

# 4TH INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE

The six-digit number listed with each paper is used in the indexing system developed for the IECEC. These papers are included in a cumulative index at the back of this book.

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**Tuesday**  
8:30 A.M.—12:00 Noon  
Ballroom

## **DYNAMIC CYCLES—RANKINE**

### Part I

**A. W. Adam, Chairman**  
Sundstrand Aviation  
Rockford, Illinois

### **Organic Rankine Cycle System with Reciprocating Engine**

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D. T. MORGAN, E. F. DOYLE AND S. KITRILAKIS,  
THERMO ELECTRON CORPORATION, WALTHAM, MASSACHUSETTS

### **Jet Condenser Development for an Organic Rankine Cycle Power Conversion System**

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R. GARCIA, AEROJET-GENERAL CORPORATION,  
AZUSA, CALIFORNIA

### **Design of a Practical Hydrocarbon Boiler**

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J. P. NORTON, AMERICAN AIR FILTER COMPANY, INC.,  
ST. LOUIS, MISSOURI

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**Tuesday**  
8:30 A.M.—12:00 Noon  
Congressional Room

## **SPACE POWER**

### Part I

**H. H. Greenfield, Chairman**  
Lockheed Missiles and  
Space Company  
Sunnyvale, California

### **Computer Analysis of Space Power Systems for Mission Analysis**

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R. D. ARNO, (SPEAKER) NASA, AMES RESEARCH  
CENTER, MOFFETT FIELD, CALIFORNIA

### **Computer Simulation of Satellite Electric Power Systems**

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P. BAUER, TRW SYSTEMS, INC., REDONDO BEACH,  
CALIFORNIA

### **Performance Analysis of Satellite Electric Power Systems by Computer Simulation**

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M. SCHWARTZBURG, TRW SYSTEMS, INC., REDONDO  
BEACH, CALIFORNIA

### **Solar Cell Power Systems for Manned Space Stations**

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H. WEINER, MCDONNELL DOUGLAS ASTRONAUTICS,  
SANTA MONICA, CALIFORNIA

### **Optimization of Battery Systems for Earth Satellite Lifetimes of Greater than 5 Years**

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M. KOSLOVER, TRW SYSTEMS, INC., REDONDO  
BEACH, CALIFORNIA

### **Power Systems for the Apollo Applications Program**

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D. L. DAUBERT (SPEAKER), W. H. GROSS, MARTIN  
MARIETTA CORPORATION, DENVER, COLORADO, C. B.  
GRAFF, NASA MARSHALL SPACE FLIGHT CENTER,  
HUNTSVILLE, ALABAMA, AND J. D. MURRELL,  
MANNED SPACECRAFT CENTER, HOUSTON, TEXAS

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**Tuesday**  
8:30 A.M.—12:00 Noon  
Senate Room

## **BIOMEDICAL POWER**

### Part I

**L. T. Harmison, Chairman**  
National Heart Institute  
Bethesda, Maryland

**W. R. Martini, CoChairman**  
Donald W. Douglas Laboratories  
Richland, Washington

### **Energy System for a Heart Assist Device**

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P. M. NEWGARD AND G. J. EILERS, STANFORD  
RESEARCH INSTITUTE, MENLO PARK, CALIFORNIA

## Energy Transmission Through Intact Skin

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L. A. HEIMLICH AND F. H. CHRISTIANSEN, HAMILTON STANDARD DIVISION OF UNITED AIRCRAFT CORPORATION, FARMINGTON, CONNECTICUT, AND T. SATO, YALE UNIVERSITY, MEDICAL SCHOOL, NEW HAVEN, CONNECTICUT

## Electromechanical Energy Conversion for Artificial Hearts—A New Concept Utilizing a Nutating Motor

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W. S. KELLY AND R. D. CROSIER, BATTTELLE NORTHWEST, RICHLAND, WASHINGTON

## Nuclear Electric Power Sources for Biomedical Applications

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D. E. KNAPP (SPEAKER), A. BENNETT, J. G. DEStESSE, L. C. OLSEN, E. W. SAASKI, B. I. GRIFFIN, K. A. GASPER, DONALD W. DOUGLAS LABORATORIES, RICHLAND, WASHINGTON

## Development of an Implantable Artificial Heat Power Source Employing a Thermocompressor

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W. R. MARTINI, DONALD W. DOUGLAS LABORATORIES, RICHLAND, WASHINGTON

## Development of a Stirling Cycle Power System for Artificial Hearts

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K. BUCK, AEROJET-GENERAL CORPORATION, SAN RAMON, CALIFORNIA

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Tuesday  
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Federal Room

## THERMIONIC POWER

Part I

R. F. Mather, *Chairman*  
NASA—Lewis Research Center  
Cleveland, Ohio

### Thermionic Reactor Concepts

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D. S. BEARD AND L. K. PRICE, U.S. ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.

