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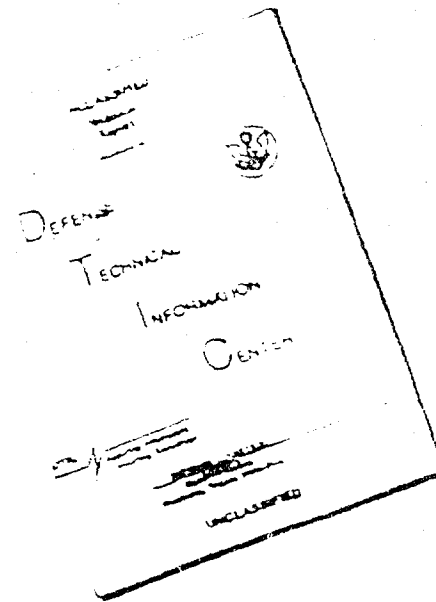
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BOOK 2

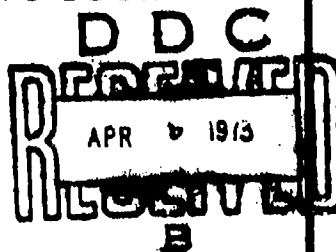
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BALLUTE STABILIZATION FOR VARIOUS MUNITION CONFIGURATIONS

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GOODYEAR AEROSPACE CORPORATION

TECHNICAL REPORT AFATL-TR-72-75 BOOK 2
APRIL 1972



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EGLIN AIR FORCE BASE, FLORIDA

Ballute Stabilization For Various Munition Configurations

J. J. Graham

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FOREWORD

This project was conducted by the Goodyear Aerospace Corporation, Akron, Ohio, under Contract F08635-70-C-0050 with the Air Force Armament Laboratory, Eglin Air Force Base, Florida. This effort was conducted during the period from 18 December 1969 to 30 April 1972. The program monitor for the Armament Laboratory was Captain Mark O. Schlegel (DLDL).

This technical report has been reviewed and is approved.



DALE M. DAVIS
Director, Guns and Rockets Division

ABSTRACT

One hundred and nineteen Ballute stabilized bomb configurations were studied to determine the feasibility of ram air-inflated Ballutes as stabilizers or decelerators for various tactical missions. Both subsonic and transonic wind tunnel tests were conducted to define static and dynamic aerodynamic characteristics.

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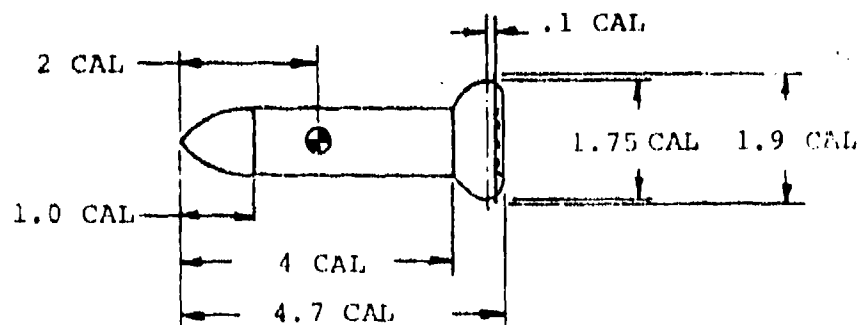
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Item	Page
Static aerodynamic data	
Tabulated	336
Plotted	337
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
Tripper = none
Fineness ratio = 4.0 caliber
Stabilizer = see sketch
Barble fence = see sketch
Boattail = none
Strakes (8) = none

Remarks

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Figure 206. Model Specifications for Configuration 96

TABLE CX. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 98

VELOCITY (FT/SEC) = 200.00 REFERENCE LENGTH (FT) = 0.1250
 DENSITY (SLUGS/CU FT) = 0.002467 REFERENCE AREA (SQ FT) = 0.0125
 DYNAMIC PRESSURE (LBS/CU FT) = 47.34 C.G. (CALIBERS) = 4.0000
 REYNOLDS NUMBER = 0.1575E 06 ALPHA SET (DEGREES) = 1.000

ALPHA (DEGREES) SET TRUE		CL	CD	CN	CA	CM	CM (CALIBERS)
-5.0	-4.0	-0.266	0.723	-0.332	0.767	0.338	0.306
-4.0	-3.0	-0.248	0.760	-0.300	0.741	0.279	-0.673
-3.0	-2.0	-0.149	0.743	-0.187	0.735	0.212	-0.611
-2.0	-1.0	-0.116	0.760	-0.142	0.755	0.185	-0.424
-1.0	0.0	0.0	0.760	-0.013	0.760	0.114	-0.912
0.0	1.0	0.050	0.727	0.050	0.727	0.010	-6.565
1.0	2.0	0.050	0.775	0.063	0.775	0.020	0.294
2.0	3.0	0.149	0.793	0.176	0.787	0.035	0.560
3.0	4.0	0.132	0.775	0.173	0.768	0.062	-2.175
4.0	5.0	0.182	0.793	0.237	0.778	-0.010	-0.041
5.0	6.0	0.215	0.809	0.284	0.786	-0.014	-0.051
6.0	7.0	0.281	0.809	0.364	0.776	-0.082	-0.227
7.0	8.0	0.330	0.809	0.427	0.763	-0.128	-0.300
8.0	9.0	0.446	0.826	0.557	0.756	-0.179	-0.321
9.0	10.0	0.512	0.859	0.640	0.768	-0.254	-0.347
10.0	11.0	0.694	0.842	0.829	0.769	-0.343	-0.413
11.0	12.0	0.661	0.908	0.822	0.766	-0.378	-0.460
12.0	13.0	0.760	0.925	0.936	0.747	-0.428	-0.458
13.0	14.0	0.793	0.942	0.984	0.749	-0.454	-0.461
14.0	15.0	0.826	0.941	1.041	0.762	-0.465	-0.447
15.0	16.0	0.942	1.024	1.174	0.744	-0.563	-0.479
16.0	17.0	0.955	1.008	1.199	0.765	-0.547	-0.540
17.0	18.0	0.959	1.057	1.225	0.731	-0.701	-0.572
18.0	19.0	0.991	1.024	1.259	0.665	-0.760	-0.603
19.0	20.0	1.057	1.000	1.354	0.637	-0.841	-0.621
20.0	21.0	1.140	1.090	1.444	0.635	-0.840	-0.553

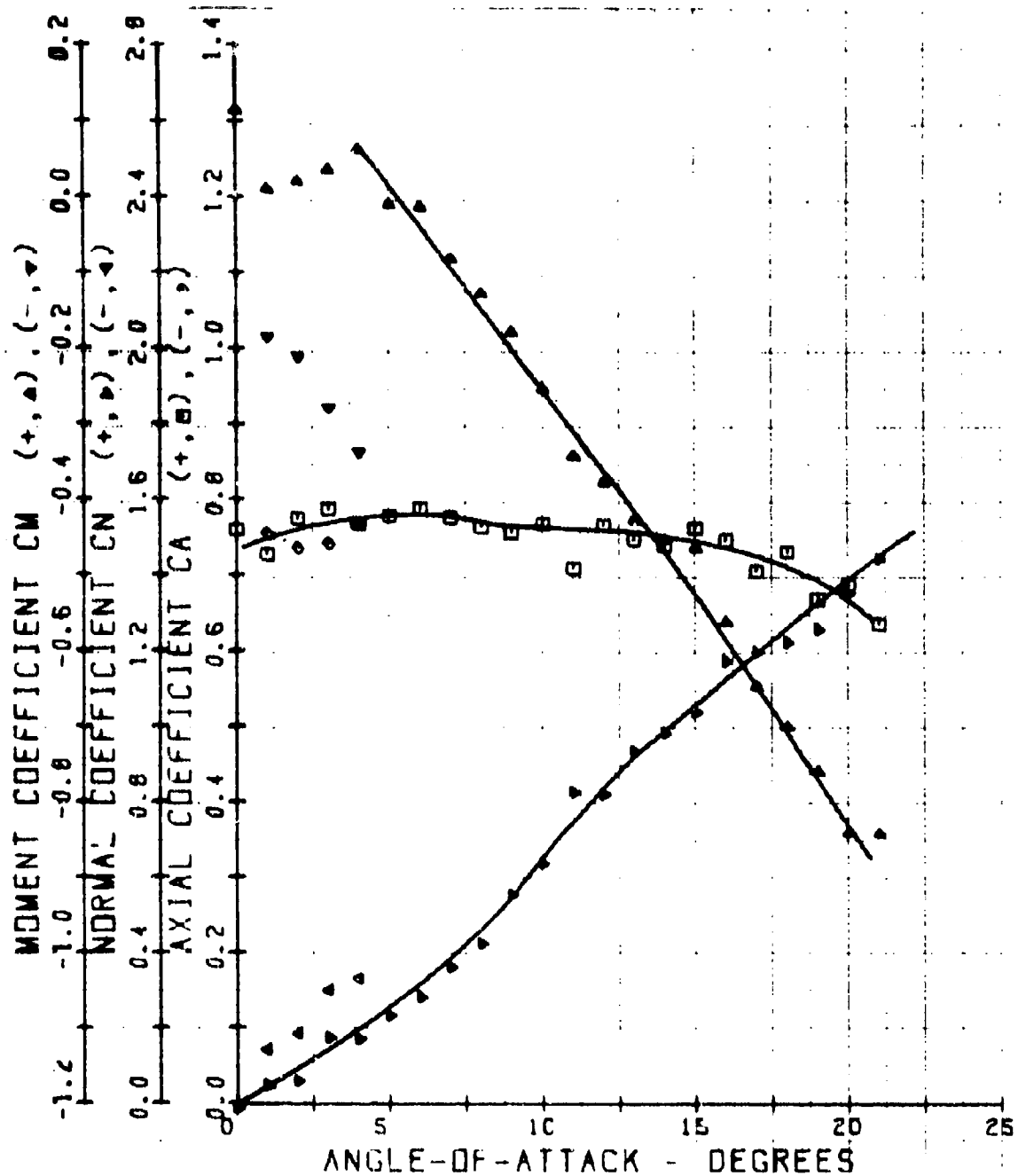


Figure 207. Graphic Static Aerodynamic Test Data: Configuration 96
(Test No. E 1)

Item	Page
Static aerodynamic data	
Tabulated	339
Plotted	340
Dynamic stability data	
Tabulated	
Plotted	

General data

Model weight = not applicable

Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive

Tripper = none

Fineness ratio = 4.0 caliber

Stabilizer = see sketch

Burble fence = see sketch

Boattail = none

Strakes (8) = none

Remarks

Figure 208. Model Specification for Configuration 97

TABLE CXI. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 97

VELOCITY (FT/SEC) = 200.00 REFERENCE LENGTH (FT) = 0.1250
 DENSITY (SLUGS/CU FT) = 0.002467 REFERENCE AREA (SQ FT) = 0.0123
 DYNAMIC PRESSURE (LB/5/2 CU FT) = 49.52 CALIBERS (CALIBERS) = 4.0000
 ALPHA (DEGREES) = 0.15300 ALPHA SHIFT (DEGREES) = 2.200

ALPHA (DEGREES)	CL	CD	CN	CA	CM	SM (CALIBERS)
-9.0	-0.197	1.201	-0.301	1.180	0.175	-0.468
-6.0	-0.099	1.159	-0.185	1.159	0.025	6.356
-3.0	-0.115	1.213	-0.179	1.210	-0.074	-0.549
-2.0	0.069	1.189	0.003	1.186	-0.117	-0.376
-1.0	0.099	1.234	0.077	1.236	-0.196	-8.271
0.0	0.082	1.234	0.082	1.234	-0.239	-1.984
1.0	0.099	1.218	0.125	1.216	-0.280	11.053
2.0	0.082	1.185	0.124	1.181	-0.228	-0.975
3.0	0.197	1.201	0.265	1.189	-0.433	-1.664
4.0	0.214	1.218	0.293	1.200	-0.525	-1.759
5.0	0.285	1.251	0.344	1.222	-0.578	-1.491
6.0	0.362	1.185	0.484	1.141	-0.675	-1.395
7.0	0.444	1.267	0.644	1.198	-0.807	-1.253
8.0	0.543	1.234	0.713	1.147	-0.845	-1.191
9.0	0.592	1.267	0.783	1.159	-0.963	-1.229
10.0	0.729	1.317	0.725	1.174	-1.065	-1.150
11.0	0.823	1.432	1.073	1.200	-1.236	-1.153
12.0	0.889	1.415	1.164	1.200	-1.376	-1.183
13.0	0.905	1.448	1.203	1.208	-1.449	-1.200
14.0	1.037	1.455	1.362	1.170	-1.543	-1.134
15.0	1.075	1.465	1.412	1.134	-1.652	-1.170
16.0	1.075	1.605	1.432	1.113	-1.805	-1.260
17.0	1.151	1.576	1.553	1.140	-1.540	-1.198
18.0	1.201	1.575	1.735	1.147	-1.945	-1.189
19.0	1.219	1.613	1.677	1.129	-2.080	-1.241
20.0	1.351	1.546	1.531	1.085	-2.089	-1.141

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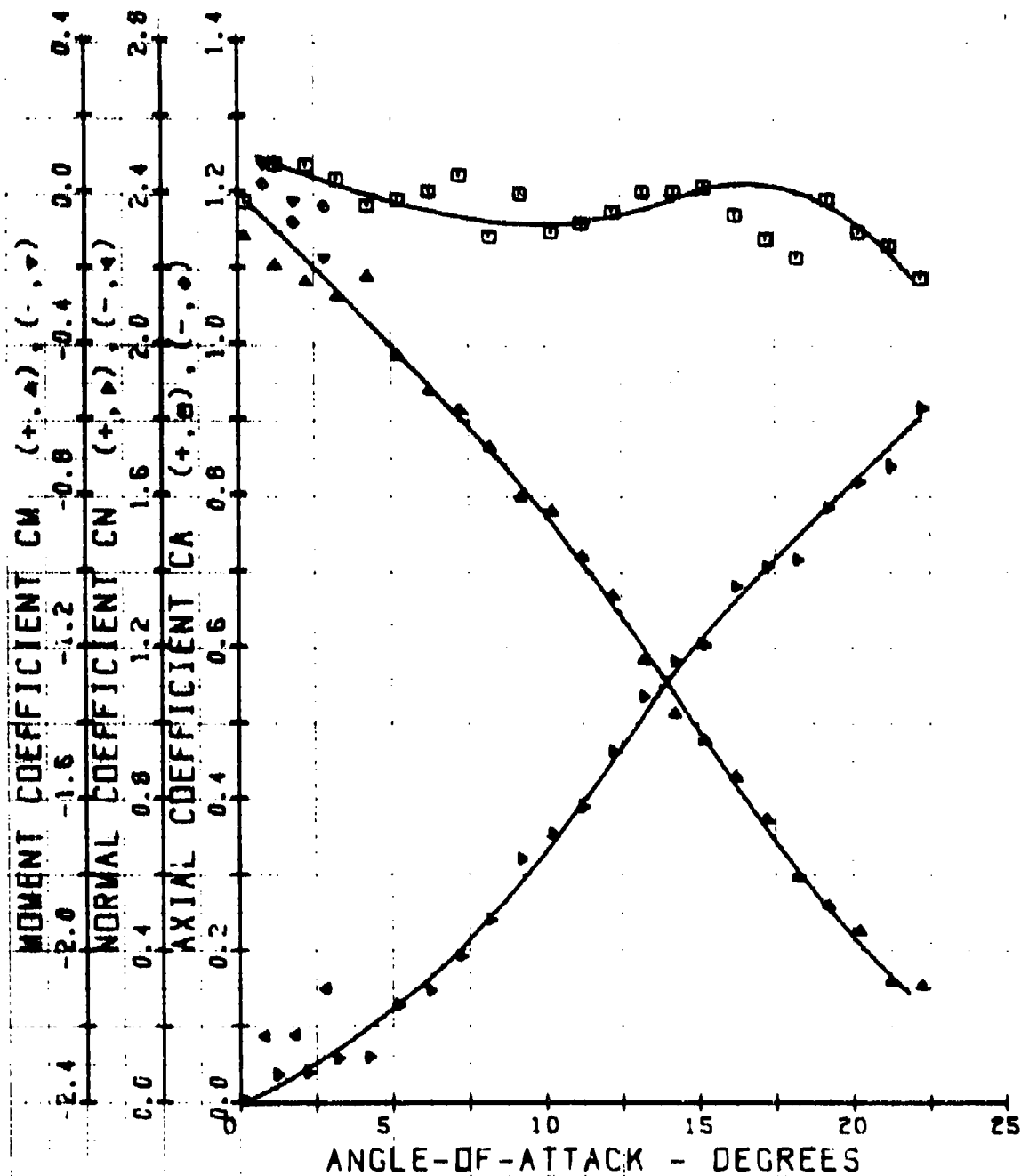
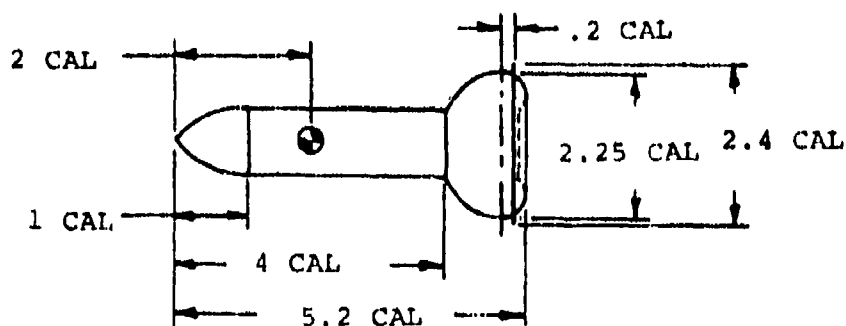


Figure 209. Graphic Static Aerodynamic Test Data: Configuration 97
(Test No. E 2)

<u>Item</u>	<u>Page</u>
Static aerodynamic data	
Tabulated	342
Plotted	343
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
Tripper = none
Fineness ratio = 4.0 caliber
Stabilizer = see sketch
Bumble fence = see sketch
Boattail = none
Strakes (8) = none

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Remarks

Figure 210. Model Specifications for Configuration 98

TABLE CXII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 98

VELOCITY(FT/SEC) = 210.00 REFERENCE LENGTH(FT) = 0.1250
 DENSITY(SLUGS/CU FT) = 0.002431 REFERENCE AREA(SQ FT) = 0.0123
 DYNAMIC PRESSURE(LBS/CU FT) = 47.67 C.D. (CALIBERS) = 4.0000
 REYNOLDS NUMBER = 0.1533E 06 ALPHA SHIF (DEGREES) = 2.200

ALPHA (DEGREES) SET TRUE		CL	CD	CN	CA	CM	SM (CALIBERS)
-5.0	-2.8	-0.279	2.447	-0.491	2.414	1.034	16.345
-4.0	-1.8	-0.181	2.432	-0.343	2.314	1.012	-1.831
-3.0	-0.8	0.0	2.102	-0.110	2.019	0.531	-1.889
-2.0	0.2	0.082	2.152	0.007	2.153	0.297	-12.802
-1.0	1.2	0.0	2.283	-0.040	2.283	0.110	0.826
0.0	2.2	-0.033	2.250	-0.033	2.250	0.214	1.606
1.0	3.2	0.016	2.267	0.056	2.266	0.208	-22.417
2.0	4.2	0.016	2.257	0.096	2.255	-0.098	-0.774
3.0	5.2	0.394	2.134	0.503	2.151	-0.181	-0.355
4.0	6.2	0.411	2.217	0.564	2.183	-0.429	-0.760
5.0	7.2	0.394	2.332	0.596	2.289	-0.607	-1.019
6.0	8.2	0.460	2.297	0.698	2.239	-0.777	-1.114
7.0	9.2	0.476	2.250	0.747	2.175	-0.941	-1.260
8.0	10.2	0.558	2.283	0.871	2.133	-0.929	-1.067
9.0	11.2	0.838	2.283	1.134	2.124	-1.484	-1.253
10.0	12.2	0.887	2.217	1.258	2.030	-1.579	-1.255
11.0	13.2	1.068	2.217	1.471	1.973	-1.737	-1.181
12.0	14.2	1.051	2.234	1.493	1.966	-1.848	-1.238
13.0	15.2	1.133	2.283	1.618	1.977	-2.058	-1.272
14.0	16.2	1.117	2.316	1.646	1.977	-2.020	-1.229
15.0	17.2	1.330	2.257	1.872	1.845	-2.144	-1.146
16.0	18.2	1.276	2.233	1.876	1.837	-2.409	-1.284
17.0	19.2	1.445	2.234	2.035	1.716	-2.507	-1.233
18.0	20.2	1.350	2.192	1.977	1.622	-2.619	-1.325
19.0	21.2	1.565	2.382	2.251	1.764	-2.751	-1.227
20.0	22.2	1.564	2.349	2.254	1.679	-3.037	-1.347

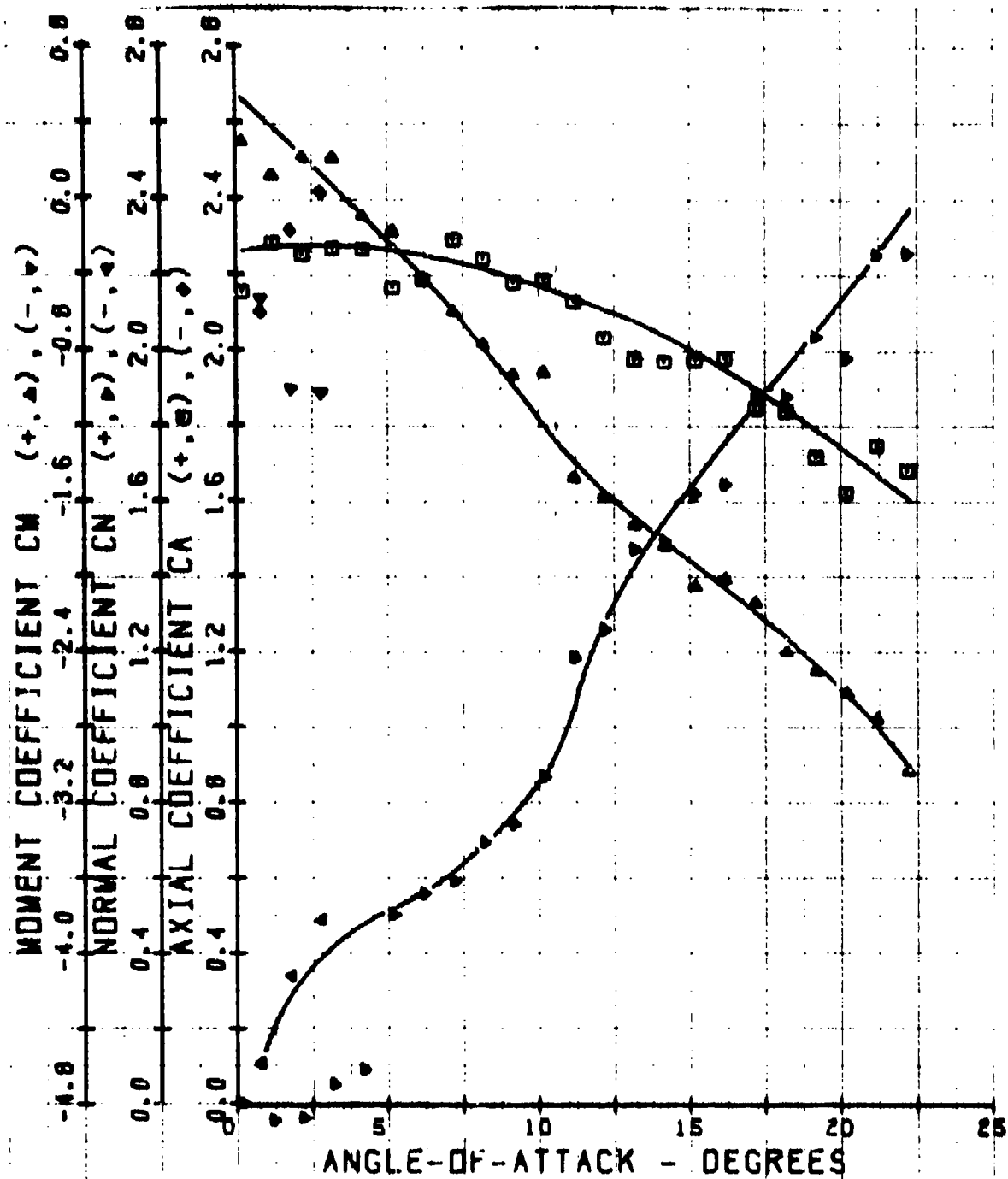


Figure 211. Graphic Static Aerodynamic Test Data: Configuration 98
(Test No. E 3)

Item	Page
Static aerodynamic data	
Tabulated	345
Plotted	346
Dynamic stability data	
Tabulated	
Plotted	

General data

Model weight = not applicable

Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive

Tripper = none

Fineness ratio = 4.0 caliber

Stabilizer = see sketch

Burble fence = see sketch

Boattail = none

Strakes (8) = none

Remarks

Figure 212. Model Specifications for Configuration 99

TABLE CXIII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 99

VELOCITY (FT/SEC) = 200.00 REFERENCE LENGTH (FT) = 0.1250
 DENSITY (SLUGS/CU FT) = 0.002494 REFERENCE AREA (SQ FT) = 0.0123
 DYNAMIC PRESSURE (LB/SQ FT) = 49.88 C.G. (CALIBERS) = 4.0000
 REYNOLDS NUMBER = 0.1592E 06 ALPHA SHIFT (DEGREES) = 1.800

ALPHA (DEGREES)		CL	CD	CN	CA	CM	SM (CALIBERS)
SET	TRUE						
-5.0	-3.2	-0.229	5.735	-0.729	5.693	1.912	2.214
-4.0	-2.2	-0.163	5.735	-0.563	5.710	1.430	-1.584
-3.0	-1.2	0.0	5.686	-0.298	5.678	0.781	-28.182
-2.0	-0.2	-0.049	5.696	-0.247	5.581	-0.198	-2.931
-1.0	0.8	0.005	5.572	0.507	5.581	-1.613	-1.733
0.0	1.8	0.556	5.817	0.555	5.817	-1.775	-1.545
1.0	2.8	0.817	5.784	0.918	5.769	-2.387	-2.567
2.0	3.8	0.817	5.947	1.024	5.915	-3.142	46.248
3.0	4.8	0.333	5.784	1.135	5.733	-3.584	-1.192
4.0	5.8	1.242	5.915	1.651	5.314	-4.041	-2.447
5.0	6.8	1.291	5.947	1.804	5.812	-4.441	-2.462
6.0	7.8	1.274	6.144	1.910	5.977	-4.854	-2.542
7.0	8.8	1.340	6.175	2.082	5.967	-5.080	-2.440
8.0	9.8	1.356	6.078	2.189	5.830	-11.789	-5.386
9.0	10.8	1.471	6.078	2.403	5.773	-5.669	-2.359
10.0	11.8	1.372	6.029	2.398	5.699	-5.959	-2.485
11.0	12.8	1.307	6.193	2.464	5.829	-6.777	-2.750
12.0	13.8	1.291	6.094	2.529	5.693	-6.710	-2.653
13.0	14.8	1.716	5.931	3.006	5.393	-7.619	-2.535
14.0	15.8	1.363	5.833	3.218	5.209	-7.599	-2.361
15.0	16.8	2.010	5.882	3.463	5.162	-8.266	-2.347
16.0	17.8	2.189	5.784	3.699	4.957	-9.008	-2.436
17.0	18.8	2.157	5.947	3.801	5.057	-9.260	-2.436
18.0	19.8	2.159	5.784	3.869	4.825	-9.418	-2.434
19.0	20.8	2.435	5.849	4.206	4.738	-9.915	-2.357
20.0	21.8	2.467	5.882	4.330	4.684	-10.422	-2.407

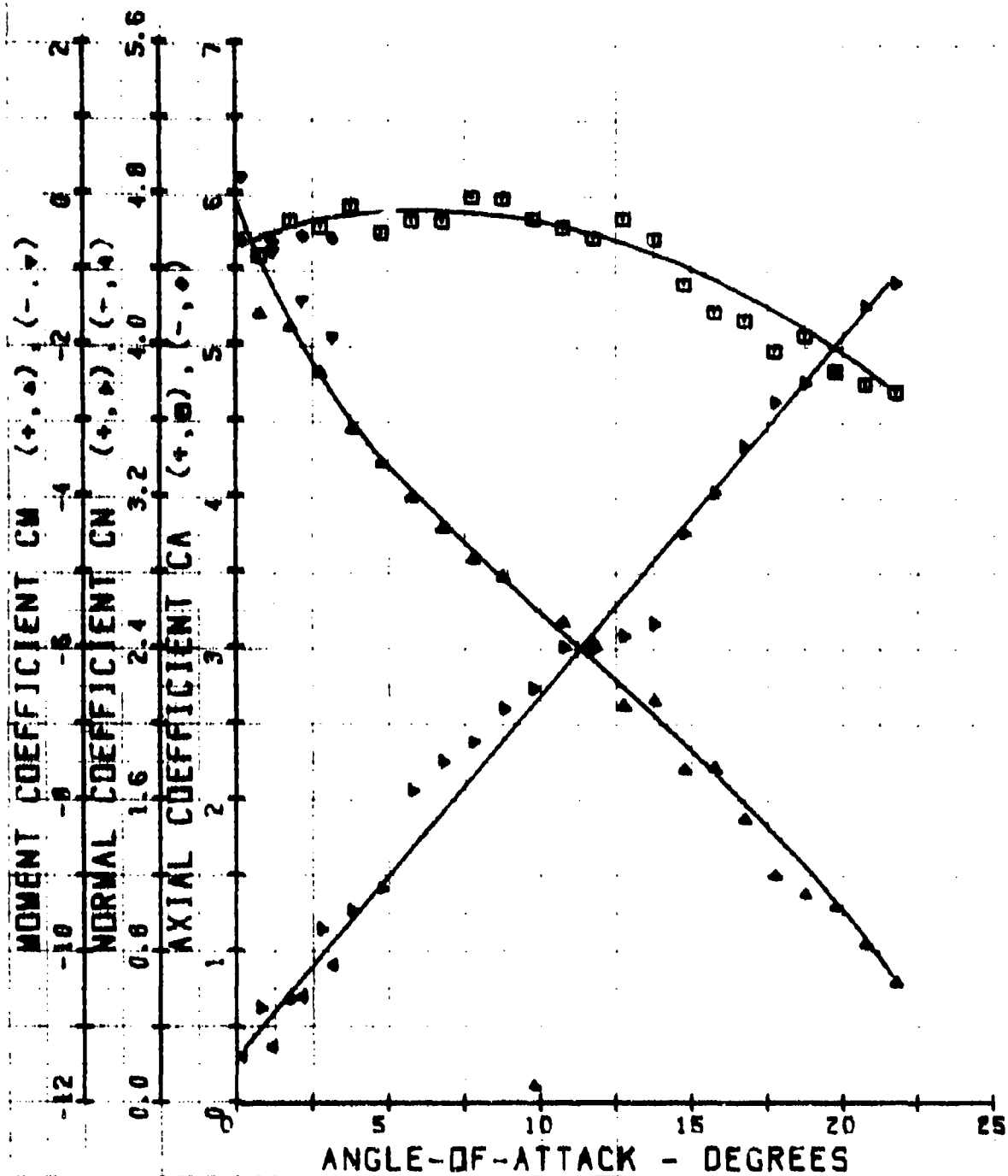
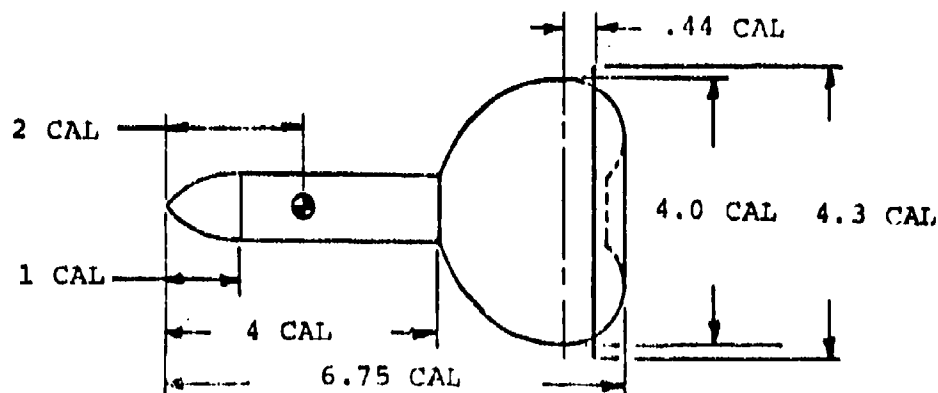


Figure 213. Graphite Static Aerodynamic Test Data: Configuration 99
(Test No. E 4)

<u>Item</u>	<u>Page</u>
Static aerodynamic data	
Tabulated	348
Plotted	349
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
Tripper = none
Fineness ratio = 4.0 caliber
Stabilizer = see sketch
Bumble fence = see sketch
Boattail = none
Strakes (8) = none

Remarks

Figure 214. Model Specifications for Configuration 100

TABLE CXIV. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 100

VELOCITY(FT/SEC) = 200.00 REFERENCE LENGTH(FT) = 0.1250
 DENSITY(SLUGS/CU FT) = 0.002498 REFERENCE AREA(SQ FT) = 0.0123
 DYNAMIC PRESSURE(LBS/CU FT) = 47.76 C.O. (CALIBERS) = 4.0000
 REYNOLDS NUMBER = 0.15740 ALPHA SHIFT (DEGREES) = -0.800

ALPHA (DEGREES)		CL		CD		CM		SM (CALIBERS)	
SET	TRUE								
-5.0	-5.8	-1.387	8.417	-2.115	8.265	9.114	-4.309		
-4.0	-4.8	-1.387	8.417	-1.970	8.300	8.155	-3.023		
-3.0	-3.8	-1.044	8.776	-1.502	8.710	5.444	-2.640		
-2.0	-2.8	-0.734	8.238	-1.021	8.207	5.122	-1.752		
-1.0	-1.8	-0.489	8.237	-0.634	8.277	3.361	-0.040		
0.0	-0.8	-0.359	8.075	-0.359	8.075	1.707	-6.564		
1.0	0.2	-0.082	8.320	0.069	8.320	-0.646	-2.265		
2.0	1.2	0.0	8.568	0.302	8.641	-0.328	-2.417		
3.0	2.2	0.326	8.155	0.753	8.120	-2.622	-3.798		
4.0	3.2	0.816	8.443	1.405	8.405	-4.235	-2.925		
5.0	4.2	1.060	8.452	1.793	8.326	-6.083	-5.073		
6.0	5.2	1.305	8.450	2.141	8.267	-7.069	-3.241		
7.0	6.2	1.501	8.385	2.511	8.140	-7.059	-2.411		
8.0	7.2	1.223	8.776	2.433	8.521	-8.334	-3.426		
9.0	8.2	1.745	8.483	3.051	8.105	-9.152	-3.000		
10.0	9.2	1.876	8.401	3.506	7.945	-10.006	-3.026		
11.0	10.2	1.715	8.509	3.362	8.300	-10.309	-3.067		
12.0	11.2	1.875	8.433	3.593	7.977	-11.543	-3.208		
13.0	12.2	2.088	8.403	3.942	7.796	-12.200	-4.094		
14.0	13.2	2.610	8.483	4.504	7.600	-13.516	-2.948		
15.0	14.2	2.610	8.433	4.716	7.515	-14.166	-3.004		
16.0	15.2	2.773	8.433	5.004	7.377	-15.472	-3.092		
17.0	16.2	2.936	8.320	5.240	7.078	-16.741	-3.195		
18.0	17.2	3.099	8.640	5.610	7.205	-17.465	-3.109		
19.0	18.2	3.263	8.320	5.793	6.805	-18.917	-3.266		
20.0	19.2	3.752	8.300	5.371	6.535	-19.794	-3.107		

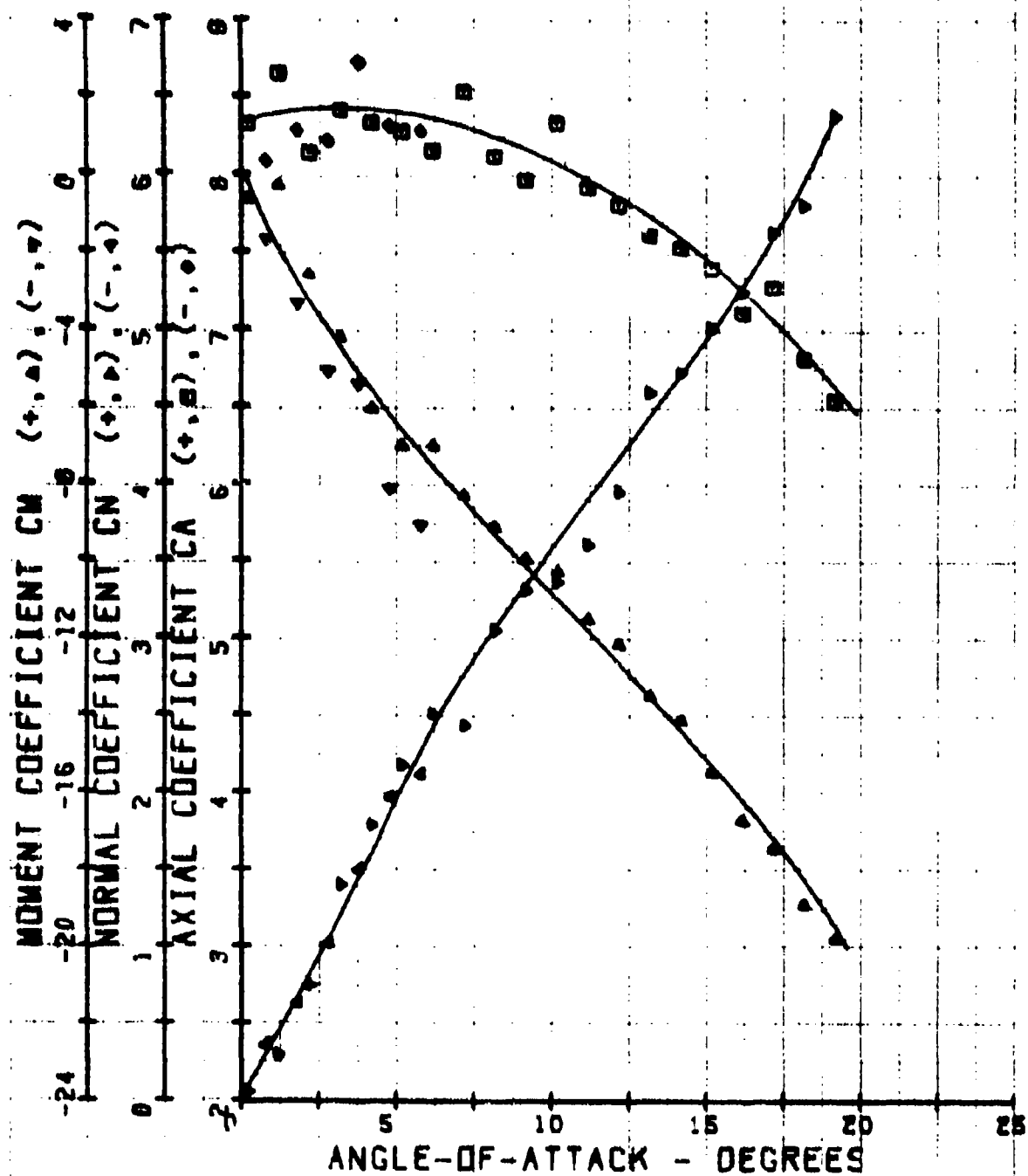


Figure 215. Graphic Static Aerodynamic Test Data: Configuration 100.
(Test No. E 5)

Item	Page
Static aerodynamic data	
Tabulated	351
Plotted	352
Dynamic stability data	
Tabulated	
Plotted	

General data

Model weight = not applicable

Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive

Tripper = none

Fineness ratio = 4.0 caliber

Stabilizer = see sketch

Burple fence = see sketch

Boattail = none

Strakes (8) = none

Remarks

Figure 216. Model Specifications for Configuration 101

TABLE CXV. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 101

VELOCITY (FT/SEC) = 200.00 REFERENCE LENGTH (FT) = 0.1250
 DENSITY (SLUGS/CU FT) = 0.002501 REFERENCE AREA (SQ FT) = 0.0123
 DYNAMIC PRESSURE (LBS/CU FT) = 50.02 C.G. (CALIBERS) = 4.0000
 REYNOLDS NUMBER = 0.1596E 06 ALPHA SHIFT (DEGREES) = 2.800

ALPHA (DEGREES)	CL	CD	CN	CA	CM	SM (CALIBERS)
-5.0	-0.652	13.586	-1.842	13.578	7.788	0.054
-4.0	-0.163	13.524	-1.106	13.479	5.197	-16.739
-3.0	0.163	13.524	-0.545	13.514	0.838	-2.764
-2.0	1.303	14.338	0.802	14.375	-1.130	-1.722
-1.0	0.815	13.849	0.573	13.861	-3.171	-24.481
0.0	1.629	13.849	1.629	13.849	-7.981	1.384
1.0	2.115	14.012	2.362	13.973	-3.255	-2.046
2.0	2.607	14.664	3.117	14.564	-12.542	-11.106
3.0	3.422	14.175	4.159	13.977	-18.541	-4.458
4.0	3.585	14.990	4.621	14.703	-20.248	-4.382
5.0	2.444	14.990	3.741	14.720	-20.859	-5.576
6.0	3.910	15.153	5.473	14.661	-25.720	-4.700
7.0	4.725	14.990	6.516	14.303	-25.923	-3.978
8.0	3.585	14.990	5.635	14.345	-26.752	-4.747
9.0	4.073	14.990	6.368	14.168	-26.981	-4.237
10.0	4.725	14.990	7.256	13.942	-29.385	-4.050
11.0	4.725	15.642	7.622	14.453	-29.311	-3.845
12.0	4.888	15.316	7.965	13.965	-26.631	-3.343
13.0	4.073	15.316	7.414	14.007	-29.646	-3.999
14.0	4.088	15.316	8.447	13.579	-31.618	-3.743
15.0	4.725	15.968	8.670	14.201	-32.409	-3.727
16.0	4.725	15.642	8.853	13.734	-33.634	-3.799
17.0	4.339	15.968	8.875	13.984	-33.045	-3.723
18.0	4.888	15.316	9.381	13.056	-33.990	-3.623
19.0	5.551	15.479	9.514	12.992	-35.980	-3.666
20.0	4.544	15.805	9.998	13.180	-33.874	-3.388

