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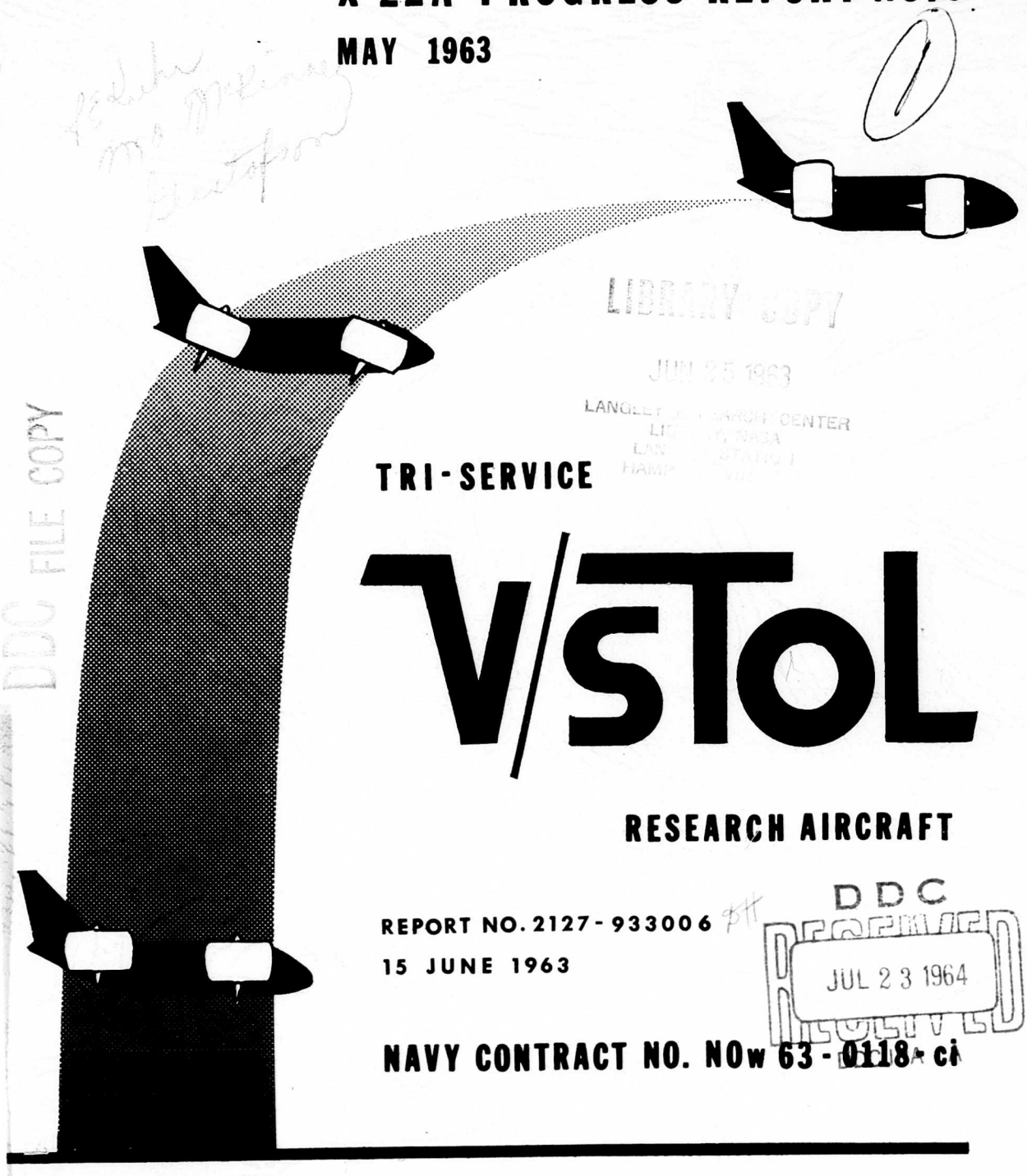
X-22A PROGRESS REPORT NO. 6

MAY 1963



TRI-SERVICE

V/STOL

RESEARCH AIRCRAFT

REPORT NO. 2127-933006

15 JUNE 1963

NAVY CONTRACT NO. NOw 63-0118-c

BELL AEROSYSTEMS COMPANY
DIVISION OF BELL AEROSPACE CORPORATION - A textron COMPANY

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BELL AEROSYSTEMS COMPANY, Buffalo, N.Y.

X-22A TRI-SERVICE V/STOL AIRCRAFT,

MONTHLY PROGRESS REPORT, No. 6, 1-31 May 63.

Report No. 2127-933006

~~May 1963~~

This is the sixth Monthly Progress Report as required in Section F(5) of the contract, and outlines progress for the period 1 May 1963 through 31 May 1963.

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

CONTENTS

CONTENTS (CONT)

ILLUSTRATIONS

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 aircraft. The official negotiation 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 and conventional type operation. It carries a flight crew of two men in the cockpit, a pilot and copilot, and is capable of carrying a nominal 1200-pound payload. The aircraft will be designed to a target value for weight empty of 10,635 pounds, a speed of 303 knots, and endurance of 1.09 hours.

