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X-22A PROGRESS REPORT NO. 9
AUGUST 1963

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V/STOL

RESEARCH AIRCRAFT

REPORT NO. 2127-933009
15 SEPTEMBER 1963

DDC

JUL 23 1964

NAVY CONTRACT NO. N0W 63-0118-CI



BELL AEROSYSTEMS COMPANY
DIVISION OF BELL AEROSPACE CORPORATION-A COMPANY

5
60 **BELL AEROSYSTEMS COMPANY**

Buffalo, NY

6 X-22A TRI-SERVICE V/STOL AIRCRAFT .

9 MONTHLY PROGRESS REPORT

no. 9, 25 JUL - 31 Aug 63,

14 Report No. 2127-933009

August 1963

This is the ninth Monthly Progress Report as required in Section F (5) of the contract, and outlines progress for the period 25 July 1963 through 31 August 1963.

10
A. J. Marchese
Project Director
X-22A PROGRAM

WIB

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I. INTRODUCTION

Bell Aerosystems Company was awarded Contract NOw 63-0118-ci by the Department of the Navy, Bureau of Naval Weapons for two Model X-22A Tri-Service V/STOL Research Aircraft. The official contract was authorized on 30 November 1962.

The X-22A aircraft is a dual tandem ducted propeller research airplane (Figure 1), with a prime mission of exploring the mechanical and aerodynamic problem of an aircraft designed and constructed for both vertical takeoffs and landings as well as conventional type operation. Lift and thrust are provided by four turboshaft engines mounted in dual engine pods, one on each side of the aft fuselage. Four rotatable ducted propeller units, each including a three-blade propeller, are interconnected and driven by the engines through an aircraft transmission system.

This aircraft, with speeds up to 303 knots, carries a flight crew of two, and capable of carrying a 1200 pound payload while maintaining continuous hover . . . with one engine out. With four engines in operation the payload range will be substantially increased. Provisions are made for the installation of six passenger seats in the cabin area. The aircraft is in the 15,000 pound gross weight category.

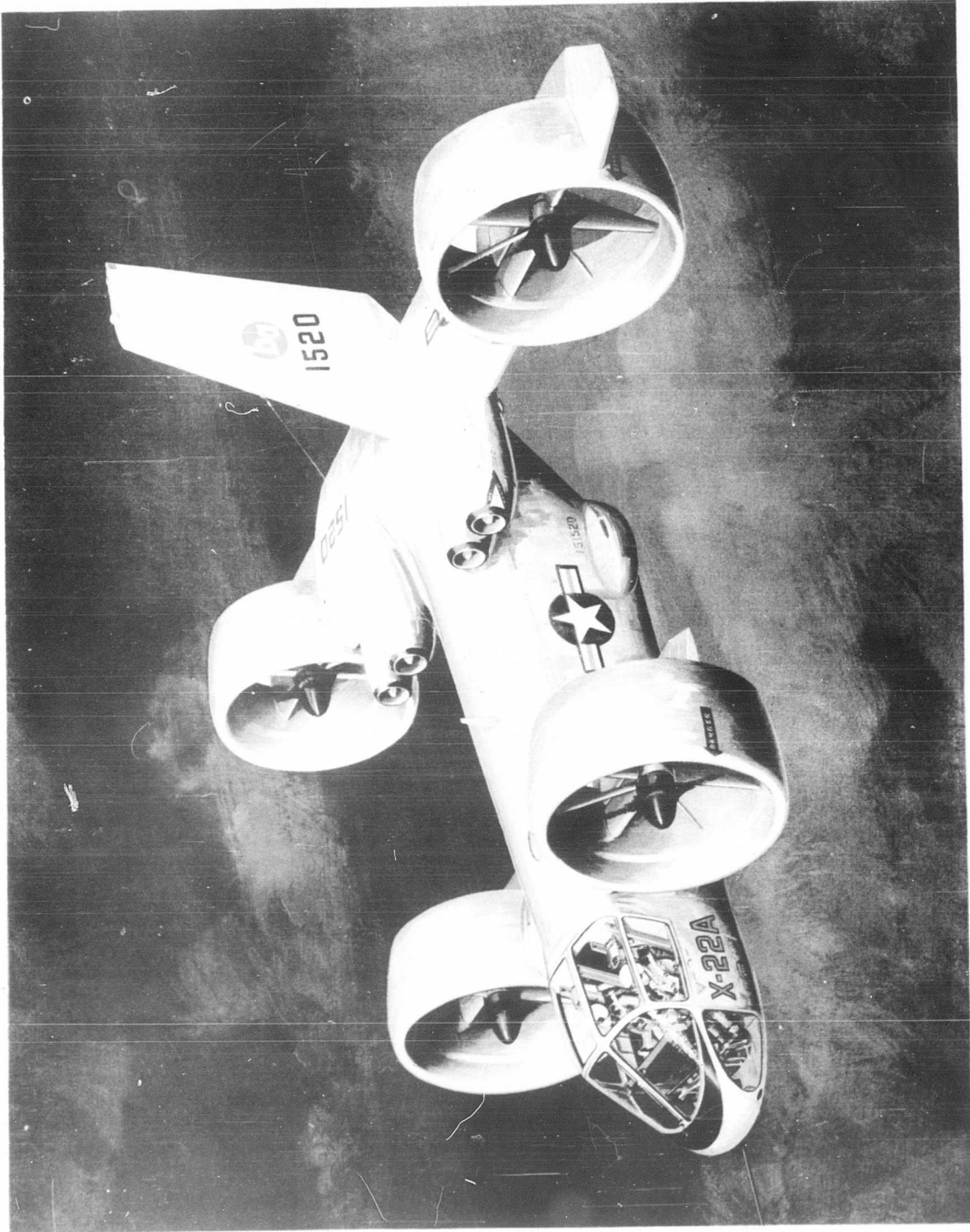


Figure 1. X-22A Tri-Service Research V/STOL Aircraft

II. SUMMARY

System configurations based on the aircraft freeze and wind tunnel test results available have been established and effort is now progressing in layouts and details for release to manufacturing for fabrication. The one system which still involves extra concentration is the Flight Control System which required a major redesign.

Weight control program effort is continuing.

Prime effort in the Wind Tunnel Test program was centered on the 1/7 scale flutter model which to date reflects satisfactory results.

The fuselage shear test specimen tests were completed satisfactorily and tests are in process on the duct noise specimens.

Subcontractor coordination, review meetings, technical visits, and PERT scheduling have continued with all programs on schedule.

During the August period, all contractual reports and data requirements were completed essentially as scheduled.

Management controls of PERT scheduling and costing continued. The sixth PERT Cost Report, PERT Milestone Computer report and PERT Interim report for the month of July were all submitted to BuWeps as scheduled.

These reports indicated increases in total required manhours but were still slightly below the negotiated manhours. However, due to the application of current estimated overhead rates, the total program target cost is still in excess of the negotiated contract.

Progress between 25 July and 31 August 1963 has continued in the detail review of all program efforts. All networks have been updated as of 23 August 1963.

Budgets in line with negotiated costs through August 1963 were issued and were used by each operational department. Daily reviews of these budgets were made and expenditures through 31 August 1963 remained within the authorized funds for this period. The authorized direct labor hours for each net, through the use of the PERT/COST EDP run, were released as the operating official manhours and equivalent manpower to each department.

As indicated in last month's report this contractor instituted an overtime and work effort through vacation shutdown, to minimize engineering schedule slippages. Reviews this past month have established a continued requirement in the use of overtime which now may require an expansion to include premium overtime design personnel.

Use of PERT on this program is now identifying necessary controls and manpower requirements which were not readily recognizable prior to reviews and detail expansion of all PERT nets. In addition, the familiarization with PERT data by all affected personnel is surfacing increased areas of effort, which require additional analysis and review to assure plans compatible with contract commitments.

The contractual Cockpit Mockup Inspection date has been firmed to be held at Bell Aerosystems Company on 17 - 18 September. This contractual milestone was successfully advanced by a time period in excess of one month.

Figure 2, X-22A Milestone Data Requirements Chart for the 3rd Quarter of 1963 and Figure 3, Program Schedule, reflect the program and status as of 31 August 1963.

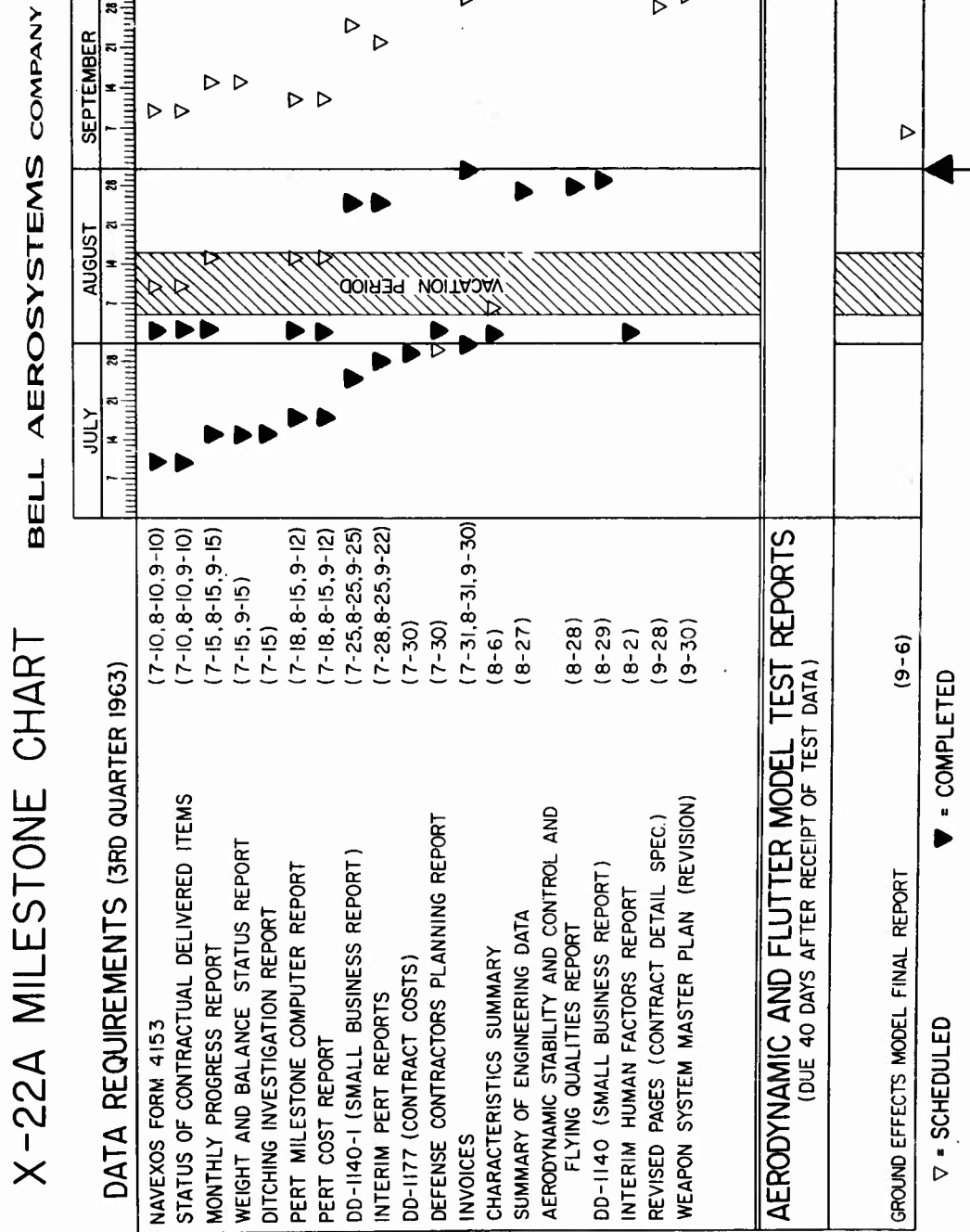


Figure 2. X-22A Milestone Chart - Data Requirements
(Third Quarter)

