AD-A053 686   BELL AEROSPACE TEXTRON BUFFALO N Y   F/G 1/3

PILOT MODEL AIR CUSHION \EHICLE (LACV-30) PROGRAM.(U)

FEB 78 R P KAISER   DAAK02-75-C-0149

UNCLASSIFIED   7467-928010   NL

1 OF 2

AD
A053686

~~END~~
DATE
FILMED
6-78
DDC

CONT.

DAAK-02-75-C-0149

(13)

AD A053686

REPORT: 7467-928010

PILOT MODEL AIR CUSHION VEHICLE (LACV-30) PROGRAM

Robert P. Kaiser
Bell Aerospace Textron
P. O. Box 1
Buffalo, New York 14240

February 1978

Final Technical Report

Prepared For

U.S. ARMY MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT COMMAND

Fort Belvoir, VA

SECURITY CLASSIFICATION OF THIS PAGE (*When Data Entered*)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (*and Subtitle*) (6) Pilot Model Air Cushion Vehicle (LACV-30) Program.		5. TYPE OF REPORT & PERIOD COVERED (9) Final Technical rept. Mar [redacted] 75 - [redacted] Feb [redacted] 78,
		6. PERFORMING ORG. REPORT NUMBER (14) 7467-928010
7. AUTHOR(s) (10) [redacted] P./Kaiser (Robert)		8. CONTRACT OR GRANT NUMBER(s) (15) DAAK 02-75-C-0149
9. PERFORMING ORGANIZATION NAME AND ADDRESS Bell Aerospace Textron P. O. Box 1 Buffalo, N. Y. 14240		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS (12) 15p.
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Mobility Equipment Research and Development Command Fort Belvoir, Virginia		12. REPORT DATE (11) Feb [redacted] 1978
		13. NUMBER OF PAGES 14
14. MONITORING AGENCY NAME & ADDRESS (*if different from Controlling Office*)		15. SECURITY CLASS. (*of this report*) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (*of this Report*)

This document has been approved for public release and sale; its distribution is unlimited.

17. DISTRIBUTION STATEMENT (*of the abstract entered in Block 20, if different from Report*)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (*Continue on reverse side if necessary and identify by block number*)

U.S. Army Logistic Air Cushion Vehicle

20. ABSTRACT (*Continue on reverse side if necessary and identify by block number*)

This report presents summaries of seven Final Reports of vehicle, subsystem and model test investigations performed by Bell Aerospace Textron under the Pilot Model Air Cushion Vehicle (LACV-30) Contract No. DAAK 02-75-C-0149. Summaries are also presented of six BAT IR&D investigations of its Stretched Voyageur vehicle which have some relevance to the LACV-30.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (*When Data Entered*)

408 855

SUMMARY

This report comprises summaries extracted from the following Contractual and Independent reports:

Contractual

1. "Surf Tests of a 1/7.5 Scale Model of the LACV-30," Bell Aerospace Textron Report No. 7467-927009, October 1975.

2. "Tests for Particle Contamination of the Engine Inlet Airflow from the LACV-30 Air Management System," Bell Aerospace Textron Report No. 7467-928003, January 1977.

3. "LACV-30 Auxiliary Power Unit Investigation" Bell Aerospace Textron Report No. 7467-927024, June 1977.

4. "LACV-30 Pre-Delivery Water Test Program," Bell Aerospace Textron Report No. 7467-928006, February 1978.

5. "Performance of the LACV-30 Air Management System Original Configuration," Bell Aerospace Textron Report No. 7467-928007, February 1978.

6. "Performance of the LACV-30 Air Management System Modified Configuration," Bell Aerospace Textron Report No. 7467-928008, February 1978.

7. "LACV-30 Test and Demonstration Report," Bell Aerospace Textron Report No. 7467-928009, February 1978.

Independent

1. "Stretched Voyageur Model Testing," Bell Aerospace Textron IR&D Report No. 7467-927011, December 1975.