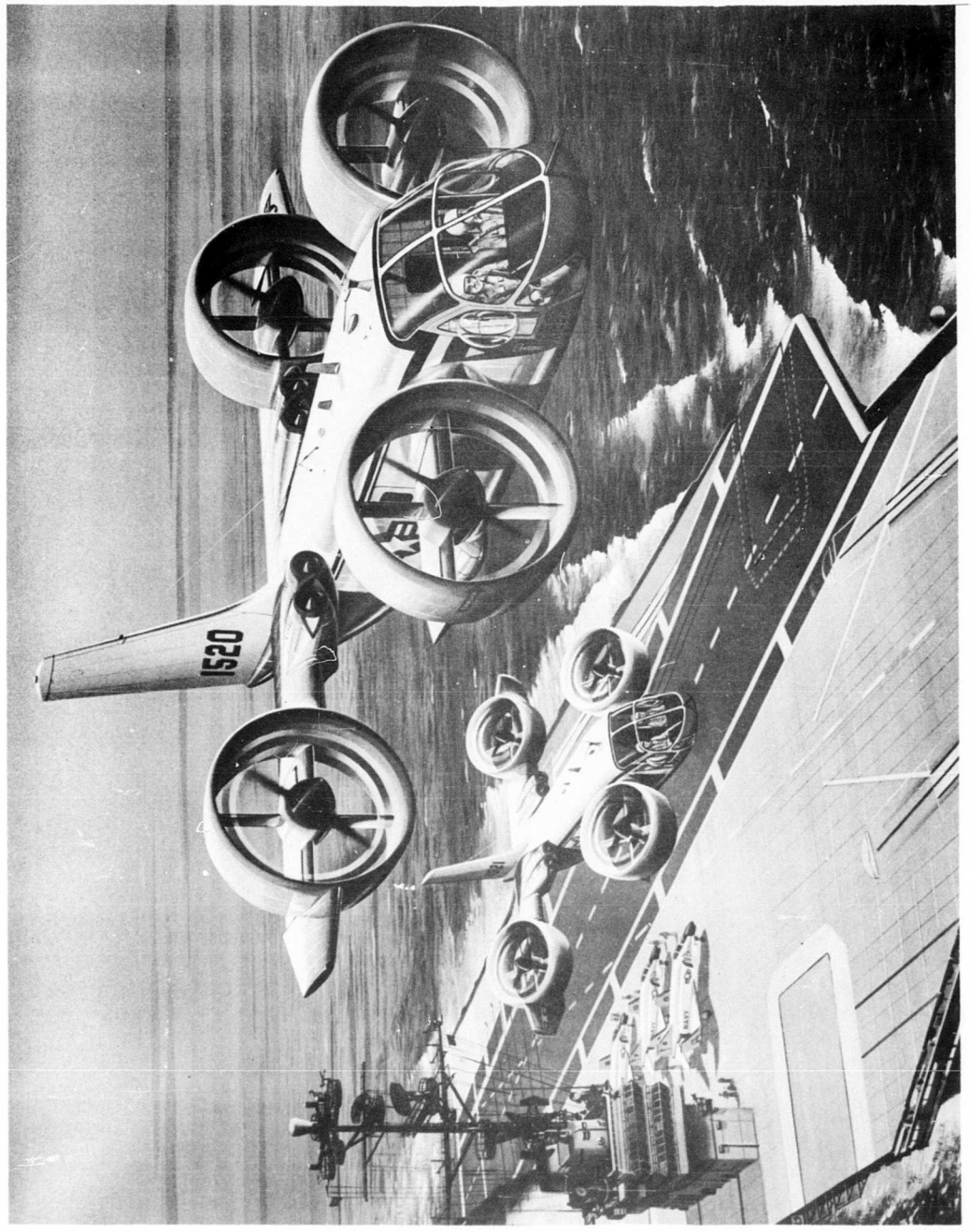

Figure 1. X-22A Tri-Service V/STOL Aircraft

II. SUMMARY

Design effort continued. Revisions to the wing and fin areas to improve longitudinal and directional stability in work. Reviews and refinements to designs to reduce the weight increases due to these changes plus estimated weights of the control system progressing on an expedited basis.

Studies to improve the longitudinal and directional stability as a result of the 1/8 scale wind tunnel testing have been completed.

The wind tunnel program, design, fabrication and test has been revised reflecting the necessary redesigns as a result of the 1/6 scale model test data.

1/5th scale powered wing tunnel modifications components have been shipped to the test facility. Modified parts for the 1/6th scale were also completed and will be shipped to the test facility in early June.

Some delays have been experienced in wind tunnel model testing due to higher priorities at the test facilities.

Steel Products Engineering Co. has been awarded the subcontract for design fabrication test and delivery of the X-22A transmission systems (gearboxes and shafting).

Close coordination maintained with Hamilton Standard on propellers, Steel Products Engineering Co. on transmissions and Cornell Aeronautical Laboratory on the variable stability system - our three major subcontractors.

Proposals for the Landing Gear System are in work by three (3) prospective vendors and scheduled to be received at Bell on 25 June 1963.

During this period, all contractual data requirements were completed essentially as scheduled.

Management controls (PERT scheduling and costing) continued. Nets and EDP runs are still being expanded and improved on an expeditied basis. The third PERT COST report from this effort was issued, as scheduled, on 16 May 1963.

A preliminary noncontractual cockpit mockup inspection was held 23 and 24 May 1963 at Bell, attended by

Lt. Cmdr. H. Heininger - BuWeps
Cmdr. J. Snyder - BuWeps
Lt. Cmdr. J. J. Moylan - BuWeps
Lt. Cmdr. R. Yeatman - BuWeps
Lt. Cmdr. J. Williford - Pax River
Lt. Cmdr. Kastner - Pax River
Lt. W. Salo - Pax River
Mr. E. Formhals - BuWeps
Cmdr. J. Braun - BuWeps

This preliminary inspection was made on a three dimensional mockup which Bell fabricated to assist Human Factors and Engineering designers during the early stages of formulating instruments, and controls arrangements.

Progress between 1 May 1963 and 31 May 1963 has continued in the detail planning of all program efforts. In PERT schedules, we are continuing to revise our original top level nets into expanded detail nets.

To date, approximately 70 percent of the complete program has been planned and is estimated on detailed PERT nets. The networks have been updated as of 24 May 1963, resulting in Revision 18 to Network 2127-PN-200. The PERT Milestone Computer report and the PERT Interim Report for the month of May were submitted to BuWeps on schedule.

Budgets in line with negotiated costs through May 1963 have been issued and are being used by each operational department. Daily reviews of these budgets are being made and expenditures through 31 May 1963 are within the authorized funds for this period. The authorized direct labor hours for each net, through the use of the PERT/COST EDP run, will be released as the operating official hours to each department as each detail net is completed.

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

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 are being held.