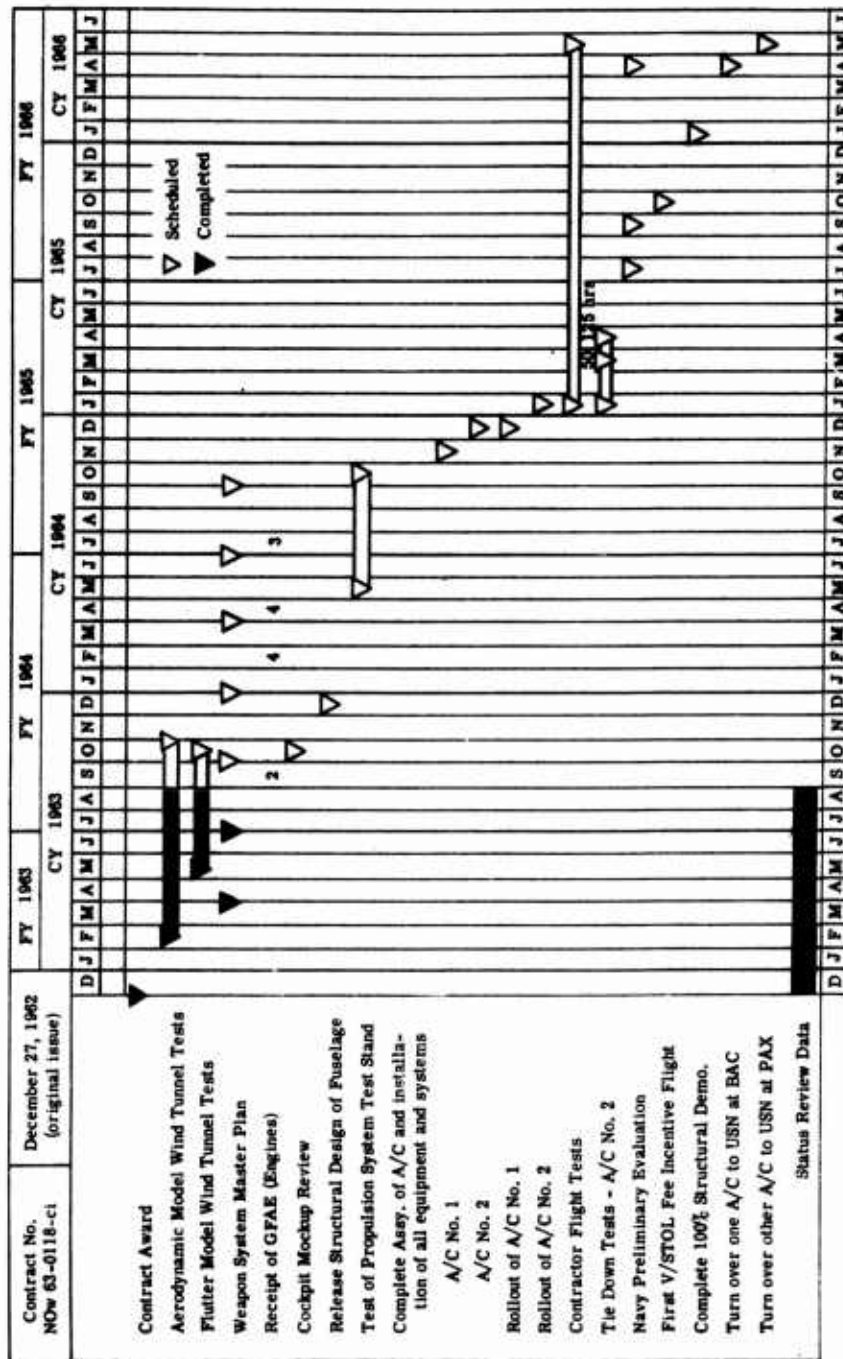


Figure 3. Program Schedule

All operating departments are continuing with necessary planning and interdepartmental coordination as required, spearheaded by a weekly meeting attended by all members of the X-22A Management Organization.

The Engineering and Manufacturing weekly meetings to discuss and review designs, techniques, specifications, equipment etc., are continuing. Weekly top management program reviews have been held.

III. PRELIMINARY DESIGN

A. FLIGHT TECHNOLOGY

1. Performance

The wind tunnel data analysis with respect to drag thus far indicate there will be an increase in zero-lift drag and a decrease in induced drag which will improve maximum endurance and slightly penalize maximum speed. The analysis is being continued.

Several takeoff and landing transition time histories have been calculated for use in VSS design.

2. Propulsion Analysis

Altitude performance and control calculation for the latest propeller configuration were completed.

Analysis of the effect of propeller tip to shroud clearance was started during this report period.

A review was completed of the proposal Kellett Aircraft made to BuWeps for continued impingement testing and it was found that in some respects it did not support the X-22A program objectives. A meeting with Kellett representatives is scheduled to resolve the differences.

Shaft torques and control forces were calculated for constant throttle settings. Since power absorption is not linear with blade angle, a speed decrease resulted and torques increased. The resulting torque for maximum control and military power are within the transmission and propeller specified values.

3. Stability and Control

a. Wind Tunnel Data Analysis

As a result of the DTMB Phase II and Langley 17 foot tunnel Phase I wind tunnel tests, several configuration improvements were adopted. The vertical tail area was increased to 68.5 square feet to meet directional stability requirements. The forward duct fillet was reshaped to improve the longitudinal stability and drag characteristics. The forward-aft duct incidence combination of the nominal configuration was changed to +2 degrees forward and -3 degrees aft to minimize longitudinal power effects and to provide a more linear pitching moment coefficient variation with angle of attack. With these configuration modifications, the airplane will satisfy the specified neutral point and longitudinal frequency versus damping ratio requirements.

b. Controls Analysis

The maximum control moments available for pitch, roll, and yaw were calculated for all transition flight conditions based upon revised control effectiveness data and control phasing schedules. Maximum roll-yaw and yaw-roll coupling moments were also determined.

c. Variable Stability

A complete set of aerodynamic force and moment equations with the quantitative trim parameters and derivatives which represent the aerodynamics and control characteristics of the X-22A in transition flight have been submitted to the Cornell Aeronautical Laboratory for VSS analysis. These data will be revised if necessary when analysis of the 1/5 scale powered model test data is complete.

B. VEHICLE STRUCTURES

1. Criteria and Loads

Gust loads are being determined for the present airplane configuration using flexible airframe derivatives. Six degree of freedom equations for use in investigating MIL-A-8861 (ASG) maneuvers and gusts are being programmed for solution with the IBM 7090 computer.

Sections of the revised flight and ground loads criteria reports have been submitted to BuWeps Structures Branch in rough draft form for coordination and comments prior to formal submittal.

Preliminary propeller blade and gearbox alternating loads due to excitation under duct stall conditions have been received from the propeller system subcontractor. The alternating loads have been found to be severe from a fatigue point of view. Refinements of the analysis is in progress since conservative simplifying assumptions were employed in the present analysis.

2. Structural Analysis

a. Front and Rear Ducts

Shear flow distribution curves for the shroud skins and beam webs have been completed for all critical design conditions investigated to date.

Analysis of the intermediate center section and trailing edge duct ribs has been completed. Additional completed items include the inner and outer plate installations and the machined rib at the duct support region. The front and rear beam analysis for final drawing release are currently in work.

b. Wing and Duct Support Structure

Fuselage frame loads at the front and rear beam attachment of the wing to fuselage have been completed for unit load conditions and the vertical abrupt pitch and gust symmetrical flight conditions.

Detail stress analyses are continuing on major elements of the main wing box. These are the major ribs supporting the duct and engine, the front and rear beams and the leading edge structure extending forward of the duct support fittings between the duct and engine cowling.

Structural temperatures calculated on the basis of T58 engine heat rejection data and structures employing various techniques are being used in the analysis of the aft engine face extension main mounts, and engine support beam. Critical loads have been summarized for the mounts and shear moment and torsion curves have been calculated for the engine support beam. Loads on the engine support beam will be completed following determination of the air load distributions on the engine cowling.

c. Fin

An initial analysis of the new 68.5 square foot fin was performed to obtain support reactions and preliminary skin-stringer dimensions and rib spacings. Based on this information, a new analysis has been prepared for computation. Flexibility provided by the fuselage is being taken into account in the revised analysis.

d. Fuselage

Static tests were conducted on the fuselage shear test specimen. Structural integrity of the skin-frame combination was demonstrated with no permanent buckling or yielding at limit load and no failure at ultimate

load. Diagonal tension folds at limit load, both internally and externally, are illustrated in Figures 4 and 5. Tests are continuing to determine the ultimate panel strength.

The slope of the longeron just above the cabin door was increased to parallel the upper longeron thus obtaining a constant depth shear web. The emergency door, aft of Sta. 361, was changed to a structural door consisting of 5 tapered pins to carry body shear. These pins are retracted by a single latch mechanism for fast removal during an emergency. Frame Sta. 169.95 and Sta. 200 and the canopy plexiglas assembly drawings were approved.

e. Control System

Because of the large increases in mechanical advantage which occur at the variable ratio bell cranks during duct rotation, MIL-A-8865(ASG) limit pilot applied loads in the control system become extremely large. In order to deal with this problem, the following ground rules have been adopted. MIL-A-8865(ASG) loads will be introduced into the control system for the duct in the full down and in the full up configurations. For all intermediate duct positions, strength will be provided as required to prevent the control system from yielding or breaking when MIL-A-8865(ASG) loads are applied to the cockpit controls. In this instance, relief due to elastic deformation in the system will be considered.

In the propeller pitch change mechanism, a 500 pound load limiter device was added in the region adjacent to the gearbox to maintain control loads to the linkage on the gearbox.

