

EDITOR-IN-CHIEF

LEO STEG, General Electric Company

ASSOCIATE TECHNICAL EDITOR

IRVIN GLASSMAN, Princeton University

ASSOCIATE EDITORS

HOLT ASHLEY, Massachusetts Institute of Technology
WALTER G. BERL, Applied Physics Laboratory
HANS H. BLEICH, Columbia University
ARTHUR E. BRYSON JR., Harvard University
BERNARD BUDIANSKY, Harvard University
ALFRED M. FREUDENTHAL, Columbia University
ROBERT G. JAHN, Princeton University
IGOR JURKEVICH, General Electric Company
PAUL A. LIBBY, Polytechnic Institute of Brooklyn
CHARLES J. MUNDO JR., Institute for Defense Analyses
B. H. PAIEWONSKY, Aeronautical Research Associates of Princeton
EDWIN L. RESLER, Cornell University
MAURICE H. SMITH, Princeton University

DIRECTOR OF PUBLICATIONS SERVICES

Irwin Hersey

MANAGING EDITOR

Ruth F. Bryans

SENIOR EDITORIAL ASSISTANTS

Norma Herrin
Carol Rubenstein

EDITORIAL ASSISTANTS

Dolores Amir
Susan Gritz
Milica Jovanovich
Susan McGrath

Scope of AIAA Journal

This Journal is devoted to the advancement of astronautics and aeronautics through the dissemination of original papers disclosing new scientific knowledge and basic applications of such knowledge. The sciences of astronautics and aeronautics are understood here to embrace selected aspects of jet and rocket propulsion, flight mechanics, astrodynamics, aerodynamics, flight guidance, space communications, atmospheric and outer space physics, materials and structures, human engineering, over-all system analysis, and possibly certain other scientific areas. The selection of papers to be printed will be governed by the pertinence of the topic to the field of astronautics and aeronautics, by the current or probable future significance of the research, and by the importance of distributing the information to the members of the Society and to the profession at large.

Submission of Manuscripts

Submit manuscripts in triplicate (original plus two carbons) with three sets of illustrations and covering letter to the Managing Editor, AIAA Journal, 500 Fifth Avenue, New York 36, N. Y. See July 1963 issue for detailed instructions.

Publication Charges

Author's institutions will be requested to pay a publication charge of \$40 per page, with a minimum of \$40 per Note or Comment which, if honored, entitles them to 100 free reprints. Instructions will be sent with galley proofs.

Acknowledgments

Publication of AIAA Journal is being accomplished with the cooperation and financial assistance of the National Science Foundation and National Aeronautics and Space Administration.

AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, 500 Fifth Avenue, New York 36, N. Y.

Area Code 212 PE 6-6845

OFFICERS

President

W. H. PICKERING

Vice-Presidents

Publications: MARTIN SUMMERFIELD

Technical Activities: HAROLD T. LUSKIN

Section Affairs: CHARLES TILGNER JR.

Executive Secretary

S. PAUL JOHNSTON

Deputy Executive Secretary

JAMES J. HARFORD

Secretary

ROBERT R. DEXTER

Treasurer

R. DIXON SPEAS

Counsel

ALLAN D. EMIL

ANDREW G. HALEY

BOARD OF DIRECTORS (Terms expire in January of year indicated)

Technical Directors

ERNST STUHLINGER (1966)
GEORGE SCHAIRER (1966)
SAMUEL HERRICK (1965)
R. L. BISPLINGHOFF (1965)
ROBERT W. BUSSARD (1964)
ALFRED J. EGGERS JR. (1964)

Directors-at-Large

W. R. SEARS (1966)
HOWARD S. SEIFERT (1966)
ARTHUR E. RAYMOND (1965)
ARTHUR KANTROWITZ (1965)
HALL HIBBARD (1963)
ROBERT A. GROSS (1964)
L. EUGENE ROOT (1965)

