	311
◇	234	.50	.06	311
▽	235	.50	.06	311

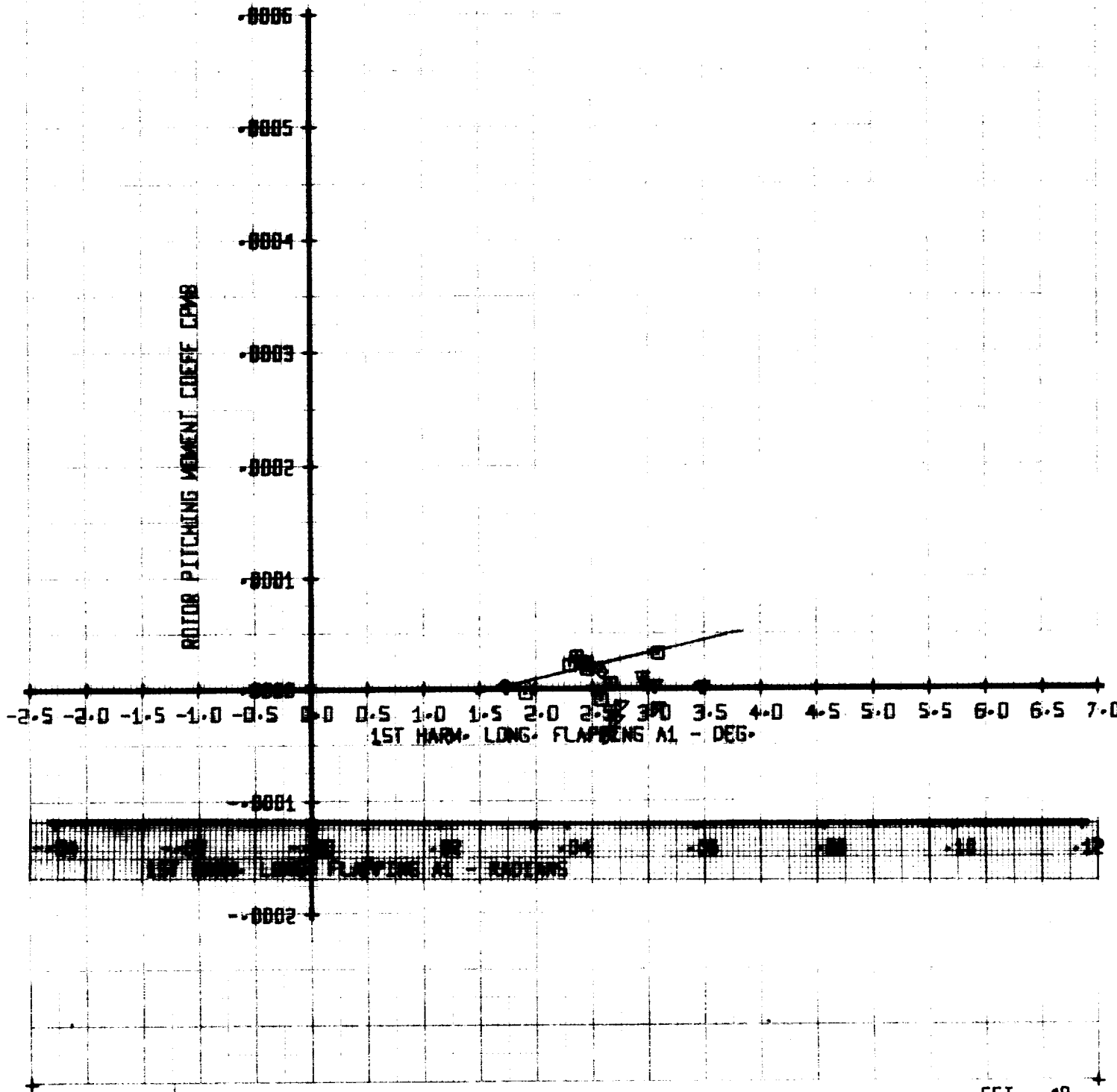
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		CT/VSB	YTUN
SYM	RUN	MI'	
○	232	.95	311
△	233	.96	311
◇	234	.98	311
▽	235	.95	311

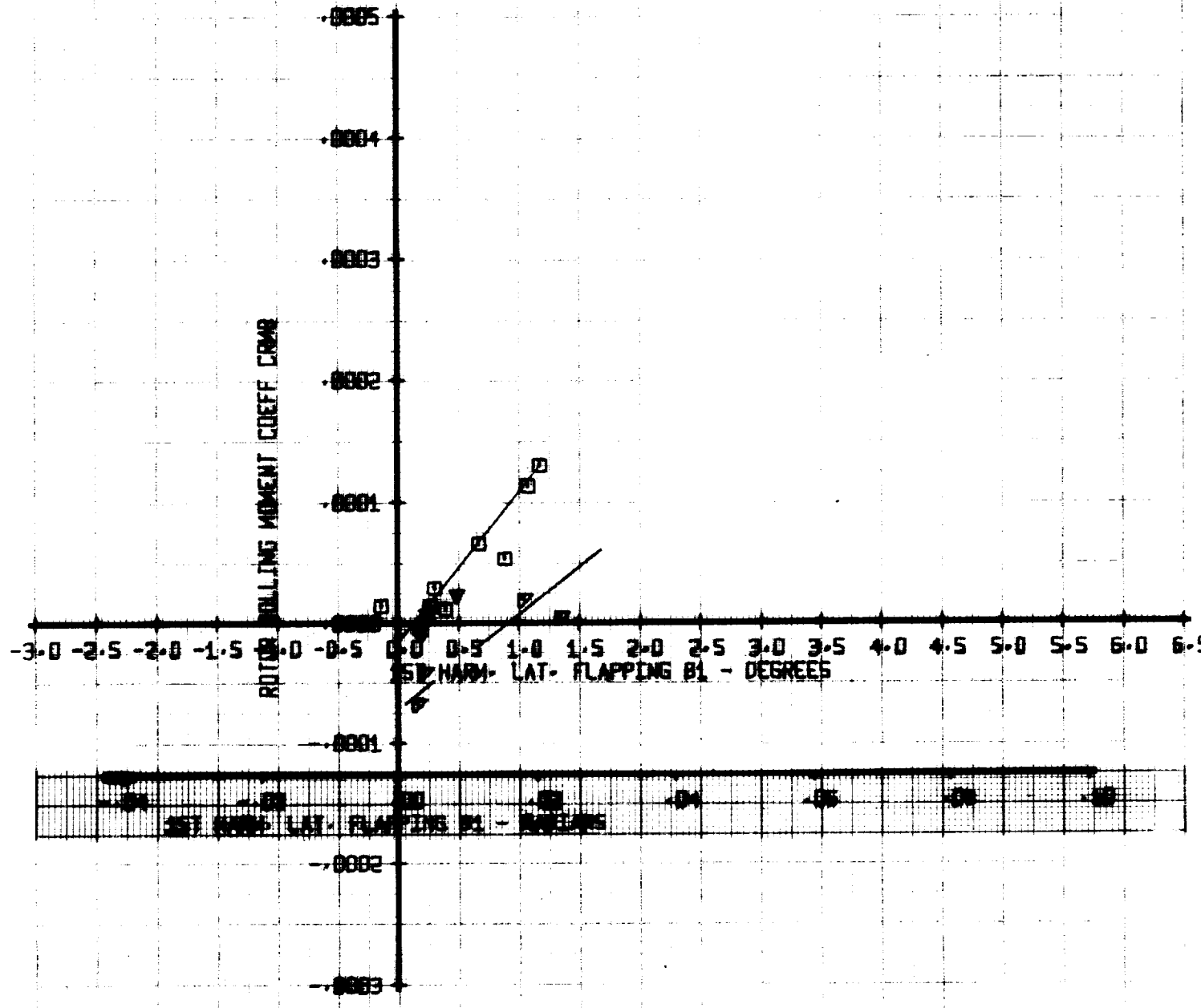
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		CT°/5B	YTUN
SYM	BLIN	.50	311
□	232	.06	311
△	233	.06	311
◆	234	.08	311
▲	235	.08	311

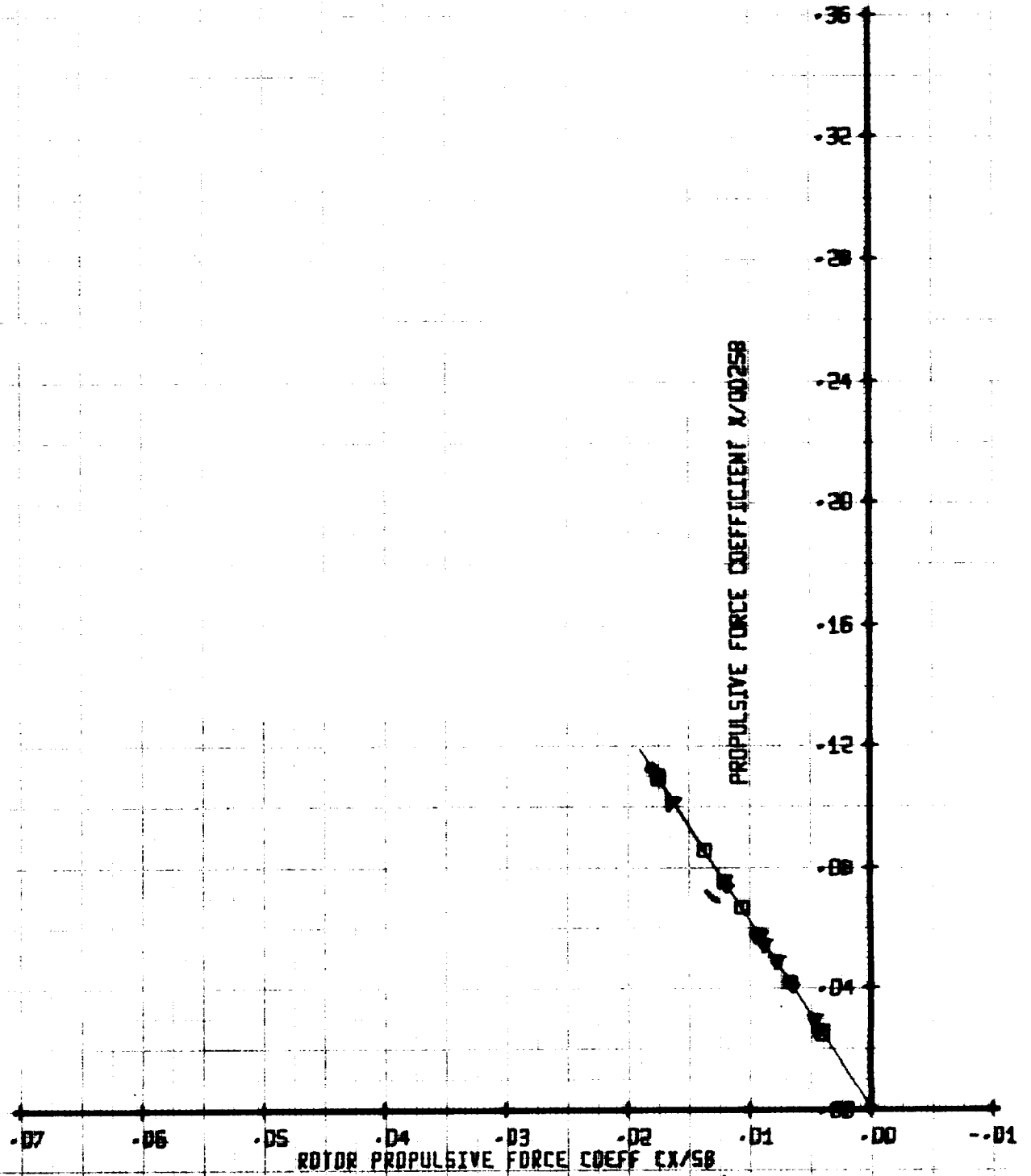
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND				
SYM	RUN	MI	CT/58	YLN
○	269	.50	.05	311
△	270	.50	.07	311
◆	271	.50	.08	311
▼	272	.50	.10	311

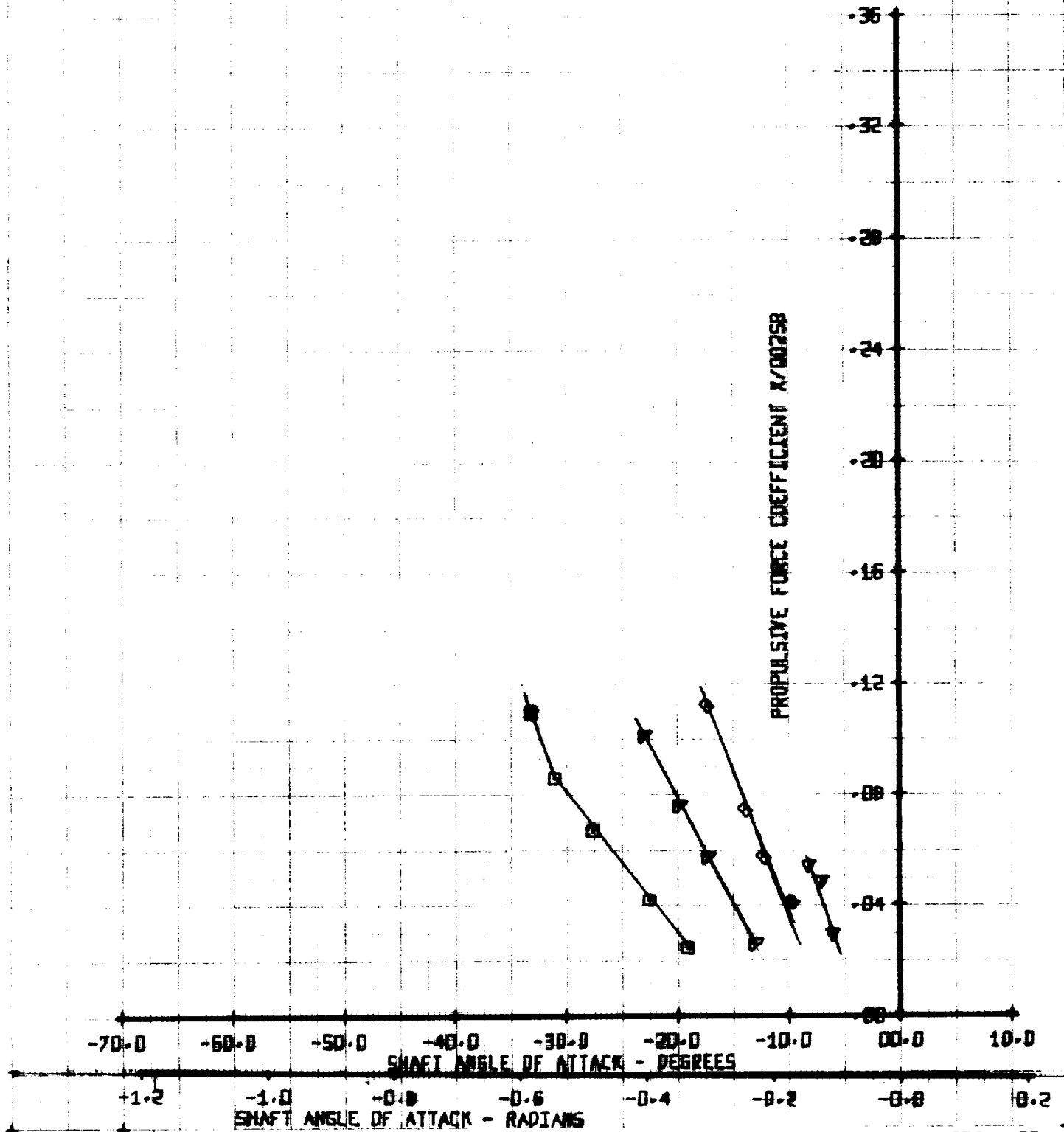
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MU'	CT/YSB	YTLN
□	269	.50	.05	311
△	270	.50	.07	311
◆	271	.50	.09	311
▲	272	.50	.10	311

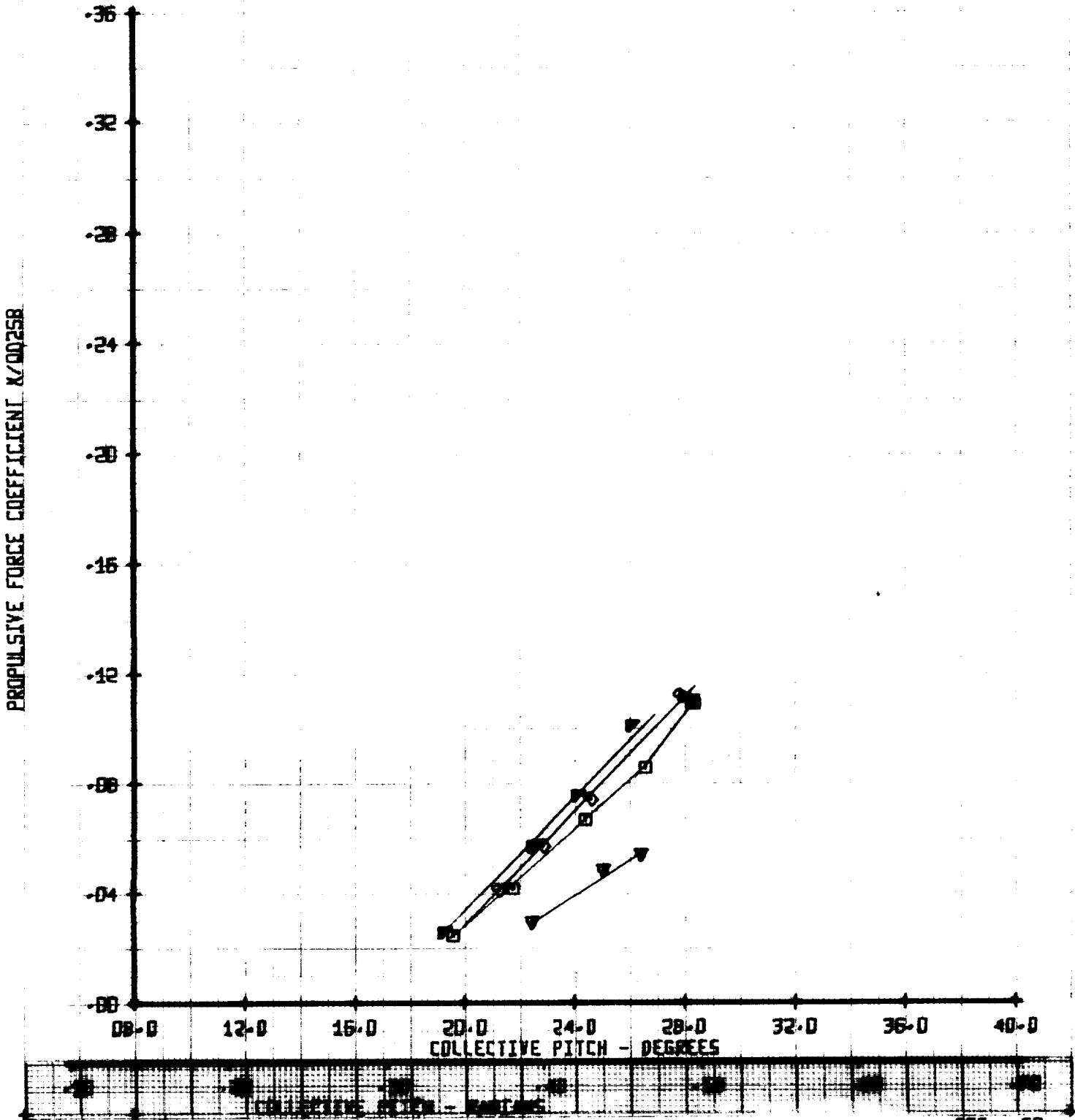
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		CT/58	VTIN
SYM	RUN		
□	269	.05	311
△	270	.07	311
◇	271	.09	311
▽	272	.10	311

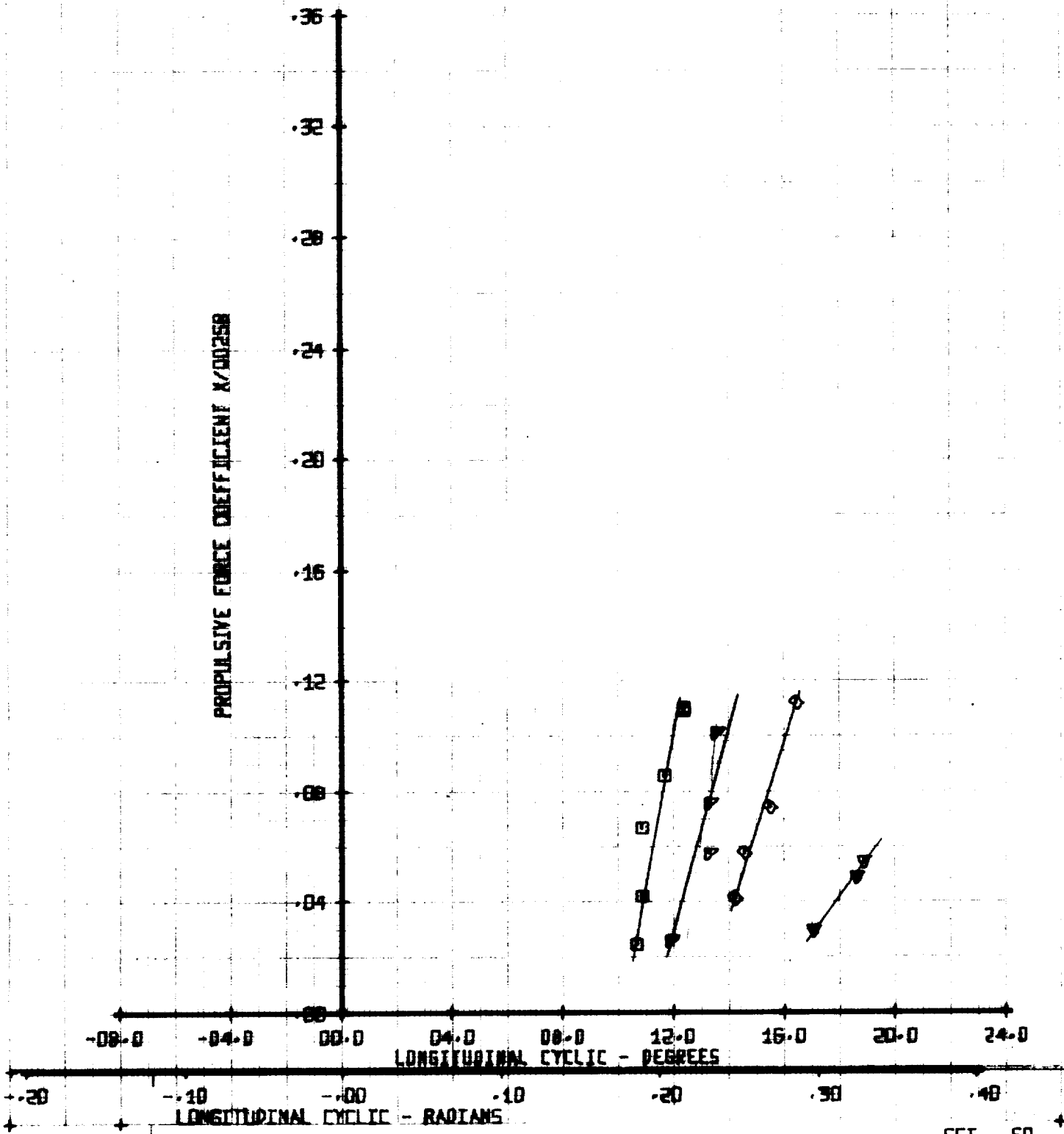
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MU'	CT'/58	YTUN
□	269	.50	.05	311
○	270	.50	.07	311
◇	271	.50	.09	311
△	272	.50	.10	311

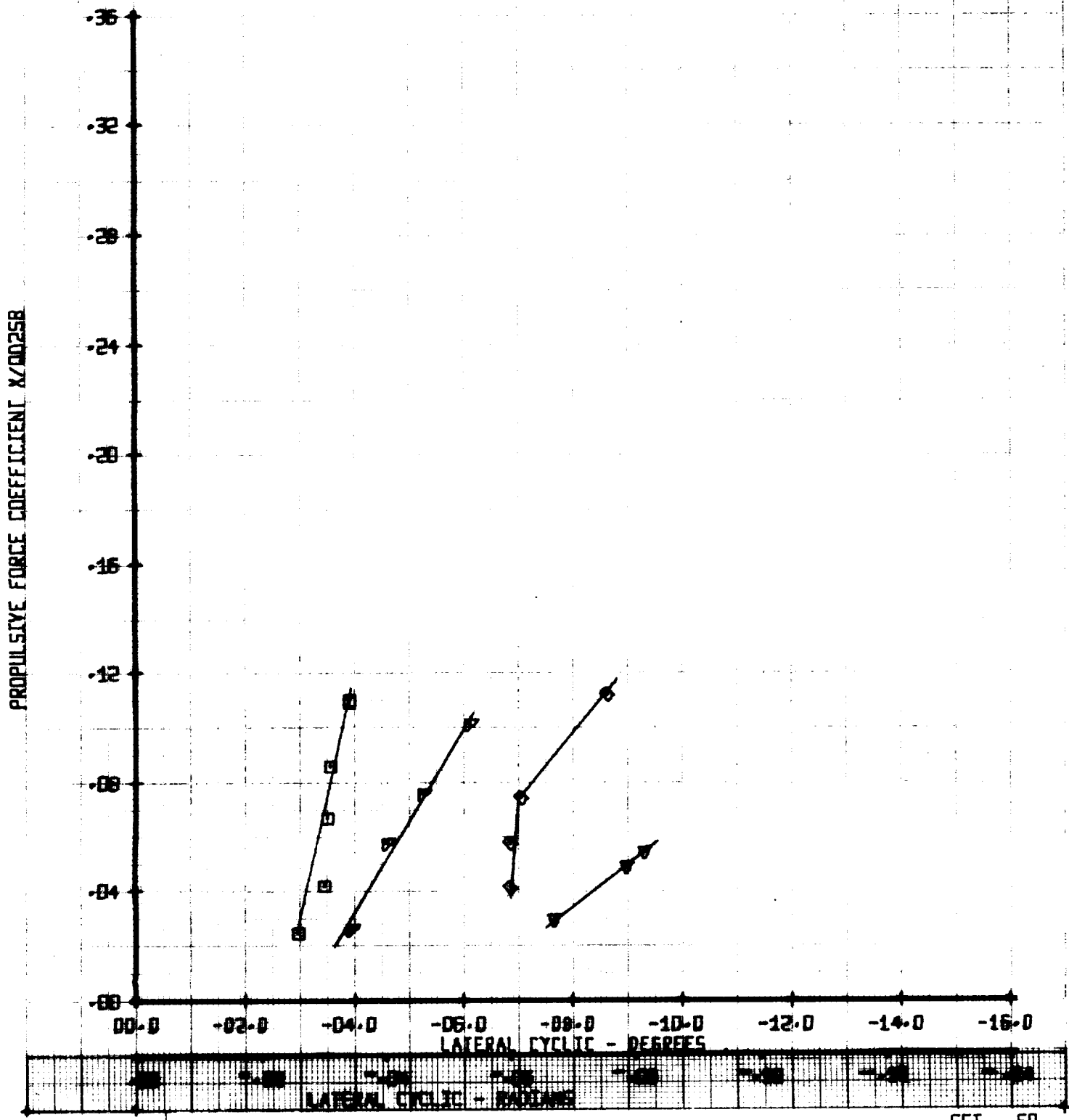
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MI'	CT' / SB	YTLN
SYM	RUN			
□	269	.50	.05	311
△	270	.50	.07	311
◇	271	.50	.09	311
▽	272	.50	.10	311

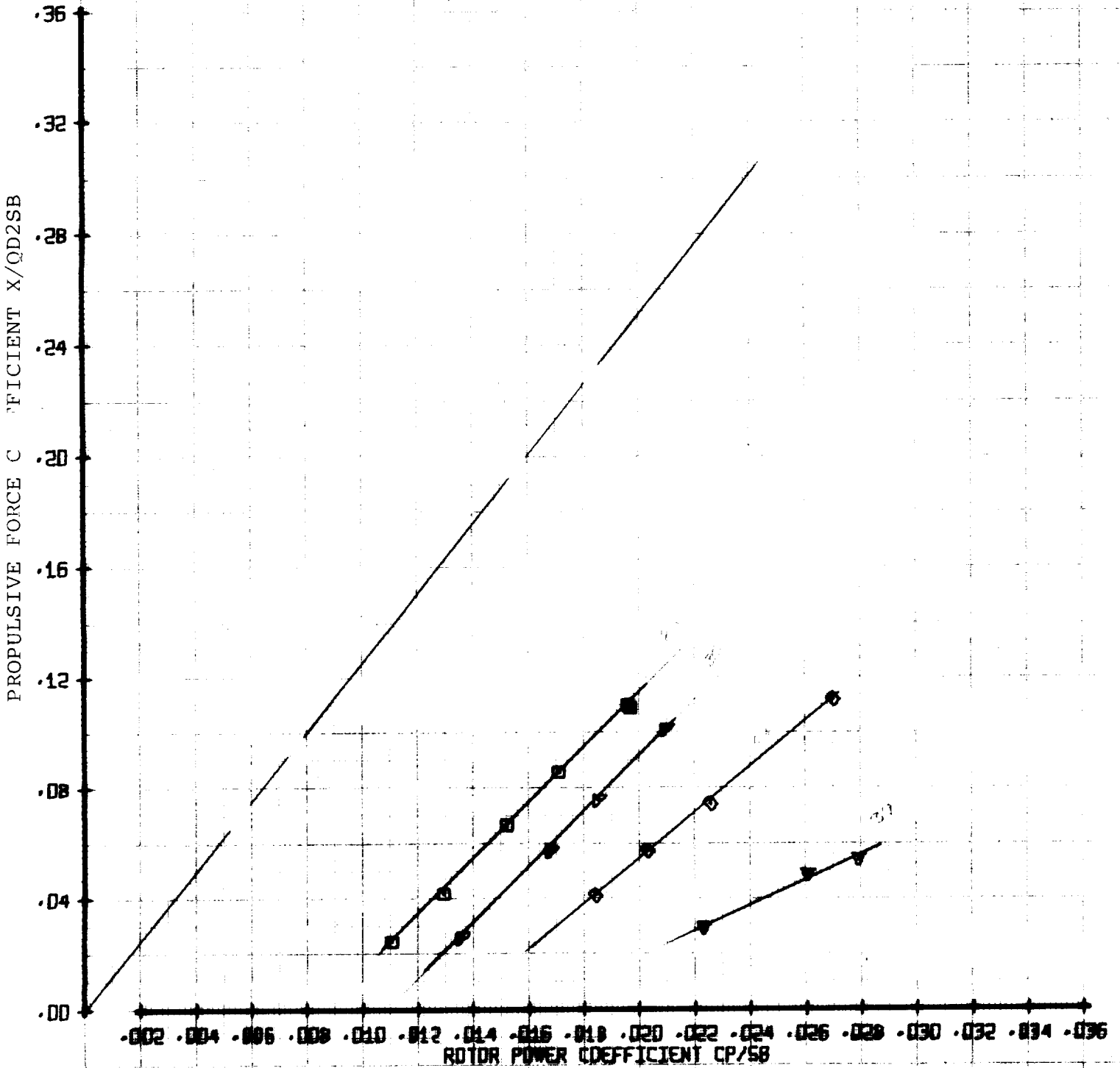
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	MIN	MI'	CT'/58	VTUN	
□	269	.50	.05	311	
△	270	.50	.07	311	
◇	271	.50	.09	311	
▽	272	.50	.10		

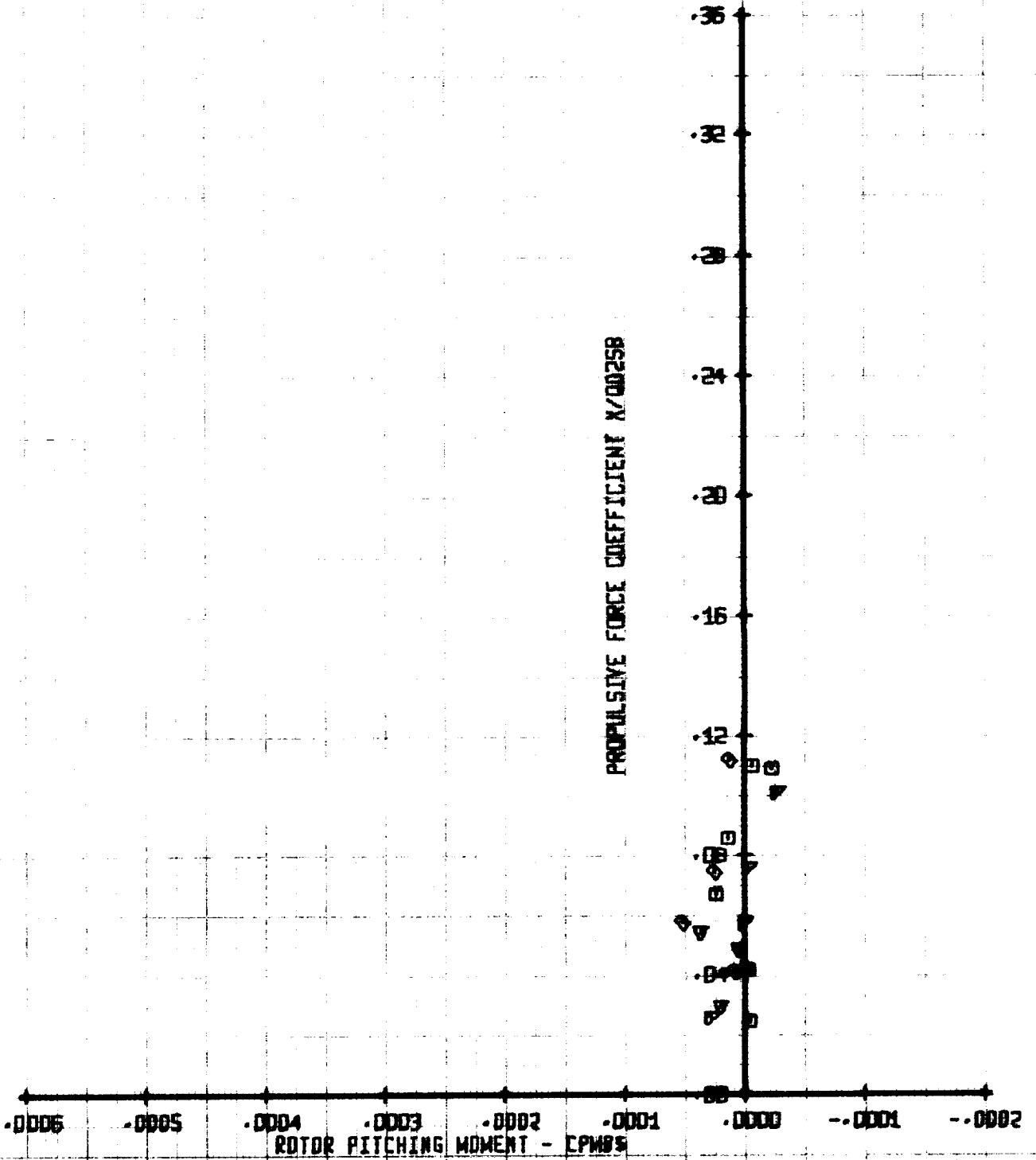
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		CT/58	VTUN
SYM	RUN		
□	269	.05	311
△	270	.07	311
◇	271	.09	311
▽	272	.10	311

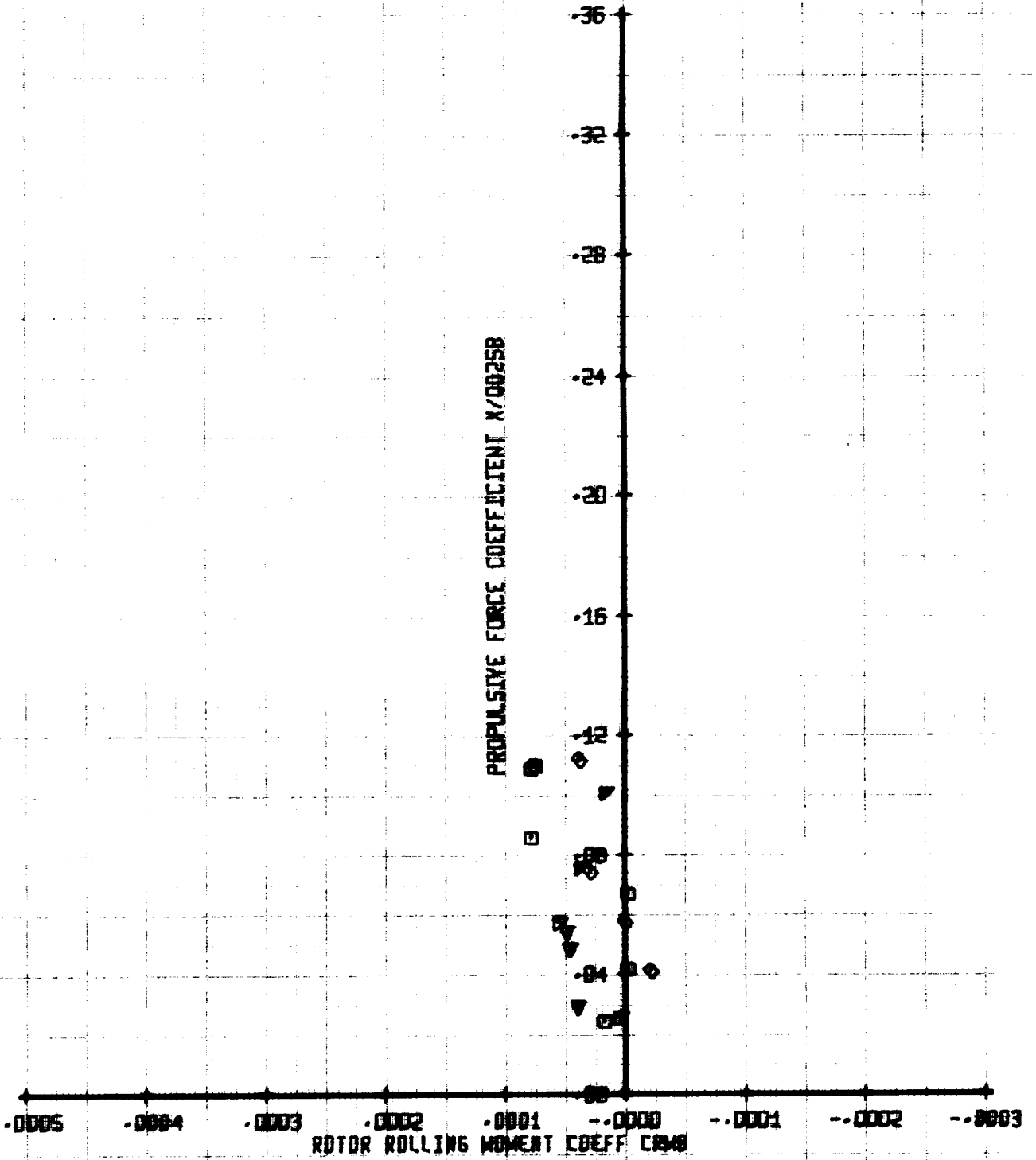
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	MIN	ML	CT/2SB	YTLN	
□	269	.50	.05	311	
△	270	.50	.07	311	
◇	271	.50	.08	311	
▽	272	.50	.10	311	

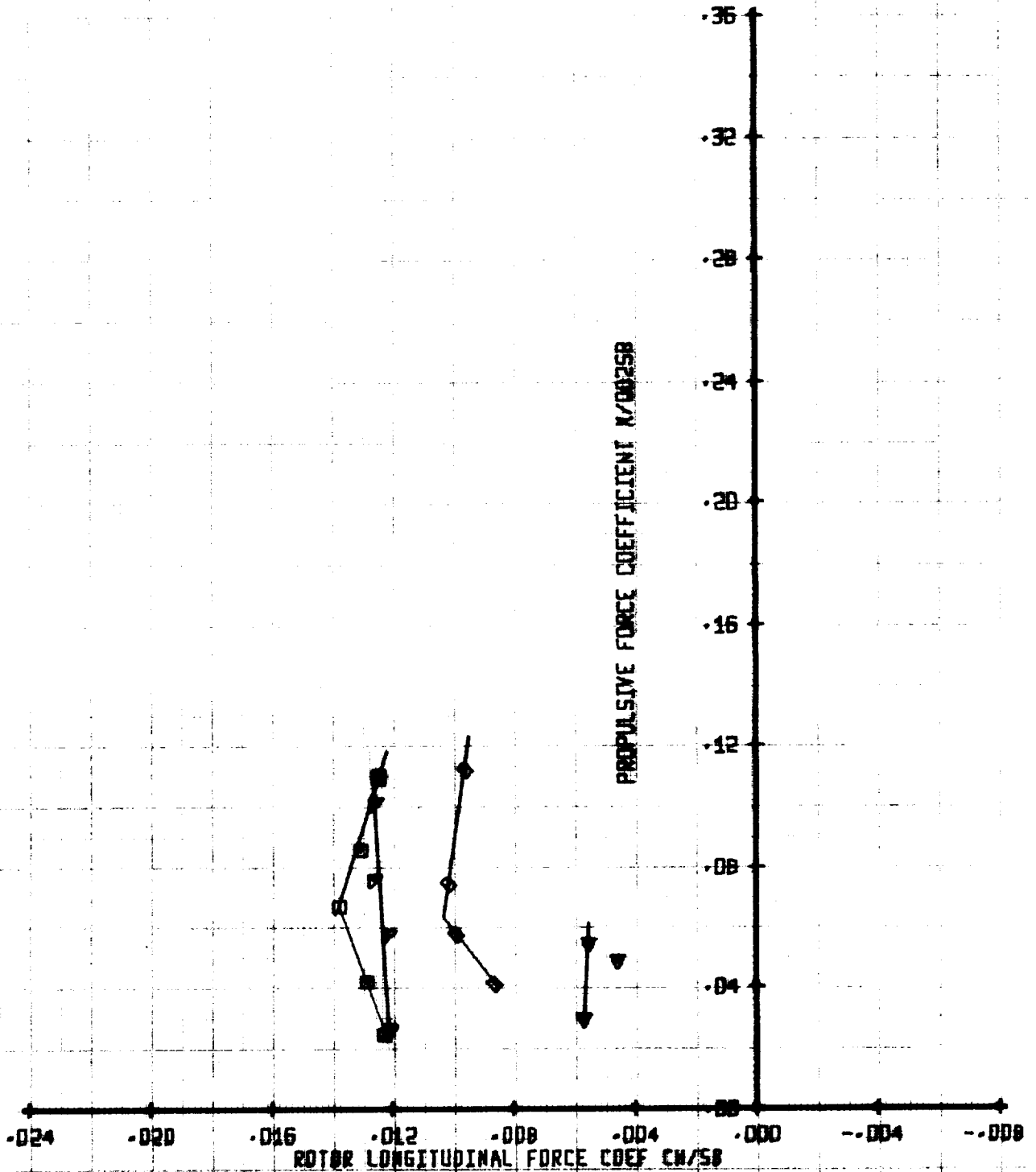
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	ML'	CT'Y58	YTUM	
○	269	.50	.05	311	
□	270	.50	.07	311	
◇	271	.50	.08	311	
▼	272	.50	.10	311	

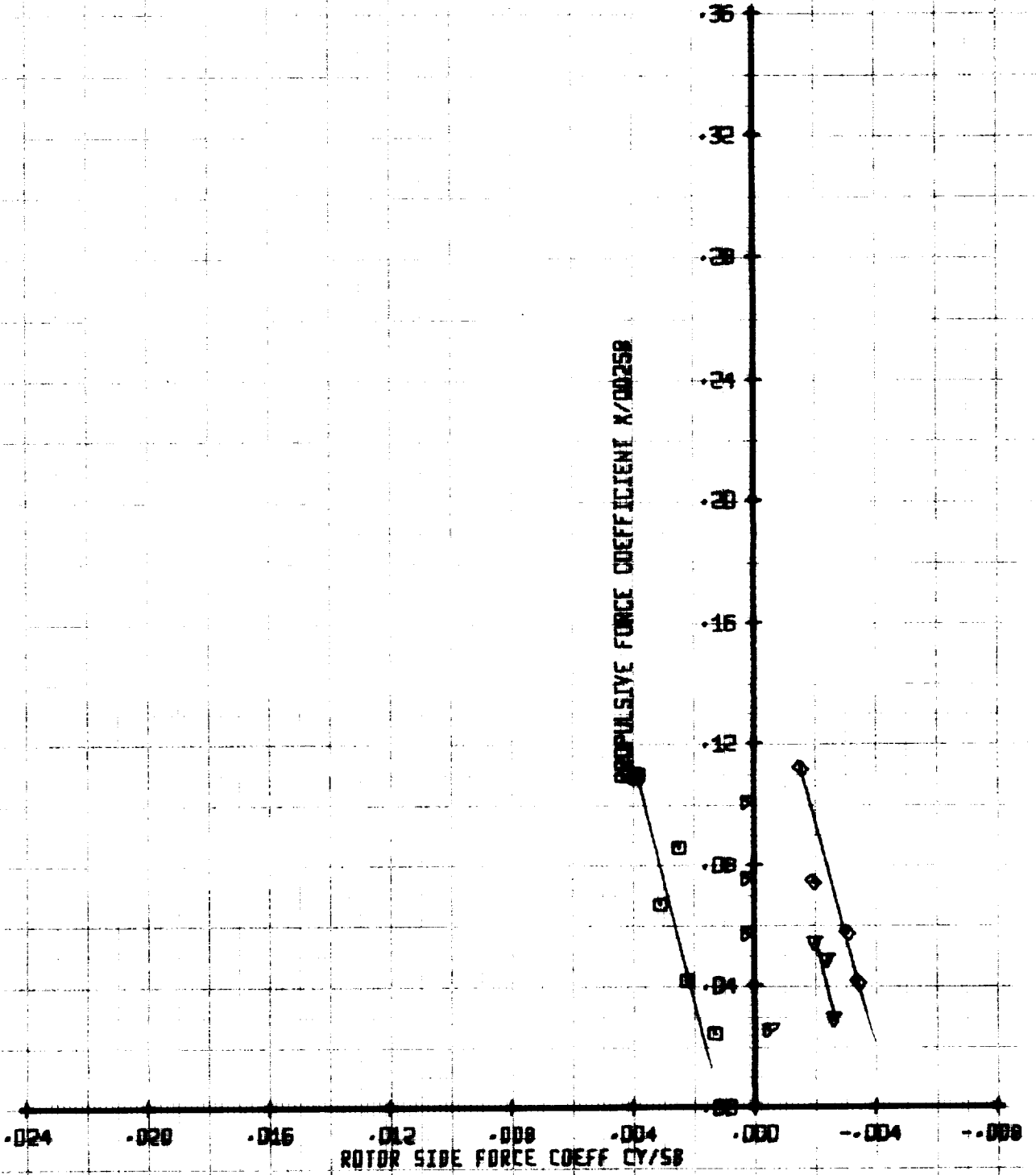
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		CT/58	Y/TUN
SYM	RUN		
□	269	.05	311
△	270	.07	311
◇	271	.08	311
▽	272	.10	311

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT

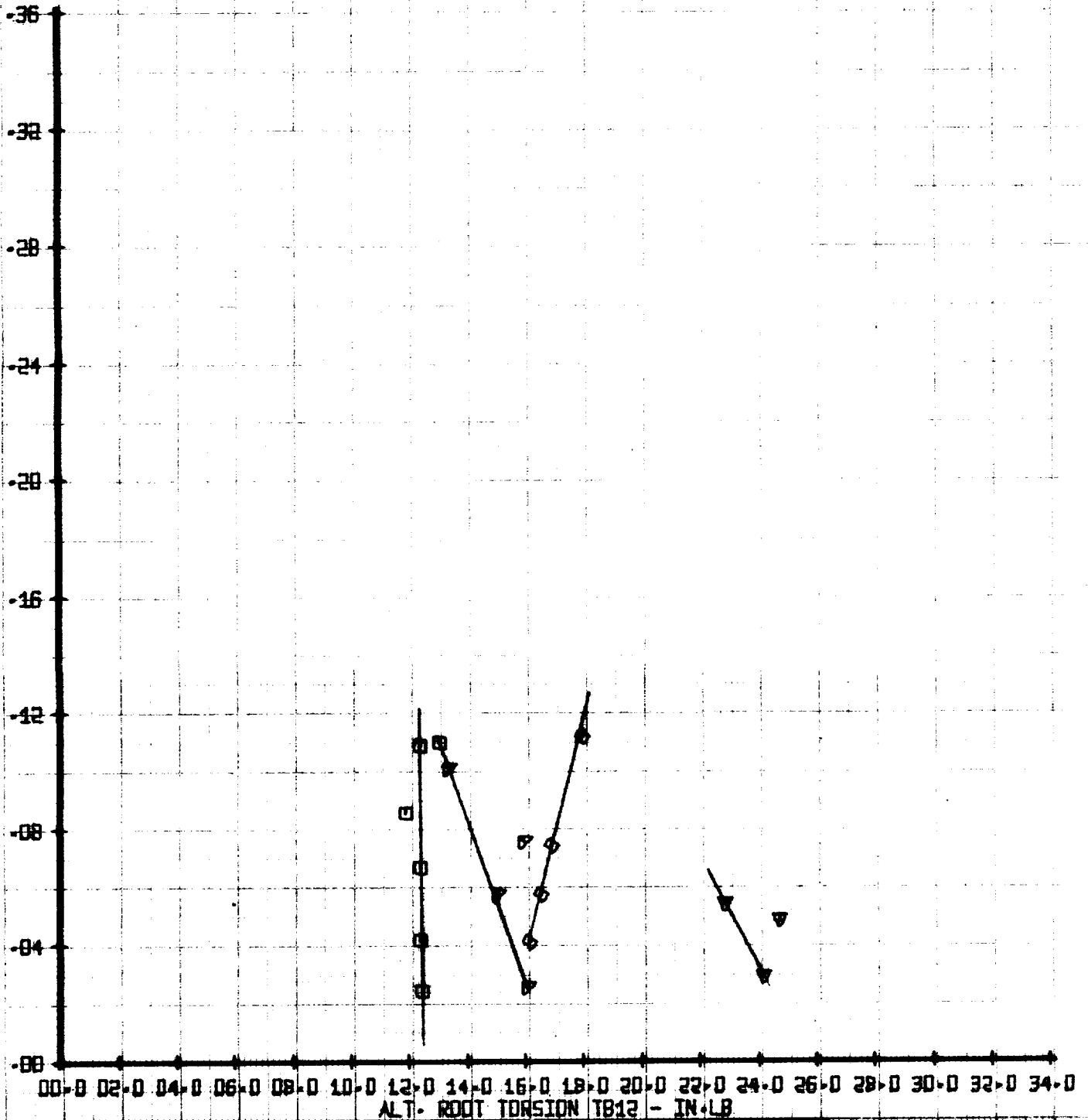


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MI'	CT' / 258	VTIN
□	269	.50	.05	311
▽	270	.50	.07	311
◇	271	.50	.09	311
▽	272	.50	.10	311

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12

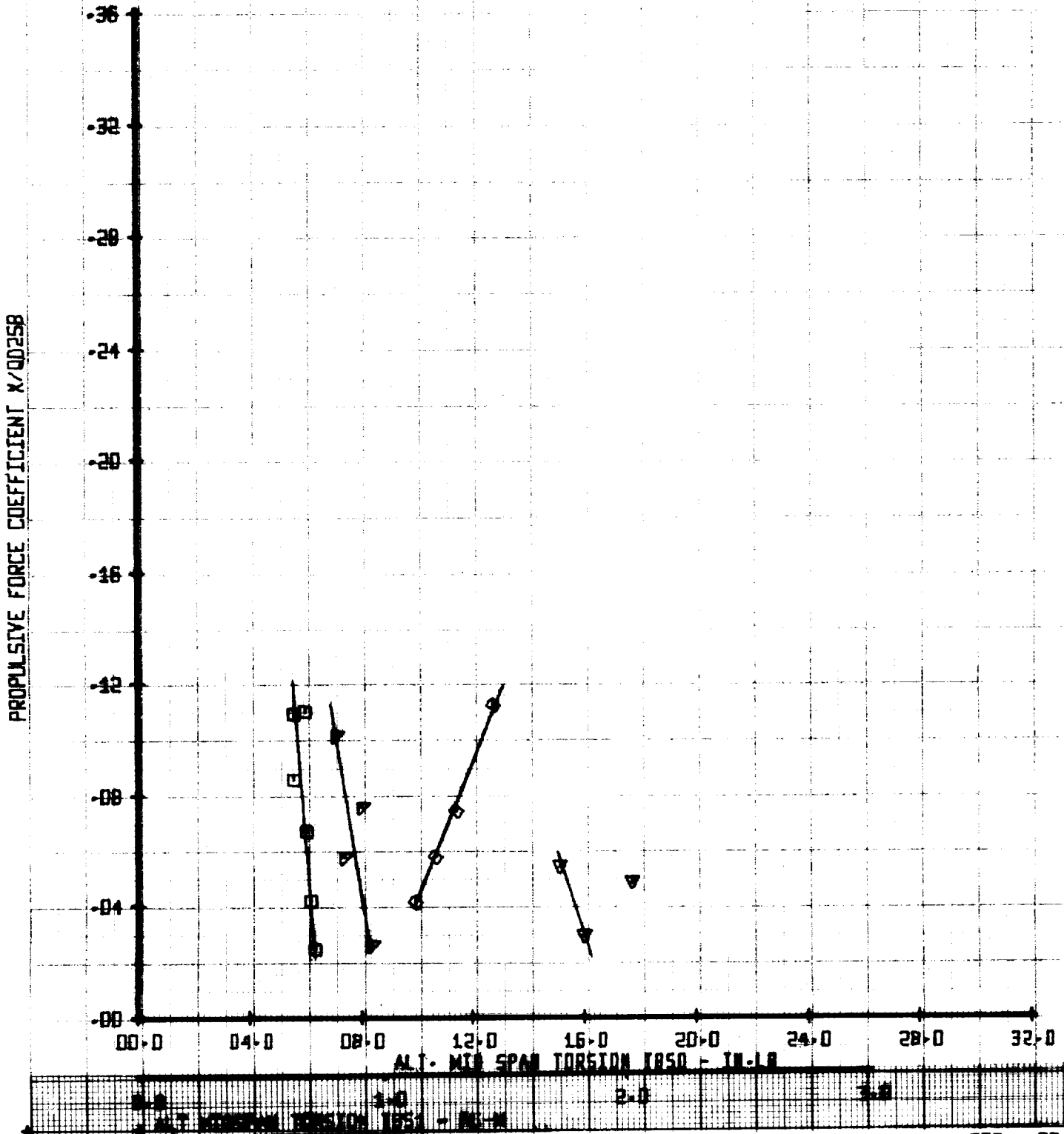
PROPULSIVE FORCE COEFFIC IT X/QD258



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		ML'	CT' / SB	VTUN
SYM	RUN			
□	269	.50	.05	311
▽	270	.50	.07	311
◇	271	.50	.09	311
▼	272	.50	.10	