### Thermionic Fuel Element Development

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L. K. PRICE AND D. S. BEARD, U.S. ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.

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B. DEVIN, COMMISSARIAT A L'ENERGIE ATOMIQUE, SACLAY, FRANCE

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## NUCLEAR POWER AND HYBRIDS

M. Steinberg, *Chairman*  
Brookhaven National Laboratory  
Upton, New York

### SNAP-21 10-Watt Thermoelectric Power System

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F. K. FOX (SPEAKER) AND L. R. NIENDORF, 3M COMPANY, ROSEVILLE, MINNESOTA

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A. PITROLO (SPEAKER) AND J. LEONARD, GENERAL ELECTRIC COMPANY, PHILADELPHIA, PENNSYLVANIA

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M. STEINBERG (SPEAKER) J. POWELL AND B. MANOWITZ, BROOKHAVEN NATIONAL LABORATORY, UPTON, NEW YORK

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Tuesday  
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Ballroom

## DYNAMIC CYCLES—RANKINE

Part II

A. W. Adam, *Chairman*  
Sundstrand Aviation  
Rockford, Illinois

### Effect of Pressure Ratio on the Performance of Supersonic Turbine-Nozzles

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R. E. BARBER, BARBER-NICHOLS ENGINEERING COMPANY, ARVADA, COLORADO

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A. V. PRADHAN, PESCO PRODUCTS, BEDFORD, OHIO

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P. F. SWENSON, Jr., SWENSON RESEARCH INC., BEDFORD HEIGHTS, OHIO, AND E. N. POULOS, PROTHERM RESEARCH LABS, INC., CLEVELAND, OHIO

## Design of Vapor Turbines Including Effects of Supersaturation

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K. E. BOYD, (SPEAKER), E. A. MOCK, AND R. A. RACKLEY, AIRESEARCH MANUFACTURING COMPANY, PHOENIX, ARIZONA

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P. TAUSON, WESTINGHOUSE ASTRONUCLEAR LABORATORY, PITTSBURGH, PENNSYLVANIA

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Congressional Room

## SPACE POWER

Part II

H. H. Greenfield, *Chairman*  
Lockheed Missiles and  
Space Company  
Sunnyvale, California

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M. SWERDLING, JET PROPULSION LABORATORY, PASADENA, CALIFORNIA

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J. D. GYLFE, R. A. JOHNSON, ATOMICS INTERNATIONAL, CANOGA PARK, CALIFORNIA, R. A. DUVAL, U.S. ATOMIC ENERGY COMMISSION, GERMANTOWN, MARYLAND, AND L. W. BRANTLEY, NASA-MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALABAMA

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W. RUEHLE (SPEAKER) AND D. L. FORREST, AEROJET-GENERAL CORPORATION, SAN RAMON, CALIFORNIA

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Senate Room

## BIOMEDICAL POWER

Part II

L. T. Harmison, *Chairman*  
National Heart Institute  
Bethesda, Maryland

R. F. Drake, *CoChairman*  
American Hospital Supply  
Corporation  
Everett, Massachusetts

## The New Mercuric Oxide-Cadmium (MERCAD<sup>®</sup>) Battery System for Medical and Implantation Applications

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M. EISENBERG, ELECTROCHIMICA CORPORATION, MENLO PARK, CALIFORNIA

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R. P. HAMLIN, E. G. SIWEK, G. RAMPPEL, L. D. WECHSLER AND J. ZAMPINI, GENERAL ELECTRIC COMPANY, SCHENECTADY, NEW YORK

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A. J. APPLEBY, D. Y. C. NG, INSTITUTE OF GAS TECHNOLOGY, CHICAGO, ILLINOIS, S. K. WOLFSON, JR., MICHAEL REESE HOSPITAL MEDICAL CENTER, CHICAGO, ILLINOIS, AND H. WEINSTEIN, ILLINOIS INSTITUTE OF TECHNOLOGY, CHICAGO, ILLINOIS

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Federal Room

## THERMIONIC POWER

Part II

R. F. Mather, *Chairman*  
NASA—Lewis Research Center  
Cleveland, Ohio

**Present Status of Developments of Thermionic Diodes and Thermionic Reactors in the Federal Republic of Germany**

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KLAUS EINFELD, INTERATOM, COLOGNE, WEST GERMANY

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J. KRAMAR, RESEARCH INSTITUTE OF ELECTRICAL ENGINEERING, BECHOVICE, CZECHOSLOVAKIA

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L. Topper, *Chairman*  
US Atomic Energy Commission  
Washington, D.C.

