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BOOK 1

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BALLUTE STABILIZATION FOR VARIOUS MUNITION CONFIGURATIONS

GOODYEAR AEROSPACE CORPORATION

TECHNICAL REPORT AFATL-TR-72-75 BOOK 1
APRIL 1972

AIR FORCE ARMAMENT LABORATORY
AIR FORCE SYSTEMS COMMAND • UNITED STATES AIR FORCE
EGLIN AIR FORCE BASE, FLORIDA

Ballute Stabilization For Various Munition Configurations

J. J. Graham

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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SECTION 1

INTRODUCTION

1. BACKGROUND

The shapes of bombs and similar air-deliverable stores have changed little since World War I except perhaps in size. Some obvious improvements resulting from space-age technological fall out have been incorporated when practicable. Advances in aircraft design upgrading speed, size, payload size, safety, automation, and electronic subsystems have continued to broaden the gap between the state-of-the-art of aircraft technology and bomb design.

The experience of the past decade, during which air power has been required to support a sophisticated brand of guerrilla-type warfare, has pointed up the need for considerable improvement in air-deliverable munitions techniques.

Closer examination of the problems has revealed that further improvement of aircraft performance would only be offset by existing restrictions of the munition package.

Some specific tactical problems most frequently discussed will serve to exemplify the kinds of problems involved.

a. Increased Effective Payload Weight-to-Volume Ratio

The waste volume penalty paid for stability, especially in the larger bombs, is severely out of proportion with the functional efficiency of the rest of the aircraft. For example, the fin assembly of a 3000-lb demolition bomb comprises one-half of its total length. Slender nose ogives and tapered after sections further contribute to this inefficient use of space.

It is obvious that these geometric characteristics exist to provide a high degree of stability, to reduce aerodynamic drag on the aircraft, and other reasons. A tradeoff analysis is certainly indicated, and alternate methods of providing these performance characteristics should be investigated when such large potential space dividends are considered.

Similarly, the excessively long empennage of some bombs render them incompatible with certain aircraft because of interference with landing gears, control surfaces, and access doors.

b. A second category of problems is sampled with the transonic release velocities required in certain missions with high-performance aircraft. Pilot and aircraft safety are prime considerations in the release procedures for any airborne store. When such separation occurs above Mach 1.0, the aerodynamic coefficients are near their peak values thereby magnifying the effects of initial perturbation or instability. The intricacies of the flow field in the vicinity of the aircraft, the interaction of shock waves, and the transition from supersonic to subsonic flight all have critical effects on the final trajectory of the released store.

Clean separation of the bomb from the aircraft and preclusion of subsequent collision are dependent not only upon constraining the maneuvering envelope within which the pilot may operate but also on the predictability of the tolerances inherent in the aerodynanic characteristics of the bomb. Reexamination of configurations from these aspects is in order.

c. Because of the destruct characteristics of certain munitions, their overall efficiency may be enhanced by controlling the impact angle, the impact velocity, the total flight elapsed time, or the relative positions of the detonation point and the aircraft. Many of these refinements may be achieved by dual mode trajectory control in the form of delayed drag and deceleration.

The examples cited above serve only to indicate the need for a comprehensive reexamination of bomb configurations based on functional design criteria unhampered by unwarranted acceptance of classical approaches.

Although there are other concepts by which these new performance criteria may be achieved, we have examined in detail the feasibility of solution by means of deployable inflatable stabilization and/or deceleration systems.

The Ballute (balloon-parachute) was conceived at the contractor facility 12 years ago as a supersonic decelerator when parachutes failed in this velocity regime. Since its inception, the Ballute has undergone many variations designed to satisfy the requirements of numerous missions both as a stabilizer and decelerator. Ballutes from 1 to 35 feet in diameter have been tested at speeds from 3 feet/second to Mach = 10.0.

Interest in the Ballute as a bomb stabilizer received considerable impetus after a series of flight tests of a modified 3000-pound bomb. The problem presented to the contractor involved a physical interference between the M118 bomb fin assembly and a portion of the structure of the aircraft involved. To solve the problem, the 7-1/2 foot M135 fin assembly had to be shortened by 5-1/2 feet. In a series of flight tests, the feasibility of this Ballute was demonstrated. The original fin assembly was replaced by a 2-foot-long tapered canister containing a 33-inch - diameter Ballute. The lanyard-actuated system was initiated by separation of the bomb from the aircraft, causing the ram-air-inflated Ballute to be deployed and operating within 2 feet of the aircraft. The flight of this drag-stabilized bomb was stable and repeatable.

As a result of this and other experiments and analyses, the Ballute as a drag stabilizer for bombs appeared increasingly more practical.

2. OBJECTIVES

The primary purpose of this program has been to define the aerodynamic characteristics of a broad range of bomb configuration with an emphasis on variations of inflatable Ballutes and stabilizers. Since this program is but a small portion of an overall reevaluation of basic bomb design philosophy, the intention has been to cover as wide a range of configuration as possible within the level of effort provided for by the scope of the contract.

The specific objectives have been to obtain aerodynamic data by means of wind tunnel tests for both subsonic and transonic velocities. The testing consisted of force measurements to determine static aerodynamic coefficients as well as free oscillation tests and the calculation of dynamic damping derivatives.

3. PROGRAM SCOPE

The definition of the configurations to be investigated was based on payload and mission considerations by AFATL combined with inflatable afterbody geometry by the contractor.

After joint selection of the candidate configurations the subsonic wind tunnel models were designed and fabricated for use in the AFATL subsonic facility. The model components designed for modular assemblies included different nose cones, body lengths, boattails, fin assemblies, and inflatable stabilizers. The 150 model components permitted a choice of configurations from thousands of possible combinations. In addition to the models, both static and dynamic model support systems were designed and fabricated.

The test program was conducted by AFATL personnel with field support engineering by the contractor over a three-week period. Within the allotted test period, data on 95 configurations was obtained. Because of a requirement program, the emphasis was placed on blunt nosed configurations with a fineness ratio range of from 3 to 11.

The raw data obtained from the tests was reduced and analyzed by the contractor, and the results are documented in this report.

The transonic test program was conducted in the I-T facility at Arnold Engineering Development Center, Arnold AFS, Tennessee. The configuration selection was made by AFATL personnel based, in part, on the results of the subsonic tests. Goodyear Aerospace Corporation fabricated the models for both the static and dynamic tests. A total of 54 configurations were possible test items, but tunnel occupancy time restricted the number of configurations tested. Reduction and analysis of the transonic data was executed by AEDC and AFATL personnel. The results of the experiments are presented in this comprehensive final report.

SECTION II

SUBSONIC TEST PROGRAM

1. PROGRAM PLAN

The primary purpose of this effort was to obtain aerodynamic data for a variety of configurations to enable designers to make appropriate performance tradeoffs in configuring new stores or upgrading existing items. Because of the variety of delivery missions being evaluated as well as the number of groups involved in these separate studies, the number of potential configurations is quite large. One of the first tasks of the program was to define a spectrum of various test item components that would lend versatility to the models and permit the approximation of almost any bomb shape currently under consideration.

It is obvious that a complete test program defining only the essential aerodynamic coefficients of all the possible geometric combinations would constitute an effort of considerable magnitude. The available time and funding became important factors in the test program plan. In conjunction with AFATL personnel, an open-ended program was prepared. The guidelines established were as follows:

a. Provide aerodynamic data for the prime configurations being considered in the Modular Bomb Study.

b. Emphasize the Ballute and inflatable stabilizers rather than rigid fin assemblies and define their feasibility.

c. Provide interchangeable model components to permit the approximation of all major classical bomb shapes.

d. Determine by wind tunnel tests the basic static aerodynamics and dynamic damping coefficients of the candidate configurations.

e. Limit the wind tunnel tests to a three-week occupancy level of effort.

f. Maintain a flexible test schedule so that promising configuration trends may be expanded and negative results eliminated during the test period.

2. CONFIGURATIONS

A complete list of configuration variables is given in the configuration index on pages 441 through 451.

The first important variable considered was fineness ratio. The models provided permitted model length variations from 2 to 12 calibers in increments of 1/4 caliber.

The fore section or nose assemblies included tangent ogives and cones of various lengths, flat and hemispherical shapes. Trip rings for the blunt-nosed shapes were also provided.

The after section variables consisted of boattails of various lengths with different kinds of cross-flow strakes, straight cylindrical sections, and an oversize 1.1-caliber diameter cylindrical section. With the exception of rigid fin assemblies used as control specimens, the stabilizer configurations were all various types of Ballutes. (The inflated fin configurations are considered Ballutes.)

The standard, body-of-revolution Ballutes ranged in size from 1-1/4 calibers to 2-1/4 calibers. The basic geometry of these Ballutes was defined by specific guidelines. Because the Ballute is a ram air-inflated flexible membrane, its shape is not optional but the result of tensile forces caused by the pressure differential over its entire surface in conjunction with the tailored geometry. The Ballutes used in this program were designed around attachments to rigid structure fore and aft. The forward end of the Ballute attaches to the aftermost section of the bomb, while the aft section of the Ballute attaches to the movable aft cover plate of the original airborne bomb. Upon deployment, the aft bomb cover is released and permitted to move back by force of the inflation air a predetermined distance becoming the aft closure of the Ballute. In the full-scale system this closure plate is restrained by an internal post, cables, or similar structure. The use of the aft cover plate has a twofold function: the system may be deployed without debris potentially dangerous to other aircraft, and the large diameter aft attachment circle allows Ballute tailoring for maximum diameter with a minimum length.

The concave Ballute extension configurations are based on the same attachment concept.

3. AFATL SUBSONIC WIND TUNNEL FACILITY

The wind tunnel facility at Eglin Air Force Base, Florida, is a blower-drive atmospheric exhaust system with a test section cross section 26 by 40 inches. The installation is relatively new, and some of the pecularities, common to all wind tunnel facilities, are still being uncovered. The turbulence factor affecting Reynolds number has a value of 1.8. Plans are underway for the incorporation of upstream screens to reduce the turbulences. The exhaust duct from the test section terminates outside of the facility building and is subject to the effects of the local weather environment. Variations in the test section pressure level indicate some effect due to wind gusts although the magnitude of these effects has not been measured. Because of the generally comparative nature of the experiments conducted for this effort the effects should be negligible.

The tunnel has a maximum velocity capability of 150 mph. Velocity is controlled by manual setting of the intake vanes of the squirrel cage blower and monitored by test section pressure as indicated by an inclined manometer.

Force measurements are recorded by a six-component strain gage-type balance mounted below the floor of the test section. For the tests conducted in this program, only drag force, side force, and yawing moment were used.

Forces on the test item are transferred to the balance by a single model support strut extending through the tunnel floor which is protected by an aerodynamic fairing. The balance platform can be rotated and is servo-controlled, permitting remote orientation of the model to any yaw angle during tunnel operation. Model position is recorded by an electro-mechanical counter to 1/10 to 1 degree of yaw.

Moment, drag, and side force loads are detected by strain gage load cells whose amplified output is displayed on visual readout panels. All data must be visually read and manually recorded.

The basic tunnel data was supplemented by meteorological readings supplied by the base weather station.

For the dynamic damping tests the model angle of attack was detected by a rotary potentiometer and recorded on a time-based oscillograph trace.

4. MODELS

In order to achieve the variations required in the number of configurations to be tested within the allowable budget, the following model design criteria was adopted:

a. All model components must be interchangeable.

b. The same models must be used for force measurements and for dynamic damping tests.

c. All configurations must be capable of static balancing for dynamic testing and moment of inertia measurements.

d. Dimensional tolerances must be considered in light of fabrication costs and their effect on data validity.

e. Model attachments and component assembly techniques must be designed to permit minimum loss of time during configuration changes.

SECTION III

SUBSONIC TEST DATA

1. GENERAL

The aerodynamic data derived from the wind tunnel tests is the most important product of this program, and the presentation of the data constitutes the major portion of this report. One of the primary objectives of the engineer using this data will be to make critical comparisons of performance characteristics as they apply to the specific mission. In addition to the basic data, which has been documented completely, certain performance characteristics of groups of configurations have been presented graphically to allow comparative evaluation.

2. SCOPE

Not all of the configurations were tested both statically and dynamically because of the flexible nature of the program plan. In some cases a free oscillation test was used to determine the feasibility of proceeding with force data tests. Whenever the model trimmed out at an angle of attack other than zero indicating static instability, force tests were not run. Conversely, preliminary analysis of force data was used to screen configurations with marginal performance characteristics and eliminate them from dynamic testing.

3. EVALUATION

The data acquired during this effort is designed to support a broad spectrum of mission requirements and bomb delivery applications. Any valid interpretation of the data must, of necessity, be tied to a specific mission. It is not the intent of this report to provide the optimum configuration for specific mission but rather to point out in a general but quantitative manner the gross effects and the trends created by varying specific aspects of the aerodynamic vehicle. Selection of the specific variables and their effect on performance remains the task of the user of this data, and the evaluation must be conducted in light of the mission at hand.

There are, on the other hand, performance trends that are apparent and which deserve notation in this report.

The purpose of the study has been to define the relative efficiency of various stabilizing devices. It is apparent that the efficiency of a given stabilizer varies with the basic bomb shape to which it is attached. Likewise, minor variations in a stabilizer concept may have an appreciable effect on performance regardless of the basic configurations. Certain significant features of the total geometry of the shapes tested have been isolated, and their specific contributions to stability have been shown graphically in Figures 254 through 284. Fineness ratio, nose shapes, Ballute size, burble fence size, and boattail geometry are among the characteristics used in these comparisons.

4. DATA INDEX

The basic subsonic data is presented on pages 20 through 351 and covers configurations 1 through 101.

The basic transonic data is presented on pages 352 through 387 and covers configurations 102 through 119.

Comparatic aerodynamic data for various configurations is presented on pages 388 through 439.

A Configuration Characteristics Identification Index is presented on pages 441 through 451.

The salient features of the model characteristics are listed in the left-hand vertical column.

Whenever a model characteristic applies to a given configuration, it is designated by a dot in the appropriate block in the vertical column for that configuration.

The type of data and the pages on which it may be found are designated at the bottom of the index page under the appropriate configuration column.

The identification index lists only the basic data for each configuration. Comparison of the performance characteristics of groups of configurations is contained in Figures 254 through 284 and are designated in the List of Figures.

5. TEST RESULTS

Because of the comprehensive nature of the study, there was no single mission or specific performance characteristics that might be considered an ultimate goal. Rather, the intent has been to provide a broad spectrum of combinations of forebody and Ballute combinations so that the users of this data might select either the configuration or the performance which best suits their specific requirement and use the data as a guideline for their initial design.

For this reason the data is presented generally in the order in which the tests were conducted.

The performance characteristics of a fully tested configuration are presented in five pages of data.

A. Model Specification Sheet

The geometry and physical characteristics of the model are defined and a sketch of the model is presented.

B. Static Aerodynamic Test Data

This page is a reproduction of the digital printout from the contractor's IBM 360-40 computer. The computer program uses the raw wind tunnel data from the Eglin facility and converts the data to aerodynamic coefficients versus angle of attack. Included in the program calculations are:

a. Application of the calibration factors of the three basic load cells of the tunnel balance system.

b. Correction of nominal angle of attack to true flow conditions.

c. Correction of the aerodynamic influence of the strut support system by appropriate comparison of test run forces with tare run forces.

C. Graphic Static Aerodynamic Data

This page is a reproduction of the computer-plotted data presented in digital form on the preceding page. The coefficient values for positive and negative angles of attack have been superimposed to permit more accurate fairing of the data since all the configurations are geometrically symmetrical. No smoothing techniques have been used in the reduction process other than manual fairings of the solid line curves and the elimination in the raw data of obviously erroneous data readings.

D. Dynamic Stability Test Data(Digital)

The dynamic damping derivative as determined from free oscillation testing is defined here as well as the time to 1/2 amplitude. Each configuration was released from 5 different angles of attack under 1 or 2 velocity conditions.

E. Dynamic Stability Test Data(Graphic)

The damping derivatives are presented graphically to illustrate the effect of velocity and release angle of attack on the values obtained.

Since some models were tested for specific purposes, not all configurations are supported by the full five-page compliment of data. Similarly some of the information blocks on the Model Specification Sheets have been left blank in those cases where the dimensional sketch fully describes the model geometry and additional information not germane to the test was not recorded.

SECTION IV

TRANSONIC TEST PROGRAM

The investigation of Bomb-Ballute configurations described in Sections II and III covered a broad range of variables in both forebody and Ballute geometry. Concurrent with this effort a study of high-density modular bomb configurations was being conducted by AFATL. Because of limitations of available wind tunnel time and the higher costs of models for the transonic tunnel, relatively few configurations could be tested in the transonic flight regime. The view of the immediacy of the requirements for information on modular bomb configurations, the transonic test program was primarily geared to support this effort.

The subsonic test results were used to screen configurations with respect to Ballute performance characteristics and the results of the modular bomb study defined the bomb geometries.

The contractor participation in the transonic test program was limited to definition of Ballute geometry, support of the test program, and summarization of the data in this report.

The tests were conducted at Arnold Engineering Development Center, Air Force Systems Command, Arnold Air Force Station, Tennessee. The results of these tests have been published in AEDC-TR-71-8, "Transonic Wind Tunnel Investigation of Ballute-Stabilized Bomb Configurations", dated January 1971.

The transonic test data has been included in the Configurations Characteristics Identification Index on page 451. Configurations 102 through 119 were tested at Mach numbers = 0.2 through 1.5. The data is presented on pages 352 through 386.

SECTION V

WIND TUNNEL PRESSURE DISTRIBUTION MODELS

Although the contractor has been designing and fabricating Ballutes for 13 years, the majority of the missions have required trailing decelerators and considerable data is available for these types of Ballutes. The attached Ballute, however, presents a number of design problems associated with local airflow phenomena. The general approach to the design or geometry of the Ballute shapes studied during this program was confirmed by the successful flight tests of a Ballute-stabilized, 3000-lb M118 bomb. (Reference AFATL-TR-68-113, "Ballute Stabilization System for M118 Bomb").

The essence of the problem lies in the effect of the abrupt step that exists at the bomb-Ballute interface station. This gross irregularity in the aerodynamic contour results in boundary layer separation on the forebody which, in turn, severely modifies the pressure distribution on the forward portion of the Ballute. If the Ballute for a specific mission is to be designed for large quantity production, considerably more must be known about this phenomena before the design may be optimized. The forward contour of the Ballute, the local stress levels in the Ballute membrane and ram-air inlet size and placement are all affected by the boundry layer separation and reattachment.

The contractor designed a series of modular wind tunnel model components to be fabricated by AFATL for the purpose of measuring the pressure distribution on a variety of bomb-Ballute configurations. The testing will be conducted in the 4-foot transonic wind tunnel at Arnold Air Force Station, Tennessee. The models were designed so that nose shape, fineness ratio, boattail length, and Ballute size can be varied.

The diameter of the cylindrical portion of the bomb models is 1.75 in. Pressure orfices have been located over the total configuration length, approximately every 1/4 caliber.

Only a selected few of the thousands of possible configurations will be tested transonically due to the limited tunnel occupancy time scheduled. The same models, however, will be installed in the AFATL subsonic tunnel for additional testing. The results of the pressure distribution tests and the airgun-launched flight tests will be documented separately by AFATL.

SECTION VI

AIR GUN FLIGHT TEST MODELS

All of the efforts previously discussed have been based on rigid model testing in controlled environment. It was obvious that some intermediate confirmation of Ballute performance would be desirable prior to commencement of a costly full-scale flight test program. The air gun test facility at Eglin Air Force Base was chosen as the test bed for these first free-flight experiments.

The 5.5-inch-diameter bore air gun with its ten-foot-long barrel is capable of launching a 13-lb bomb-Ballute model up to 1600-foot apogee altitude at muzzle velocities up to 600 feet per second.

The air gun test program will be conducted by AFATL personnel at Eglin Air Force Base Florida. In support of this effort and as part of subject contract, the contractor completed the following tasks:

1. A series of 79 point-mass trajectories were run on the IBM computer with the following variables:

   (a) Payload weight

   (b) Ballute size

   (c) Muzzle velocity

   (d) Gun elevation angle

2. The test vehicle was designed by the contractor, and raw material was supplied to AFATL for fabrication by them.

3. Certain portions of the test vehicles were fabricated by the contractor including:

   (a) Three Ballute canisters

   (b) Frangible nose cones

   (c) Three 1.75-caliber vinyl Ballutes
   Three 2.00-caliber vinyl Ballutes
   Three 2.50-caliber vinyl Ballutes

The test vehicle will have provisions for ballasting to obtain the desired center-of-gravity location. An aft-looking high speed camera with battery pack has been included to define the flight characteristics during the ascent portion of the flight through correlating the photographic image with a ground target pattern. Four self-erecting ram-air inlets will deploy and inflate the Ballute as the round emerges from the muzzle.

The bomb configuration chosen was one of the modular bomb candidate configurations and is the same as the forebody used in Part 2 of the subsonic wind tunnel tests (Configurations 96 through 101).

This test program will afford the first opportunity of correlation of wind tunnel results with free-flight data on a bomb-Ballute system.

SECTION VII

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

1. SUMMARY OF ACCOMPLISHMENTS

During the course of this program, several contract modifications were implemented to expand the scope of the effort. Brief descriptions of the major tasks undertaken during the program are presented here by way of summary.

a. A review of current and future tactical mission requirements for aircraft-delivered munitions was conducted jointly with AFATL.

b. A review of current and planned munition configurations and stowage concepts was accomplished jointly with AFATL.

c. The results of a and b, above, was the basis for the broad spectrum of munition configurations that were to be investigated in the wind tunnel test programs.

d. Components for subsonic wind tunnel models were designed, fabricated, and tested at the AFATL facility.

e. Additional components compatible with the models in d, above, were fabricated in support of the concurrent Modular Weapons Study. These components consisted of nose sections and fixed and deployable fin concepts.

f. The raw data from the subsonic testing of 101 configurations was reduced and analyzed, and the results are presented in this report.

g. A series of selected bomb-Ballute configurations fabricated and tested in the one-foot transonic tunnel at AEDC.

h. The results of the tests, in g, are presented graphically in this report.

I. A series of pressure-survey wind-tunnel models was designed for fabrication by AFATL for subsequent testing at the 4-foot transonic tunnel at AEDC.

j. An instrumented, free flight vehicle was designed for fabrication by AFATL and subsequent testing by launching from the AFATL 5.5-inch-diameter air gun.

k. Three Ballute canisters and nine Ballutes were fabricated for the air gun tests.

2. CONCLUSIONS

A. General

A review of the configurations tested indicates that relatively small caliber Ballutes can provide good static and dynamic stability characteristics often with better static margins than with conventional fin-stabilized munitions. These characteristics are exhibited both subsonically and in the transonic regime. Erratic aerodynamic characteristics are noted, especially in the smaller caliber Ballutes, in the region of sonic velocity. This phenomena is not unexpected and should be considered in light of the short duration of exposure to the critical Mach number that would be experienced in a descent trajectory. The aerodynamic coefficient at Mach numbers above and below the critical value should govern the importance of the effect of the erratic data.

The deployable feature of these small stabilizing Ballutes and the accompanying increased efficient use of available munition stowage space indicate serious consideration should be given to stabilization by Ballute in future munitions designs.

A sufficient variety of Ballute sizes was tested to indicate the smallest effective stabilizing Ballute for a given munition shape.

In general, the stability of a configuration increases significantly as Ballute size increases; consequently, there exists no line of demarcation between stabilizing and decelerator Ballutes. The required terminal velocity or the critical level of deceleration during the trajectory becomes the sizing criterion. In testing Ballutes up to five calibers in diameter, all of the current known deceleration missions have been covered at least in the magnitude of the drag required.

B. Interpretation of Data

The Ballute shapes tested throughout this program are based on the concept of rigid support for the Ballute both at its forward and aft extremities. This approach to the hardware design minimizes the Ballute distortion at high angles of attack. Obviously, the smaller the Ballute, the less the distortion at a given angle of attack by virtue of the ratio of the attachment diameter to inflated diameter. Since the tested models are rigid, distortion effects are not apparent. The application of the data presented should be tempered by consideration of size and angle of attack.

As discussed earlier in the text, boundary layer separation and the resultant low energy air pocket have significant impact on local pressure coefficients and, therefore, an aerodynamic coefficient as well. Since Reynolds number is a major factor in boundary layer separation, careful comparison of test Reynolds number to anticipated full-scale flight Reynolds number should be made.

C. Utility

The comprehensive nature of this study and the variety of configurations tested tend to emphasize one of the primary goals of the program. This goal was to present, in a usable format, sufficient data to permit the reader to locate configurations sufficiently close to his own in either geometry or performance so that an immediate evaluation of the feasibility of using a Ballute as either decelerator or stabilizer might be made.

The data presented in this report attains that goal and will further be enhanced when the results of the pressure survey tests and air gun tests are published.

3. RECOMMENDATIONS

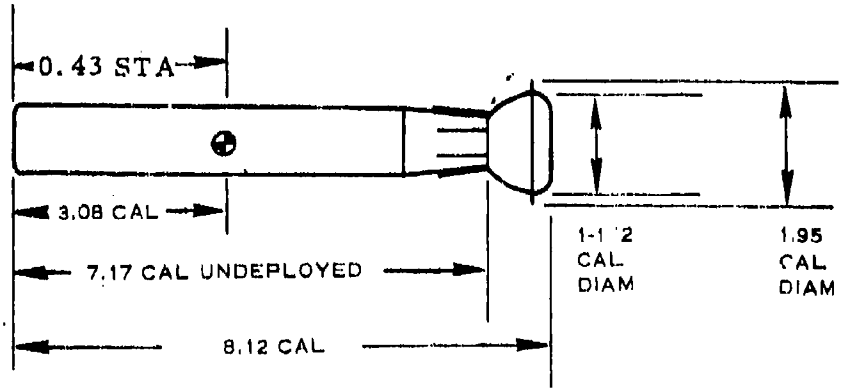
It is concluded that Ballutes have an important role to play in future munitions delivery concepts. Several programs are currently in progress at the contractor facility in which Ballutes are being used to deliver munitions from aircraft. The contractor is continuing in-house efforts to refine low cost fabrication techniques for high quantity Ballute production. The publication of pressure distribution test results and air gun test results will further complete the aerodynamic picture. Widespread interest in Ballutes indicates the continuing nature of the technology.

Examination of the isolated facts, as stated above, shows the need for continuation of the effort begun here.

The next obvious step is to combine this data with the information that will be obtained from the programs mentioned. At that time some of the inadequate configurations should be eliminated. To further enhance the usefulness of the proposed text, some basic ground rules should be established on various tables compiled that would permit the using engineer to bracket the problems of stowage compartment volume, Ballute system weight, inflation times, and performance criteria during inflation inlet sizing and placement.

It is recommended that a program be initiated to accomplish the correlation of the data in this report with data to be derived from the related efforts in order to provide a more useful format for the user.

Item	Page
Static aerodynamic data	
Tabulated	21
Plotted	22
Dynamic stability data	
Tabulated	23
Plotted	24



General data

Model weight = 425.3 gm

Moment of inertia = 0.20670 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	7.17
Stabilizer	=	1-1/2 caliber diameter ballute
Burble fence	=	1.95 caliber diameter
Boattail	=	1-1/3 caliber long, 10 degree cone angle
Strakes (8)	=	0.05 caliber high

Remarks

Figure 1. Model Specifications for Configuration 1

TABLE I. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 1
(TEST NO. 12)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002340	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 56.64	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=0.2500E 08	ALPHA SHIFT(DEGREES)	=-1.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-41.0	-2.682	5.707	-5.768	2.547	5.435	0.942
-30.0	-31.0	-1.707	4.415	-3.737	2.906	3.307	0.885
-20.0	-21.0	-1.119	3.914	-2.447	3.253	2.228	0.911
-15.0	-16.0	-0.545	3.641	-1.528	3.350	1.585	1.037
-10.0	-11.0	-0.359	3.469	-1.014	3.337	1.099	1.084
-6.0	-7.0	-0.215	3.441	-0.633	3.389	0.956	1.511
-3.0	-4.0	-0.143	3.412	-0.381	3.394	0.659	1.728
-0.0	-1.0	0.014	3.233	-0.043	3.233	0.144	3.353
3.0	2.0	0.159	3.207	0.273	3.290	-0.714	2.617
6.0	5.0	0.301	3.412	0.597	3.373	-1.087	1.819
10.0	9.0	0.215	3.484	0.757	3.407	-1.357	1.791
15.0	14.0	0.459	3.436	1.283	3.269	-1.330	1.032
20.0	19.0	0.332	3.641	1.972	3.172	-1.990	1.009
30.0	29.0	1.506	4.545	3.520	3.245	-3.298	0.937
40.0	39.0	2.524	5.649	5.517	2.902	-5.058	0.917

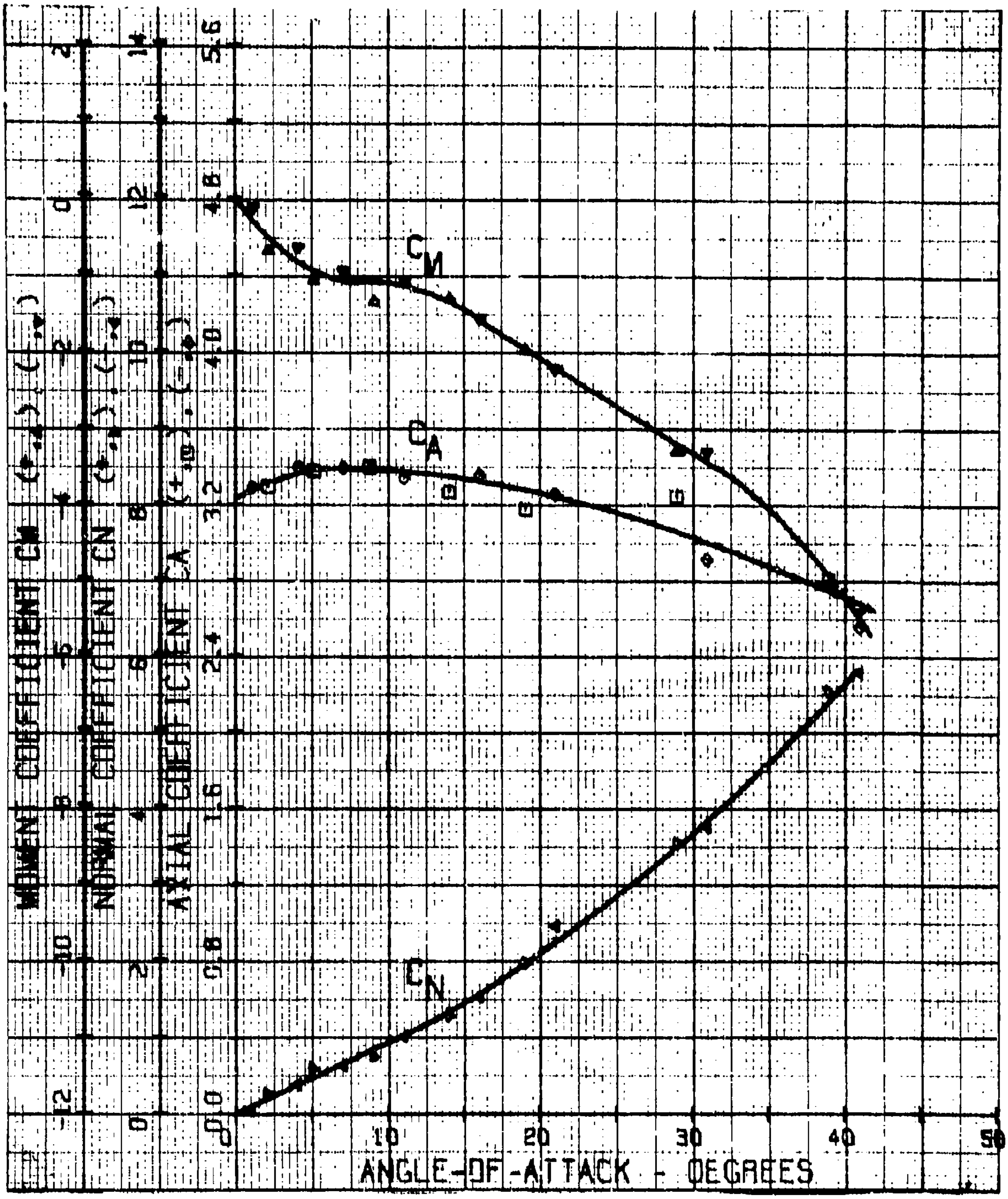


Figure 2. Graphic Static Aerodynamic Test Data: Configuration 1 (Test No. 12)

TABLE II. DYNAMIC STABILITY TEST DATA: CONFIGURATION 1

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.206700
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002306
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS = 6, 7
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.853	-105.279
50.000	25.000	0.878	-102.282
40.000	20.000	0.906	-99.107
30.000	15.000	0.863	-104.134
25.000	12.500	0.794	-113.154

TEST NUMBERS = 2, 3
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.175	-152.878
50.000	25.000	1.253	-143.347
40.000	20.000	1.291	-140.201
30.000	15.000	1.322	-135.892
25.000	12.500	1.281	-140.201

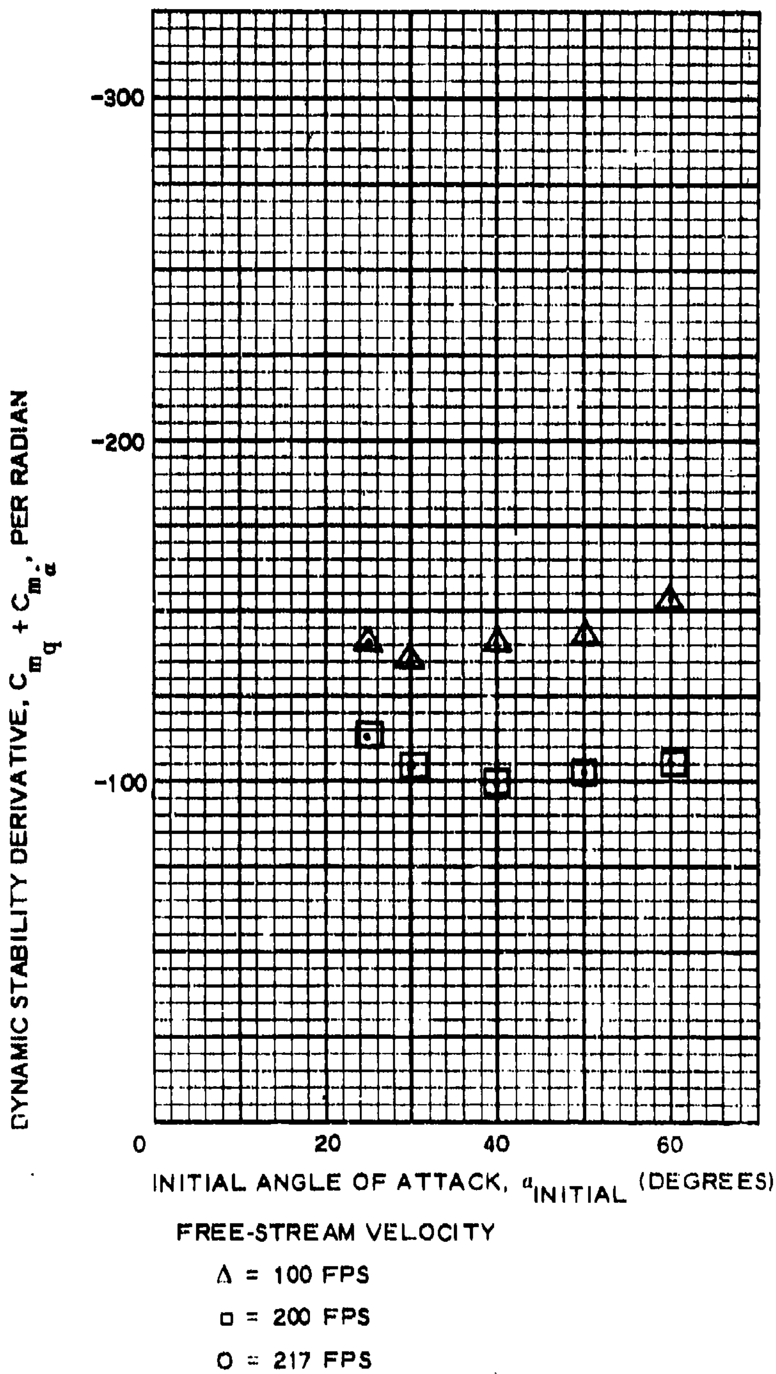
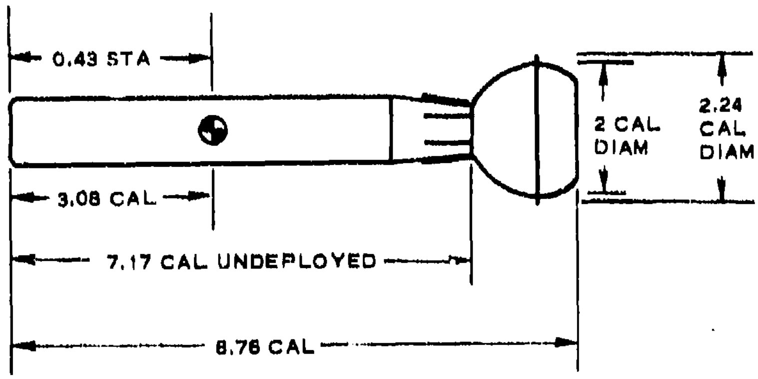


Figure 3. Graphic Dynamic Stability Test Data: Configuration 1



General data

Model weight = 457.5 gm

Moment of inertia = 0.30732 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	7.17
Stabilizer	=	2 caliber diameter ballute
Burble fence	=	2.24 caliber diameter
Boattail	=	1-1/3 caliber long, 10 degree cone angle
Strakes (8)	=	0.05 caliber high

Remarks

Figure 4. Model Specifications for Configuration 2

TABLE III. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 2
(TEST NO. 13)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002338	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 56.59	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=0.2703E 06	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-3.487	6.283	-6.836	2.217	10.005	1.464
-30.0	-33.0	-2.468	4.929	-4.759	2.732	6.952	1.464
-20.0	-23.0	-1.507	4.289	-3.063	3.359	4.323	1.411
-15.0	-18.0	-0.847	4.115	-2.077	3.653	2.805	1.350
-10.0	-13.0	-0.488	4.102	-1.398	3.887	1.754	1.262
-6.0	-9.0	-0.402	4.083	-1.036	3.975	1.391	1.342
-3.0	-6.0	-0.373	3.987	-0.788	3.926	1.122	1.424
-0.0	-3.0	-0.201	4.007	-0.410	3.936	0.150	0.366
3.0	0.0	0.144	4.030	0.144	4.030	-1.704	11.874
6.0	3.0	0.057	4.088	0.271	4.079	-2.241	9.262
10.0	7.0	0.215	4.073	0.710	4.017	-2.366	3.332
15.0	12.0	0.592	4.045	1.332	3.852	-3.272	2.456
20.0	17.0	1.076	4.102	2.229	3.608	-4.857	2.179
30.0	27.0	2.224	4.701	4.157	3.259	-7.268	1.749
40.0	37.0	3.229	6.149	6.274	2.960	-10.069	1.605

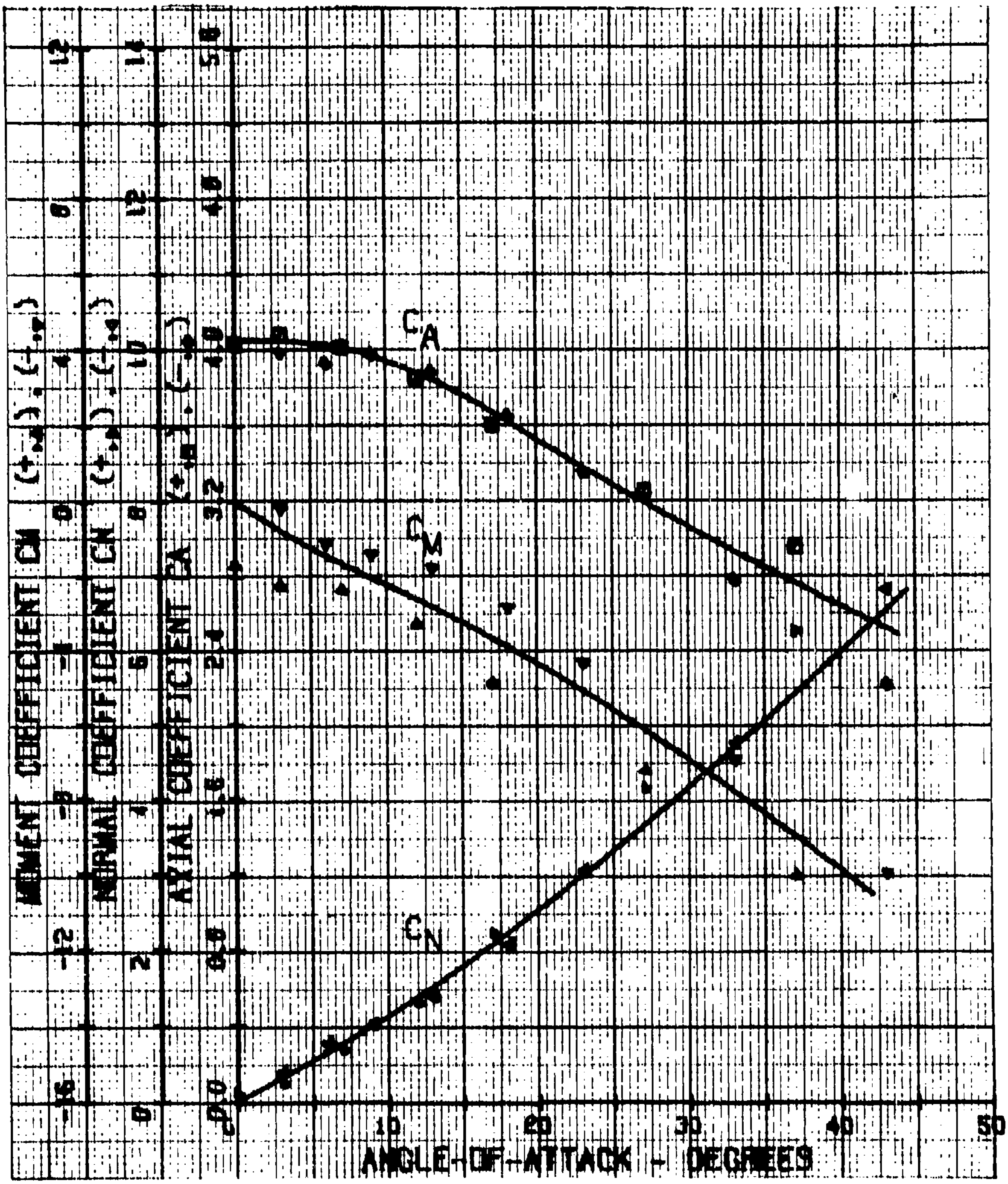


Figure 5. Graphic Static Aerodynamic Test Data: Configuration 2 (Test No. 13)

TABLE IV, DYNAMIC STABILITY TEST DATA: CONFIGURATION 2

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.000
MOMENT OF INERTIA(SLUG-IN.SQ) =0.307320
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002300
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS = 11, 12
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.806	-166.046
50.000	25.000	0.925	-144.729
40.000	20.000	0.994	-135.999
30.000	15.000	1.012	-132.221
25.000	12.500	0.966	-138.640

TEST NUMBERS = 15, 16
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.203	-222.544
50.000	25.000	1.403	-190.823
40.000	20.000	1.528	-175.214
30.000	15.000	1.344	-199.255
25.000	12.500	[illegible]	-221.968

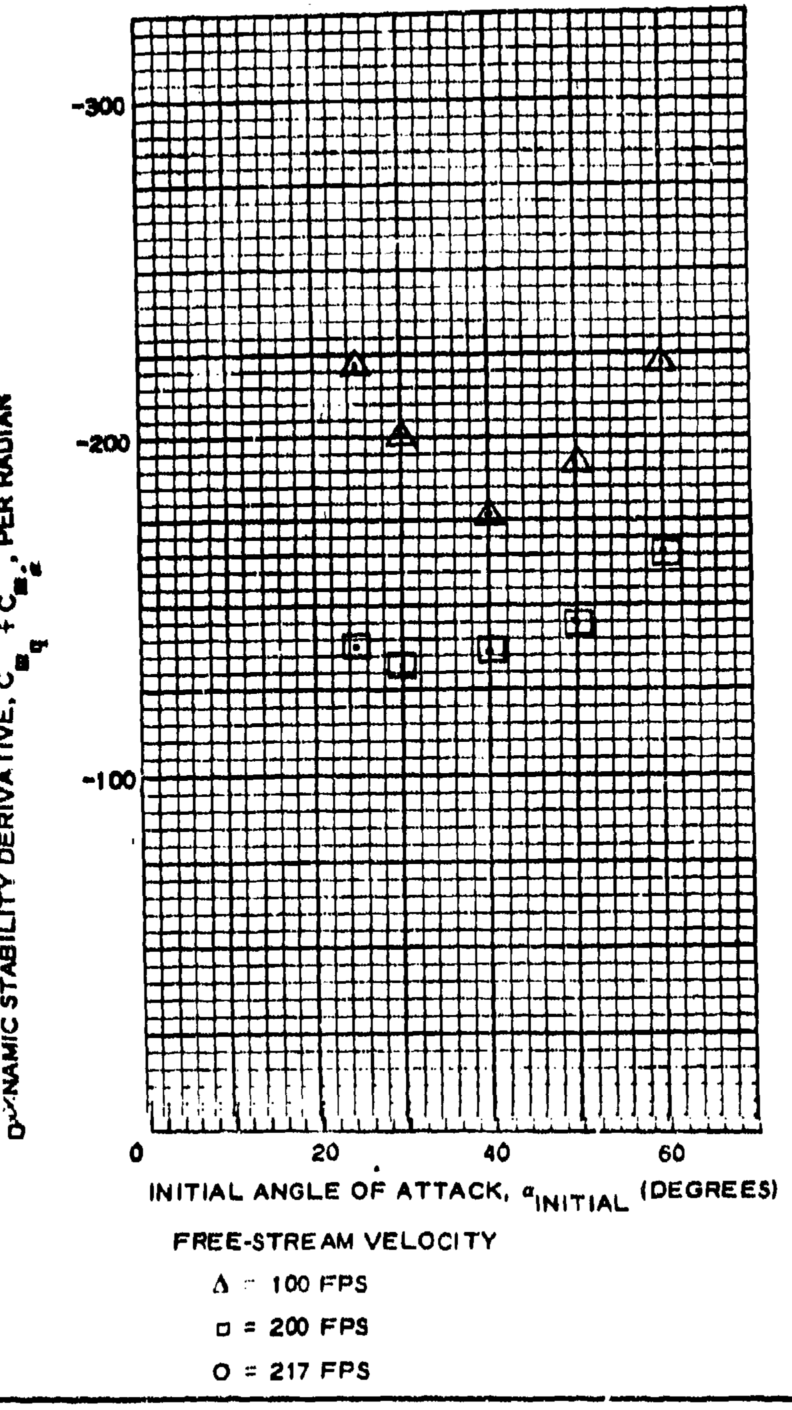
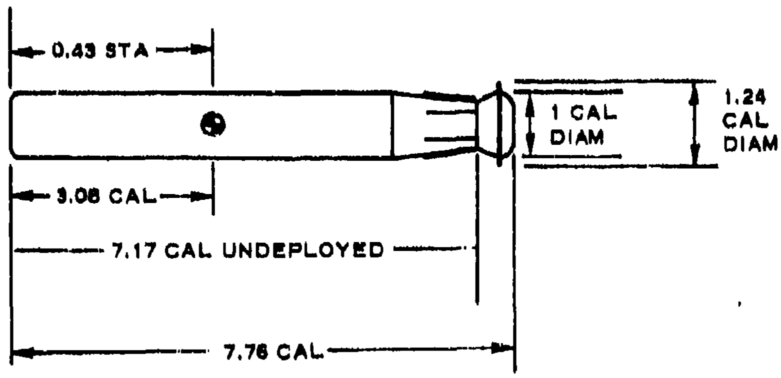


Figure 6. Graphic Dynamic Stability Test Data: Configuration 2

Item	Page
Static aerodynamic data	See "Remarks" below.
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 379.0 gm

Moment of inertia = 0.15260 slug in.^{2}

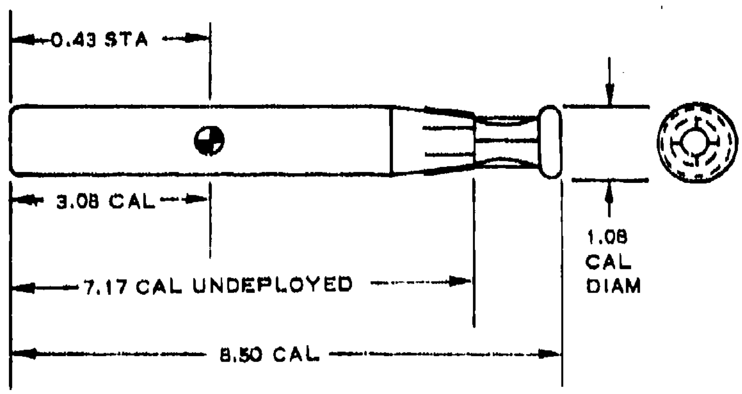
Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	7.17
Stabilizer	=	1 caliber diameter ballute
Burble fence	=	1.24 caliber diameter
Boattail	=	1-1/3 caliber long, 10 degree cone angle
Strakes (8)	=	0.05 caliber high

Remarks

Figure 7. Model Specifications for Configuration 3

Item	Page
Static aerodynamic data	
Tabulated	32
Plotted	33
Dynamic stability data	
Tabulated	34
Plotted	35



General data

Model weight = 383.0 gm

Moment of inertia = 0.17626 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	7.17
Stabilizer	=	1.08 caliber diam toroid on concave extension with panels
Burble fence	=	none
Boattail	=	1-1/3 caliber long, 10 degree cone angle
Strakes (8)	=	0.05 caliber high

Remarks

Figure 8. Model Specifications for Configuration 4

TABLE V. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 4
(TEST NO. 141)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002337	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 56.54	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=0.2622E 06	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-3.793	4.855	-6.085	0.964	4.974	0.817
-30.0	-33.0	-2.687	3.002	-3.888	1.055	2.725	0.701
-20.0	-23.0	-1.738	1.867	-2.330	1.040	1.569	0.674
-15.0	-18.0	-1.178	1.451	-1.569	1.016	1.035	0.660
-10.0	-13.0	-0.747	1.206	-0.999	1.007	0.591	0.591
-6.0	-9.0	-0.388	0.941	-0.531	0.875	0.032	0.060
-3.0	-6.0	-0.172	0.876	-0.263	0.853	-0.111	-0.421
-0.0	-3.0	-0.027	0.819	-0.072	0.816	-0.179	-2.502
3.0	0.0	0.101	0.833	0.101	0.833	-0.141	1.405
6.0	3.0	0.158	0.962	0.203	0.952	-0.182	0.897
10.0	7.0	0.388	1.034	0.511	0.979	-0.489	0.956
15.0	12.0	0.876	1.273	1.123	1.068	-0.994	0.885
20.0	17.0	1.379	1.503	1.760	1.039	-1.305	0.741
30.0	27.0	2.327	2.567	3.234	1.222	-2.487	0.769
40.0	37.0	3.261	4.037	5.034	1.261	-4.262	0.847

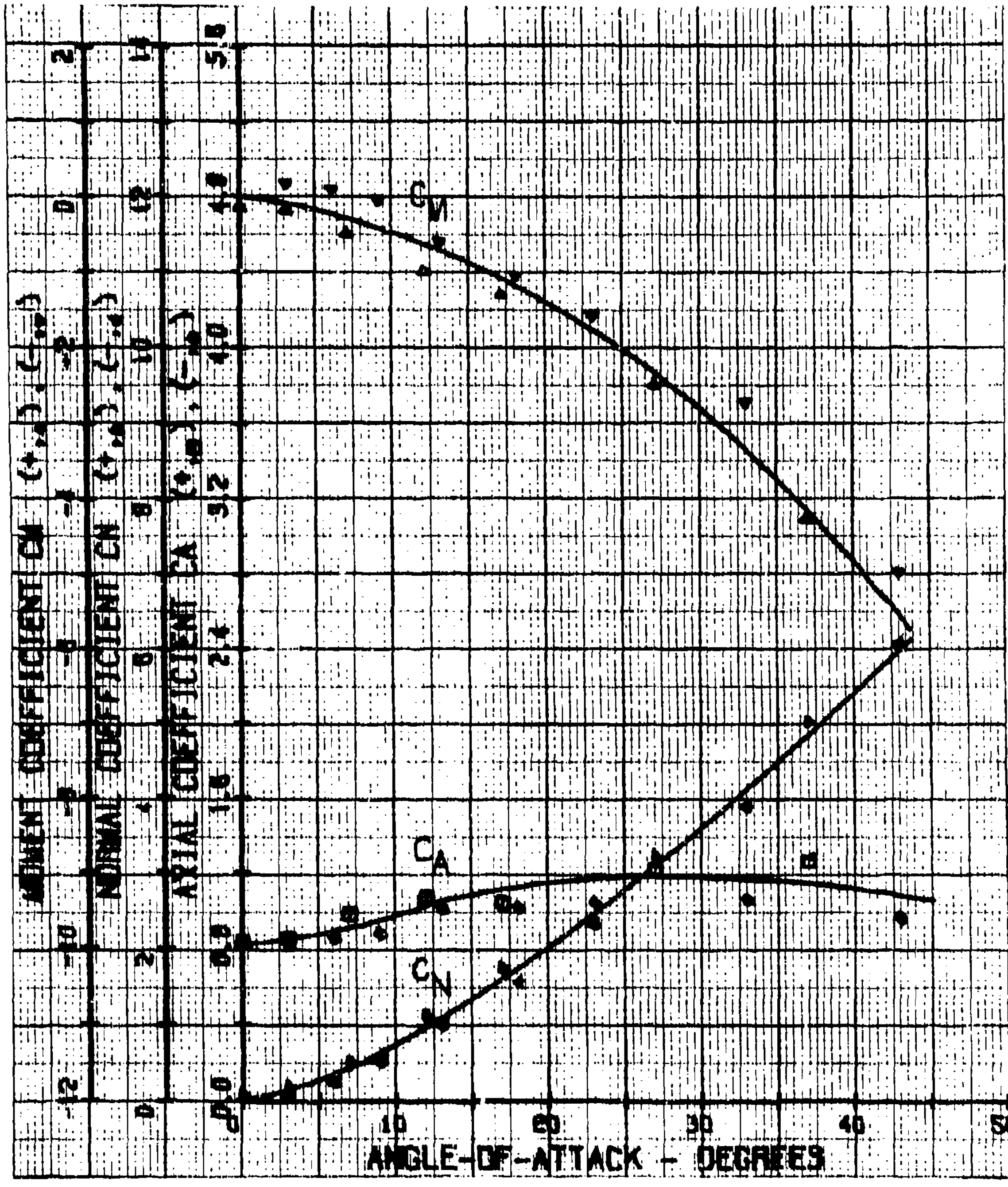


Figure 9. Graphic Static Aerodynamic Test Data: Configuration 4 (Test No. 141)

TABLE VI, DYNAMIC STABILITY TEST DATA: CONFIGURATION 4

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.176260
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002[illegible]
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS = 27, 28
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.756	-101.872
50.000	25.000	0.837	-86.806
40.000	20.000	1.009	-76.325
30.000	15.000	1.100	-70.037
25.000	12.500	1.053	-73.154

TEST NUMBERS = 31, 32
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.934	-164.903
50.000	25.000	1.094	-140.875
40.000	20.000	-0.509	302.491
30.000	15.000	-0.934	164.903
25.000	12.500	-1.334	115.471

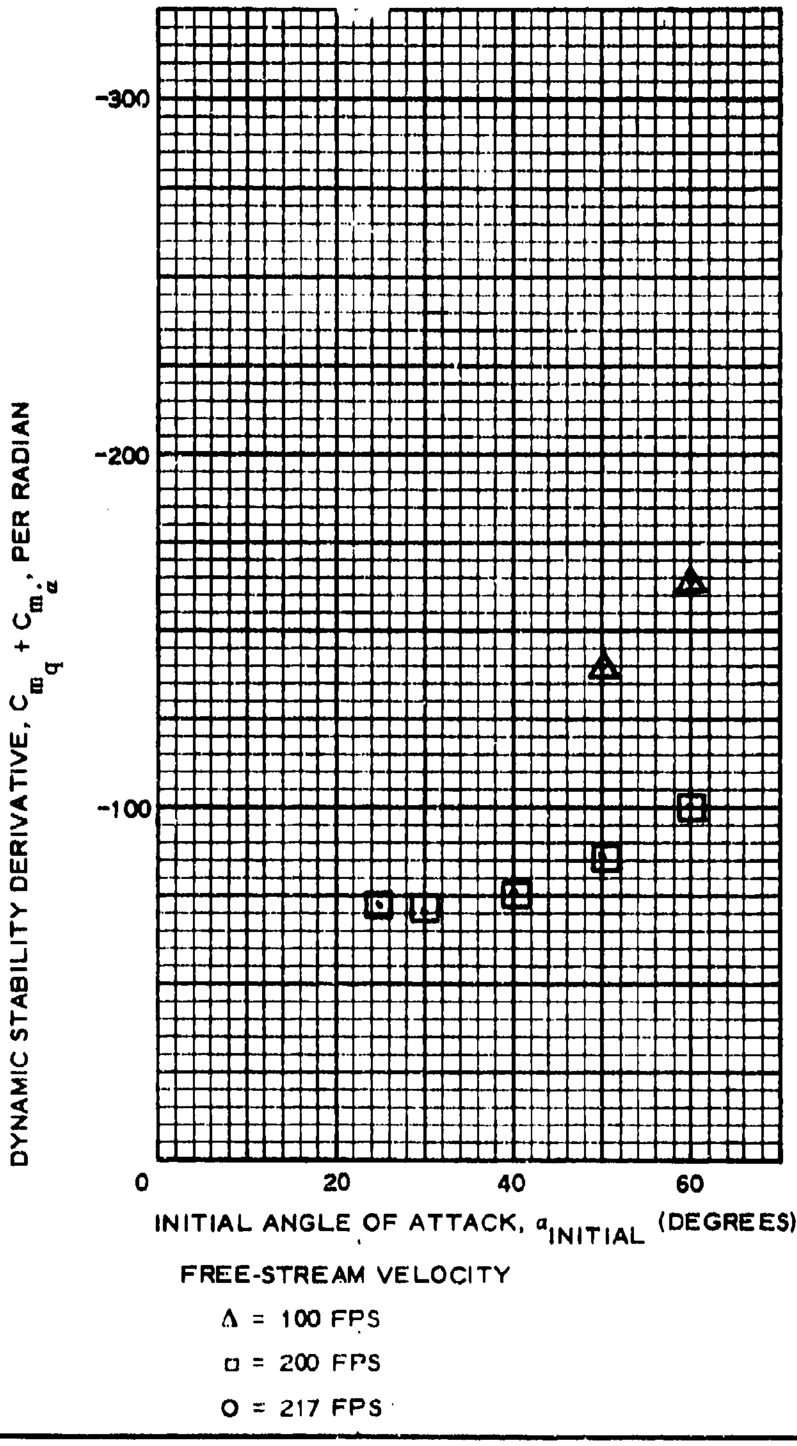
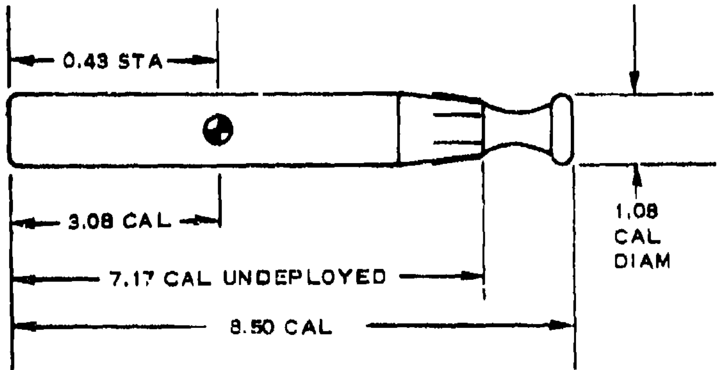


Figure 10. Graphic Dynamic Stability Test Data: **Configuration 4**

Item	Page
Static aerodynamic data	See "Remarks" below.
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 382.2 gm

Moment of inertia = 0.17393 slug in.^{2}

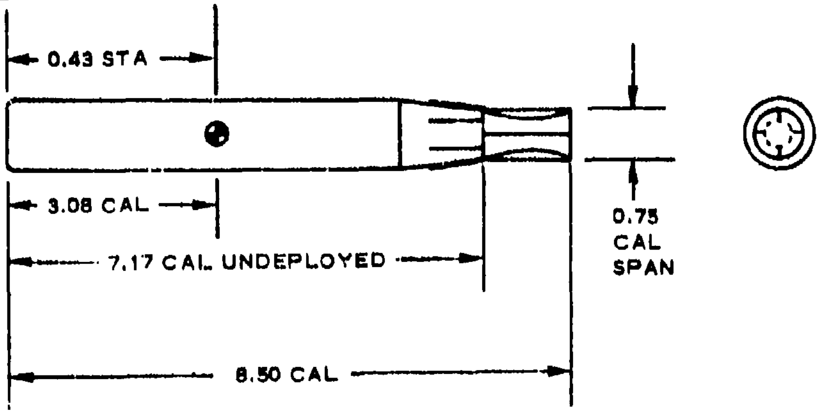
Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	7.17
Stabilizer	=	1.08 caliber diam toroid on conca extension with ut panels
Burble fence	=	none
Boattail	=	1-1/3 caliber long, 10 degree cone angle
Strakes (8)	=	0.05 caliber high

Remarks

Figure 11. Model Specifications for Configuration 5

Item	Page
Static aerodynamic data	See "Remarks" below.
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 376.0 gm

Moment of inertia = 0.15063 slug in.^{2}

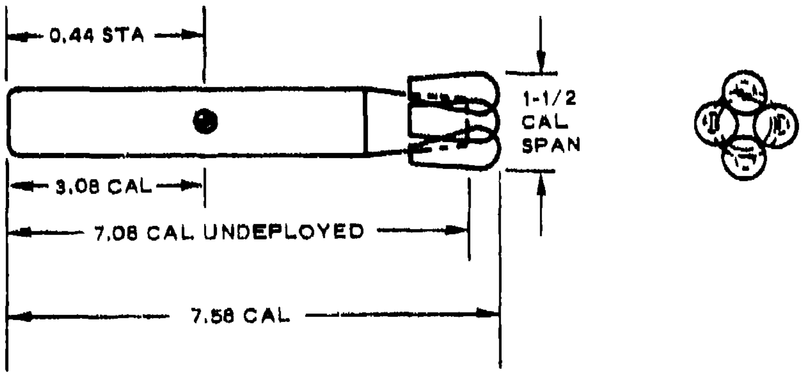
Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	7.17
Stabilizer	=	0.75 caliber diam concave extension with panels
Burble fence	=	none
Boattail	=	1-1/3 caliber long, 10 degree cone angle
Strakes (8)	=	0.05 caliber high

Remarks

Figure 12. Model Specifications for Configuration 6

Item	Page
Static aerodynamic data	
Tabulated	39
Plotted	40
Dynamic stability data	
Tabulated	41
Plotted	42



General data

Model weight = 312.5 gm

Moment of inertia = 0.14810 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	7.08
Stabilizer	=	1-1/2 caliber span inflatable conics
Burble fence	=	none
Boattail	=	1-1/2 caliber long, 10 degree cone angle
Strakes (8)	=	none

Remarks

Figure 13. Model Specifications for Configuration 7

TABLE VII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 7, TEST NO. 16

VELOCITY(FT/SEC)	= 218.50	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002313	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 55.22	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=0.2376E 08	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-4.148	4.946	-6.434	0.818	3.325	0.517
-30.0	-33.0	-2.956	3.147	-4.194	1.029	2.034	0.485
-20.0	-23.0	-2.080	2.051	-2.727	1.079	1.606	0.589
-15.0	-18.0	-1.559	1.632	-1.987	1.071	1.059	0.533
-10.0	-13.0	-0.956	1.290	-1.213	1.003	0.505	0.416
-6.0	-9.0	-0.544	1.133	-0.710	1.004	0.192	0.271
-3.0	-6.0	-0.309	1.000	-0.412	0.962	0.148	0.360
-0.0	-3.0	-0.221	0.852	-0.266	0.869	0.086	0.322
3.0	0.0	0.0	0.857	0.0	0.867	-0.068	0.0
6.0	3.0	0.235	0.912	0.283	0.898	-0.111	0.394
10.0	7.0	0.456	0.970	0.571	0.908	-0.195	0.342
15.0	12.0	0.868	1.162	1.090	0.956	-0.569	0.522
20.0	17.0	1.353	1.529	1.741	1.067	-1.315	0.755
30.0	27.0	2.412	2.353	3.218	1.001	-1.792	0.557
40.0	37.0	3.354	3.500	4.785	0.777	-2.766	0.578

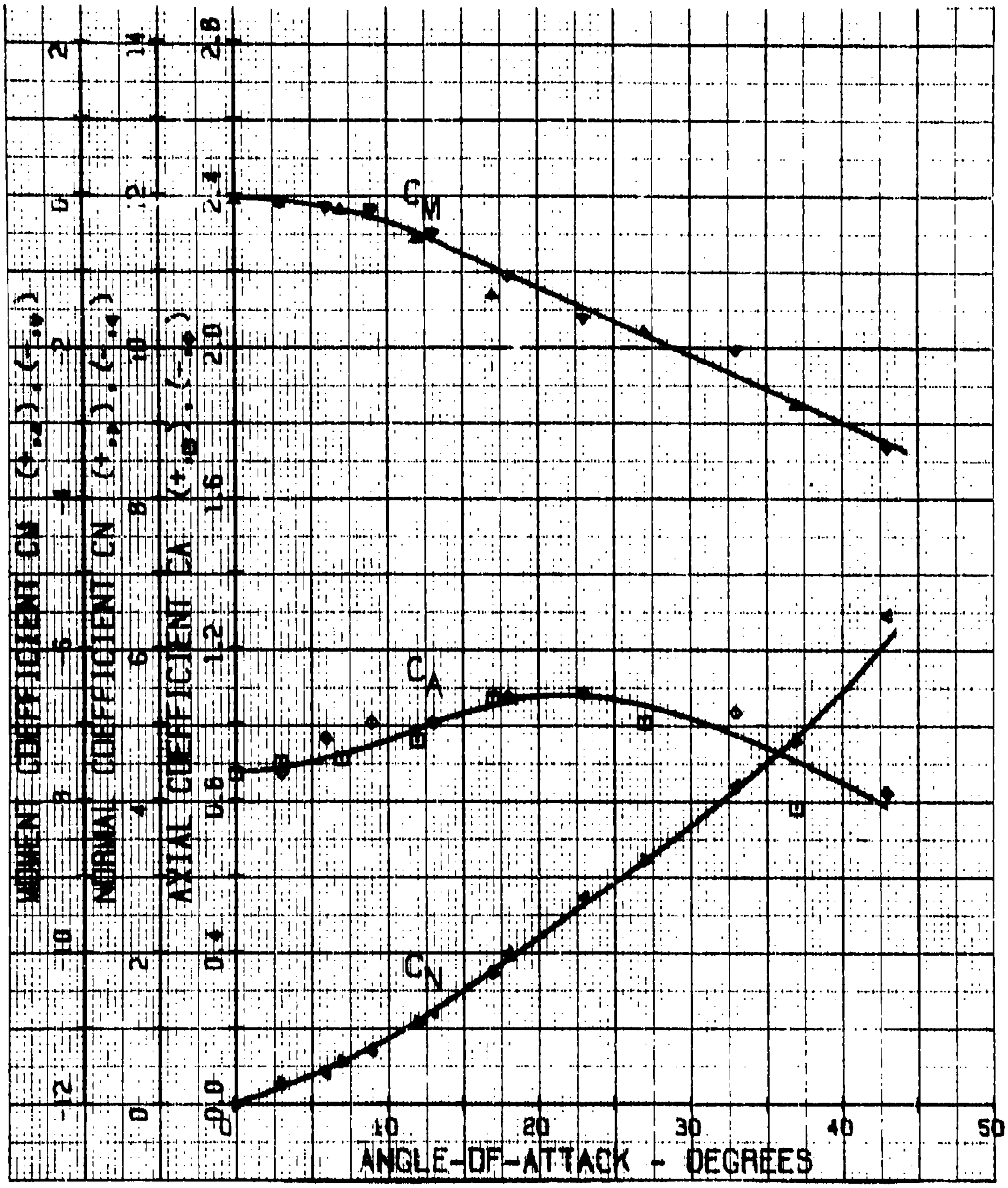


Figure 14. Graphic Static Aerodynamic Test Data: Configuration 7(Test No. 16)

TABLE VIII. DYNAMIC STABILITY TEST DATA; CONFIGURATION 7

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.148100
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002288
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS = 55, 56
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.769	-84.347
50.000	25.000	0.831	-78.005
40.000	20.000	0.881	-73.579
30.000	15.000	1.006	-64.439
25.000	12.500	1.087	-59.624

TEST NUMBERS = 51, 52
VELOCITY(FT/SEC)= 1[illegible]0.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.066	-121.697
50.000	25.000	1.200	-108.070
40.000	20.000	1.228	-105.595
30.000	15.000	1.169	-110.959
25.000	12.500	1.075	-120.636

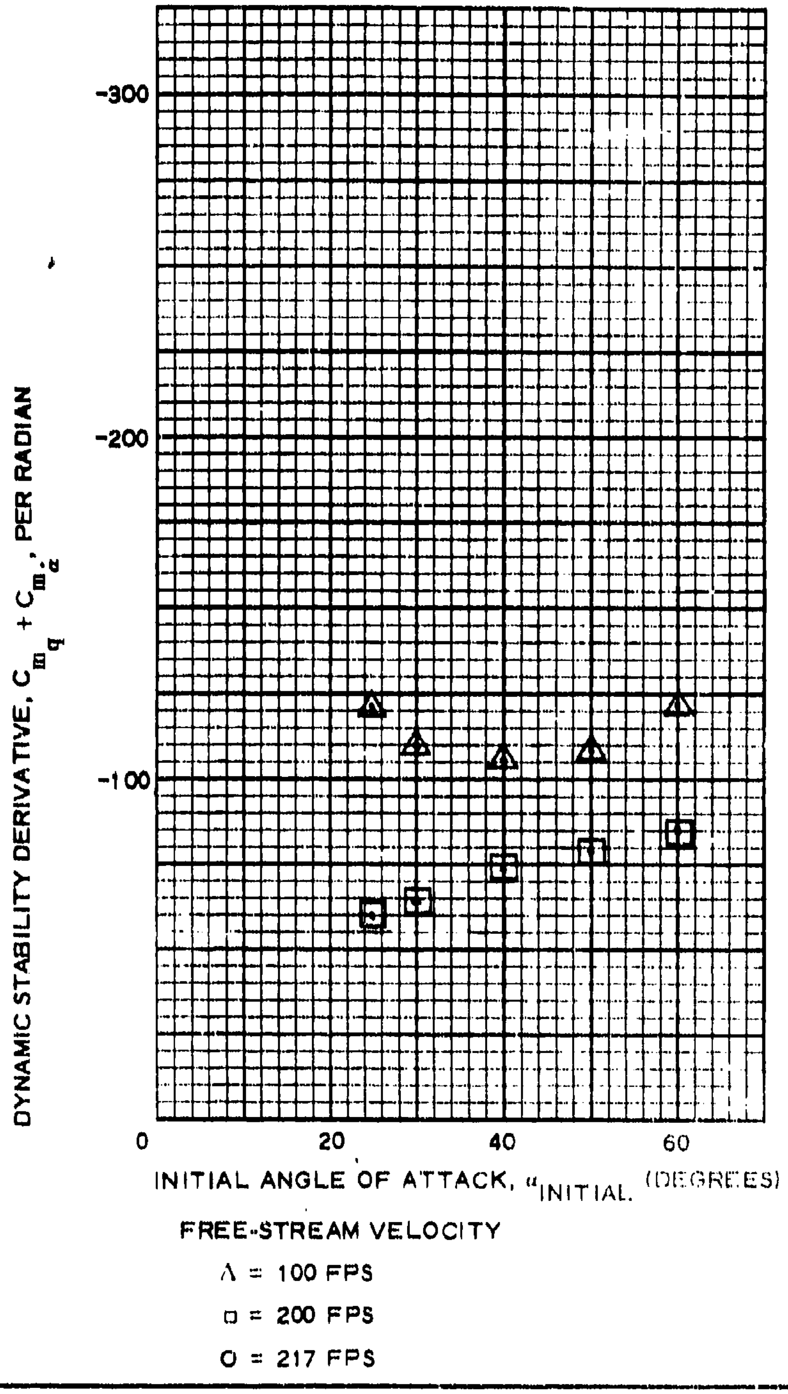
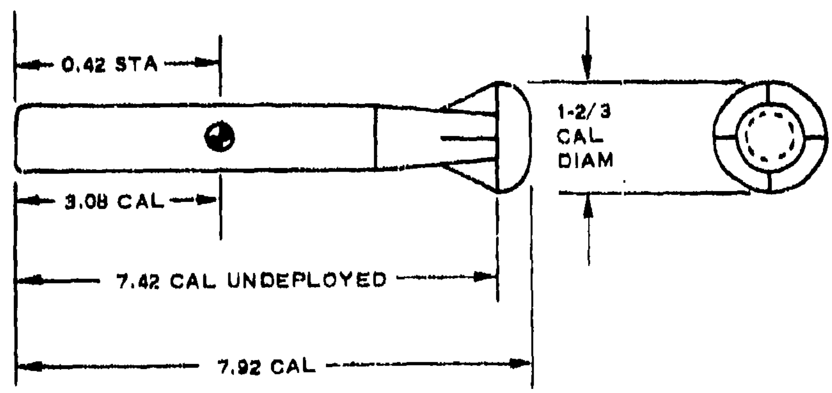


Figure 15. Graphic Dynamic Stability Test Data: Configuration 7

Item	Page
Static aerodynamic data	
Tabulated	44
Plotted	45
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 306.2 gm

Moment of inertia = 0.13076 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	7.42
Stabilizer	=	1-2/3 caliber diam inflatable paratail
Burble fence	=	none
Boattail	=	1.84 caliber long, 10 degree cone angle
Strakes (8)	=	none

Remarks

Figure 16. Model Specifications for Configuration 8

TABLE IX. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 8 (TEST NO. 17)

VELOCITY(FT/SEC)	= 213.50	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002311	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 55.18	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=0.2235E 08	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-4.314	5.506	-6.910	1.085	4.334	0.627
-30.0	-33.0	-3.195	3.474	-4.572	1.174	2.796	0.612
-20.0	-23.0	-2.917	2.736	-3.754	1.326	1.851	0.672
-15.0	-18.0	-1.193	1.737	-1.671	1.283	0.811	0.486
-10.0	-13.0	-0.633	1.424	-0.938	1.249	-0.087	-0.093
-6.0	-9.0	-0.280	1.251	-0.472	1.192	-0.513	-1.087
-3.0	-6.0	-0.250	1.310	-0.366	1.277	-0.323	-0.836
-0.0	-3.0	-0.206	1.266	-0.272	1.253	0.274	1.006
3.0	0.0	-0.015	1.222	-0.015	1.222	0.026	1.739
6.0	3.0	0.103	1.236	0.163	1.229	-0.190	1.136
10.0	7.0	0.191	1.265	0.344	1.233	0.181	-0.527
15.0	12.0	0.736	1.325	0.995	1.143	-0.314	0.315
20.0	17.0	1.355	1.619	1.769	1.152	-1.208	0.683
30.0	27.0	2.474	2.605	3.387	1.199	-2.724	0.804
40.0	37.0	3.298	3.975	5.026	1.190	-3.565	0.709

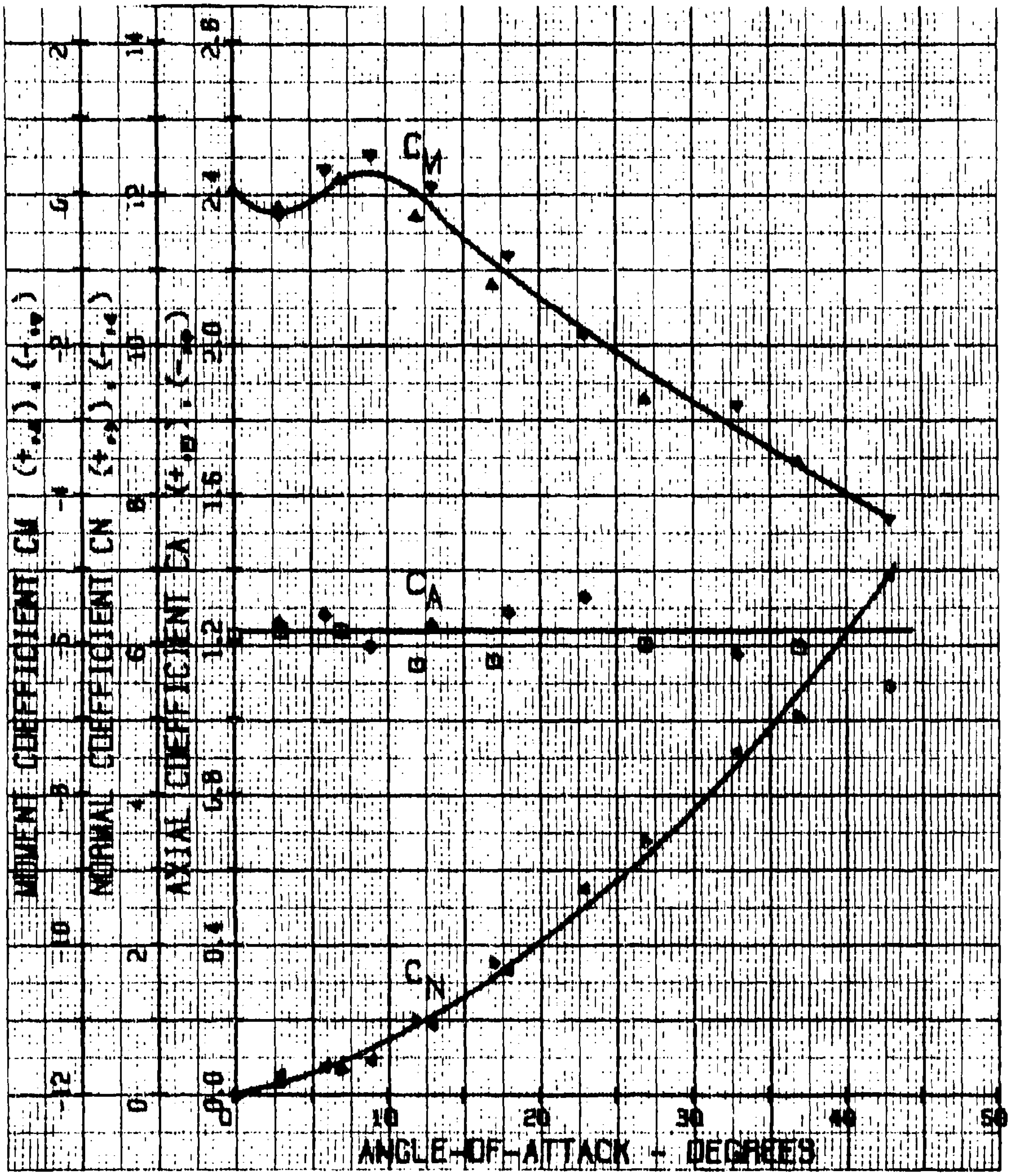
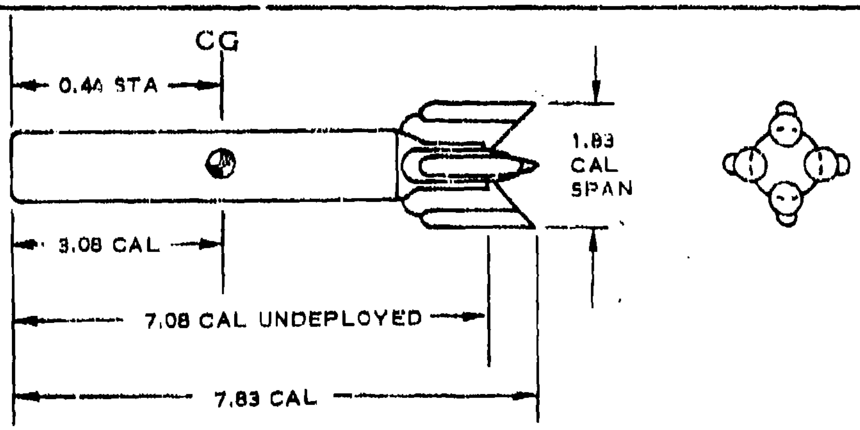


Figure 17. Graphic Static Aerodynamic Test Data: Configuration 8 (Test No. 17)

Item	Page
Static aerodynamic data	
Tabulated	47
Plotted	48
Dynamic stability data	
Tabulated	49
Plotted	50



General data

Model weight = 329.5 gm

Moment of inertia = 0.15160 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	7.08
Stabilizer	=	1.83 caliber span inflatable fins
Burble fence	=	none
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 18. Model Specifications for Configuration 9

TABLE X. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 9 (TEST NO. 18)

VELOCITY(FT/SEC)	= 213.50	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002311	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 55.18	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=0.2374E 06	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-5.785	6.197	-8.457	0.537	9.377	1.109
-30.0	-33.0	-4.697	3.634	-5.950	0.541	6.671	1.121
-20.0	-23.0	-2.988	2.340	-3.665	0.986	4.455	1.216
-15.0	-18.0	-2.076	1.673	-2.492	0.954	3.429	1.376
-10.0	-13.0	-1.560	1.240	-1.808	0.896	2.248	1.243
-6.0	-9.0	-1.075	1.030	-1.222	0.949	1.497	1.225
-3.0	-6.0	-0.677	0.912	-0.769	0.836	1.121	1.458
-0.0	-3.0	-0.339	0.853	-0.383	0.834	0.541	1.413
3.0	0.0	0.029	0.809	0.029	0.809	0.057	-1.934
6.0	3.0	0.191	0.824	0.234	0.913	-0.474	2.022
10.0	7.0	0.780	0.893	0.884	0.796	-1.168	1.322
15.0	12.0	1.325	1.113	1.528	0.818	-1.938	1.268
20.0	17.0	2.061	1.442	2.392	0.777	-3.288	1.374
30.0	27.0	3.533	2.795	4.417	0.898	-5.532	1.252
40.0	37.0	4.784	4.622	6.602	0.812	-7.519	1.139

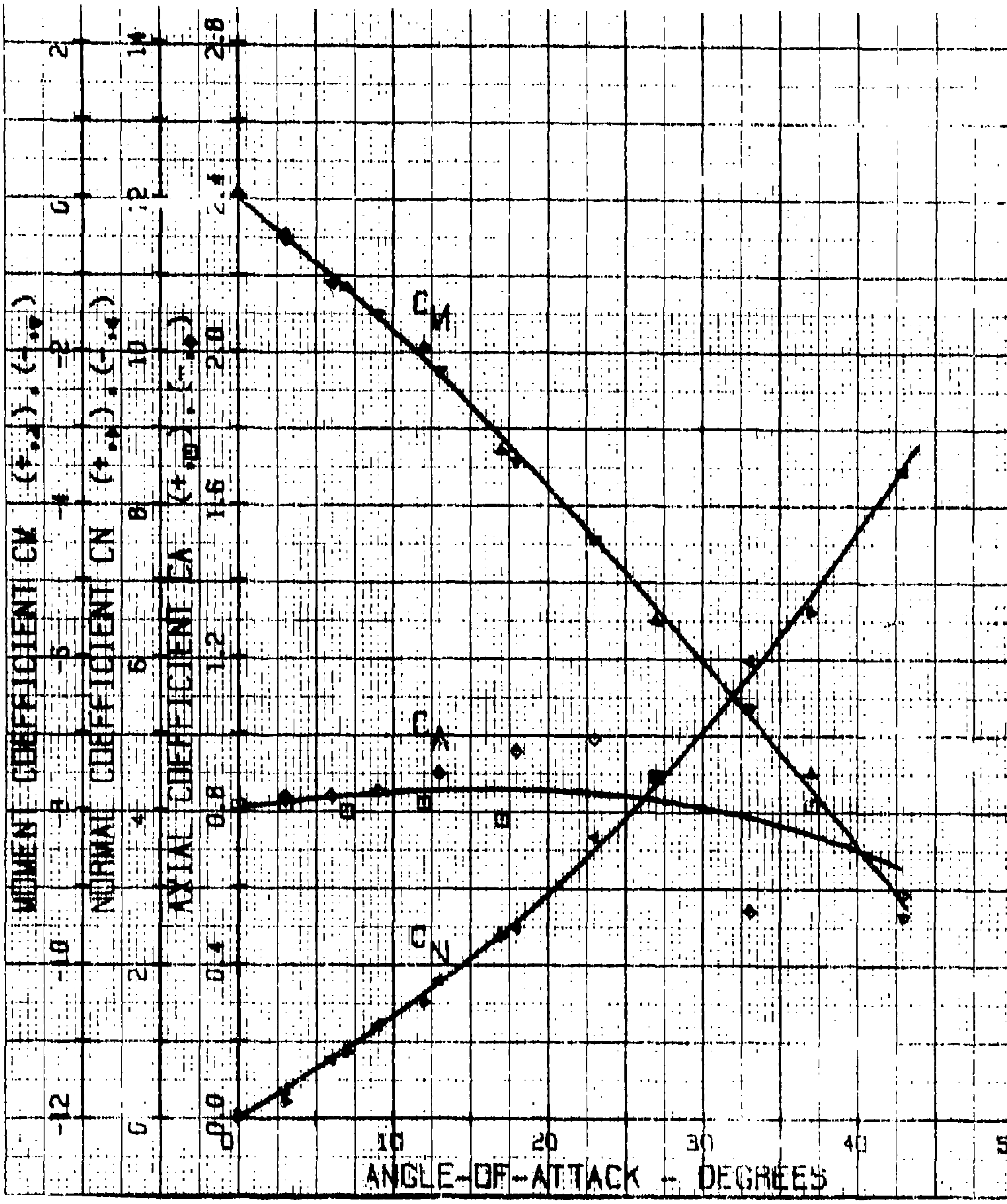


Figure 19. Graphic Static Aerodynamic Test Data: Configuration 9 (Test No. 18)