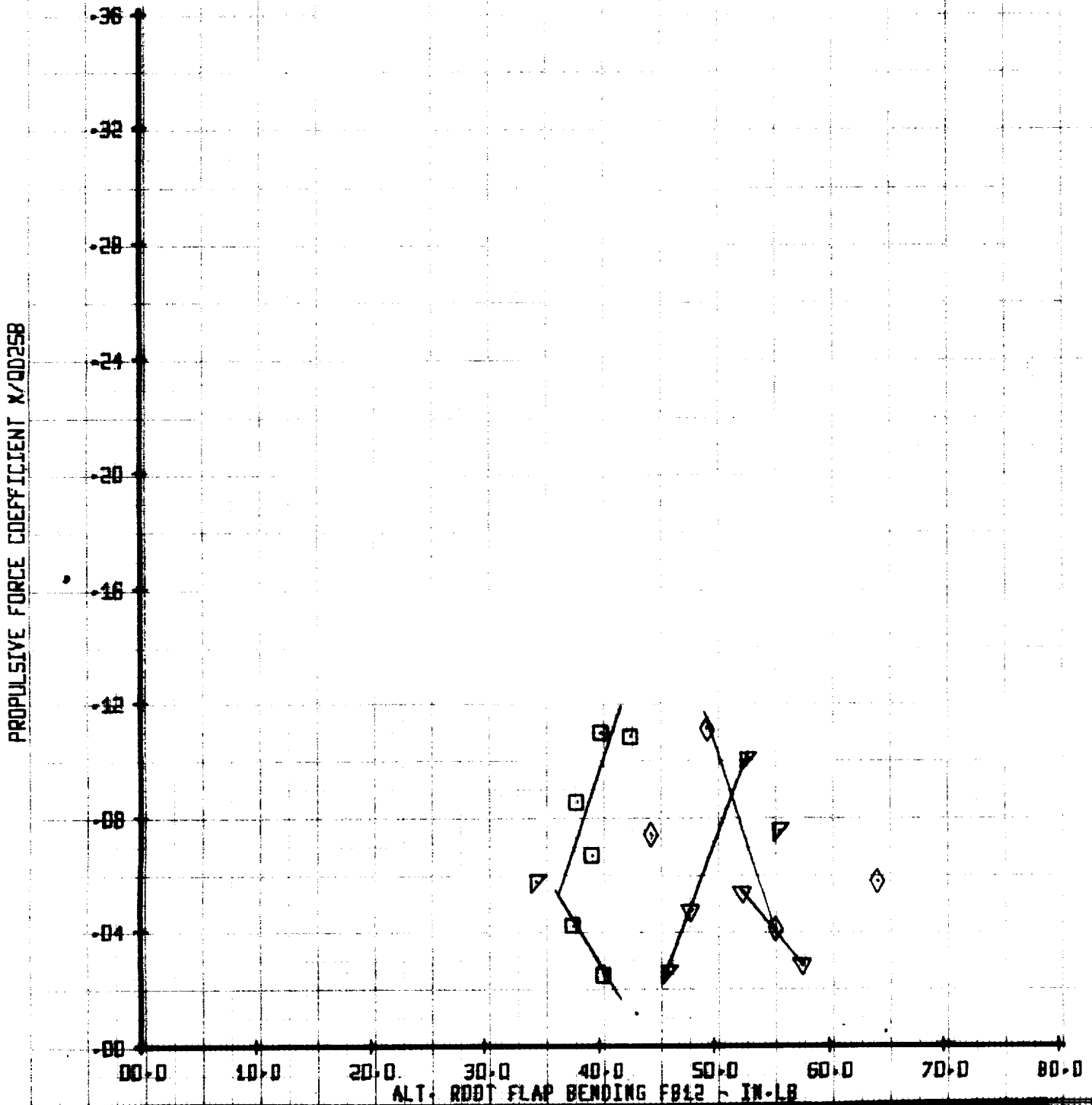
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MI'	CT' / 58	VTUM
□	269	.50	.05	311
▽	270	.50	.07	311
◇	271	.50	.09	311
▽	272	.50	.10	311

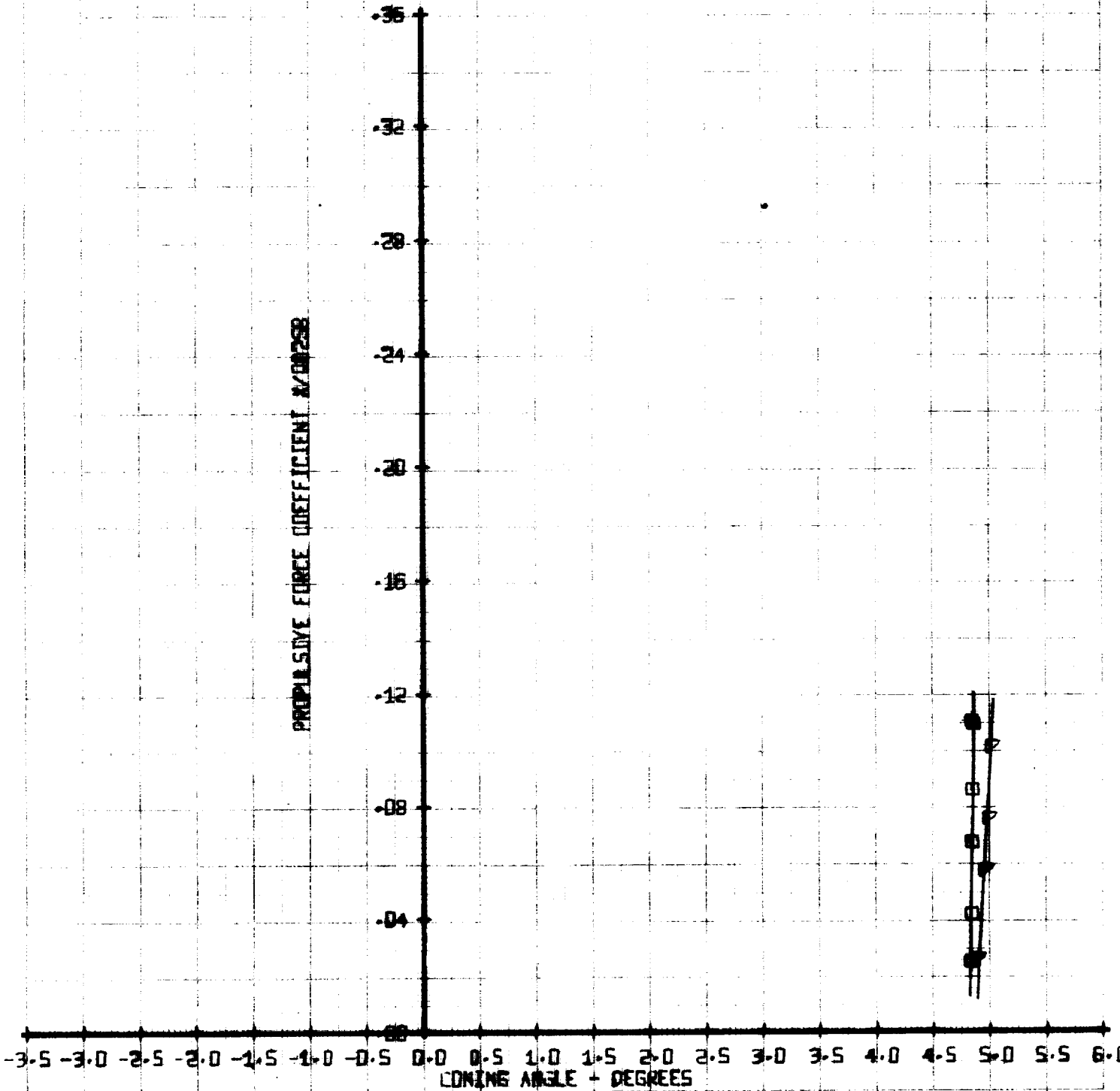
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-17B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MU'	CT'/SB	VILIN
□	269	.50	.05	311
△	270	.50	.07	311
◇	271	.50	.09	311
▽	272	.50	.10	311

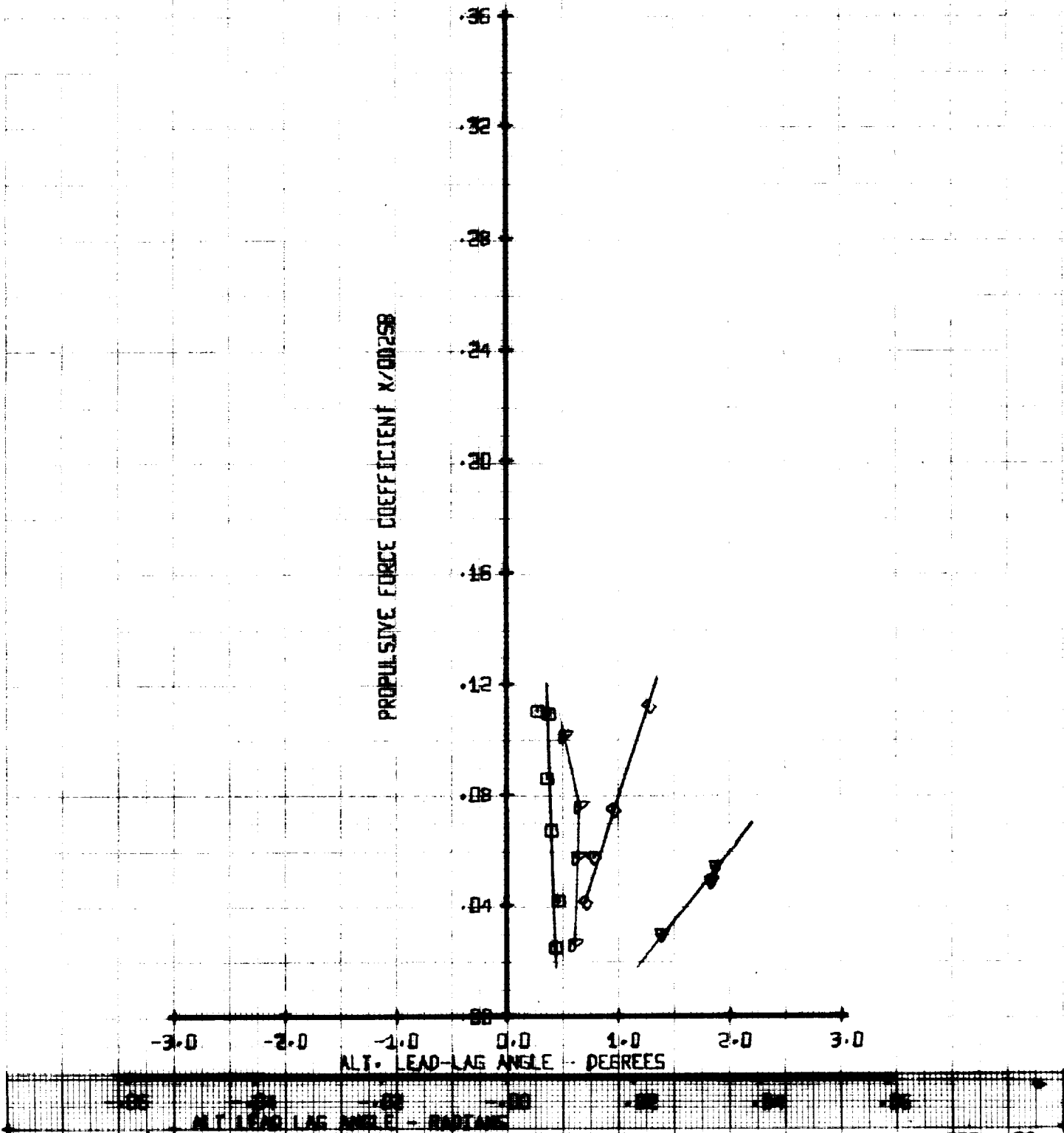
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	BLM	MU'	CT' / SB	VTUM
□	269	.50	.05	311
△	270	.50	.07	311
○	271	.50	.09	311
▽	272	.50	.10	311

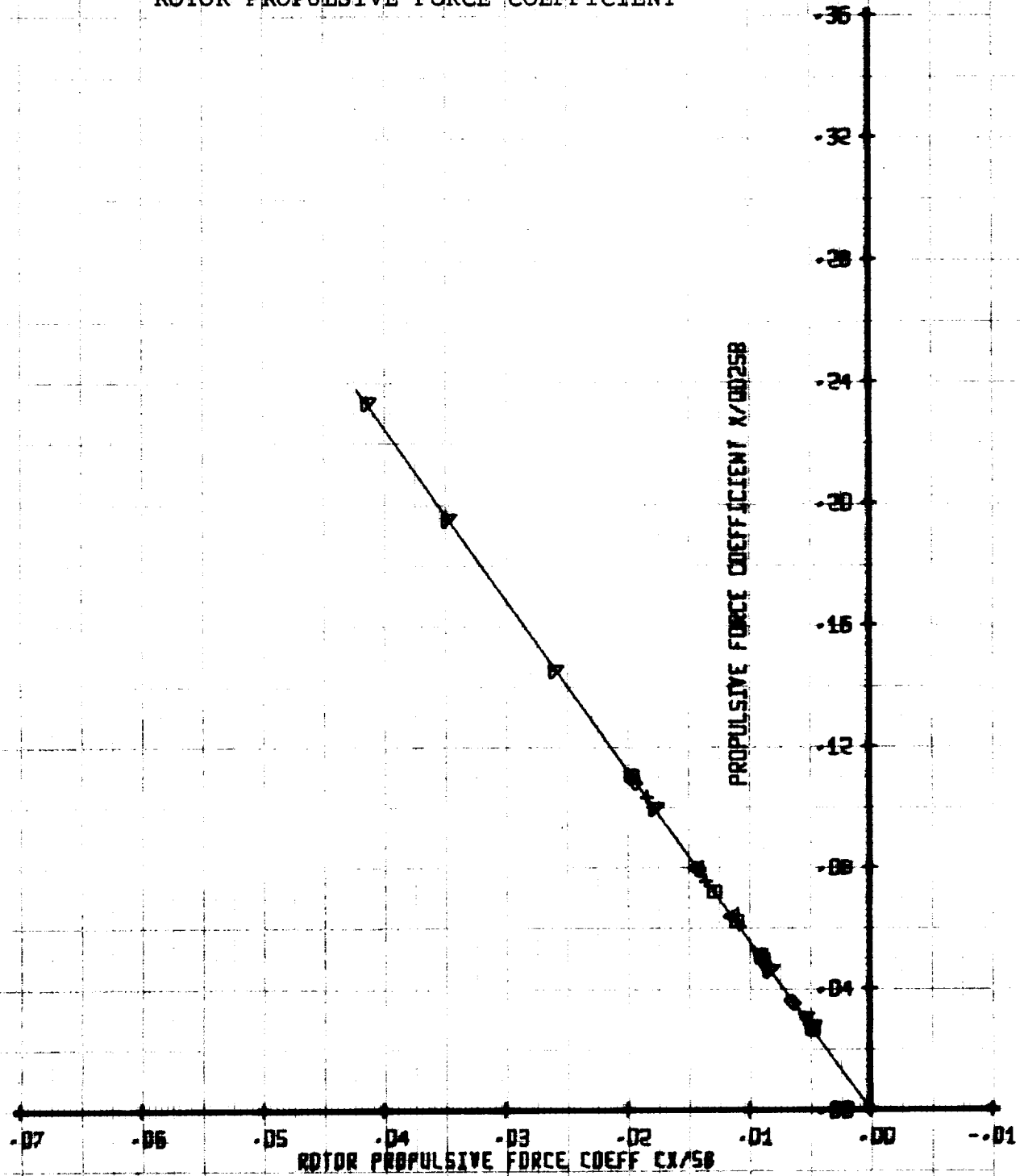
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	M1	CT/58	VTUM
+	268	.0153	.05	328
+	240	.0153	.06	328
+	266	.0153	.07	328
+	241	.0153	.08	328
+	242	.0153	.09	328
+	267	.0153	.10	328

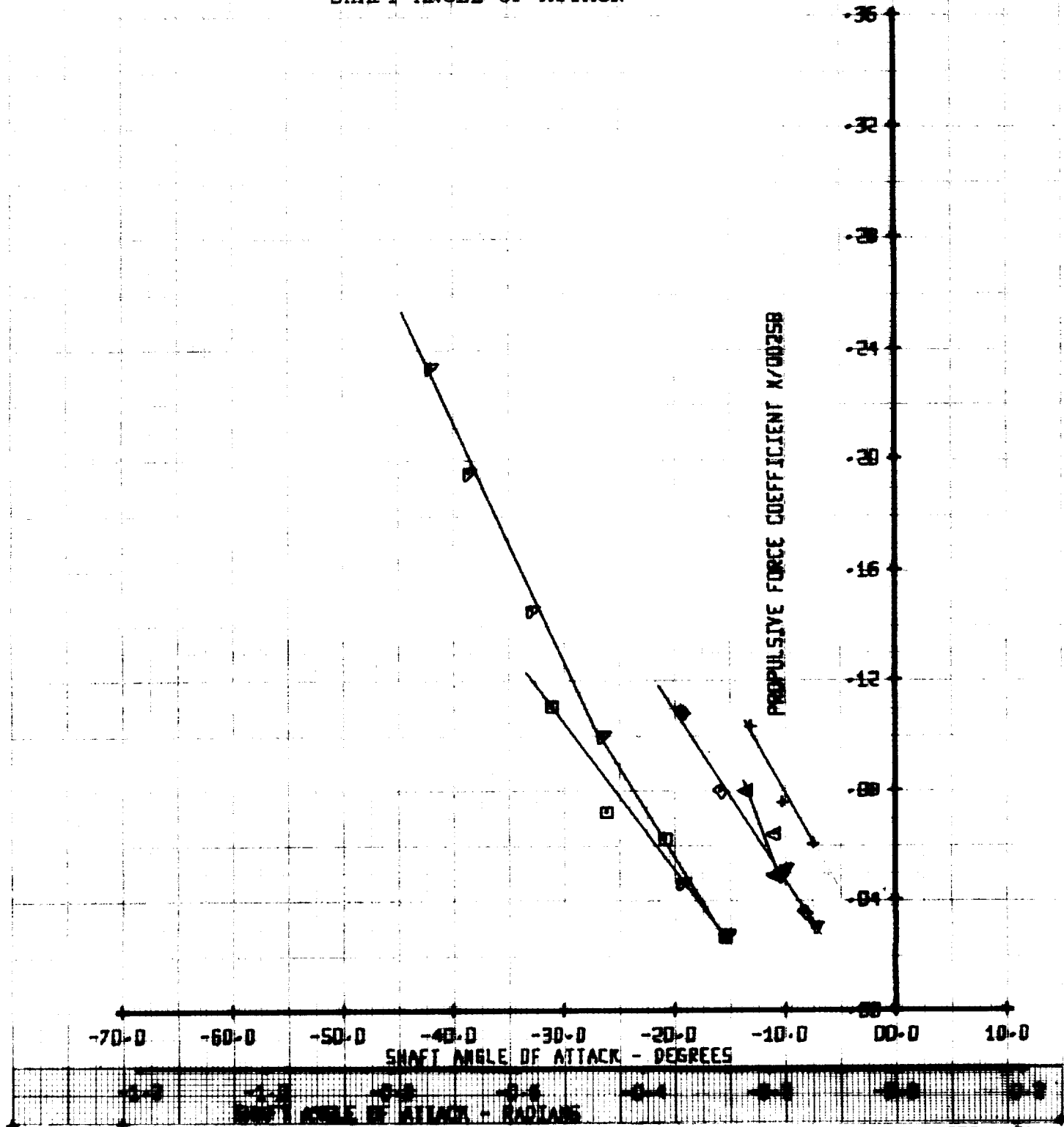
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MI'	CT'/58	YTLIN
○	260	.53	.05	328
□	240	.53	.06	328
◇	266	.53	.08	328
△	241	.53	.09	328
+	242	.53	.09	328
	267	.53	.10	328

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK

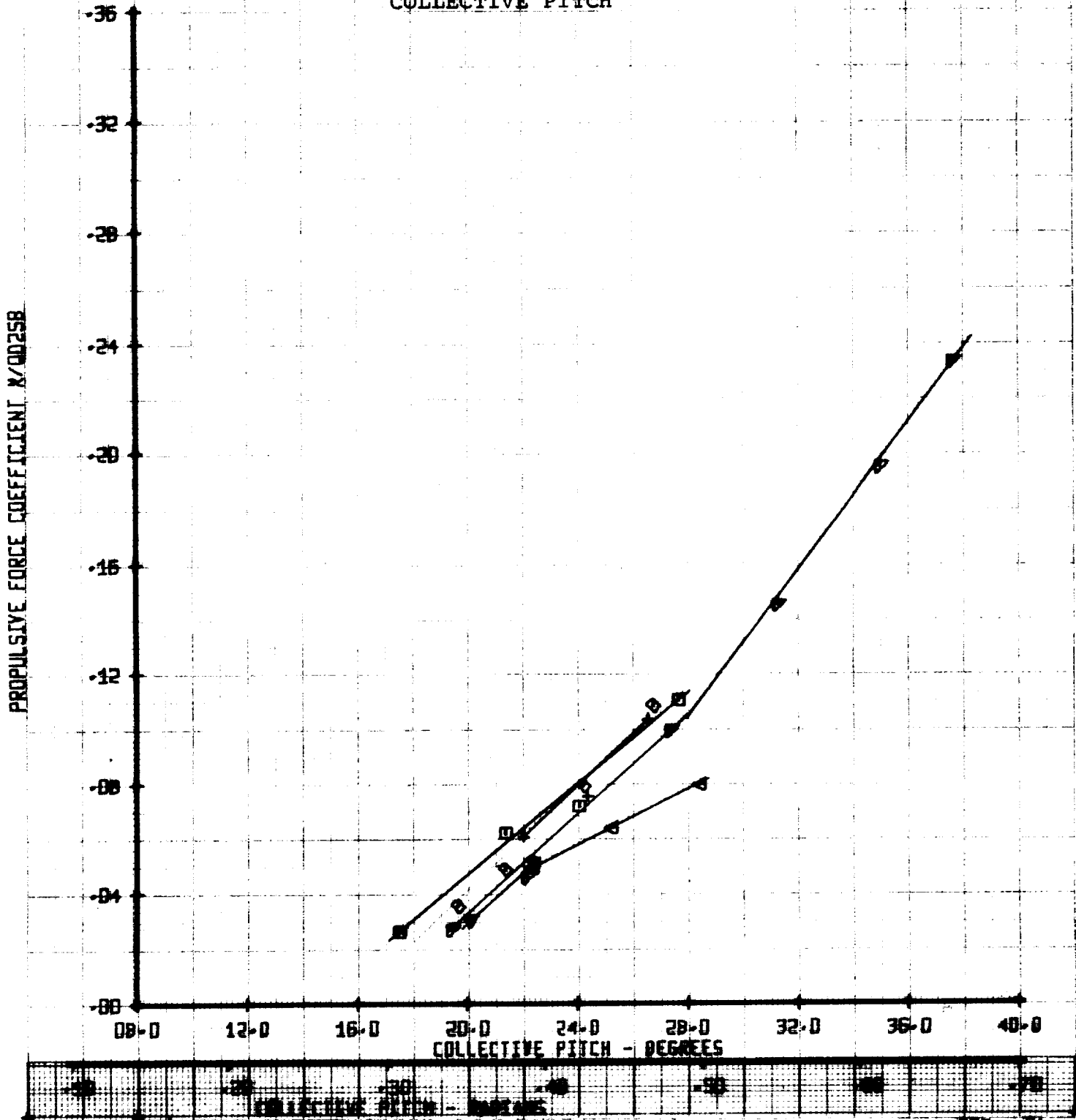


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND

SYM	RUN	MI'	CT'/58	Y10N
○	260	.53	.05	320
□	240	.53	.06	320
◇	266	.53	.08	320
△	241	.53	.09	320
+	242	.53	.09	320
	267	.53	.10	320

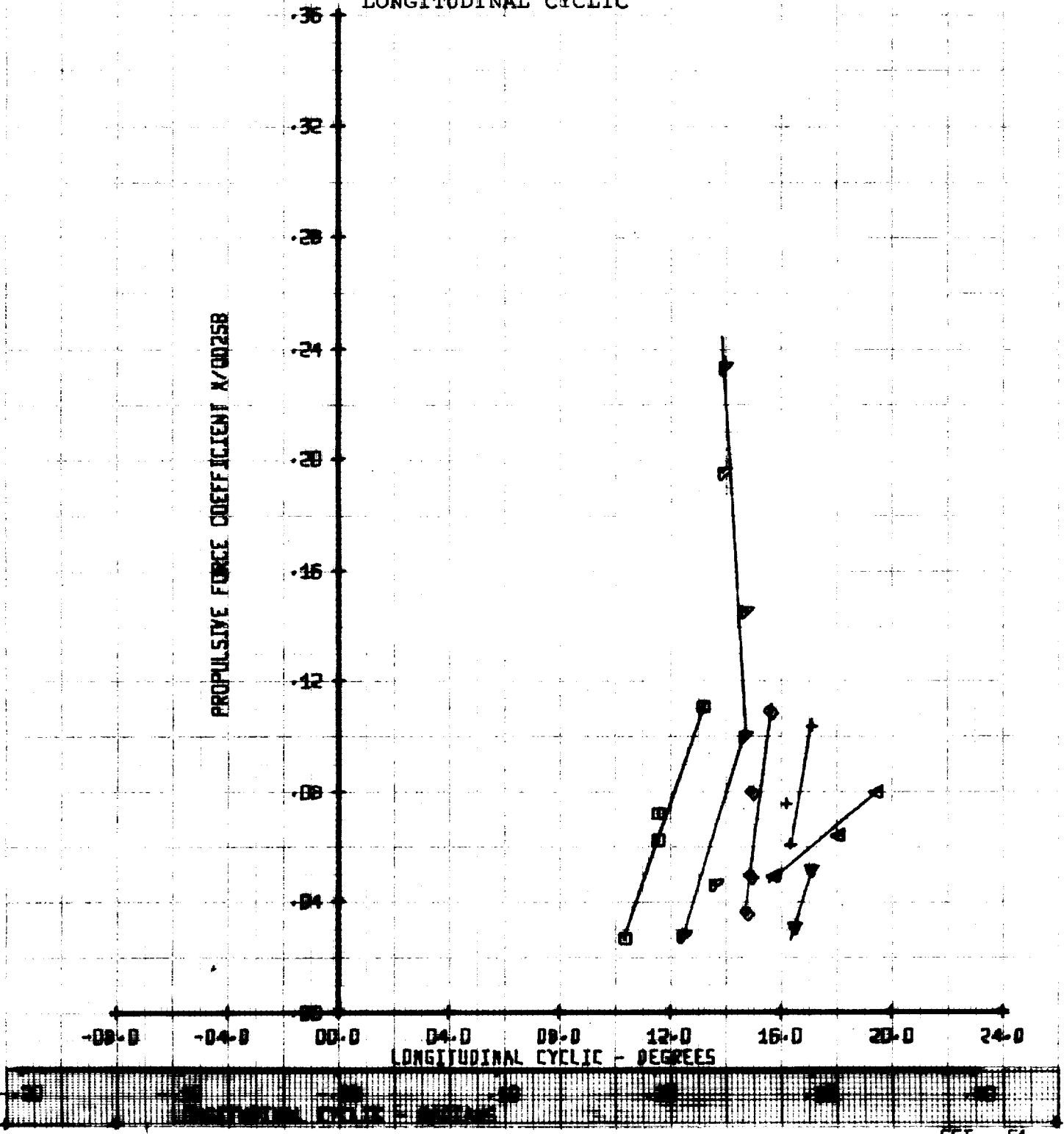
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MI	CT/58	YTLN
○	230	0.05	05	320
△	240	0.06	06	320
◇	250	0.08	08	320
▽	261	0.09	09	320
+	272	0.05	05	320
	287	0.06	06	320

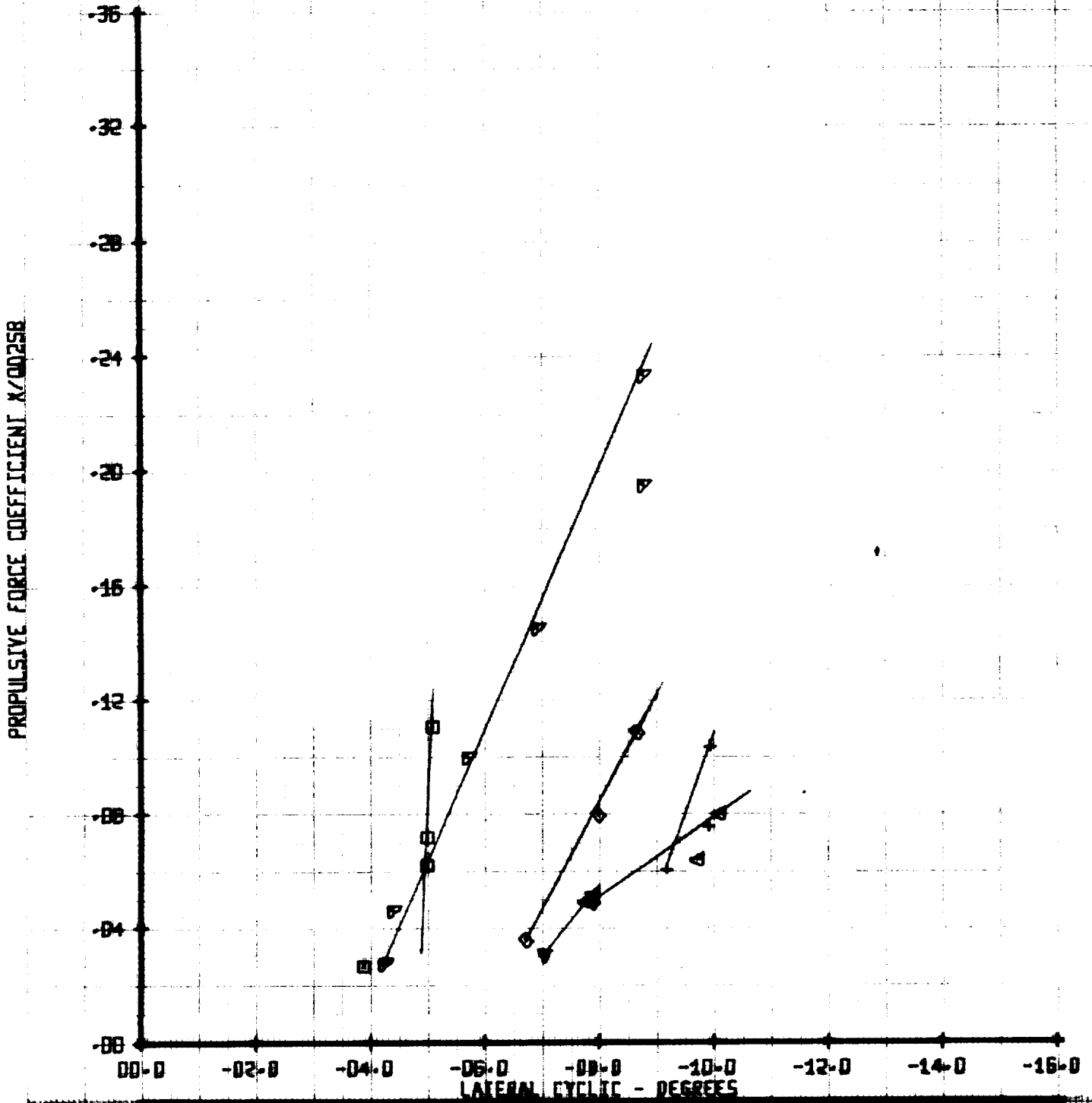
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MI	CT ^{1/58}	Y/TUN
○	268	0.000	0.000	320
□	240	0.000	0.000	320
◇	266	0.000	0.000	320
▽	241	0.000	0.000	320
△	242	0.000	0.000	320
+	267	0.000	0.000	320

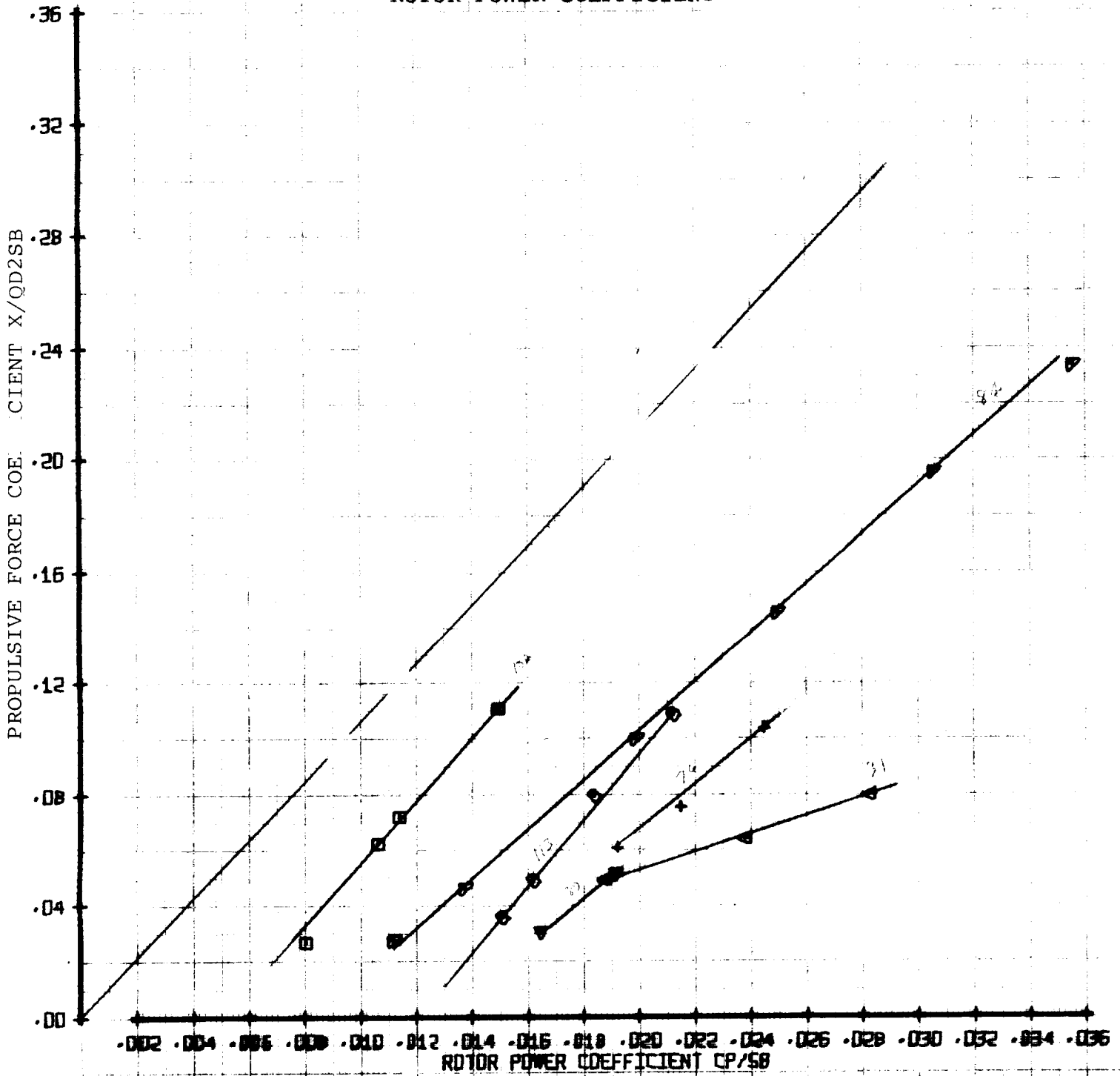
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MU'	CT'/58	YTLN
□	268	.53	.05	328
△	240	.53	.06	328
◇	266	.53	.08	328
▽	241	.53	.085	328
▲	242	.53	.09	328
+	267	.53	.18	328

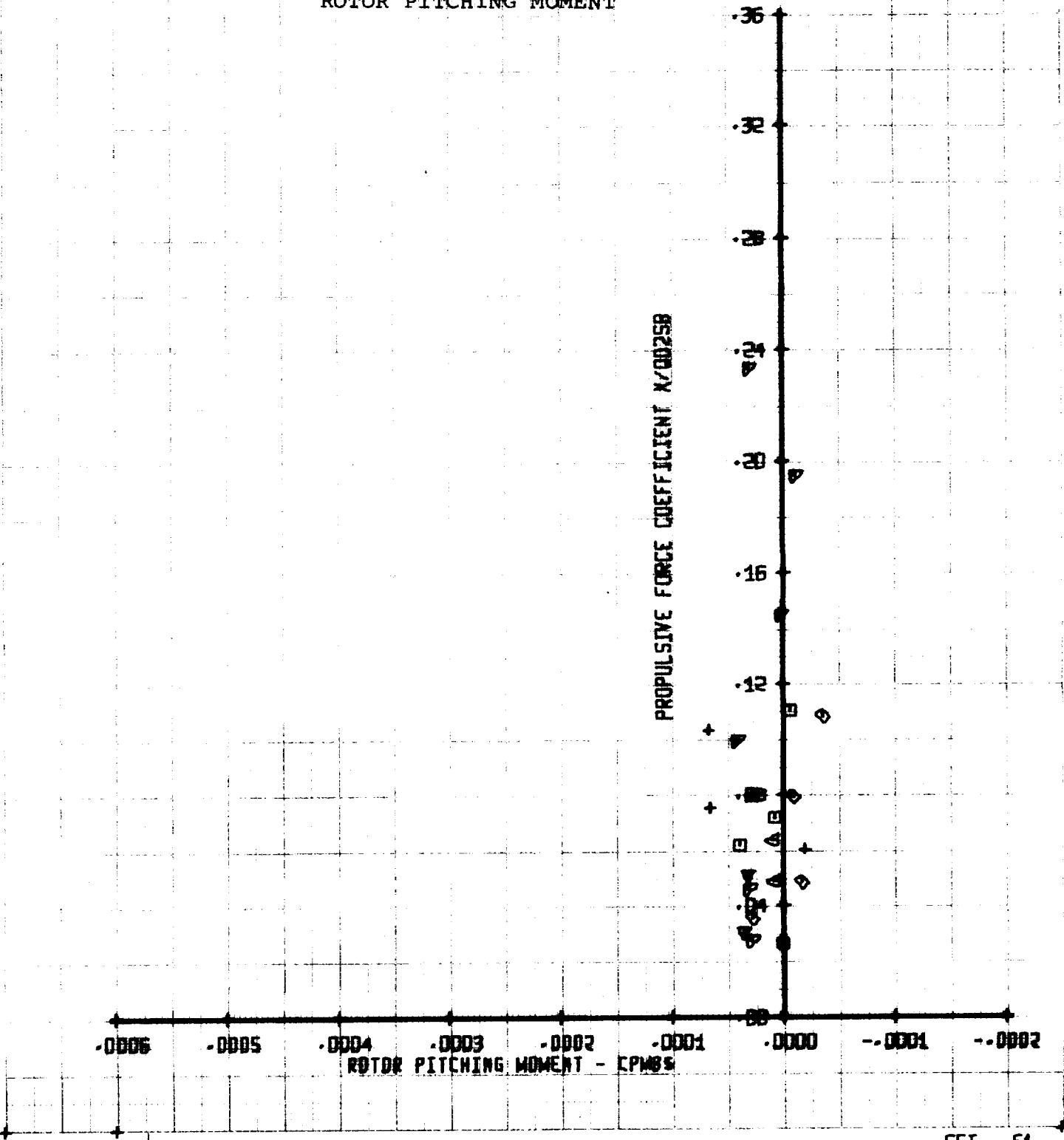
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MEI	CT' / SB	YTUN
+	250	0.05	320	
△	240	0.06	320	
□	266	0.06	320	
◇	241	0.09	320	
○	242	0.09	320	
×	267	0.18	320	

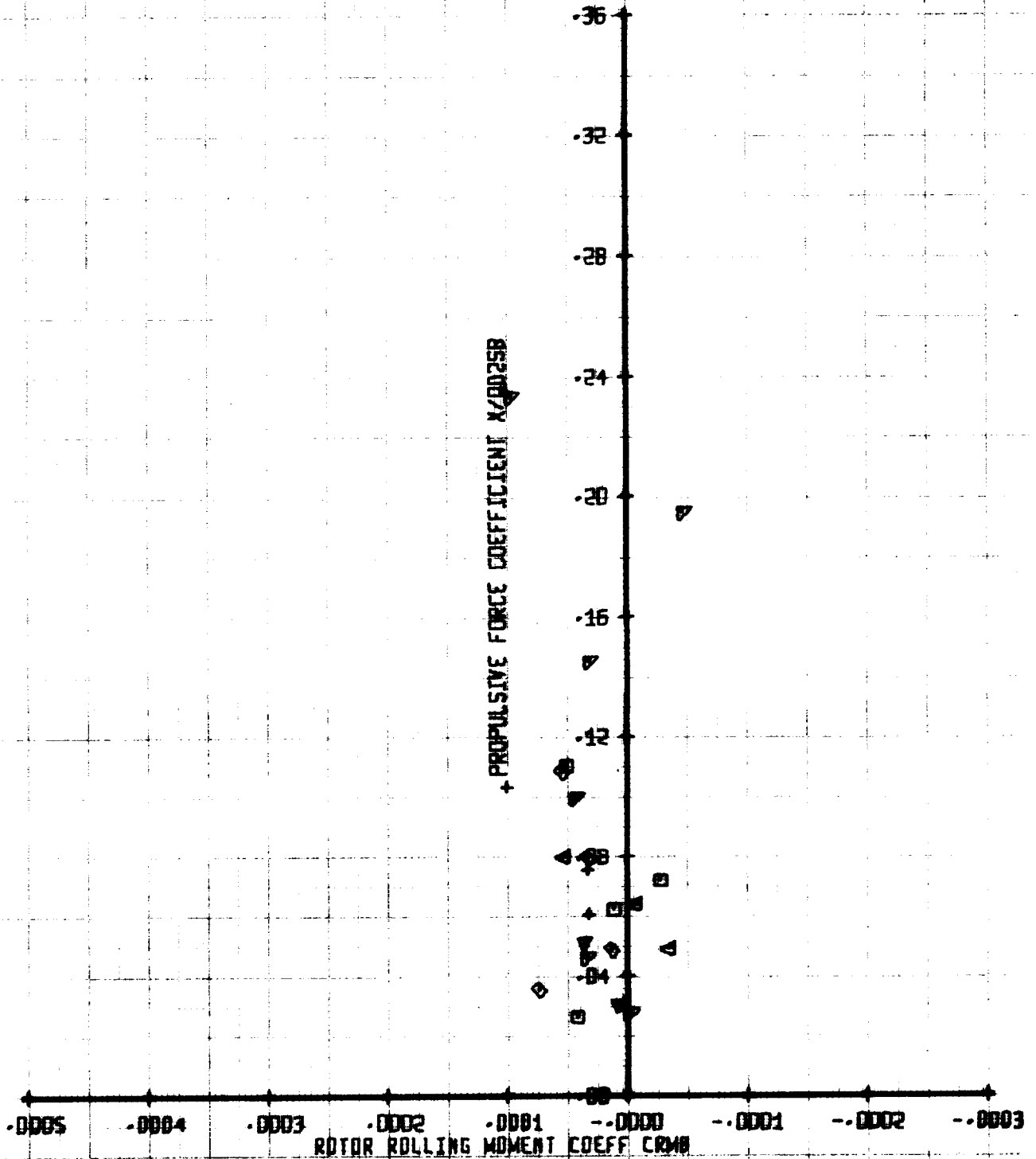
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	ML'	CT'YSB	YTUN
+	268	.53	.05	328
△	240	.53	.06	328
◇	266	.53	.08	328
▽	241	.53	.09	328
+	242	.53	.09	328
+	267	.53	.10	328

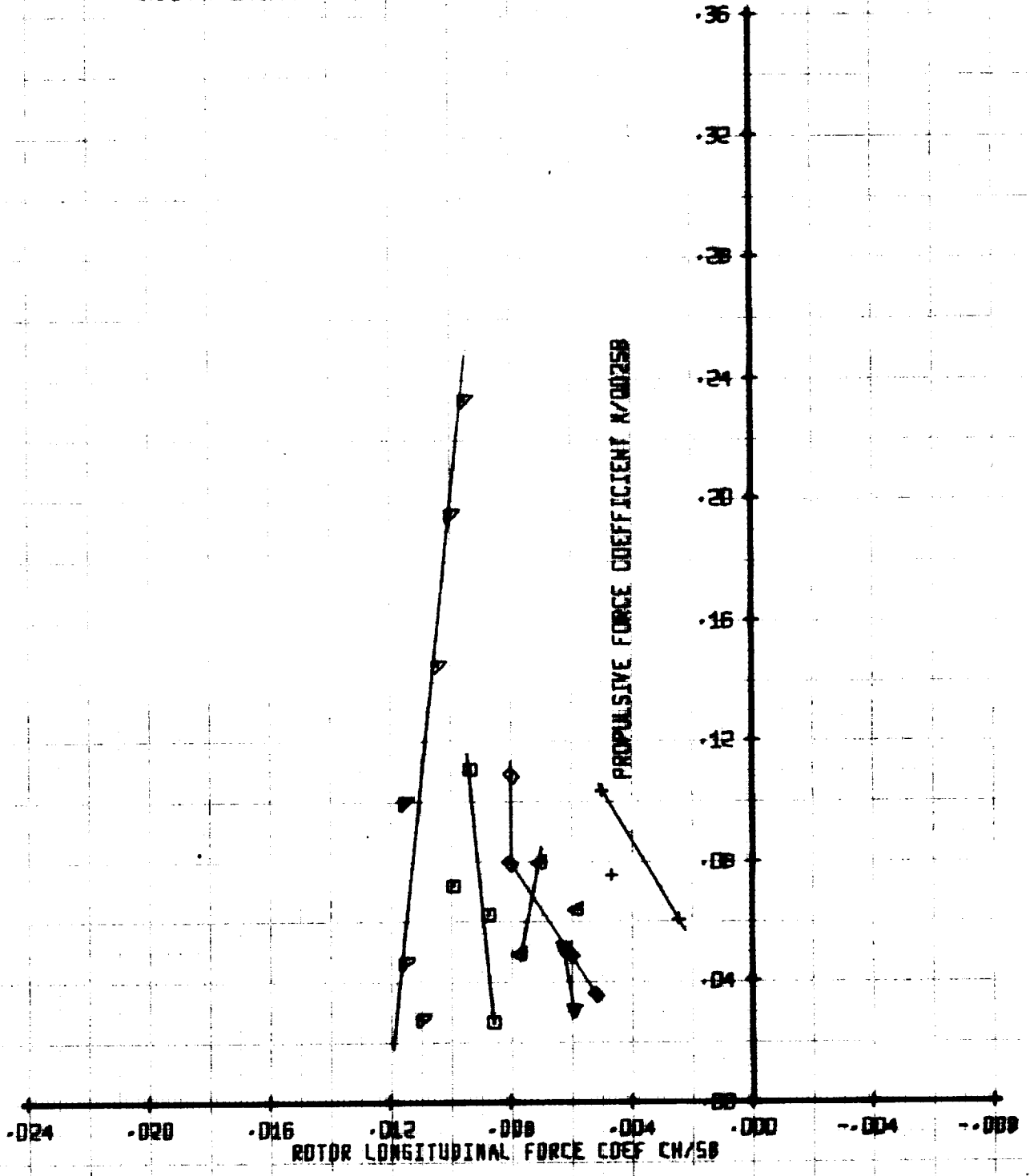
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	ML'	CT' / 58	VTUN
○	268	.53	.05	328
△	240	.53	.06	328
◇	266	.53	.08	328
□	241	.53	.09	328
+	243	.53	.09	328
+	267	.53	.10	328

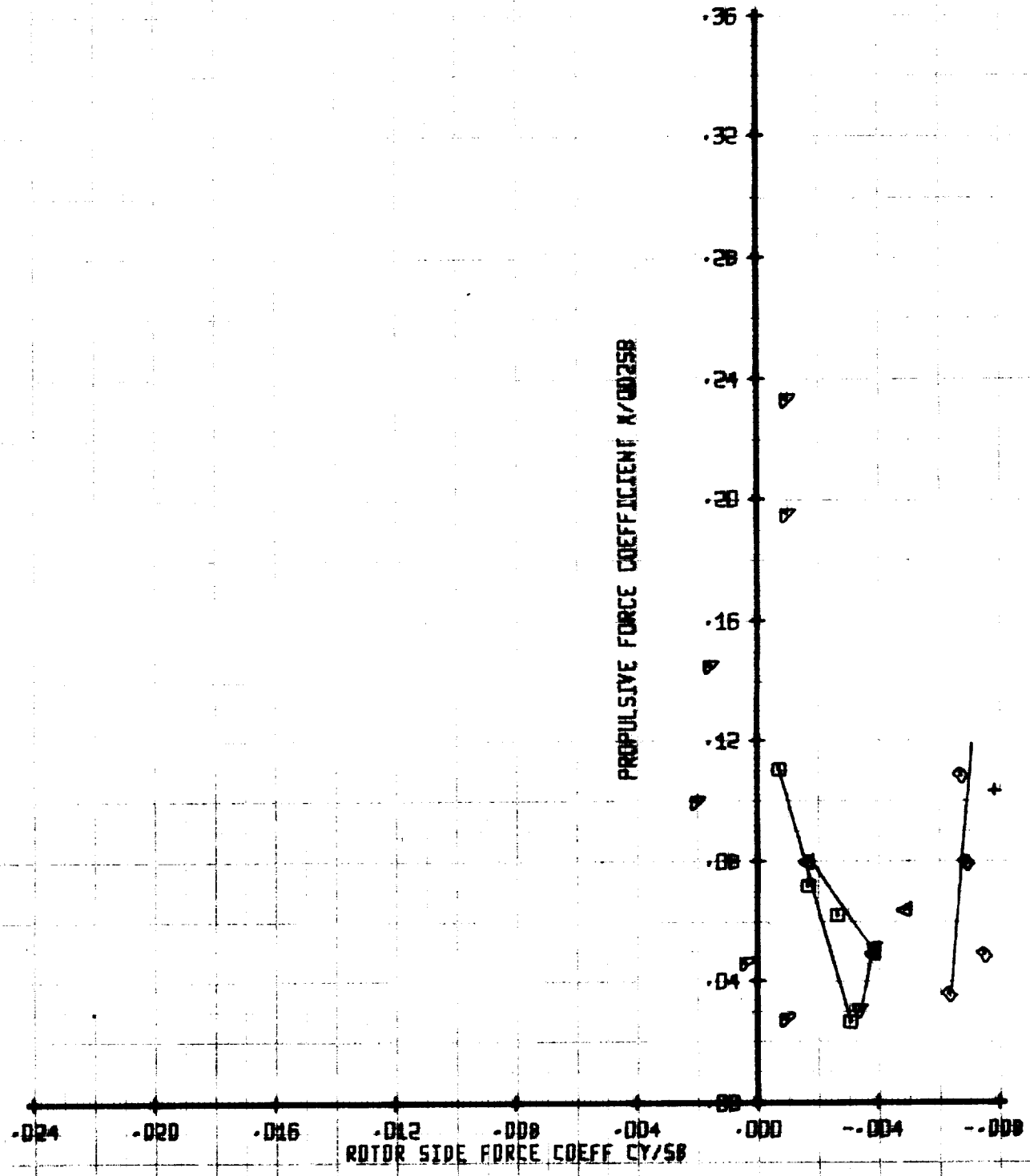
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	ML'	CT'/SB	Y/TUN
○	268	.53	.05	328
△	240	.53	.06	328
◇	266	.53	.08	328
▽	241	.53	.09	328
+	242	.53	.09	328
+	267	.53	.18	328

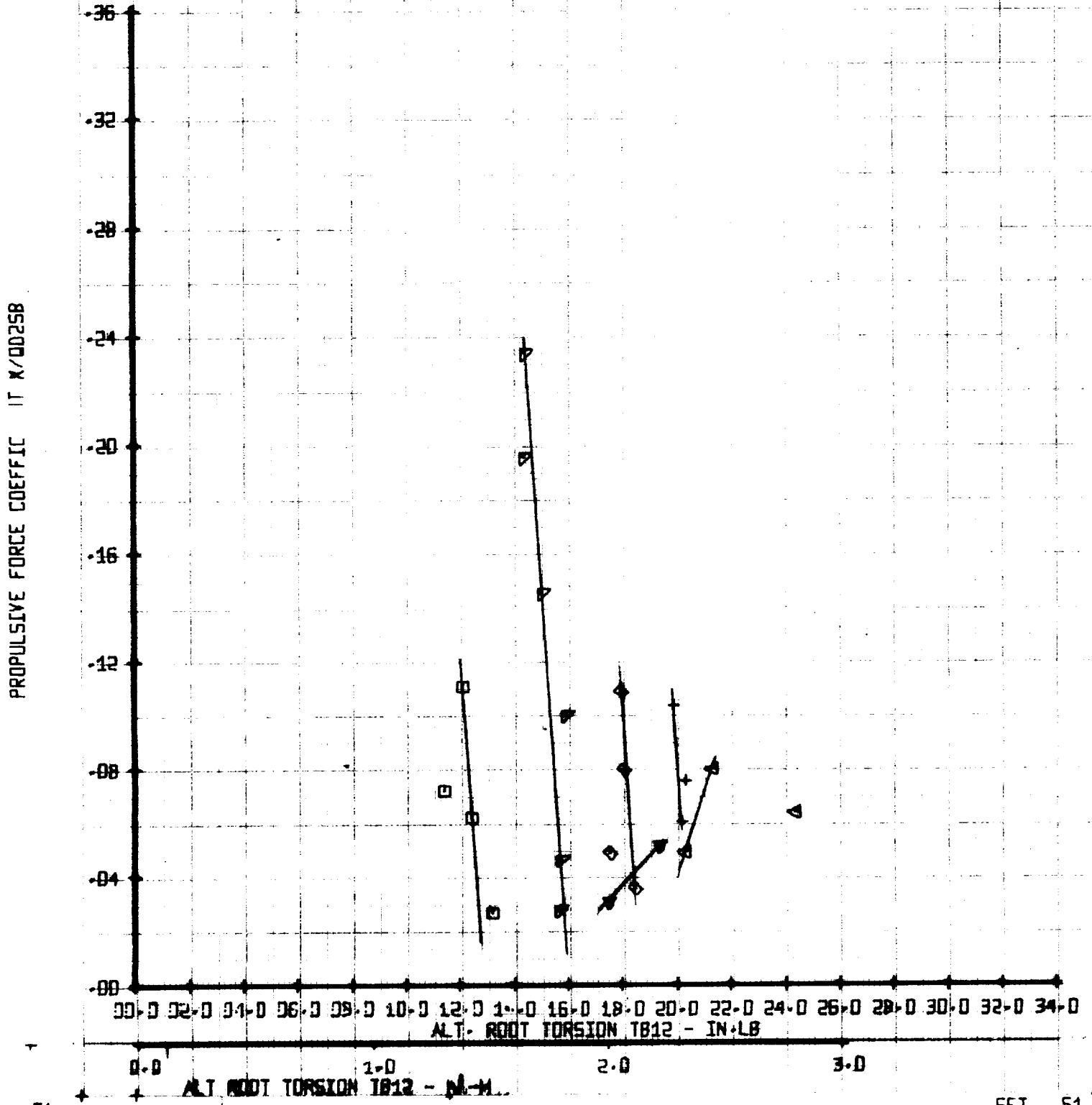
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1210 SCALE OF 173 ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	VEL	CT %SB	VTUN
○	269	100	.05	328
△	243	100	.06	328
▽	266	100	.08	328
▲	241	100	.09	328
+	242	100	.07	328
◇	267	100	.08	328