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R. E. BERLIN, L. H. GNAU AND R. S. NELSON, RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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M. L. PAQUIN, THERMO ELECTRON CORPORATION, WALTHAM, MASSACHUSETTS

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A. HERCHAKOWSKI, ELECTRONICS COMPONENTS LABORATORY, FORT MONMOUTH, NEW JERSEY

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P. ROUKLOVE AND V. TRUSCELLO, JET PROPULSION LABORATORY, PASADENA, CALIFORNIA

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Congressional Room

**DYNAMIC CYCLES—RANKINE**

Part III

A. W. Adam, *Chairman*  
Sundstrand Aviation  
Rockford, Illinois

**An Organic Rankine Power System for Manned Space Applications**

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A. M. TAYLOR, AND S. D. DIAMOND, MCDONNELL-DOUGLAS ASTRONAUTICS COMPANY, SANTA MONICA, CALIFORNIA

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J. H. VAN OSDOL (SPEAKER), R. F. WILSON, ATOMICS INTERNATIONAL, CANOGA PARK, CALIFORNIA, AND R. E. NIGGEMANN, SUNDSTRAND AVIATION, ROCKFORD, ILLINOIS

**Study of a 300 kWe Rankine Cycle Advanced Nuclear-Electric Space-Power System**

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J. A. HELLER (SPEAKER), T. A. MOSS AND G. J. BARNA, NASA-LEWIS RESEARCH CENTER, CLEVELAND, OHIO

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E. KAPLAN (SPEAKER) AND E. LODWIG, FAIRCHILD HILLER CORPORATION, BAY SHORE, NEW YORK.

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Senate Room

**SPACE POWER**

Part III

H. H. Greenfield, *Chairman*  
Lockheed Missiles and  
Space Company  
Sunnyvale, California

**Radioisotope Thermal Energy Sources for Space Station Integrated Life Support Systems**

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R. V. ELMS AND H. H. GREENFIELD, LOCKHEED MISSILES & SPACE COMPANY, SUNNYVALE, CALIFORNIA

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C. H. SHINBROT AND J. V. COGGI, MCDONNELL-DOUGLAS ASTRONAUTICS COMPANY, SANTA MONICA, CALIFORNIA

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E. J. STEEGER AND J. E. CRUVER, GULF GENERAL ATOMIC INC., SAN DIEGO, CALIFORNIA

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Part I

**E. Y. Weissman, Chairman**  
Globe Union, Inc.  
Milwaukee, Wisconsin

**New Low Temperature Batteries**

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N. T. WILBURN AND A. L. ALMERINI, U.S. ARMY ELECTRONICS COMMAND, FORT MONMOUTH, NEW JERSEY

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K. H. M. BRAEUER, U.S. ARMY ELECTRONICS COMMAND, FORT MONMOUTH, NEW JERSEY

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H. SHIMOTAKE, A. K. FISCHER AND E. J. CAIRNS, ARGONNE NATIONAL LABORATORY, ARGONNE, ILLINOIS

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J. R. MOSER (SPEAKER), H. J. GOLDSMITH AND R. L. BLUCHER, CATALYST RESEARCH CORPORATION, BALTIMORE, MARYLAND.

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Wednesday  
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South American Room

**PHOTOVOLTAIC POWER**

Part I

**W. R. Cherry, Chairman**  
NASA-Goddard  
Space Flight Center  
Greenbelt, Maryland

**Characteristics of GaAs Photovoltaic Diodes at Low Irradiance**

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R. KALIBJIAN AND K. MAYEDA, LAWRENCE RADIATION LABORATORY, LIVERMORE, CALIFORNIA

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K. L. KENNERUD, THE BOEING COMPANY, SEATTLE, WASHINGTON

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J. W. FAIRBANKS, NASA GODDARD SPACE FLIGHT CENTER, GREENBELT, MARYLAND

**The "Hot Spot" Failure Mode for Solar Arrays**

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F. A. BLAKE AND K. L. HANSON, GENERAL ELECTRIC COMPANY, KING OF PRUSSIA, PENNSYLVANIA

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W. LUFT AND E. MAIDEN, TRW SYSTEMS, INC., REDONDO BEACH, CALIFORNIA

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Wednesday  
2:00 P.M.-5:30 P.M.  
Gallery