2. "Annular Tank Aero-Propulsive Tests of the Stretched Voyageur Model with a Simulated Exhaust System," Bell Aerospace Textron IR&D Report No. 7467-927019, November 1976.

3. "Lift System and Over Water Tests of the Stretched Voyageur Model with a Simulated Exhaust System," Bell Aerospace Textron IR&D Report No. 7467-927020, December 1976.

4. "Static Tests of the Stretched Voyageur Model with Fan Plenum Feed Holes for Air Management System Supply," Bell Aerospace Textron IR&D Report No. 7467-927021, December 1976.

5. "Comparison of Measured and Predicted Hover Performance of LACV-30 Vehicles at BATNFO," Bell Aerospace Textron IR&D Report No. 7467-928022, December 1976.

6. "Stretched Voyageur Model Testing Pitch and Roll Stiffness Tests," Bell Aerospace Textron Report No. 7467-928005, December 1976.

PREFACE

This report lists and summarizes under one cover all of the Final Reports of vehicle, subsystem and model test investigations performed by Bell Aerospace Textron under Contract No. DAAK 02-75-C-0149 with the U. S. Army Mobility Equipment Research and Development Command. Mr. John Sargent was the Contracting Officer's Technical Representative and Mr. C. E. Burr was the BAT Program Manager for these investigations.

Relevant BAT IR&D investigations of its Stretched Voyageur are also summarized in this report.

CONTENTS

I. INTRODUCTION

The primary objective of the Pilot Model Air Cushion Vehicle (LACV-30) program was to provide two lead vehicles to the U. S. Army for their evaluation in Phase II Development Tests and Operational Tests. During the three year course of the program, Bell Aerospace Textron also performed several vehicle, subsystem and model test investigations, each of which is documented in a separate Final Report. The purpose of this program Final Report is to list and summarize all of the contractually required reports under one cover. The reader is referred to the individual reports for detailed discussions, conclusions and recommendations.

Because the LACV-30 is a stretched outgrowth of Bell's Voyageur air cushion vehicle, a number of Independent Research and Development investigations are also applicable to the LACV-30. Summaries of relevant IR&D Final Reports are included under a separate heading.

II. CONTRACTUAL INVESTIGATION SUMMARIES

A. "Surf Tests of a 1/7.5 Scale Model of the LACV-30," Bell Aerospace Textron Report No. 7467-927009, October 1975.

Surf tests were performed to determine the capability of the LACV-30 to perform in 6 and 8 foot plunging surf conditions. The testing period was one week. The table below is a summary of the configuration and tests performed for the two surf conditions.

Condition	Configuration	Weight lbs.	Surf Height ft.	No. of Runs
Landward	Vehicle with surf fence and MILVANs	115,000	6	11
Seaward	Vehicle with surf fence	84,375	6	5
Landward	Vehicle with surf fence and MILVANs	115,000	8	9
Landward	Vehicle with surf fence, MILVANs and crane	115,000	8	7
Seaward	Vehicle with surf fence, MILVANs and crane	115,000	8	5
Seaward	Vehicle with surf fence, MILVANs and crane	84,375	8	1

The test program demonstrated that the LACV-30 model performed satisfactorily in all conditions tested. When operating landward, the vehicle speed should equal or exceed the surf speed to reduce impact of the waves on the stern of the vehicle. Seaward operations will experience frequent wave impact on the bow of the vehicle. The surf fence is effective in minimizing the wash over the deck. Best performance appears to result for surf entry speeds just below hump speed, 20.5 miles per hour.

B. "Tests for Particle Contamination of the Engine Inlet Airflow from the LACV-30 Air Management System," Bell Aerospace Textron Report No. 7467-928003, January 1977.