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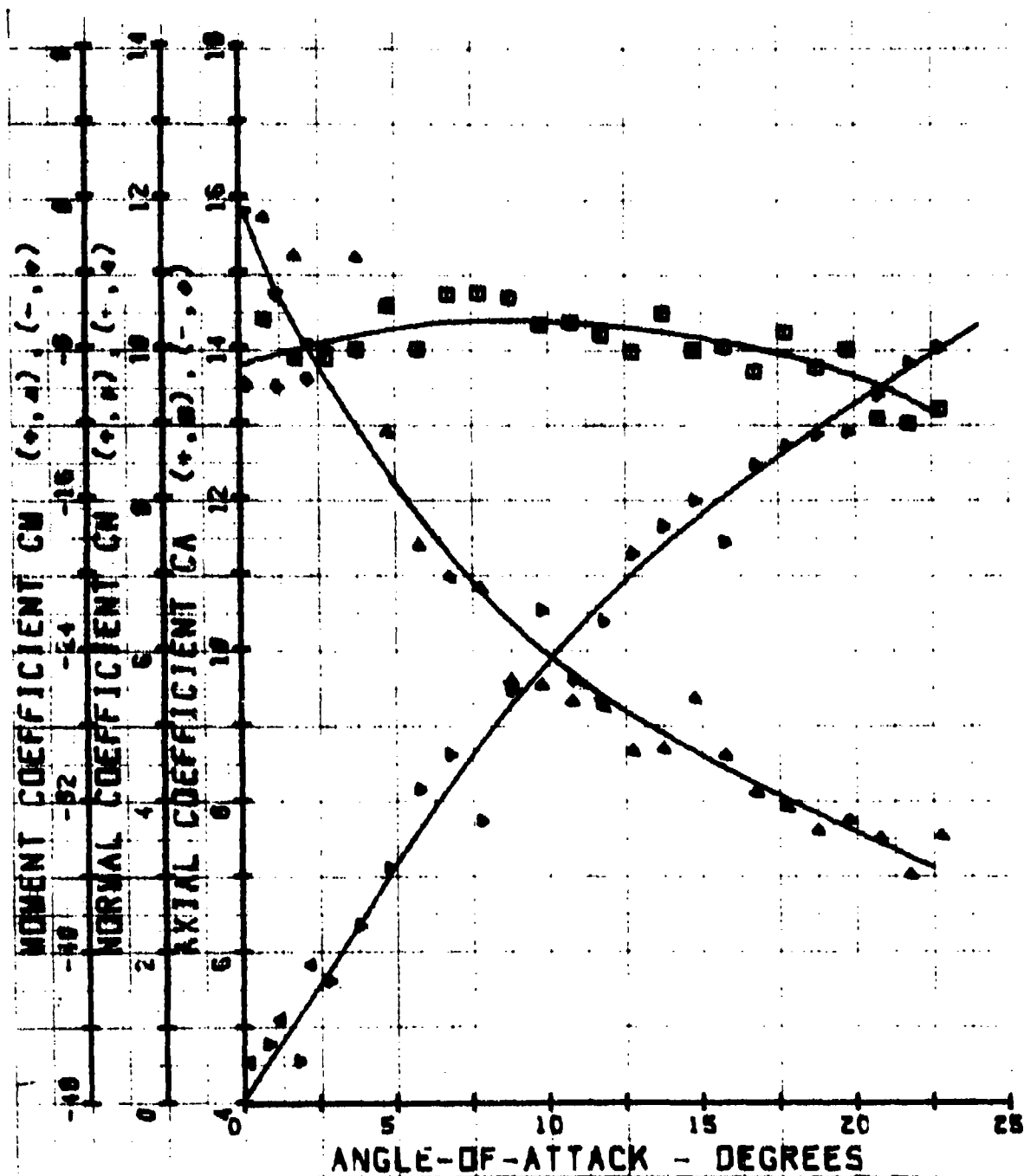
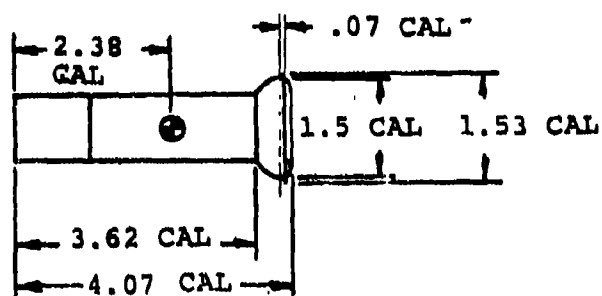


Figure 217. Graphic Static Aerodynamic Test Data: Configuration 101
(Test No. E 6)

<u>Item</u>	<u>Page</u>
Static aerodynamic data	
Tabulated	
Plotted	354
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
Tripper = none
Fineness ratio = 4.0 caliber
Stabilizer = see sketch
Burbie fence = see sketch
Boattail = none
Strakes (8) = none

Remarks

Figure 218. Model Specification for Configuration 102

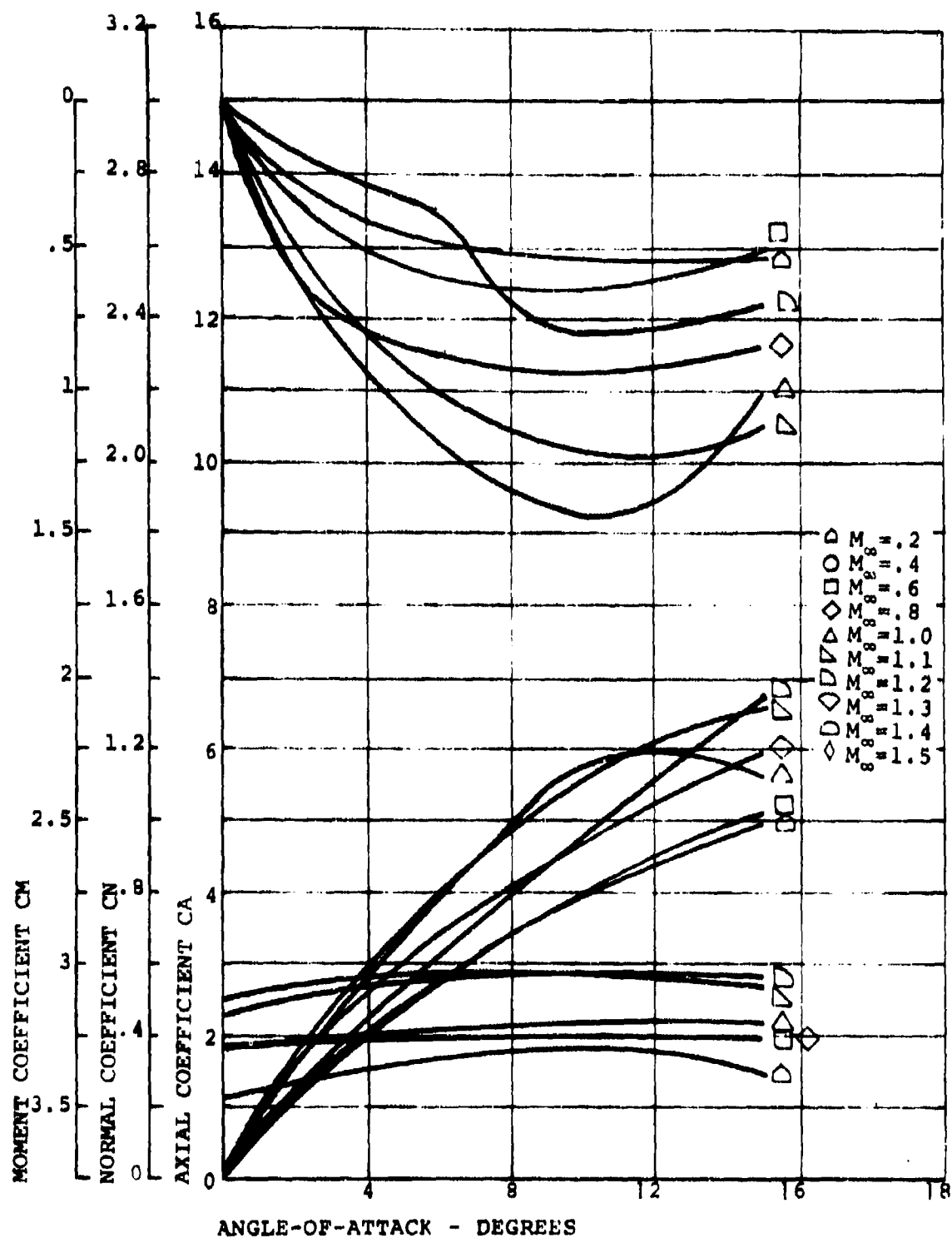
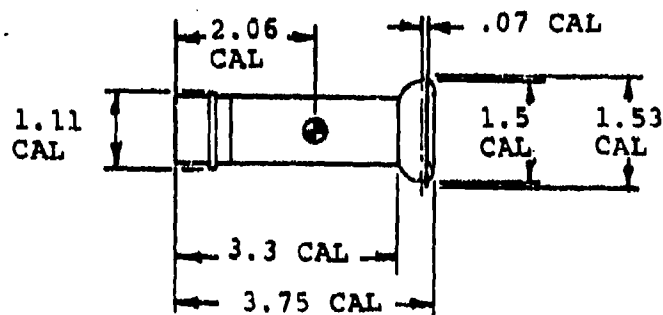


Figure 219. Graphic Static Aerodynamic Test Data: Configuration 102
(Test No. E 7)

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	356
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
Tripper = none
Fineness ratio = 4.0 caliber
Stabilizer = see sketch
Burbie fence = see sketch
Boattail = none
Strakes (8) = none

Remarks

Figure 220. Model Specifications for Configuration 103

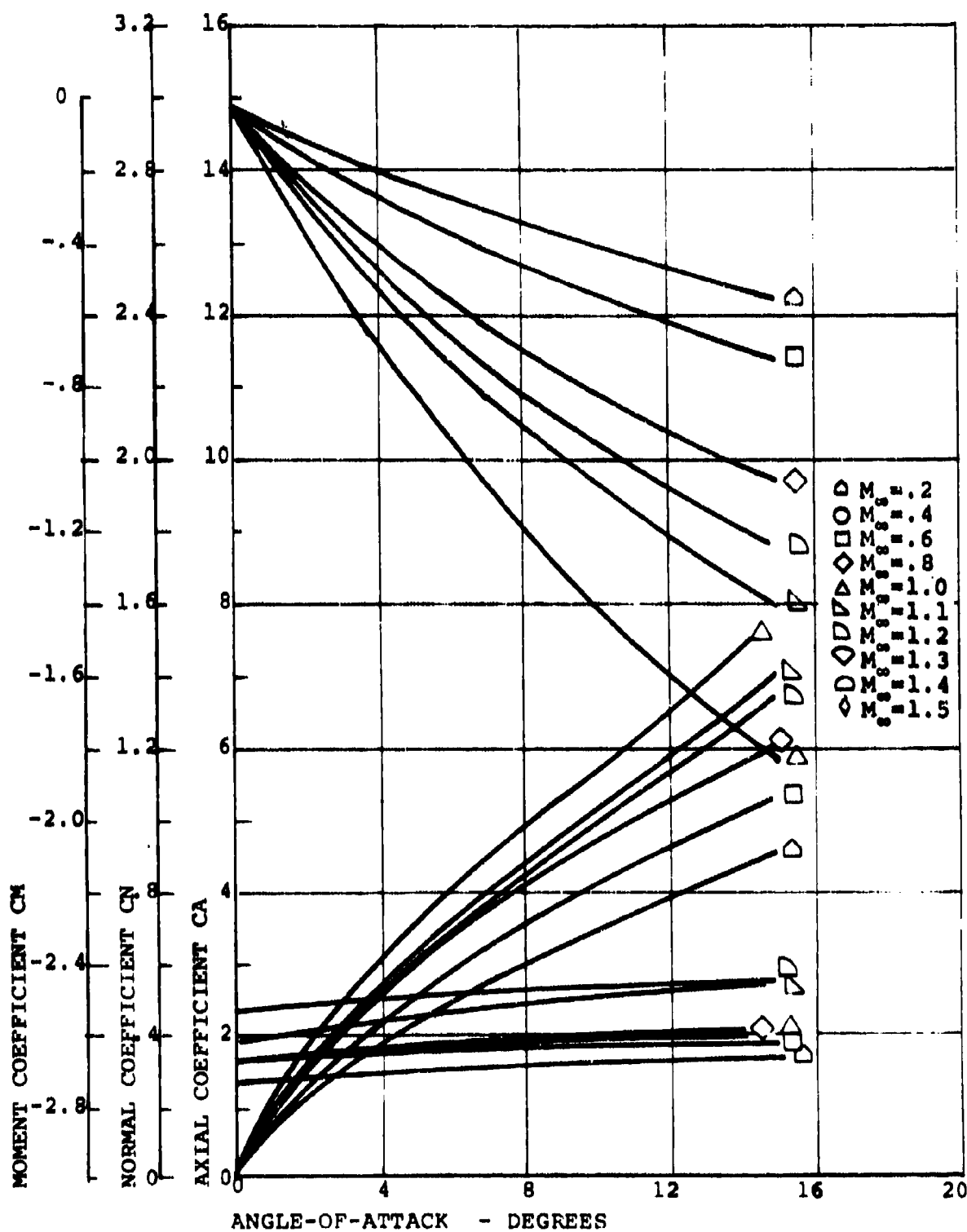
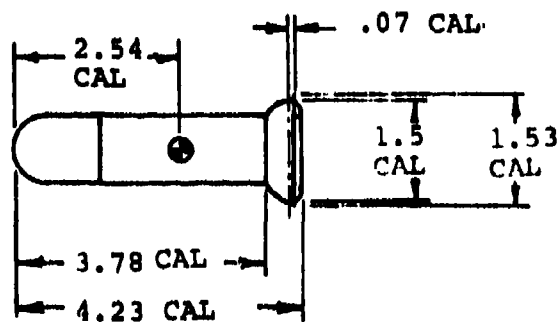


Figure 221. Graphic Static Aerodynamic Test Data: Configuration 103 (Test No. E 8)

<u>Item</u>	<u>Page</u>
Static aerodynamic data	
Tabulated	
Plotted	358
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
 Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
 Tripper = none
 Fineness ratio = 4.0 caliber
 Stabilizer = see sketch
 Burble fence = see sketch
 Boattail = none
 Strakes (8) = none

Remarks

Figure 222. Model Specifications for Configuration 104

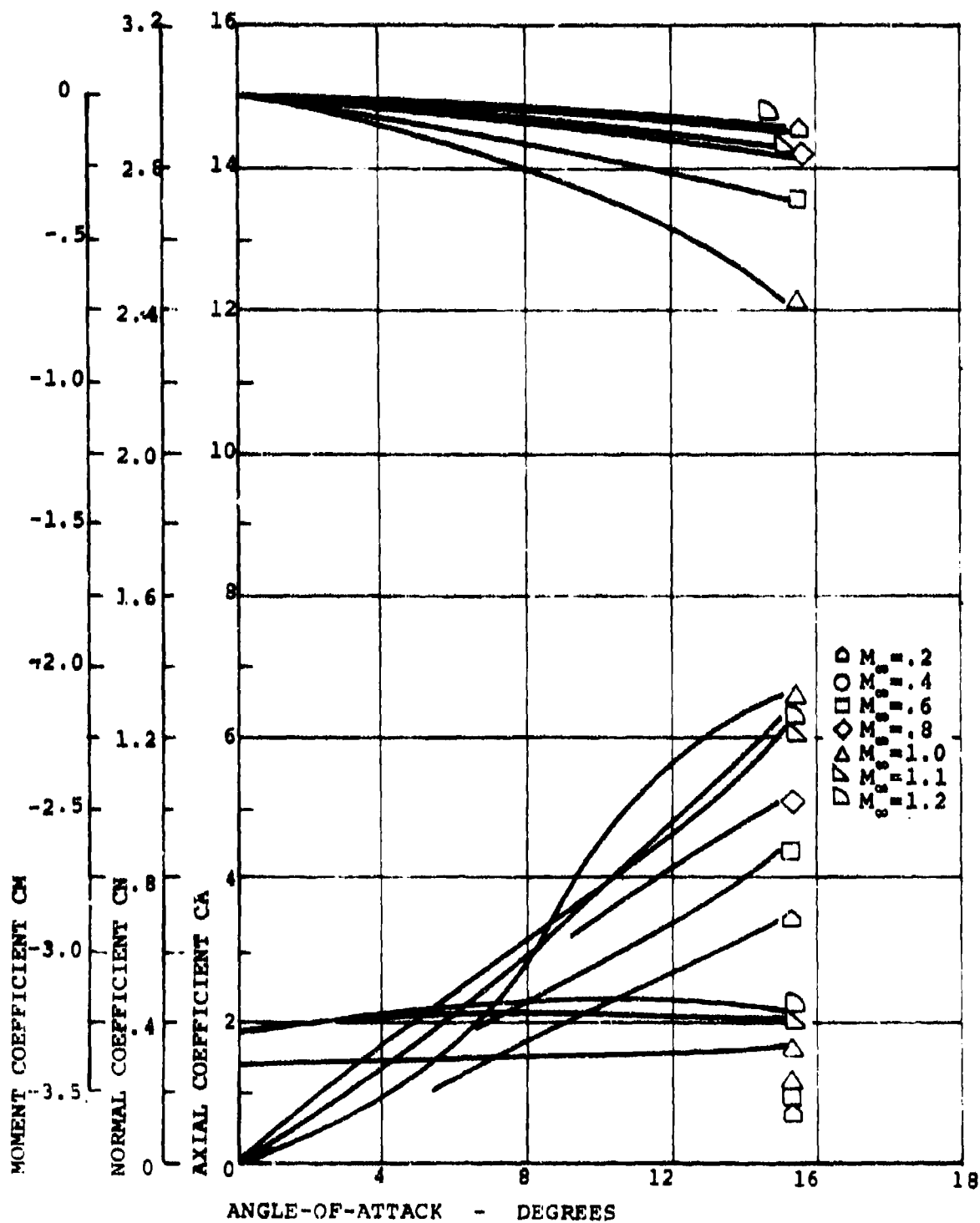
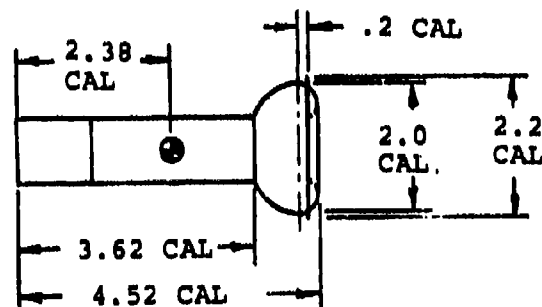


Figure 223. Graphic Static Aerodynamic Test Data: Configuration 104 (Test No. E 9)

<u>Item</u>	<u>Page</u>
Static aerodynamic data	
Tabulated	
Plotted	360
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
Tripper = none
Fineness ratio = 4.0 caliber
Stabilizer = see sketch
Burple fence = see sketch
Boattail = none
Strakes (8) = none

Remarks

Figure 224. Model Specification for Configuration 105

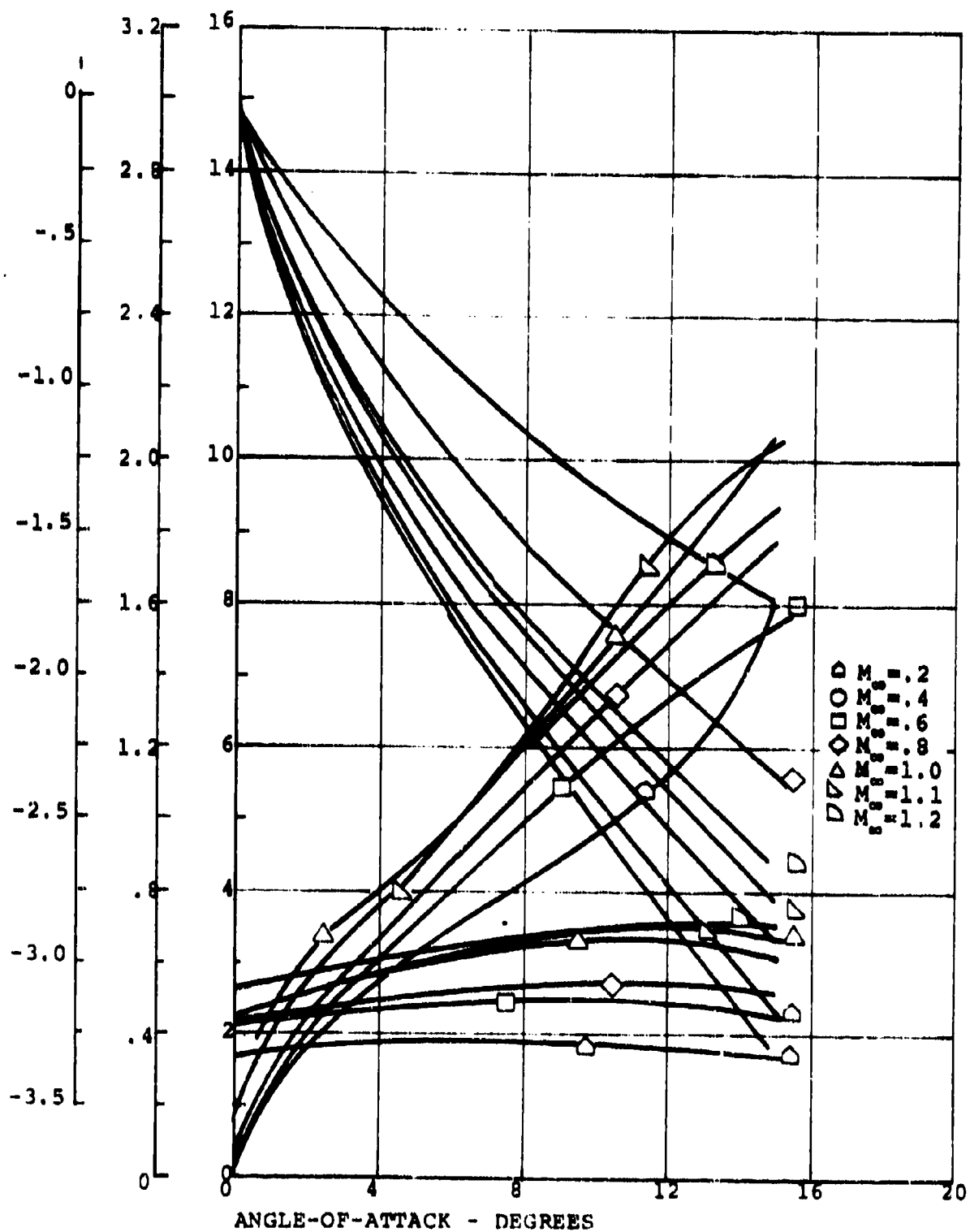
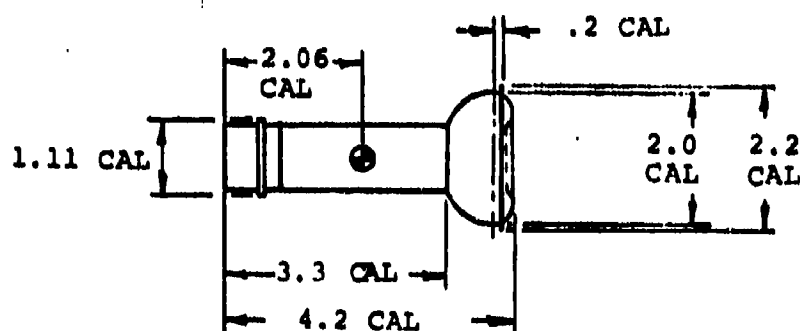


Figure 225. Graphic Static Aerodynamic Test Data: Configuration 105
(Test No. E 10)

<u>Item</u>	<u>Page</u>
Static aerodynamic data	
Tabulated	
Plotted	362
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
Tripper = none
Fineness ratio = 4.0 caliber
Stabilizer = see sketch
Burble fence = see sketch
Boattail = none
Strakes (8) = none

Remarks

Figure 226. Model Specifications for Configuration 106

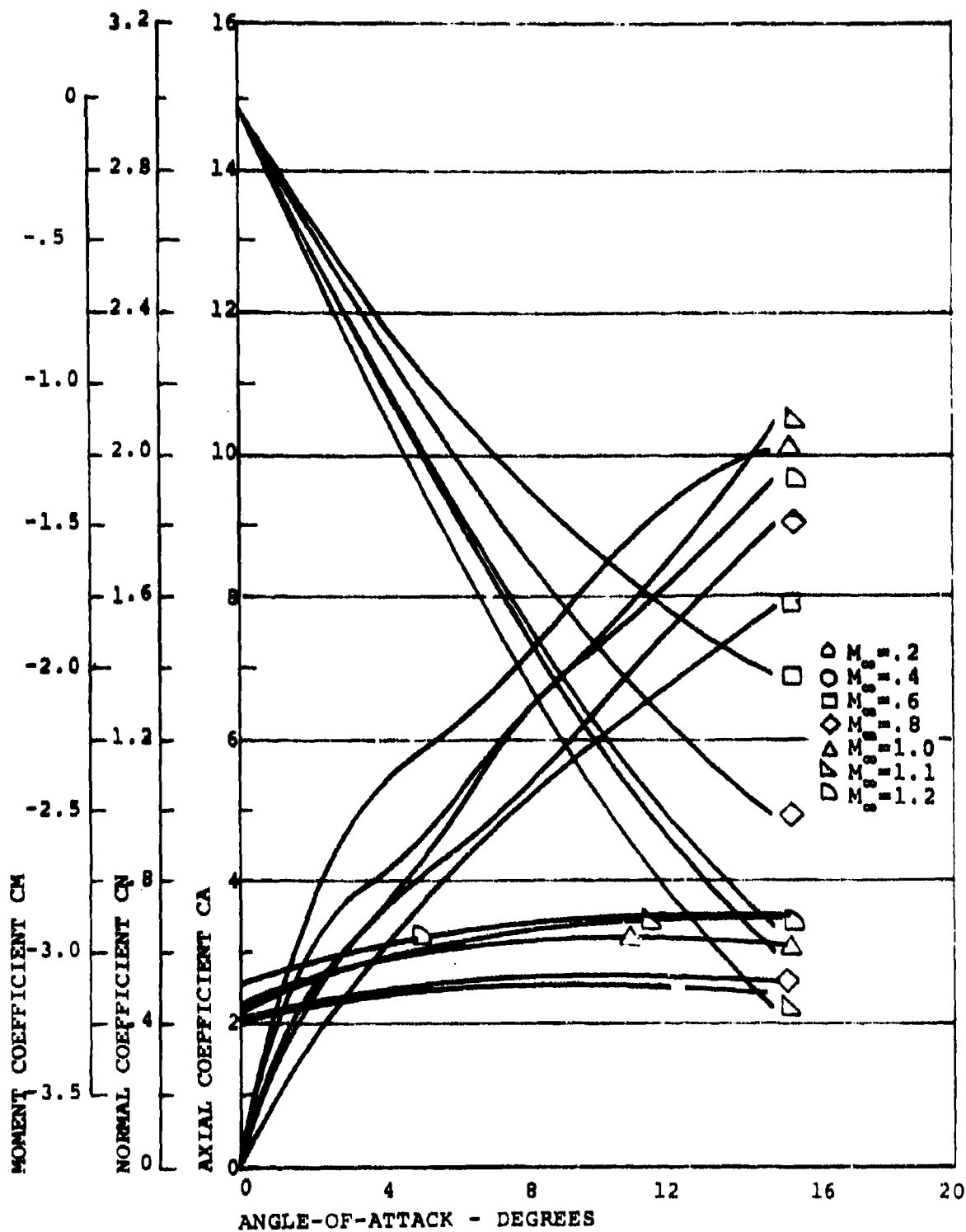
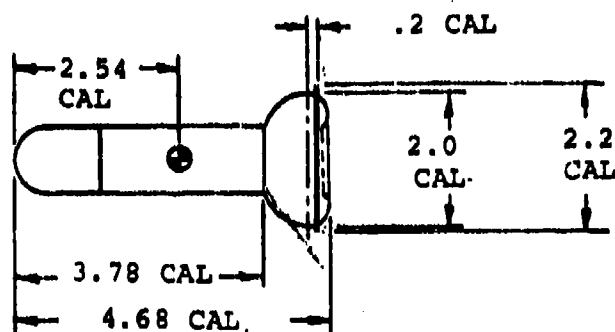


Figure 227. Graphic Static Aerodynamic Test Data:
Configuration 106 (Test No. E 11)

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	364
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
Tripper = none
Fineness ratio = 4.0 caliber
Stabilizer = see sketch
Burble fence = see sketch
Boattail = none
Strakes (8) = none

Remarks

Figure 228. Model Specifications for Configuration 107

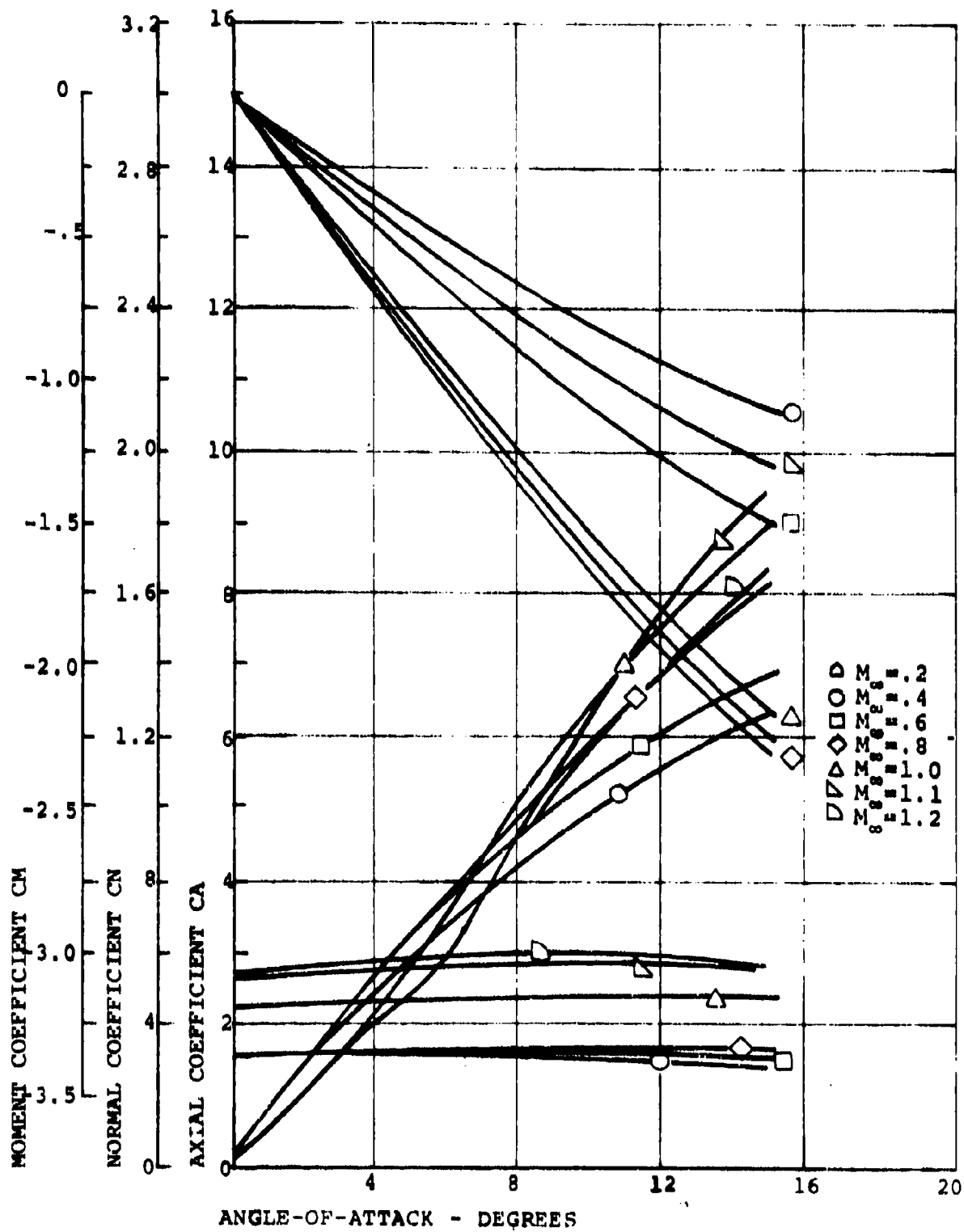
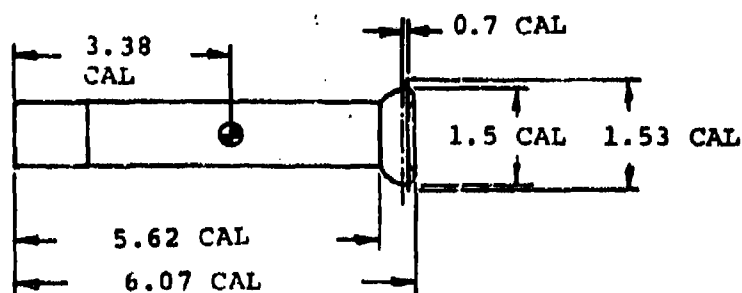


Figure 229. Graphic Static Aerodynamics Test Data:
Configuration 107 (Test No. E 12)

<u>Item</u>	<u>Page</u>
Static aerodynamic data	
Tabulated	
Plotted	366
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
 Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
 Tripper = none
 Fineness ratio = 4.0 caliber
 Stabilizer = see sketch
 Burble fence = see sketch
 Boattail = none
 Strakes (8) = none

Remarks

Figure 230. Model Specifications for Configuration 108

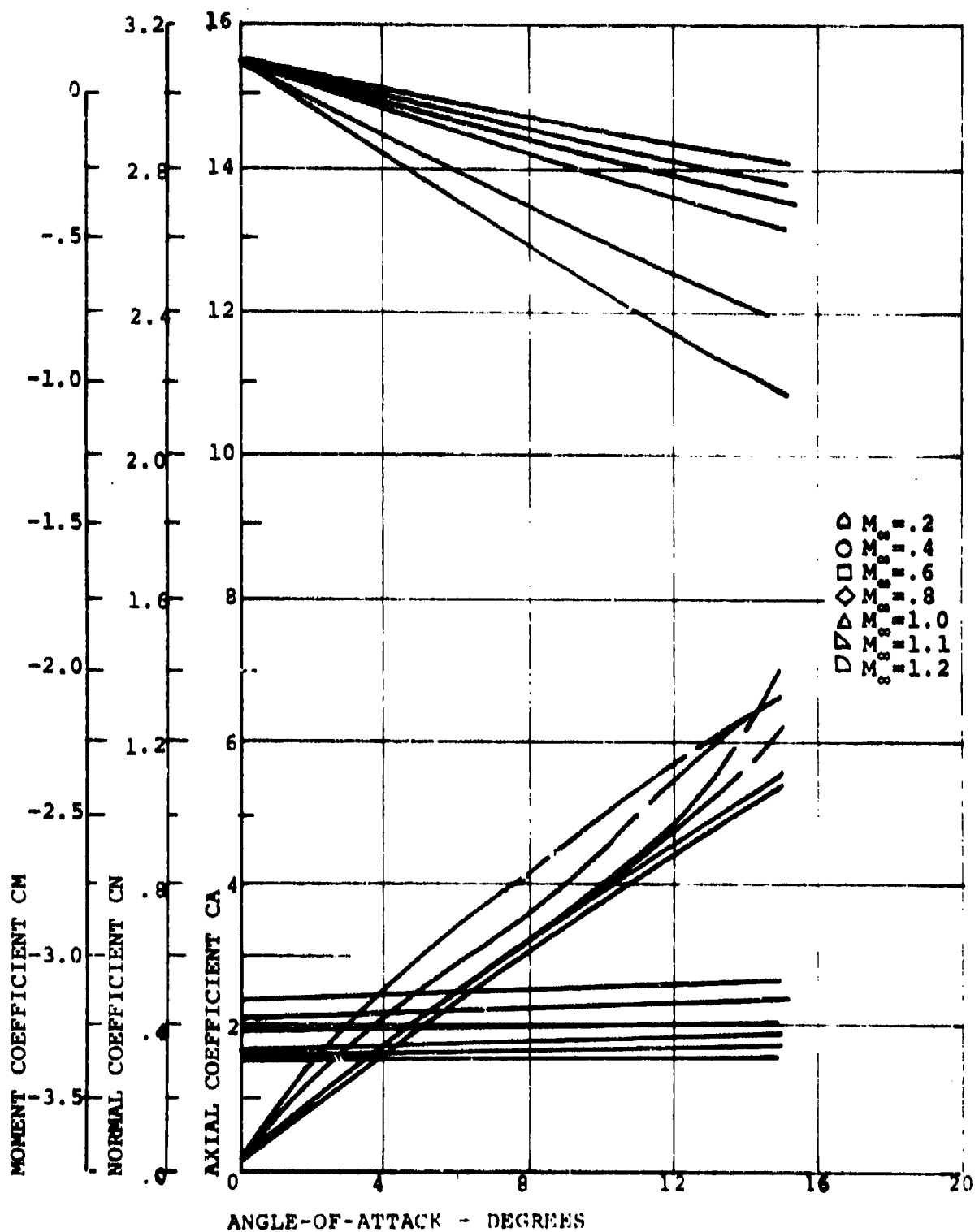
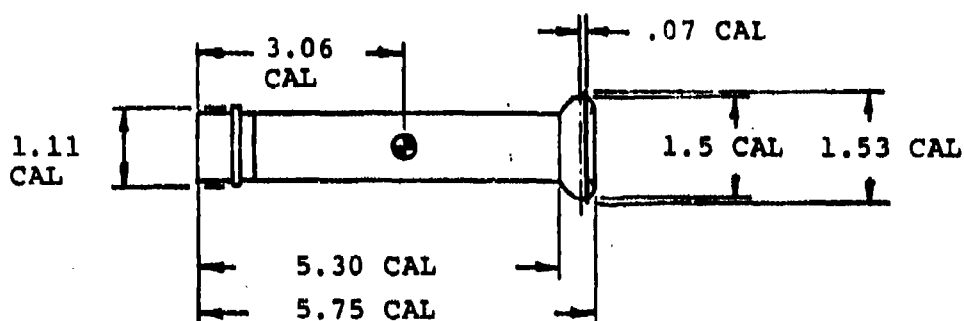


Figure 231. Graphic Static Aerodynamic Test Data:
Configuration 108 (Test No. E 13)

<u>Item</u>	<u>Page</u>
Static aerodynamic data	
Tabulated	
Plotted	368
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
Tripper = none
Fineness ratio = 4.0 caliber
Stabilizer = see sketch
Bumble fence = see sketch
Boattail = none
Strakes (8) = none

Remarks

Figure 232. Model Specifications for Configuration 109

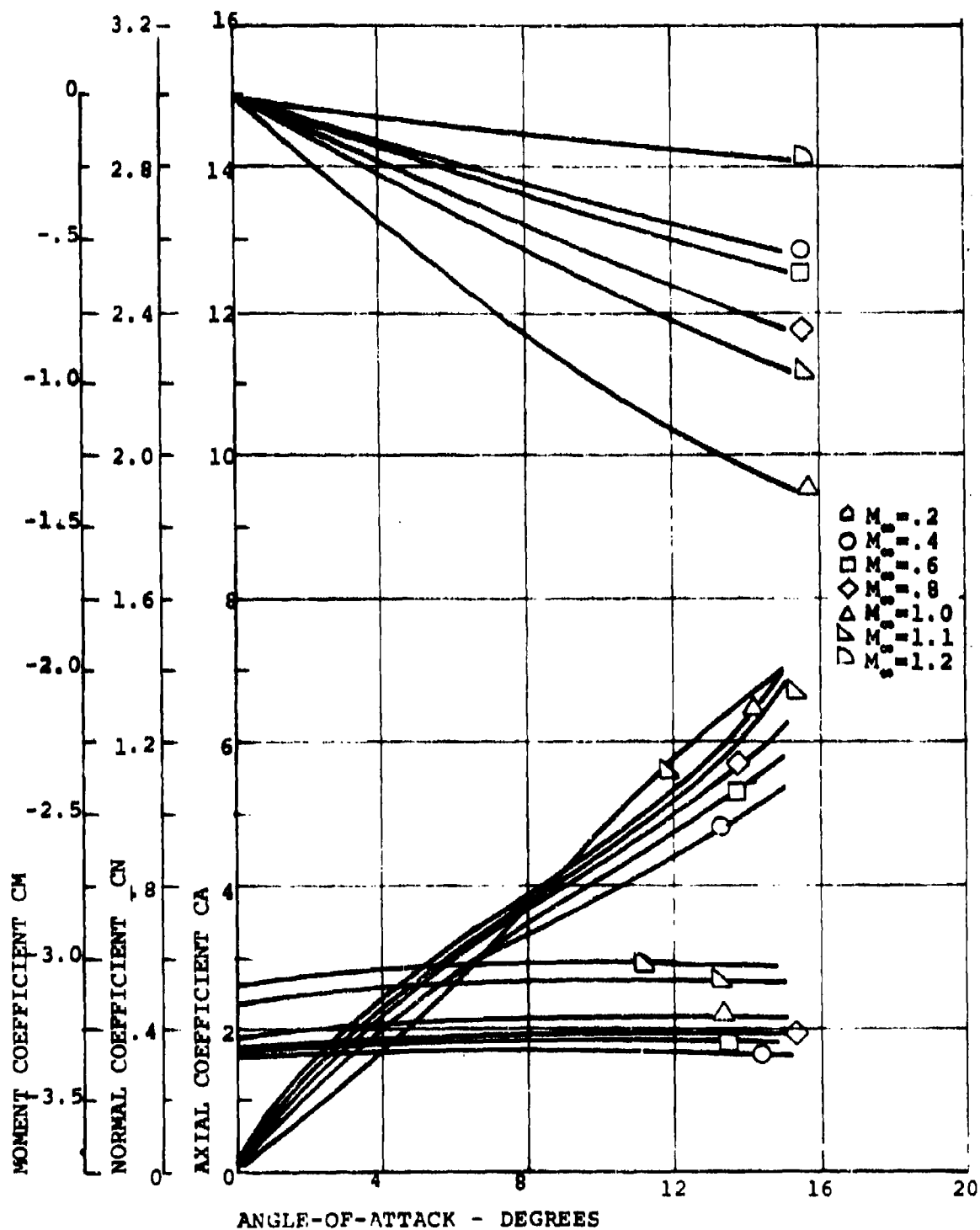


Figure 233. Graphic Static Aerodynamic Test Data:
Configuration 109 (Test No. E 14)