**CHEMICAL AND PHYSICAL SYSTEMS**

**W. M. Crim, Jr., Chairman**  
U.S. Army Reactors Group  
Ft. Belvoir, Virginia

**A Demonstration of the Feasibility of All-Solid, Exothermic Reactions as Chemical Heat Sources Suitable for Spacecraft Thermal Control**

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R. W. RIEBLING, CALIFORNIA INSTITUTE OF TECHNOLOGY, PASADENA, CALIFORNIA

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C. H. WOLGEMUTH, PENNSYLVANIA STATE UNIVERSITY, UNIVERSITY PARK, PENNSYLVANIA

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R. RAMAKUMAR, H. J. ALLISON, W. L. HUGHES, AND K. A. MCCOLLOM, OKLAHOMA STATE UNIVERSITY, STILLWATER, OKLAHOMA

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O. E. BUXTON, JR., OHIO STATE UNIVERSITY, COLUMBUS, OHIO

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2:00 P.M.—5:30 P.M.  
Congressional Room

**DYNAMIC CYCLES—  
BRAYTON, STIRLING**

Part IV

**E. B. Zwick, Chairman**  
The Zwick Company  
Northridge, California

**Closed Brayton Cycle Power System Applications**

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A. PIETSCH (SPEAKER), AIRESEARCH MANUFACTURING COMPANY OF ARIZONA, PHOENIX, ARIZONA

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WILLIAM J. BROWN, LEWIS RESEARCH CENTER, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, CLEVELAND, OHIO

**Hot Performance Characteristics of a Gas-Bearing Brayton-Cycle Turboalternator**

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J. C. WOOD (SPEAKER), M. E. VALGORA AND H. B. TRYON, NASA—LEWIS RESEARCH CENTER, CLEVELAND, OHIO

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D. A. CANTONI AND R. L. THOMAS, NASA—LEWIS RESEARCH CENTER, CLEVELAND, OHIO

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C. E. LEACH (SPEAKER) AND B. C. FRYER, BATTELLE MEMORIAL INSTITUTE, RICHLAND, WASHINGTON

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Wednesday  
2:00 P.M.—5:30 P.M.  
Senate Room

**UNDERWATER POWER**

**J. H. Harrison, Chairman**  
Naval Ship Research and  
Development Laboratory  
Annapolis, Maryland

**Economic Selection of Undersea Powerplants**

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R. N. EDWARDS, J. A. HILL AND M. COHEN, GENERAL ELECTRIC COMPANY, PHILADELPHIA, PENNSYLVANIA

**A Long Lived Sea Water Battery**

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C. L. OPITZ, LOCKHEED ELECTRONICS COMPANY, PLAINFIELD, NEW JERSEY

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Wednesday  
2:00 P.M.—5:30 P.M.  
Federal Room

**ELECTROCHEMICAL POWER**

Part II

**D. Douglas, Chairman**  
Gould National Batteries  
Minneapolis, Minnesota

**Parametric Charge Studies for Aerospace Nickel-Cadmium Batteries**

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K. E. PREUSSE (SPEAKER), R. C. SHAIR, F. E. BETZ AND J. SYLVIA, GULTON INDUSTRIES, INC., METUCHEN, NEW JERSEY

**Electrical Characteristics of a Sealed Nickel-Cadmium Battery Having a Bipolar Construction**

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H. N. SEIGER (SPEAKER), S. CHARLIP AND S. LERNER, GULTON INDUSTRIES, INC., METUCHEN, NEW JERSEY

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W. VON HARTMANN, JET PROPULSION LABORATORY, PASADENA, CALIFORNIA

**Two Year Flight Performance of the Lockheed Type XI Nickel-Cadmium Battery**

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MICHAEL J. TERESA AND ROBERT E. CORBETT, LOCKHEED MISSILES & SPACE COMPANY, SUNNYVALE, CALIFORNIA

## PHOTOVOLTAIC POWER

### Part II

**W. R. Cherry, Chairman**  
NASA-Goddard Space Flight Center  
Greenbelt, Maryland

#### **Apollo Telescope Mount (ATM) Solar Cell Module Performance Testing**

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J. BRUNO, MARTIN-MARIETTA CORPORATION, DENVER, COLORADO

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D. J. CURTIN AND J. F. STOCKEL, COMMUNICATIONS SATELLITE CORPORATION, WASHINGTON, D.C.