Tests were conducted on the overland training course at Fort Story, Virginia on 23 November 1976, for the purpose of quantitatively validating that at least 95 percent of the sand introduced into the LACV-30 Air Management System is removed by the filtration system prior to the engine inlets. The contamination measuring system employed a single sampling probe centered in the AMS inlet stack and three uniformly spaced probes at the engine inlet plenum entrance. The system was fabricated and calibrated at Bell Aerospace Textron prior to installation.

With the sampling system operating, LACV-30-1 was operated for 22 minutes through a series of slow maneuvers aimed at keeping the craft engulfed in a cloud of sand and dust. At the conclusion of the test, the 1-micron barrier filter in each probe was carefully removed and packaged for shipment to Bell Aerospace Textron. There, each filter was accurately weighed and compared to its pretest weight.

Analysis of the weight data indicated that 97.0 percent of the particulate matter entering the air management system inlet was removed before reaching the engine inlet. Based on an analysis of measurement accuracies and potential error sources, it is concluded that the test successfully validated the required 95% minimum efficiency of the air management system.

C. "LACV-30 Auxiliary Power Unit Investigation," Bell Aerospace Textron Report No. 7467-927024, June 1977.

This report documents the results of an intensive investigation to determine the cause of a series of T-62T-32-3 engine failures in the Auxiliary Power Unit (APU) on the LACV-30 vehicles, and to develop a solution to the problem.

Failure investigations were performed on failed engines S/N's 750186, 750207, and 750185, all from LACV-30-1. Study of the failed hardware yielded no significant results. An examination was made of the engine build histories and rotor clearance records, also without significant results.

Vibration measurements were made on engine S/N 750185 just prior to failure. The measurements showed levels of 250 and 1000 Hz vibrations generally similar to those which had been measured on engine S/N 500056 during initial LACV-30-1 checkout tests in January, 1976.

Similar measurements were made on five well-performing engines of the same type in Army Ground Power Units at Fort Belvoir. Only one engine showed the presence of 250 Hz vibration, and that was at a low level.

The first of a series of extensively instrumented tests was performed on LACV-30-2 at Aberdeen Proving Grounds, on engine S/N 750192 which had accumulated 260 hours of operation. No unusual vibration characteristics were noted in any mode of operation. Significantly, the 250 Hz vibration previously seen on engines which later failed was of very small magnitude, and was discernable only by using a Peak Hold capability of the spectrum analyzer.

A replacement engine (S/N 750228) for LACV-30-1 was specially instrumented with thermocouples on the roller bearing and with proximity probes reading the motion of the aluminum structure surrounding the bearing support tube. This engine was acceptance tested at Solar on their production test stand and produced a normal vibration signature. The engine was then transferred to Alturdyne where it was installed in the APU module. During testing in this module, it was found that the rotor first flexure mode of vibration (~250 Hz) was at an abnormally high level. It was calculated that the roller bearing loading resulting from the measured displacement would drastically reduce bearing life. It was also found that this vibration could be controlled by the application of very light loads on the combustor discharge flange or by the installation of an exhaust bellows or heavy tailpipe.

A reinforced panel to attach an exhaust bellows to the module structure was fabricated and tested, with the result that the flexure mode was controlled to very low magnitude. This unit was then tested aboard LACV-30-1 at Fort Story, Virginia. No phase of craft operation was found to excite the vibration to significant levels with the panel and bellows in place.

During the test program, the instrumented engine was operated on Solar's test stand without any exhaust pipe connection, and the 250-Hz mode was not excited to significant levels. The same engine was tested in the APU module (without bellows) immediately following this test and experienced 5-mil excursions. A second T-62T-32 (S/N 700097) in an EMU-30/E generator set was tested with no exhaust system connected and the test results corraborated the Solar production test stand results.

It was concluded from this investigation that the inherent first rotor flexural mode of the engine was being reinforced or excited to destructive levels in the original APU module configuration and that this vibration could be controlled to acceptable levels by modification of the APU.