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	370
Dynamic stability data	
Tabulated	
Plotted	

Diagram illustrating the model specifications for Configuration 110, showing various length measurements in calibers (CAL):

- 3.54 CAL (Nose to point)
- 5.78 CAL (Nose to tail)
- 6.23 CAL (Nose to end)
- .07 CAL (Tail fin)
- 1.5 CAL (Upper tail fin)
- 1.53 CAL (Lower tail fin)

General data

Model weight = not applicable

Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive

Tripper = none

Fineness ratio = 4.0 caliber

Stabilizer = see sketch

Burble fence = see sketch

Boattail = none

Strakes (8) = none

Remarks

Figure 234. Model Specifications for Configuration 110

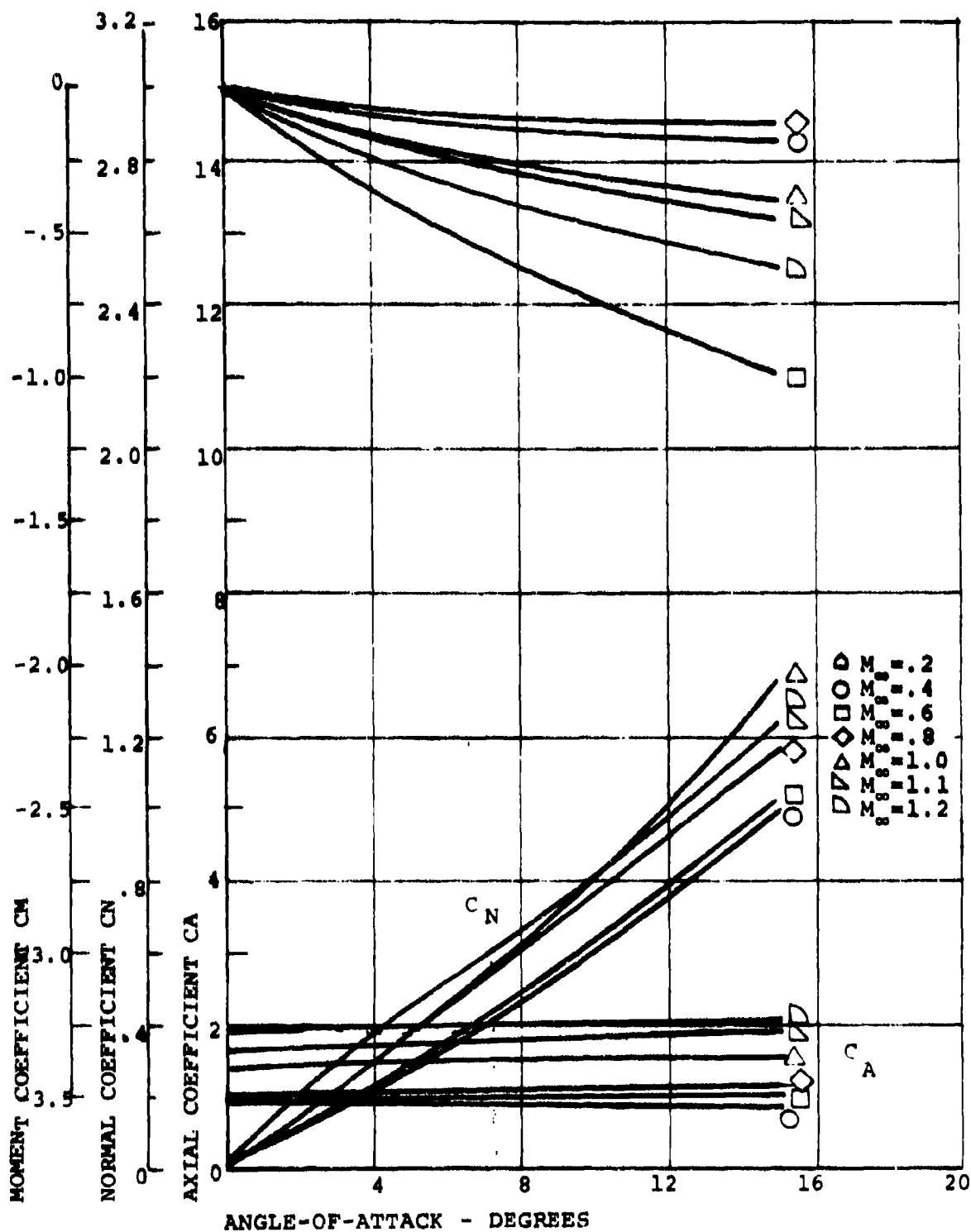


Figure 235. Graphic Static Aerodynamic Test Data:
Configuration 110 (Test No. E 15)

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	372
Dynamic stability data	
Tabulated	
Plotted	

General data

Model weight = not applicable

Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive

Tripper = none

Fineness ratio = 4.0 caliber

Stabilizer = see sketch

Burble fence = see sketch

Boattail = none

Strakes (8) = none

Remarks

Figure 236. Model Specifications for Configuration 111

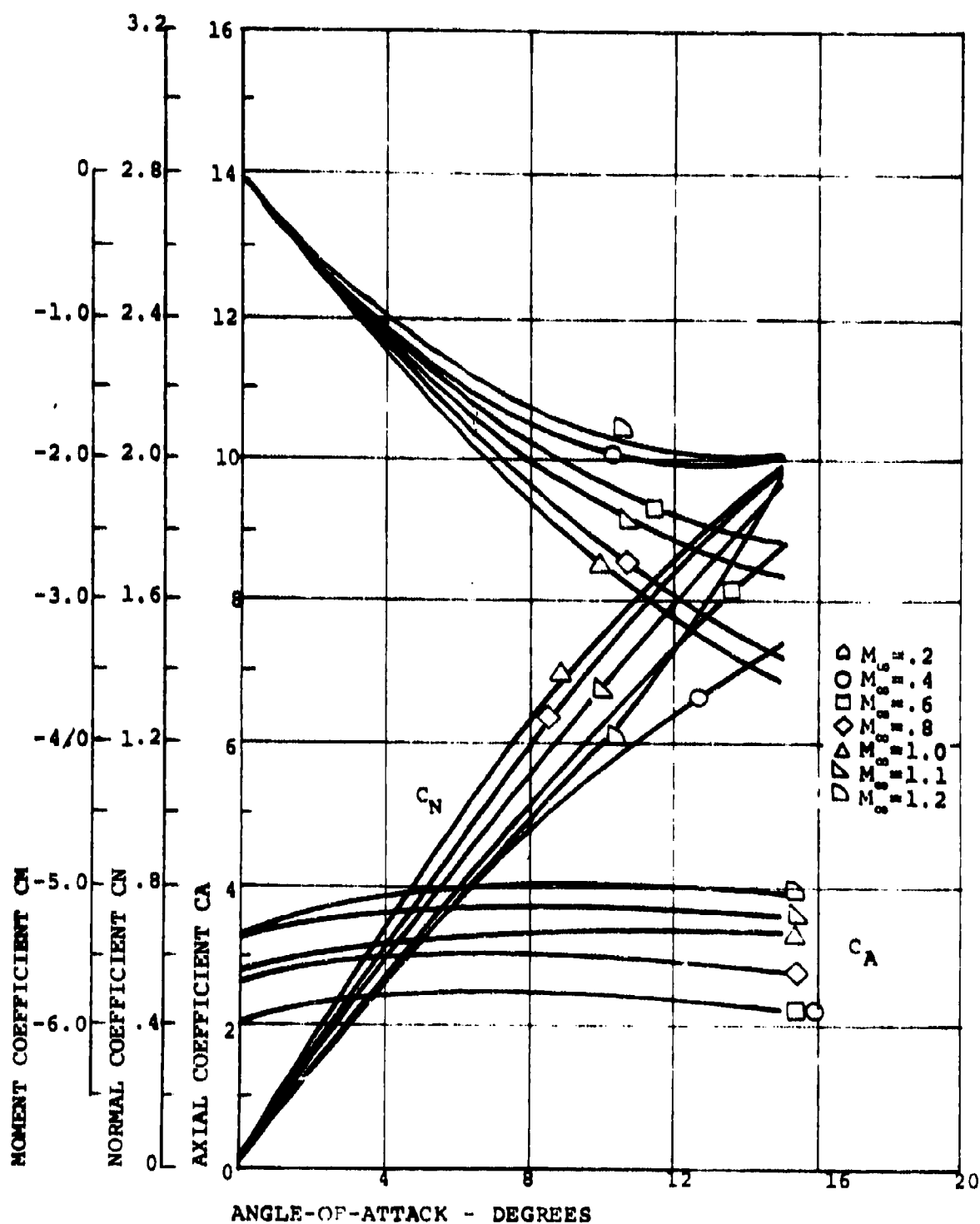


Figure 237. Graphic Static Aerodynamic Test Data:
Configuration 111 (Test No E 16)

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	374
Dynamic stability data	
Tabulated	
Plotted	

1.11 CAL

3.06 CAL

5.3 CAL

6.2 CAL

.2 CAL

2.0 CAL

2.2 CAL

General data

Model weight = not applicable

Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive

Tripper = none

Fineness ratio = 4.0 caliber

Stabilizer = see sketch

Burble fence = see sketch

Boattail = none

Strakes (8) = none

Remarks

Figure 238. Model Specifications for Configuration 112

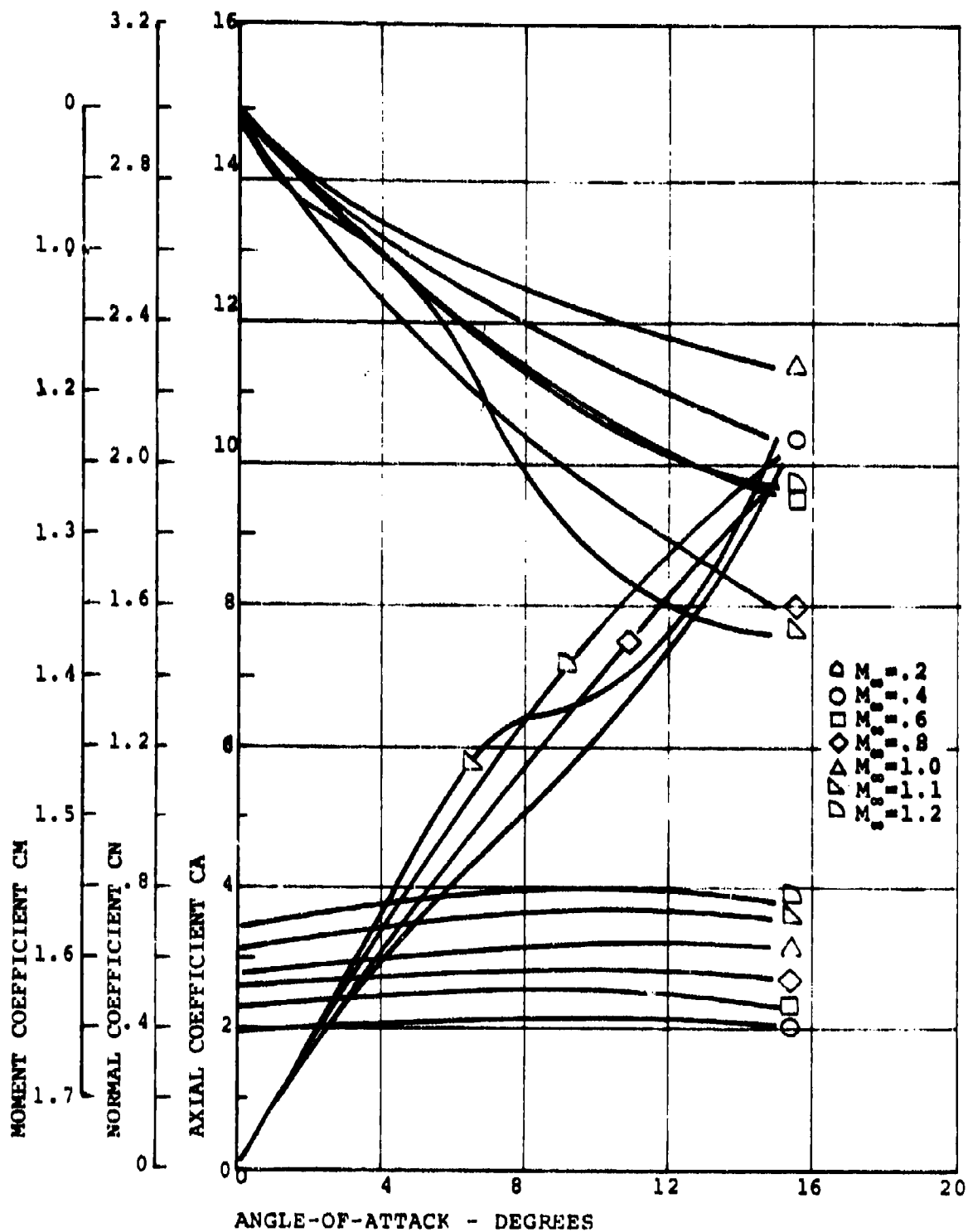
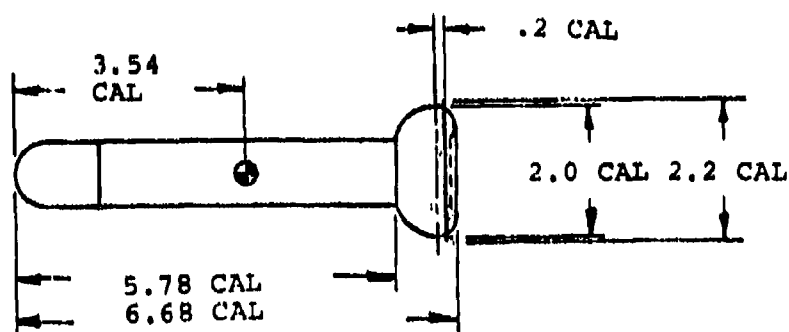


Figure 239. Graphic Static Aerodynamic Test Data:
Configuration 112 (Test No. E 17)

<u>Item</u>	<u>Page</u>
Static aerodynamic data	
Tabulated	
Plotted	376
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
Tripper = none
Fineness ratio = 4.0 caliber
Stabilizer = see sketch
Bumble fence = see sketch
Boattail = none
Strakes (8) = none

Remarks

Figure 240. Model Specifications for Configuration 113

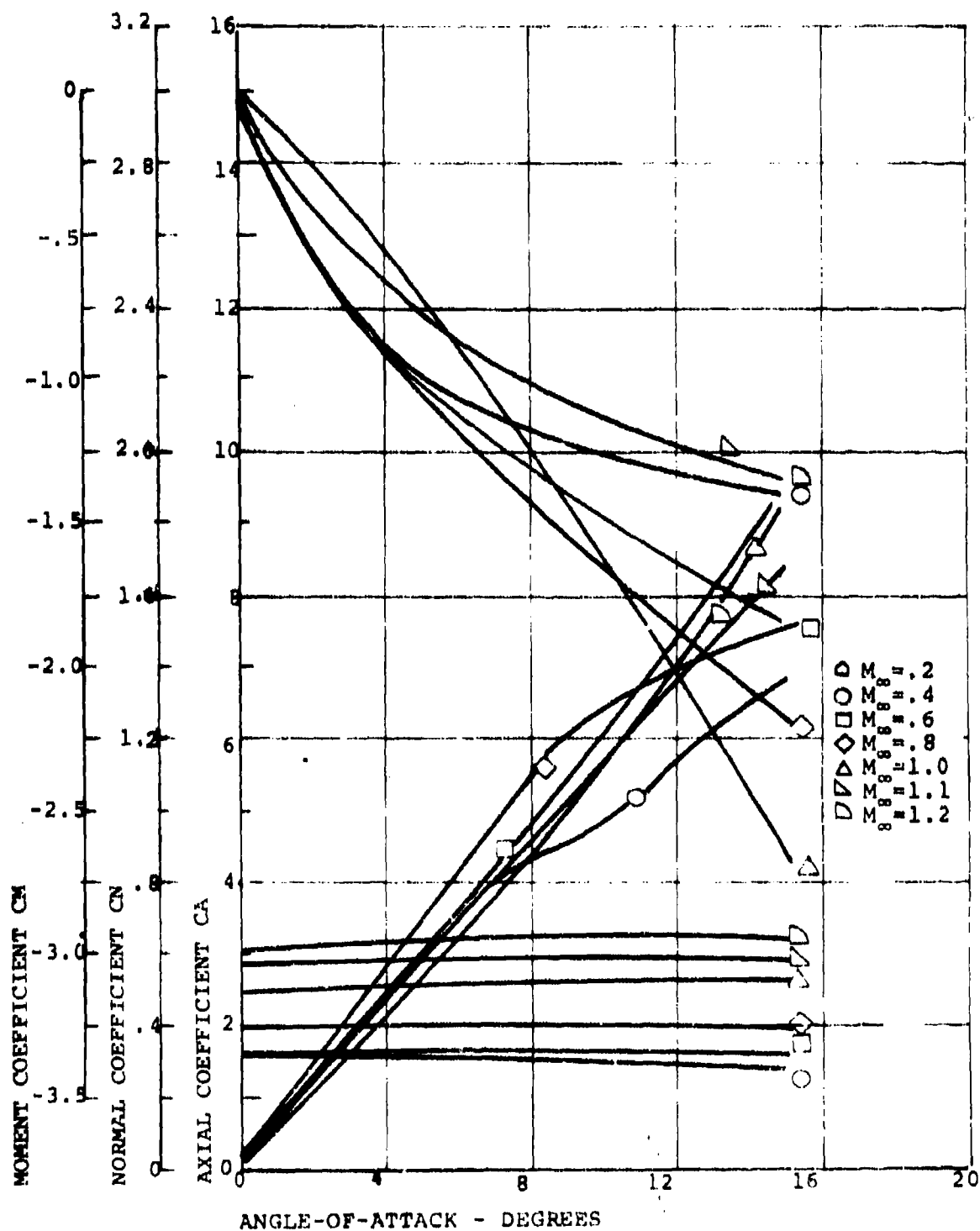
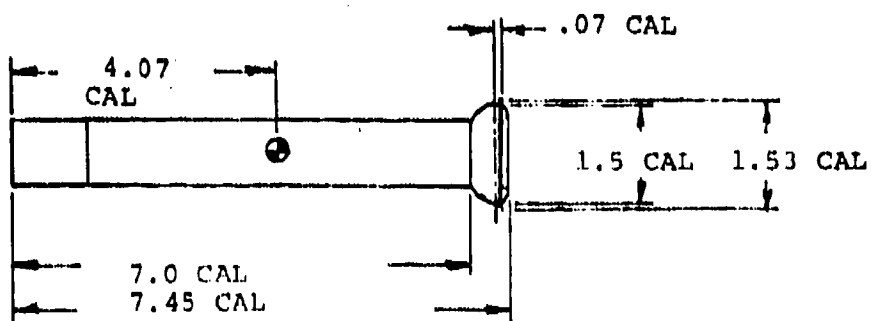


Figure 241. Graphic Static Aerodynamic Test Data:
Configuration 113 (Test No. E 18)

<u>Item</u>	<u>Page</u>
Static aerodynamic data	
Tabulated	
Plotted	378
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
Tripper = none
Fineness ratio = 4.0 caliber
Stabilizer = see sketch
Bumble fence = see sketch
Boattail = none
Strakes (8) = none

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Remarks

Figure 242. Model Specifications for Configuration 114

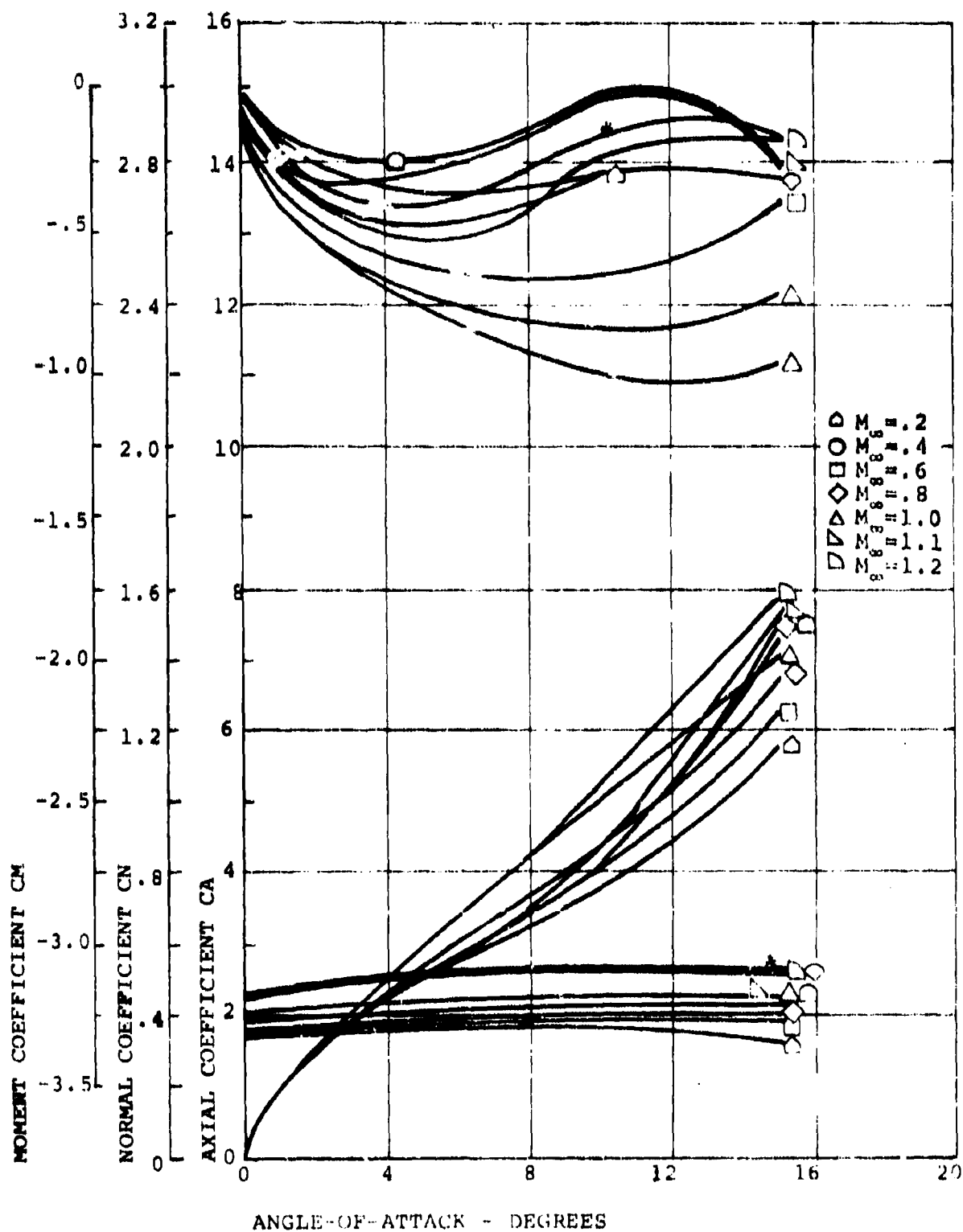


Figure 243. Graphic Static Aerodynamic Test Data:
Configuration 114 (Test No. E 19)

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	380
Dynamic stability data	
Tabulated	
Plotted	

4.63 CAL

7.56 CAL

8.01 CAL

.07 CAL

1.5 CAL 1.53 CAL

General data

Model weight = not applicable

Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive

Tripper = none

Fineness ratio = 4.0 caliber

Stabilizer = see sketch

Bubble fence = see sketch

Boattail = none

Strakes (8) = none

Remarks

Figure 244. Model Specification for Configuration 115

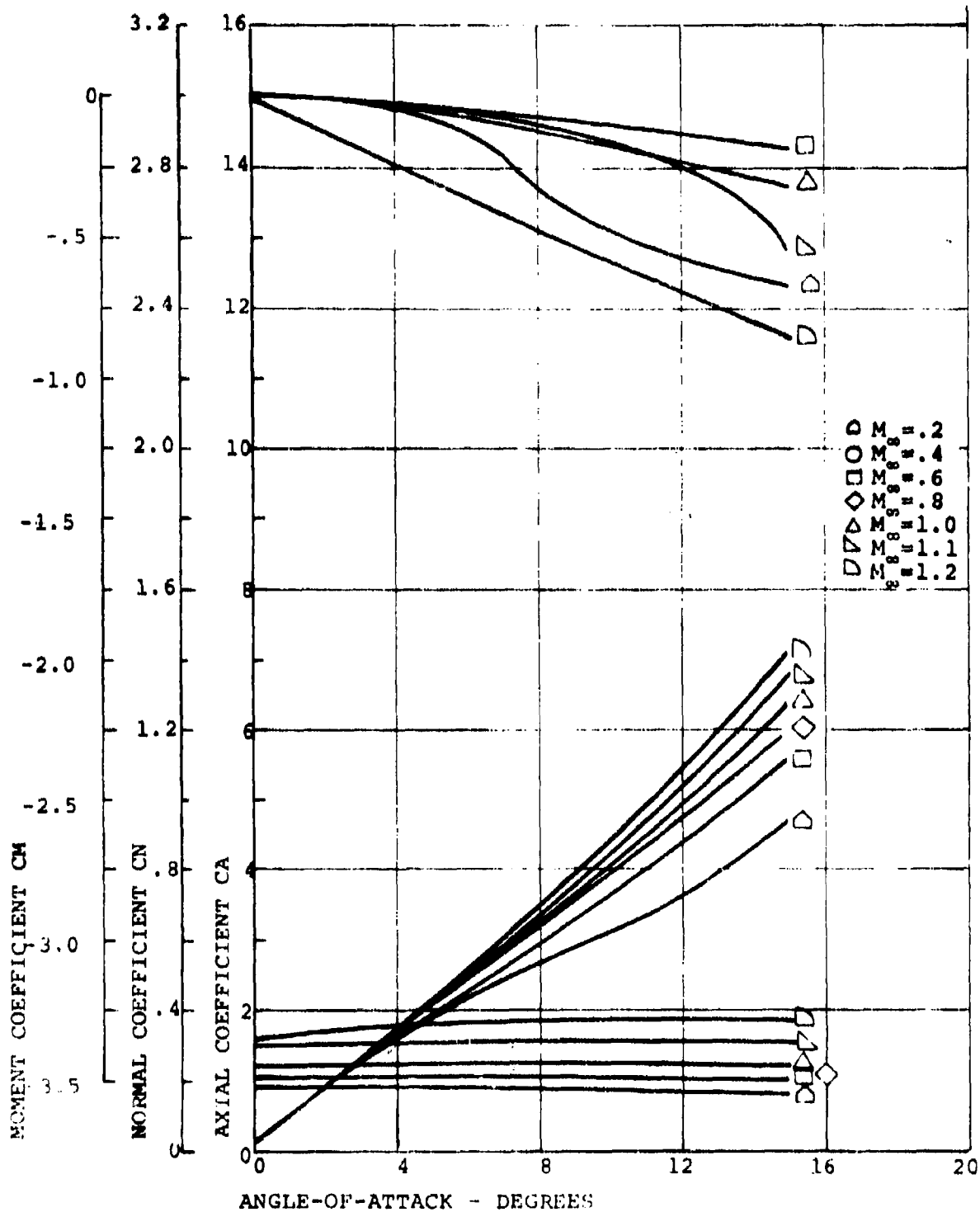
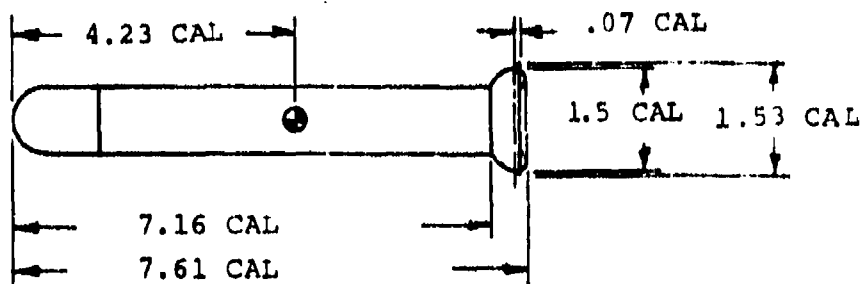


Figure 245. Graphic Static Aerodynamic Test Data:
Configuration 115 (Test No. E 20)

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	382
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
 Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
 Tripper = none
 Fineness ratio = 4.0 caliber
 Stabilizer = see sketch
 Burble fence = see sketch
 Boattail = none
 Strakes (8) = none

Remarks

Figure 246. Model Specification for Configuration 116

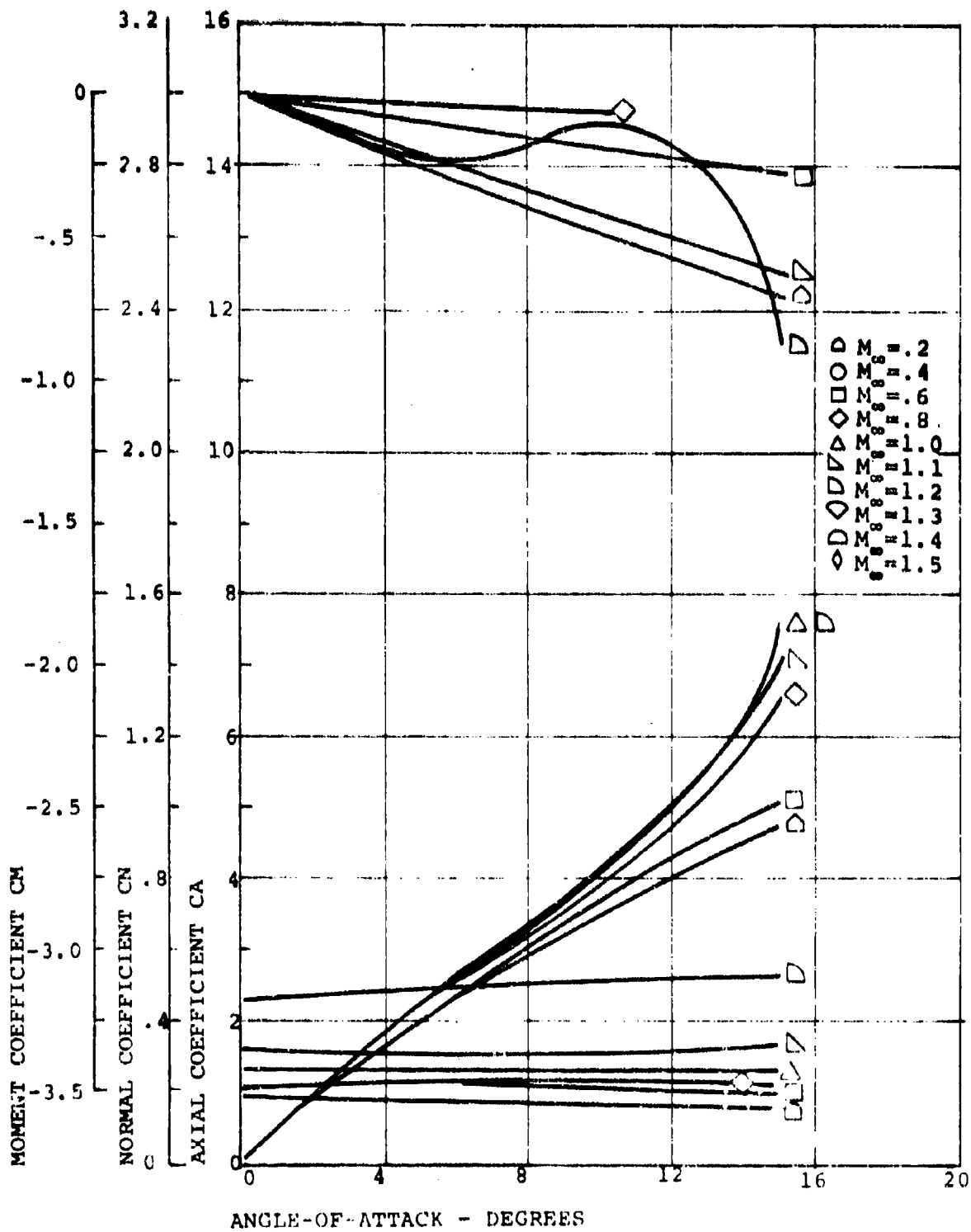
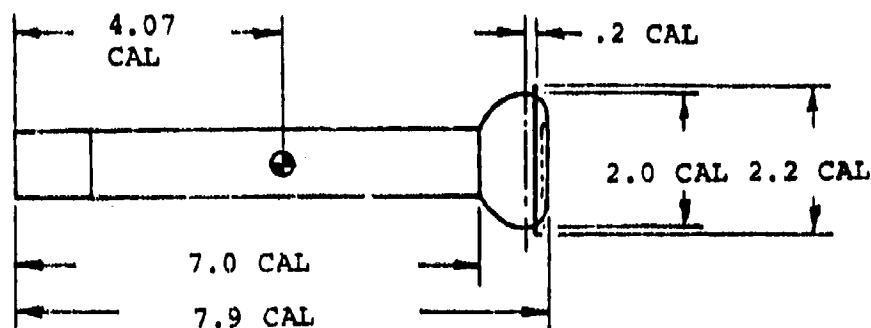


Figure 247. Graphic Static Aerodynamic Test Data:
Configuration 116 (Test No. E 21)

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	384
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
 Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
 Tripper = none
 Fineness ratio = 4.0 caliber
 Stabilizer = see sketch
 Burble fence = see sketch
 Boattail = none
 Strakes (8) = none

Remarks

Figure 248. Model Specification for Configuration 117

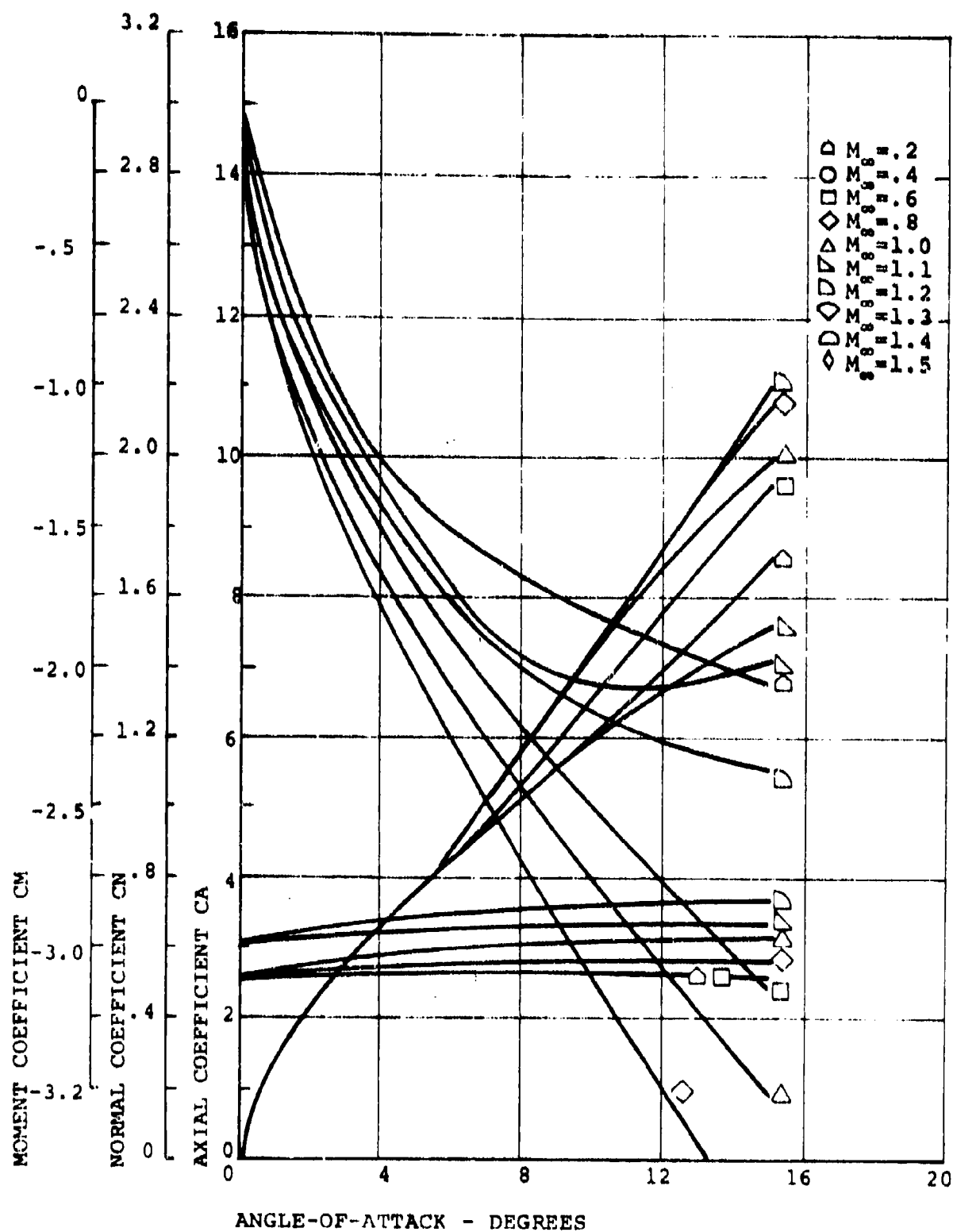
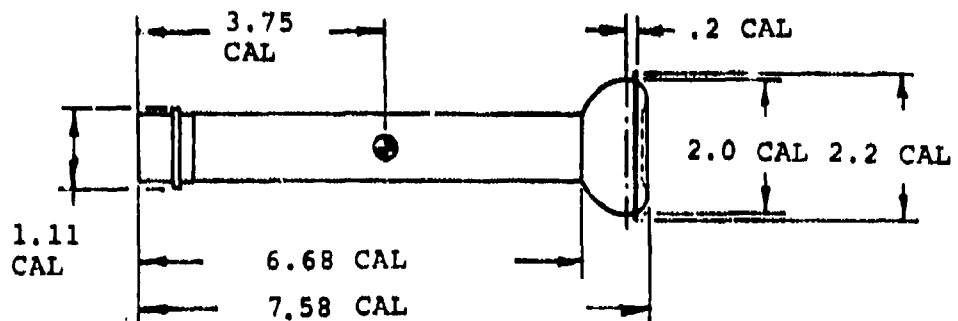


Figure 249. Graphic Static Aerodynamic Test Data:
Configuration 117 (Test No. E 22)

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	386
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
Tripper = none
Fineness ratio = 4.0 caliber
Stabilizer = see sketch
Burble fence = see sketch
Boattail = none
Strakes (8) = none

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Remarks

Figure 250. Model Specifications for Configuration 118

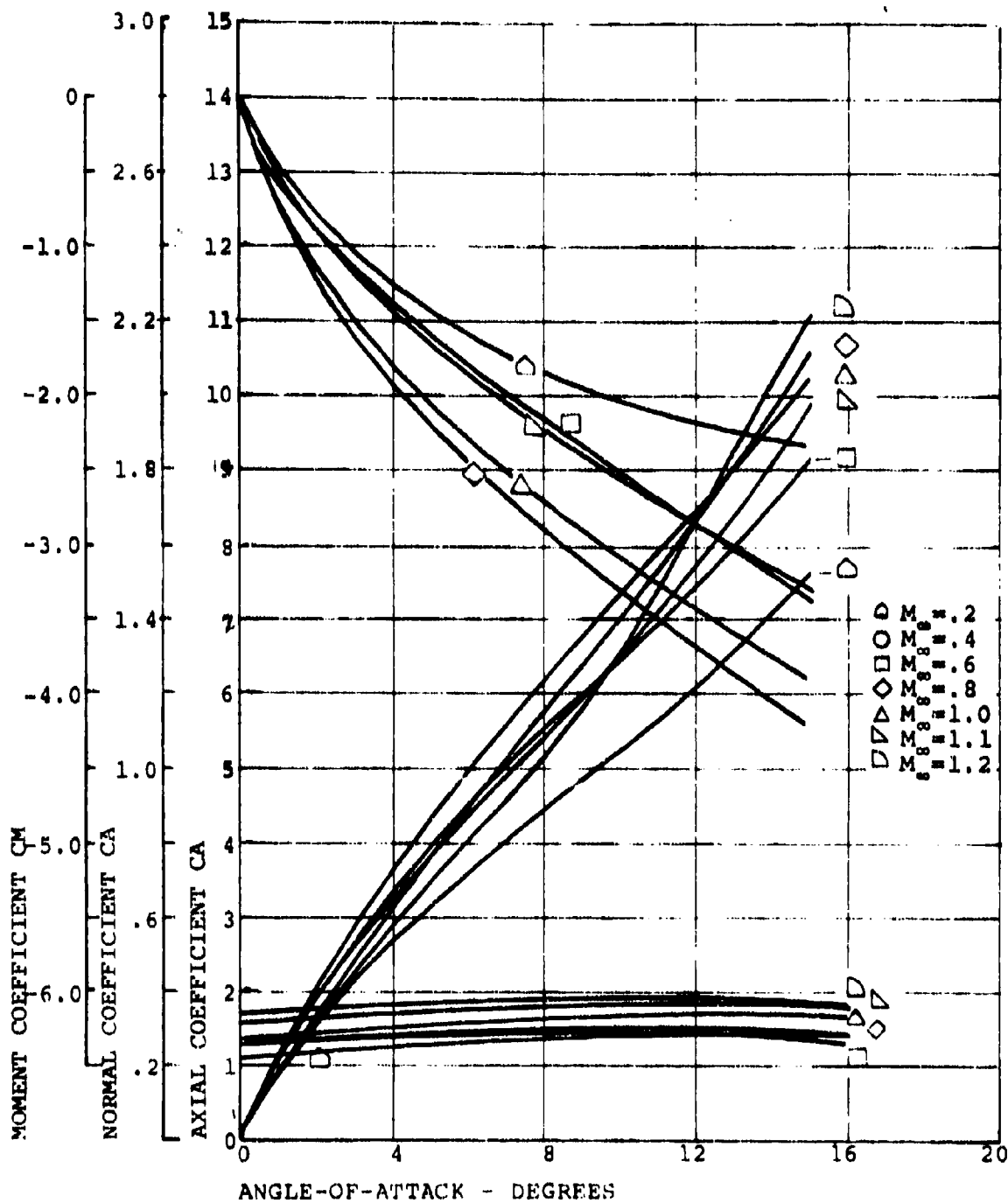
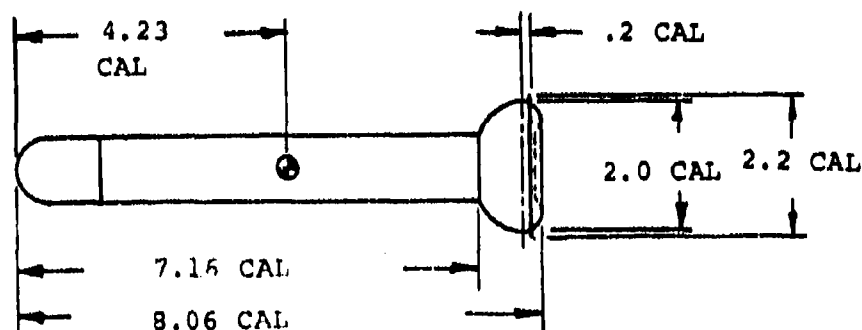