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J. L. MILLER (SPEAKER), NASA, MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALABAMA, AND J. E. BORETZ, TRW SYSTEMS, INC., REDONDO BEACH, CALIFORNIA

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W. HASBACH (SPEAKER) AND M. SWERDLING, JET PROPULSION LABORATORY, PASADENA, CALIFORNIA

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P. A. DILLARD, TRW SYSTEMS, INC., REDONDO BEACH, CALIFORNIA

#### **Lightweight Large Area Solar Array**

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D. D. ABBOTT, THE BOEING COMPANY, SEATTLE, WASHINGTON

## TRANSPORTATION

### Part I

**F. A. Wyczalek, Chairman**  
GM Technical Center  
Warren, Michigan

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E. J. WARD AND K. L. LAWSON, OFFICE OF HIGH SPEED GROUND TRANSPORTATION, WASHINGTON, D.C.

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K. M. CHIRGWIN, C. H. LEE, J. G. KIMBALL AND P. J. LARSEN, AIRESEARCH MANUFACTURING COMPANY, TORRANCE, CALIFORNIA

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G. P. KALMAN (SPEAKER), D. IRANI AND A. U. SIMPSON, AIRESEARCH MANUFACTURING COMPANY, TORRANCE, CALIFORNIA

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## POWER CONDITIONING

### Part I

**F. J. Wrublewski, Chairman**  
U.S. Army Electronics Command  
Ft. Monmouth, New Jersey

#### **High Quality Electric Power Program**

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H. H. KAJIHARA, NAVAL CIVIL ENGINEERING LABORATORY, PORT HUENEME, CALIFORNIA

#### **Modularization of High Power Inverters and Converters**

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F. GOURASH (SPEAKER), NASA—LEWIS RESEARCH CENTER, CLEVELAND, OHIO, P. F. PITTMAN, WESTINGHOUSE RESEARCH LABORATORIES, PITTSBURGH, PENNSYLVANIA, AND J. F. HEINS, WESTINGHOUSE AEROSPACE, LIMA, OHIO

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A. SCHLOSS, JET PROPULSION LABORATORY, PASADENA, CALIFORNIA, AND P. GUTKNECHT, WESTINGHOUSE RESEARCH LABORATORIES, PITTSBURGH, PENNSYLVANIA

#### **Power Processing and Control for Military Manpack Fuel Cell Power Sources**

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W. B. KEMPLER AND M. E. CANNON, U.S. ARMY ELECTRONICS COMMAND, FORT MONMOUTH, NEW JERSEY

## **I KVA, Three-Phase DC-AC Inverter with Digital Control**

Page 854 699104

M. KNIGHT, U.S. NAVY, AND R. TORKILDSEN,  
GENERAL ELECTRIC, WEST LYNN, MASSACHUSETTS

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Thursday  
8:30 A.M.—12:00 Noon  
Senate Room

### **HEAT PIPES**

Part I

**W. E. Harbaugh, Chairman**  
RCA Electronic  
Components and Devices  
Lancaster, Pennsylvania

#### **Heat Pipe Thermionic Converter Research in Europe**

Page 861 699105

C. A. BUSSE, EURATOM CCR, ISPRA, ITALY

#### **The Heat Pipe—A Progress Report**

Page 873 699106

G. Y. EASTMAN, RCA, ELECTRONICS COMPONENTS  
AND DEVICES, LANCASTER, PENNSYLVANIA

#### **Heat Pipe Development for Thermionic Applications**

Page 879 699107

D. M. ERNST AND P. K. SHEFSIEK, RCA ELECTRONIC  
COMPONENTS AND DEVICES, LANCASTER, PENNSYL-  
VANIA

#### **Experimental Determination of Wick Properties for Heat Pipe Applications**

Page 888 699108

R. A. FREGGENS, RCA ELECTRONICS COMPONENTS  
AND DEVICES, LANCASTER, PENNSYLVANIA

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Thursday  
8:30 A.M.—12:00 Noon  
Federal Room

### **ELECTROCHEMICAL POWER**

Part III

**D. Pouli, Chairman**  
Allis-Chalmers  
Manufacturing Company  
Greendale, Wisconsin

#### **Development of New Materials of Construction for Fuel Cells**

Page 898 699110

R. R. SAYANO (SPEAKER), R. A. MENDELSON, M. E.  
KIRKPATRICK, E. T. SEO AND H. P. SILVERMAN,  
TRW SYSTEMS, INC., REDONDO BEACH, CALIFORNIA

#### **An Aluminum-Hydrogen Peroxide Power Source**

Page 904 699111

S. ZAROMB, ZAROMB RESEARCH CORPORATION,  
PASSAIC, NEW JERSEY

## **High Rate Performance of Zinc-Air Batteries**

Page 911 699112

N. I. PALMER (SPEAKER), B. E. JAGID AND F. J.  
STAUDINGER, LEESONA MOOS LABORATORIES, GREAT  
NECK, NEW YORK

## **Purge Dynamics of Fuel Cells**

Page 920 699113

S. S. SAREEN (SPEAKER) AND D. GIDASPOW, INSTI-  
TUTE OF GAS TECHNOLOGY, CHICAGO, ILLINOIS

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Thursday  
2:00 P.M.—5:30 P.M.  
Ballroom