As of June 1, 1977, the modified APU aboard LACV-30-1 had accumulated 380 hours of successful operation. In March, 1977, an unmodified APU aboard LACV-30-2 (engine S/N 750192) failed after 310 hours of operation. Both vehicles now have modified APU's, and cabin instruments to continuously monitor the 250-Hz mode of vibration.

D. "LACV-30 Pre-Delivery Water Test Program," Bell Aerospace Textron Report No. 7467-928006, February 1978.

A limited over-water test program was conducted on the LACV-30-1 craft prior to its planned delivery to the U.S. Army for Acceptance Tests. The objectives of these tests were to provide for the initial shakedown of the craft and subsystems and to establish the basic performance characteristics and compatibility of the craft with its water environment. To accomplish these objectives, checkout tests and over-water handling quality, performance and miscellaneous tests were planned. These tests were conducted on Lake Huron at the Bell Aerospace Textron Facility at Grand Bend, Ontario, Canada, during the period from October 16 to October 28, 1975. Tests were made in all of the planned categories although the number made in some cases was less than planned due to normal craft shakedown problems. The results of these tests showed that the craft handled well but that the performance was not as good as predicted. This was due primarily to larger than expected leakage at the stern trunk intersections with the side trunk and longitudinal keel that existed on the craft at the time of the tests. The stern seal has since been modified to alleviate this problem.

E. "Performance of the LACV-30 Air Management System Initial Configuration," Bell Aerospace Textron Report No. 7467-928007, February, 1978.

In response to earlier indications of excessive sand ingestion through the LACV-30 main engines and low pressures at their inlets, the inlet Air Management System was instrumented for air flows, pressures and temperatures and tested at various power conditions. These tests confirmed the presence of negative pressures at the inlets and provided data showing where the principal pressure losses occurred.

Concurrent analysis of the original two-stage filtration system demonstrated that at its design filtration efficiency it would pass excessive amounts of particulates when operating in the high sand and dust environment experienced during testing at Fort Story, Virginia. It was concluded that a third stage of filtration must be added to the system.

Various modifications to reduce losses and further increase AMS pressures to accommodate a third stage of filtration were investigated. A modified AMS configuration incorporating additional filtration, a diffuser at the fan exit, an enlarged entrance to the engine inlet compartment, and shifting the oil cooler air load from the AMS fan to the lift system was designed and analyzed. Analysis showed that this configuration would provide a positive pressure of from 4" to 7" of water at the engine inlets. Recommendations were made for installation and early tests of key components in the original AMS aboard LACV-30-2 and, upon verification of expected performance, to fabricate, install and test the modified AMS configuration.

F. "Performance of the LACV-30 Air Management System," Bell Aerospace Textron Report No. 7467-923008, February 1978.

A prior investigation of the LACV-30 Air Management system had noted certain deficiencies, recommended design changes, and predicted the performance of the modified system. The present investigation first evaluated two candidate changes and determined that one of them, consisting of changes to the fan inlet, offered little potential for improvement and should not be further pursued while the other, a diffuser at the fan discharge, was beneficial and should be incorporated.

The finalized Air Management System configuration was fabricated, installed, and tested. Its performance fell somewhat short of predictions, primarily as a result of pressure losses attributable to higher than expected (or required) scavenge airflow from the inertial separators. However, the requirement for a positive gage pressure at the engine inlets was met, with achieved pressures ranging between 1 and 3 inches of water. The potential for further increasing these pressures by reducing the filter scavenge flow was also demonstrated. It was concluded that the modified Air Management System is suitable for use on the LACV-30.

G. "ACV-30 Test and Demonstration Report," Bell Aerospace Textron Report No. 7467-928009, February, 1978.

The test and Demonstration Report for the LACV-30-1 and LACV-30-2 air cushion vehicles fulfills the requirement of Contract No. DAAK02-75-C-0149. This report includes all the acceptance and type tests performed on both vehicles as part of the vehicle demonstration program and proof of design tests.