TABLE XI. DYNAMIC STABILITY TEST DATA: CONFIGURATION 9

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.151600
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002298
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS = 71, 72
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.412	-160.231
50.000	25.000	0.475	-139.148
40.000	20.000	0.506	-130.558
30.000	15.000	0.478	-138.238
25.000	12.500	0.462	-142.908

TEST NUMBERS = 67, 68
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.625	-211.504
50.000	25.000	0.719	-183.917
40.000	20.000	0.806	-163.957
30.000	15.000	0.812	-162.696
25.000	12.500	0.863	-153.264

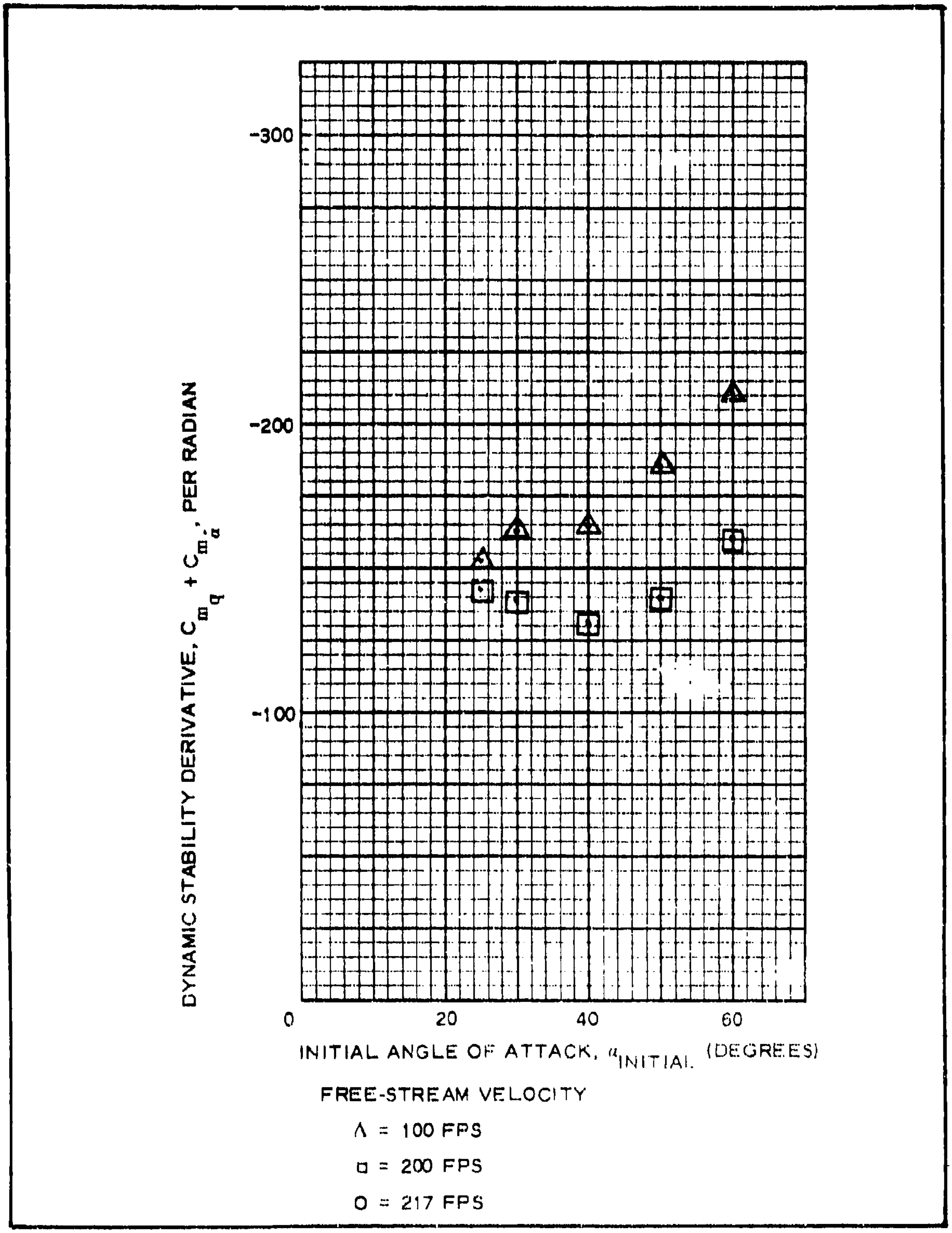
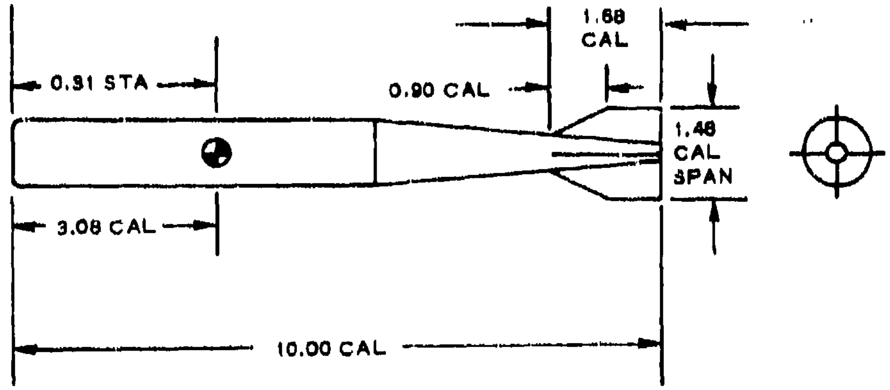


Figure 20. Graphic Dynamic Stability Test Data: Configuration 9

Item	Page
Static aerodynamic data	
Tabulated	52
Plotted	53
Dynamic stability data	
Tabulated	54
Plotted	55



General data

Model weight = 410.4 gm

Moment of inertia = 0.26603 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	10.00
Stabilizer	=	1.48 caliber span rigid fins (M-118 bomb)
Burble fence	=	none
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 21. Model Specifications for Configuration 10

TABLE XII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 10 (TEST NO. 19)

VELOCITY(FT/SEC)	= 218.50	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002308	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 55.09	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=0.30257 08	ALPHA SHIFT(DEGREES)	=-4.500

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-44.5	-6.090	6.134	-8.643	0.197	20.137	2.330
-30.0	-34.5	-5.176	3.873	-6.462	0.264	18.021	2.789
-20.0	-24.5	-3.539	2.073	-4.082	0.424	12.590	3.062
-15.0	-19.5	-2.551	1.415	-2.877	0.483	8.523	2.962
-10.0	-14.5	-1.548	0.884	-1.720	0.463	5.292	3.076
-6.0	-10.5	-1.062	0.706	-1.154	0.401	3.501	3.034
-3.0	-7.5	-0.782	0.545	-0.846	0.439	3.214	3.799
-0.0	-4.5	-0.265	0.501	-0.304	0.479	1.628	5.357
3.0	-1.5	-0.162	0.442	-0.174	0.438	0.535	3.080
6.0	1.5	0.177	0.486	0.193	0.432	-0.197	1.040
10.0	5.5	0.442	0.545	0.493	0.509	-1.481	3.007
15.0	10.5	1.135	0.733	1.243	0.474	-3.385	2.724
20.0	15.5	1.976	1.150	2.211	0.580	-6.159	2.790
30.0	25.5	3.672	2.462	4.374	0.642	-12.601	2.881
40.0	35.5	4.895	4.244	6.451	0.614	-17.597	2.728

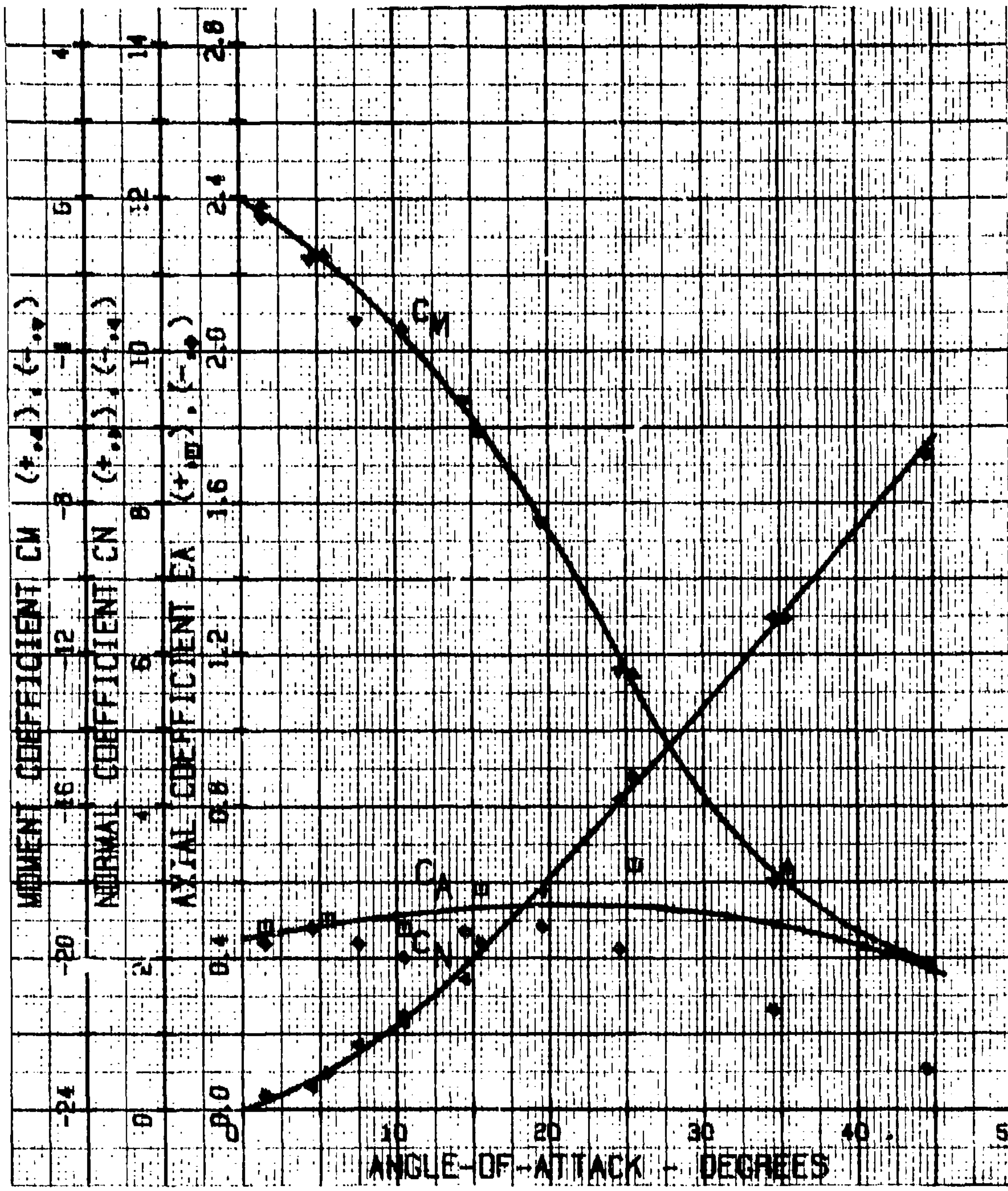


Figure 22. Graphic Static Aerodynamic Test Data: **Configuration** 10 (Test No. 19)

TABLE XIII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 10

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.266030
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002302
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS = 75, 76
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.241	-431.206
50.000	25.000	0.287	-402.749
40.000	20.000	0.347	-333.810
30.000	15.000	0.397	-291.795
25.000	12.500	0.447	-259.111

TEST NUMBERS = 79, 80
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.453	-511.074
50.000	25.000	0.575	-402.749
40.000	20.000	0.697	-332.313
30.000	15.000	0.766	-302.472
25.000	12.500	0.722	-320.804

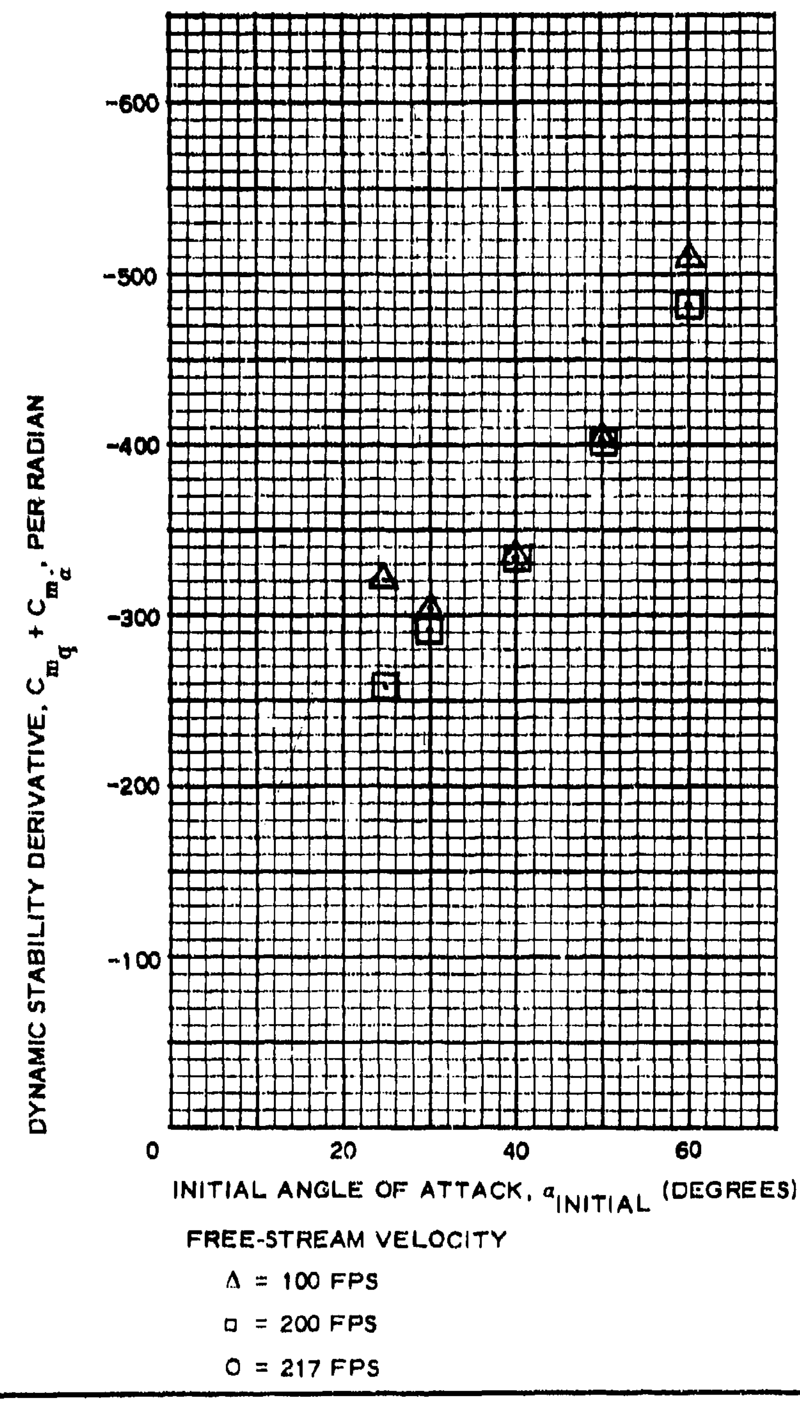
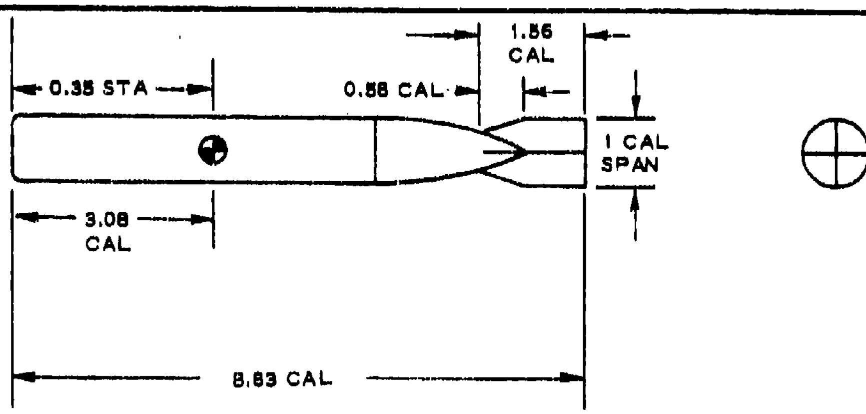


Figure 23. Graphic Dynamic Stability Test Data: Configuration 10

Item	Page
Static aerodynamic data	See "Remarks" below.
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 348.5 gm

Moment of inertia = 0.17514 slug in.^{2}

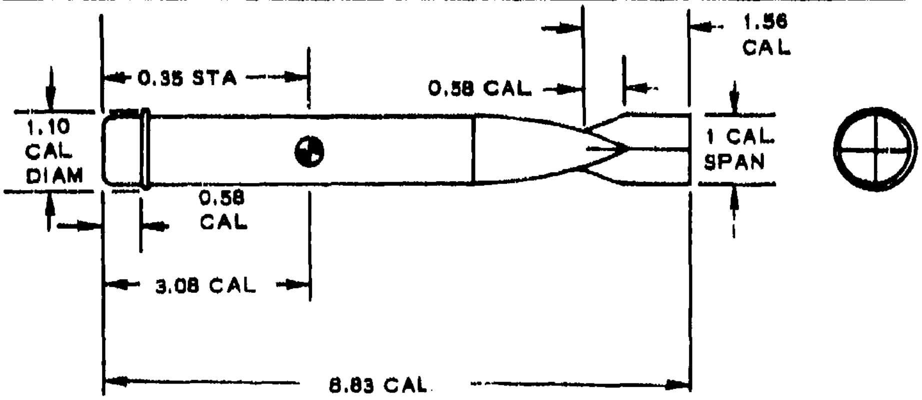
Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	8.83
Stabilizer	=	1 caliber span rigid fins (BLU-27B-fire bomb)
Burble fence	=	none
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 24. Model Specifications for Configuration 11

Item	Page
Static aerodynamic data	See "Remarks" below.
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	
Plotted	



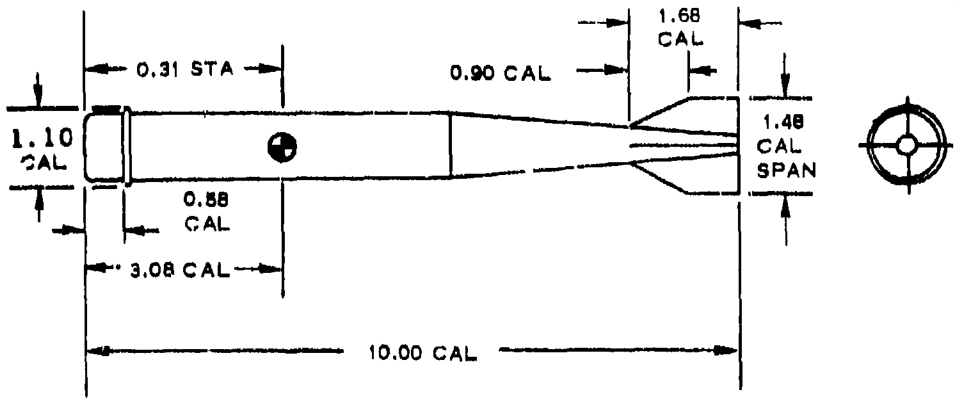
General data
- Model weight = 361.2 gm
- Moment of inertia = 0.17258 slug in.^{2}

Description of components
- Nose shape = flat with 0.1 caliber radius
- Tripper = 1.10 caliber diameter
- Fineness ratio = 8.83
- Stabilizer = 1 caliber span rigid fins (BLU-27/B fire bomb)
- Burble fence = none
- Boattail = none
- Strakes (8) = none

Remarks

Figure 25. Model Specification for Configuration 12

Item	Page
Static aerodynamic data	
Tabulated	59
Plotted	60
Dynamic stability data	
Tabulated	61
Plotted	62



General data

Model weight = 423.3 gm

Moment of inertia = 0.26223 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	10.00
Stabilizer	=	1.48 caliber span rigid fins (M-118 bomb)
Burble fence	=	none
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 26. Model Specifications for Configuration 13

TABLE XIV. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 13 (TEST NO. 21)

VELOCITY(FT/SEC)	= 218.50	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002274	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.76	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=0.3007E 08	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-5.310	5.844	-7.869	0.652	20.441	2.598
-30.0	-33.0	-4.479	3.871	-5.865	0.807	18.270	3.115
-20.0	-23.0	-3.426	2.180	-4.006	0.668	12.681	3.166
-15.0	-18.0	-2.358	1.483	-2.701	0.682	8.842	3.273
-10.0	-13.0	-1.602	1.053	-1.798	0.666	5.836	3.246
-6.0	-9.0	-0.949	0.801	-1.063	0.642	3.517	3.309
-3.0	-6.0	-0.489	0.533	-0.549	0.539	2.002	3.647
-0.0	-3.0	-0.297	0.445	-0.320	0.429	1.190	3.725
3.0	0.0	-0.104	0.430	-0.104	0.430	0.461	4.440
6.0	3.0	0.311	0.445	0.334	0.428	-0.470	1.405
10.0	7.0	0.697	0.612	0.775	0.592	-2.060	2.658
15.0	12.0	1.335	0.830	1.478	0.535	-3.994	2.702
20.0	17.0	2.121	1.[illegible]75	2.401	0.600	-6.793	2.829
30.0	27.0	3.767	2.551	4.515	0.563	-13.850	3.068
40.0	37.0	4.717	4.212	6.302	0.525	-18.782	2.980

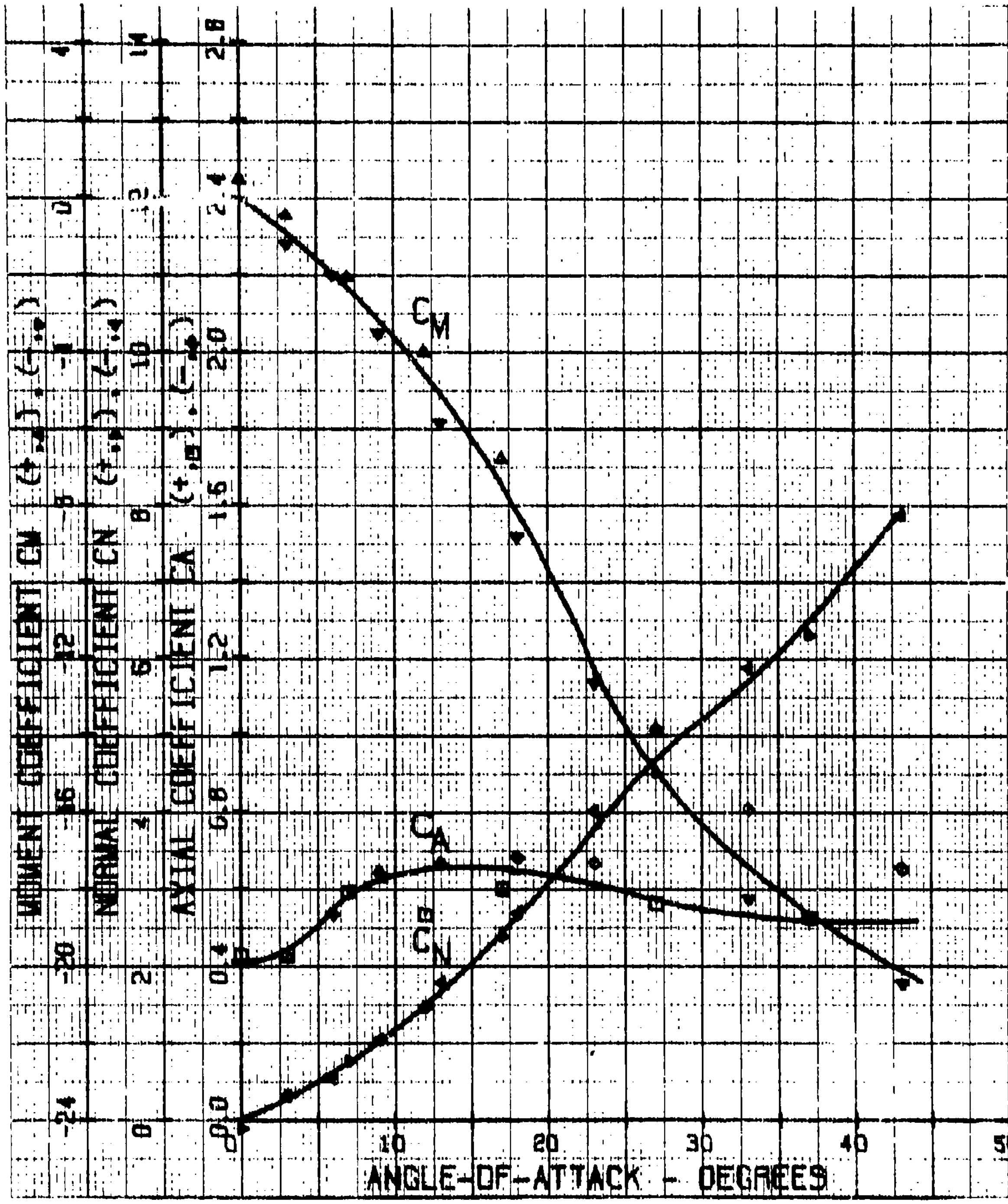


Figure 27. Graphic Static Aerodynamic Test Data: Configuration 13 (Test No. 21)

TABLE XV. DYNAMIC STABILITY TEST DATA: CONFIGURATION 13

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.262230
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002311
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =103,104
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.184	-616.458
50.000	25.000	0.259	-438.205
40.000	20.000	0.297	-382.853
30.000	15.000	0.356	-319.044
25.000	12.500	0.409	-284.149

TEST NUMBERS = 99,100
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.466	-488.202
50.000	25.000	0.516	-440.861
40.000	20.000	0.581	-391.087
30.000	15.000	0.662	-343.123
25.000	12.500	0.781	-290.968

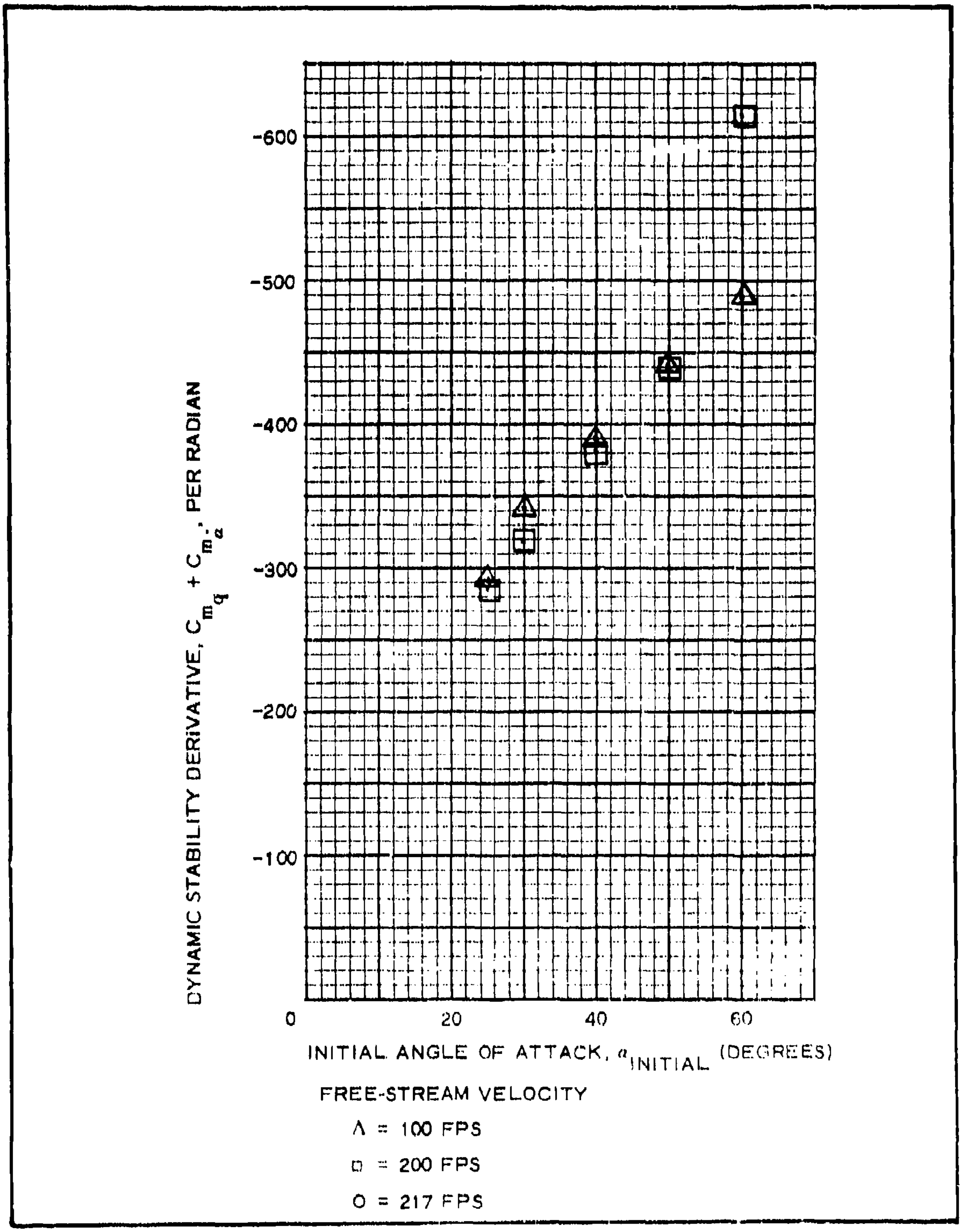
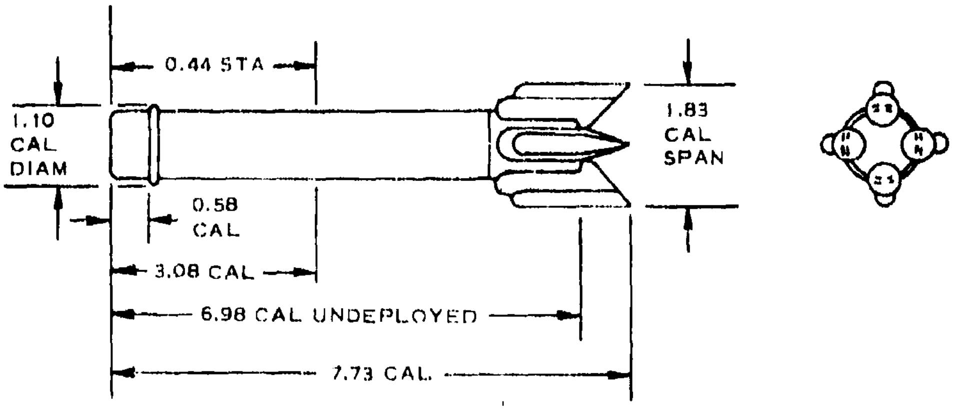


Figure 28. Graphic Dynamic Stability Test Data: **Configuration 13**

Item	Page
Static aerodynamic data	
Tabulated	64
Plotted	65
Dynamic stability data	
Tabulated	66
Plotted	67



General data

Model weight = 339.5 gm

Moment of inertia = 0.14643 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	6.98
Stabilizer	=	1.83 caliber span inflatable fins
Burble fence	-	none
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 29. Model Specifications for Configuration 14

TABLE XVI. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 14 (Test No. 22)

VELOCITY(FT/SEC)	= [illegible]18.50	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002236	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.58	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=1.2317E 05	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-5.282	5.371	-7.526	0.326	8.554	1.137
-30.0	-33.0	-3.943	3.630	-5.284	0.897	5.678	1.264
-20.0	-23.0	-2.812	2.231	-3.484	1.019	4.573	1.313
-15.0	-18.0	-1.994	1.711	-2.425	1.011	3.187	1.314
-10.0	-13.0	-1.533	1.15[illegible]	-1.754	0.736	2.131	1.215
-6.0	-9.0	-0.937	1.[illegible]	-1.091	0.896	1.472	1.349
-3.0	-6.0	-0.610	0.[illegible]	-0.703	0.853	1.054	1.499
-0.0	-3.0	-0.193	0.[illegible]	-0.235	0.782	0.197	0.838
3.0	0.0	0.030	0.714	0.030	0.714	-0.148	4.967
6.0	3.0	0.387	0.8[illegible]	0.423	0.732	-0.515	1.202
10.0	7.0	0.818	1.041	0.939	0.834	-1.534	1.633
15.0	12.0	1.473	1.3[illegible]	1.713	0.974	-2.813	1.642
20.0	17.0	2.098	1.636	2.485	0.951	-3.324	1.338
30.0	27.0	3.040	2.018	3.933	0.935	-5.271	1.340
40.0	37.0	3.624	4.225	5.597	1.073	-7.434	1.328

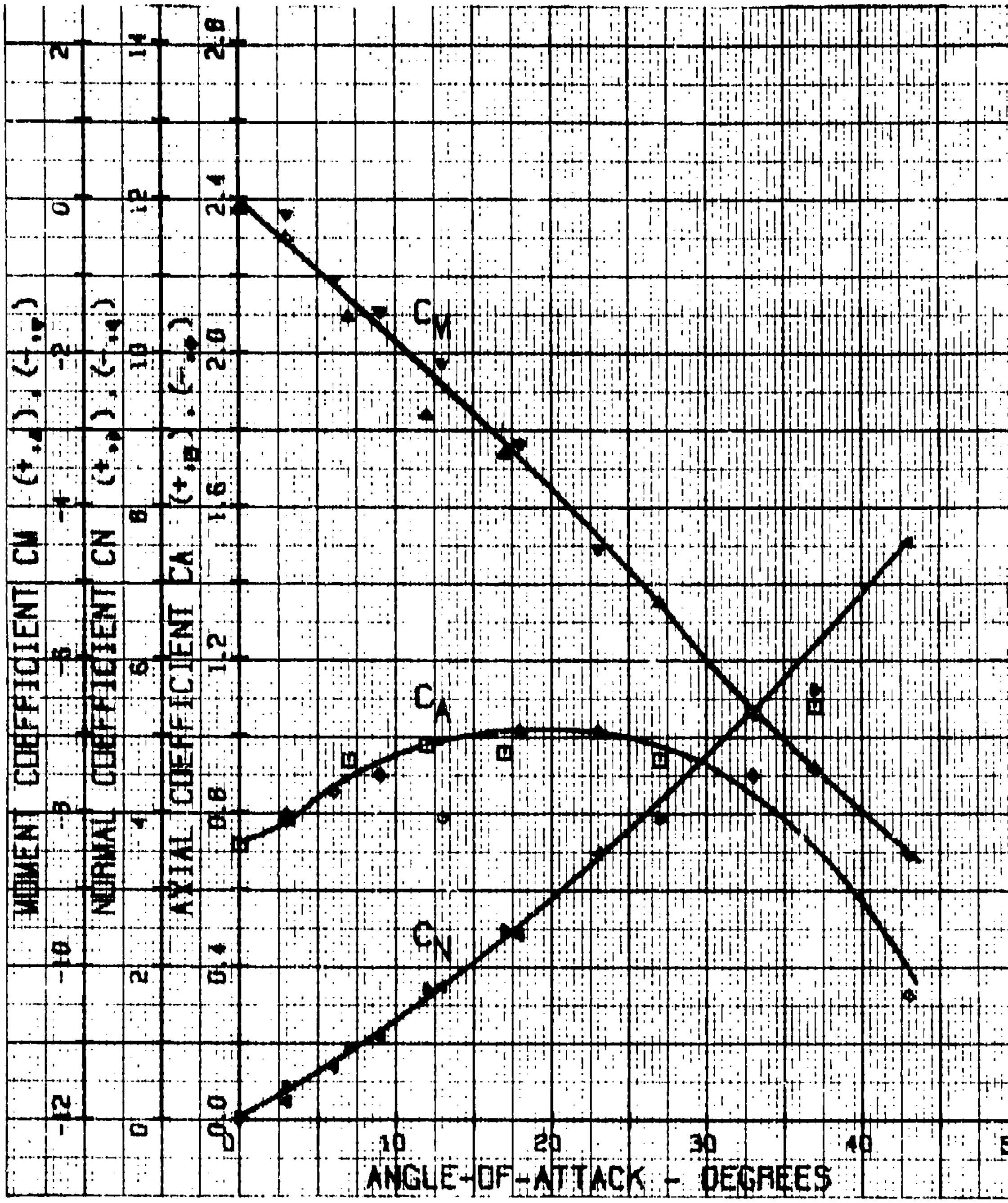


Figure 30. Graphic Static Aerodynamic Test Data: Configuration 14 (Test No. 22)

TABLE XVII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 14

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.14[illegible]
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002313
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =107,108
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.453	-132.950
50.000	25.000	0.500	-126.830
40.000	20.000	0.537	-117.981
30.000	15.000	0.537	-117.981
25.000	12.500	0.534	-113.671

TEST NUMBERS =111,112
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.609	-208.131
50.000	25.000	0.659	-189.652
40.000	20.000	0.737	-171.972
30.000	15.000	0.841	-150.975
25.000	12.500	0.894	-141.907

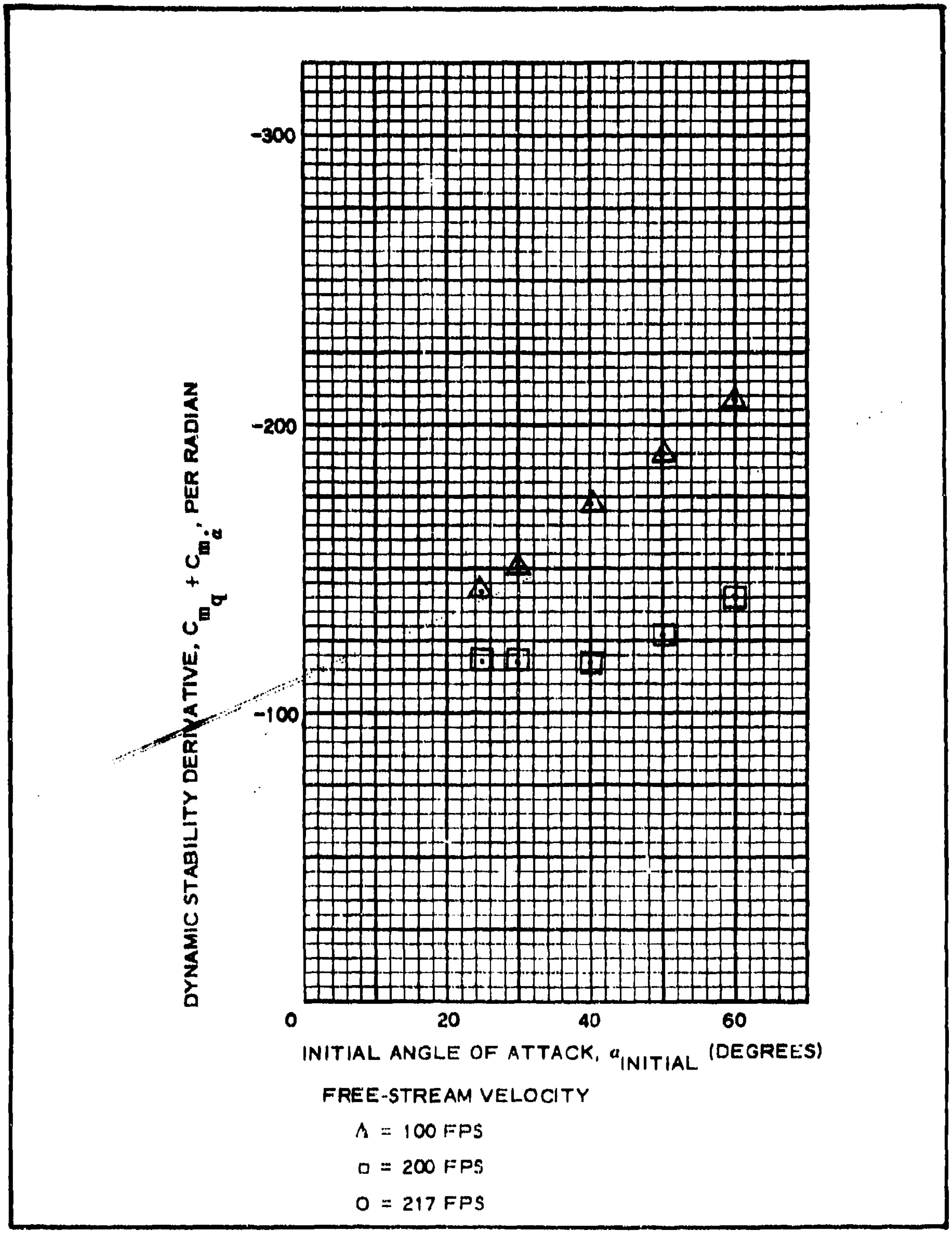
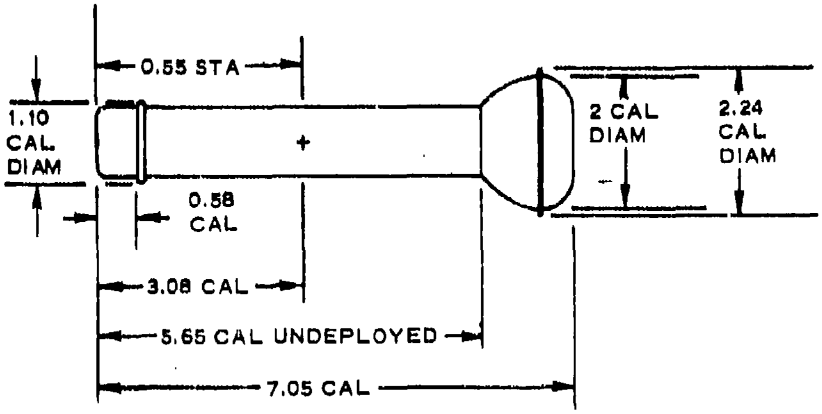


Figure 31. Graphic Dynamic Stability Test Data: Configuration 14

Item	Page
Static aerodynamic data	
Tabulated	69
Plotted	70
Dynamic stability data	
Tabulated	71
Plotted	72



General data

Model weight = 388.7 gm

Moment of inertia = 0.18798 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber diameter
Tripper	=	1.10 caliber diameter
Fineness ratio	=	5.65
Stabilizer	=	2 caliber diameter Ballute
Burble fence	=	2.24 caliber diameter
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 32. Model Specifications for Configuration 15

TABLE XVIII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 15 (TEST NO. 23)

VELOCITY(FT/SEC)	= 213.50	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002277	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.35	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=0.2105E 08	ALPHA SHIFT(DEGREES)	=-3.500

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.5	-2.734	6.132	-6.239	2.603	4.611	0.739
-30.0	-33.5	-1.838	4.912	-4.244	3.982	3.282	0.773
-20.0	-23.5	-1.120	4.539	-2.837	3.716	2.339	0.824
-15.0	-18.5	-0.777	4.464	-2.153	3.987	1.742	0.809
-10.0	-13.5	-0.538	4.419	-1.555	4.172	1.459	0.938
-6.0	-9.5	-0.403	4.404	-1.125	4.277	1.270	1.129
-3.0	-6.5	-0.448	4.360	-0.939	4.231	1.162	1.237
-0.0	-3.5	-0.284	4.134	-0.536	4.111	0.678	1.265
3.0	-0.5	0.075	4.106	0.039	4.106	-0.368	9.480
6.0	2.5	0.179	4.240	0.364	4.228	-1.017	2.793
10.0	6.5	0.299	4.471	0.604	4.417	-1.336	1.662
15.0	11.5	0.314	4.419	1.189	4.268	-1.479	1.244
20.0	16.5	0.598	4.375	1.815	4.025	-1.742	0.960
30.0	26.5	1.315	4.621	3.242	3.556	-3.025	0.933
40.0	36.5	2.077	5.195	4.769	2.942	-4.140	0.870

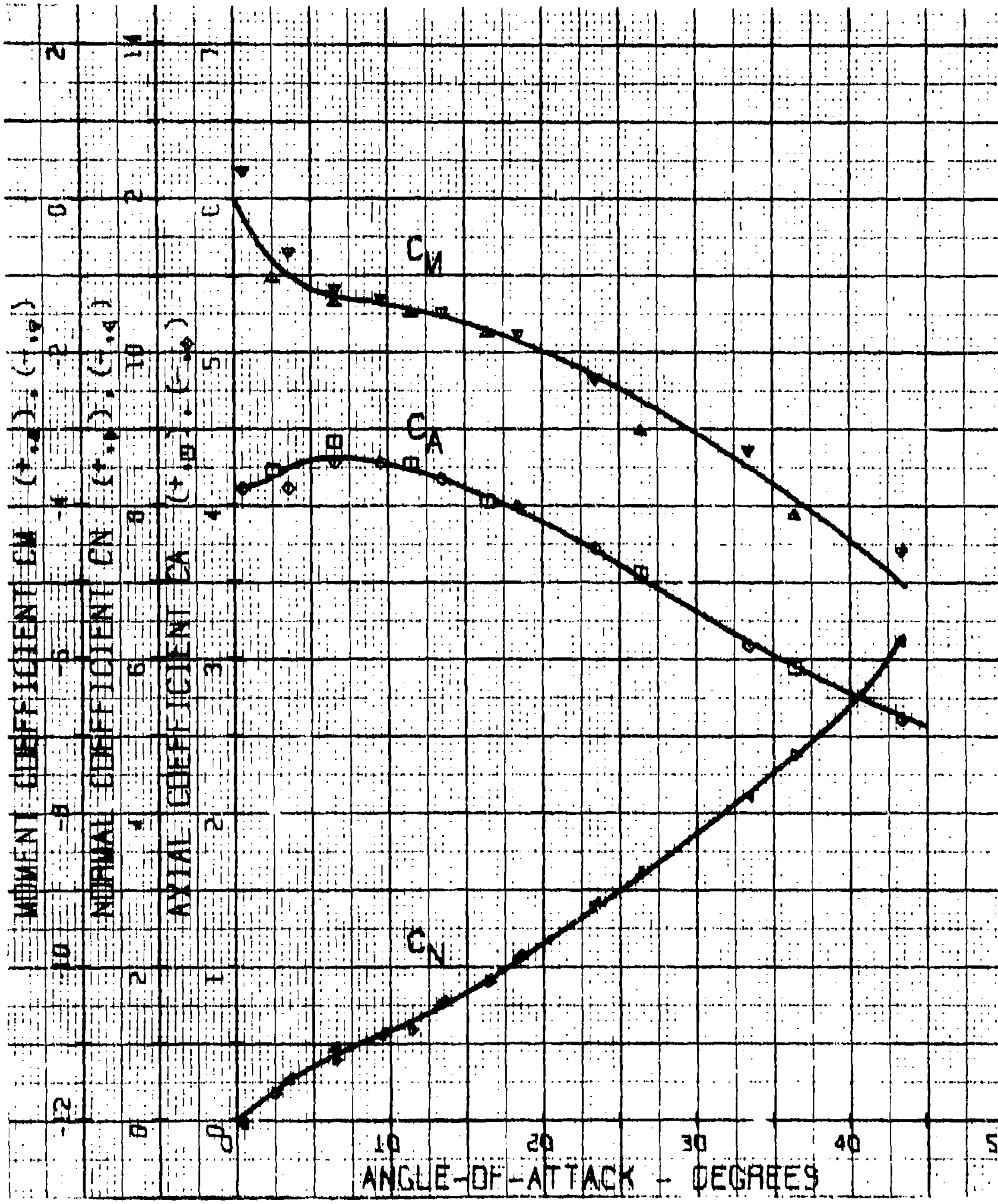


Figure 33. Graphic Static Aerodynamic Test Data: Configuration 15 (Test No. 23)

TABLE XIX. DYNAMIC STABILITY TEST DATA: CONFIGURATION 15

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.187980
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002315
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =112,120
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.934	-87.054
50.000	25.000	1.203	-67.608
40.000	20.000	1.394	-58.361
30.000	15.000	1.634	-48.292
25.000	12.500	1.837	-44.267

TEST NUMBERS =115,116
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.141	-142.626
50.000	25.000	1.159	-140.319
40.000	20.000	1.200	-135.568
30.000	15.000	1.500	-108.455
25.000	12.500	1.769	-91.976

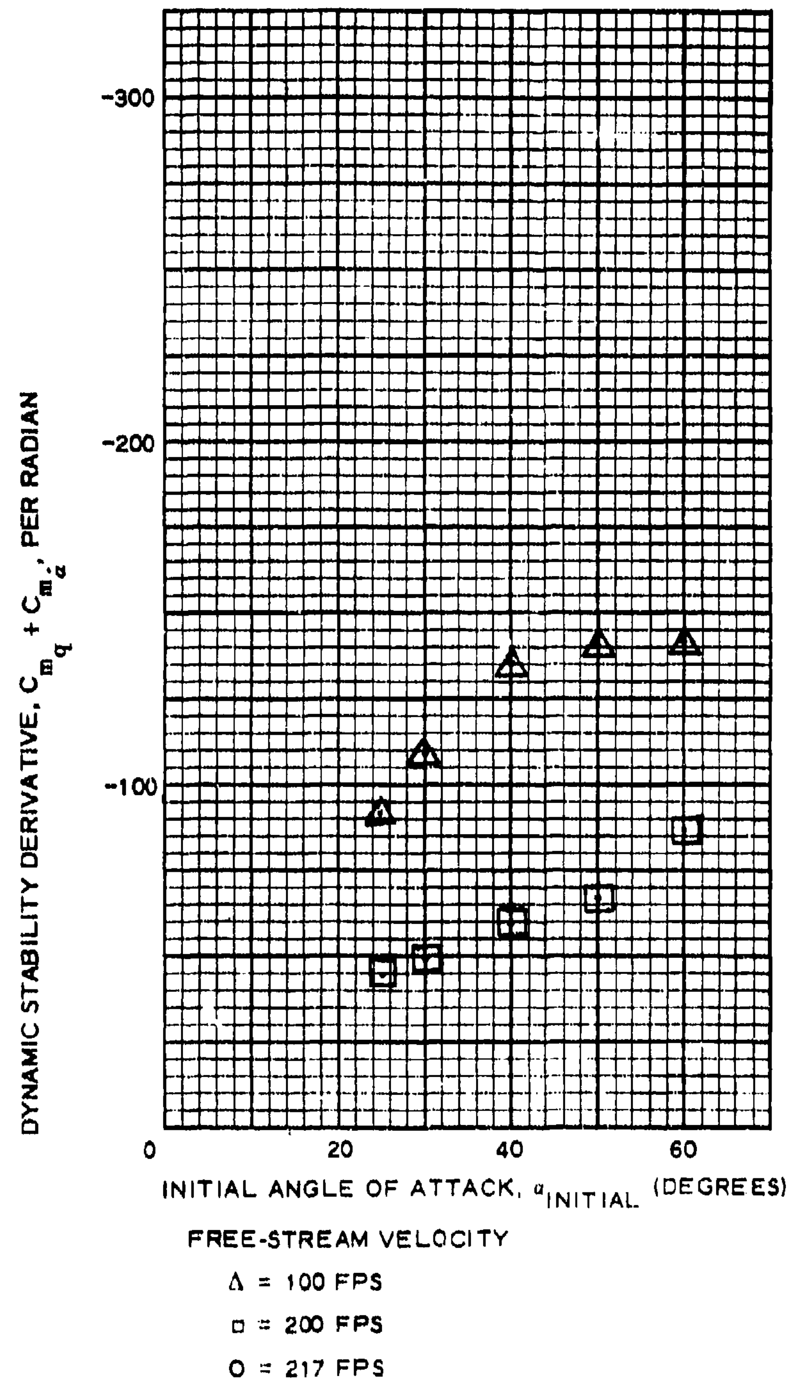
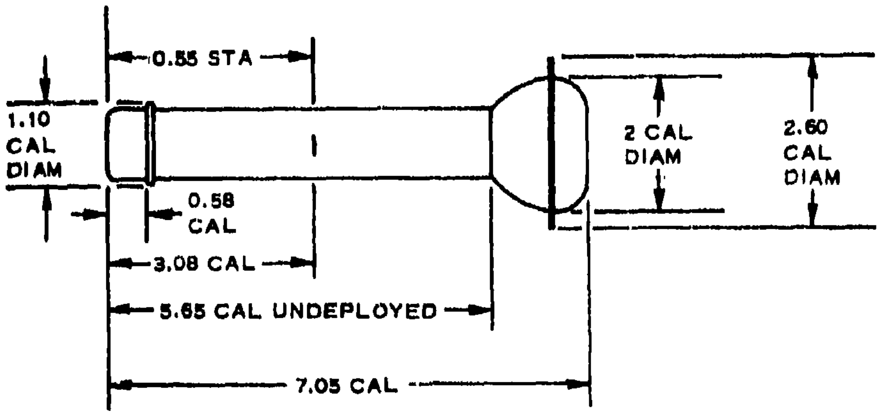


Figure 34. Graphic Dynamic Stability Test Data: Configuration 15

Item	Page
Static aerodynamic data	
Tabulated	74
Plotted	75
Dynamic stability data	
Tabulated	76
Plotted	77



General data

Model weight = 391.0 gm

Moment of inertia = 0.18928 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	5.65
Stabilizer	=	2 caliber diameter Ballute
Burble fence	=	2.60 caliber diameter
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 35. Model Specifications for Configuration 16

TABLE XX. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 16 (TEST NO. 24)

VELOCITY(FT/SEC)	= 213.50	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002277	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.35	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=0.2105E 08	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-1.345	7.540	-6.126	4.597	4.038	0.659
-30.0	-33.0	-0.164	6.748	-3.813	5.570	2.788	0.731
-20.0	-23.0	-0.090	6.809	-2.743	6.232	2.173	0.792
-15.0	-18.0	0.030	6.853	-2.094	6.541	1.902	0.909
-10.0	-13.0	0.015	6.957	-1.551	6.782	1.707	1.101
-6.0	-9.0	-0.224	6.928	-1.305	6.807	1.584	1.214
-3.0	-6.0	-0.403	6.853	-1.117	6.773	1.583	1.417
-0.0	-3.0	-0.373	6.569	-0.717	6.540	0.971	1.355
3.0	0.0	-0.030	6.494	-0.030	6.494	-0.485	-16.222
6.0	3.0	0.015	6.639	0.365	6.679	-1.416	3.879
10.0	7.0	-0.209	6.957	0.640	6.931	-1.575	2.460
15.0	12.0	-0.359	6.972	1.099	6.895	-1.591	1.439
20.0	17.0	-0.403	6.942	1.644	6.757	-1.840	1.119
30.0	27.0	-0.398	6.773	2.731	6.216	-2.547	0.933
40.0	37.0	0.015	6.838	4.127	5.452	-3.220	0.780

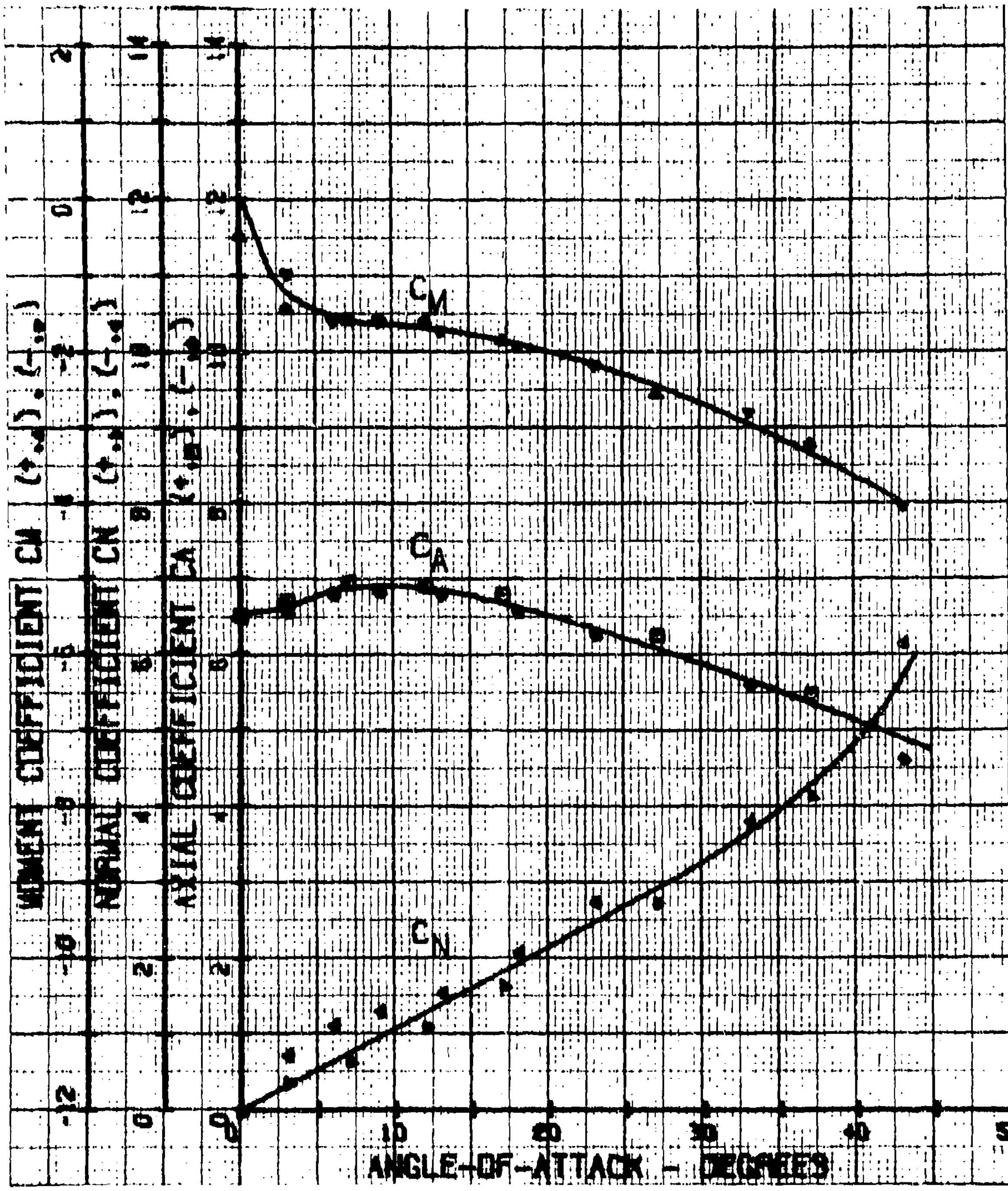


Figure 36. Graphic Static Aerodynamic Test Data: Configuration 16 (Test No. 24)

TABLE XXI. DYNAMIC STABILITY TEST DATA: CONFIGURATION 16

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.189230
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002319
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =123,124
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.041	-78.576
50.000	25.000	1.250	-65.414
40.000	20.000	1.403	-58.017
30.000	15.000	1.466	-55.790
25.000	12.500	1.400	-53.405

TEST NUMBERS =127,128
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.356	-120.578
50.000	25.000	1.352	-120.025
40.000	20.000	1.325	-123.422
30.000	15.000	1.294	-126.403
25.000	12.500	1.447	-113.026

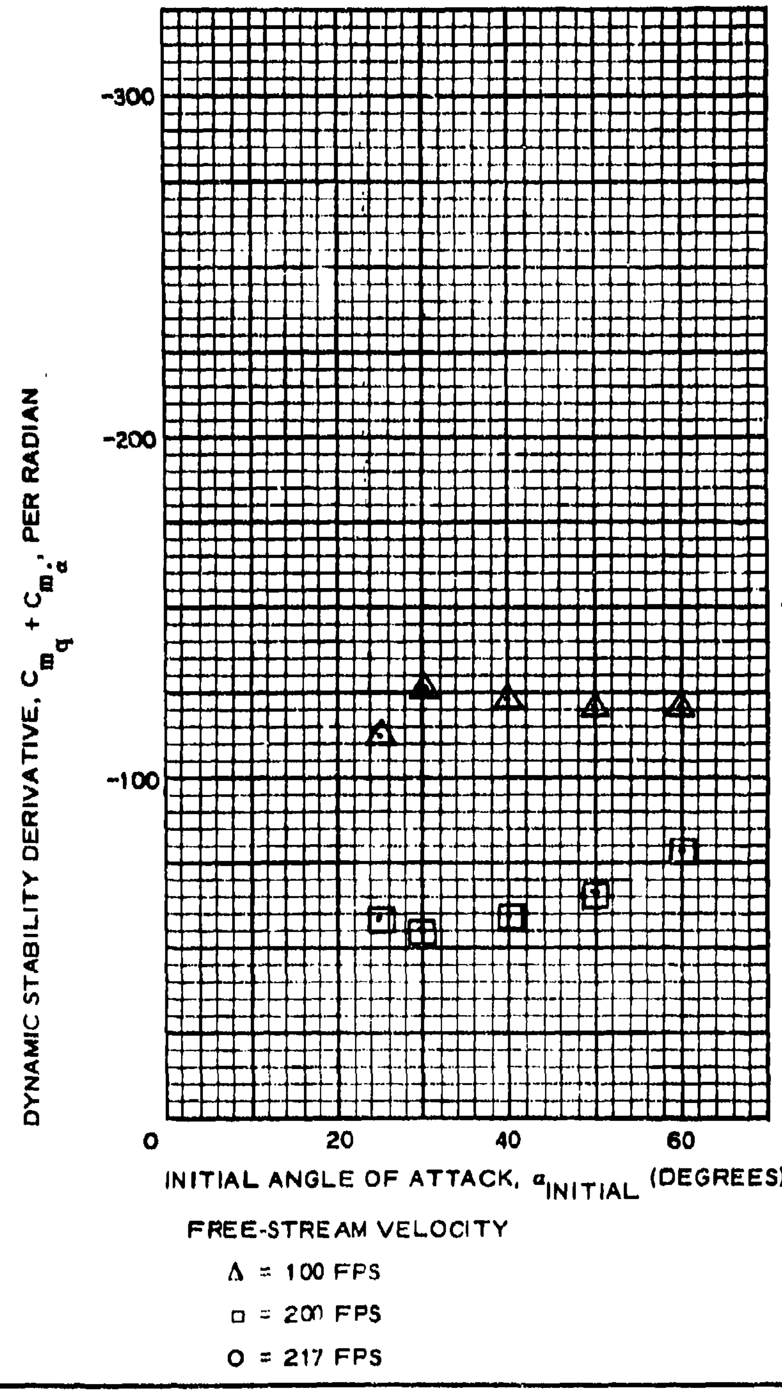
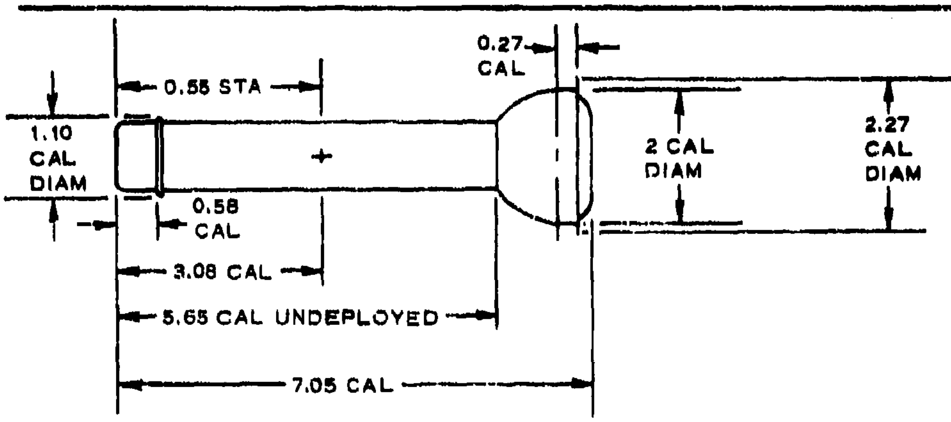


Figure 37. Graphic Dynamic Stability Test Data: Configuration 16



General data

Model weight = 387.0 gm

Moment of inertia = 0.18121 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	5.65
Stabilizer	=	2 caliber diameter Ballute
Burble fence	=	2.27 caliber diameter
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 38. Model Specifications for Configuration 17

TABLE XXII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 17 (TEST No. 25)

VELOCITY(FT/SEC)	= 213.50	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002279	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.39	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=0.2107E 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-3.627	6.237	-6.975	1.845	6.848	0.982
-30.0	-35.0	-2.553	4.759	-4.821	2.435	5.509	1.143
-20.0	-25.0	-1.821	4.257	-3.454	3.097	4.403	1.275
-15.0	-20.0	-1.552	4.119	-2.867	3.338	3.497	1.220
-10.0	-15.0	-1.120	3.864	-2.081	3.442	2.763	1.327
-6.0	-11.0	-0.896	3.729	-1.591	3.490	2.389	1.502
-3.0	-8.0	-0.891	3.640	-1.379	3.482	1.968	1.427
-0.0	-5.0	-0.537	3.415	-0.833	3.356	1.205	1.446
3.0	-2.0	-0.224	3.252	-0.338	3.272	0.092	0.271
6.0	1.0	0.119	3.431	0.180	3.488	-0.805	4.465
10.0	5.0	0.313	3.655	0.631	3.614	-1.475	2.339
15.0	10.0	0.642	3.774	1.288	3.605	-2.237	1.738
20.0	15.0	0.985	3.968	1.979	3.578	-2.908	1.470
30.0	25.0	1.732	4.401	3.429	3.257	-4.371	1.275
40.0	35.0	2.538	4.924	4.903	2.578	-6.297	1.284

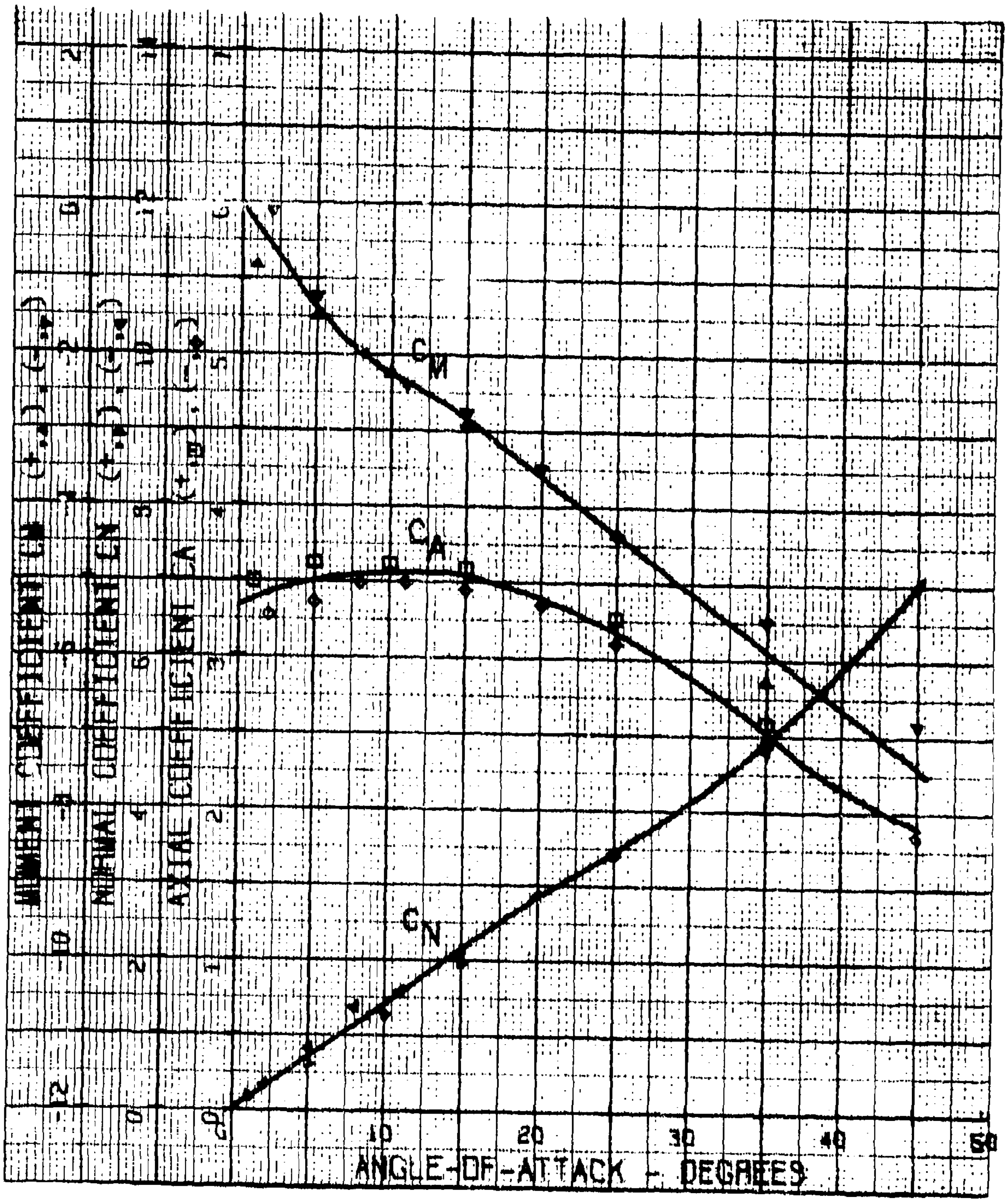


Figure 39. Graphic Static Aerodynamic Test Data: Configuration 17 (Test No. 25)

TABLE XXIII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 17

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.181210
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002321
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =135,136
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.684	-114.288
50.000	25.000	0.734	-106.507
40.000	20.000	0.741	-105.608
30.000	15.000	0.756	-103.426
25.000	12.500	0.850	-92.017

TEST NUMBERS =131,132
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.047	-149.428
50.000	25.000	1.162	-134.565
40.000	20.000	1.172	-133.489
30.000	15.000	1.112	-140.613
25.000	12.500	1.097	-142.616

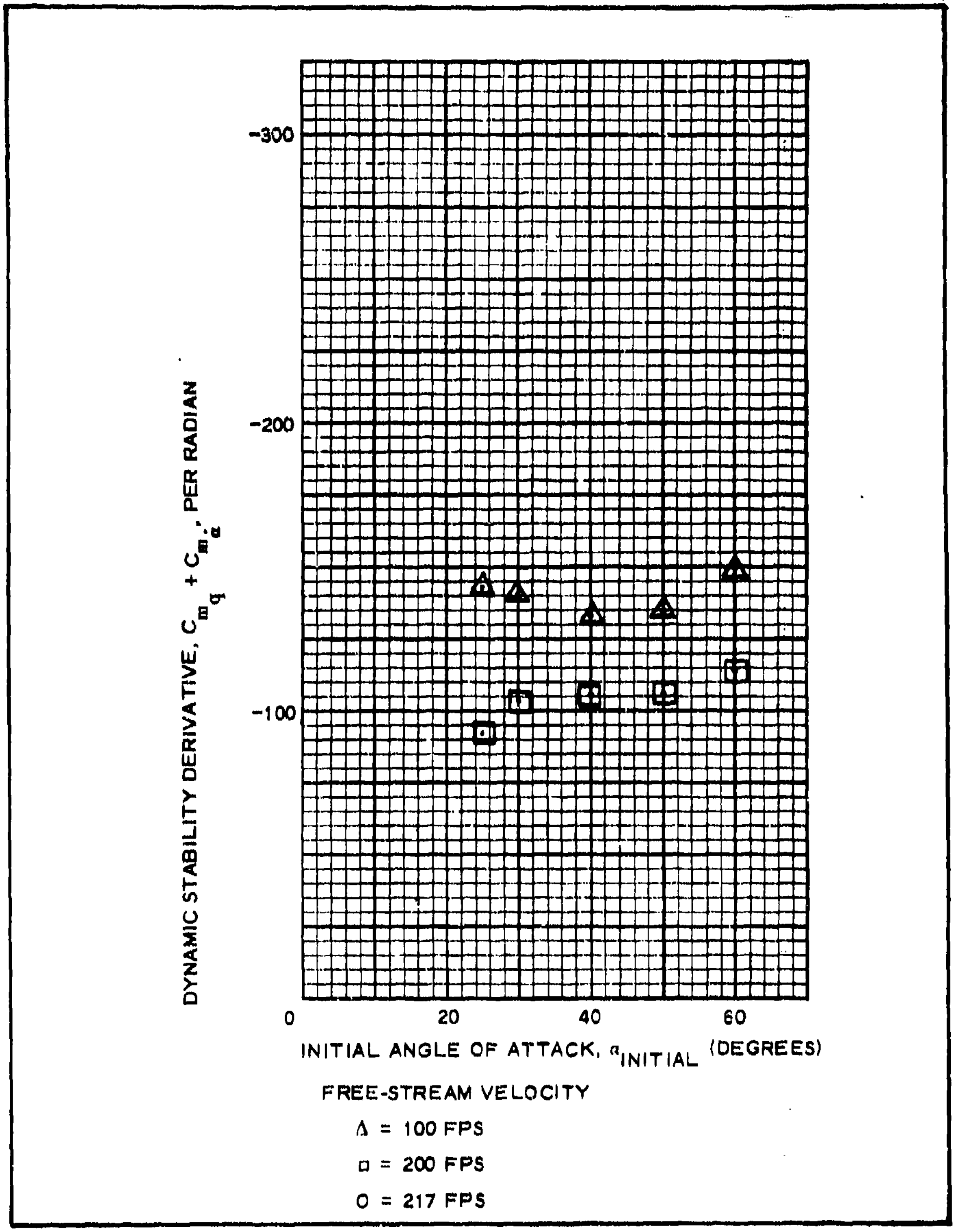
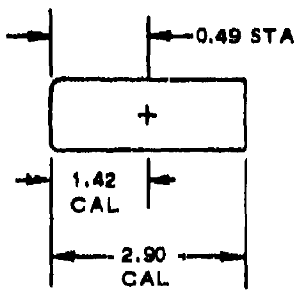


Figure 40. Graphic Dynamic Stability Test Data: Configuration 17



General data

Model weight	=	182.3 gm
Moment of inertia	=	0.06216 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	2.90
Stabilizer	=	none
Burble fence	=	none
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 41. Model Specification for Configuration 18

TABLE XXIV. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 18 (TEST NO. 27)

VELOCITY(FT/SEC)	= 218.50	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002279	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.39	C.G.(CALIBERS)	=1.4167
REYNOLDS NUMBER	=0.8653E 07	ALPHA SHIFT(DEGREES)	=-4.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-44.0	-1.031	2.196	-2.267	0.864	-0.355	-0.156
-30.0	-34.0	-0.941	1.733	-1.750	0.910	-0.340	-0.194
-20.0	-24.0	-0.762	1.240	-1.201	0.823	-0.326	-0.271
-15.0	-19.0	-0.613	0.986	-0.900	0.733	-0.289	-0.321
-10.0	-14.0	-0.374	0.807	-0.558	0.692	-0.244	-0.438
-6.0	-10.0	-0.314	0.672	-0.426	0.608	-0.106	-0.249
-3.0	-7.0	-0.194	0.627	-0.269	0.599	-0.059	-0.221
-0.0	-4.0	-0.164	0.578	-0.206	0.585	0.005	0.024
3.0	-1.0	-0.045	0.538	-0.054	0.537	0.013	0.243
6.0	2.0	0.075	0.598	0.096	0.595	-0.033	0.348
10.0	6.0	0.194	0.583	0.254	0.559	0.189	-0.743
15.0	11.0	0.284	0.717	0.416	0.650	0.294	-0.707
20.0	16.0	0.493	0.881	0.717	0.711	0.336	-0.469
30.0	26.0	0.822	1.389	1.348	0.889	0.284	-0.211
40.0	36.0	0.986	1.883	1.904	0.943	0.277	-0.146

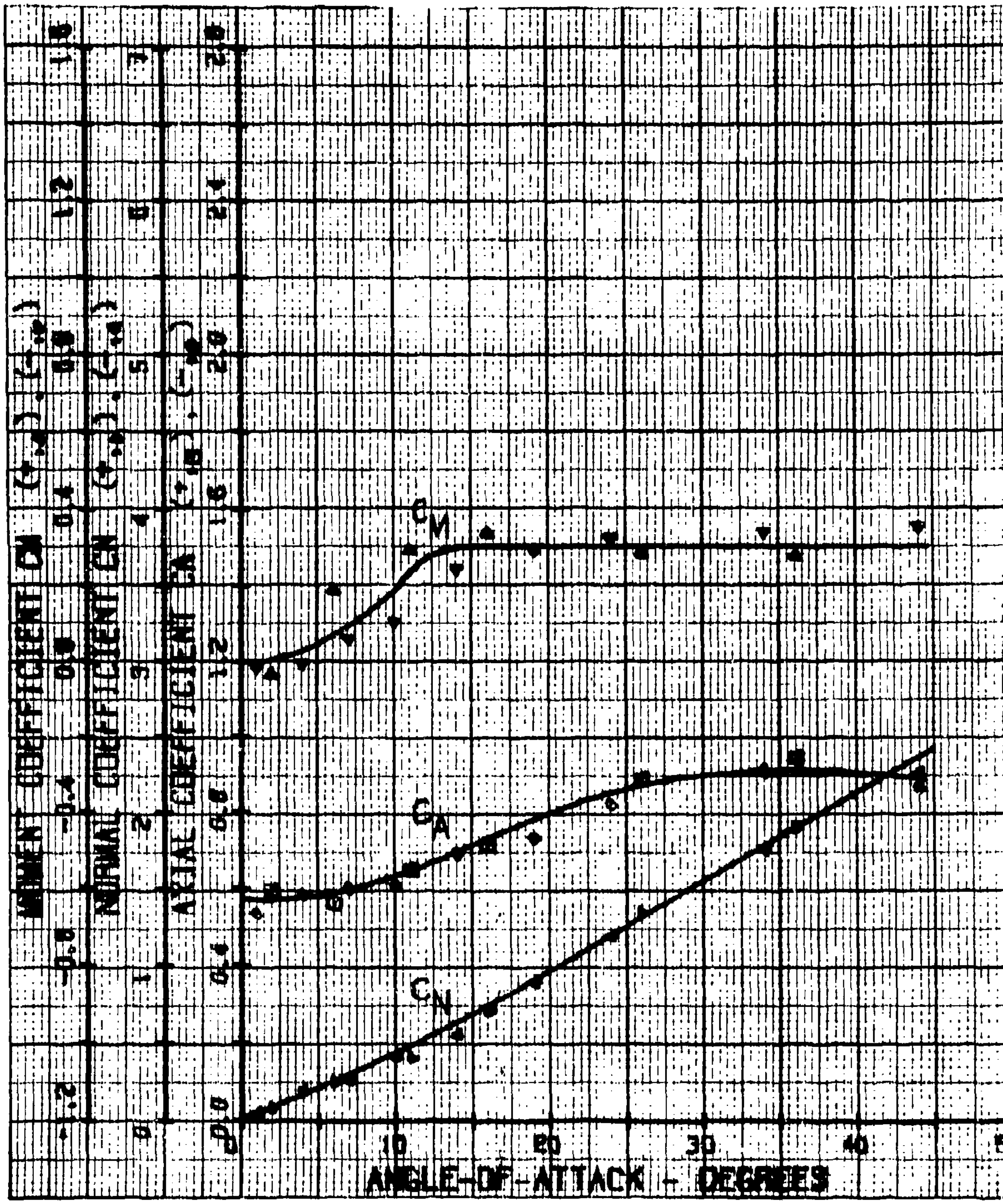
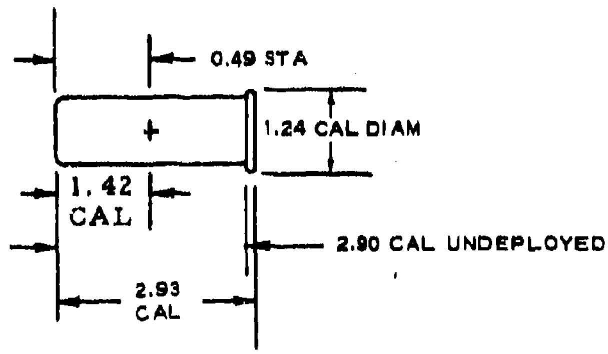


Figure 42. Graphic Static Aerodynamic Test Data: Configuration 18 (Test No. 27)

Item	Page
Static aerodynamic data	See "Remarks" below.
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 194.7 gm

Moment of inertia = 0.06405 slug in.^{2}

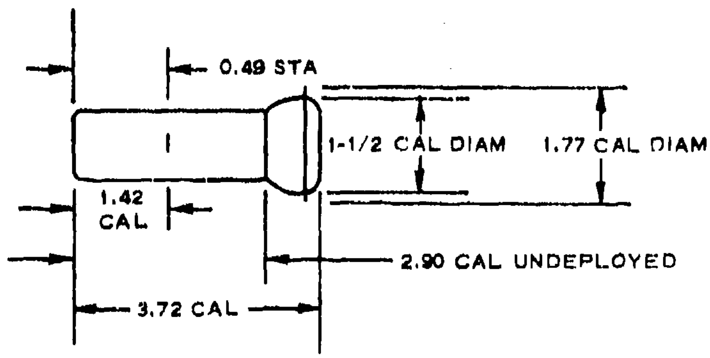
Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	2.90
Stabilizer	=	1.24 caliber diameter toroidal Ballute
Burble fence	=	none
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 43. Model Specifications for Configuration 19

Item	Page
Static aerodynamic data	
Tabulated	88
Plotted	89
Dynamic stability data	
Tabulated	90
Plotted	91



General data

Model weight = 282.6 gm

Moment of inertia = 0.07618 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	2.90
Stabilizer	=	1-1/2 caliber diameter Ballute
Burble fence	=	1.77 caliber diameter
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 44. Model Specifications for Configuration 20

TABLE XXV. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 20 (TEST NO. 281)

VELOCITY(FT/SEC)	= 213.50	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002279	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.39	C.G.(CALIBERS)	=1.4167
REYNOLDS NUMBER	=0.111[illegible]E 08	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-1.629	3.361	-3.483	1.348	1.769	0.508
-30.0	-33.0	-1.309	2.943	-2.693	1.750	1.285	0.477
-20.0	-23.0	-0.926	2.704	-1.909	2.127	0.832	0.436
-15.0	-18.0	-0.687	2.539	-1.438	2.203	0.691	0.473
-10.0	-13.0	-0.448	2.435	-0.984	2.272	0.521	0.529
-6.0	-9.0	-0.374	2.405	-0.745	2.317	0.470	0.630
-3.0	-6.0	-0.269	2.393	-0.517	2.349	0.435	0.841
-0.0	-3.0	-0.254	2.360	-0.377	2.344	0.382	1.013
3.0	0.0	0.090	2.330	0.090	2.330	-0.129	1.436
6.0	3.0	0.209	2.360	0.332	2.346	-0.508	1.527
10.0	7.0	0.269	2.420	0.562	2.369	-0.471	0.838
15.0	12.0	0.433	2.450	0.933	2.306	-0.509	0.545
20.0	17.0	0.627	2.435	1.329	2.202	-0.707	0.532
30.0	27.0	1.076	2.763	2.213	1.974	-1.084	0.490
40.0	37.0	1.524	3.042	3.078	1.552	-1.585	0.515

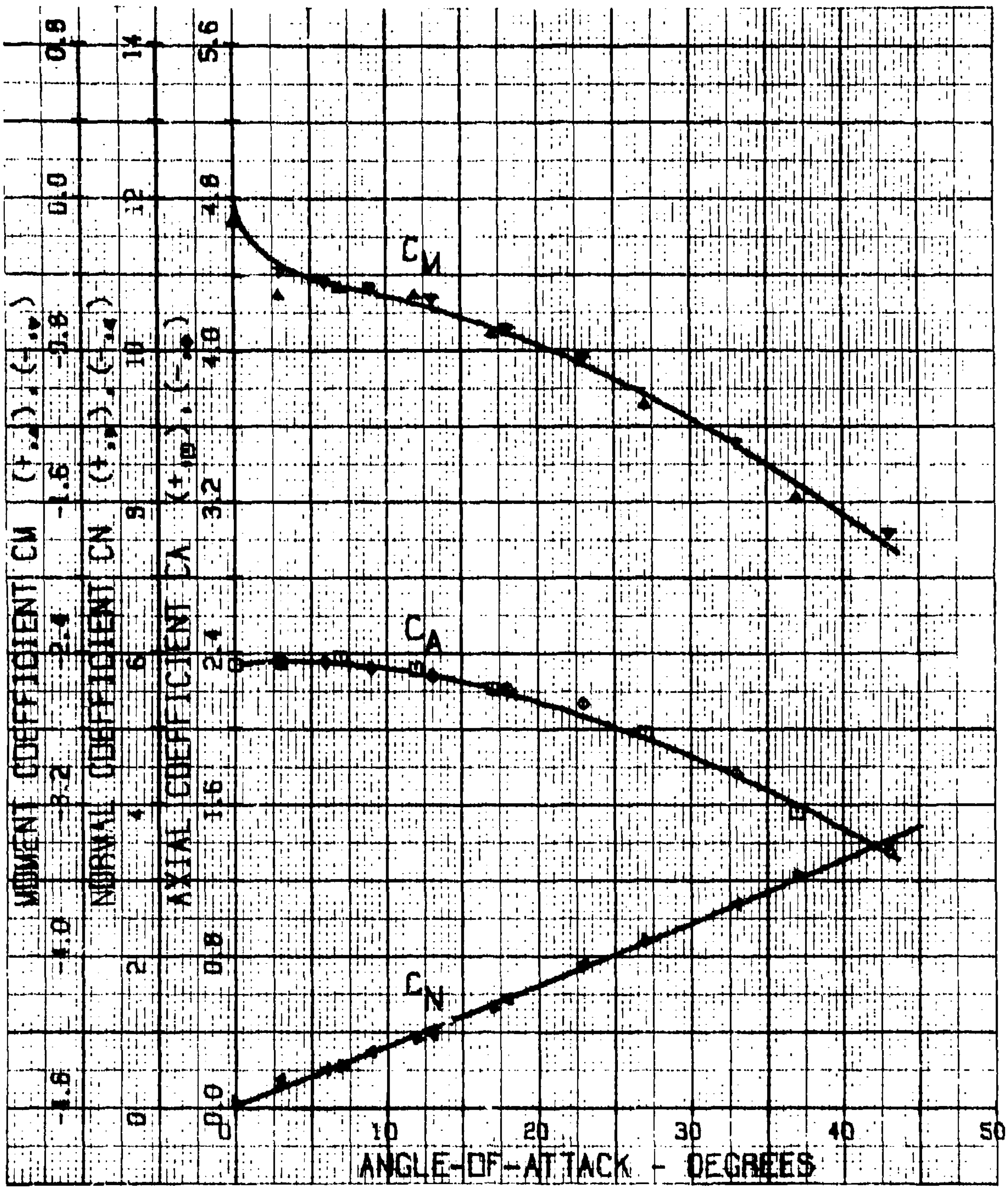


Figure 45. Graphic Static Aerodynamic Test Data:Configuration 20
(Test No. 281)