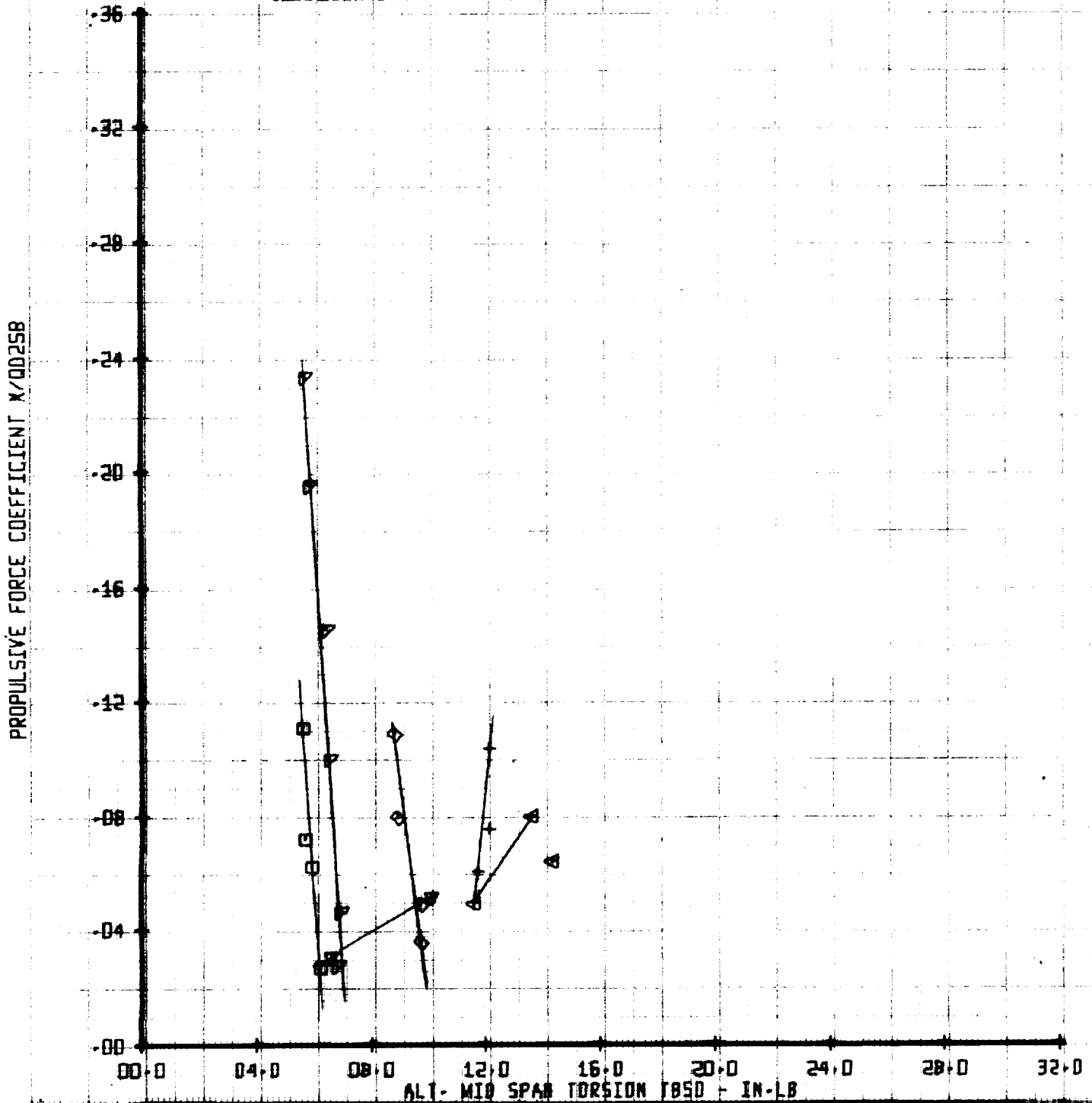
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MI'	CT' / SB	VTUN
○	268	.53	.05	328
□	240	.53	.06	328
◇	266	.53	.08	328
△	241	.53	.09	328
+	242	.53	.09	328
+	267	.53	.18	328

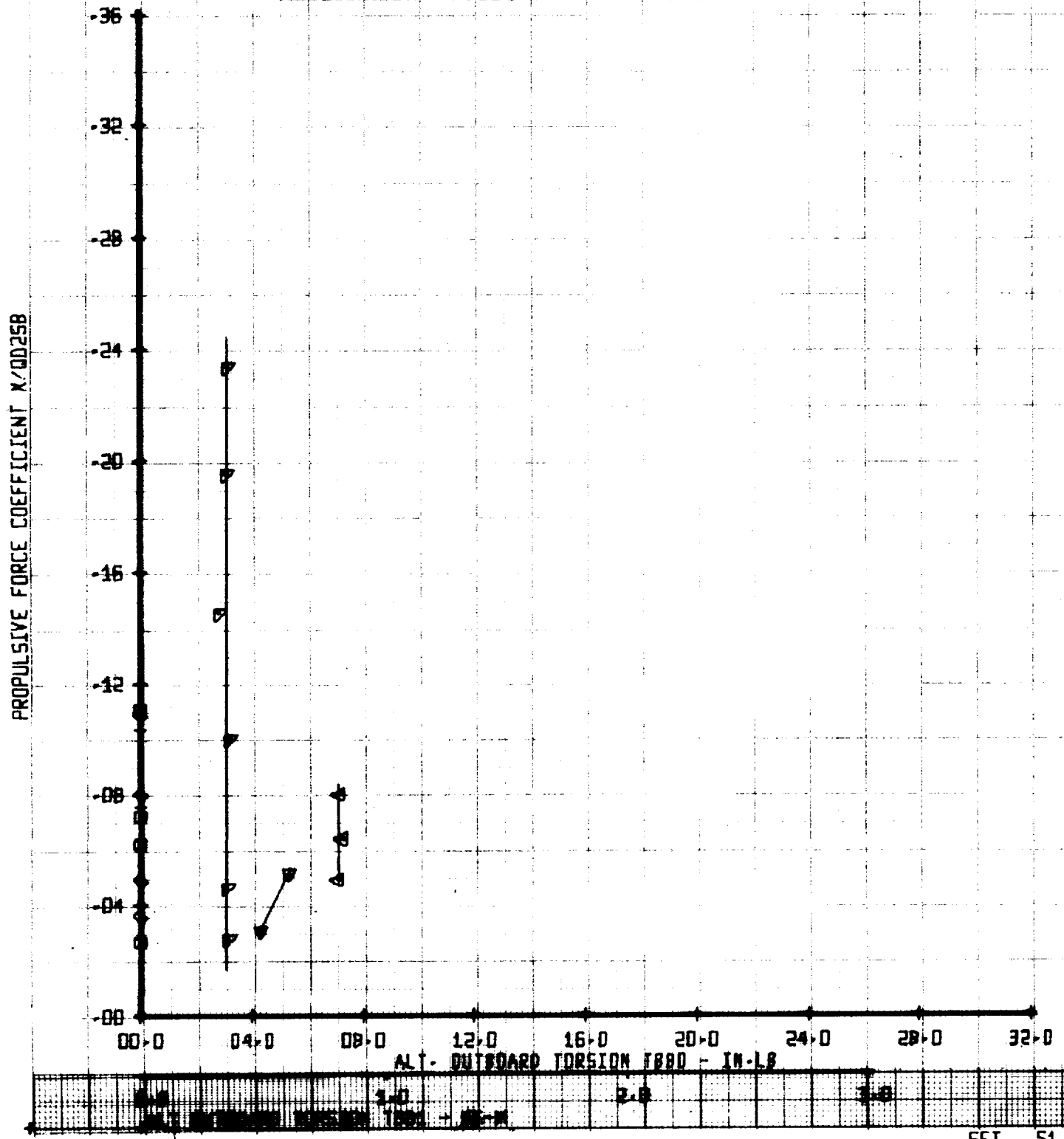
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	ML'	CT' / SB	VTUN
○	268	.53	.05	328
△	240	.53	.06	328
◇	266	.53	.08	328
▽	241	.53	.09	328
+	242	.53	.09	328
+	267	.53	.10	328

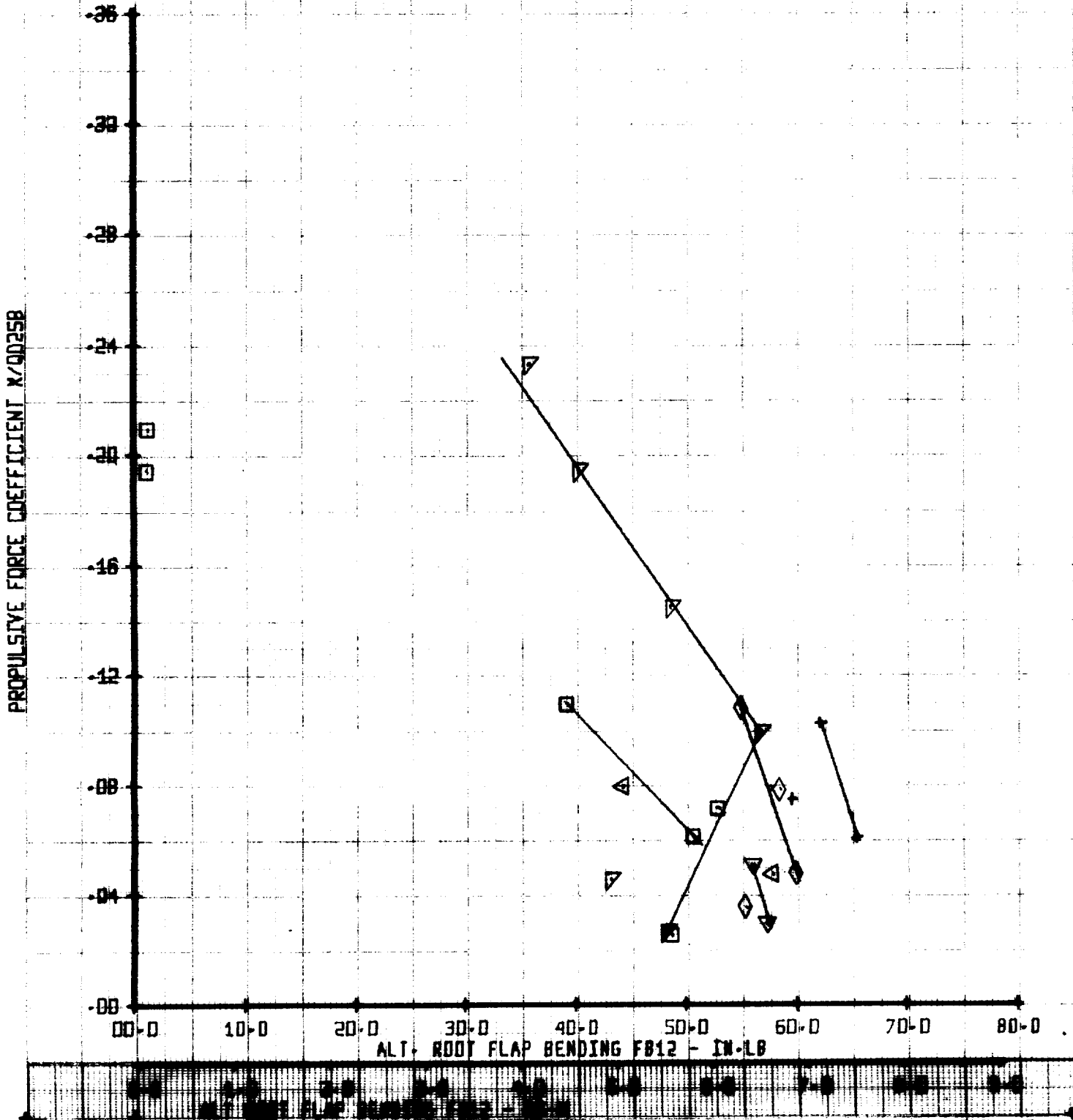
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB80



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND					
SYM	RUN	MJ'	CT'Y5B	VTUN	
□	258	.53	.05	328	
▽	240	.53	.06	328	
◇	256	.53	.08	328	
▽	241	.53	.09	328	
△	242	.53	.09	328	
+	267	.53	.10	328	

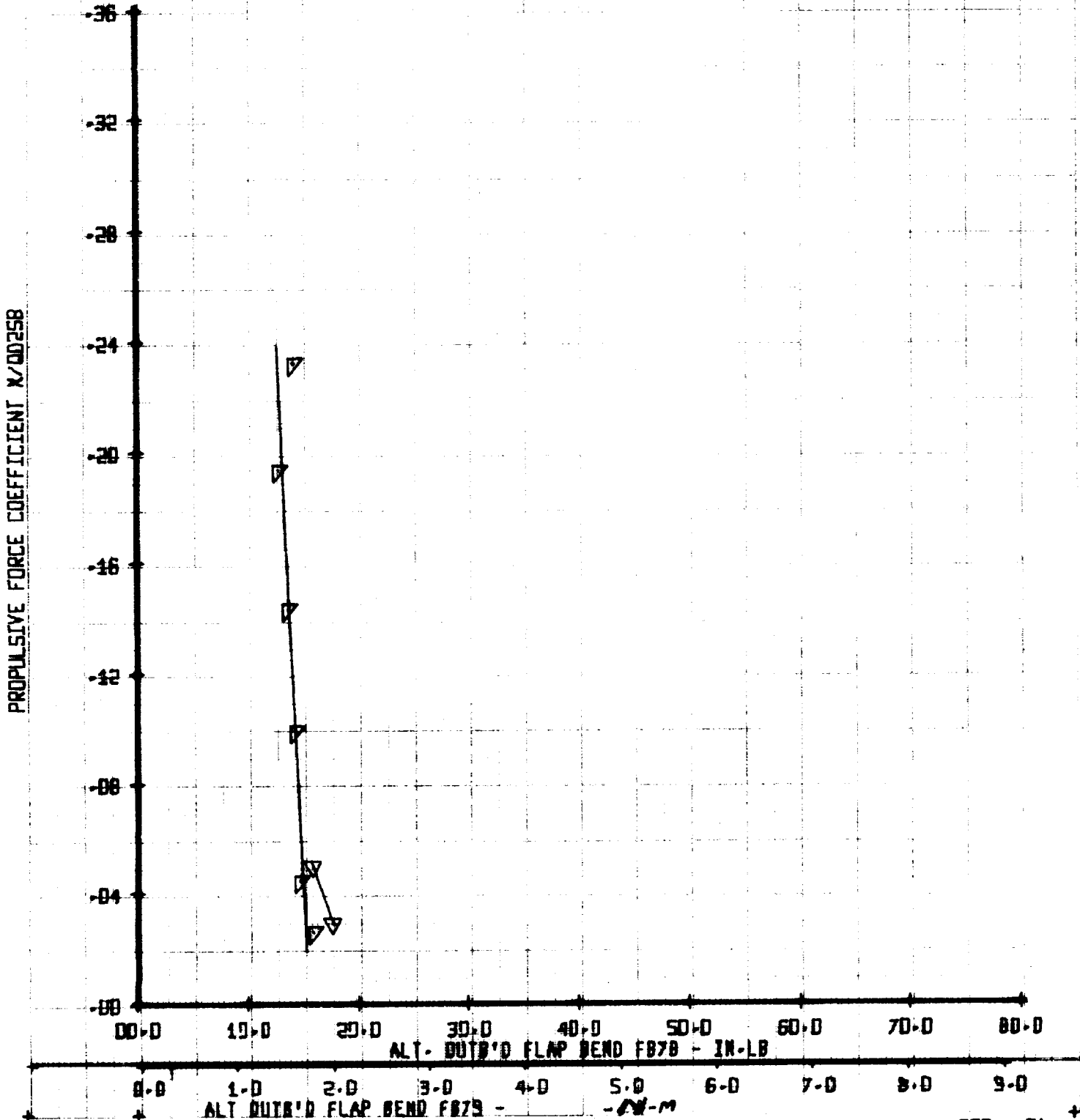
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MU'	CT' / 58	VTUN
+	268	.53	.05	320
△	240	.58	.05	320
▽	266	.58	.05	320
◇	241	.58	.05	320
+	240	.58	.05	320
△	267	.58	.05	320

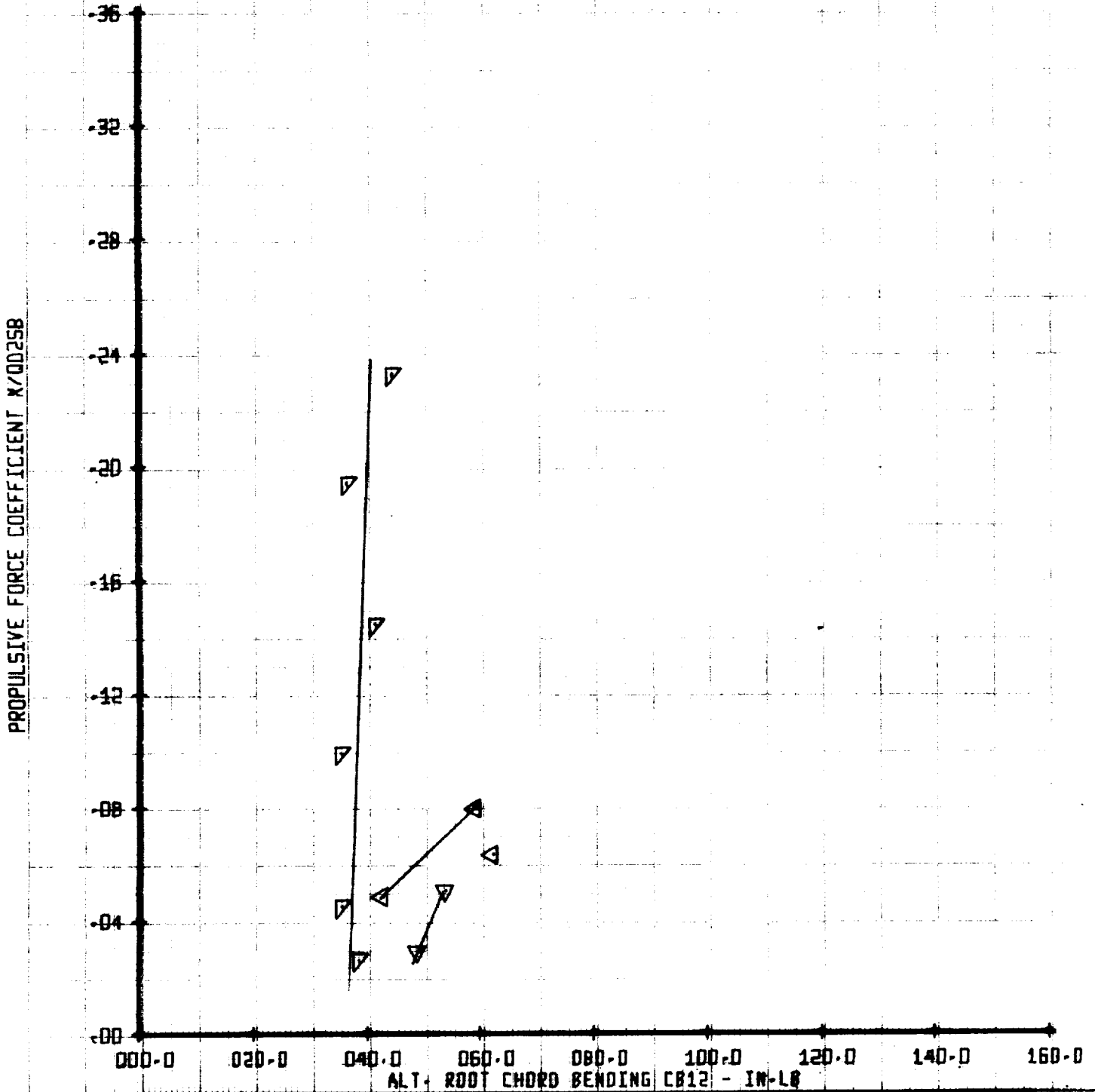
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB78



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT' / SB	VTUN	
○	268 X	.53	.05	328	
△	240 ✓	.53	.06	328	
◇	266 ✓	.53	.08	328	
▽	241 ✓	.53	.09	328	
+	242 ✓	.53	.09	328	
○	267 ✓	.53	.10	328	

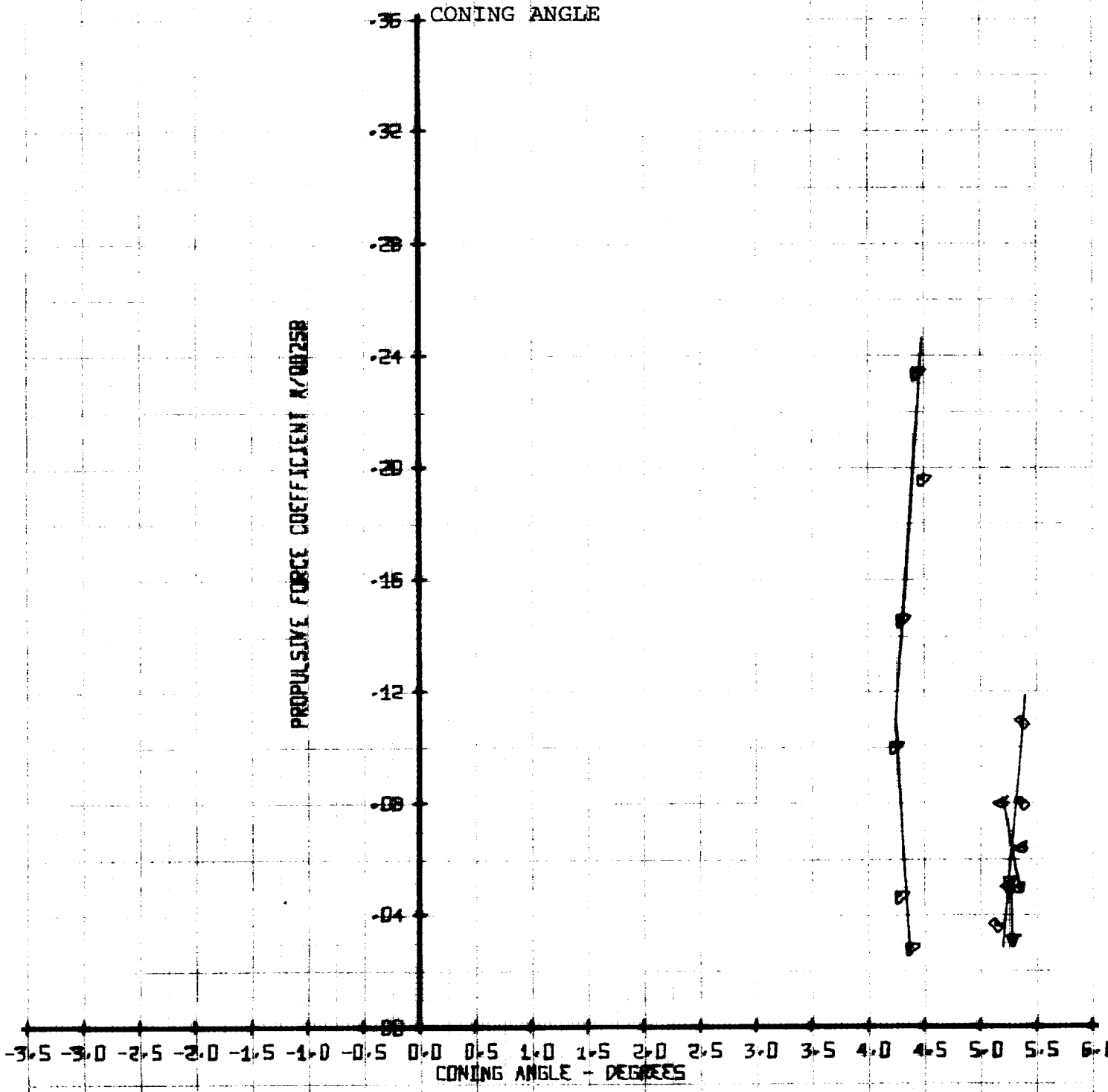
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MU'	CT' 256	YTLN
□	269	.53	.55	30
△	240	.53	.55	30
◇	266	.53	.55	30
▽	241	.53	.55	30
+	242	.53	.55	30
	267	.53	.55	30

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 CONING ANGLE



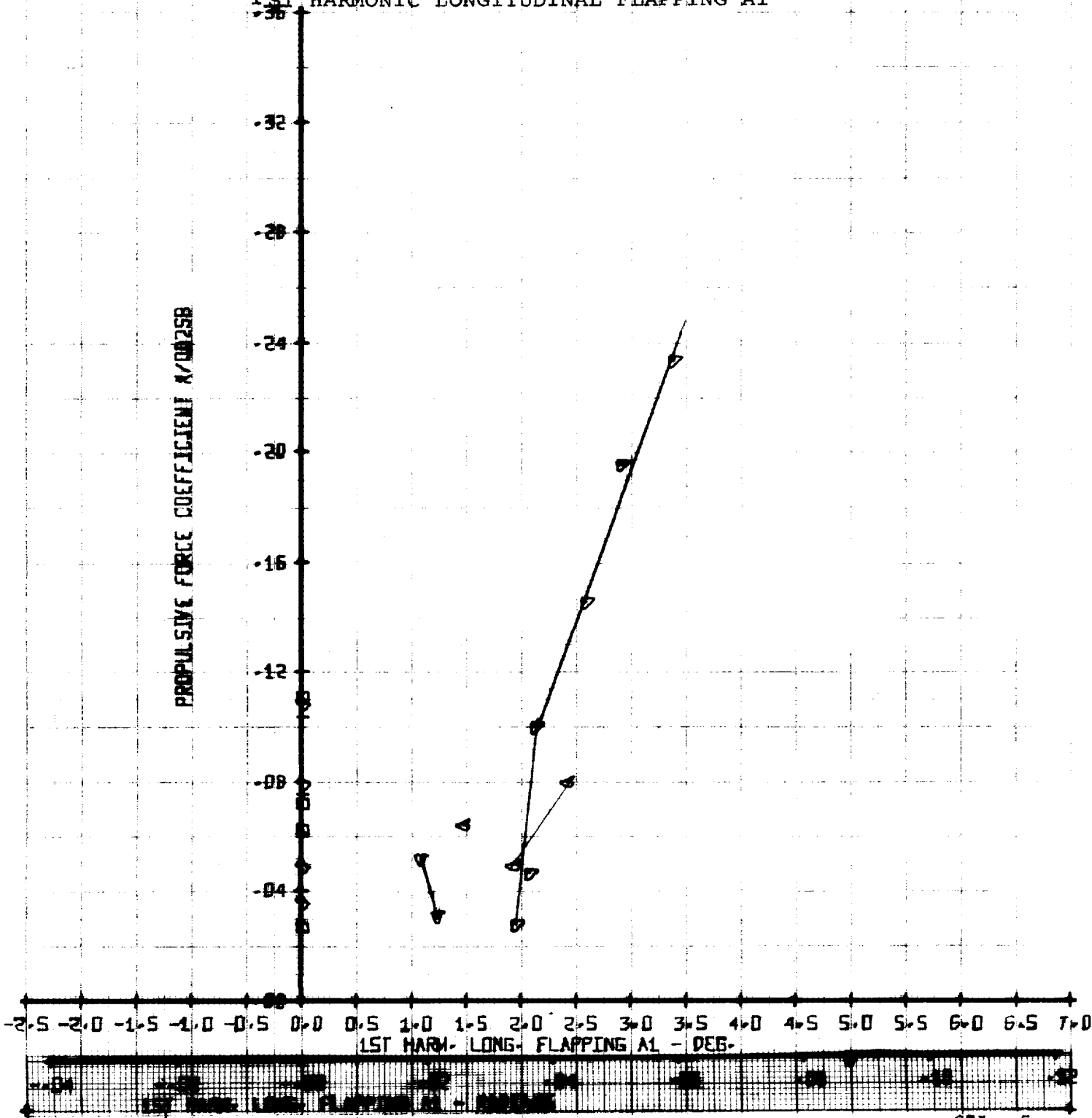
LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47E ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MU'	CT' / 58	Y/TUN
□	268	.53	.05	320
△	240	.53	.06	320
◇	266	.53	.08	320
▽	241	.53	.09	320
+	242	.53	.09	320
•	267	.53	.10	320

PROPULSIVE FORCE COEFFICIENT

VERSUS

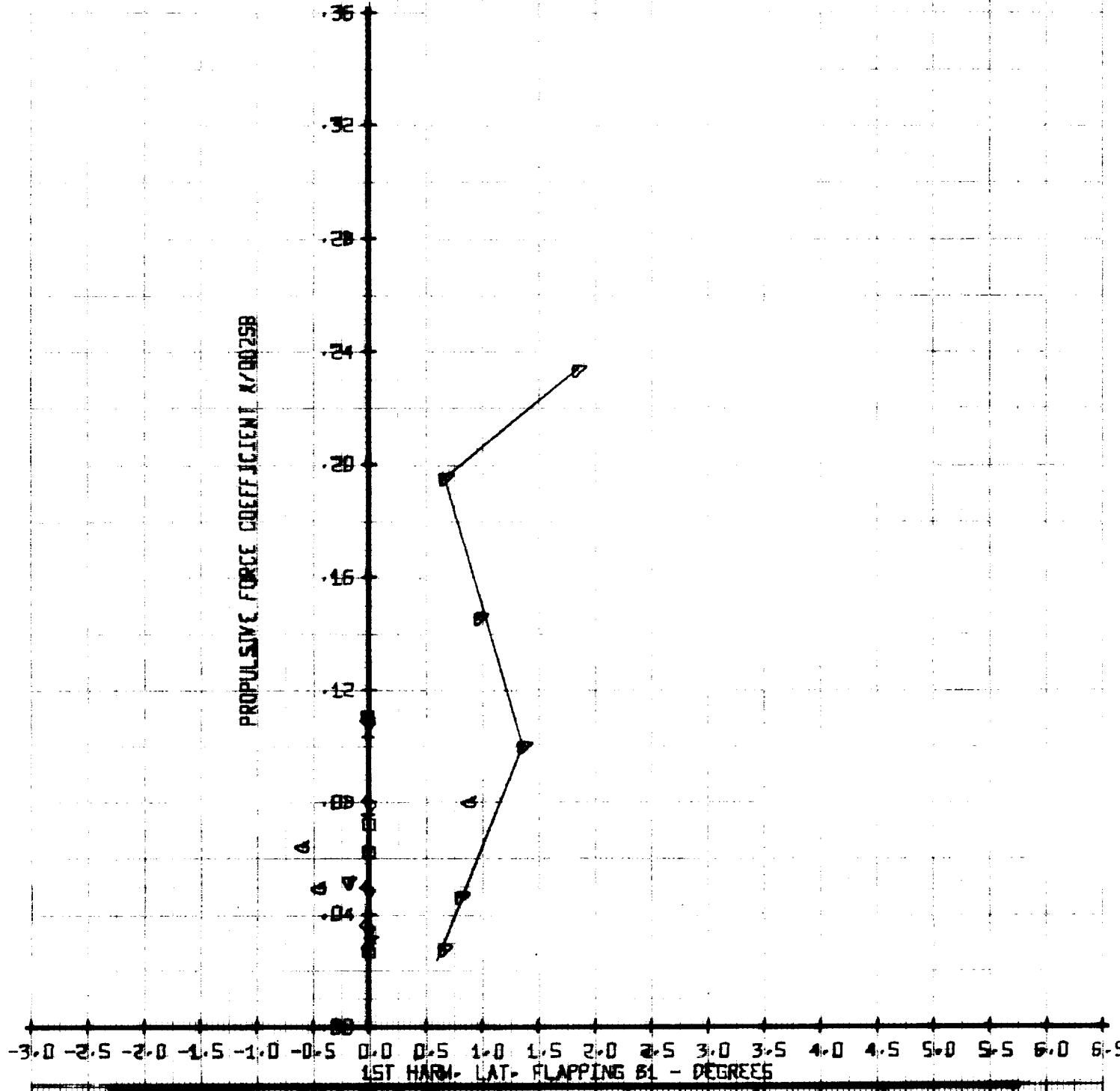
1ST HARMONIC LONGITUDINAL FLAPPING A1



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	BLIN	MU'	CT'/58	YTLIN
□	258	.53	.05	32
○	240	.53	.06	32
△	266	.53	.08	32
▽	241	.53	.09	32
◇	242	.53	.09	32
+	267	.53	.10	32

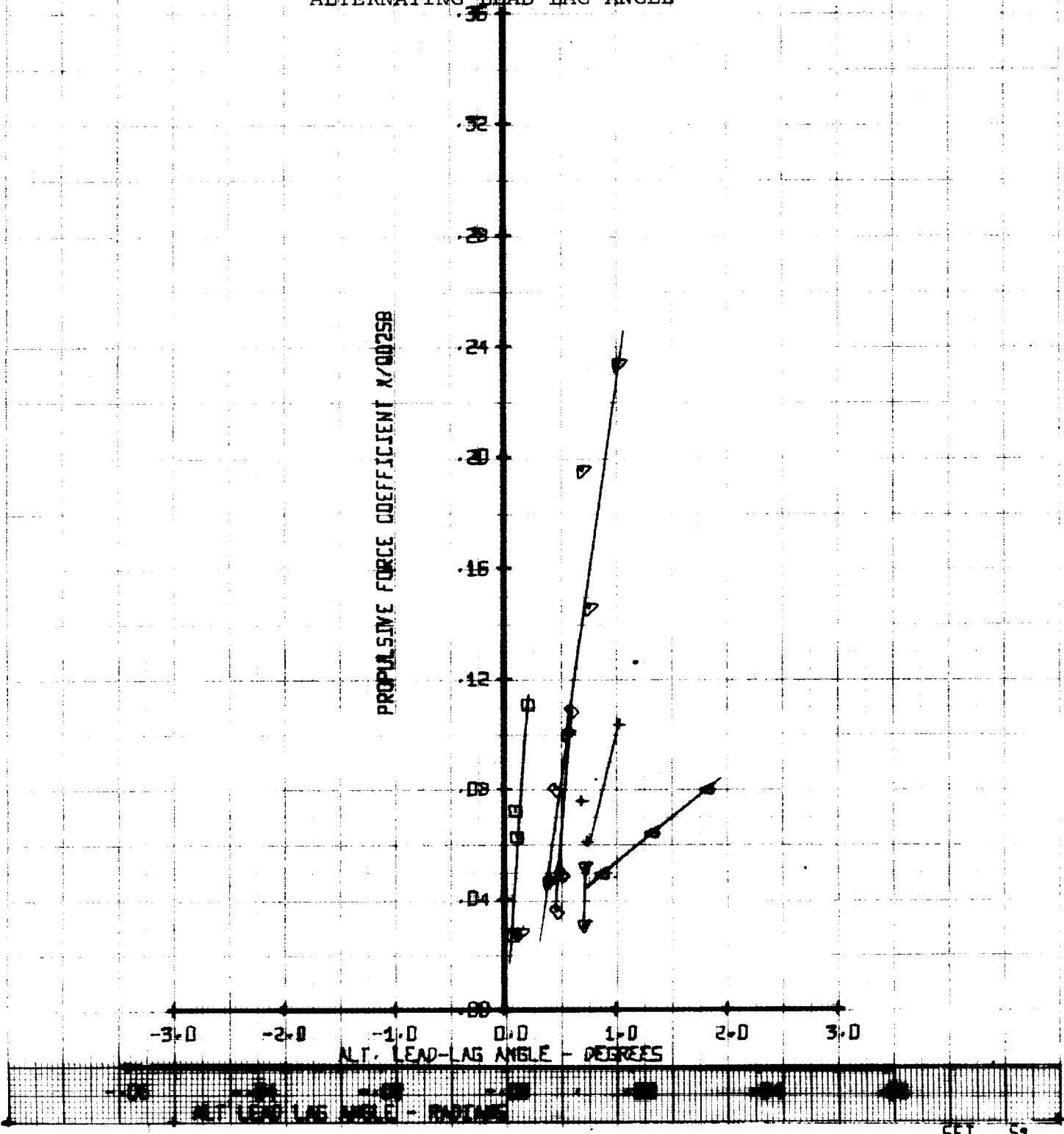
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING BL



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	BLIN	MLI'	CT' / 56	YILN
□	268	.53	.05	320
○	280	.53	.08	320
◇	286	.53	.08	320
△	241	.53	.08	320
▽	242	.53	.08	320
+	257	.53	.08	320

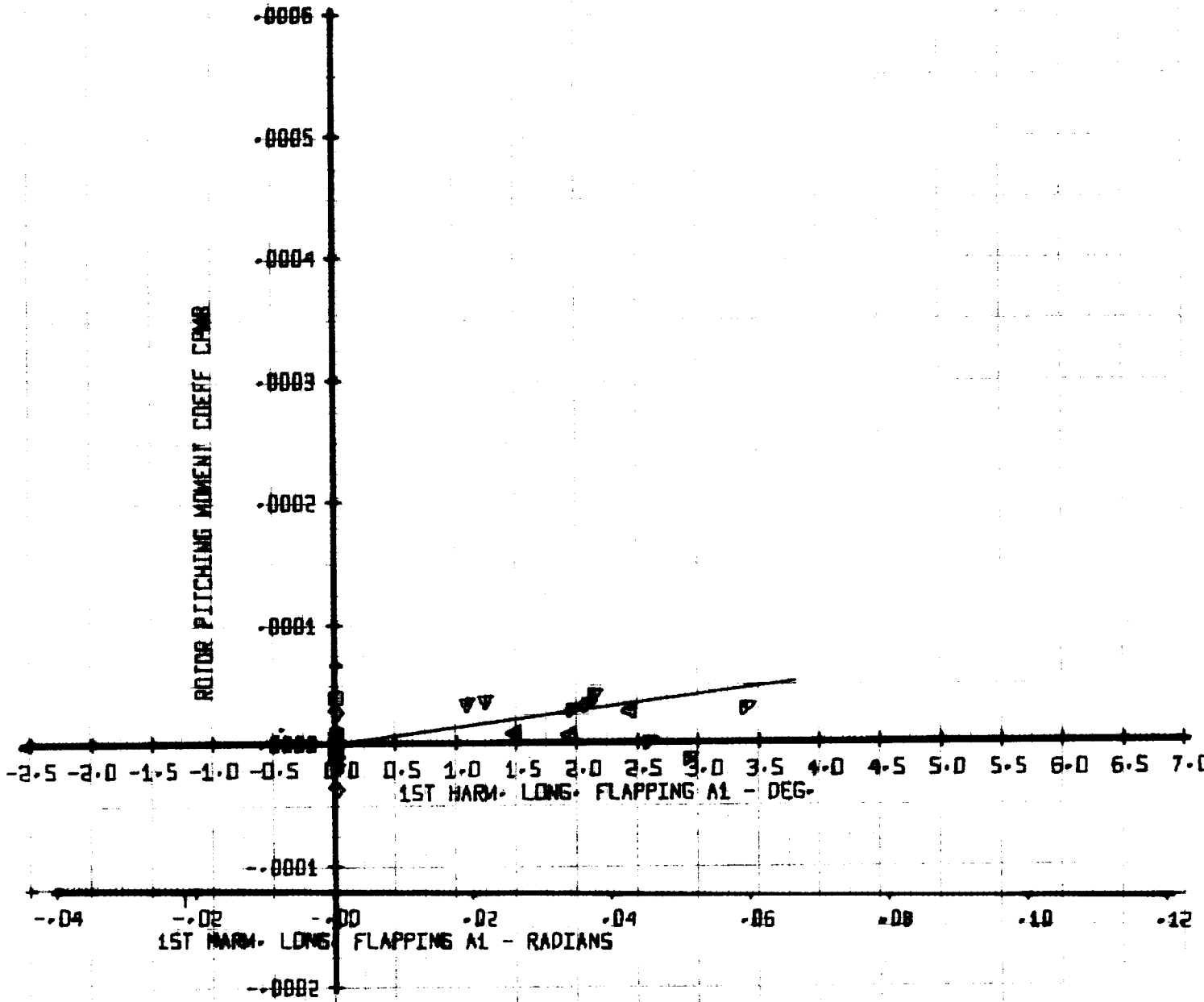
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MLI'	CT'/SB	YTLIN
○	268	.53	.05	328
△	240	.53	.06	328
◇	266	.53	.06	328
▽	241	.53	.09	328
+	242	.53	.09	328
+	267	.53	.10	328

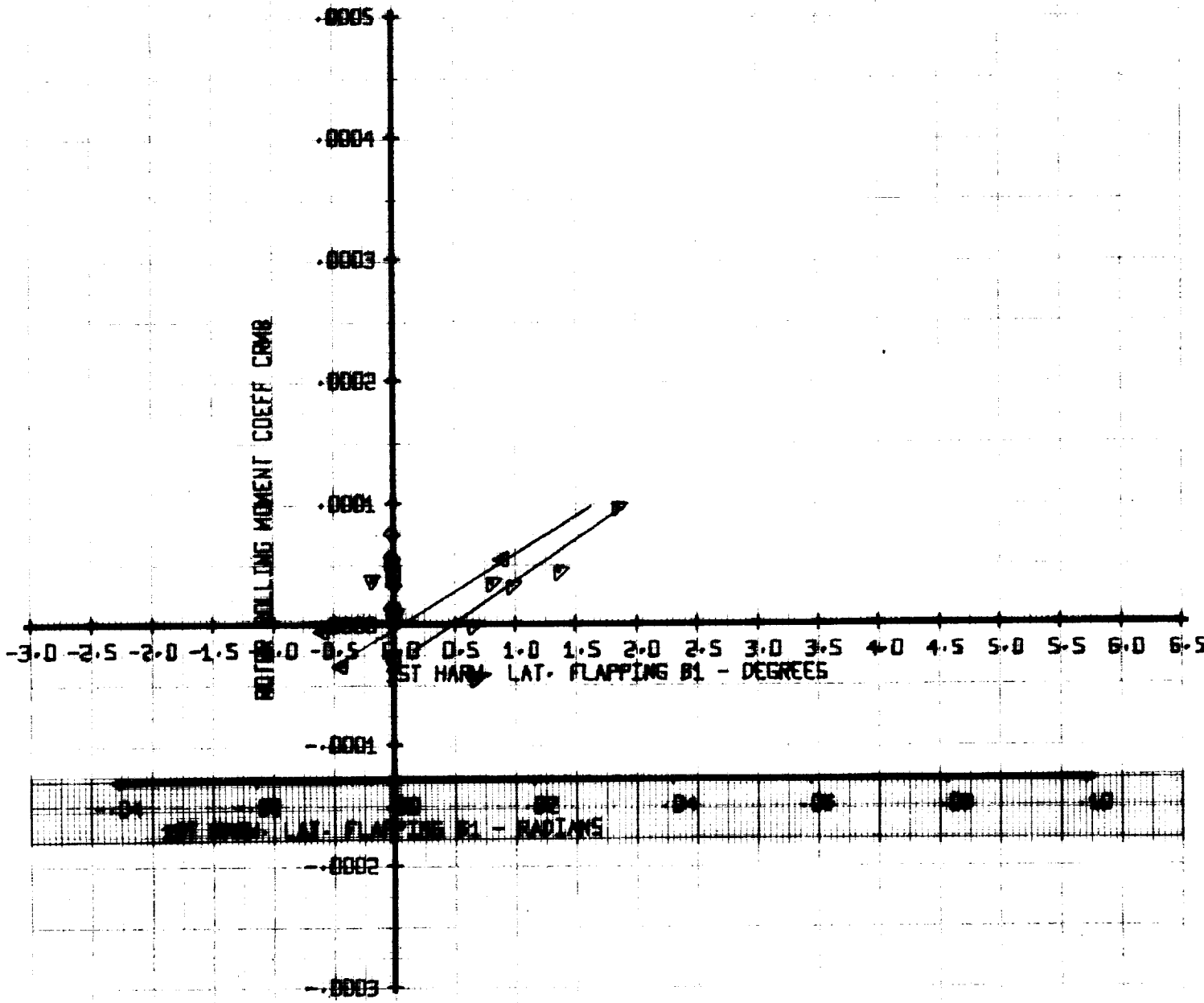
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	BLIN	MU'	CT'/SB	YTLN
○	268	.53	.05	328
△	240	.53	.06	328
◇	266	.53	.08	328
▽	241	.53	.09	328
+	242	.53	.09	328
	267	.53	.18	328

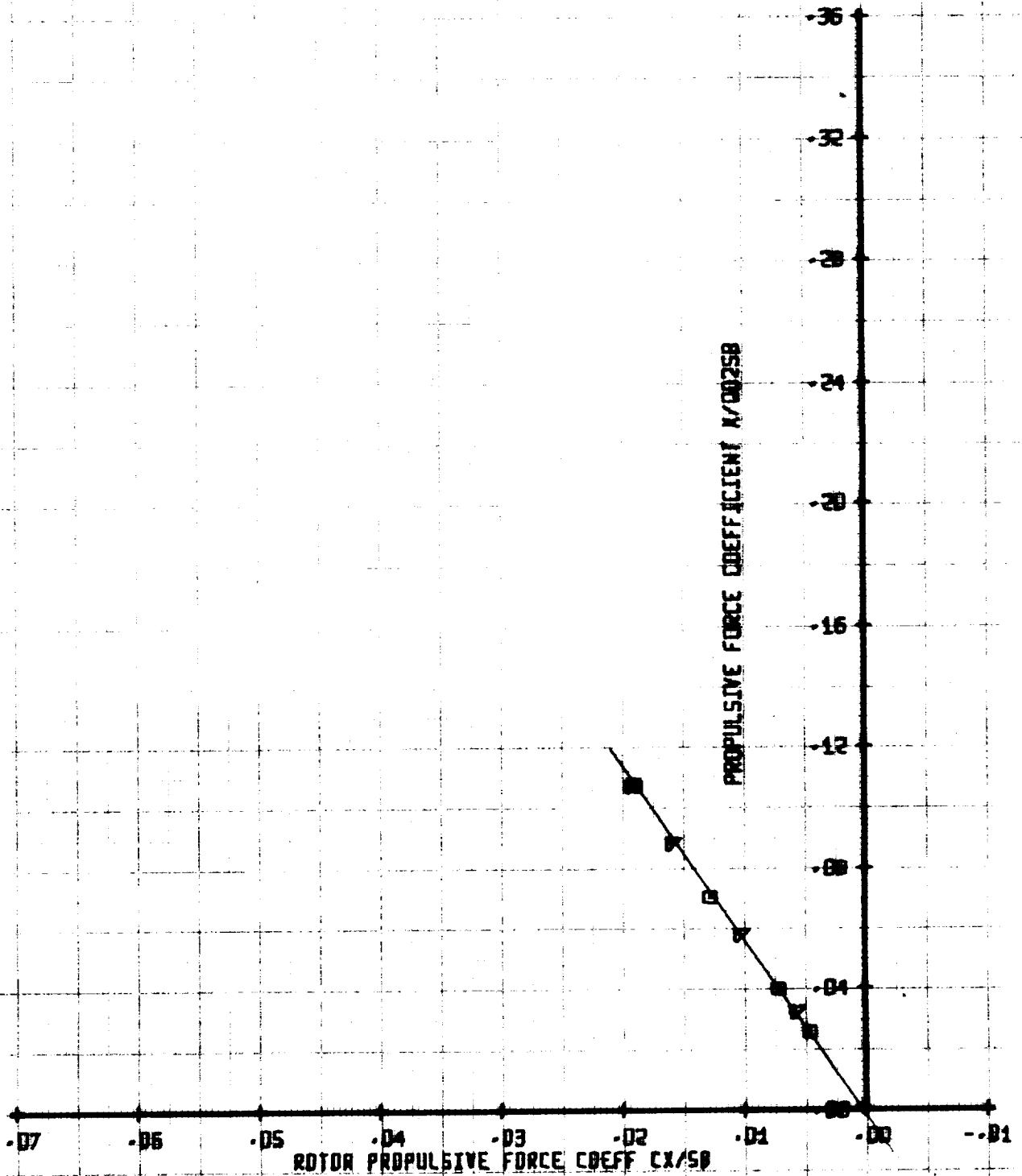
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	ML'	CT' / SB	Y/LIN
□	254	.53	.05	328
▽	255	.53	.07	328

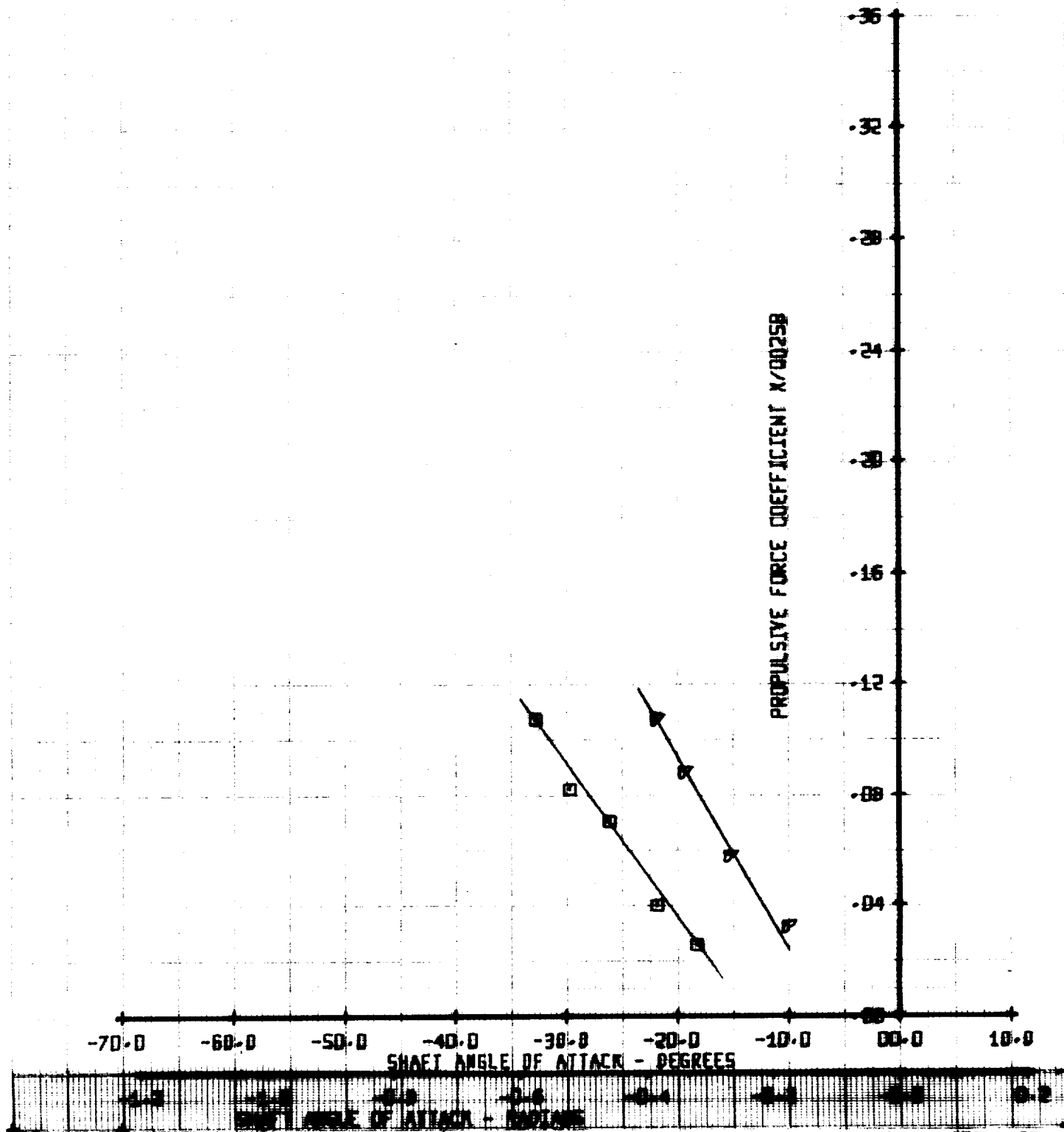
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	ML'	CT'/58	YTLN
□	264	.53	.05	328
▴	265	.53	.07	328

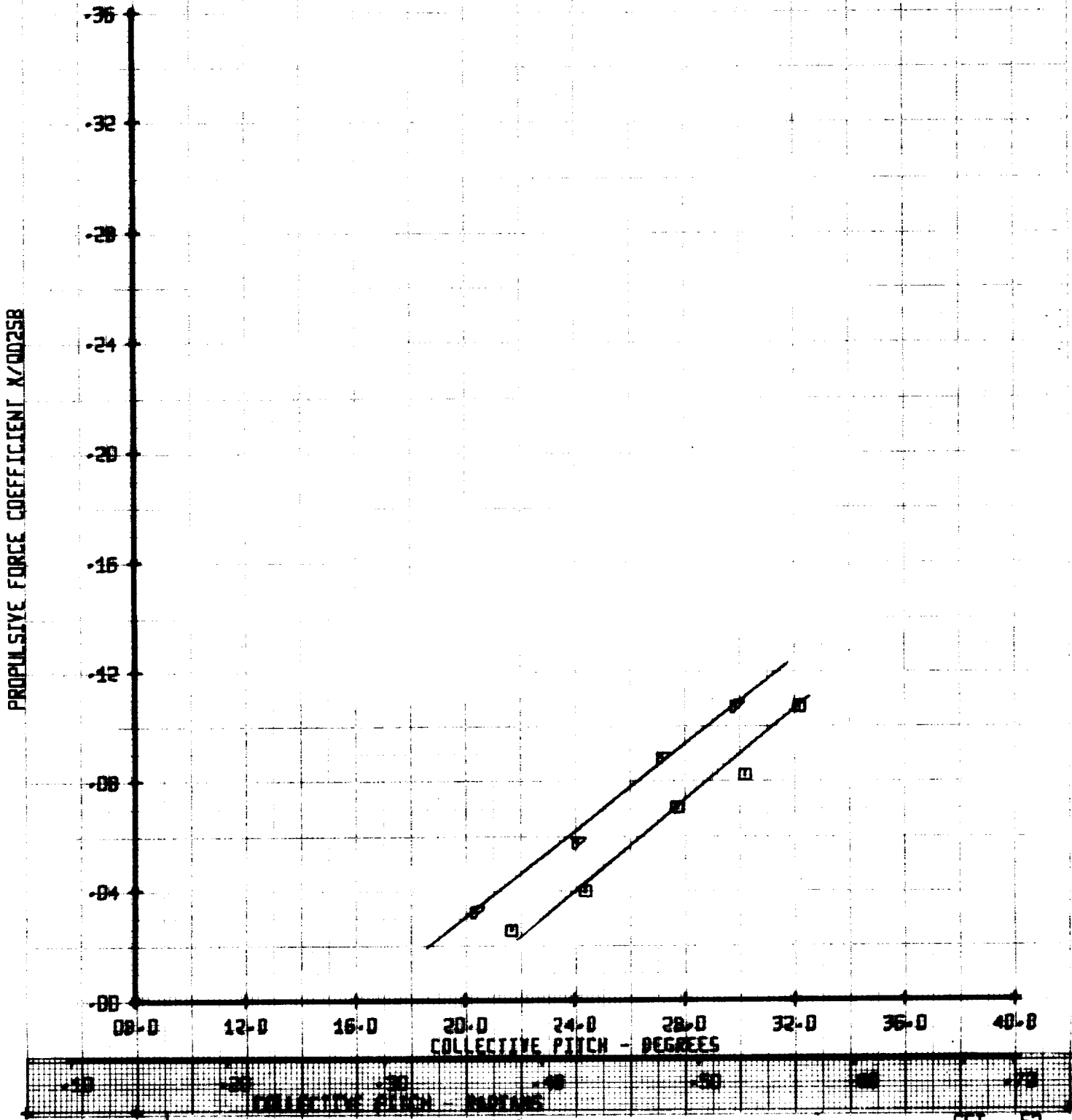
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	ML'	CT'/58	VTUM	
□	264	.53	.05	328	
△	265	.53	.07	328	