Regional Directors

HILLIARD W. PAIGE (1966)
COURTLAND D. PERKINS (1966)
JOSEPH WIGGINS (1966)
FRANK A. CLEVELAND II (1966)
MAURICE J. ZUCROW (1966)
E. J. MANGANIELLO (1966)
JOHN F. TORMEY (1966)
MARTIN GOLAND (1966)
PAUL M. LELAND (1966)
WILLIAM J. CECKA JR. (1966)
DONALD P. GERMERAD (1966)
NORMAN FISHMAN (1966)

TECHNICAL COMMITTEES AND CHAIRMEN

SPACE AND ATMOSPHERIC PHYSICS: Francis S. Johnson, *Southwest Center for Advanced Studies*

ATMOSPHERIC ENVIRONMENT: Herbert Riehl, *Colorado State University*

FLUID DYNAMICS: Ronald F. Probst, *Massachusetts Institute of Technology*

PLASMA DYNAMICS: Daniel Bershader, *Stanford University*

ATMOSPHERIC FLIGHT MECHANICS: Charles J. Donlan, *NASA Langley Research Center*

ASTRODYNAMICS: Robert M. L. Baker Jr., *Lockheed-California Company*

THERMOPHYSICS: R. E. Gaumer, *Lockheed Missiles and Space Company*

PROPELLANTS AND COMBUSTION: Stanford S. Penner, *Institute for Defense Analyses*

ELECTRIC POWER SYSTEMS: George C. Szego, *Institute for Defense Analyses*

ELECTRIC PROPULSION: John M. Teem, *Electro-Optical Systems, Inc.*

LIQUID ROCKETS: A. O. Tischler, *NASA Office of Manned Space Flight*

SOLID ROCKETS: Edward W. Price, *U. S. Naval Ordnance Test Station*

AIR BREATHING PROPULSION: William H. Sens, *Pratt & Whitney Aircraft*

NUCLEAR PROPULSION: Robert Fox, *Institute for Defense Analyses*

UNDERWATER PROPULSION: Leonard Greiner, *Texaco-Experiment, Inc.*

COMMUNICATIONS: Sidney Metzger, *RCA Surface Communications Division*

INSTRUMENTATION: Max A. Lowy, *Gulton Industries*

GUIDANCE AND CONTROL: Robert C. Langford, *Aerospace Group, General Precision, Inc.*

STRUCTURAL DYNAMICS: William R. Laidlaw, *Space and Information Systems Division, North American Aviation, Inc.*

STRUCTURES: Richard R. Heldenfels, *NASA Langley Research Center*

MATERIALS: Morris A. Steinberg, *Lockheed Missiles and Space Company*

AIRCRAFT DESIGN: Conrad A. Lau, *Ling-Temco-Vought*

AIRCRAFT OPERATIONS: William Littlewood, *American Airlines*

SPACECRAFT: Clifford I. Cummings, *Jet Propulsion Laboratory*

ENTRY VEHICLES: Mac C. Adams, *Avco-RAD*

LAUNCH VEHICLES AND MISSILES: Maxwell W. Hunter II, *National Aeronautics and Space Council*

MARINE SYSTEMS: Ernest G. Stout, *Lockheed Aircraft Corporation*

FLIGHT TESTING: Scott Crossfield, *North American Aviation, Inc.*

GROUND TESTING: Bernard H. Goethert, *ARO, Inc.*

GROUND SUPPORT EQUIPMENT: Prentice B. Peabody, *Air Force Ballistic Systems Division*

RELIABILITY AND MAINTAINABILITY: John de S. Coutinho, *Grumman Aircraft Engineering Company*

LIFE SCIENCES AND SYSTEMS: William M. Helvey, *Republic Aviation Corporation*

MANAGEMENT: Sidney Sternberg, *RCA Astro-Electronics Division*

SPACE LAW: Andrew G. Haley, *Haley, Bader and Potts*