TABLE XXVI. DYNAMIC STABILITY TEST DATA: CONFIGURATION 20

```
RELEASE ANGLE-OF-ATTACK(DEGREES)=    60.00
MOMENT OF INERTIA(SLUG-IN.SQ)     =0.076180
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002472
REFERENCE AREA(SQ FT)             =0.012300
REFERENCE LENGTH(FEET)            =0.125000
```

TEST NUMBERS =147,149
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.137	-26.002
50.000	25.000	1.237	-24.952
40.000	20.000	1.203	-25.665
30.000	15.000	1.112	-27.755
25.000	12.500	1.294	-23.867

TEST NUMBERS =151,152
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.125	-54.894
50.000	25.000	1.097	-56.302
40.000	20.000	0.944	-65.437
30.000	15.000	0.756	-81.661
25.000	12.500	0.675	-91.490

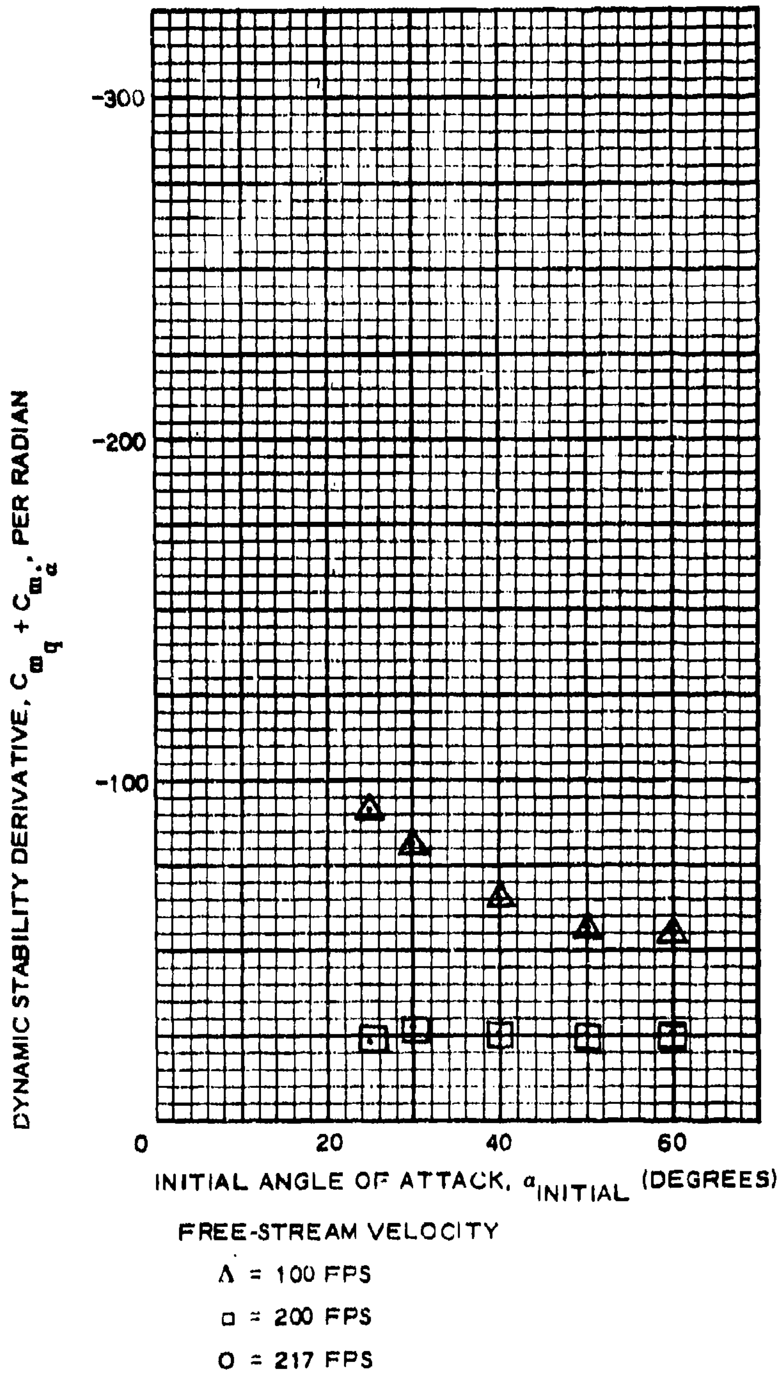
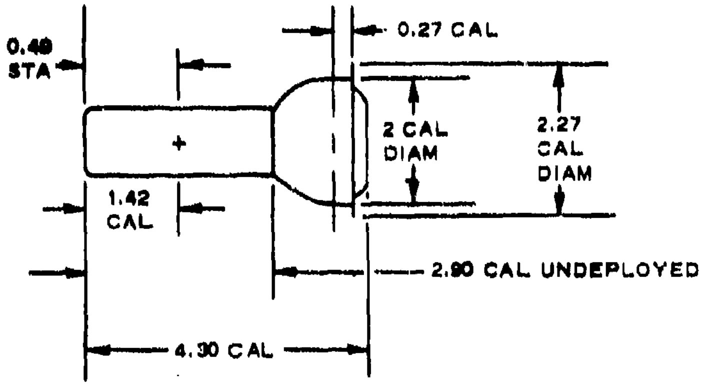


Figure 46. Graphic Dynamic Stability Test Data: Configuration 20

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	93
Plotted	94



General data

Model weight = 346.4 gm
Moment of inertia = 0.09851

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	2.90
Stabilizer	=	2 caliber diameter Ballute
Burble fence	=	2.27 caliber diameter
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 47. Model Specifications for Configuration 21

TABLE XXVII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 21

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.098510
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002468
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =159,160
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.728	-54.924
50.000	25.000	0.775	-51.602
40.000	20.000	0.759	-52.664
30.000	15.000	0.753	-53.101
25.000	12.500	0.769	-52.021

TEST NUMBERS =155,156
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.025	-78.032
50.000	25.000	1.100	-72.712
40.000	20.000	1.106	-72.301
30.000	15.000	1.050	-76.174
25.000	12.500	1.003	-79.734

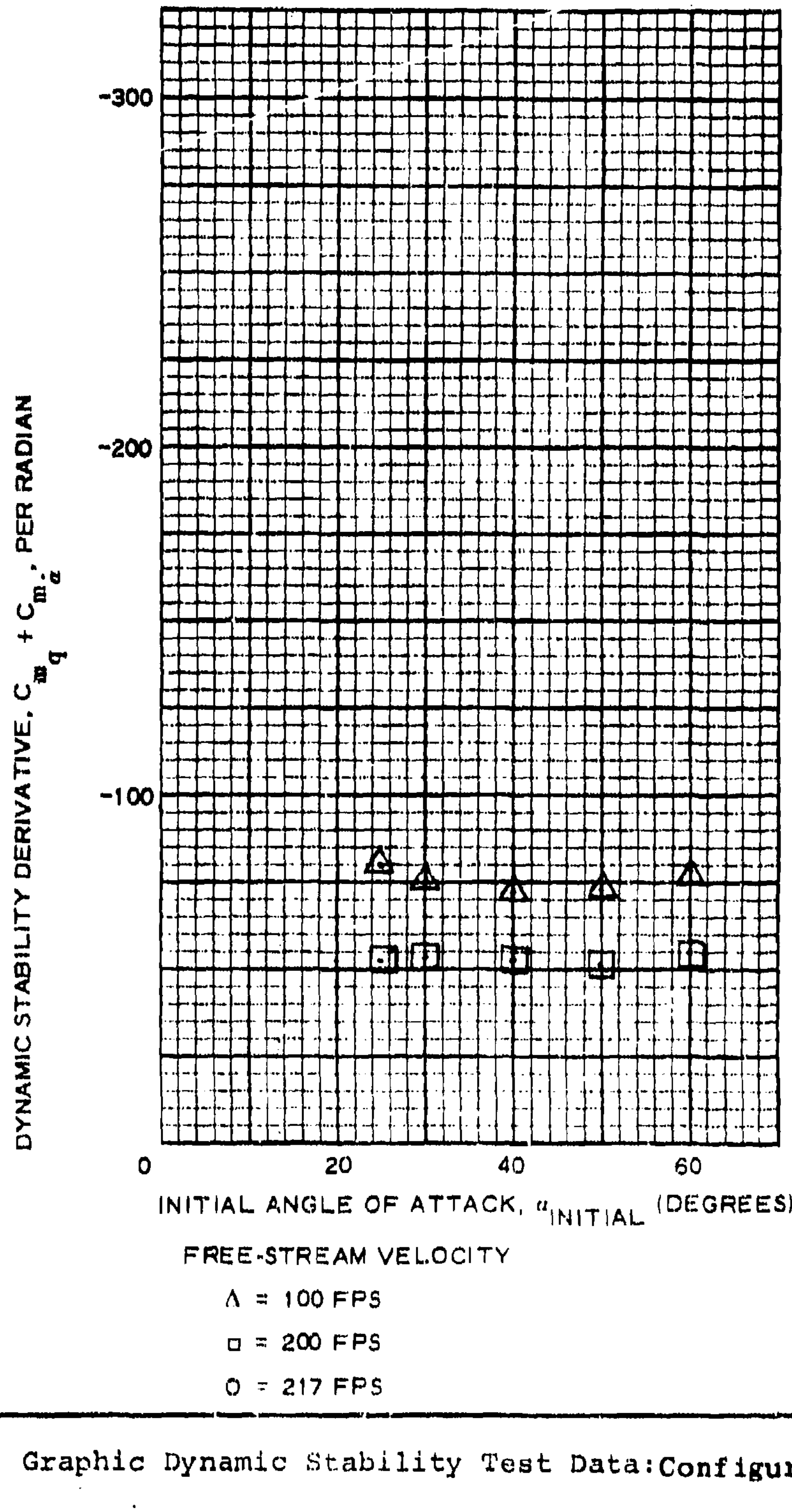
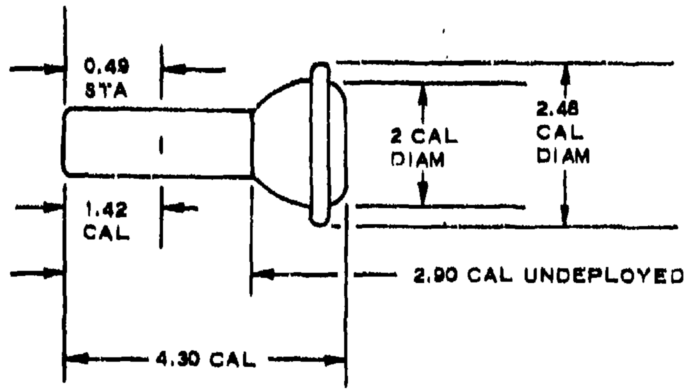


Figure 48. Graphic Dynamic Stability Test Data:Configuration 21

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	96
Plotted	97



General data

Model weight = 370.7 gm

Moment of inertia = 0.10347 slug in.^{2}

Description of components

Nose shape = flat with 0.1 caliber radius

Tripper = none

Fineness ratio = 2.90

Stabilizer = 2 caliber diameter Ballute

Burble fence = 2.48 caliber diameter toroid

Boattail = none

Strakes (8) = none

Remarks

Figure 49. Model Specifications for Configuration 22

TABLES XXVIII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 22

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.103470
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002466
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =167,168
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.462	-57.488
50.000	25.000	1.631	-51.541
40.000	20.000	1.606	-52.343
30.000	15.000	1.634	-51.442
25.000	12.500	1.678	-50.101

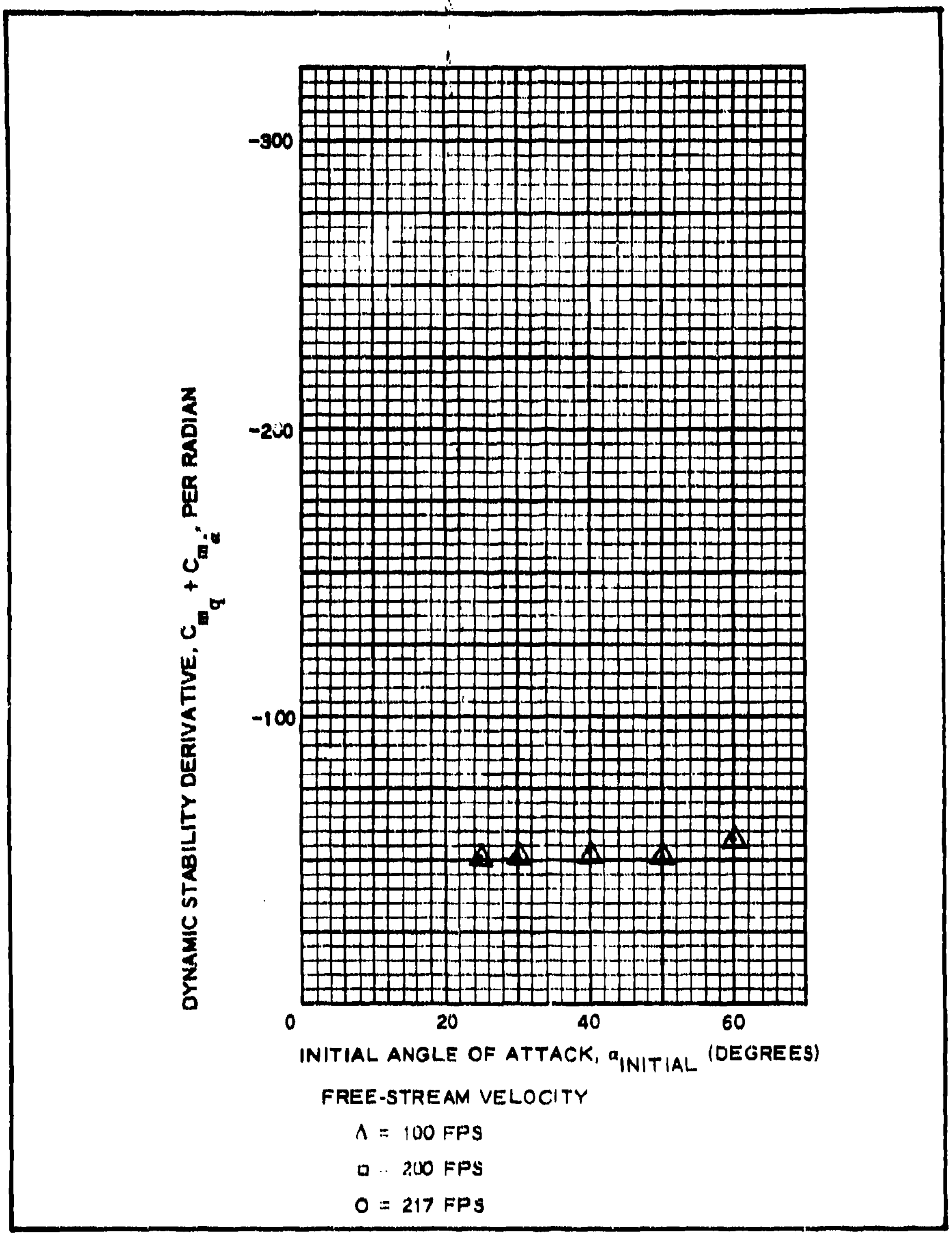
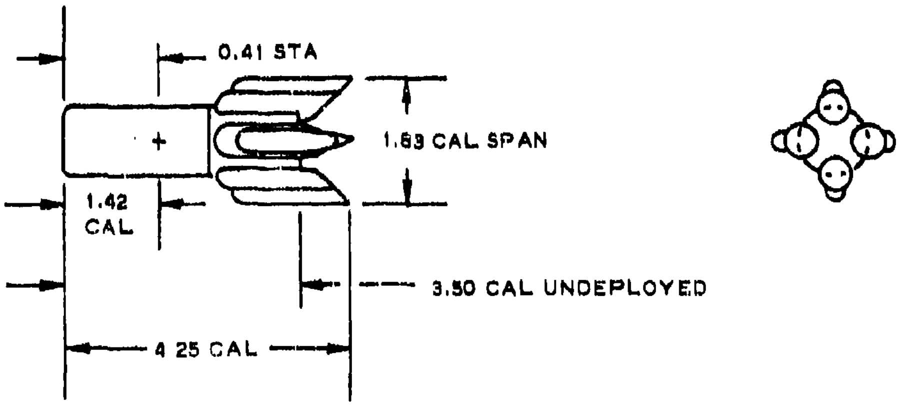


Figure 44. Graphic Dynamic Stability Test Data: Configuration 22

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	99
Plotted	100



General data

Model weight = 231.5 gm

Moment of inertia = 0.27996 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	3.50
Stabilizer	=	1.83 caliber span inflatable fins
Burble fence	=	none
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 51. Model Specifications for Configuration 23

TABLE XXIX. DYNAMIC STABILITY TEST DATA: CONFIGURATION 23

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.279960
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002464
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =175,176
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.681	-167.092
50.000	25.000	0.772	-147.474
40.000	20.000	0.791	-143.977
30.000	15.000	0.706	-161.177
25.000	12.500	0.681	-167.092

TEST NUMBERS =171,172
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.778	-292.579
50.000	25.000	0.812	-280.201
40.000	20.000	0.809	-281.282
30.000	15.000	0.781	-291.409
25.000	12.500	0.716	-318.132

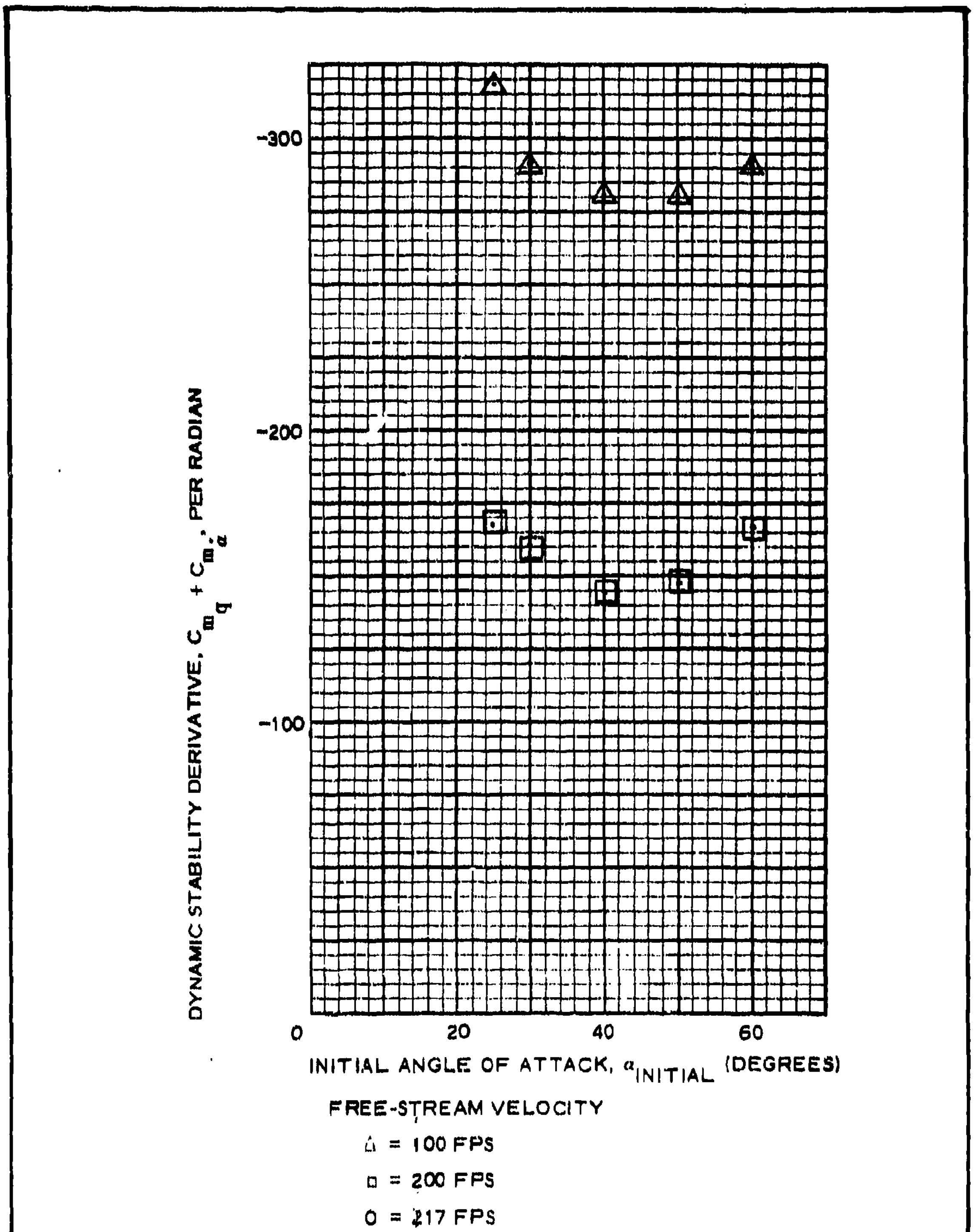
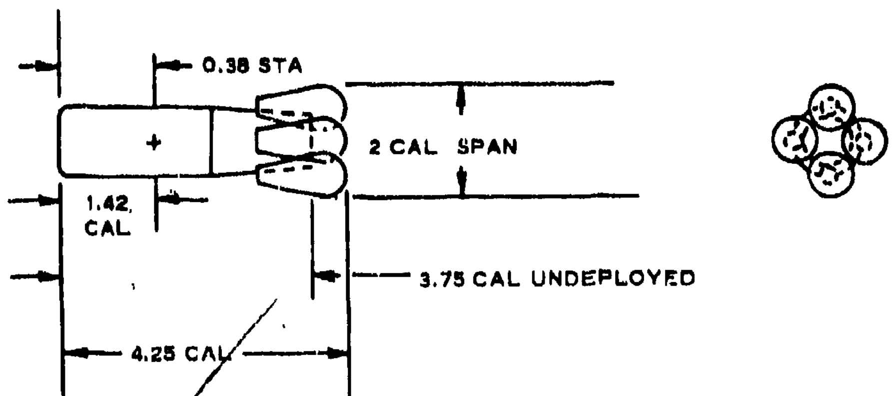


Figure 52. Graphic Dynamic Stability Test Data:Configuration 23

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	102
Plotted	103



General data
Model weight = 248.0 gm
Moment of inertia = 0.07245 slug in.^{2}

Description of components
Nose shape = flat with 0.1 caliber radius
Tripper = none
Fineness ratio = 3.75
Stabilizer = 2 caliber span inflatable conics
Burble fence = none
Boattail = 1-1/2 caliber long, 10 degree cone angle
Strakes (8) = none

Remarks

Figure 53. Model Specifications for Configuration 24

TABLE XXX. DYNAMIC STABILITY TEST DATA: CONFIGURATION 24

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.072450
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002462
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =179,180
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.056	-27.911
50.000	25.000	1.081	-27.266
40.000	20.000	1.103	-26.725
30.000	15.000	1.137	-25.918
25.000	12.500	1.200	-24.568

TEST NUMBERS =183,184
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.025	-57.524
50.000	25.000	0.991	-59.520
40.000	20.000	0.906	-65.062
30.000	15.000	0.775	-76.081
25.000	12.500	0.722	-81.680

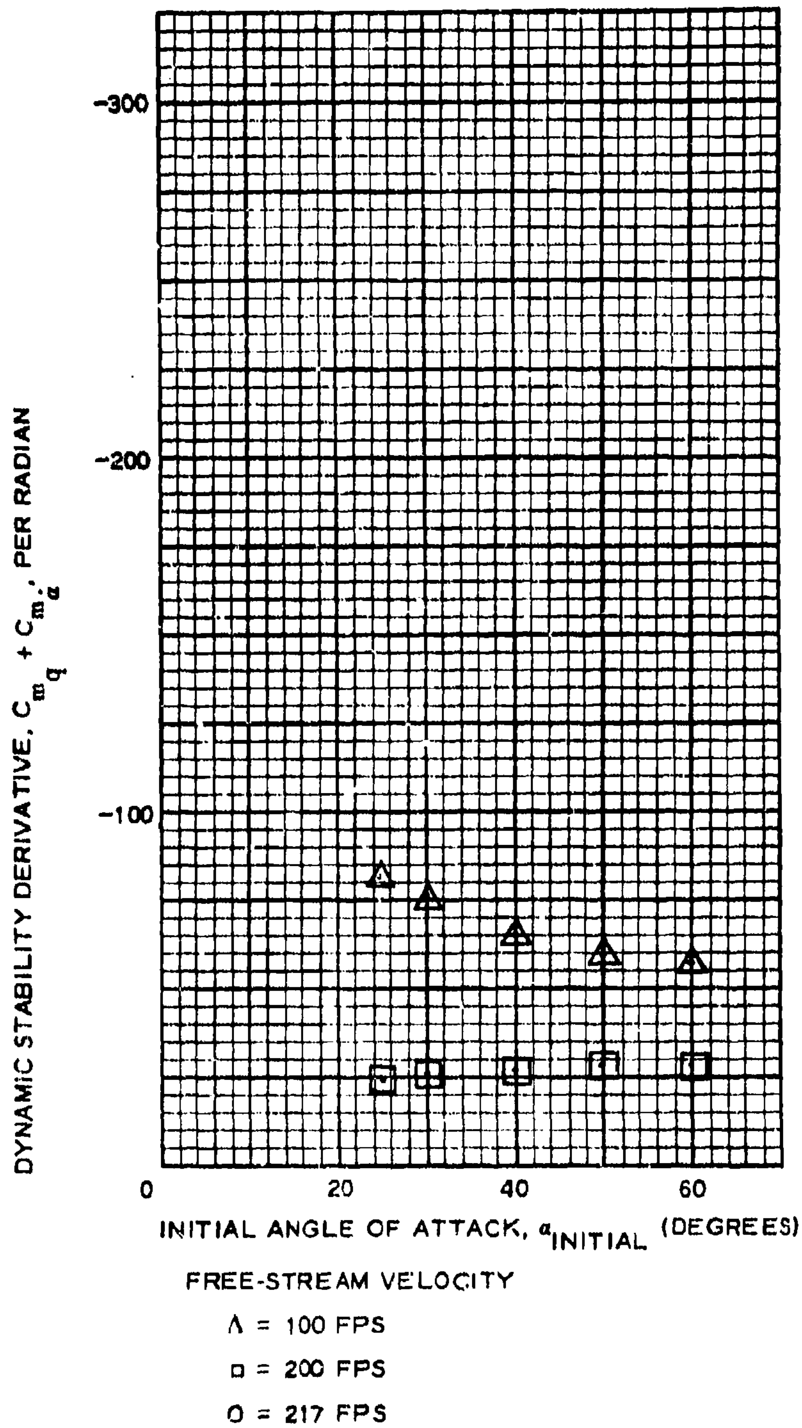
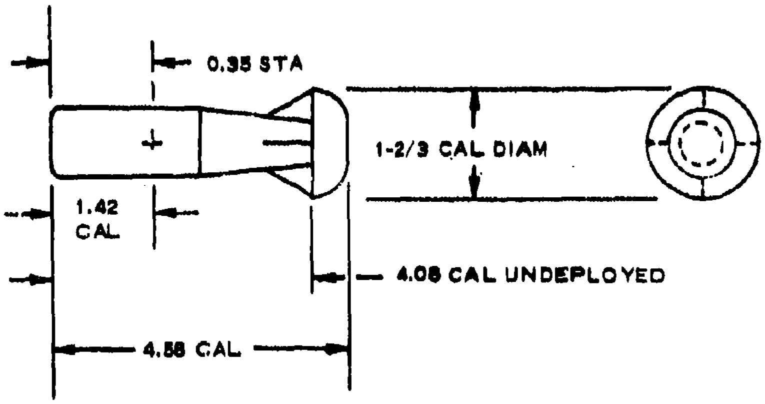


Figure 54. Graphic Dynamic Stability Test Data: Configuration 24

Item	Page
Static aerodynamic data	See "Remarks" below.
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 229.1 gm

Moment of inertia = 0.06876 slug in.^{2}

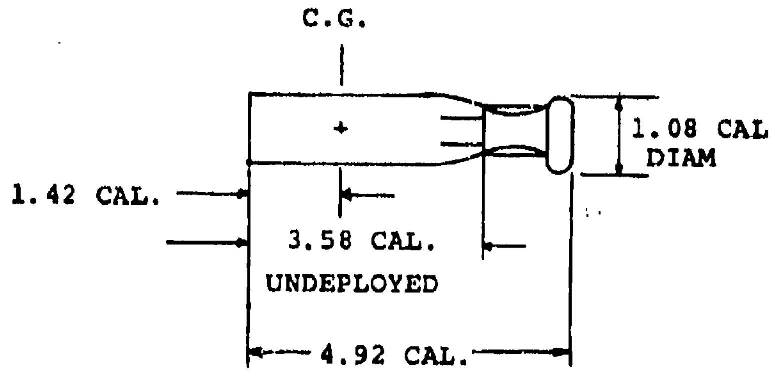
Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	4.08
Stabilizer	=	1-2/3 caliber diam inflatable paratail
Burble fence	=	none
Boattail	=	1-3/4 caliber long, 10 degree cone angle
Strakes (8)	=	none

Remarks

Figure 55. Model Specifications for Configuration 26

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	106
Plotted	107



General data

Model weight	=	280.3 gm
Moment of inertia	=	0.08295

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	3.58
Stabilizer	=	1.08 caliber diam toroidal ballute diffuser with panels
Burble fence	=	none
Boattail	=	1 caliber long, 10 deg cone angle
Strakes (8)	=	0.05 caliber high

Remarks

Figure 56. Model Specifications for Configuration 26

TABLE XXXI. DYNAMIC STABILITY TEST DATA: CONFIGURATION 26

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.082950
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002458
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =195,196
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.181	-28.620
50.000	25.000	1.291	-26.194
40.000	20.000	1.325	-25.515
30.000	15.000	1.166	-29.003
25.000	12.500	1.012	-33.390

TEST NUMBERS =199,200
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.253	-53.956
50.000	25.000	1.278	-52.901
40.000	20.000	1.125	-60.101
30.000	15.000	0.875	-77.273
25.000	12.500	0.744	-90.909

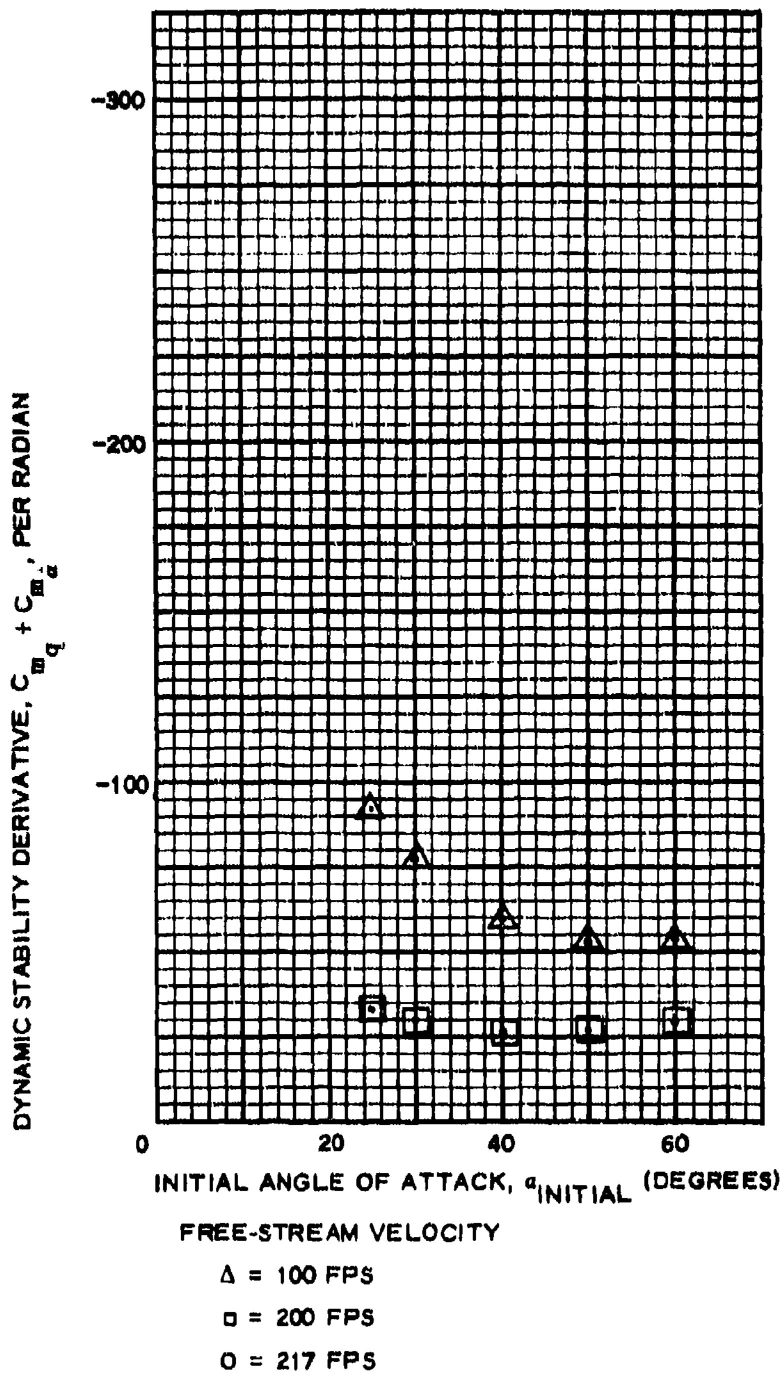
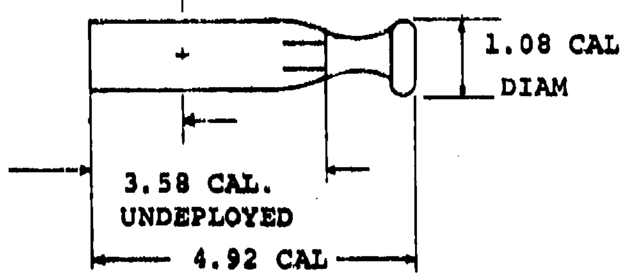


Figure 57. Graphic Dynamic Stability Test Data: Configuration 26

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	109
Plotted	110



General data

Model weight	=	272.8 gm
Moment of inertia	=	0.0814

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	3.58
Stabilizer	=	1.08 caliber diam toridal ballute diffuser without panels
Burble fence	=	none
Boattail	=	1 caliber long, 10 deg cone angle
Strakes (8)	=	0.05 caliber high

Remarks

Figure 58. Model Specifications for Configuration 27

TABLE XXXII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 27

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.081490
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002456
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =207,208
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.812	-18.338
50.000	25.000	1.787	-18.595
40.000	20.000	1.425	-23.325
30.000	15.000	1.069	-31.100
25.000	12.500	0.913	-36.425

TEST NUMBERS =203,204
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.197	-55.541
50.000	25.000	1.075	-61.838
40.000	20.000	0.850	-78.207
30.000	15.000	0.644	-103.264
25.000	12.500	0.547	-121.556

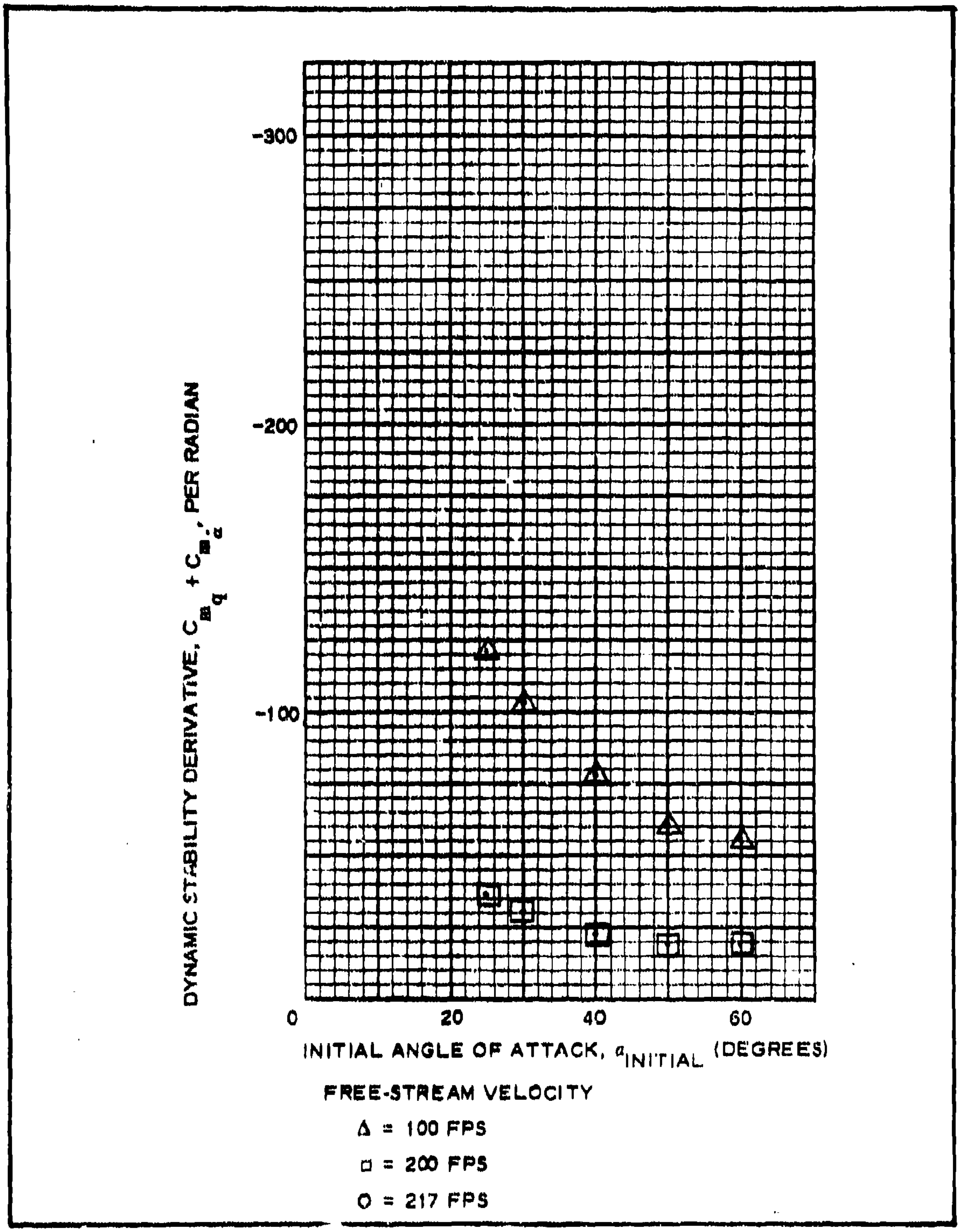
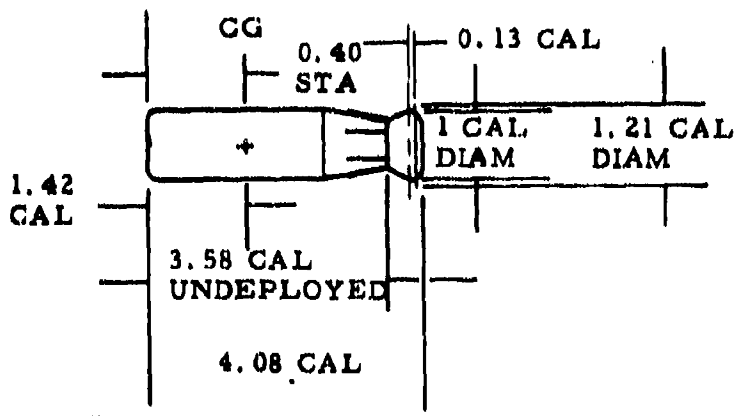


Figure 59. Graphic Dynamic Stability Test Data: Configuration 27

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	112
Plotted	113



General data
- Model weight = 235.5 gm
- Moment of inertia = 0.07069 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	none
Fineness ratio	=	3.58
Stabilizer	=	1 caliber diameter Ballute
Burble fence	=	1.21 caliber diameter
Boattail	=	1 caliber long, 10 degree cone angle
Strakes (8)	=	0.05 caliber high

Remarks

Figure 60. Model Specifications for Configuration 28

TABLE XXXIII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 28

```
RELEASE ANGLE-OF-ATTACK(DEGREES)=    60.00
MOMENT OF INERTIA(SLUG-IN.SQ)      =0.070690
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002454
REFERENCE AREA(SQ FT)              =0.012300
REFERENCE LENGTH(FEET)             =0.125000
```

TEST NUMBERS =211,212
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.556	-18.542
50.000	25.000	1.478	-19.522
40.000	20.000	1.250	-23.084
30.000	15.000	1.012	-28.499
25.000	12.500	0.959	-33.215

TEST NUMBERS =215,216
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.241	-46.519
50.000	25.000	1.084	-53.221
40.000	20.000	0.894	-54.572
30.000	15.000	0.706	-31.715
25.000	12.500	0.600	-35.185

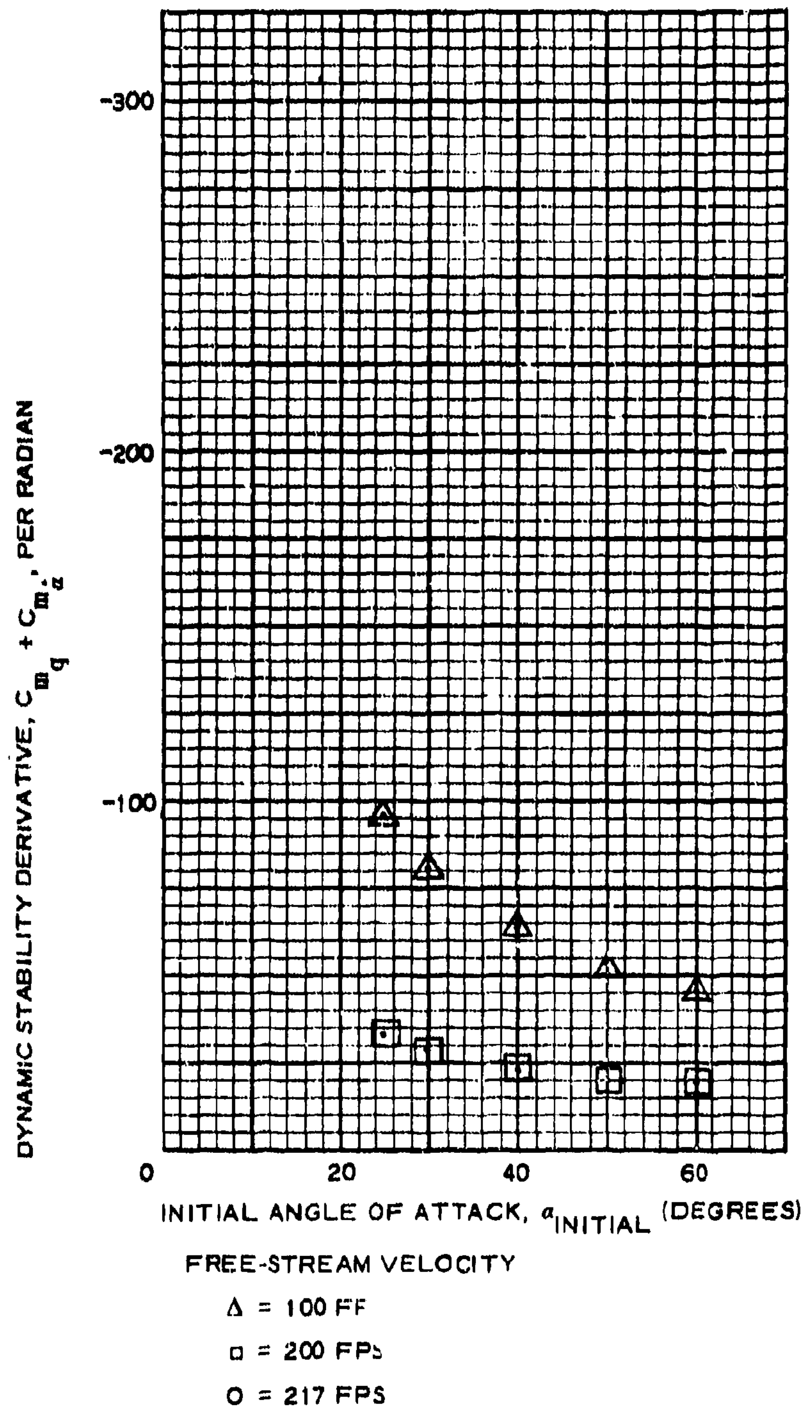
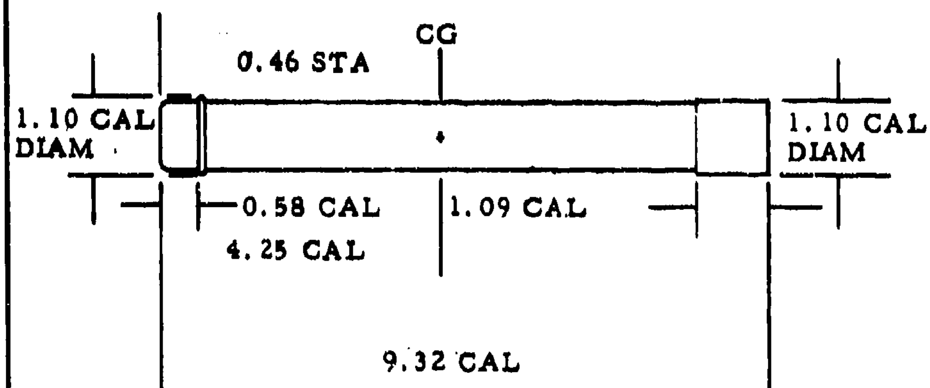


Figure 61. Graphic Dynamic Stability Test Data: Configuration 28

Item	Page
Static aerodynamic data	See "Remarks" below.
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 431.8 gm

Moment of inertia = 0.34551 slug in.^{2}

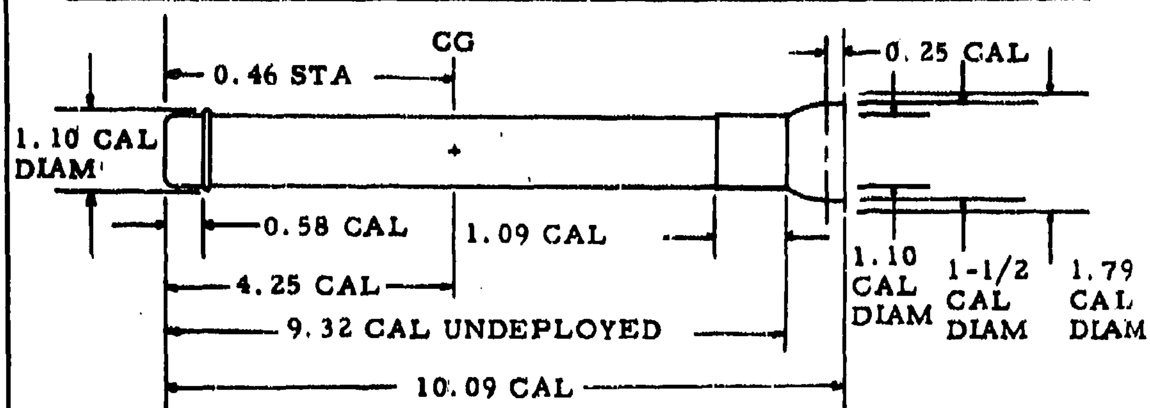
Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	9.32
Stabilizer	=	none
Burble fence	=	none
Boattail	=	none, but 1.10 caliber diameter after-section
Strakes (8)	=	none

Remarks

Figure 62. Model Specifications for Configuration 29

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	116
Plotted	117



General data

Model weight	=	524.3 gm
Moment of inertia	=	0.48867 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	9.32
Stabilizer	=	1-1/2 caliber diameter ballute
Burble fence	=	1.79 caliber diameter
Boattail	=	none, but 1.10 caliber diameter aftersection
Strakes (8)	=	none

Remarks

Figure 63. Model Specifications for Configuration 30

TABLE XXXIV. DYNAMIC STABILITY TEST DATA:CONFIGURATION 30

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.488670
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002443
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =224,225
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.119	-179.147
50.000	25.000	1.172	-171.026
40.000	20.000	1.144	-175.231
30.000	15.000	1.037	-193.177
25.000	12.500	1.047	-191.447

TEST NUMBERS =228,229
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.629	-246.198
50.000	25.000	1.800	-222.690
40.000	20.000	1.866	-214.856
30.000	15.000	1.794	-223.466
25.000	12.500	1.866	-214.856

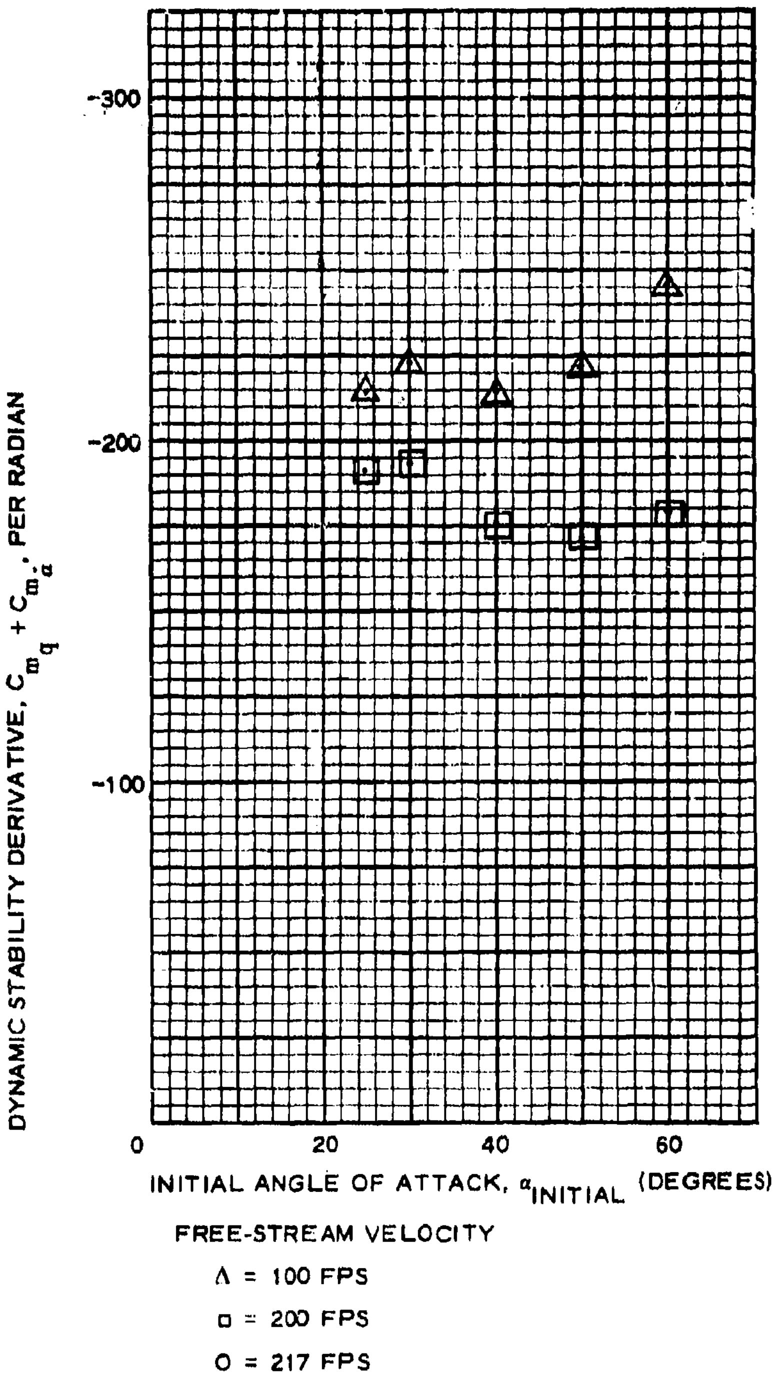
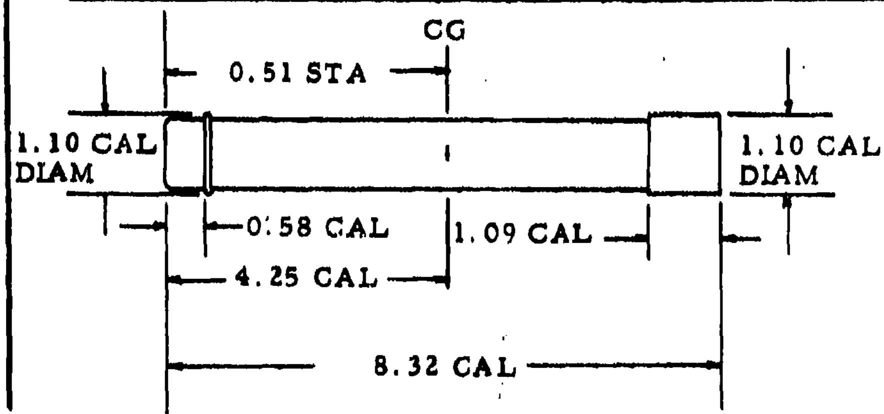


Figure 64. Graphic Dynamic Stability Test Data: Configuration 30

Item	Page
Static aerodynamic data	See "Remarks" below.
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 380.7 gm

Moment of inertia = slug in.^{2}

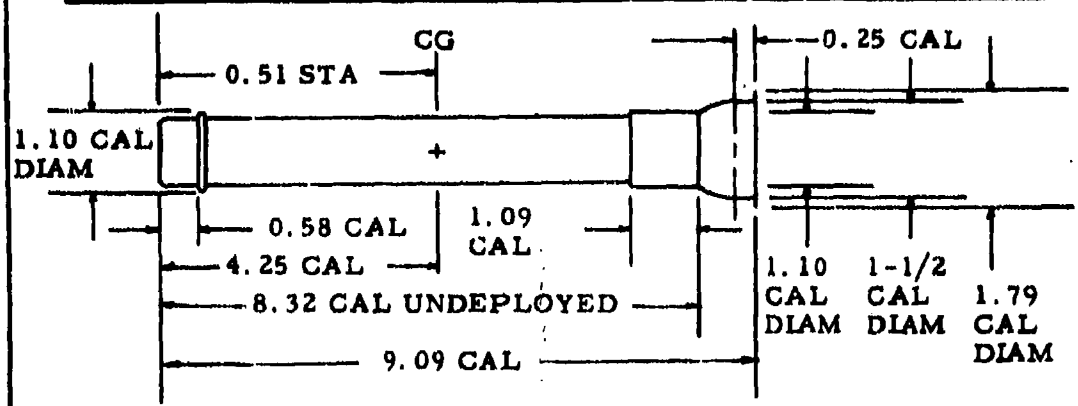
Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10
Fineness ratio	=	8.32
Stabilizer	=	none
Burble fence	=	none
Boattail	=	none, but 1.10 caliber diameter aftersection
Strakes (8)	=	none

Remarks

Figure 65. Model Specifications for Configuration 31

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	120
Plotted	121



General data

Model weight	=	460.9 gm
Moment of inertia	=	0.33996 slug in.^{2}

Description of components

Nose shape	=	nose with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	8.32
Stabilizer	=	1-1/2 caliber diameter Ballute
Burble fence	=	1.79 caliber diameter
Boattail	=	none, but 1.10 caliber diameter aftersection
Strakes (8)	=	none

Remarks

Figure 66. Model Specification for Configuration 32

TABLE XXXV. DYNAMIC STABILITY TEST DATA: CONFIGURATION 32

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.339960
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002439
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =240,241
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.137	-122.770
50.000	25.000	1.075	-129.907
40.000	20.000	0.978	-142.774
30.000	15.000	0.950	-147.000
25.000	12.500	0.966	-144.622

TEST NUMBERS =236,237
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.872	-149.209
50.000	25.000	1.775	-157.353
40.000	20.000	1.541	-181.291
30.000	15.000	1.284	-217.460
25.000	12.500	1.212	-230.351

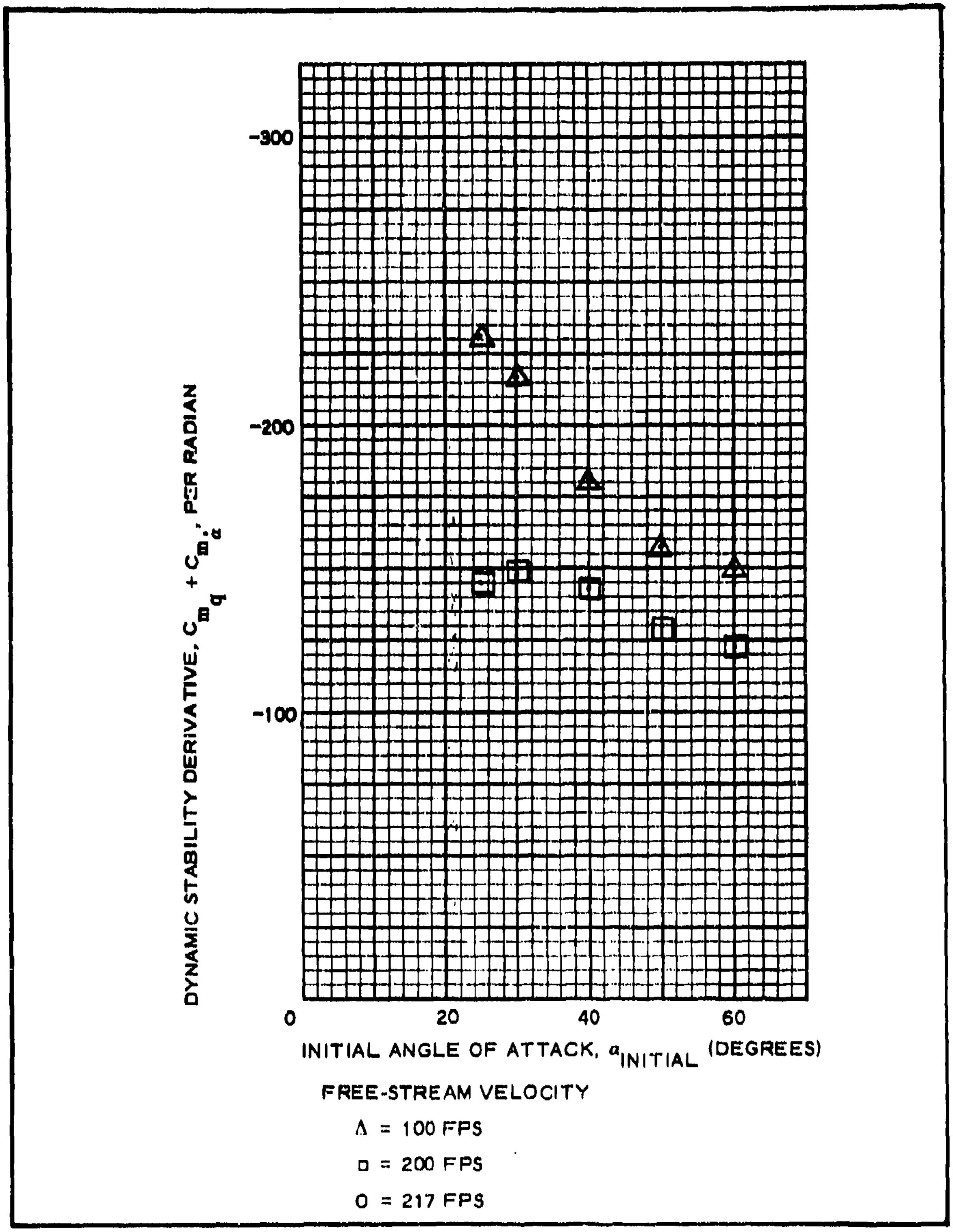
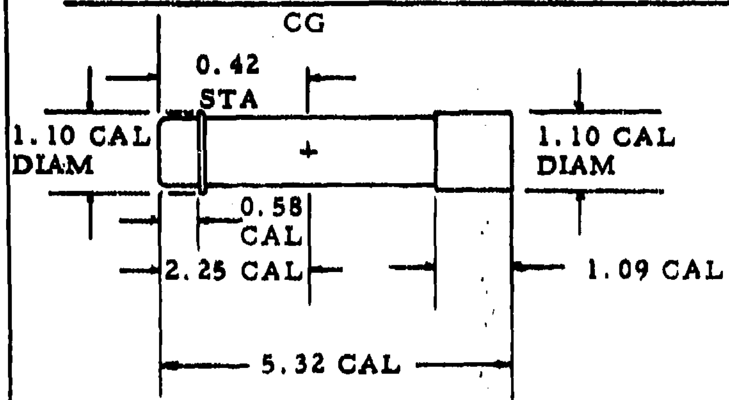


Figure 67. Graphic Dynamic Stability Test Data: Configuration 32

Item	Page
Static aerodynamic data	See "Remarks" below.
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 341.0 gm

Moment of inertia = slug in.^{2}

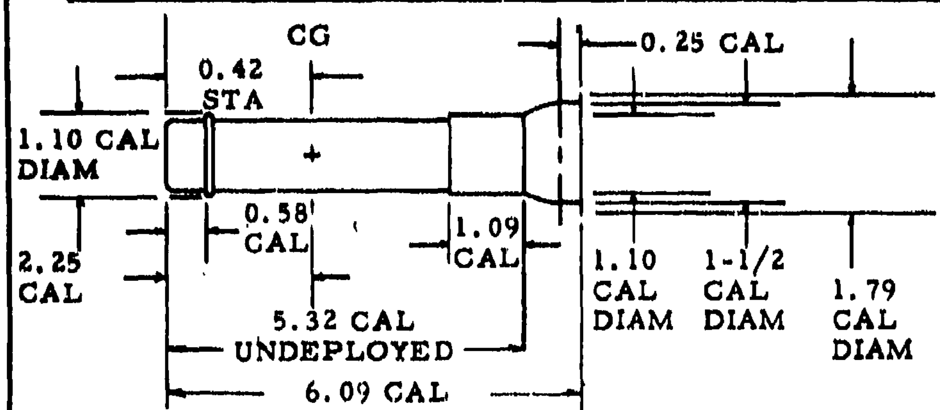
Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	5.32
Stabilizer	=	none
Burble fence	=	none
Boattail	=	none, but 1.10 caliber diameter after-section
Strakes (8)	=	none

Remarks

Figure 68. Model Specifications for Configuration 33

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	124
Plotted	125



General data

Model weight	=	431.4 gm
Moment of inertia	=	0.16752 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	5.32
Stabilizer	=	1-1/2 caliber diameter Ballute
Burble fence	=	1.79 caliber diameter
Boattail	=	none, but 1.10 caliber diameter aftersection
Strakes (8)	=	none

Remarks

Figure 69. Model Specifications for Configuration 34

TABLE XXXVI. DYNAMIC STABILITY TEST DATA: CONFIGURATION 34

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.167520
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002435
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =248,249
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.078	-63.929
50.000	25.000	1.006	-58.496
40.000	20.000	0.976	-76.054
30.000	15.000	0.825	-83.544
25.000	12.500	0.828	-93.229

TEST NUMBERS =252,253
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.519	-90.764
50.000	25.000	1.400	-98.463
40.000	20.000	1.247	-110.554
30.000	15.000	1.175	-117.317
25.000	12.500	1.150	-119.867

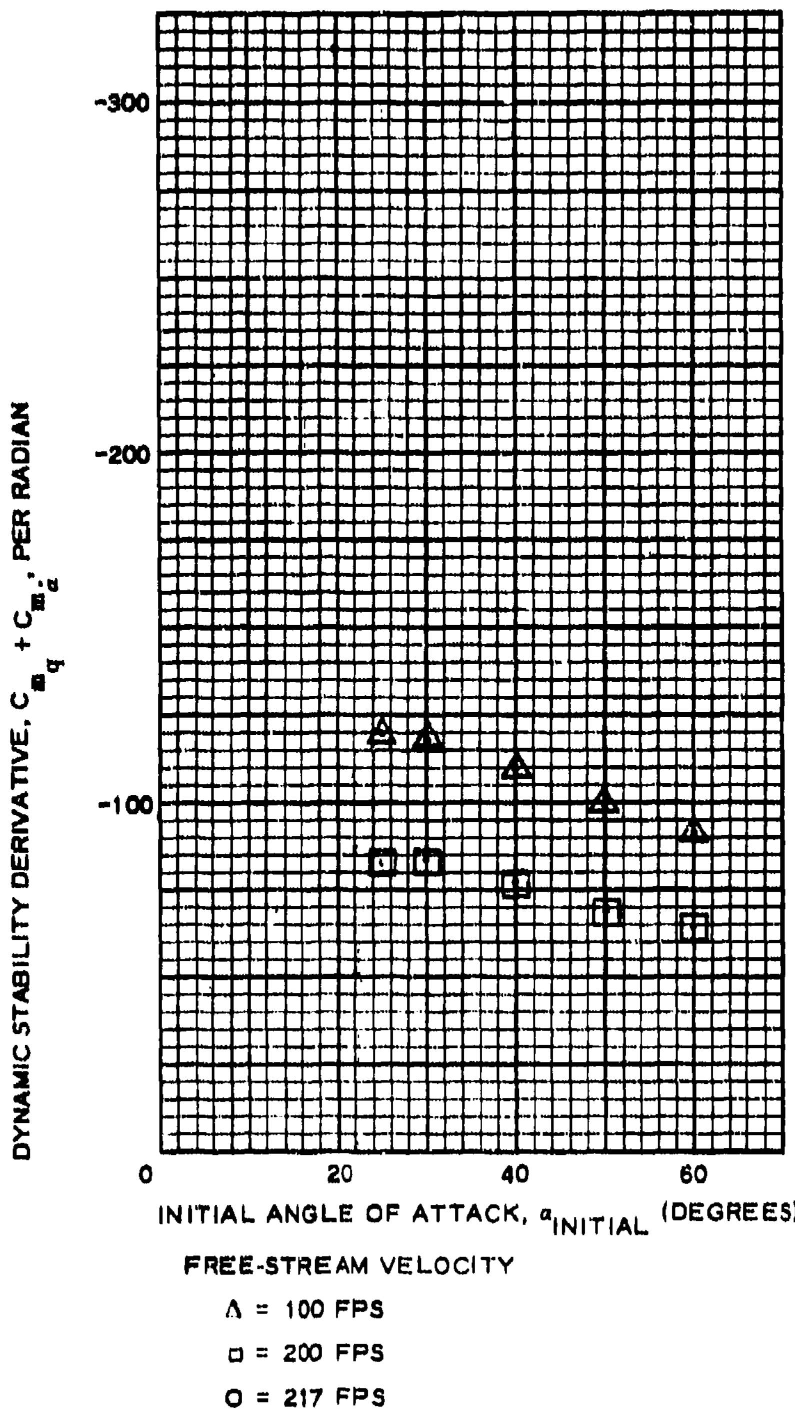
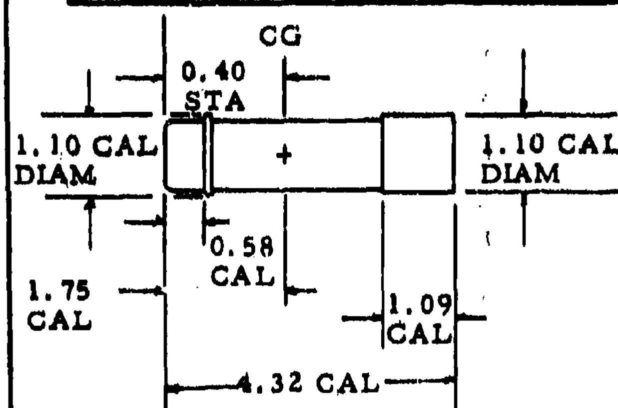


Figure 70. Graphic Dynamic Stability Test Data: Configuration 34

Item	Page
Static aerodynamic data	See "Remarks" below.
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	
Plotted	



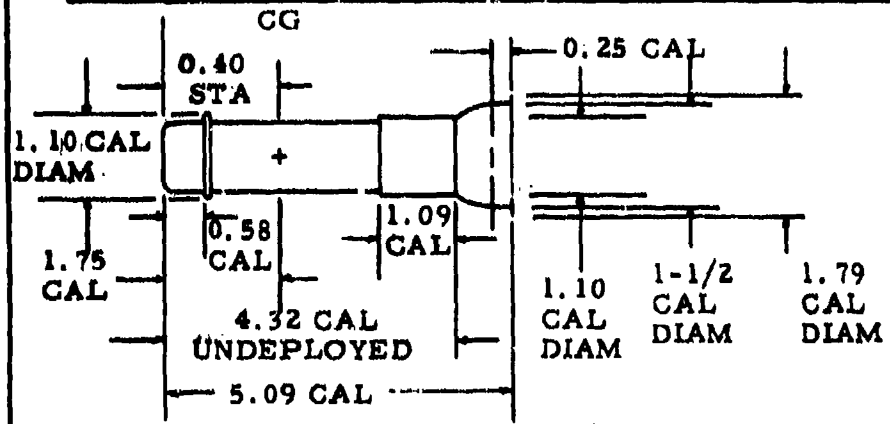
General data
- Model weight = 358.4 gm
- Moment of inertia = slug in.^{2}

Description of components
- Nose shape = flat with 0.1 caliber radius
- Tripper = 1.10 caliber diameter
- Fineness ratio = 4.32
- Stabilizer = none
- Burble fence = none
- Boattail = none, but 1.10 caliber diameter aftersection
- Strakes (8) = none

Remarks

Figure 71. Model Specifications for Configuration 35

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	128
Plotted	129



General data

Model weight	=	438.8 gm
Moment of inertia	=	0.12964 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	4.32
Stabilizer	=	1-1/2 caliber diameter Ballute
Burble fence	=	1.79 caliber diameter
Boattail	=	none, but 1.10 caliber diameter aftersection
Strakes (8)	=	none

Remarks

Figure 72. Model Specifications for Configuration 36

TABLE XXXVII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 36

RELEASE ANGLE-OF-ATTACK(DEGREES) = 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.129640
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002433
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =267,268
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.009	-52.885
50.000	25.000	0.925	-57.709
40.000	20.000	0.969	-55.103
30.000	15.000	0.881	-60.574
25.000	12.500	0.819	-65.198

TEST NUMBERS =271,272
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.337	-73.822
50.000	25.000	1.31[illegible]	[illegible]0.957
40.000	20.000	1.200	-83.968
30.000	15.000	1.041	-102.594
25.000	12.500	0.972	-104.851

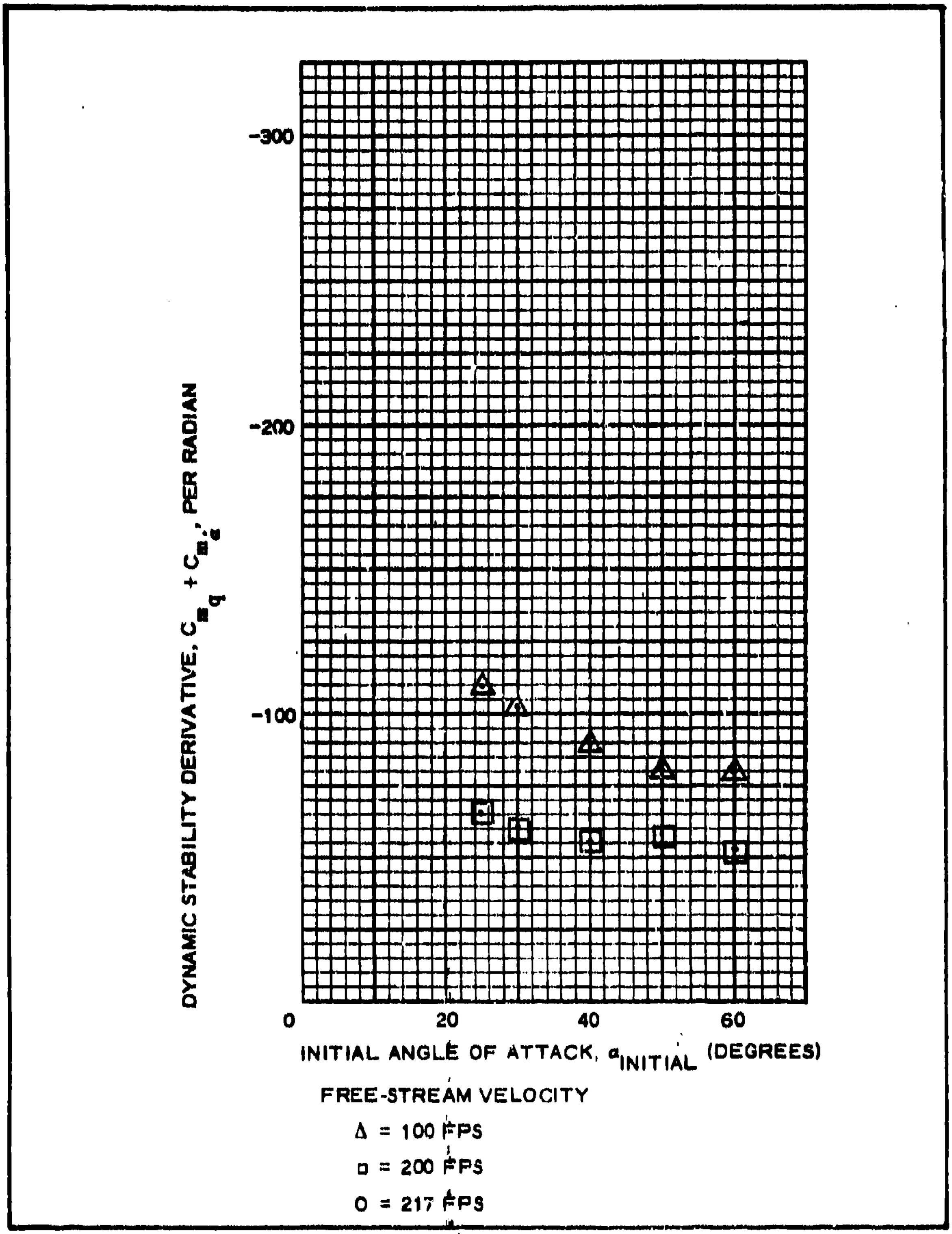
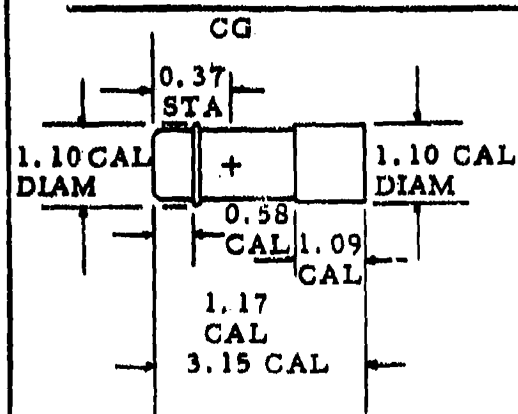


Figure 73. Graphic Dynamic Stability Test Data: Configuration 36

Item	Page
Static aerodynamic data	
Tabulated	131
Plotted	132
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight	=	270.4 gm
Moment of inertia	=	0.07452 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	3.15
Stabilizer	=	none
Burble fence	=	none
Boattail	=	none, but 1.10 caliber diameter aftersection
Strakes (8)	=	none.