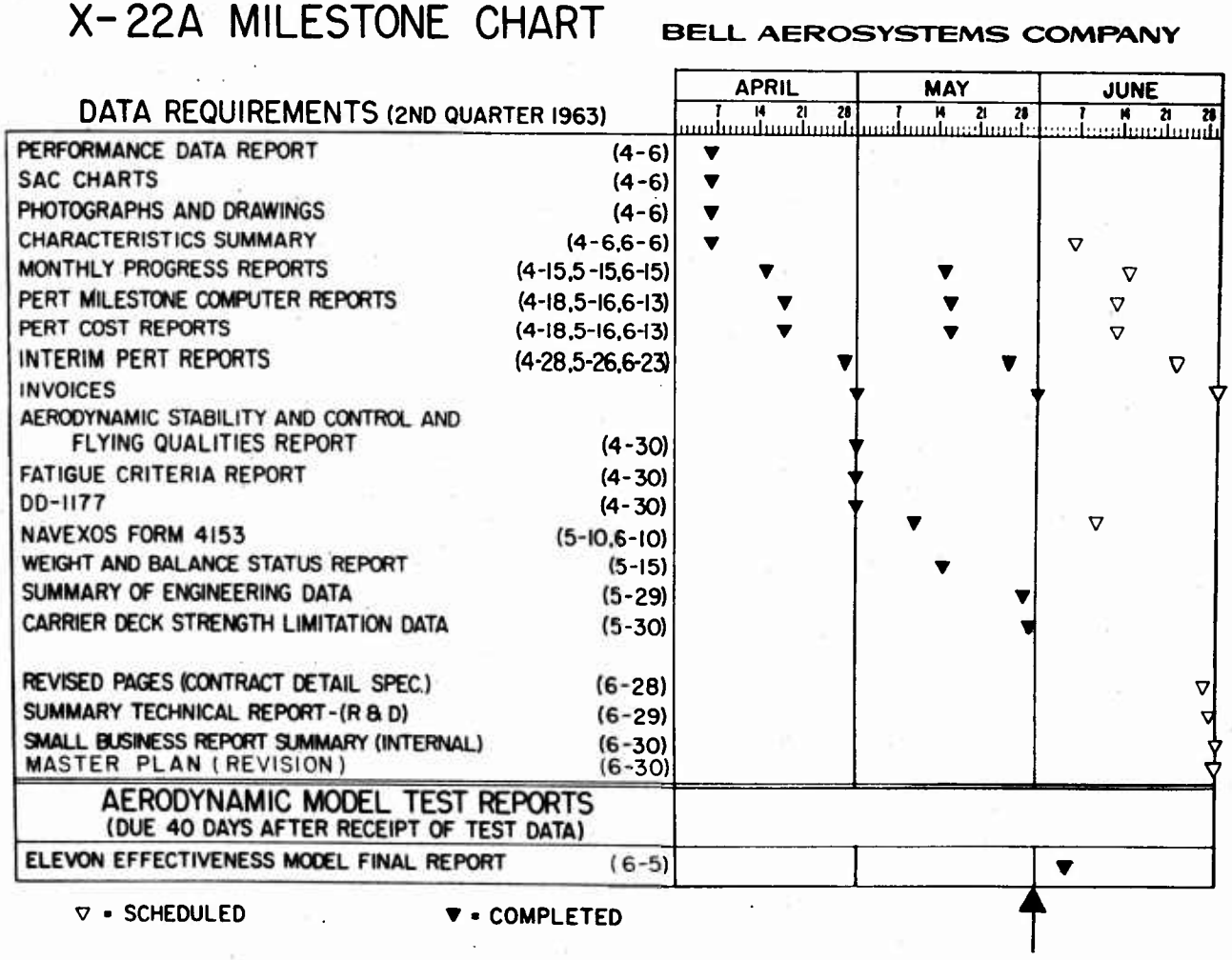

Figure 2. X-22A Milestone Chart - Data Requirements (Second Quarter)

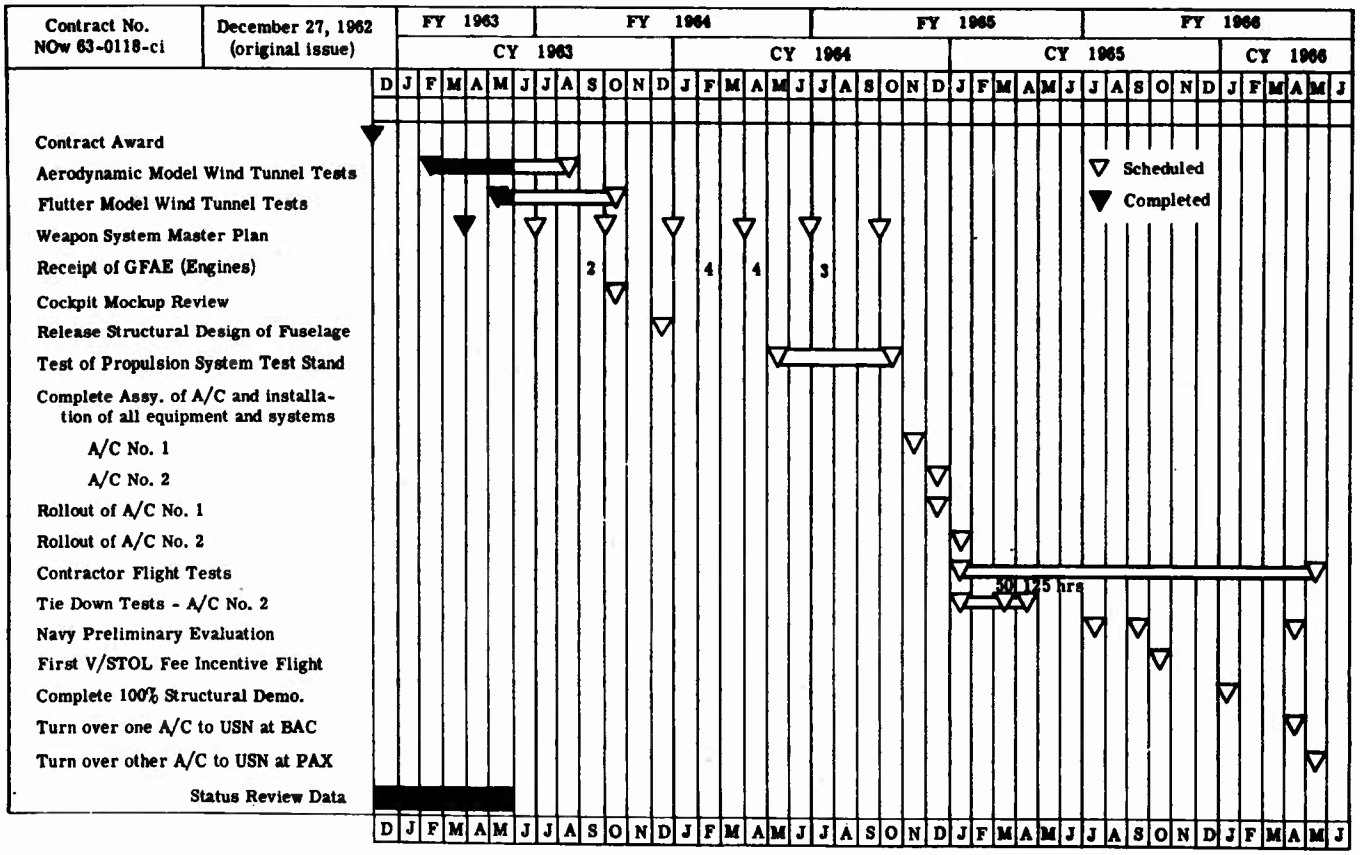

Figure 3. Program Schedule

III. PRELIMINARY DESIGN

A. FLIGHT TECHNOLOGY

1. Performance

The Performance Report was revised to include partial engine climb performance and the effects of zero-lift drag increments on performance.