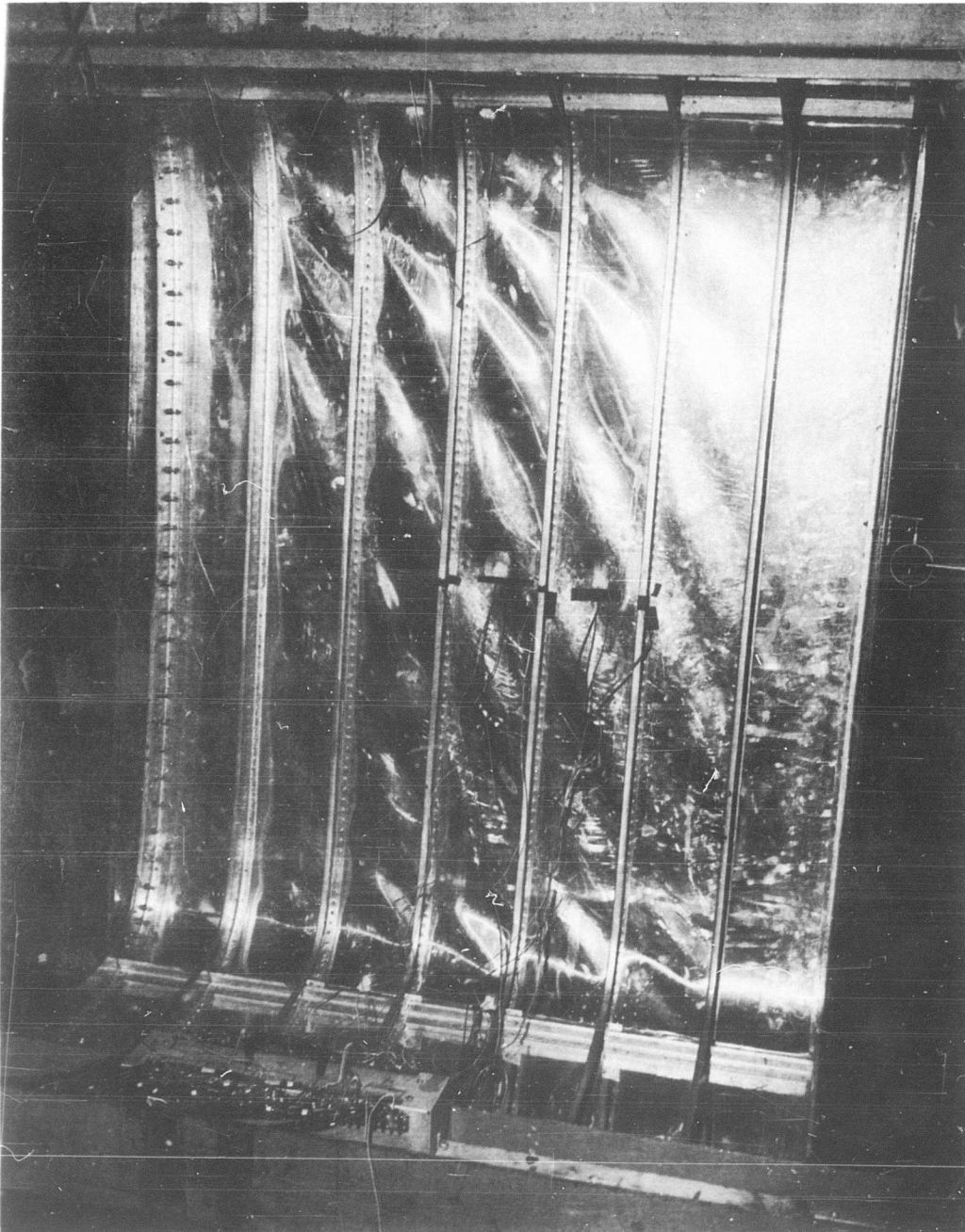


Figure 4. Fuselage Shear Test Specimen - Limit Load

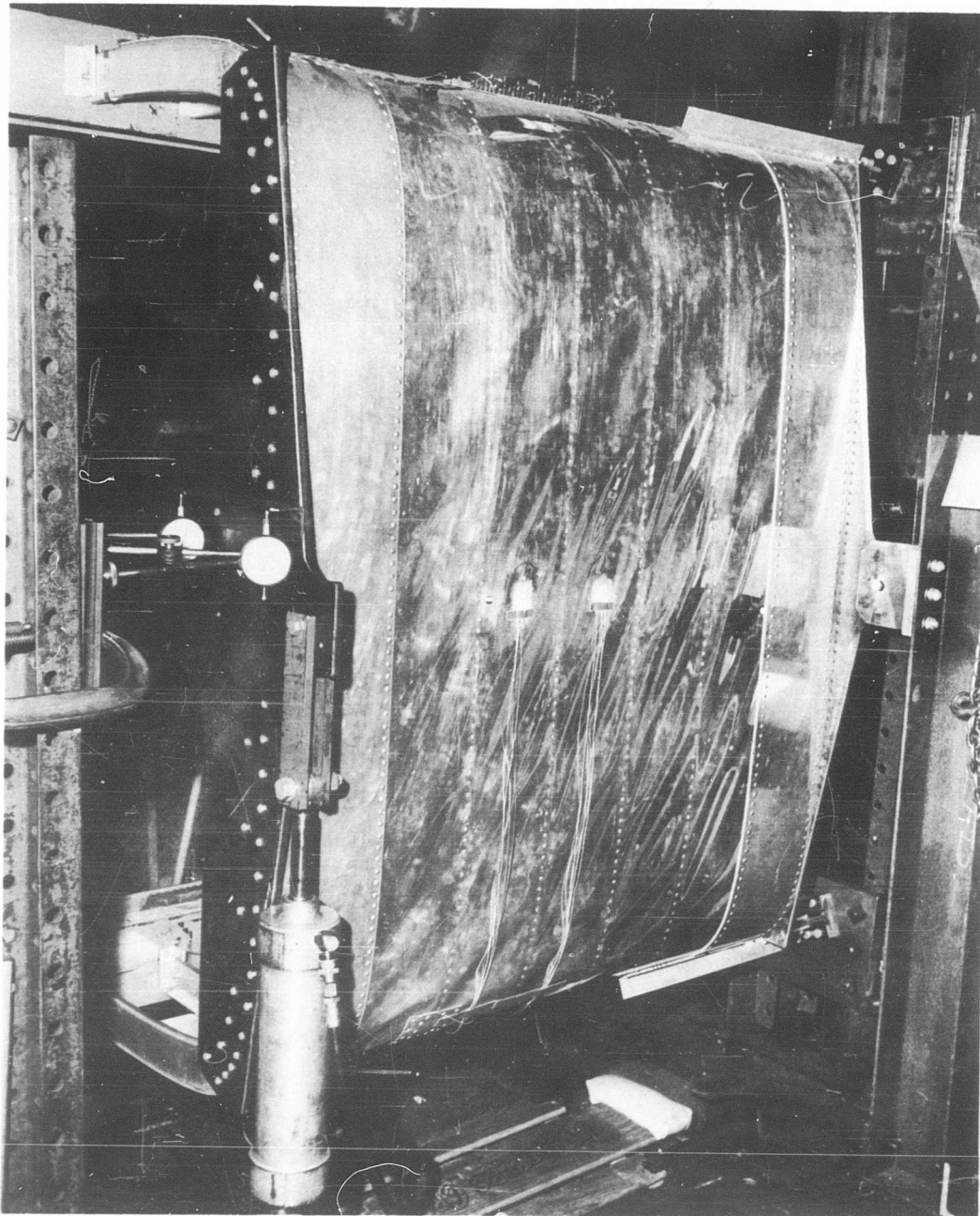


Figure 5. Fuselage Shear Test Specimen - Limit Load

Use of the commercially available "Controlex" cable for power controls in the cockpit area is being investigated. The static strength, weight, and the life provided under load cycling appears promising.

3. Aeroelasticity

Available manpower was applied largely to the flutter model test program at David Taylor Model Basin between July 22 and August 9. These tests are covered in the section on Model Test Programs. No increased prototype structural stiffness requirements are indicated by flutter tests to date.

Eleven degrees of freedom and refinements in duct aerodynamic terms are presently being incorporated into the flutter analysis to provide a more exact mathematical model for correlation with test results. Model test results will be covered in Bell Report 2127-941031.

4. Weights

Several minor weight changes occurring since last reported increase the weight empty from 10,890.9 pounds to 10,893.7 pounds, a 2.8 increase. The majority of the weight control effort in the past month has been devoted to work on hardware drawings. An evaluation of landing gear proposals from two vendors has been conducted. Weights quoted by the vendors approximate those estimated, one being 17 pounds under and the other 7 pounds heavier. The weight increment for the larger vertical fin has not been firmly established.

The current center of gravity locations being used in design are based on data developed for submittal of the last weight and balance status report, 2127-942004. Slight weight empty changes and a change in fuel

capacity have moved the most aft c.g. slightly aft. The effect of this movement is being assessed.

Preparation of the 4th weight and balance status report, is in work and will reflect a weight empty of 10,893.7 pounds.

C. DESIGN

1. General

Engineering worked during the vacation shutdown which occurred during this period. Major effort was applied on: (a) Propulsion system, (b) Finalizing of airframe components, (c) Weight control studies and optimization, and (d) Control system redesign.

2. Airframe

a. Lines

With the exception of specialized areas, the lines are essentially complete.

b. Duct

The details of the propeller plane beam, rear beam, duct ribs, and duct support tube have been completed and the drawings are being checked. Detailing of the vertical strut has started.

Detail designs of the leading edge ribs, centerbody casting and center hinge support are continuing. Layouts of the duct stops and the horizontal strut are being prepared. A trailing edge assembly and installation drawing has been started.

c. Wing

A layout of the engine support beam, its related structure, and the rear spar has been started. Drawings of the harmonic drive access opening, outboard bearing support, and various leading edge details are ready for release. Rib installations of Sta. 89.0 and 109.5 leading edge are also ready for release.

d. Fin

A layout of the new larger area fin has been made.

e. Fuselage

The following drawings have been completed:

- (1) Frames at Sta. 95, 124.0, 139.0 and 162.85.
- (2) Seat track support installation.
- (3) Longerons installation at WL 124
- (4) Miscellaneous canopy framing details, floor and windshield canted frame.

The following drawings are in various stages of work as noted:

- (1) Frames at Sta. 175.5 and Sta. 182.75, released for checking.
- (2) Frames at Sta. 220 and 233.33, 75% complete.
- (3) Duct rotation support installation drawing is in checking.
- (4) Layouts are in process on the forward wheel fuselage door, fuel tank area and the emergency door area.
- (5) Layouts are also proceeding on the canopy emergency release mechanism.

3. Flight Controls and Equipment

a. Flight Controls

The revised control system is in layout stage, including studies of new nonlinear bellcranks, and new control rod routing. Detailing of the duct rotation system brake is underway. Layouts of the duct interconnection and Beta controls area are in work.

The draft of the preliminary Flight Controls and Hydraulic test stand plan has been completed for final review.

b. Equipment

The layouts of the circuit breaker panel have been completed. A layout of the side and center consoles has been started.

4. Propulsion

The preliminary layouts of the lateral and longitudinal drive shaft bearing hangers have been sent to the transmission vendor for comment. The layouts of the supporting structure of these items are in work plus the accessory and transmission lube system.