Remarks

Figure 74. Model Specifications for Configuration 37

TABLE XXXVIII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 37 (TEST NO. 9)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002321	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 5[illegible].17	C.G.(CALIBERS)	=1.1667
REYNOLDS NUMBER	=0.9661E 07	ALPHA SHIFT(DEGREES)	=-1.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-41.0	-1.042	2.069	-2.144	0.878	0.166	0.078
-30.0	-31.0	-0.796	1.606	-1.509	0.967	-0.069	-0.045
-20.0	-21.0	-0.593	1.201	-0.984	0.908	-0.084	-0.085
-15.0	-16.0	-0.376	0.984	-0.633	0.842	-0.053	-0.083
-10.0	-11.0	-0.246	0.781	-0.391	0.720	0.015	0.037
-6.0	-7.0	-0.188	0.694	-0.271	0.666	0.008	0.029
-3.0	-4.0	-0.116	0.637	-0.160	0.627	-0.042	-0.262
-0.0	-1.0	0.029	0.550	0.019	0.550	-0.011	0.561
3.0	2.0	0.043	0.579	0.064	0.577	-0.303	4.767
6.0	5.0	0.130	0.694	0.190	0.680	-0.316	1.663
10.0	9.0	0.283	0.825	0.415	0.769	-0.292	0.704
15.0	14.0	0.333	0.984	0.561	0.874	-0.251	0.448
20.0	19.0	0.535	1.186	0.892	0.947	-0.215	0.240
30.0	29.0	0.767	1.635	1.463	1.058	-0.510	0.348
40.0	39.0	1.071	2.112	2.161	0.968	-0.939	0.434

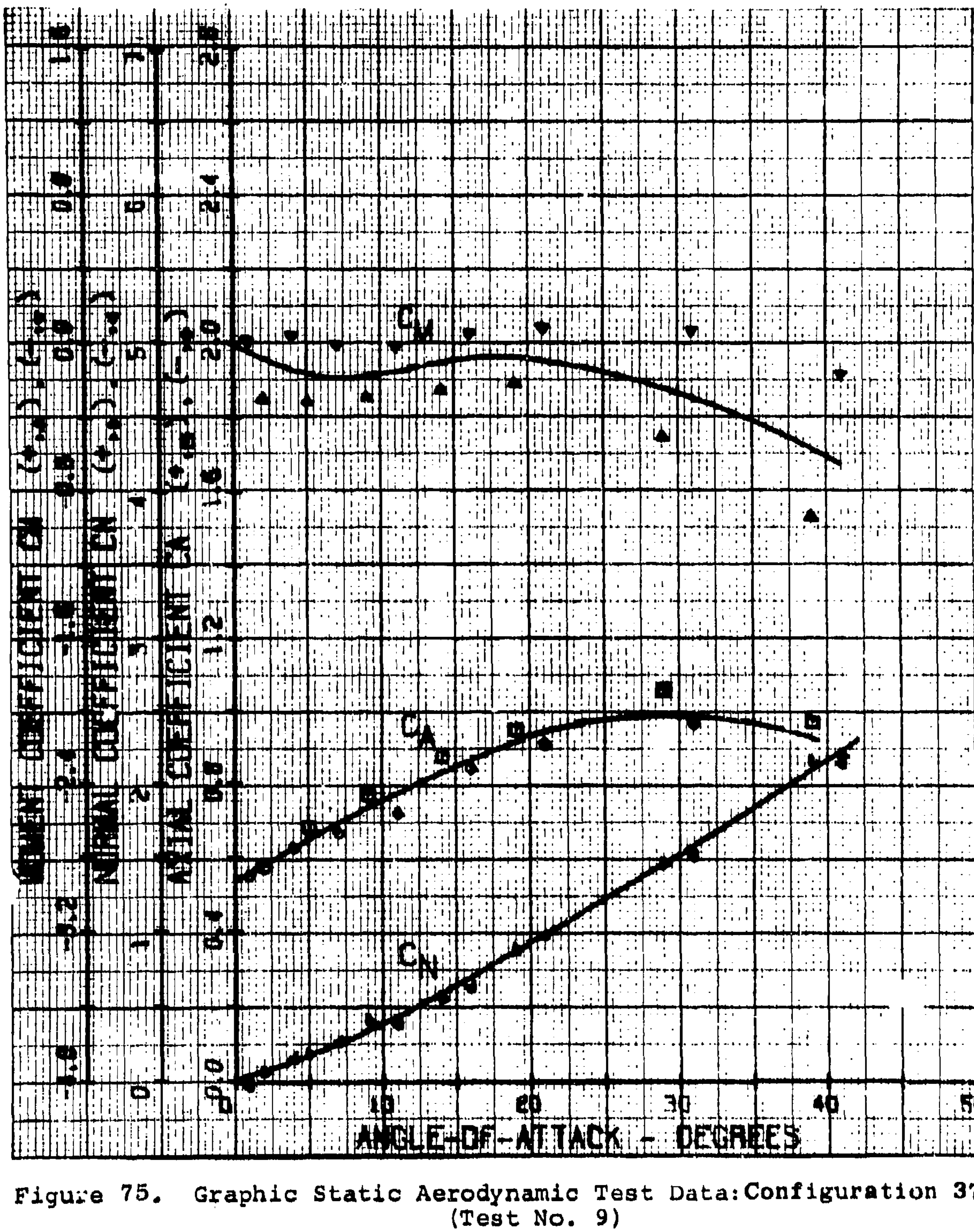
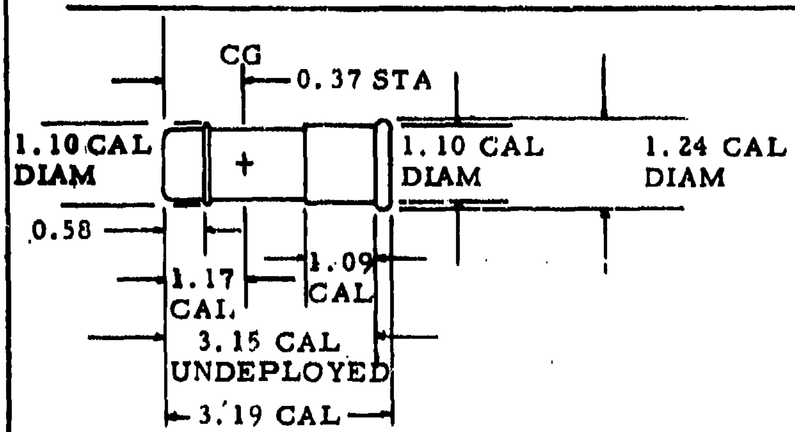


Figure 75. Graphic Static Aerodynamic Test Data: Configuration 37 (Test No. 9)

Item	Page
Static aerodynamic data	
Tabulated	134
Plotted	135
Dynamic stability data	
Tabulated	136
Plotted	137



General data

Model weight = 294.3 gm

Moment of inertia = 0.07688 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	3.15
Stabilizer	=	1.24 caliber diameter inflatable toroid
Burble fence	=	none
Boattail	=	none, but 1.10 caliber diameter after-section
Strakes (8)	=	none

Remarks

Figure 76. Model Specifications for Configuration 38

TABLE XXXIX. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 38
TEST NO. 10)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002321	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 55.17	C.G.(CALIBERS)	=1.1667
REYNOLDS NUMBER	=0.1007E 06	ALPHA SHIFT(DEGREES)	=-0.500

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-40.5	-1.157	2.242	-2.337	0.953	0.662	0.284
-30.0	-30.5	-0.868	1.794	-1.658	1.105	0.446	0.269
-20.0	-20.5	-0.680	1.331	-1.103	1.009	0.091	0.083
-15.0	-15.5	-0.521	1.114	-0.800	0.934	-0.012	-0.015
-10.0	-10.5	-0.362	0.940	-0.527	0.859	-0.006	-0.012
-6.0	-6.5	-0.189	0.716	-0.277	0.769	-0.024	-0.088
-3.0	-3.5	-0.174	0.723	-0.217	0.711	-0.034	-0.154
-0.0	-0.5	-0.043	0.622	-0.049	0.672	-0.097	-1.988
3.0	2.5	0.101	0.604	0.131	0.689	-0.202	1.533
6.0	5.5	0.188	0.796	0.263	0.774	-0.232	0.882
10.0	9.5	0.304	0.926	0.452	0.863	-0.227	0.502
15.0	14.5	0.449	1.123	0.717	0.930	-0.346	0.482
20.0	19.5	0.651	1.350	1.068	1.065	-0.370	0.346
30.0	29.5	0.810	1.808	1.596	1.175	-0.529	0.332
40.0	39.5	1.186	2.303	2.379	1.029	-0.978	0.411

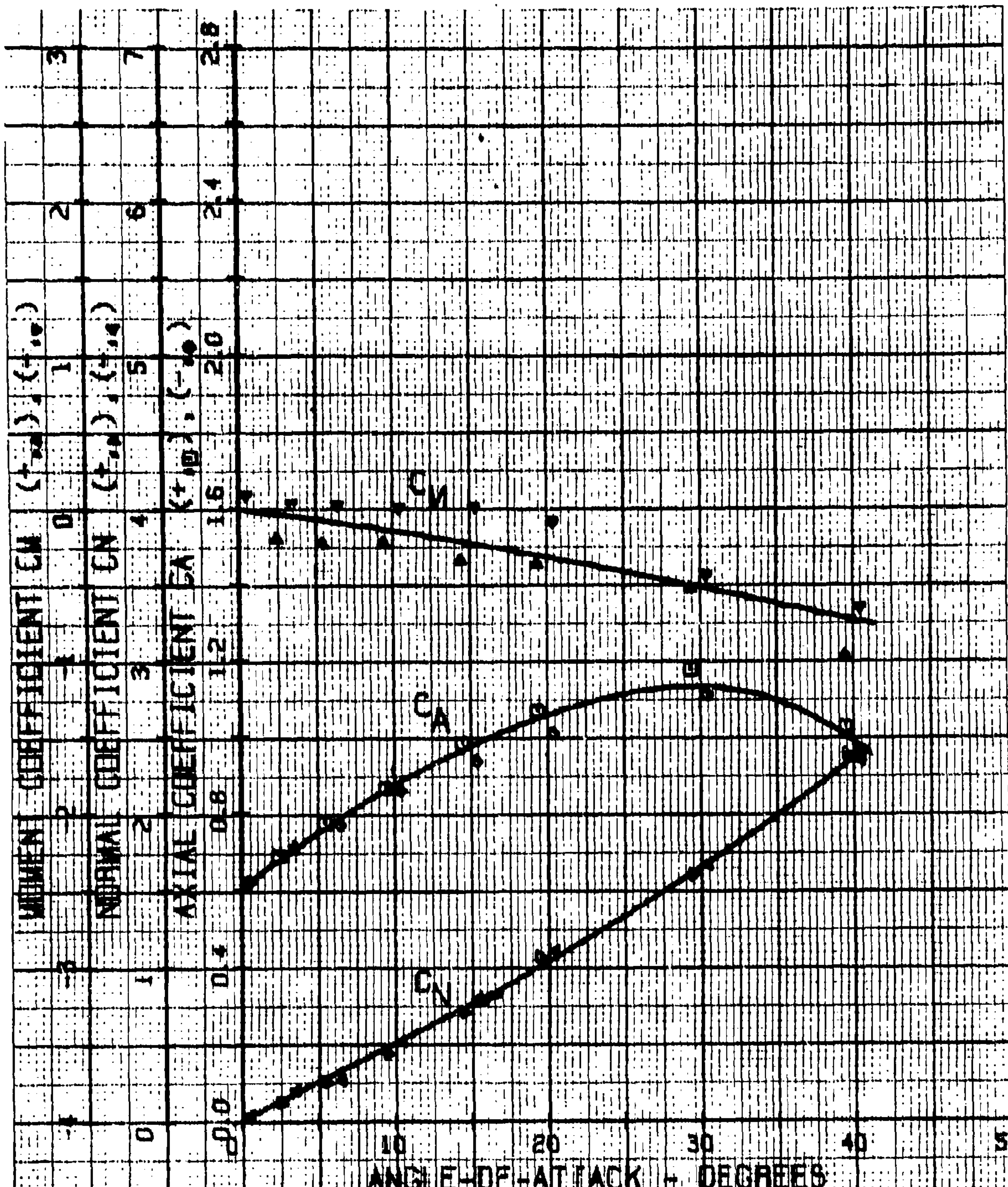


Figure 77. Graphic Static Aerodynamic Test Data: Configuration 38 (Test No. 10)

TABLE XL. DYNAMIC STABILITY TEST DATA: CONFIGURATION 38

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.076830
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002429
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =283,284
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.273	-24.807
50.000	25.000	1.087	-29.156
40.000	20.000	0.959	-36.895
30.000	15.000	0.634	-49.981
25.000	12.500	0.516	-61.492

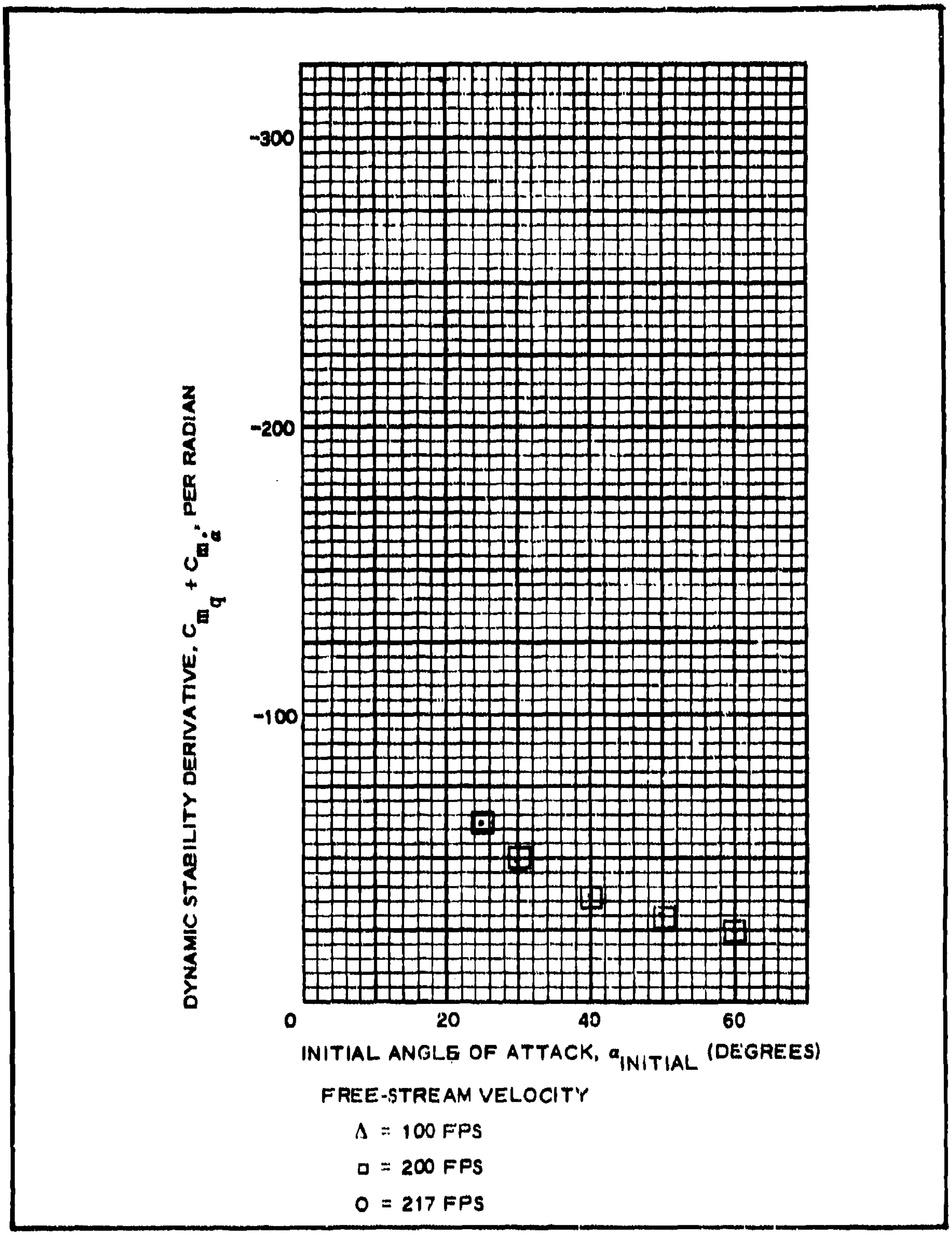
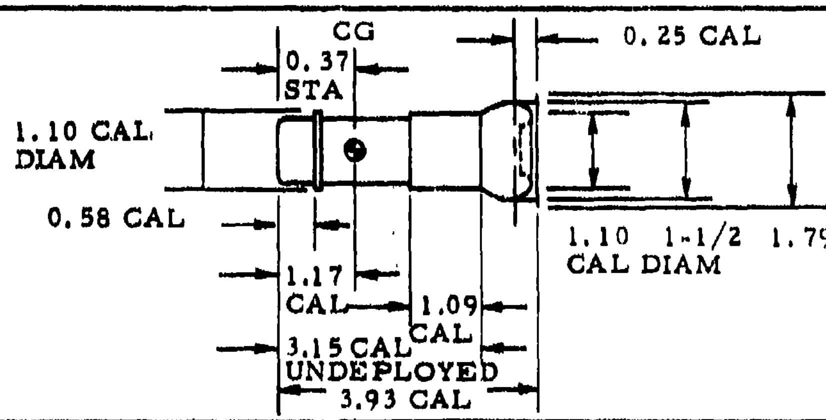


Figure 78. Graphic Dynamic Stability Test Data: Configuration 38



General data

Model weight = 361.0 gm
Moment of inertia = 0.09428 slug in.^{2}

Description of components

Nose shape	= flat with 0.1 caliber radius
Tripper	= 1.10 caliber diameter
Fineness ratio	= 3.15 (high-density bomb shape)
Stabilizer	= 1-1/2 caliber diameter Ballute
Burble fence	= 1.79 caliber diameter
Boattail	= none
Strakes (8)	= none

Remarks

Figure 79. Model Specifications for Configuration 39

TABLE XLI. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 39 (TEST NO. 11)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002322	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 56.19	C.G.(CALIBERS)	=1.1667
REYNOLDS NUMBER	=0.1204E 08	ALPHA SHIFT(DEGREES)	=-1.500

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-41.5	-1.808	3.354	-3.577	1.315	3.125	0.874
-30.0	-31.5	-1.461	3.022	-2.824	1.813	2.434	0.862
-20.0	-21.5	-0.926	2.704	-1.852	2.176	1.681	0.908
-15.0	-16.5	-0.795	2.530	-1.481	2.200	1.305	0.881
-10.0	-11.5	-0.578	2.486	-1.042	2.222	1.060	1.017
-6.0	-7.5	-0.521	2.371	-0.826	2.283	0.719	0.871
-3.0	-4.5	-0.405	2.140	-0.572	2.101	0.482	0.842
-0.0	-1.5	-0.077	2.082	-0.127	2.079	-0.048	-0.380
3.0	1.5	0.087	2.143	0.144	2.180	-0.386	2.680
6.0	4.5	0.333	2.234	0.511	2.251	-0.858	1.679
10.0	8.5	0.376	2.342	0.718	2.261	-1.130	1.574
15.0	13.5	0.564	2.443	1.119	2.244	-1.426	1.275
20.0	18.5	0.781	2.602	1.566	2.220	-1.825	1.165
30.0	28.5	1.359	2.950	2.602	1.943	-2.700	1.038
40.0	38.5	1.649	3.325	3.360	1.576	-3.324	0.989

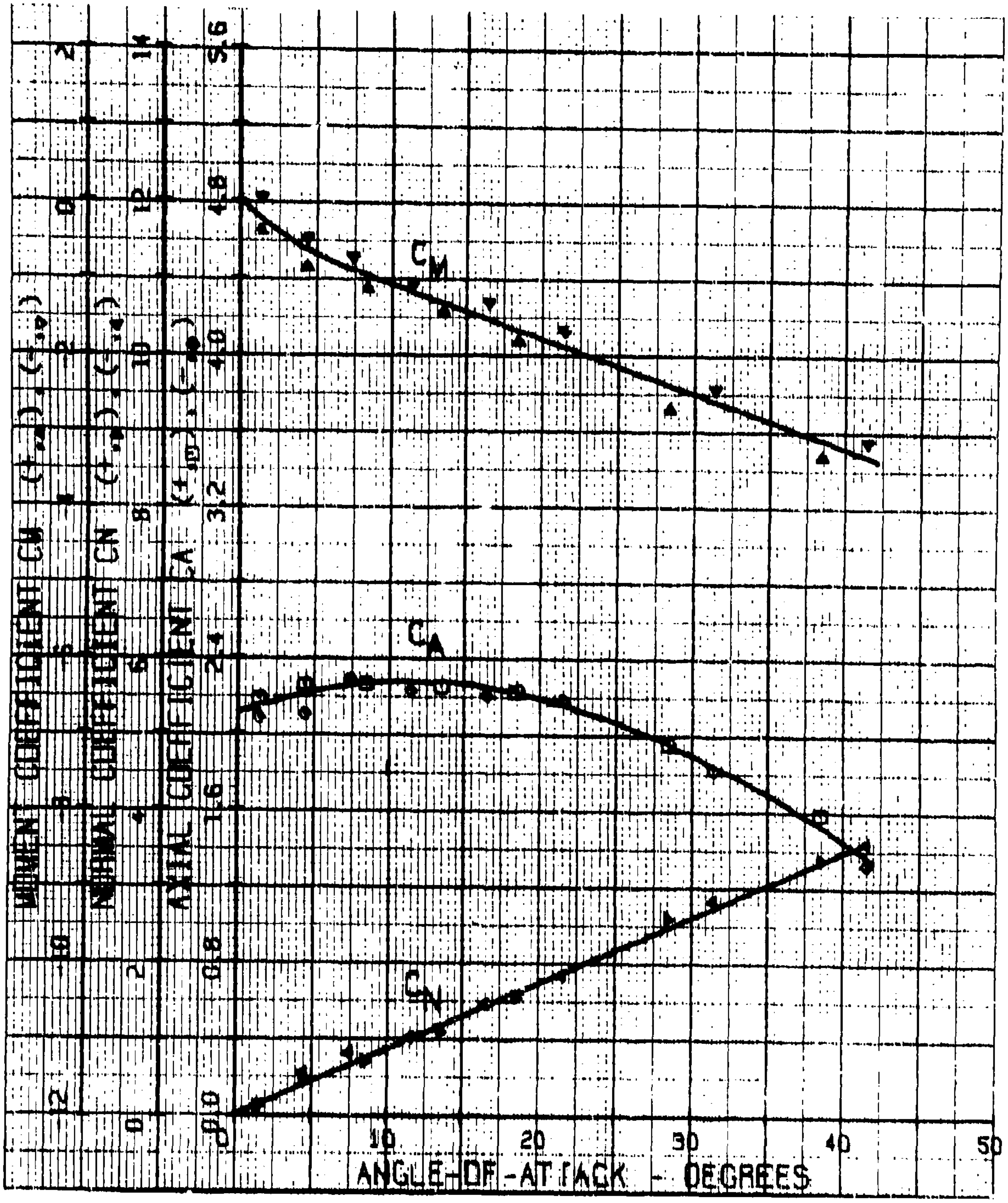


Figure 80. Graphic Static Aerodynamic Test Data: Configuration 39
(Test No. 11)

TABLE XLII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 39

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.094280
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002427
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =295,296
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.916	-42.500
50.000	25.000	0.981	-39.657
40.000	20.000	0.947	-41.097
30.000	15.000	0.981	-39.657
25.000	12.500	0.991	-39.282

TEST NUMBERS =291,292
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.378	-56.473
50.000	25.000	1.162	-66.948
40.000	20.000	1.012	-76.866
30.000	15.000	0.844	-92.240
25.000	12.500	0.753	-103.339

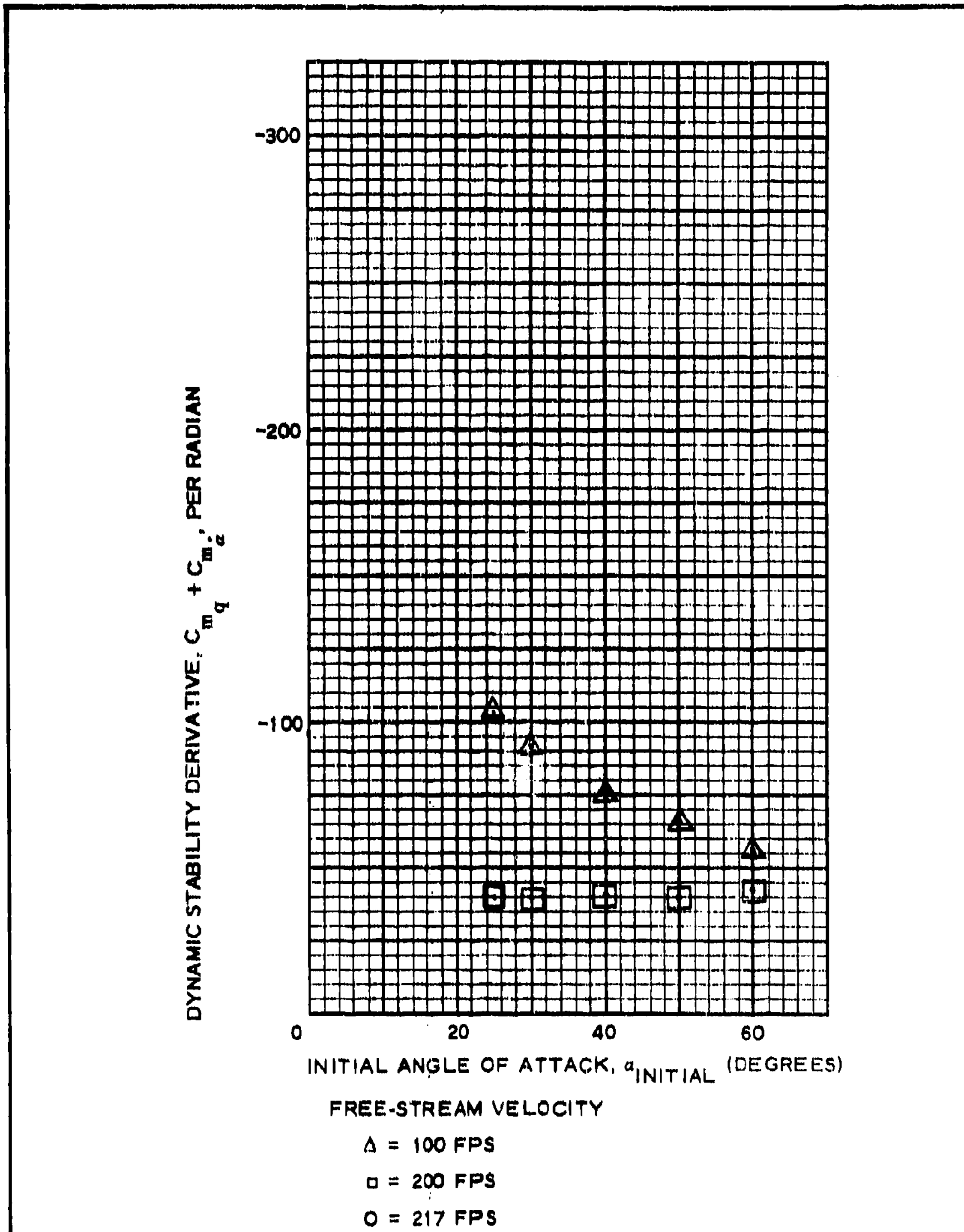
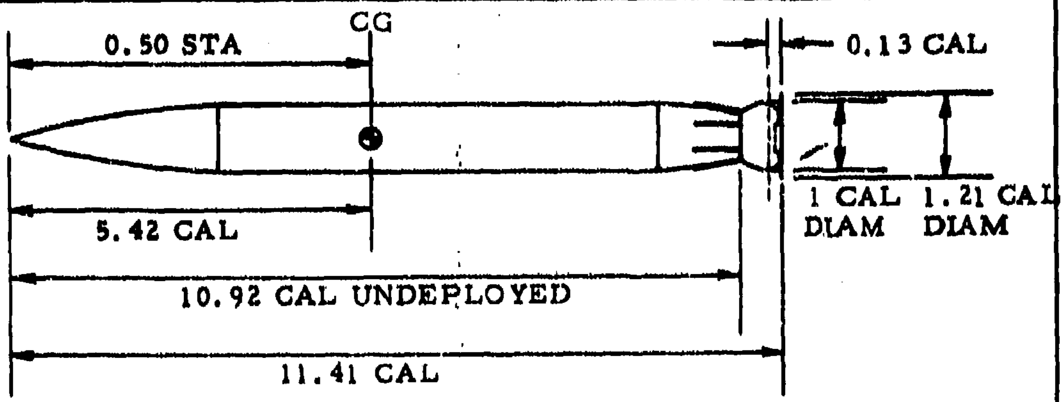


Figure 81. Graphic Dynamic Stability Test Data: Configuration 39

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



General data

Model weight = 436.6 gm

Moment of inertia =

Description of components

Nose shape = 3 caliber ogive

Tripper = none

Fineness ratio = 10.92

Stabilizer = 1 caliber diameter Ballute

Burble fence = 1.21 caliber diameter

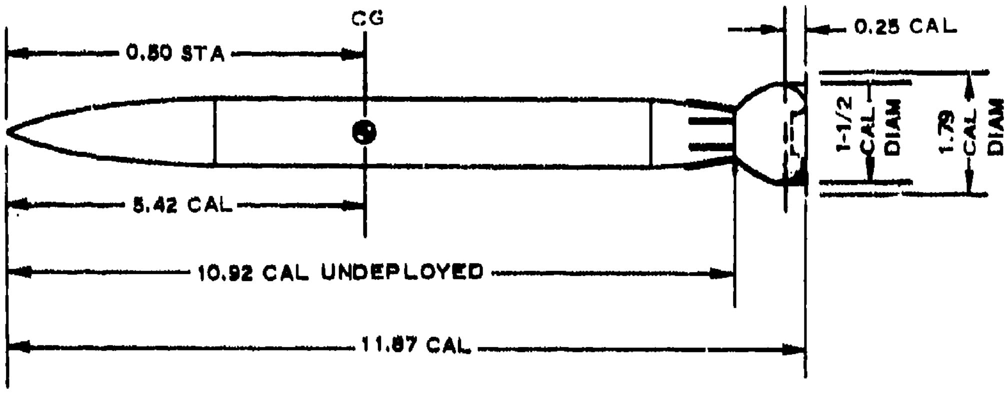
Boattail = 1-1/3 caliber long, 10 degree cone angle

Strakes (8) = 0.05 caliber high

Remarks

Figure 82. Model Specification for Configuration 40

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	145
Plotted	146



General data

Model weight	= 484.7 gm
Moment of inertia	= 0.40078 slug in.^{2}

Description of components

Nose shape	= 3 caliber ogive
Tripper	= none
Fineness ratio	= 10.92
Stabilizer	= 1-1/2 caliber diameter Ballute
Burble fence	= 1.79 caliber diameter
Boattail	= 1-1/3 caliber long, 10 degree cone angle
Strakes (8)	= 0.05 caliber high

Remarks

Figure 83. Model Specifications for Configuration 41

TABLE XLIII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 41

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.400780
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002421
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =302,303
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.575	-288.375
50.000	25.000	0.594	-279.269
40.000	20.000	0.610	-276.360
30.000	15.000	0.603	-274.928
25.000	12.500	0.606	-273.510

TEST NUMBERS =306,307
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.856	-387.307
50.000	25.000	0.937	-353.740
40.000	20.000	1.034	-320.611
30.000	15.000	1.097	-302.342
25.000	12.500	1.066	-311.209

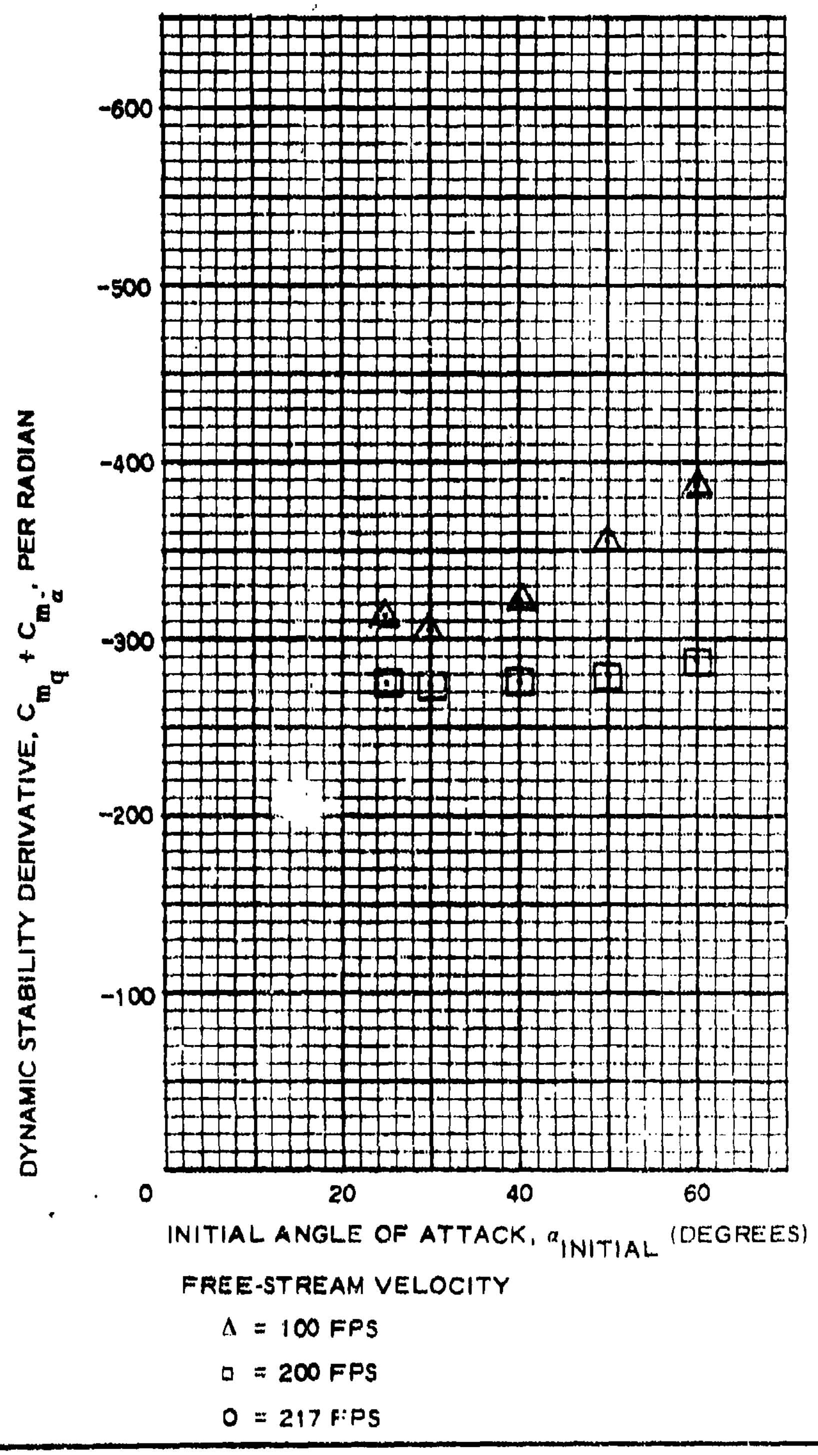
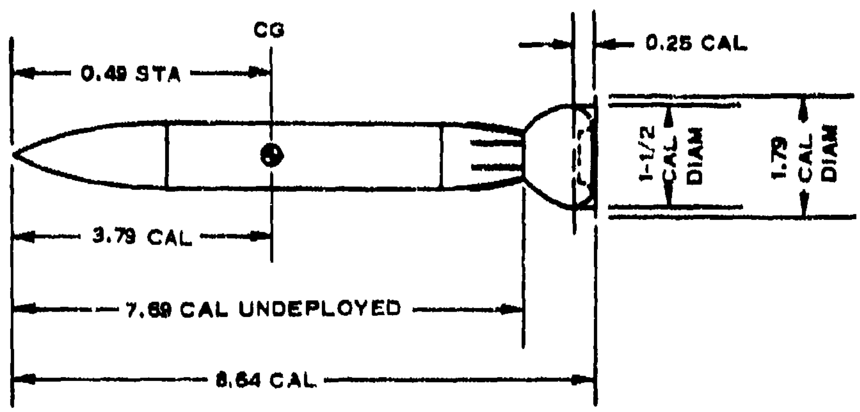


Figure 84. Graphic Dynamic Stability Test Data: Configuration 41



General data

Model weight = 405.2 gm

Moment of inertia = 0.18500 slug in.^{2}

Description of components

Nose shape = 2 caliber ogive

Tripper = none

Fineness ratio = 7.69

Stabilizer = 1-1/2 caliber diameter Ballute

Burble fence = 1.79 caliber diameter

Boattail = 1-1/3 caliber long, 10 degree cone angle

Strakes (8) = 0.05 caliber high

Remarks

Figure 85. Model Specifications for Configuration 42

TABLE XLIV STATIC AERODYNAMIC TEST DATA: CONFIGURATION 42
(Test No. 2)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002342	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 56.68	C.G.(CALIBERS)	=3.7913
REYNOLDS NUMBER	=0.2672E 08	ALPHA SHIFT(DEGREES)	=-2.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-42.0	-4.013	4.485	-5.983	0.648	6.752	1.129
-30.0	-32.0	-2.379	3.310	-3.771	1.546	4.260	1.130
-20.0	-22.0	-1.462	2.564	-2.316	1.930	2.713	1.171
-15.0	-17.0	-1.003	2.364	-1.650	1.967	1.771	1.073
-10.0	-12.0	-0.645	2.20[illegible]	-1.090	2.024	0.809	0.825
-6.0	-8.0	-0.330	2.149	-0.625	2.082	0.528	0.844
-3.0	-5.0	-0.229	2.147	-0.416	2.121	0.263	0.634
-0.0	-2.0	-0.100	2.063	-0.172	2.058	-0.124	-0.721
3.0	1.0	0.100	2.106	0.137	2.104	-0.471	3.434
6.0	4.0	0.229	2.145	0.378	2.113	-0.739	1.956
10.0	8.0	0.459	2.192	0.759	2.107	-1.105	1.455
15.0	13.0	0.631	2.264	1.124	2.064	-1.739	1.548
20.0	18.0	1.218	2.521	1.938	2.022	-2.509	1.295
30.0	28.0	1.935	3.023	3.127	1.761	-3.910	1.250
40.0	38.0	3.081	3.893	4.819	1.163	-5.554	1.153

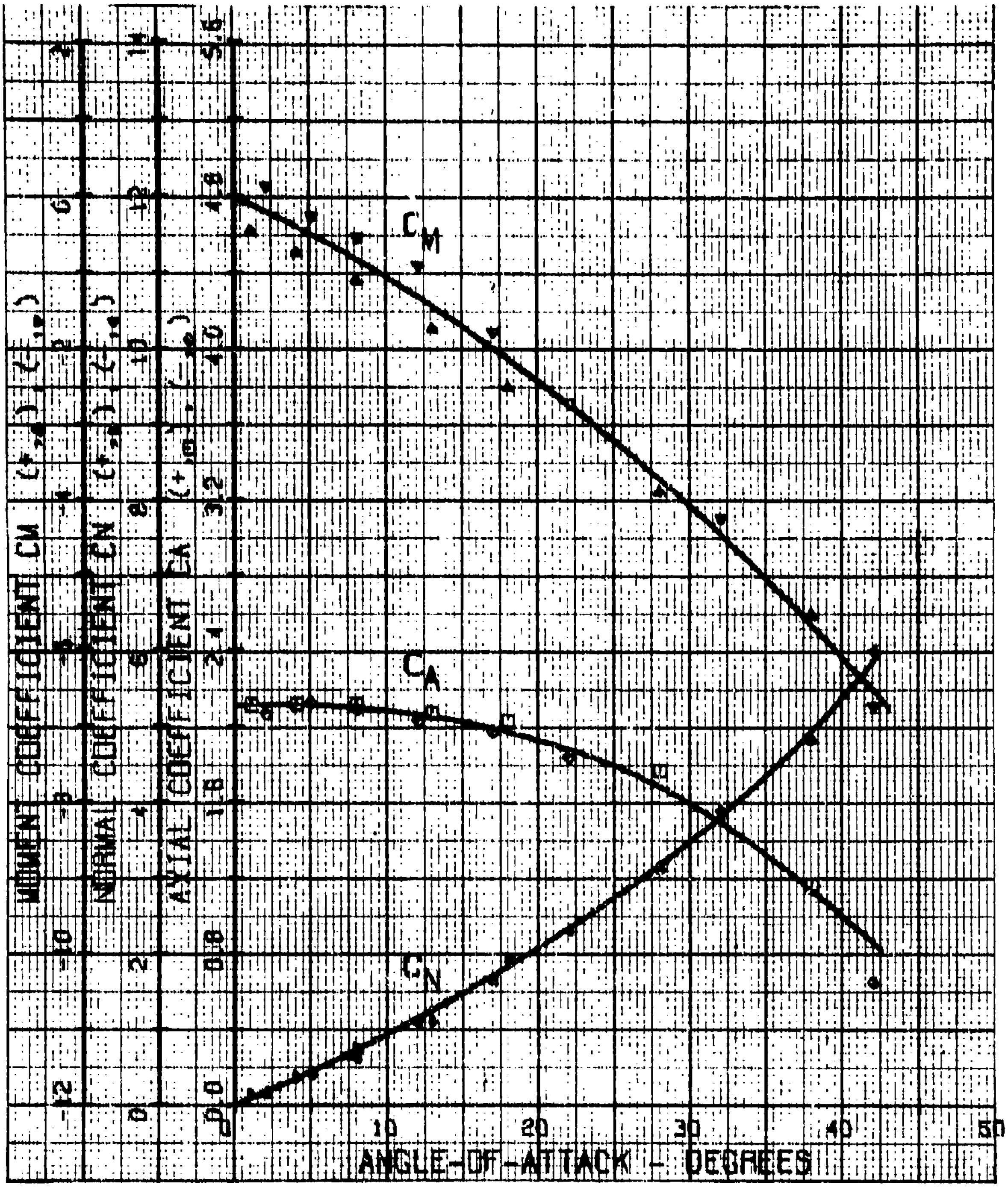


Figure 86. Graphic Static Aerodynamic Test Data: Configuration 42 (Test No. 2)

TABLE XLV. DYNAMIC STABILITY TEST DATA: CONFIGURATION 42

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.185000
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002466
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =314,315
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.519	-144.891
50.000	25.000	0.534	-140.654
40.000	20.000	0.562	-133.621
30.000	15.000	0.569	-132.153
25.000	12.500	0.556	-135.123

TEST NUMBERS =310,311
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.766	-196.342
50.000	25.000	0.775	-193.967
40.000	20.000	0.809	-185.729
30.000	15.000	0.794	-189.385
25.000	12.500	0.775	-193.956

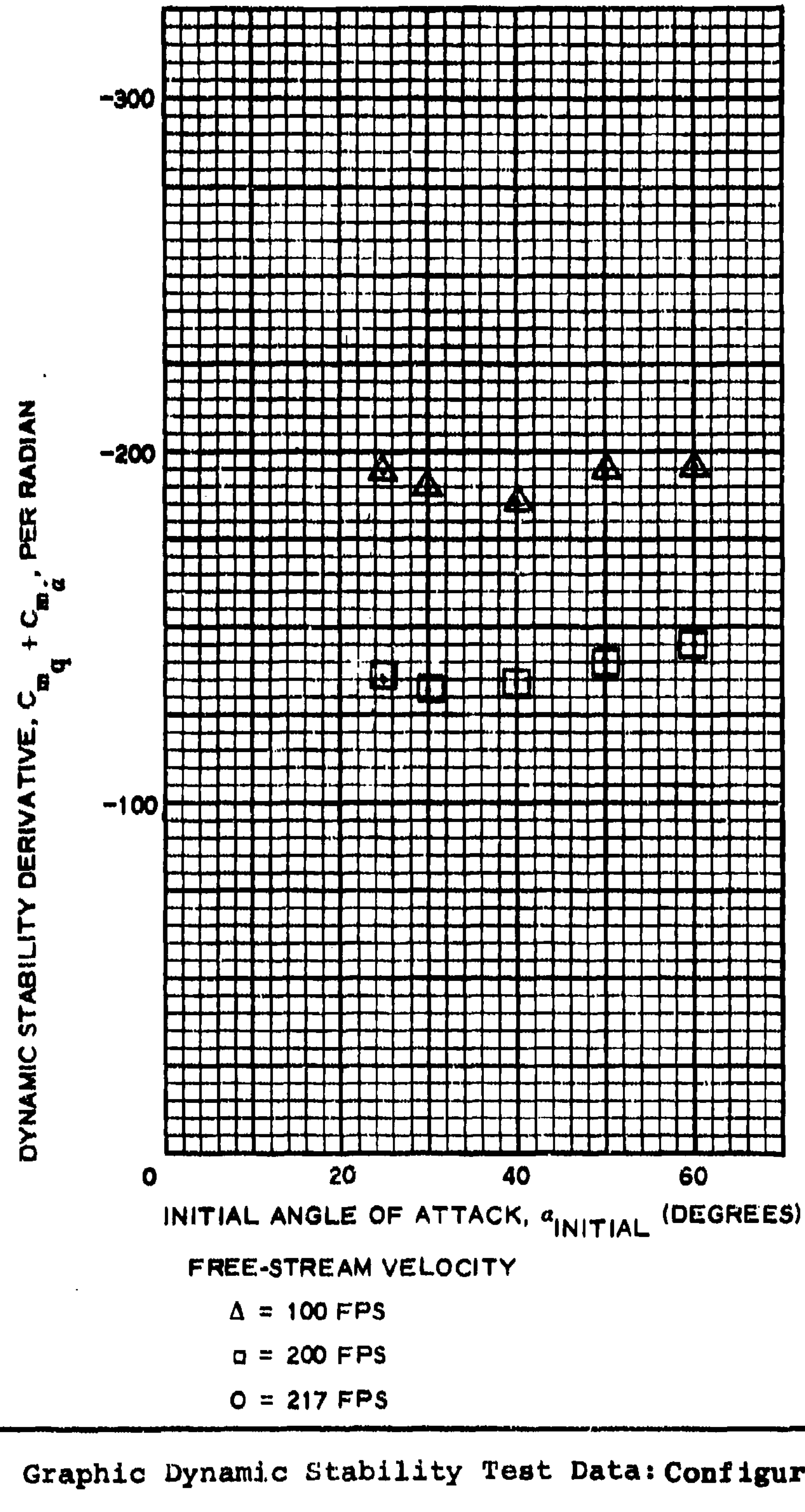
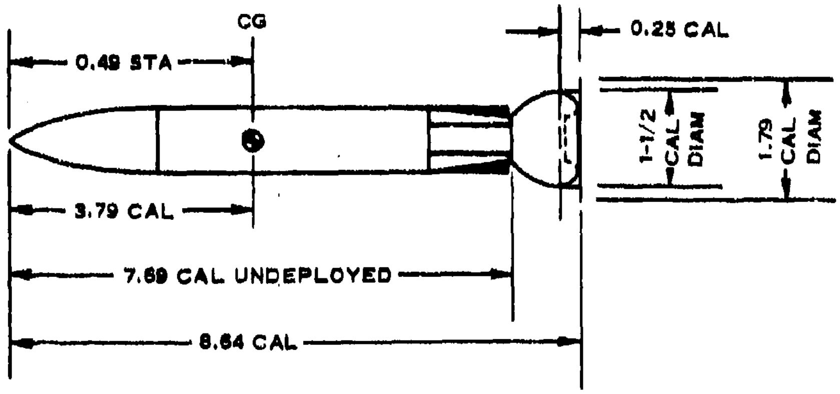


Figure 87. Graphic Dynamic Stability Test Data: Configuration 42

Item	Page
Static aerodynamic data	
Tabulated	153
Plotted	154
Dynamic stability data	
Tabulated	155
Plotted	156



General data

Model weight = 404.8 gm

Moment of inertia = 0.18062 slug in.^{2}

Description of components

Nose shape	= 2 caliber ogive
Tripper	= none
Fineness ratio	= 7.69
Stabilizer	= 1-1/2 caliber diameter Ballute
Burble fence	= 1.79 caliber diameter
Boattail	= 1-1/3 caliber long, 10 degree cone angle
Strakes (8)	= 1 caliber span

Remarks

Figure 88. Model Specifications for Configuration 43

TABLE XLVI. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 43 (Test No. 3)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002338	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 56.59	C.G.(CALIBERS)	=3.7913
REYNOLDS NUMBER	=0.2668E 08	ALPHA SHIFT(DEGREES)	=-4.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-44.0	-3.890	4.564	-5.969	0.581	6.772	1.135
-30.0	-34.0	-2.541	3.057	-3.816	1.113	4.246	1.113
-20.0	-24.0	-1.536	2.454	-2.401	1.617	2.561	1.066
-15.0	-19.0	-1.206	2.231	-1.869	1.724	1.580	0.846
-10.0	-14.0	-0.818	2.109	-1.304	1.849	0.818	0.627
-6.0	-10.0	-0.617	1.935	-0.954	1.857	0.587	0.615
-3.0	-7.0	-0.474	2.099	-0.715	1.936	0.339	0.475
-0.0	-4.0	-0.287	1.952	-0.423	1.927	-0.110	-0.260
3.0	-1.0	-0.201	1.952	-0.235	1.948	-0.433	-1.842
6.0	2.0	-0.000	1.937	0.069	1.936	-0.773	11.431
10.0	6.0	0.158	1.966	0.363	1.939	-1.060	2.923
15.0	11.0	0.502	2.033	0.882	1.904	-1.715	1.944
20.0	16.0	0.940	2.239	1.569	1.879	-2.594	1.653
30.0	26.0	1.751	2.942	2.820	1.786	-4.125	1.463
40.0	36.0	3.086	3.875	4.775	1.321	-6.060	1.269

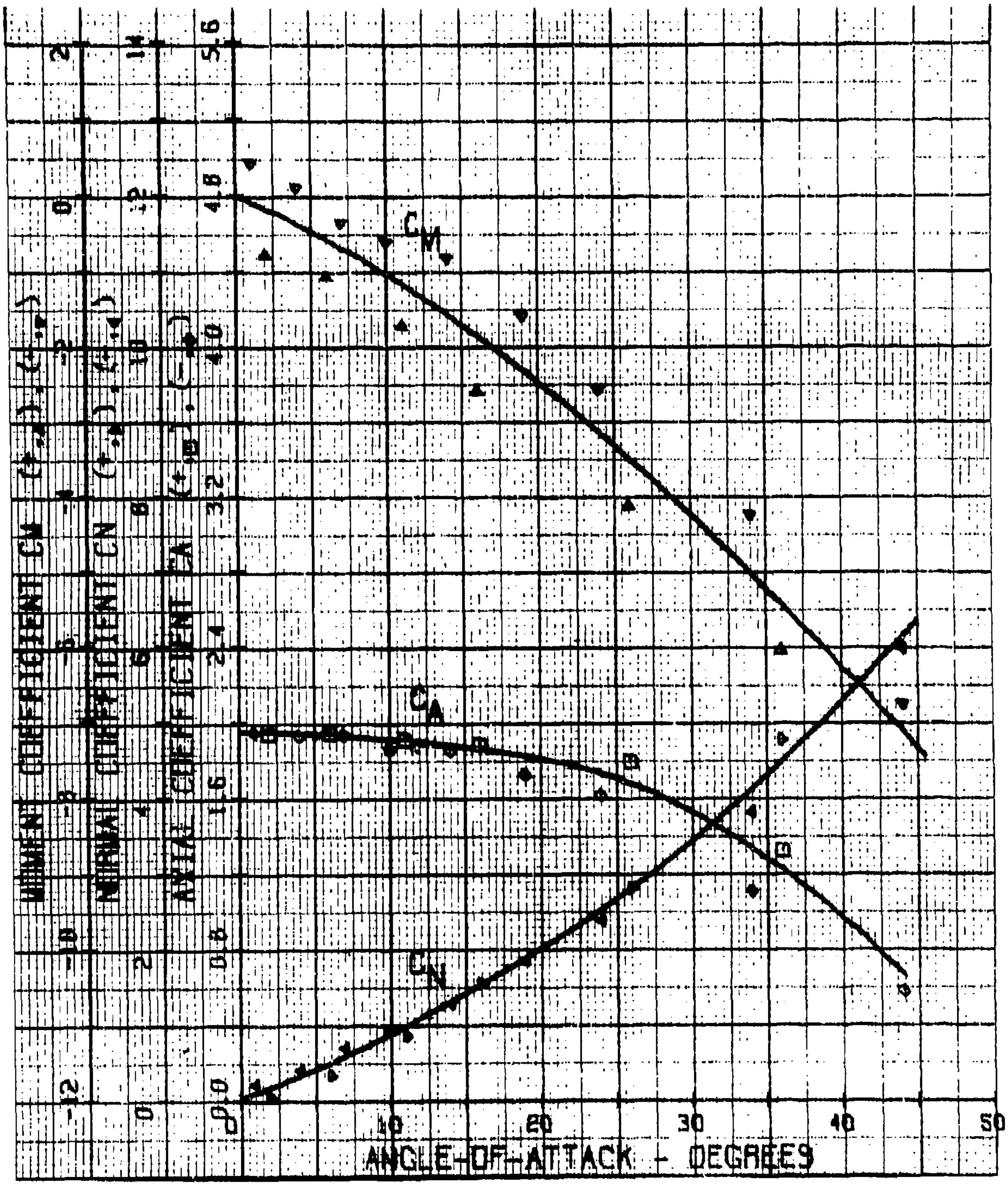


Figure 89. Graphic Static Aerodynamic Test Data:Configuration 43
(Test No. 3)

TABLE XLVII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 43

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.180620
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002447
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =318,319
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.516	-143.441
50.000	25.000	0.528	-140.046
40.000	20.000	0.547	-135.244
30.000	15.000	0.544	-136.021
25.000	12.500	0.531	-139.222

TEST NUMBERS =322,323
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.737	-187.839
50.000	25.000	0.841	-175.968
40.000	20.000	0.863	-170.271
30.000	15.000	0.834	-177.286
25.000	12.500	0.791	-187.097

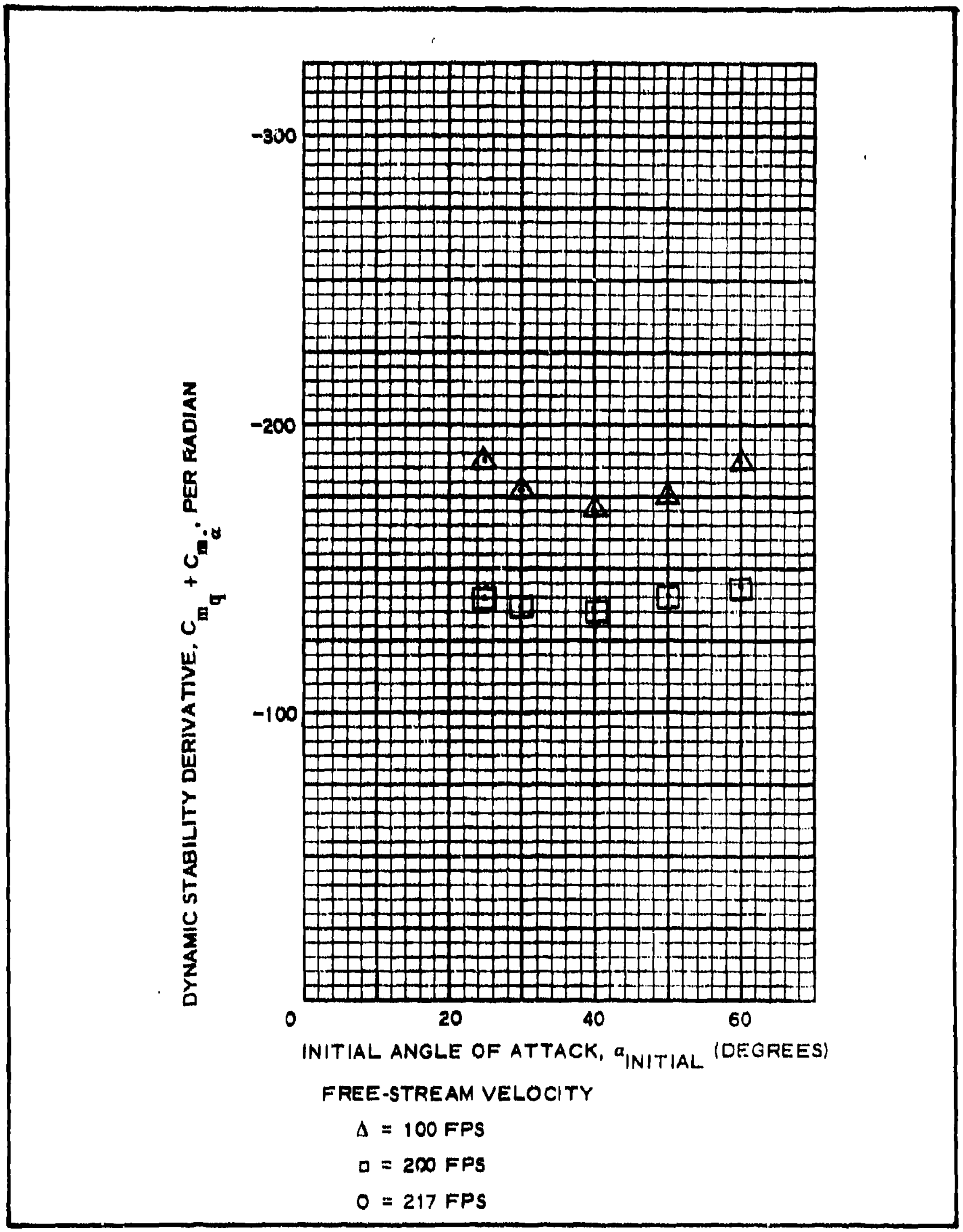
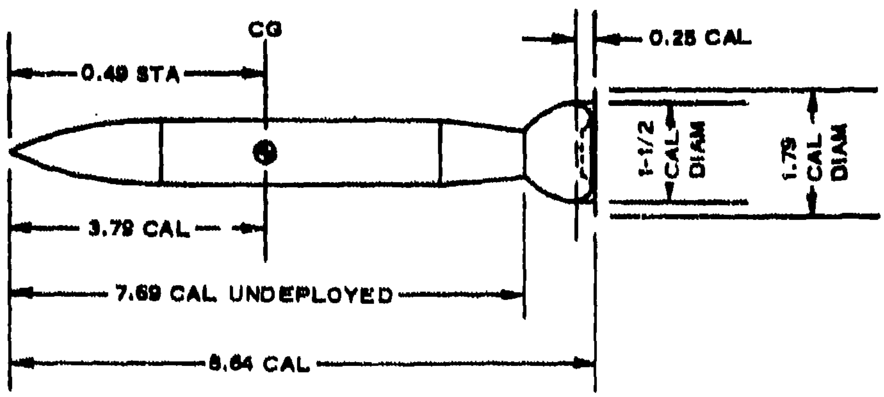


Figure 90. Graphic Dynamic Stability Test Data: Configuration 43

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	158
Plotted	159



General data

Model weight = 404.4 gm

Moment of inertia = 0.18017 slug in.^{2}

Description of components

Nose shape = 2 caliber ogive

Tripper = none

Fineness ratio = 7.69

Stabilizer = 1-1/2 caliber diameter Ballute

Burble fence = 1.79 caliber diameter

Boattail = 1-1/3 caliber long, 10 degree cone angle

Strakes (8) = none

Remarks

Figure 91. Model Specifications for Configuration 44

TABLE XLVIII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 44

RELEASE ANGLE-OF-ATTACK(DEGREES) = 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) = 0.180170
ATMOSPHERIC DENSITY(SLUGS/CU FT) = 0.002441
REFERENCE AREA(SQ FT) = 0.012300
REFERENCE LENGTH(FEET) = 0.125000

TEST NUMBERS = 330,331
VELOCITY(FT/SEC) = 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.512	-144.298
50.000	25.000	0.512	-144.298
40.000	20.000	0.512	-144.298
30.000	15.000	0.506	-146.079
25.000	12.500	0.475	-155.690

TEST NUMBERS = 326,327
VELOCITY(FT/SEC) = 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.791	-187.074
50.000	25.000	0.787	-187.816
40.000	20.000	0.822	-179.960
30.000	15.000	0.384	-167.242
25.000	12.500	0.376	-163.206

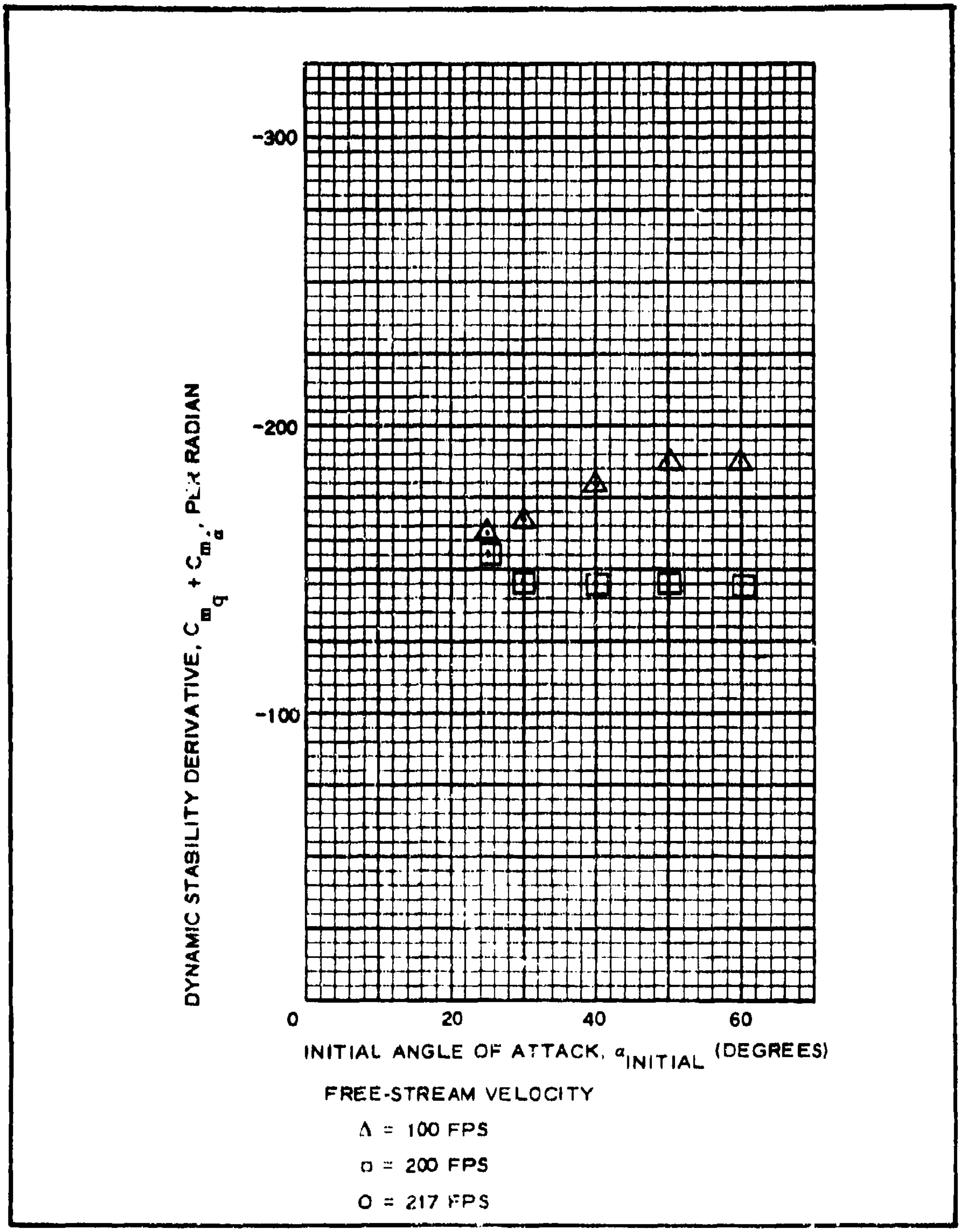
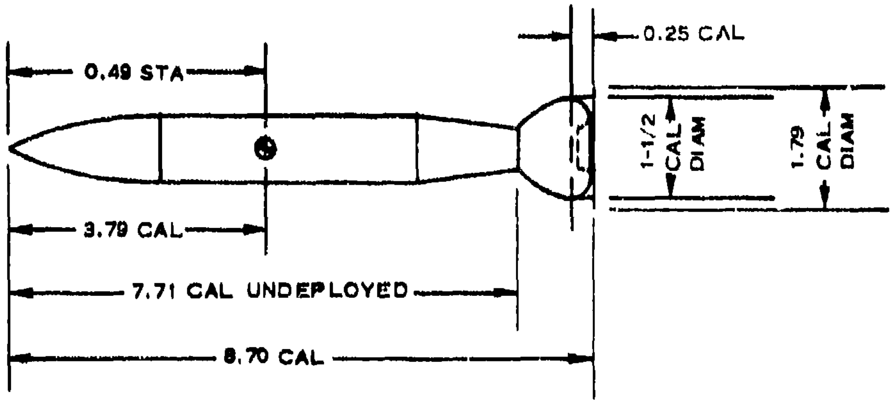


Figure 92. Graphic Dynamic Stability Test Data: Configuration 44

Item	Page
Static aerodynamic data	
Tabulated	161
Plotted	162
Dynamic stability data	
Tabulated	163
Plotted	164



General data

Model weight = 394.9 gm

Moment of inertia = 0.17104 slug in.^{2}

Description of components

Nose shape = 2 caliber ogive

Tripper = none

Fineness ratio = 7.71

Stabilizer = 1-1/2 caliber diameter Ballute

Burble fence = 1.79 caliber diameter

Boattail = 1-2/3 caliber long, 10 degree cone angle

Strakes (8) = none

Remarks

Figure 93. Model Specifications for Configuration 45

TABLE XLIX. STATIC AERODYNAMICS TEST DATA: CONFIGURATION 45 (TEST NO. 4)

VELOCITY(FT/SEC)	220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002331	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 56.40	C.G.(CALIBERS)	=3.7913
REYNOLDS NUMBER	=0.2678E 08	ALPHA SHIFT(DEGREES)	=-1.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-41.0	-2.621	3.744	-4.434	1.106	3.995	0.901
-30.0	-31.0	-1.757	2.721	-2.908	1.428	2.887	0.993
-20.0	-21.0	-1.109	2.376	-1.887	1.820	2.466	1.307
-15.0	-16.0	-0.778	2.246	-1.367	1.945	1.586	1.160
-10.0	-11.0	-0.475	2.160	-0.879	2.029	1.083	1.233
-6.0	-7.0	-0.245	2.073	-0.496	2.028	0.868	1.751
-3.0	-4.0	-0.187	2.015	-0.327	1.998	0.379	1.157
-0.0	-1.0	-0.014	2.001	-0.049	2.001	0.172	3.492
3.0	2.0	0.014	2.011	0.084	1.999	-0.305	3.622
6.0	5.0	0.302	2.115	0.485	2.082	-0.816	1.679
10.0	9.0	0.374	2.073	0.694	1.999	-0.960	1.383
15.0	14.0	0.763	2.133	1.270	1.939	-1.680	1.322
20.0	19.0	1.066	2.233	1.753	1.317	-2.358	1.345
30.0	29.0	1.736	2.643	2.845	1.451	-3.041	1.068
40.0	39.0	2.448	3.513	4.114	1.190	-4.139	1.006

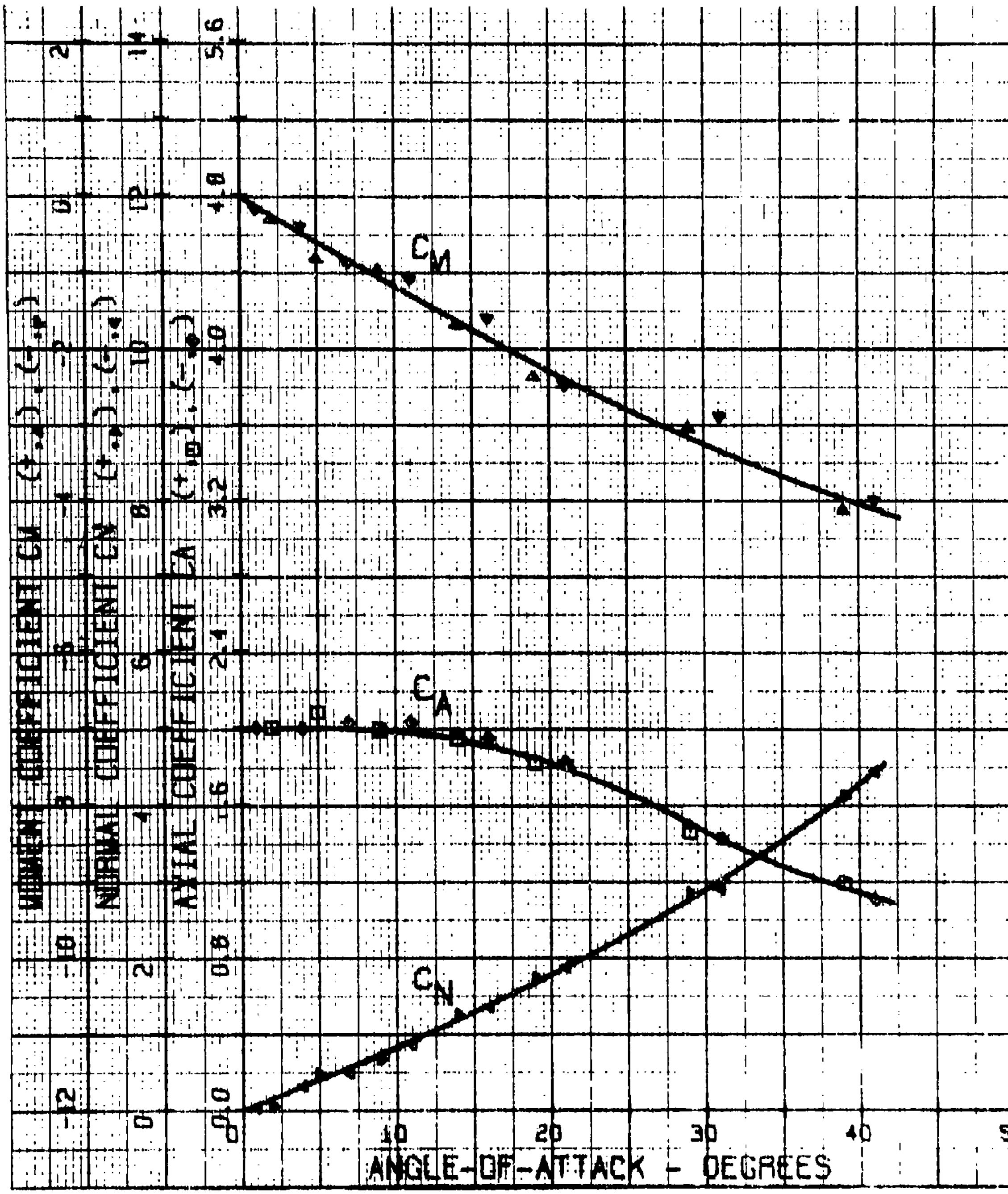


Figure 94. Graphic Static Aerodynamic Test Data: Configuration 45 (Test No. 4)

TABLE L. DYNAMIC STABILITY TEST DATA: CONFIGURATION 45

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.171040
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002439
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =334,335
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.503	-139.648
50.000	25.000	0.503	-139.648
40.000	20.000	0.509	-137.935
30.000	15.000	0.513	-137.094
25.000	12.500	0.513	-137.094

TEST NUMBERS =338,339
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.810	-171.629
50.000	25.000	0.806	-174.290
40.000	20.000	0.741	-189.733
30.000	15.000	0.737	-190.537
25.000	12.500	0.728	-192.990

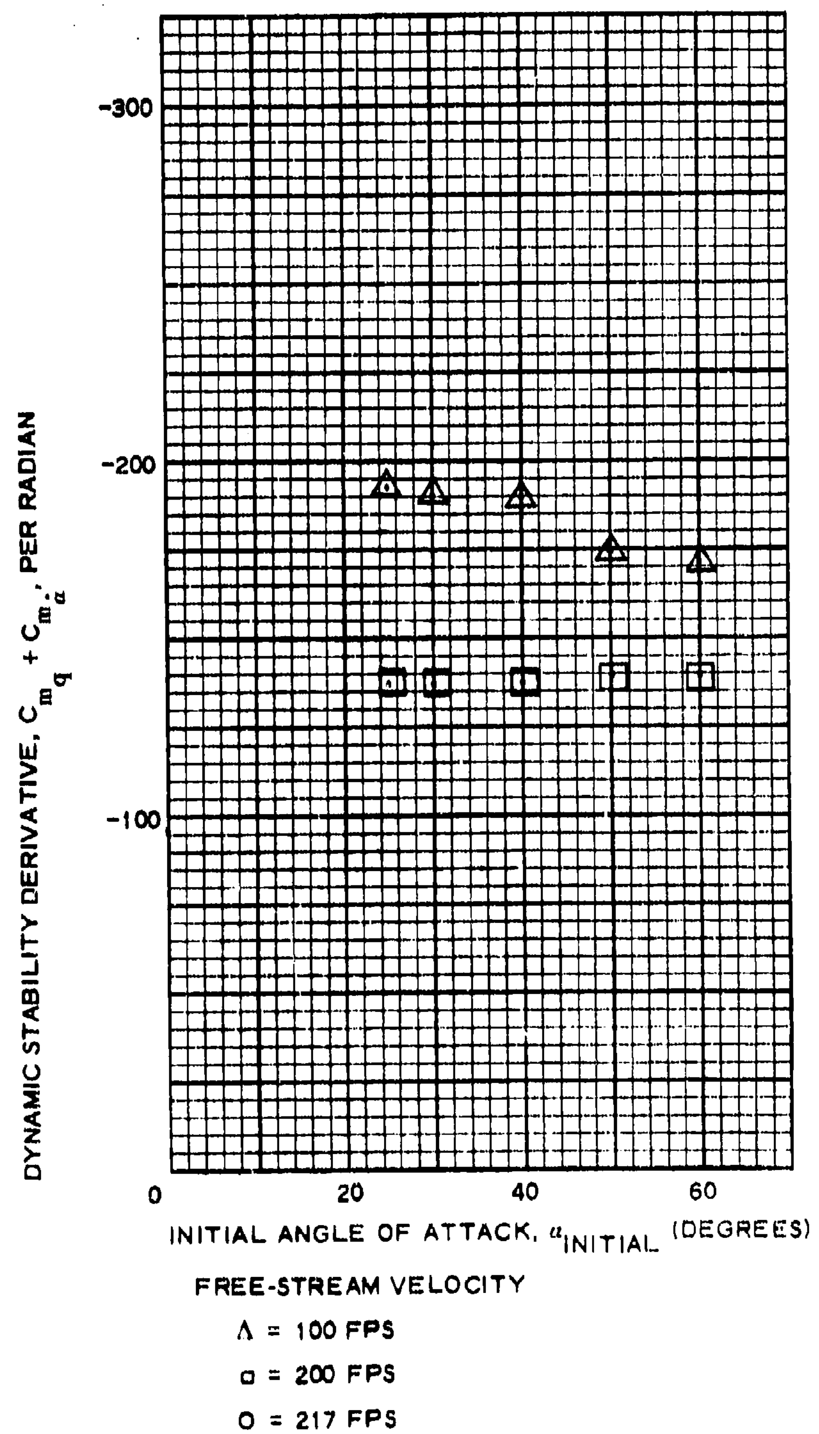
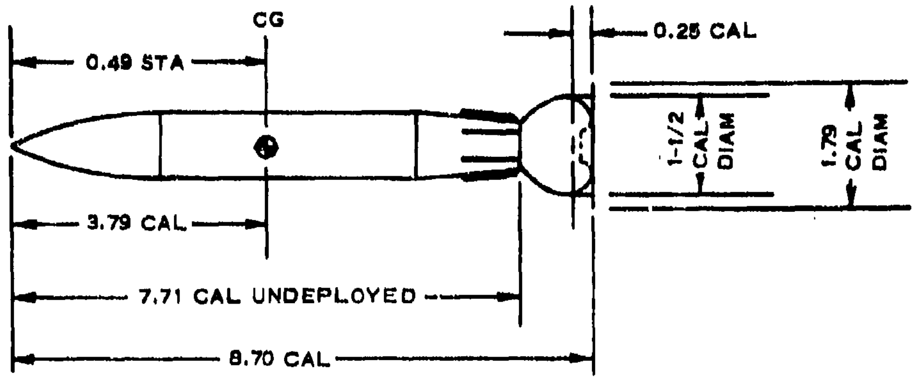


Figure 95. Graphic Dynamic Stability Test Data: Configuration 45

Item	Page
Static aerodynamic data	
Tabulated	166
Plotted	167
Dynamic stability data	
Tabulated	168
Plotted	169



General data

Model weight = 396.8 gm

Moment of inertia = 0.17435 slug in.^{2}

Description of components

Nose shape = 2 caliber ogive

Tripper = none

Fineness ratio = 7.71

Stabilizer = 1-1/2 caliber diameter Ballute

Burble fence = 1.79 caliber diameter

Boattail = 1-2/3 caliber long, 10 degree cone angle

Strakes (8) = 0.05 caliber high

Remarks

Figure 96. Model Specifications for Configuration 46

TABLE LI. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 46 (TEST NO. 5)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002327	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 56.31	C.G.(CALIBERS)	=3.7913
		ALPHA SHIFT(DEGREES)	= 0.0

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-40.0	-3.054	4.154	-5.013	1.216	5.925	1.182
-30.0	-30.0	-2.149	3.086	-3.405	1.593	4.226	1.241
-20.0	-20.0	-1.284	2.452	-2.045	1.865	3.076	1.504
-15.0	-15.0	-1.053	2.423	-1.644	2.068	1.777	1.081
-10.0	-10.0	-0.519	2.120	-0.880	1.997	0.918	1.043
-6.0	-6.0	-0.289	2.033	-0.499	1.992	0.317	0.635
-3.0	-3.0	-0.159	2.062	-0.266	2.051	-0.011	-0.040
-0.0	0.0	0.072	2.077	0.072	2.077	-0.298	4.133
3.0	3.0	0.101	2.062	0.209	2.054	-0.774	3.709
6.0	6.0	0.245	2.019	0.455	1.982	-0.843	1.853
10.0	10.0	0.519	2.048	0.867	1.926	-1.343	1.549
15.0	15.0	0.765	2.153	1.298	1.891	-1.871	1.441
20.0	20.0	1.327	2.452	2.086	1.850	-3.208	1.539
30.0	30.0	2.267	3.086	3.455	1.569	-4.757	1.380
40.0	40.0	3.116	4.183	5.076	1.201	-6.409	1.263

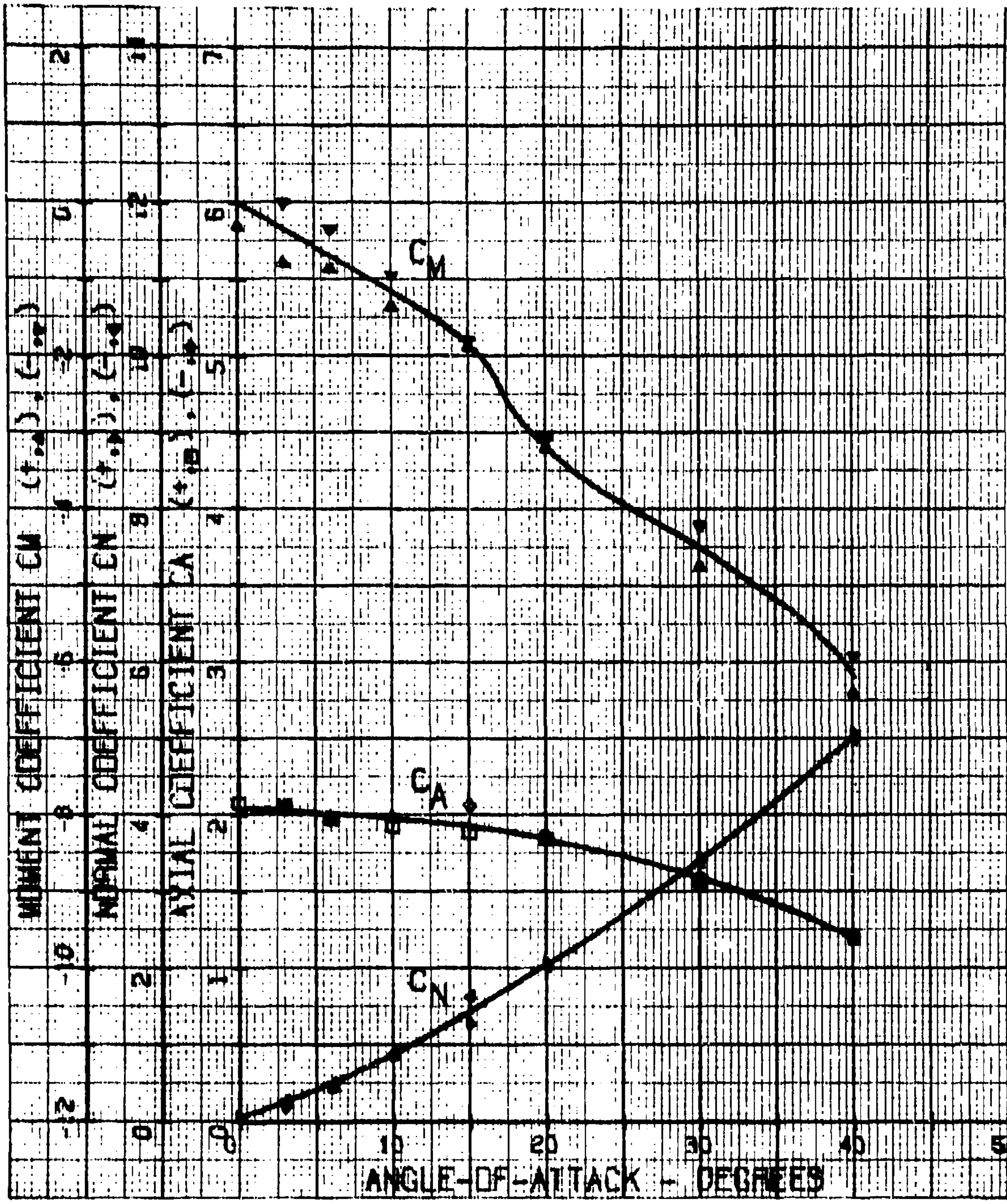


Figure 97. Graphic Static Aerodynamic Test Data: Configuration 46 (Test No. 5)

TABLE LII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 46

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.174350
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002435
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =346,347
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.459	-156.155
50.000	25.000	0.466	-154.059
40.000	20.000	0.459	-156.155
30.000	15.000	0.456	-157.225
25.000	12.500	0.450	-159.409

TEST NUMBERS =342,343
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.731	-136.195
50.000	25.000	0.775	-135.120
40.000	20.000	0.784	-132.997
30.000	15.000	0.784	-132.997
25.000	12.500	0.753	-139.497

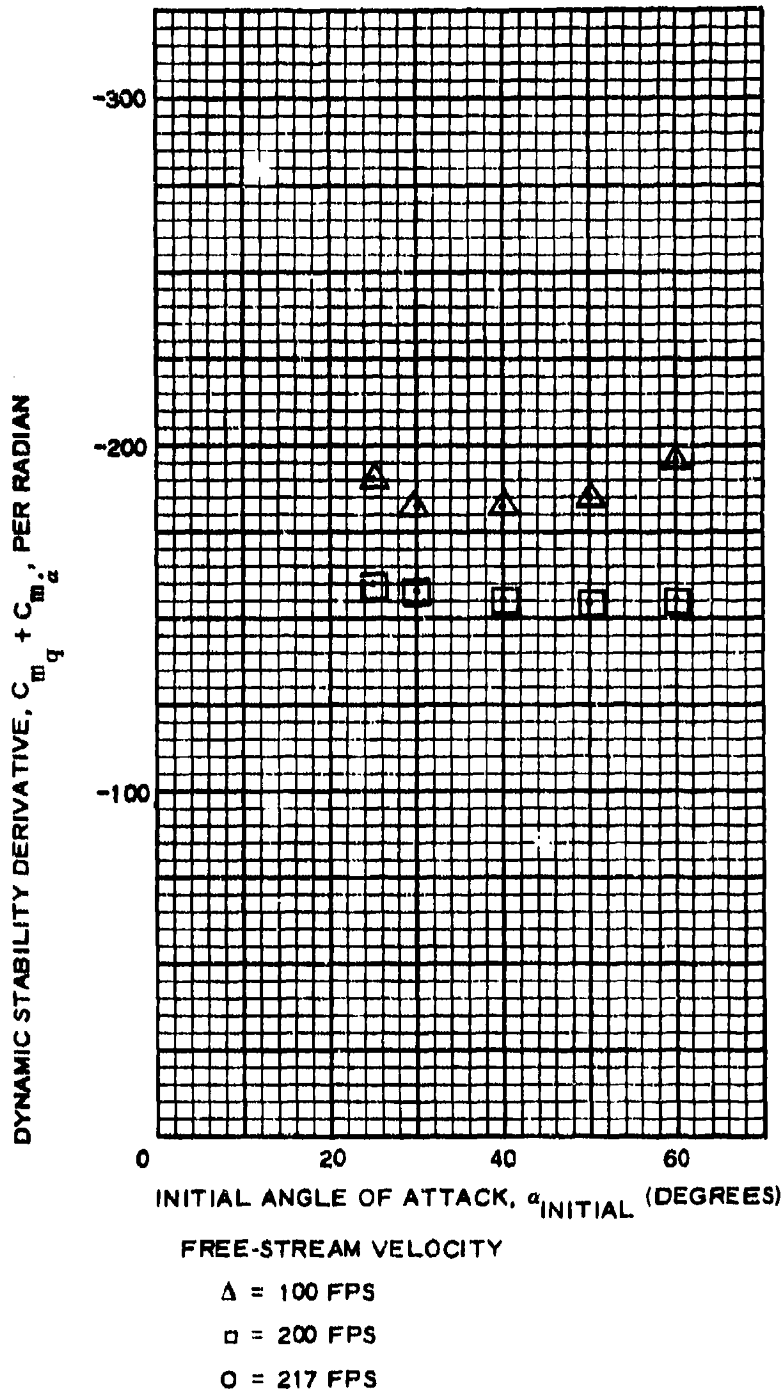
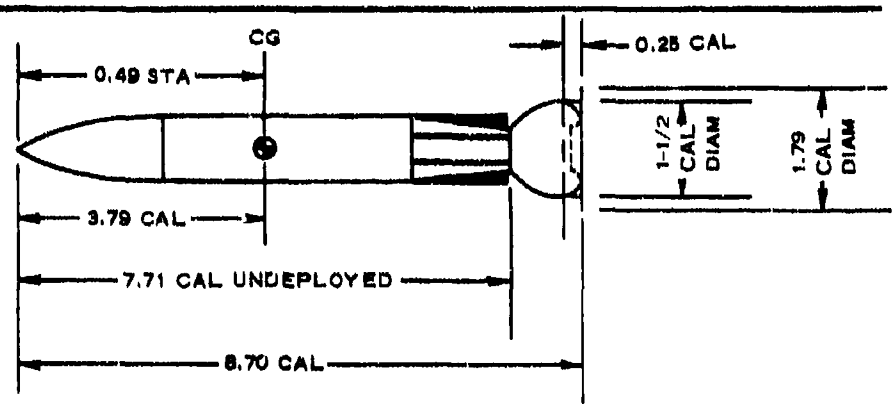


Figure 98. Graphic Dynamic Stability Test Data: Configuration 46

Item	Page
Static aerodynamic data	
Tabulated	171
Plotted	172
Dynamic stability data	
Tabulated	173
Plotted	174



General data

Model weight =

Moment of inertia =

Description of components

Nose shape = 2 caliber ogive

Tripper = none

Fineness ratio = 7.71

Stabilizer = 1-1/2 caliber diameter Ballute

Burble fence = 1.79 caliber diameter

Boattail = 1-2/3 caliber long, 10 degree cone

Strakes (8) = 1 caliber span

Remarks

Figure 99. Model Specifications for Configuration 47

TABLE LIII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 47 (TEST NO. 6)

STATIC AERODYNAMIC TEST DATA: CONFIGURATION 47
(TEST NO. 6)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002319	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 56.12	C.G.(CALIBERS)	=3.7913
REYNOLDS NUMBER	=0.2665E 08	ALPHA SHIFT(DEGREES)	= 0.0

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-40.0	-3.343	4.009	-5.138	0.922	4.617	0.899
-30.0	-30.0	-2.562	2.923	-3.680	1.250	3.666	0.996
-20.0	-20.0	-1.549	2.330	-2.252	1.659	2.331	1.035
-15.0	-15.0	-1.013	2.055	-1.510	1.722	1.408	0.932
-10.0	-10.0	-0.637	1.937	-0.974	1.856	0.513	0.527
-6.0	-6.0	-0.440	1.866	-0.641	1.309	0.147	0.230
-3.0	-3.0	-0.174	1.823	-0.269	1.811	-0.192	-0.714
-0.0	0.0	-0.014	1.823	-0.014	1.823	-0.537	-37.083
3.0	3.0	0.101	1.866	0.199	1.859	-0.906	4,557
6.0	6.0	0.087	1.891	0.283	1.862	-1.253	4.427
10.0	10.0	0.420	1.982	0.758	1.879	-1.609	2.124
15.0	15.0	0.782	2.040	1.293	1.768	-2.210	1.722
20.0	20.0	1.303	2.139	1.976	1.621	-3.343	1.691
30.0	30.0	2.316	2.883	3.445	1.336	-5.821	1.689
40.0	40.0	3.242	3.835	4.949	0.354	-7.029	1.420

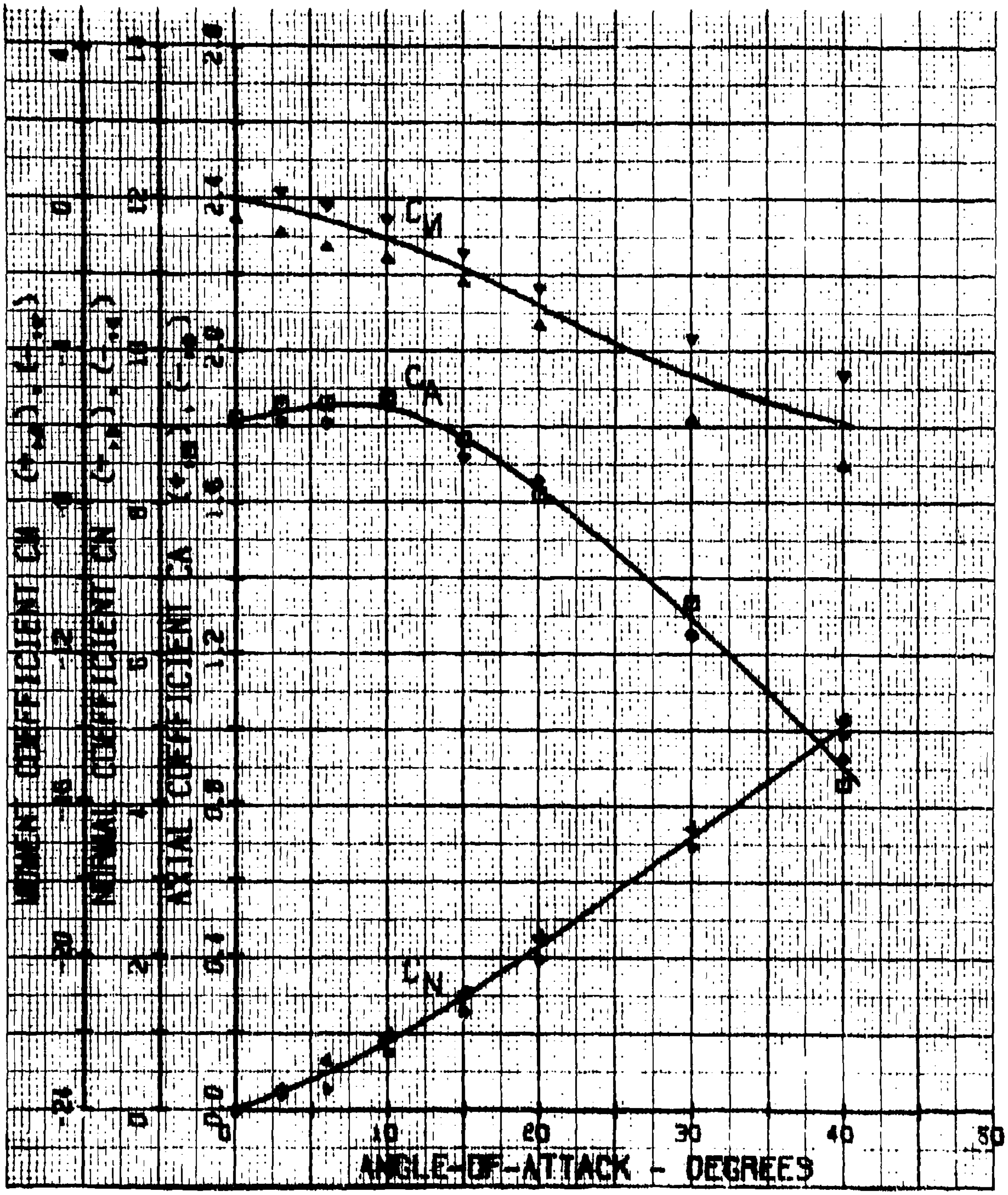


Figure 100. Graphic Static Aerodynamic Test Data: Configuration 47 (Test No. 6)

TABLE LIV. DYNAMIC STABILITY TEST DATA: CONFIGURATION 47

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.173160
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002431
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =360,361
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.459	-155.336
50.000	25.000	0.481	-148.275
40.000	20.000	0.497	-143.613
30.000	15.000	0.491	-145.442
25.000	12.500	0.494	-144.521

TEST NUMBERS =354,355
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.652	-215.419
50.000	25.000	0.694	-205.715
40.000	20.000	0.728	-196.003
30.000	15.000	0.731	-171.687
25.000	12.500	0.722	-173.646