Test data and analysis covers two phases of testing for each vehicle. The LACV-30-1 vehicle was tested at Bell Aerospace in Wheatfield, N. Y., and Ft. Story, Va. The LACV-30-2, which did not have a swing crane installed, was tested at Bell Aerospace and Aberdeen Proving Grounds in Maryland. In all cases, the vehicles performed satisfactorily and were accepted by the U. S. Army. Two corrective actions were required on the LACV-30-1; installation of a new horn and addition of bow pre-loaders to maintain pressure on the front loading pads during swing crane operations.

III. INDEPENDENT INVESTIGATION SUMMARIES

A. "Stretched Voyageur Model Testing", Bell Aerospace Textron IR&D Report No. 9467-927011, December, 1975.

The lift system improvement program ended in December 1974 with significant changes to the 1/7.5 scale model of the stretched Voyageur, see Reference 1. The recommendations of that program included installation of volutes in both lift fan plenums, new fingers on the skirt system, new stern seal, testing in the cushion flow rig, and round-the-pole testing of the final configuration.

Four separate tasks were performed during 1975. The first of these was a cushion flow test to determine the effects of new fingers installed on the bag and of volute modifications in the starboard plenum. The results of the testing indicated a slight improvement in heave height which could possibly be attributed to new finger material. Longitudinal keel and stern bag-to-cushion pressure ratio improved with the starboard volute modification, but no change in total flow or side bag-to-cushion pressure ratio resulted.

Additional testing was performed to evaluate the lateral keel feed area and cone exit configuration. These tests led to the installation of diaphragms in the exit cones to properly simulate the full scale vehicle. The last part of this task was concerned with determining the effect of cushion flow leakage out of the stern seal. A continuous stern seal was installed and air gaps were plugged where the bags did not seal properly to the peripheral side bag. Tests of the continuous stern seal showed significantly increased heave height.

The second task was performed to determine the overwater drag of a model configuration employing the improved volutes developed in Task I, and the new stern seal installed in the tasks reported in Reference 1. The tests indicated larger than predicted drag levels, with substantial differences in predicted and test values of maximum speed. The results of this task, in conjunction with the Task I findings with a continuous seal, led to a recommendation for a modification of the new stern seal and a complete test program to determine its effect on performance.

The addition of the modified stern seal in Task III significantly increased the hover heave height; a small air gap was evident at the design gross weight of 115,000 pounds and lift fan speed of 945 rpm. The overwater drag obtained from round-the-pole testing showed a significant decrease in comparison to the tests performed in Task II. The drags were closer to predicted and resulted in a maximum speed of 54 mph compared to a predicted value of 56.5 mph. Pitch and roll stiffness was obtained for the 115,000 pound gross weight condition and found to be adequate. A configuration with no longitudinal keel was tested at the same gross weight. Results indicated a reduction in pitch stiffness of 11 percent and roll stiffness in excess of 50 percent.

The modification to the stern seal included the following, both bags were extended to the craft centerline so that when inflated would butt against each other and seal, the longitudinal keel was shortened to reduce interference between bag and exit cones, and three exit cones were added to each bag to seal the gap due to shortening the keel. The side peripheral bags were extended one finger width and six cones replaced the original two cones to reduce leakage at the stern corners of the vehicle.

It is recommended that the full scale stern seal be modified to incorporate the latest model configuration. Additional model testing should be performed to further define the drag variation with speed.

Analysis of test data obtained from round-the-pole tests in Task III indicated the possibility that the existing propeller data used in previous analyses was in error. The propeller calibration data used had been obtained from tests of a free propeller in a wind tunnel in the ACV Laboratory.

Since the determination of the model overwater drag is a direct function of the propeller calibration, it was decided to recalibrate the propellers on the model. This effort was labeled Task IV. The model was mounted in the annular tank and propeller thrusts were obtained as a function of forward speed, with and without forward obstructions such as surf fence, crane and MILVANS. The test results showed a significant difference from the calibration curves previously used, especially in the high speed condition (10,000 and 11,000 propeller rpm in the model).