Figure 251. Graphic Static Aerodynamic Test Data:
Configuration 118 (Test No. E 23)

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	388
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = not applicable
Moment of inertia = not applicable

Description of components

Nose shape = 1.0 caliber ogive
Tripper = none
Fineness ratio = 4.0 caliber
Stabilizer = see sketch
Burbie fence = see sketch
Boattail = none
Strakes (8) = none

Remarks

Figure 252. Model Specification for Configuration 119

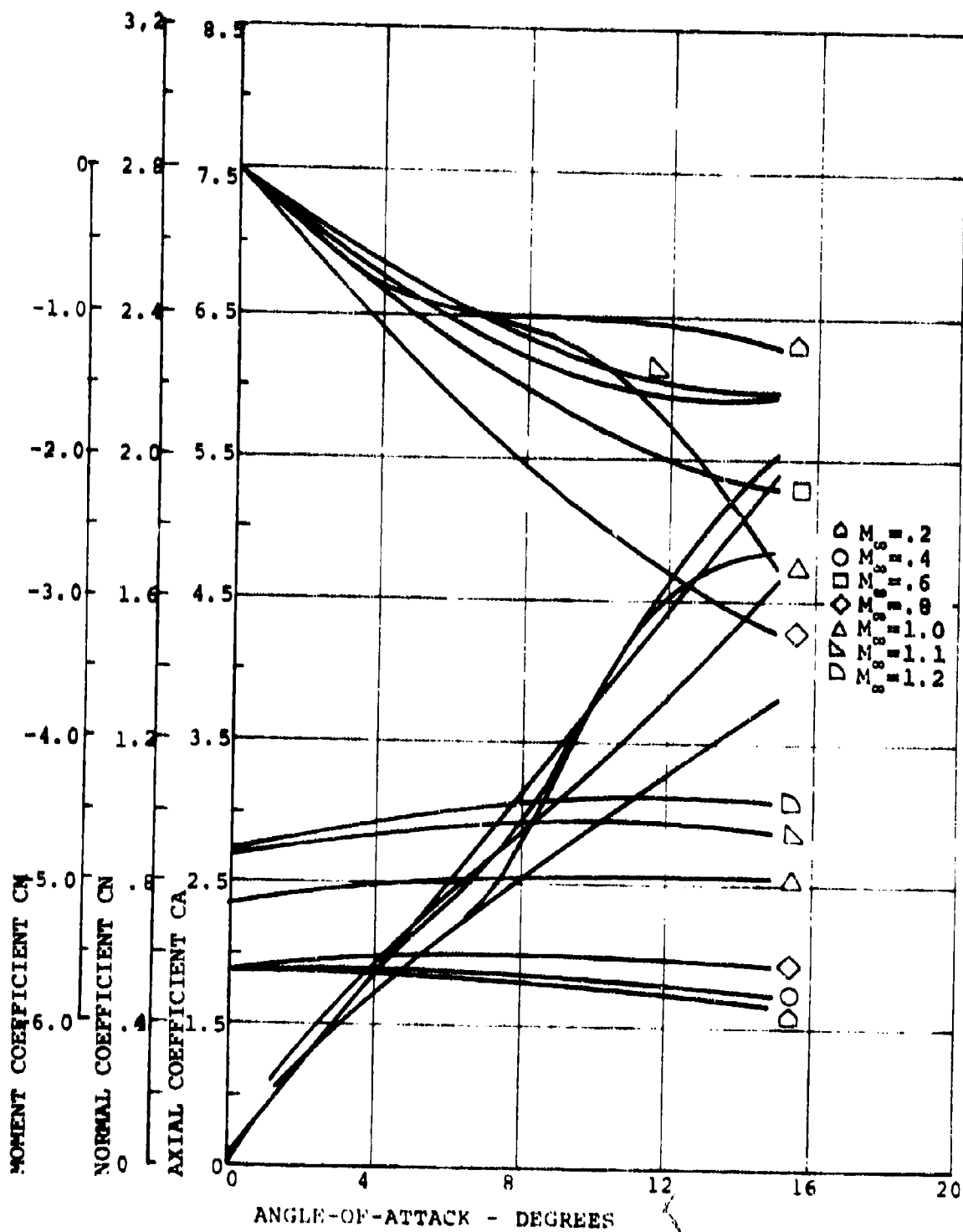


Figure 253. Graphic Static Aerodynamic Test Data:
Configuration 119 (Test No. E 24)

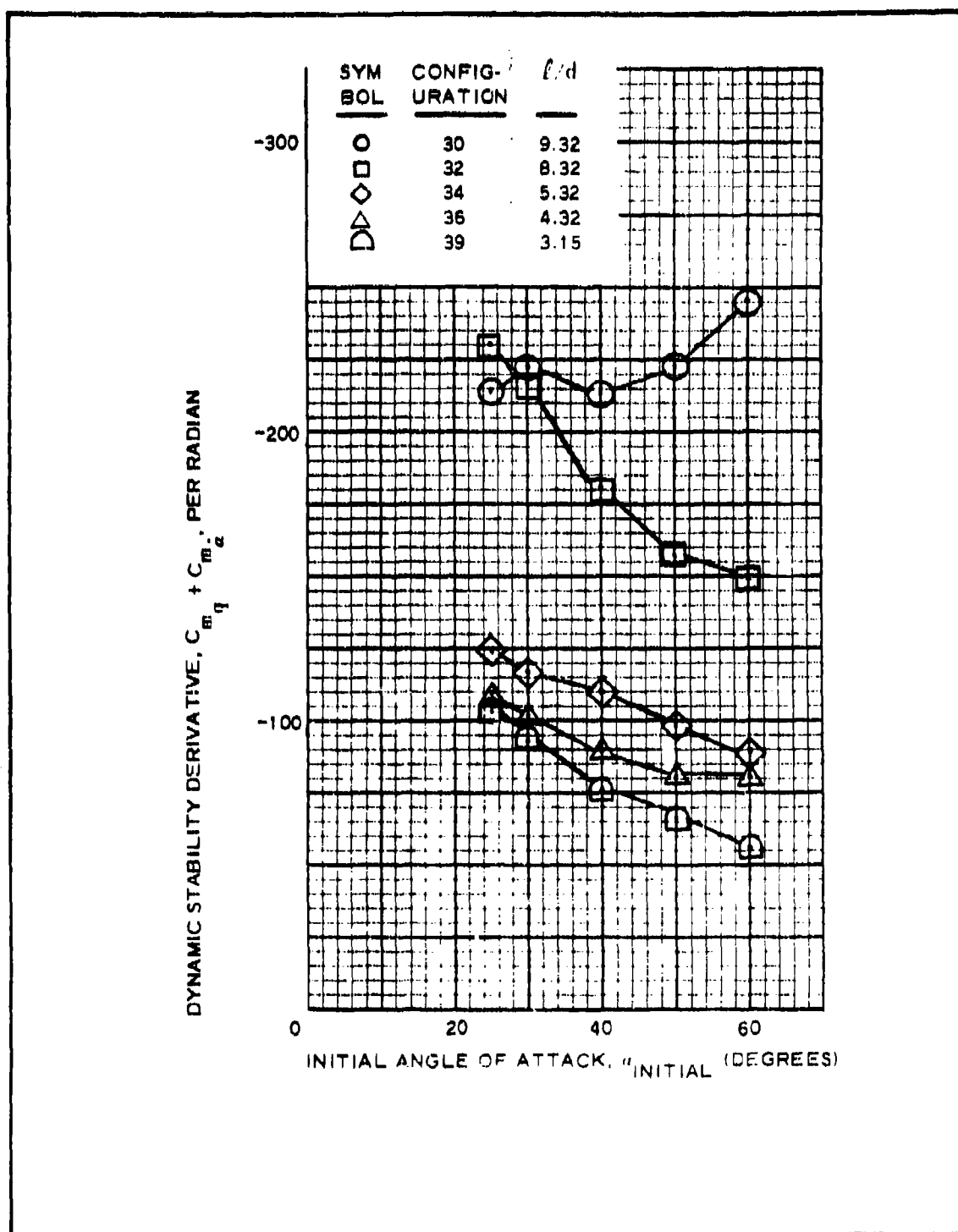


Figure 254. Effect of fineness Ratio on Dynamic Stability of Ballute Stabilized Bomb: 1-1/2-Caliber Ballute, $V = 100$ Feet per Second

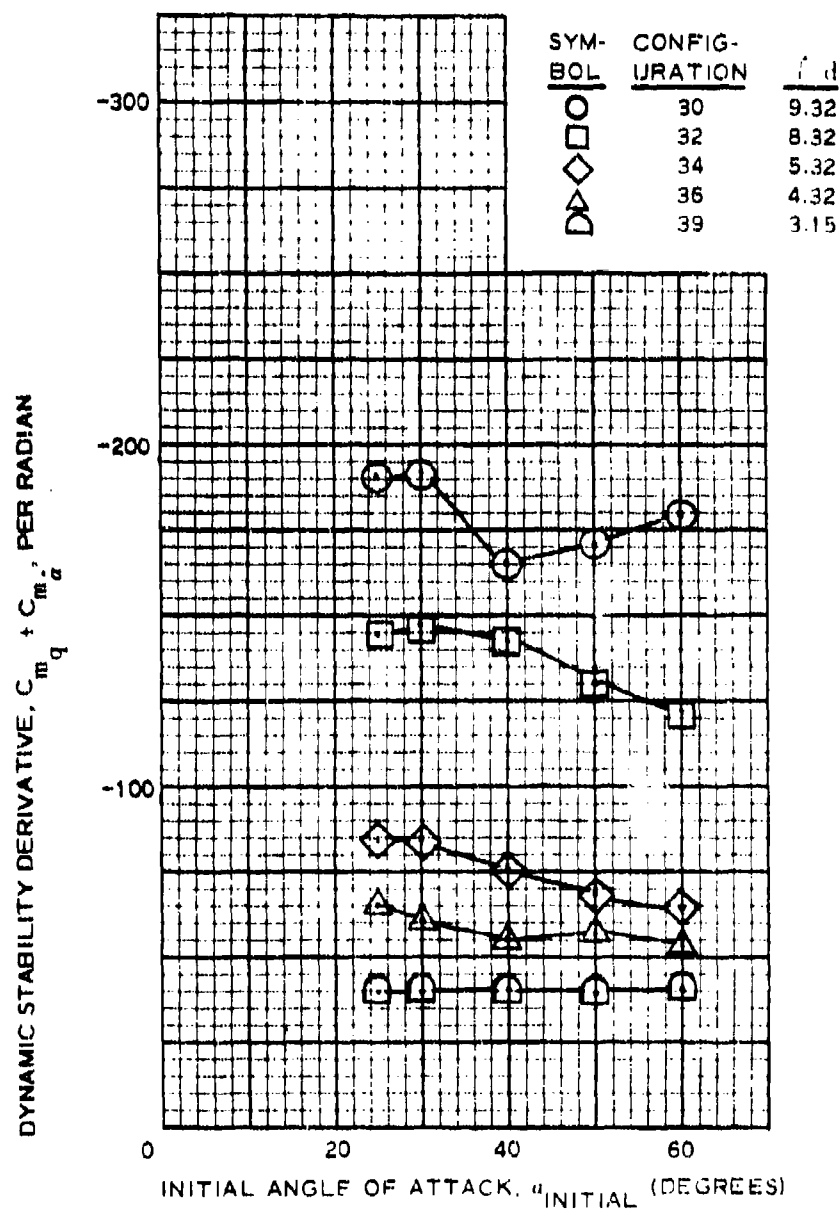


Figure 255. Effect of Fineness Ratio on Dynamic Stability of Ballute Stabilized Bomb: 1-1/2-Caliber Ballute, $V = 200$ Feet per Second

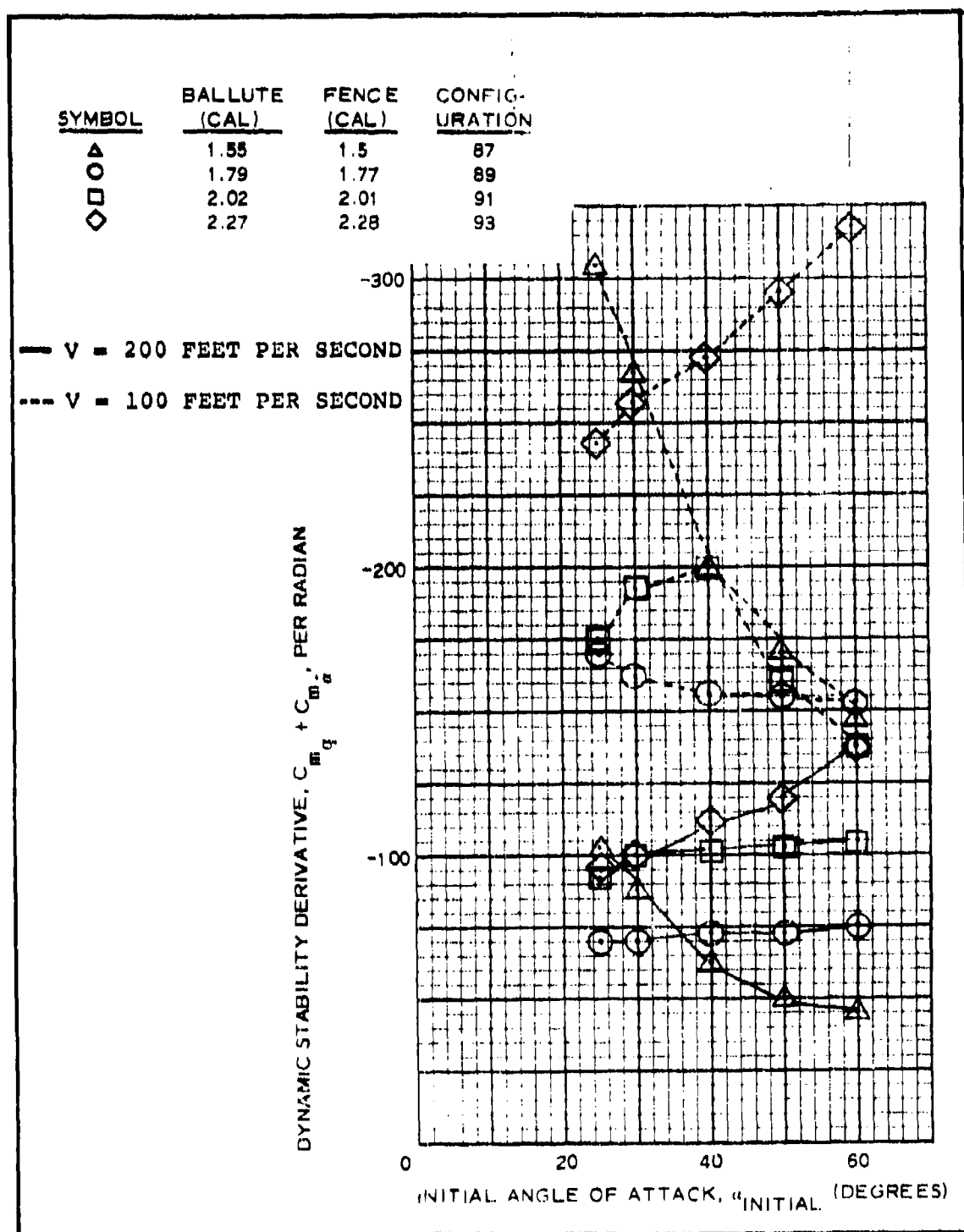


Figure 256. Effect Ballute Size on Dynamic Stability of 3.0-Caliber Bomb

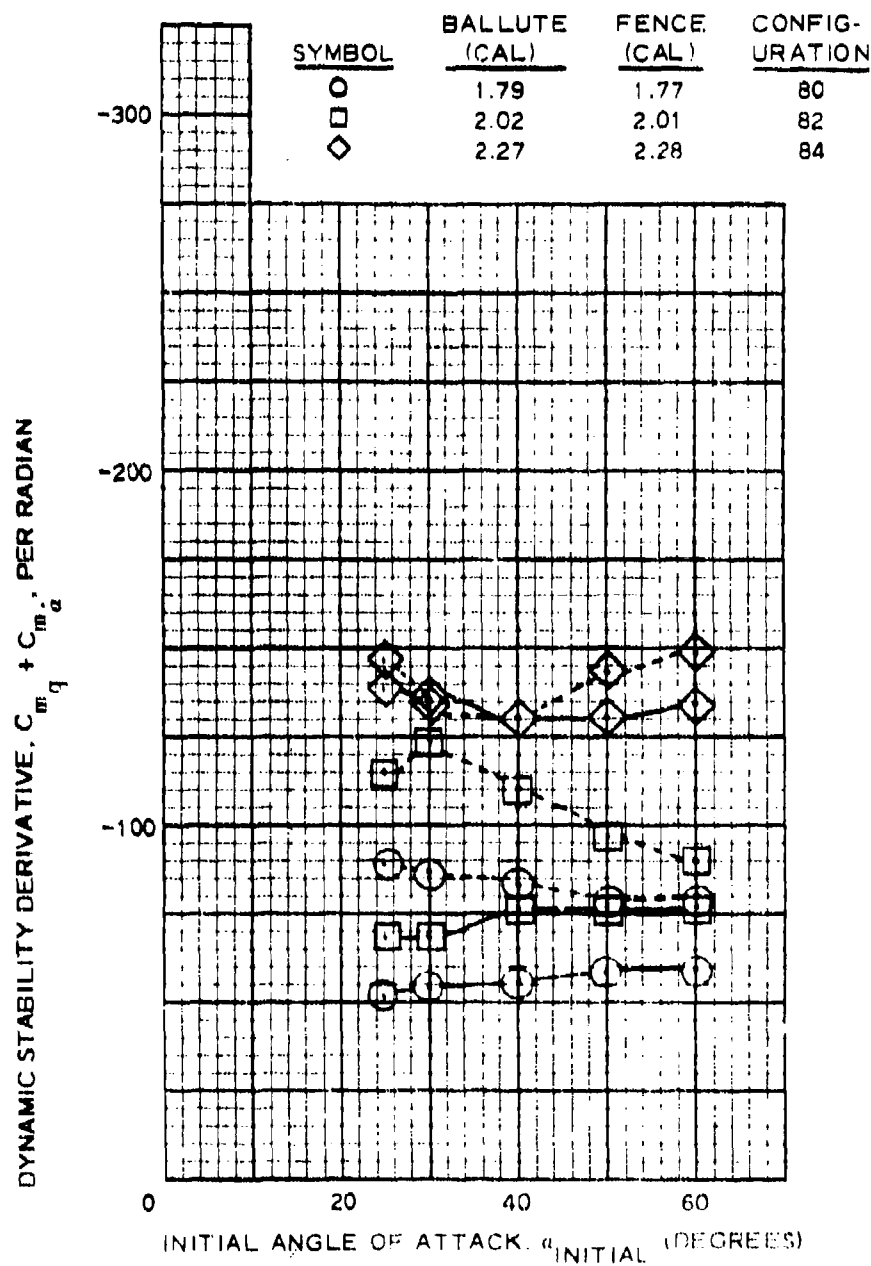


Figure 257. Effect of Ballute Size on Dynamic Stability of 5.0-Caliber Bomb

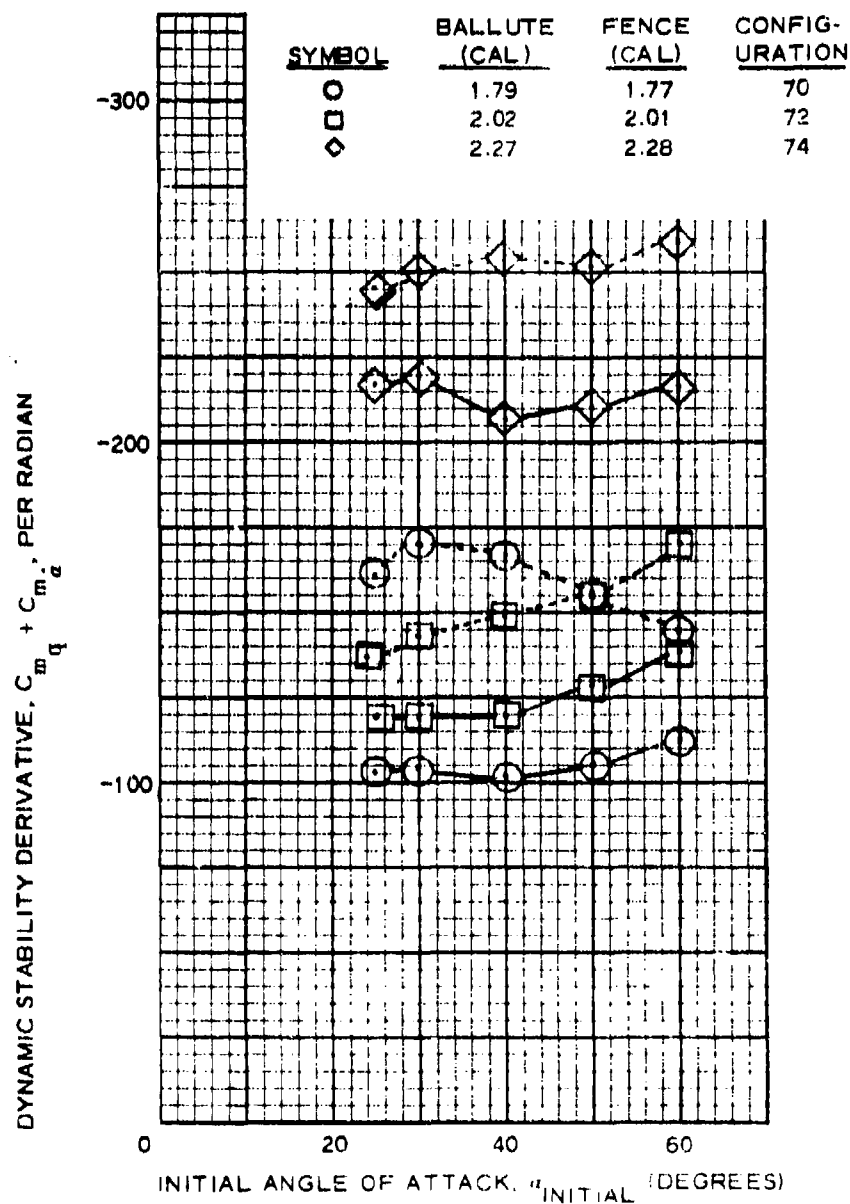


Figure 258. Effect of Ballute Size on Dynamic Stability of 7.0-Caliber Bomb

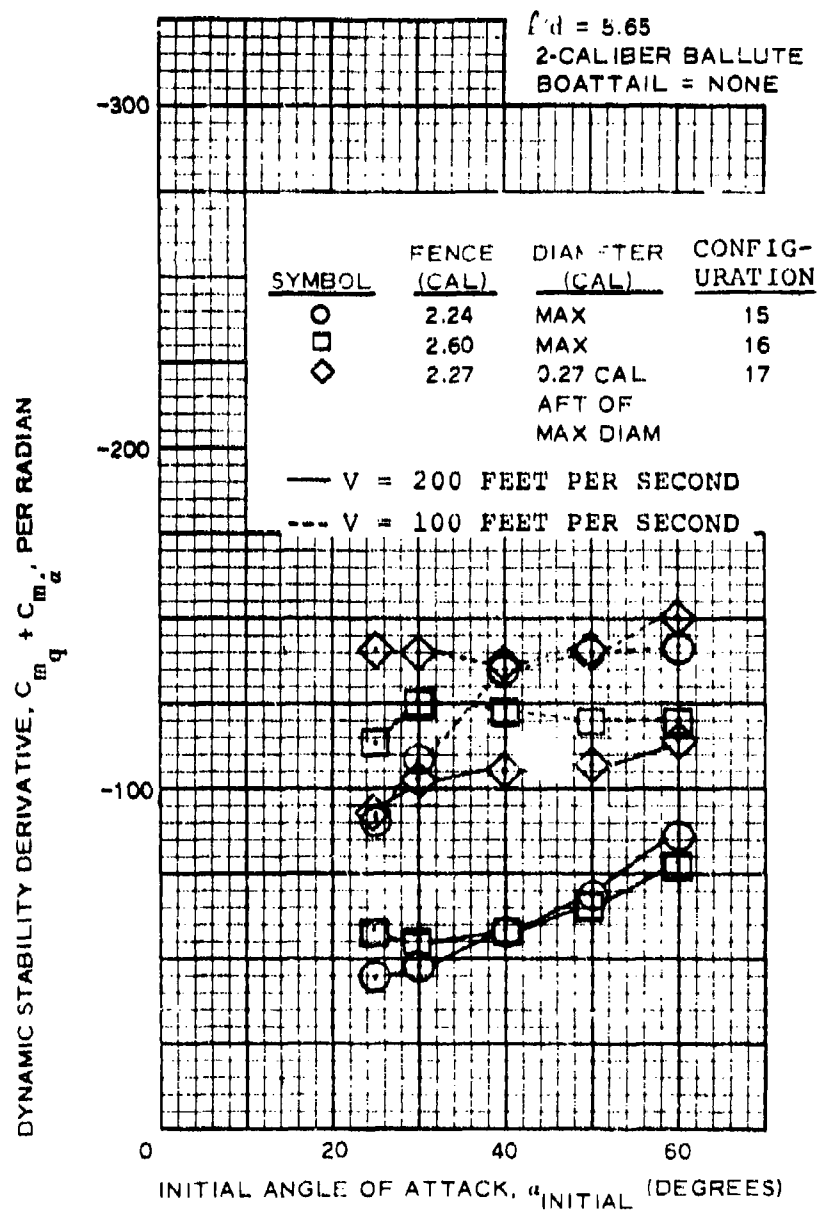


Figure 259. Effect of Ballute Burbule Fence Variables on Dynamic Stability of 5.65-Caliber Bomb

SYM- BOL	CONFIG- URATION	ℓ/d	TYPE FENCE
○	72	7	2.01 CALIBER, SET BACK 0.25 CAL
□	82	5	2.01 CALIBER, SET BACK 0.25 CAL
◇	91	3	2.01 CALIBER, SET BACK 0.25 CAL
△	17	5.65	2.27 CALIBER, SET BACK 0.27 CAL
◻	15	5.65	2.24 CALIBER
◊	16	5.65	2.60 CALIBER

V = 100 FPS
STABILIZER = 2.0 CALIBER
BALLUTE

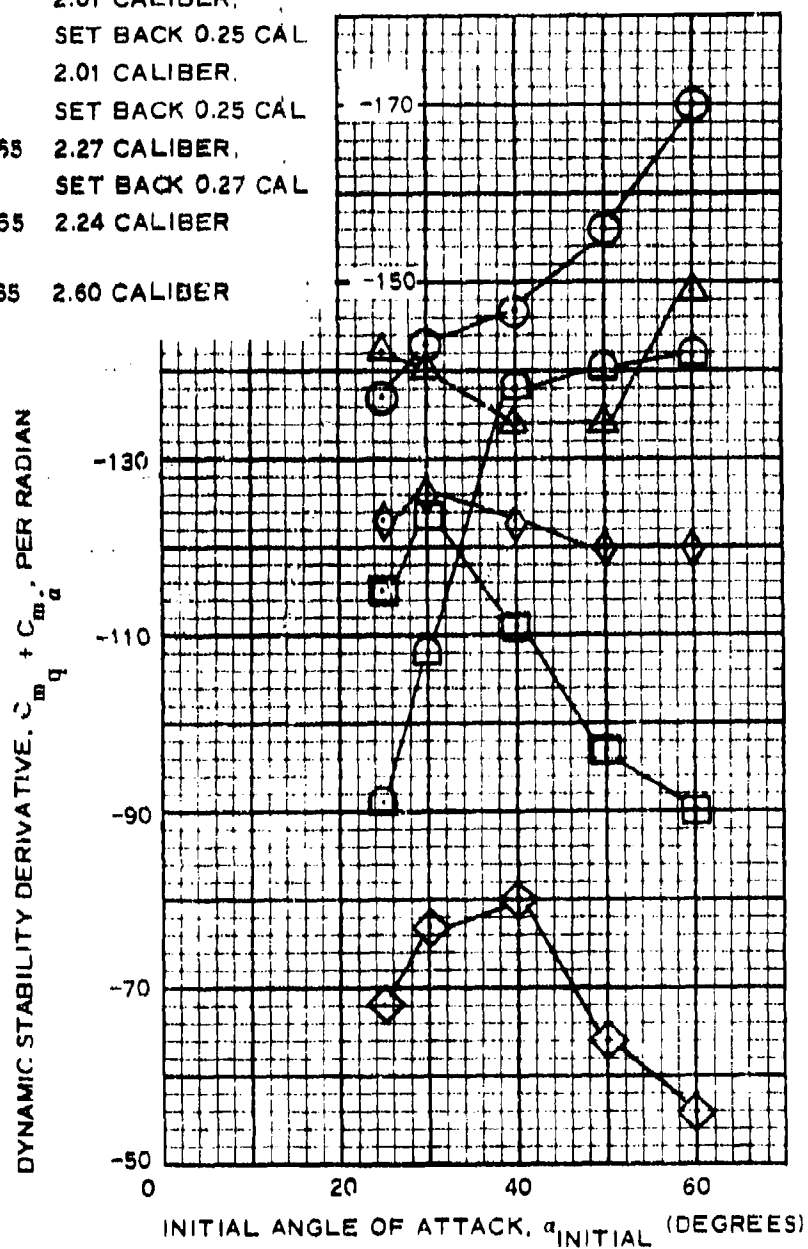


Figure 260. Combined Effects of Fineness Ratio and Burble Fence on Dynamic Stability: V = 100 FPS, Stabilizer = 2.0-Caliber Ballute

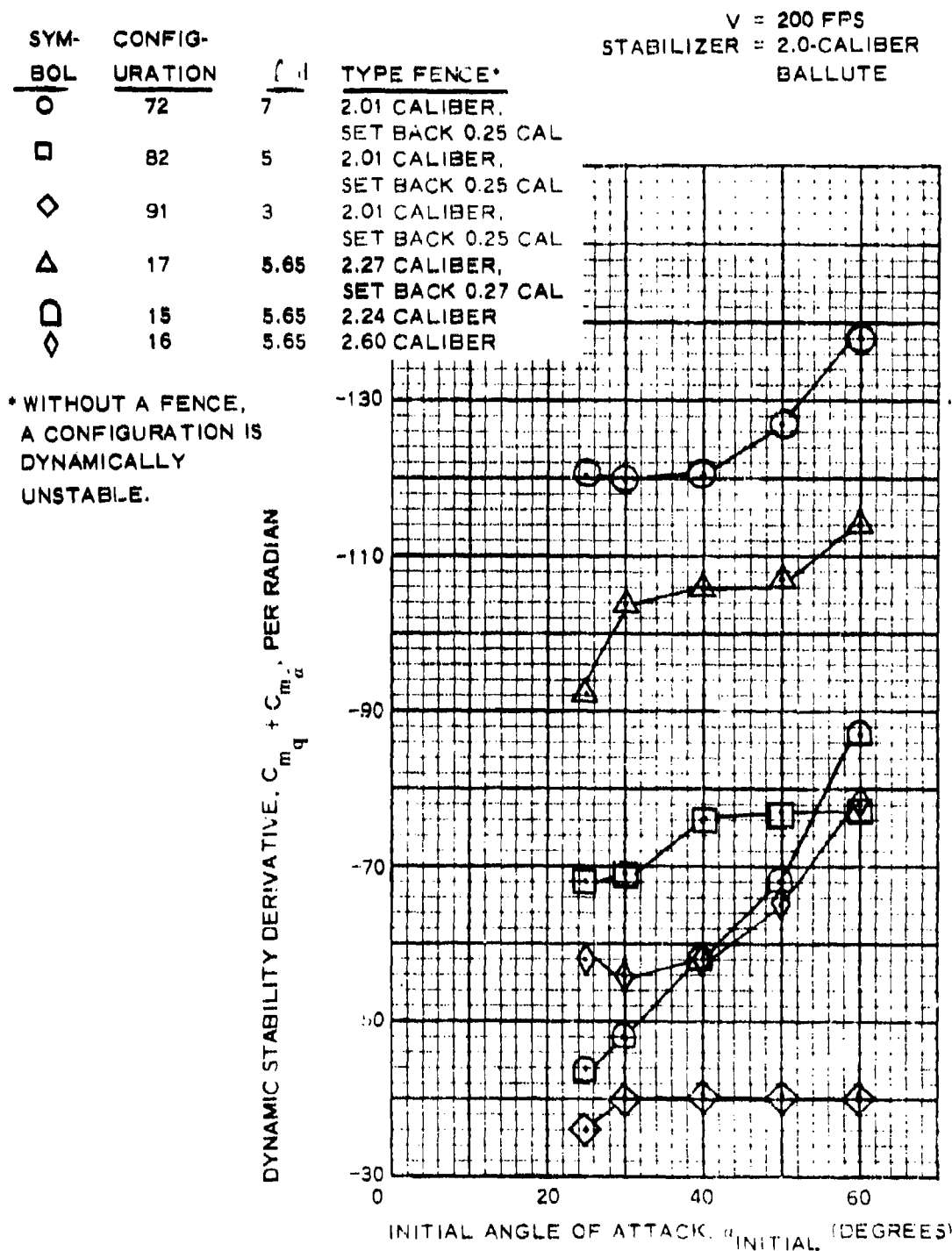
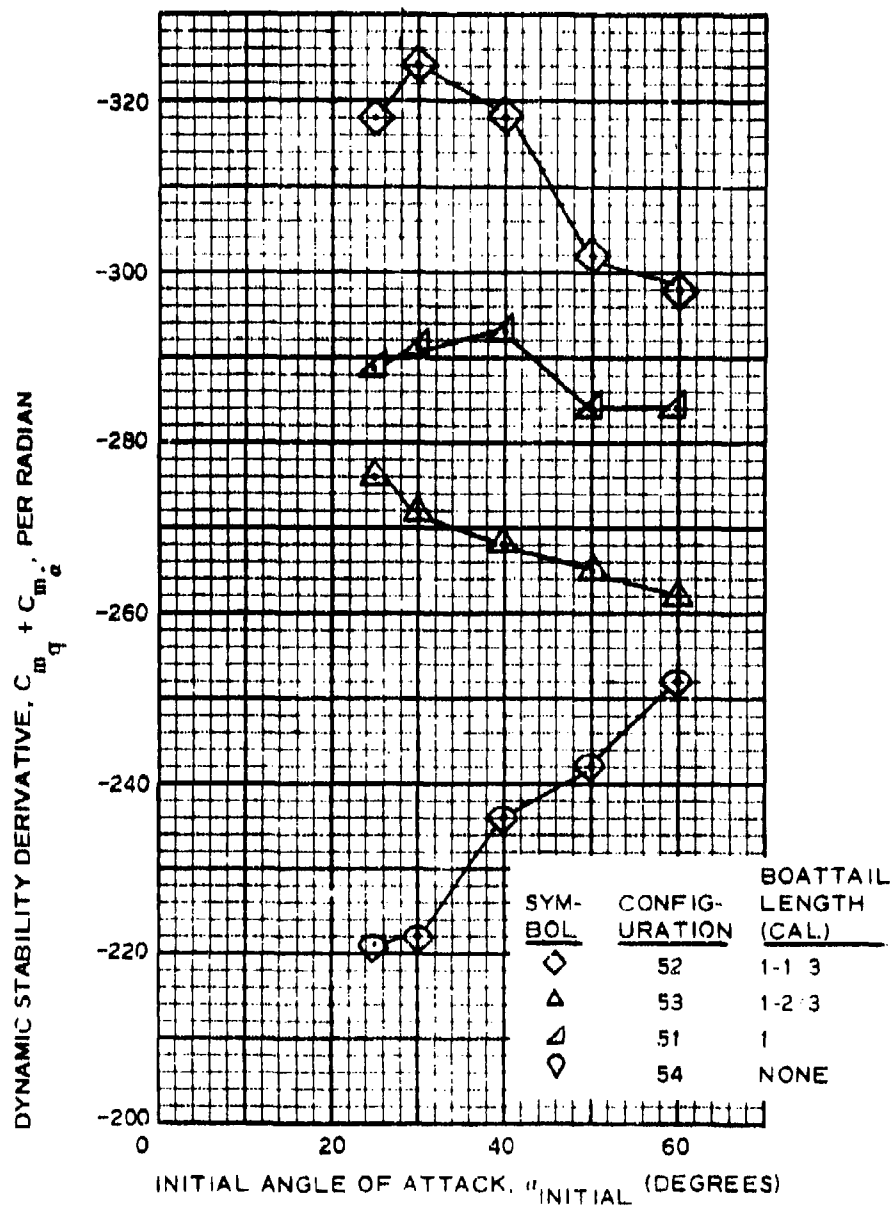
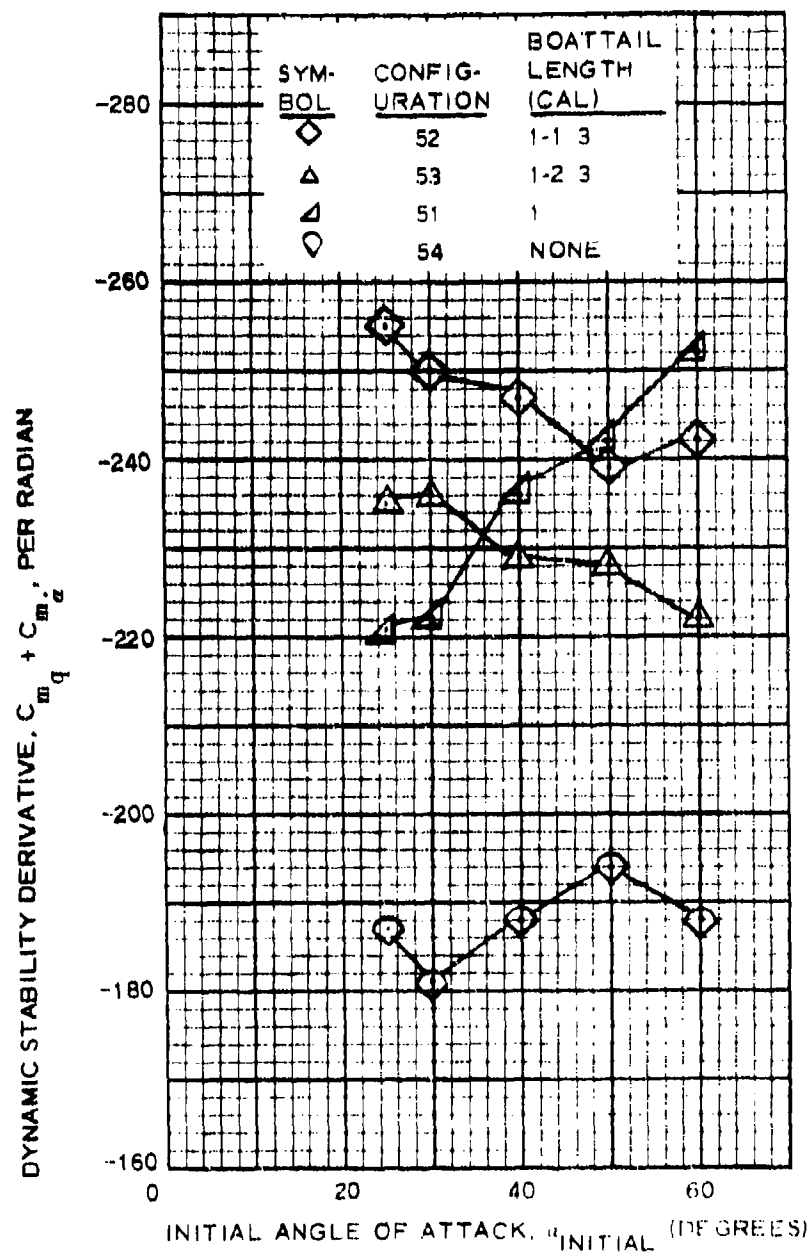


Figure 261. Combined Effects of Fineness Ratio and Burble Fence on Dynamic Stability: V = 200 FPS, Stabilizer = 2.0-Caliber Ballute



V = 100 FPS
 2.0-CALIBER BALLUTE
 $\ell/d = 7.7$

Figure 262. Effects of Boattail Length on Dynamic Stability: V = 100 FPS, 2.0-Caliber Ballute $\ell/d = 7.7$



$V = 200$ FEET PER SECOND
 2.0-CALIBER BALLUTE
 $\lambda/d = 7.8$

Figure 263. Effects of Boattail Length on Dynamic Stability:
 $V = 200$ Feet per Second, 2.0-Caliber Ballute $\lambda/d = 7.8$