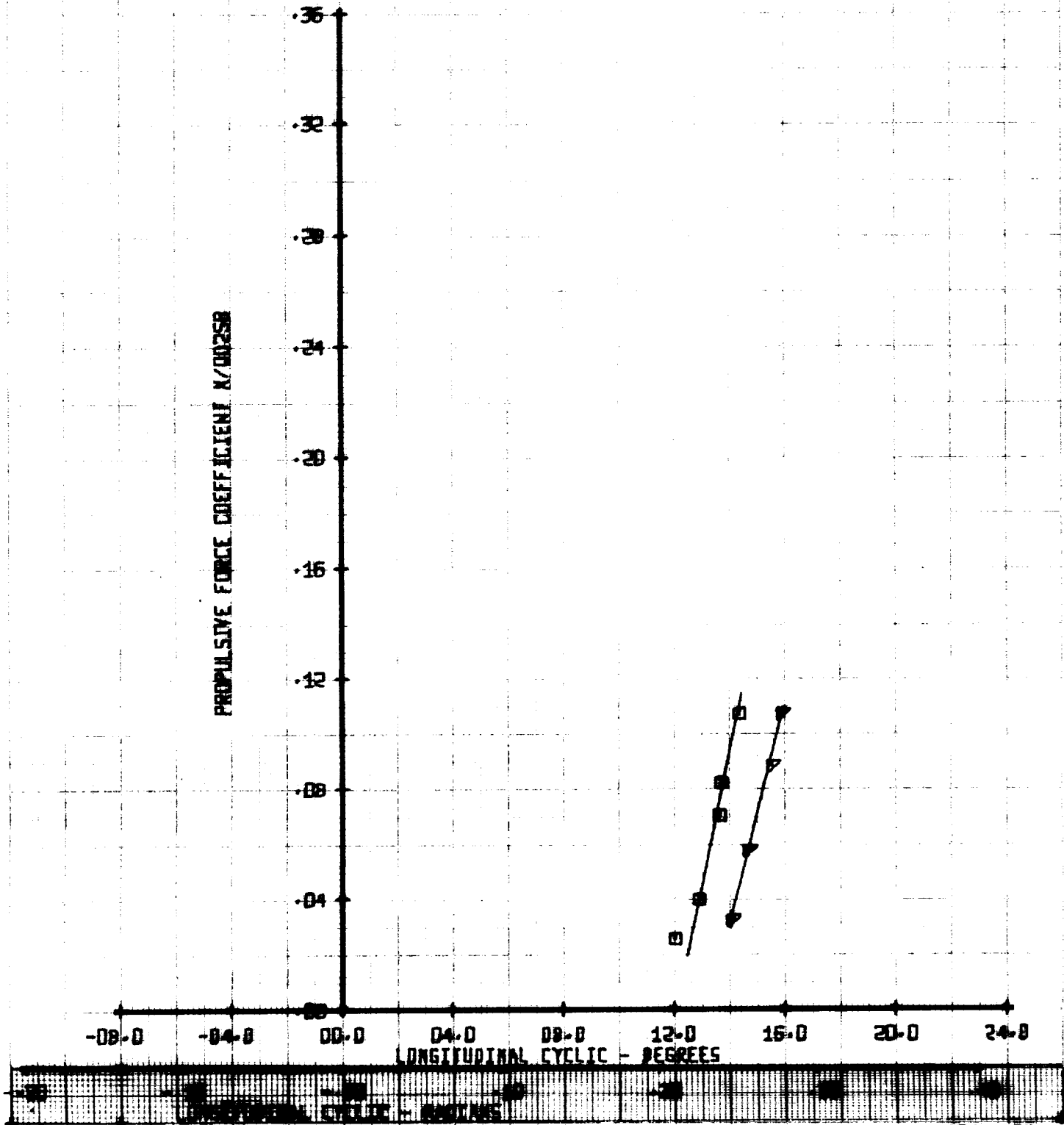
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	MIN	MI'	CT'58	YTDN	
□	254	.53	.05	320	
▽	265	.53	.07	320	

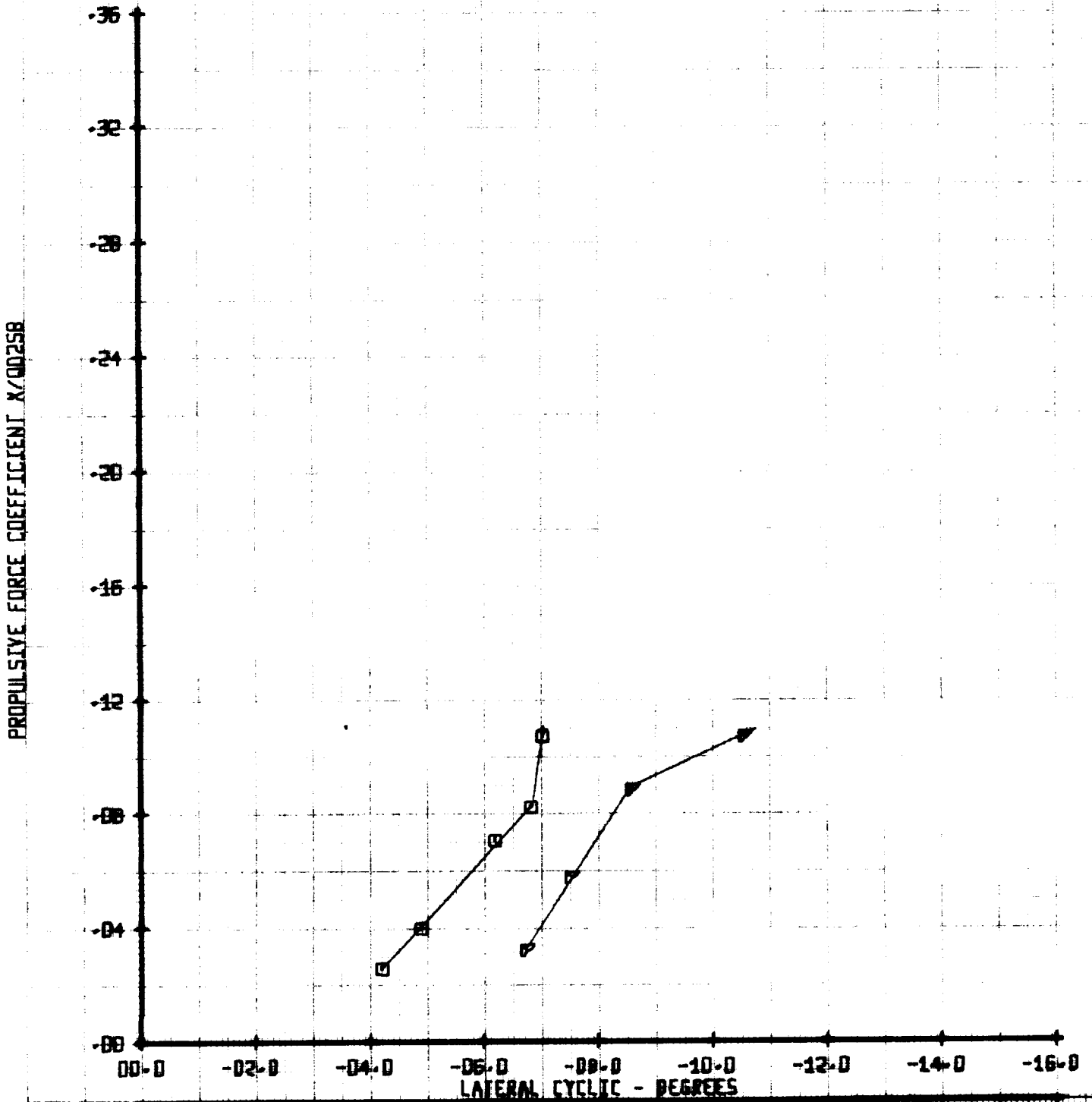
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'Y/SB	YTUN	
□	264	.53	.05	320	
△	265	.53	.07	320	

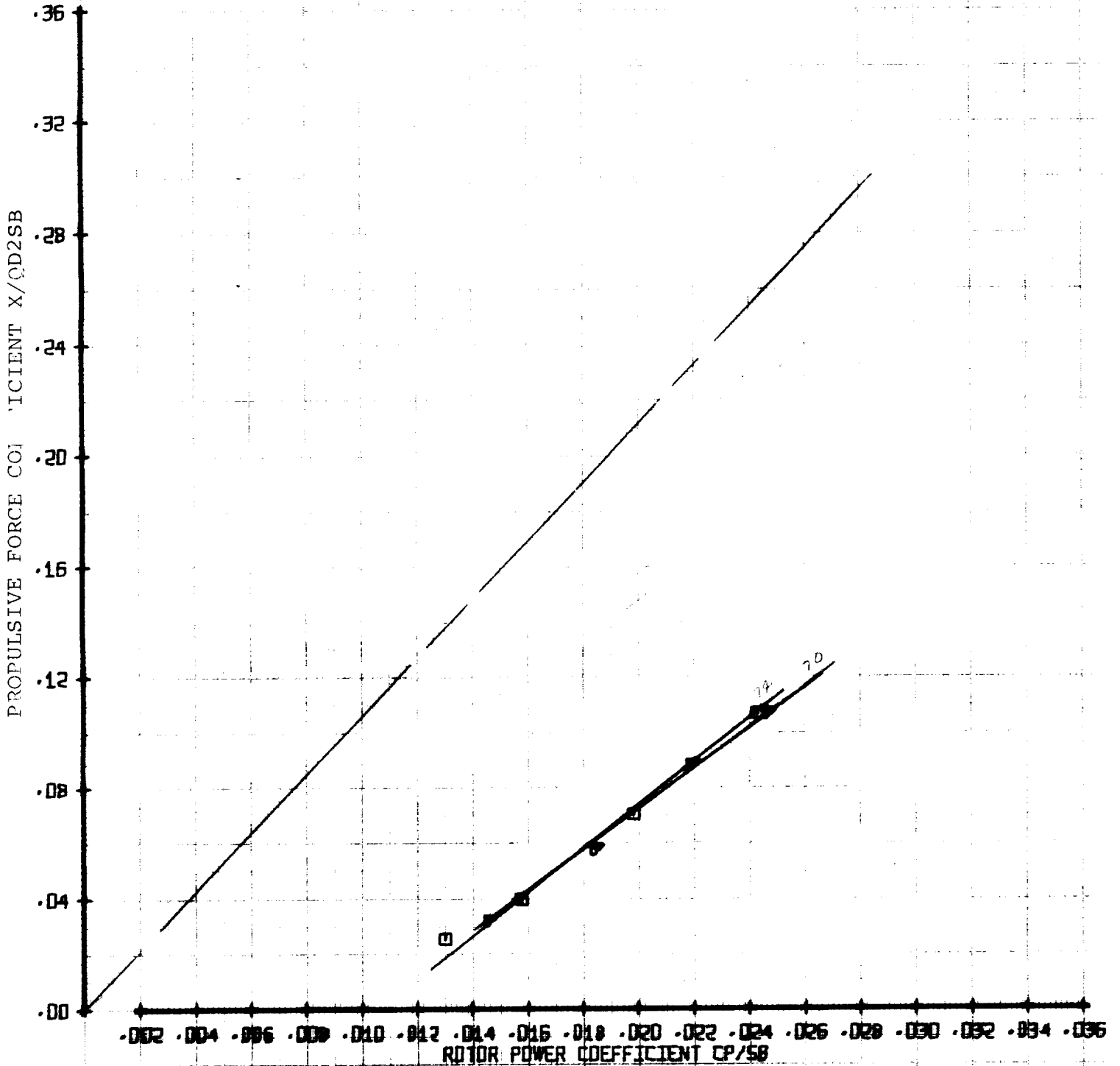
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MI'	CT'/58	Y/TIN	
□	264	.53	.05	320	
○	265	.53	.07	320	

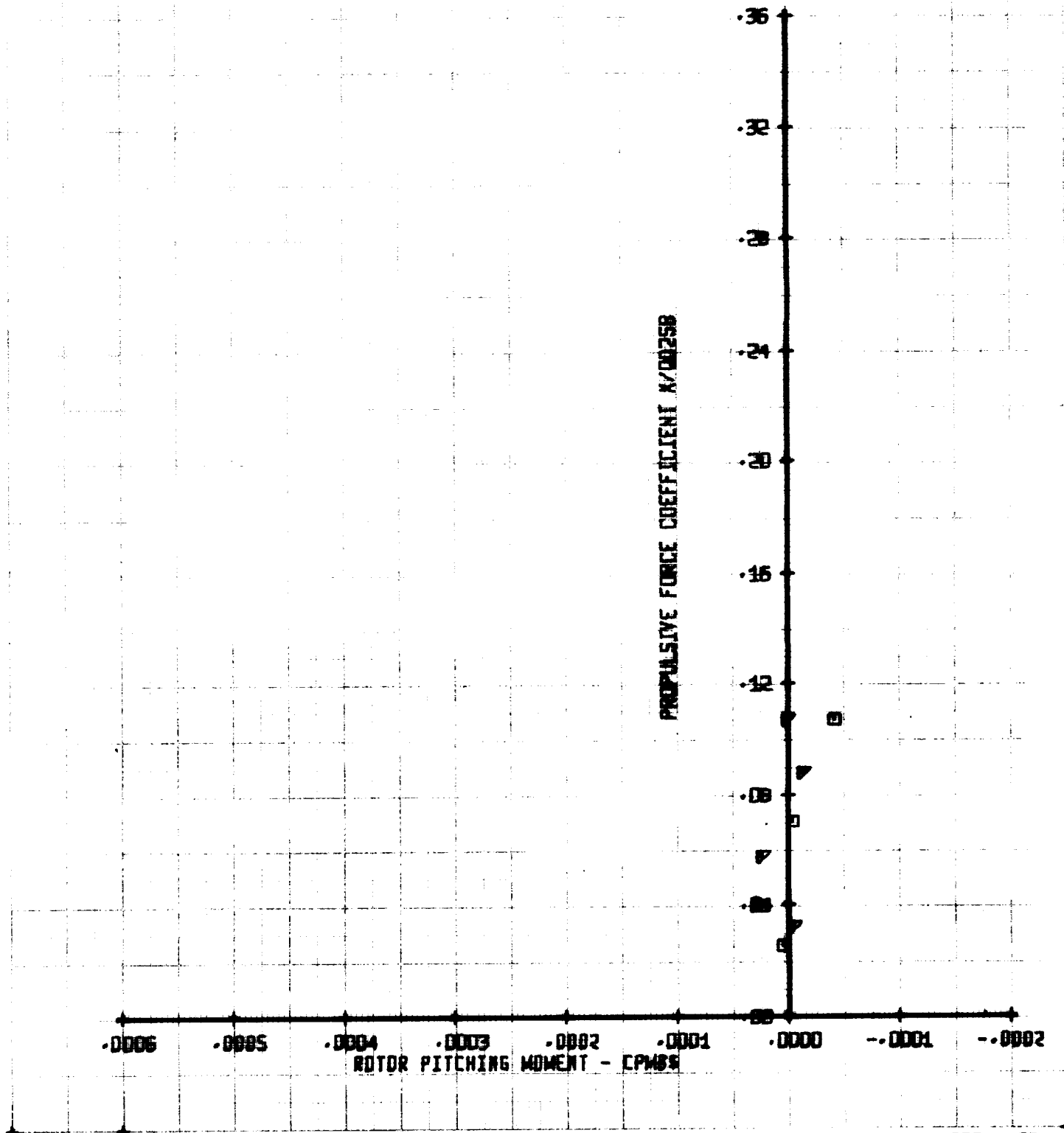
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	ML'	CT' / 58	YTLN	
□	264	.93	.05	328	
▽	265	.93	.07	328	

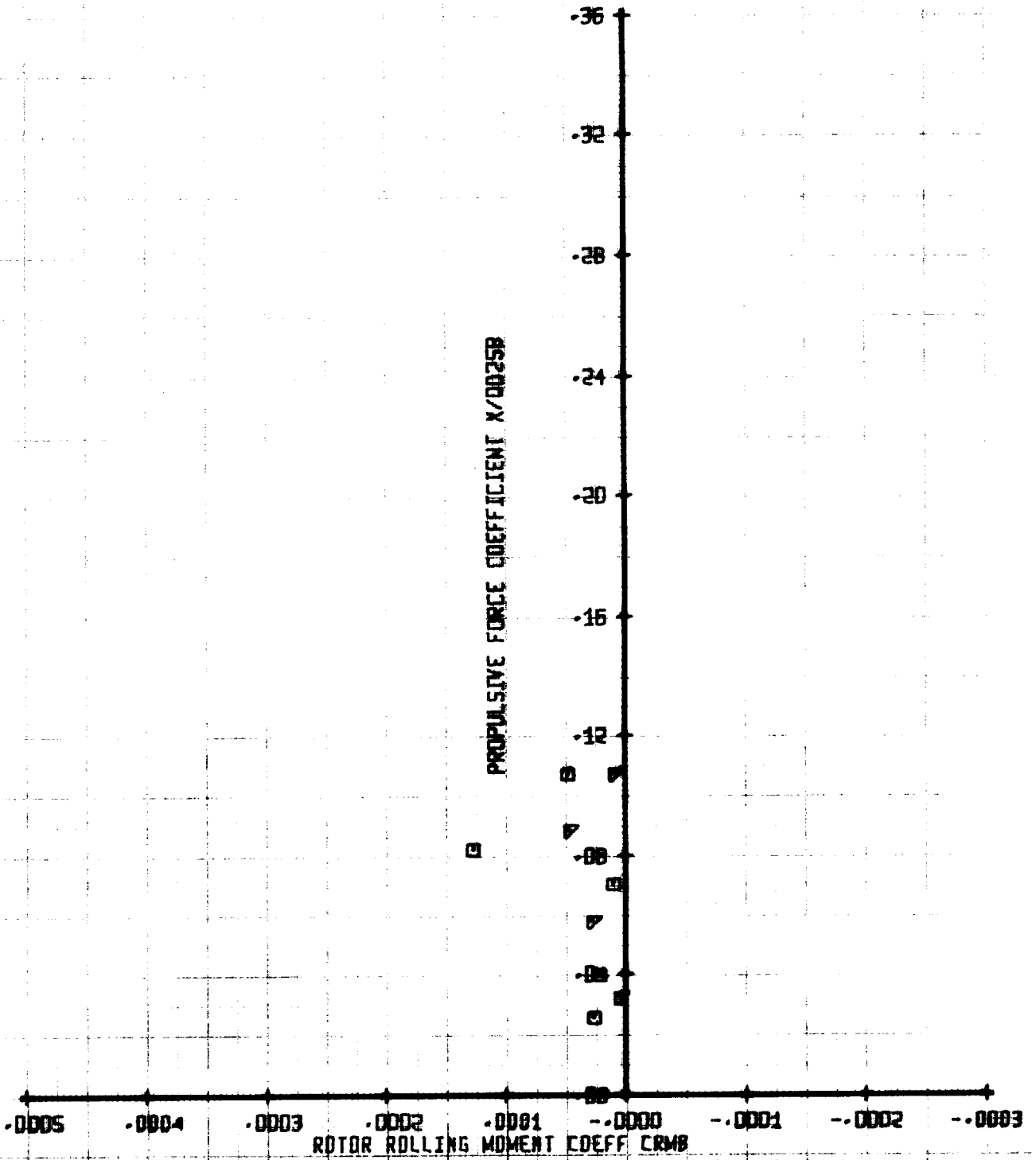
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	ML'	CT' / 58	VTIN
□	264	.53	.05	328
△	265	.53	.07	328

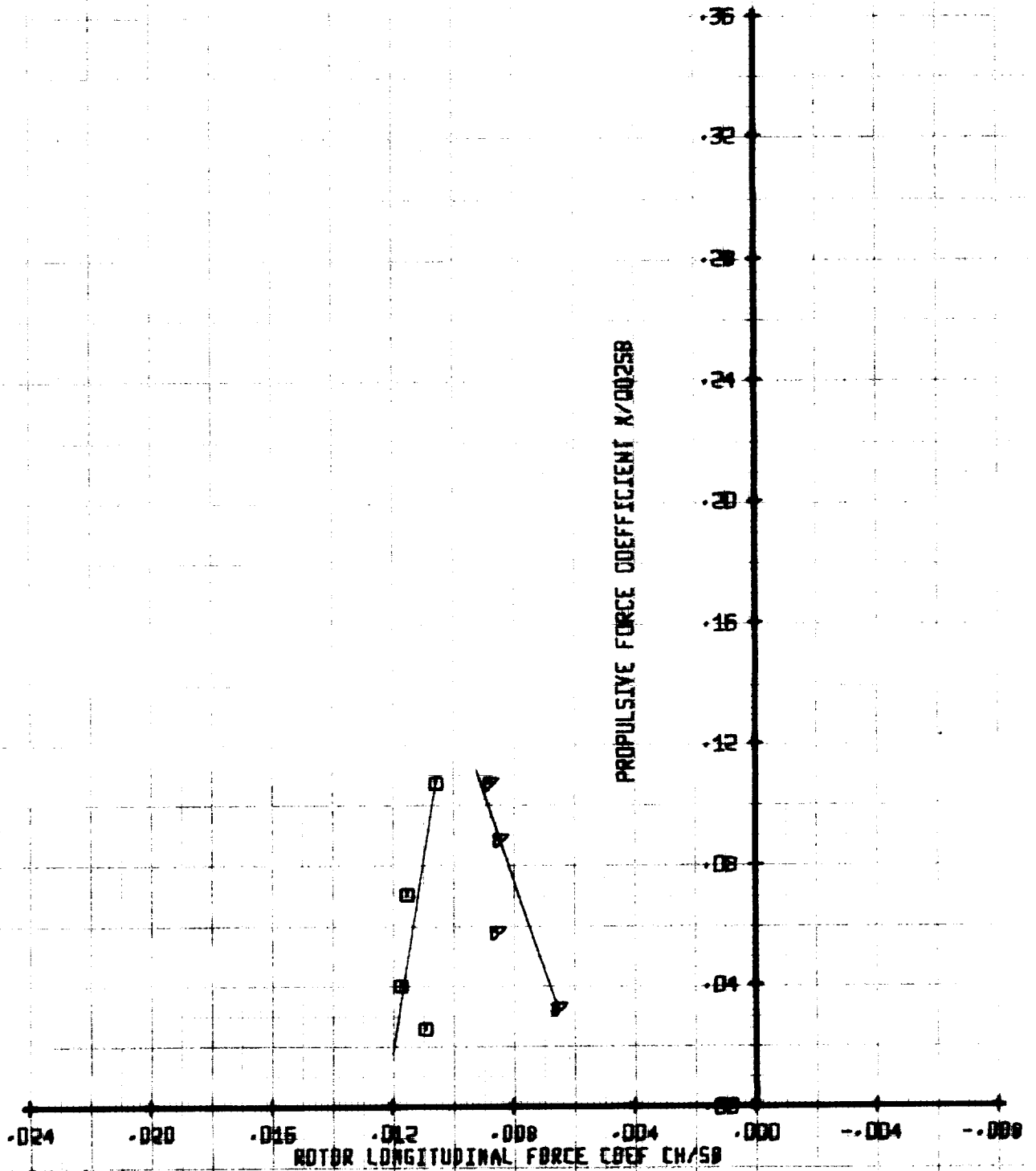
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MI'	CT'YSB	YTUN
□	264	.53	.05	320
△	265	.53	.07	320

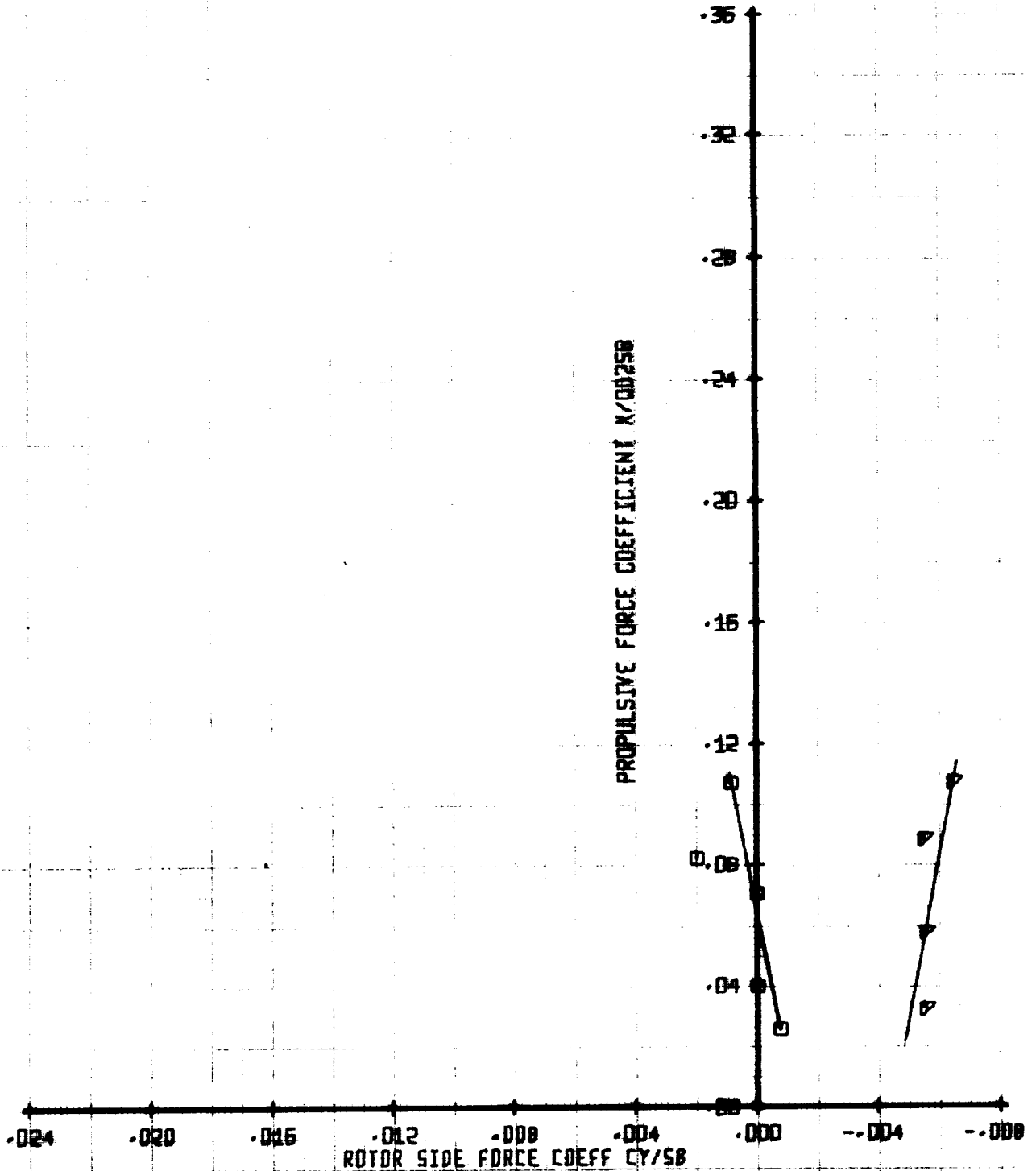
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MI'	CT'/SB	VTUN
□	264	.53	.05	320
△	265	.53	.07	320

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT

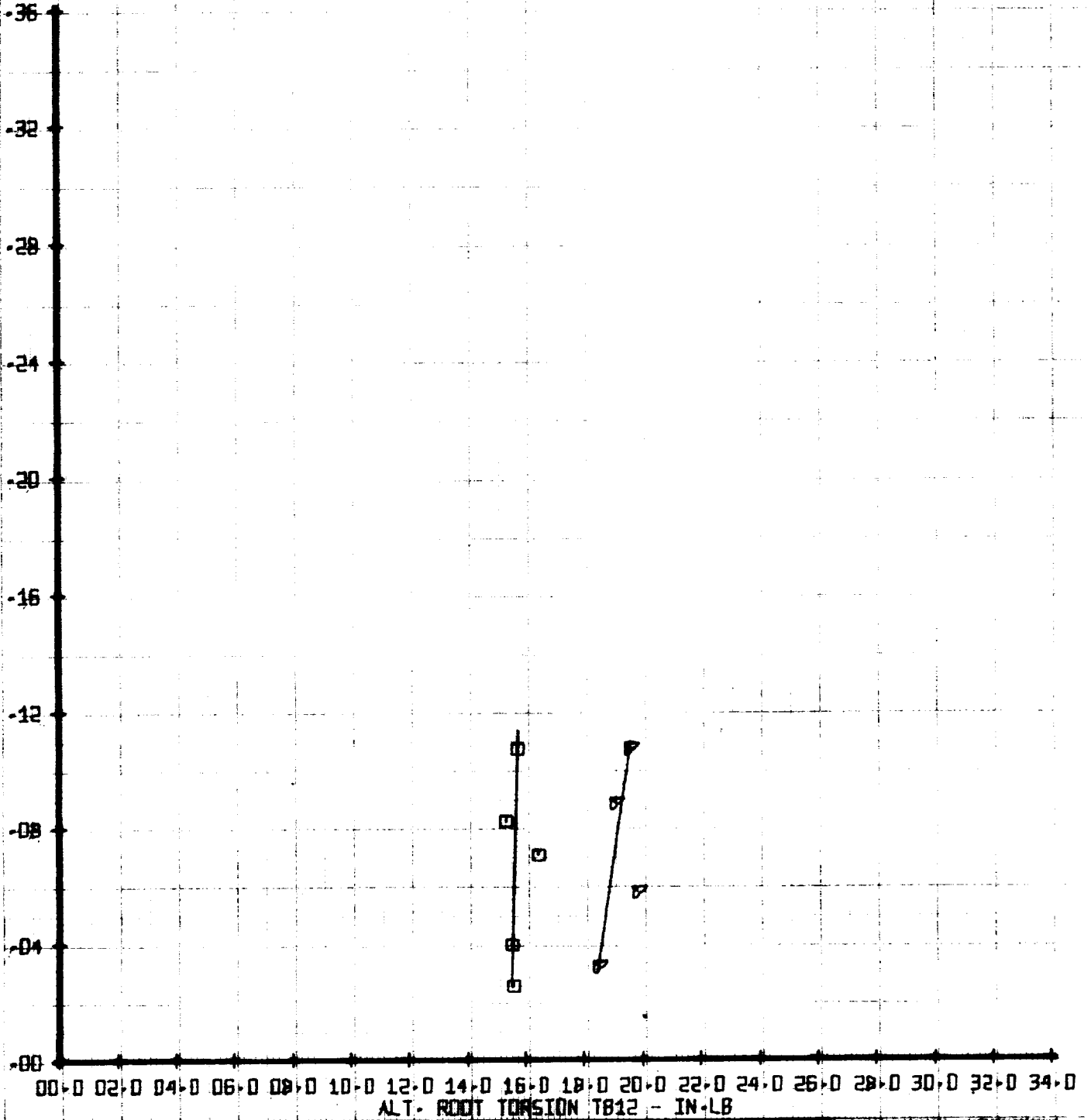


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	VILIN	
□	264	.53	.05	320	
△	265	.53	.07	320	

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12

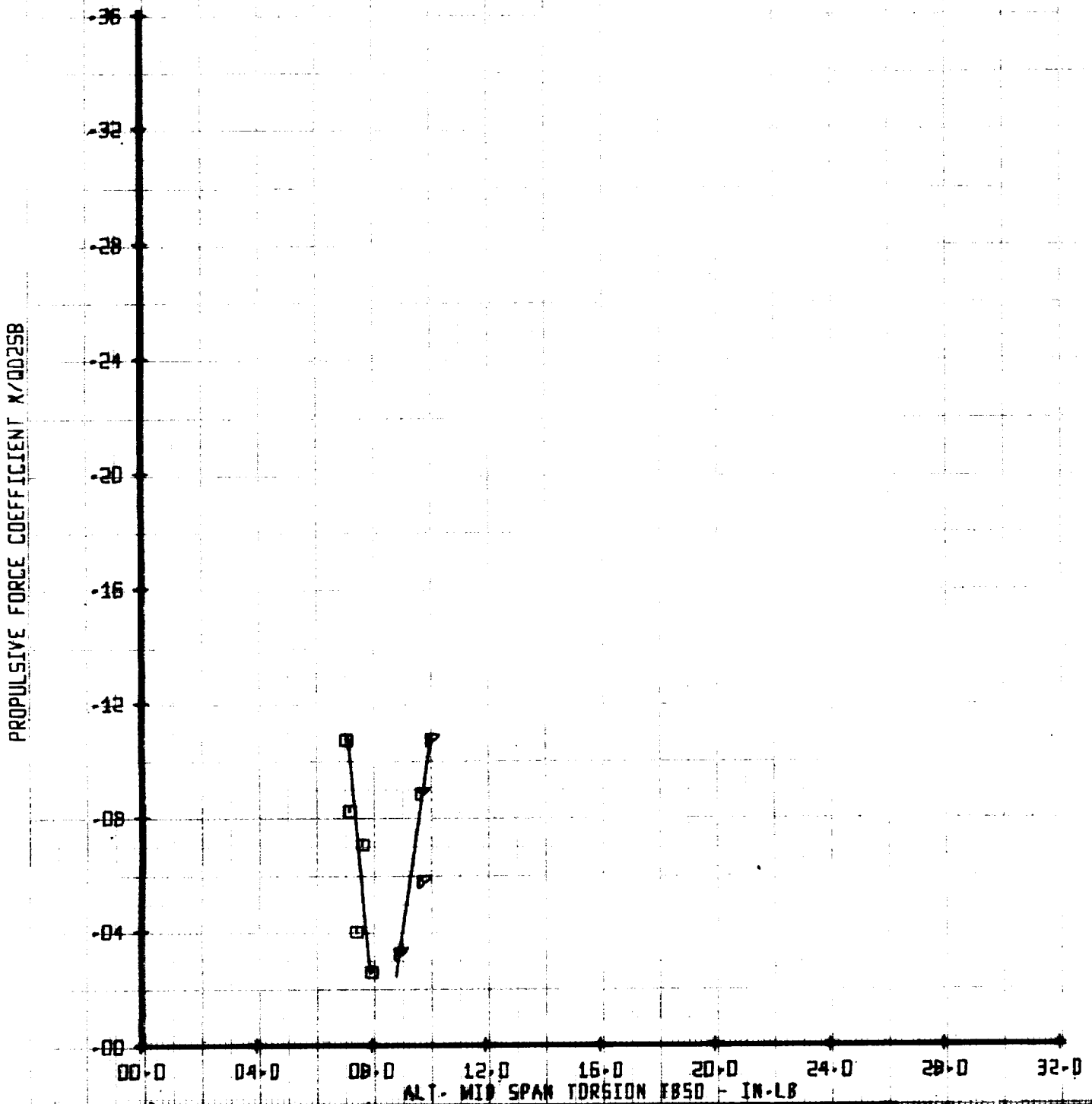
PROPULSIVE FORCE COEFFIC IT X/00258



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUN		MLI		CT %SB		VTOW	
□	○	264	265	.53	.53	.05	.07	32B	32B

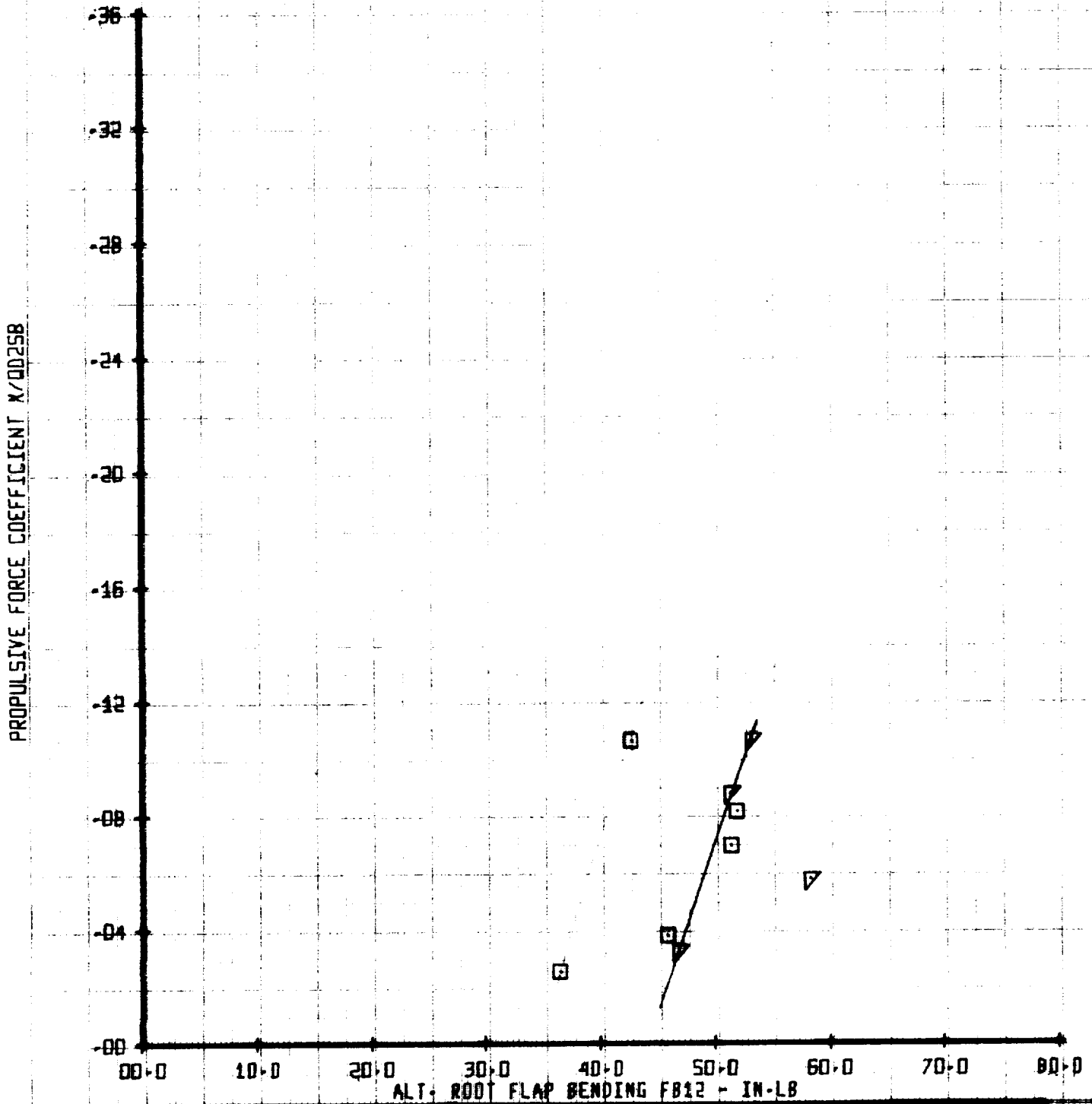
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MLI'	CT'/SB	VTUN	
□	264	.53	.05	320	
▽	265	.53	.07	320	

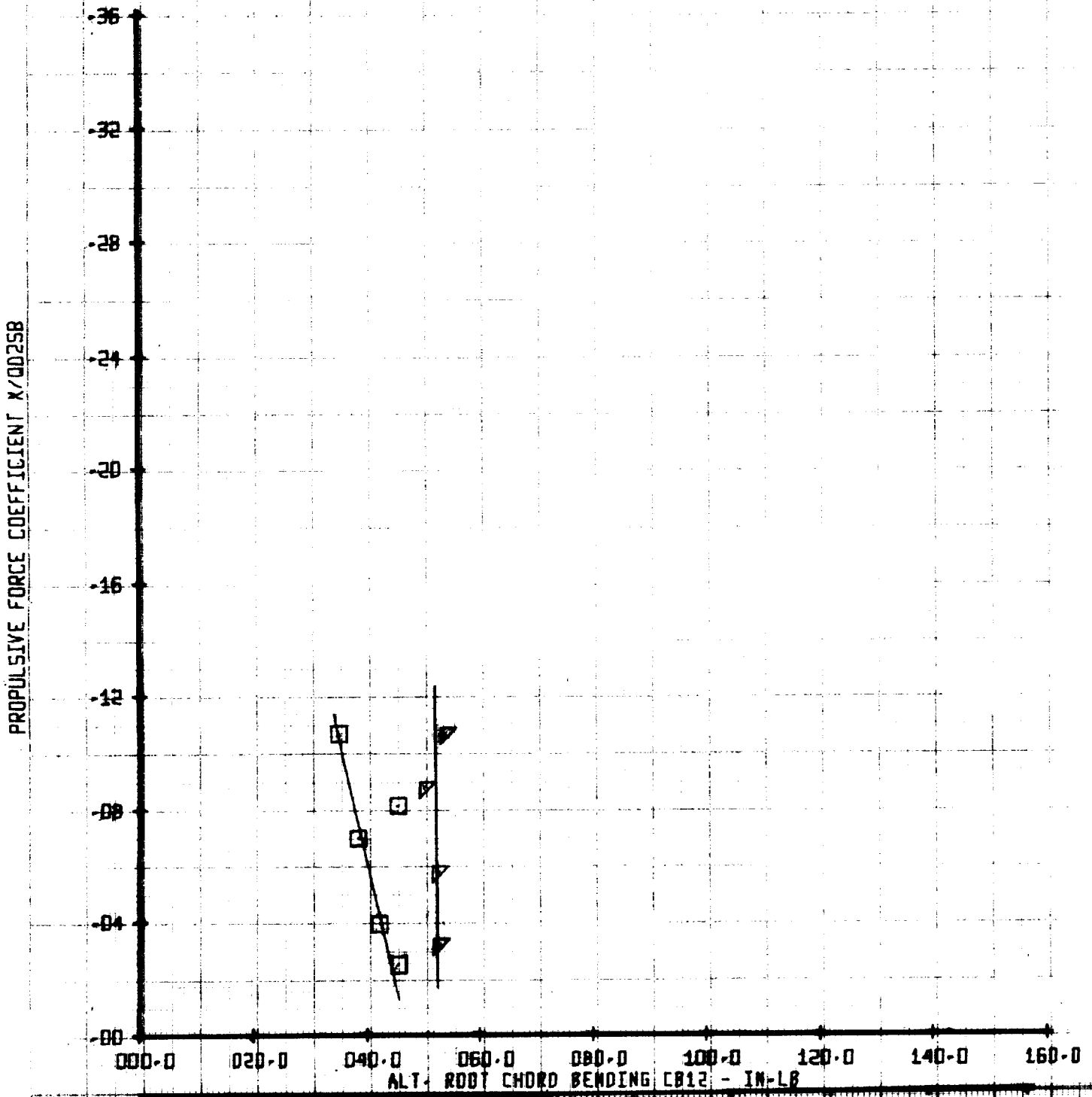
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	ML'	CT' / SB	VTUN
□	264	.53	.05	320
▴	265	.53	.07	320

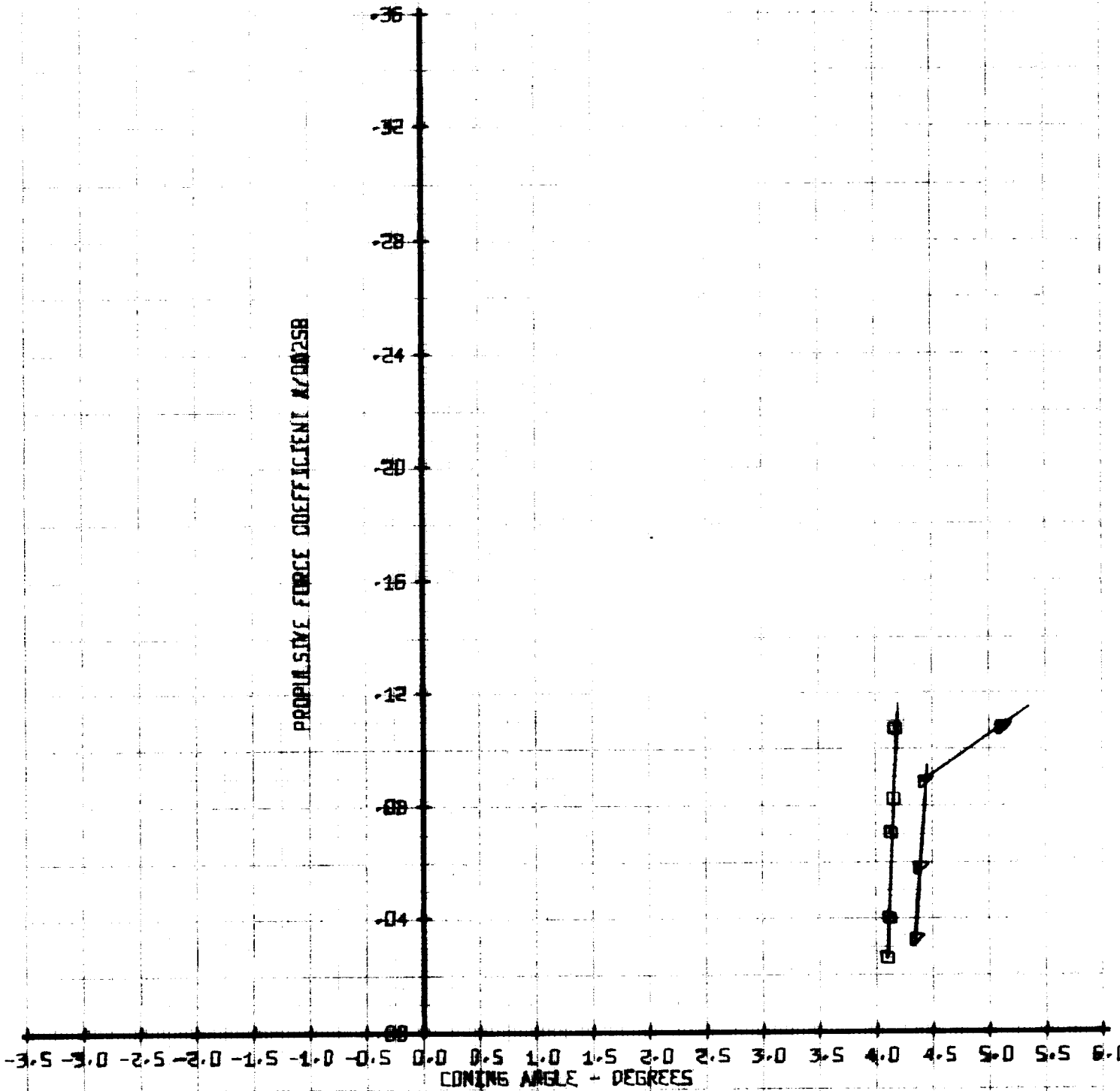
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUM		MU'		CT' / 258		YTLN	
□	△	264	265	.53	.53	.05	.07	328	329

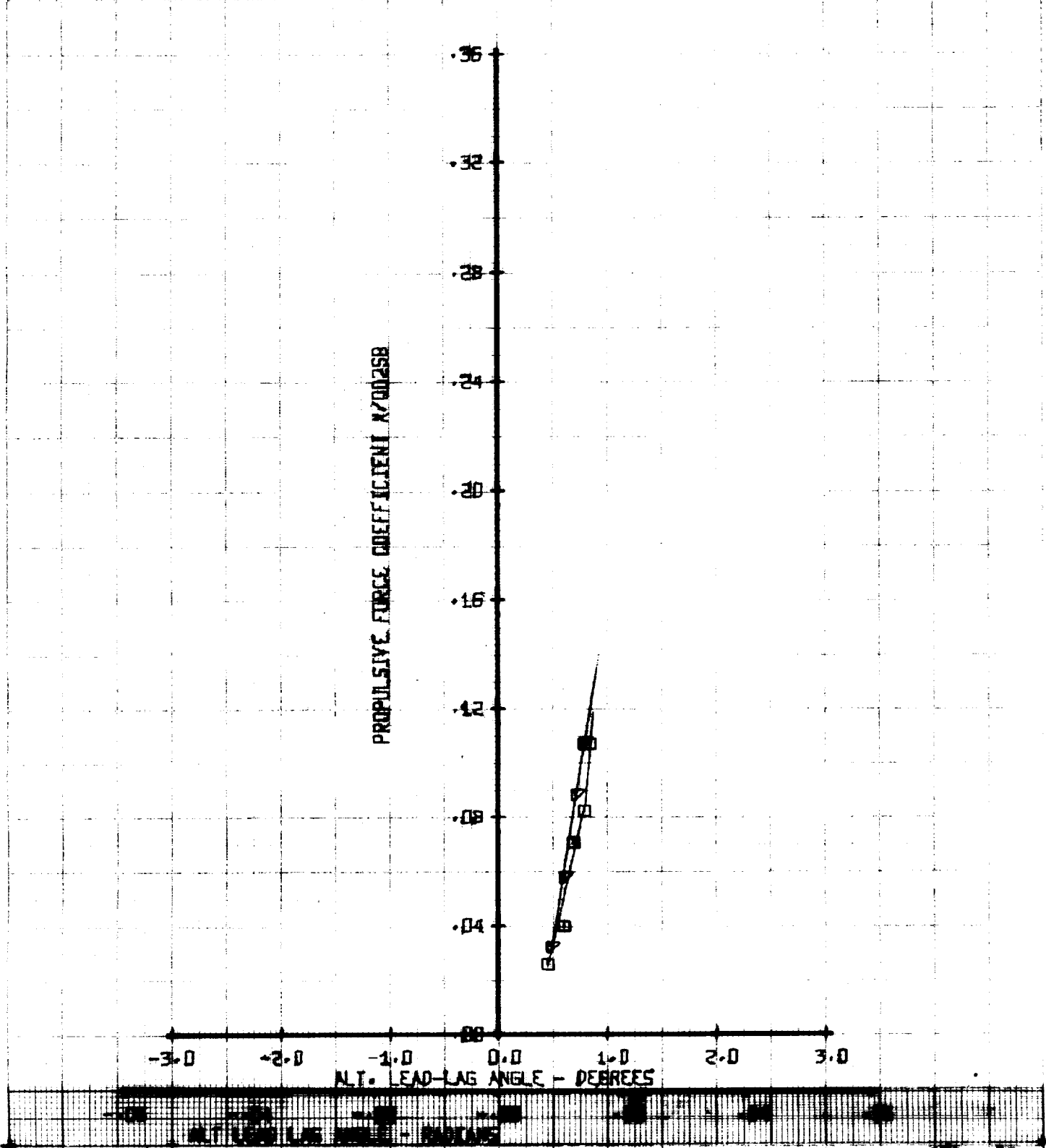
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	RUN	MU'	CT'/58	YOUN
□	264	.53	.05	328
△	265	.53	.07	328

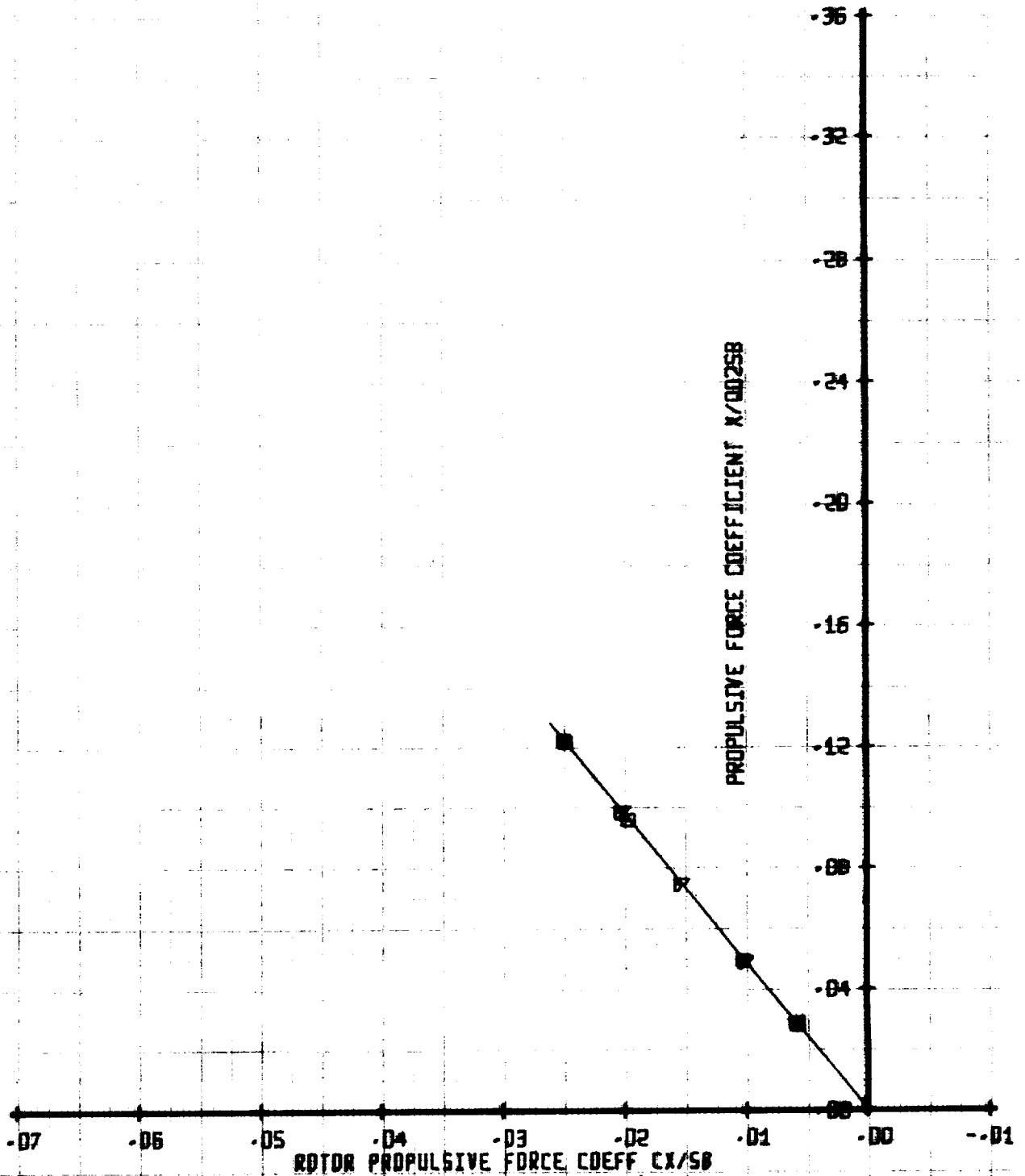
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/58	VTIM	
□	236	.57	.06	353	
△	237	.57	.076	353	