The new calibrations were used to reduce the test results in Task III but not in Task II. Thus, the drag differences observed between these tasks is not entirely attributable to the effects of volute and stern seal modifications. In order to determine these actual differences, it is recommended that the Task II data be reduced using the latest propeller calibration. It is also recommended that future tests should be preceded by proper thrust calibration.

B. "Annular Tank Aero-Propulsive Tests of the Stretched Voyageur Model with a Simulated Exhaust System," Bell Aerospace Textron IR&D Report No. 7467-927019, November, 1976.

The stretched Voyageur model with hot exhaust system installed was tested in the annular tank facility in the ACV Laboratory at Wheatfield, New York. The purpose of the test was to obtain the effect of the exhaust system installation on propeller thrust and propeller thrust calibration for drag analysis of previously run overwater tests.

Three model configurations were tested. All included crane, MILVANS, and surf fence. The configurations tested were complete craft, complete craft with exhaust system and recommended strakes.

The test data indicates that the addition of exhaust ducting in front of the propeller has no noticeable effect on the static thrust when compared to the configuration with no ducts. Adding strakes to the exhaust duct however, results in a 3.4% thrust loss.

The test data also indicates that the installation of the exhaust system results in an increase in thrust at forward speeds when compared to test results for the basic stretched Voyaguer configuration. The increase in the thrust possibly could be attributed to a reduction in free stream velocity entering the propeller plane resulting in an increase in thrust for a constant blade rotational speed and blade angle.

It is recommended that the propeller calibration curve obtained for the stretched Voyageur model with exhaust system be used to reduce the test data from round-the-pole tests of a similar configuration. Considerable difficulty was experienced with the load measuring system. Therefore, it is suggested that a more improved system should be employed to obtain better accuracy and confidence in the final data.

C. "Lift System and Over Water Tests of the Stretched Voyageur Model with a Simulated Exhaust System," Bell Aerospace Textron IR&D Report No. 7467-927020, December, 1976.

The stretched Voyageur model with exhaust collector ducts installed was tested in the cushion flow rig and square water tank in the ACV Laboratory. The purpose of these tests was to determine the influence of the exhaust duct on lift system performance and aerodynamic drag. Tests were performed for a simlated gross weight of 115,000 pounds and lift fan speed of 945 RPM.

Test Analysis indicated that the exhaust duct installation had a negligible effect on total cushion flow, but increased aerodynamic drag and reduced craft over-water speed.

D. "Static Tests of the Stretched Voyageur Model with Fan Plenum Feed Holes for Air Management System Supply," Bell Aerospace Textron IR&D Report No. 7467-927021, December, 1976.

The stretched Voyageur model with plenum box installed on the deck to bleed air from the lift fan plenum was tested on the static test table and cushion flow rig in the ACV Laboratory. The purpose of these tests was to investigate the feasibility of using this source of pressurized air for engine breathing and/or oil cooling by determining the effect of plenum bleed on the vehicle static performance. Tests were performed on the static test table for gross weights of 115,000, 90,000 and 70,000 pounds and lift fan speeds of 945, 845, and 696 RPM. Tests were performed in the cushion flow rig for the same lift fan speeds for gross weights of 115,000 and 100,000 pounds.

Test analysis indicated that the lift fan has the capacity to provide the plenum feed flows of up to 32,000 CFM with no apparent degradation in vehicle static performance.

Test results from the cushion flow rig are in good agreement with lift system performance predictions obtained from an IBM computer program. The verification of this computer program enhances its use in determining lift system performance of future LACV-class craft.

E. "Comparison of Measured and Predicted Hover Performance of LACV-30 Vehicles at BATNFO," Bell Aerospace Textron IR&D Report No. 7467-928022, December 1976.