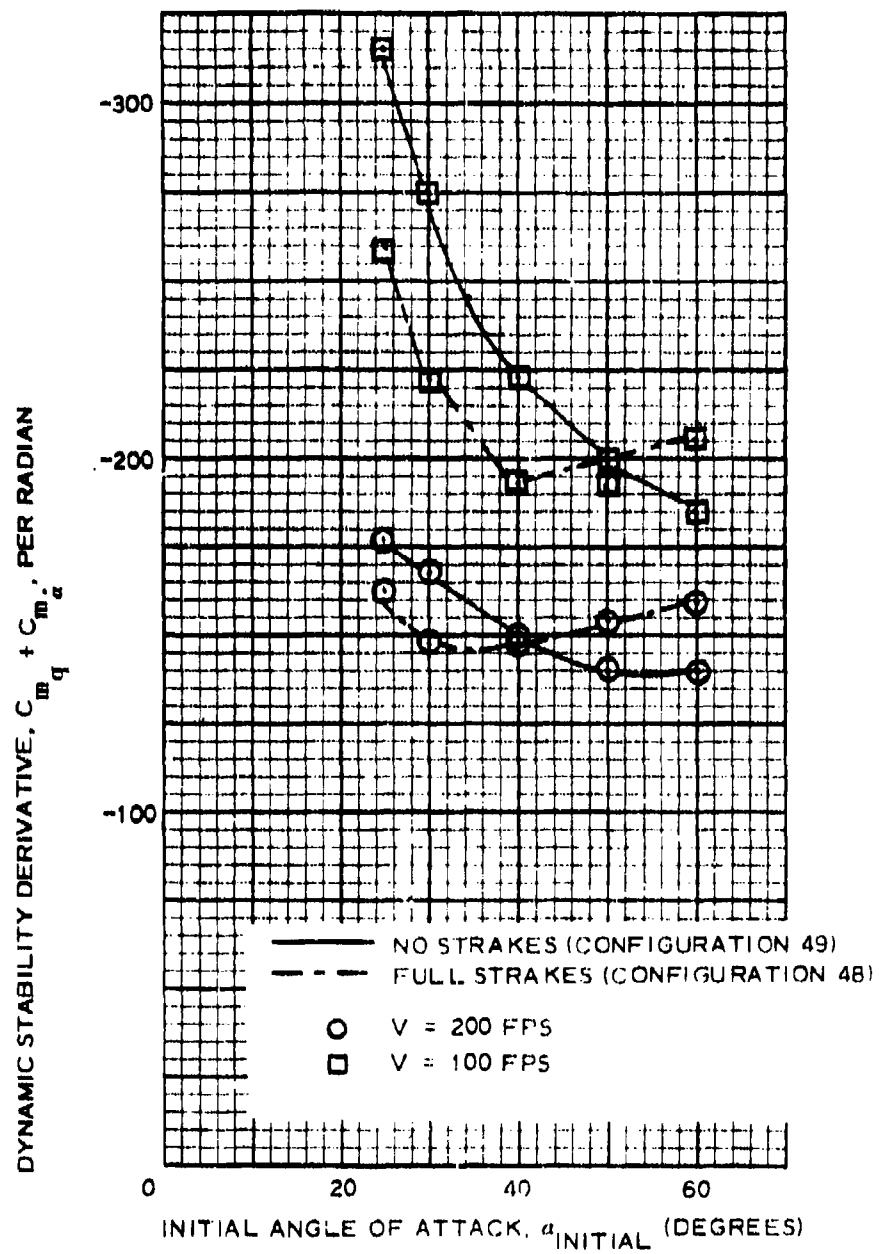


Figure 264. Effects of Boattail Strakes on Dynamic Stability: 1-1/2-Caliber Ballute, 1-Caliber Boattail, $L/d = 7.7$

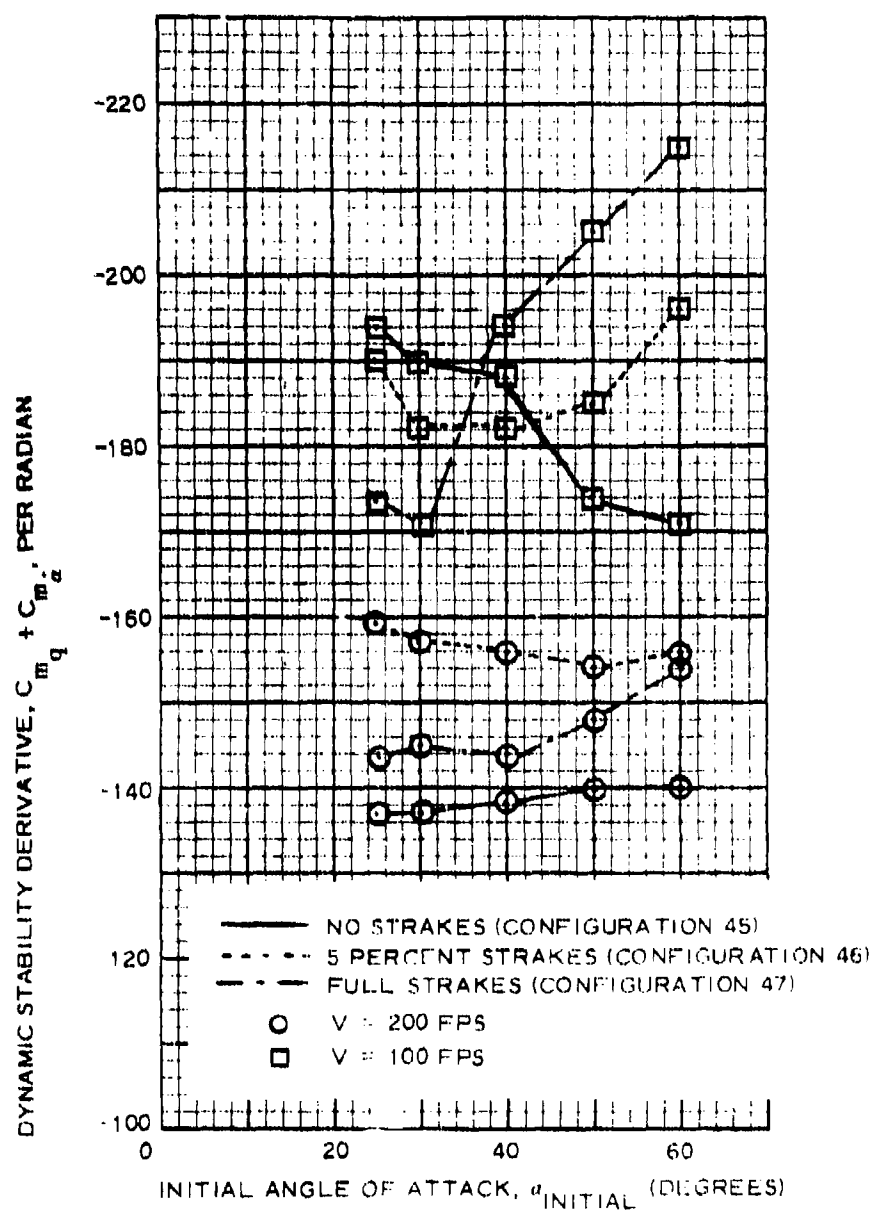


Figure 265. Effects of Boattail Strakes on Dynamic Stability: 1-1/2-Caliber Ballute, 1-2/3-Caliber Boattail, 2.0-Caliber Ogive Nose, $\rho d = 7.7$

SYM- BOL	CONFIG- URATION	BOATTAIL LENGTH (CAL)	STRAKES (CAL)
○	42	1-1/3	0.05 HIGH
□	43	1-1/3	FULL
◇	44	1-1/3	NONE
△	45	1-2/3	NONE
◻	46	1-2/3	0.05 HIGH
◊	47	1-2/3	FULL
◈	48	1	FULL
◉	49	1	NONE
◊	50	NONE	NONE

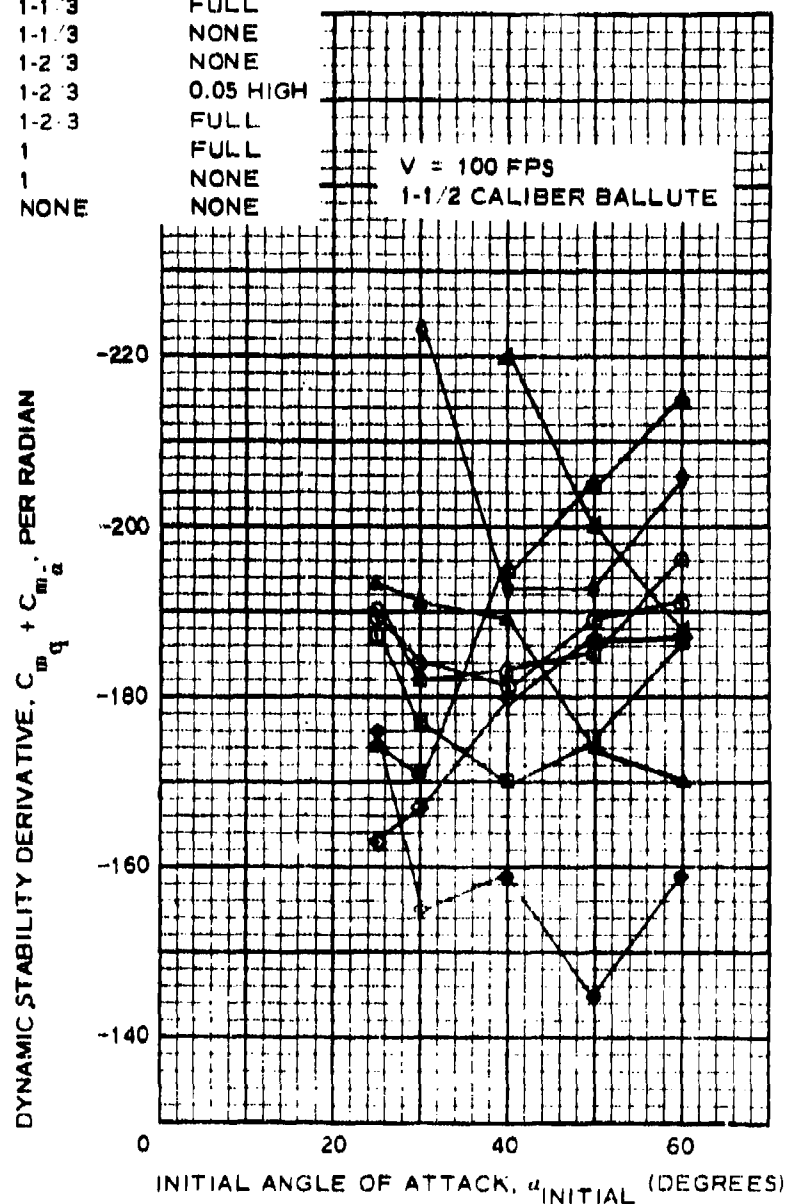


Figure 266. Effect of Various Boattail Characteristics on Dynamic Stability:
 $V = 100 \text{ FPS}$, $1\text{-}1/2\text{-Caliber Ballute}$

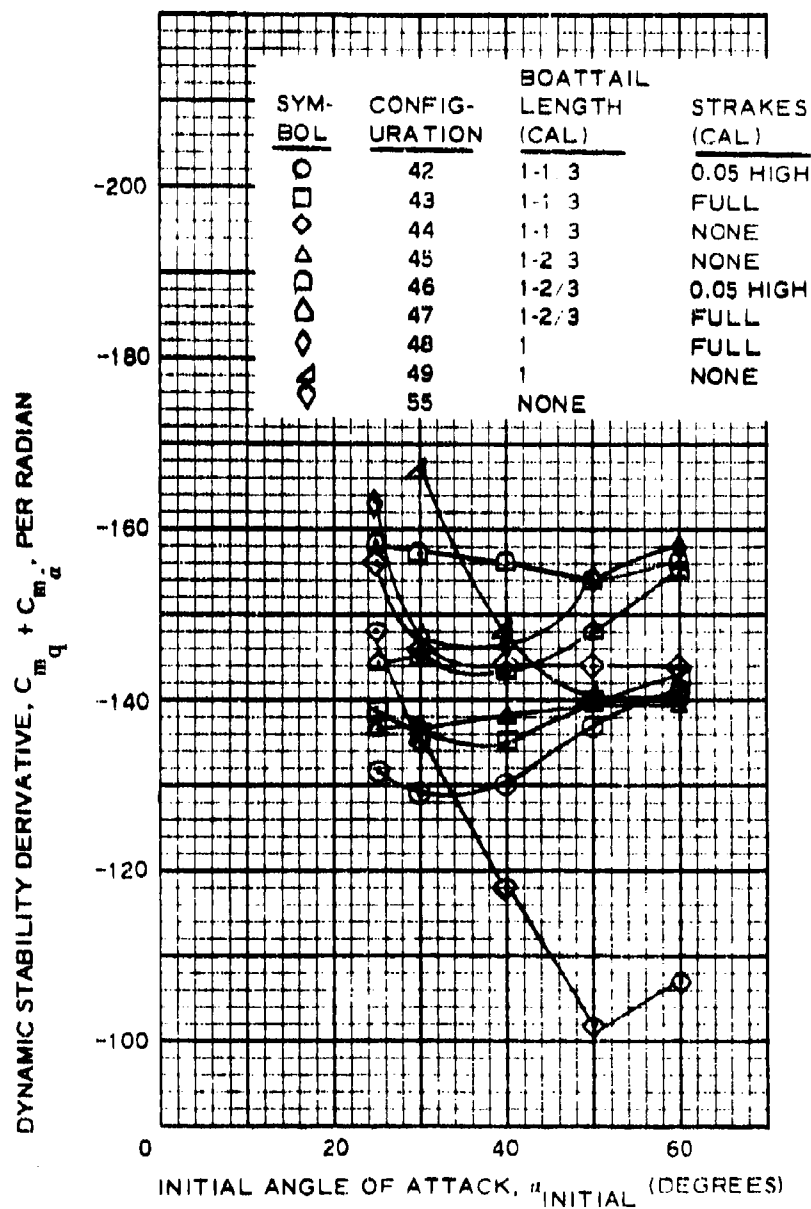
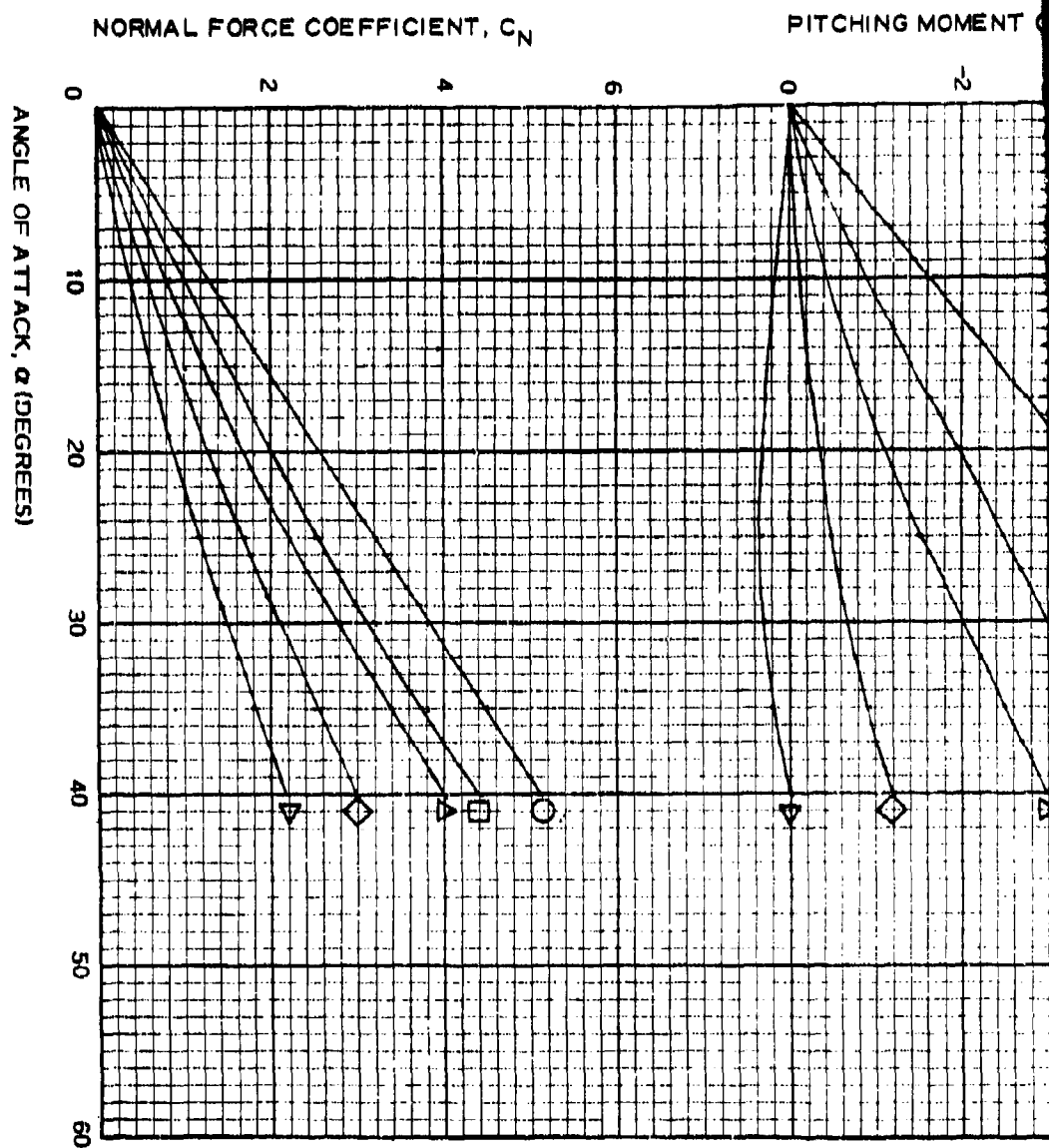


Figure 287. Effects of Various Boattail Characteristics on Dynamic Stability:
 V = 200 FPS, 1-1 1/2-Caliber Ballute

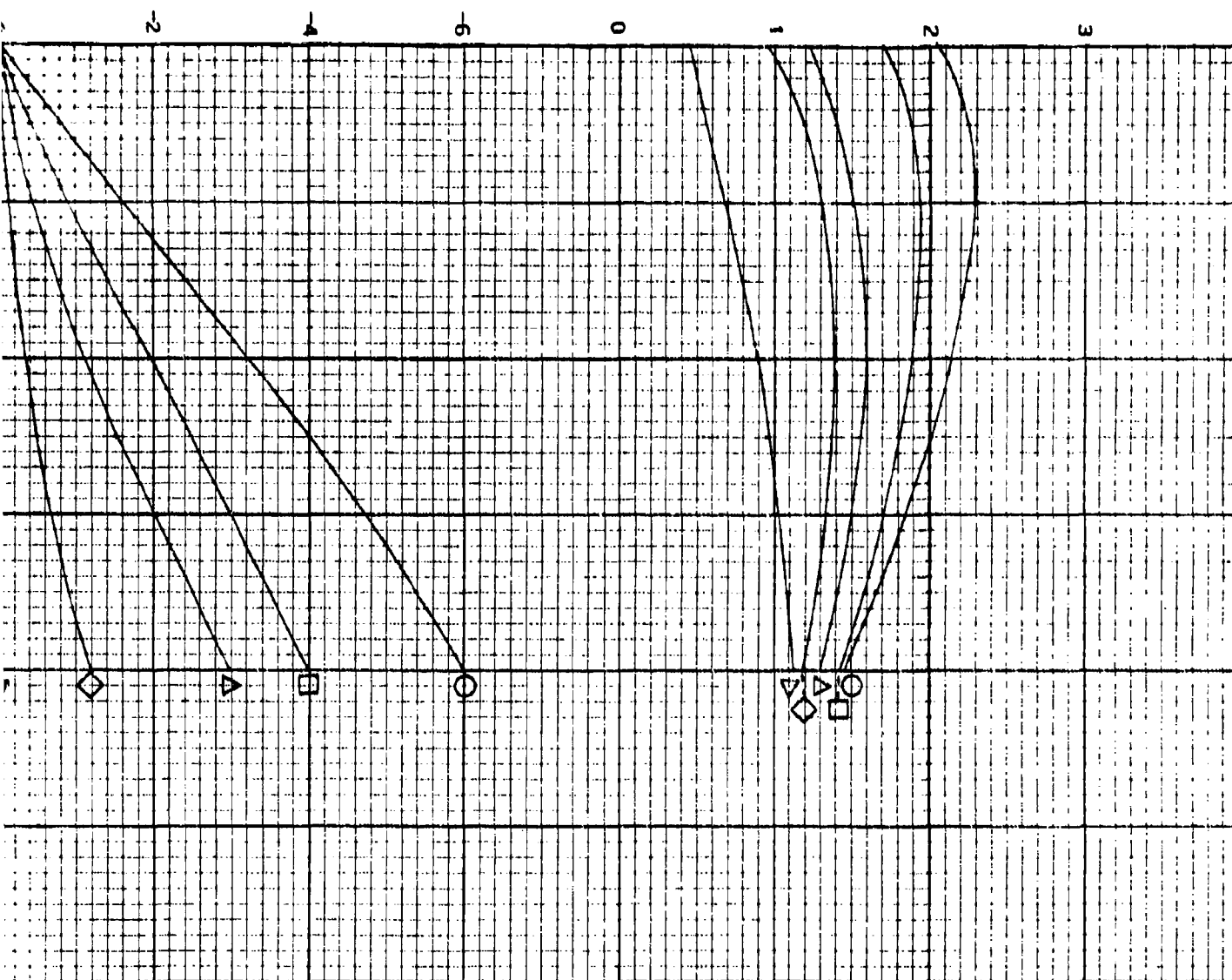


$$S_{REF} = \frac{\pi D^2}{4} \text{ CYLINDER}$$

$L_{REF} = D \text{ CYLINDER}$

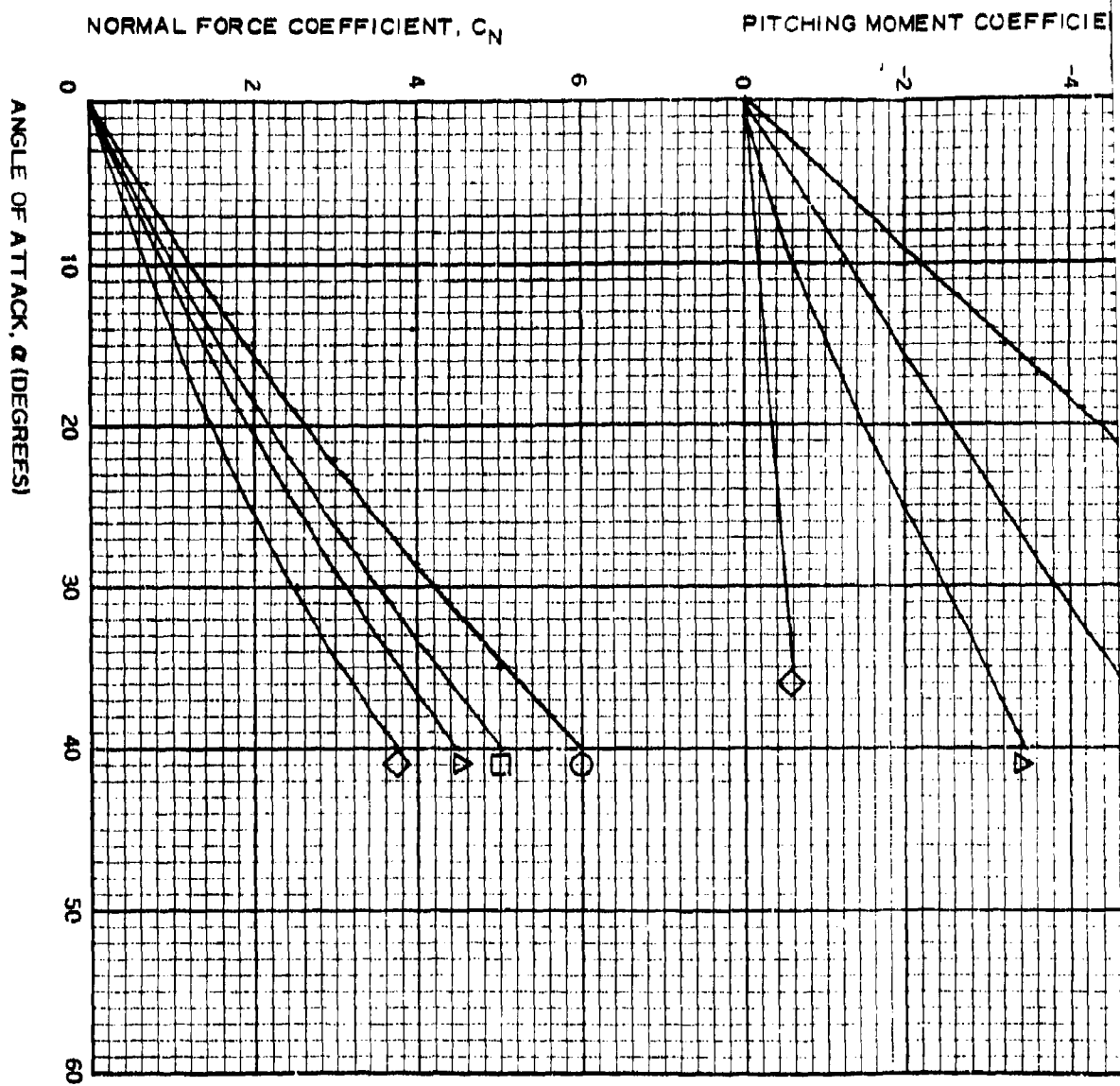
PITCHING MOMENT COEFFICIENT, C_m

AXIAL FORCE COEFFICIENT, C_A



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permit fully legible reproduction

Figure 268. Effect of Ballute Size on Static Aerodynamics of 3.0-Caliber Flat-Nosed Bomb with 1.1 Caliber Trip and Ballute Stabilizer with Fence



SYM- BOL	CONFIG- URATION	BALLUTE (CAL)	FENCE (CAL)	AFT
84		2.27	2.28	
82		2.02	2.01	
80		1.79	1.77	
78		1.55	1.50	

$$S_{REF} = \frac{\pi D^2}{4} \text{ CYLINDER}$$

$$f_{REF} = D \text{ CYLINDER}$$

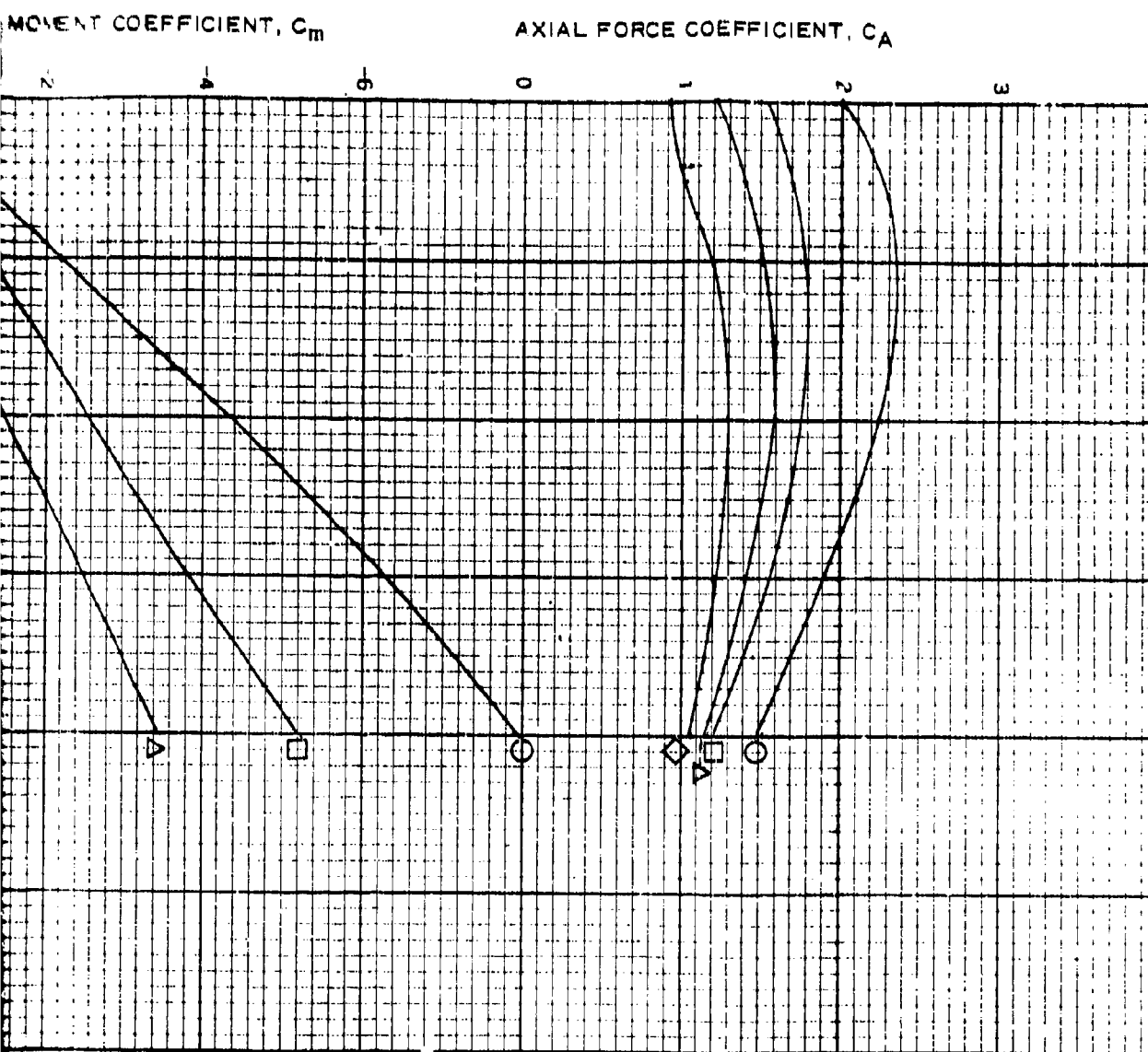
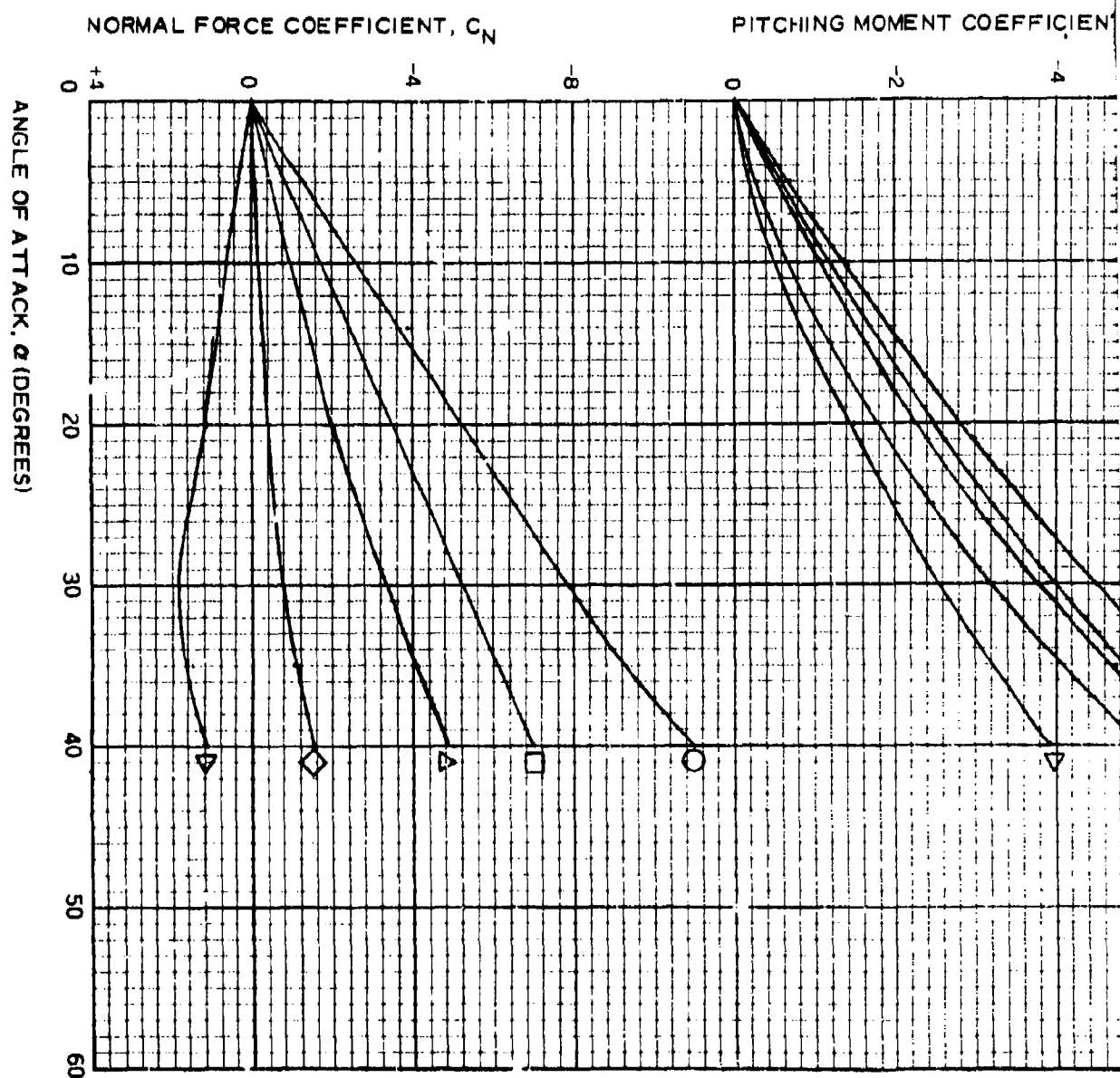


Figure 269. Effect of Ballute Size on Static Aerodynamics of 5.0-Caliber Flat-Nosed Bomb with 1.1-Caliber Trip Ring and Ballute Stabilizer with Fence

○ □ ▽ ◇ ▽



$$S_{REF} = \frac{\pi D^2}{4} \text{ CYLINDER}$$

$$f_{REF} = D \text{ CYLINDER}$$

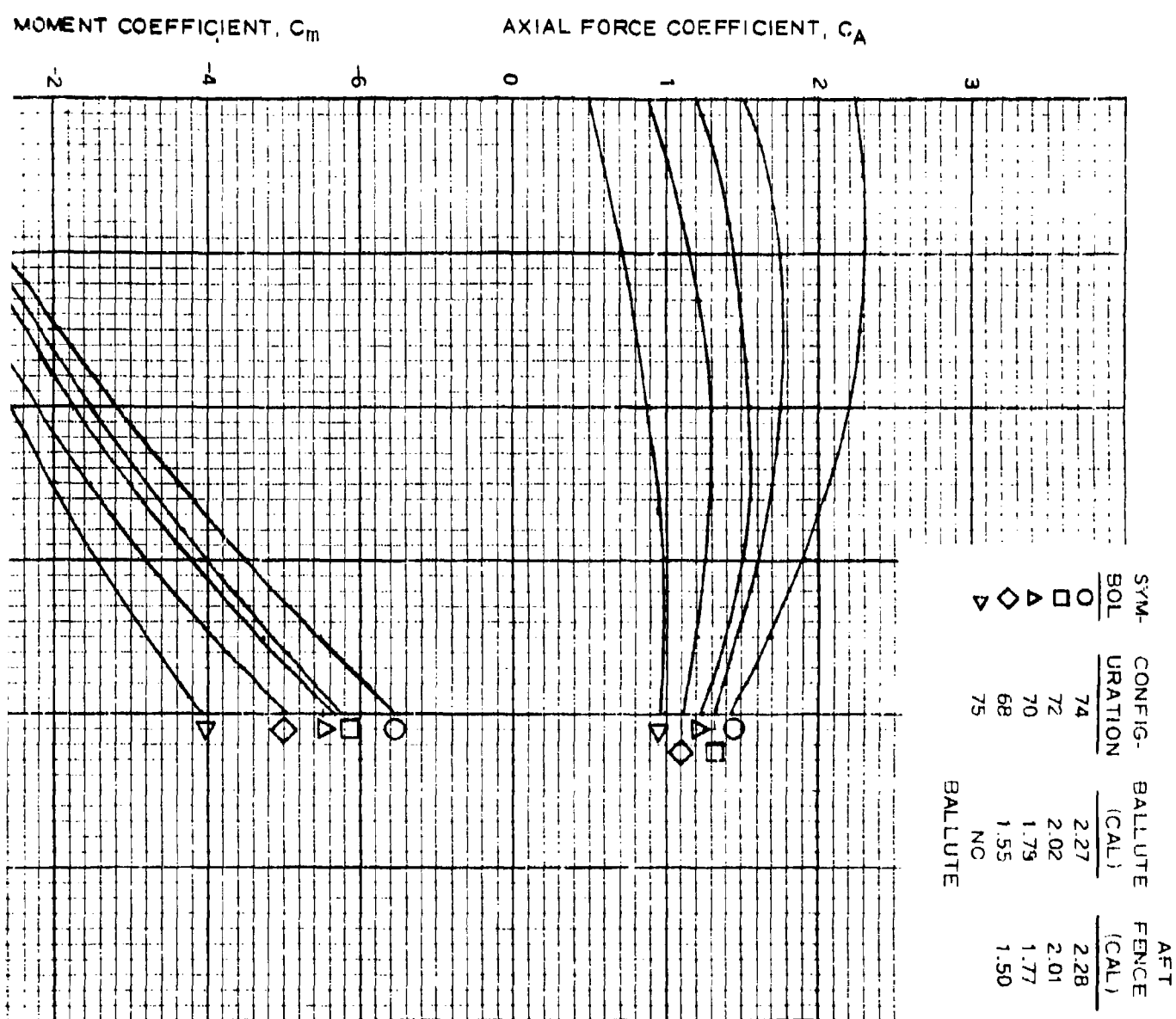
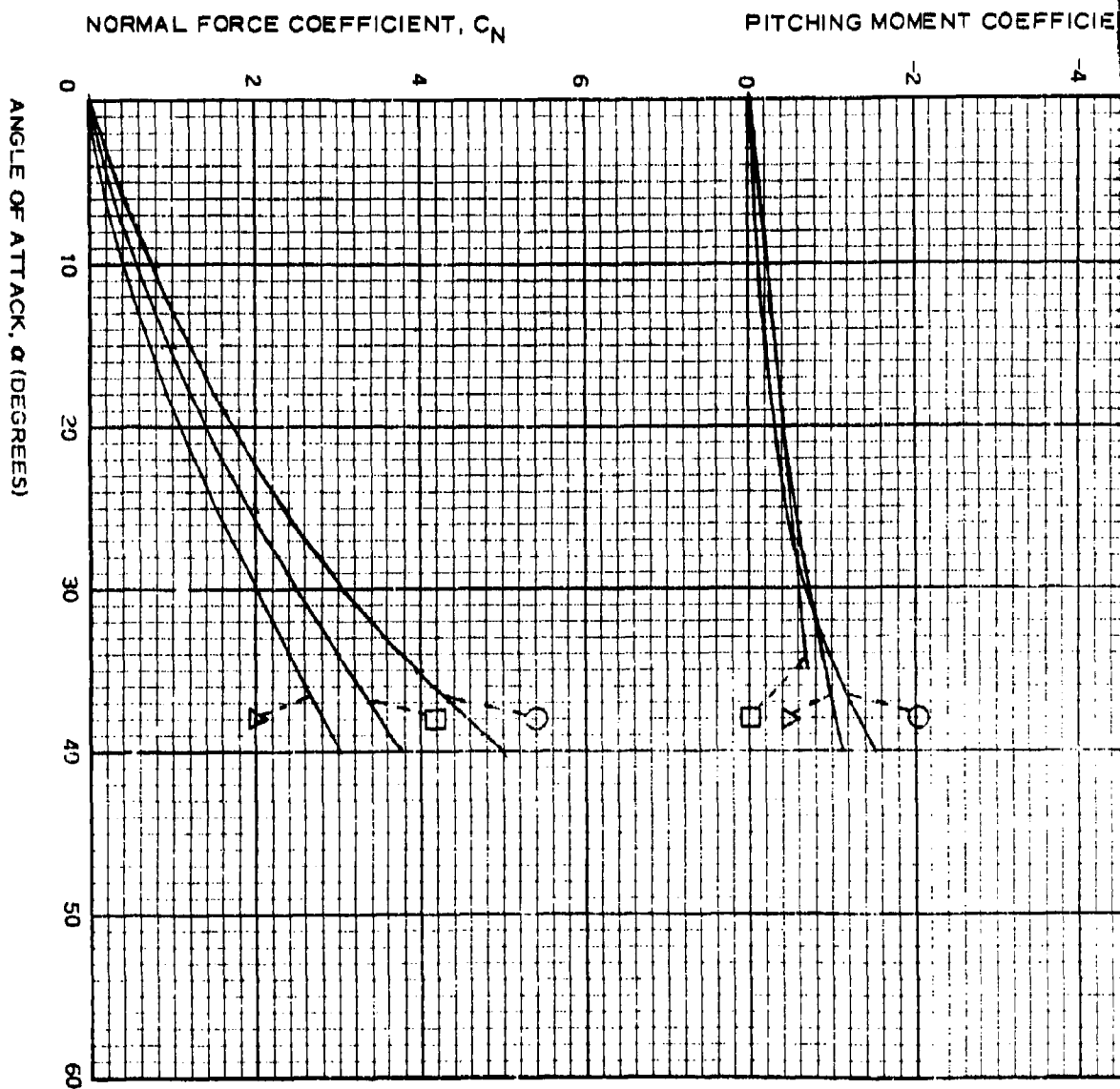


Figure 270. Effect of Ballute Size on Static Aerodynamics of 7.0-Caliber Flat-Nosed Bomb with 1.1-Caliber Trip Ring and Ballute Stabilizer with Fence