The specification control drawing for the fuel cell bladder is in work. A layout of the engine oil tank has been started.

Installation layouts of engine mounts are in work and work on actual details continues. Layouts of quadrant and shut off valve are in work. Investigation of power boost engine controls is underway.

The test stand structural drawings and the propulsion system test plan have been released.

5. Electrical and Electronics

Specification control drawings of the 20 KVA and 10 KVA generators, transformer rectifier and voltage regulator and the constant speed drive final specification have been completed. The landing light installation drawing is in work and the layout of the aft electrical equipment compartment is being revised.

ABM's of the following electronic equipment have been released: IFF, ADF, TACAN, marker beacon, and AN/ARC-51 communications set.

6. Landing Gear and Hydraulic

Layouts and design evaluations are continuing for the duct center body aft section. A layout of the duct rotation system incorporating the flow control valve has been started. Layouts are in work for the doors and operating mechanisms of the nose and main gears.

D. SYSTEMS SUPPORT

1. Human Factors

An analysis of switch functions and locations was accomplished to determine switch guard requirements. The completed cockpit mockup is being utilized in a review of cockpit detail design for application of human engineering principles.

2. Maintainability and AGE

A study of the safety requirements for protective shields over shafts, cables, lines and push-pull rods in the cabin area has been completed. Inspection requirements have been established in this area.

3. Environmental Factors

Machine computed data on the expected sound pressure levels, have been evaluated and included in an early draft of the Preliminary Environmental Vibration Report.

The modal density of vibrations of the cockpit has been calculated over the frequency range of interest. Preliminary values for the vibration level and spectrum of the cockpit have been established. For external (free field sound pressure levels of 130 db), an overall vibration of 8 g is predicted, predominantly concentrated at lower frequencies.

E. SUBCONTRACTS

1. Propellers - Hamilton Standard Division of United Aircraft Corporation.

Progress continues on the design and manufacture of the propeller system. Long lead time hardware has been committed and some hardware has been received from Hamilton Standard vendors for manufacture of the full-scale wind tunnel model (which will be tested at NASA Ames).

Negative slack previously reported has been eliminated.

Negotiations for definitization of the contract are entering the final stages.

2. Variable Stability System - Cornell Aeronautical Laboratories

Design effort continues on the complete definition of the requirements for the systems. Design of modules, weight control investigations and similar early design tasks are underway. Program is proceeding on schedule.

3. Transmission and Gearbox System - Steel Products Engineering Company

Design of gearboxes and shafting continues satisfactorily. The program for manufacture and testing of shafting specimens is proceeding.

Although a small amount of negative slack is currently reported, SPECOS is taking action to eliminate this.

4. Cockpit Simulator

Proposals were solicited and an evaluation was made. Trainer Corporation was the low bidder.

5. Landing Gear

Proposals have been received from Cleveland Pneumatic Tool Company and H.W. Loud Company. Evaluations are being conducted.

Proposal review meetings were held at Bell with each potential subcontractor.

6. Ames Test Gearbox - York Gears Ltd.

A visit made to check on status and the program is progressing on schedule.

7. Duct Support Tube

Possible sources have been contacted and quotations received from Engineering Enterprises Inc. and the Cleveland Pneumatic Tool Co.

8. Harmonic Drive Gearboxes

Proposal requests have been sent to nine possible subcontractors. Replies expected by September 20, 1963.

9. Constant Speed Drive

A proposal package has been sent to the Lycoming Division of Avco Corporation with a requested bid due date of September 17, 1963.

IV. MODELS

A. WIND TUNNEL TEST PROGRAMS

1. 1/6 Scale Unpowered Airplane Model

The interim letter report for the Phase II tests of this model was submitted to BuWeps. Plotting of data for the report is being held up pending receipt from DTMB of reduced data which contain the refined wind tunnel wall corrections mentioned in the July Progress Report. The Phase I data are being corrected with equations developed by DTMB.

2. 1/5 Scale Powered Airplane Model

The Interim Letter Report for the Phase I tests of this model was submitted. Only a part of the original planned tests in transition flight were obtained. As a result, NASA has decided to conduct a second test period of about three weeks in October to complete the program. Tabulated data have been received from NASA.

3. 1/3 Scale Powered Duct Model

Testing of this model has been delayed until September 9 due to duct balance calibration problems and time required for DTMB to finish the propeller blades. Discussions with BuWeps and subsequently with DTMB have resulted in the decision for DTMB to fabricate a half-fuselage to be tested with the 1/3 scale duct to determine its effects on blade stress. At the present time, four consecutive weeks of testing are scheduled for the program.

4. Full-Scale Powered Duct Model

Design of this model will be completed in the next period. Fabrication is progressing satisfactorily.

5. Elevon Effectiveness Model

The alternate elevon configuration has been completed and is ready for testing. Photographs of the test setup is shown in Figures 6 through 9.

6. Free Flight Model

Recent contact with NASA has indicated this model will not be ready to test until November 1963.

7. 1/20 Scale Spin Models

The vertical tails are being changed to the current configuration and the models are expected to be completed August 30, 1963. The models will then go to the NASA Langley Research Center Spin Tunnel for testing.

8. Ground Effect Model

The data report for this model is 75 percent complete.

9. 1/7 Scale Wing-Duct Flutter Model

Flutter tests were conducted at DTMB between July 22 and August 2, 1963, on the aft wing duct semispan model. Duct pitching frequency and elevon rotation frequency were varied over a wide range extending beyond the anticipated airplane values. Free play was also introduced into the duct pitch control system to determine buzz possibilities. No sign of buzz, propeller whirl flutter or conventional flutter were detected. (Figures 10 through 13)