The characteristics summary, reflecting the current configuration, has been revised and will be submitted early in June.

An analysis of wind tunnel data was started to obtain a better understanding of component drag buildup.

2. Propulsion Analysis

Preliminary data on the electrical compartment cooling air flow system was issued for design studies.

Estimated propeller in-flow velocities for static and in-flight cases were made based on University of Wichita tests. Static results at high power loadings indicated low velocities at the propeller tip due probably to incorrect blade twist distribution. In flight, distribution varied five percent and agreed with analytical predictions.

An estimate of maximum power absorption for an unducted X-22A propeller was made. Based on equal axial thrusts the free propeller would not load the transmission system sufficiently for test stand operation.

Hamilton Standard has recommended a propeller design which will result in lower blade stress levels. Thrust at high speed will be reduced slightly. The effect of this proposed blade is under consideration by Bell.

Control forces available from propeller pitch change during transition are being estimated from available data. Propeller and duct axial thrusts for maximum power were estimated at 150 knots and 40 degree angle of attack.

Selection of airfoil sections for duct strut's and elevon leading edges to prevent stall and remove swirl is in process.

3. Stability and Control

The 1/6 scale model test data was analyzed and configuration modifications for satisfactory longitudinal and directional stability were determined to meet the stability design criteria. These recommendations were presented and discussed at BuWeps, and a revised longitudinal stability criteria was agreed upon, which permitted some reduction in vertical tail size and in the amount of additional wing area required for longitudinal stability. Revised configuration modifications were made in accordance with the reduced stability criteria.

The level flight longitudinal stick force per g characteristics were analyzed with respect to the reduced stability criteria for the most forward and aft centers of gravity. The level of stick force per g meets the specifications with the reduced stability criteria. Suggested revisions to SD-550-1, incorporating the agreed upon changes in longitudinal stability criteria and design c.g. envelope have been prepared for submittal to BuWeps.

Wind tunnel discussions concerning the 1/5 scale powered model tests were held with Langley 7 x 10 foot tunnel personnel and a tentative run program was transmitted. Planning is continuing and tests are scheduled to begin on June 10.

B. VEHICLE STRUCTURES

1. Criteria and Loads

Fuselage shear, bending moment, and torsion data for all of the ground loading conditions presented in Appendix B of Bell Report No. 2127-941004 have been calculated and summarized in graphical form.

Recommended nominal duct incidence settings and maximum ground adjustment angles for flight at 365 knots have also been established for structural loading purposes, and based on a study of duct loads and hinge moments. The nominal incidence angles which have been recommended are +5 degrees and +3 degrees, for the forward and aft ducts respectively. The recommended ground adjustment angles are ±2 degrees for both pairs of ducts. The resulting adjustment extremes are currently being employed for all flight loading conditions.

Structural design loads for symmetrical flight conditions have been determined on the basis of the component aerodynamic data contained in Section V of Bell Report No. 2127-917003 except that lift and normal force data used in conjunction with gust load investigations have been increased to reflect higher lift curve slope data obtained in unpowered model wind tunnel test data. Conditions considered include steady and abrupt pitch maneuvers in transition and at 365 knots, and positive gust encounter at 303 knots. The resulting loads are significantly greater than those previously used, which were determined from much earlier aerodynamic data.

2. Structural Analysis

a. Front and Rear Ducts

The IBM program for evaluation of torsional and bending deformations of the duct has been extended to yield elevon reactions since the elevon support is redundant and reactions are based on duct deformations.

Most of the duct root structure has been resized based on the revised loads mentioned above. The main duct beam has also been reestablished and inputs have been completed for duct deformation calculations under the new loads and with the new sizes.

b. Wing and Duct Support Structure

Detail analyses of the wingtip rib structure in the region of the duct support bearings are continuing. Deflections and internal load distributions have been obtained for the main wing box and the machined fittings forward of the front beam. Calculations have been completed for loads occurring in critical symmetrical flight conditions and are continuing for loads occurring in unsymmetrical flight and ground tiedown conditions.

An element test of the outboard duct bearing support structure was completed using plexiglass material and parts cut full size. Objectives of the test were to determine the pressure distribution between the support tube and bearing support fitting and to observe and collect data on the deformation pattern.

Preliminary test results verify an analysis based on determining the pressure distribution between the inner and outer elements of the bearing from a study of bearing deformations. The results

of both test and analysis suggest pressure distributions which are more or less uniform through an arc of 180 degrees. The distribution used for detail analysis of the bearings is sinusoidal which is therefore conservative.

c. Controls

Initial control system weight studies have revealed a significant potential overweight and studies to minimize this weight have been initiated. These studies are based on the use of machined and built-up fittings rather than castings wherever possible and the substitution of cables and pulleys for push-pull rods were possible. In addition, the 1.33 factor which is required by the structural design criteria for untested structural components has been eliminated since it now appears feasible to static test the flight control system to ultimate loads on the fatigue test stand after the fatigue test is completed. No major modifications of the test stand appear necessary to accomplish this test.

d. Fin

The fin has been resized in connection with the configuration changes to improve stability and a new structural arrangement has been completed and major structural sizes established.

e. Fuselage

The forward duct support frames at Stations 191 and 210 were evaluated for the critical duct loading conditions. The top portion of these frames will now be an integral machined 7079-T651 fitting with the lower portion and sides fabricated from 2024-T4 formed sheet. The top portion of the frames which are essentially deep beams across

the fuselage have been extended to the upper skin line. In the previous design a light frame element formed the fuselage profile but was subjected to very high stresses due to the deformations induced by bending of the duct support beams forming the upper part of the frame.

The outboard duct bearing housing has been sized and the detail design developed. The bearing is an integral machined 18 percent maraging steel fitting which spans between the extensions of the frames at Stations 191 and 210.