The purpose of the 1976 IR&D program was to perform full scale craft tests, evaluate the test results and correlate them with model test data. The initial task in the program was to perform hover tests of the full scale LACV-30-1 and LACV-30-2 vehicles at the Bell Aerospace Flight Test Facility in Wheatfield, New York.

The most extensive testing was performed on the LACV-30-1 where data was obtained for corrected gross weights of 83,678, 94,320 and 116,000 pounds. The lift fan speeds tested ranged from 930 to 980 RPM. All test data were corrected to standard day conditions for correlation and comparison. Instrumentation problems voided the test results obtained from the 83,678 pound gross weight condition. The LACV-30-2 test was performed for a corrected gross weight of 93,820 pounds and corrected lift fan speeds of 845, 907, and 955 RPM.

Analysis of the full scale test results indicate that the LACV-30 has a larger than predicted cushion footprint area with a corresponding reduction in cushion pressure.

The peripheral bag pressures measured in the tests were compared to predicted values obtained from a computer model of the lift system. The increased custion area was used to calculate the predicted values. The use of immediate side deck pressure adjacent to the lift fan discharge area provided the best correlation to predicted values. A complete set of updated lift system performance predictions based upon the measured cushion area is included in this report.

The LACV-30 vehicle exhibited the same characteristic drop in bow bag pressure as seen on the Voyageur (002) craft; however, it appears that the addition of the stretch section resulted in a larger pressure drop from stern to bow bag pressure. The results of the 1/7.5 stretched Voyageur model tests indicated a negligible difference in peripheral bag pressure.

It is recommended that a continual monitoring of full scale data from the LACV-30 and Voyageur vehicles be performed and the results incorporated into the computer lift system model for future design considerations.

F. "Stretched Voyageur Model Testing Pitch and Roll Stiffness Tests," Bell Aerospace Textron Report No. 7467-928005, December, 1976.

The stretched Voyageur model was used to determine the pitch and roll stiffness characteristics for LACV class craft at simulated gross weights of 105,000 and 90,000 pounds. The data was obtained to expand available model test data for use in evaluation of full scale test results. Previous model testing had been limited to determination of attitude stiffness for a simulated design gross weight of 115,000 pounds.

Test results indicate that the pitch and roll stiffnes at low angles do not vary with vehicle gross weight. A pitch stiffness value of 2.4% L_c/deg was calculated for the -1 to +1 degree pitch range for all three gross weights tested. A roll stiffness value of 1.1% B_c/deg was calculated for the -2 to +2 degree roll range for all three gross weights tested.

AD-A053 686 BELL AEROSPACE TEXTRON BUFFALO N Y F/G 1/3

PILOT MODEL AIR CUSHION VEHICLE (LACV-30) PROGRAM.(U)

FEB 78 R P KAISER DAAK02-75-C-0149

UNCLASSIFIED 7467-928010 NL

2 OF 2

ADA 053686

SUPPLEMENTARY INFORMATION

END

DATE FILMED

12-78

DDC

SUPPLEMENTARY

INFORMATION

AD-A053686

Bell Aerospace TEXTRON

22 May 1978

Division of Textron Inc.

8:443

Post Office Box One
Buffalo, New York 14240
716/297-1000

Defense Documentation Center
Defense Supply Agency
Cameron Station
Alexandria, Virginia 22314

Subject: Contract DAAK02-75-C-0149
Final Report - SDRL Sequence Item BOOD

The final report required under the subject contract was shipped under DD 250 dated 78 April 12, P/S No. W8-20132. The attached Errata Sheet is transmitted for inclusion in the report as indicated.

R. E. Gardner

R. E. Gardner
Contracts Management

REG/b

Attach: 12 Copies

ERRATA

"Pilot Model Air Cushion Vehicle (LACV-30) Program,"
Report No. 7467-928010

Page 1. Contractual item 6 should be Report No. 7467-928008, instead of 7467-928009.

Page 9. Paragraph F. report title should be "Performance of the LACV-30 Air Management System Modified Configuration."