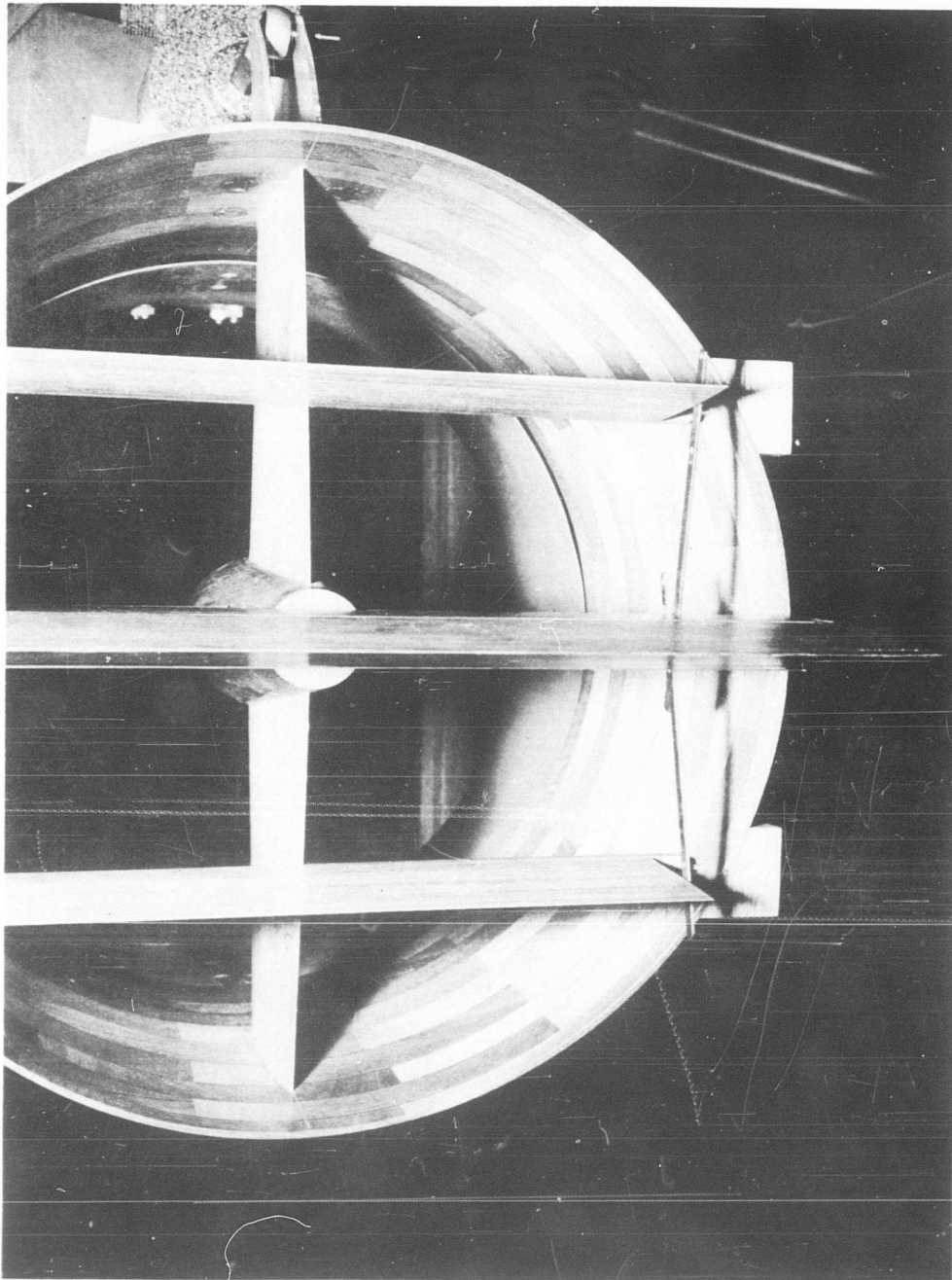


Figure 6. Alternate Elevon Configuration Model Test Set-up

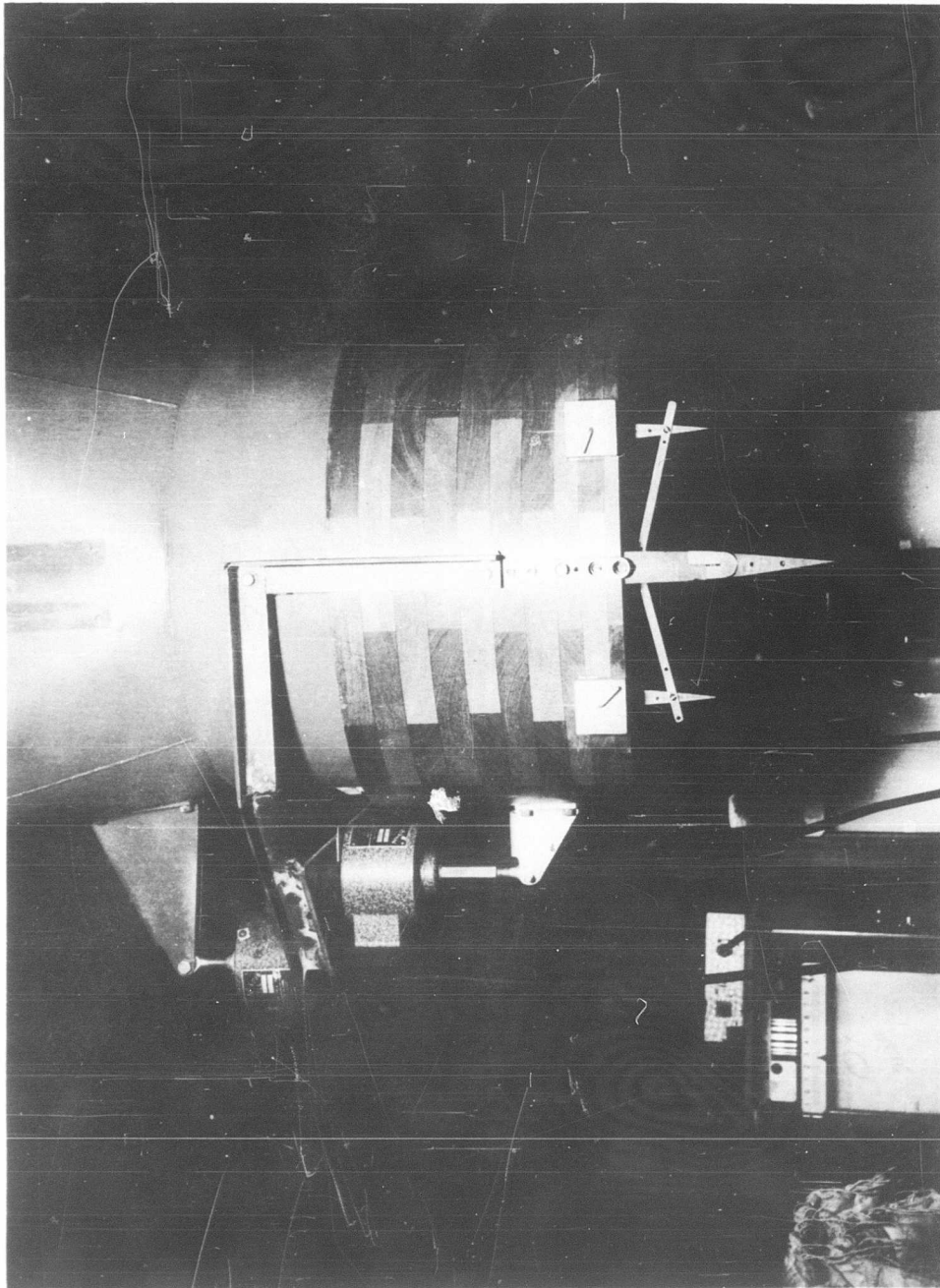


Figure 7. Alternate Elevon Configuration Model Test Set-up



Figure 8. Alternate Elevon Configuration Model Test Set-up

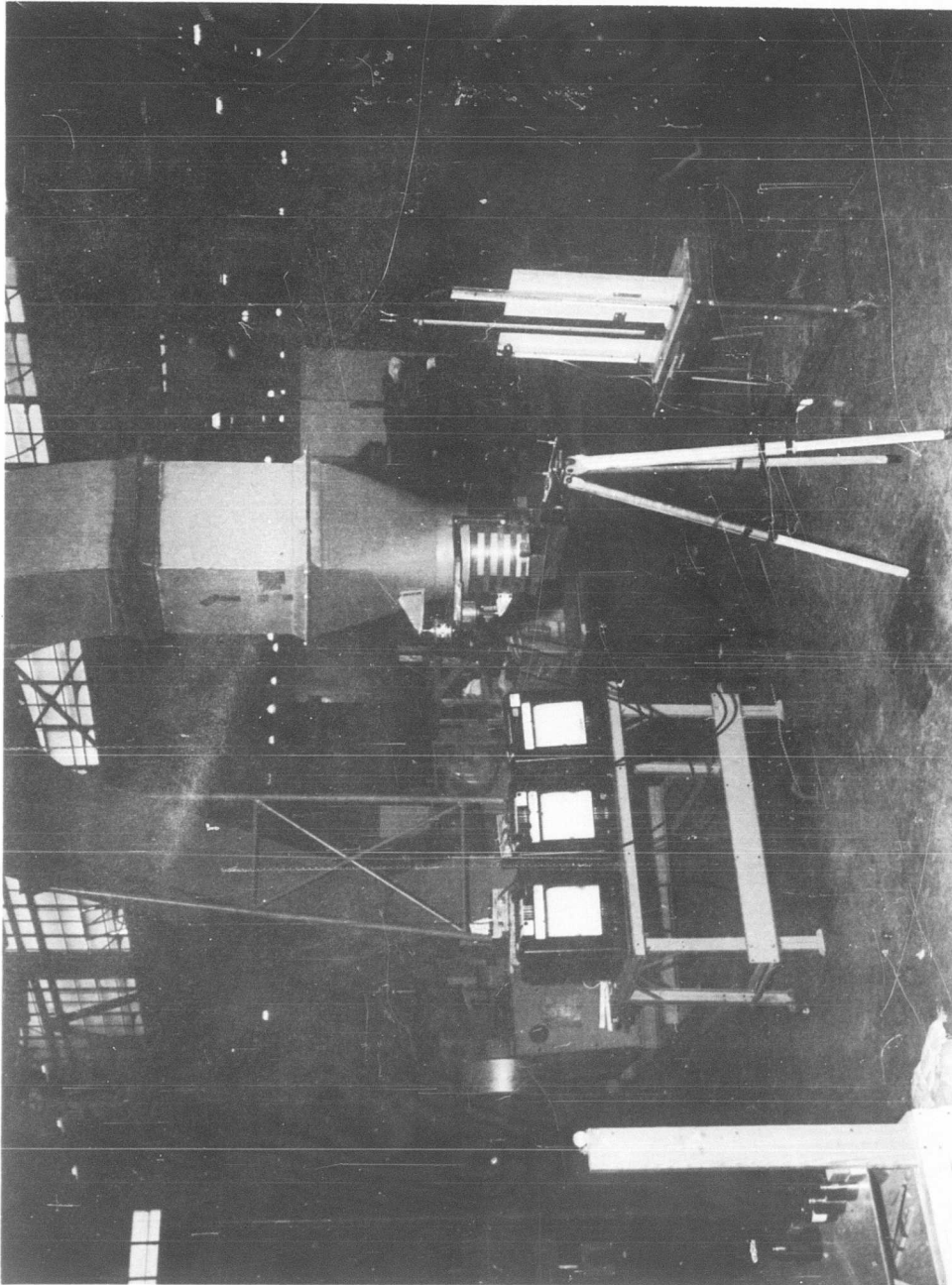
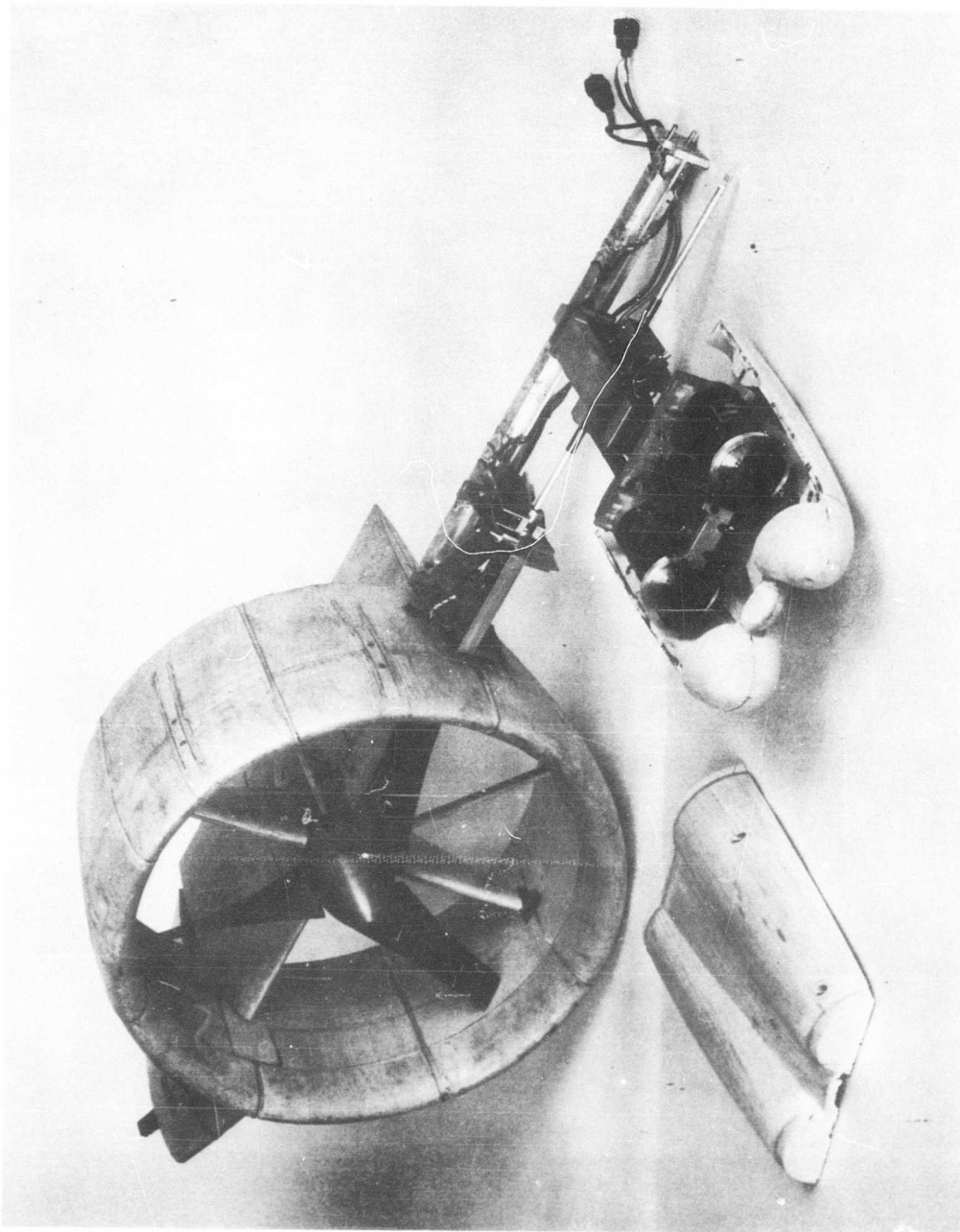