The cargo floor was changed from an aluminum alloy honeycomb panel to a 0.040 inch thick aluminum sheet, thereby effecting both weight reduction and manufacturing simplification. The honeycomb sandwich floor was selected initially on the basis of minimum weight but attaching member inserts for cargo tiedown fittings, etc. have introduced considerable weight and complexity.

f. Transmission System

Gearbox reaction loads due to maximum inertia forces and maximum system torques were calculated based upon Bell layout drawings and weight estimates. A study to establish fatigue analysis methods and allowable fatigue stresses was initiated and is continuing.

g. Wing

The structural arrangement of the wing was finalized including the configuration changes required to improve stability and involving greater wing span and chord. Arrangement of the wing section in relation to the fuselage and fin attachment structure was completed.

3. Aeroelasticity

Flutter analyses are continuing for both symmetric and antisymmetric modes with fuselage, aft wing, and duct pitch and roll degrees of freedom included. Results to date have not indicated any serious flutter conditions; however, many potential flutter modes remain to be investigated. Divergence analyses of the latest aft wing duct configuration shows divergence to be a negligible problem.

4. Weights

Weight and Balance Status Report No. 2 was submitted to BuWeps on schedule. A design center of gravity envelope was prepared and was discussed briefly with interested BuWeps personnel. C.G. limits for structural design and for stability and control are satisfactorily in agreement as a result of this effort.

The current weight empty is 10777 pounds. The major change provides for increased wing and tail areas needed for adequate longitudinal and directional stability. This change has added 169 pounds to the weight empty. Other changes incorporated as a result of the c.g. envelope development are the removal of aft compartment tiedown fittings and the relocation of one of the passengers from the aft compartment to the forward compartment. The gearbox and shafting vendor has been selected and his guaranteed weights are 13 pounds under those previously carried by Bell.

Several weight studies are in process. The major study is concerned with an overweight in the Flight Controls Group. The complexity of the systems, which essentially consist of separate helicopter and conventional aircraft types of systems that are also partially

combined, is being reduced and wider use of pulleys/cables in lieu of push-pull rods/bellcranks is being sought. Fuselage weight is being broken down into detail components and appears to indicate weight reductions. The fuel tank weight is being updated to reflect semicylinder ends. Duct and support weight is being reevaluated as is the wing in connection with a change in loads.

C. DESIGN

1. General Design

The configuration and tradeoff studies as a result of wind tunnel results have been resolved. These consist, basically, of a 38 inch total inner wing span increase, a new stabilizer of less area, a (larger) fin of 59 square feet area, and moving the nacelles outboard five inches.

The DALs for the propulsion system have been sent to BuWeps for approval. Work in these detail areas continues.

All releases for the cockpit mockup have been made.

2. Airframe

Detail design and actual detailing of the duct support and harmonic drive have been started.

Design layouts of the following components are well underway and have been distributed to Structures for approval, and to Manufacturing for planning and comment:

(a) Ducts – Supports and associated details, elevon hinge and attachments and supporting struts

(b) Fuselage – Canted bulkhead including seat supports and nose gear attachment.

Detail design layouts of landing gear attachment fittings.

Upper longeron layout

Fuselage basic bulkhead, longeron ties, splices, and floor attachment.

Cockpit framing and canopies

Fuel tank compartment

(c) Stabilizer Assembly and details

(d) Wing – Wing data drawing completed, Duct bearing support ribs.

(e) Fin – General arrangement drawing

3. Flight Controls and Equipment

Layouts of the control system for weight reduction are in work and includes:

(a) Revision to the swashplate

(b) Revised rudder pedal assembly

(c) Rerouting and revising of cabling and changing from push-pull tubes to cables.

The mockup general arrangement drawing has been up dated.

The cockpit nomenclature chart has been released for mockup.

All basic mockup drawings have now been released to manufacturing.

The flight control system schematic was completed and transmitted to BuWeps.

Several visits have been made to Cornell Aeronautical Laboratory to discuss the VSS program.

4. Propulsion

The DALs of the propulsion system have been officially submitted to BuWeps and representatives of Bell visited BuWeps to discuss them.

A layout of the revised accessory gearbox area, to obtain increased accessibility and better maintenance, is underway.

Meetings with Hamilton Standard were held to coordinate the specification and design of the propeller and integral gearbox. A visit was made to Steel Products Engineering Company to discuss the transmission system.

A vendor listing of the propulsion instruments is being prepared.

Full scale layouts of the throttle installation have been started.

Letters of inquiry have been sent on the majority of purchased parts.

The test stand layouts are being revised to the latest designs and layouts of the engine mount and fuel system are in work.

5. Electrical and Electronic

A new load analysis has been prepared to delete one Constant Speed Drive unit and reduce the battery from a 30 pound 30 AH unit to a 2 3/4 pound 0.08 AH unit.

The layout of the aft power shield has been completed.

The layout of the overall electrical and electronic system is in the design and coordination stage.

6. Landing Gear and Hydraulics

The landing gear DAL's have been completed and submitted to BuWeps.

Layouts have been initiated on the main and nose gear wheel doors and their operating mechanisms.

The layout of the main gear trunnion mount has been completed and is ready for detailing.

Revisions to SD-550-1 plus justifications have been prepared for the landing gear configuration and the hydraulic system. These items have previously been discussed and tentatively approved by BuWeps.

An analysis of the pressure drops in the supply and return lines to the propeller pitch control, for various flow conditions, has been completed. Graphs have been supplied for submittal to Hamilton Standard.

A layout is in work of the parallel actuations for the compound elevons.

D. SYSTEMS SUPPORT

1. Human Factors Section

Initial task analysis involving both the evaluation pilot and the safety pilot was undertaken relative to variable stability system operation. Preliminary procedures for trim balance, transfer to and from VSS flight and for in-flight adjustment of control parameters have been considered and some functions allocation accomplished. Tentative control display requirements based on this preliminary analysis have been determined.

A layout of the main instrument panel is being prepared to show the feasibility of incorporating these requirements.

An analysis of pilot tasks in event of Stability Augmentation System failure is progressing.

An annunciator panel arrangement consisting of 26 caution or information items was developed. Selection of items was based on required pilot action with all inputs requiring identical action centered in one caution light. Legends were grouped according to function and related systems. Grouping was arranged to conform with normal reading habits.

2. Environmental Factors

As previously reported, tests are planned to determine the effectiveness of combining microphone shield and the noise cancelling microphone. The Harris Handbook of noise control, ("McGraw Hill",1957) states that almost complete intelligibility is assured when the signal exceeds the noise by at least 12 db in the octave band levels 600 to 4800 cps. Data has been compiled and plots drawn showing that the combination of shield and noise cancelling microphone may reduce the background noise sufficiently for acceptable speech communications and stay within the comfort level to the ear.

