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SCIENTIFIC AND TECHNICAL INFORMATION OUTPUT
of the Langley Research Center
FOR CALENDAR YEAR 1976
PREFACE

This document contains a listing of the Scientific and Technical Information that the Langley Research Center has been responsible for producing during the calendar year of 1976. Included in this listing are NASA Technical Reports, Technical Notes, Technical Memorandums, Special Publications, Contractor Reports, Journal Articles, and Technical Presentations made at Society meetings. NASA formal reports included in this listing are those that have been mailed and distributed to the ultimate user. In selecting Journal Articles, only those articles which were published in a Journal during the past calendar year are included. Similarly, material presented at Society meetings was presented during the calendar year 1976.

The material presented here is listed first by Division and then under the following headings: (a) Formal Reports, (b) Contractor Reports, (c) Articles and Meeting Presentations, and (d) High Number Technical Memorandums (High TM X's). Under each heading, the material is listed by authors in alphabetical order. If a report has more than one author and these authors are from different Divisions, the report is listed only once, under the senior author's name.

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II. PUBLICATIONS FOR INSTRUMENT RESEARCH DIVISION

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IV. PUBLICATIONS FOR FLIGHT INSTRUMENTATION DIVISION

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B. Contractor Reports


15. Harwit, Martin; Swift, Roderick; Wattson, Richard; Decker, John; and Paganetti, Ralph: Development and Evaluation of a Hadamard Transform Imaging Spectrometer and a Hadamard Transform Thermal Imager. NASA CR-145036 (NAS1-12690 American Science and Engineering, Inc.)


C. Articles and Meeting Presentations


D. High Number Technical Memorandums


V. PUBLICATIONS FOR ACOUSTICS AND NOISE REDUCTION DIVISION

A. Formal Reports


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11. Lumsdaine, Edward; Cherng, Jenn G.; and Tag, Ismail: Noise Suppression With High Mach Number Inlets. NASA CR-2708, 1976. (NSG-1081 University of Tennessee)


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VI. PUBLICATIONS FOR STRUCTURES AND DYNAMICS DIVISION

A. Formal Reports


B. Contractor Reports


C. Articles and Meeting Presentations


28. Mei, Chuh; and Rogers, James L., Jr.: Application of NASTRAN to Large Deflection Supersonic Flutter of Panels. Presented at the Fifth NASTRAN Users' Colloquium, October 1976.


D. High Number Technical Memorandums


VII. PUBLICATIONS FOR MATERIALS DIVISION

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26. Rice, Richard C.; and Reynolcs, J. L.: Compilation of Fatigue, Fatigue-Crack-
Propagation, and Fracture Data for 2024 and 7075 Aluminum, Ti-6Al-4V Titanium, 
and 300M Steel — Volume I: Description of Data and Data Storage on Magnetic 
Tape. NASA CR-144982, 1976. (NAS1-13358 Battelle Memorial Institute)

27. Sharpe, W. N., Jr.: Development and Application of an Interferometric System for 
State University)

28. Sloecklin, Robert L.: Development, Manufacturing, and Test of Graphite-Epoxy Com-
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1976. (NAS1-11668 Boeing Commercial Airplane Company)

Webber, M. J.; Bulson, R. W.; and Nehrich, J. W.: Study of Improved Resins for 
Advanced Supersonic Technology Composites: Part I. Heteroaromatic Polymers 
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C. Articles and Meeting Presentations

1. Bales, Thomas T.; Hoffman, Edward L.; Payne, Lee; and Carter, Alan L.: 
Fabrication and Evaluation of Advanced Titanium and Composite Structural Panels. 
Presented at the Supersonic Cruise Aircraft Technology Conference, November 
1976.

2. Bales, Thomas T.; Wiant, H. Ross; and Royster, Dick M.: Brazed Borsic Aluminum 


4. Bell, Vernon L.; Stump, Billy L.; and Gager, Helen: Polymide Structure-Property 
Relationships. II. Polymers From Isomeric Diamines. Journal of Polymer 


33. St. Clair, Anne K.; and Bell, Vernon L.: Crosslinked Polyphenylquinoxalines Containing 3,3',4,4'-Tetraaminodiphenylmethane. Presented at the 28th Annual Southeast Regional Meeting of the American Chemical Society, October 1976.


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VIII. PUBLICATIONS FOR AERONAUTICAL SYSTEMS DIVISION

A. Formal Reports


B. Contractor Reports


33. Anon.: Study of the Potentials for Improving the Efficiency and Economics of Liquid Hydrogen Produced From Coal. NASA CR-145077, 1976. (NAS1-14120 The Linde Division of Union Carbide)


C. Articles and Meeting Presentations


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6. Jernell, Lloyd S.: Development of Two Supercritical Airfoils With a Thickness-to-Chord Ratio of 0.20 and Design Lift Coefficients of 0.3 and 0.4. NASA TM X-73948, 1976.


