

California Institute of Technology

SIXTY-FOURTH ANNUAL

COMMENCEMENT
EXERCISES



*Friday afternoon, June thirteenth, nineteen fifty-eight
at four-thirty o'clock*

ACADEMIC PROCESSION

Chief Marshal: HARVEY EAGLESON, Ph.D.

Assistant Marshals: DONALD S. CLARK, Ph.D.

JAMES C. DAVIES, Ph.D.

RODMAN W. PAUL, Ph.D.

Division I

CANDIDATES FOR THE DEGREE OF BACHELOR OF SCIENCE

CANDIDATES FOR THE DEGREE OF
MASTER OF SCIENCE IN SCIENCE

CANDIDATES FOR THE DEGREE OF
MASTER OF SCIENCE IN ENGINEERING

CANDIDATES FOR THE ENGINEER'S DEGREE

CANDIDATES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Division II

THE FACULTY OF THE CALIFORNIA INSTITUTE

THE CHAIRMEN OF DIVISIONS
AND DIRECTORS OF LABORATORIES

THE TRUSTEES OF THE CALIFORNIA INSTITUTE

THE REPRESENTATIVE OF THE UNITED STATES AIR FORCE

THE COMMENCEMENT CHAPLAIN

THE PRESIDENT OF THE CALIFORNIA INSTITUTE

THE CHAIRMAN OF THE BOARD OF TRUSTEES

PROGRAM

Presiding: ALBERT B. RUDDOCK, B.A., M.A.
Chairman of the Board of Trustees

PRELUDE AND PROCESSIONAL MARCH

Organist: JAMES H. SHEARER, A.R.C.M., A.R.C.O.

INVOCATION

THE REVEREND MAX M. MORRISON, D.D.
Westminster Presbyterian Church of Pasadena

COMMENCEMENT ADDRESS

“The Challenge of Change”

DETLEV W. BRONK, PH.D., LL.D., D.LITT.
President, Rockefeller Institute for Medical Research
President, National Academy of Sciences

PROGRAM—*continued*

CONFERRING OF DEGREES

BY

PRESIDENT DUBRIDGE

PRESENTATION OF CANDIDATES FOR DEGREES

For the degree of Bachelor of Science, by

PAUL CONANT EATON, A.M.

Dean of Students

For the degree of Master of Science in Science, by

WILLIAM R. SMYTHE, Ph.D.

Chairman of the Committee on the Course in Science

For the degree of Master of Science in Engineering, by

DAVID S. WOOD, Ph.D.

Chairman of the Committee on the Course in Engineering

For the Engineer's degree, by

FREDERIC BOHNENBLUST, Ph.D.

Dean of Graduate Studies

For the degree of Doctor of Philosophy, by

DEAN BOHNENBLUST

PROGRAM—*continued*

COMMISSIONING OF AIR FORCE RESERVE OFFICERS

Presentation of Cadets, by

LIEUTENANT COLONEL LYLE F. JOHNSTON, B.S.

Professor of Air Science and Tactics

*Oath of Office and award of Certificate of Commission as
Second Lieutenant in the Air Force Reserve, by*

MAJOR GENERAL JACK W. WOOD

United States Air Force

ANNOUNCEMENTS

PRESIDENT DUBRIDGE

BENEDICTION

THE REVEREND DR. MORRISON

*The audience is requested to remain standing until
the end of the Recessional March*

RECESSIONAL MARCH

Candidates for Degrees

BACHELOR OF SCIENCE IN SCIENCE

- David Anthony Ackley, Lakeside, California. *Physics*.
- Gordon Stewart Barienbrock, Santa Monica, California. *Physics*.
- Robert Leland Blakeley, Santa Ana, California. *Chemistry*.
- Gordon Elliott Brown, Ellensburg, Washington. *Mathematics; Academic Honor*.
- David G. Byles, Aberdeen, Washington. *Physics; Academic Honor*.
- George M. Canova, Duarte, California. *Physics*.
- Berken Chang, State College, New Mexico. *Physics; Academic Honor*.
- Eugene Harold Cordes, Grand Island, Nebraska. *Chemistry; Honor Key*.
- Robert S. Deverill, Hilo, Hawaii. *Chemistry; Academic Honor*.
- Norman T. Ellett, River Forest, Illinois. *Physics*.
- Alan S. Emanuel, Van Nuys, California. *Applied Chemistry; Academic Honor*.
- James Henry Espenson, Pomona, California. *Chemistry*.
- Barry Eric Feinberg, Plainfield, New Jersey. *Physics*.
- Joseph Clinton Fineman, Shaftsbury, Vermont. *Physics; Academic Honor*.
- Darrell Eugene Fleischman, Phoenix, Arizona. *Chemistry*.
- Jerrold Fried, Phoenix, Arizona. *Physics; Academic Honor*.
- Stuart Goff, Van Nuys, California. *Physics; Honor Key*.
- David Eiben Groce, La Mesa, California. *Physics; Academic Honor*.
- Nathaniel Grossman, Aurora, Illinois. *Mathematics*.
- William Phillip Helman, Grand Junction, Colorado. *Chemistry*.
- Stephen Ford Holtzman, Tempe, Arizona. *Physics*.
- Daniel Henry Horowitz, Atlantic City, New Jersey. *Geology*.
- Laurence Gordon Jones, Riverside, California. *Biology*.
- Mauritz Jacob Kallerud, Casper, Wyoming. *Applied Chemistry*.
- William Kern, Sacramento, California. *Physics*.
- William Klement, Jr., Bensenville, Illinois. *Physics; Academic Honor*.
- Michael Warren Konrad, Virginia Beach, Virginia. *Physics; Academic Honor, Honor Key*.
- Edward Lee Krehbiel, Long Beach, California. *Biology*.
- Gordon David Lange, Phoenix, Arizona. *Biology; Academic Honor*.
- Loren R. Linstrom, Glendale, California. *Astronomy*.