3. Maintainability and AGE Section

The aft compartment electrical installation, air cooling system, and master prop control layouts have been reviewed.

New access openings have been added to the human factors mockup.

Preliminary inspection and servicing data are being collected.

E. SYSTEM ANALYSIS AND INTEGRATION

Discussions have continued between the Variable Stability System subcontractor and the various design groups.

The functional dynamic requirements of the front hover servos have been established. Effects on component design and leakage rates are being investigated.

F. SUBCONTRACTS

1. Propellers

Vendor design effort has progressed. Design status and review meetings were held at Bell on 28 and 29 May. Negotiations on specifications have been concluded, and definitized subcontracts are expected to be formalized before the end of June 1963.

The PERT system has been authorized and is in use by the vendor.

Duct for propeller test in work at Bell. Basic mold has been completed and duct details in fabrication. Female forms for the inner and outer skins are in work as are the plaster forms for the horizontal strut.

2. Variable Stability System

Specification and design effort is underway with Cornell Aeronautical Laboratory. Negotiations have been reduced to area of resolving Quality Control Plan No. 4 compliance. Contract being prepared by legal department and scheduled for formalization by mid June 1963. PERT has been included as a requirement.

3. Transmission and Gearbox System

Steel Products Engineering Company, selected as vendor for gearboxes and transmission shafting has instituted preliminary design effort. A definitized contract is scheduled before the end of June 1963.

Two visits to Bell have been made in establishing an internal working PERT system for the contract.

4. Ejection Seats

The order for two Douglas 1D ejection seats for use in the cockpit mockup has been confirmed for receipt 22 July; seat rails will be shipped in advance 19 June. A color change by the vendor has been requested of BuWeps to allow this scheduling.

Two sets of GFE parachutes and torso harnesses have been requested of BuWeps.

5. Landing Gear

At the request of potential vendors, the proposal dates have been extended to 25 June. Three out of four have indicated intent to bid.

6. Duct Rotation System

Engineering technical review is continuing with United Shoe Machinery. Study is being made of preliminary harmonic drive system designs. Final loads are being established.

7. Right Angle Gearbox for NASA-AMES Duct/Propeller

The requirement for a right angle gearbox necessary to power this full scale duct and propeller at the wind tunnel was placed with York Gear Ltd, Toronto, Canada.

IV. MODELS

A. WIND TUNNEL TEST PROGRAM

1. 1/6 Scale Unpowered Airplane Model

Modifications to this model have been completed and further testing is scheduled to start at DTMB approximately 14 June.

2. 1/5 Scale Powered Airplane Model

Modifications to this model, as a result of the 1/6 scale model test results, were completed and shipped to the test facility. The model has been assembled and testing is scheduled to start during the week of 6/3/63. The test program proposed by Bell Aerosystems Company included a series of duct alone tests. The test facility feels that this is a separate program and such tests can not be performed until sometime after the complete model has been tested.

3. 1/3 Scale Powered Duct Model

The pretest report was submitted and contained an extensive test program. Discussions will be held with DTMB early in June relative to some curtailment of this program. Testing is expected to start early in July 1963.

4. Full-Scale Powered Duct Model

Assembly and tunnel installation drawings were completed and approved verbally by NASA-Ames. Gearbox contract was awarded for delivery to Bell 15 October. Planning and Loft is complete.

5. Elevon Effectiveness Model

The data report for these tests has been completed and is being published.

6. Free Flight Model

Configuration changes resulting from the 1/6-scale model tests were forwarded to NASA to be incorporated in this model.

7. 1/20 Scale Spin Model

Configuration changes resulting from the 1/6 scale model tests were forwarded to DTMB to be incorporated into the spin models.

8. 1/7 Scale Duct/Wing Flutter Model

Manufacture of the 1/7 scale Wing/Duct Flutter Model has been completed except for minor modifications to reflect late prototype configuration changes. Calibrations are in progress. The DTMB test starting date of June 3 was rescheduled by the Navy to July 8 because of other high priority Navy work. The model and instrumentation are presently scheduled for shipment to DTMB during the week of June 24-28.

9. 1/7 Scale Complete Airplane Flutter Model

Manufacture of components for the 1/7 scale complete flutter model has been completed except for instrumentation installation. A brief exploratory checkout of this complete configuration will be included in the first windtunnel test period; however, the bulk of the testing of this configuration will occur in a test period of two weeks during September 1963.

Some modifications of this model may be made between July and September 1963 to incorporate features found desirable in the first test period and/or to update the configuration.

10. Ground Effect Model

The model was completed, the balance system calibrated, and the installation for testing completed. Testing will start June 3.

11. General

Rescheduling of tunnel facilities as experienced on the X-22A Wind Tunnel Model Test Programs at DTMB and NASA – Langley, is beginning to affect our progress in Engineering regards timely receipt of test results as applied to the designs.

V. MOCKUP

A. COCKPIT MOCKUP (See Figures 4 and 5)

Canopy and skin installations were completed. Details for the pedestal, control stick, flight and engine controls are progressing on schedule.

The overall mockup is progressing well ahead of schedule.

B. HUMAN FACTORS MOCKUP

This economical three-dimensional Mockup, (cockpit section only) was moved to the Mockup Area for preliminary inspection and review by BuWeps and PAX visitors on 23 and 24 May. A complete summary of suggestions, recommendations, and comments has been prepared for correlation with the summary report from the customer. This will be reviewed and action taken as required.

The inspection, preliminary in nature, was constructive and welcomed by Bell. The Mockup gave advance design and installation review far in advance of Contractural Mockup availability. This factor is of decided benefit to both BuWeps and Bell.

The Human Factors Engineering activity in relation to the Mockup is noted in Section D, Human Factors Section.