IX. PUBLICATIONS FOR FLIGHT RESEARCH DIVISION

A. Formal Reports


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18. White, Samuel, Jr.: Safety Considerations for the RSRA. Presented at the American Society of Safety Engineers Meeting, November 1976.

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X. PUBLICATIONS FOR HIGH-SPEED AERODYNAMICS DIVISION

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C. Articles and Meeting Presentations


34. Putnam, Lawrence E.: Favorable Interference Effects Due to Over the Wing Blowing. Presented at the Ad Hoc Aircraft Fuel Conservation Committee Meeting, February 1976.


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XI. PUBLICATIONS FOR SUBSONIC-TRANSONIC AERODYNAMICS DIVISION

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D. High Number Technical Memorandums

2. Allison, Dennis O.: Shockless Airfoils With Thicknesses of 20.6 and 20.7 Percent Chord Analytically Designed for a Mach Number of 0.68 and a Lift Coefficient of 0.40. NASA TM X-73917, 1976.


11. Haut, Richard C.; and Adcock, Jerry B.: Prandtl-Meyer Flow Tables for Parahydrogen at Total Temperatures From 30K to 290K and for Nitrogen at Total Temperatures From 100K to 300K at Total Pressures From 1 ATM to 10 ATM. NASA TM X-73932, 1976.


XII. PUBLICATIONS FOR ENVIRONMENTAL AND SPACE SCIENCES DIVISION

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XIII. PUBLICATIONS FOR ATMOSPHERIC ENVIRONMENTAL SCIENCES DIVISION

A. Formal Reports


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XIV. PUBLICATIONS FOR SPACE SYSTEMS DIVISION

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7. Miller, Charles G., III; and Wilder, Sue E.: Table and Charts of Equilibrium Normal-Shock Properties for Pure Hydrogen With Velocities to 70 km sec. NASA SP-3087 (Revised), 1976.


12. Moore, John A.: Description and Operating Performance of a Parallel-Rail Electric-
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13. Powell, Richard W.; Stone, Howard W.; and Rowell, Lawrence F.: Effects of Modifi-
cations to the Space Shuttle Entry Guidance and Control Systems. NASA TN

14. Simmonds, Ann L.; Miller, Charles G., III; and Nealy, John E.: Tables and Charts
of Equilibrium Thermodynamic Properties of Ammonia for Temperatures
From 500 to 50 000 K. NASA SP-3099, 1976.


16. Throckmorton, David A.: Effect of a Surface-to-Gap Temperature Discontinuity on
the Heat Transfer to Reusable Surface Insulation Tile Gaps. NASA TN D-8233,
1976.

17. Zoby, Ernest V.; Gnoffo, Peter A.; and Graves, Randolph A., Jr.: Correlations for
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B. Contractor Reports

1. Bolz, Charles W., Jr.: An Algorithm for Selecting a Radiation Transport Subgrid
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2. Buseman, Adolph; Vinh, Nguyen X.; and Culp, Robert D.: Solution of the Exact Equa-
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3. Marconi, Frank; Salas, Manuel; and Yaeger, Larry: Development of a Computer
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(NAS1-11525 Grumman Aerospace Corporation)

4. Marconi, Frank; and Yaeger, Larry: Development of a Computer Code for Calculat-
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Aerospace Corporation)


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9. Hearth, Donald P.: Panel Discussion "Where Do We Go From Here?" Presented at the American Association for the Advancement of Science Annual "Viking Mars Science Experiments Expectations" Symposium, February 1976.


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XIX. PUBLICATIONS FOR OFFICE OF DIRECTOR FOR ELECTRONICS

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XXVI. PUBLICATIONS FOR PROJECTS GROUP

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7. DiBattista, John D.: Long Duration Exposure Facility -- A New Capability for Space
Testing and Basic Research. Presented at the XXVIIIth International Astronautical
Congress, October 1976.

8. DiBattista, John D.: Low Duration Exposure Facility. Presented at the UCLA

of Tennessee Space Institute Short Course on "Space Shuttle Applications and

10. Kinard, William H.: The Long Duration Exposure Facility -- A Multipurpose Free-
Flying Experiment Carrier. Presented at the International Meeting on Utilization
of Space Shuttle and Spacelab, June 1976.

Experiment Carrier. Published in RAUMFAHRTFORSCHUNG, 1976.

12. Leiss, Abraham: The NASA DOD Scout Launch Vehicle. Presented at the University
of Pittsburgh Mechanical Engineering Department Seminar, March 1976.

Efficient Transport Aircraft. Presented at the SAE 1976 Aerospace Engineering
and Manufacturing Meeting, November 1976.

D. High Number Technical Memorandums

No high number technical memorandums.