ACADEMIC HONOR: *Graduated with scholastic honor in accordance with a vote of the Faculty.*

HONOR KEY: *Awarded by the Associated Students, CIT, for participation in student activities.*

BACHELOR OF SCIENCE IN SCIENCE

- Paul Carlson Minning, Williamsburg, Ohio. *Physics; Academic Honor.*
- Louis B. Montoya, Los Angeles, California. *Physics.*
- Harold D. Morris, Rosemead, California. *Physics.*
- Wayne B. Nelson, Chicago, Illinois. *Physics.*
- Charles Herbert Neuman, Fullerton, California. *Physics; Academic Honor.*
- Hallan C. Noltimier, Whittier, California. *Geophysics.*
- Ernest Roland Parkinson, Boulder City, Nevada. *Physics.*
- Robert Reid Parmerter, Fontana, California. *Physics.*
- Charles Ronald Penquite, Phoenix, Arizona. *Applied Chemistry.*
- Dennis Gail Peters, Eagle Rock, California. *Chemistry; Academic Honor.*
- Robert Joseph Phelan, Jr., Pasadena, California. *Physics.*
- Gerald Michael Pjerrou, Fontana, California. *Physics.*
- George McCoy Poor, McAlester, Oklahoma. *Geology.*
- Donald Richard Reiterman, Altadena, California. *Applied Chemistry.*
- Philip Lee Reynolds, Glendale, California. *Applied Chemistry.*
- James Steven Rode, Glendale, California. *Applied Chemistry; Academic Honor.*
- Michael Randolph Rusch, Glendale, California. *Chemistry; Academic Honor.*
- Robert Earl Schenter, Inglewood, California. *Physics.*
- Thomas Gerald Schumann, Tujunga, California. *Physics; Academic Honor.*
- Lawrence Shepard Smith, Los Angeles, California. *Physics.*
- Donald Stern, North Hollywood, California. *Physics; Academic Honor, Honor Key.*
- Charles Joel Stone, Van Nuys, California. *Mathematics; Academic Honor.*
- Howard Ewing Sturgis, Los Angeles, California. *Mathematics.*
- Robert Leicester Tambling, Jr., Glen Ridge, New Jersey. *Physics.*
- Vincent Deacon Taylor, Los Angeles, California. *Physics; Honor Key.*
- Philip Duryea Thacher, Auberry, California. *Physics; Academic Honor.*
- Martial Leon Thieboux, Jr., Whittier, California. *Physics; Academic Honor.*
- Jon René Valbert, Harvey, Illinois. *Applied Chemistry; Academic Honor.*
- William Gerard Wagner, South Pasadena, California. *Physics; Academic Honor.*
- Daniel Lewis Wulff, Santa Barbara, California. *Chemistry; Academic Honor.*
- George Andrew Yankura, Bayonne, New Jersey. *Physics.*
- Jack Henry Zeilenga, San Diego, California. *Physics; Academic Honor.*