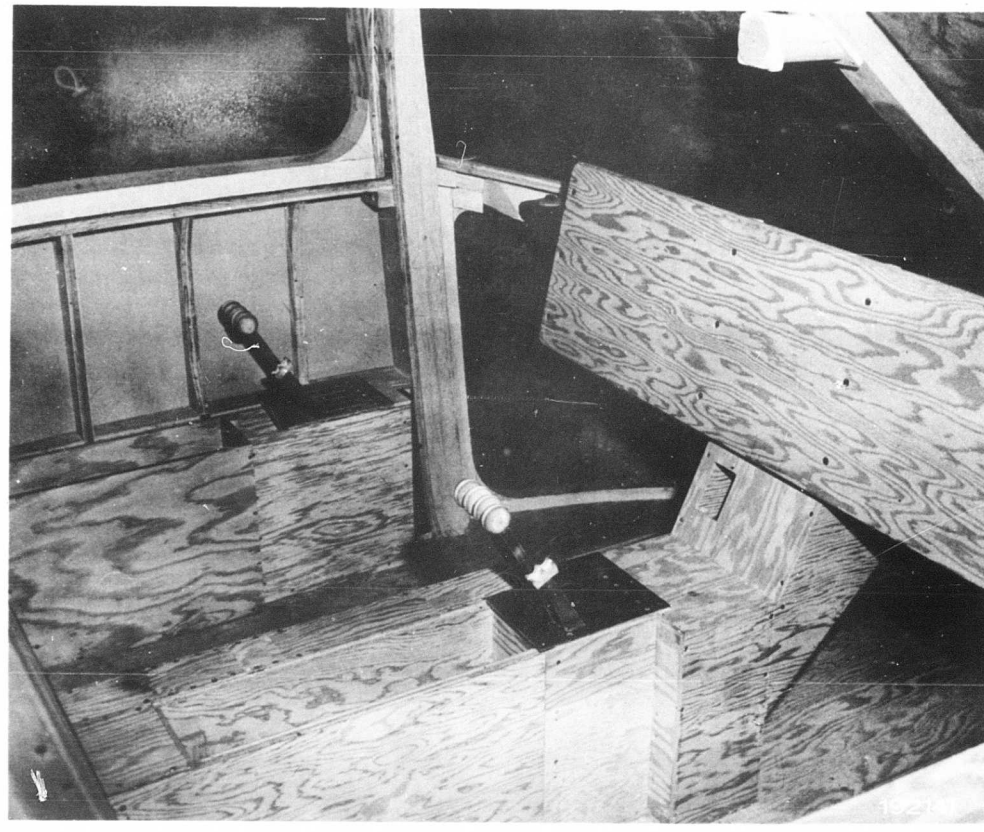

Figure 4. Model X-22A Cockpit Mockup-Interior View

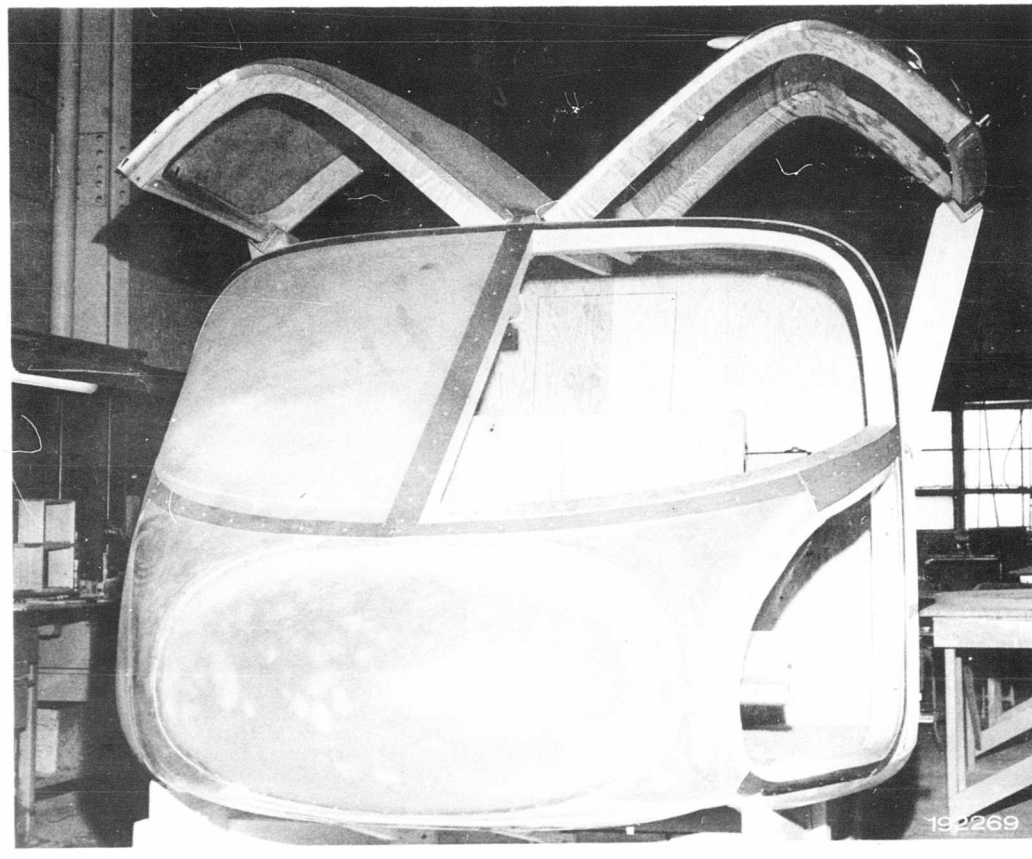

Figure 5. Model X-22A Cockpit Mockup

VI. GENERAL

A. TRIPS AND VISITORS

1. Trips

Date	Destination	Purpose
5/7/63	BuWeps	X-22A Status
5/8/63	BuWeps	Stability and Control
5/8/63	BuWeps	Electrical System
5/9/63	BuWeps	Landing Gear
5/9/63	CAL	VSS Data
5/12/63	BuWeps	Propulsion Design
5/14/63	NASA Langley	1/5 Scale Model
5/14/63	BuWeps	Ejection Seats
5/15/63	BuWeps	Stability and Control
5/15/63	BuWeps	Weight Status
5/20/63	Hamilton Standard	PERT of Propeller
5/24/63	CAL	VSS Data
5/27/63	NASA Langley	1/5 Scale Model
5/27/63	Therm	Prop Consultation
5/29/63	BuWeps	Criteria and Loads

2. Visitors

Date	Representing	Purpose
5/1/63	BuWeps FLTREAD-REPLANT	BWR Management Review
5/4/63	Hamilton Standard	Propeller Spec