Figure 9. Alternate Elevon Configuration Model Test Set-up



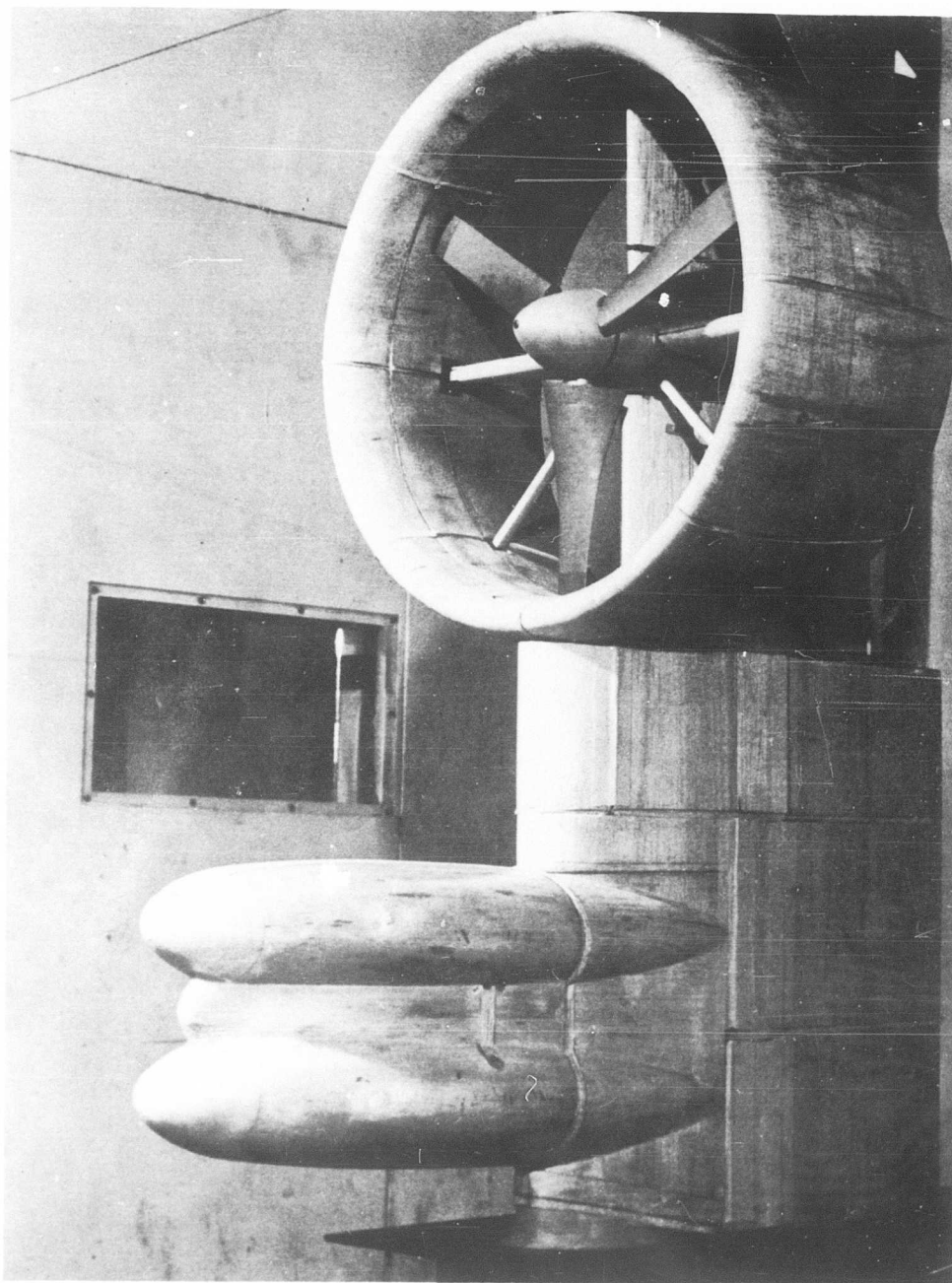


Figure 11. Front View - Semi-Span Aft Wing-Duct-Nacelle Combination

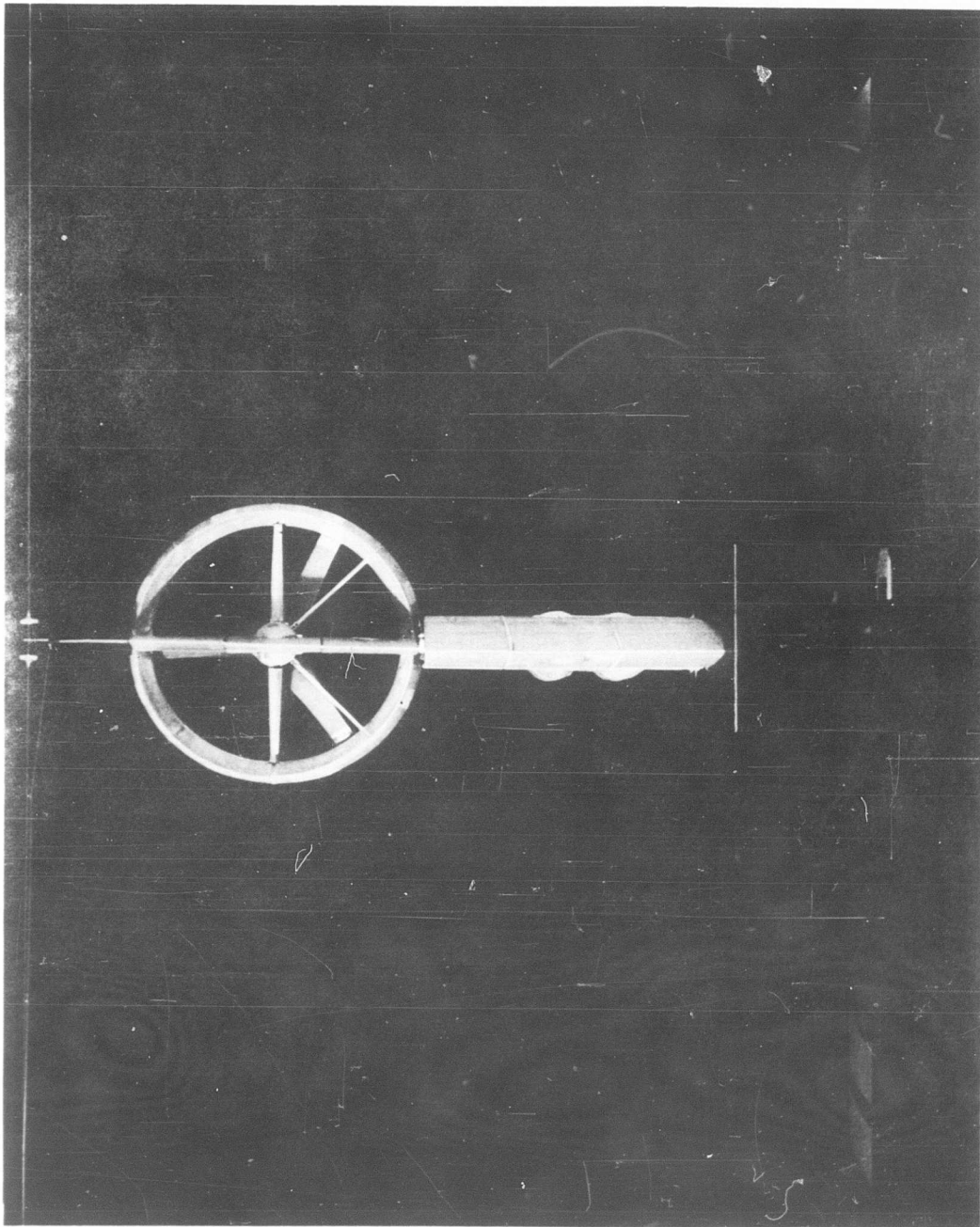


Figure 12. Aft View - Aft Wing - Duct-Nacelle Combination

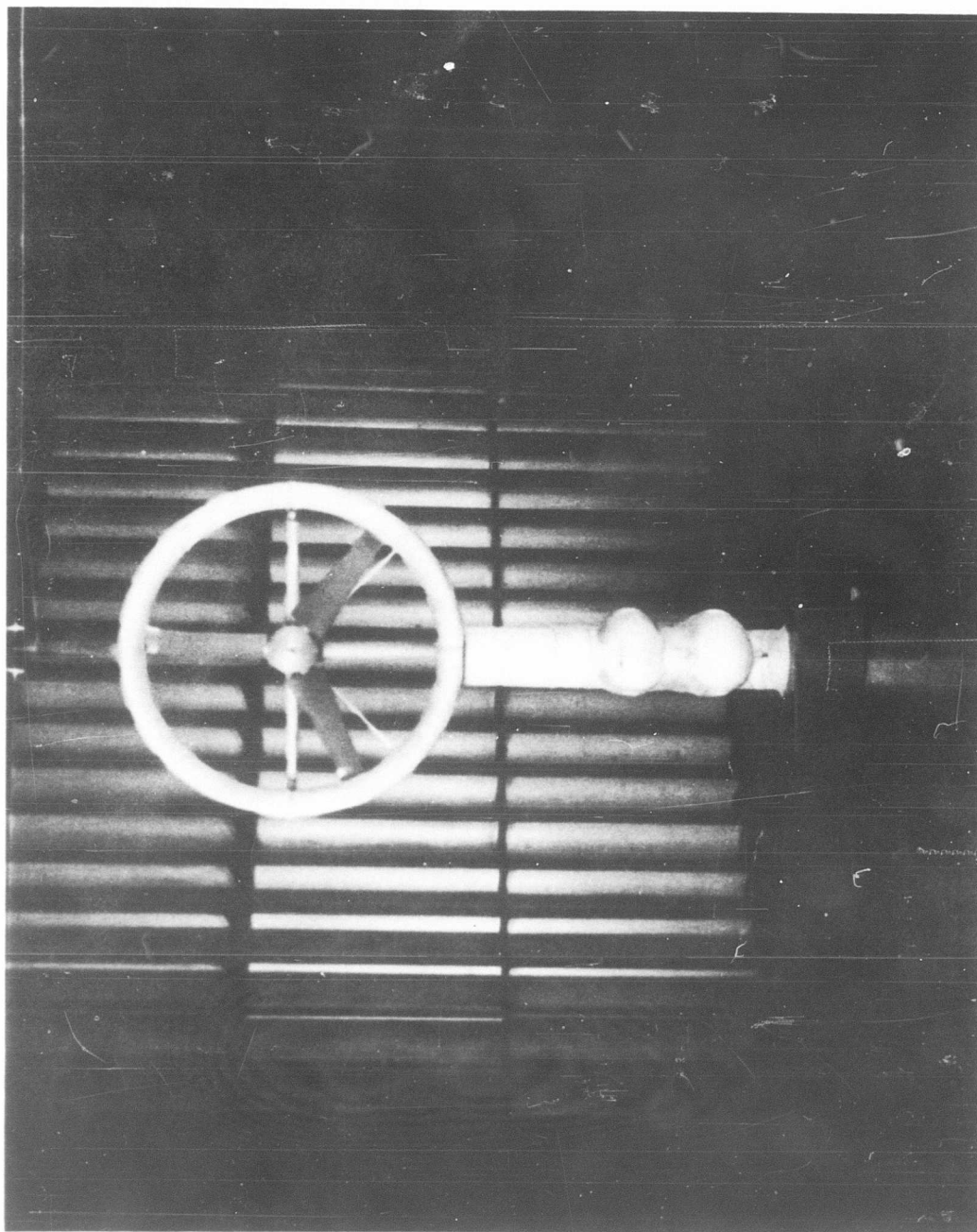


Figure 13. Front View - Aft Wing - Duct-Nacelle Combination

10. 1/7 Scale Complete Airframe Model (Figures 14 and 15)

Flutter tests were conducted on the complete airframe flutter model from August 5 - 9, 1963 to establish the suitability of the model design for the second test period in October 1963, and to obtain as much preliminary flutter data as the limited time would permit. No flutter was encountered either with the fuselage held rigidly or with the elastic mounting system. Duct and elevon stiffnesses were varied over a range bracketing prototype elastic possibilities.