SYM- BOL	CONF- URATION	l/d
○	68	7.0
□	78	5.0
△	87	3.0

$$S_{REF} = \frac{\pi D^2}{4} \text{ CYLINDER}$$

$l_{REF} = D \text{ CYLINDER}$

IG MOMENT COEFFICIENT, C_m

AXIAL FORCE COEFFICIENT, C_A

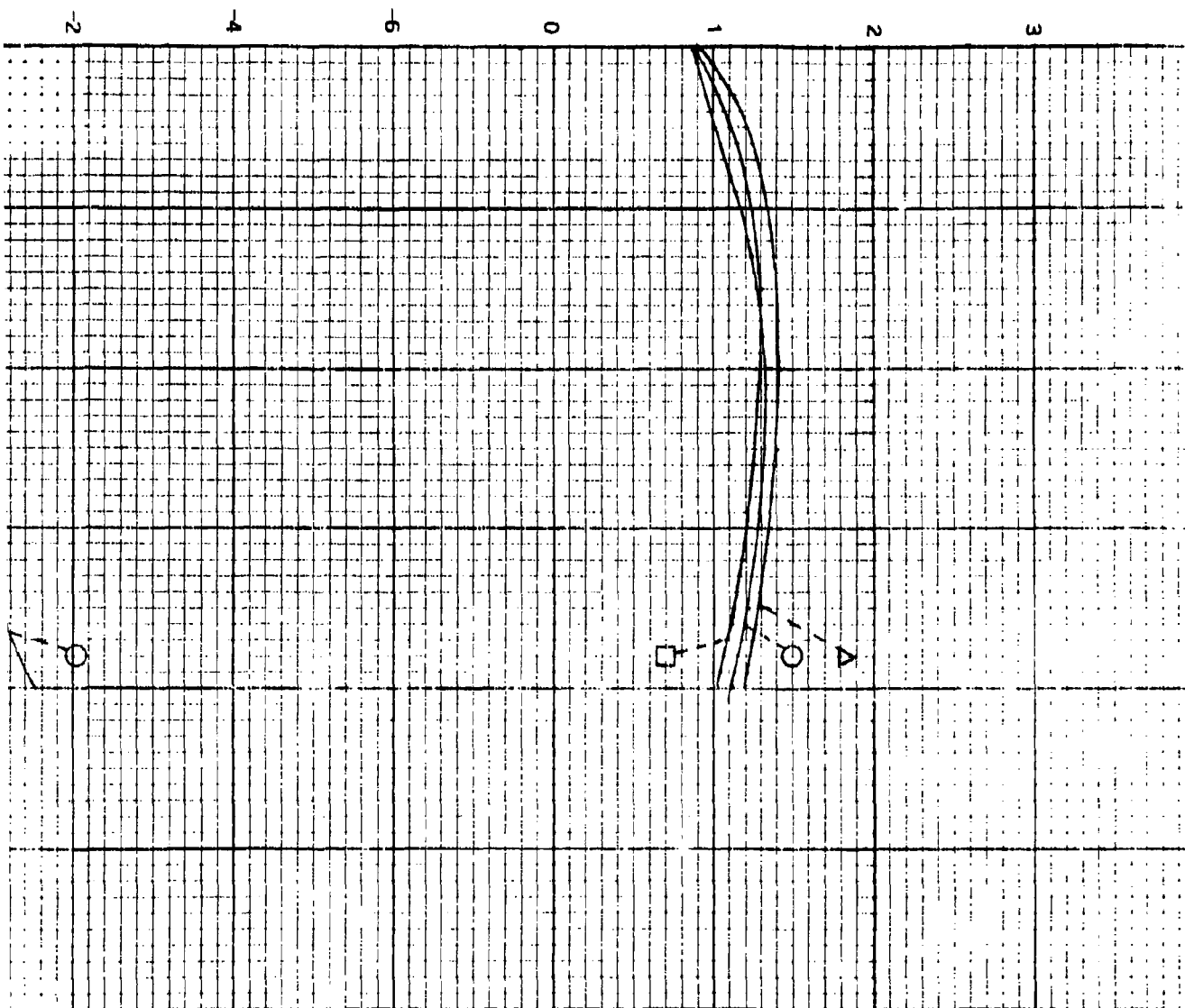
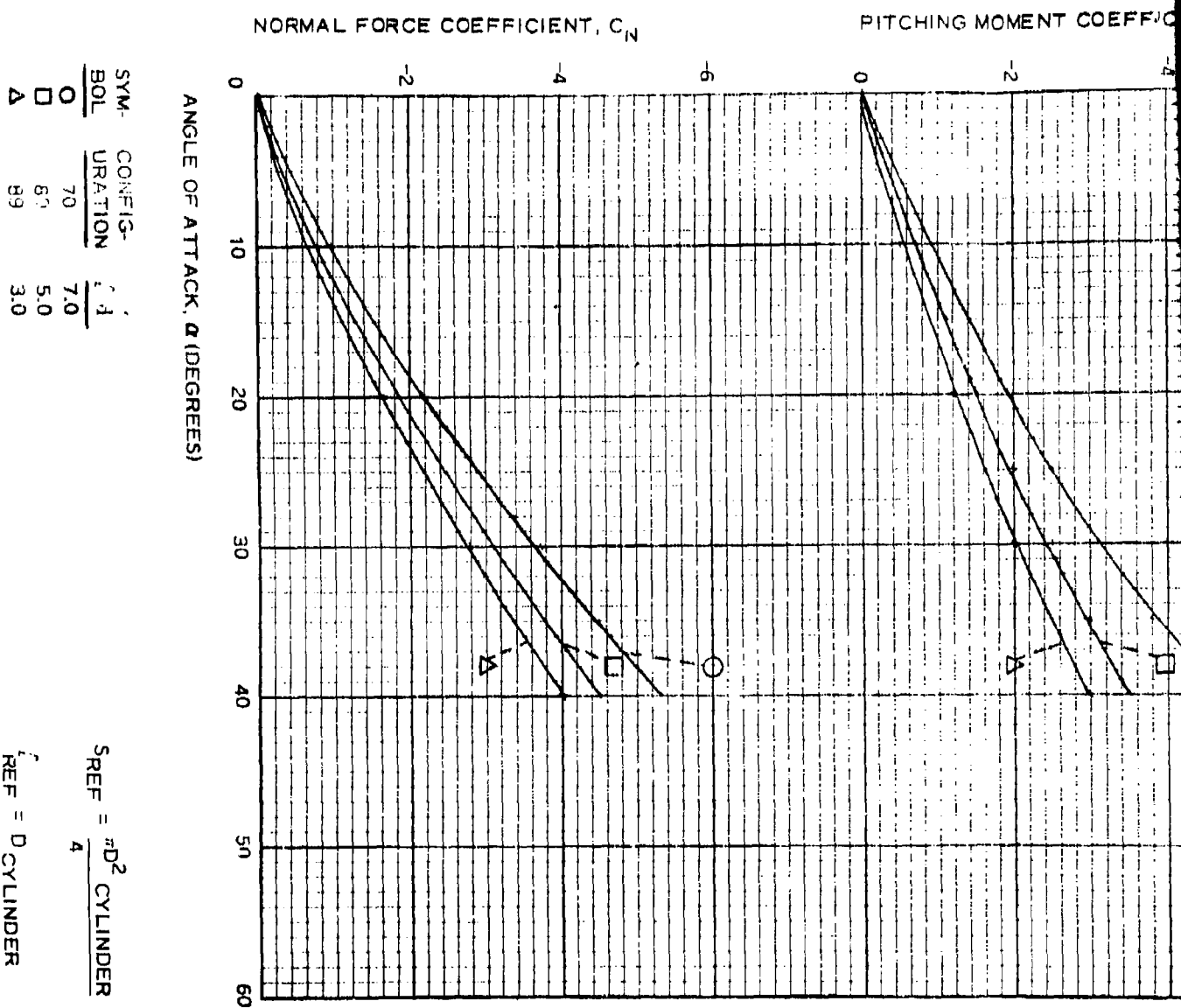


Figure 271. Effect of Fineness Ratio on Static Aerodynamics of Flat-Nosed Bomb with 1.1-Caliber Trip Ring and 1.5-Caliber Ballute Stabilizer with Aft Fence



ROLLING MOMENT COEFFICIENT, C_m

AXIAL FORCE COEFFICIENT, C_A

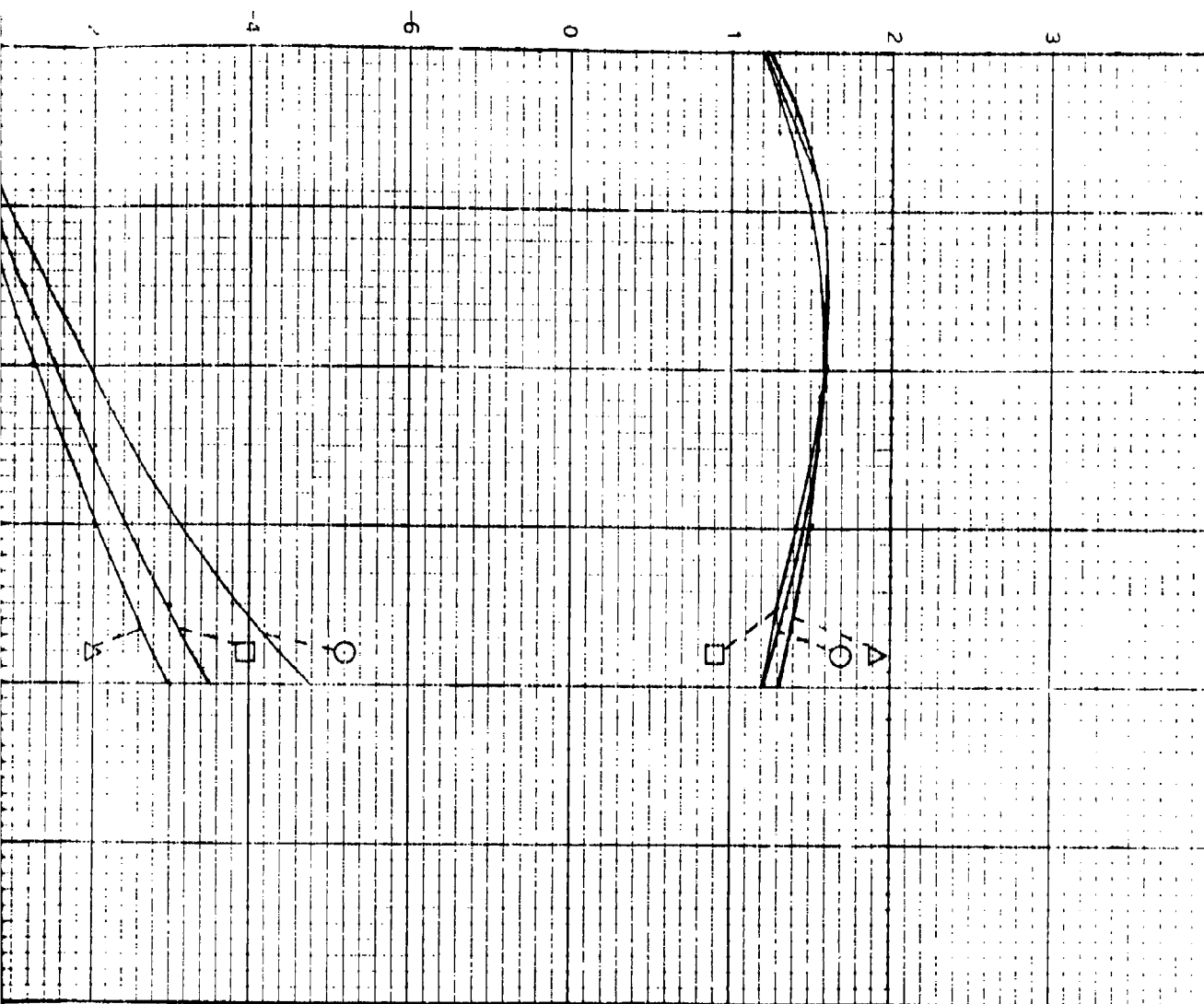
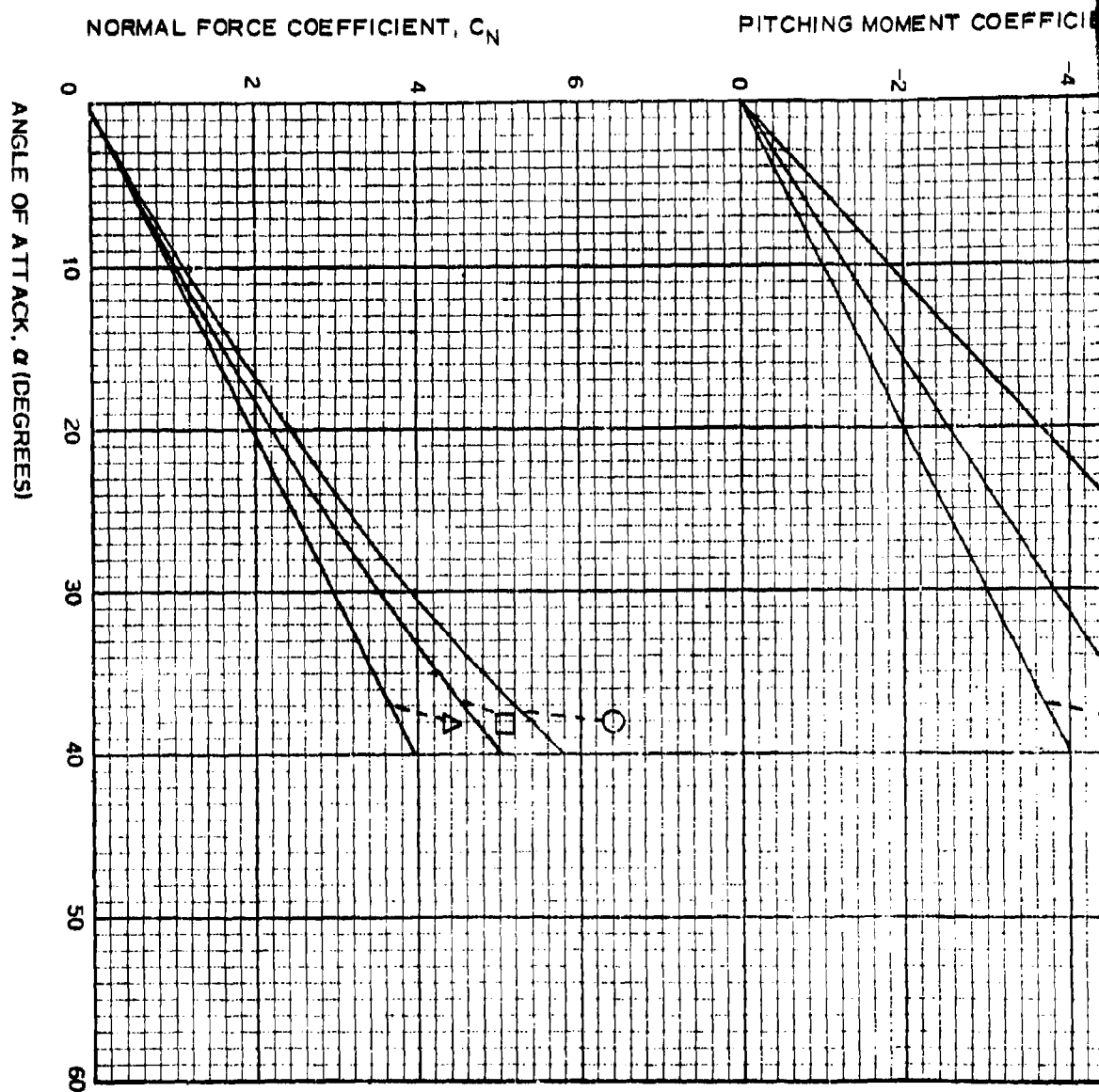


Figure 272. Effect of Fineness Ratio on Static Aerodynamics of Flat-Nosed Bomb with Trip Ring and 1.75 Caliber Ballute Stabilizer with Aft Fence



SYM-	CONFIG-
BOL	URATION
72	7.0
82	5.0
91	3.0

$$S_{REF} = \frac{\pi D^2}{4} \text{ CYLINDER}$$

REF = D CYLINDER

3 MOMENT COEFFICIENT, C_{M3}

AXIAL FORCE COEFFICIENT, C_A

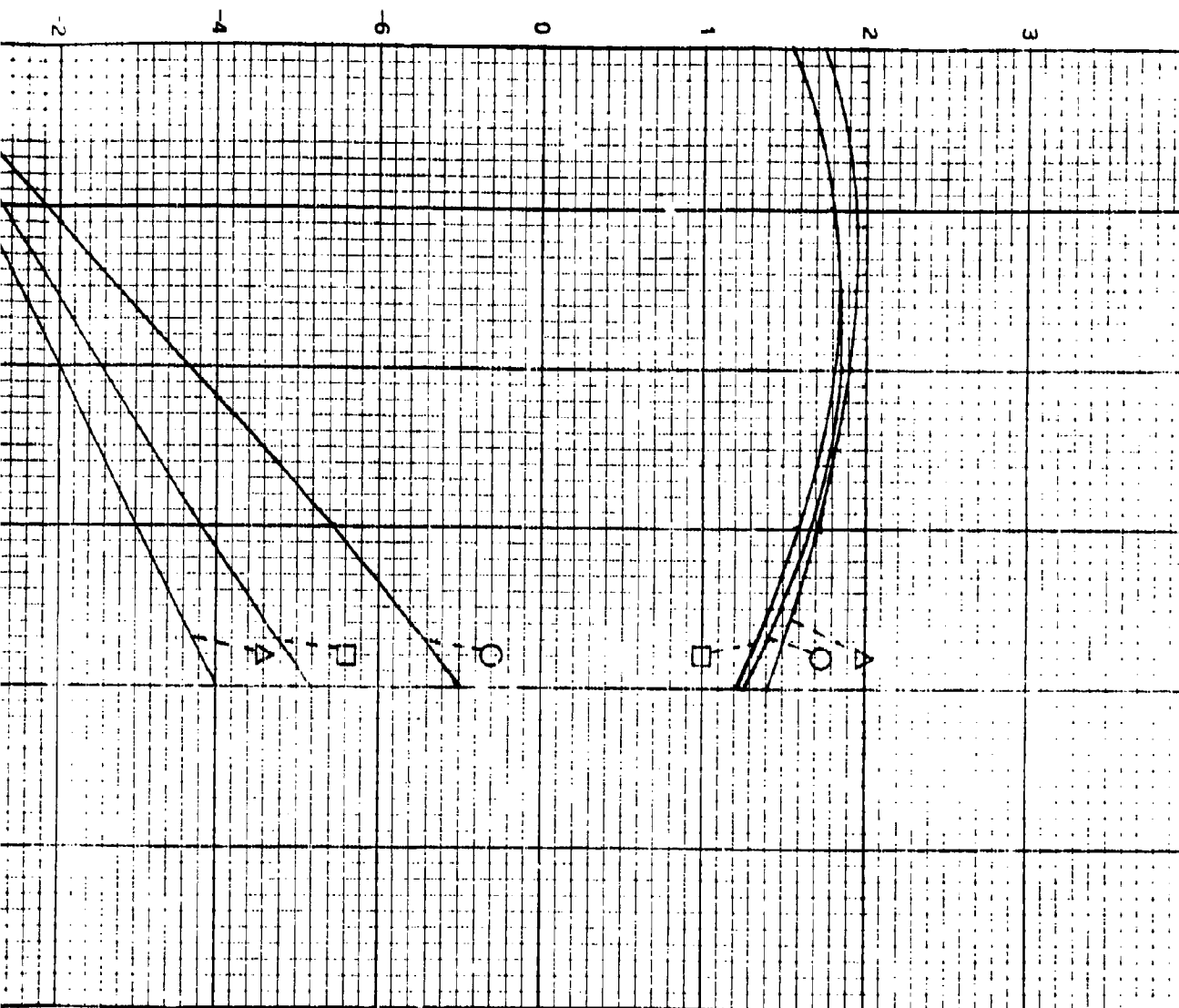
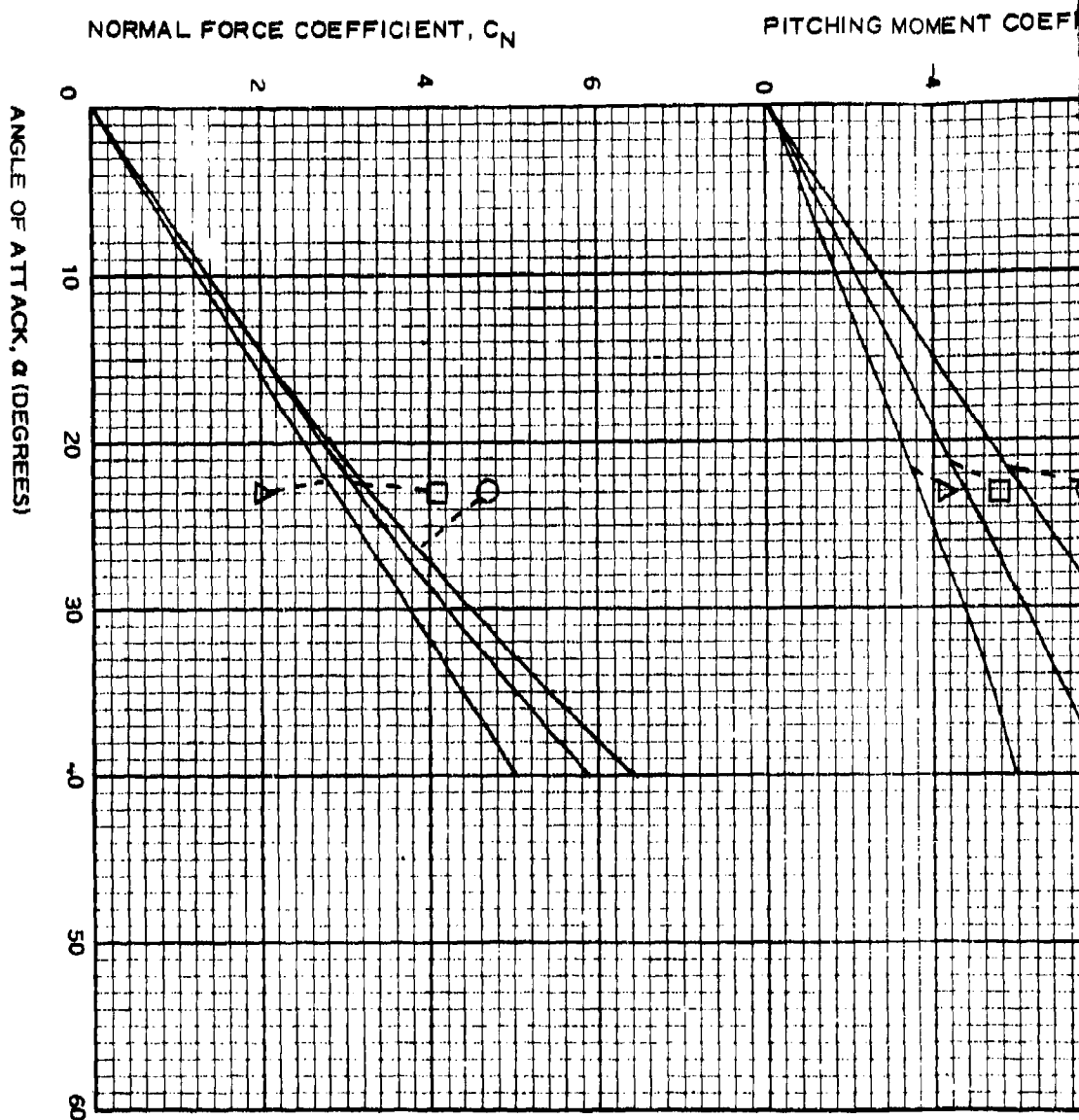


Figure 273. Effect of Fineness Ratio on Static Aerodynamics of Flat-Nosed Bomb with 1.1-Caliber Trip Ring and 2.0-Caliber Ballute with Aft Fence



SYM- BOL	CONFIG- URATION	l/d
74	7.0	7.0
93	5.0	5.0
84	3.0	3.0

$S_{REF} = \frac{\pi D^2}{4}$ CYLINDER
 $l_{REF} = D$ CYLINDER

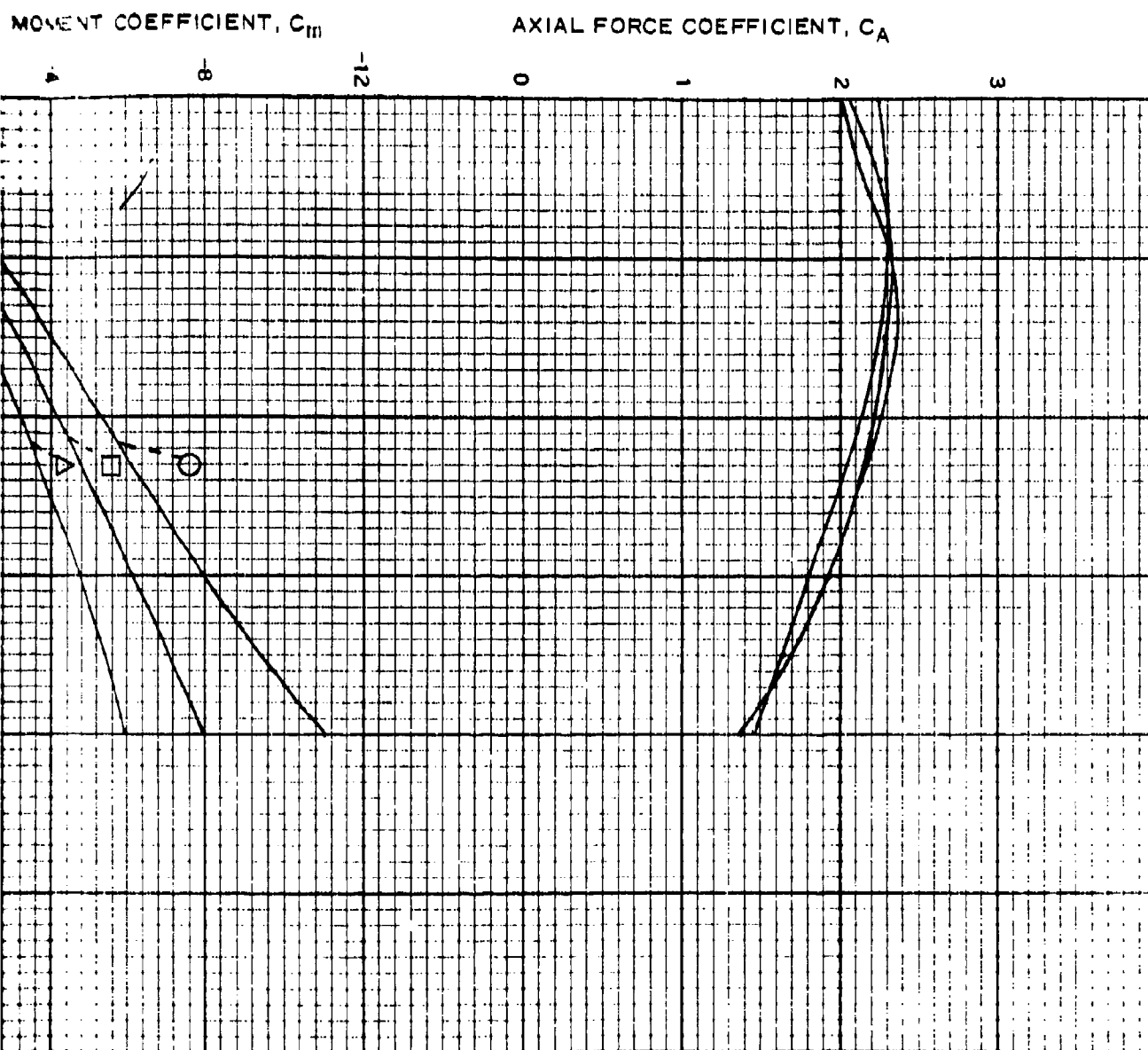
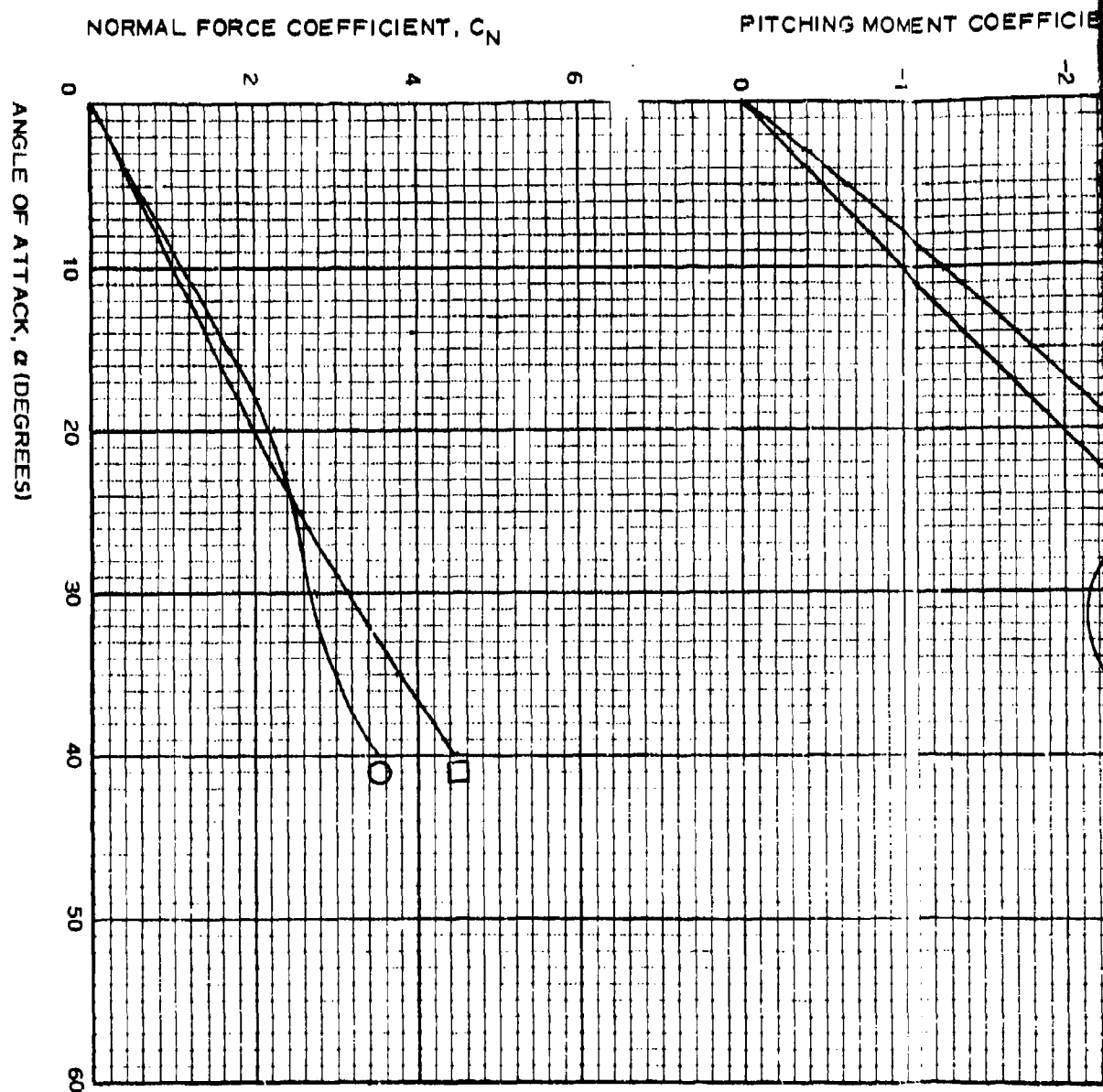


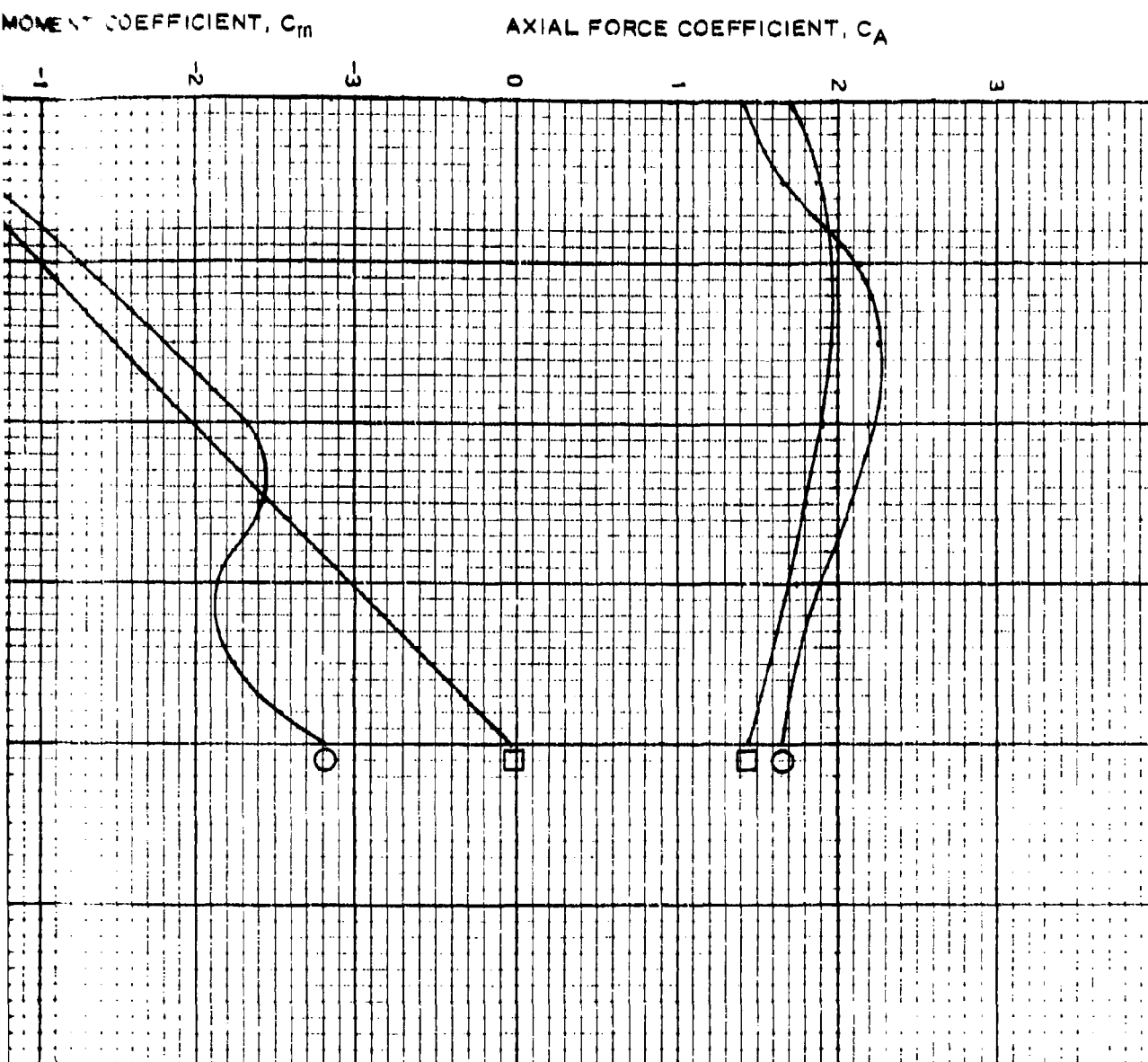
Figure 274. Effect of Fineness Ratio on Static Aerodynamics of Flat-Nosed Bomb with 1.1-Caliber Trip Ring and 2.27-Caliber Ballute with Aft Fence



SYM- CONFIG- FENCE
 BOL- URATION TYPE
 90 BURBLE
 91 AFT

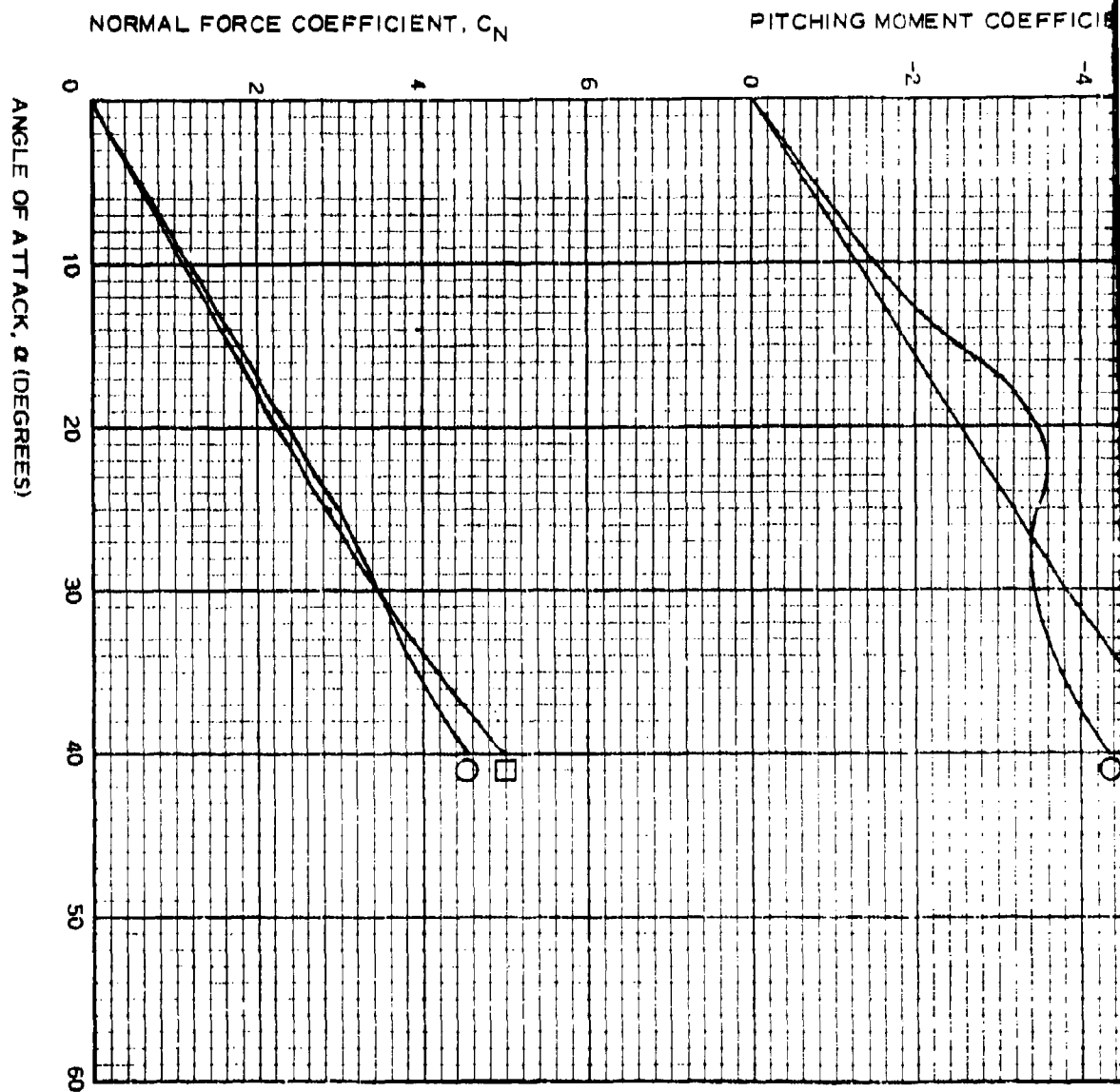
$$S_{REF} = \frac{\pi D^2}{4} \text{ CYLINDER}$$

$S_{REF} = D \text{ CYLINDER}$



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Figure 275. Effect of Burble Fence on the Static Aerodynamics of a 3.0-Caliber Flat-Nosed Bomb with 1.1-Caliber Trip Ring and 2.0-Caliber Ballute Stabilizer



SYM-
 BCL
 CONFIG-
 URATION
 81
 82
 FENCE
 TYPE
 BURBLE
 AFT

$S_{REF} = \frac{\pi D^2}{4}$ CYLINDER
 $C_{REF} = D$ CYLINDER

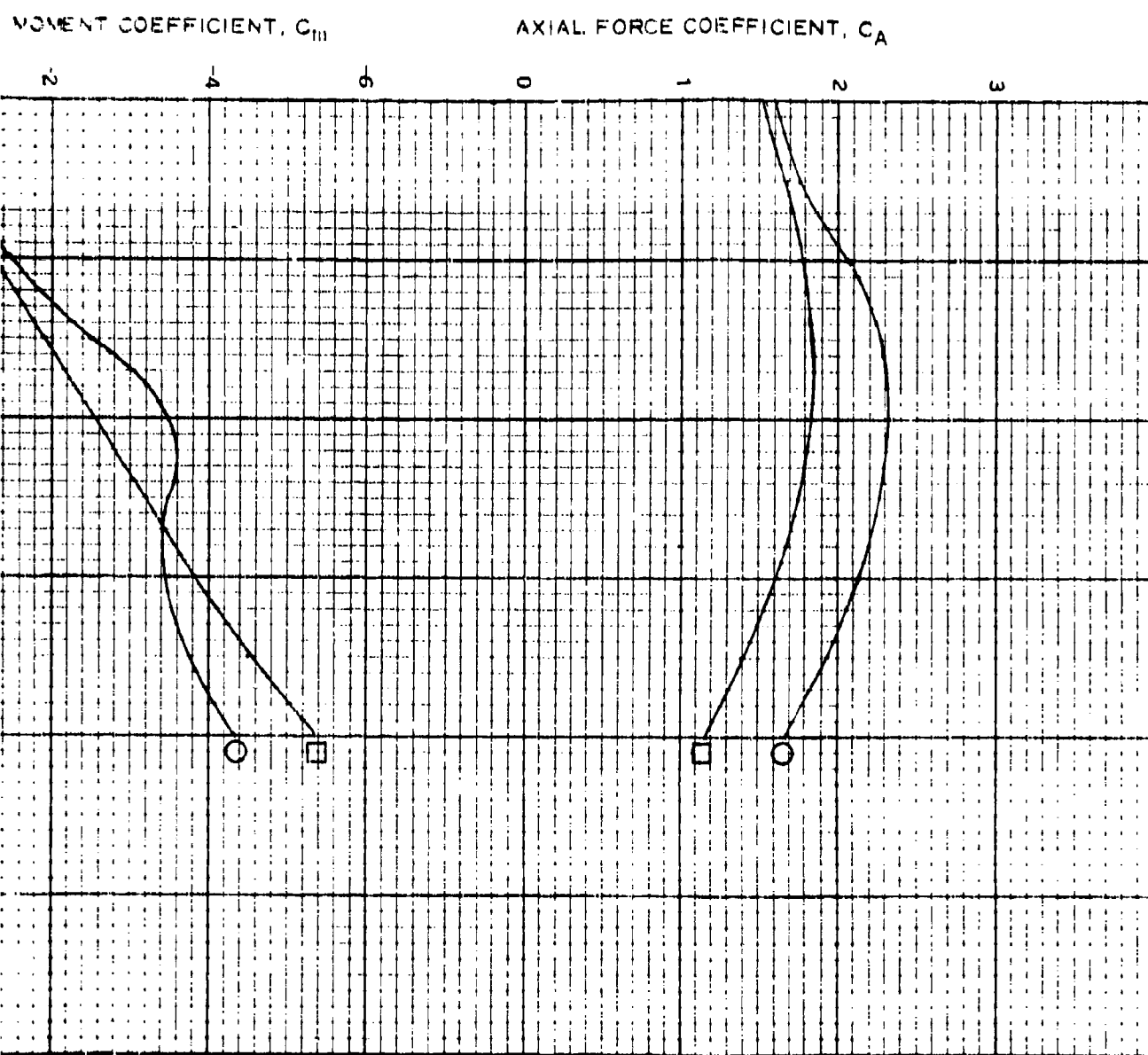
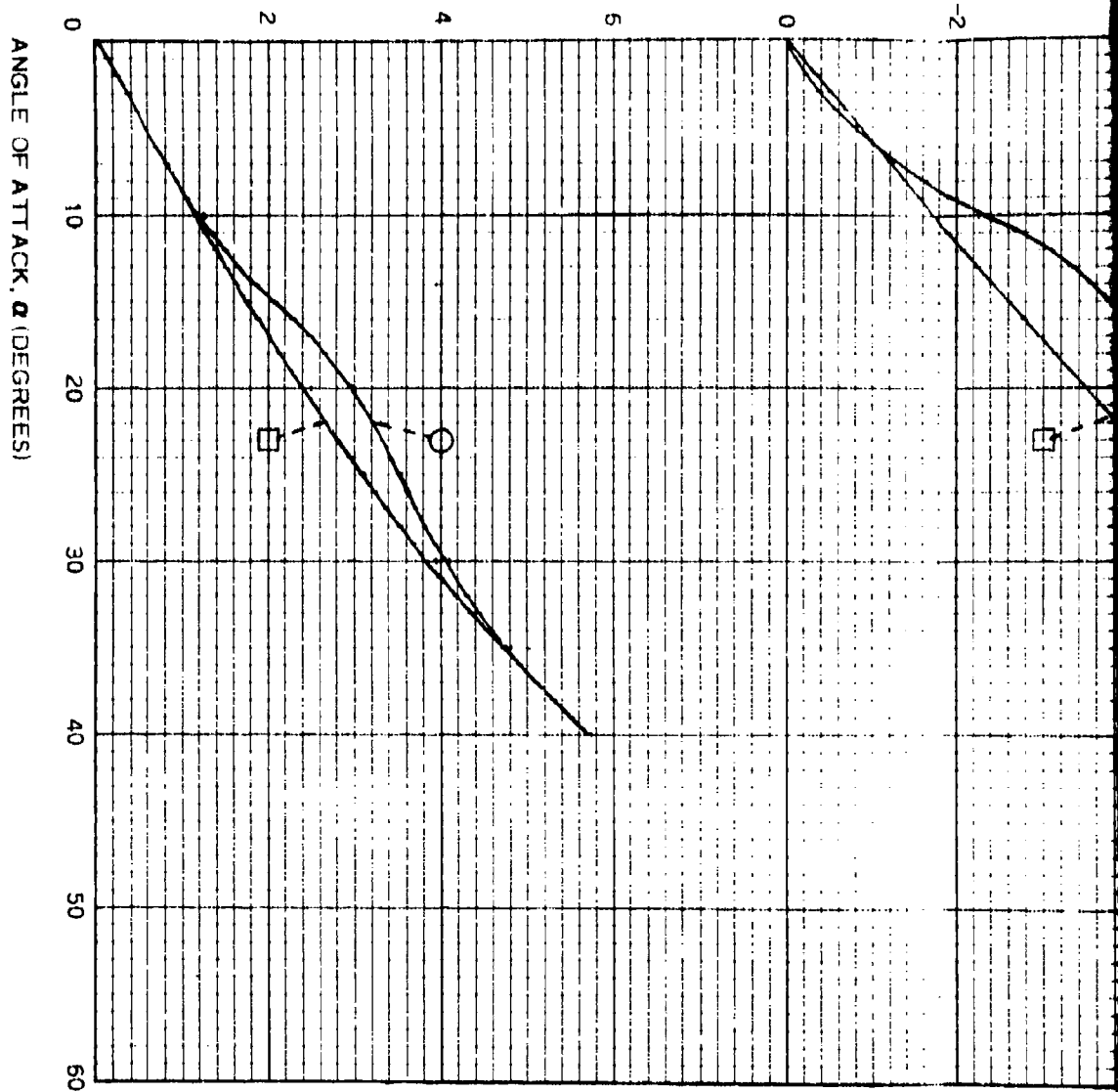