Date	Representing	Purpose
5/10/63	BuWeps	X-22A Status
5/14/63	General Electric	T58 Status
5/14/63	CAL	Variable Stability System
5/14/63	Hamilton Standard	Propeller Spec
5/16/63	CAL	Variable Stability System
5/17/63	Steel Products	Transmission
5/21/63	Lycoming	CSD
5/21/63	Bendix	Landing Gear
5/22/63	Lear	Instrumentation
5/23/63	Hamilton Standard	Propeller Spec
5/23/63	Bendix Radio	Helmet Radio
5/23-24/63	BuWeps, NATC	Mockup Status
5/27/63	Cleveland Pneumatic	Landing Gear
5/28/63	Hamilton Standard	Concept Review
5/29/63	CAL	Variable Stability System Human Factors

B. REPORTS AND CORRESPONDENCE SUBMITTED DURING MAY 1963

BAC Letter No.	Date Submitted	To	Subject	Reason
173	5/1	BuWeps RA-443	Aerodynamics and Flutter Model Test Program (Rept. 2127-917001)	Approval
174	5/1	BuWeps RA-443	Revision to Addendum No. 162	Approval

BAC Letter No.	Date Submitted	To	Subject	Report
175	5/1	General Electric Mr. D. Teece	Engine Installation	Info
176	5/1	NASA-Langley	1/5 Scale Model Pre-Test Report	Approval
177	5/2	BuWeps RA-443	Rev. to SD-550-1 - Electronic Equipment	Info
178	5/2	BuWeps RA-443	Aero. Stab. and Control and Flying Qualities Rept.	Info
179	5/3	BuWeps RA-443	Performance Data (Revision)	Info
180	5/3	DTMB	1/7 Scale Test Planning Rpt	Approval
181	5/6	BuWeps RA-443	Fatigue Criteria Report	Approval
182	5/6	BuWeps RA-443	Propulsion System Dwgs,	Approval
183	5/6	BuWeps RA-443	1/7 Scale Test Planning Rept	Approval
184	5/7	BuWeps RA-443	Rev to SD-550-1 (Para 5.16.9.2)	Approval
185	5/7	BuWeps RA-443	1/5 Scale Model Pre-Test Report	Approval
186	5/8	DTMB	Pre-Test Rept for 1/3 Scale Powered Duct	Approval
187	5/9	BuWeps RA-443	Propulsion System Dwg	Approval
188	5/9	U.S. Naval Test Center Pax River	Aerodynamic and Flutter Model Test Program Test Rept	Info

BAC Letter No.	Date Submitted	To	Subject	Reason
189	5/9	BuWeps RA-443	1/3 Scale Model Pre-Test Rept	Info
190	5/9	ASD	Fatigue Criteria Rept	Info
202	5/13	BuWeps RA-443	Propulsion System Dwg	Approval
203	5/13	BuWeps RA-443	Add'l Data Requested Douglas 1D Ejection Seat	Approval
204	5/15	BuWeps RA-443	Weight and Balance Status Rept No. 2	Info
205	5/15	BuWeps RA-443	Weapon System Master Plan Monthly Status 2127-933051	Approval
206	5/15	BuWeps NPR-2411	Schedules for Deliverable Items	Info
207	5/15	NASA-Ames	Full Scale Duct/Prop Wind Tunnel Model	Approval
208	5/15	BuWeps RA-443	Landing Gear Dwgs	Approval
209	5/16	BuWeps RA-443	1/6 Scale Power Model-Pre-Test Rept	Info
210	5/16	BuWeps RA-443	Elevon Effectiveness Model - Interim Test Rept	Info
211	5/16	BuWeps RA-443	PERT Reports - April	Info
212	5/17	BuWeps RA-443	Monthly Progress Rept No. 5	Info
213	5/23	BuWeps RA-443	Landing Gear Drawing	Approval
214	5/22	BuWeps RA-443	Wind Tunnel Selection	Approval

BAC Letter No.	Date Submitted	To	Subject	Reason
215	5/23	BuWeps RA-443	Engine Del Requirements	Approval
216	5/23	BuWeps NPAF-35	Rev to SD-550-1 (Electrical Equipment)	Approval
217	5/23	BuWeps RA-443	Propulsion Sys. Dwgs	Approval
218	5/23	General Electric	Windmilling and Air Starts	Info
223	5/24	BuWeps RA-443	PERT Interim Report	Info
224	5/24	BuWeps NPAF-35	Prop Rev to Addendum 162 (Ditching Investigation Program)	Approval
225	5/27	BuWeps RA-443	Landing Gear Dwgs	Approval
226 - 236	5/27	See Dist List in Monthly Report	Monthly Progress Report No. 5	Info
237	5/28	BuWeps Rep E. Longwell	Premium Overtime, Request for	Approval
238 - 247	5/29	See Dist List in Weapon System Master Plan	Weapon System Master Plan - Monthly Status	Info
248	5/29	BuWeps RA-443	Summary of Engrg Data	Approval
249	5/29	BuWeps RA-443	Flt Control Sys Dwg	Approval
250	5/29	BuWeps RA-443	Carrier Deck Strength Limitation Data	Info
257	5/31	BuWeps NPAF-35	Rev to SD-550-1 (Propeller Brake System)	Approval

BAC Letter No.	Date Submitted	To	Subject	Reason
258	5/31	BuWeps RA-443	Prel Wiring Diag - Elec Sys	Approval
263	5/31	BuWeps RA-443	Prop Install Dwg 2127-438003	Approval
264	5/31	BuWeps Rep L. Cummings	Defense Contr Planning Rep DCPR	Info
265	5/31	BuWeps RA-443	Cockpit Mockup Photos	Info
272	5/31	DTMB	Spin Model Configuration	Info
273	5/31	BuWeps RA-443	Weapon System Master Plan (Rev.)	Approval

C. OPEN ITEMS (Submitted at least 30 days prior to end of May)

1. BuWeps and BuWeps Rep

BAC Letter No.	Subject	Date Submitted	Required Approval Date
28	Basic Aerodynamic Data Report - Revision (2127-917002)	1-24-63	5-31-63
31	Human Factors Data Report (2127-919001)	1-29-63	5-31-63
75	Vibration Program Report (2127-932001)	2-27-63	5-31-63
84	Revision to SD-550-1 Para 3.1.2.1 (Endurance Reqmt)	3-1-63	*
94	Douglas Ejection Seat	3-12-63	4-12-63
120	Preliminary Wiring Diagrams - Electrical System	3-28-63	4-28-63
157	Defense Materials System (DMS) Self-Authorization Approval	4-18-63	5-18-63
171	Revision to SD-550-1 (Pilot's Cockpit)	4-26-63	*

*Commander Braun verbally advised BAC on April 30, 1963 that a letter is forthcoming which will describe method of requesting changes.

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