All tests were conducted with ducts in the forward zero angle of attack position. Propellers were free wheeling and were not powered. The October test program will include tests with: (1) the new larger fin, (2) various duct angles of attack, without power to the propellers, to study stall flutter and/or buffet tendencies.

11. Wind Tunnel Facilities

This contractor is reviewing the test delays and continued slippages and rescheduling of the Wind Tunnel Model Test programs and will formally submit effects on program schedules and costs as soon as the various tests have been completed.

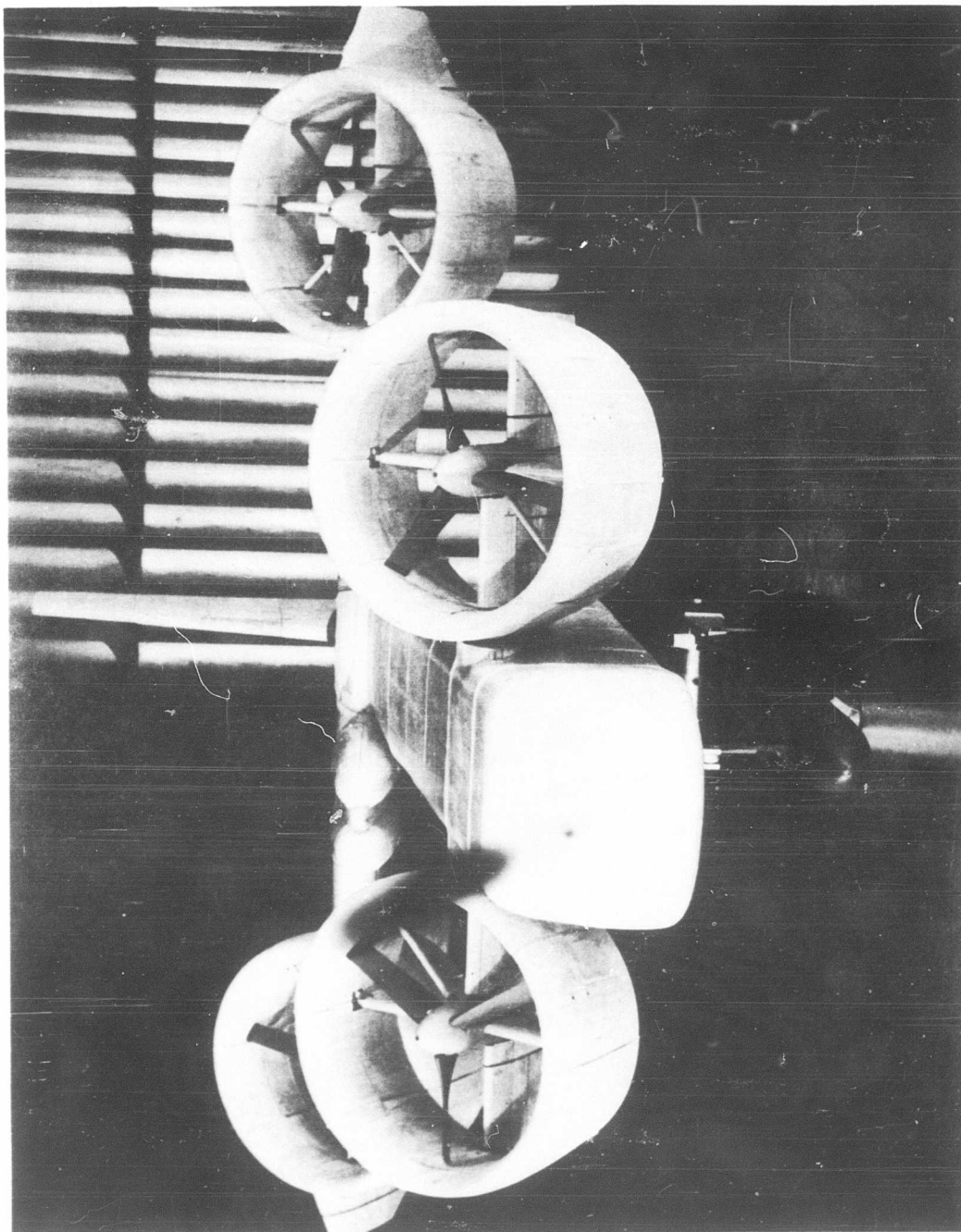


Figure 14. Front View - Complete Model Transition Attitude

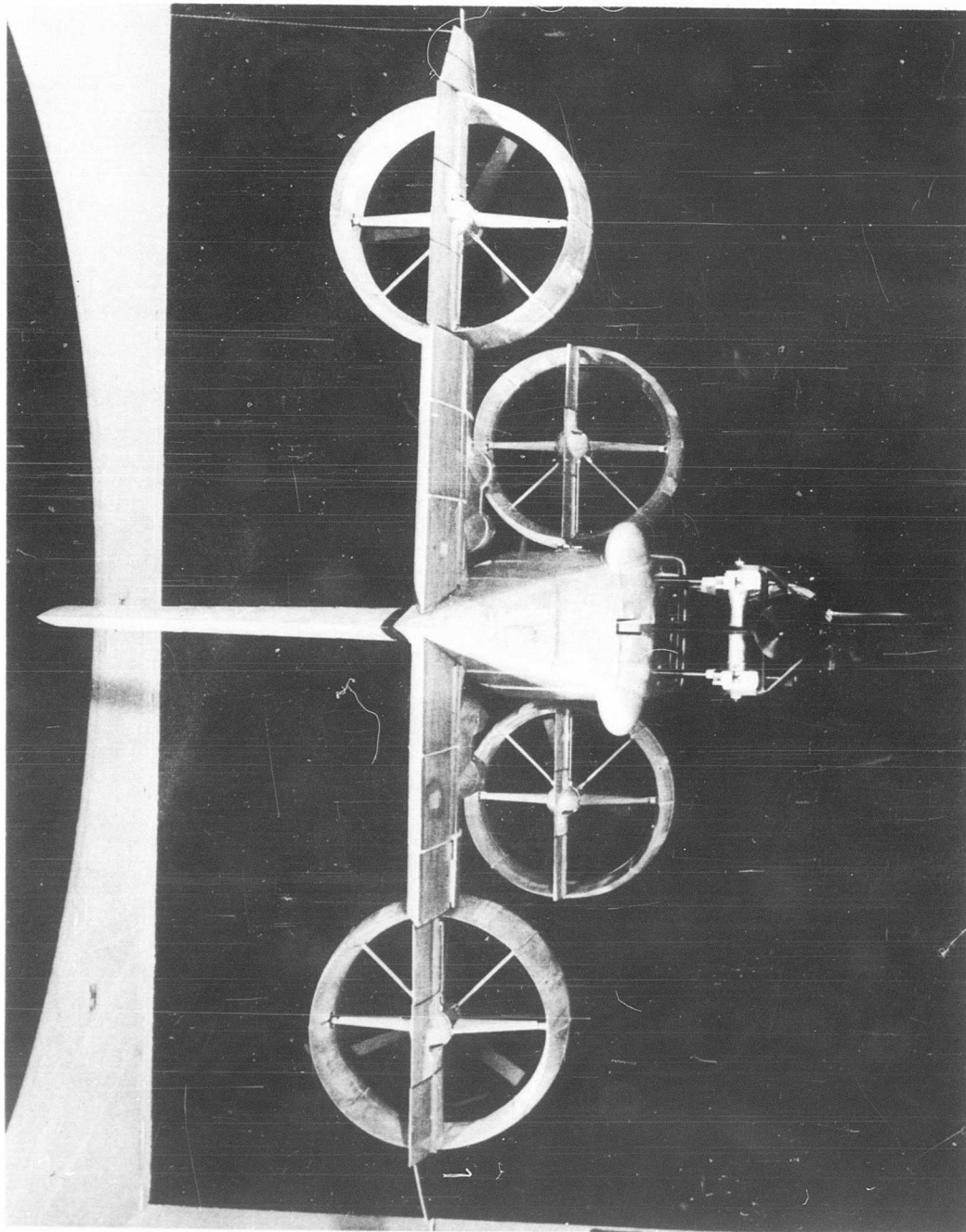


Figure 15. Aft View - Complete Model

V. MOCKUP

A. COCKPIT MOCKUP (Figure 16)

The program schedule was successfully advanced which allowed completion of the mockup and a formal inspection now scheduled for 17 - 18 September, over one month ahead of contract requirement. All installations were checked and the unit painted and moved into the Bell Aerosystems Mockup Area, to be ready for inspection review.

Coordination with BuWeps made possible the completion of the Mockup Brochure for advance transmission to concerned personnel.

B. HUMAN FACTORS MOCKUP

The instrument panel layout area of this unit has been completed to conform to the actual mockup, for use during the Formal Mockup Review. It has been painted and moved into the Mockup Area to assist inspection members in the evaluation of display arrangements and grouping schemes.