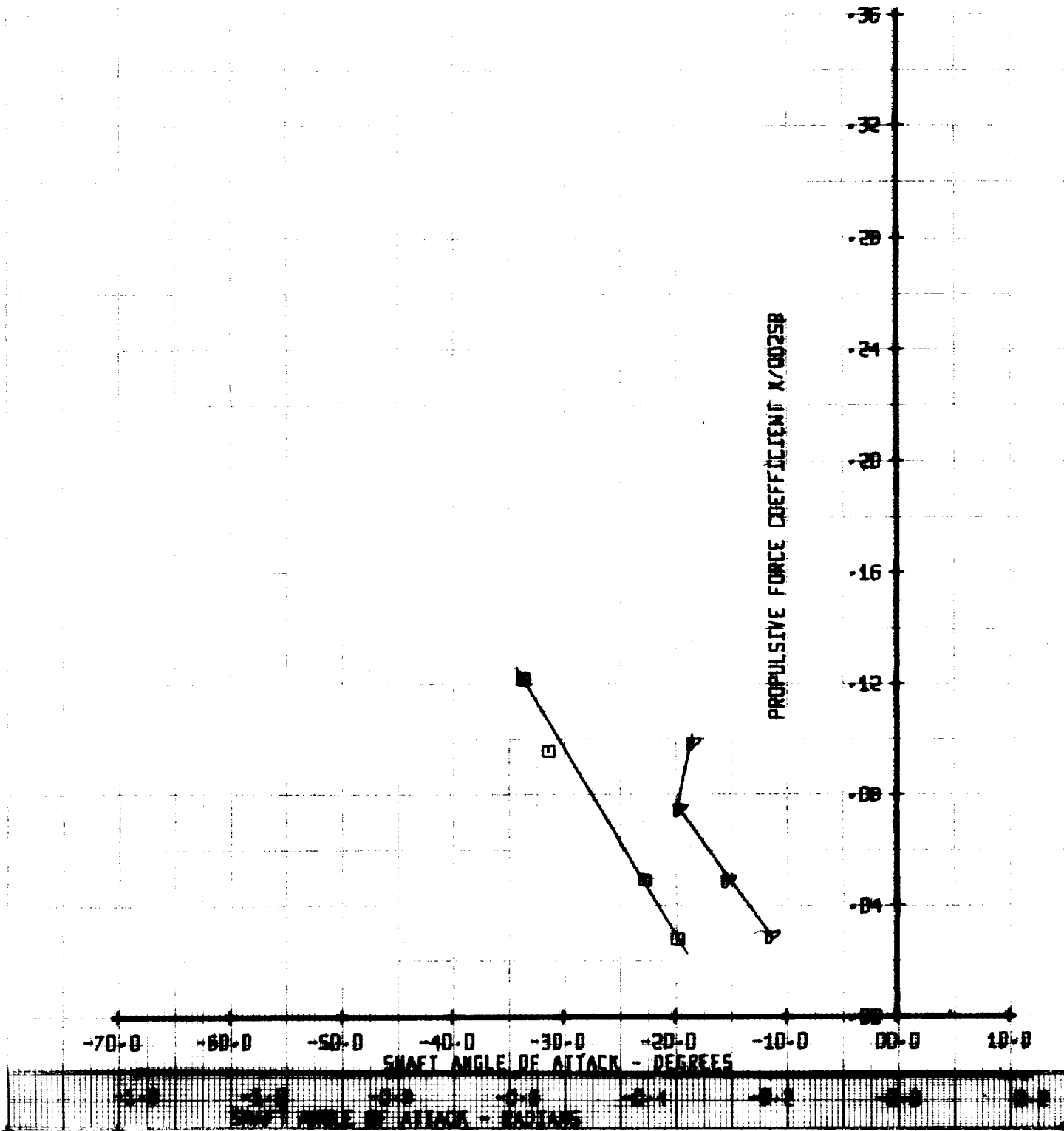
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND				
SYM	RUN	MI'	CT'/SB	VTUM
□	236	.57	.06	353
△	237	.57	.076	353

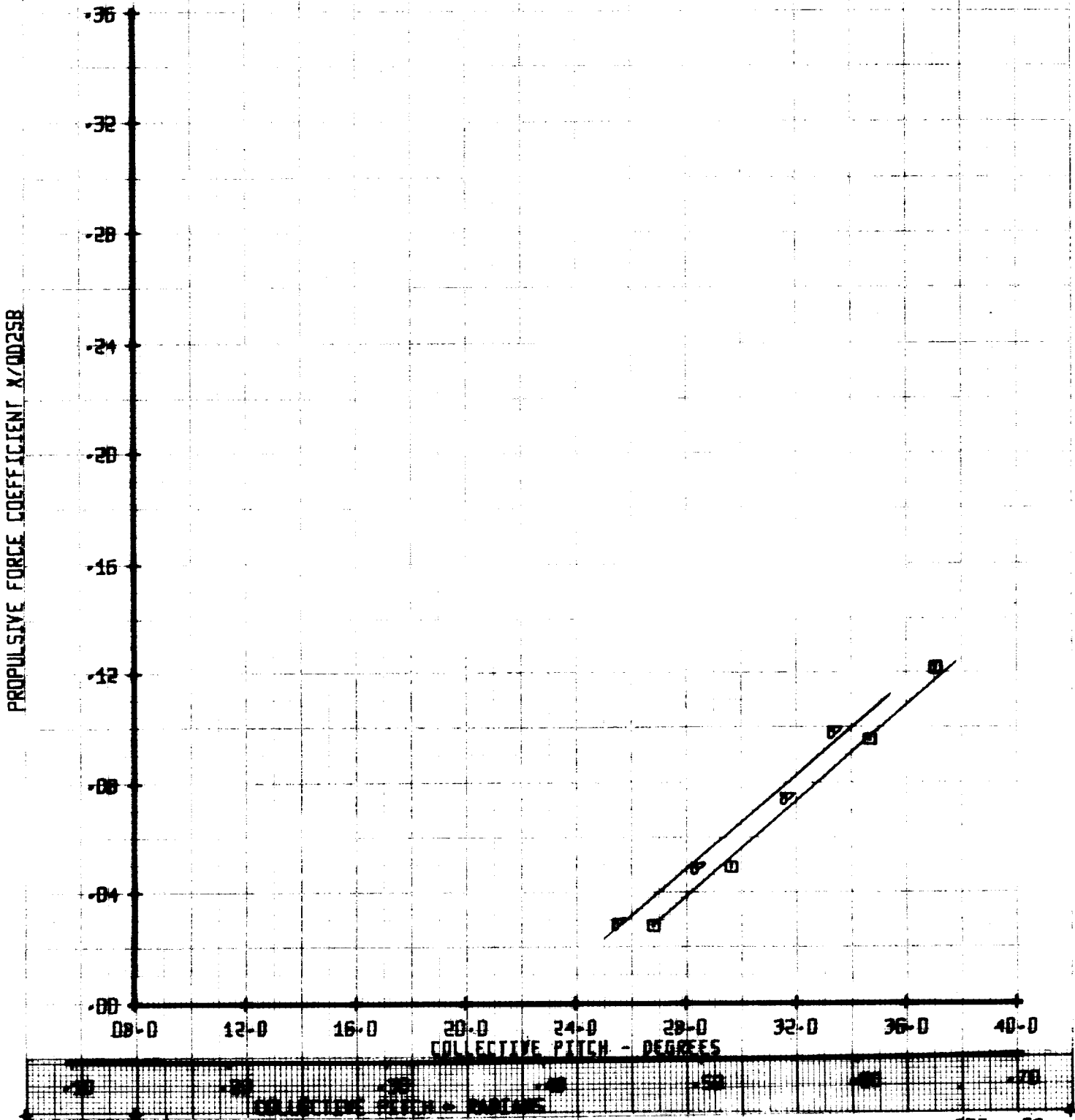
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/SB	VTUM
□	236	.57	06	353
○	237	.57	-076	353

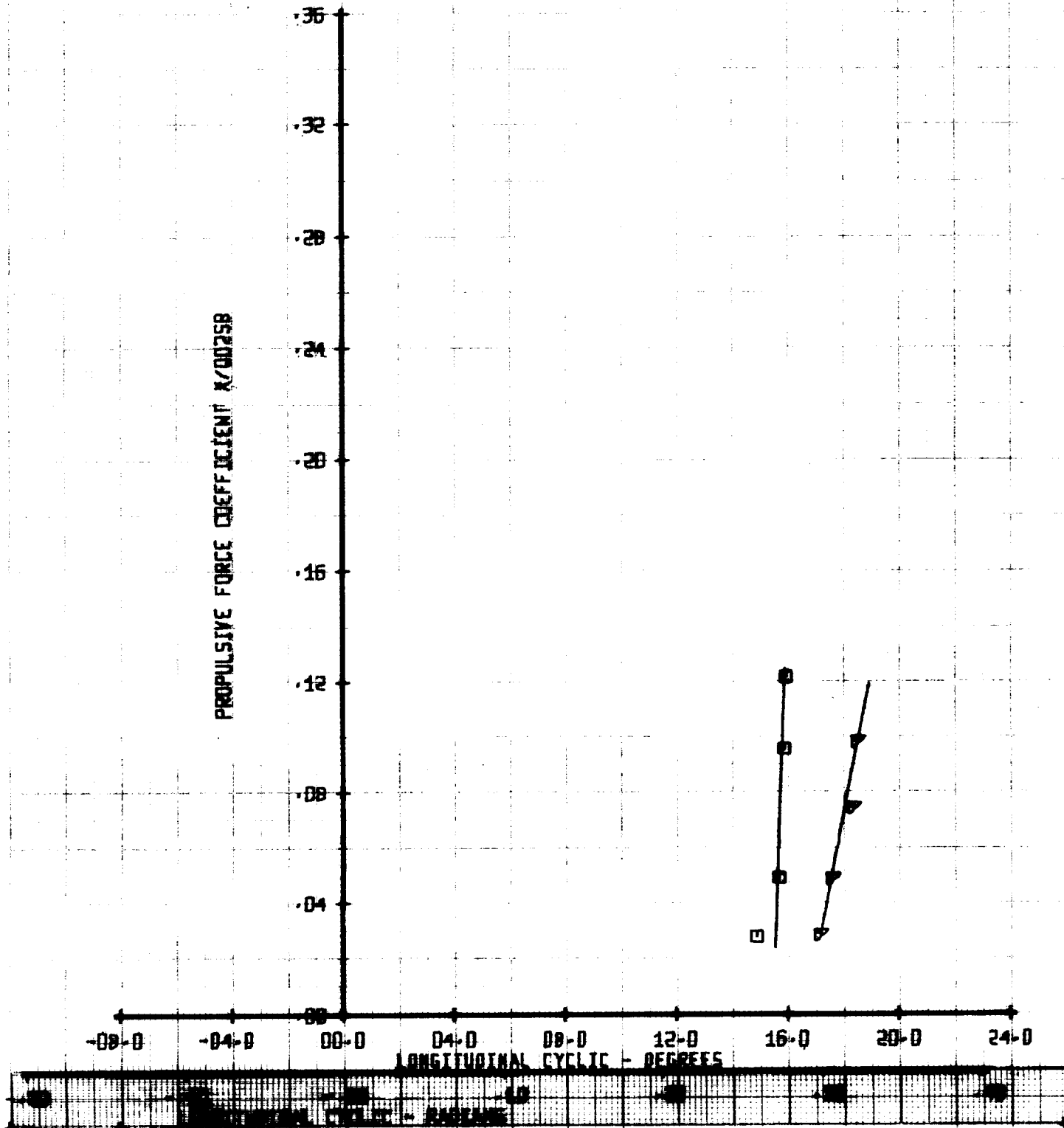
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MI'	CT' / SB	VTUM
□	236	.57	06	358
△	237	.57	.076	358

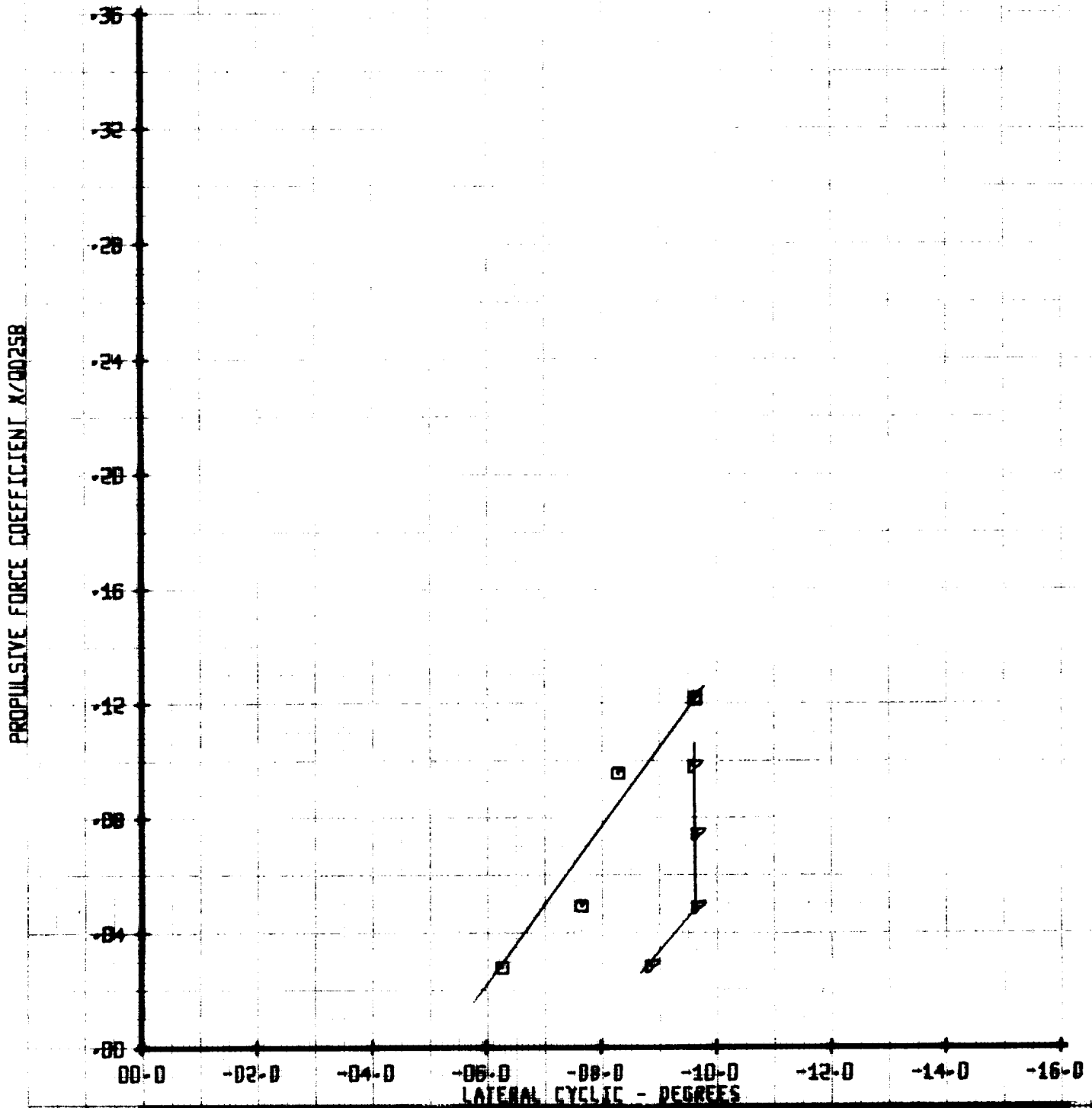
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU	CT/58	VTUN	
□	236	.57	06	353	
△	237	.57	.076	353	

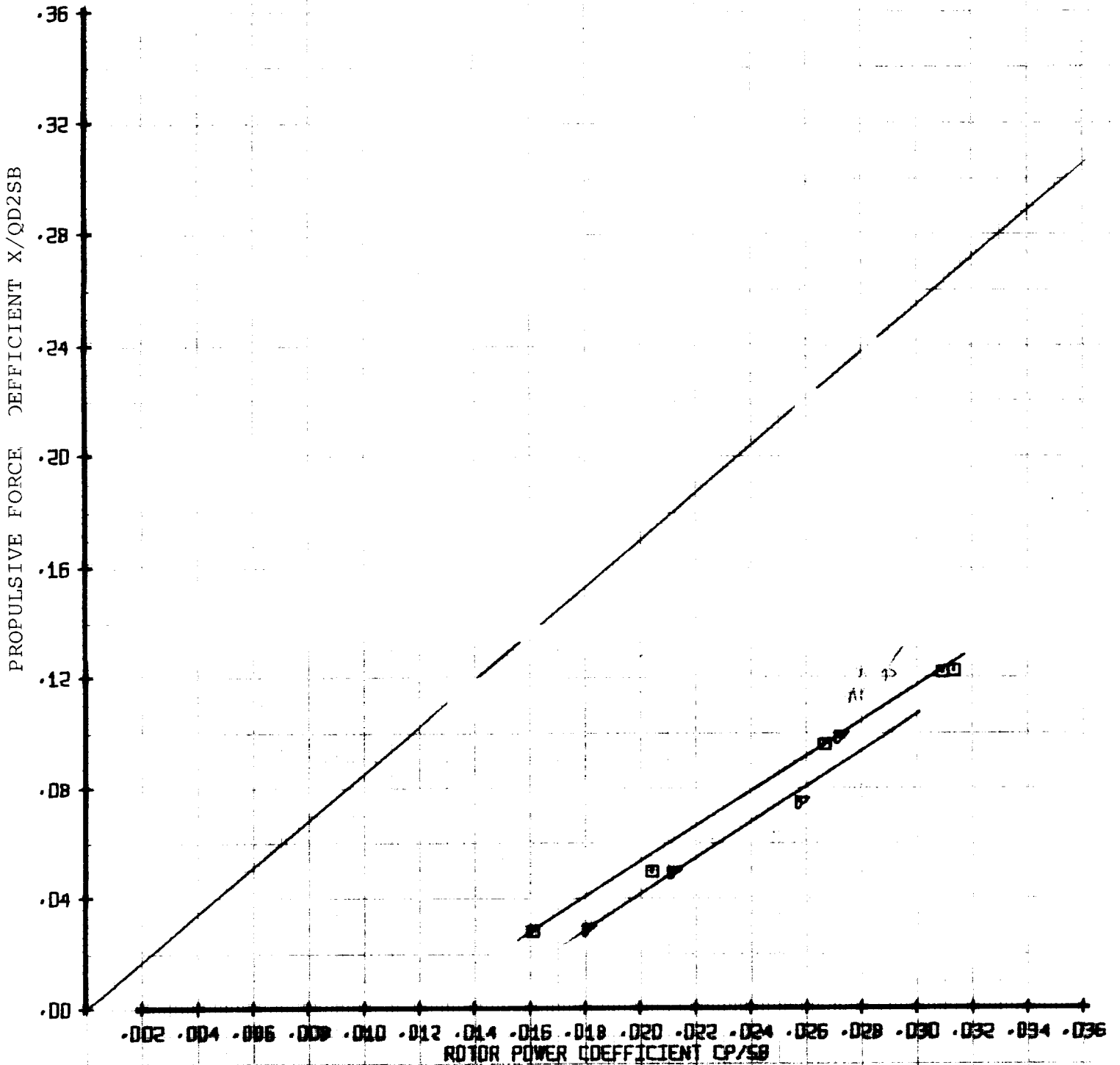
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MI'	CI' / SB	VTUM	
□	236	.57	.06	358	
△	237	.57	.076	358	

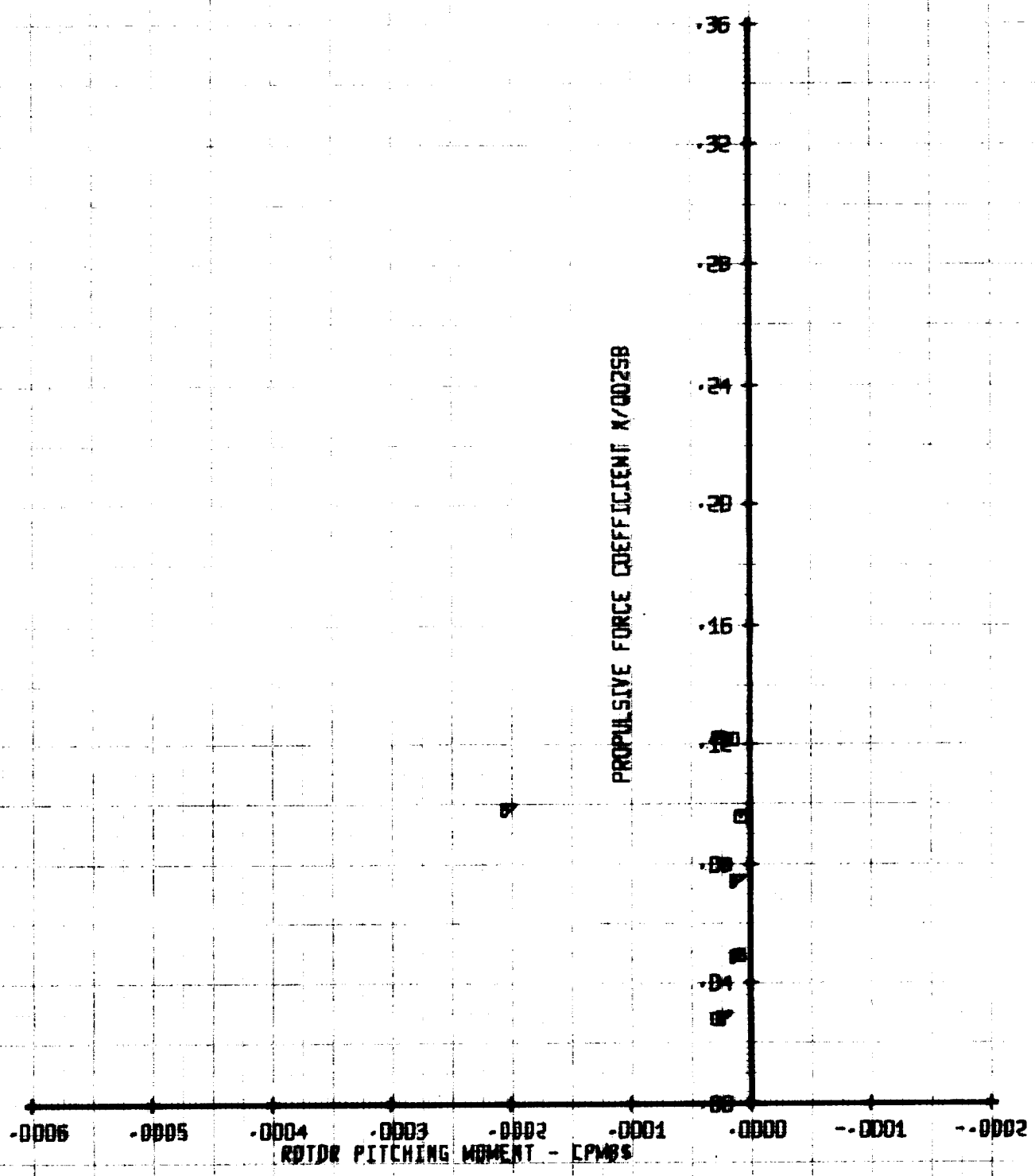
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MO'	CT' / SB	VTUN	
B	236	.57	.06	353	
A	237	.57	.076	353	

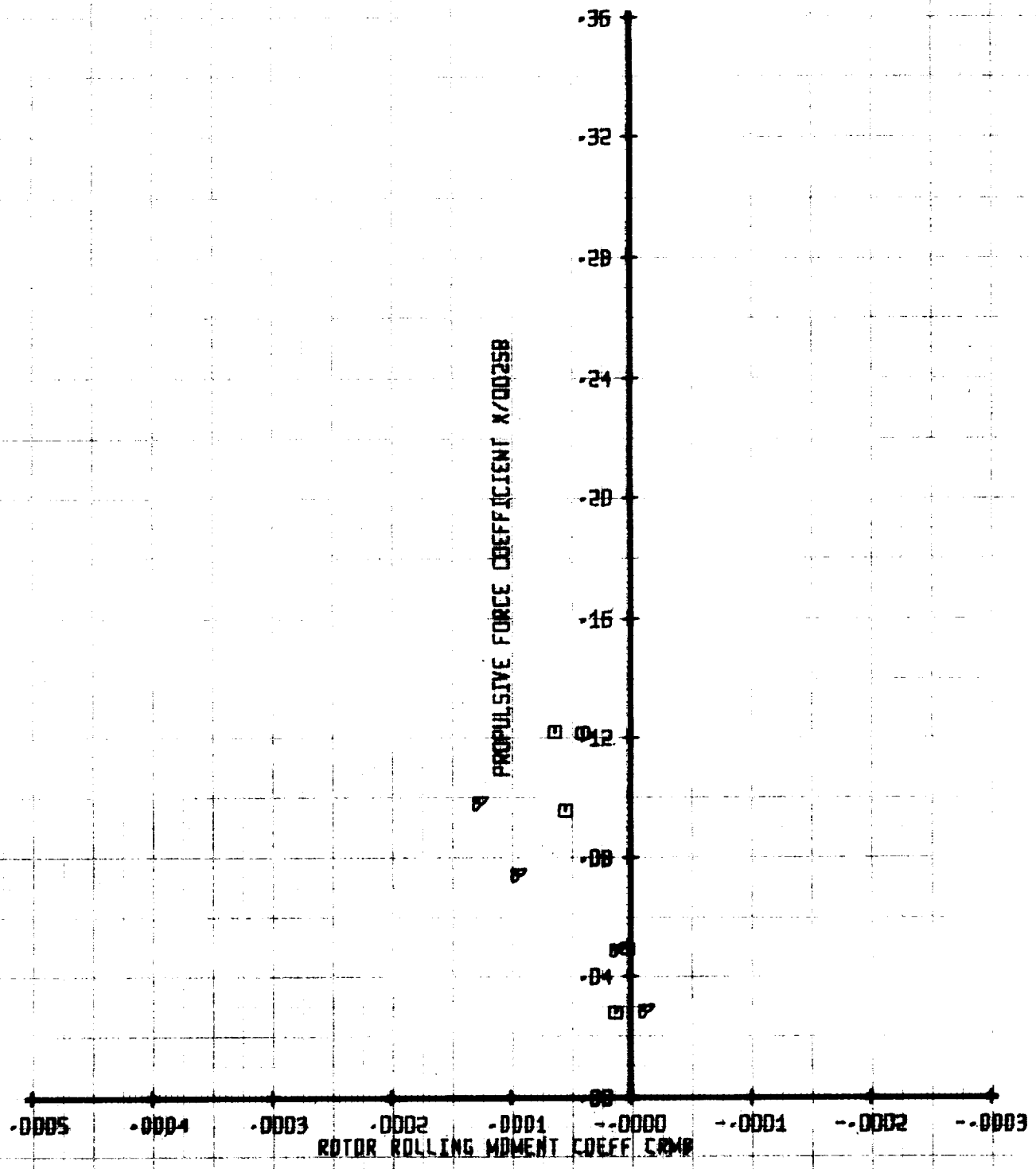
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		CT/258	VTUM
SYM	RUN	MU'	
□	236	.57	353
△	237	.57	353

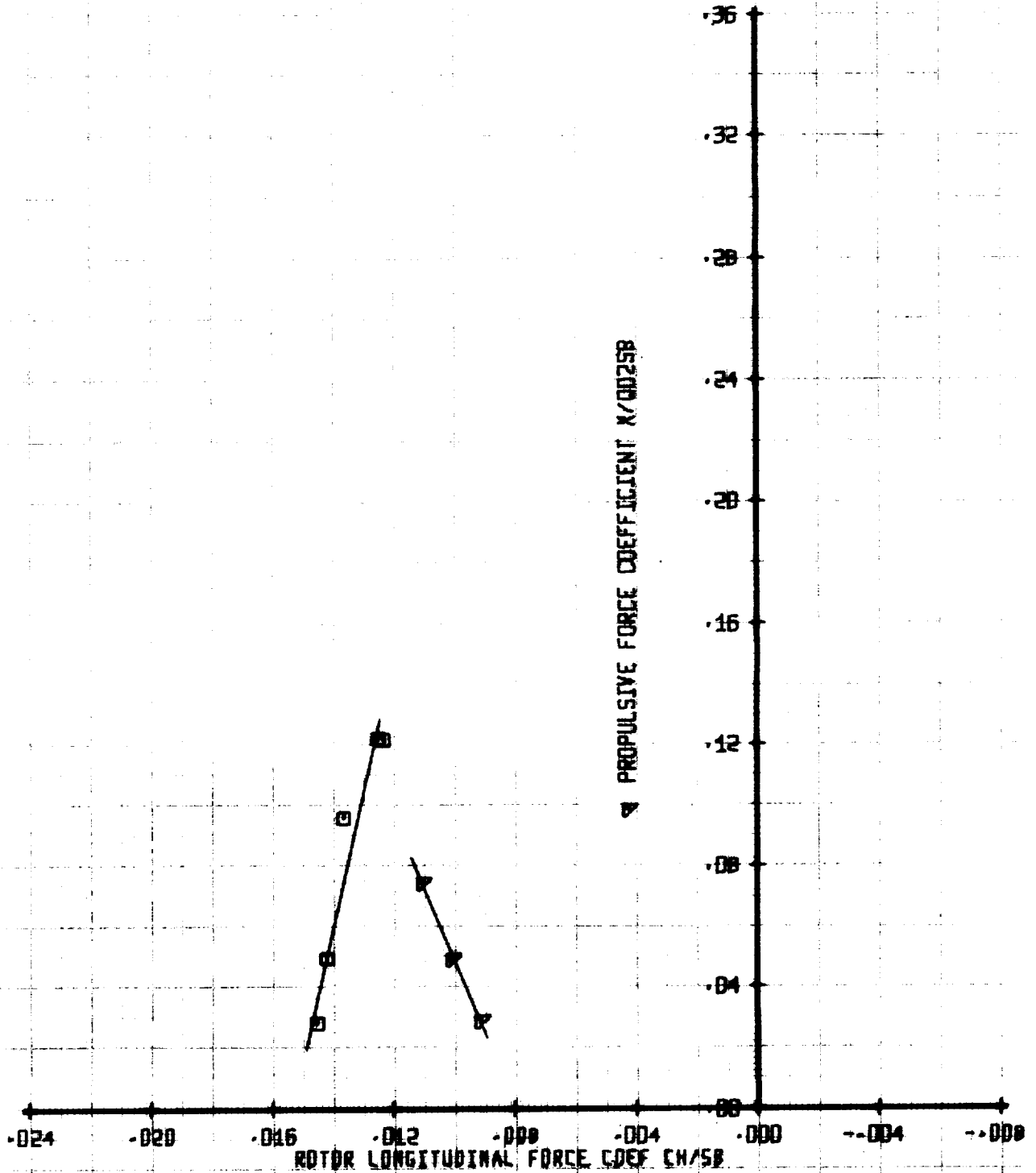
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	VTUN	
□	236	.57	.06	353	
△	237	.57	.076	353	

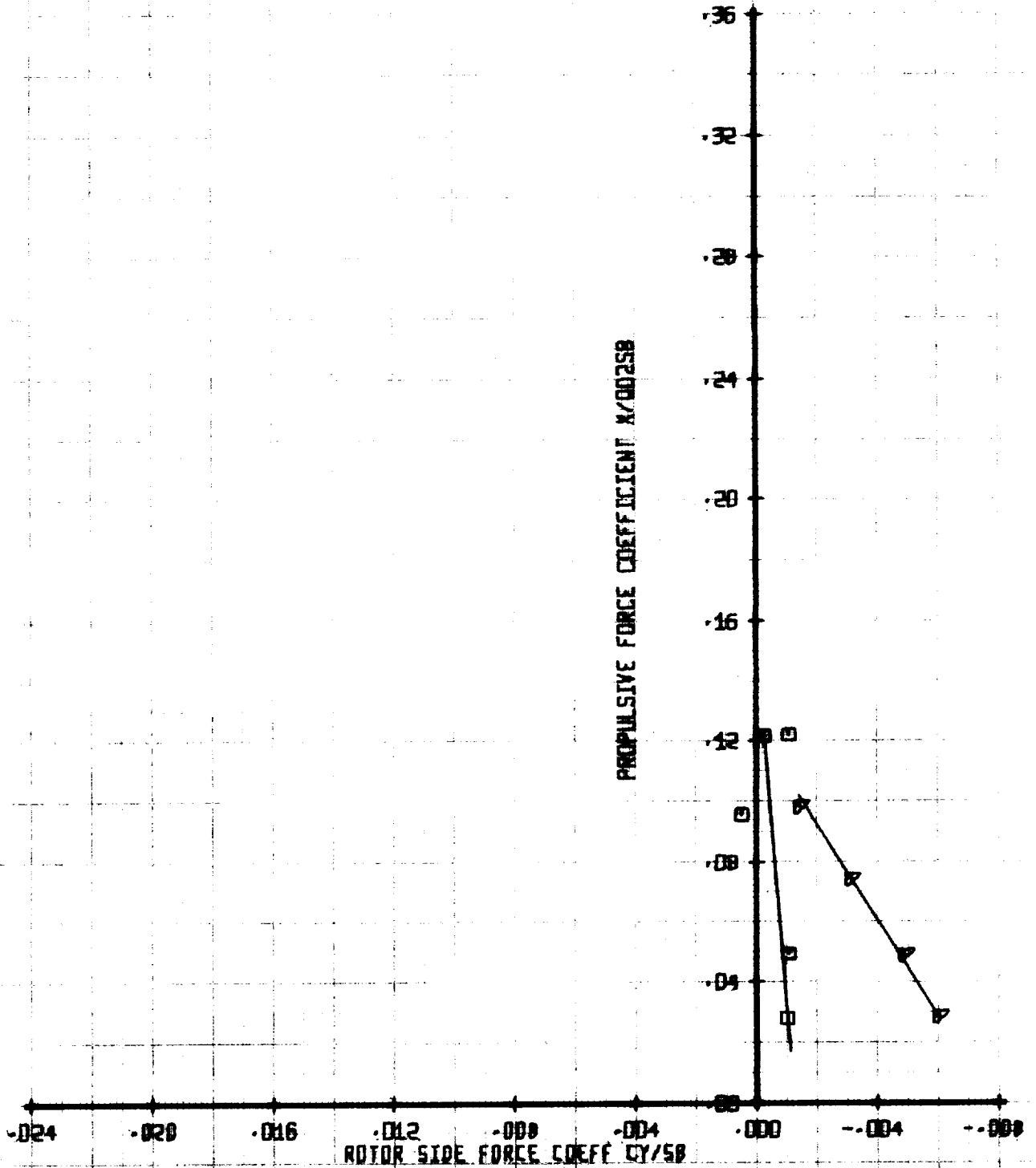
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MI	CT/58	VTUN
□	336	.57	.06	353
△	337	.57	.076	353

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT

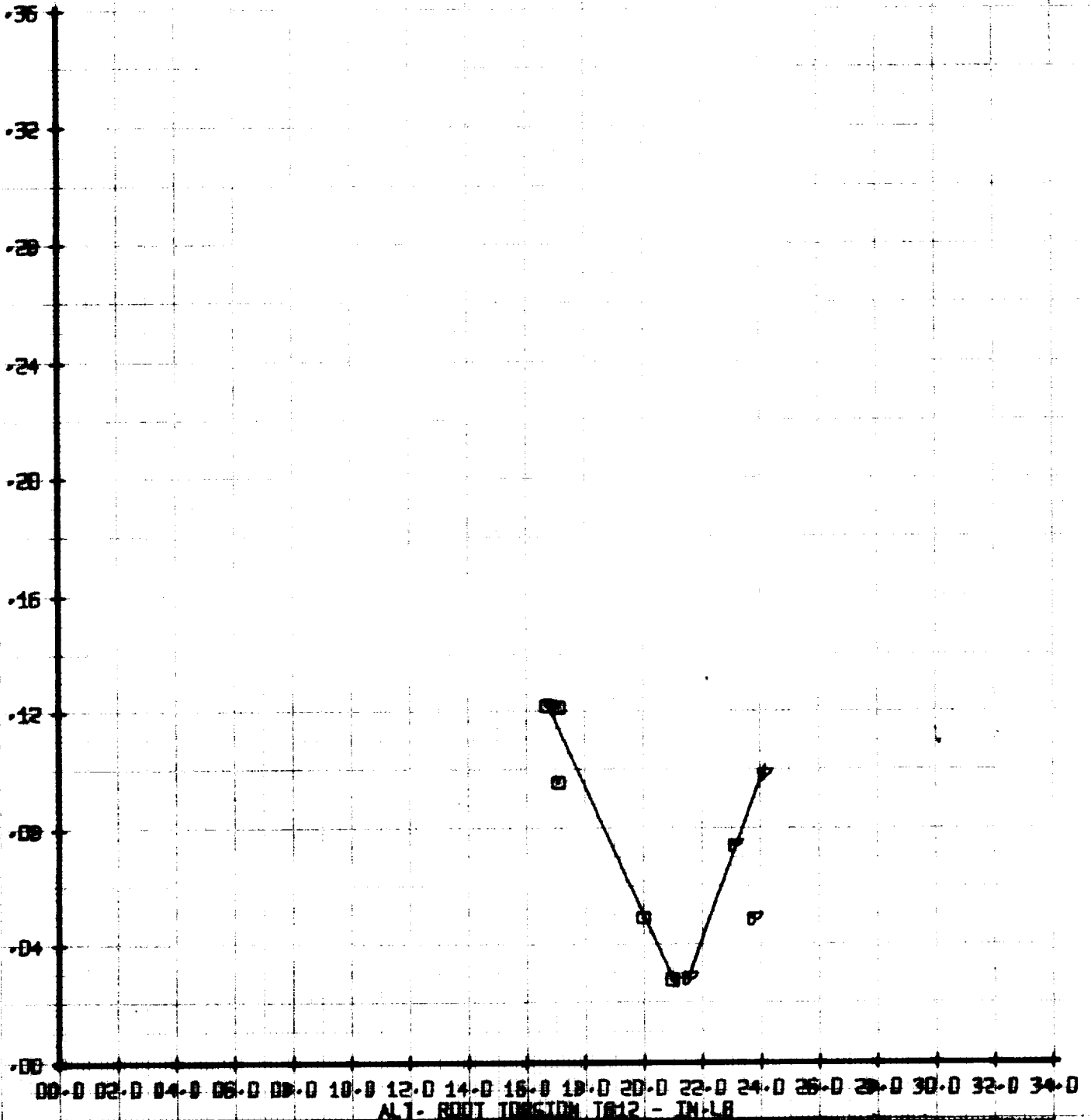


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/58	VTUN	
□	236	.57	06	353	
△	237	.57	.076	353	

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12

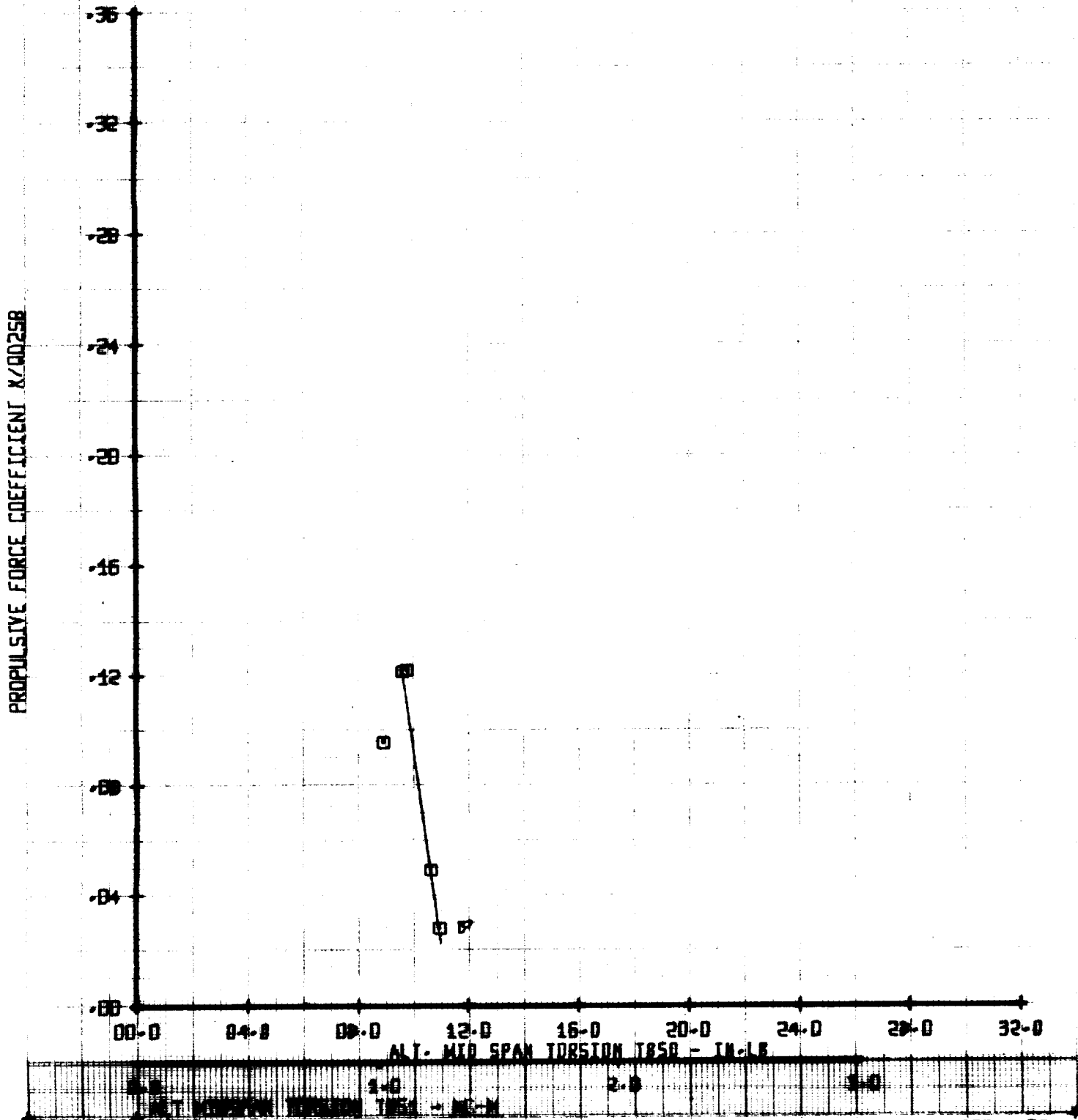
PROPULSIVE FORCE COEFFIC T N/00258



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	VTUN	
□	236	.57	06	353	
□	237	.57	.076	353	

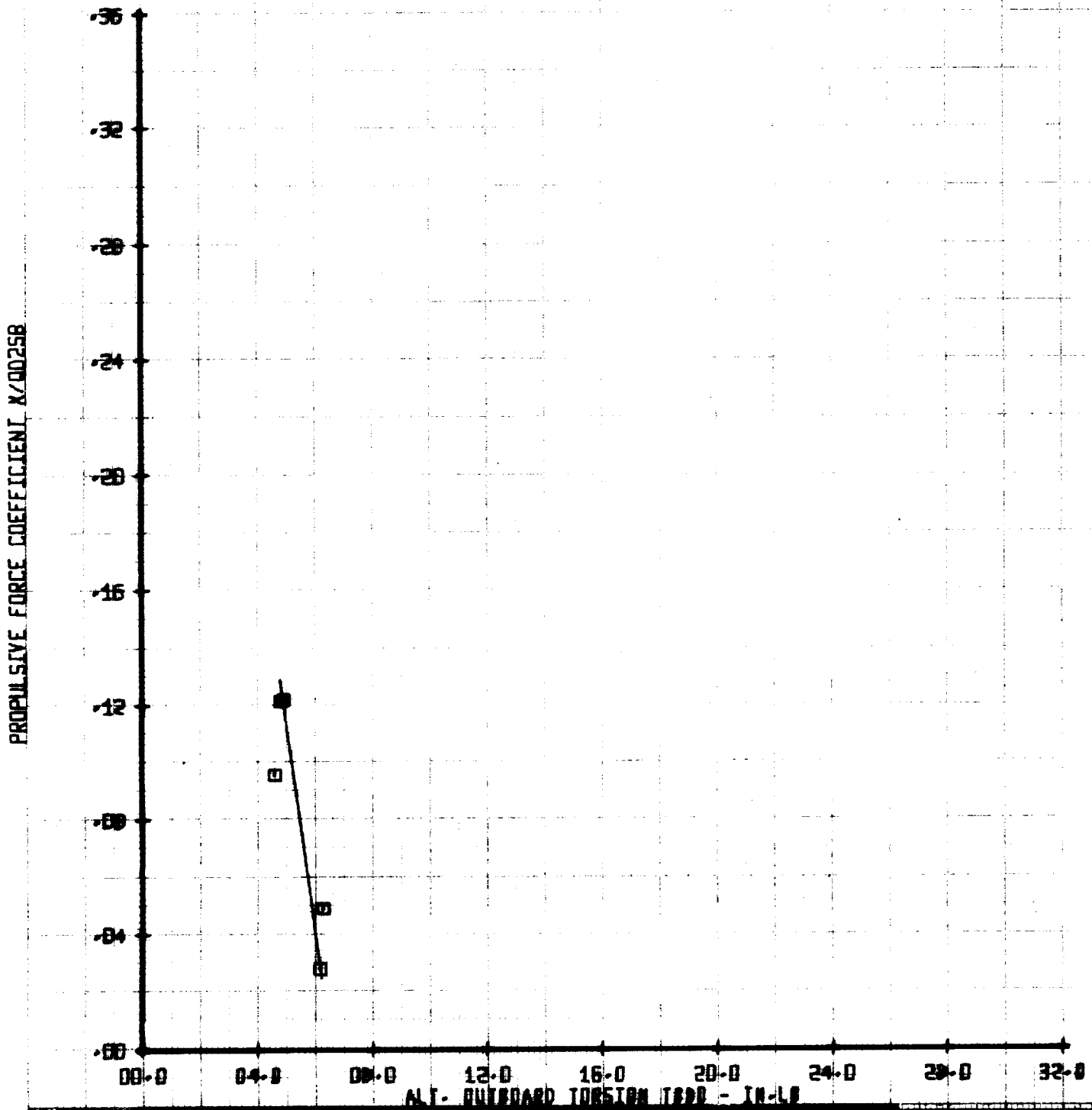
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47D ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT' / SB	VTUN	
□	236	.57	06	353	
●	237	.57	.076	353	

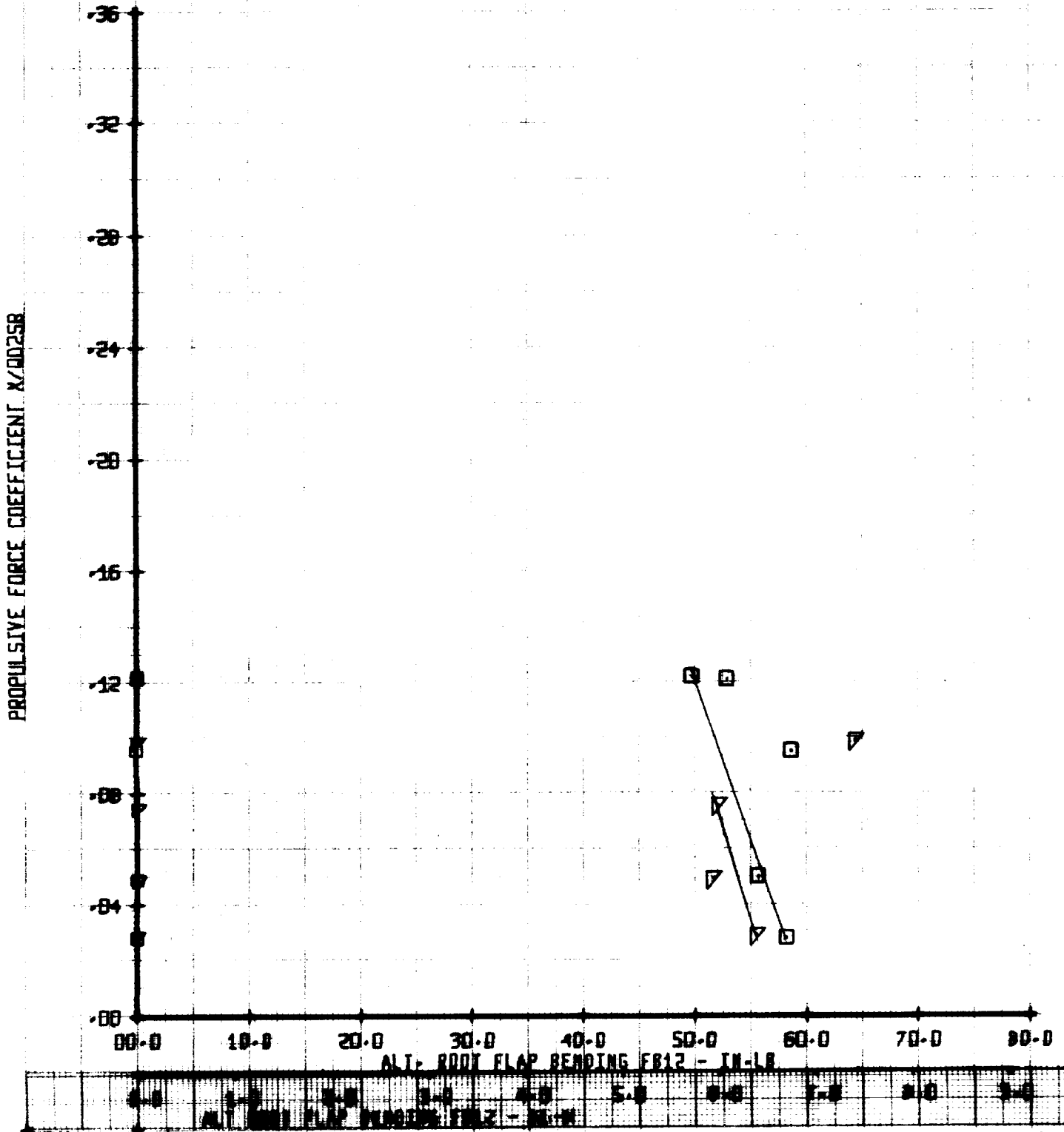
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB80



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND				
SYM	RUN	MU	CT/58	YTDN
□	236	.57	.06	353
▽	237	.57	.076	353

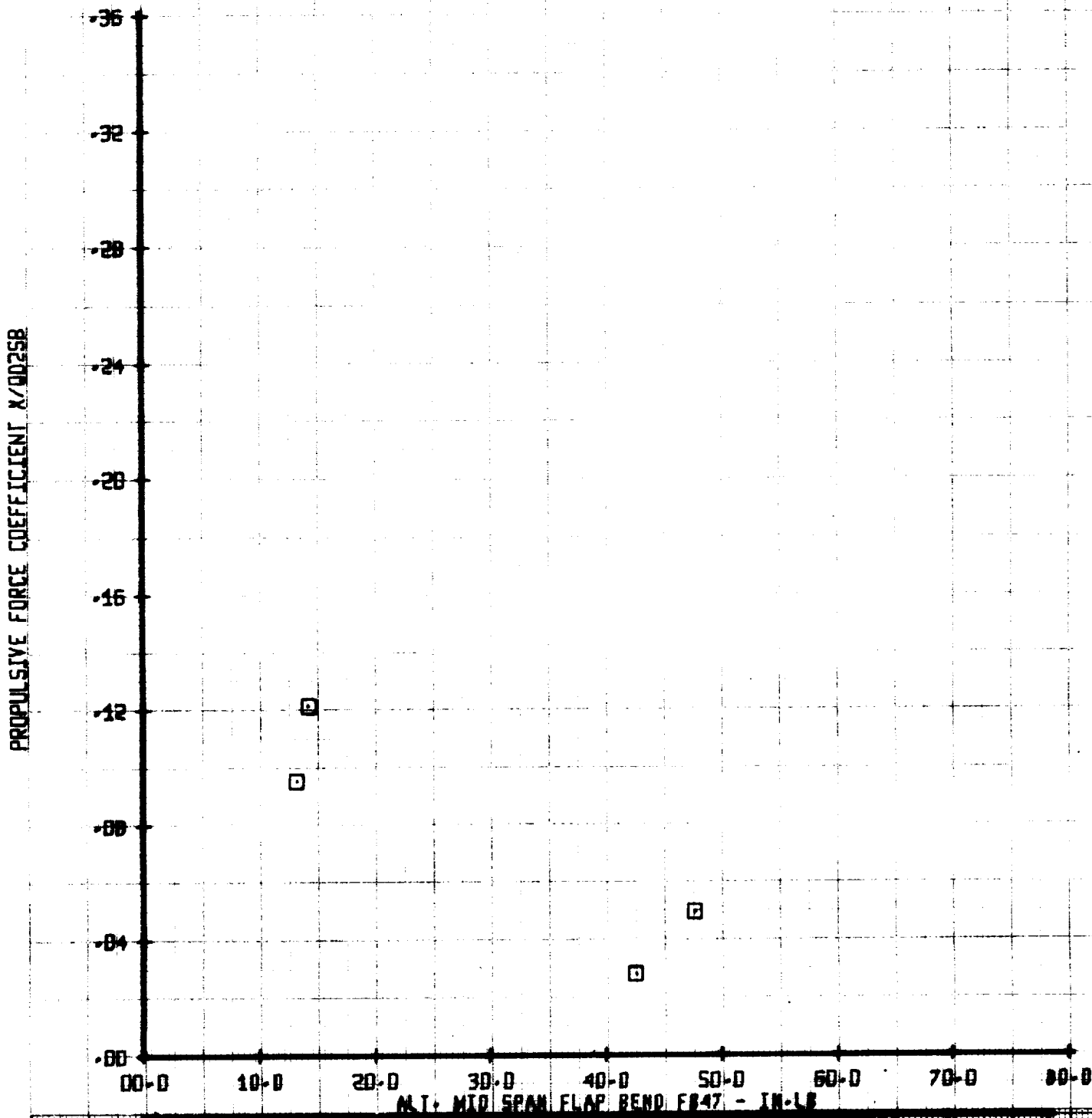
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	ML'	CT'YSB	VTIN
□	236	.57	06	358
○	237	.57	.076	358

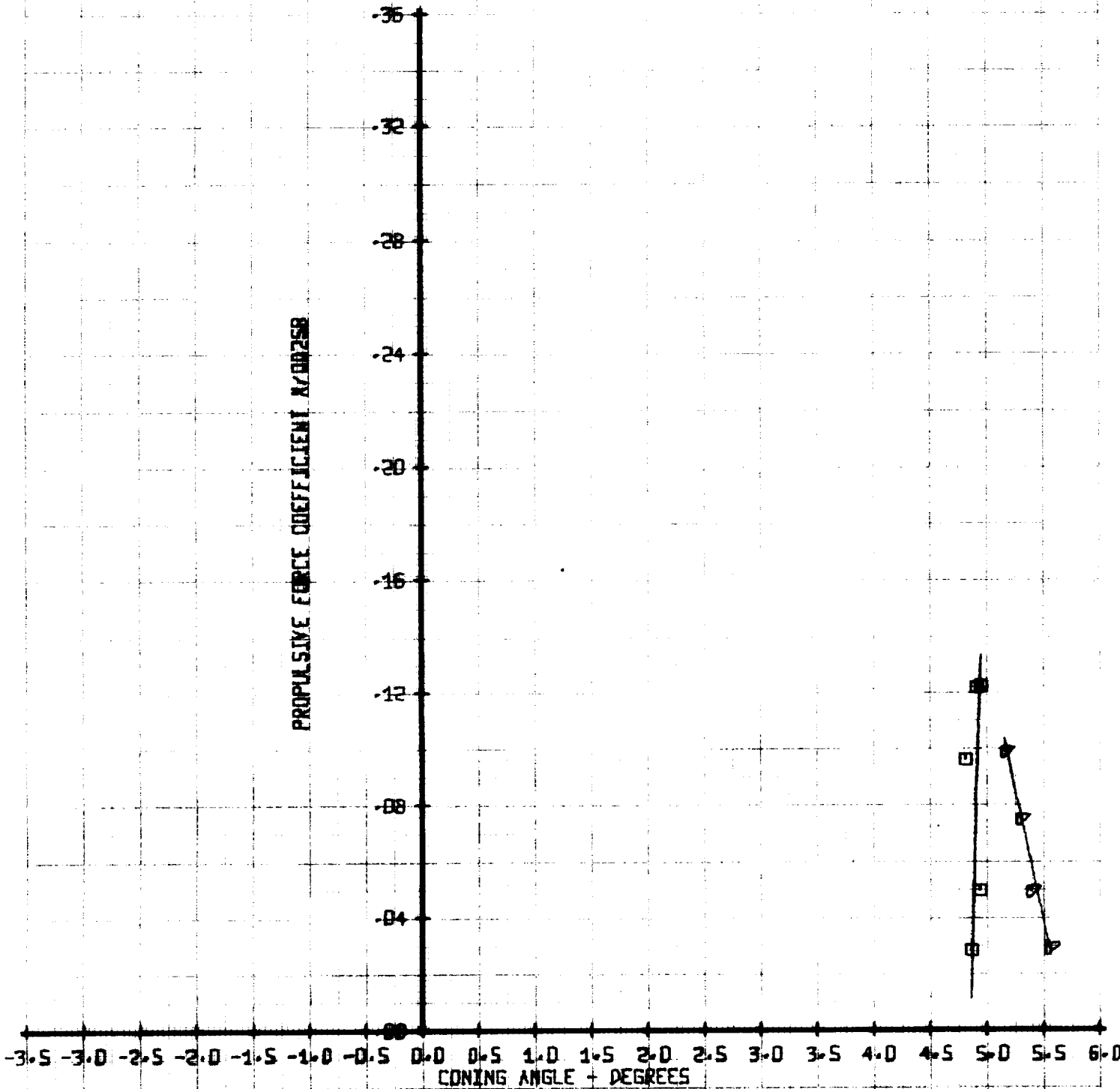
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN FLAP BENDING FB47