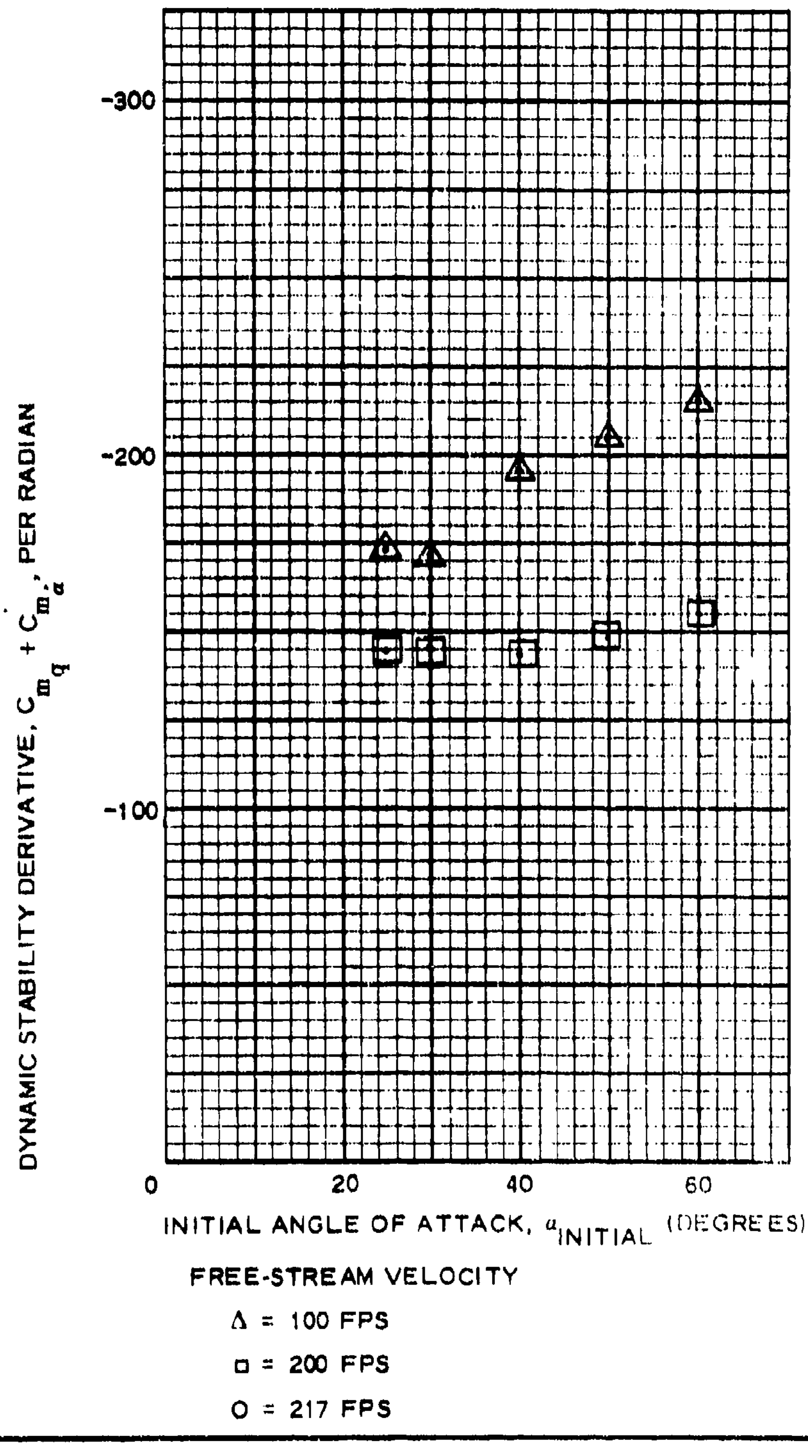
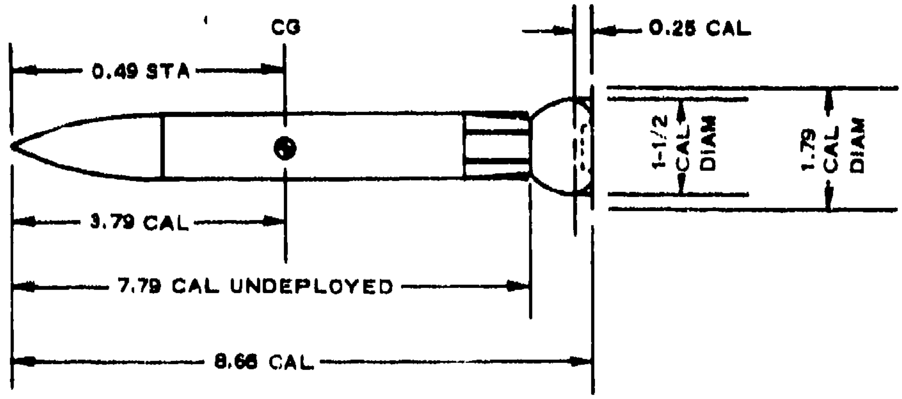


Figure 101. Graphic Dynamic Stability Test Data:Configuration 47

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	176
Plotted	177



General data

Model weight = 412.0 gm

Moment of inertia = 0.19565 slug in.^{2}

Description of components

Nose shape = 2 caliber ogive

Tripper = none

Fineness ratio = 7.79

Stabilizer = 1-1/2 caliber diameter Ballute

Burble fence = 1.79 caliber diameter

Boattail = 1 caliber long, 10 degree cone angle

Strakes (8) = 1 caliber span

Remarks

Figure 102. Model Specifications for Configuration 48

TABLE LV. DYNAMIC STABILITY TEST DATA: CONFIGURATION 48

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.195650
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002427
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =362,363
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.506	-159.513
50.000	25.000	0.525	-153.817
40.000	20.000	0.550	-146.825
30.000	15.000	0.550	-146.825
25.000	12.500	0.494	-153.552

TEST NUMBERS =358,359
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.784	-205.906
50.000	25.000	0.837	-192.845
40.000	20.000	0.838	-192.844
30.000	15.000	0.722	-223.733
25.000	12.500	0.622	-259.710

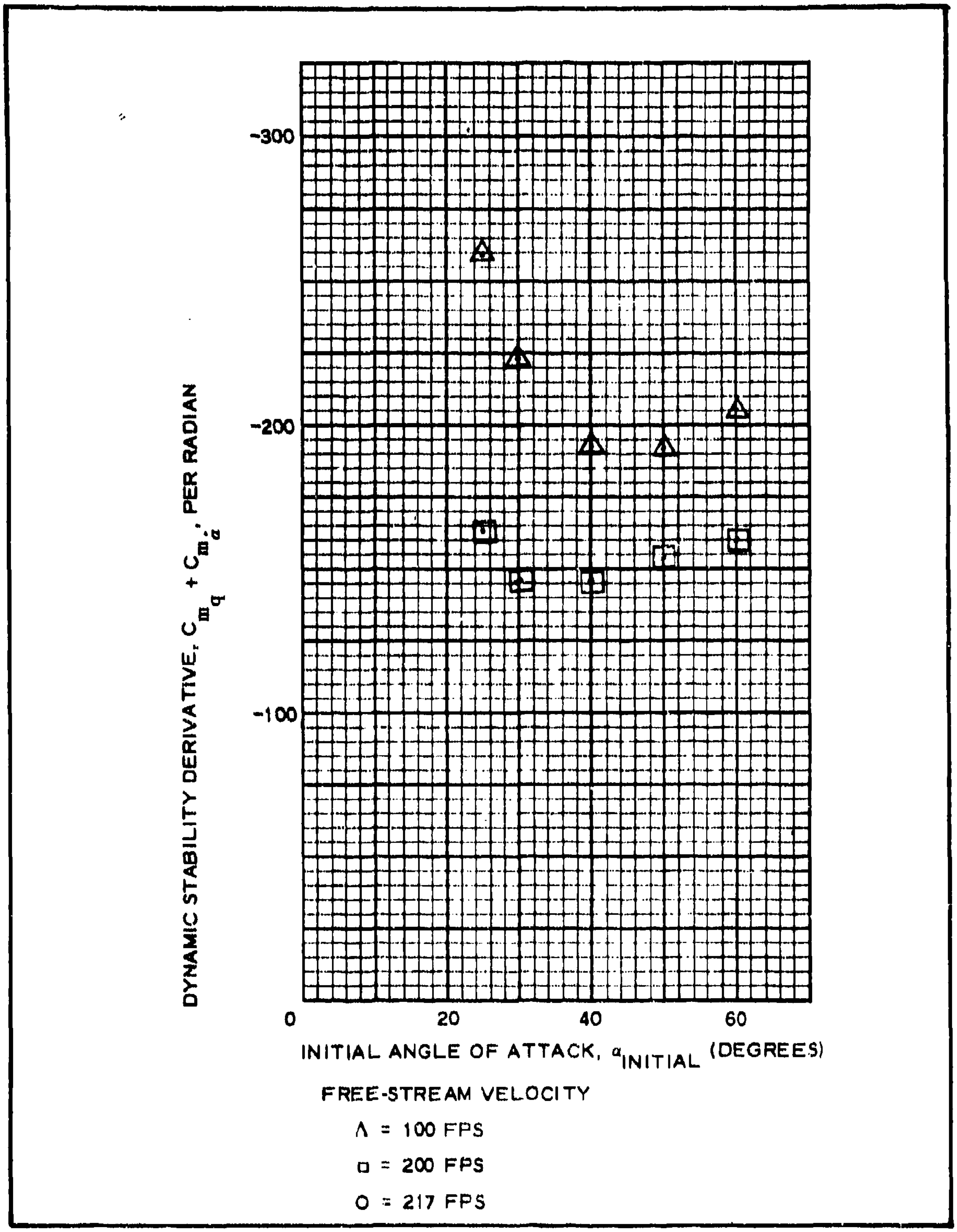
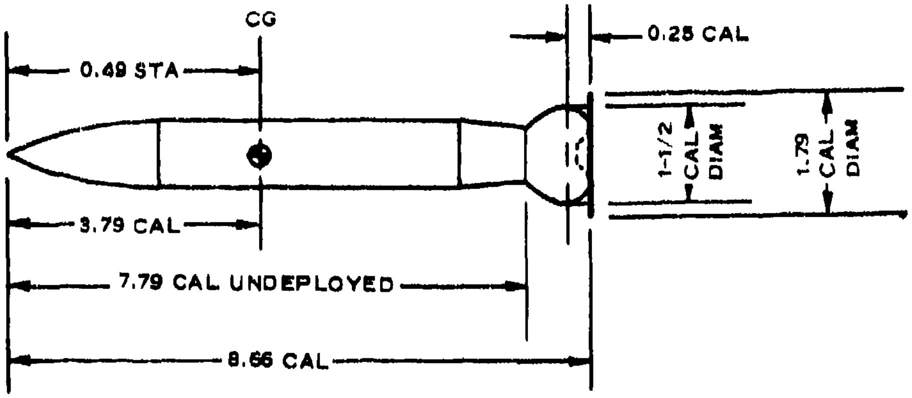


Figure 103. Graphic Dynamic Stability Test Data: Configuration 48

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	179
Plotted	180



General data
Model weight =
Moment of inertia =

Description of components
Nose shape = 2 caliber ogive
Tripper = none
Fineness ratio = 7.79
Stabilizer = 1-1/2 caliber diameter Ballute
Burble fence = 1.79 caliber diameter
Boattail = 1 caliber long, 10 degree cone angle
Strakes (8) = none

Remarks

Figure 104. Model Specifications for Configuration 49

TABLE LVI. DYNAMIC STABILITY TEST DATA: CONFIGURATION 49

```
RELEASE ANGLE-OF-ATTACK(DEGREES)=    60.00
MOMENT OF INERTIA(SLUG-IN.SQ)      =0.192840
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002423
REFERENCE AREA(SQ FT)               =0.012300
REFERENCE LENGTH(FEET)              =0.125000
```

TEST NUMBERS =366,367
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.569	-140.168
50.000	25.000	0.572	-139.402
40.000	20.000	0.538	-148.317
30.000	15.000	0.478	-166.736
25.000	12.500	0.447	-178.396

TEST NUMBERS =370,371
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.862	-184.860
50.000	25.000	0.797	-200.083
40.000	20.000	0.716	-222.800
30.000	15.000	0.578	-275.790
25.000	12.500	0.506	-314.946

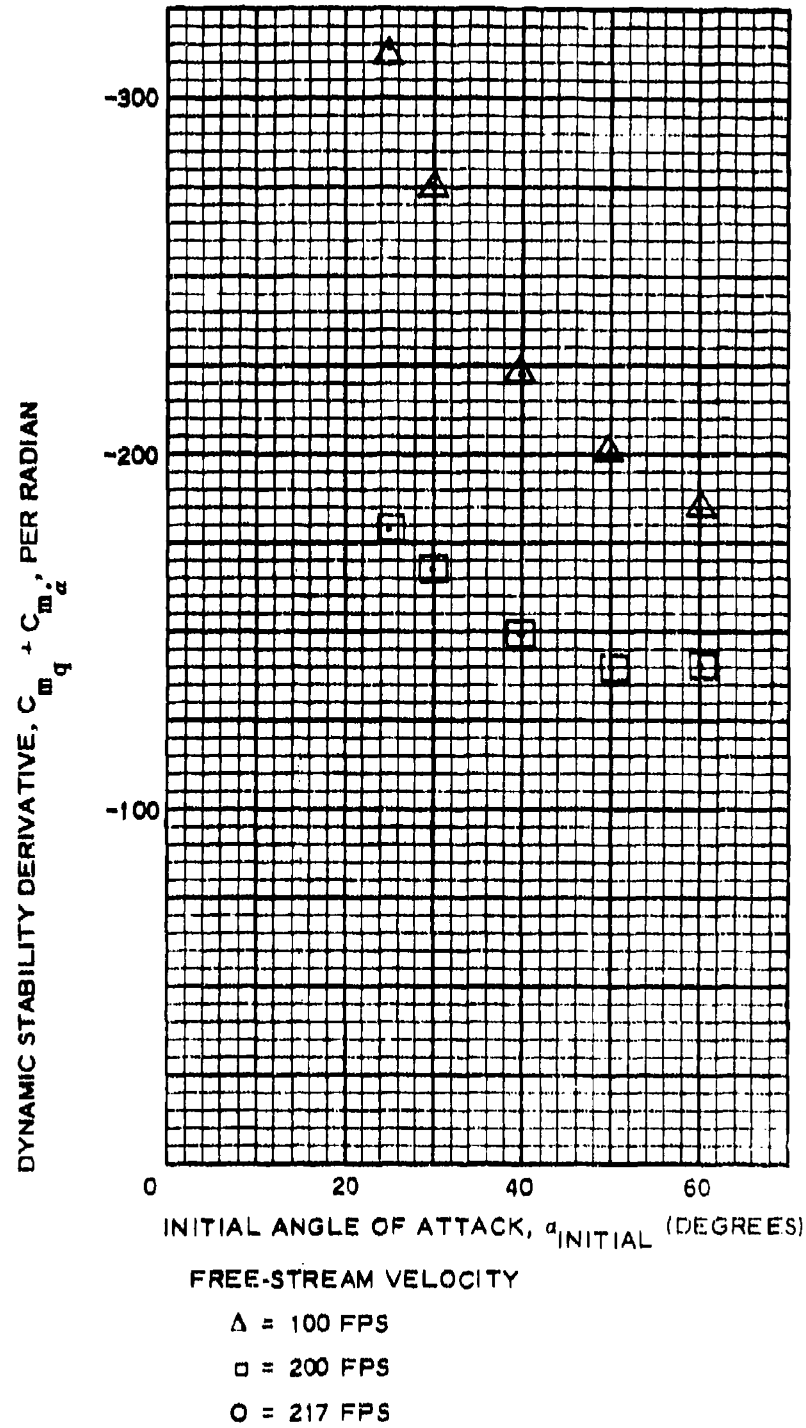
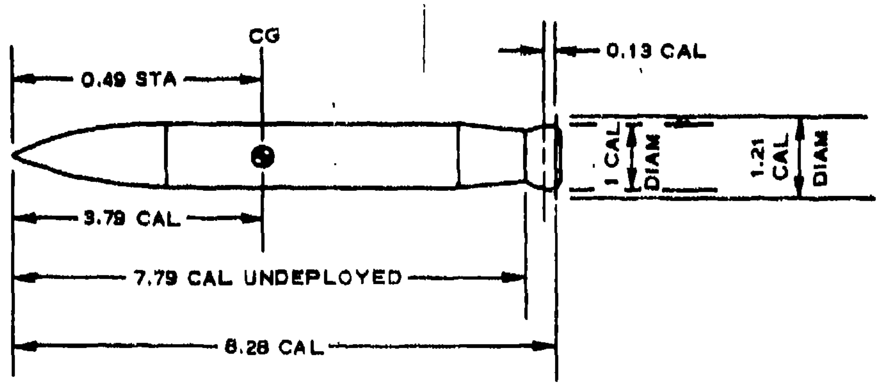


Figure 105. Graphic Dynamic Stability Test Data: Configuration 49

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



General data

Model weight = 394.5 gm
Moment of inertia =

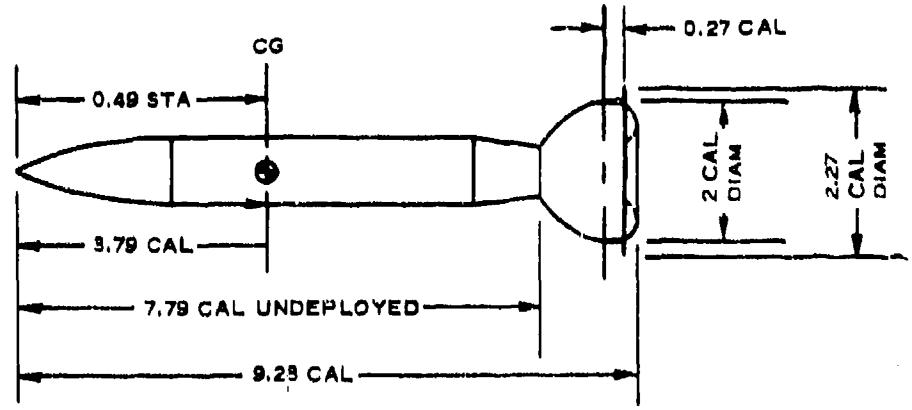
Description of components

Nose shape = 2 caliber ogive
Tripper = none
Fineness ratio = 7.79
Stabilizer = 1 caliber diameter Ballute
Burble fence = 1.21 caliber diameter
Boattail = 1 caliber long, 10 degree cone angle
Strakes (8) = none

Remarks

Figure 106. Model Specifications for Configuration 50

Item	Page
Static aerodynamic data	
Tabulated	183
Plotted	184
Dynamic stability data	
Tabulated	185
Plotted	186



General data

Model weight = 484.5 gm
Moment of inertia = 0.28484 slug in.^{2}

Description of components

Nose shape = 2 caliber ogive
Tripper = none
Fineness ratio = 7.79
Stabilizer = 2 caliber diameter Ballute
Burble fence = 2.27 caliber diameter
Boattail = 1 caliber long, 10 degree cone angle
Strakes (8) = none

Remarks

Figure 107. Model Specifications for Configuration 51

TABLE LVII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 51 (TEST NO. 7)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002319	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 56.12	C.G.(CALIBERS)	=3.7913
REYNOLDS NUMBER	=0.2842E 06	ALPHA SHIFT(DEGREES)	=-4.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-44.0	-3.371	5.019	-5.912	1.269	8.425	1.425
-30.0	-34.0	-2.474	4.122	-4.356	2.034	7.242	1.662
-20.0	-24.0	-1.650	3.553	-2.954	2.579	5.986	2.026
-15.0	-19.0	-1.187	3.413	-2.233	2.841	4.450	1.993
-10.0	-14.0	-0.695	3.254	-1.461	2.989	2.819	1.930
-6.0	-10.0	-0.564	3.254	-1.121	3.107	2.015	1.798
-3.0	-7.0	-0.391	3.138	-0.770	3.067	0.896	1.163
-0.0	-4.0	-0.159	3.196	-0.382	3.177	0.198	0.520
3.0	-1.0	0.0	3.167	-0.055	3.167	-0.797	-14.417
6.0	2.0	0.145	3.153	0.255	3.146	-1.659	6.515
10.0	6.0	0.550	3.182	0.879	3.107	-2.602	2.959
15.0	11.0	0.868	3.239	1.470	3.014	-4.184	2.845
20.0	16.0	1.331	3.384	2.212	2.886	-5.582	2.523
30.0	26.0	2.257	3.731	3.665	2.364	-7.940	2.167
40.0	36.0	3.328	4.744	5.481	1.332	5.301	-0.967

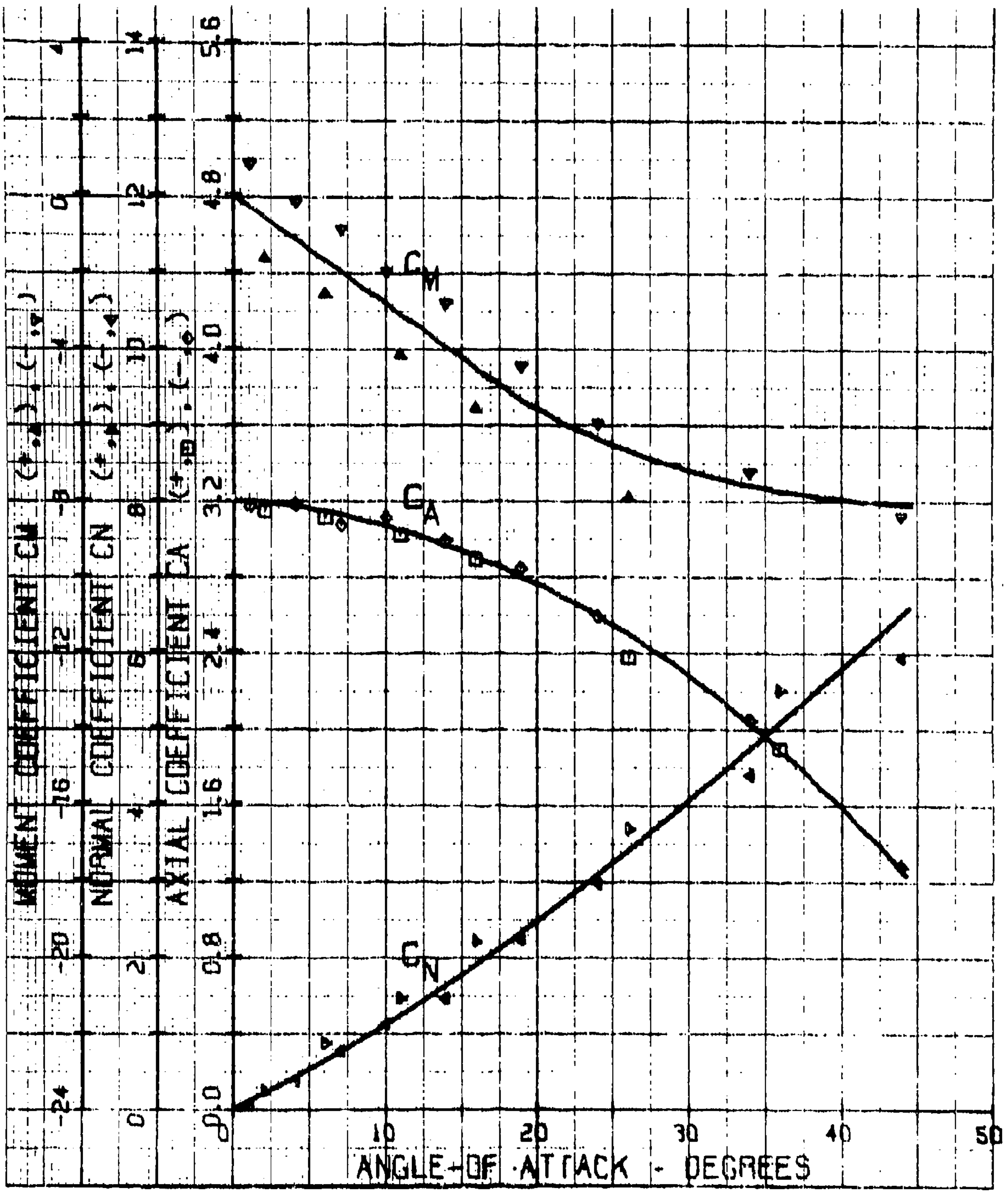


Figure 108. Graphic Static Aerodynamic Test Data:Configuration 51 (Test No. 7)

TABLE LVIII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 51

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.284840
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002416
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =377,378
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.469	-252.011
50.000	25.000	0.487	-242.319
40.000	20.000	0.500	-236.261
30.000	15.000	0.531	-222.363
25.000	12.500	0.534	-221.063

TEST NUMBERS =391,392
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.831	-284.223
50.000	25.000	0.831	-284.223
40.000	20.000	0.806	-293.036
30.000	15.000	0.809	-291.905
25.000	12.500	0.819	-283.562

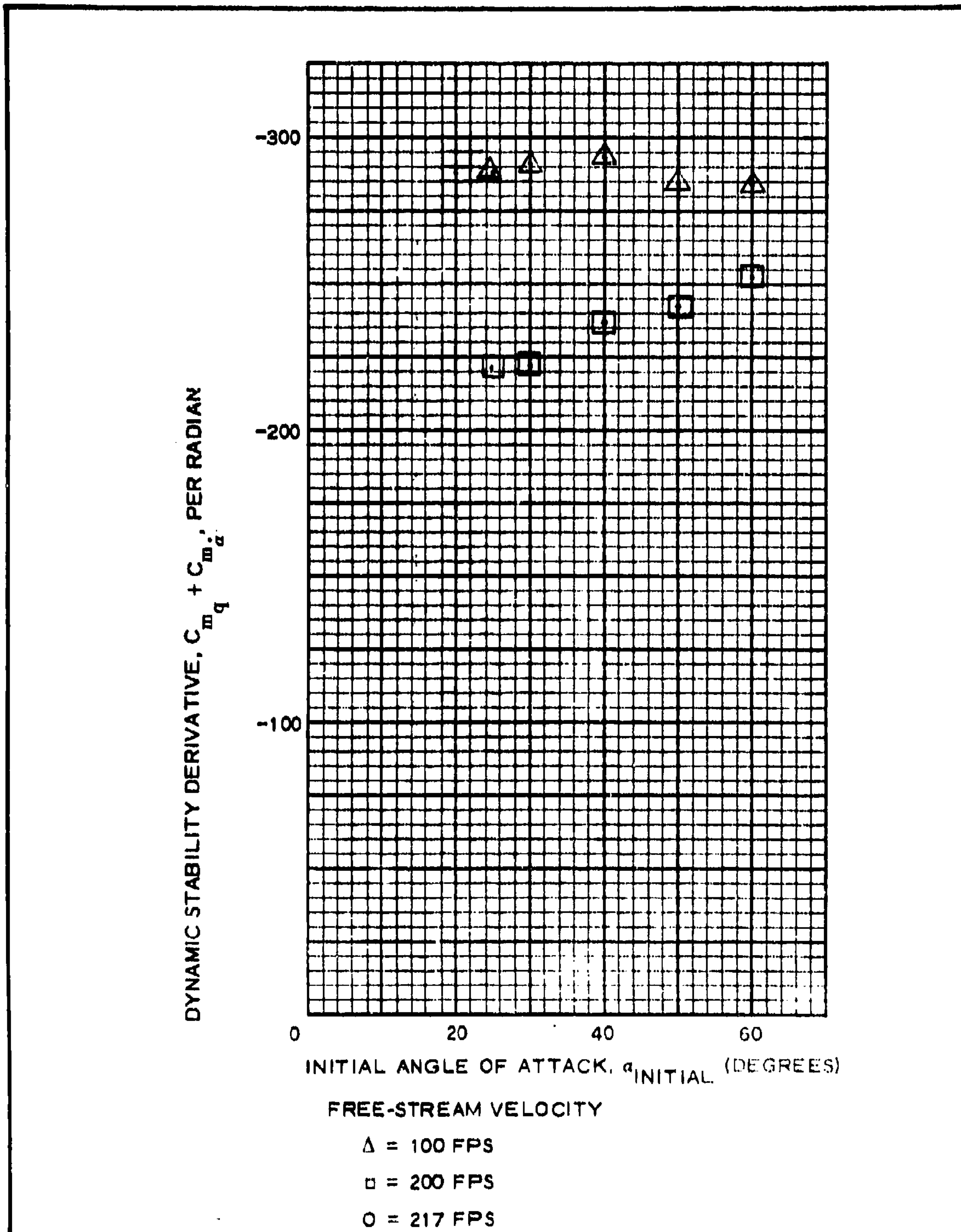
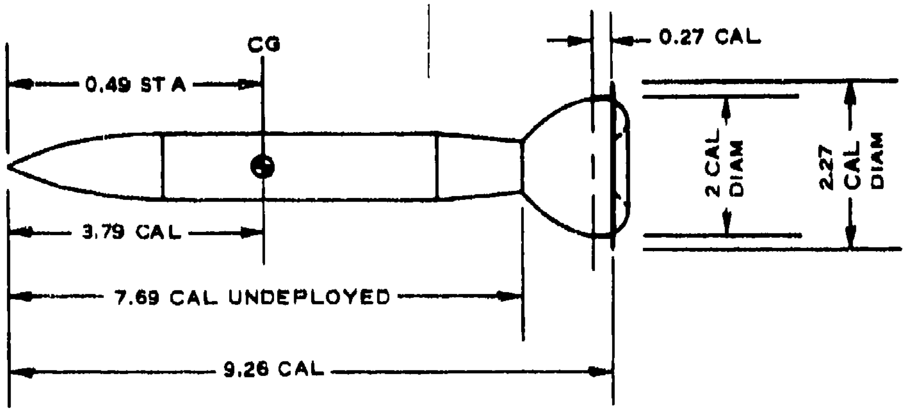


Figure 109. Graphic Dynamic Stability Test Data: Configuration 51

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	188
Plotted	189



General data
- Model weight = 478.0 gm
- Moment of inertia = 0.27208 slug in.^{2}

Description of components
- Nose shape = 2 caliber ogive
- Tripper = none
- Fineness ratio = 7.69
- Stabilizer = 2 caliber diameter Ballute
- Burble fence = 2.27 caliber diameter
- Boattail = 1-1/3 caliber long, 10 degree cone angle
- Strakes (8) = none

Remarks

Figure 110. Model Specifications for Configuration 52

TABLE LIX. DYNAMIC STABILITY TEST DATA: CONFIGURATION 52

```
RELEASE ANGLE-OF-ATTACK(DEGREES)=    60.00
MOMENT OF INERTIA(SLUG-IN.SQ)     =0.272000
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002[illegible]14
REFERENCE AREA(SQ FT)             =0.012300
REFERENCE LENGTH(FEET)            =0.125000
```

```
TEST NUMBERS      =389,390
VELOCITY(FT/SEC)= 200.
```

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.455	-242.511
50.000	25.000	0.472	-233.319
40.000	20.000	0.456	-247.515
30.000	15.000	0.450	-250.953
25.000	12.500	0.441	-255.292

```
TEST NUMBERS      =385,386
VELOCITY(FT/SEC)= 100.
```

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.756	-298.654
50.000	25.000	0.747	-302.4[illegible]
40.000	20.000	0.709	-318.[illegible]
30.000	15.000	0.687	-324.100
25.000	12.500	0.709	-318.[illegible]

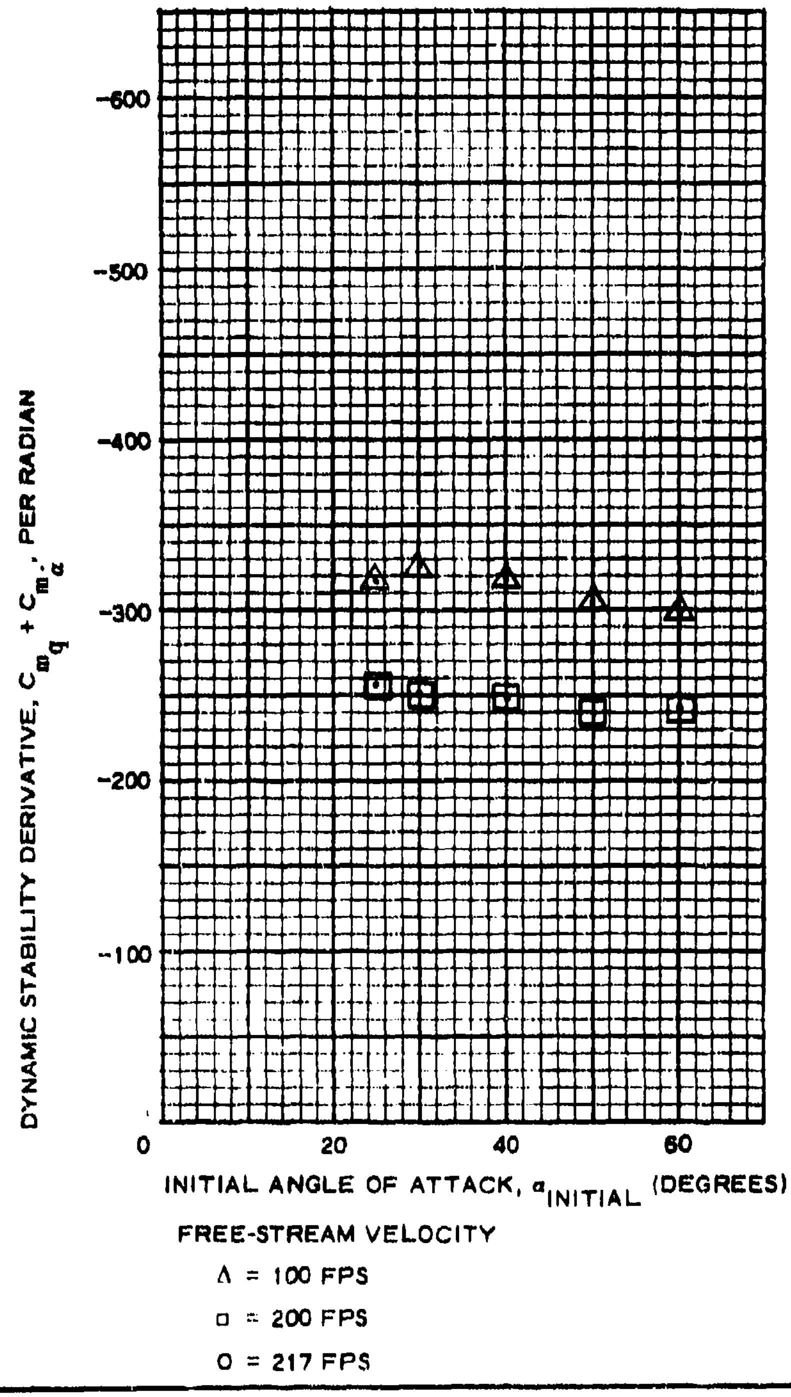
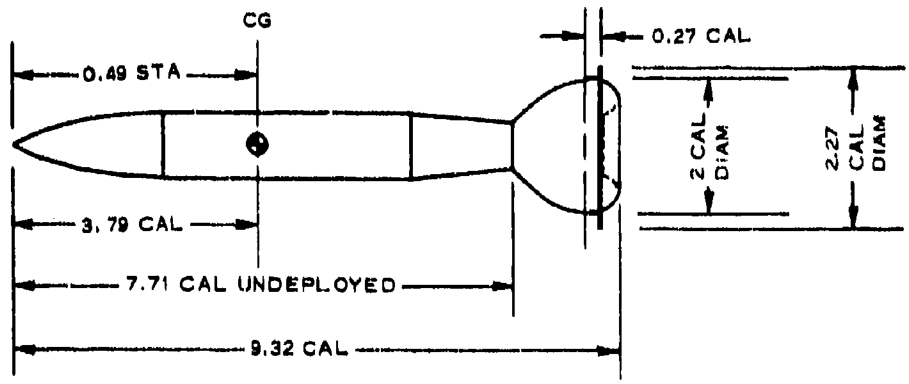


Figure 111. Graphic Dynamic Stability Test Data: Configuration 52



General data

Model weight = 468.7 gm

Moment of inertia = 0.26117 slug in.^{2}

Description of components

Nose shape = 2 caliber ogive

Tripper = none

Fineness ratio = 7.71

Stabilizer = 2 caliber diameter Ballute

Burble fence = 2.27 caliber diameter

Boattail = 1-2/3 caliber long, 10 degree cone angle

Strakes (8) = none

Remarks

Figure 112. Model Specifications for Configuration 53

TABLE LX. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 53 (TEST NO. 8)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002321	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 56.17	C.G.(CALIBERS)	=3.7913
REYNOLDS NUMBER	=0.2857E 08	ALPHA SHIFT(DEGREES)	= 0.0

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-40.0	-3.268	5.038	-5.774	1.797	8.370	1.450
-30.0	-30.0	-2.328	4.032	-4.032	2.328	6.573	1.630
-20.0	-20.0	-1.431	3.512	-2.546	2.810	5.139	2.018
-15.0	-15.0	-1.012	3.382	-1.853	3.095	3.757	2.027
-10.0	-10.0	-0.578	3.266	-1.137	3.116	2.218	1.951
-6.0	-6.0	-0.376	3.299	-0.713	3.238	0.658	0.917
-3.0	-3.0	-0.231	3.338	-0.406	3.322	0.542	1.335
-0.0	0.0	0.043	3.170	0.043	3.179	-0.301	6.944
3.0	3.0	0.145	3.230	0.316	3.268	-1.967	6.224
6.0	6.0	0.289	3.230	0.630	3.232	-2.657	4.214
10.0	10.0	0.535	3.333	1.107	3.195	-3.545	3.203
15.0	15.0	0.954	3.395	1.801	3.333	-5.510	3.060
20.0	20.0	1.374	3.526	2.497	2.344	-6.983	2.797
30.0	30.0	2.328	3.601	3.916	2.128	-9.041	2.308
40.0	40.0	3.022	4.625	5.283	1.691	-11.154	2.109

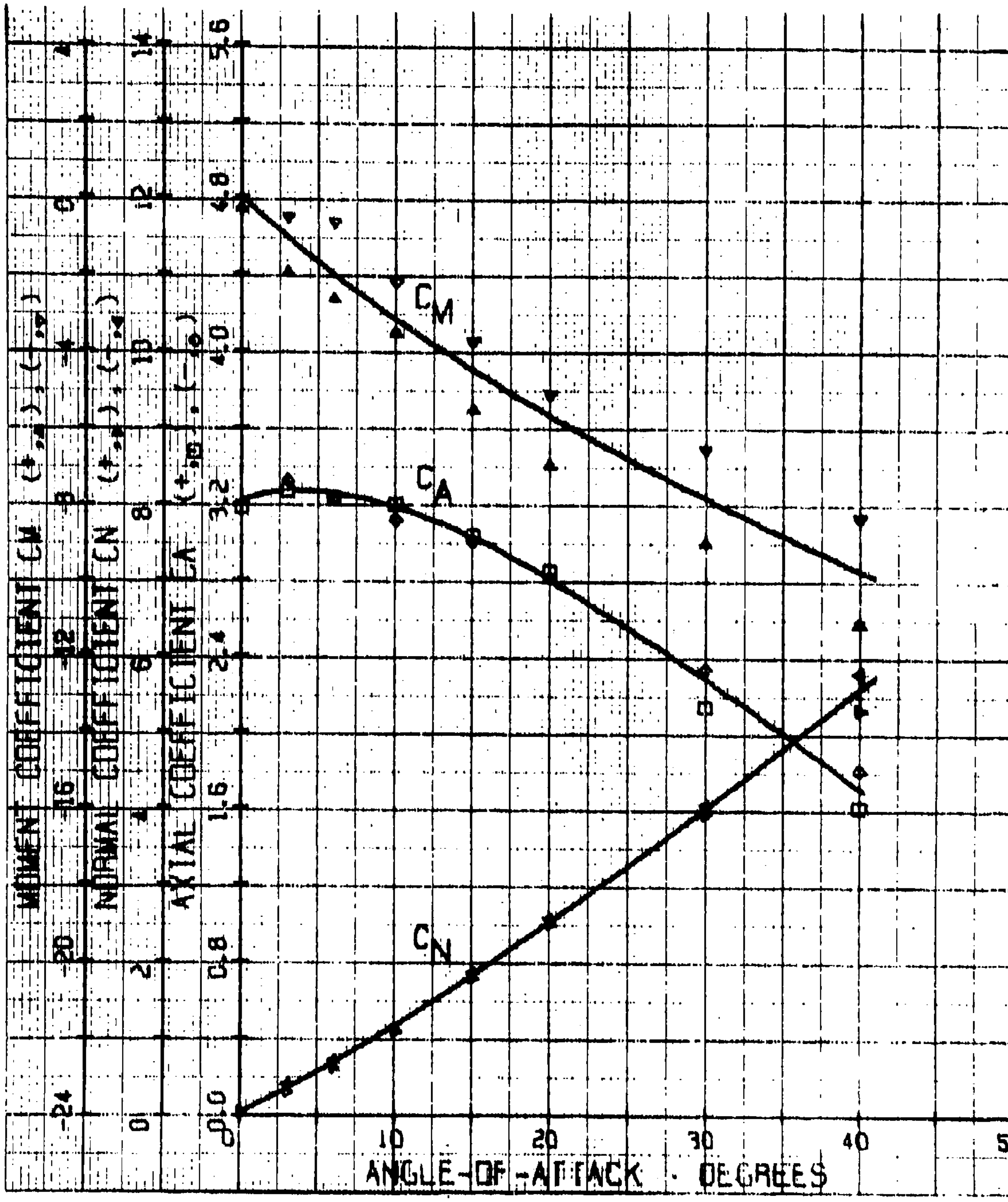


Figure 113. Graphic Static Aerodynamic Test Data:Configuration 53 (Test No. 8)

TABLE LXI. DYNAMIC STABILITY TEST DATA: CONFIGURATION 53

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.261170
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002412
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =393,394
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.437	-222.538
50.000	25.000	0.475	-228.394
40.000	20.000	0.472	-229.907
30.000	15.000	0.459	-236.163
25.000	12.500	0.463	-234.567

TEST NUMBERS =397,398
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.825	-262.999
50.000	25.000	0.819	-265.007
40.000	20.000	0.809	-268.076
30.000	15.000	0.797	-272.281
25.000	12.500	0.784	-276.621

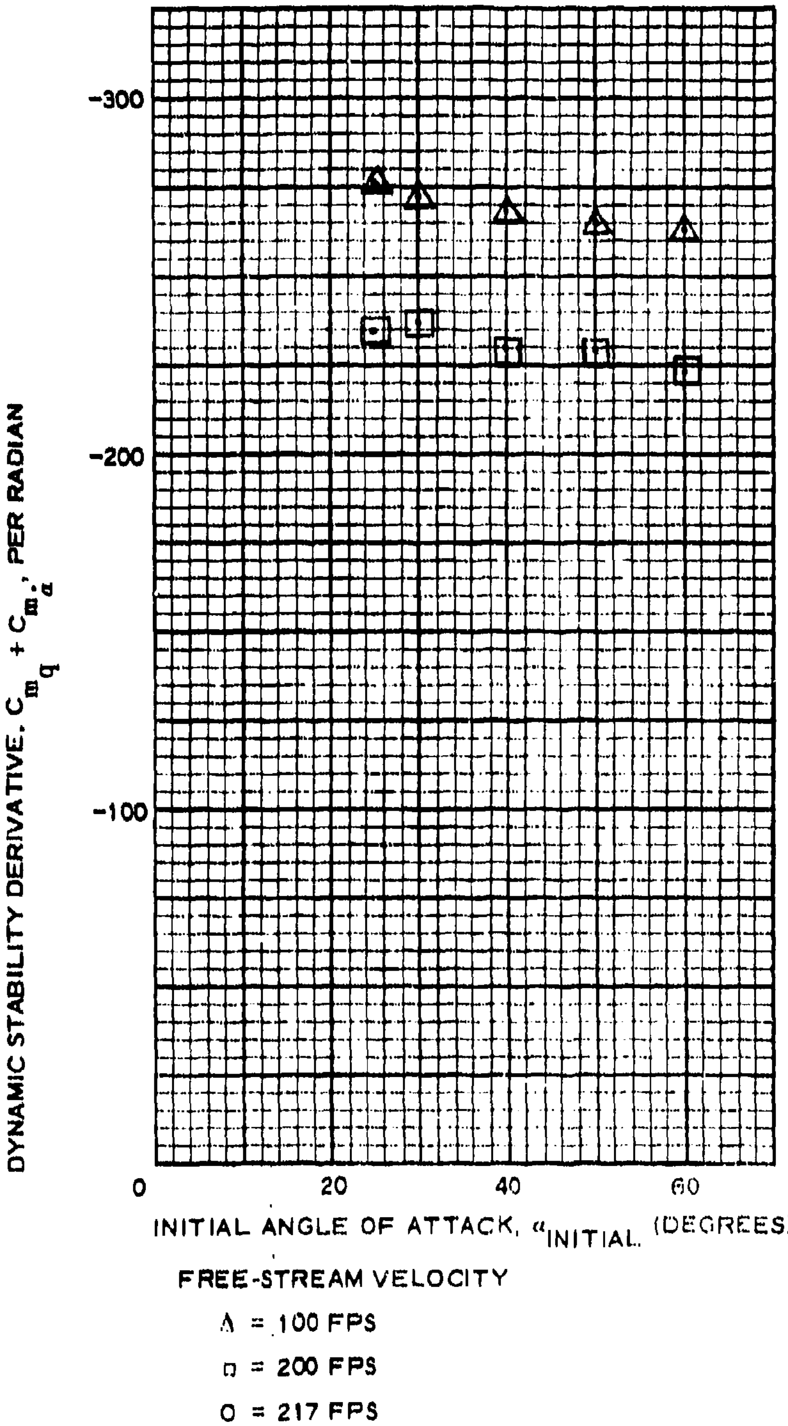
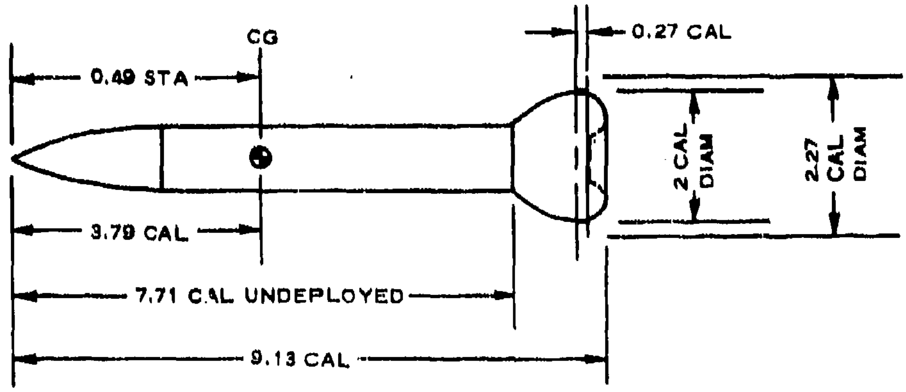


Figure 114. Graphic Dynamic Stability Test Data: Configuration 53



General data

- Model weight = 571.0 gm
- Moment of inertia = 0.28344 slug $in.^2$

Description of components

- Nose shape = 2 caliber ogive
- Tripper = none
- Fineness ratio = 7.71
- Stabilizer = 2 caliber diameter Ballute
- Burble fence = 2.27 caliber diameter
- Boattail = none
- Strakes (8) = none

Remarks

Figure 115. Model Specifications for Configuration 54

TABLE LXII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 54

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.283440
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002[illegible]4
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =405,406
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.628	-188.046
50.000	25.000	0.606	-194.831
40.000	20.000	0.628	-188.046
30.000	15.000	0.650	-181.717
25.000	12.500	0.631	-187.115

TEST NUMBERS =401,402
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.841	-291.020
50.000	25.000	0.916	-258.001
40.000	20.000	0.955	-247.040
30.000	15.000	1.025	-230.471
25.000	12.500	0.950	-249.666

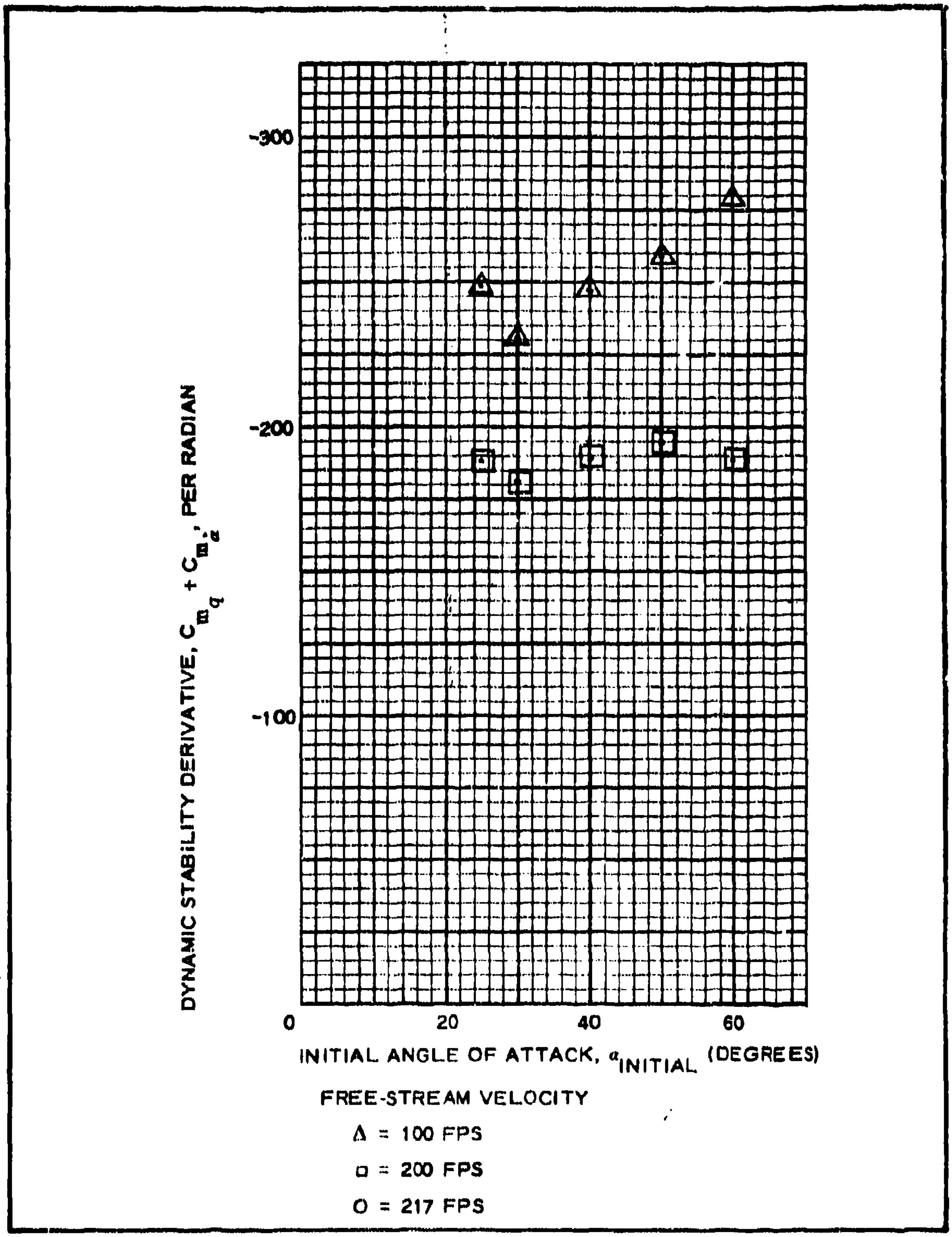
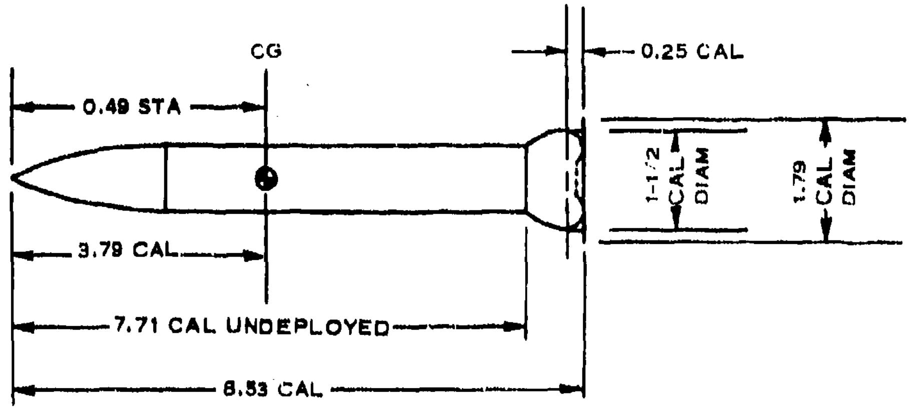


Figure 116. Graphic Dynamic Stability Test Data: Configuration 54

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	199
Plotted	200



General data

Model weight = 455.2 gm

Moment of inertia = 0.21972 slug in.^{2}

Description of components

Nose shape = 2 caliber ogive

Tripper = none

Fineness ratio = 7.71

Stabilizer = 1-1/2 caliber diameter Ballute

Burble fence = 1.79 caliber diameter

Boattail = none

Strakes (8) = none

Remarks

Figure 117. Model Specifications for Configuration 55

TABLE LXIII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 55

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.219720
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002393
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =409,410
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.859	-107.061
50.000	25.000	0.878	-104.775
40.000	20.000	0.778	-1[illegible]0.241
30.000	15.000	0.681	-135.055
25.000	12.500	0.619	-148.696

TEST NUMBERS =413,414
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.156	-159.145
50.000	25.000	1.269	-145.034
40.000	20.000	1.156	-159.145
30.000	15.000	1.191	-155.777
25.000	12.500	1.044	-176.299

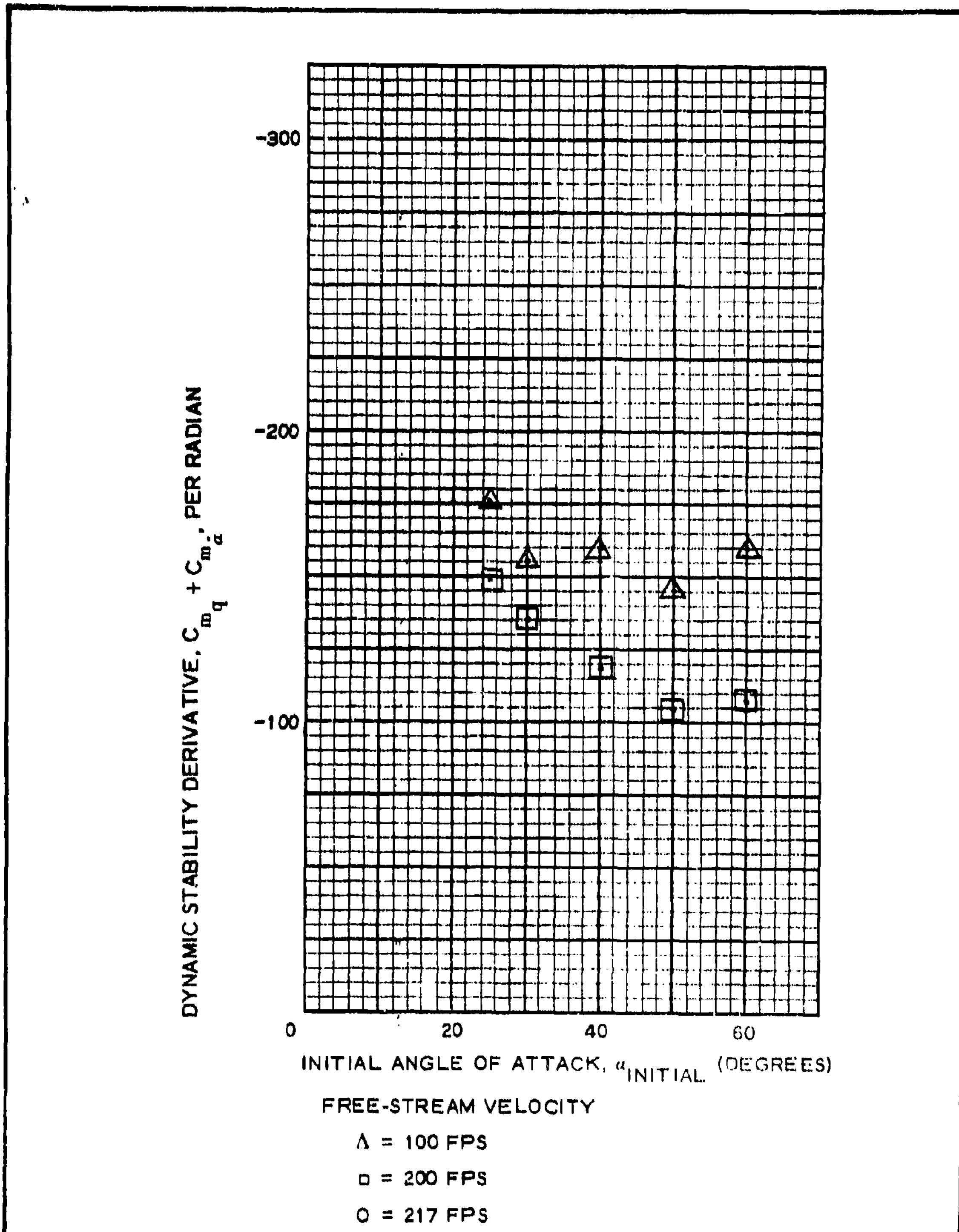
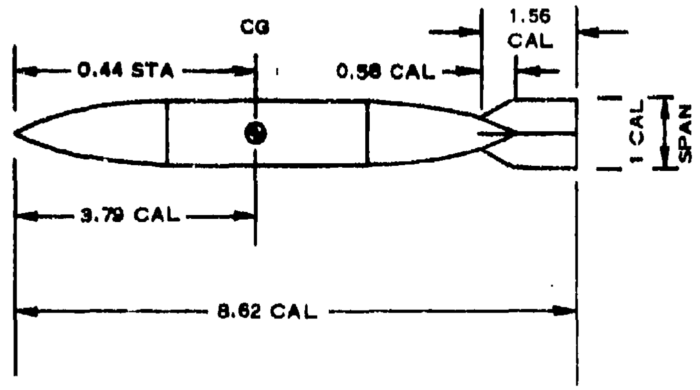


Figure 118. Graphic Dynamic Stability Test Data: Configuration 55

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



General data

Model weight = 309.6 gm

Moment of inertia = 0.12136 slug in.^{2}

Description of components

Nose shape = 2 caliber ogive

Tripper = none

Fineness ratio = 8.62

Stabilizer = 1 caliber span rigid fins (BLU-27/B fire bomb)

Burble fence = none

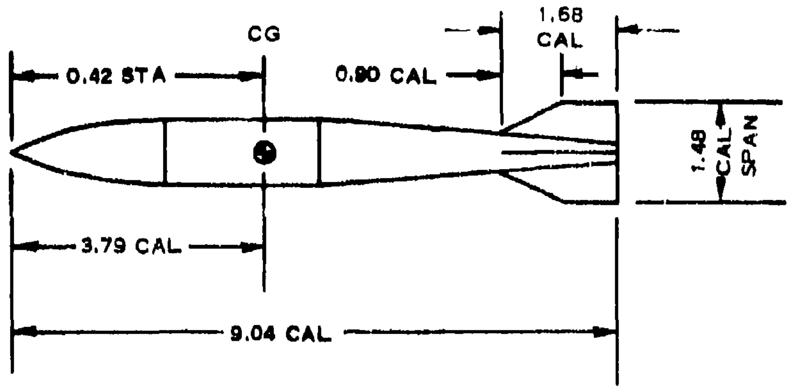
Boattail = none

Strakes (8) = none

Remarks

Figure 119. Model Specifications for Configuration 56

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	203
Plotted	204



General data

Model weight = 295.0 gm

Moment of inertia = 0.14363 slug in.^{2}

Description of components

Nose shape = 2 caliber ogive

Tripper = none

Fineness ratio = 9.04

Stabilizer = 1.48 caliber span rigid fins (M-118 bomb)

Burble fence = none

Boattail = none

Strakes (8) = none

Remarks

Figure 120. Model Specifications for Configuration 57

TABLE LXIV. DYNAMIC STABILITY TEST DATA: CONFIGURATION 57

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.143630
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002393
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =425,426
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.212	-283.030
50.000	25.000	0.247	-243.621
40.000	20.000	0.275	-218.705
30.000	15.000	0.316	-190.555
25.000	12.500	0.337	-178.204

TEST NUMBERS =429,430
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.362	-331.828
50.000	25.000	0.425	-283.030
40.000	20.000	0.475	-253.237
30.000	15.000	0.503	-239.081
25.000	12.500	0.481	-249.948

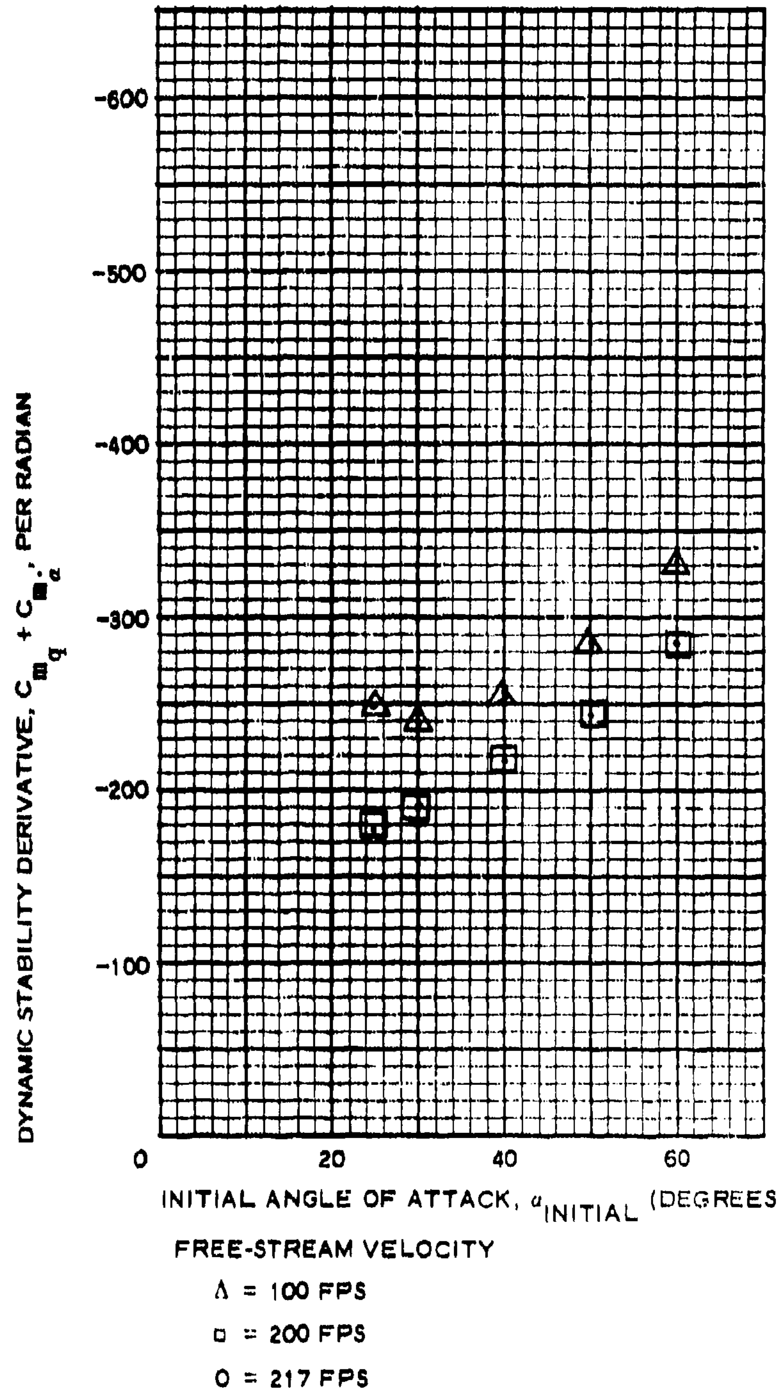
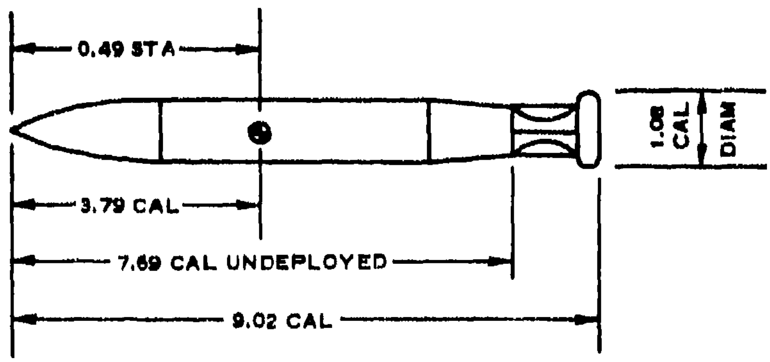


Figure 121. Graphic Dynamic Stability Test Data: Configuration 57

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



General data

Model weight = 364.7 gm
Moment of inertia = 0.16582 slug in.^{2}

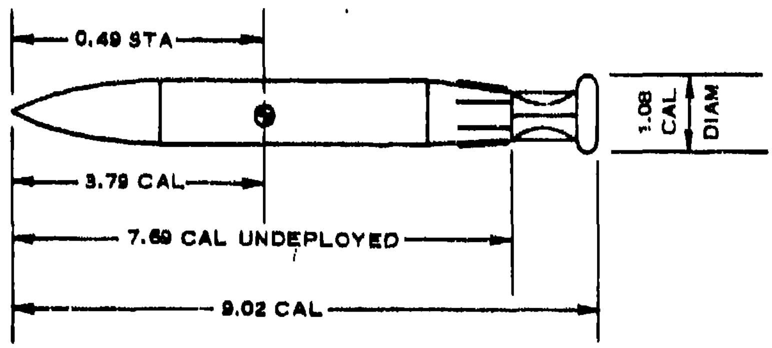
Description of components

Nose shape = 2 caliber ogive
Tripper = none
Fineness ratio = 7.69
Stabilizer = 1.08 caliber diameter toroid on concave extension with panels
Burble fence = none
Boattail = 1-1/3 caliber long, 10 degree cone angle
Strakes (8) = none

Remarks

Figure 122. Model Specifications for Configuration 58

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



General data

Model weight = 365.8 gm

Moment of inertia = 0.16735 slug in.^{2}

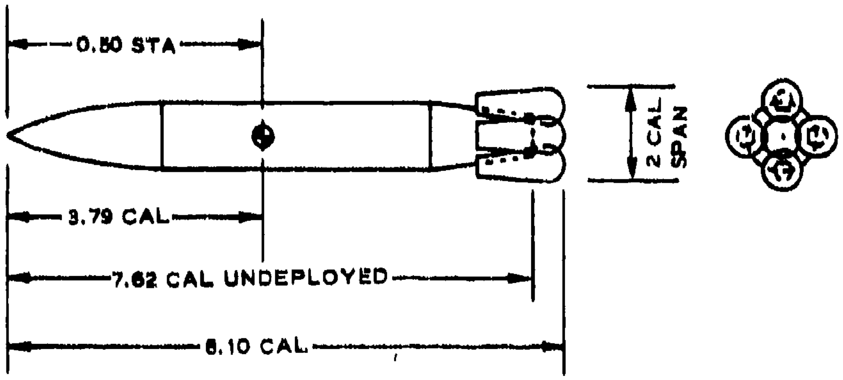
Description of components

Nose shape	= 2 caliber ogive
Tripper	= none
Fineness ratio	= 7.69
Stabilizer	= 1.08 caliber diameter toroid on concave extension with panels
Burble fence	= none
Boattail	= 1-1/3 caliber long, 10 degree cone angle
Strakes (8)	= 0.05 caliber high

Remarks

Figure 123. Model Specifications for Configuration 59

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	208
Plotted	209



General data

Model weight = 357.2 gm

Moment of inertia = 0.13017 slug in.^{2}

Description of components

Nose shape = 2 caliber ogive

Tripper = none

Fineness ratio = 7.62

Stabilizer = 2 caliber span inflatable conics

Burble fence = none

Boattail = 1-1/2 caliber long, 10 degree cone angle

Strakes (8) = none

Remarks

Figure 124. Model Specification for Configuration 60

TABLE LXV. DYNAMIC STABILITY TEST DATA: CONFIGURATION 60

RELEASE ANGLE-OF-ATTACK(DEGREES) = 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.130170
ATMOSPHERIC DENSITY(SLUGS/CU FT) =0.002394
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =453,454
VELOCITY(FT/SEC) = 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.653	-83.389
50.000	25.000	0.734	-74.163
40.000	20.000	0.812	-67.032
30.000	15.000	0.872	-62.467
25.000	12.500	0.906	-60.098

TEST NUMBERS =449,450
VELOCITY(FT/SEC) = 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.550	-198.050
50.000	25.000	0.650	-167.581
40.000	20.000	0.762	-142.855
30.000	15.000	0.791	-137.774
25.000	12.500	0.772	-141.120

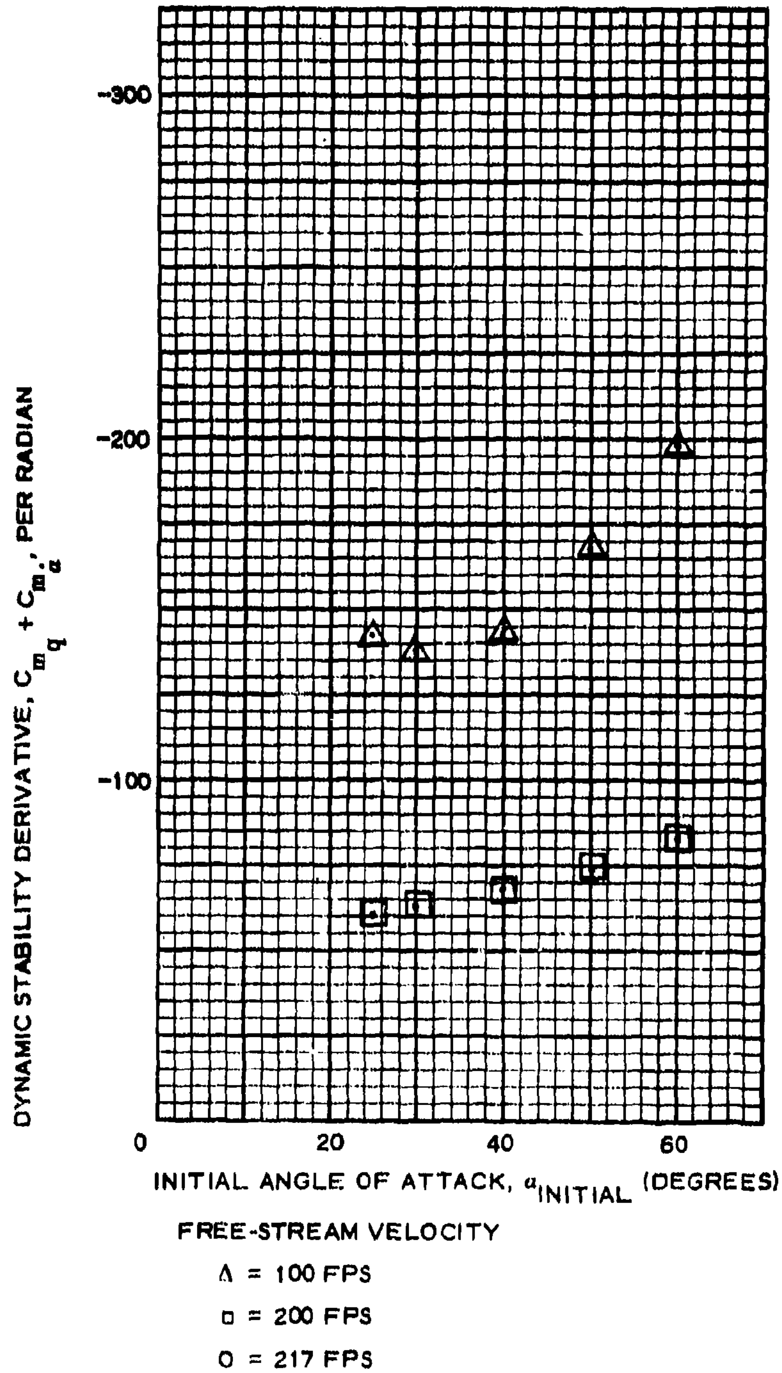
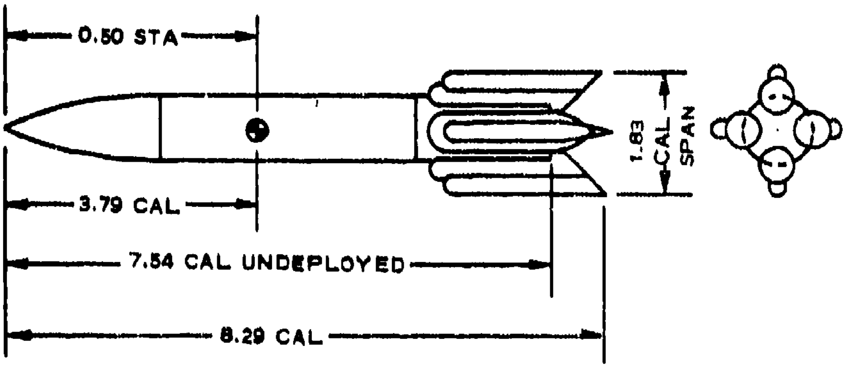


Figure 125. Graphic Dynamic Stability Test Data: Configuration 60

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	211
Plotted	212



General data
- Model weight = 353.5 gm
- Moment of inertia = 0.12708 slug in.^{2}

Description of components
- Nose shape = 2 caliber ogive
- Tripper = none
- Fineness ratio = 7.54
- Stabilizer = 1.83 caliber span inflatable fins
- Burble fence = none
- Boattail = none
- Strakes (8) = none

Remarks

Figure 126. Model Specifications for Configuration 61

TABLE LXVI. DYNAMIC STABILITY TEST DATA: CONFIGURATION 61

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.127080
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002394
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =457,458
VELOCITY(FT/SEC)= 200.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.378	-140.617
50.000	25.000	0.416	-127.930
40.000	20.000	0.447	-118.984
30.000	15.000	0.469	-113.431
25.000	12.500	0.465	-114.192

TEST NUMBERS =461,462
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.625	-170.146
50.000	25.000	0.722	-147.313
40.000	20.000	0.812	-130.892
30.000	15.000	0.853	-124.649
25.000	12.500	0.822	-129.389

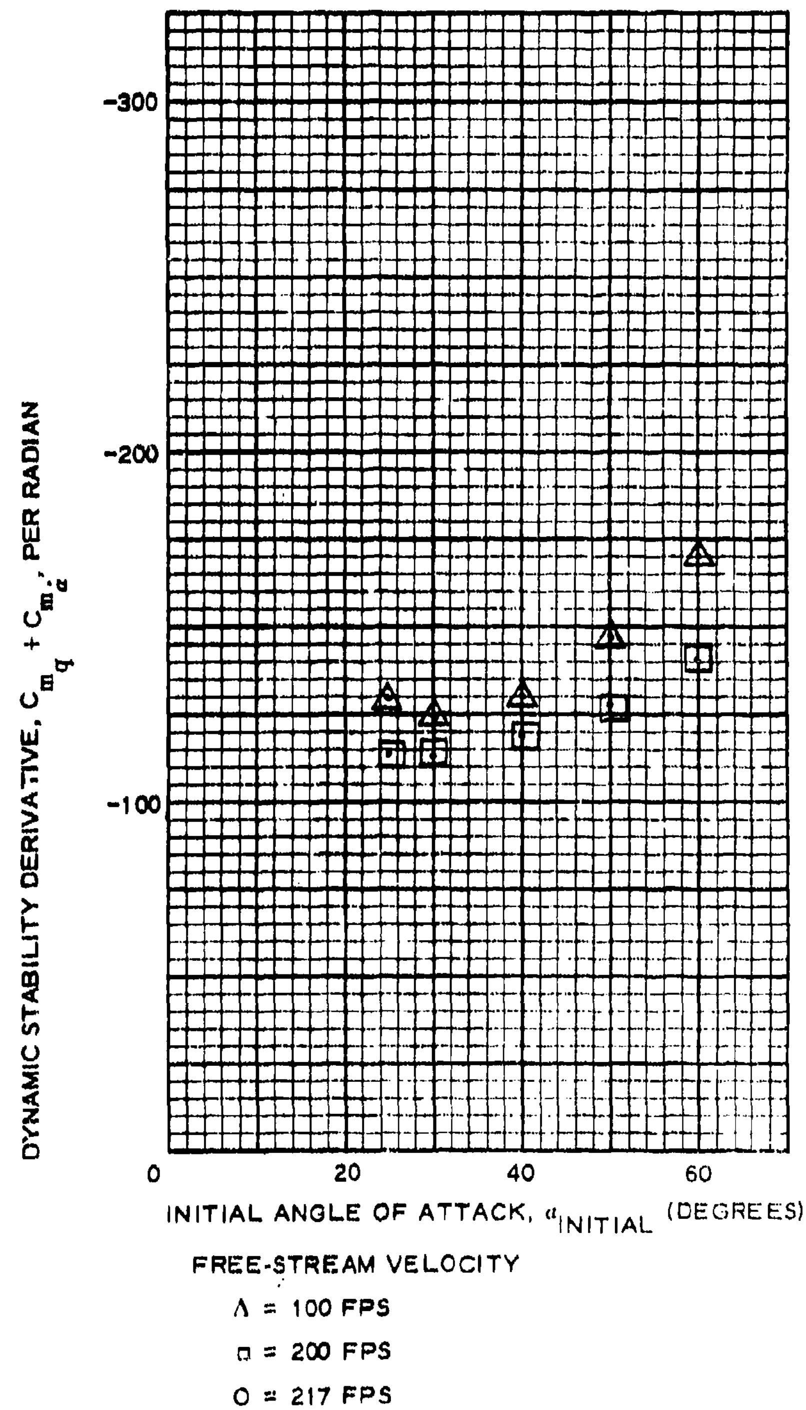
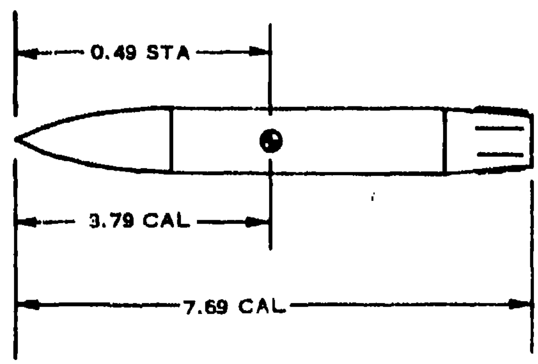


Figure 127. Graphic Dynamic Stability Test Data: Configuration 61

Item	Page
Static aerodynamic data	
Tabulated	214
Plotted	215
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight =

Moment of inertia =

Description of components

Nose shape	=	2 caliber ogive
Tripper	=	none
Fineness ratio	=	7.69
Stabilizer	=	none
Burble fence	=	none
Boattail	=	1-1/3 caliber long, 10 degree cone angle
Strakes (8)	=	0.05 caliber high

Remarks

Figure 128. Model Specifications for Configuration 62

TABLE LXVII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 62 (TEST NO. 1)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002352	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 56.92	C.G.(CALIBERS)	=3.7913
REYNOLDS NUMBER	=0.2387E 08	ALPHA SHIFT(DEGREES)	=-1.500

ALPHA (DEGREES) SET	TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-41.5	-3.740	3.540	-5.147	0.173	0.121	0.023
-30.0	-31.5	-1.870	1.395	-2.318	0.203	-0.915	-0.395
-20.0	-21.5	-1.171	0.756	-1.366	0.275	-0.825	-0.604
-15.0	-16.5	-0.785	0.542	-0.907	0.297	-0.795	-0.876
-10.0	-11.5	-0.414	0.400	-0.485	0.309	-0.718	-1.479
-6.0	-7.5	-0.243	0.257	-0.274	0.223	-0.490	-1.786
-3.0	-4.5	-0.100	0.214	-0.116	0.206	-0.255	-2.194
-0.0	-1.5	0.100	0.200	0.095	0.202	-0.063	0.666
3.0	1.5	0.100	0.200	0.105	0.197	0.204	-1.938
6.0	4.5	0.157	0.200	0.172	0.187	0.356	-2.069
10.0	8.5	0.328	0.285	0.367	0.234	0.727	-1.981
15.0	13.5	0.600	0.385	0.673	0.235	0.868	-1.290
20.0	18.5	0.956	0.542	1.079	0.211	0.889	-0.824
30.0	28.5	1.784	1.123	2.106	0.140	0.959	-0.456
40.0	38.5	3.126	2.026	4.081	0.109	-0.166	0.041

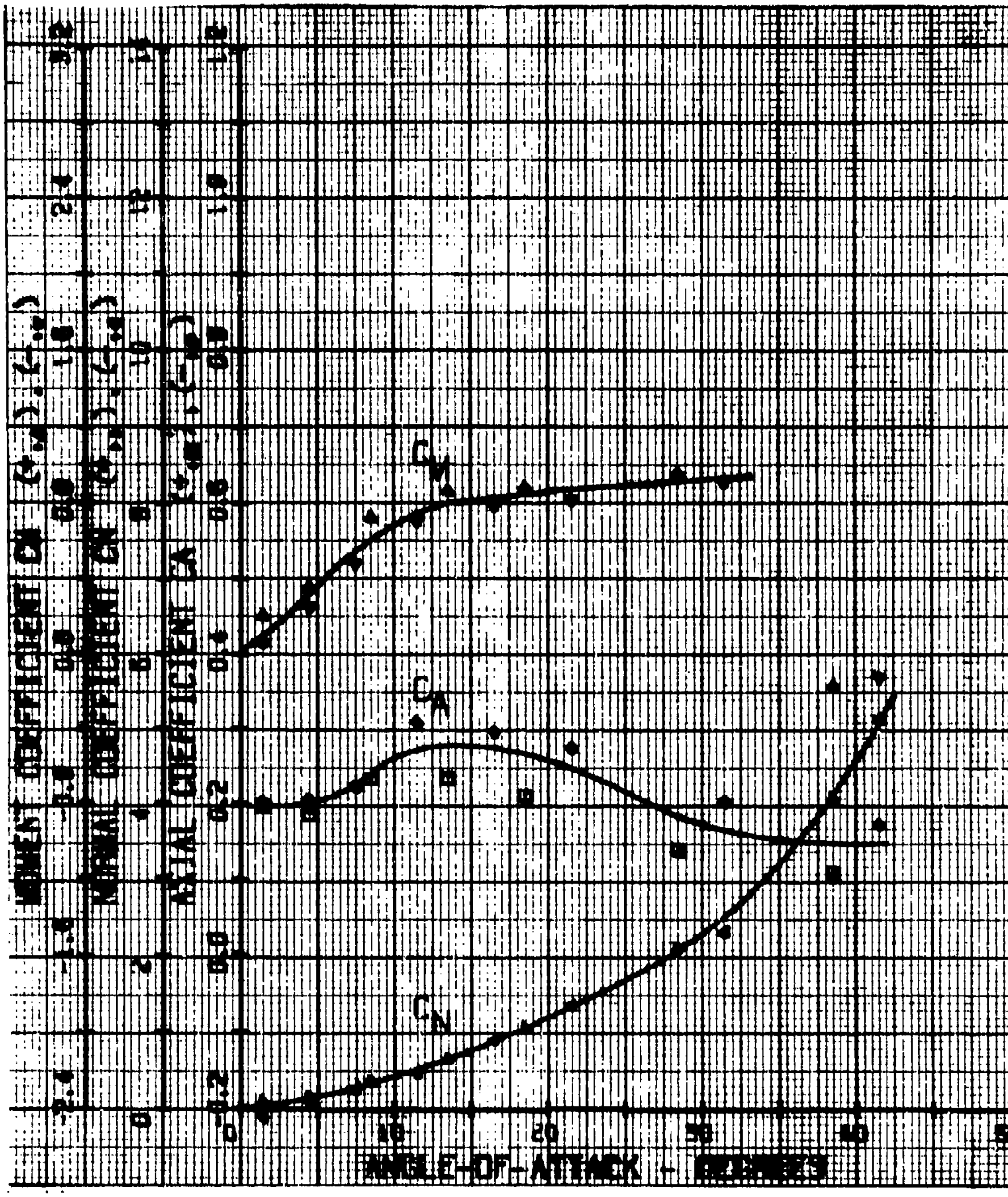
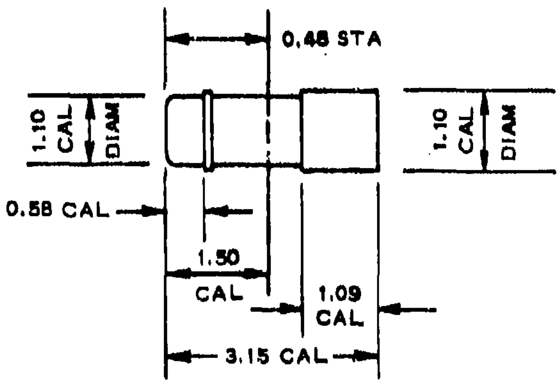


Figure 129. Graphic Static Aerodynamic Test Data: Configuration 62
(Test No. 1)

Item	Page
Static aerodynamic data	
Tabulated	217
Plotted	218
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight =

Moment of inertia =

Description of components

Nose shape	= flat with 0.1 caliber radius
Tripper	= 1.10 caliber diameter
Fineness ratio	= 3.15
Stabilizer	= none
Burble fence	= none
Boattail	= none, but 1.10 caliber diameter aftersection
Strakes (8)	= none

Remarks

Figure 130. Model Specifications for Configuration 63

TABLE LXVIII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 63
(TEST NO. 15)

VELOCITY(FT/SEC)	= 220.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002326	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 56.29	C.G.(CALIBERS)	=1.5000
REYNOLDS NUMBER	=0.9681E 07	ALPHA SHIFT(DEGREES)	= 0.0