### **TRANSPORTATION**

Part II

**P. D. Agarwal, Chairman**  
General Motors Research Labs  
Warren, Michigan

#### **Energy Conversion Devices in Ground Transportation**

Page 933 699115

G. G. LEETH, GENERAL ELECTRIC TEMPO, SANTA  
BARBARA, CALIFORNIA

#### **Energy Transformations in Tubeflight Propulsion**

Page 940 699116

J. V. FOA, RENSSELAER POLYTECHNIC INSTITUTE,  
TROY, NEW YORK

#### **Magnetically Suspended Trains for Very High Speed Transport**

Page 953 699118

J. R. POWELL (SPEAKER) AND G. T. DANBY, BROOK-  
HAVEN NATIONAL LABORATORY, UPTON, NEW YORK

#### **Linear Induction Motor for High Speed Ground Transportation**

Page 964 699119

T. C. WANG, NATIONAL TAIWAN UNIVERSITY, TAIPEI,  
CHINA

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Thursday  
2:00 P.M.—5:30 P.M.  
Congressional Room

### **POWER CONDITIONING**

Part II

**E. J. Levy, Chairman**  
Hughes Aircraft Corporation  
El Segundo, California

#### **Power Conditioning Development for the NASA SERT II Ion Thruster**

Page 975 699120

A. C. HOFFMAN, NASA LEWIS RESEARCH CENTER,  
CLEVELAND, OHIO, R. W. BRIGGS, S. F. BAUER, E.  
F. SWIDERSKI AND R. M. WEGER, WESTINGHOUSE  
ELECTRIC CORPORATION, LIMA, OHIO



**High Frequency Capabilities of a New Power Thyristor**

Page 987 699121

R. L. DAVIES, GENERAL ELECTRIC COMPANY, AUBURN, NEW YORK

**Ultra-Reliable Power Processor for Hydrocarbon-Air Fuel Cell Power Systems**

Page 992 699122

M. S. KOSMIN, U.S. ARMY ELECTRONICS COMMAND, FORT MONMOUTH, NEW JERSEY

**High Efficiency Boost Regulator Design for Planetary Spacecraft**

Page 1000 699123

D. J. HOPPER, JET PROPULSION LABORATORY, PASADENA, CALIFORNIA

**Tracking Solar Array Maximum Power by Sensing Array Temperature**

Page 1004 699124

M. SUSSMAN, NASA—LANGLEY RESEARCH CENTER, HAMPTON, VIRGINIA

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Thursday  
2:00 P.M.—5:30 P.M.  
Senate Room

**HEAT PIPES**

Part II

**J. E. Kemme, Chairman**  
Los Alamos Scientific Lab  
Los Alamos, New Mexico

**Development of an Advanced Space Radiator System**

Page 1010 699125

J. T. PETERS AND R. G. HANNAH, ISOTOPES, INC., MIDDLE RIVER, MARYLAND

**Avionic Application of a Heat Pipe**

Page 1016 699126

A. T. CALIMBAS (SPEAKER) AND R. H. HULETT, PHILCO-FORD CORPORATION, PALO ALTO, CALIFORNIA

**Experimental Performance of a Two-Liquid Heat Pipe**

Page 1025 699127

K. T. FELDMAN, JR., UNIVERSITY OF NEW MEXICO, ALBUQUERQUE, NEW MEXICO, G. L. WHITLOW AND J. D. KUSIANOVICH, ENERGY CONVERSION SYSTEMS, INC., ALBUQUERQUE, NEW MEXICO

**Heat Pipes for Temperature Control**

Page 1033 699128

W. BIENERT, DYNATHERM CORPORATION, COCKEYSVILLE, MARYLAND

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Thursday  
2:00 P.M.—5:30 P.M.  
Federal Room