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CM-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYN		RUN		MUI		CT/VSB		YTLN	
0	4	236	237	.57	.57	06	.076	353	353

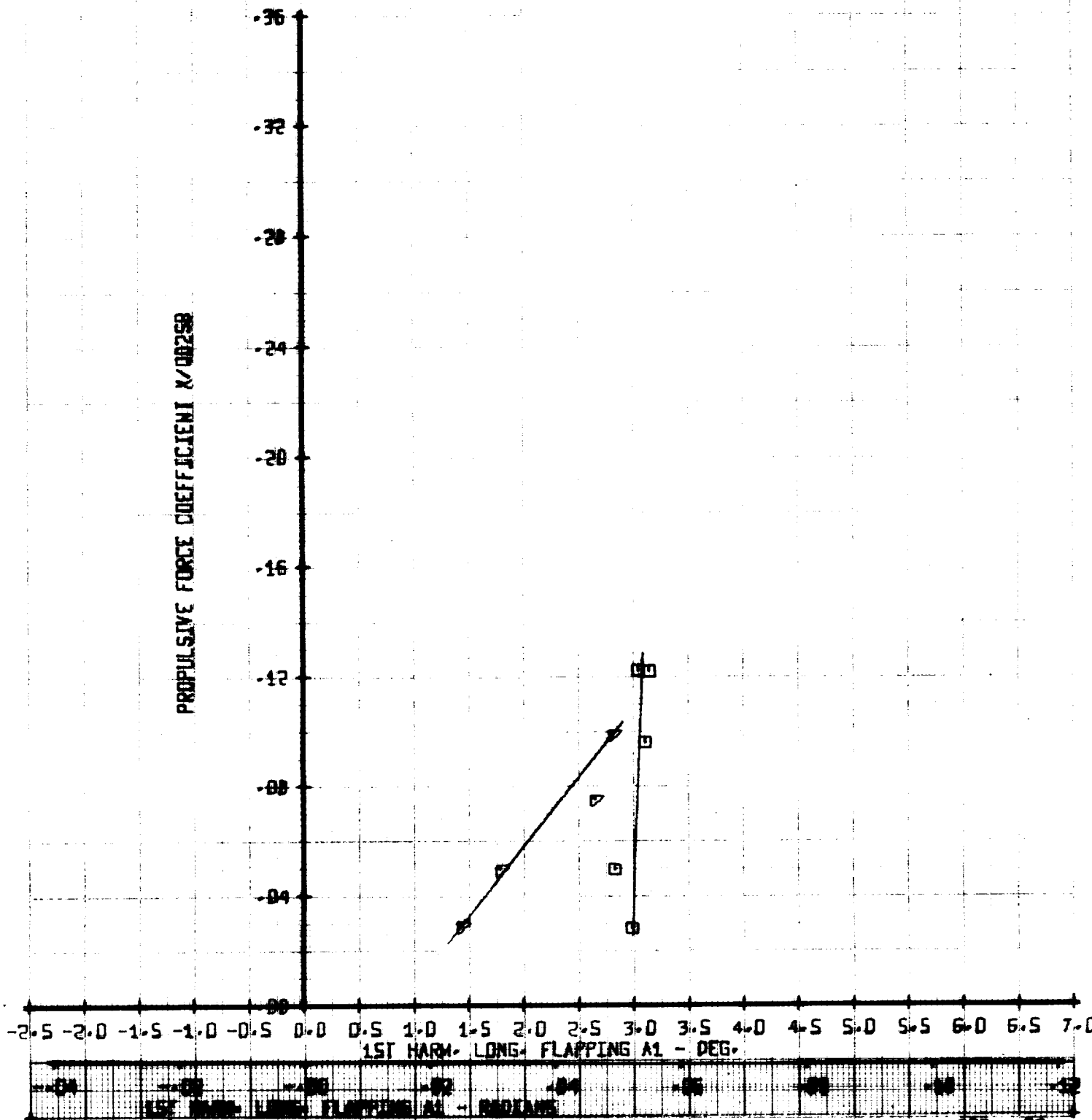
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/58	YIUN	
□	236	.57	06	353	
△	237	.57	.076	353	

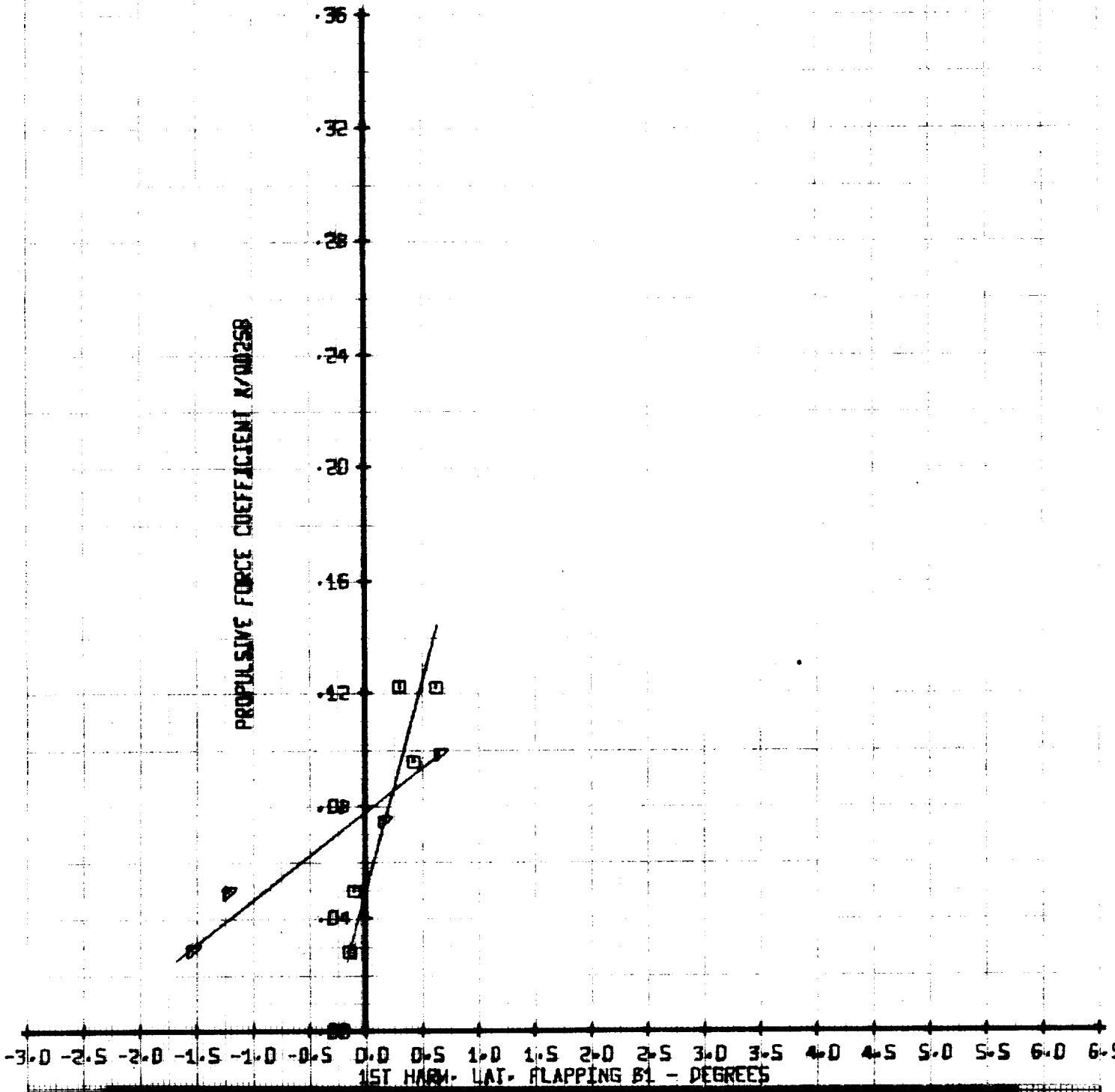
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MLI'	CT' / YSB	YIUN
□	236	-57	06	353
△	237	-57	-076	353

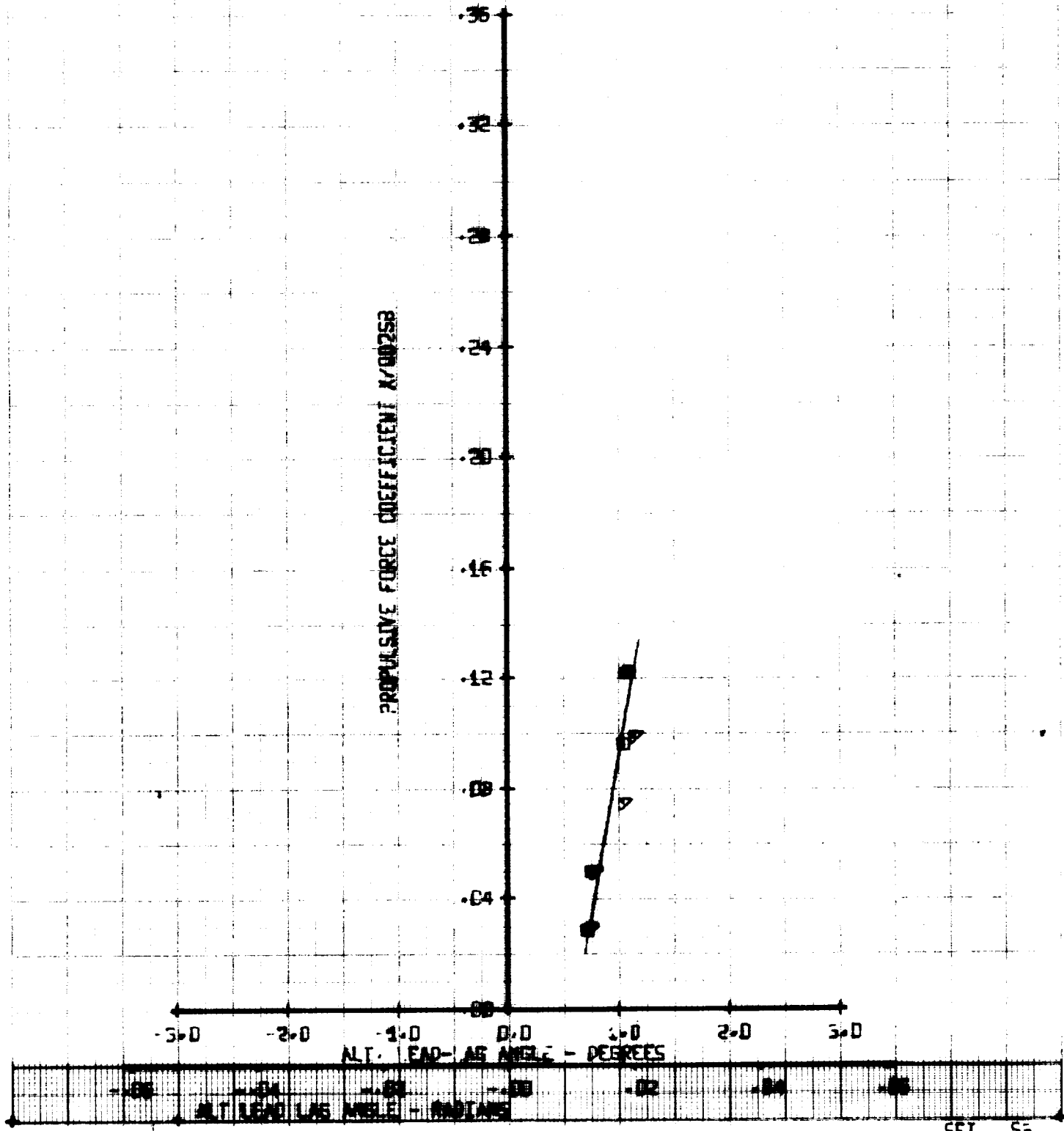
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND				
SYM	MIN	MAX	CT#258	VT#N
□	236	.57	06	355
△	237	.57	.076	353

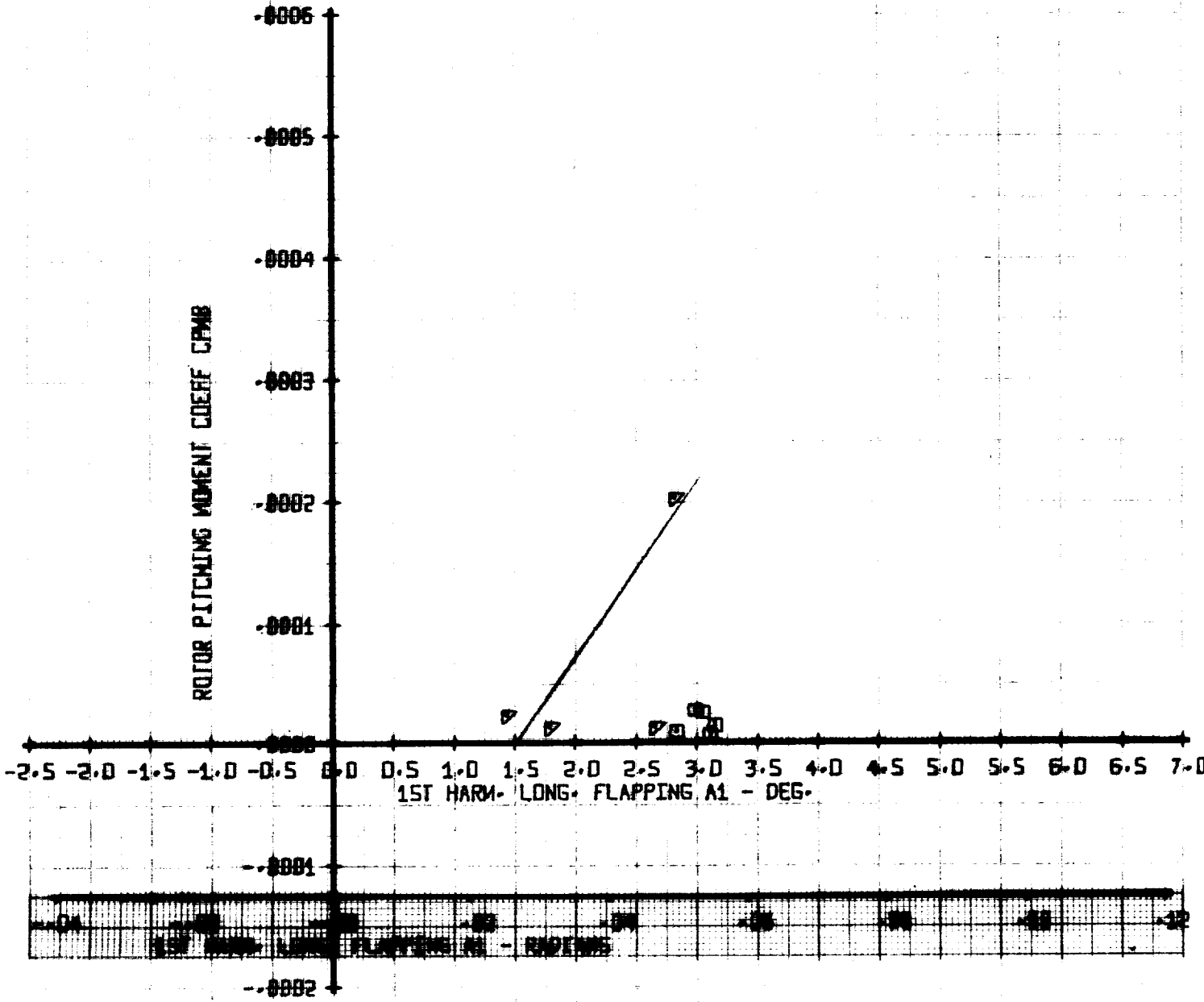
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	YTDN	
□	236	.57	.06	353	
△	237	.57	.076	353	

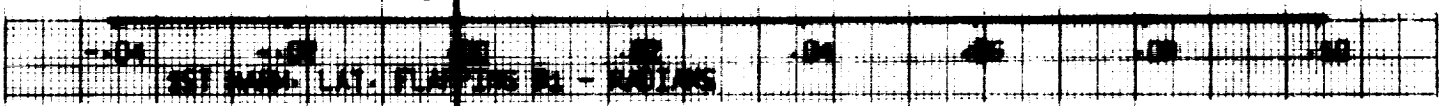
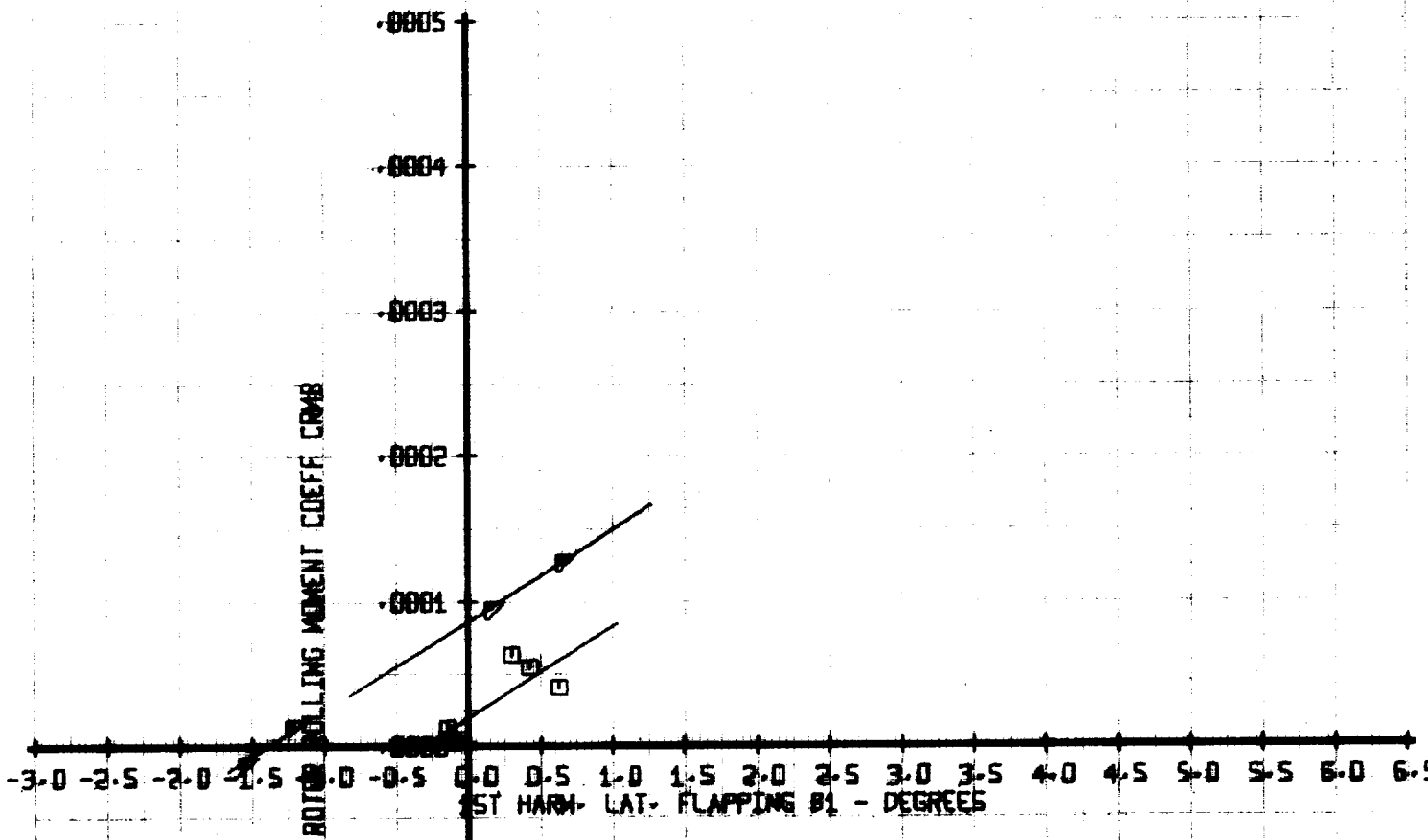
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT' / 58	YTUM	
□	236	.57	.06	353	
△	237	.57	-.076	353	

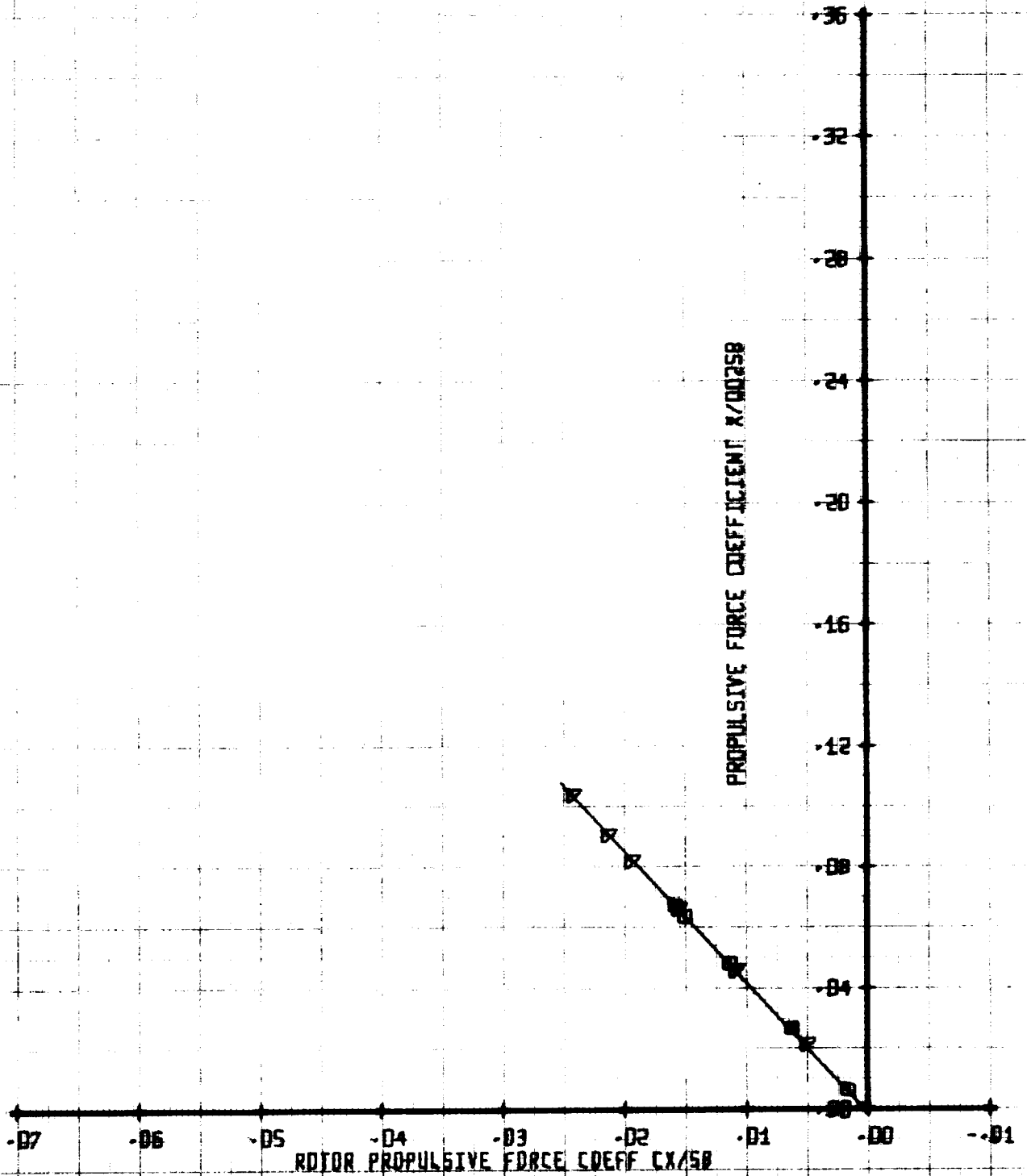
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MJ'	CT'/58	VTUM
SYM	RUN	.61	.04	370
0	239	.61	.055	370
4	238			

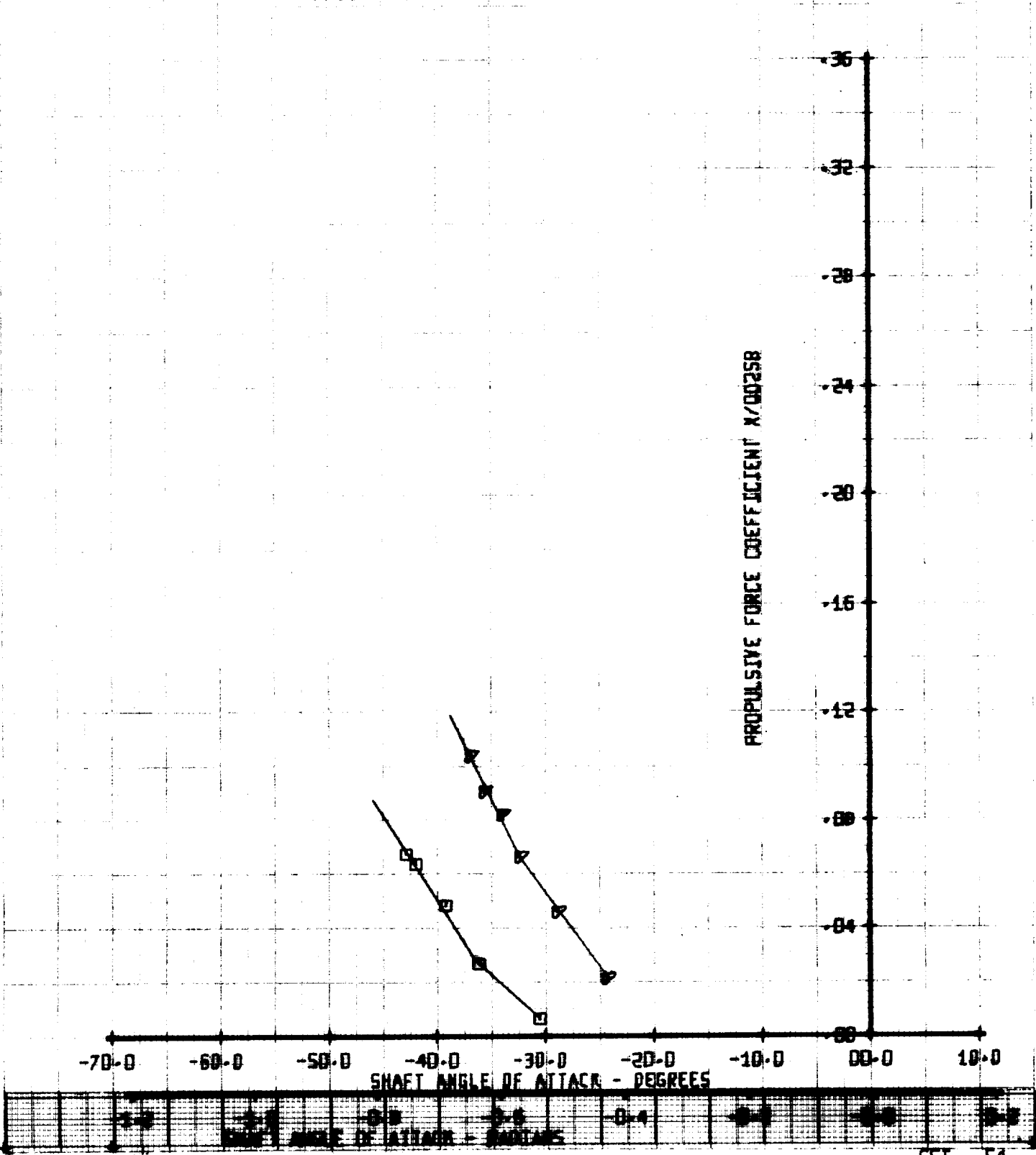
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RPM		MU		CT/VSB		VTUN	
P	0	339	238	.61	.61	.04	.055	370	370

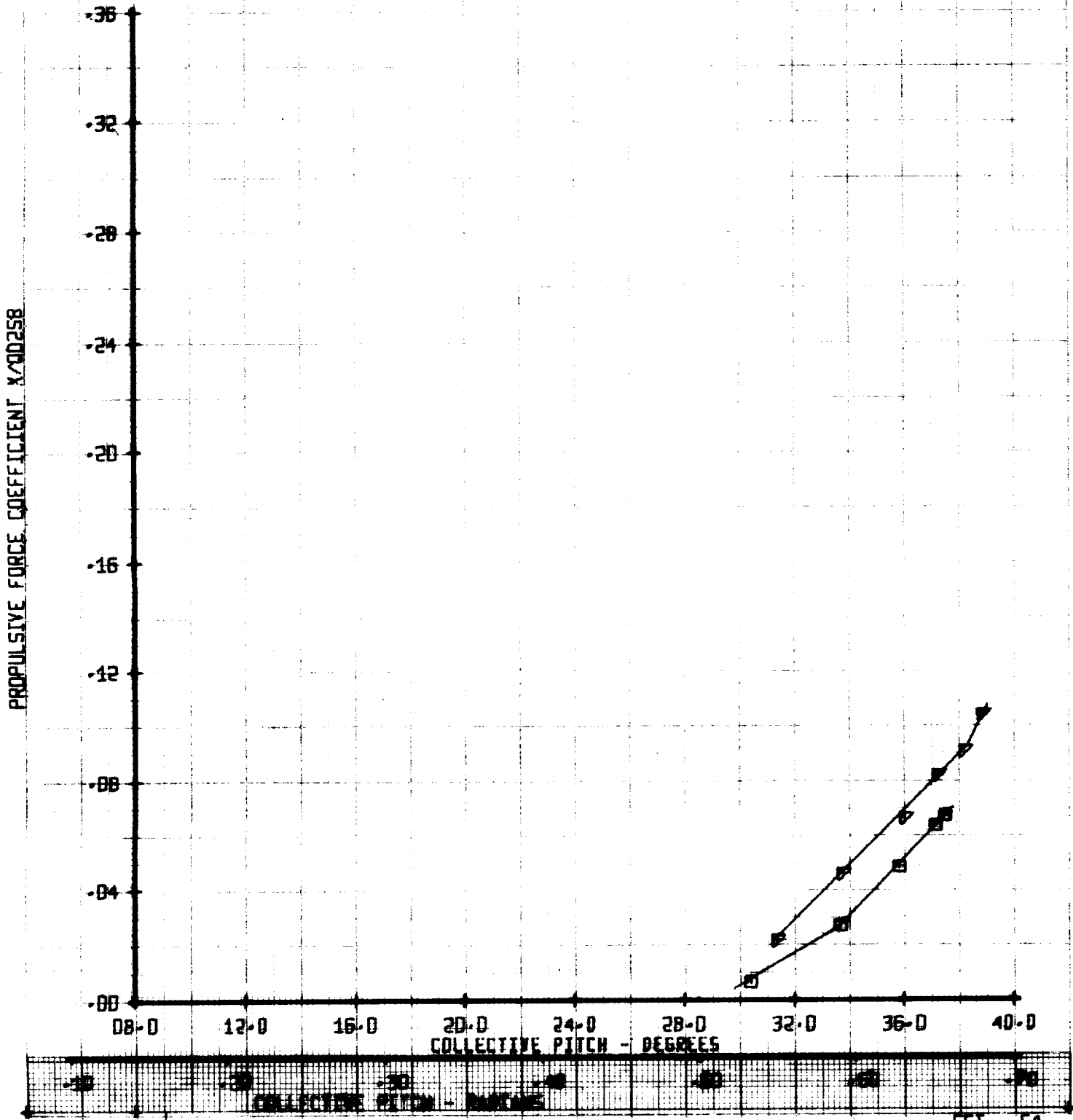
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUN		MU'		CT'/SB		VTUN	
□	○	239	239	.61	.61	.04	.055	37B	37B
▽	○	238	238	.61	.61	.04	.055	37B	37B

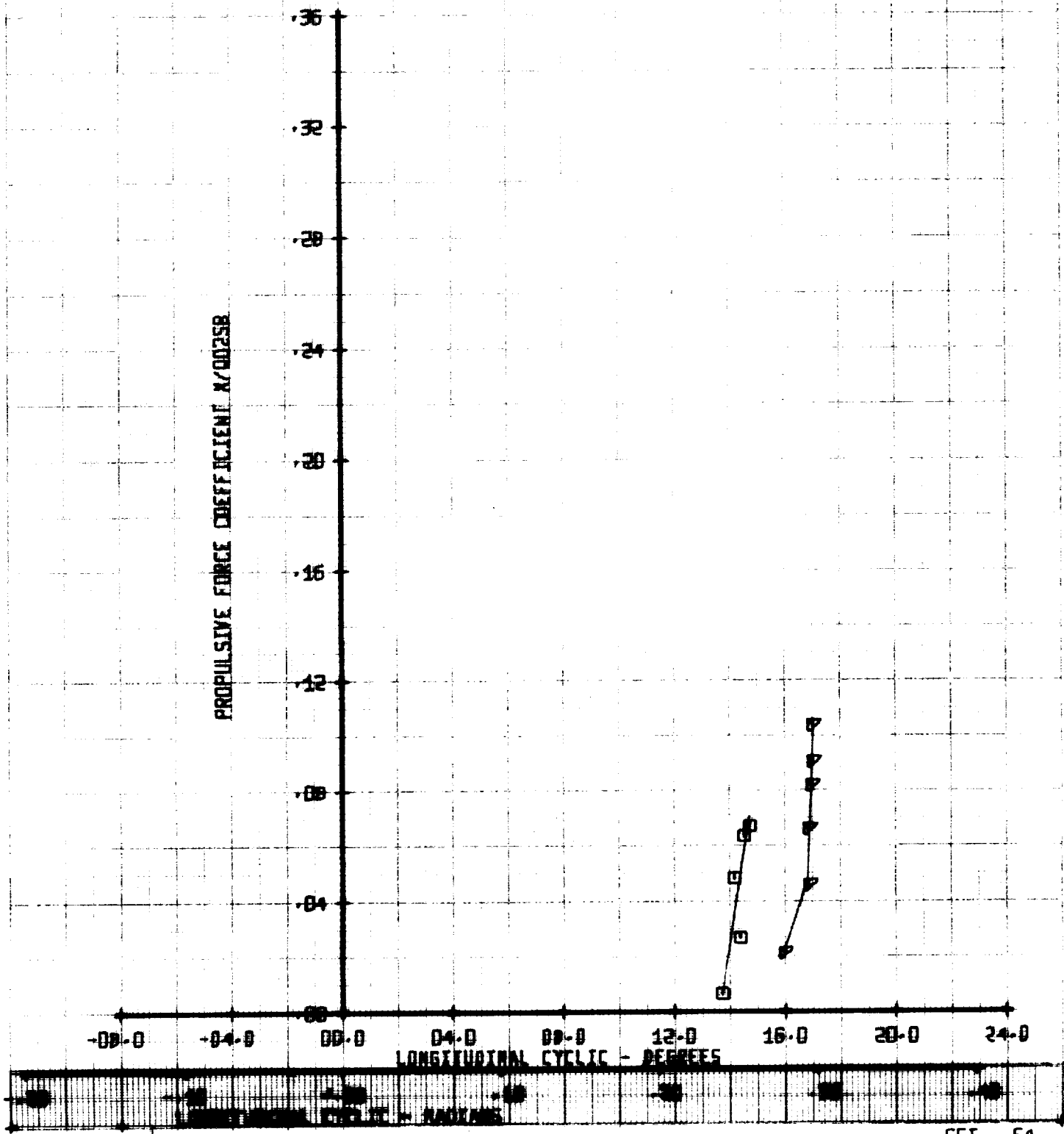
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT' / SB	VTUN	
□	239	.61	.04	37B	
△	238	.61	.055	37B	

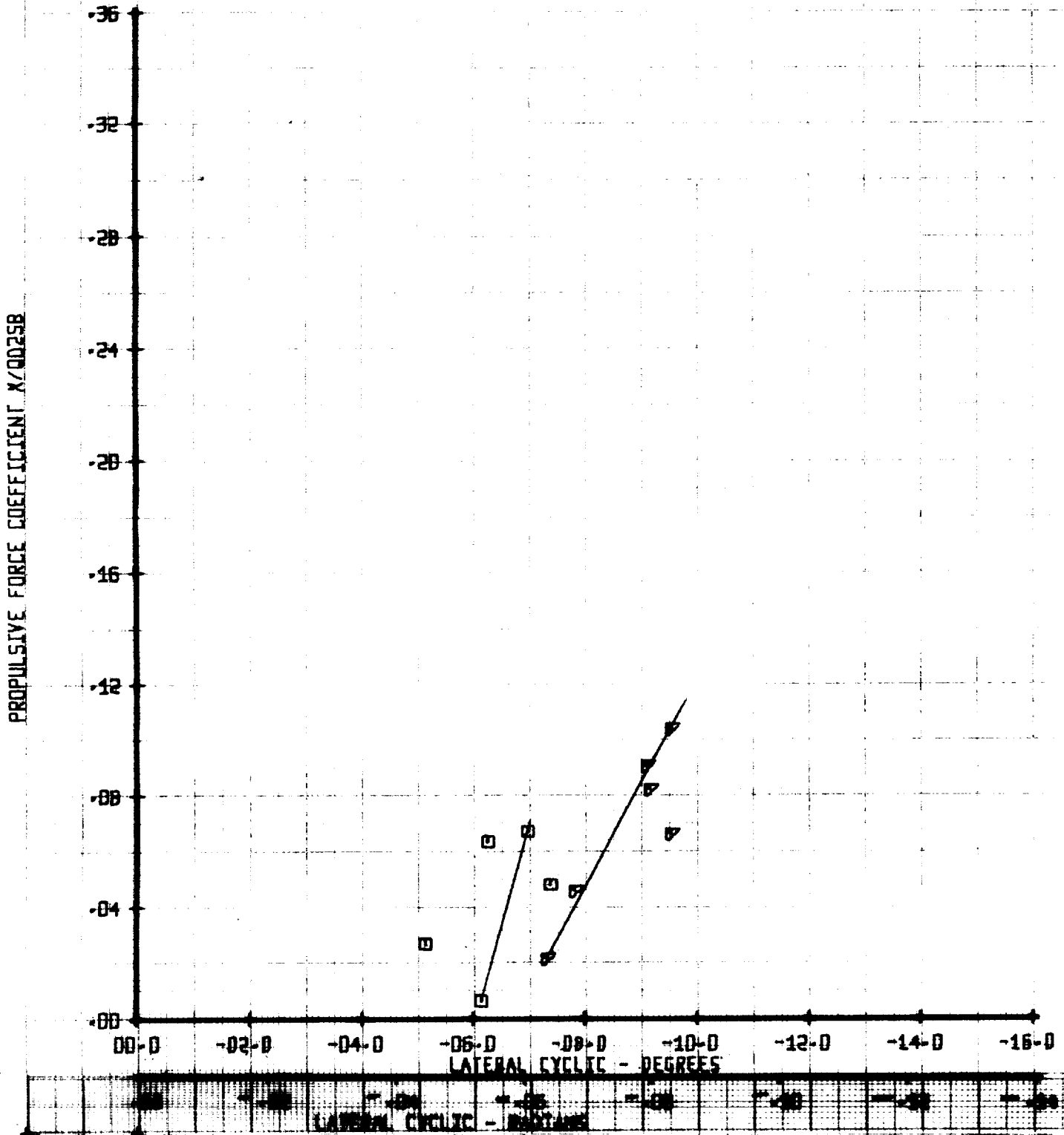
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU	CT/58	VTUN
□	239	.61	.04	37B
△	238	.61	.055	37B

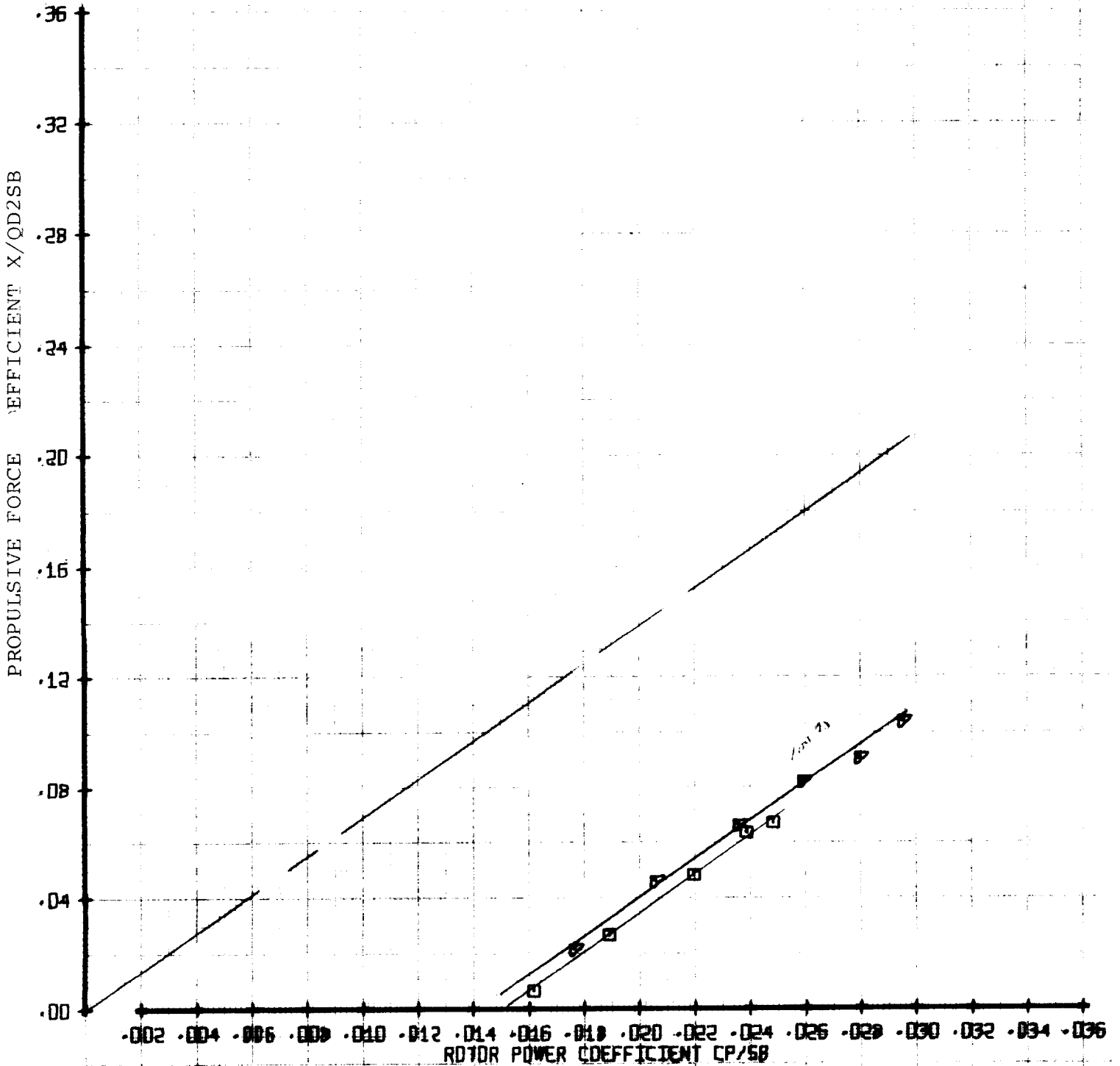
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	YTDN	
□	239	-61	-04	37B	
○	238	-61	-055	37B	

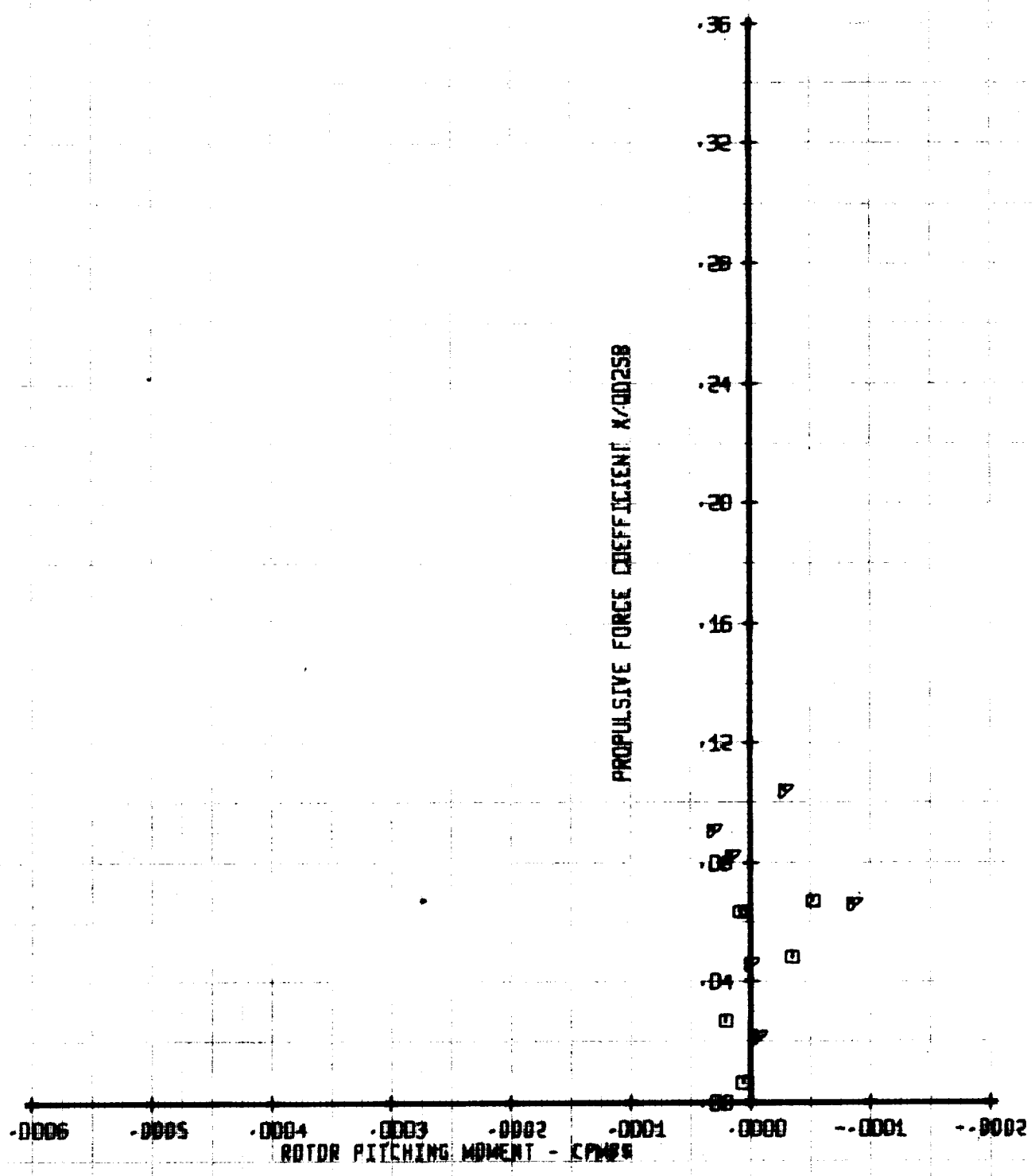
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU	CT/58	VTUN	
□	239	.61	.04	37B	
△	238	.61	.055	37B	

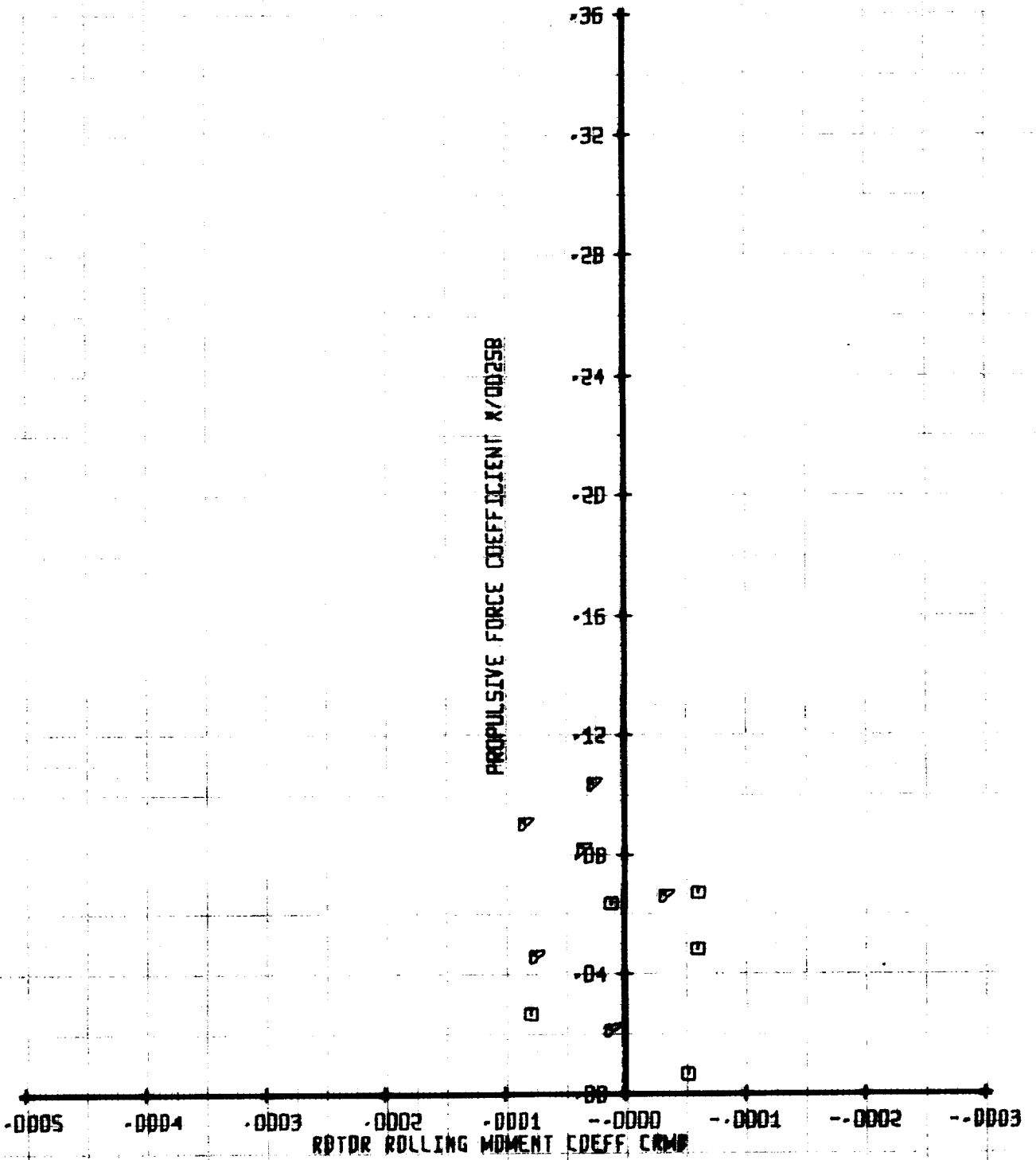
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUN		MU'		CT'Y58		VTUN	
9	0	239	238	.61	.61	.04	.055	37B	37B

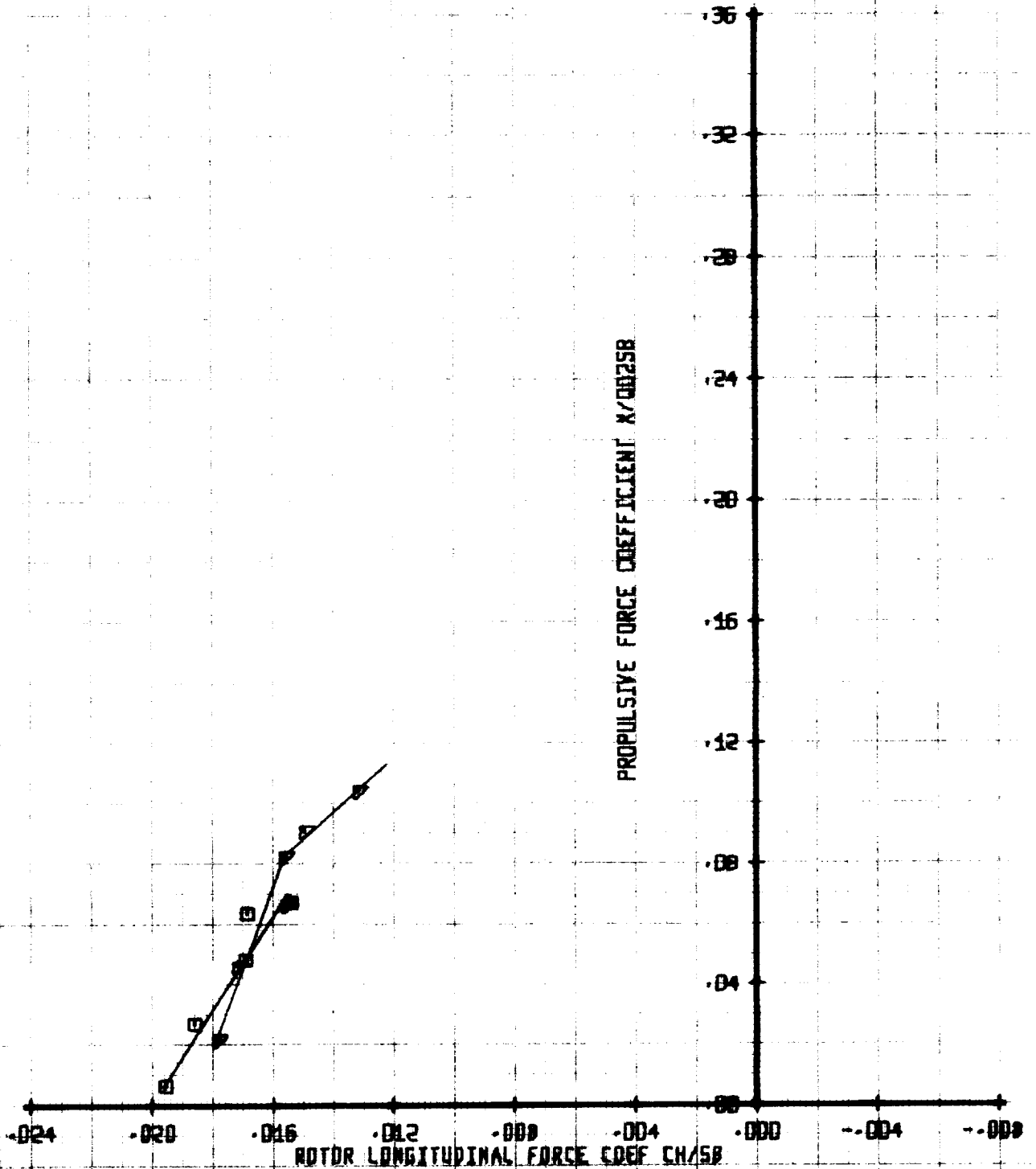
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/SB	VTUN
□	239	.61	.04	370
△	238	.61	.055	370