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-40.0	-0.996	2.363	-2.285	1.173	0.180	0.079
-30.0	-30.0	-0.751	1.906	-1.603	1.275	-0.072	-0.045
-20.0	-20.0	-0.520	1.386	-0.962	1.125	0.045	0.047
-15.0	-15.0	-0.419	1.184	-0.711	1.035	0.017	0.024
-10.0	-10.0	-0.303	1.011	-0.474	0.943	-0.035	-0.073
-6.0	-6.0	-0.159	0.866	-0.248	0.845	0.063	0.252
-3.0	-3.0	-0.087	0.673	-0.122	0.673	0.126	1.033
-0.0	0.0	0.029	0.592	0.029	0.592	0.157	-5.438
3.0	3.0	0.144	0.650	0.179	0.641	0.170	-0.954
6.0	6.0	0.202	0.673	0.273	0.668	0.166	-0.605
10.0	10.0	0.318	0.835	0.469	0.826	0.219	-0.469
15.0	15.0	0.390	1.053	0.653	0.931	0.297	-0.455
20.0	20.0	0.578	1.256	0.972	0.983	0.374	-0.385
30.0	30.0	0.809	1.704	1.552	1.071	0.369	-0.238
40.0	40.0	0.996	2.231	2.229	1.107	0.084	-0.038

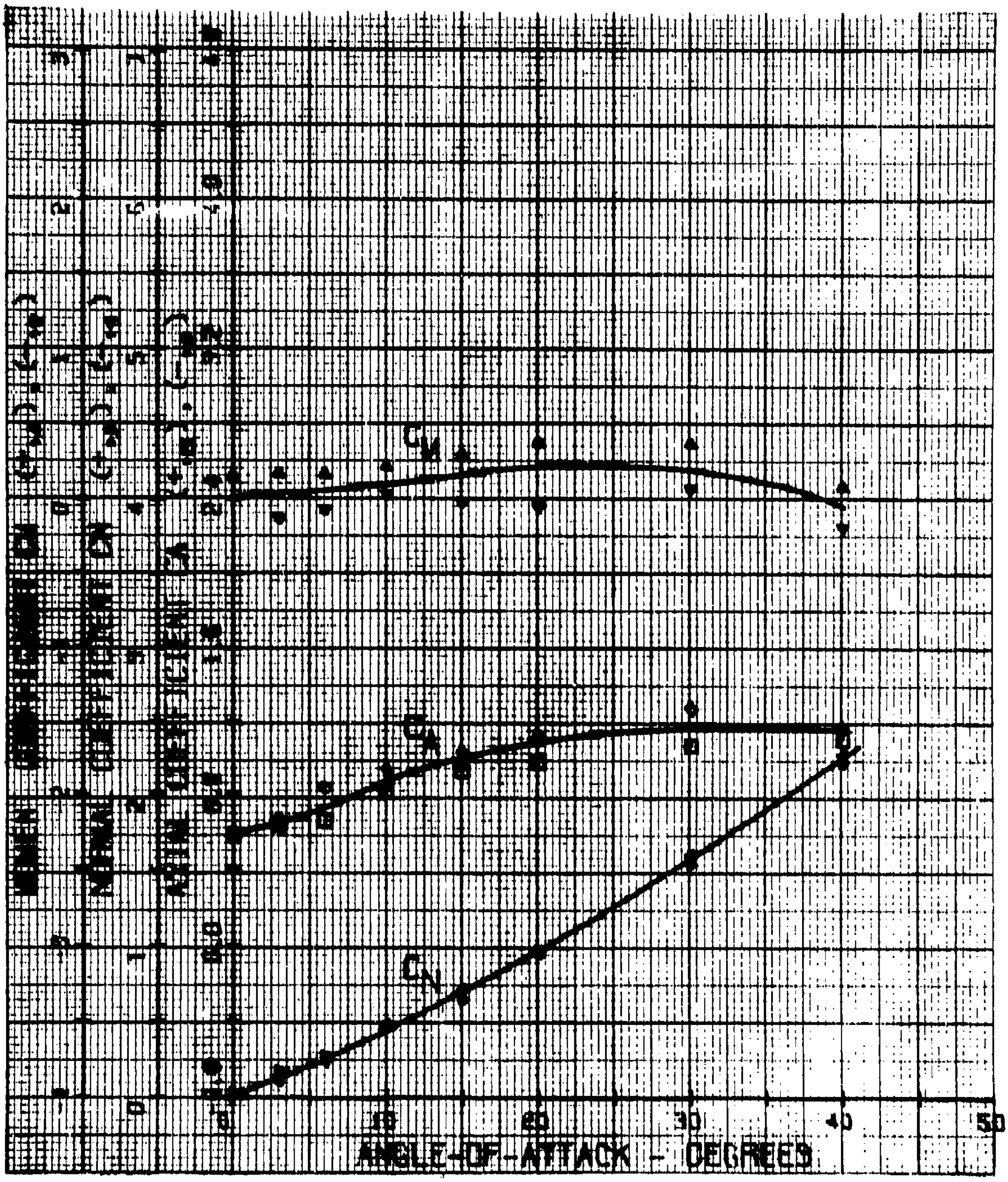
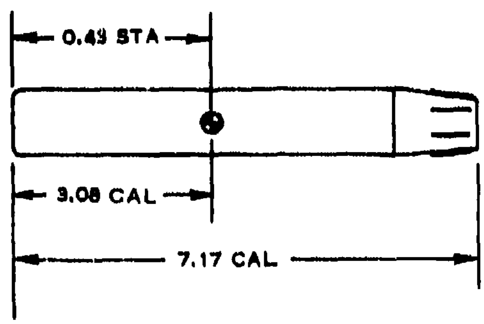


Figure 131. Graphic Static Aerodynamics Test Data:
Configuration 63 (Test No. 15)



General data
Model weight =
Moment of inertia =

Description of components

Nose shape	= flat with 0.1 caliber radius
Tripper	= none
Fineness ratio	= 7.17
Stabilizer	= none
Burble fence	= none
Boattail	= 1-1/3 caliber long, 10 degree cone angle
Strakes (8)	= 0.05 caliber high

Remarks

Figure 132. Model Specifications for Configuration 64

TABLE LXIX. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 64 (TEST NO. 20)

VELOCITY(FT/SEC)	= 218.50	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002298	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.85	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=0.2159E 08	ALPHA SHIFT(DEGREES)	=-4.000

ALPHA (DEGREES) SET	TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-44.0	-3.761	4.412	-5.770	0.561	0.611	0.106
-30.0	-34.0	-2.532	2.576	-3.540	0.720	-0.792	-0.224
-20.0	-24.0	-1.614	1.480	-2.077	0.696	-0.653	-0.314
-15.0	-19.0	-1.214	1.155	-1.524	0.696	-0.764	-0.502
-10.0	-14.0	-0.681	0.785	-0.851	0.596	-0.793	-0.932
-6.0	-10.0	-0.400	0.651	-0.507	0.572	-0.676	-1.333
-3.0	-7.0	-0.267	0.622	-0.340	0.585	-0.552	-1.623
-0.0	-4.0	-0.118	0.562	-0.157	0.553	-0.327	-2.077
3.0	-1.0	-0.030	0.543	-0.039	0.547	-0.107	-2.737
6.0	2.0	0.0	0.533	0.019	0.532	0.172	-9.237
10.0	6.0	0.222	0.577	0.281	0.551	0.424	-1.508
15.0	11.0	0.400	0.725	0.531	0.636	0.605	-1.140
20.0	16.0	0.962	0.977	1.194	0.674	0.637	-0.533
30.0	26.0	1.777	1.732	2.356	0.778	0.636	-0.270
40.0	36.0	2.680	2.857	3.848	0.736	0.663	-0.172

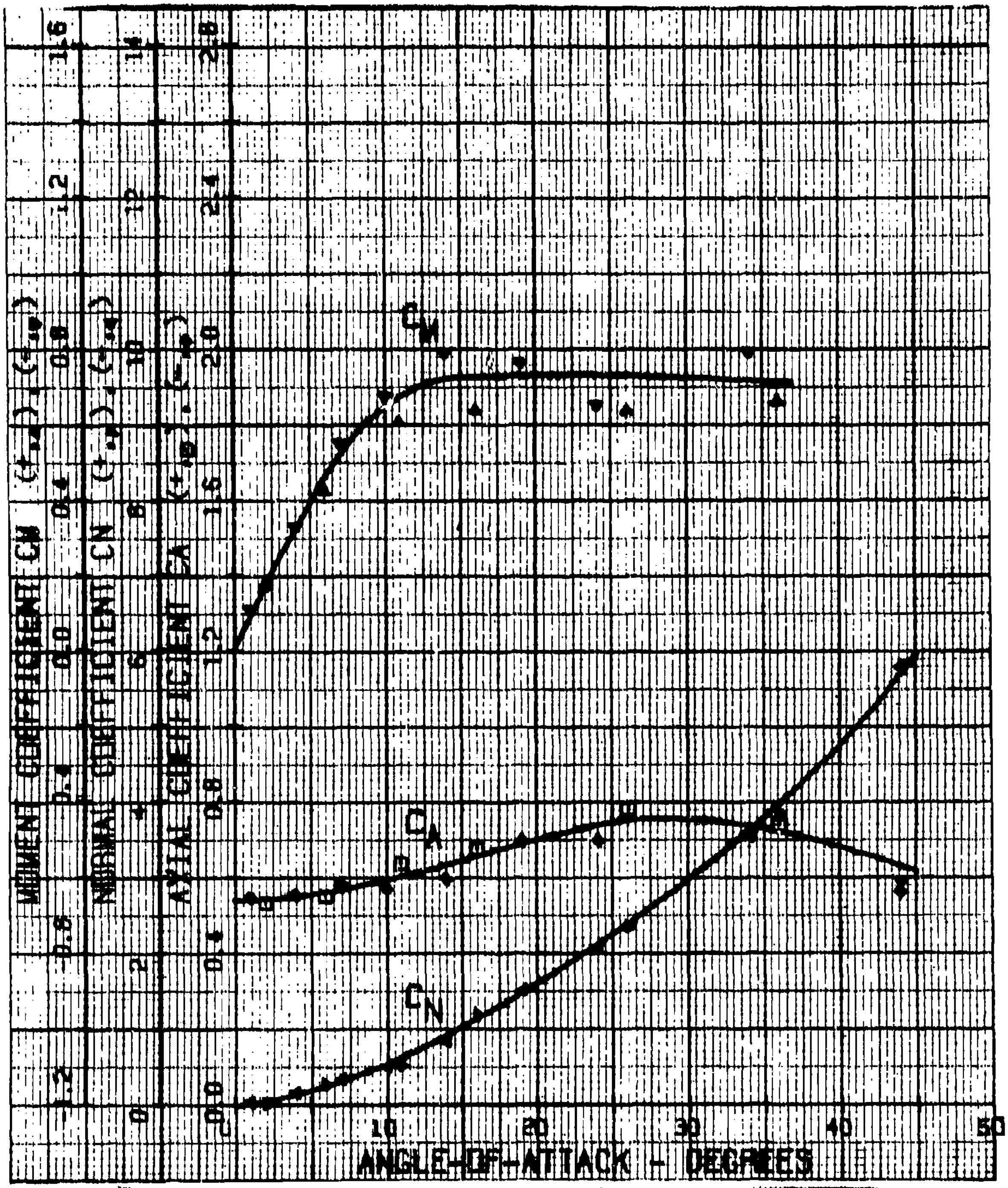
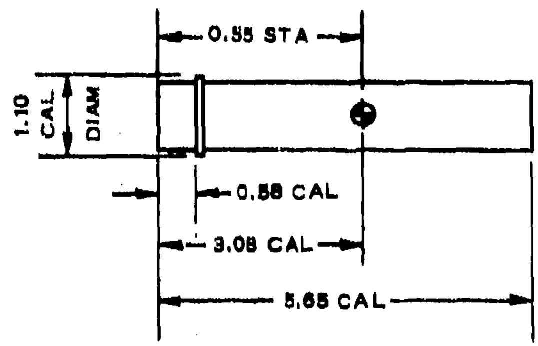


Figure 133. Graphic Static Aerodynamic Test Data: Configuration 64 (Test NO. 20)

Item	Page
Static aerodynamic data	
Tabulated	223
Plotted	224
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight =

Moment of inertia =

Description of components

Nose shape	= flat with 0.1 caliber radius
Tripper	= 1.10 caliber diameter
Fineness ratio	= 5.65
Stabilizer	= none
Burble fence	= none
Boattail	= none
Strakes (8)	= none

Remarks

Figure 134. Model Specifications for Configuration 65

TABLE LXX. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 65 (TEST NO. 26)

VELOCITY(FT/SEC)	= 218.50	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002279	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.39	C.G.(CALIBERS)	=3.0833
REYNOLDS NUMBER	=0.1687E 08	ALPHA SHIFT(DEGREES)	=-4.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-44.0	-2.375	3.316	-4.012	0.735	-1.830	-0.456
-30.0	-34.0	-1.419	2.166	-2.388	1.002	-1.715	-0.718
-20.0	-24.0	-1.046	1.509	-1.569	0.953	-1.198	-0.764
-15.0	-19.0	-0.792	1.210	-1.142	0.886	-0.897	-0.785
-10.0	-14.0	-0.553	1.045	-0.789	0.881	-0.653	-0.828
-6.0	-10.0	-0.403	0.895	-0.553	0.812	-0.433	-0.784
-3.0	-7.0	-0.239	0.717	-0.325	0.682	-0.170	-0.525
-0.0	-4.0	-0.239	0.612	-0.281	0.594	-0.017	-0.060
3.0	-1.0	0.0	0.553	-0.010	0.552	0.171	17.700
6.0	2.0	0.0	0.627	0.022	0.627	0.282	-12.874
10.0	6.0	0.134	0.806	0.218	0.788	0.560	-2.569
15.0	11.0	0.359	0.986	0.540	0.899	0.899	-1.665
20.0	16.0	0.512	1.165	0.910	0.951	1.219	-1.340
30.0	26.0	1.061	1.837	1.759	1.186	1.588	-0.903
40.0	36.0	1.359	2.405	2.513	1.147	2.253	-0.896

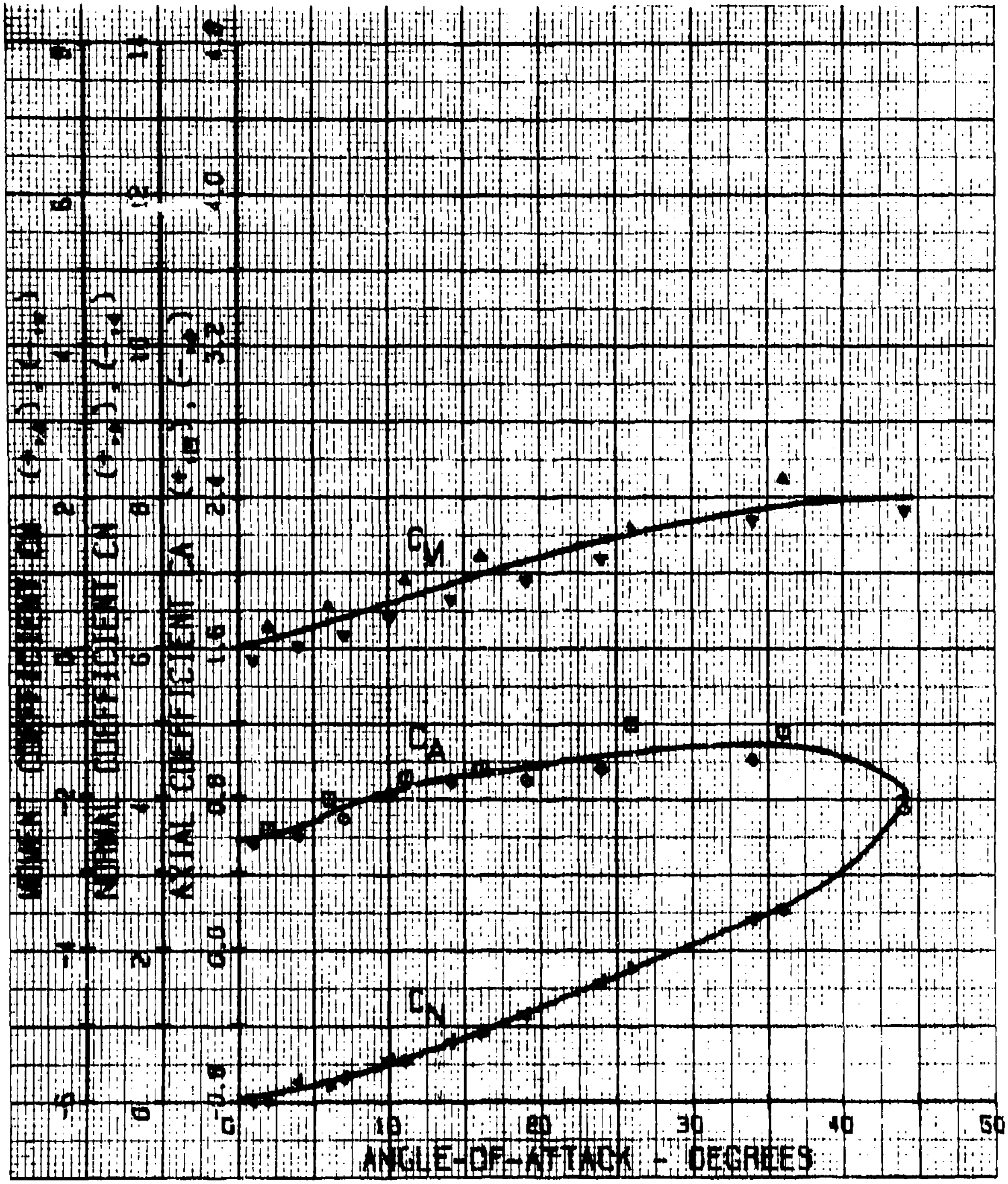
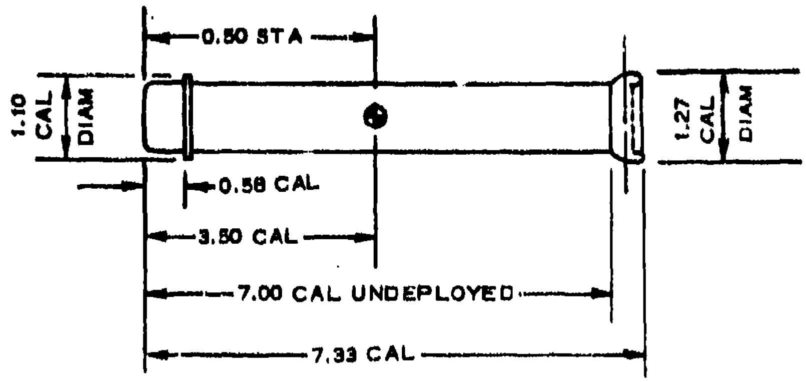


Figure 135. Graphic Static Aerodynamics Test Data: Configuration 65 (Test No. 26)

Item	Page
Static aerodynamic data	
Tabulated	226
Plotted	227
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight =

Moment of inertia =

Description of components

Nose shape	= flat with 0.1 caliber radius
Tripper	= 1.10 caliber diameter
Fineness ratio	= 7.00
Stabilizer	= 1.27 caliber diameter Ballute
Burble fence	= none
Boattail	= none
Strakes (8)	= none

Remarks

Figure 136. Model Specifications for Configuration 66

TABLE LXXI. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 66 (TEST NO. 28)

VELOCITY(FT/SEC)	= 219.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002298	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 55.10	C.G.(CALIBERS)	=3.5000
REYNOLDS NUMBER	=0.2214E 08	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-3.346	4.540	-5.544	1.038	-1.771	-0.319
-30.0	-33.0	-1.916	2.697	-3.076	1.218	-0.473	-0.154
-20.0	-23.0	-1.371	2.004	-2.045	1.309	-0.328	-0.160
-15.0	-18.0	-1.091	1.592	-1.529	1.177	-0.249	-0.163
-10.0	-13.0	-0.826	1.341	-1.106	1.121	-0.292	-0.264
-6.0	-9.0	-0.516	1.149	-0.689	1.055	-0.226	-0.327
-3.0	-6.0	-0.265	1.061	-0.375	1.027	-0.114	-0.305
-0.0	-3.0	-0.221	0.928	-0.269	0.915	-0.077	-0.285
3.0	0.0	0.059	0.840	0.059	0.840	-0.104	1.762
6.0	3.0	0.059	0.840	0.103	0.836	-0.024	0.234
10.0	7.0	0.295	0.973	0.411	0.929	-0.039	0.094
15.0	12.0	0.501	1.179	0.735	1.049	0.156	-0.211
20.0	17.0	0.943	1.459	1.329	1.119	0.126	-0.095
30.0	27.0	1.474	2.036	2.237	1.143	0.049	-0.022
40.0	37.0	2.389	3.066	3.752	1.011	-0.170	0.045

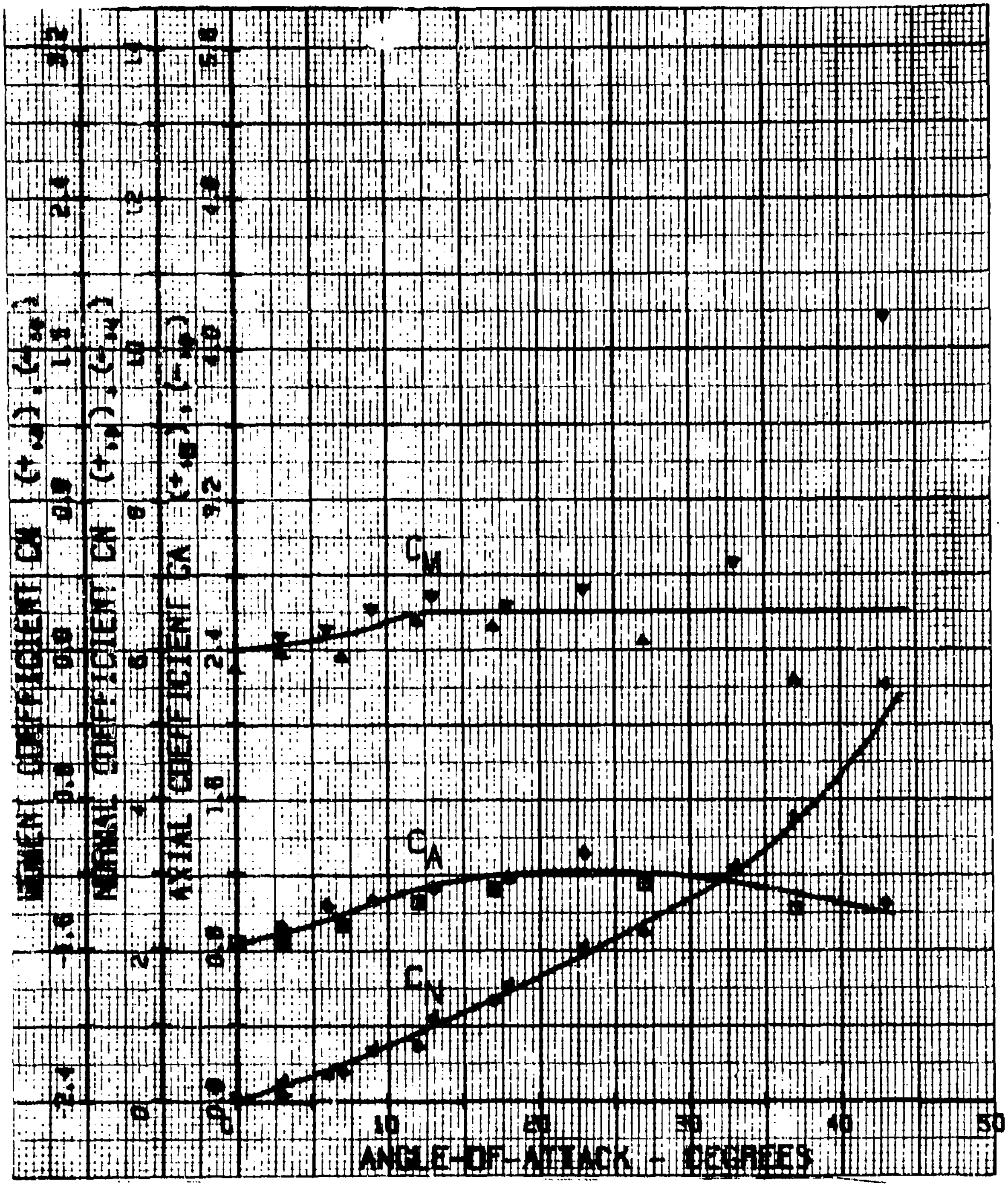
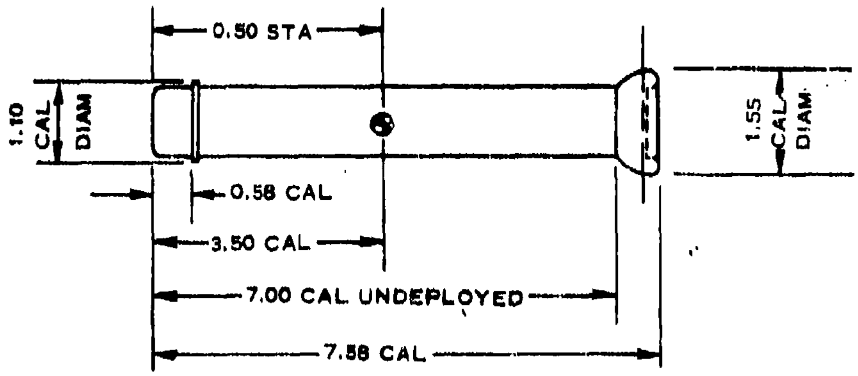


Figure 137. Graphic Static Aerodynamics Test Data: Configuration 66 (Test No. 28)

Item	Page
Static aerodynamic data	
Tabulated	229
Plotted	230
Dynamic stability data	
Tabulated	
Plotted	



General data
    Model weight =
    Moment of inertia =

Description of components
    Nose shape = flat with 0.1 caliber radius
    Tripper = 1.10 caliber diameter
    Fineness ratio = 7.00
    Stabilizer = 1.55 caliber diameter Ballute
    Burble fence = none
    Boattail = none
    Strakes (8) = none

Remarks

Figure 138. Model Specification for Configuration 67

TABLE LXXII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 67 (TEST NO. 31)

VELOCITY(FT/SEC)	= 219.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002238	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 55.10	C.G.(CALIBERS)	=3.5000
REYNOLDS NUMBER	=0.2289E 08	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-3.464	4.746	-5.770	1.109	2.091	0.362
-30.0	-33.0	-2.255	3.125	-3.593	1.392	1.080	0.301
-20.0	-23.0	-1.636	2.255	-2.387	1.436	0.719	0.301
-15.0	-18.0	-1.224	1.945	-1.765	1.472	0.490	0.278
-10.0	-13.0	-0.781	1.518	-1.103	1.303	0.157	0.142
-6.0	-9.0	-0.545	1.341	-0.748	1.239	-0.112	-0.150
-3.0	-6.0	-0.398	1.179	-0.519	1.131	-0.169	-0.325
-0.0	-3.0	-0.177	1.076	-0.233	1.065	-0.233	-0.999
3.0	0.0	0.029	0.987	0.029	0.987	-0.437	14.808
6.0	3.0	0.133	1.002	0.185	0.994	-0.457	2.470
10.0	7.0	0.369	1.223	0.515	1.169	-0.599	1.164
15.0	12.0	0.663	1.474	0.955	1.304	-0.783	0.820
20.0	17.0	1.076	1.827	1.563	1.433	-1.116	0.714
30.0	27.0	1.813	2.476	2.740	1.383	-1.769	0.646
40.0	37.0	2.594	3.449	4.148	1.193	-1.508	0.364

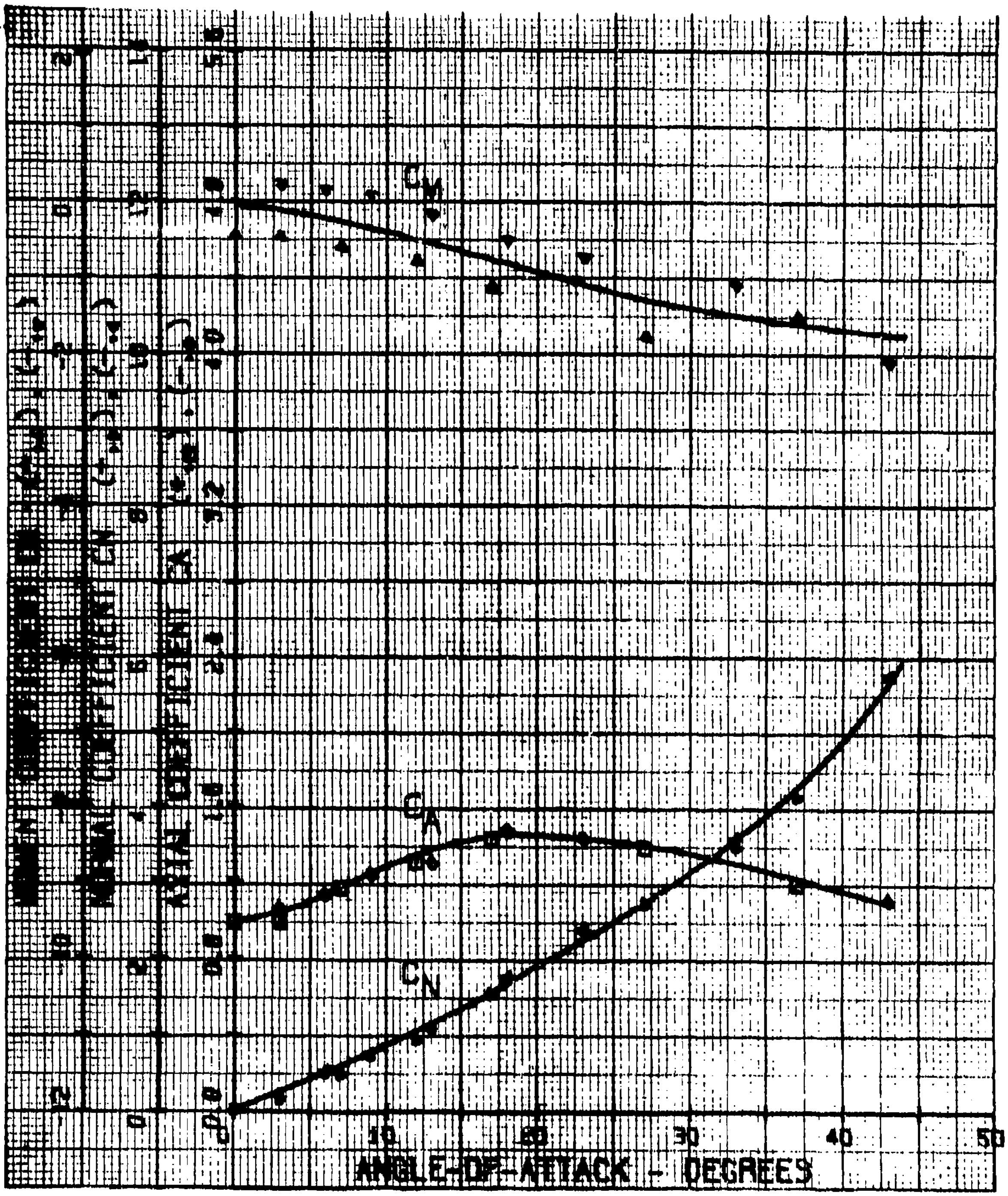
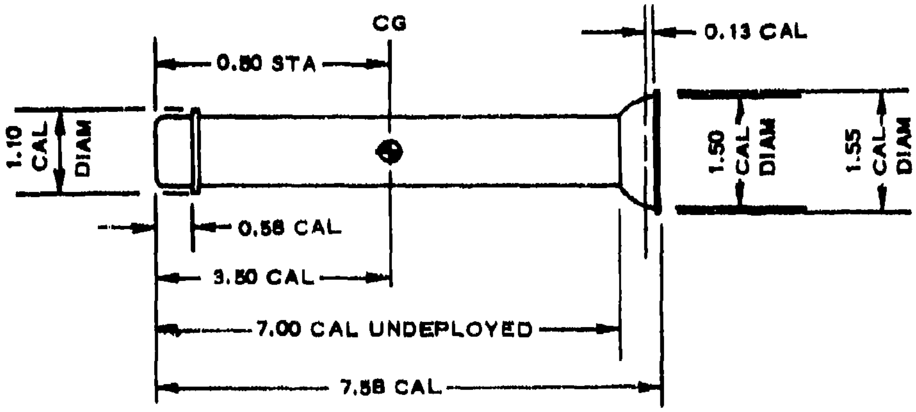


Figure 139. Graphic Static Aerodynamic Test Data: Configuration 67. (Test No. 31)

Item	Page
Static aerodynamic data	
Tabulated	232
Plotted	233
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 365.0 gm
Moment of inertia = 0.19939 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	7.00
Stabilizer	=	1.55 caliber diameter Ballute
Burble fence	=	1.50 caliber diameter
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 140. Model Specification for Configuration 68

TABLE LXXIII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 68 (TEST NO. 32)

VELOCITY(FT/SEC)	= 219.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002298	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 55.10	C.G.(CALIBERS)	=3.5000
REYNOLDS NUMBER	=0.2289E 08	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-3.479	4.628	-5.701	1.012	2.206	0.387
-30.0	-33.0	-2.093	2.933	-3.353	1.320	0.477	0.142
-20.0	-23.0	-1.563	2.108	-2.262	1.329	0.346	0.153
-15.0	-18.0	-1.238	1.695	-1.701	1.229	0.209	0.123
-10.0	-13.0	-0.708	1.444	-1.014	1.248	0.167	0.164
-6.0	-9.0	-0.501	1.253	-0.691	1.159	0.135	0.195
-3.0	-6.0	-0.383	1.076	-0.494	1.030	0.139	0.282
-0.0	-3.0	-0.162	0.987	-0.214	0.977	0.171	0.802
3.0	0.0	-0.088	0.869	-0.083	0.869	-0.049	-0.549
6.0	3.0	0.162	0.943	0.211	0.933	-0.115	0.546
10.0	7.0	0.457	1.164	0.595	1.100	-0.160	0.269
15.0	12.0	0.634	1.341	0.899	1.180	-0.139	0.154
20.0	17.0	1.002	1.547	1.411	1.187	-0.219	0.155
30.0	27.0	1.946	2.358	2.804	1.218	-0.990	0.353
40.0	37.0	2.712	3.582	4.322	1.228	-1.306	0.302

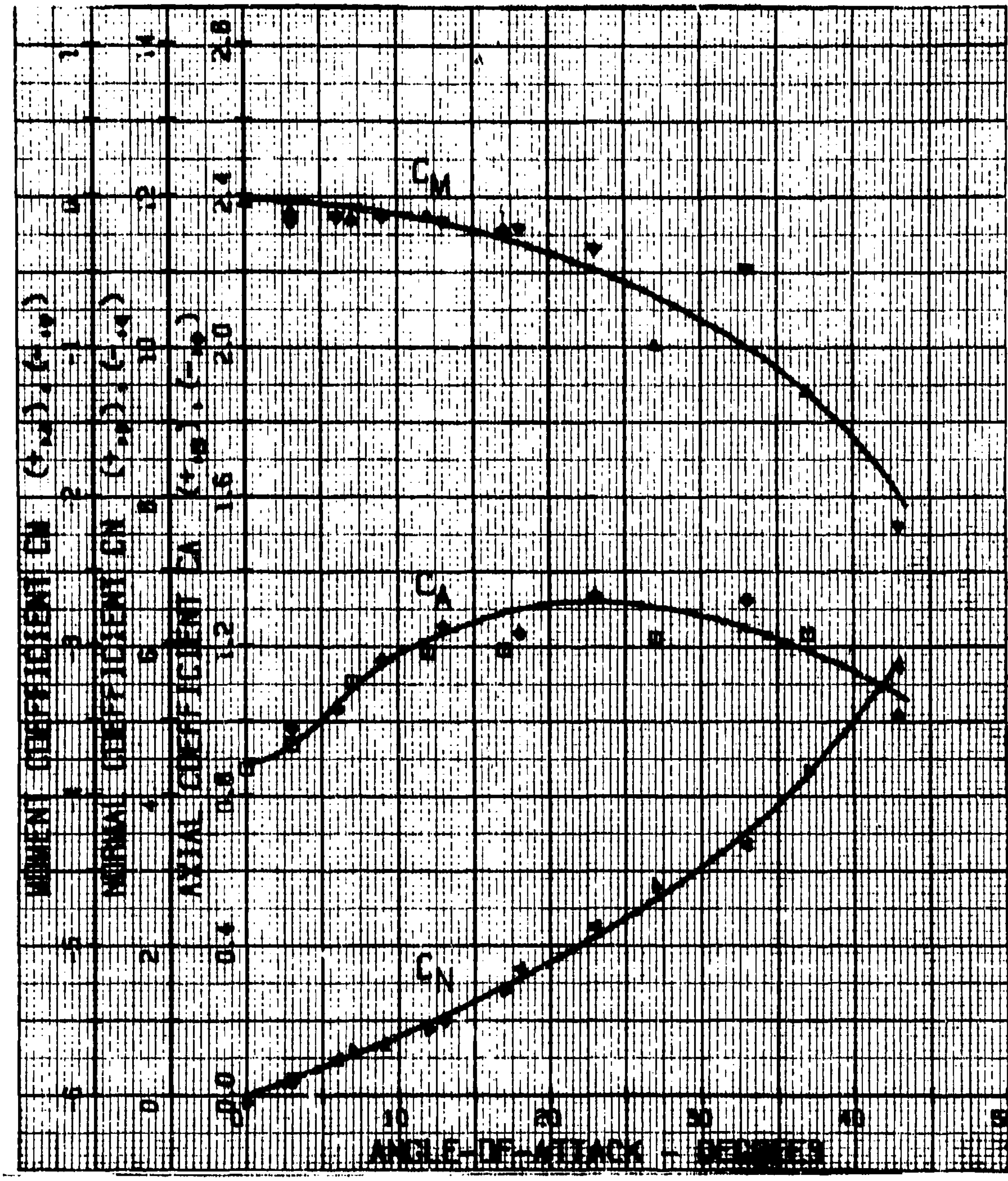
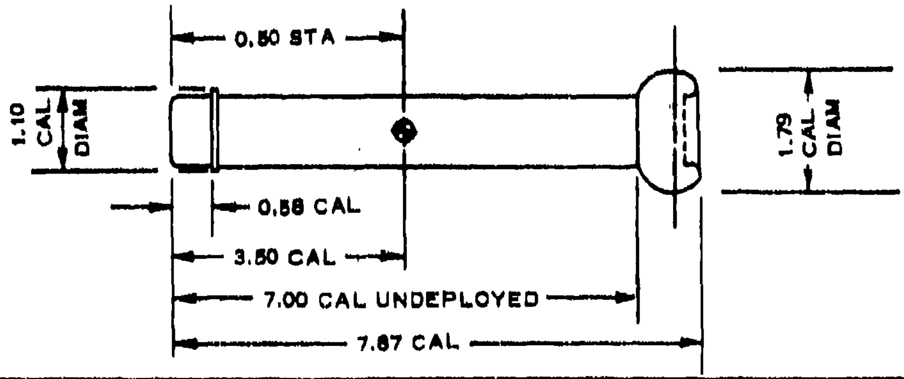


Figure 141. Graphic Static Aerodynamics Test Data: Configuration 68. (Test No. 32)

Item	Page
Static aerodynamic data	
Tabulated	235
Plotted	236
Dynamic stability data	
Tabulated	
Plotted	



General data
    Model weight =
    Moment of inertia =

Description of components
    Nose shape = flat with 0.1 caliber radius
    Tripper = 1.10 caliber diameter
    Fineness ratio = 7.00
    Stabilizer = 1.79 caliber diameter Ballute
    Burble fence = none
    Boattail = none
    Strakes (8) = none

Remarks

Figure 142. Model Specifications for Configuration 69

TABLE LXXIV. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 69
(TEST NO. 35)

VELOCITY(FT/SEC)	= 219.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002292	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.97	C.G.(CALIBERS)	=3.5000
REYNOLDS NUMBER	=0.2371E 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-3.872	5.703	-6.770	1.295	5.113	0.755
-30.0	-35.0	-2.926	3.612	-4.583	1.444	3.944	0.860
-20.0	-25.0	-1.936	2.984	-3.016	1.887	3.185	1.056
-15.0	-20.0	-1.818	2.630	-2.607	1.849	2.963	1.136
-10.0	-15.0	-1.300	2.290	-1.849	1.875	2.127	1.150
-6.0	-11.0	-0.872	1.891	-1.217	1.690	1.492	1.227
-3.0	-8.0	-0.576	1.654	-0.801	1.558	0.993	1.239
-0.0	-5.0	-0.355	1.521	-0.486	1.485	0.618	1.271
3.0	-2.0	0.015	1.374	-0.033	1.373	0.106	3.194
6.0	1.0	0.118	1.359	0.142	1.357	-0.225	1.588
10.0	5.0	0.458	1.565	0.593	1.520	-1.036	1.747
15.0	10.0	0.887	1.906	1.204	1.723	-1.821	1.512
20.0	15.0	1.389	2.245	1.923	1.809	-2.703	1.406
30.0	25.0	2.364	2.919	3.373	1.638	-4.205	1.247
40.0	35.0	2.911	3.767	4.546	1.416	-4.638	1.020

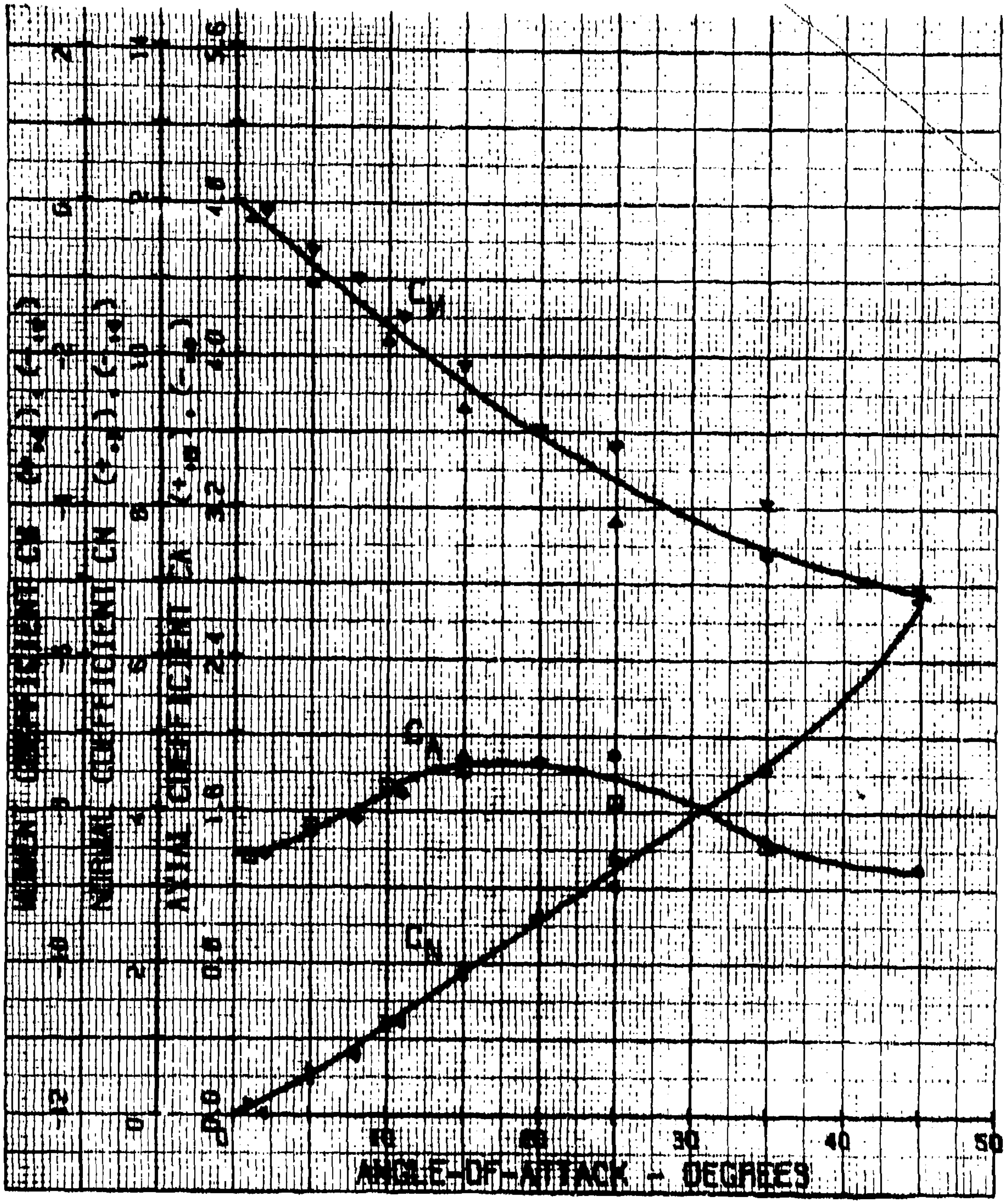
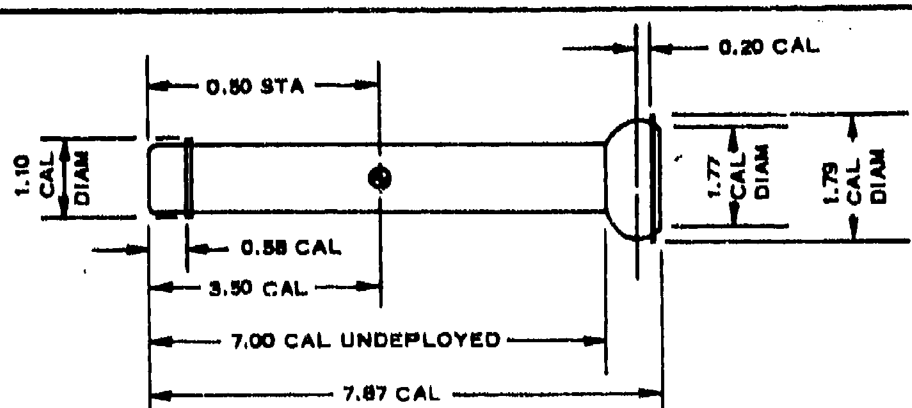


Figure 143. Graphic Static Aerodynamic Test Data: Configuration 69 (Test No. 35)

Item	Page
Static aerodynamic data	
Tabulated	238
Plotted	239
Dynamic stability data	
Tabulated	240
Plotted	241



General data

Model weight = 368.3 gm
Moment of inertia = 0.20797 slug in.^{2}

Description of components

Nose shape = flat with 0.1 caliber radius
Tripper = 1.10 caliber radius
Fineness ratio = 7.00
Stabilizer = 1.79 caliber diameter Ballute
Burble fence = 1.77 caliber diameter
Boattail = none
Strakes (8) = none

Remarks

Figure 144. Model Specifications for Configuration 70

TABLE LXXV. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 70 (TEST NO. 36)

VELOCITY(FT/SEC)	= 219.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002292	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.77	C.G.(CALIBERS)	=3.5000
REYNOLDS NUMBER	=0.2371E 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-4.019	5.733	-6.896	1.212	5.187	0.752
-30.0	-35.0	-3.015	3.605	-4.537	1.224	3.677	0.810
-20.0	-25.0	-1.980	2.674	-2.925	1.597	2.340	0.800
-15.0	-20.0	-1.699	2.185	-2.345	1.473	1.918	0.818
-10.0	-15.0	-1.034	1.861	-1.481	1.510	1.394	0.941
-6.0	-11.0	-0.783	1.640	-1.082	1.460	1.051	0.972
-3.0	-8.0	-0.709	1.507	-0.912	1.393	0.795	0.871
-0.0	-5.0	-0.340	1.374	-0.458	1.339	0.577	1.259
3.0	-2.0	-0.192	1.226	-0.235	1.218	0.282	1.200
6.0	1.0	0.015	1.167	0.035	1.166	0.015	-0.424
10.0	5.0	0.340	1.344	0.456	1.309	-0.536	1.177
15.0	10.0	0.709	1.551	0.968	1.404	-0.734	0.820
20.0	15.0	1.212	1.832	1.645	1.456	-1.296	0.788
30.0	25.0	2.187	2.644	3.100	1.472	-3.230	1.042
40.0	35.0	3.088	3.634	4.615	1.206	-4.013	0.870

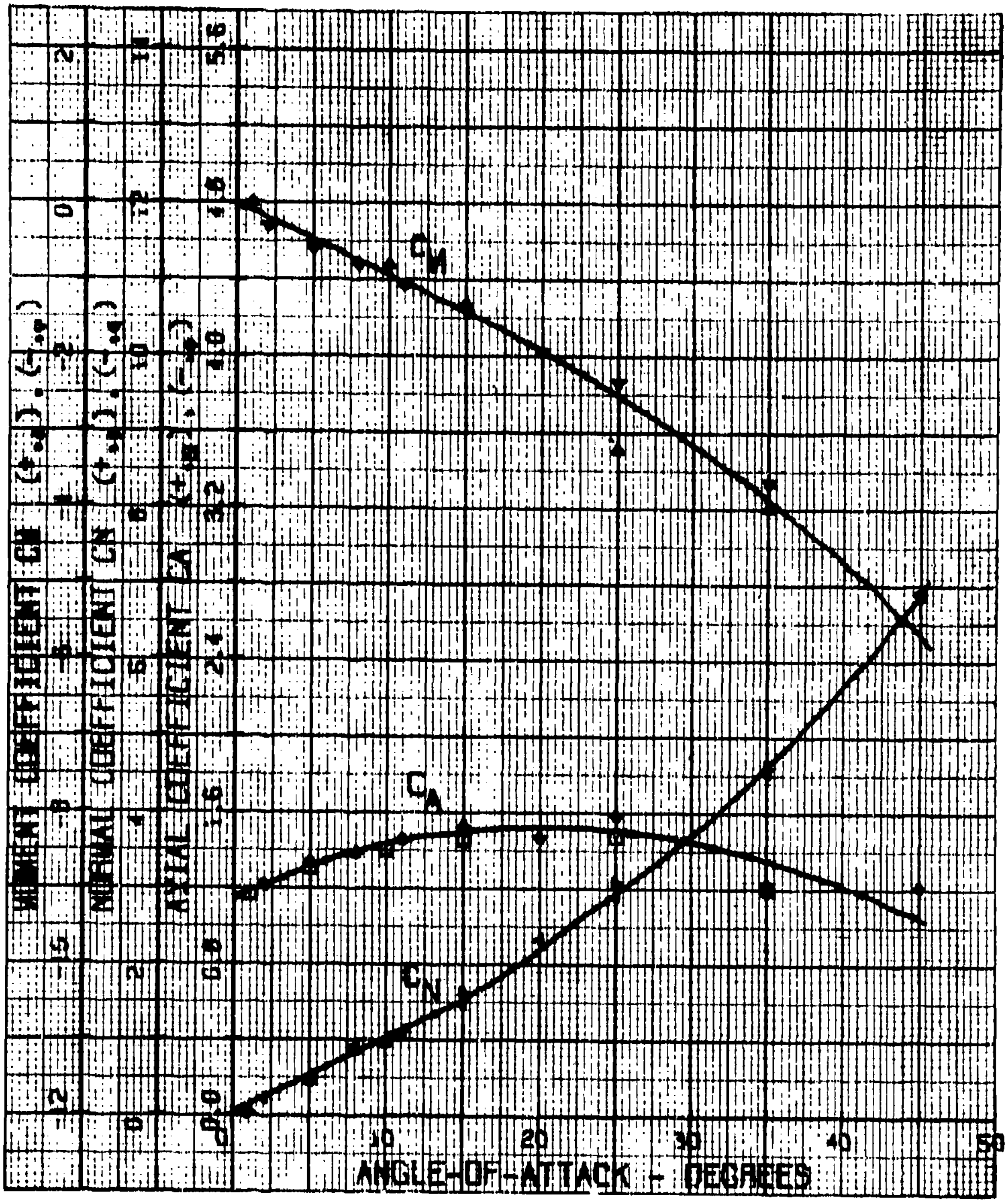


Figure 145. Graphic Static Aerodynamic Test Data: Configuration 70 (Test No. 36)

TABLE LXXVI. DYNAMIC STABILITY TEST DATA: CONFIGURATION 70

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.207970
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002298
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =623,626
VELOCITY(FT/SEC)= 217.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.747	-111.891
50.000	25.000	0.791	-105.699
40.000	20.000	0.825	-101.295
30.000	15.000	0.803	-104.054
25.000	12.500	0.809	-103.250

TEST NUMBERS =618,621
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.253	-144.713
50.000	25.000	1.162	-155.994
40.000	20.000	1.084	-167.233
30.000	15.000	1.066	-170.176
25.000	12.500	1.128	-160.748

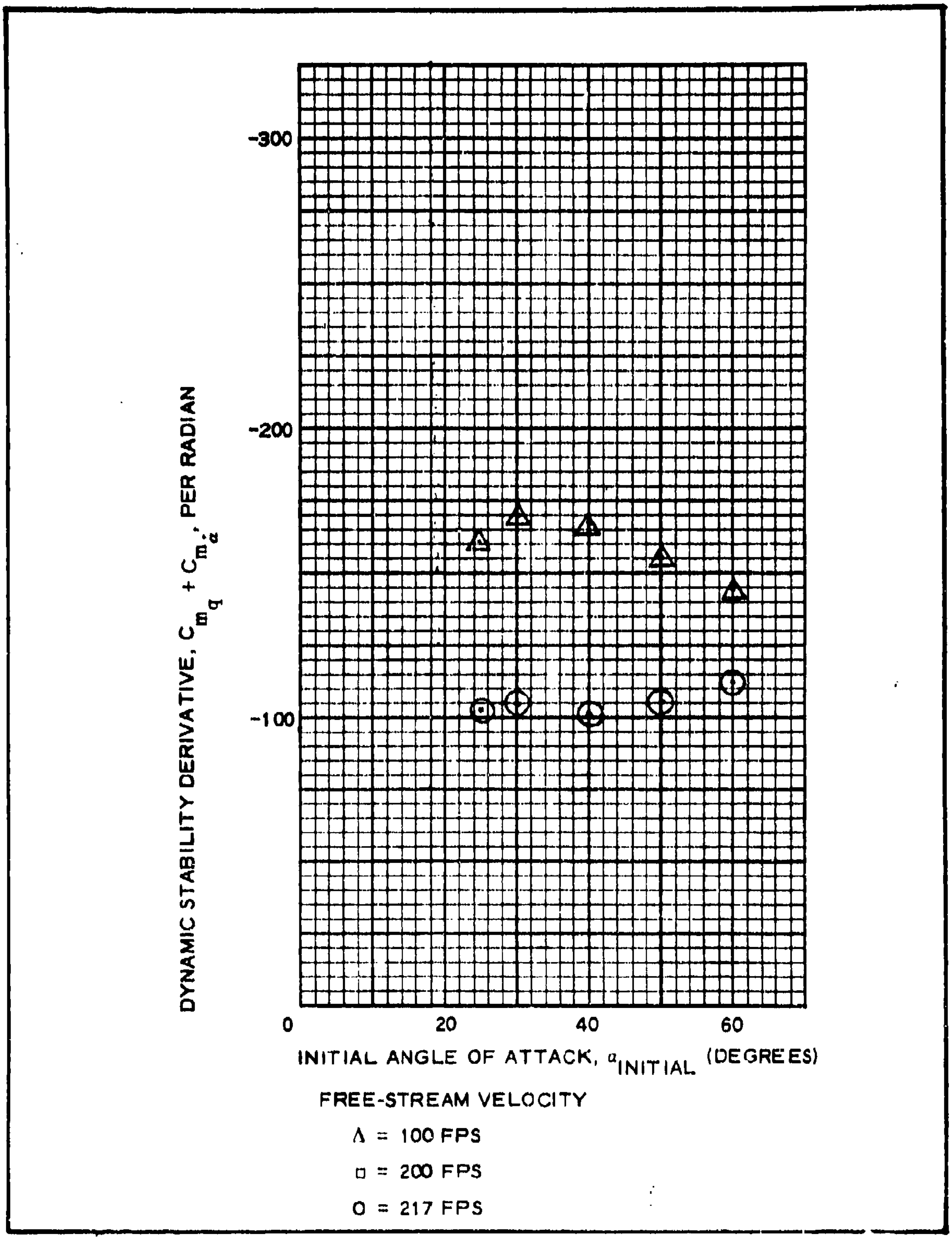
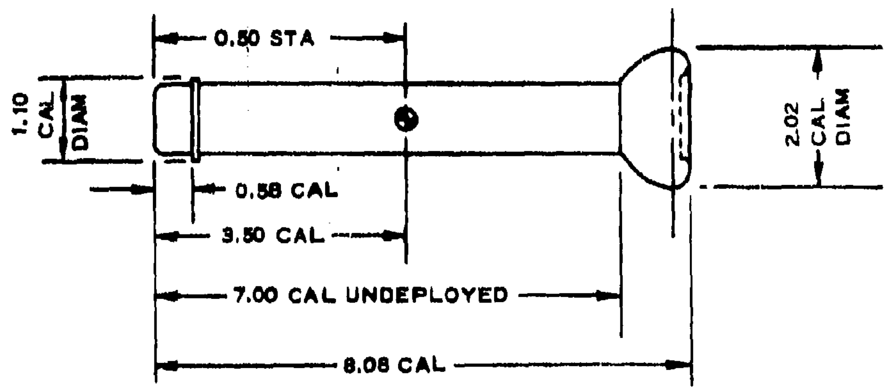


Figure 146. Graphic Dynamic Stability Test Data: Configuration 70

Item	Page
Static aerodynamic data	
Tabulated	243
Plotted	244
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight =

Moment of inertia =

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	7.00
Stabilizer	=	2.02 caliber diameter Ballute
Burble fence	=	none
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 147. Model Specifications on Configuration 71

TABLE LXXVII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 71 (TEST NO. 39)

VELOCITY(FT/SEC)	= 219.00	REFFRENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002286	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.83	C.G.(CALIBERS)	=3.5000
REYNOLDS NUMBER	=0.2427E 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-3.896	5.791	-6.850	1.340	6.162	0.900
-30.0	-35.0	-2.800	4.250	-4.731	1.876	5.276	1.115
-20.0	-25.0	-2.296	3.451	-3.539	2.157	4.929	1.393
-15.0	-20.0	-2.044	3.125	-2.990	2.237	4.802	1.606
-10.0	-15.0	-1.496	2.621	-2.124	2.144	3.571	1.682
-6.0	-11.0	-0.918	2.369	-1.354	2.150	2.344	1.732
-3.0	-8.0	-0.726	1.969	-0.993	1.849	1.608	1.619
-0.0	-5.0	-0.444	1.762	-0.596	1.716	0.728	1.220
3.0	-2.0	-0.148	1.614	-0.204	1.608	-0.180	-0.880
6.0	1.0	0.059	1.614	0.087	1.612	0.395	-4.521
10.0	5.0	0.444	1.747	0.595	1.702	-1.099	1.848
15.0	10.0	0.874	2.206	1.244	2.021	-2.473	1.988
20.0	15.0	1.467	2.651	2.103	2.181	-3.862	1.837
30.0	25.0	2.444	3.317	3.617	1.973	-5.307	1.467
40.0	35.0	2.977	4.162	4.826	1.701	-5.935	1.230

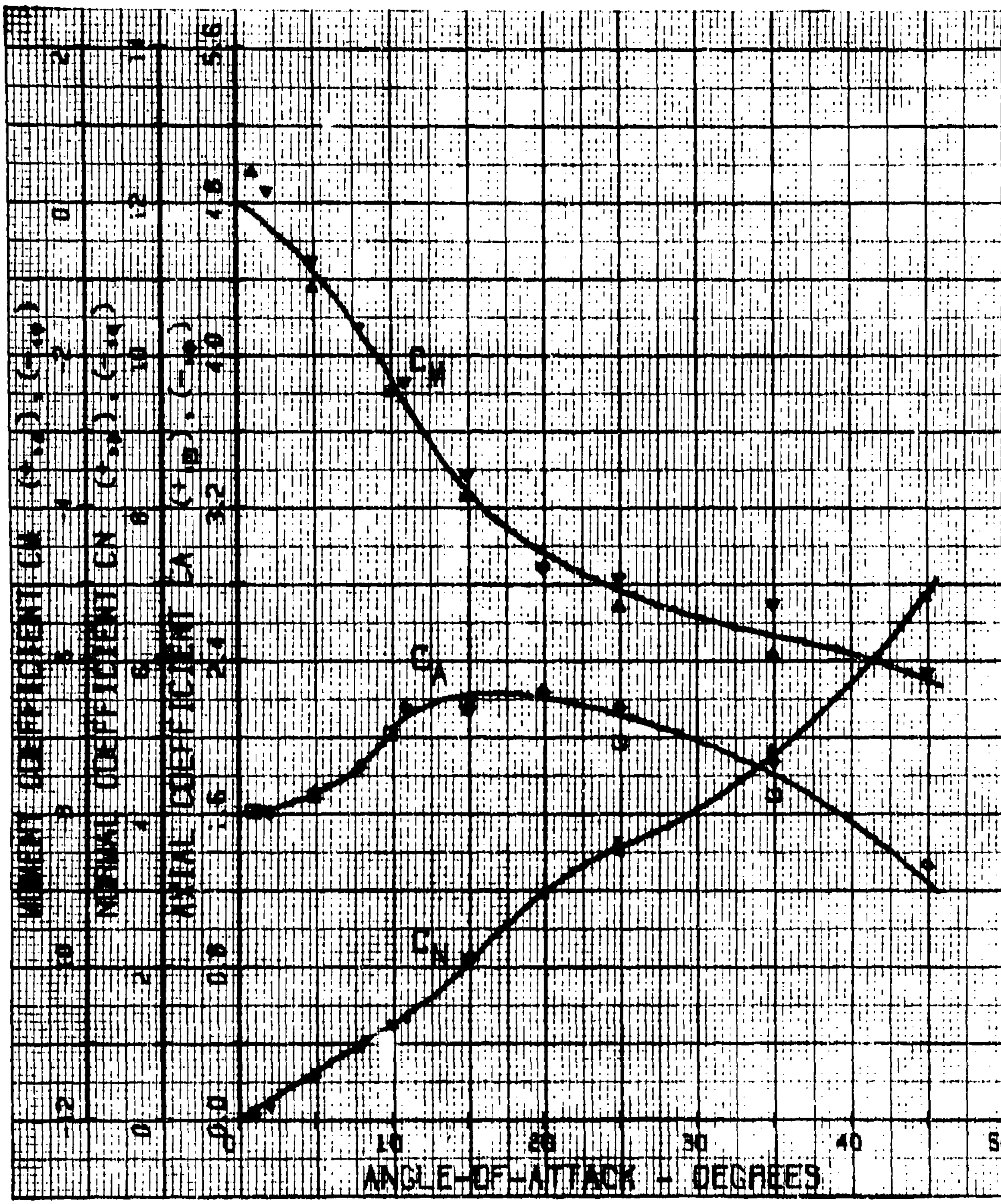
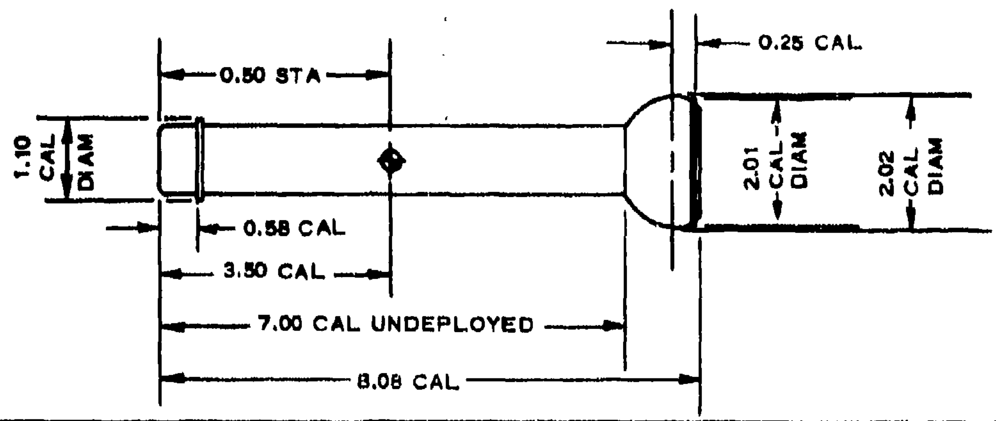


Figure 148. Graphic Static Aerodynamic Test Data: Configuration 71 (Test No. 39)



General data

Model weight = 372.0 gm
Moment of inertia = 0.22049 slug in.^{2}

Description of components

Nose shape = flat with 0.1 caliber radius
Tripper = 1.10 caliber diameter
Fineness ratio = 7.00
Stabilizer = 2.02 caliber diameter Ballute
Burble fence = 2.01 caliber diameter
Boattail = none
Strakes (8) = none

Remarks

Figure 149. Model Specifications for Configuration 72

TABLE LXXVIII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 72 (TEST NO. 40)

VELOCITY(FT/SEC)	= 219.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002279	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.64	C.G.(CALIBERS)	=3.5000
REYNOLDS NUMBER	=0.2419E 08	ALPHA SHIFT(DEGREES)	=-6.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-46.0	-4.489	6.375	-7.704	1.200	8.083	1.049
-30.0	-36.0	-3.092	4.057	-4.886	1.465	5.838	1.195
-20.0	-26.0	-2.096	3.046	-3.219	1.819	4.229	1.314
-15.0	-21.0	-1.784	2.615	-2.602	1.802	3.440	1.322
-10.0	-16.0	-1.323	2.303	-1.906	1.849	2.535	1.330
-6.0	-12.0	-0.966	2.050	-1.371	1.805	2.076	1.514
-3.0	-9.0	-0.817	1.887	-1.103	1.736	1.823	1.653
-0.0	-6.0	-0.520	1.739	-0.699	1.674	1.368	1.957
3.0	-3.0	-0.297	1.619	-0.382	1.601	0.573	1.501
6.0	0.0	0.045	1.589	0.045	1.599	0.202	-4.529
10.0	4.0	0.342	1.723	0.461	1.675	-0.663	1.438
15.0	9.0	0.713	1.902	1.002	1.767	-1.354	1.351
20.0	14.0	1.189	2.154	1.675	1.803	-2.350	1.403
30.0	24.0	2.363	2.927	3.350	1.713	-4.507	1.346
40.0	34.0	3.255	3.968	4.917	1.469	-6.289	1.279

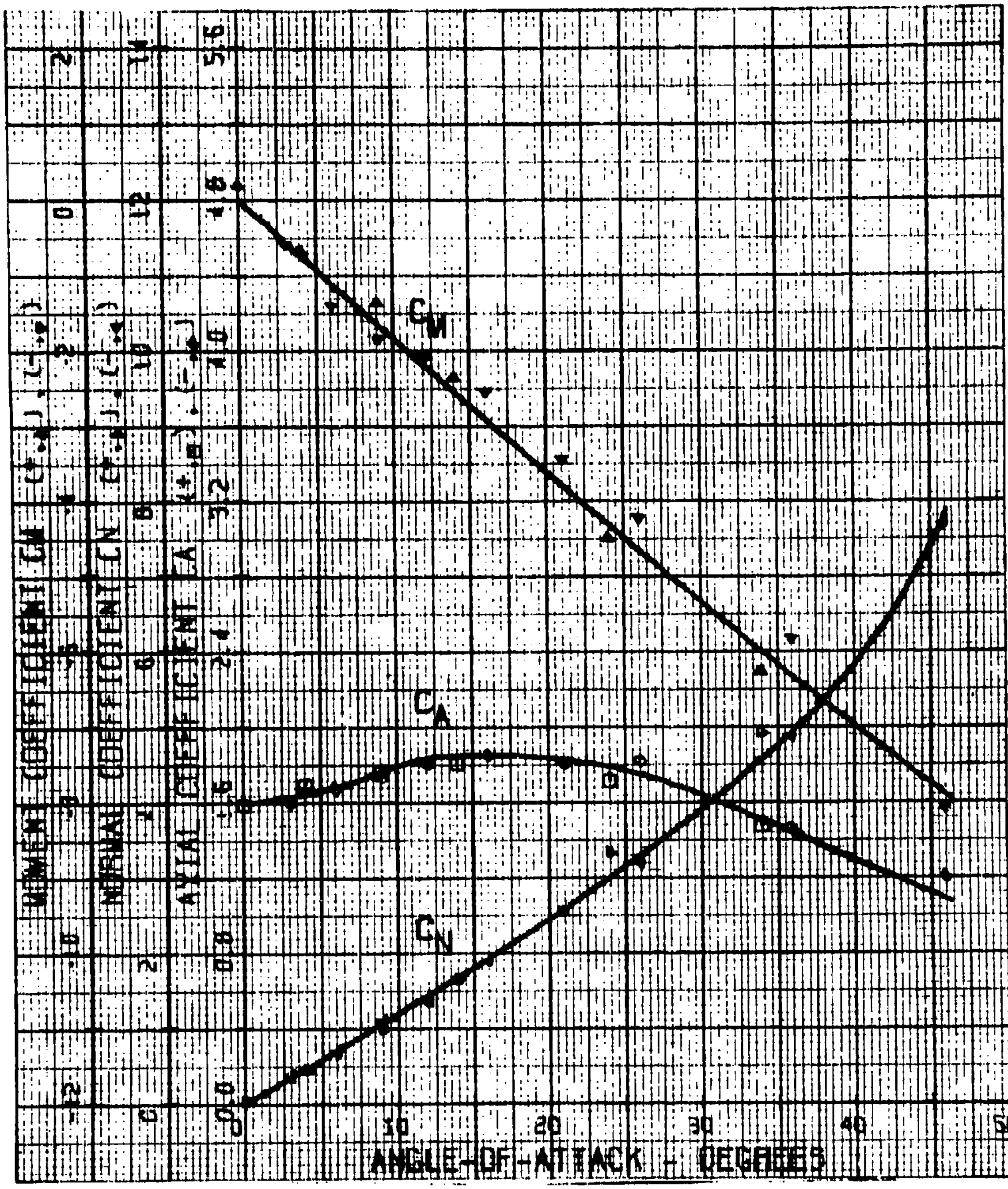


Figure 150. Graphic Static Aerodynamic Test Data: Configuration 72 (Test No. 40)

TABLE LXXIX. DYNAMIC STABILITY TEST DATA: CONFIGURATION 72

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.220490
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002298
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =628,631
VELOCITY(FT/SEC)= 217.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.641	-138.301
50.000	25.000	0.697	-127.138
40.000	20.000	0.741	-119.628
30.000	15.000	0.744	-119.125
25.000	12.500	0.744	-119.125

TEST NUMBERS =633,636
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.128	-170.425
50.000	25.000	1.231	-156.151
40.000	20.000	1.297	-148.249
30.000	15.000	1.341	-143.411
25.000	12.500	1.406	-136.718

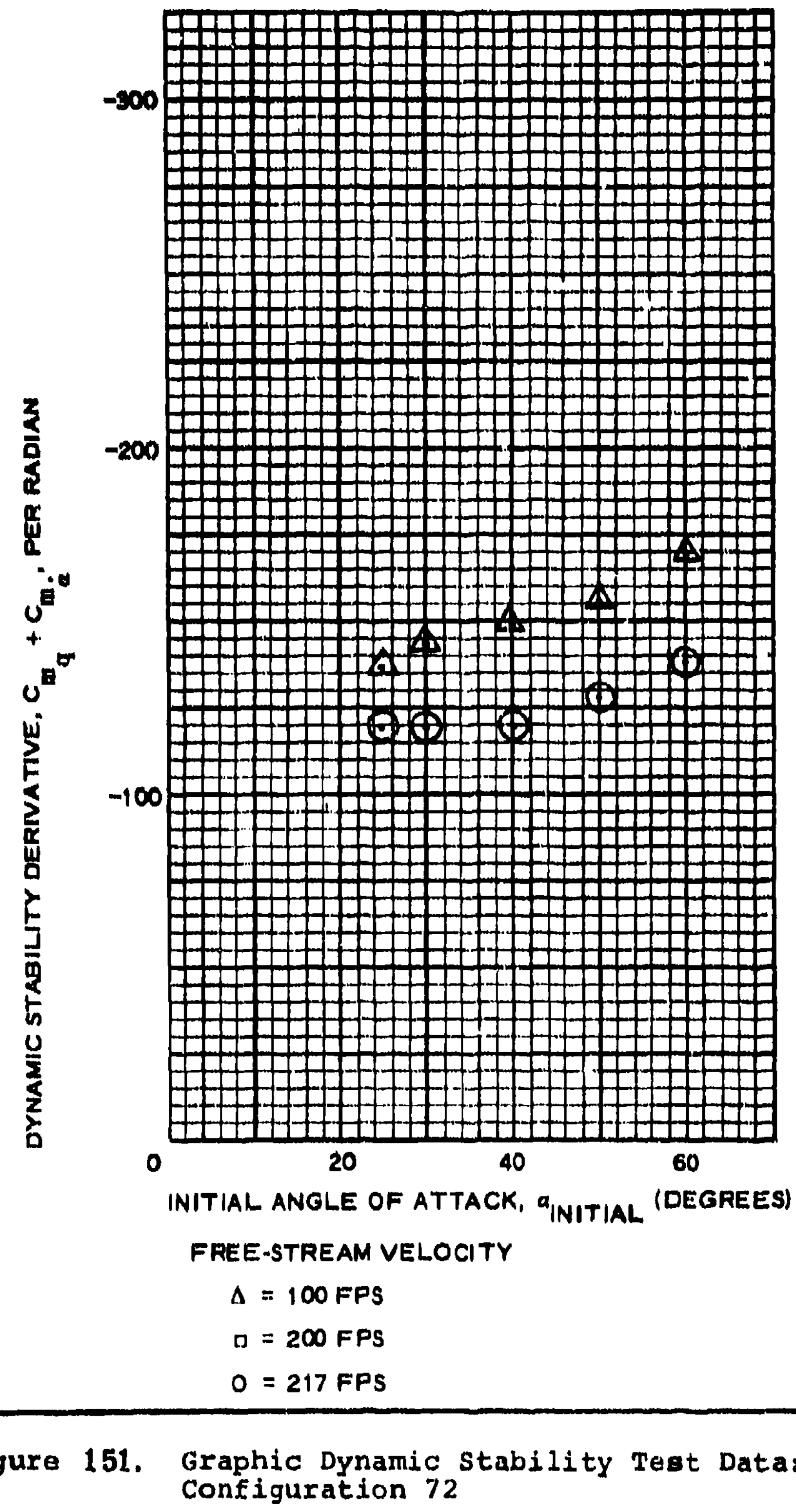
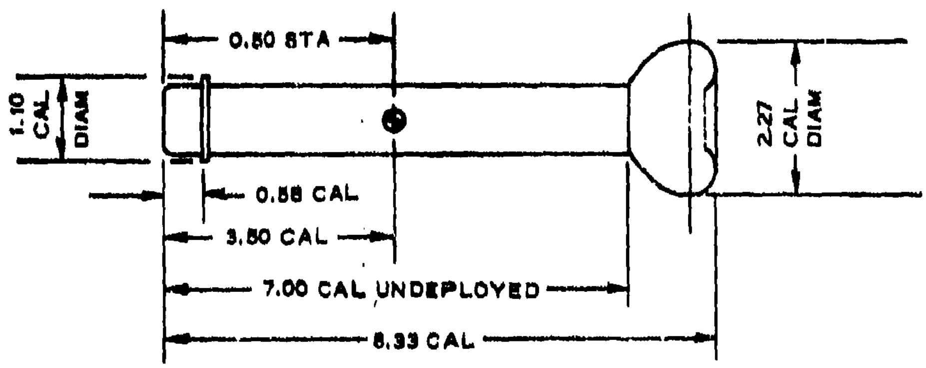


Figure 151. Graphic Dynamic Stability Test Data: Configuration 72

Item	Page
Static aerodynamic data	
Tabulated	251
Plotted	252
Dynamic stability data	
Tabulated	
Plotted	



General data
- Model weight =
- Moment of inertia =

Description of components
- Nose shape = flat with 0.1 caliber radius
- Tripper = 1.10 caliber diameter
- Fineness ratio = 7.00
- Stabilizer = 2.27 caliber diameter Ballute
- Burble fence = none
- Boattail = none
- Strakes (8) = none

Remarks

Figure 152. Model Specifications for Configuration 73

TABLE LXXX. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 73 (TEST NO. 43)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002279	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 53.65	C.G.(CALIBERS)	=3.5000
REYNOLDS NUMBER	=0.2472E 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-4.783	6.583	-8.037	1.273	10.701	1.331
-30.0	-35.0	-3.497	4.797	-5.616	1.924	9.365	1.668
-20.0	-25.0	-2.815	3.980	-4.234	2.417	7.902	1.867
-15.0	-20.0	-2.225	3.556	-3.307	2.580	7.261	2.196
-10.0	-15.0	-1.514	3.056	-2.253	2.560	5.154	2.287
-6.0	-11.0	-1.105	2.633	-1.587	2.373	3.195	2.014
-3.0	-8.0	-0.666	2.436	-0.999	2.319	1.973	1.976
-0.0	-5.0	-0.409	2.174	-0.597	2.135	1.039	1.741
3.0	-2.0	-0.212	1.921	-0.279	1.913	0.206	0.740
6.0	1.0	0.030	1.845	0.062	1.845	-0.004	0.060
10.0	5.0	0.437	1.967	0.609	1.921	-1.347	2.213
15.0	10.0	0.984	2.481	1.400	2.273	-2.957	2.113
20.0	15.0	1.423	3.011	2.154	2.540	-4.728	2.196
30.0	25.0	3.119	3.829	4.444	2.152	-8.903	2.003
40.0	35.0	3.905	4.736	5.916	1.640	-10.213	1.726

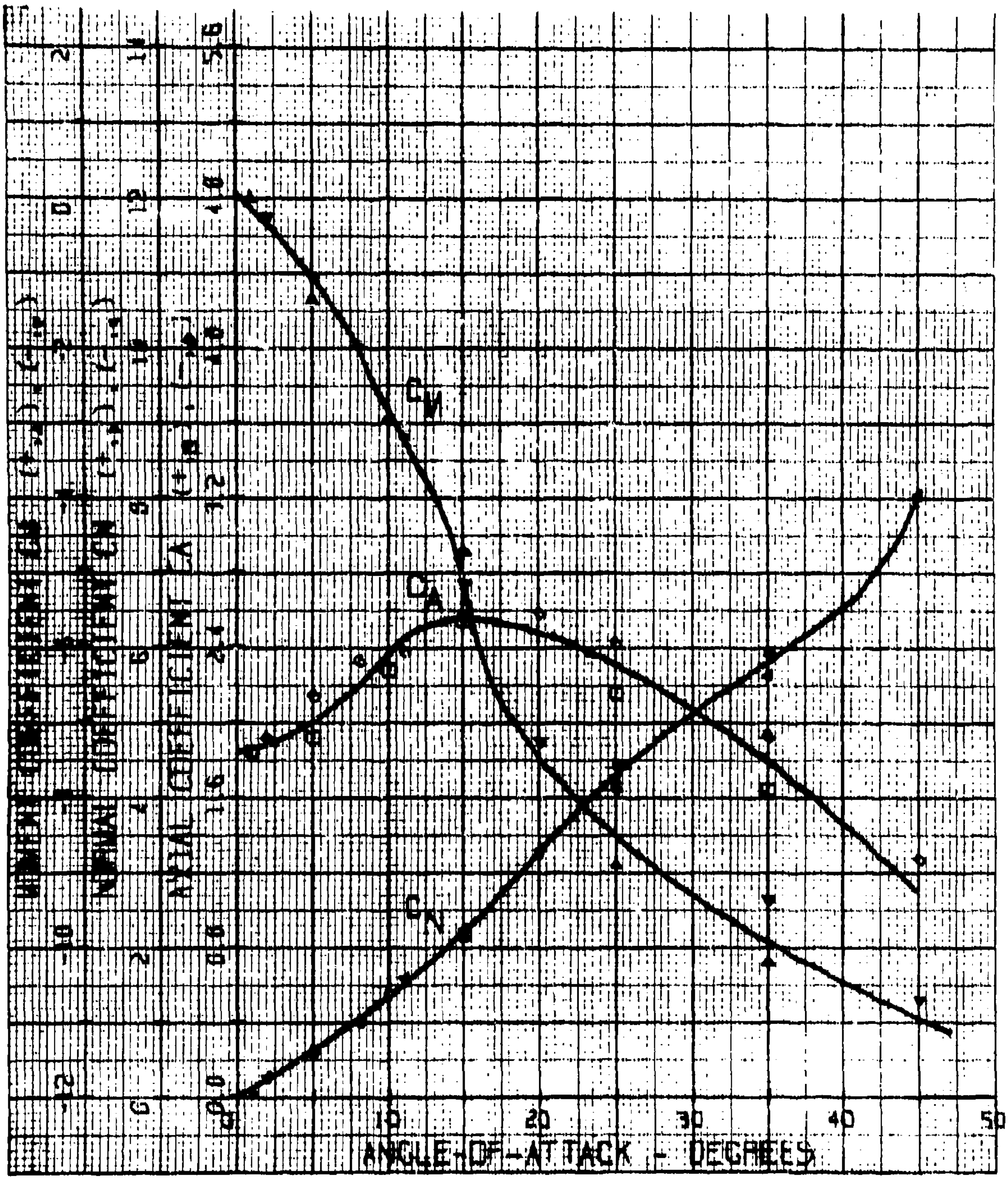
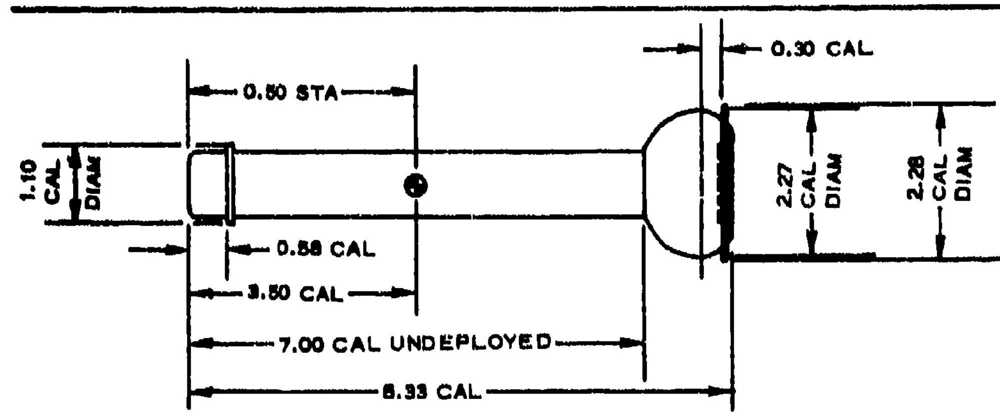


Figure 153. Graphic Static Aerodynamics Test Data: Configuration 73 (Test No. 43)

Item	Page
Static aerodynamic data	
Tabulated	254
Plotted	255
Dynamic stability data	
Tabulated	256
Plotted	257



General data

Model weight = 380.0 gm
Moment of inertia = 0.25622 slug in.^{2}

Description of components

Nose shape = flat with 0.1 caliber radius
Tripper = 1.10 caliber diameter
Fineness ratio = 7.00
Stabilizer = 2.27 caliber diameter Ballute
Burble fence = 2.28 caliber diameter
Boattail = none
Strakes (8) = none

Remarks

Figure 154. Model Specification for Configuration 74

TABLE LXXXI. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 74
(TEST NO. 45)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002279	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 53.65	C.G.(CALIBERS)	=3.5000
REYNOLDS NUMBER	=0.2472E 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-4.783	6.477	-7.962	1.198	11.504	1.445
-30.0	-35.0	-3.451	4.691	-5.518	1.863	8.895	1.612
-20.0	-25.0	-2.467	3.526	-3.726	2.152	6.510	1.747
-15.0	-20.0	-1.816	2.996	-2.731	2.194	4.953	1.813
-10.0	-15.0	-1.196	2.678	-1.848	2.277	3.689	1.996
-6.0	-11.0	-1.014	2.587	-1.483	2.346	3.161	2.123
-3.0	-8.0	-0.817	2.436	-1.149	2.298	2.598	2.262
-0.0	-5.0	-0.530	2.284	-0.727	2.229	1.672	2.300
3.0	-2.0	-0.061	2.209	-0.138	2.205	0.756	5.495
6.0	1.0	0.151	2.254	0.191	2.251	0.047	-0.248
10.0	5.0	0.515	2.299	0.713	2.246	-1.286	1.804
15.0	10.0	0.984	2.511	1.405	2.302	-2.880	2.050
20.0	15.0	1.499	2.723	2.152	2.243	-4.211	1.956
30.0	25.0	2.815	3.329	3.958	1.827	-6.748	1.705
40.0	35.0	3.512	4.267	5.324	1.481	-9.315	1.750