**ELECTROCHEMICAL POWER**

Part IV

**E. Gillis, Chairman**  
U.S. Army Mobility Equipment  
Research and Development Center  
Ft. Belvoir, Virginia

**Economic High-Pressure Hydrogen-Oxygen Regenerative Fuel-Cell Systems**

Page 1042 699129

H. J. ALLISON, R. RAMAKUMAR AND W. L. HUGHES, OKLAHOMA STATE UNIVERSITY, STILLWATER, OKLAHOMA

**Ammonia-Air Fuel Cell System**

Page 1048 699130

P. L. TERRY (SPEAKER) AND O. J. ADLHART, ENGLAND INDUSTRIES, NEWARK, NEW JERSEY

**The Hydrazine-Air Bi Cell, A Simplified Fuel Cell System**

Page 1052 699131

J. PERRY, JR. AND L. J. ROGERS, U.S. ARMY ELECTRONICS COMMAND, FORT MONMOUTH, NEW JERSEY

**A Circulating Electrolyte Hydrogen/Air Fuel Cell System**

Page 1057 699132

C. G. CLOW AND J. G. BANNOCHIE, ENERGY CONVERSION LIMITED, BASINGSTOKE, ENGLAND

**High Power Density Fuel Cell**

Page 1065 699133

B. DURANTE (SPEAKER), U.S. AIR FORCE, WRIGHT-PATTERSON AIR FORCE BASE, OHIO, J. K. STEDMAN AND C. L. BUSHNELL, PRATT & WHITNEY AIRCRAFT, SOUTH WINDSOR, CONNECTICUT

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Friday  
8:30 A.M.—12:00 Noon  
Ballroom

**USER REQUIREMENTS**

Part I

**T. G. Kirkland, Chairman**  
U.S. Army Mobility Equipment  
Research and Development Center  
Ft. Belvoir, Virginia

**Strategies for a National Nuclear Engineering Program**

Page 1072 699135

CHAUNCEY STARR AND C. B. SMITH, UNIVERSITY OF CALIFORNIA, LOS ANGELES, CALIFORNIA

Papers presented in the Classified Sessions will be printed and distributed to usual recipients of AEC Space Power Programs Classified Reports. Others desiring copies should complete and process through proper approval channels AEC Form 277, "Request for Visit or Access Approval," indicating thereon the approved classified mailing address. Requests should be sent to Atomic Energy Commission Space Nuclear Systems Division, Washington, D.C. 20545, attention: Application and Requirements.

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Thursday  
9:00 A.M.—1:00 P.M.  
Institute for Defense Analyses

**CLASSIFIED**

Part I

**R. C. Hamilton, Chairman**  
Institute for Defense Analyses  
Arlington, Virginia

**J. D. Lafleur, CoChairman**  
Atomic Energy Commission  
Germantown, Maryland

**A—GENERAL**

**Advanced Energy Conversion Technology in the USSR**

B. A. BENTSEN AND M. C. DAVIS, AIR FORCE SYSTEMS COMMAND, WRIGHT PATTERSON AIR FORCE BASE, OHIO

**Projected Military Space Electric Power Requirements**

R. H. BRICELAND, INSTITUTE FOR DEFENSE ANALYSES, ARLINGTON, VIRGINIA AND E. D. HARNEY, U.S. AIR FORCE, RETIRED

**B—RADIOISOTOPE HEAT SOURCES**

**Pu<sup>238</sup> O<sub>2</sub> Composite Fuel Form**

W. M. PARDUE, BATTELLE MEMORIAL INSTITUTE, COLUMBUS, OHIO.

**C—THERMOELECTRIC**

**L. Topper, Chairman**  
Atomic Energy Commission  
Germantown, Maryland

**Compact Thermoelectric Converter Program**

D. ROBERTS, WESTINGHOUSE ELECTRIC CORPORATION, PITTSBURGH, PENNSYLVANIA

**Metallurgical Process Employed in Fabricating Small Pb-Te/Pb-Sn/Mn-Te Thermoelectric Elements**

M. B. ELSNER AND M. EMKEN, GULF GENERAL ATOMIC, SAN DIEGO, CALIFORNIA

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Thursday  
2:15 P.M.—4:30 P.M.  
Institute for Defense Analyses

**CLASSIFIED**

Part II

**R. C. Hamilton, Chairman**  
Institute for Defense Analyses  
Arlington, Virginia

**J. D. Lafleur, CoChairman**  
Atomic Energy Commission  
Germantown, Maryland

**D—THERMIONICS**

**D. S. Beard, Chairman**  
Atomic Energy Commission  
Germantown, Maryland

**ZrHx Thermionic Space Power Supplies**

R. C. ANDERSON, T. G. FRANK AND E. W. SALMI, LOS ALAMOS SCIENTIFIC LABORATORY, LOS ALAMOS, NEW MEXICO

**Thermionic Reactor System Development**

J. W. HOLLAND AND W. G. HOMEYER, GULF GENERAL ATOMIC, SAN DIEGO, CALIFORNIA

**External Fuel Thermionic Reactor—Design and Technology Review**

M. ABBATE, C. L. EISEN, R. RAAB AND A. SCHOCK, FAIRCHILD HILLER CORPORATION, FARMINGDALE, NEW YORK

**Recent Developments in Reactor Thermionic Power Plants**

J. VANHOOMISSON, P. R. HILL AND C. D. SAWYER, GENERAL ELECTRIC COMPANY, PLEASANTON, CALIFORNIA

The following papers, which will be presented at the Conference, are not included in these Proceedings and are available only from the authors.