Figure 276. Effect of Burble Fence on the Static Aerodynamics of a 5.0-Caliber Flat-Nosed Bomb with 1.1-Caliber Trip Ring and 2.0-Caliber Ballute Stabilizer

NORMAL FORCE COEFFICIENT, C_N

PITCHING MOMENT COEFF



SYM-
BOL

CONF-
URATION

FENCE
TYPE

71

72

AFT

$S_{REF} = \frac{\pi D^2}{4}$ CYLINDER

$S_{REF} = D$ CYLINDER

ROLLING MOMENT COEFFICIENT, C_{lm}

AXIAL FORCE COEFFICIENT, C_A

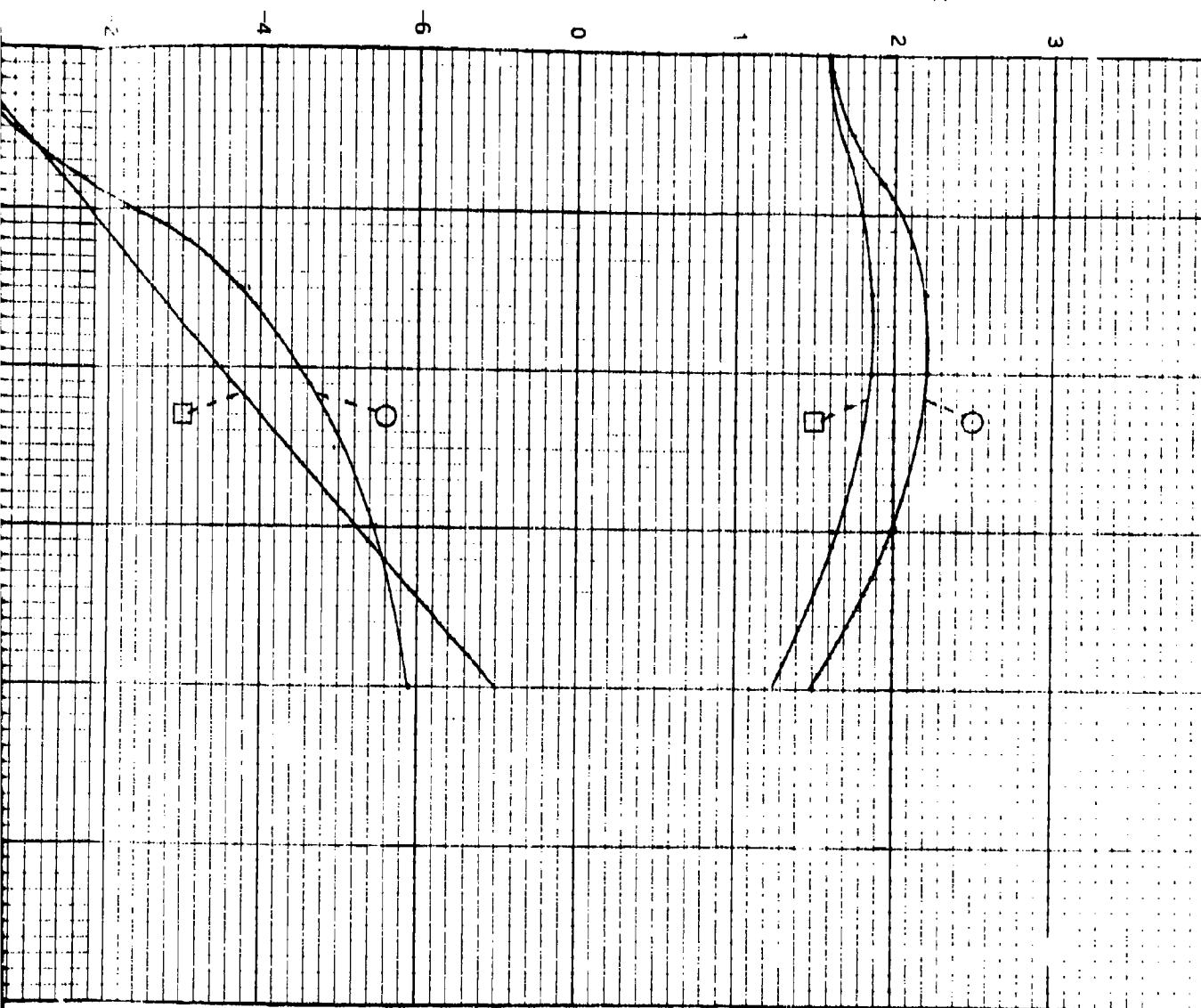
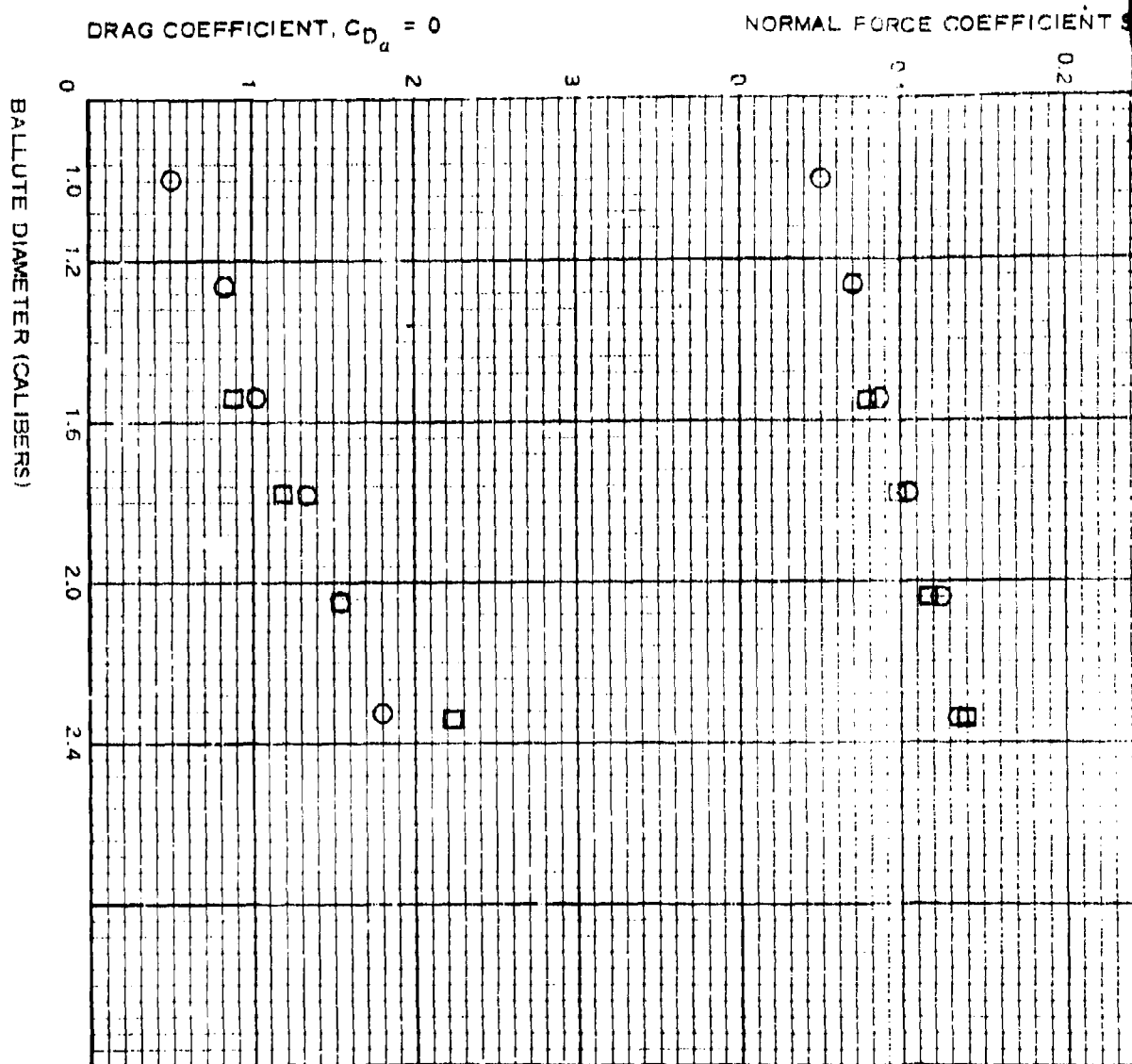


Figure 277. Effect of Burble Fence on the Static Aerodynamics of a 7.0-Caliber Modular Bomb and 2.0-Caliber Ballute

- WITHOUT FENCE
 - WITH FENCE
- READ DIRECTLY BELOW A CONFIGURATION NUMBER TO OBSERVE DATA FOR THAT CONFIGURATION.



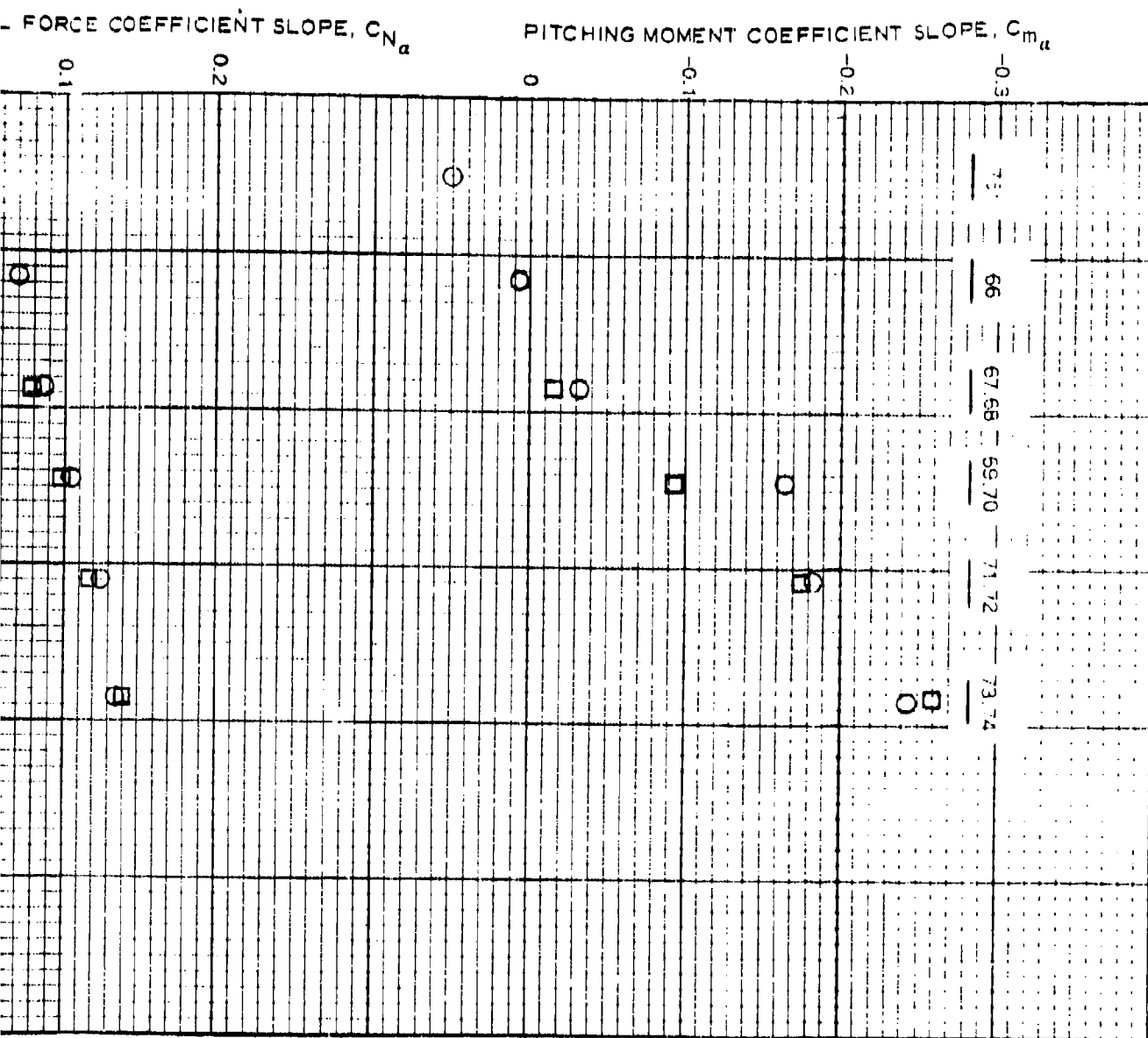


Figure 278. Effect of Burble Fence on Static Aerodynamics of Various Size Ballutes

DRAG COEFFICIENT, $C_{D_n} = 0$

NORMAL FORCE COEFFICIENT

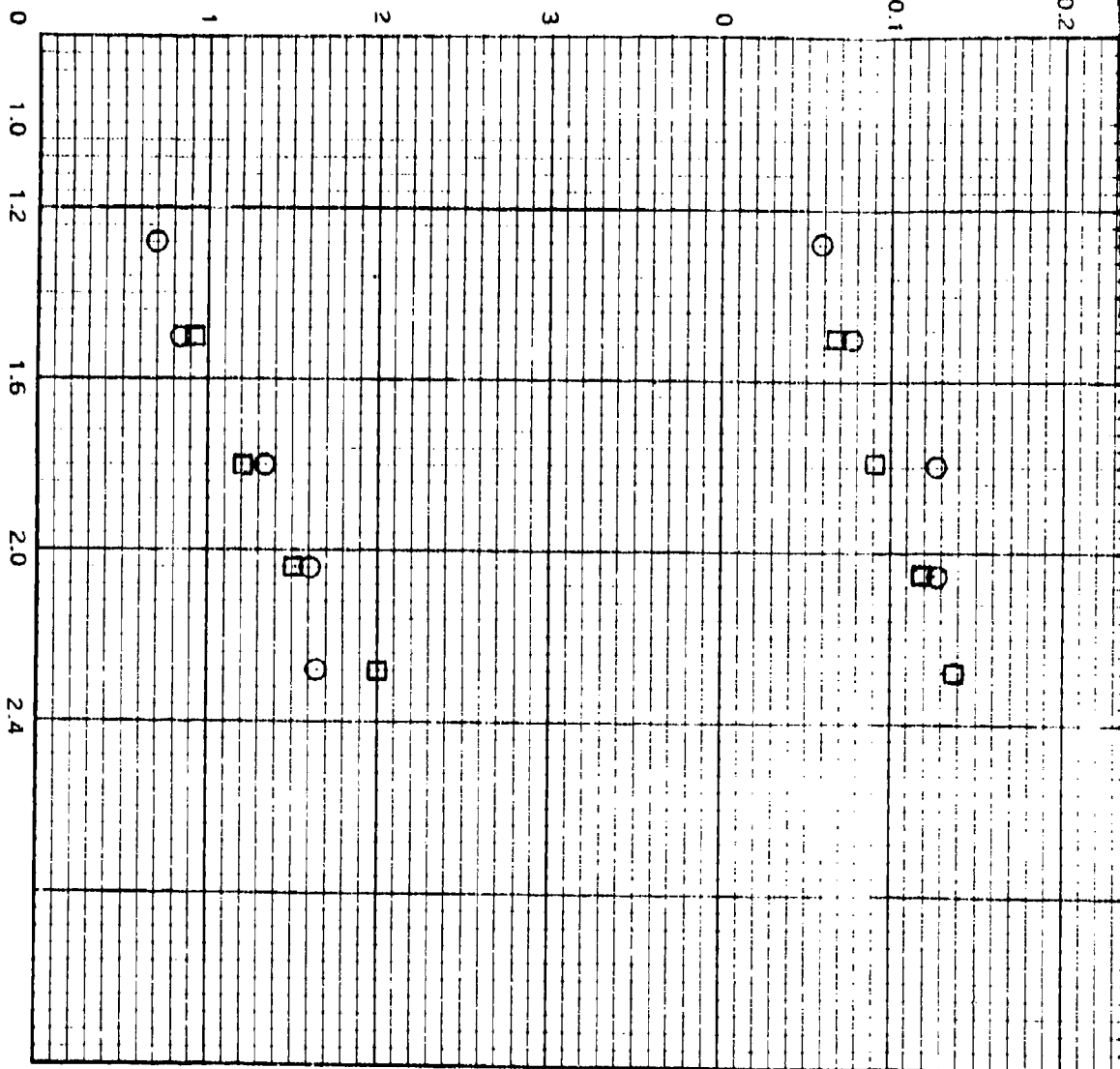
BALLUTE DIAMETER (CALIBERS)

WITHOUT FENCE
WITH FENCE

*READ DIRECTLY BELOW CONFIGURATION NUMBER TO
OBSERVE DATA FOR THAT CONFIGURATION.

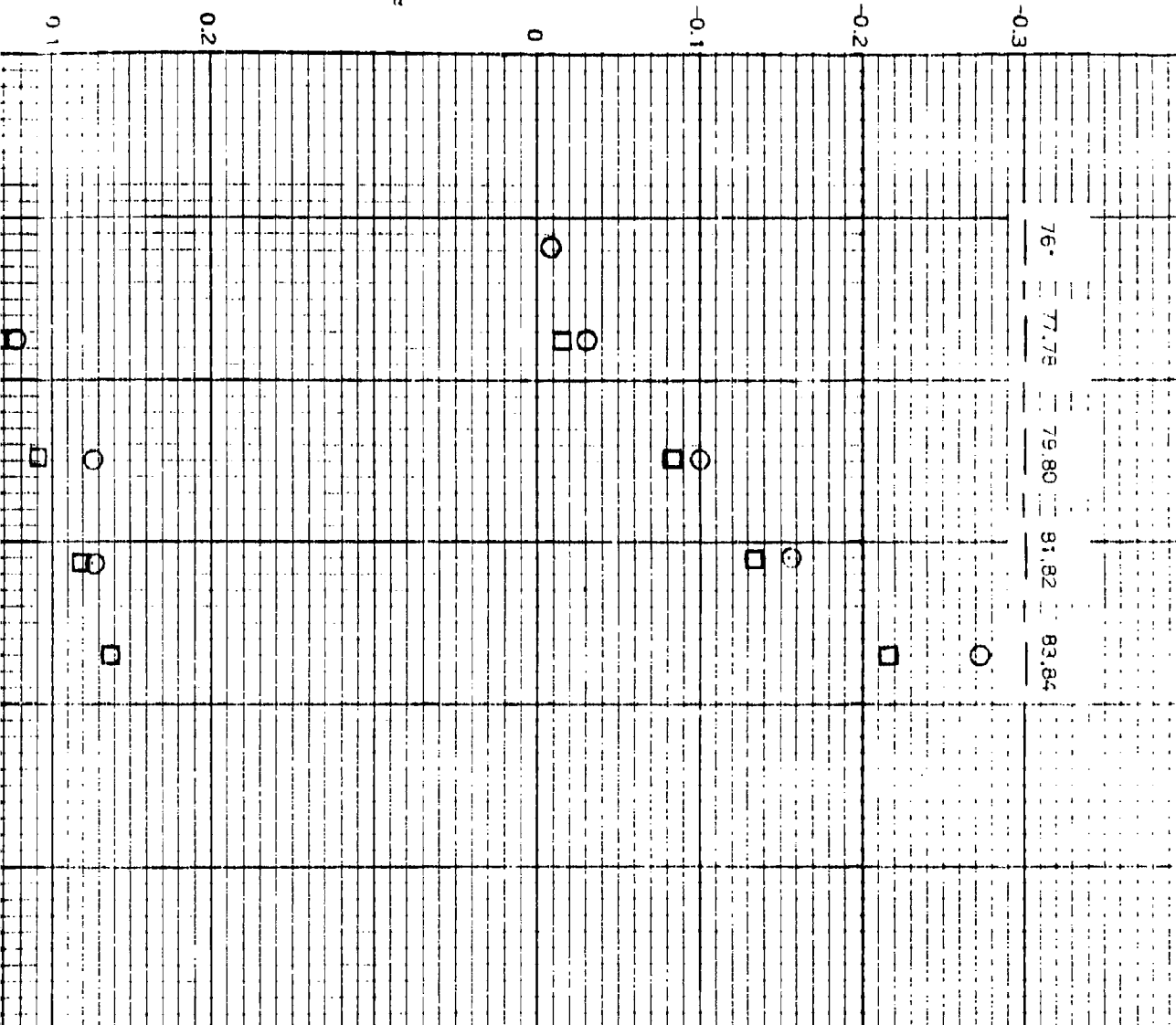
$$S_{REF} = \frac{\pi D^2}{4} \text{ CYLINDER}$$

$C_{REF} = D \text{ CYLINDER}$



FORCE COEFFICIENT SLOPE, C_{N_α}

PITCHING MOMENT COEFFICIENT SLOPE, C_{m_α}

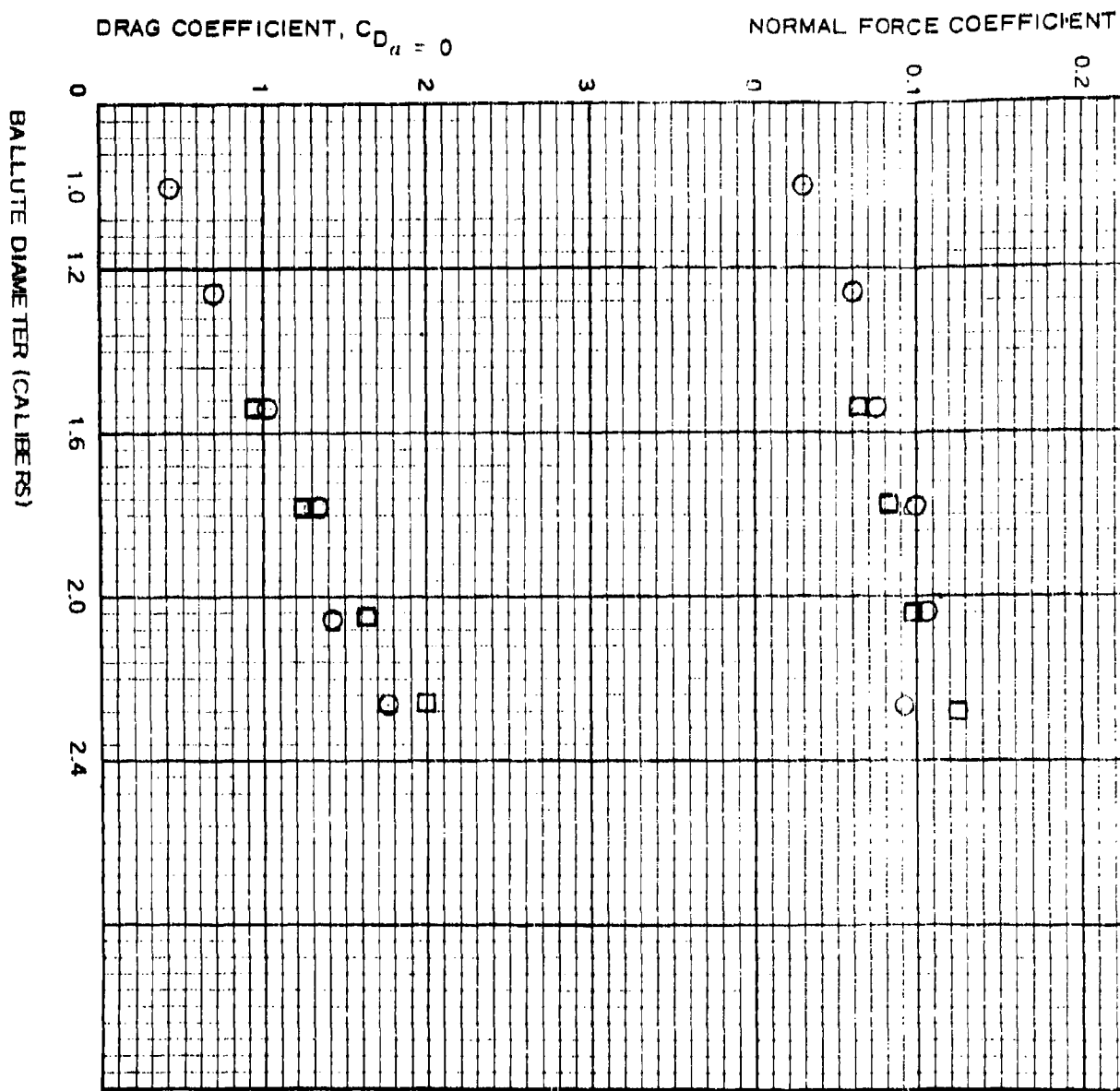


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Figure 278. Effect of Burble Fence on Static Aerodynamics
 of Various Size Ballutes (Continued)

○ WITHOUT FENCE
 □ WITH FENCE

* READ DIRECTLY BELOW A CONFIGURATION NUMBER TO
 OBSERVE DATA FOR THAT CONFIGURATION.



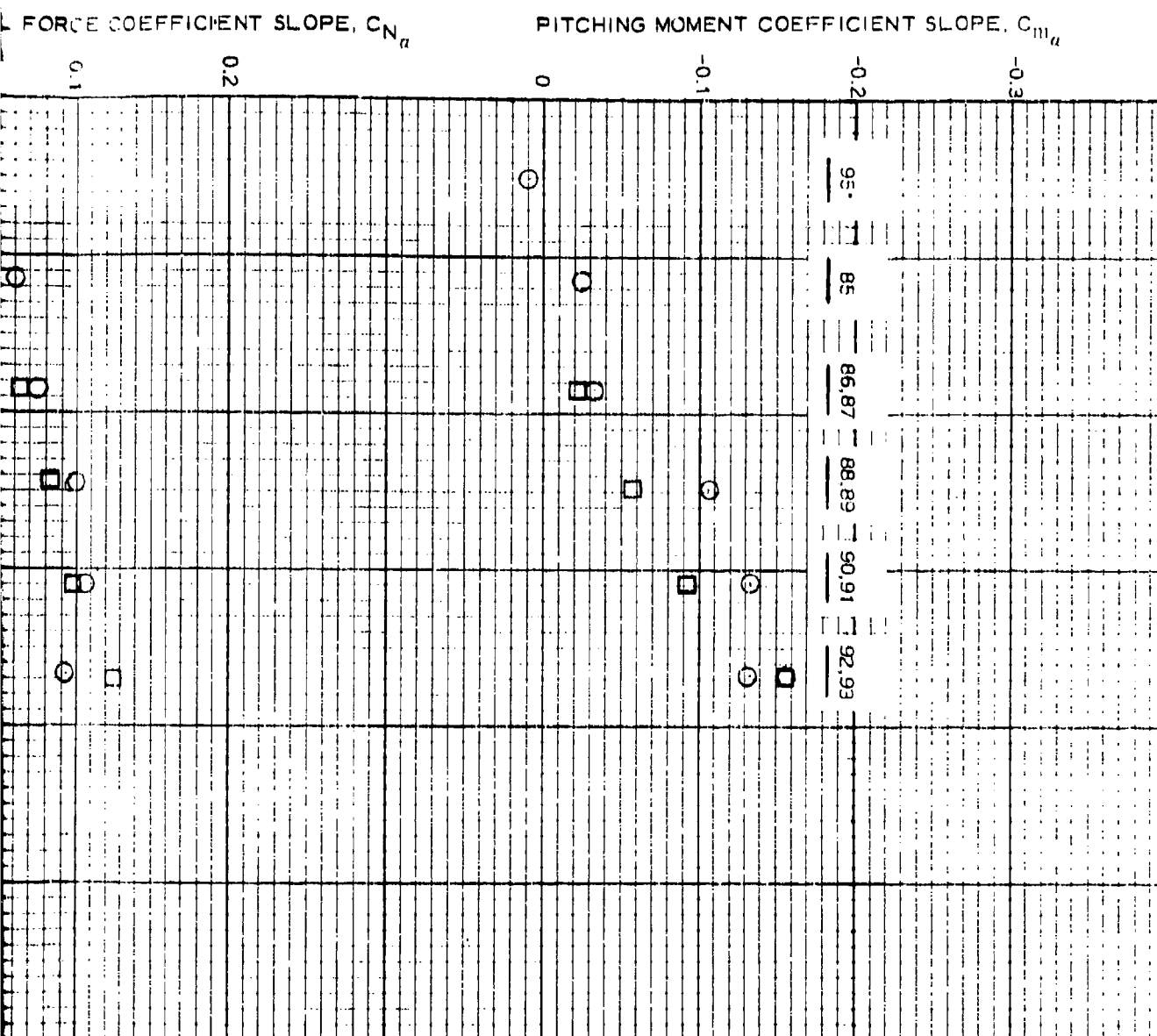
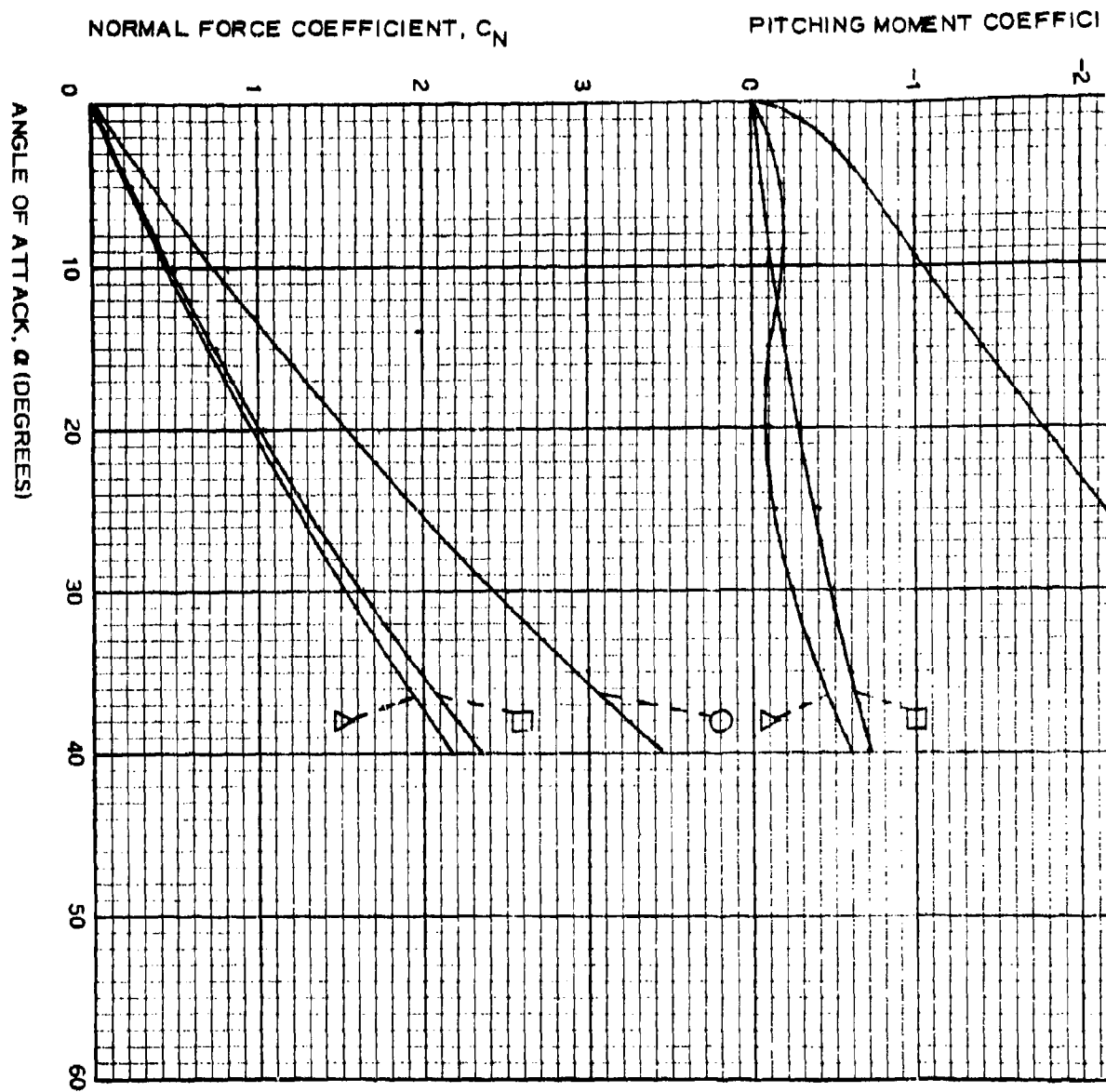


Figure 278. Effect of Burble Fence on Static Aerodynamics of Various Size Ballutes (Concluded)



SYMBOL	CONFIGURATION
39	
38	
37	

$$S_{REF} = \frac{\pi D^2}{4} \text{ CYLINDER}$$

$f_{REF} = D \text{ CYLINDER}$

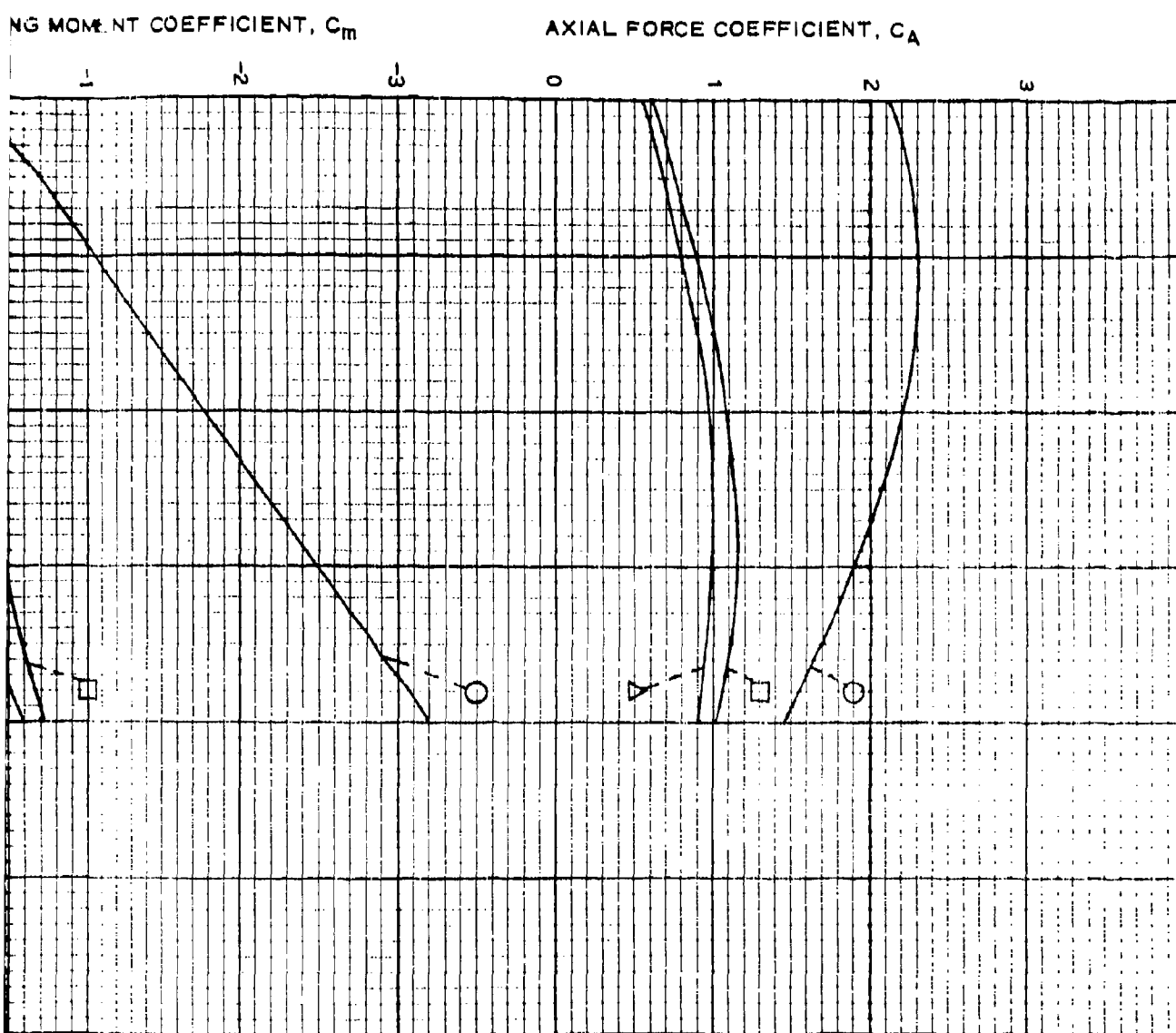
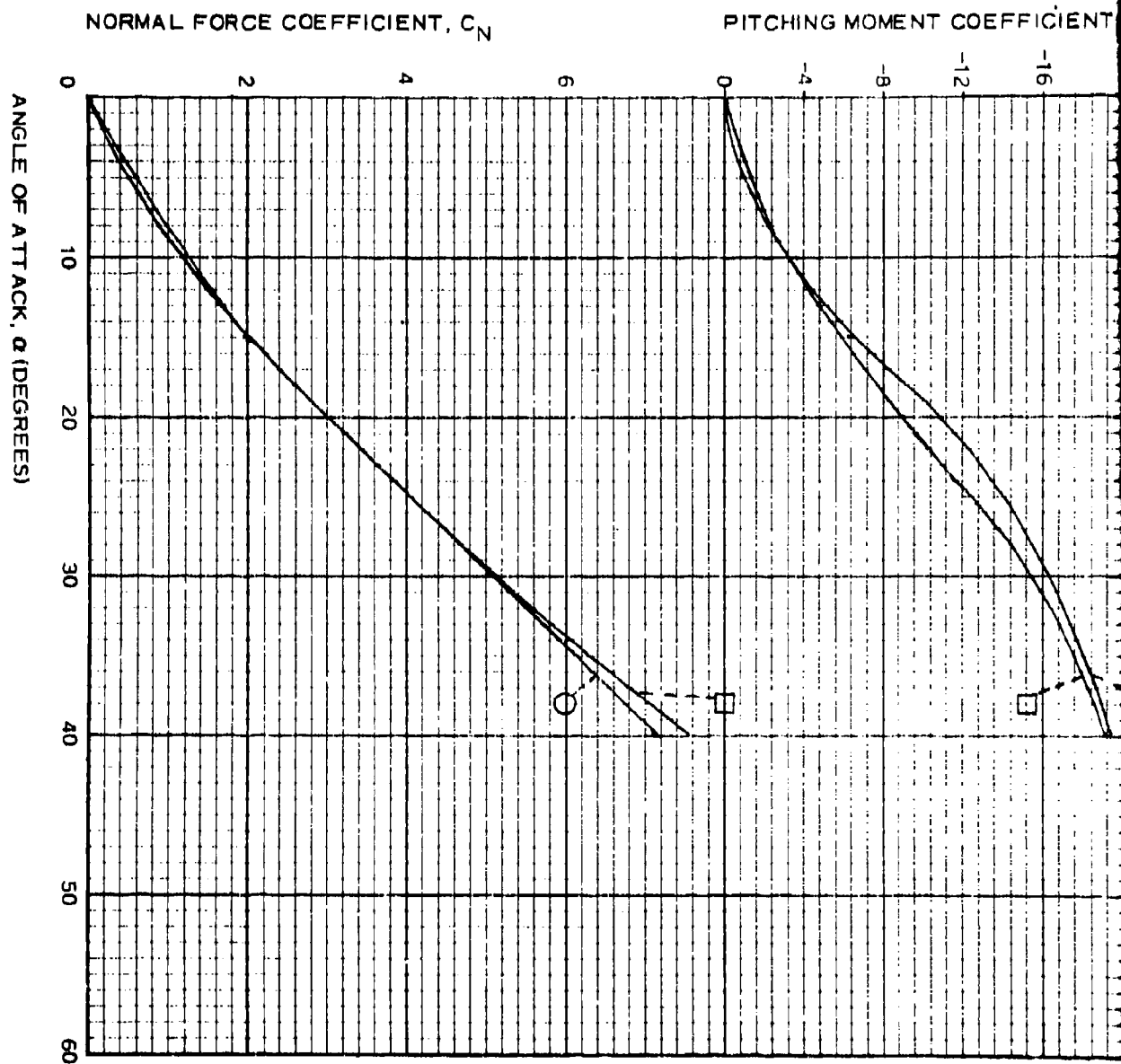