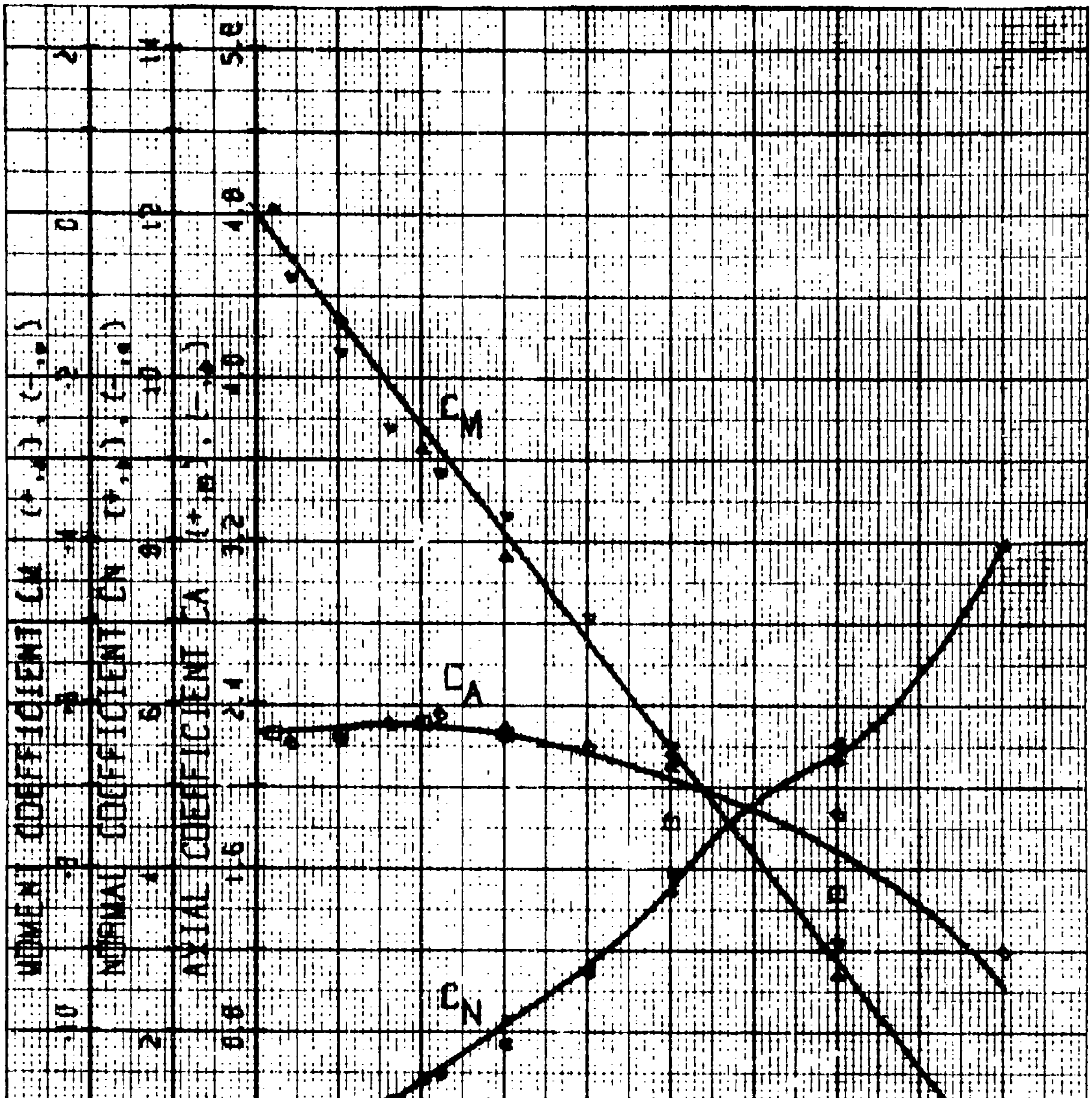


Figure 155. Graphic Static Aerodynamic Test Data: Configuration 74 (Test No. 45)

TABLE LXXXII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 74

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.256220
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002298
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =643,646
VELOCITY(FT/SEC)= 217.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.475	-216.751
50.000	25.000	0.487	-211.193
40.000	20.000	0.497	-207.208
30.000	15.000	0.469	-219.641
25.000	12.500	0.475	-216.751

TEST NUMBERS =638,641
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.862	-259.033
50.000	25.000	0.887	-251.736
40.000	20.000	0.884	-252.626
30.000	15.000	0.891	-250.853
25.000	12.500	0.909	-245.681

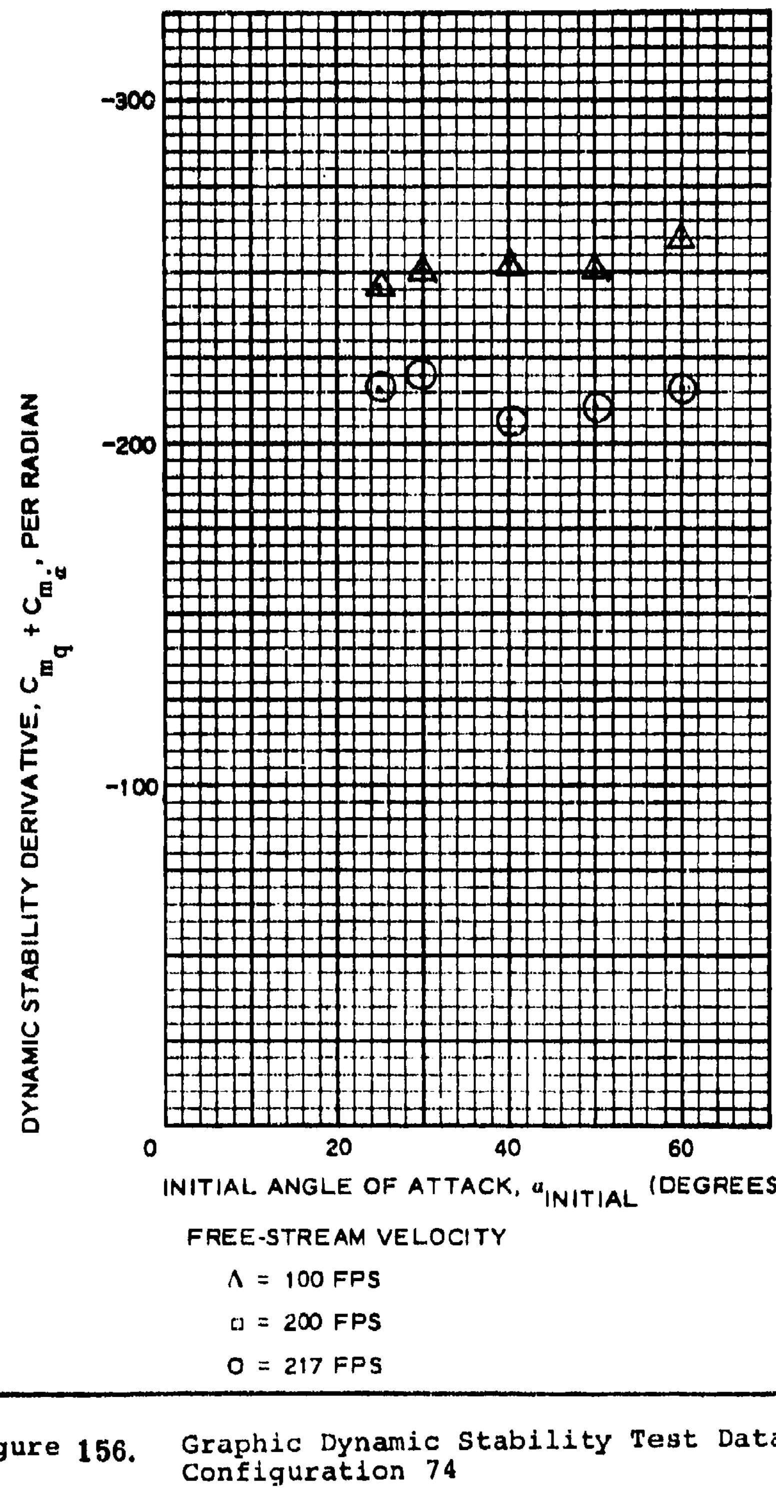
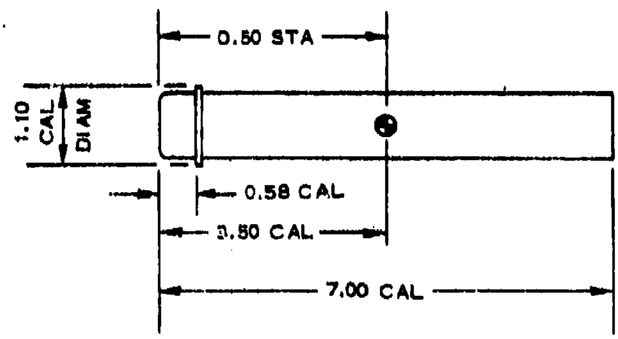


Figure 156. Graphic Dynamic Stability Test Data: Configuration 74

Item	Page
Static aerodynamic data	
Tabulated	259
Plotted	260
Dynamic stability data	
Tabulated	
Plotted	



General data
    Model weight =
    Moment of inertia =

Description of components
    Nose shape = flat with 0.1 caliber radius
    Tripper = 1.10 caliber diameter
    Fineness ratio = 7.00
    Stabilizer = none
    Burble fence = none
    Boattail = none
    Strakes (8) = none

Remarks

Figure 157. Model Specification for Configuration 75

TABLE LXXXIII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 75 (TEST NO. 49)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002279	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 53.65	C.G.(CALIBERS)	=3.5000
REYNOLDS NUMBER	=0.2077E 08	ALPHA SHIFT(DEGREES)	=-4.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-44.0	-3.165	4.164	-5.169	0.797	-0.758	-0.147
-30.0	-34.0	-1.711	2.377	-2.748	1.014	-1.582	-0.576
-20.0	-24.0	-1.287	1.635	-1.841	0.970	-1.148	-0.624
-15.0	-19.0	-0.939	1.257	-1.297	0.883	-0.973	-0.751
-10.0	-14.0	-0.621	0.984	-0.840	0.805	-0.895	-1.065
-6.0	-10.0	-0.409	0.848	-0.550	0.764	-0.633	-1.152
-3.0	-7.0	-0.303	0.711	-0.387	0.669	-0.352	-0.910
-0.0	-4.0	-0.197	0.575	-0.237	0.560	-0.092	-0.390
3.0	-1.0	0.045	0.545	0.036	0.546	-0.067	1.877
6.0	2.0	0.091	0.469	0.107	0.466	0.165	-1.537
10.0	6.0	0.242	0.651	0.309	0.622	0.305	-0.988
15.0	11.0	0.409	0.817	0.557	0.724	0.772	-1.384
20.0	16.0	0.742	1.060	1.005	0.814	0.907	-0.902
30.0	26.0	1.560	1.832	2.205	0.963	0.806	-0.365
40.0	36.0	2.241	2.665	3.379	0.839	1.371	-0.406

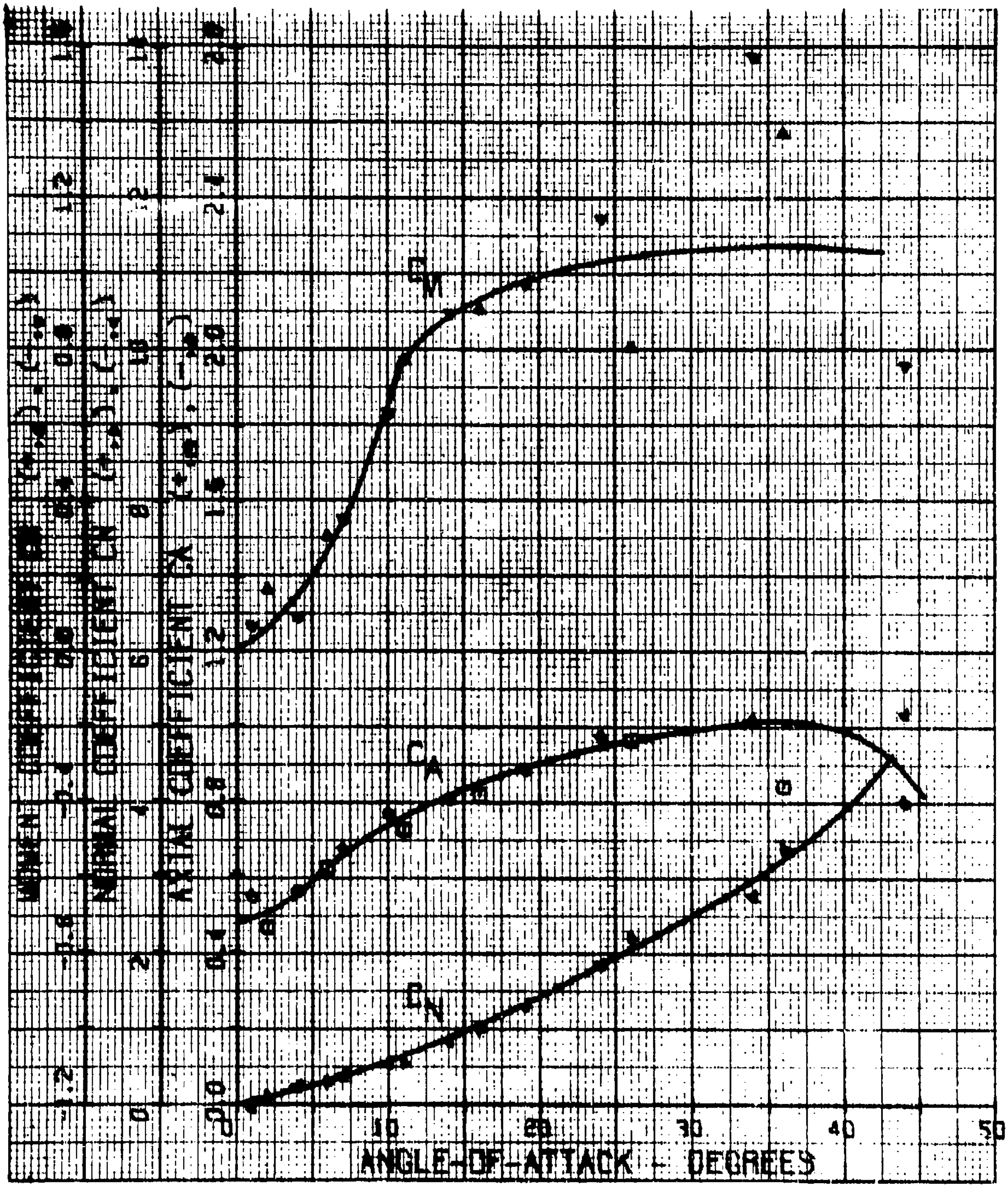
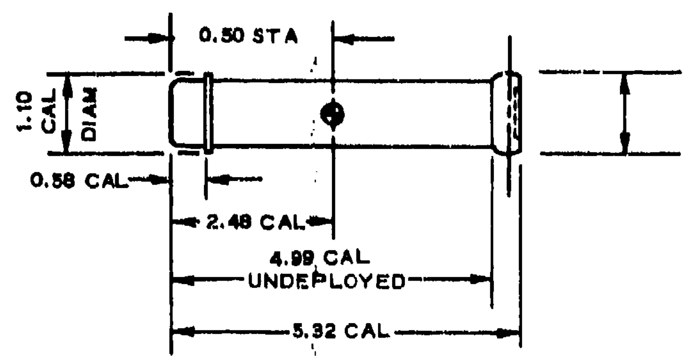


Figure 158. Graphic Static Aerodynamic Test Data:
Configuration 75 (Test No. 49)

Item	Page
Static aerodynamic data	
Tabulated	262
Plotted	263
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 310.7 gm
Moment of inertia = 0.11775 slug in.^{2}

Description of components

Nose shape = flat with 0.1 caliber radius
Tripper = 1.10 caliber diameter
Fineness ratio = 4.99
Stabilizer = 1.27 caliber diameter Ballute
Burble fence = none
Boattail = none
Strakes (8) = none

Remarks

Figure 159. Model Specification for Configuration 76

TABLE LXXXIV. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 76
(TEST NO. 50)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002338	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 55.06	C.G.(CALIBERS)	=2.4800
REYNOLDS NUMBER	=0.1620E 08	ALPHA SHIFT(DEGREES)	=-3.500

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.5	-2.140	3.350	-3.858	0.957	0.110	0.029
-30.0	-33.5	-1.579	2.376	-2.628	1.110	-0.369	-0.140
-20.0	-23.5	-1.092	1.682	-1.672	1.107	-0.245	-0.147
-15.0	-18.5	-0.871	1.475	-1.294	1.123	-0.234	-0.181
-10.0	-13.5	-0.649	1.166	-0.903	0.982	-0.289	-0.320
-6.0	-9.5	-0.413	1.048	-0.580	0.965	-0.193	-0.332
-3.0	-6.5	-0.310	0.915	-0.411	0.874	-0.076	-0.185
-0.0	-3.5	-0.207	0.797	-0.255	0.783	-0.080	-0.314
3.0	-0.5	0.0	0.708	-0.006	0.708	-0.107	-17.356
6.0	2.5	0.177	0.782	0.211	0.773	-0.115	0.546
10.0	6.5	0.251	0.944	0.356	0.910	-0.114	0.319
15.0	11.5	0.457	1.151	0.678	1.037	0.021	-0.032
20.0	16.5	0.723	1.343	1.075	1.082	0.081	-0.075
30.0	26.5	1.225	1.948	1.965	1.197	0.039	-0.020
40.0	36.5	1.535	2.553	2.752	1.139	0.082	-0.030

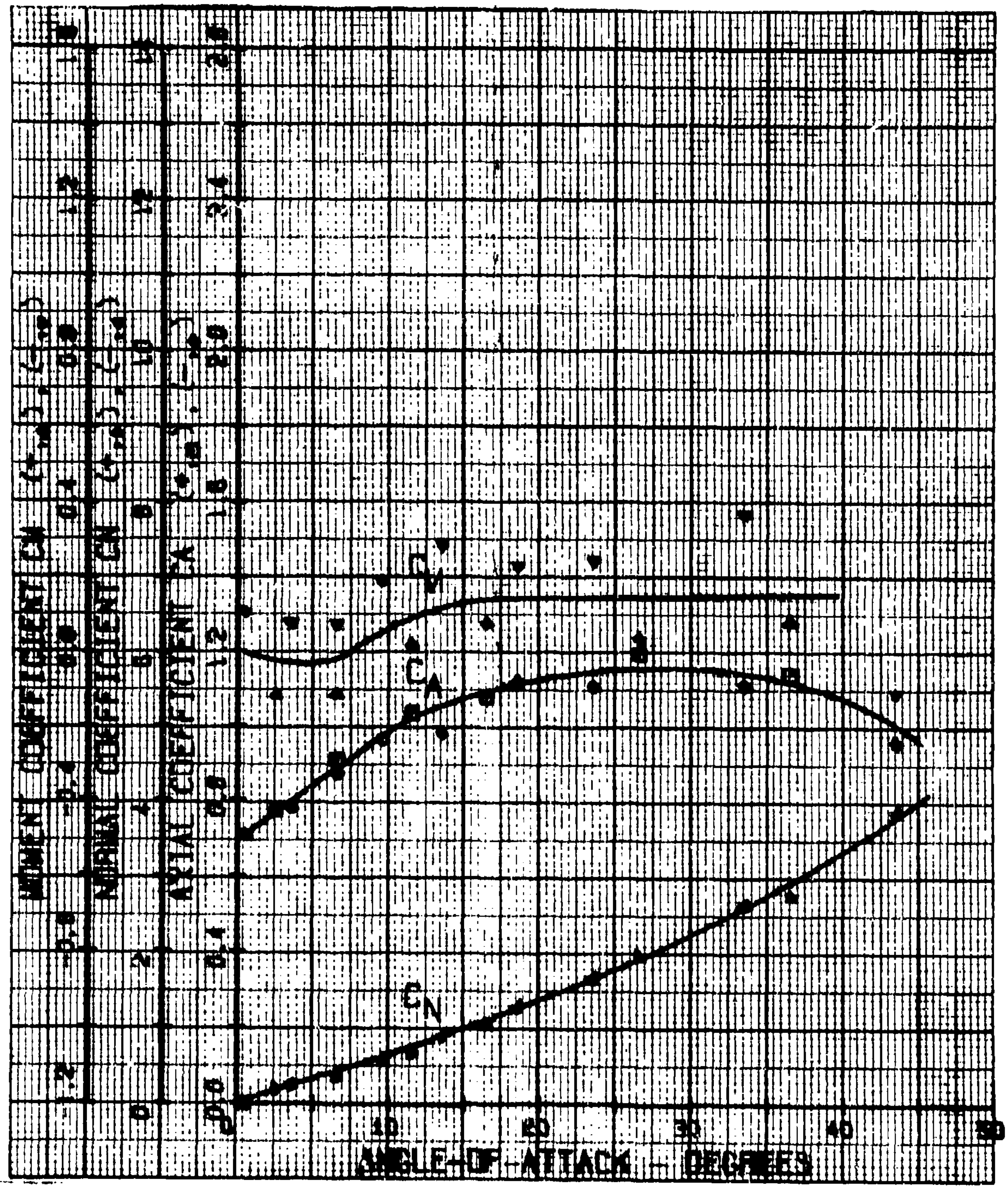
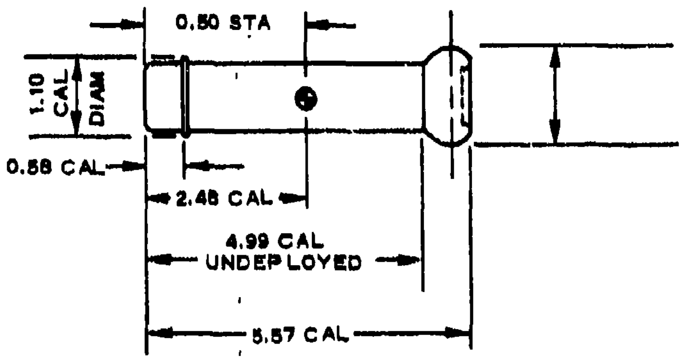


Figure 160. Graphic Static Aerodynamic Test Data: Configuration (Test No. 50)

Item	Page
Static aerodynamic data	
Tabulated	265
Plotted	266
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight =

Moment of inertia =

Description of components

Nose shape = flat with 0.1 caliber radius

Tripper = 1.10 caliber diameter

Fineness ratio = 4.99

Stabilizer = 1.55 caliber diameter Ballute

Burble fence = none

Boattail = none

Strakes (8) = none

Remarks

Figure 161. Model Specifications for Configuration 77

TABLE LXXXV. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 77 (TEST NO. 53)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002338	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 55.06	C.G.(CALIBERS)	=2.4800
REYNOLDS NUMBER	=0.1695E 08	ALPHA SHIFT(DEGREES)	=-4.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-44.0	-2.405	3.822	-4.385	1.078	1.321	0.301
-30.0	-34.0	-1.741	2.759	-2.986	1.314	0.739	0.247
-20.0	-24.0	-1.358	2.199	-2.134	1.456	0.767	0.360
-15.0	-19.0	-1.048	1.844	-1.591	1.403	0.544	0.342
-10.0	-14.0	-0.738	1.470	-1.076	1.267	0.259	0.241
-6.0	-10.0	-0.516	1.269	-0.729	1.160	0.113	0.155
-3.0	-7.0	-0.369	1.180	-0.510	1.126	0.008	0.016
-0.0	-4.0	-0.162	1.003	-0.232	0.989	-0.047	-0.202
3.0	-1.0	0.162	0.915	0.146	0.917	-0.133	0.907
6.0	2.0	0.089	0.900	0.120	0.896	-0.130	1.082
10.0	6.0	0.339	1.106	0.453	1.065	-0.350	0.772
15.0	11.0	0.635	1.372	0.885	1.226	-0.516	0.584
20.0	16.0	0.900	1.639	1.317	1.326	-0.701	0.533
30.0	26.0	1.372	2.213	2.204	1.388	-1.033	0.469
40.0	36.0	1.756	2.671	2.990	1.128	-0.836	0.279

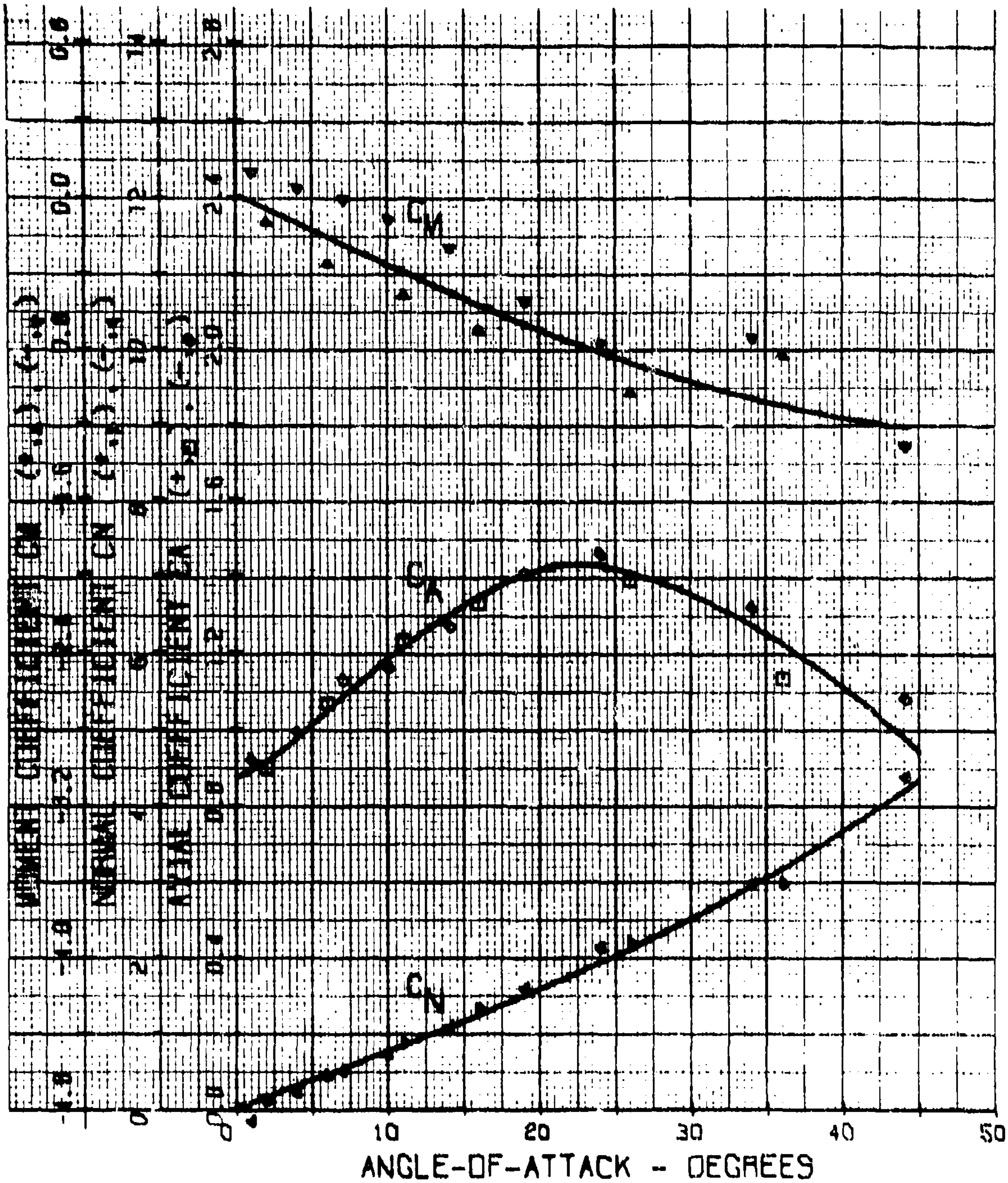
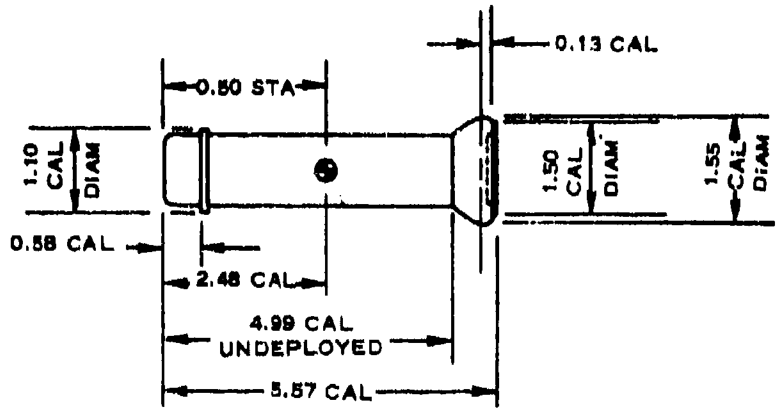


Figure 162. Graphic Static Aerodynamic Test Data: Configuration 77 (Test No. 53)

Item	Page
Static aerodynamic data	
Tabulated	268
Plotted	269
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight =

Moment of inertia =

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	4.99
Stabilizer	=	1.55 caliber diameter Ballute
Burble fence	=	1.50 caliber diameter
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 163. Model Specifications for Configuration 78

TABLE LXXXVI. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 78 (TEST NO. 54)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002333	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.92	C.G.(CALIBERS)	=2.4800
REYNOLDS NUMBER	=0.1691E 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-2.604	3.802	-4.529	0.847	1.546	0.341
-30.0	-35.0	-1.923	2.840	-3.204	1.223	0.730	0.228
-20.0	-25.0	-1.450	1.982	-2.152	1.184	0.562	0.261
-15.0	-20.0	-0.947	1.657	-1.456	1.233	0.492	0.338
-10.0	-15.0	-0.799	1.449	-1.147	1.193	0.286	0.249
-6.0	-11.0	-0.473	1.316	-0.716	1.202	0.246	0.344
-3.0	-8.0	-0.370	1.154	-0.527	1.091	0.249	0.472
-0.0	-5.0	-0.311	1.094	-0.405	1.063	0.218	0.539
3.0	-2.0	-0.133	0.902	-0.165	0.897	0.204	1.240
6.0	1.0	0.074	0.932	0.090	0.930	0.142	-1.579
10.0	5.0	0.237	1.035	0.326	1.011	-0.006	0.019
15.0	10.0	0.473	1.331	0.697	1.229	-0.177	0.254
20.0	15.0	0.769	1.553	1.145	1.301	-0.318	0.278
30.0	25.0	1.257	1.952	1.965	1.238	-0.257	0.131
40.0	35.0	1.805	2.648	2.997	1.134	-0.539	0.180

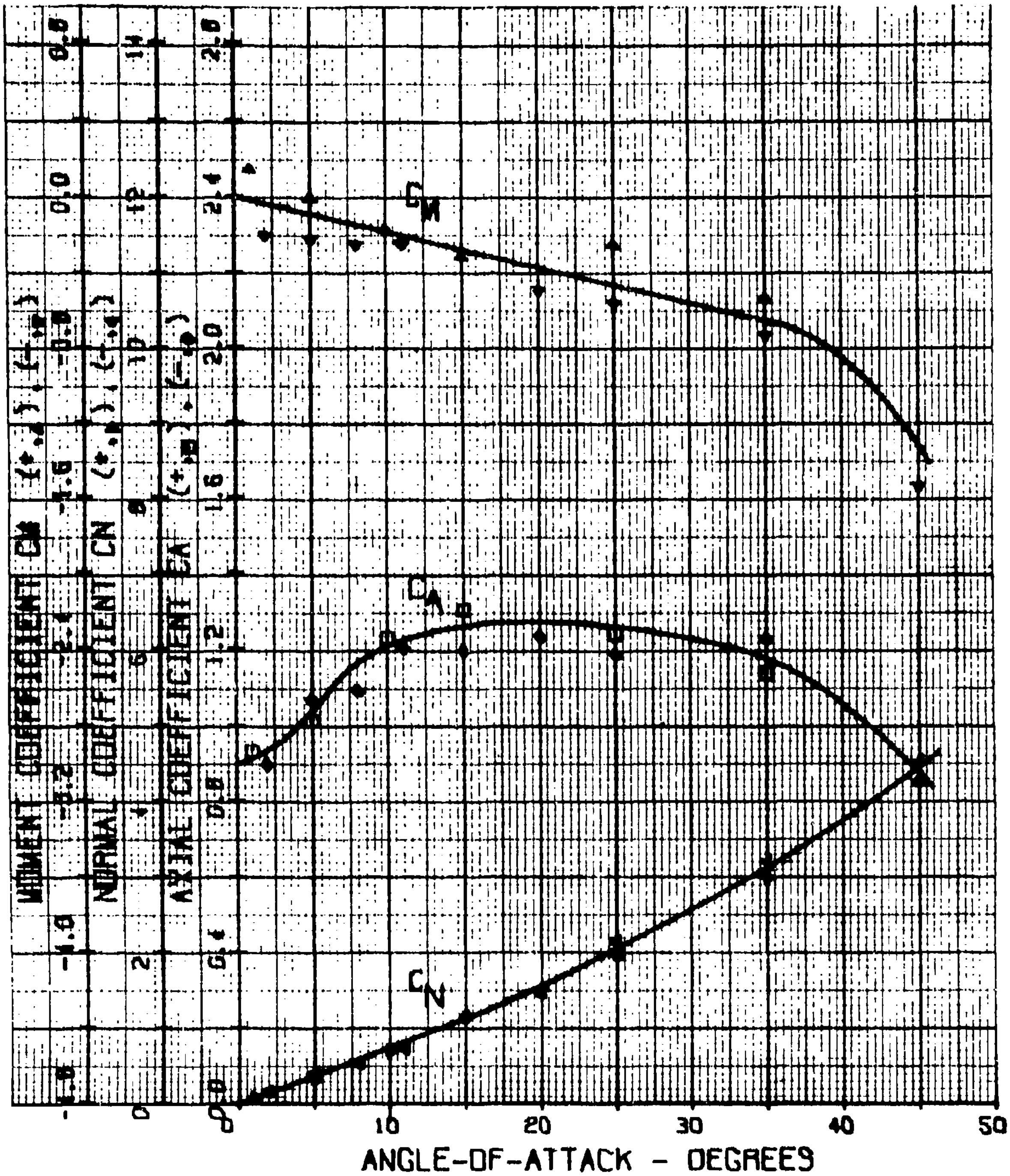
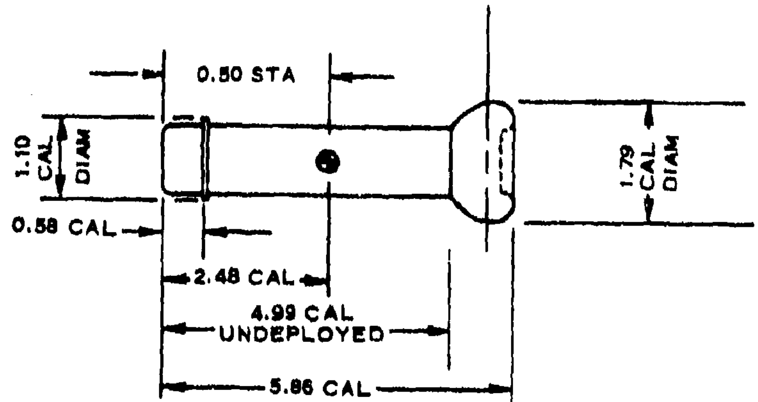


Figure 164. Graphic Static Aerodynamic Test Data: Configuration 78 (Test No. 54)

Item	Page
Static aerodynamic data	
Tabulated	271
Plotted	272
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight =

Moment of inertia =

Description of components

Nose shape	= flat with 0.1 caliber radius
Tripper	= 1.10 caliber diameter
Fineness ratio	= 4.99
Stabilizer	= 1.79 caliber diameter Ballute
Burble fence	= none
Boattail	= none
Strakes (8)	= none

Remarks

Figure 165. Model Specifications for Configuration 79

TABLE LXXXVII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 79
(TEST NO. 57)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002331	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.88	C.G.(CALIBERS)	=2.4800
REYNOLDS NUMBER	=0.1778E 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-3.005	4.441	-5.265	1.015	3.903	0.741
-30.0	-35.0	-2.339	3.434	-3.886	1.471	2.958	0.761
-20.0	-25.0	-1.777	2.723	-2.761	1.717	2.635	0.954
-15.0	-20.0	-1.480	2.561	-2.267	1.900	2.307	1.018
-10.0	-15.0	-1.125	2.220	-1.661	1.853	1.726	1.039
-6.0	-11.0	-0.711	1.894	-1.059	1.724	1.219	1.151
-3.0	-8.0	-0.503	1.805	-0.750	1.718	0.857	1.144
-0.0	-5.0	-0.385	1.524	-0.516	1.485	0.481	0.931
3.0	-2.0	-0.163	1.347	-0.210	1.340	-0.009	-0.041
6.0	1.0	0.089	1.361	0.113	1.360	-0.028	0.252
10.0	5.0	0.429	1.569	0.564	1.525	-0.663	1.174
15.0	10.0	0.785	1.983	1.117	1.817	-1.221	1.093
20.0	15.0	1.155	2.235	1.694	1.860	-1.858	1.097
30.0	25.0	1.836	2.649	2.783	1.625	-2.604	0.936
40.0	35.0	2.369	3.275	3.874	1.406	-3.045	0.785

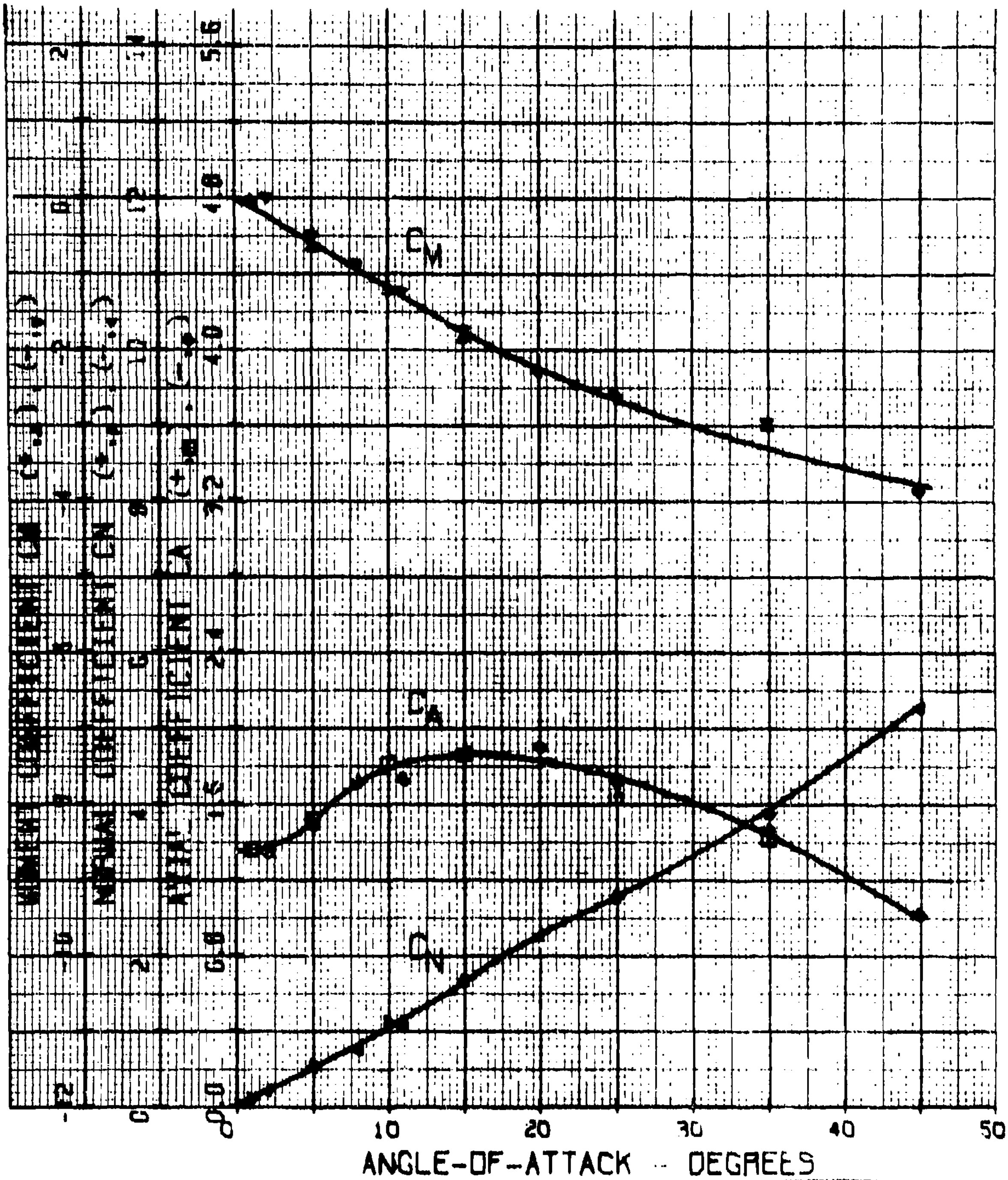
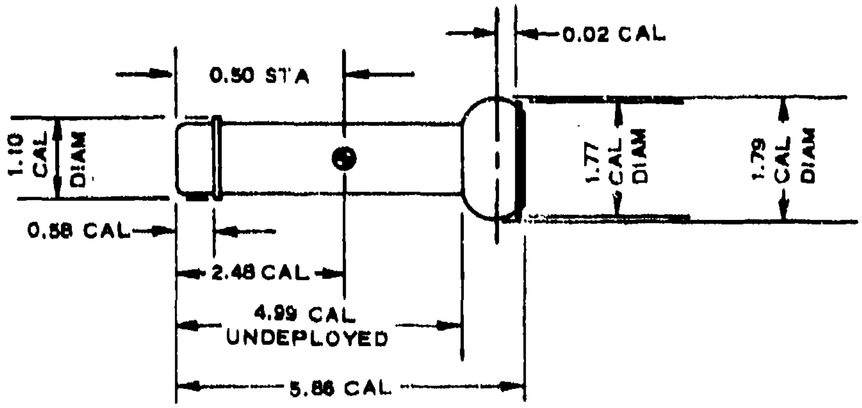


Figure 166. Graphic Static Aerodynamic Test Data: Configuration 79 (Test No. 57)

Item	Page
Static aerodynamic data	
Tabulated	274
Plotted	275
Dynamic stability data	
Tabulated	276
Plotted	277



General data

Model weight = 309.2
Moment of inertia = 0.12069 slug in.^{2}

Description of components

Nose shape = flat with 0.1 caliber radius
Tripper = 1.10 caliber diameter
Fineness ratio = 4.99
Stabilizer = 1.79 caliber diameter Ballute
Burble fence = 1.77 caliber diameter
Boattail = none
Strakes (8) = none

Remarks

Figure 167. Model Specifications for Configuration 80

TABLE LXXXVIII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 80 (TEST NO. 58)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002308	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.33	C.G.(CALIBERS)	=2.4800
REYNOLDS NUMBER	=0.1761E 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-2.976	4.560	-5.329	1.120	3.713	0.697
-30.0	-35.0	-2.482	3.289	-3.920	1.271	2.953	0.753
-20.0	-25.0	-1.600	2.541	-2.524	1.627	1.932	0.765
-15.0	-20.0	-1.316	2.138	-1.968	1.559	1.492	0.758
-10.0	-15.0	-0.972	1.913	-1.434	1.597	1.008	0.703
-6.0	-11.0	-0.763	1.704	-1.074	1.527	0.719	0.670
-3.0	-8.0	-0.479	1.599	-0.696	1.517	0.635	0.912
-0.0	-5.0	-0.359	1.420	-0.481	1.383	0.500	1.040
3.0	-2.0	-0.075	1.241	-0.118	1.237	0.186	1.572
6.0	1.0	0.030	1.196	0.051	1.195	-0.086	1.702
10.0	5.0	0.344	1.390	0.464	1.355	-0.347	0.748
15.0	10.0	0.628	1.614	0.899	1.481	-0.570	0.634
20.0	15.0	0.987	1.839	1.429	1.521	-0.991	0.693
30.0	25.0	1.720	2.467	2.601	1.509	-2.029	0.780
40.0	35.0	2.422	3.259	3.854	1.280	-2.920	0.758

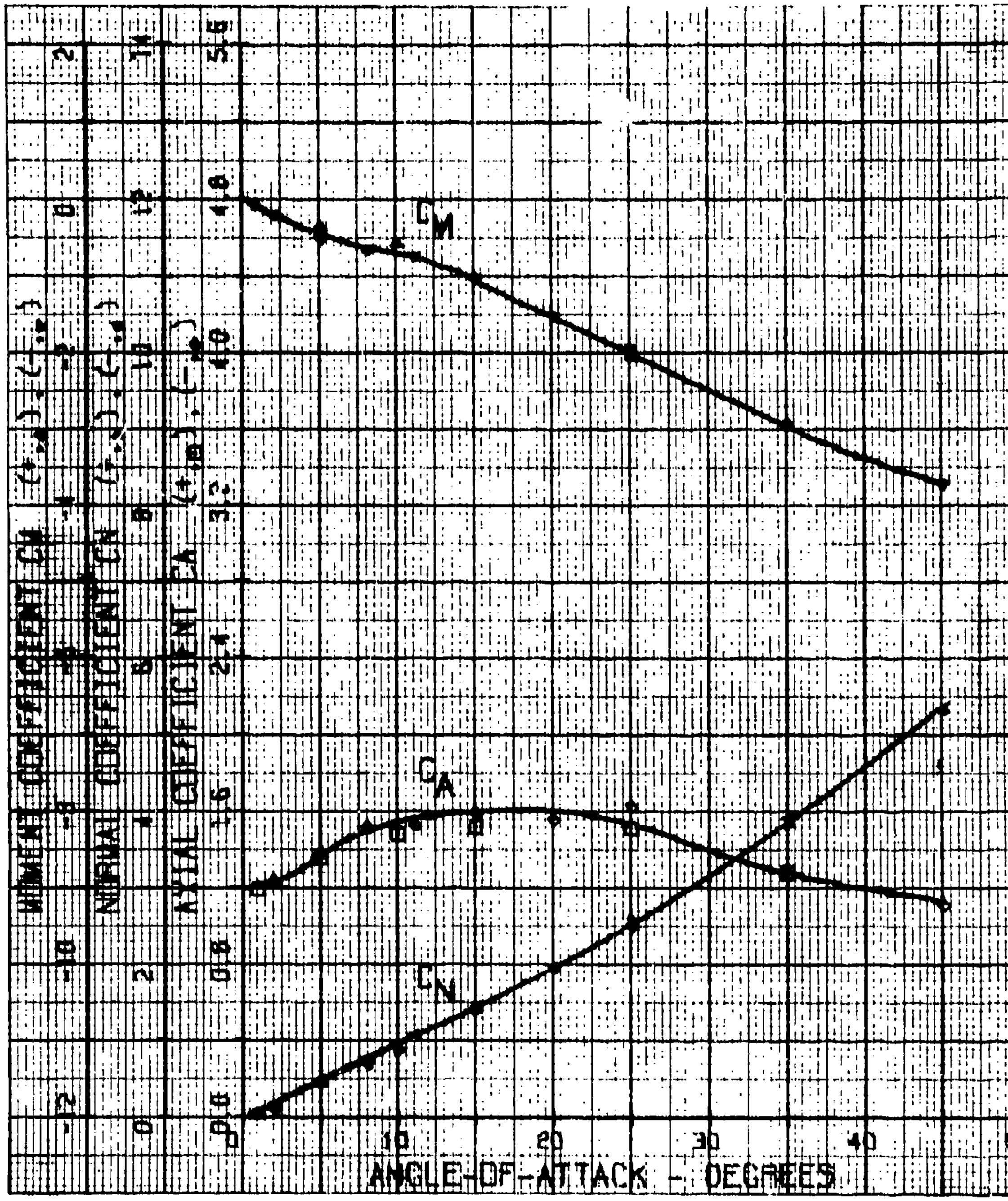


Figure 168. Graphic Static Aerodynamic Test Data: Configuration 80 (Test No. 58)

TABLE LXXXIX. DYNAMIC STABILITY TEST DATA:CONFIGURATION 80

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.120690
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002308
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =565,568
VELOCITY(FT/SEC)= 217.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.816	-59.211
50.000	25.000	0.825	-58.538
40.000	20.000	0.863	-55.993
30.000	15.000	0.909	-53.107
25.000	12.500	0.950	-50.836

TEST NUMBERS =561,564
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.328	-78.906
50.000	25.000	1.347	-77.808
40.000	20.000	1.262	-83.008
30.000	15.000	1.212	-86.431
25.000	12.500	1.181	-88.717

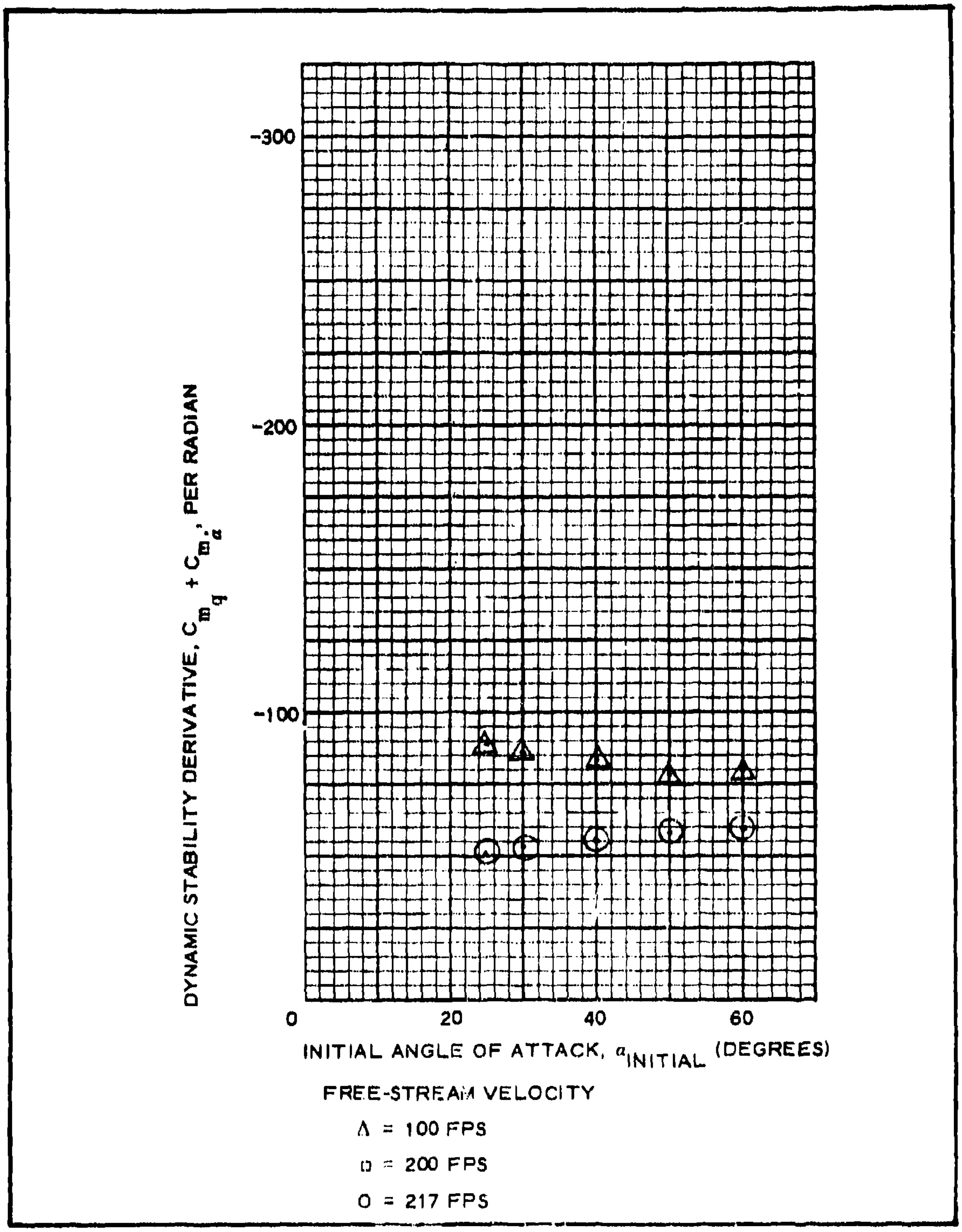
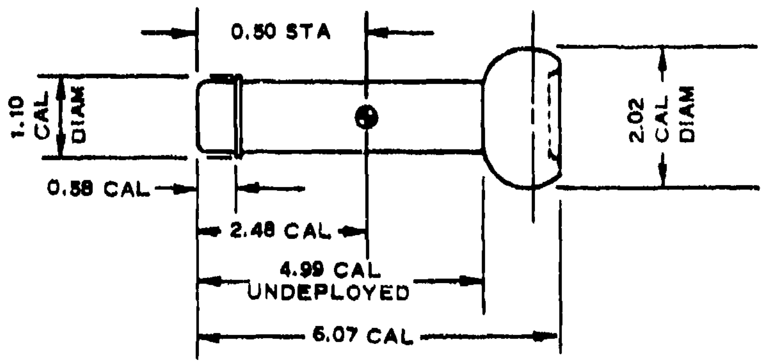


Figure 169. Graphic Dynamic Stability Test Data: Configuration 80

Item	Page
Static aerodynamic data	
Tabulated	279
Plotted	280
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight =

Moment of inertia =

Description of components

Nose shape	= flat with 0.1 caliber radius
Tripper	= 1.10 caliber diameter
Fineness ratio	= 4.99
Stabilizer	= 2.02 caliber diameter Ballute
Burble fence	= none
Boattail	= none
Strakes (8)	= none

Remarks

Figure 170. Model Specification for Configuration 81

TABLE XC. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 81 (TEST NO. 61)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002308	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.33	C.G.(CALIBERS)	=2.4800
REYNOLDS NUMBER	=0.1823E 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-2.871	4.888	-5.487	1.427	5.021	0.915
-30.0	-35.0	-1.884	3.737	-3.687	1.981	3.329	0.903
-20.0	-25.0	-1.839	3.214	-3.025	2.136	3.715	1.228
-15.0	-20.0	-1.525	3.139	-2.507	2.428	3.613	1.441
-10.0	-15.0	-1.226	2.706	-1.885	2.296	2.680	1.422
-6.0	-11.0	-0.867	2.287	-1.288	2.079	1.821	1.414
-3.0	-8.0	-0.688	1.973	-0.956	1.858	1.246	1.304
-0.0	-5.0	-0.399	1.764	-0.541	1.723	0.936	1.730
3.0	-2.0	-0.045	1.644	-0.102	1.641	0.474	4.643
6.0	1.0	0.045	1.644	0.074	1.643	0.158	-2.145
10.0	5.0	0.434	1.863	0.595	1.823	-0.564	0.948
15.0	10.0	0.807	2.332	1.200	2.156	-1.232	1.027
20.0	15.0	1.136	2.646	1.782	2.261	-2.499	1.402
30.0	25.0	1.809	3.169	2.979	2.108	-3.283	1.102
40.0	35.0	2.213	3.872	4.033	1.902	-4.241	1.051

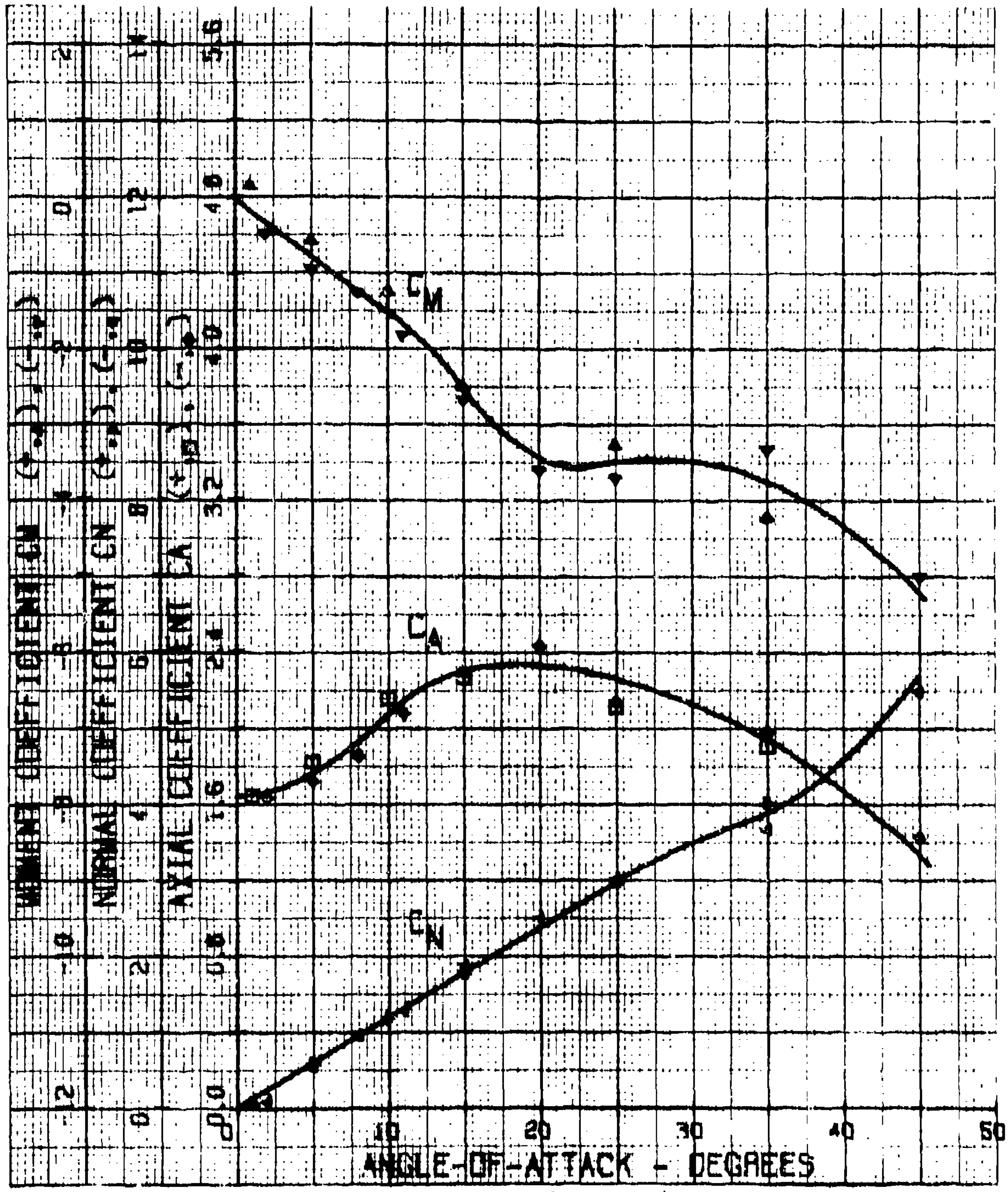
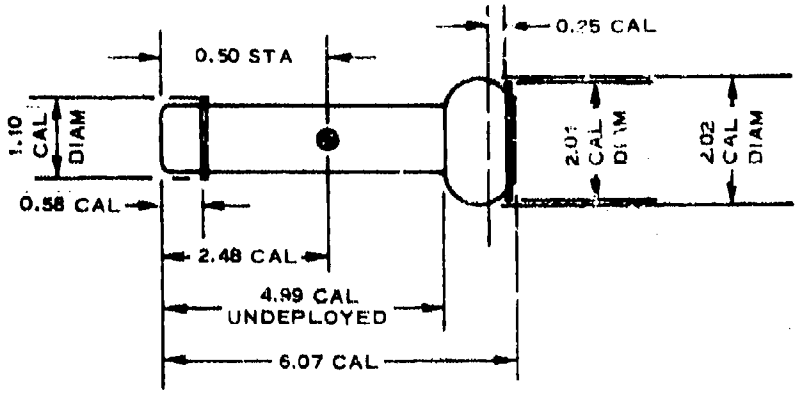


Figure 171. Graphic Static Aerodynamic Test Data: Configuration 81 (Test No. 61)

Item	Page
Static aerodynamic data	
Tabulated	282
Plotted	283
Dynamic stability data	
Tabulated	284
Plotted	285



General data

Model weight = 312.4 gm

Moment of inertia = 0.12804 slug in.^{2}

Description of components

Nose shape = flat with 0.1 caliber radius

Tripper = 1.10 caliber diameter

Fineness ratio = 4.99

Stabilizer = 2.02 caliber diameter Ballute

Burble fence = 2.01 caliber diameter

Boattail = none

Strakes (8) = none

Remarks

Figure 172. Model Specifications for Configuration 82

TABLE XCI. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 82 (TEST NO. 62)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002308	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.33	C.G.(CALIBERS)	=2.4800
REYNOLDS NUMBER	=0.1823E 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-3.364	4.829	-5.793	1.036	5.807	1.002
-30.0	-35.0	-2.432	3.693	-4.099	1.527	4.663	1.138
-20.0	-25.0	-1.779	2.841	-2.813	1.822	3.407	1.211
-15.0	-20.0	-1.361	2.511	-2.137	1.894	2.739	1.281
-10.0	-15.0	-1.241	2.227	-1.775	1.830	2.124	1.196
-6.0	-11.0	-0.792	2.043	-1.169	1.359	1.672	1.431
-3.0	-8.0	-0.643	1.853	-0.895	1.746	1.341	1.499
-0.0	-5.0	-0.389	1.749	-0.540	1.708	1.017	1.885
3.0	-2.0	-0.284	1.584	-0.339	1.573	0.592	1.479
6.0	1.0	0.099	1.599	0.118	1.597	0.143	-1.219
10.0	5.0	0.523	1.704	0.670	1.652	-0.325	0.485
15.0	10.0	0.718	1.913	1.039	1.759	-0.964	0.923
20.0	15.0	1.136	2.122	1.647	1.756	-1.621	0.985
30.0	25.0	1.944	2.759	2.924	1.671	-2.958	1.011
40.0	35.0	2.856	3.619	4.414	1.325	-4.473	1.013

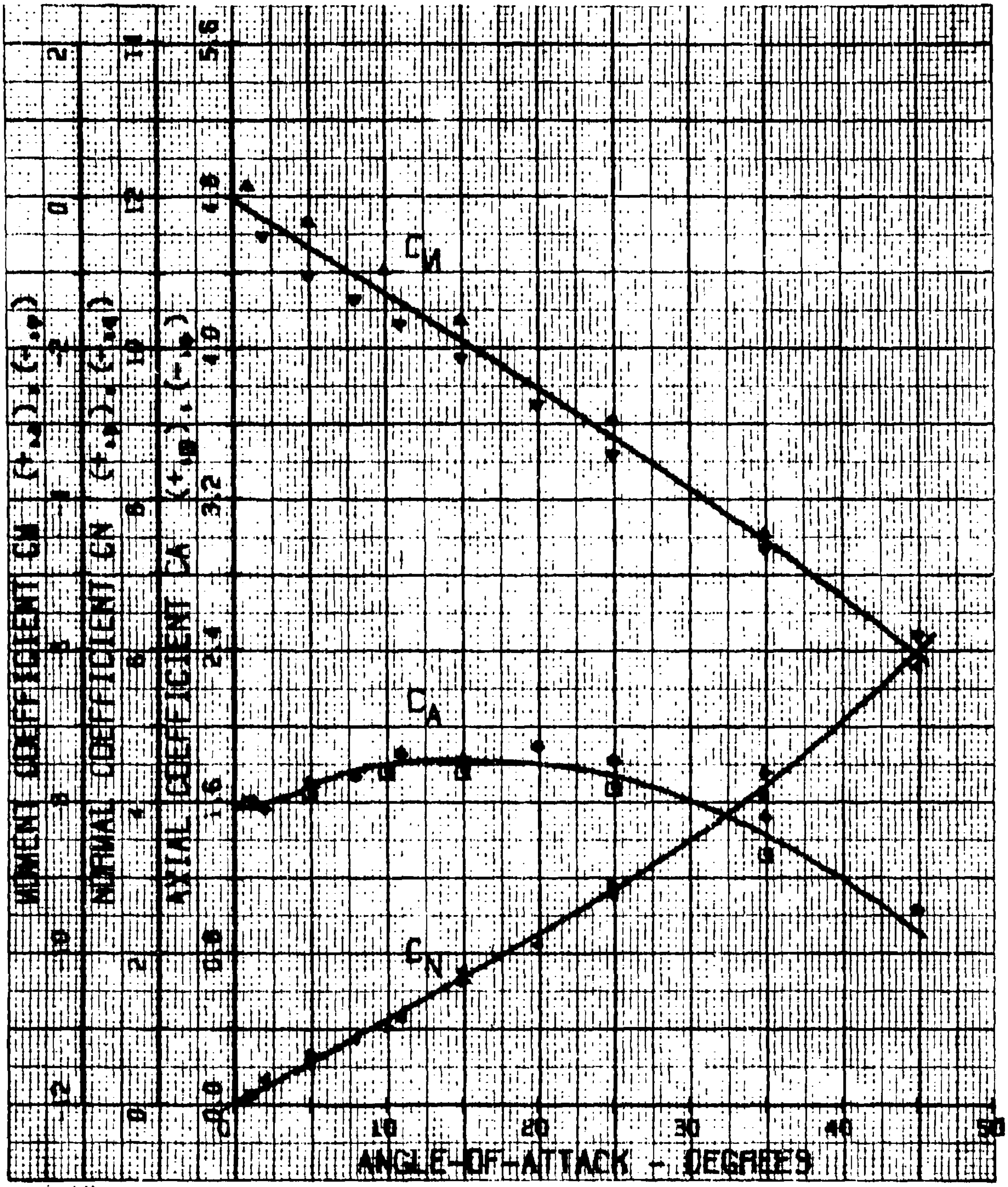


Figure 173. Graphic Static Aerodynamic Test Data: Configuration 82 (Test No. 62)

TABLE XCII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 82

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.128040
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002308
REFERENCE AREA(SQ FT) =0.012300
REFFRENCE LENGTH(FEET) =0.125000

TEST NUMBERS =569,572
VELOCITY(FT/SEC)= 217.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.666	-76.973
50.000	25.000	0.672	-76.257
40.000	20.000	0.681	-75.207
30.000	15.000	0.750	-68.313
25.000	12.500	0.747	-68.599

TEST NUMBERS =573,576
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.231	-90.298
50.000	25.000	1.147	-96.941
40.000	20.000	1.000	-111.180
30.000	15.000	0.897	-123.963
25.000	12.500	0.956	-115.137

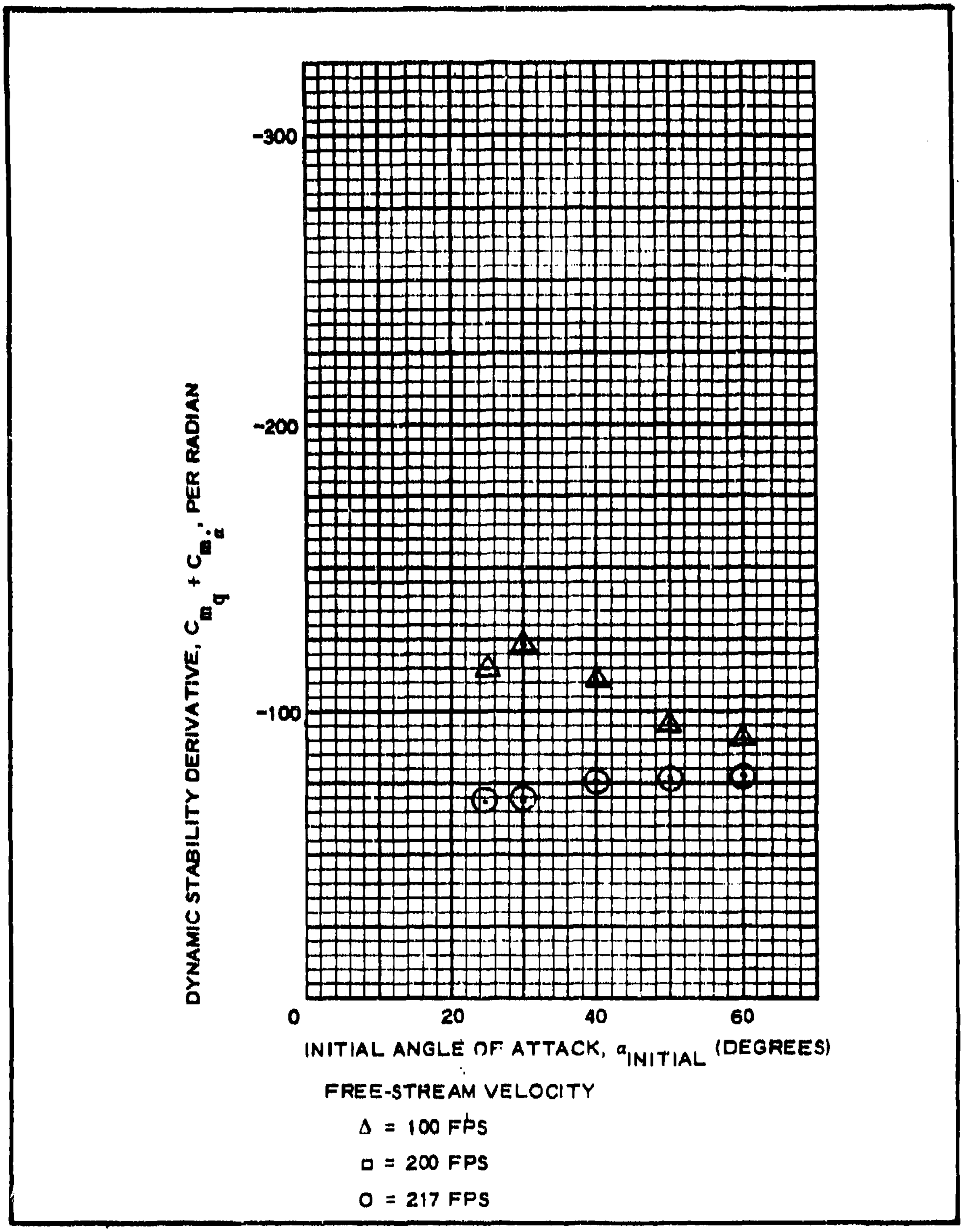
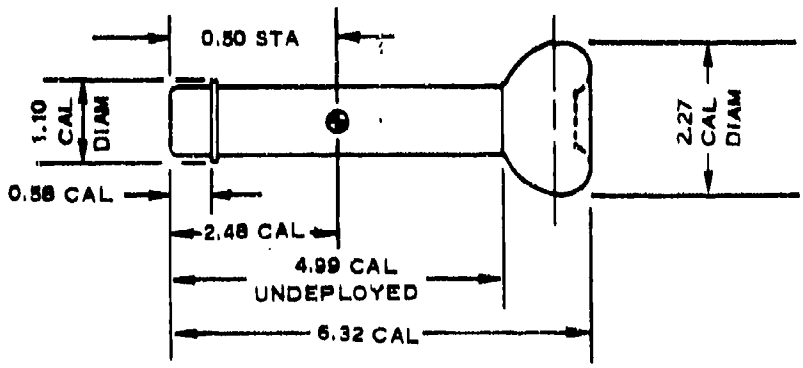


Figure 174. Graphic Dynamic Stability Test Data: Configuration 82

Item	Page
Static aerodynamic data	
Tabulated	287
Plotted	288
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 319.6 gm

Moment of inertia =

Description of components

Nose shape	= flat with 0.1 caliber radius
Tripper	= 1.10 caliber diameter
Fineness ratio	= 4.99
Stabilizer	= 2.27 caliber diameter Ballute
Burble fence	= none
Boattail	= none
Strakes (8)	= none

Remarks

Figure 175. Model Specifications for Configuration 83

TABLE XCIII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 83 (TEST NO. 65)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002298	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.10	C.G.(CALIBERS)	=2.4800
REYNOLDS NUMBER	=0.1891E 08	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-3.739	5.404	-6.419	1.403	8.113	1.264
-30.0	-33.0	-3.228	4.293	-5.045	1.842	7.231	1.433
-20.0	-23.0	-2.387	3.527	-3.575	2.314	5.892	1.648
-15.0	-18.0	-1.471	3.107	-2.359	2.500	3.974	1.684
-10.0	-13.0	-1.126	2.581	-1.678	2.262	2.888	1.721
-6.0	-9.0	-0.826	2.281	-1.172	2.124	1.990	1.698
-3.0	-6.0	-0.646	2.026	-0.854	1.947	1.385	1.623
-0.0	-3.0	-0.330	1.691	-0.418	1.661	0.751	1.797
3.0	0.0	0.330	1.666	0.330	1.666	-0.346	1.048
6.0	3.0	0.360	1.756	0.452	1.734	-0.915	2.026
10.0	7.0	0.781	2.011	1.020	1.901	-2.164	2.122
15.0	12.0	1.381	2.777	1.028	2.429	-4.011	2.080
20.0	17.0	1.771	3.092	2.598	2.439	-4.442	1.710
30.0	27.0	2.327	3.632	3.722	2.190	-5.128	1.378
40.0	37.0	3.243	4.368	5.218	1.537	-7.092	1.359

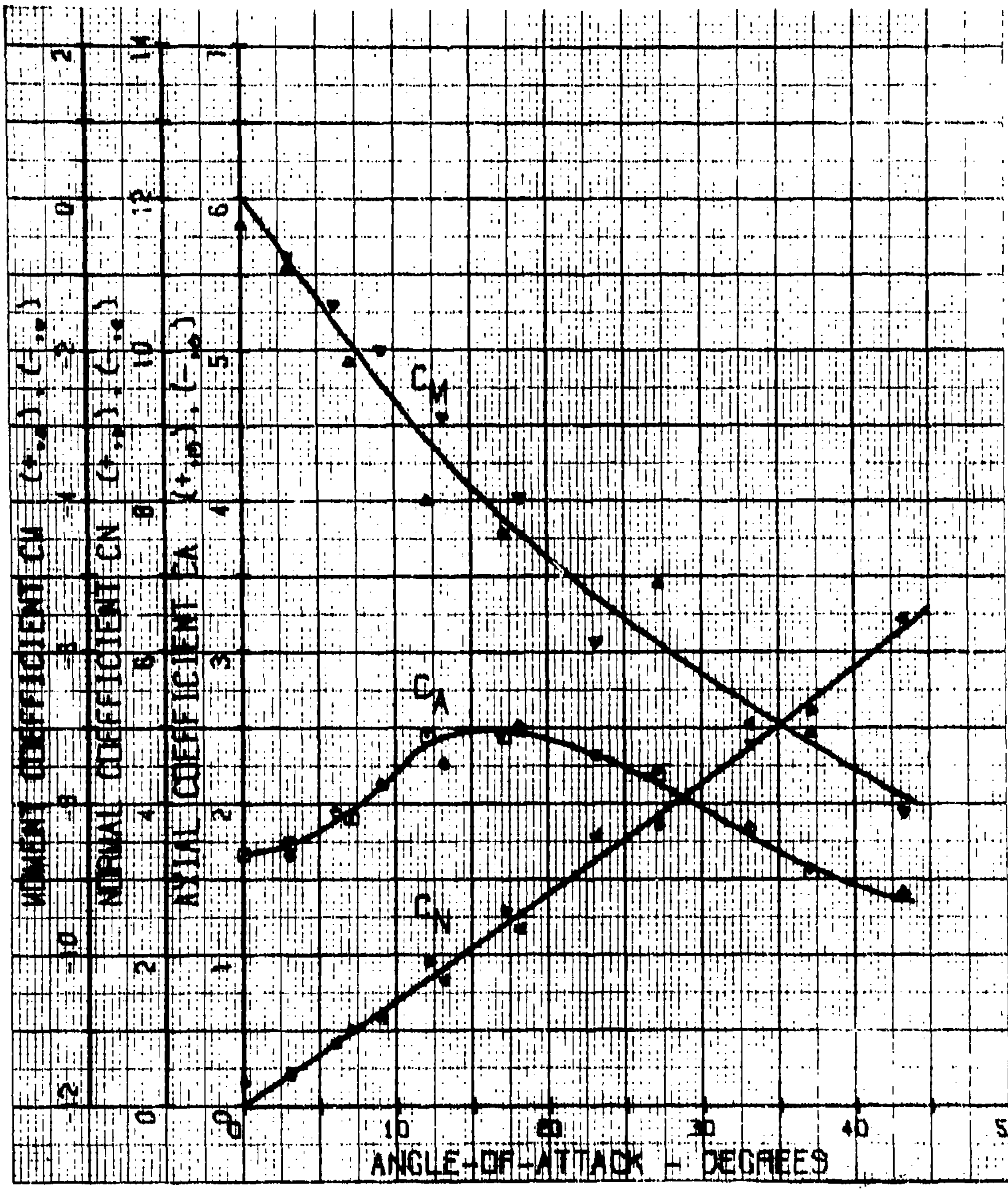
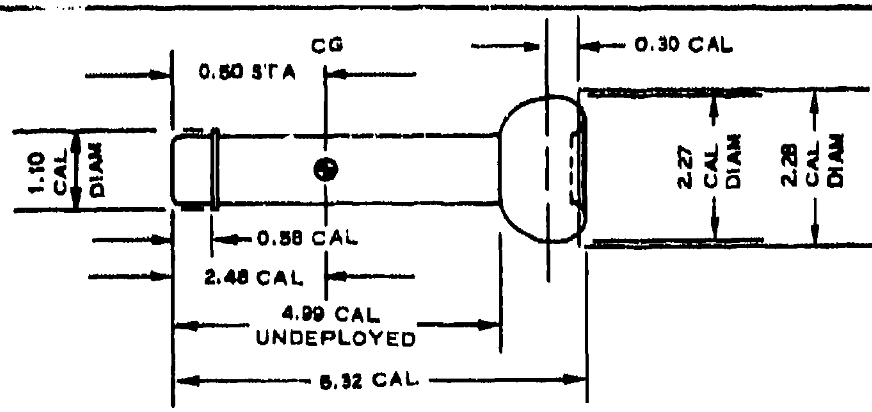


Figure 176. Graphic Static Aerodynamics Test Data; Configuration 83 (Test No. 65)

Item	Page
Static aerodynamic data	
Tabulated	290
Plotted	291
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight	=	309.2 gm
Moment of inertia	=	0.14968 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	4.99
Stabilizer	=	2.27 caliber diameter Ballute
Burble fence	=	2.28 caliber diameter
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 177. Model Specifications for Configuration 84

TABLE XCIV. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 84 (TEST NO. 66)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002298	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.10	C.G.(CALIBERS)	=2.4800
REYNOLDS NUMBER	=0.1891E 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-3.798	5.659	-6.687	1.316	8.797	1.316
-30.0	-35.0	-3.183	4.323	-5.086	1.715	7.207	1.417
-20.0	-25.0	-2.342	3.437	-3.575	2.125	5.484	1.534
-15.0	-20.0	-1.726	3.031	-2.659	2.258	4.544	1.709
-10.0	-15.0	-1.486	2.671	-2.127	2.195	3.417	1.606
-6.0	-11.0	-1.141	2.566	-1.610	2.301	2.695	1.674
-3.0	-8.0	-0.751	2.491	-1.090	2.362	2.007	1.841
-0.0	-5.0	-0.459	2.235	-0.644	2.188	1.162	1.805
3.0	-2.0	-0.285	1.996	-0.355	1.984	0.754	2.126
6.0	1.0	-0.090	2.086	-0.054	2.087	-0.135	-2.516
10.0	5.0	0.510	2.206	0.701	2.153	-1.066	1.522
15.0	10.0	0.961	2.491	1.379	2.286	-1.916	1.389
20.0	15.0	1.471	2.671	2.112	2.199	-3.172	1.502
30.0	25.0	2.232	3.392	3.502	2.110	-5.202	1.485
40.0	35.0	3.228	4.262	5.089	1.640	-6.860	1.348

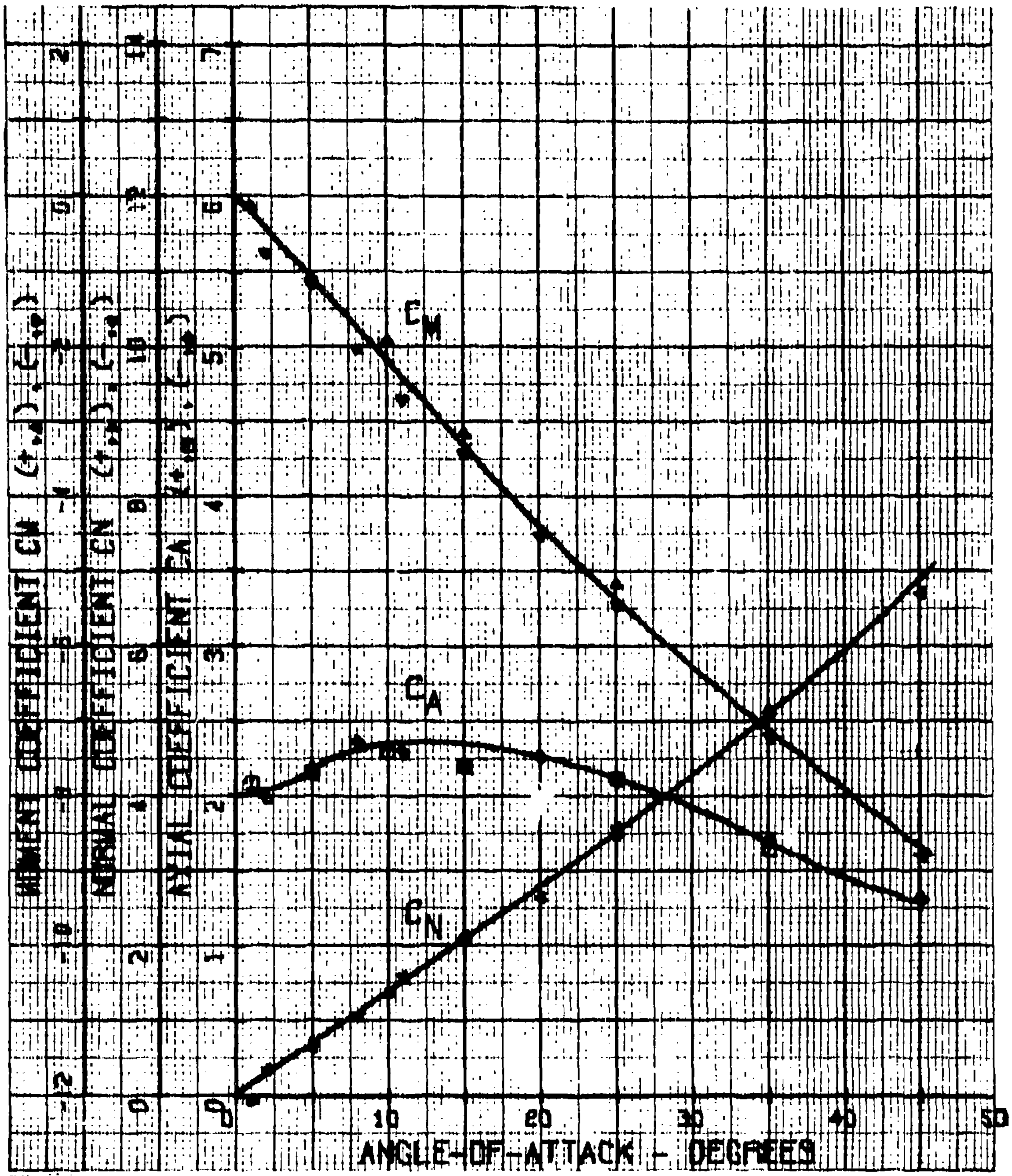
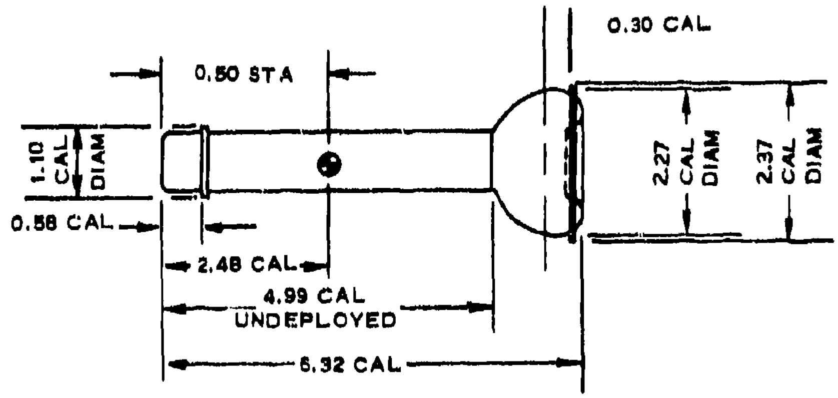


Figure 178. Graphic Static Aerodynamic Test Data: Configuration 84 (Test No. 66)

Item	Page
Static aerodynamic data	
Tabulated	
Plotted	
Dynamic stability data	
Tabulated	293
Plotted	294



General data
Model weight = 309.2
Moment of inertia =

Description of components
Nose shape = flat with 0.1 caliber radius
Tripper = 1.10 caliber diameter
Fineness ratio = 4.99
Stabilizer = 2.27 caliber diameter Ballute
Burble fence = 2.37 caliber diameter
Boattail = none
Strakes (8) = none

Remarks

Figure 179. Model Specifications for Configuration 84A

TABLE XCV. DYNAMIC STABILITY TEST DATA: CONFIGURATION 84A

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.149680
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002308
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =582,585
VELOCITY(FT/SEC)= 217.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.444	-134.972
50.000	25.000	0.456	-131.275
40.000	20.000	0.459	-130.382
30.000	15.000	0.441	-135.930
25.000	12.500	0.434	-137.885

TEST NUMBERS =578,581
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.819	-158.742
50.000	25.000	0.909	-142.922
40.000	20.000	0.997	-130.377
30.000	15.000	0.966	-134.597
25.000	12.500	0.888	-146.445