**Performance Evaluation of a 6 KWe Organic Rankine Power System**

R. E. NIGGEMANN, T. J. BLAND AND D. B. WIGMORE, SUNDSTRAND AVIATION, ROCKFORD, ILLINOIS

**A Large Cobalt-60 Heat Source for Terrestrial Power Conversion Systems**

J. W. H. CHI (SPEAKER), C. K. KIM AND A. COTTAM, WESTINGHOUSE ELECTRIC CORPORATION, PITTSBURGH, PENNSYLVANIA

**Lithium-Boiling Potassium Rankine Cycle Test Loop Operations with Shell-Side, Cross-Flow Boiler and Analog Nuclear-Reactor Simulator**

G. M. KIKIN, JET PROPULSION LABORATORY, PASADENA, CALIFORNIA

**An Implanted Energy Source**

J. J. KONIKOFF, GENERAL ELECTRIC COMPANY, PHILADELPHIA, PENNSYLVANIA

**The Challenge of Energy Conversion for the Biological Environment**

L. T. HARMISON, NATIONAL HEART INSTITUTE, BETHESDA, MARYLAND

**Advanced Rankine Cycle Provides Basic Technology for Other Power Plants as Well**

M. A. ZIPKIN, GENERAL ELECTRIC, CINCINNATI, OHIO, AND T. A. MOSS, NASA-LEWIS RESEARCH CENTER, CLEVELAND, OHIO

**Mission Planning for the ORACLE Electrical Power Systems**

P. DUCHON, AEROJET-GENERAL CORPORATION, AZUSA, CALIFORNIA

**A Solar Cell Power System for ALSEP**

R. GIBSON AND K. HSI, BENDIX AEROSPACE DIVISION, ANN ARBOR, MICHIGAN

**A Solar Powered Free Cylinder Water Pump**

W. T. BEALE (SPEAKER), R. L. STEPHENSON AND G. C. STALEY, OHIO UNIVERSITY, ATHENS, OHIO

**Fuel Cells for Ocean Applications**

B. GITLOW, J. W. BABCOCK AND J. W. SCHMITT, PRATT & WHITNEY AIRCRAFT, EAST HARTFORD, CONNECTICUT

**Operating Principles of Heat Pipes**

J. E. KEMME, LOS ALAMOS SCIENTIFIC LABORATORY, LOS ALAMOS, NEW MEXICO

**Evolution of Tracked Air Cushion Vehicle Systems**

H. R. ROSS, SVERDRUP & PARCEL ASSOCIATES, INC., WARREN, MICHIGAN

**The City as a System**

J. E. GIBSON, OAKLAND UNIVERSITY, ROCHESTER, MICHIGAN

**Department of Defense Mobile Electric Power Program**

G. B. WAREHAM AND M. J. AIKEN, DEPARTMENT OF DEFENSE, THE PENTAGON, WASHINGTON, D. C. AND

T. G. KIRKLAND, U.S. ARMY MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT CENTER, FT. BELVOIR, VIRGINIA

**Energy Centers for the Conversion of Fossil and Fissile Materials to High-Temperature Gas Mixtures for Multi-Purpose Use**

S. A. BRESLER, BRESLER-MAVROIC CHEMICAL ENGINEERING COMPANY, NEW YORK, NEW YORK AND E. F. MILLER, DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

**The American Gas Association Energy Conversion Program**

AMERICAN GAS ASSOCIATION, NEW YORK, NEW YORK

**Power Requirements for Future Communication Satellites**

J. D. DUNLOP AND W. J. BILLERBECK, COMSAT LABORATORIES, WASHINGTON, D. C.

**Cost-Reducing Condominium Systems for Low-Cost Homes**

G. C. SZEGO, INSTITUTE FOR DEFENSE ANALYSES, ARLINGTON, VIRGINIA

**Unconventional Engines for Vehicles of Low Pollution Potential**

ROBERT KIRK AND D. DAWSON, DEPARTMENT OF HEALTH, EDUCATION AND WELFARE, WASHINGTON, D. C.

**Some Solutions to Field Application Problems of Terrestrial Radioisotopic Thermoelectric Generators**

W. A. MCDONALD AND P. F. ALLER, ISOTOPES, INC., MIDDLE RIVER, MARYLAND

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