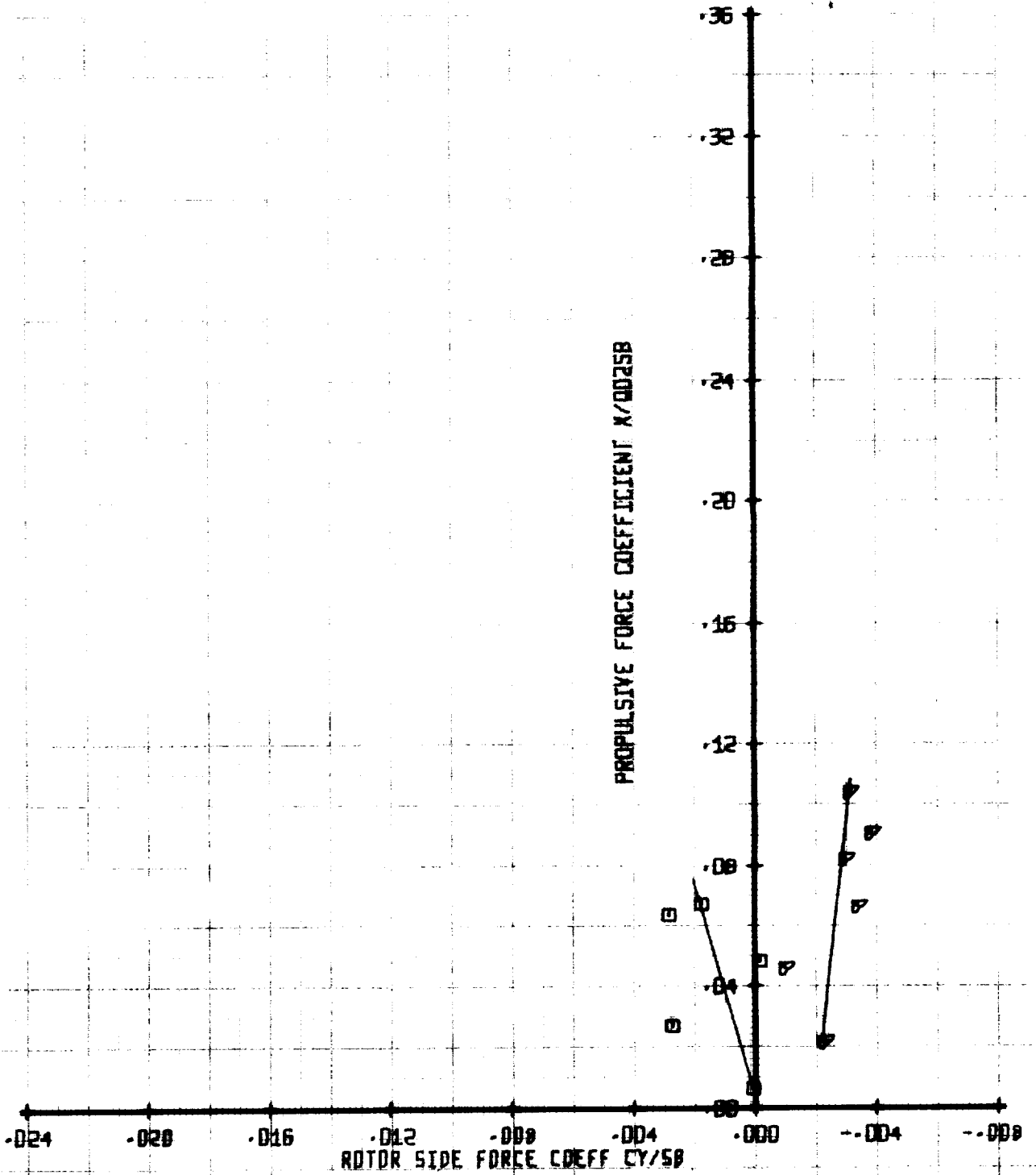
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/58	VTUN
□	239	.61	.04	37B
▽	238	.61	.055	37B

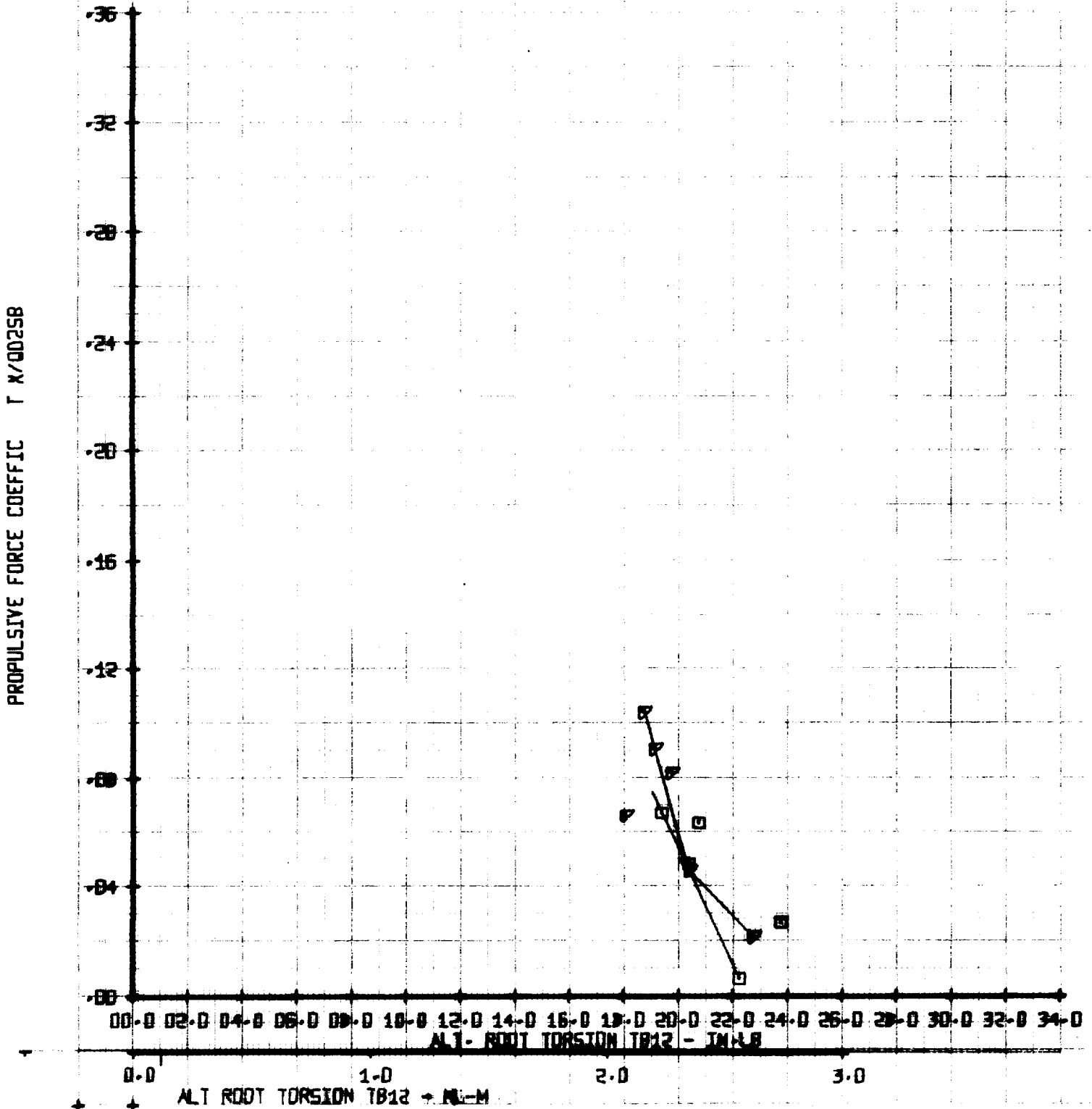
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYMBOL		LEGEND		
SYM	RUN	MU'	CT' / VSB	VTUM
□	239	.61	.04	37B
△	238	.61	.055	37B

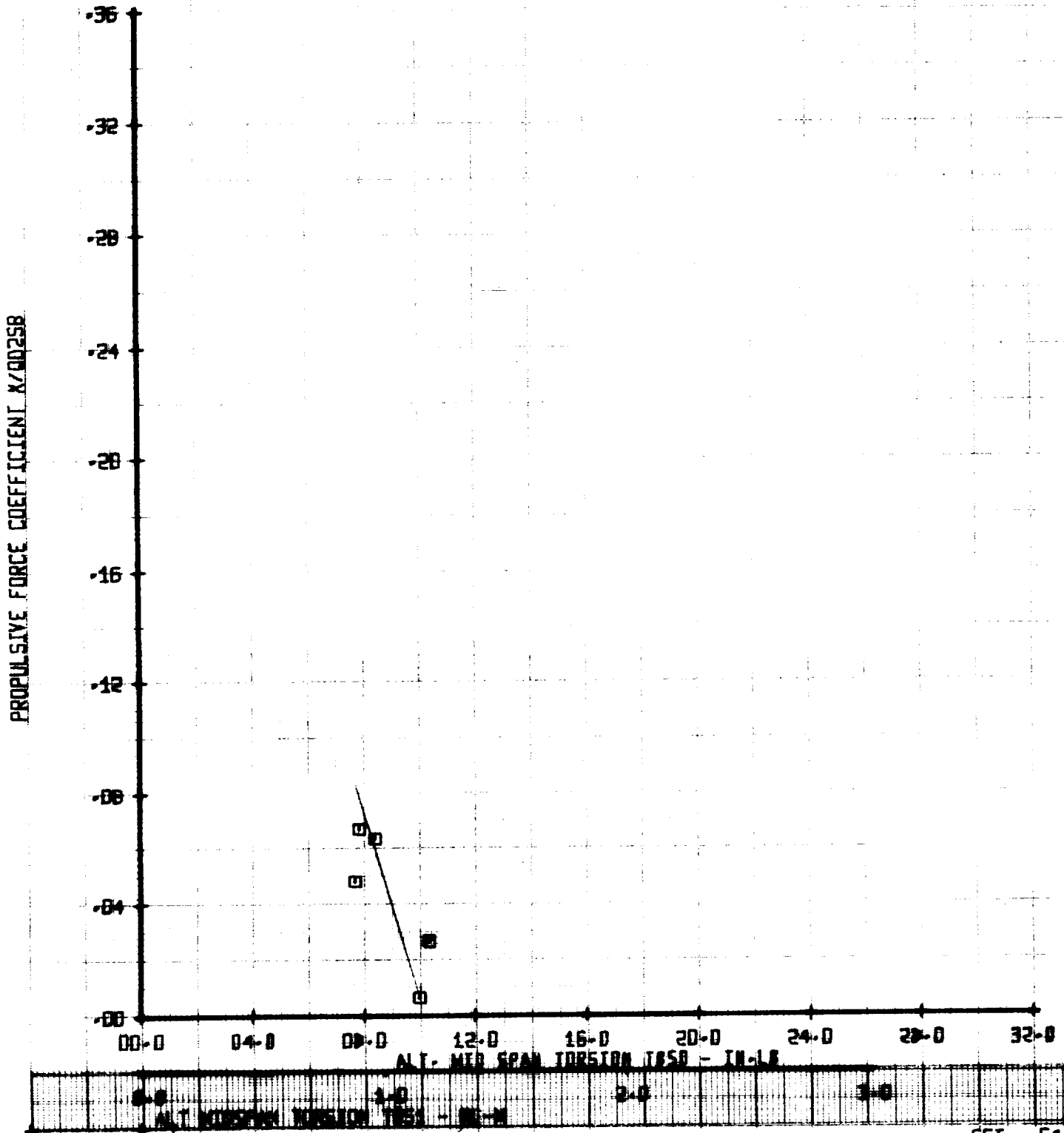
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/SB	VTUN
□	239	.61	.04	37B
○	238	.61	.055	37B

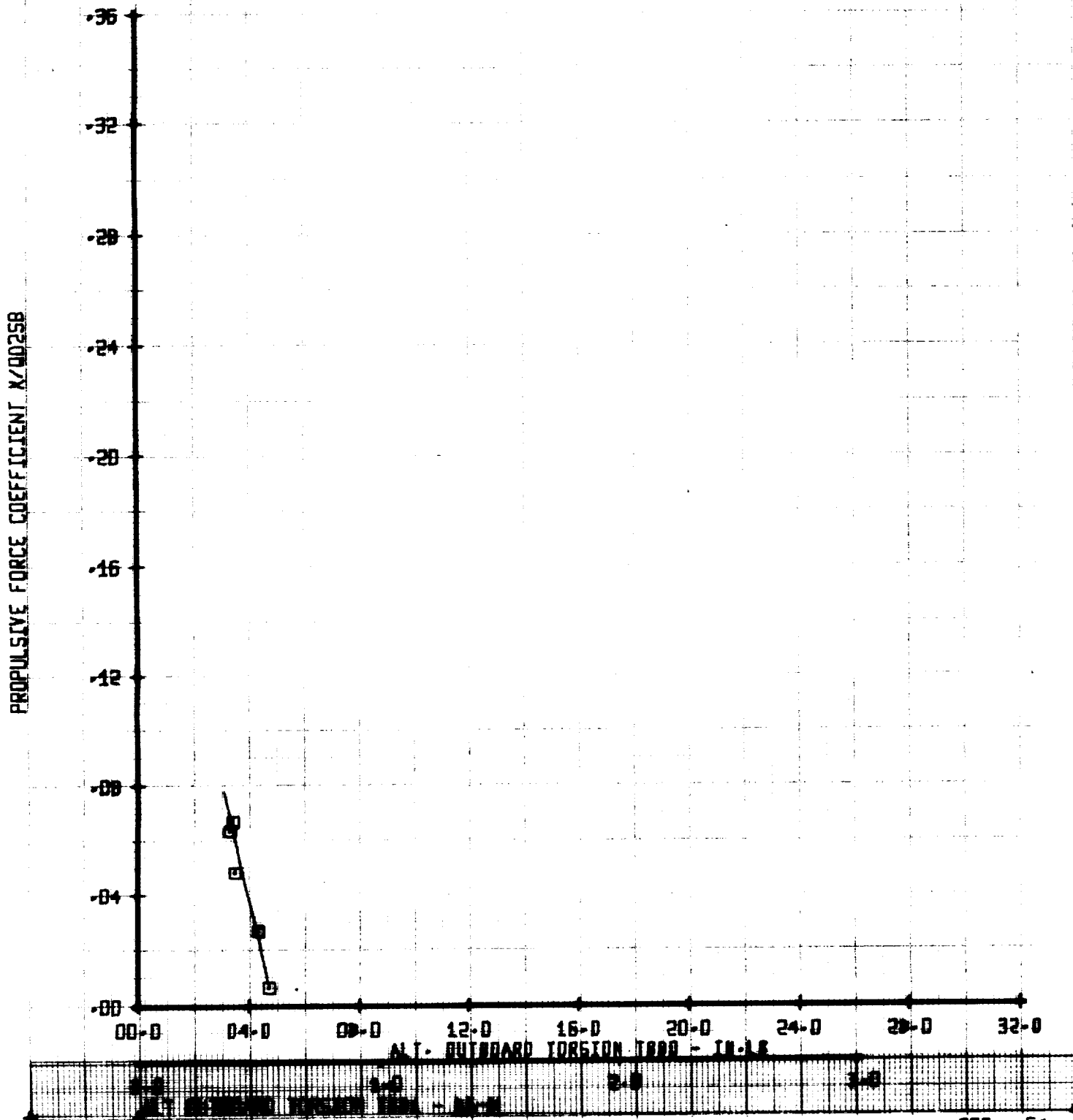
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING MID SPAN TORSION TB50



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MLI	CT/58	VTUN
□	239	.61	.04	37B
○	238	.61	.055	37B

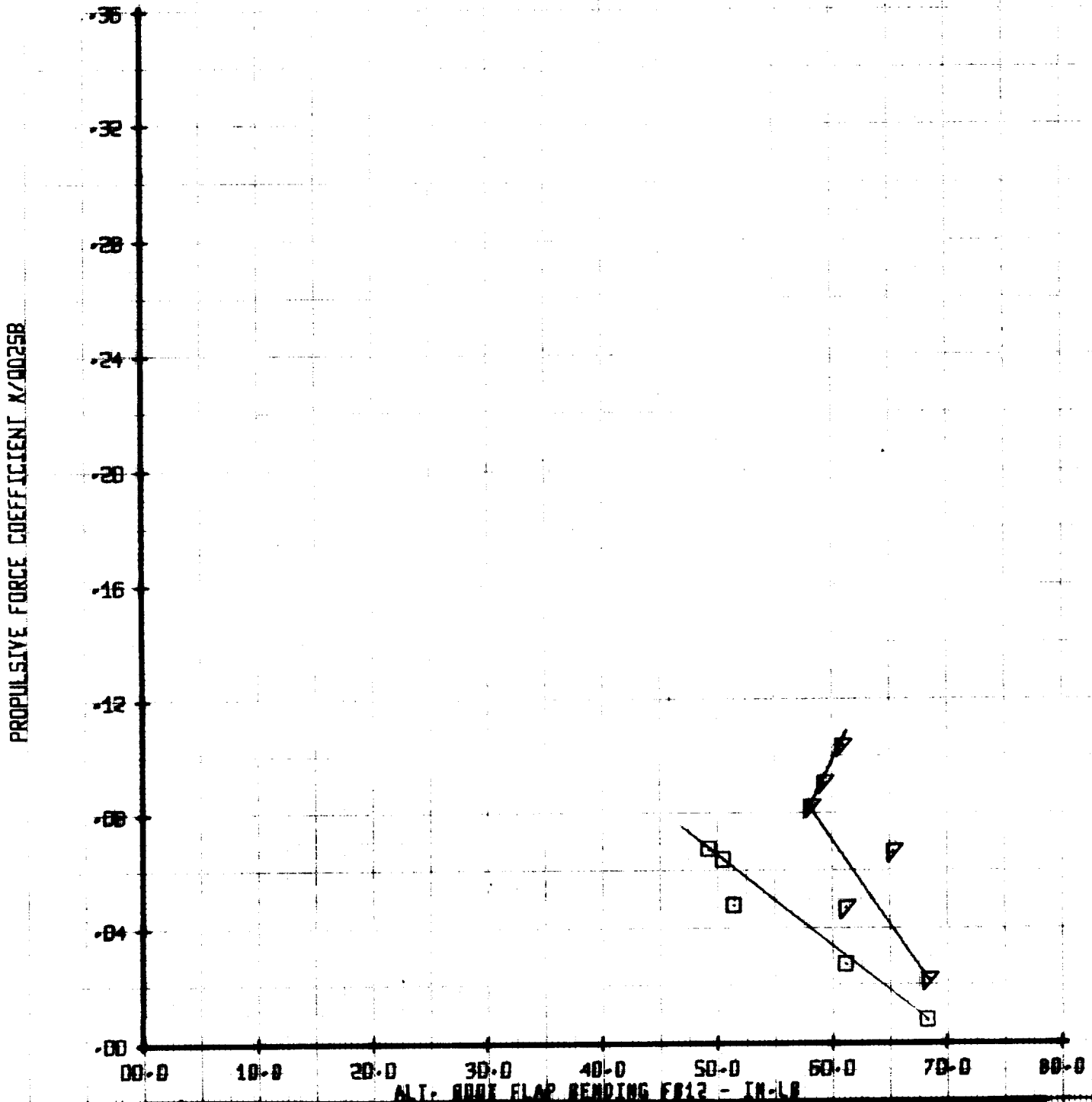
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD TORSION TB80



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	VTUN	
□	239	.61	.04	370	
▽	238	.61	.055	370	

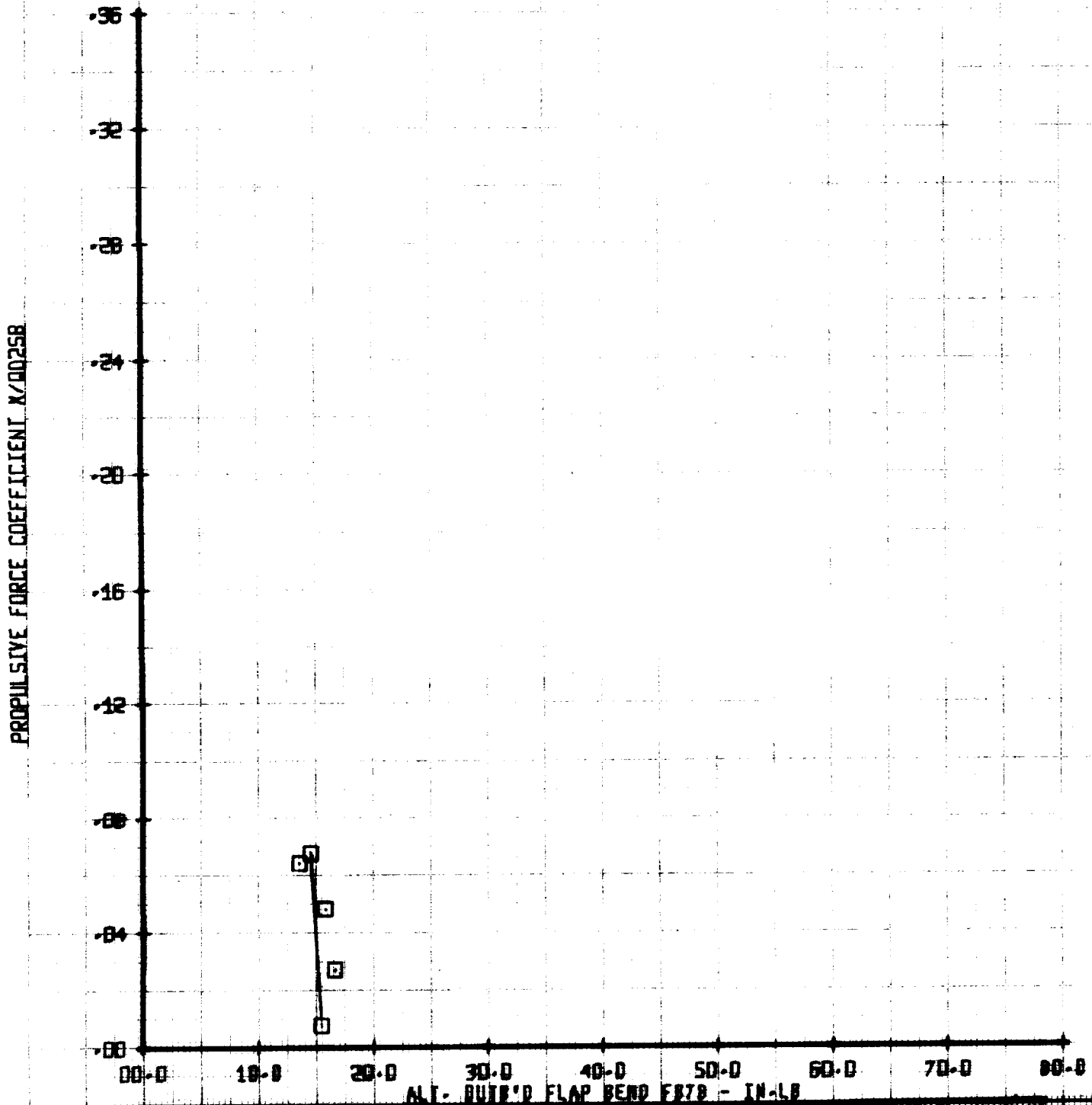
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU	CT/58	VTUN	
□	239	.61	.04	37B	
○	238	.61	.055	37B	

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING OUTBOARD FLAP BENDING FB78

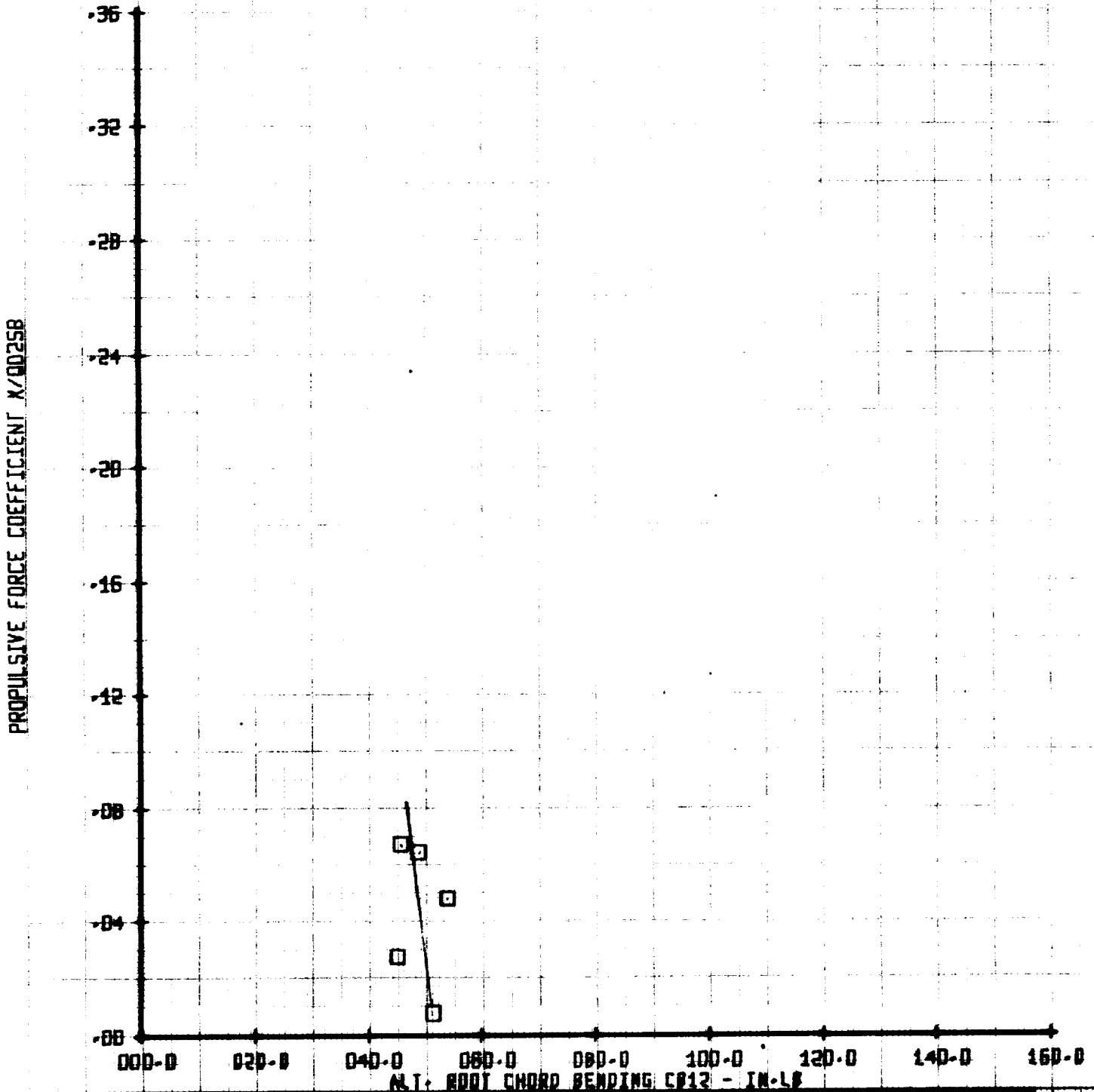


LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND

SYM	RUN	MLI	CT/5B	VTUM
0	239	.61	.04	37B
0	238	.61	.055	37B

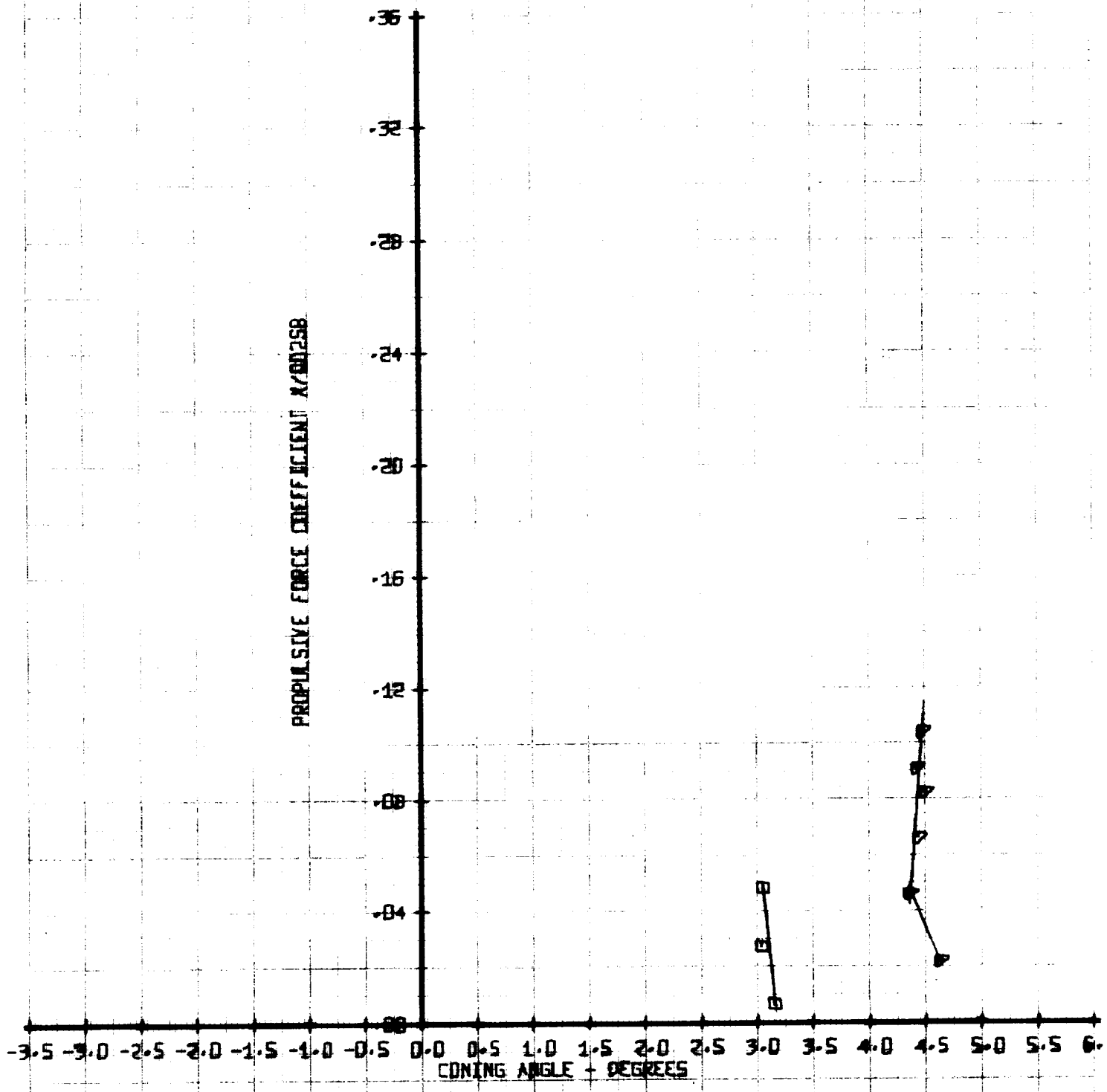
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT CHORD BENDING CB12



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	Y RUN	
□	239	.61	.04	37B	
△	238	.61	.055	37B	

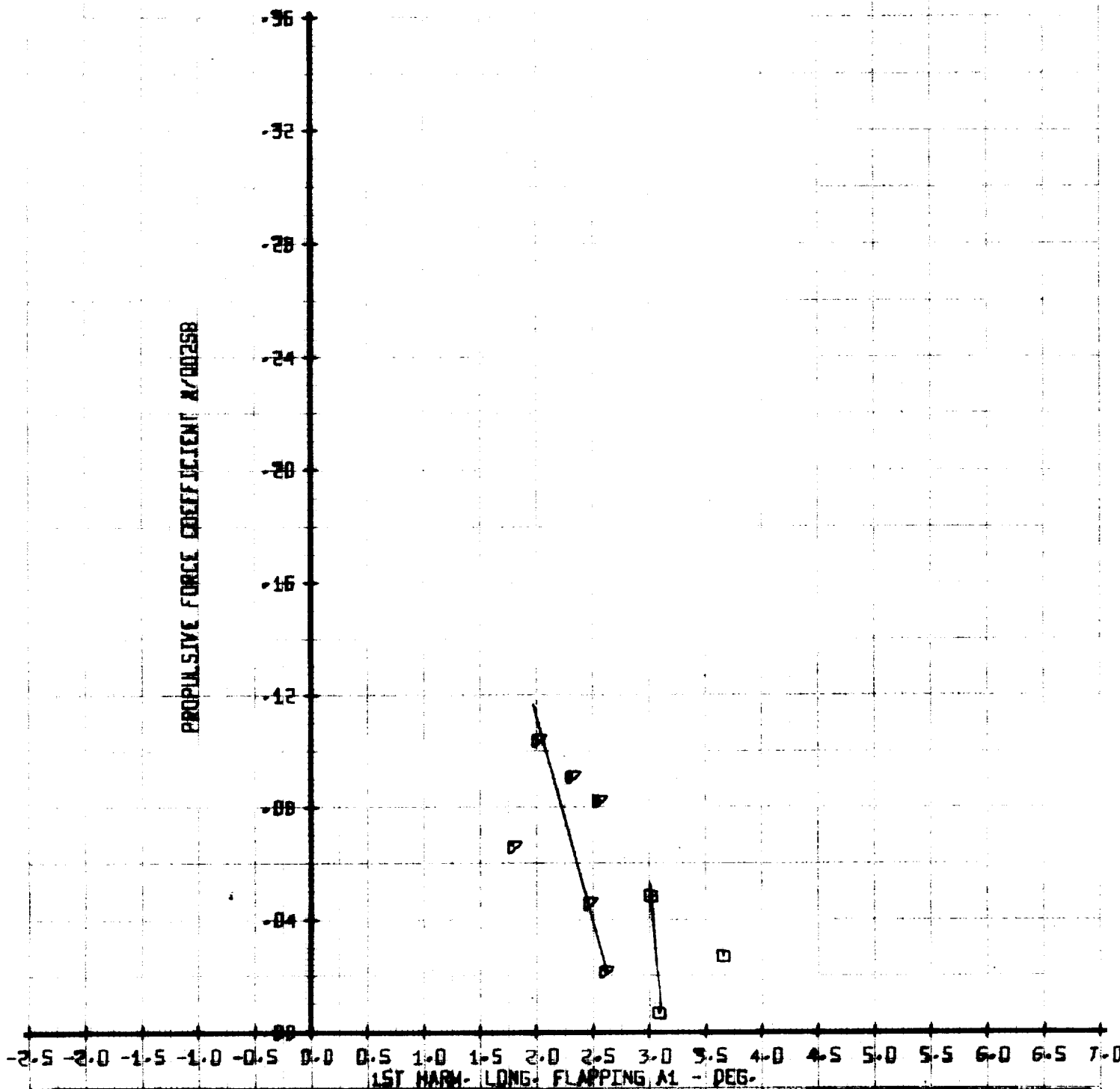
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND				
SYM	RUN	MU'	CT'/58	YOUN
□	239	.61	.04	37B
△	238	.61	.055	37B

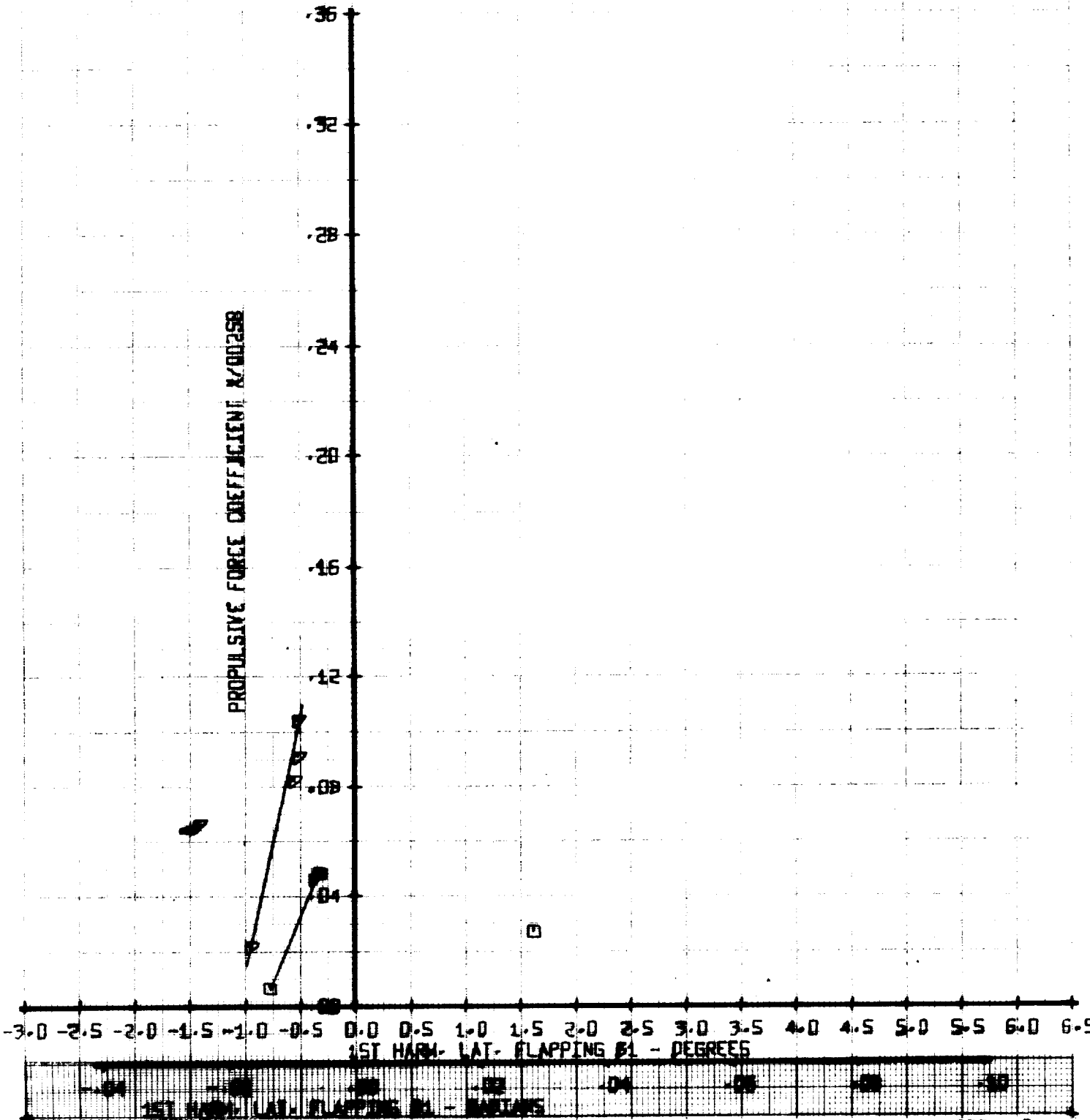
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-17B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND				
SYM	RUN	MU'	CT'/SB	YOUN
□	239	-61	-04	37B
○	238	-61	-055	37B

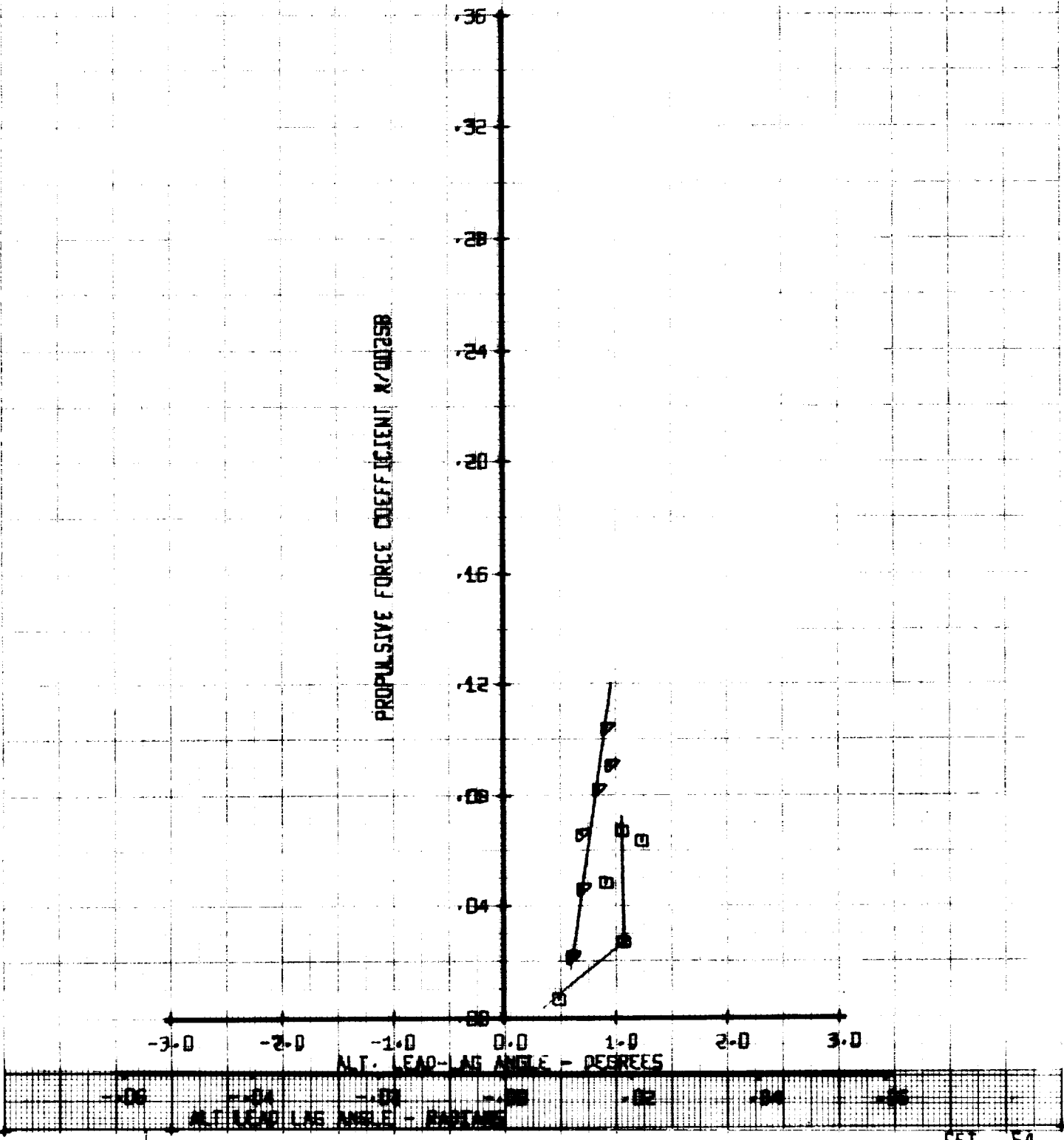
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		LEGEND		VTUN	
□	239	MU'	CT'/SB	37B	
△	238	-61	-04	37B	
		-61	-055	37B	

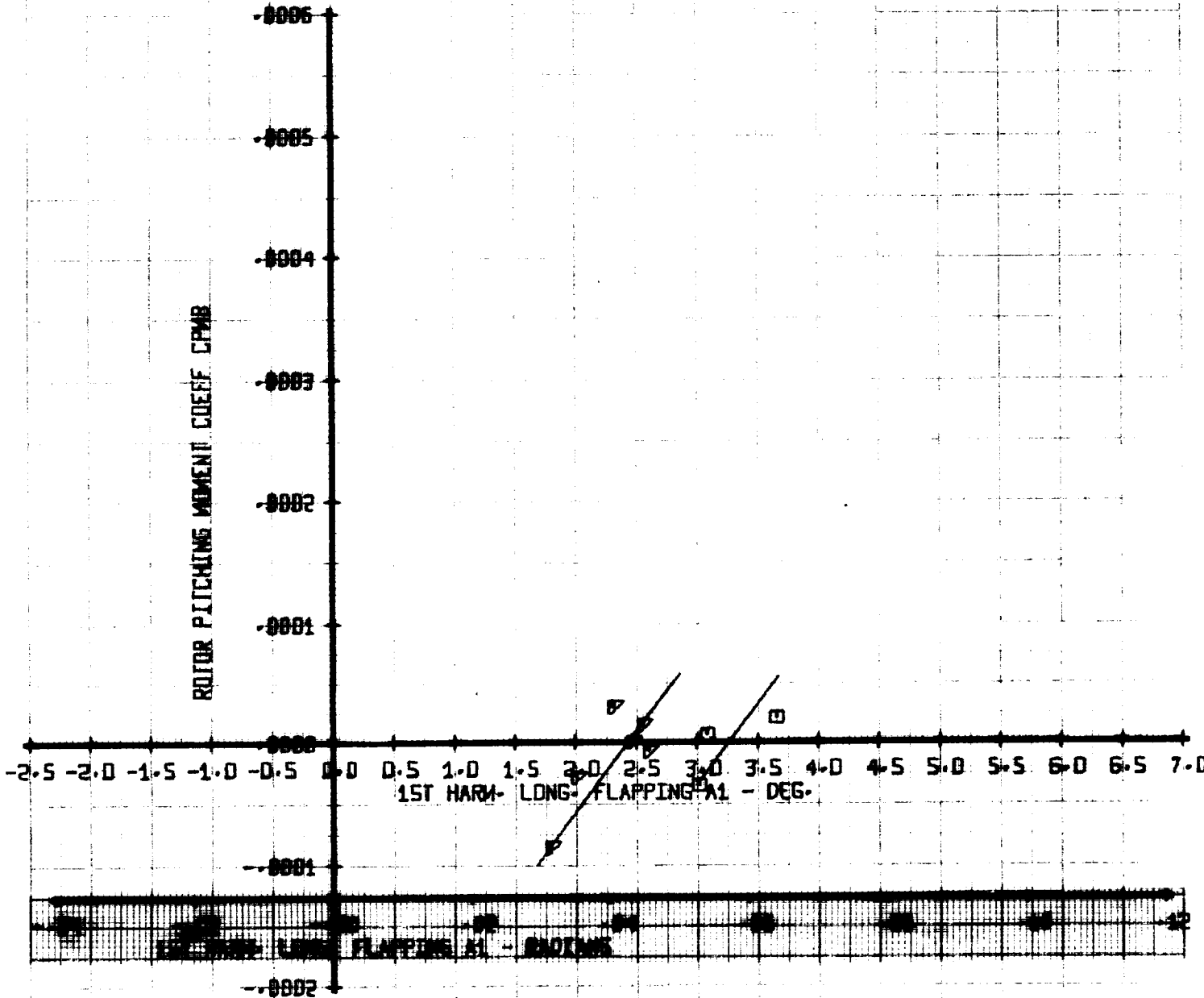
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/58	YTLN	
□	239	.61	.04	37B	
○	238	.61	.055	37B	

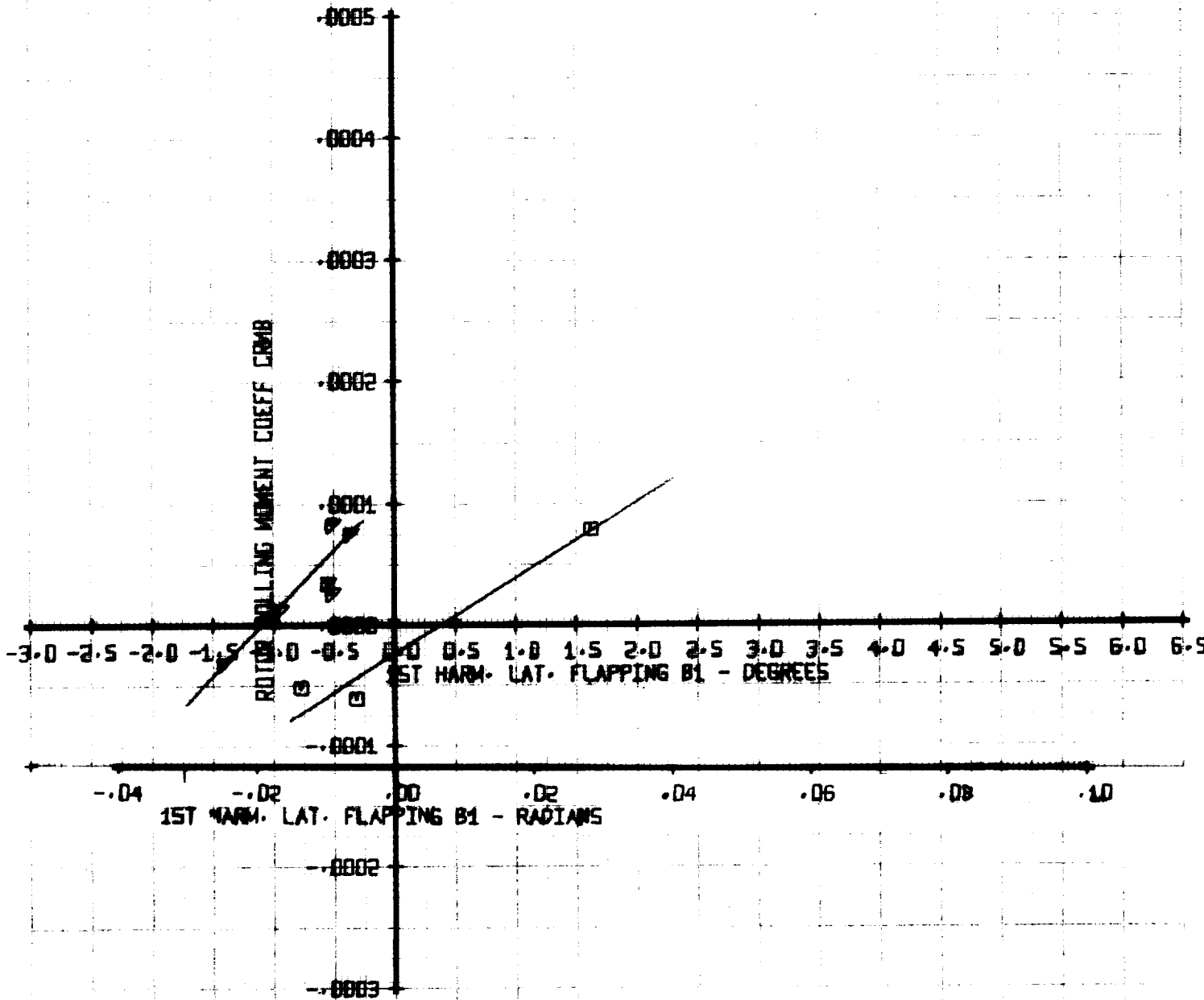
ROTOR PITCHING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	BLIN	MU'	CT'/58	YILIN	
□	239	.61	.04	378	
○	238	.61	.055	378	

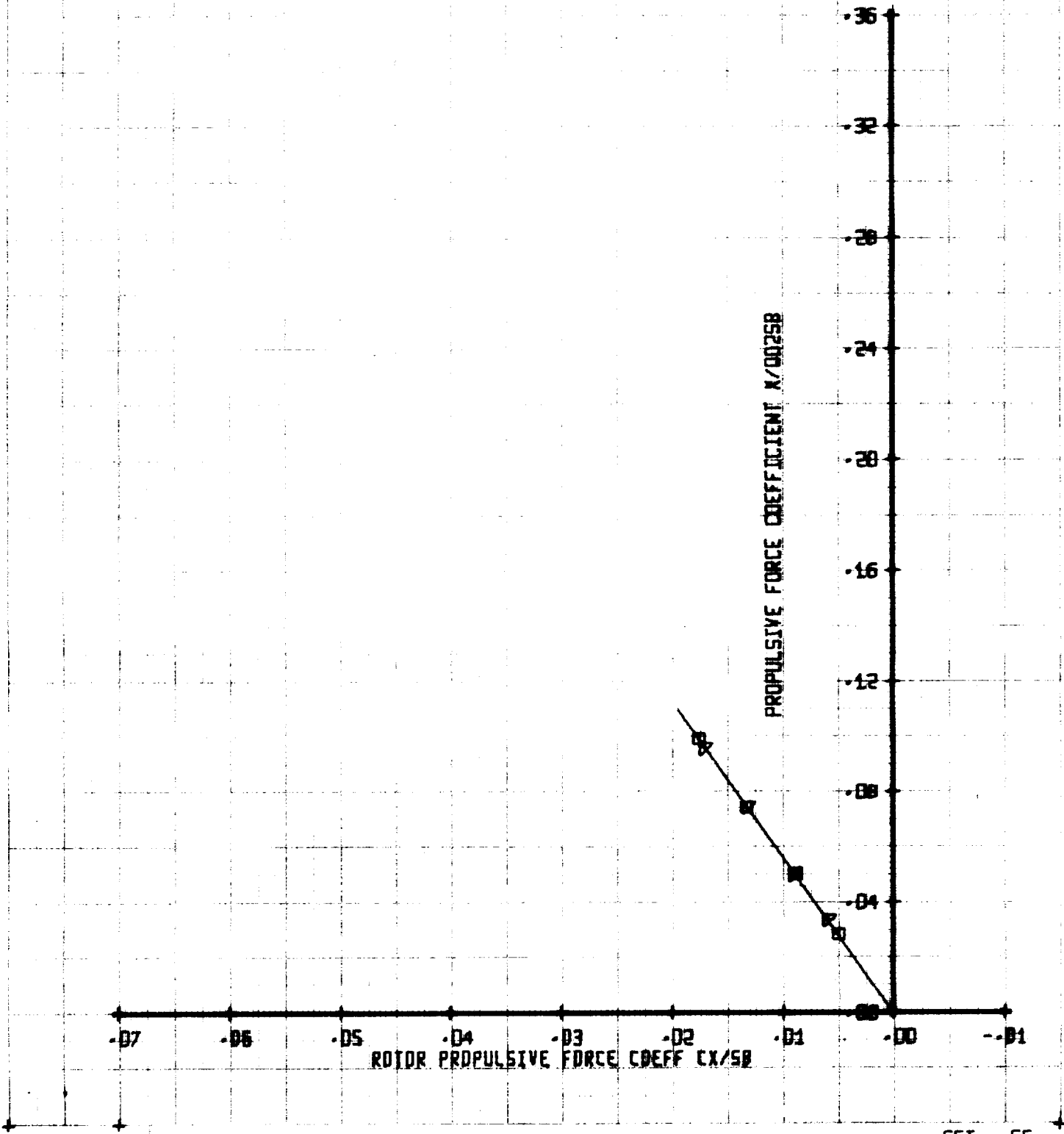
ROTOR ROLLING MOMENT COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		CT' / 58	VTUN
SYM	RUN	MU'	
□	276	.53	352
△	277	.53	352