Figure 279. Effect of Small Ballutes on Static Aerodynamics of a Short Blunt Configuration



SYM-
 BOL
 CONFIS-
 URATION
 13
 10
 1.10 CAL TRIP RING
 NO TRIP RING

$$S_{REF} = \frac{\pi D^2}{4} \text{ CYLINDER}$$

$f_{REF} = D$ CYLINDER

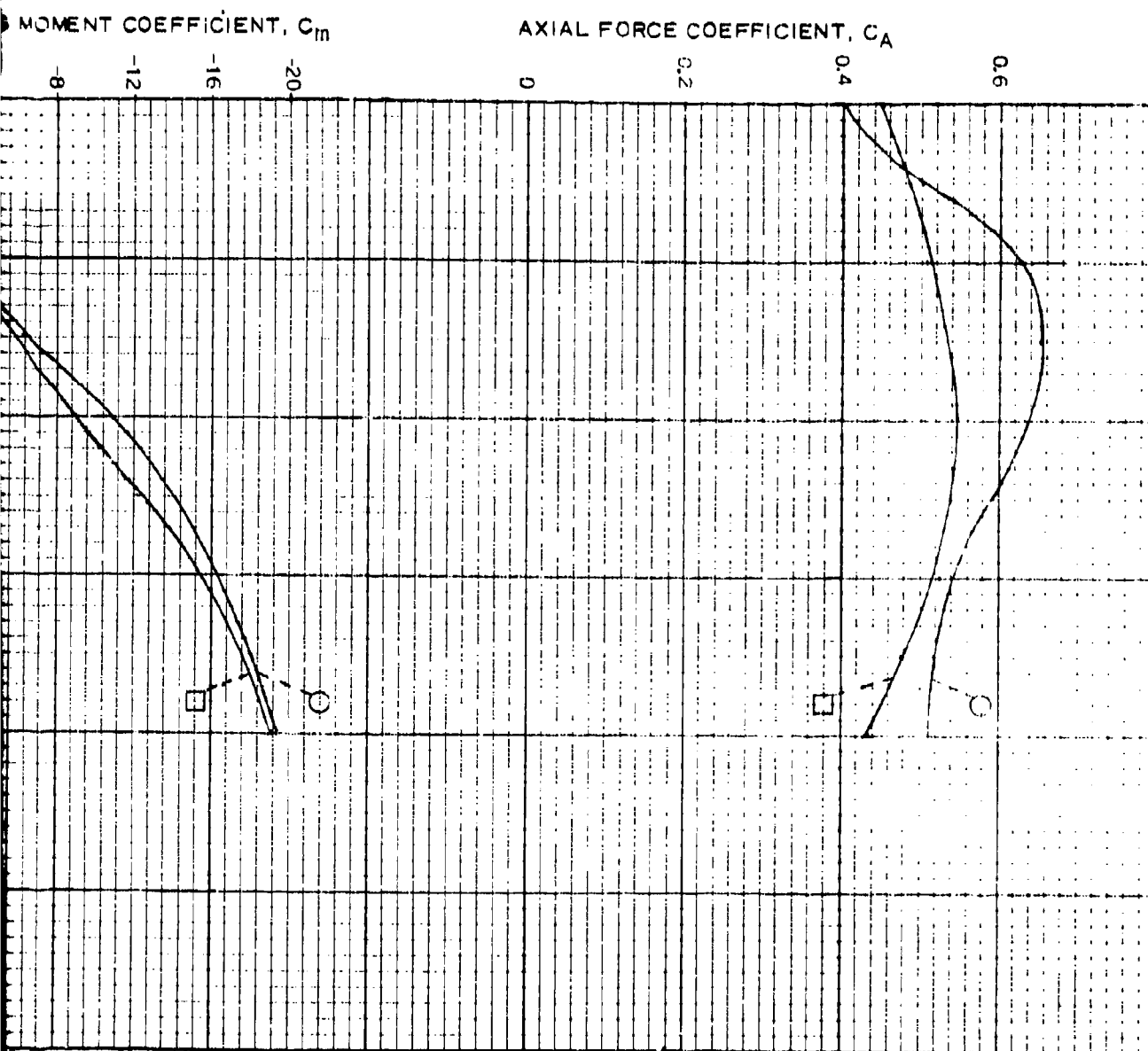
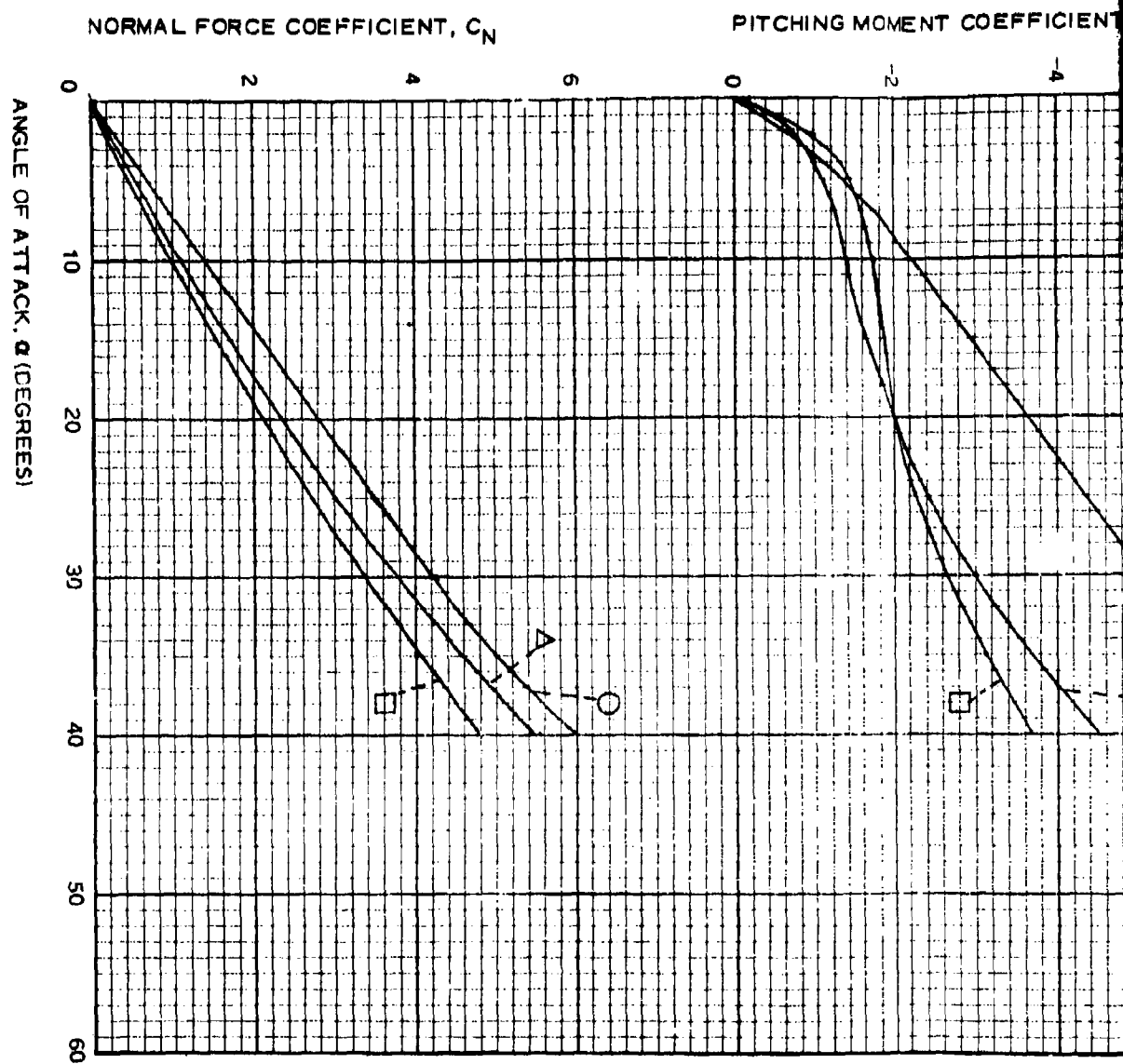


Figure 280. Effect of a Nose Trip Ring on the Static Aerodynamics of a Flat-Nosed 10-Caliber Bomb with Rigid (M118) Fins



SYM- BOL	CONF- URATION	BURBLE FENCE	
		DIAMETER (CAL)	LOCATION (CAL)
17		2.27	0.27 AFT OF MAX DIAMETER
16		2.60	AT MAXIMUM DIAMETER
15		2.24	AT MAXIMUM DIAMETER

ROLLING MOMENT COEFFICIENT, C_m

AXIAL FORCE COEFFICIENT, C_A

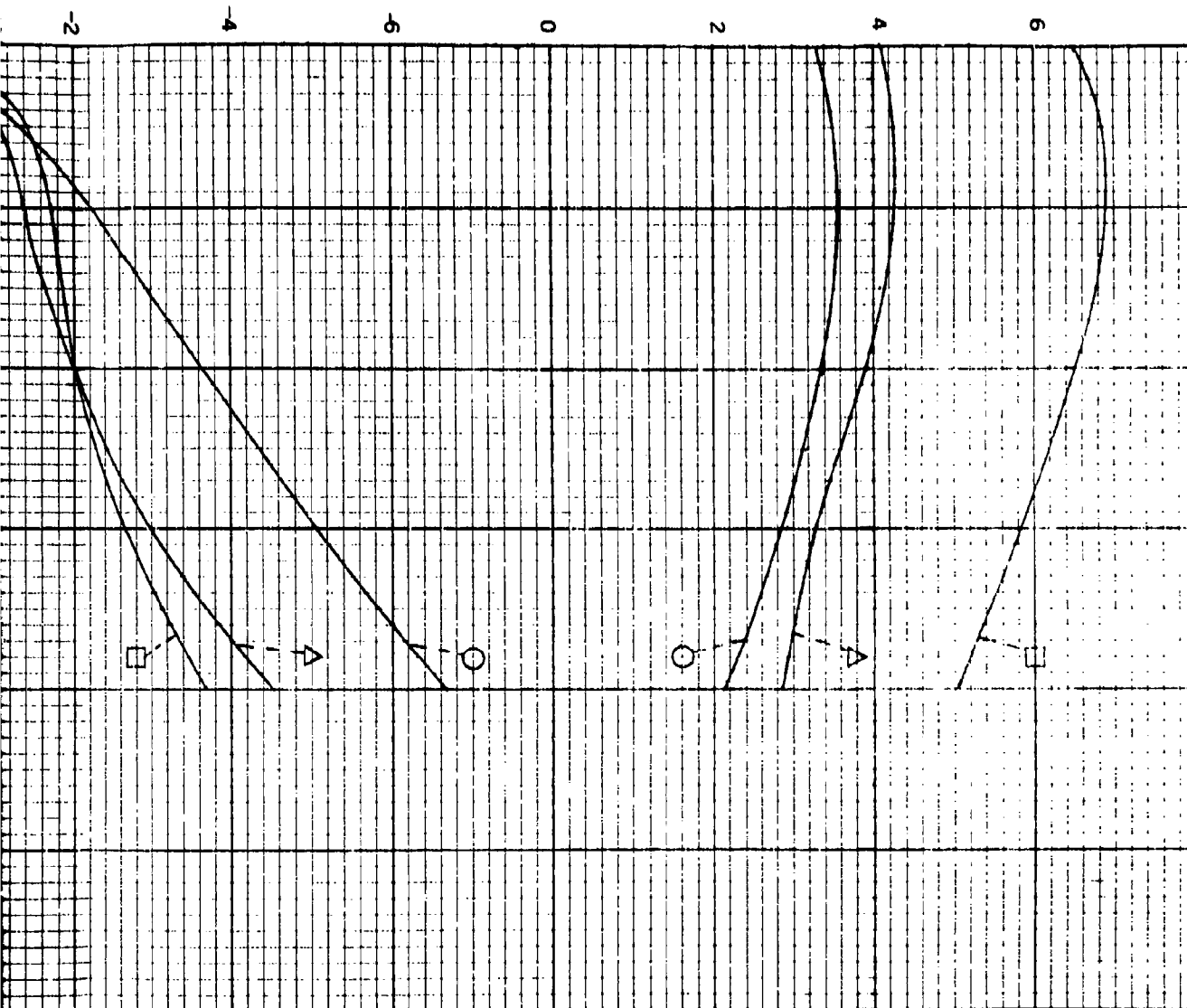
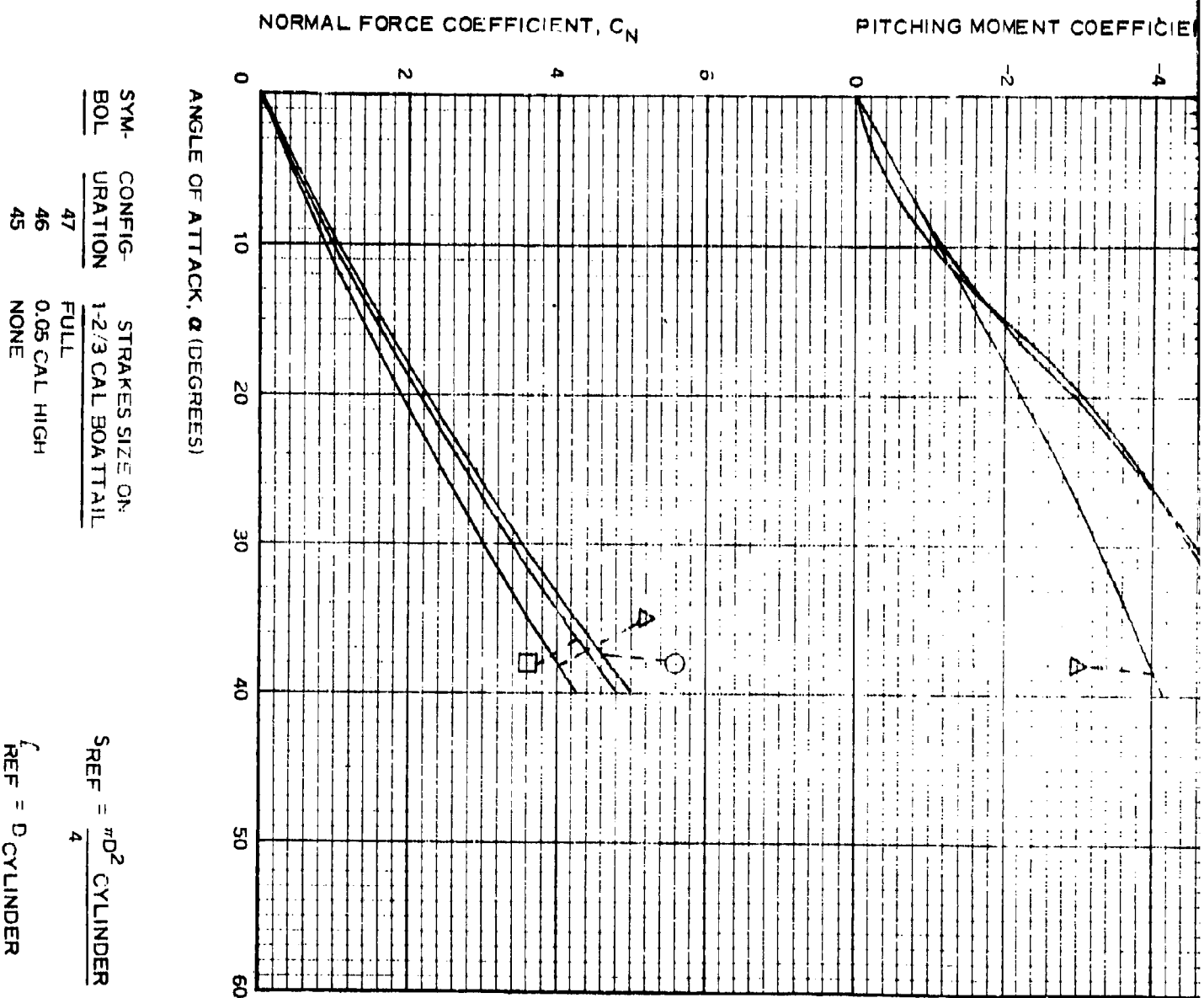


Figure 281. Effect of Burble Fence Size and Location on the Static Aerodynamics of a 5.65-Caliber Flat-Nosed Bomb with 1.1-Caliber Trip Ring and 2.0-Caliber Ballute Stabilizer



ING MOMENT COEFFICIENT, C_m

AXIAL FORCE COEFFICIENT, C_A

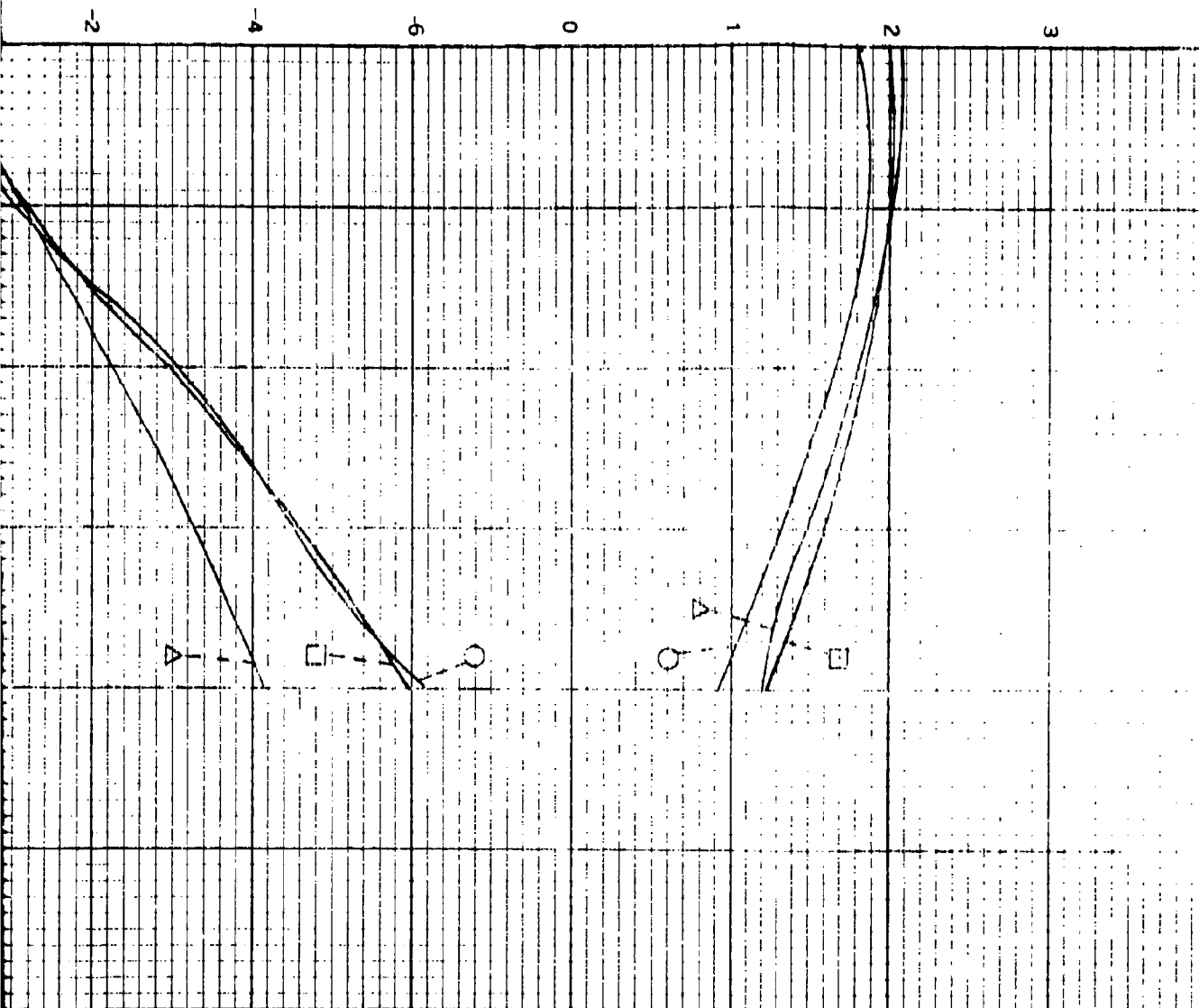
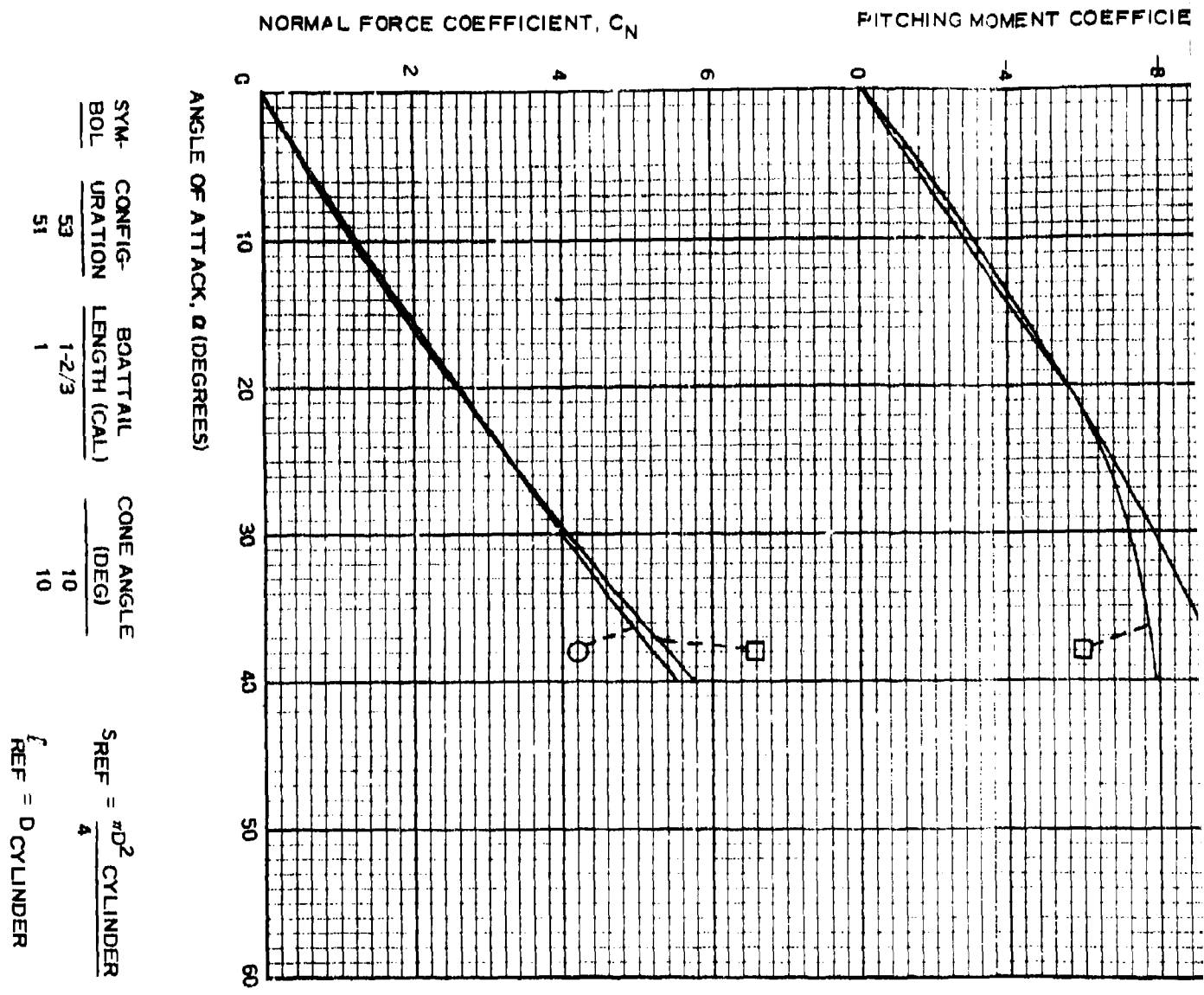


Figure 282. Effect of Strakes at 1-2/3-Caliber Boattail on the Static Aerodynamics of a 2.0-Caliber Ogive-Nosed 7.7-Caliber Bomb and 1-1/2-Caliber Ballute with 1.79-Caliber Fence



HING MOMENT COEFFICIENT, C_m

AXIAL FORCE COEFFICIENT, C_A

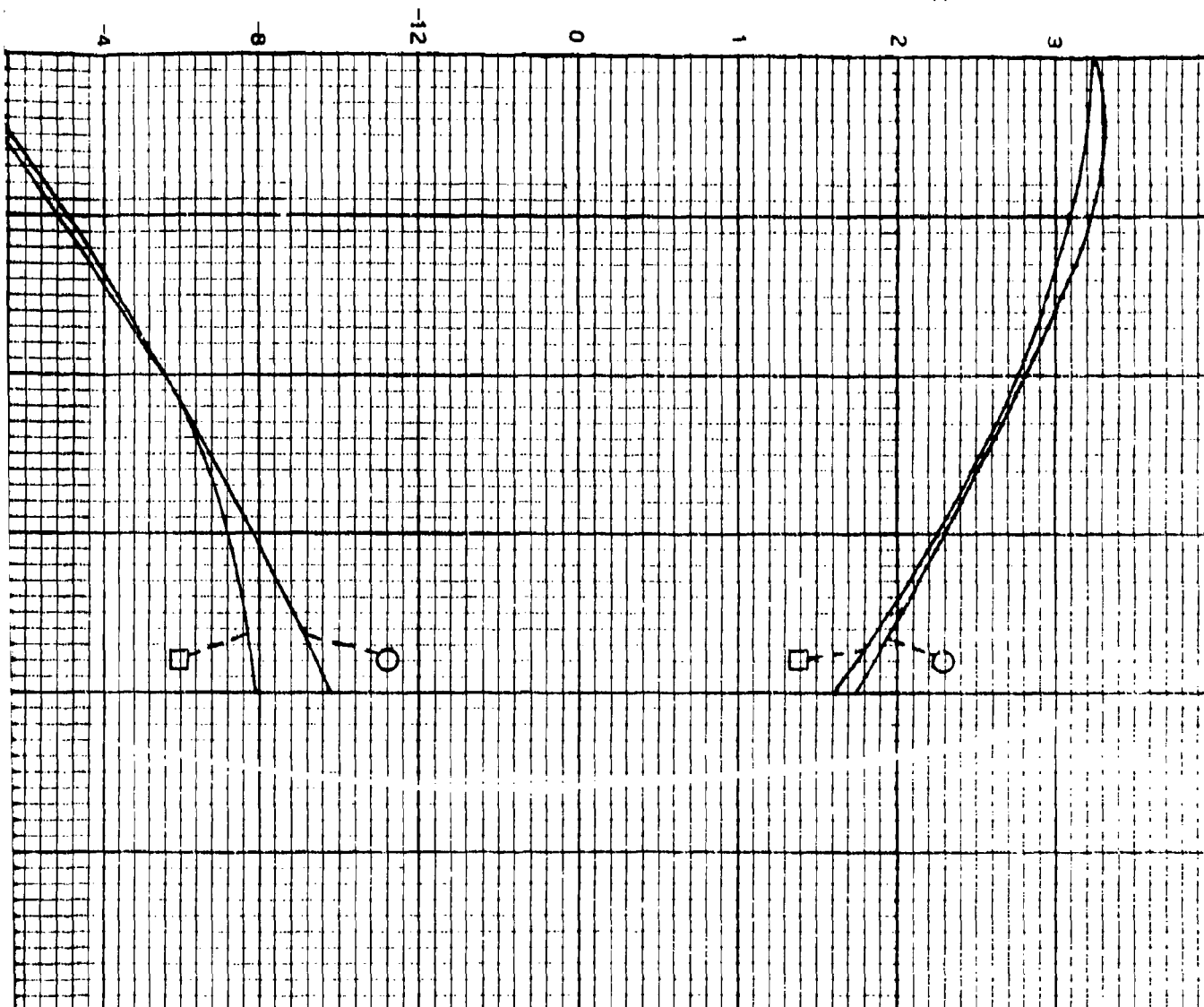
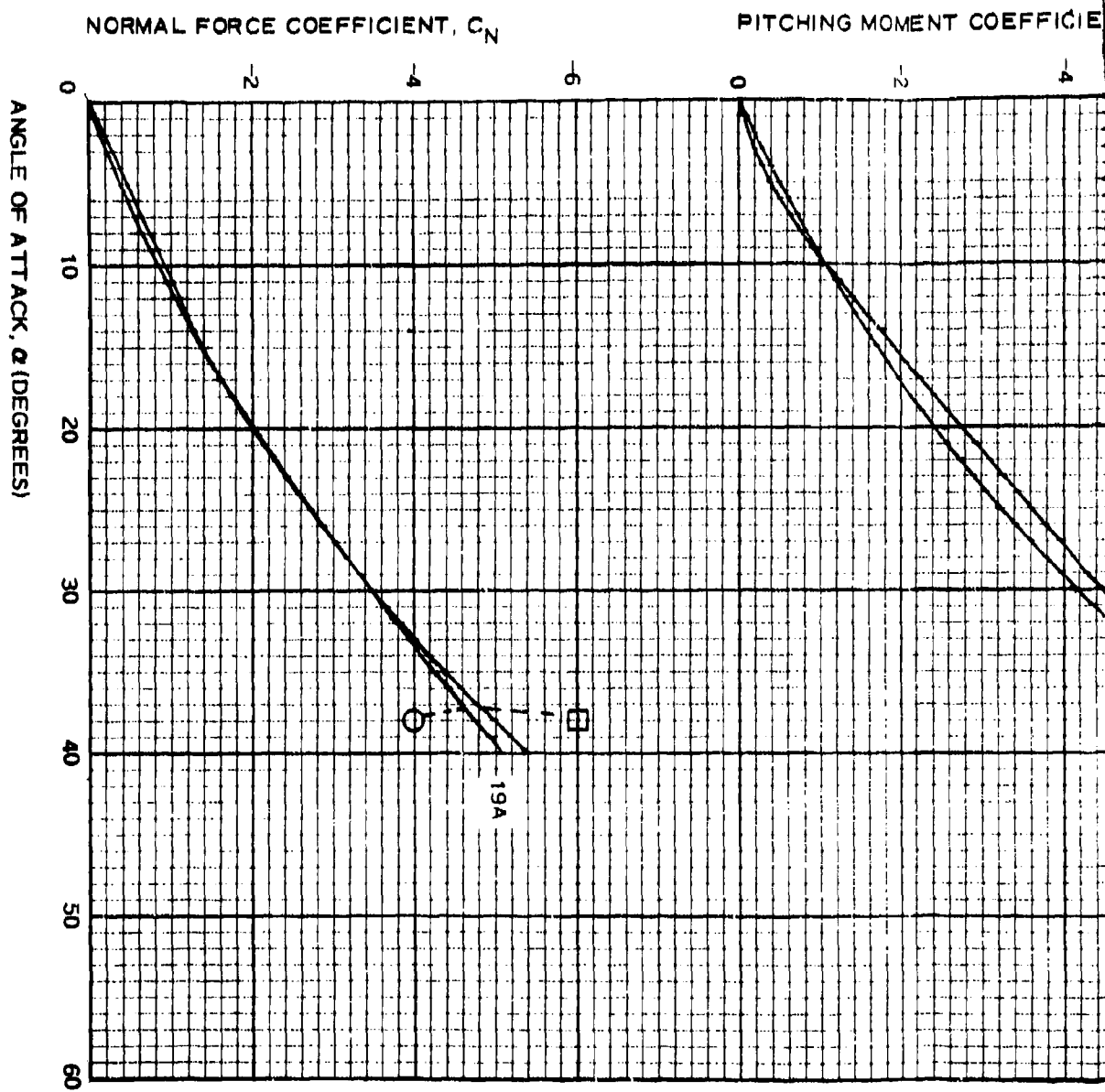


Figure 283. Effect of Boattail Length without Strakes on the Static Aerodynamics of a 2.0-Caliber Ogive-Nosed 7.7-Caliber Bomb and 2.0-Caliber Ballute Stabilizer with 2.27-Caliber Fence



SYM-
 BOL
 CONFIG-
 URATION
 BOATTAIL
 LENGTH (CAL)
 CONE ANGLE
 (DEG)
 $S_{REF} = \frac{\pi D^2}{4}$ CYLINDER
 $f_{REF} = D$ CYLINDER

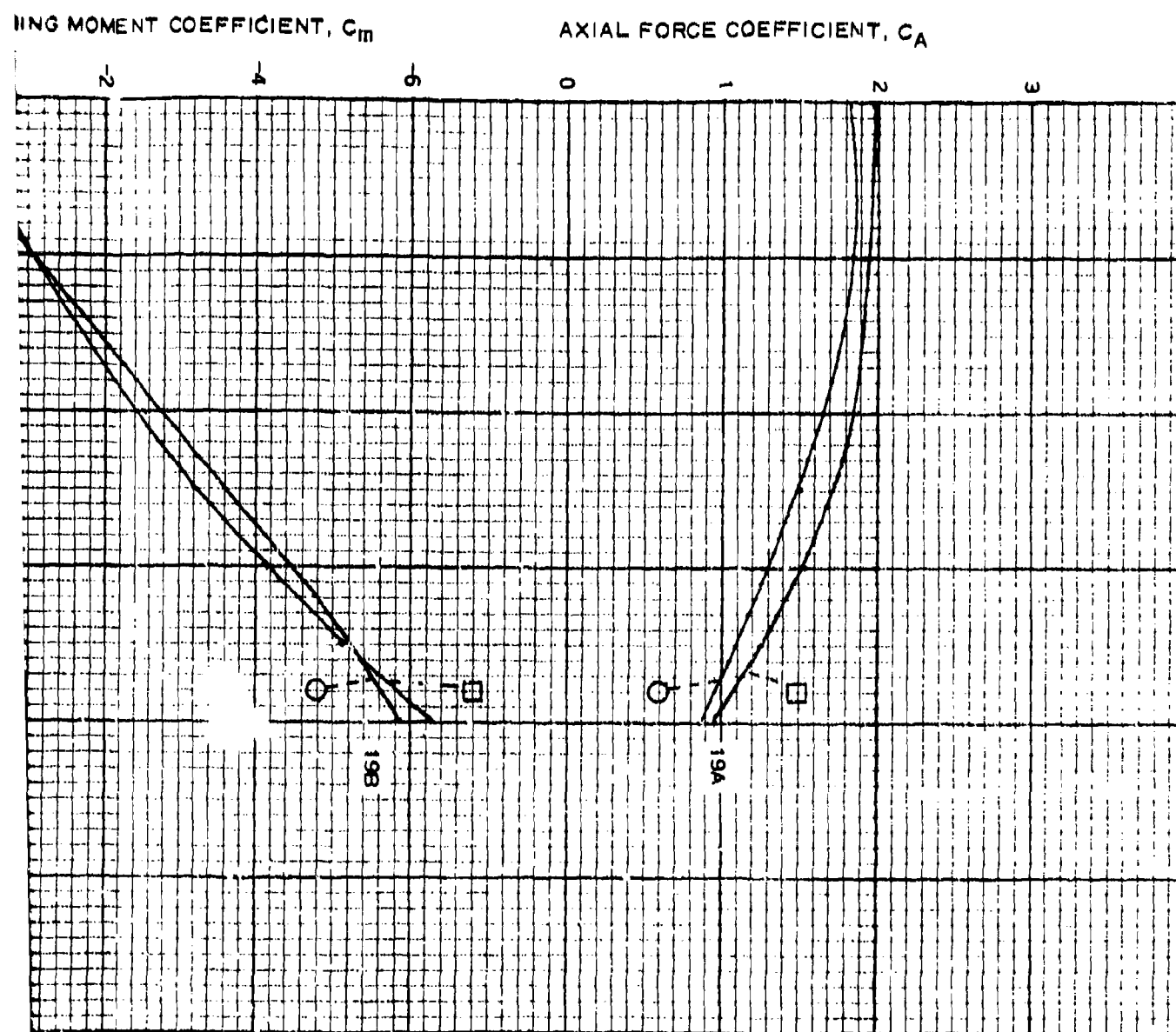


Figure 284. Effect of Boattail Length with Full Strakes on the Static Aerodynamics of a 2.0-Caliber Ogive-Nosed 7.7-Caliber Bomb and 1-1/2-Caliber Ballute Stabilizer with 1.79-Caliber Fence

[illegible]

MODEL CHARACTERISTICS	CONFIGURATION NUMBER																			
	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
NOSE GEOMETRY																				
OG,VE	•	•																		
1 CALIBER LONG																				
2 CALIBERS LONG	•	•																		
3 CALIBERS LONG																				
CONE																				
90 DEG																				
60 DEG																				
30 DEG																				
FLAT WITH 0.1 CALIBER RADIUS																				
PLAIN			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1.1 CALIBER TRIP RING																				
HEMISPHERE			•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
FINENESS RATIO (EXCLUDING INFLATABLE)																				
1 TO 4			•																	
4 TO 6				•												•	•	•	•	•
6 TO 8		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
8 TO 10																				
10 TO 12																				
AFTER SECTION GEOMETRY																				
1 CALIBER CYLINDER	•				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1.1 CALIBER CYLINDER																				
BOAT TAIL		•																		
1 CALIBER LONG																				
STRAKES																				
NONE																				
0.05 CALIBER (8)																				
FULL DIAMETER (8)																				
1-1/3 CALIBER LONG	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
STRAKES																				
NONE																				
0.05 CALIBER (8)		•																		
FULL DIAMETER (8)																				
1-2 3 CALIBER LONG																				
STRAKES																				
NONE																				
0.05 CALIBER (8)																				
FULL DIAMETER (8)																				
STABILIZER																				
NONE	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
BALLUTE																				
1 CALIBER DIAMETER																				
1-1/4 CALIBER DIAMETER																				
1-1.2 CALIBER DIAMETER																				

MODEL CHARACTERISTICS	CONFIGURATION NUMBER																			
	81	82	83	84	84 A	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
NOSE GEOMETRY																				
OGIVE																				
1 CALIBER LONG																				
2 CALIBERS LONG																				
3 CALIBERS LONG																				
CONE																				
90 DEG																				
60 DEG																				
30 DEG																				
FLAT WITH 0.1 CALIBER RADIUS																				
PLAIN																				
1.1 CALIBER TRIP RING																				
HEMISPHERE																				
FINENESS RATIO (EXCLUDING INFLATABLE)																				
1 TO 4																				
4 TO 6																				
6 TO 8																				
8 TO 10																				
10 TO 12																				
AFTER SECTION GEOMETRY																				
1 CALIBER CYLINDER																				
1.1 CALIBER CYLINDER																				
BOAT TAIL																				
1 CALIBER LONG																				
STRAKES																				
NONE																				
0.05 CALIBER (8)																				
FULL DIAMETER (8)																				
1-1/3 CALIBER LONG																				
STRAKES																				
NONE																				
0.05 CALIBER (8)																				
FULL DIAMETER (8)																				
1-2/3 CALIBER LONG																				
STRAKES																				
NCNE																				
0.05 CALIBER (8)																				
FULL DIAMETER (8)																				
STABILIZER																				
NONE																				
BALLUTE																				
3 CALIBER DIAMETER																				
1-1/4 CALIBER DIAMETER																				
1-1/2 CALIBER DIAMETER																				
1-3/4 CALIBER DIAMETER																				

STRAKES NONE 0.05 CALIBER (8) FULL DIAMETER (8)	STABILIZER NONE BALLUTE	4 CALIBER DIAMETER 5 CALIBER DIAMETER 1-1/2 CALIBER DIAMETER 1-3/4 CALIBER DIAMETER 2 CALIBER DIAMETER 2-1/4 CALIBER DIAMETER BURBLE FENCE NONE AT MAX BALLUTE DIAMETER SET BACK 5.3 CALIBER DIAMETER 1-1/2 CALIBER DIAMETER 1-3/4 CALIBER DIAMETER 2 CALIBER DIAMETER 2-1/4 CALIBER DIAMETER 2-3/8 CALIBER DIAMETER 2-1/2 CALIBER DIAMETER 4.3 CALIBER DIAMETER MISCELLANEOUS INFLATABLE CONCAVE EXTENSION, 3.4 CAL PLAIN 4 PANELS CONCAVE EXTENSION, 1 CAL WITH TORUS, NO PANELS WITH TORUS, 4 PANELS 1-1/4 CALIBER DIAMETER TORUS 1-1/2 CAL SPAN CONICAL FINS 1-7 8 CAL SPAN 2-CELL FINS 1-2 3 CALIBER PARATAIL RIGID FIN 1.5 CAL SPAN FINS (M-118) 1 CAL SPAN FINS (BLU-27 'B)	Aerodynamic Data for Configuration Number	→	Configuration Specification pp Static Coefficients (digital) pp Static Coefficients (graphic) pp Dynamic Coefficients (digital) pp Dynamic Coefficients (graphic) pp

Figure 285. Configuration Characteristics Identification Index (Concluded)

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HQ PACAF (IGY)	1
CDCLO/ADTC/DO	1
DL	1
DLOSL	2
DLWL	15
DLGC	3

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13. ABSTRACT One hundred and nineteen Ballute-stabilized bomb configurations were studied to determine the feasibility of ram air-inflated Ballutes as stabilizers or decelerators for various tactical missions. Both subsonic and transonic wind tunnel tests were conducted to define static and dynamic aerodynamic characteristics.			

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14. KEY WORDS	LINK A		LINK B		LINK C	
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Ballute Stabilization Ballute-Stabilized Bombs Bomb Decelerator Bomb Aerodynamic Characteristics Air-Deliverable Munitions Techniques Aerodynamic Data						

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