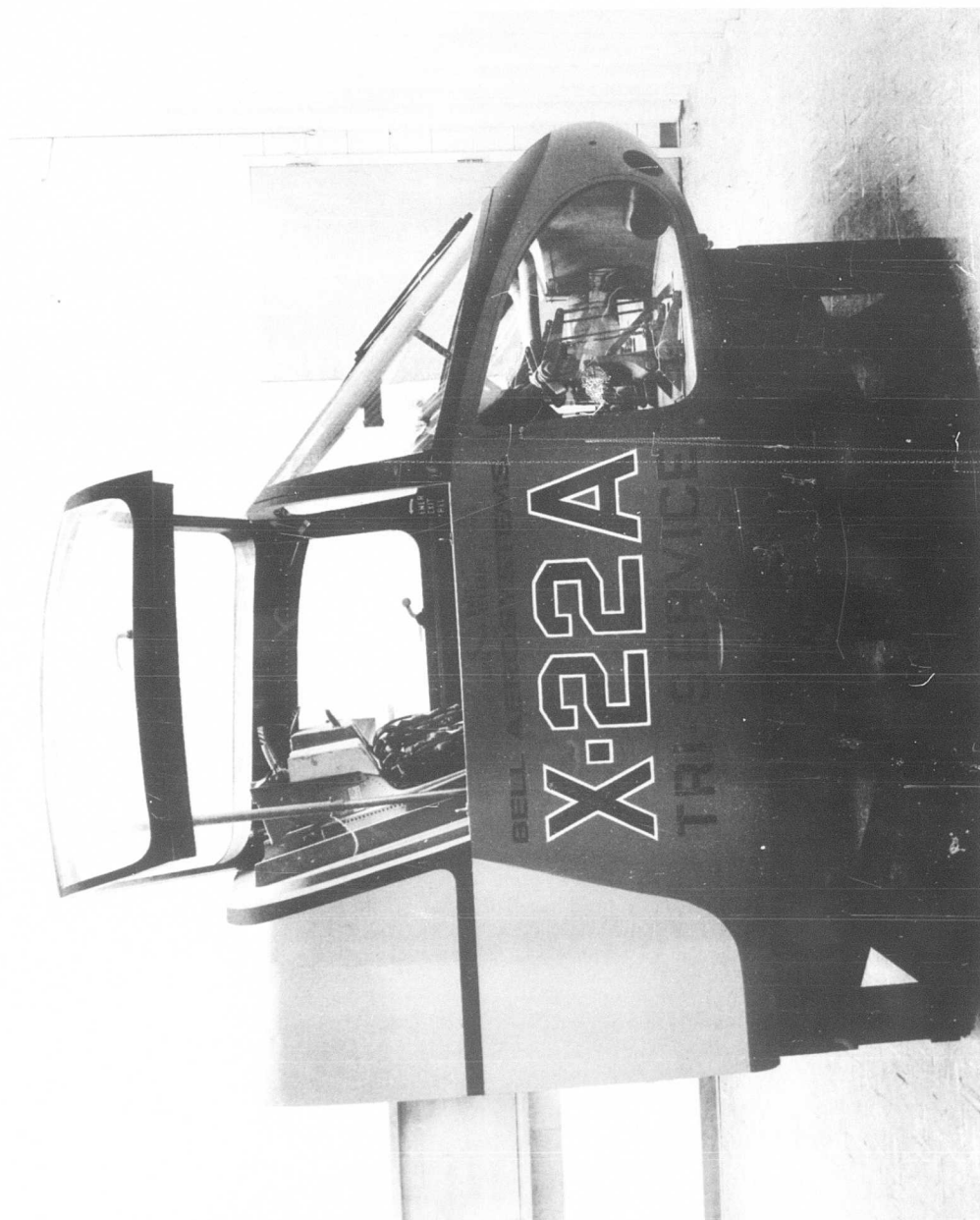


Figure 16. X-22A Cockpit Mockup - Side View - One Canopy Open

VI. GENERAL

A. TRIPS AND VISITS

1. Trips

<u>Date</u>	<u>Destination</u>	<u>Purpose</u>
7/31	BuWeps	Wind Tunnel, Flight Control, Hydraulic and Landing Gear Systems
8/1	BuWeps	Ground Impingement Tests and Constant Speed Drive.
8/22 - 23	Hamilton Standard	Program Review
8/22	DTMB	1/3 Scale Model Program
8/26	BuWeps	Engine Maintenance, Spares and Tools
8/29	Cornell Aeronautical	Variable Stability
8/30	BuWeps	Propeller and Flight Control Systems

2. Visitors

<u>Date</u>	<u>Company</u>	<u>Purpose</u>
7/25	Sundstrand	Constant Speed Drive
7/25	Steel Products	Transmission System
7/30	Controlex	Seat Controls

<u>Date</u>	<u>Company</u>	<u>Purpose</u>
8/1	Hamilton Standard	Loads and Motion Problems
8/1	Kellett Aircraft Co.	Impingement Tests
8/12	Charles Russel Co.	Plumbing
8/14	Pacific Scientific	Control Quadrants
8/15	Teleflex	Fuel Shut Off Valves
8/19	Hansen & Lynn	Control Quadrants
8/20	Shultz Tool and Mfg. Co.	Jettison Valve
8/27	Barber Coleman Co.	Jettison Valve
8/27	Fluid Regulators Company	Fluid Control Valve
8/29	Kellett Aircraft Co.	Impingement Tests
8/30	SPECO	Transmission System

B. CORRESPONDENCE AND REPORTS SUBMITTED DURING THE PERIOD OF JULY 25 - AUGUST 31, 1963

<u>BAC Letter No.</u>	<u>Date Submitted</u>	<u>To</u>	<u>Subject</u>	<u>Reason</u>
346	7-25-63	BuWeps - RA-443	Propulsion System Drawing	Release
347	7-25-63	BuWeps - RA-443	Tail Group Drawings	Info
348	7-25-63	BuWeps - RA-443	Landing Gear Drawing	Info

<u>BAC Letter No.</u>	<u>Date Submitted</u>	<u>To</u>	<u>Subject</u>	<u>Reason</u>
349	7-26-63	BuWeps - RA-443	Program Evaluation Review Technique (PERT) Interim Report	Info
350	7-29-63	BuWeps - RA-443	Propeller Test Facility Require- ments	Approval
351	7-29-63	BuWeps - NPAF- 35	Rev. to Addendum No. 162 (Static Test Require- ments)	Approval
352	7-30-63	BuWeps - NPAF- 35	Schedules for Deliverable Items	Info
353	8-1-63	BuWeps - RA-443	Characteristics Summary	Info
354	8-2-63	BuWeps - RA-443	Monthly Progress Report No. 8	Info
355	7-30-63	BuWeps - RA-443	Vacation Period - BAC	Info
356	7-31-63	BuWeps - RA-443	Human Factors Data - Interim Report	Approval
357	7-31-63	NASA	Full Scale Duct/ Prop. Wind Tunnel Model	Approval
358	7-31-63	BuWeps - RA-443	Finish Specifica- tion (Amend. No.1)	Approval
359	7-31-63	BuWeps - RA-443	Flight Control System Drawings	Release
360	8-2-63	BuWeps - RA-443	Weapon System Master Plan - Monthly Status	Info

<u>BAC Letter No.</u>	<u>Date Submitted</u>	<u>To</u>	<u>Subject</u>	<u>Reason</u>
361	8-1-63	BuWeps - RA-443	Program Evaluation Review Technique (PERT) Report	Info
362	8-1-63	BuWeps Rep - E. Longwell	Premium Overtime	Info
363	8-2-63	BuWeps - RA-443	X-22A Program Engine Maintenance Tools and Spares	Approval
364	8-5-63	BuWeps - RA-443	VSS Specification (2127-947006)	Approval
365	8-5-63	Hamilton-Standard	Copies of R. Goodman 7-26 Visit	Info
366	8-5-63	GE- Dean Teece	2 copies of No. 363 Letter	Info
367	8-6-63	Cornell Labs	Torsion Charts	Info
368	8-7-63	BuWeps - RA-443	Mockup Inspection	Info
369	8-9-63	BuWeps Boertzel	Magnesium Parts	Info
370	8-12-63	BuWeps - F. Guill	Passenger Seat Tie-Down	Info
371	8-20-63	BuWeps - RA-443	Fuel and Oil Lines- Installation of (MIL-I-18802 Aer)	Approval
372	8-20-63	BuWeps - NPAF-35	(DCPR)	Approval
373	8-22-63	BuWeps - RA-443	Transmission System Test Plan	Approval
374	8-23-63	BuWeps - RA-443	Ejection Seat	Info

bq **BELL AEROSYSTEMS COMPANY**

<u>BAC Letter No.</u>	<u>Date Submitted</u>	<u>To</u>	<u>Subject</u>	<u>Reason</u>
375	8-23-63	BuWeps - NPAF-35	Proposed Revision to Addendum No. 162 to MIL-D-8706A(WEPS) (Revision of Engr. Data)	Approval
376	8-23-63	BuWeps - RA-443	Interim Reports - 1/6 and 1/5 Scale Models	Info
377	8-23-63	Naval Air Test Center Attn: J. Williford	Photographs	Info
378	8-23-63	BuWeps - RA-443	PERT Interim Report	Info
379	8-27-63	BuWeps - RA-443	Summary of Engineering Data	Approval
380	8-27-63	BuWeps Rep	Non-hole Filling Fasteners	Approval
381	8-28-63	BuWeps - RA-443	Aerodynamic Stability and Control and Flying Qualities Report	Approval
382	8-28-63	BuWeps - NPAF-35	Revision to Addendum No. 162 to MIL-P-8706A (WEPS) (Drawing Submittals)	Approval
383	8-28-63	BuWeps - RA-443	Finish Specification - Report 2127-947002	Approval
384	8-29-63	GE - Ken Baxter	Drawing Submittals	Info

<u>BAC Letter No.</u>	<u>Date Submitted</u>	<u>To</u>	<u>Subject</u>	<u>Reason</u>
385	8-29-63	BuWeps - RA-443	General Arrange- ment Drawing	Info
386	8-29-63	BuWeps - RA-443	Inboard Profile Drawing	Info
387	8-29-63	BuWeps - RA-443	Wing Group Drawing	Info
388	8-30-63	BuWeps - RA-443	Cockpit Mockup Inspection Brochure	Info
389	8-30-63	BuWeps - RA-443	1/7 Scale Flutter Model Interim Report	Info

C. OPEN ITEMS (Submitted at least 30 days prior to Aug 31, 1963)

1. BuWeps and BuWeps Rep

<u>BAC Letter No.</u>	<u>Subject</u>	<u>Date Submitted</u>	<u>Required Approval Date</u>
28	Basic Aerodynamic Data Report - Revision (2127-917002)	1-24-63	*
31	Human Factors Data Report (2127-919001)	1-29-63	*

*BAC has scheduled a 30 day interval for approval by BuWeps of each of these submittals after BuWeps Rep. endorsement.

<u>BAC Letter No.</u>	<u>Subject</u>	<u>Date Submitted</u>	<u>Required Approval Date</u>
75	Vibration Program Report (2127-932001)	2-27-63	*
174	Revision to Addendum No. 162 (Test Program)	5-1-63	*
178	Aerodynamic Stability and Control and Flying Qualities Report	5-2-63	*
179	Performance Data (Revision)	5-3-63	*
181	Fatigue Criteria Report	5-6-63	*
215	Engine Delivery Requirements	5-23-63	*
216	Revision to SD-550-1 (Electrical Equipment)	5-23-63	*
257	Revision to SD-550-1 (Propeller Brake System)	5-31-63	*
299	Revision to SD-550-1 (Ground Clearances)	6-13-63	*
302	Revision to SD-550-1 (Hydraulic System)	6-18-63	*
316	Revision to SD-550-1 (Elevon Balancing)	6-27-63	*
318	Weapon System Master Plan - Revision No. 1	6-28-63	*
326	Revision to SD-550-1 (Fuel Tank Capacity)	7-23-63	*
328	Engine Accessory Delivery Requirements	7-15-63	*
334	Revision to SD-550-1 (Longitudinal Stability and Control Requirements)	7-16-63	*
344	Revision to SD-550-1 (Fuel System Description)	7-23-63	*
351	Revision to Addendum No. 162 (Static Test Requirements)	7-29-63	*

*BAC has scheduled a 30 day interval for approval by BuWeps of each of these submittals after BuWeps Rep. endorsement.

<u>BAC Letter No.</u>	<u>Subject</u>	<u>Date Submitted</u>	<u>Required Approval Date</u>
356	Human Factors Data - Interim Report	7-31-63	*
358	Finish Specifications - Amendment No. 1	7-31-63	*

*BAC has scheduled a 30 day interval for approval by BuWeps of each of these submittals after BuWeps Rep. endorsement.

BuWeps Project Officer verbally advised BAC on April 30, 1963 that a letter is forthcoming which will describe method of requesting changes.

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