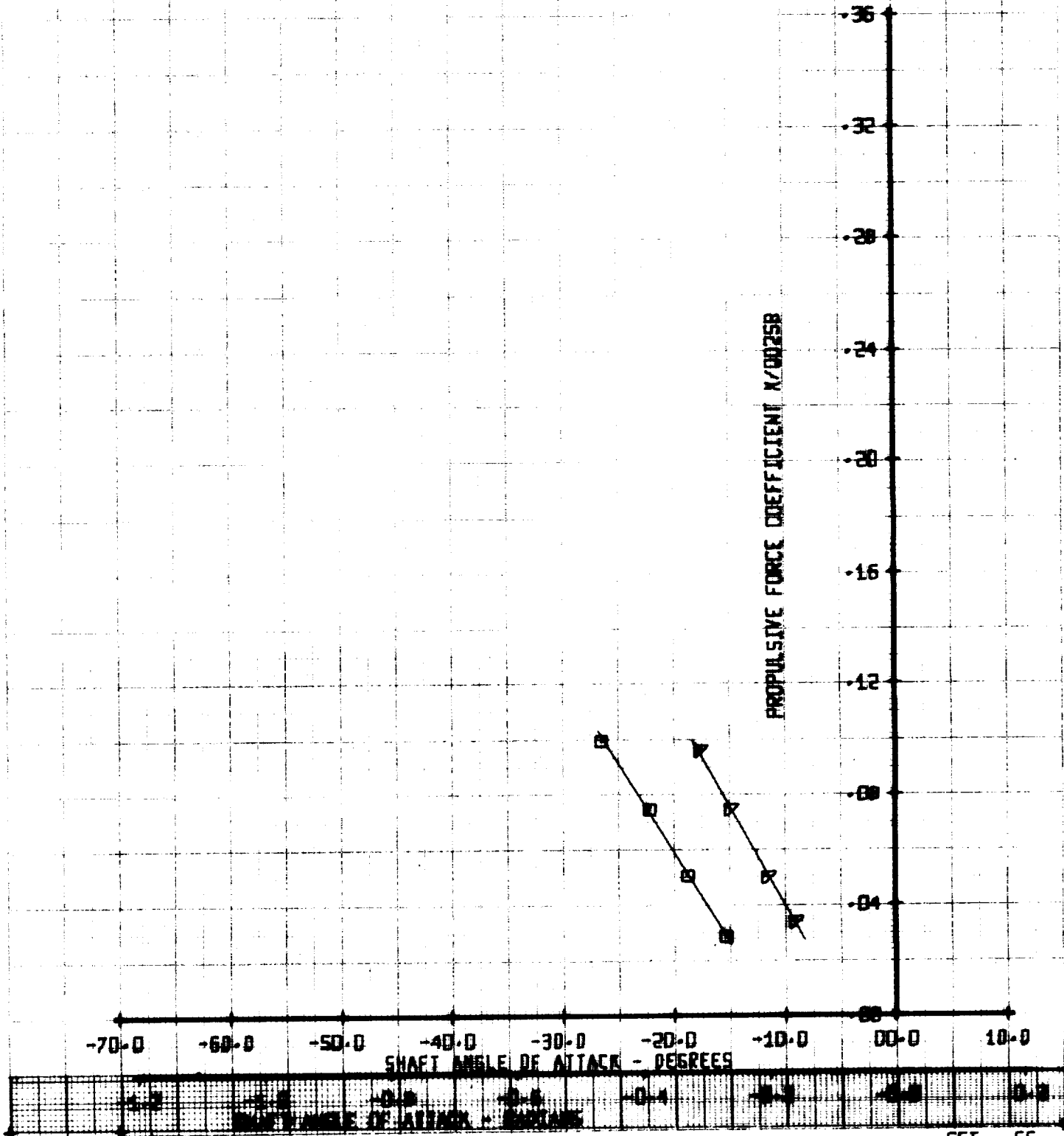
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PROPULSIVE FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	ML'	CT' / 58	VTIM	
□	276	.53	.06	352	
▽	277	.53	.08	352	

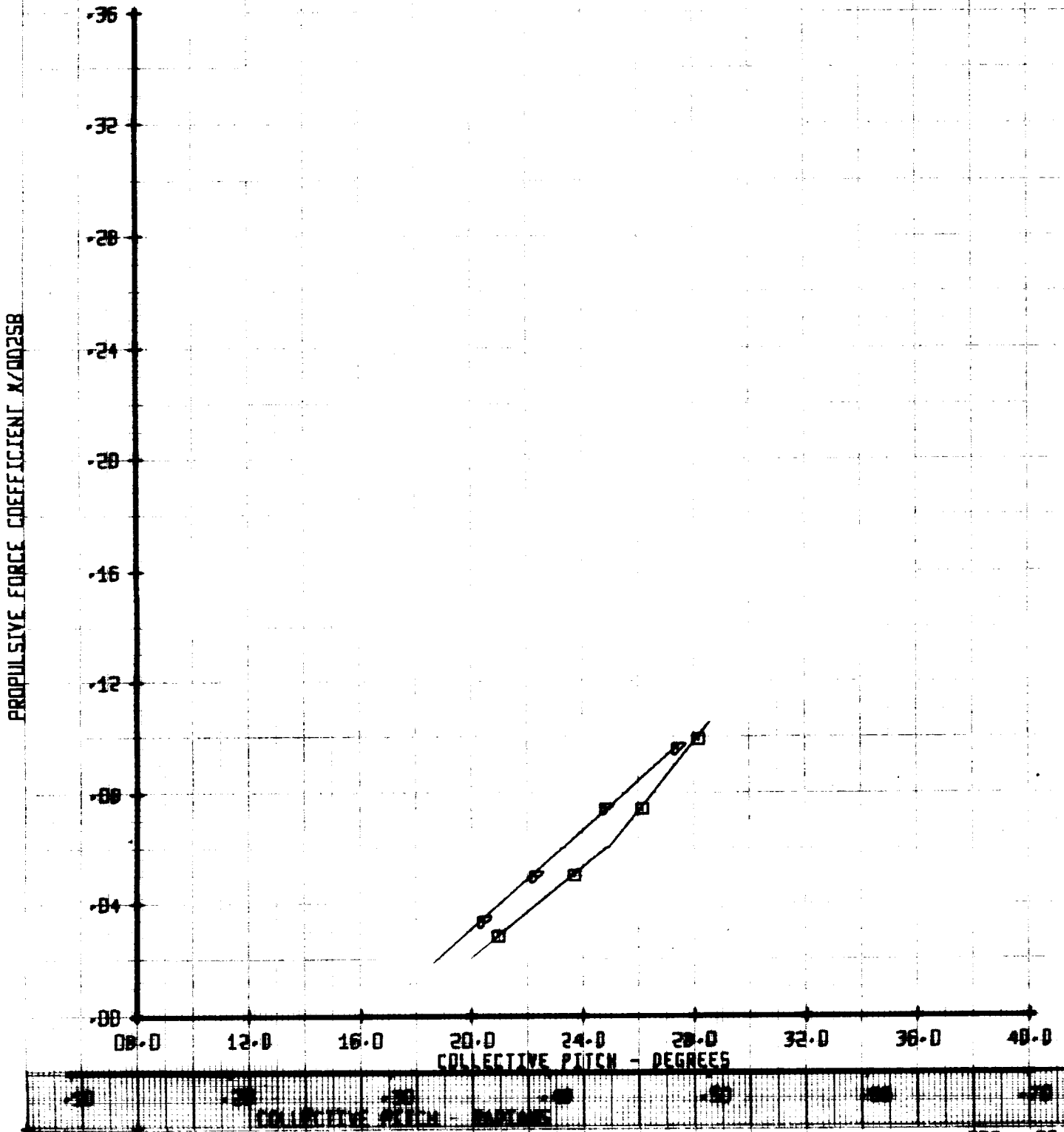
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 SHAFT ANGLE OF ATTACK



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUN		MU'		CT' / SB		VTUN	
□	○	276	277	.53	.53	.06	.08	352	352

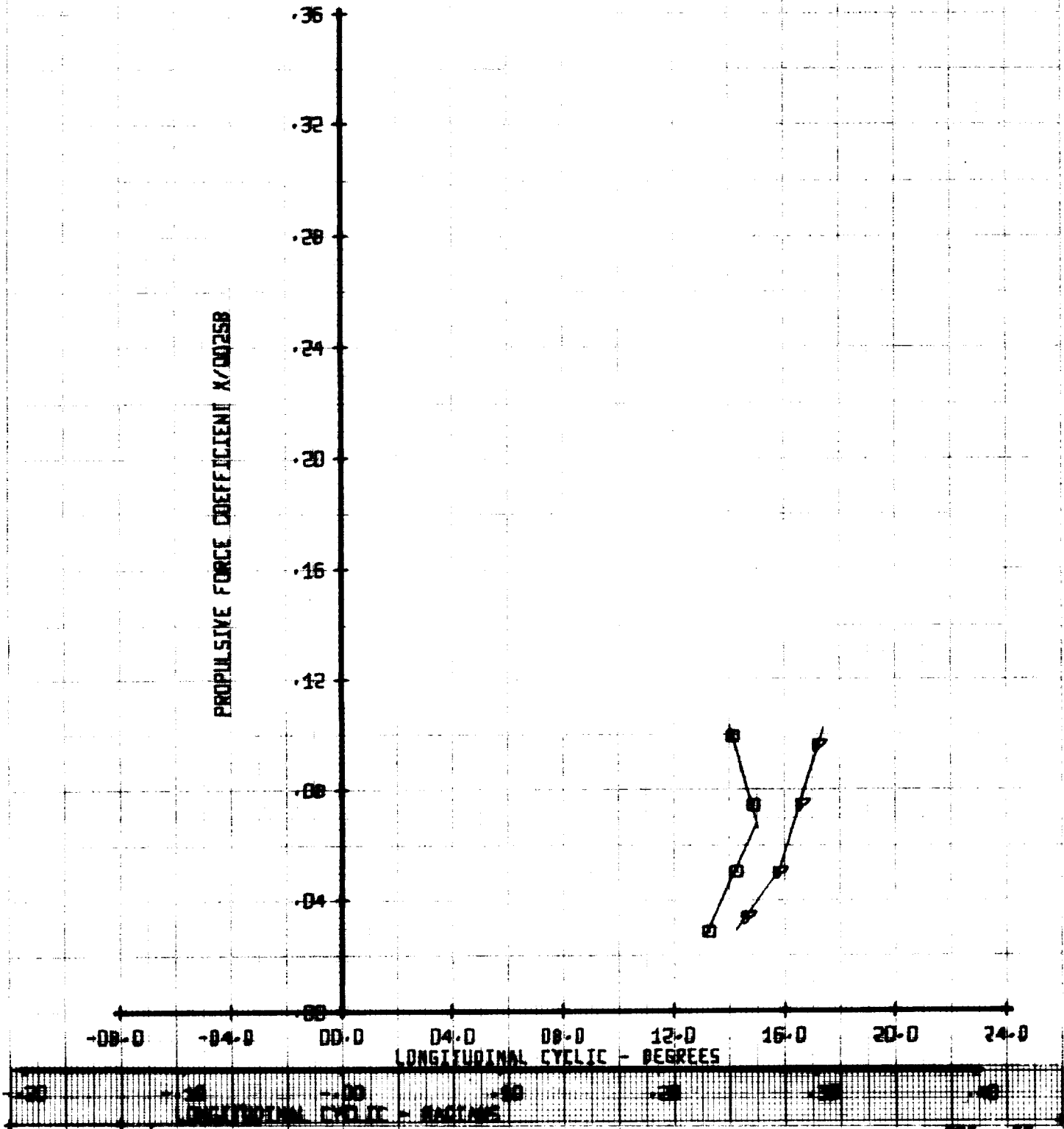
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 COLLECTIVE PITCH



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT' / 258	VTUN
□	276	.53	.06	352
▽	277	.53	.08	352

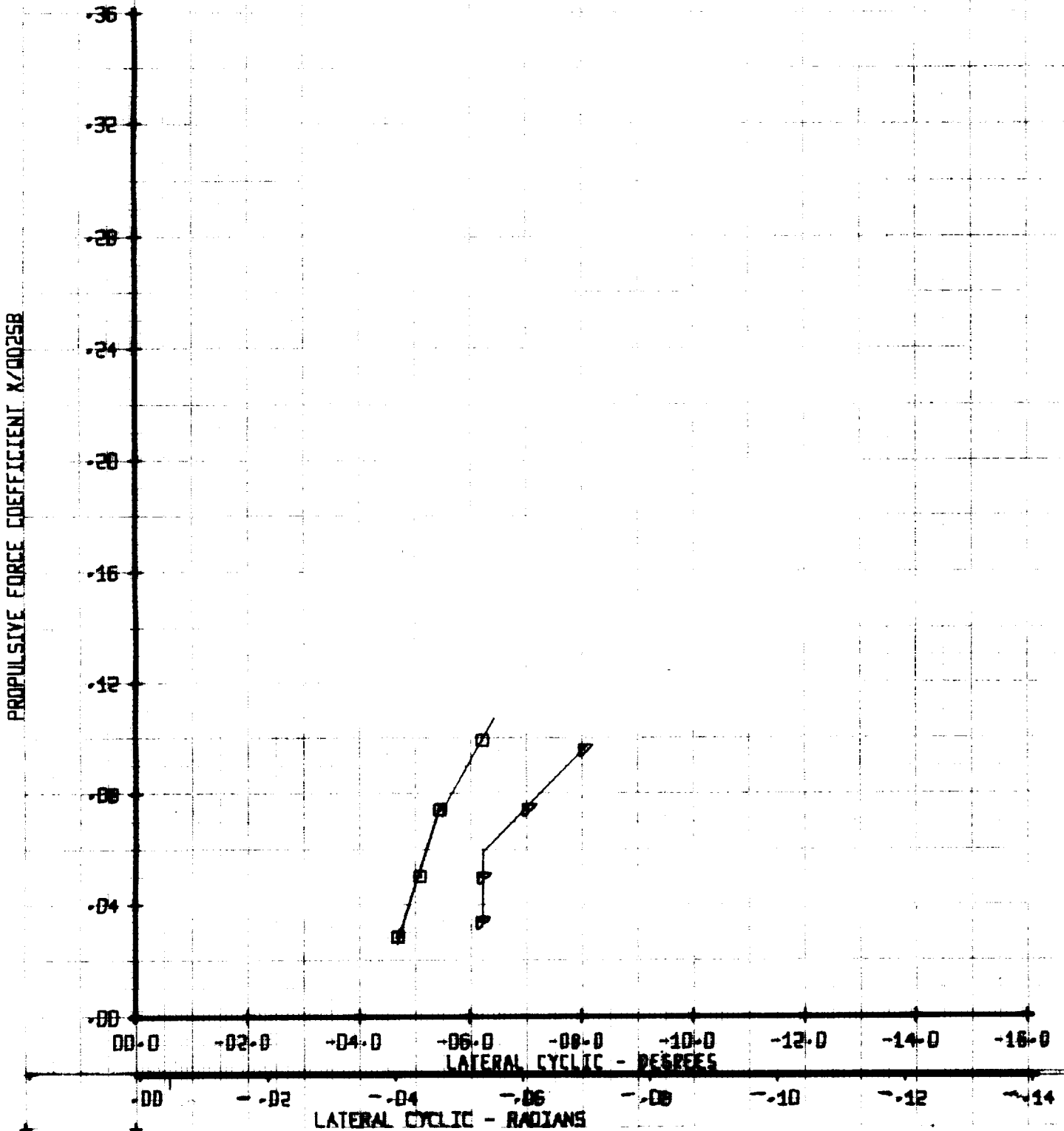
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LONGITUDINAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT' / 58	VTUN
□	276	.53	.06	352
▴	277	.53	.08	352

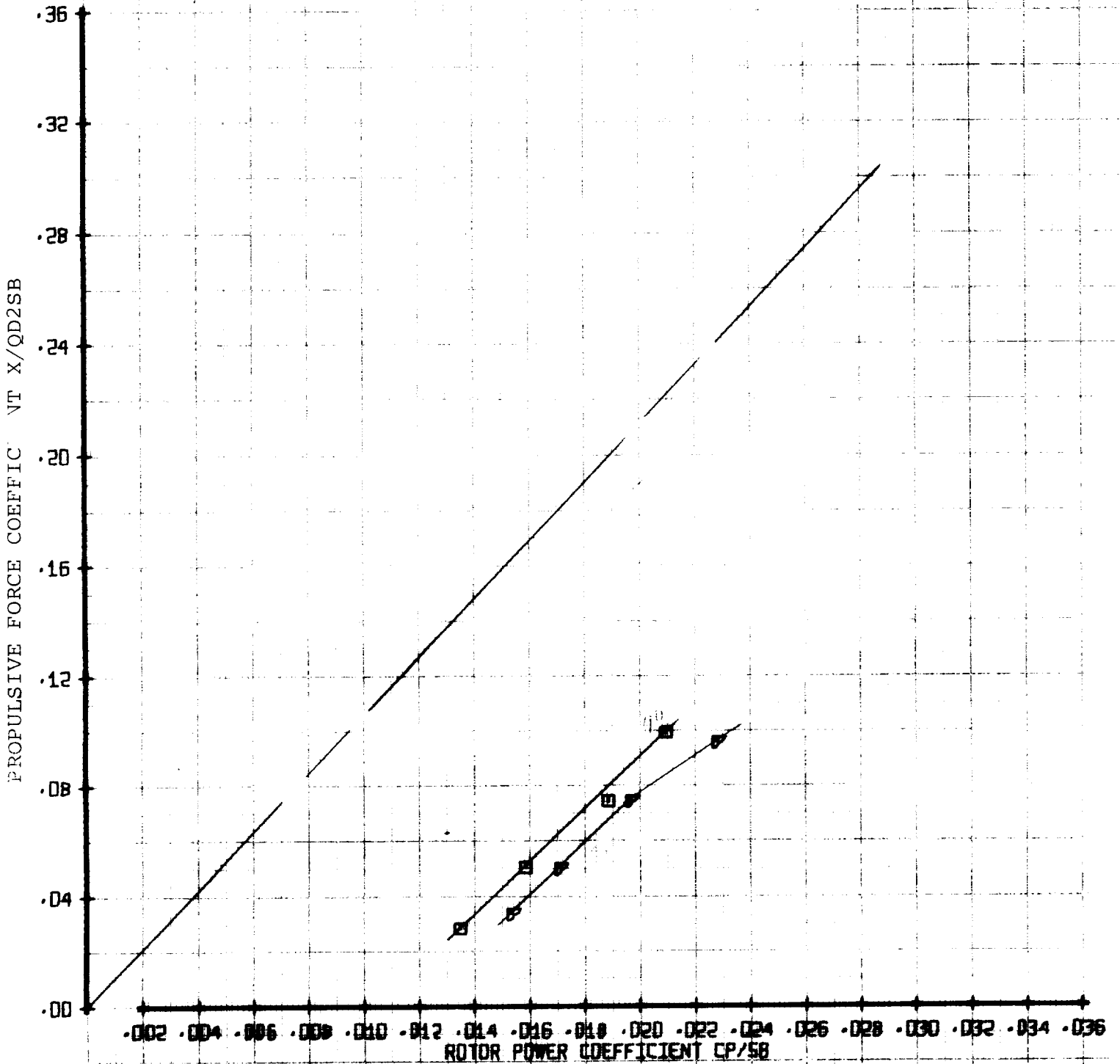
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 LATERAL CYCLIC



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUN		MU'		CT'/58		VTUN	
□	○	276	277	.53	.53	.06	.08	352	352
▽								352	

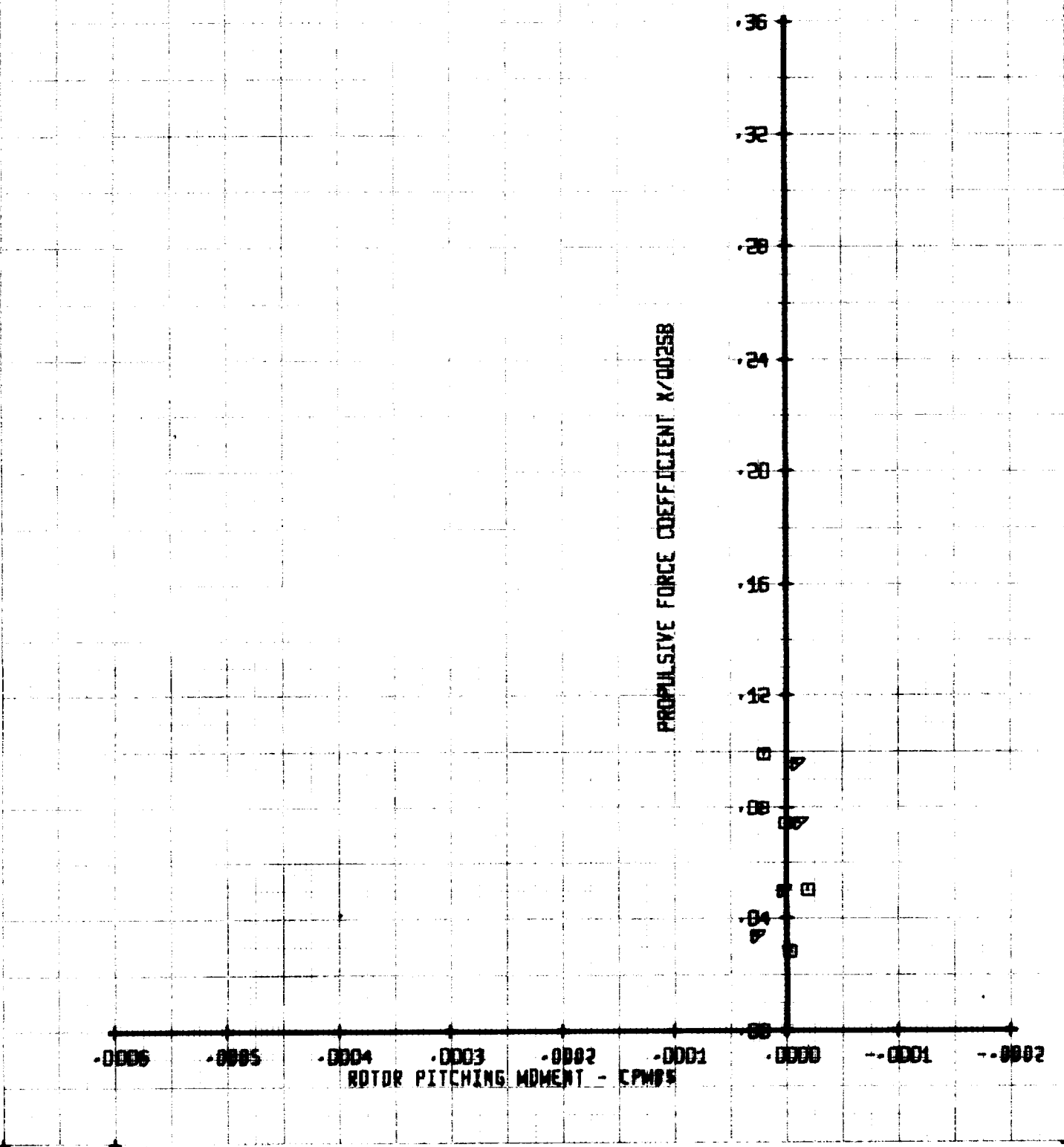
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR POWER COEFFICIENT



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CA-470 MOTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUN		M1'		CT'YSB		VTUN	
90	4	276	277	.53	.53	.06	.08	350	352

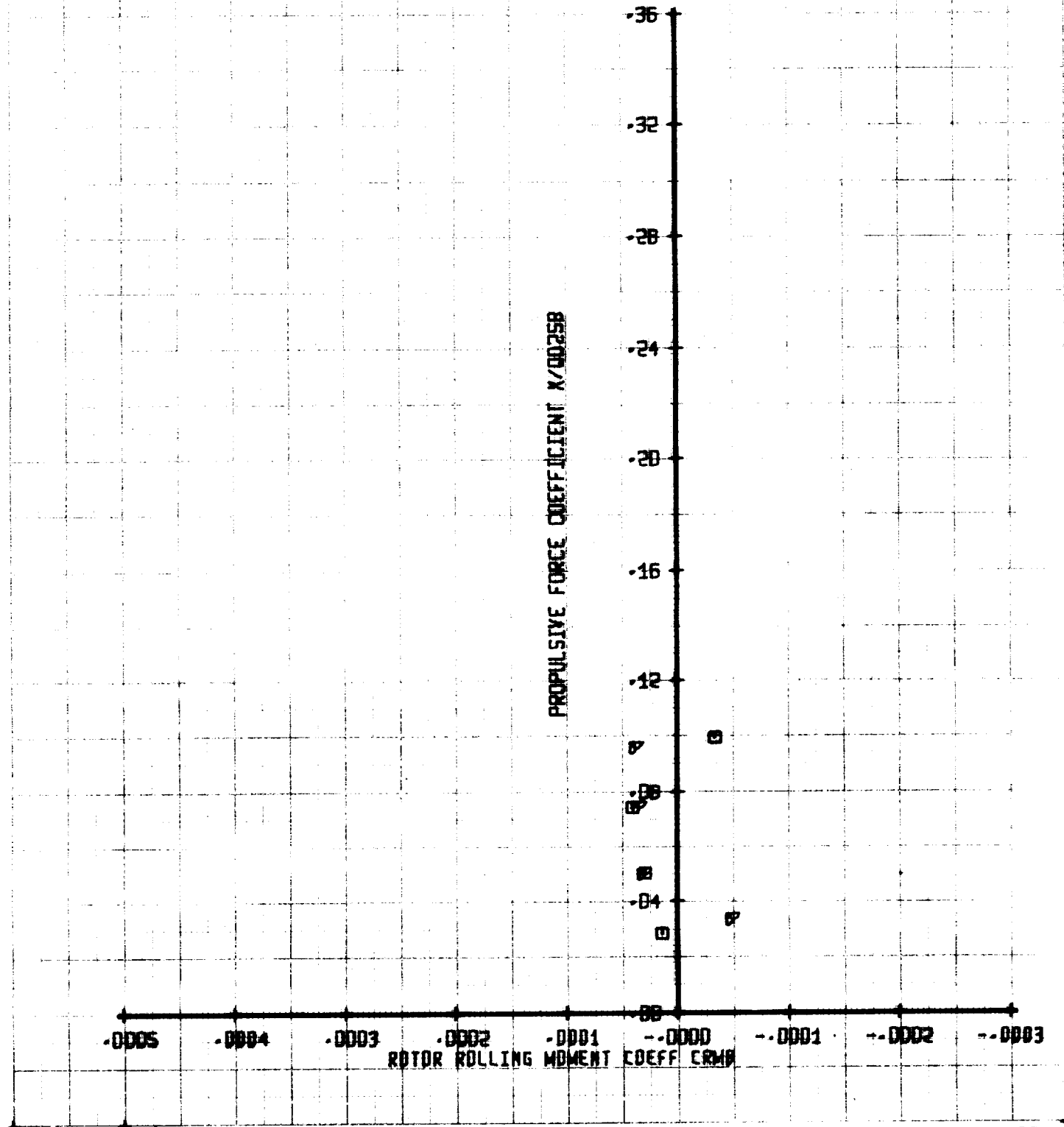
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR PITCHING MOMENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM		RUN		MU'		CT'YSB		VTUN	
□	○	276	277	.53	.53	.06	.08	352	352

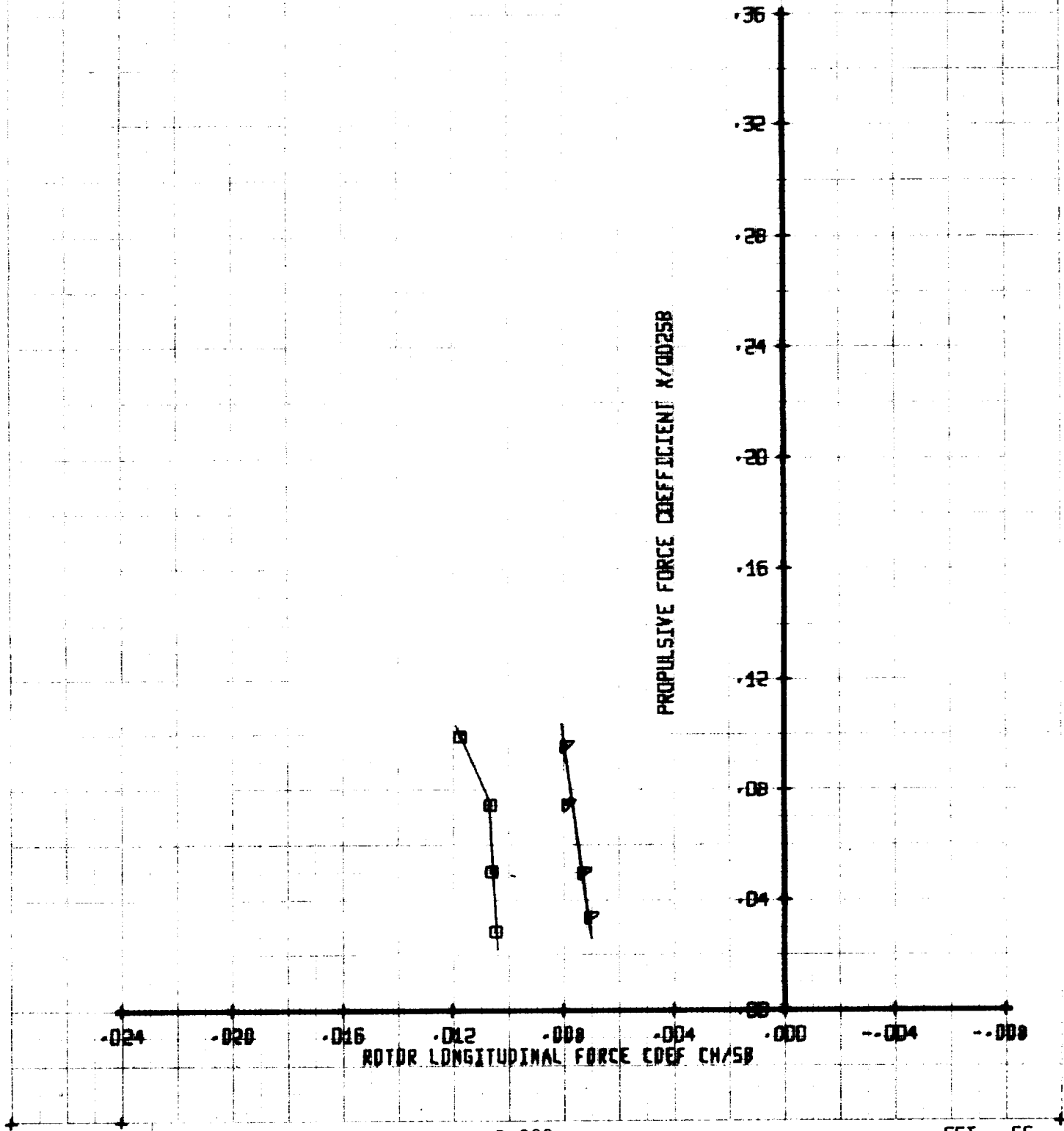
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR ROLLING MOMENT COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND		
SYM	RUN	MU'	CT'/58	VTUN
□	276	.53	.06	350
△	277	.53	.08	352

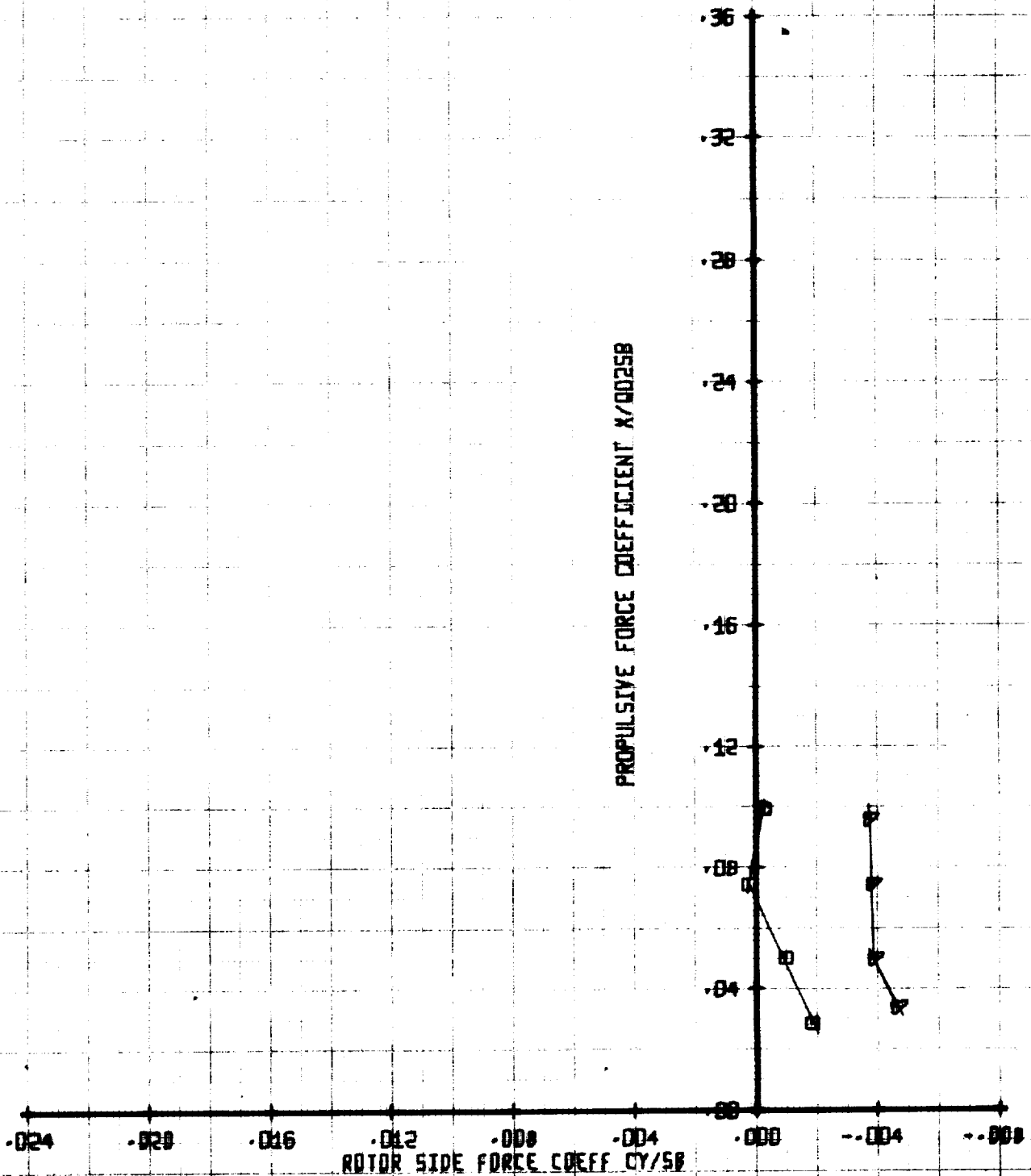
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR LONGITUDINAL FORCE COEFFICIENT



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	RUN	MU'	CT'/SB	VTUN	
□	276	.53	.06	352	
△	277	.53	.08	352	

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ROTOR SIDE FORCE COEFFICIENT



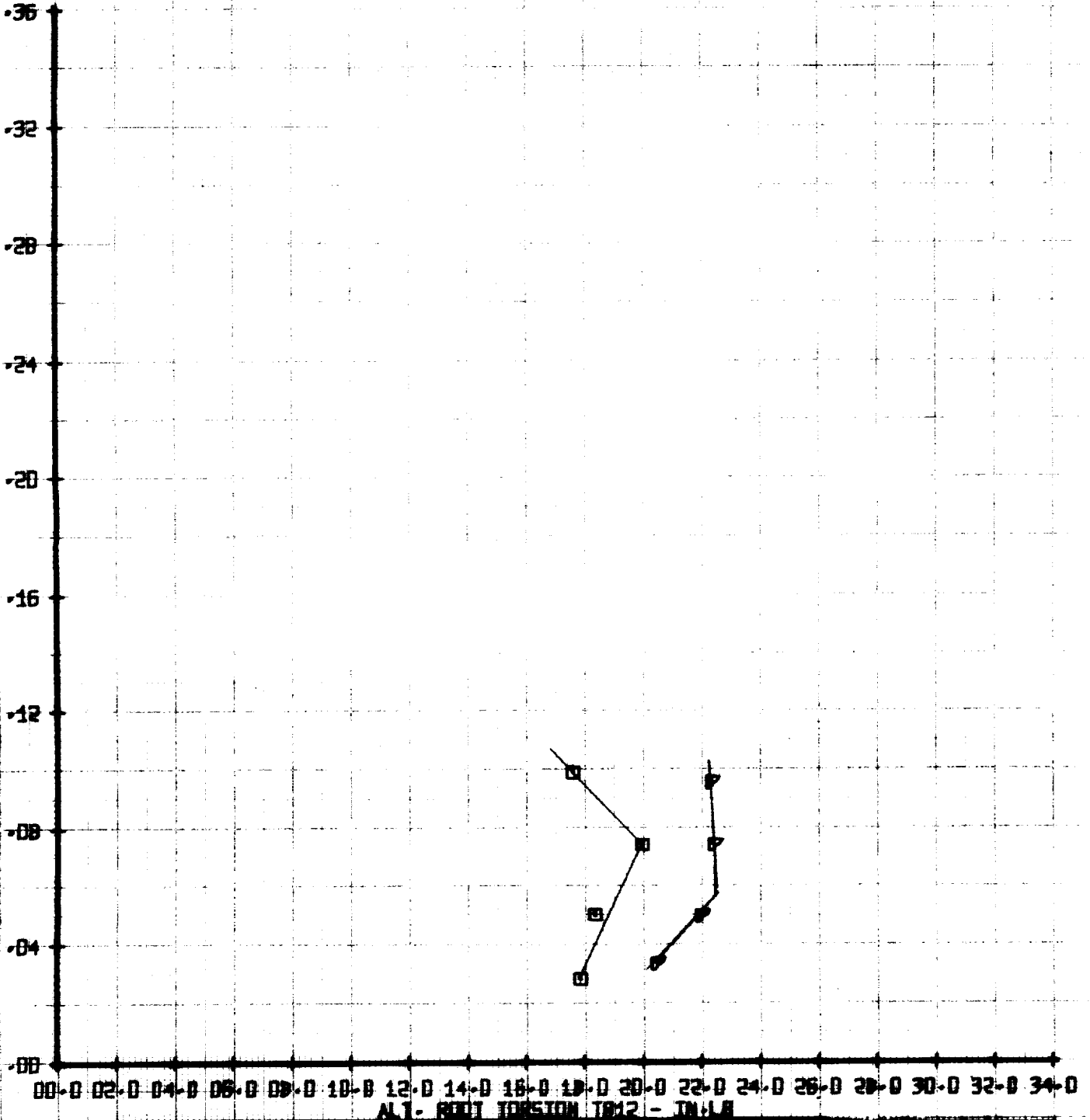
LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND

SYM	RUN	MU'	CT' / 58	VTUN
0	276	.53	.06	352
1	277	.53	.08	352

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT TORSION TB12

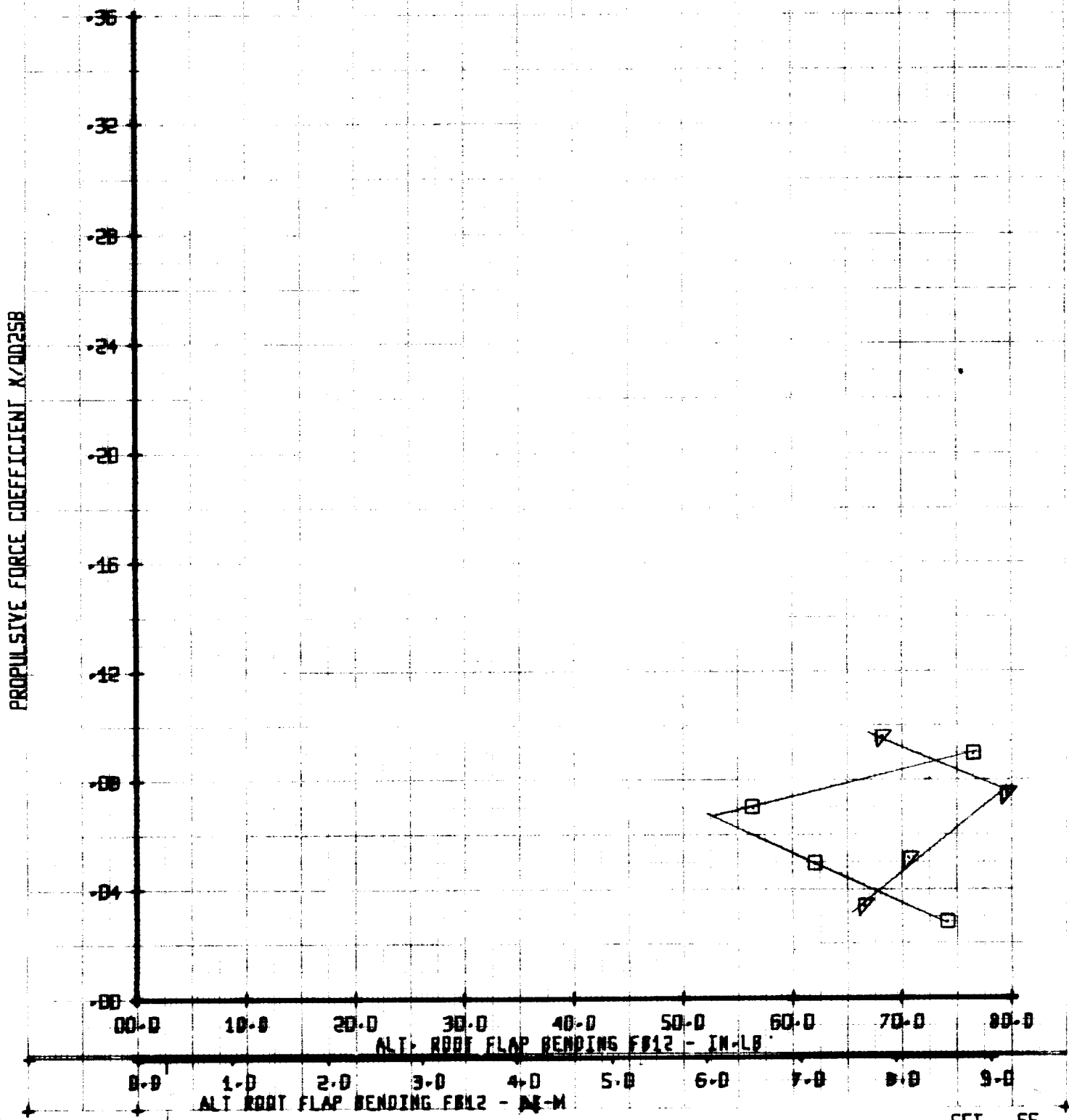
PROPULSIVE FORCE COEFFIC T X/00258



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND		MI	CT/58	VTUM
SYM	RUN	.53	.06	352
8	276	.53	.08	352
4	277			

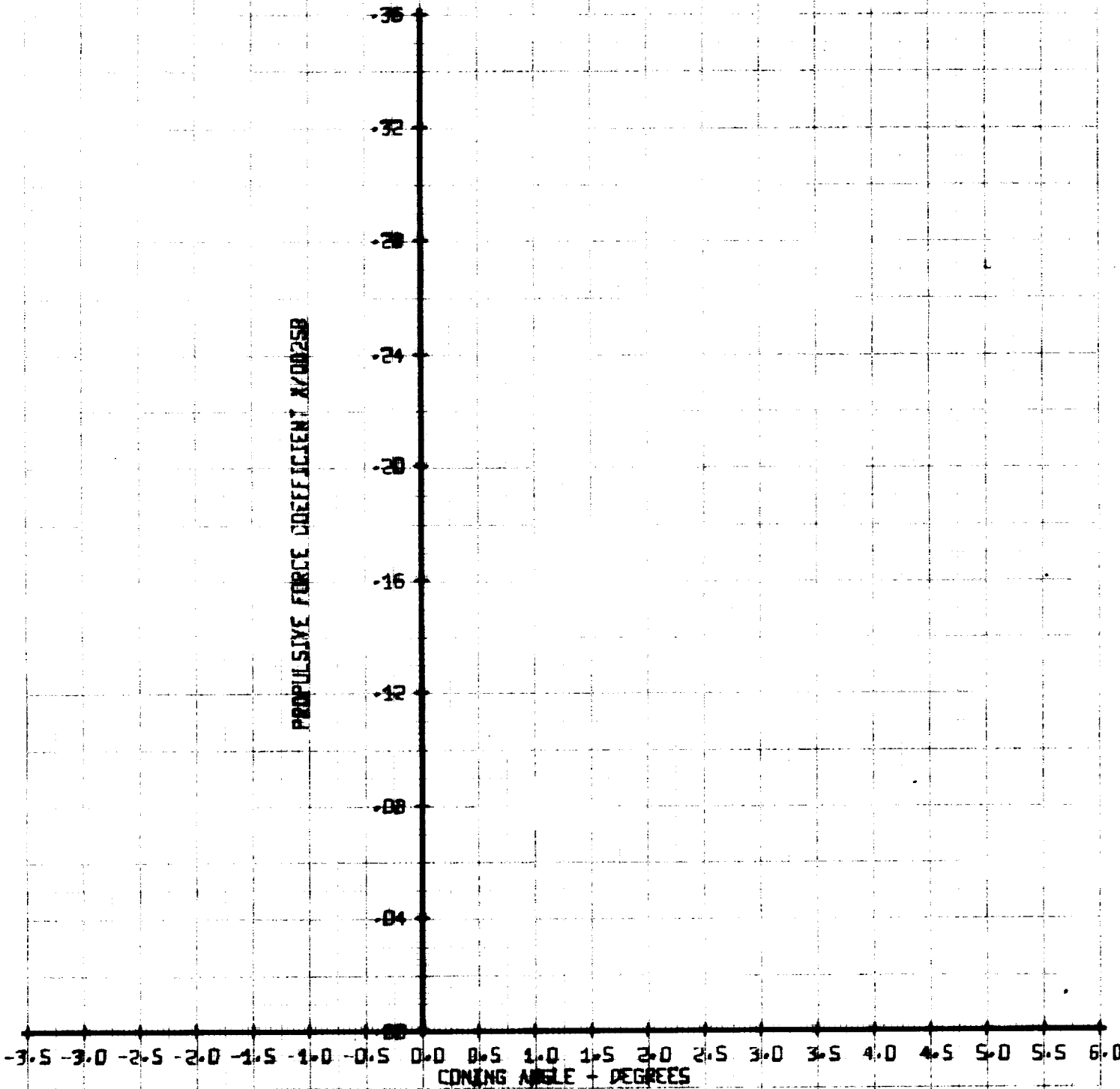
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING ROOT FLAP BENDING FB12



LEFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE CM-478 ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	REIN	MU'	CT' / 258	Y/TUM	
□	276	.53	.06	352	
○	277	.53	.08	352	

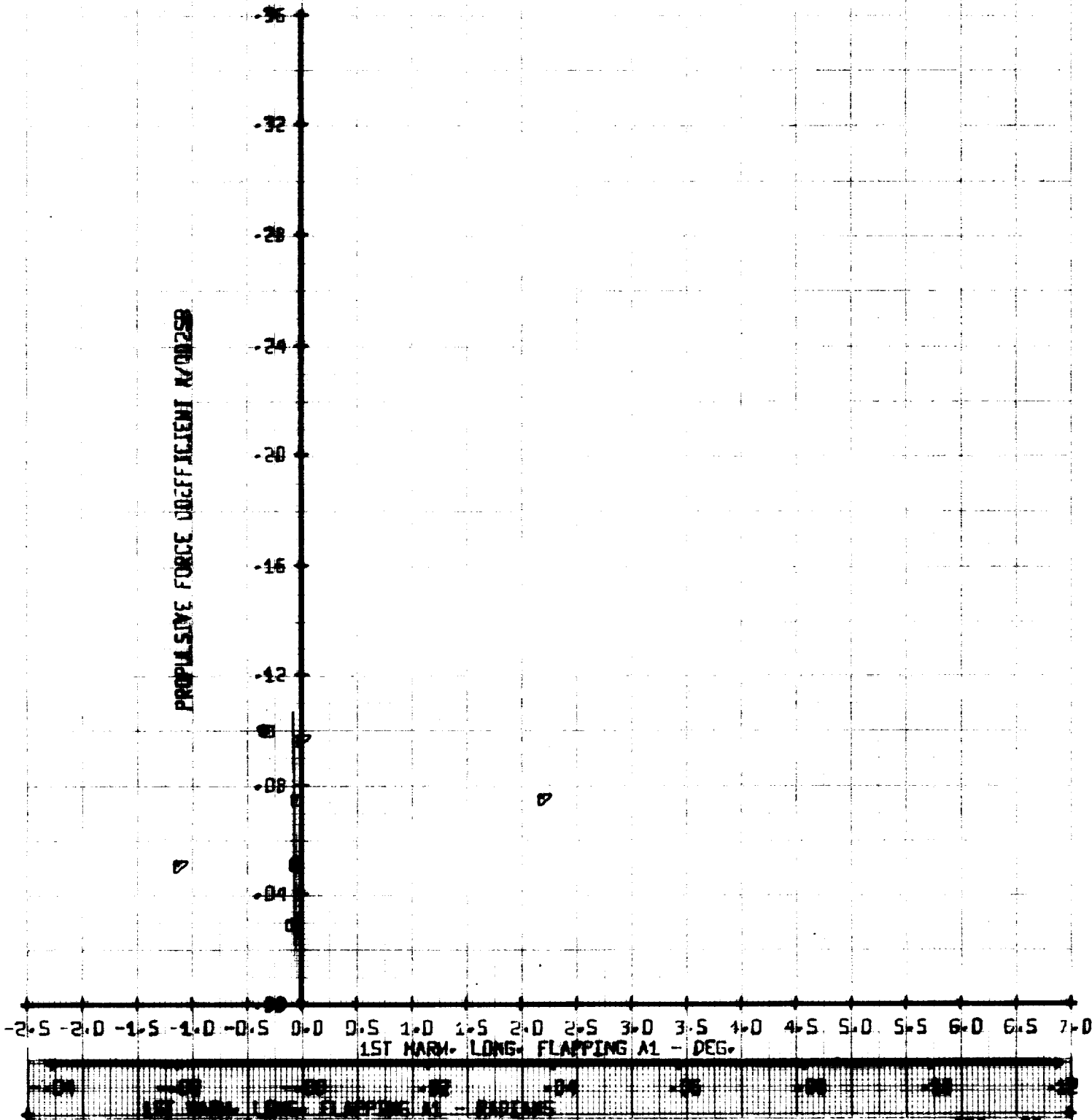
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 CONING ANGLE



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47E ROTOR
 PROPULSIVE FORCE LIMIT TESTING

LEGEND				
SYM	RUN	MU'	CT' / SB	YTLN
□	276	.53	.06	352
△	277	.53	.08	352

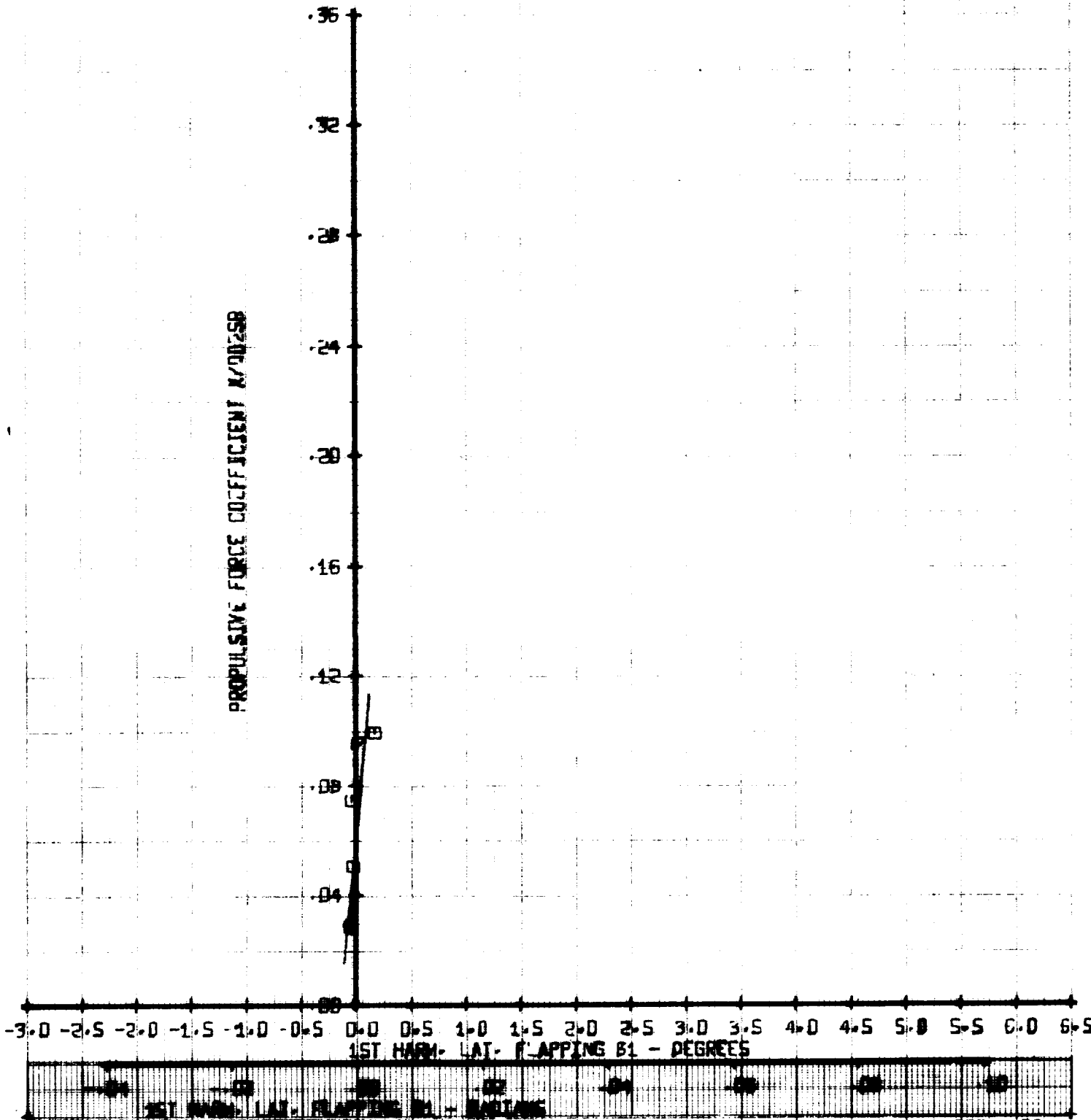
PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LONGITUDINAL FLAPPING A1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

		LEGEND			
SYM	BLIN	MU'	CT'ZSB	YTLIN	
□	276	-.53	-.06	352	
○	277	-.53	-.08	352	

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 1ST HARMONIC LATERAL FLAPPING B1



LIFT-PROPULSIVE FORCE LIMIT TEST
 1/10 SCALE OH-47B ROTOR
 PROPULSIVE FORCE LIMIT TESTING

SYM	BLIN	MU'	CT' / SB	VTUN
0	276	.53	.06	352
9	277	.53	.08	352

PROPULSIVE FORCE COEFFICIENT
 VERSUS
 ALTERNATING LEAD-LAG ANGLE