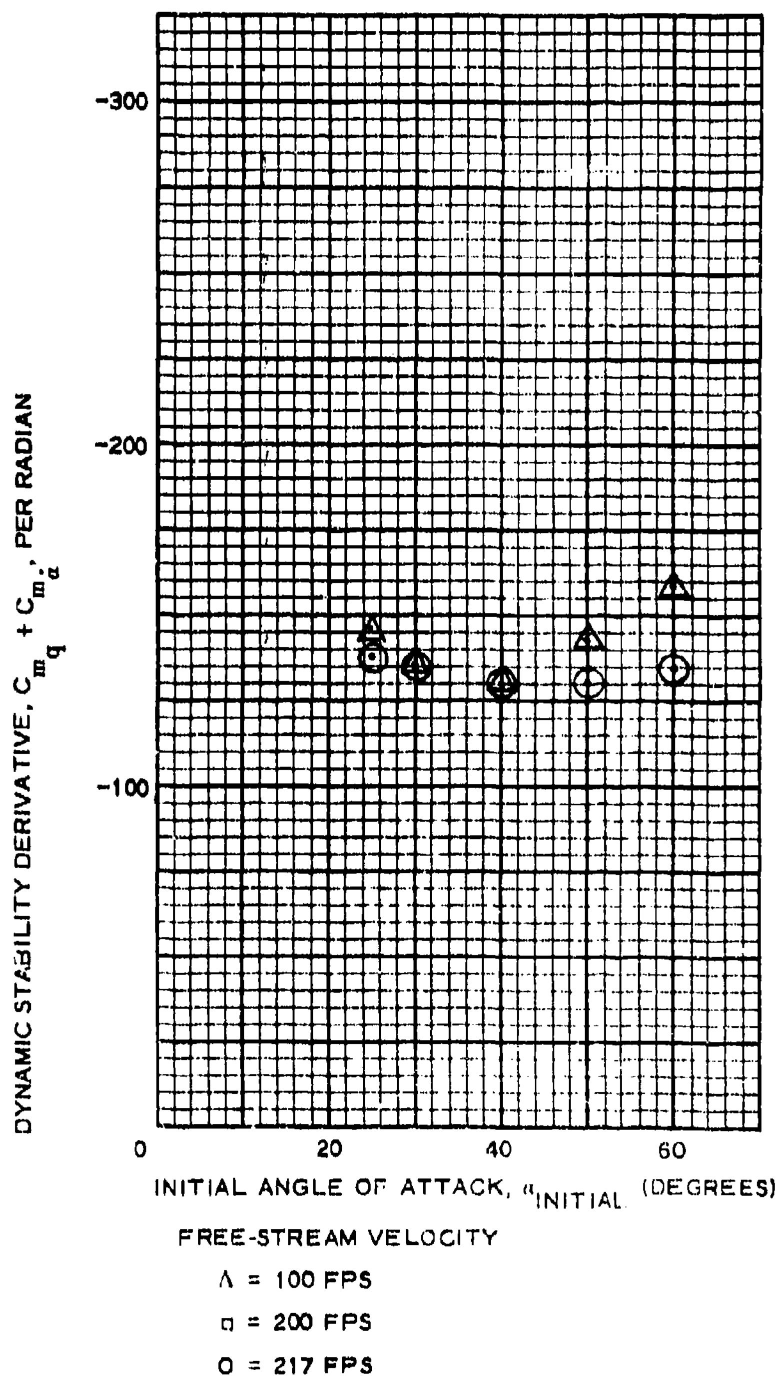
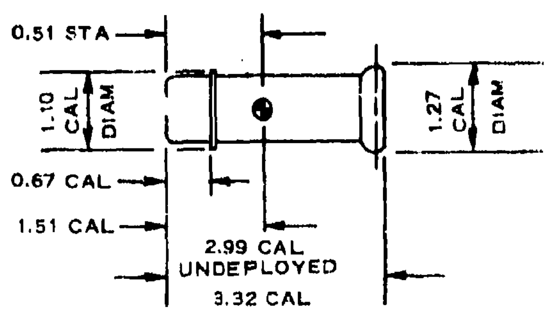


Figure 180. Graphic Dynamic Stability Test Data: Configuration 84A

Item	Page
Static aerodynamic data	
Tabulated	296
Plotted	297
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 261.1 gm

Moment of inertia = 0.08219 slug in.^{2}

Description of components

Nose shape = flat with 0.1 caliber radius

Tripper = 1.10 caliber diameter

Fineness ratio = 2.99

Stabilizer = 1.27 caliber diameter Ballute

Burble fence = none

Boattail = none

Strakes (8) = none

Remarks

Figure 181. Model Specification for Configuration 85

TABLE XCVI. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 85 (TEST NO. 69)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002279	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 53.65	C.G.(CALIBERS)	=1.5067
REYNOLDS NUMBER	=0.9849E 07	ALPHA SHIFT(DEGREES)	=-4.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-44.0	-1.378	2.863	-2.980	1.102	0.579	0.194
-30.0	-34.0	-1.166	2.151	-2.170	1.131	0.267	0.123
-20.0	-24.0	-0.870	1.590	-1.449	1.096	0.049	0.034
-15.0	-19.0	-0.636	1.400	-1.060	1.125	-0.004	-0.004
-10.0	-14.0	-0.515	1.242	-0.800	1.030	0.001	0.001
-6.0	-10.0	-0.394	1.060	-0.572	0.976	-0.014	-0.025
-3.0	-7.0	-0.258	0.930	-0.370	0.901	0.043	0.116
-0.0	-4.0	-0.182	0.803	-0.237	0.788	0.001	0.003
3.0	-1.0	-0.076	0.697	-0.088	0.695	-0.066	-0.750
6.0	2.0	0.136	0.742	0.162	0.737	-0.131	0.809
10.0	6.0	0.242	0.933	0.339	0.909	-0.194	0.572
15.0	11.0	0.470	1.121	0.675	1.011	-0.112	0.166
20.0	16.0	0.454	1.272	0.788	1.098	-0.147	0.187
30.0	26.0	0.818	1.712	1.485	1.130	-0.170	0.115
40.0	36.0	1.142	2.317	2.318	1.180	-0.550	0.237

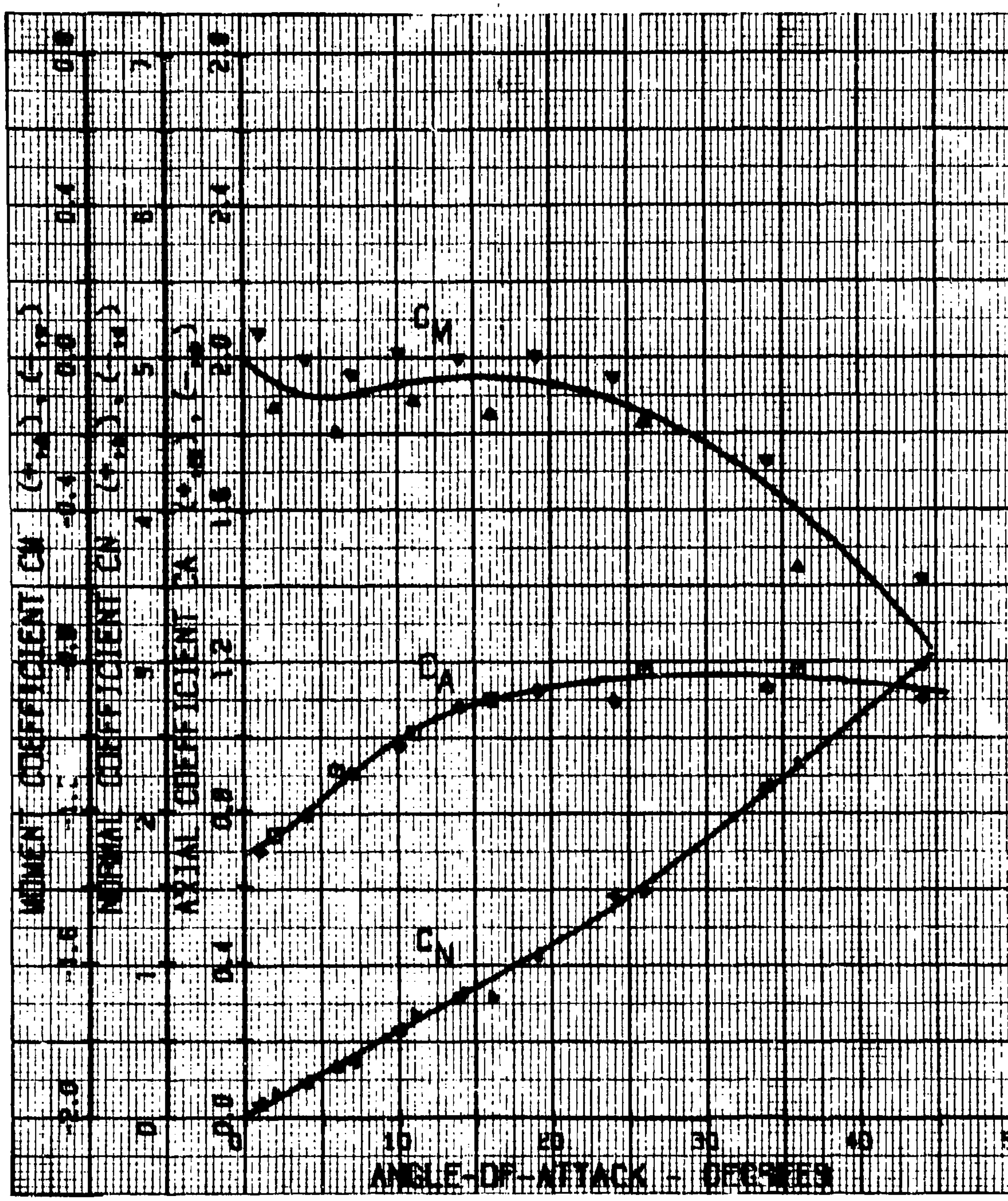
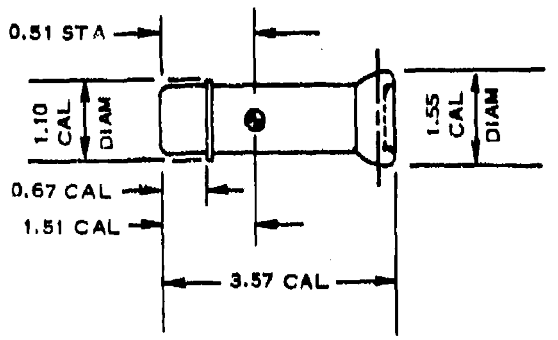


Figure 182. Graphic Static Aerodynamics Test Data: Configuration 85 (Test No. 69)

Item	Page
Static aerodynamic data	
Tabulated	299
Plotted	300
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight =

Moment of inertia =

Description of components

Nose shape = flat with 0.1 caliber radius

Tripper = 1.10 caliber diameter

Fineness ratio = 2.99

Stabilizer = 1.55 caliber diameter Ballute

Burble fence = none

Boattail = none

Strakes (8) = none

Remarks

Figure 183. Model Specifications for Configuration 86

TABLE XCVII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 86 (TEST NO. 70)

VELOCITY(FT/SEC)	217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002279	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 53.65	C.G.(CALIBERS)	=1.5067
REYNOLDS NUMBER	=0.1058E 08	ALPHA SHIFT(DEGREES)	=-1.500

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-41.5	-1.757	3.241	-3.464	1.263	1.292	0.373
-30.0	-31.5	-1.227	2.560	-2.384	1.541	0.756	0.317
-20.0	-21.5	-1.045	2.136	-1.755	1.604	0.521	0.297
-15.0	-16.5	-0.697	1.843	-1.193	1.574	0.281	0.236
-10.0	-11.5	-0.591	1.636	-0.905	1.485	0.111	0.123
-6.0	-7.5	-0.379	1.408	-0.559	1.347	0.022	0.039
-3.0	-4.5	-0.182	1.227	-0.277	1.209	-0.014	-0.049
-0.0	-1.5	-0.061	1.075	-0.089	1.073	-0.155	-1.743
3.0	1.5	0.121	1.030	0.148	1.026	-0.309	2.087
6.0	4.5	0.242	1.166	0.333	1.144	-0.345	1.034
10.0	8.5	0.454	1.348	0.649	1.266	-0.506	0.780
15.0	13.5	0.682	1.621	1.041	1.417	-0.656	0.630
20.0	18.5	0.818	1.802	1.348	1.450	-0.754	0.560
30.0	28.5	1.060	2.242	2.001	1.464	-0.976	0.488
40.0	38.5	1.242	2.651	2.622	1.301	-1.070	0.408

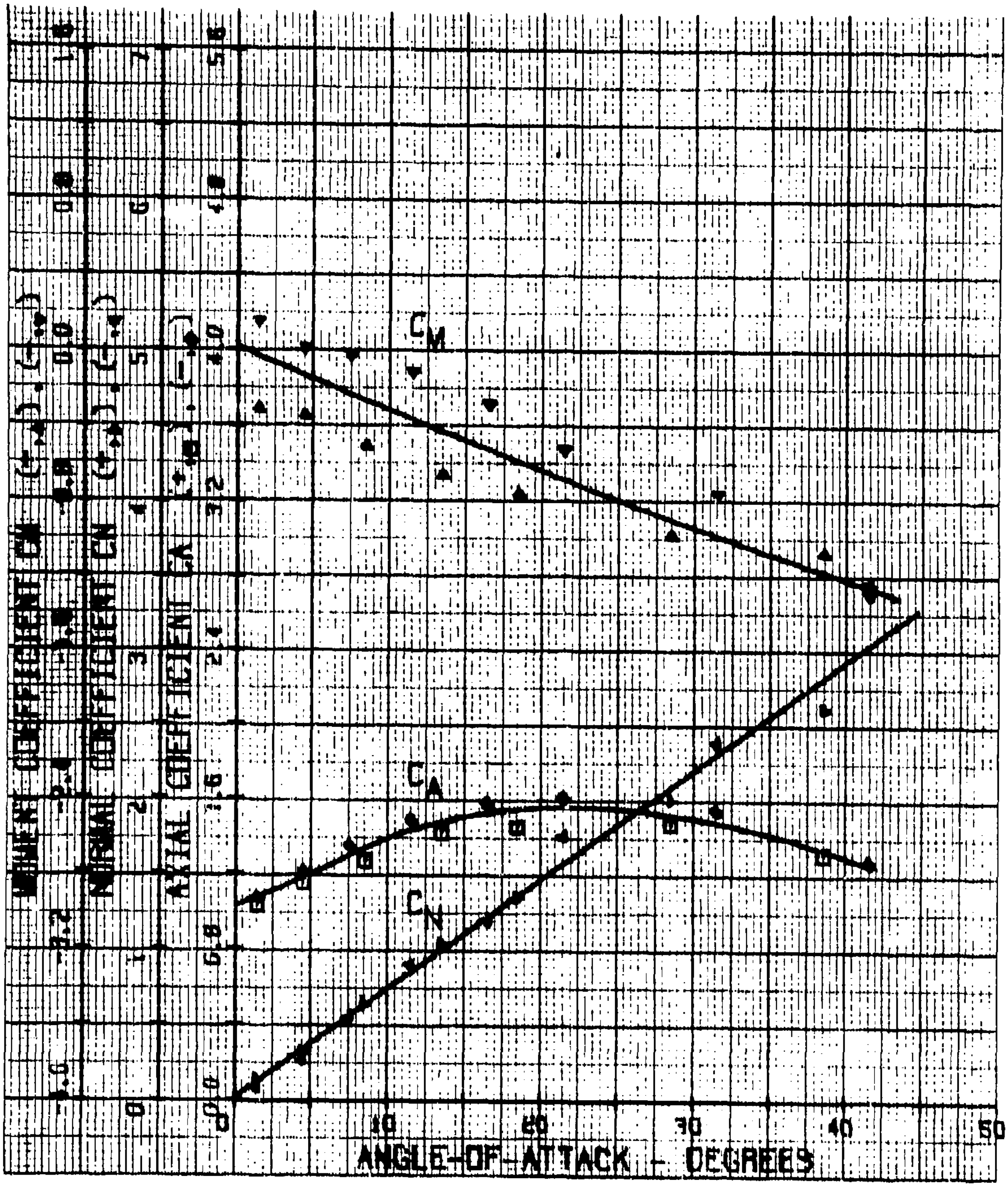
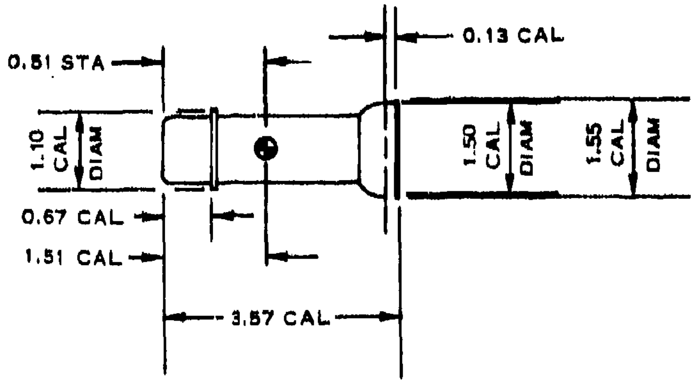


Figure 184. Graphic Static Aerodynamic Test Data:
Configuration 86 (Test No. 70)



General data

Model weight = 256.6 gm
Moment of inertia = 0.08255 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	2.99
Stabilizer	=	1.55 caliber diameter Ballute
Burble fence	=	150 caliber daimeter
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 185. Model Specifications for Configuration 87

TABLE XCVIII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 87 (TEST NO. 73)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002279	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 53.65	C.G.(CALIBERS)	=1.5067
REYNOLDS NUMBER	=0.1058E 08	ALPHA SHIFT(DEGREES)	=-3.500

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.5	-1.848	3.317	-3.624	1.134	1.524	0.421
-30.0	-33.5	-1.242	2.469	-2.398	1.373	0.708	0.295
-20.0	-23.5	-0.954	1.873	-1.624	1.342	0.354	0.218
-15.0	-18.5	-0.773	1.636	-1.252	1.306	0.229	0.183
-10.0	-13.5	-0.530	1.439	-0.851	1.275	0.096	0.113
-6.0	-9.5	-0.409	1.333	-0.623	1.247	0.052	0.083
-3.0	-6.5	-0.348	1.181	-0.480	1.134	0.053	0.110
-0.0	-3.5	-0.212	1.000	-0.276	1.045	-0.032	-0.114
3.0	-0.5	0.015	0.930	0.007	0.939	-0.116	15.697
6.0	2.5	0.151	0.993	0.195	0.992	-0.163	0.834
10.0	6.5	0.288	1.196	0.421	1.156	-0.306	0.725
15.0	11.5	0.439	1.393	0.708	1.278	-0.286	0.404
20.0	16.5	0.576	1.590	1.004	1.351	-0.396	0.385
30.0	26.5	1.015	2.030	1.814	1.363	-0.670	0.369
40.0	36.5	1.348	2.454	2.543	1.170	-1.090	0.429

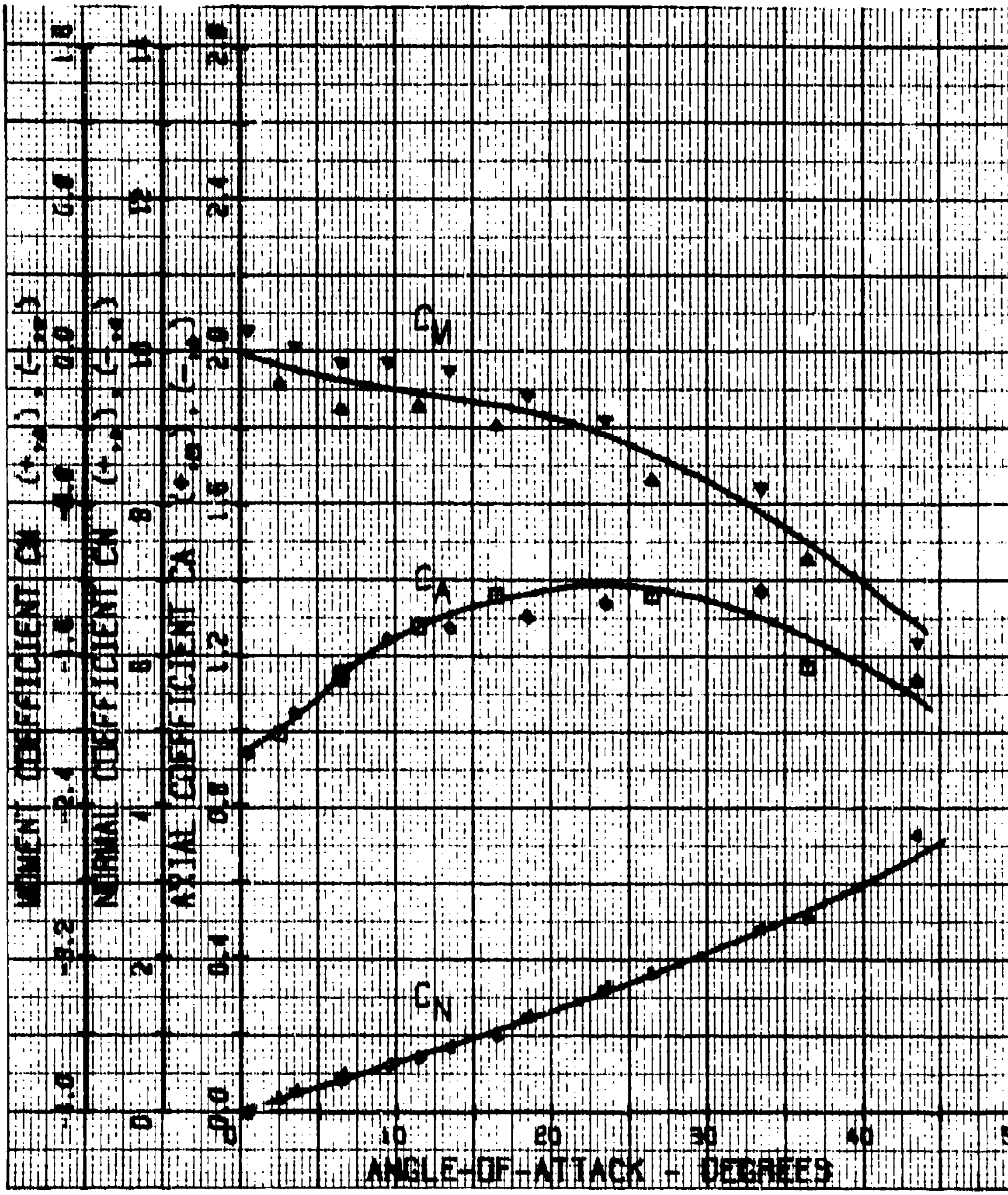


Figure 186. Graphic Static Aerodynamic Test Data: Configuration 87 (Test No. 73)

TABLE XCIX, DYNAMIC STABILITY TEST DATA: CONFIGURATION 87

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.082550
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002248
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =540,543
VELOCITY(FT/SEC)= 217.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.872	-18.117
50.000	25.000	1.706	-19.875
40.000	20.000	1.359	-24.947
30.000	15.000	0.969	-35.006
25.000	12.500	0.813	-41.419

TEST NUMBERS =544,547
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.234	-59.616
50.000	25.000	1.094	-67.281
40.000	20.000	0.912	-90.645
30.000	15.000	0.687	-107.038
25.000	12.500	0.603	-122.013

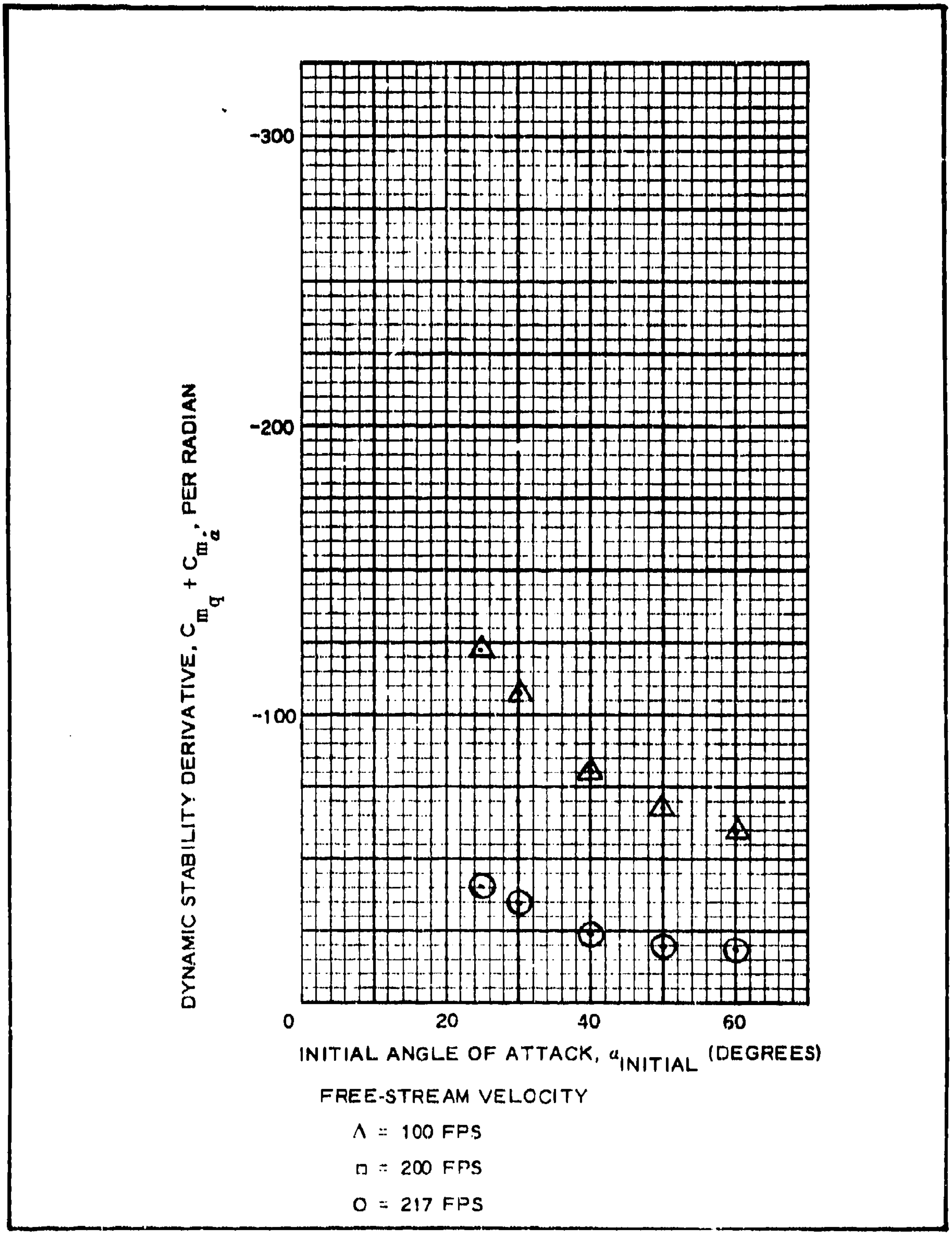
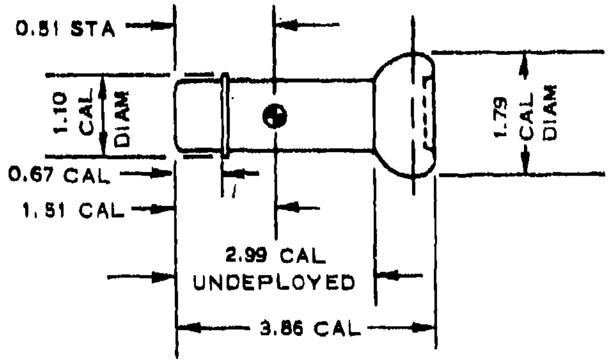


Figure 187. Graphic Dynamic Stability Test Data: Configuration 87

Item	Page
Static aerodynamic data	
Tabulated	307
Plotted	308
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 284.5 gm
Moment of inertia =

Description of components

Nose shape	= flat with 0.1 caliber radius
Tripper	= 1.10 caliber diameter
Fineness ratio	= 2.99
Stabilizer	= 1.79 caliber diameter Ballute
Burble fence	= none
Boattail	= none
Strakes (8)	= none

Remarks

Figure 188. Model Specifications for Configuration 88

TABLE C. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 88
(TEST NO. 74

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002279	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 53.65	C.G.(CALIBERS)	=1.5067
REYNOLDS NUMBER	=0.1145E 08	ALPHA SHIFT(DEGREES)	=-4.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-44.0	-2.136	3.726	-4.124	1.196	2.677	0.649
-30.0	-34.0	-1.833	3.029	-3.213	1.486	2.245	0.699
-20.0	-24.0	-1.515	2.544	-2.418	1.708	1.759	0.727
-15.0	-19.0	-1.303	2.423	-2.020	1.867	1.619	0.801
-10.0	-14.0	-0.954	2.166	-1.450	1.870	1.194	0.823
-6.0	-10.0	-0.727	1.878	-1.042	1.723	0.810	0.778
-3.0	-7.0	-0.591	1.651	-0.787	1.566	0.640	0.812
-0.0	-4.0	-0.576	1.499	-0.679	1.455	0.358	0.527
3.0	-1.0	-0.106	1.348	-0.130	1.346	-0.025	-0.195
6.0	2.0	-0.212	1.408	-0.163	1.415	-0.273	-1.678
10.0	6.0	0.379	1.605	0.544	1.557	-0.658	1.208
15.0	11.0	0.757	1.939	1.113	1.758	-1.017	0.913
20.0	16.0	0.969	2.317	1.570	1.960	-1.541	0.981
30.0	26.0	1.454	2.544	2.422	1.649	-1.919	0.792
40.0	36.0	1.969	3.029	3.373	1.203	-2.484	0.736

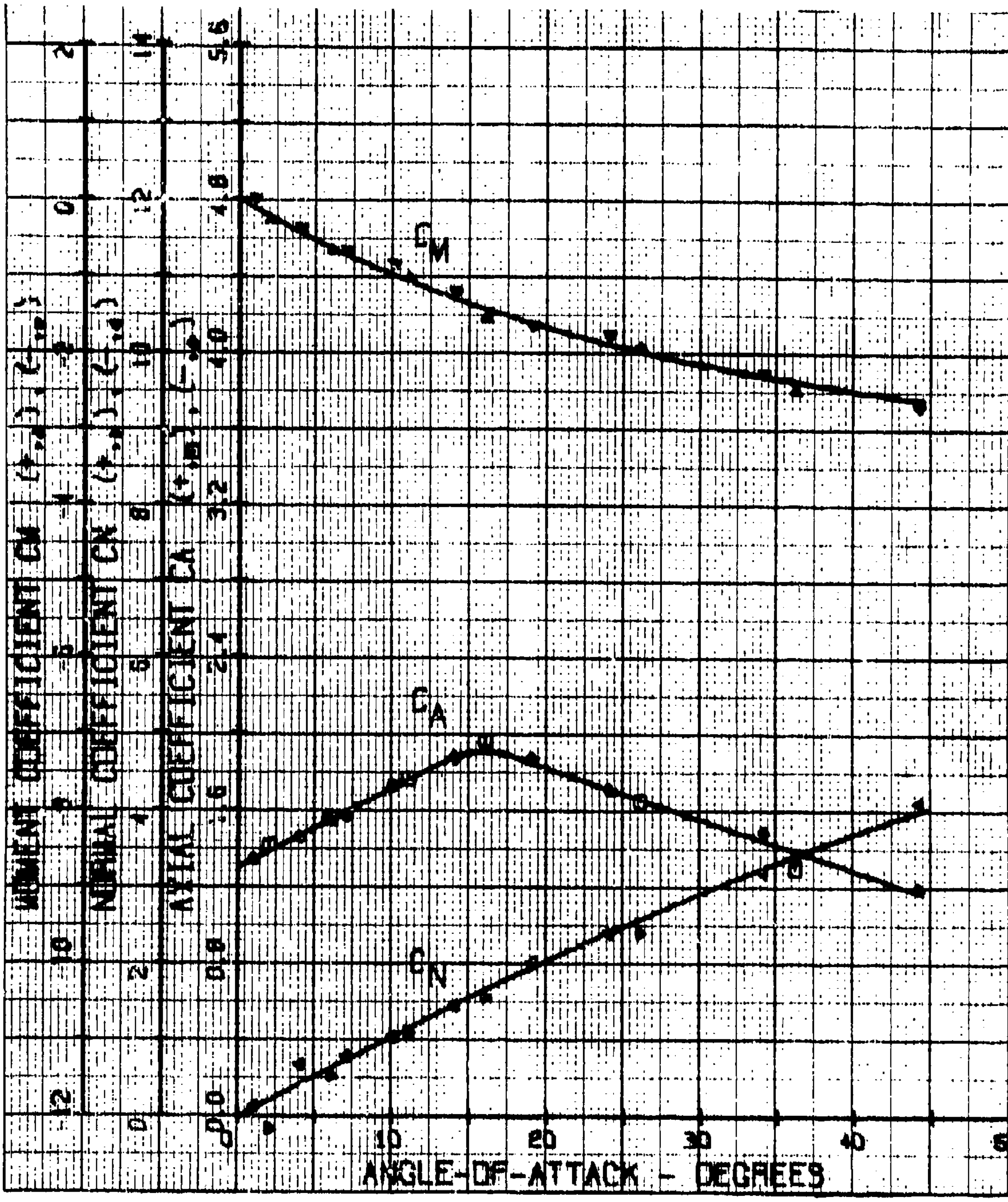
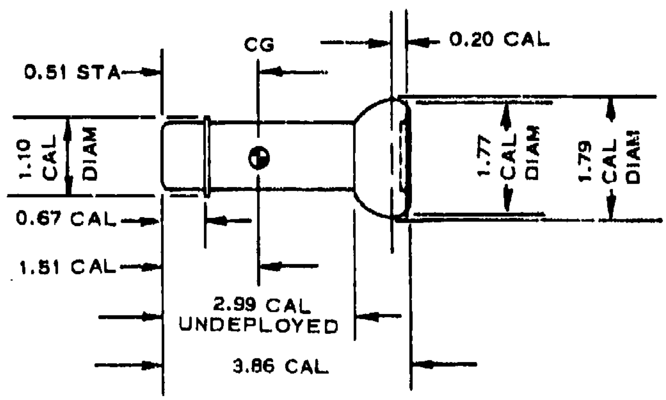


Figure 189. Graphic Static Aerodynamic Test Data: Configuration 88 (Test No. 74)

Item	Page
Static aerodynamic data	
Tabulated	310
Plotted	311
Dynamic stability data	
Tabulated	312
Plotted	313



General data

Model weight = 270.0 gm

Moment of inertia = 0.08556 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	2.99
Stabilizer	=	1.79 caliber diameter Ballute
Burble fence	=	1.77 caliber diameter
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 190. Model Specifications for Configuration 89

TABLE CI. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 89 (TEST NO. 77)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002279	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 53.55	C.G.(CALIBERS)	=1.5067
REYNOLDS NUMBER	=0.1145E 08	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-2.408	3.892	-4.416	1.204	3.118	0.706
-30.0	-33.0	-1.924	3.029	-3.263	1.493	2.326	0.713
-20.0	-23.0	-1.272	2.241	-2.047	1.566	1.335	0.652
-15.0	-18.0	-1.136	2.014	-1.703	1.564	1.027	0.603
-10.0	-13.0	-0.666	1.772	-1.048	1.576	0.619	0.590
-6.0	-9.0	-0.454	1.605	-0.700	1.514	0.381	0.544
-3.0	-6.0	-0.348	1.491	-0.503	1.454	0.275	0.547
-0.0	-3.0	-0.197	1.333	-0.266	1.329	0.116	0.436
3.0	0.0	0.0	1.257	0.0	1.257	-0.075	0.0
6.0	3.0	0.212	1.242	0.277	1.229	-0.132	0.476
10.0	7.0	0.379	1.484	0.557	1.427	-0.461	0.829
15.0	12.0	0.621	1.711	0.963	1.545	-0.626	0.650
20.0	17.0	0.924	1.908	1.441	1.555	-0.988	0.686
30.0	27.0	1.439	2.438	2.389	1.519	-1.725	0.722
40.0	37.0	1.939	3.135	3.435	1.337	-2.697	0.785

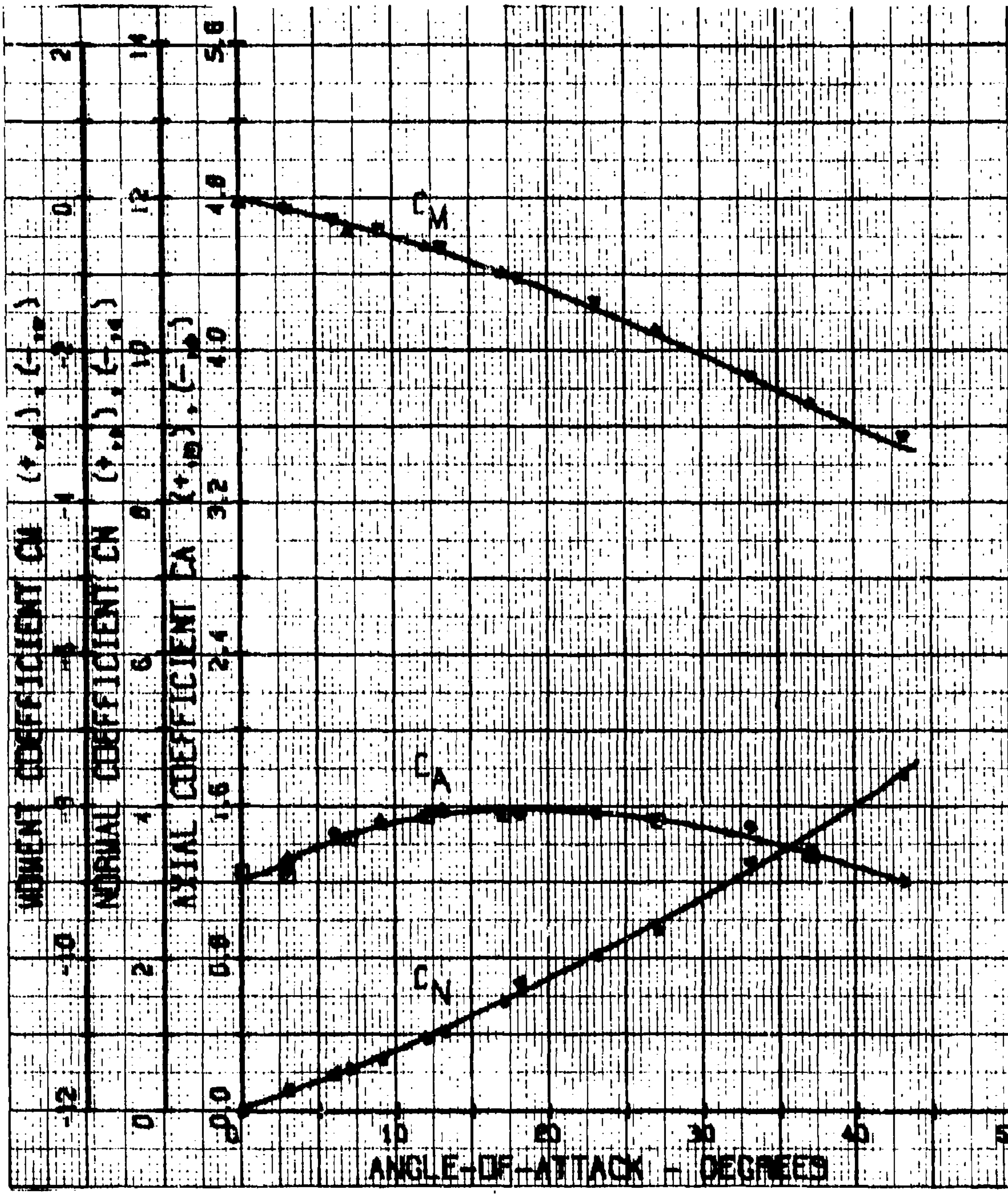


Figure 191. Graphic Static Aerodynamic Test Data: Configuration 89 (Test No. 77)

TABLE CII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 89

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.085560
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002248
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =524,527
VELOCITY(FT/SEC)= 217.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.144	-30.731
50.000	25.000	1.200	-29.290
40.000	20.000	1.194	-29.444
30.000	15.000	1.253	-29.049
25.000	12.500	1.237	-28.403

TEST NUMBERS =528,531
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.253	-60.865
50.000	25.000	1.228	-62.104
40.000	20.000	1.219	-62.582
30.000	15.000	1.184	-64.339
25.000	12.500	1.112	-68.559

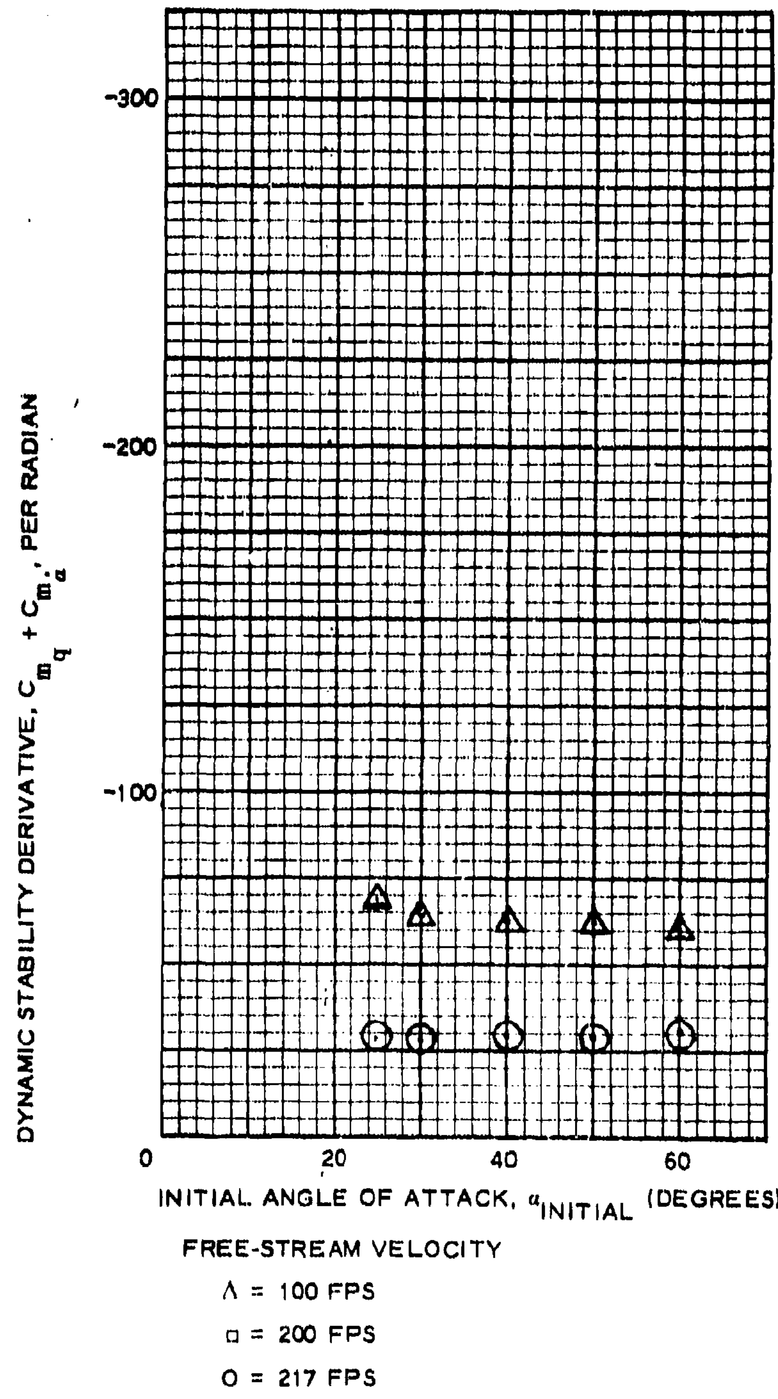
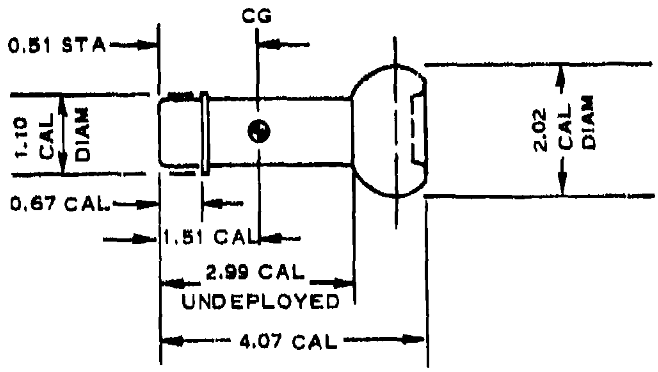


Figure 192. Graphic Dynamic Stability Test Data: Configuration 89

Item	Page
Static aerodynamic data	
Tabulated	315
Plotted	316
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight =

Moment of inertia =

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.0 caliber diameter
Fineness ratio	=	2.99
Stabilizer	=	2.02 caliber diameter Ballute
Burble fence	=	none
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 193. Model Specifications for Configuration 90

TABLE CIII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 90 (TEST NO. 78)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002298	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 54.10	C.G.(CALIBERS)	=1.5067
REYNOLDS NUMBER	=0.1217E 08	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-1.922	3.934	-4.089	1.566	3.040	0.744
-30.0	-33.0	-1.427	3.138	-2.906	1.855	2.107	0.725
-20.0	-23.0	-1.497	2.973	-2.530	2.156	2.444	0.966
-15.0	-18.0	-1.171	2.778	-1.972	2.280	2.157	1.093
-10.0	-13.0	-0.901	2.447	-1.428	2.192	1.345	0.969
-6.0	-9.0	-0.646	2.057	-0.960	1.931	0.979	1.020
-3.0	-6.0	-0.496	1.847	-0.686	1.785	0.788	1.149
-0.0	-3.0	-0.240	1.501	-0.319	1.487	0.373	1.171
3.0	0.0	0.0	1.396	0.0	1.396	-0.153	0.0
6.0	3.0	0.270	1.591	0.353	1.575	-0.495	1.401
10.0	7.0	0.541	1.982	0.778	1.901	-0.879	1.130
15.0	12.0	0.901	2.462	1.393	2.221	-1.673	1.200
20.0	17.0	1.337	2.522	2.016	2.021	-2.415	1.198
30.0	27.0	1.487	2.943	2.661	1.947	-2.310	0.868
40.0	37.0	1.652	3.313	3.362	1.716	-2.545	0.757

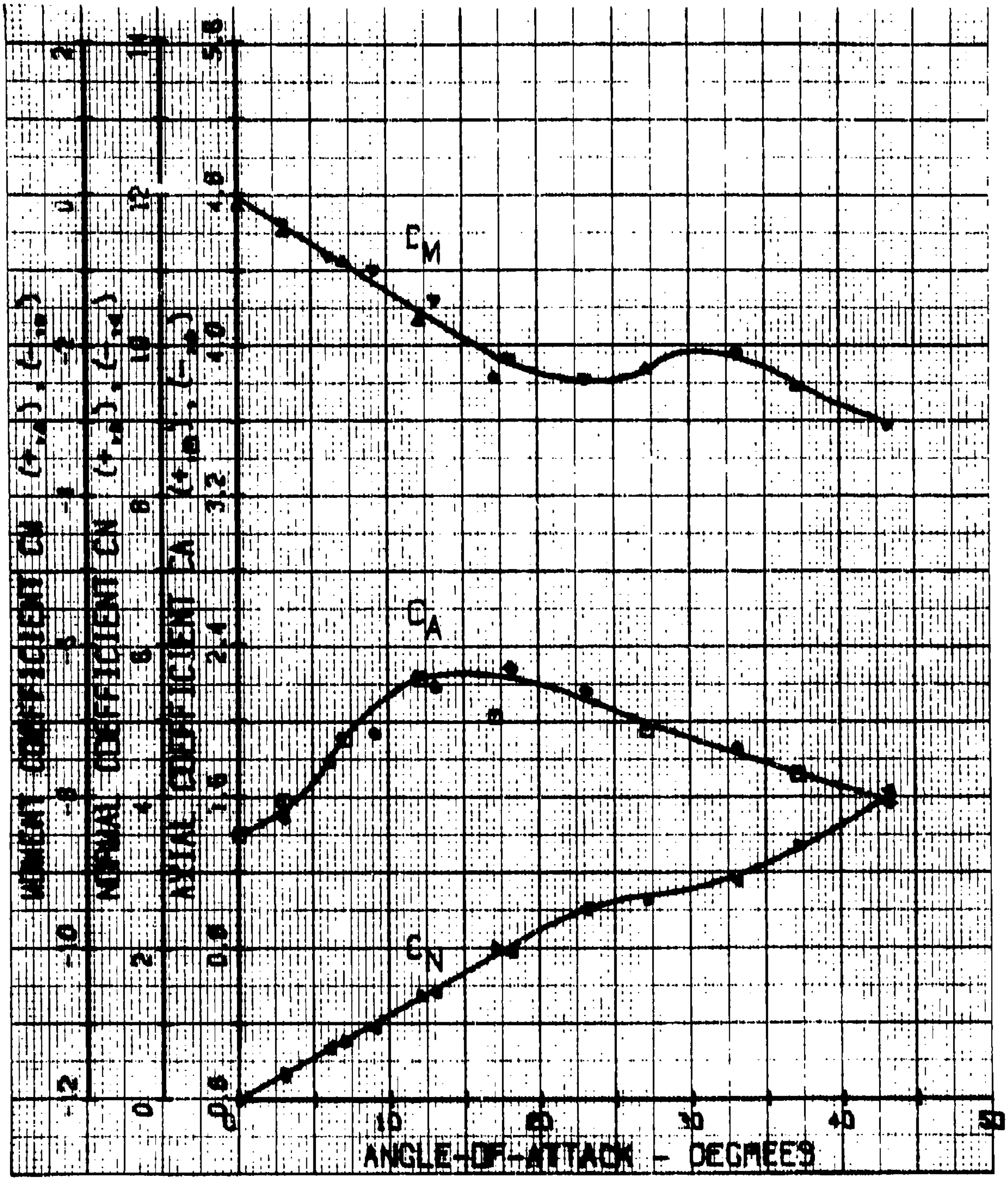
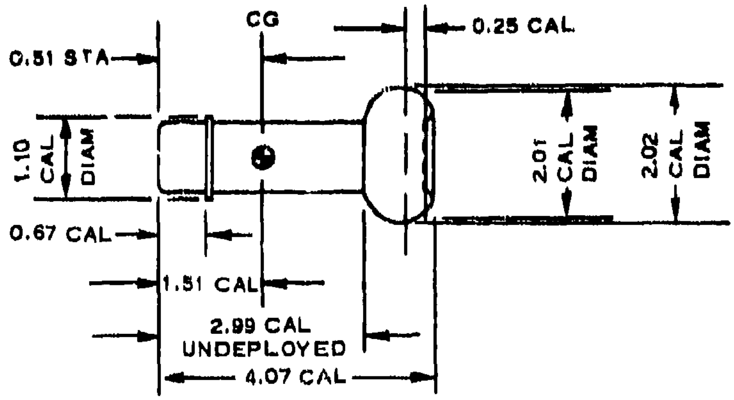


Figure 194. Graphic Static Aerodynamic Test Data: Configuration 90 (Test No. 78)



General data

Model weight = 281.1 gm

Moment of inertia = 0.08926 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	2.99
Stabilizer	=	2.02 caliber diameter Ballute
Burble fence	=	2.01 caliber diameter
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 195. Model Specification for Configuration 91

TABLE CIV. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 91 (TEST NO. 81)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002292	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 53.97	C.G.(CALIBERS)	=1.5067
REYNOLDS NUMBER	=0.1214E 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-2.755	4.380	-5.046	1.149	4.359	0.862
-30.0	-35.0	-2.243	3.507	-3.849	1.586	3.428	0.890
-20.0	-25.0	-1.686	2.785	-2.705	1.811	2.336	0.864
-15.0	-20.0	-1.310	2.484	-2.089	1.846	1.780	0.856
-10.0	-15.0	-1.024	2.213	-1.562	1.872	1.319	0.845
-6.0	-11.0	-0.768	2.032	-1.153	1.907	0.797	0.691
-3.0	-8.0	-0.572	2.017	-0.847	1.918	0.628	0.742
-0.0	-5.0	-0.422	1.942	-0.589	1.837	0.400	0.678
3.0	-2.0	-0.090	1.746	-0.151	1.742	-0.075	-0.499
6.0	1.0	-0.045	1.701	-0.015	1.701	-0.208	-13.436
10.0	5.0	0.301	1.851	0.461	1.818	-0.665	1.441
15.0	10.0	0.542	2.077	0.894	1.951	-1.068	1.195
20.0	15.0	0.948	2.213	1.489	1.892	-1.501	1.008
30.0	25.0	1.521	2.679	2.510	1.786	-2.506	0.998
40.0	35.0	2.123	3.357	3.664	1.532	-3.570	0.974

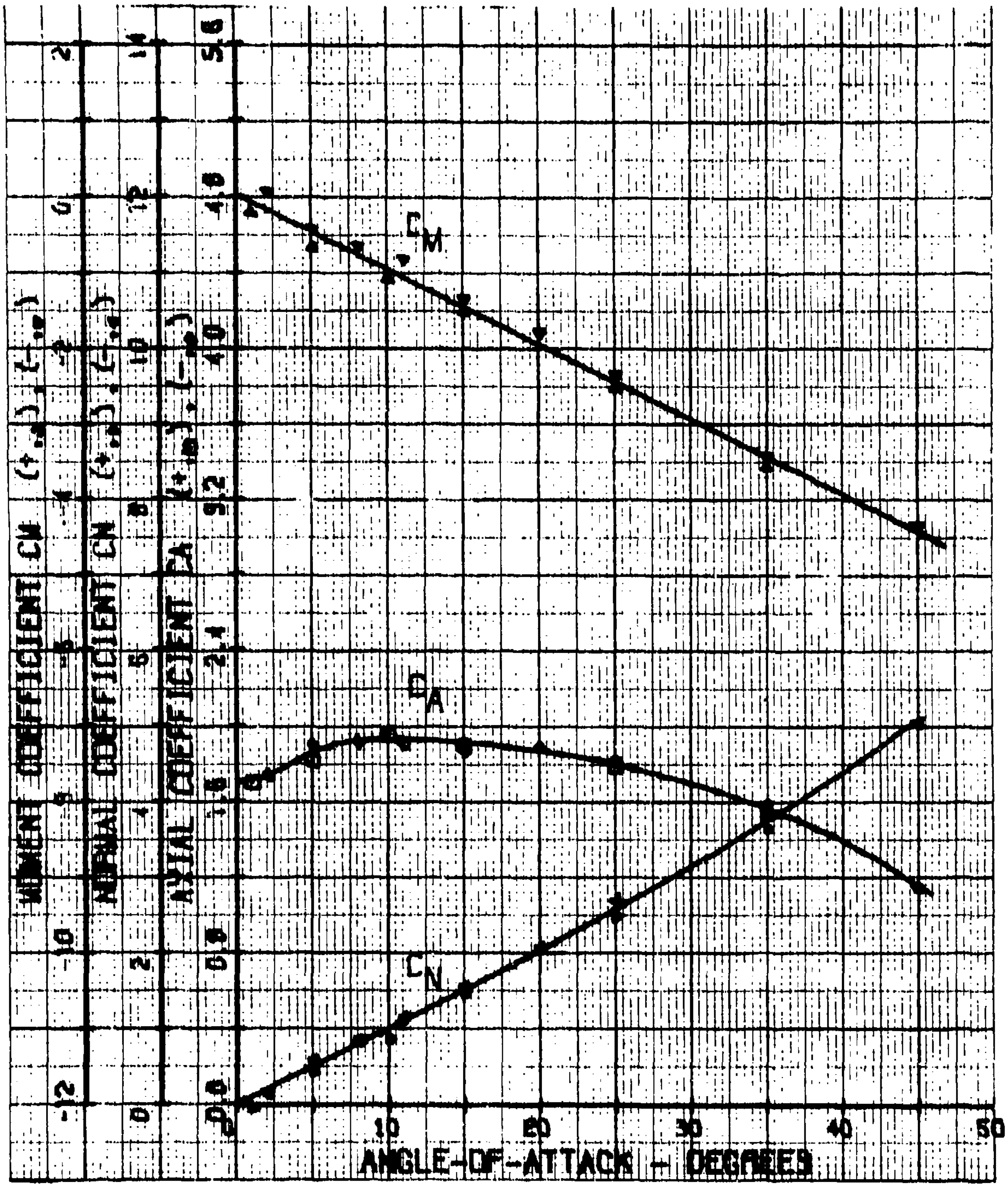


Figure 196. Graphic Static Aerodynamic Test Data: Configuration 91 (Test No. 81)

TABLE CV. DYNAMIC STABILITY TEST DATA: CONFIGURATION 91

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.08925
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002248
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =552,555
VELOCITY(FT/SEC)= 217.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.891	-41.171
50.000	25.000	0.897	-40.835
40.000	20.000	0.897	-40.885
30.000	15.000	0.928	-39.509
25.000	12.500	0.997	-36.783

TEST NUMBERS =548,551
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	1.434	-55.474
50.000	25.000	1.241	-64.137
40.000	20.000	0.994	-80.071
30.000	15.000	1.034	-75.926
25.000	12.500	1.166	-68.264

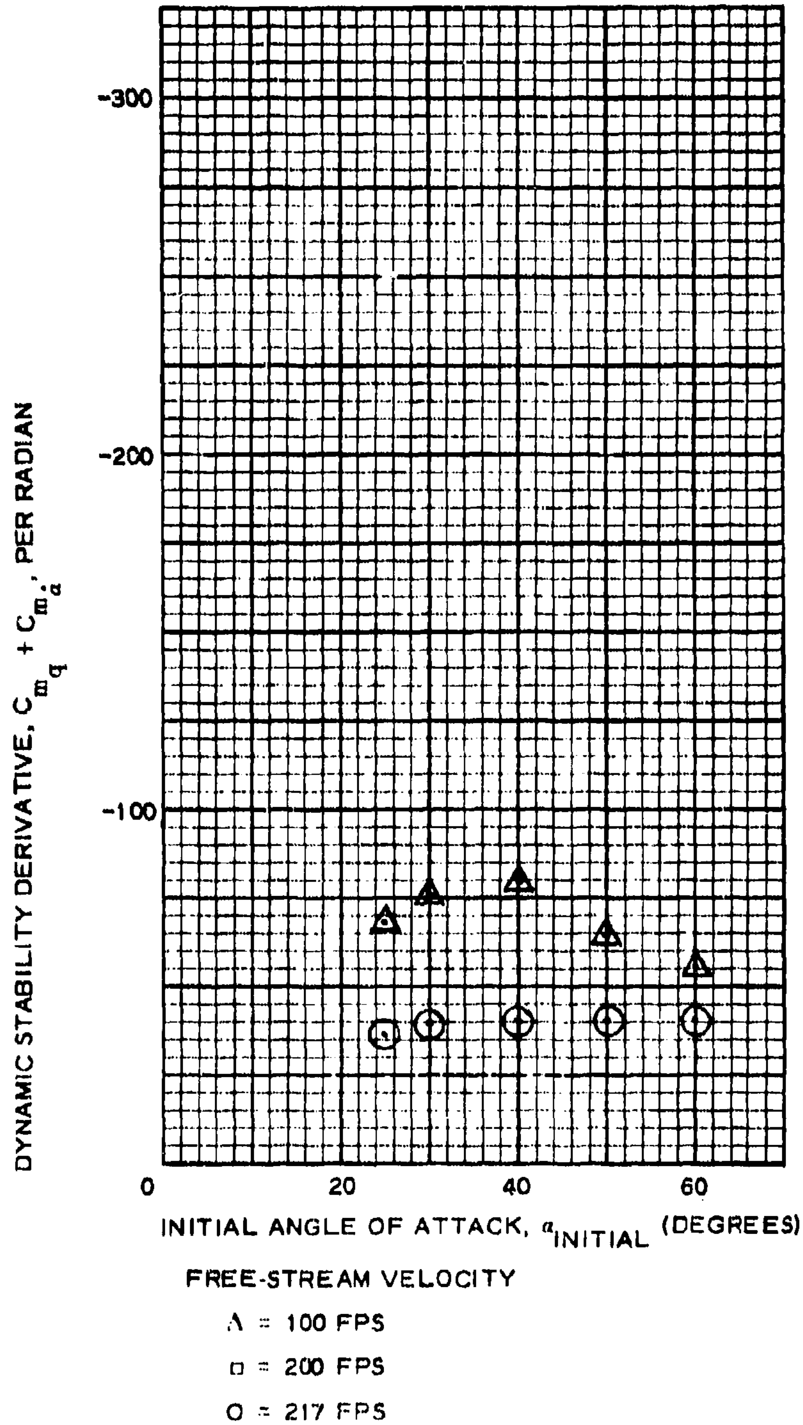
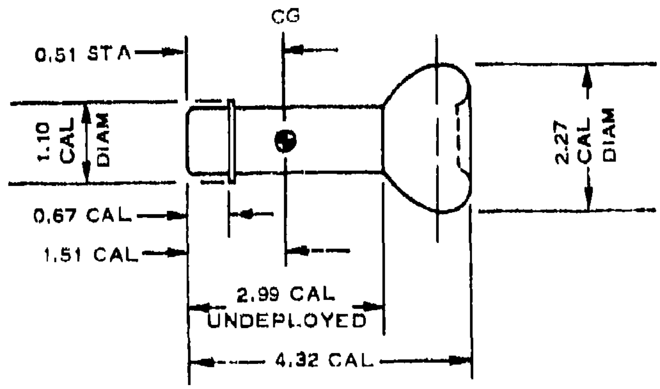


Figure 197. Graphic Dynamic Stability Test Data: Configuration 91

Item	Page
Static aerodynamic data	
Tabulated	323
Plotted	324
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight =

Moment of inertia = 0.10311 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	2.99
Stabilizer	=	2.27 caliber diameter
Burble fence	=	none
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 198. Model Specifications for Configuration 92

TABLE CVI. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 92 (TEST NO. 82)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002232	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 53.97	C.G.(CALIBERS)	=1.5067
REYNOLDS NUMBER	=0.12890 08	ALPHA SHIFT(DEGREES)	=-5.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-45.0	-2.930	4.560	-5.226	1.224	5.649	1.081
-30.0	-35.0	-2.604	3.873	-4.369	1.699	5.621	1.286
-20.0	-25.0	-2.303	3.507	-3.569	2.205	4.888	1.370
-15.0	-20.0	-2.047	3.416	-3.092	2.510	4.186	1.354
-10.0	-15.0	-1.159	2.859	-1.860	2.462	2.781	1.495
-6.0	-11.0	-0.768	2.393	-1.210	2.202	1.601	1.323
-3.0	-8.0	-0.617	2.182	-0.915	2.075	1.189	1.300
-0.0	-5.0	-0.376	1.821	-0.534	1.781	0.415	0.777
3.0	-2.0	-0.196	1.761	-0.257	1.753	0.184	0.715
6.0	1.0	-0.105	1.926	-0.072	1.928	-0.015	-0.206
10.0	5.0	0.331	2.122	0.515	2.085	-0.818	1.588
15.0	10.0	0.692	2.558	1.126	2.399	-1.607	1.427
20.0	15.0	1.355	2.965	2.076	2.513	-2.772	1.335
30.0	25.0	2.243	3.537	3.528	2.258	-4.789	1.358
40.0	35.0	2.664	4.019	4.488	1.764	-5.426	1.209

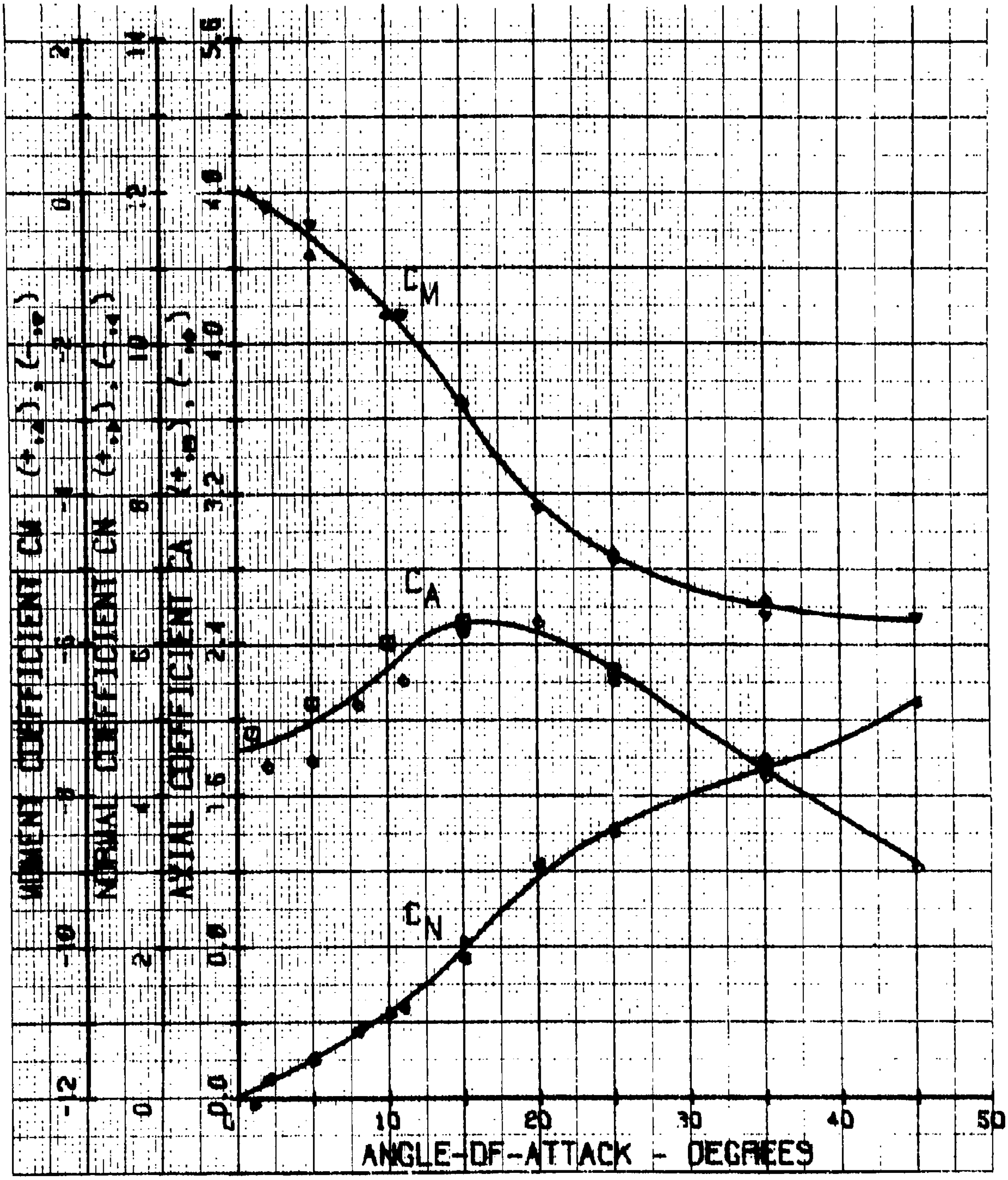
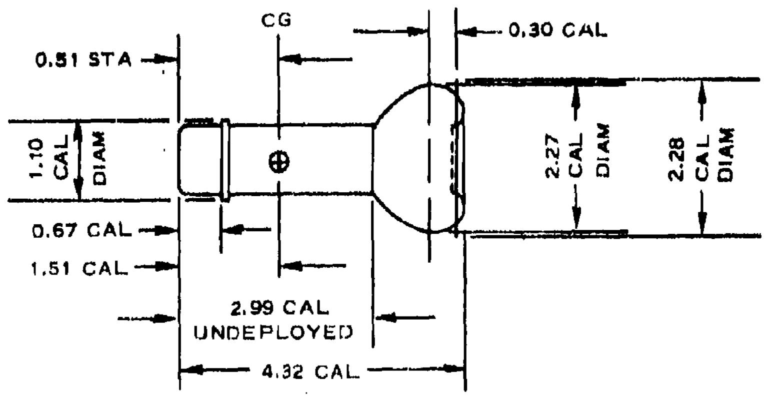


Figure 199. Graphic Static Aerodynamic Test Data: Configuration 92 (Test No. 82)

Item	Page
Static aerodynamic data	
Tabulated	326
Plotted	327
Dynamic stability data	
Tabulated	328
Plotted	329



General data

Model weight = 295.8 gm

Moment of inertia = 0.09804 slug in.^{2}

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	2.99
Stabilizer	=	2.27 caliber diameter Ballute
Burble fence	=	2.28 caliber diameter
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 200. Model Specifications for Configuration 93

TABLE CVII. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 93 (TEST NO. 85)

VELOCITY(FT/SEC)	= 217.00	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002286	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 53.83	C.G.(CALIBERS)	=1.5067
REYNOLDS NUMBER	=0.1286E 08	ALPHA SHIFT(DEGREES)	=-4.000

ALPHA (DEGREES) SET	ALPHA (DEGREES) TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-44.0	-3.154	4.738	-5.560	1.217	6.263	1.126
-30.0	-34.0	-2.686	3.832	-4.370	1.675	5.223	1.195
-20.0	-24.0	-1.977	3.063	-3.052	1.994	3.634	1.210
-15.0	-19.0	-1.645	2.806	-2.469	2.118	2.890	1.170
-10.0	-14.0	-1.238	2.610	-1.832	2.233	2.096	1.144
-6.0	-10.0	-0.845	2.504	-1.267	2.320	1.431	1.129
-3.0	-7.0	-0.679	2.414	-0.968	2.313	1.003	1.036
-0.0	-4.0	-0.332	2.233	-0.487	2.204	0.445	0.914
3.0	-1.0	0.030	2.097	-0.006	2.037	-0.179	-27.866
6.0	2.0	0.211	2.082	0.284	2.073	-0.436	1.535
10.0	6.0	0.543	2.334	0.789	2.314	-1.152	1.460
15.0	11.0	0.996	2.535	1.461	2.298	-1.909	1.306
20.0	16.0	1.328	2.821	2.054	2.346	-2.701	1.315
30.0	26.0	2.173	3.259	3.382	1.976	-4.327	1.279
40.0	36.0	2.747	4.059	4.603	1.669	-5.725	1.242

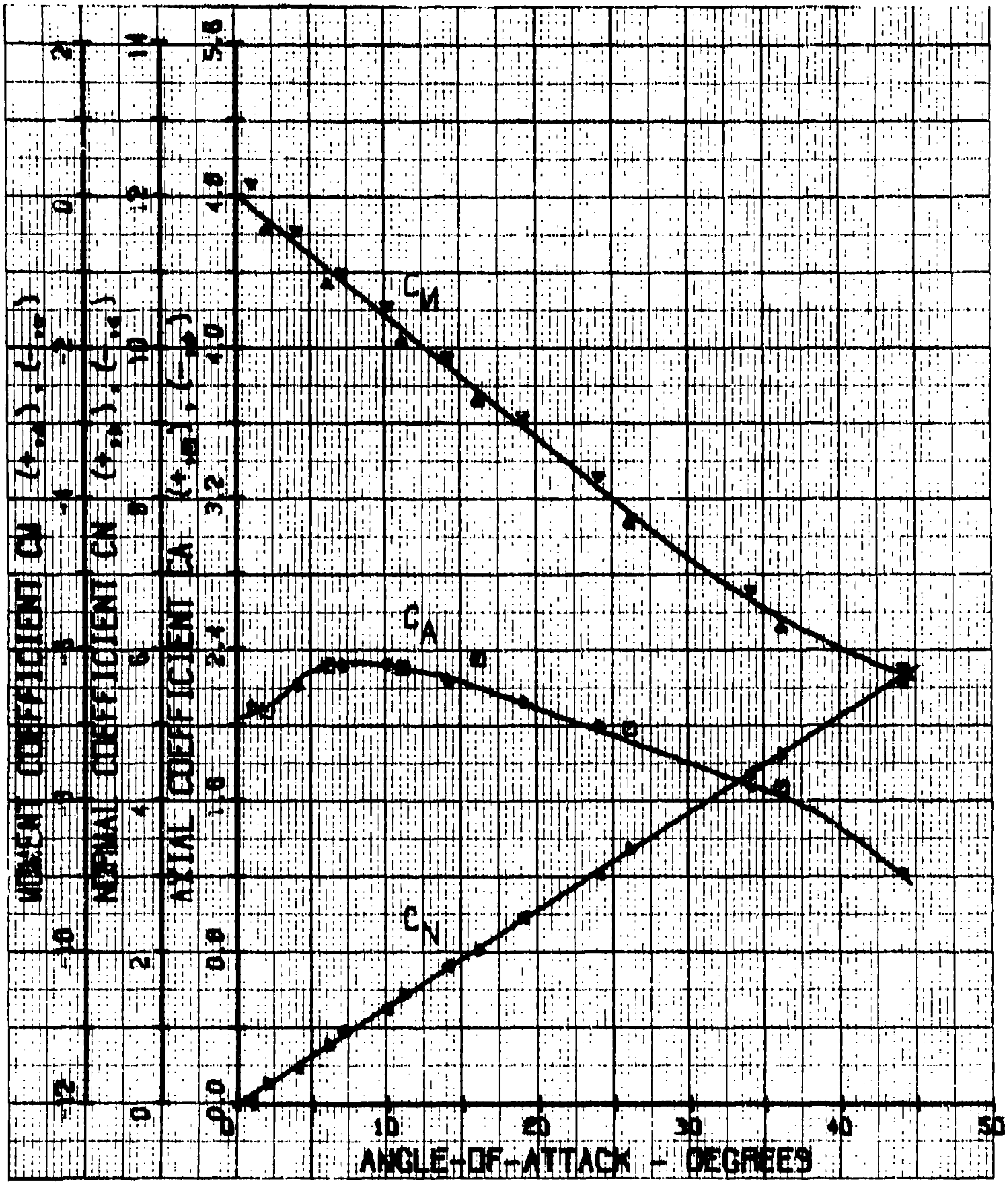


Figure 201. Graphic Static Aerodynamic Test Data: Configuration 93 (Test No. 85)

TABLE CVIII. DYNAMIC STABILITY TEST DATA: CONFIGURATION 93

RELEASE ANGLE-OF-ATTACK(DEGREES)= 60.00
MOMENT OF INERTIA(SLUG-IN.SQ) =0.098040
ATMOSPHERIC DENSITY(SLUGS/CU FT)=0.002255
REFERENCE AREA(SQ FT) =0.012300
REFERENCE LENGTH(FEET) =0.125000

TEST NUMBERS =500,503
VELOCITY(FT/SEC)= 217.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.747	-53.740
50.000	25.000	0.837	-47.925
40.000	20.000	0.894	-44.909
30.000	15.000	0.994	-40.390
25.000	12.500	1.044	-38.455

TEST NUMBERS =504,507
VELOCITY(FT/SEC)= 100.

INITIAL ANGLE (DEGREES)	HALF ANGLE (DEGREES)	TIME TO 1/2 AMPLITUDE (SECONDS)	CMQ (PER RADIAN)
60.000	30.000	0.687	-126.688
50.000	25.000	0.741	-117.601
40.000	20.000	0.794	-109.730
30.000	15.000	0.850	-102.468
25.000	12.500	0.897	-97.113

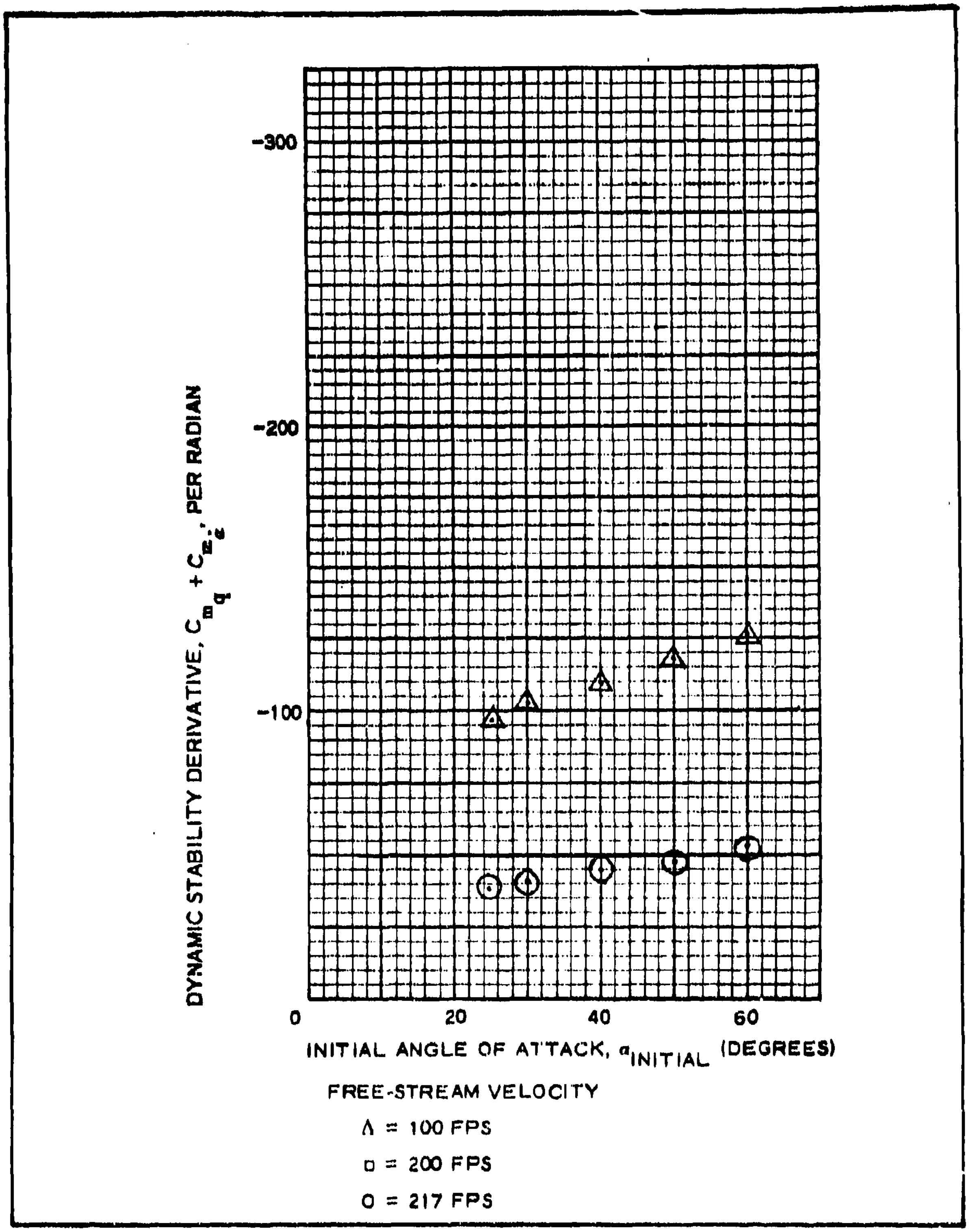
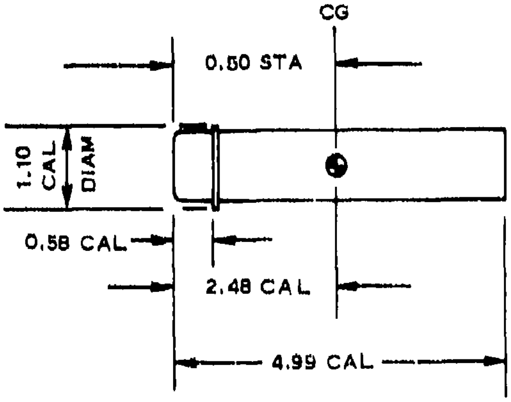


Figure 202. Graphic Dynamic Stability Test Data: Configuration 93

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



General data

Model weight =

Moment of inertia =

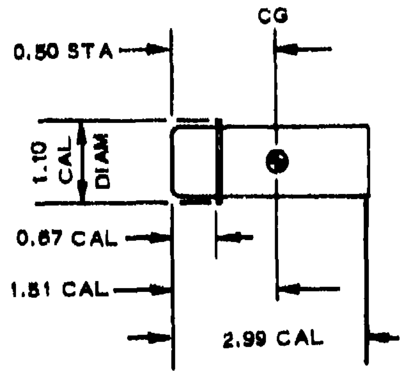
Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	4.99
Stabilizer	=	none
Burble fence	=	none
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 203. Model Specifications for Configuration 94

Item	Page
Static aerodynamic data	
Tabulated	332
Plotted	333
Dynamic stability data	
Tabulated	
Plotted	



General data

Model weight = 187.6 gm

Moment of inertia =

Description of components

Nose shape	=	flat with 0.1 caliber radius
Tripper	=	1.10 caliber diameter
Fineness ratio	=	2.99
Stabilizer	=	none
Burble fence	=	none
Boattail	=	none
Strakes (8)	=	none

Remarks

Figure 204. Model Specifications for Configuration 95

TABLE CIX. STATIC AERODYNAMIC TEST DATA: CONFIGURATION 95
(TEST NO. 91

VELOCITY(FT/SEC)	= 217.30	REFERENCE LENGTH(FT)	=0.1250
DENSITY(SLUGS/CU FT)	=0.002236	REFERENCE AREA(SQ FT)	=0.0123
DYNAMIC PRESSURE(LBS/SQ FT)	= 53.83	C.G.(CALIBERS)	=1.5067
REYNOLDS NUMBER	=[illegible].3891E 07	ALPHA SHIFT(DEGREES)	=-3.000

ALPHA (DEGREES) SET	TRUE	CL	CD	CN	CA	CM	SM (CALIBERS)
-40.0	-43.0	-0.931	2.401	-2.396	1.130	-0.031	-0.013
-30.0	-33.0	-0.770	1.777	-1.624	1.087	-0.249	-0.153
-20.0	-23.0	-0.634	1.2[illegible]	-1.079	0.990	-0.351	-0.326
-15.0	-18.0	-0.439	1.[illegible]	-0.743	0.870	-0.300	-0.404
-10.0	-13.0	-0.332	[illegible]	-0.514	0.749	-0.240	-0.448
-6.0	-9.0	-0.257	0.71[illegible]	-0.363	0.661	-0.111	-0.304
-3.0	-6.0	-0.134	0.61[illegible]	-0.200	0.601	-0.066	-0.291
-0.0	-3.0	-0.061	0.613	-0.117	0.639	-0.024	-0.204
3.0	0.0	0.015	0.623	0.015	0.423	-0.032	2.128
6.0	3.0	0.121	0.613	0.147	0.500	0.017	-0.120
10.0	7.0	0.166	[illegible]	0.244	0.574	0.043	-0.175
15.0	12.0	0.332	[illegible]	0.491	0.714	0.167	-0.340
20.0	17.0	0.408	[illegible]	0.677	0.835	0.271	-0.402
30.0	27.0	0.574	1.434	1.162	1.117	0.313	-0.261
40.0	37.0	0.901	2.033	1.933	1.099	0.105	-0.054

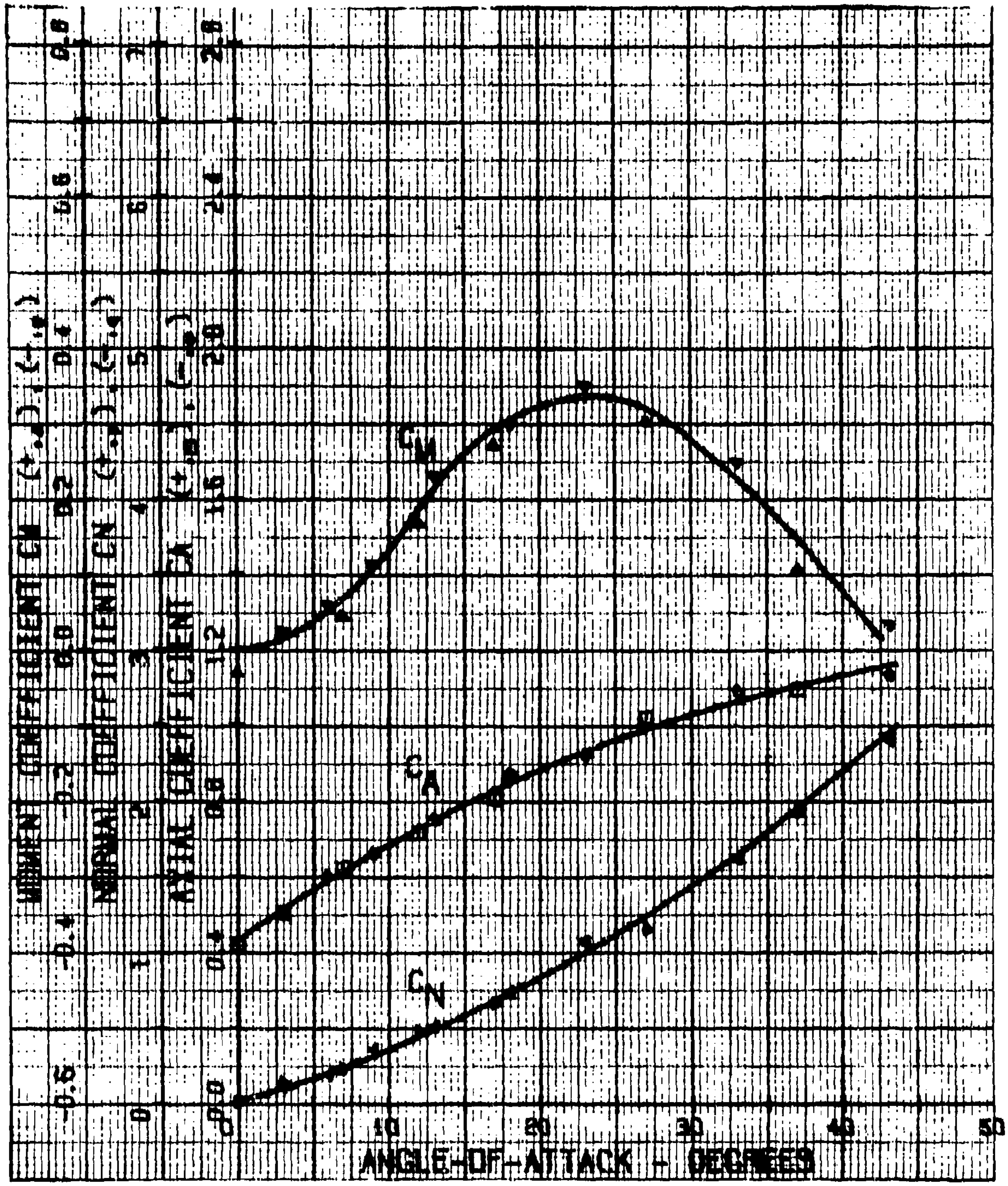


Figure 205. Graphic Static Aerodynamic Test Data: Configuration 95 (Test No. 91)

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