BACHELOR OF SCIENCE IN ENGINEERING

- Frank A. Albini, Madera, California. *Mechanical Engineering; Academic Honor.*
- John Fredrich Asmus, Ontario, California. *Electrical Engineering; Academic Honor.*
- Tracy Leon Atherton, Jr., Pasadena, California. *Electrical Engineering.*
- Richard Lee Baron, Hollywood, California. *Electrical Engineering; Academic Honor.*
- Gene Henry Beisman, Las Vegas, New Mexico. *Civil Engineering.*
- Laurence Edward Berry, Berkeley, California. *Mechanical Engineering.*
- Jay Bryan Clearwaters, Pasadena, California. *Electrical Engineering.*
- Forrest Randall Cleveland, Sacramento, California. *Mechanical Engineering.*
- Martin Leo Conneally, Sepulveda, California. *Mechanical Engineering.*
- Glenn Leland Converse, Glen Rock, New Jersey. *Mechanical Engineering; Academic Honor, Honor Key.*
- John Patrick Conway, Canoga Park, California. *Electrical Engineering.*
- Richard K. Cooper, La Crescenta, California. *Electrical Engineering; Academic Honor.*
- Richard Truman Cowley, Tigard, Oregon. *Mechanical Engineering; Academic Honor.*
- John D. Eberhardt, San Diego, California. *Mechanical Engineering; Academic Honor.*
- Craig T. Elliott, Oak Park, Illinois. *Mechanical Engineering; Honor Key.*
- Stephen Arnold Emanuel, Tujunga, California. *Civil Engineering.*
- Robert Clain Emmerling, Los Angeles, California. *Mechanical Engineering.*
- George Frederick Engelke, Los Angeles, California. *Mechanical Engineering.*
- Richard Walter Fiddler, Kirkland, Washington. *Mechanical Engineering; Academic Honor.*
- Hugo Breed Fischer, Colorado Springs, Colorado. *Civil Engineering; Academic Honor.*
- Harold Kay Forsen, San Diego, California. *Electrical Engineering; Academic Honor.*
- Alan K. Forsythe, Bozeman, Montana. *Mechanical Engineering.*
- Gordon Ellis Glattenberg, Los Angeles, California. *Mechanical Engineering.*
- William Brewster Gray, Long Beach, California. *Mechanical Engineering.*
- Thomas L. Gunckel, II, Pomona, California. *Mechanical Engineering; Academic Honor.*
- Lance Gregory Hays, Burbank, California. *Mechanical Engineering.*
- Richard F. Herlein, Portland, Oregon. *Electrical Engineering.*
- Riley Hunter Holly, Los Angeles, California. *Electrical Engineering.*
- Harvey Hiroaki Horiuchi, Junction City, Kansas. *Electrical Engineering.*
- Anthony Livingstone Howell, Des Moines, Iowa. *Mechanical Engineering.*
- Robert Slater Johnstone, Albuquerque, New Mexico. *Mechanical Engineering.*
- Richard Miles Kirk, Sacramento, California. *Mechanical Engineering; Honor Key.*
- Wolfgang Gustav Knauss, Altadena, California. *Mechanical Engineering; Academic Honor.*
- David Brent Leeson, Los Angeles, California. *Electrical Engineering; Academic Honor, Honor Key.*
- Keith Bryant Martin, Compton, California. *Electrical Engineering.*
- Bruce Timoney McKeever, Pasadena, California. *Electrical Engineering; Academic Honor.*

BACHELOR OF SCIENCE IN ENGINEERING

- Lawrence H. Nelson, Phoenix, Arizona. *Mechanical Engineering.*
- Richard Coulston Neville, Tucson, Arizona. *Electrical Engineering; Academic Honor.*
- Theodore Cameron Oakberg, Coeur d'Alene, Idaho. *Mechanical Engineering.*
- George Norton Oetzel, Beloit, Wisconsin. *Electrical Engineering; Academic Honor.*
- Andrew Louis Perga, Butte, Montana. *Electrical Engineering; Honor Key.*
- Robert Gerald Polansky, South Pasadena, California. *Electrical Engineering.*
- Clarke C. Rees, Inglewood, California. *Mechanical Engineering; Honor Key.*
- Dalip Saund, Pasadena, California. *Mechanical Engineering.*
- Walter Alan Schaal, La Crescenta, California. *Mechanical Engineering.*
- Ralph George Schinnerer, Bellflower, California. *Electrical Engineering.*
- Lee Otis Schmidt, Brea, California. *Electrical Engineering.*
- Mitchell Harvey Seidman, Huntington Park, California. *Mechanical Engineering.*
- Donald R. Sessler, Alhambra, California. *Electrical Engineering.*
- Edward Bartley Shuster, Pasadena, California. *Mechanical Engineering.*
- Joe Nelson Smith, Jr., San Clemente, California. *Electrical Engineering; Academic Honor.*
- Peter Raymond Smith, Los Angeles, California. *Electrical Engineering.*
- Robert Allen Smoak, Santa Ana, California. *Mechanical Engineering.*
- Arthur Roy Stacy, La Canada, California. *Civil Engineering; Academic Honor.*
- Lawrence Eugene Stanley, Wichita, Kansas. *Electrical Engineering.*
- Donald Wesley Stocking, Tracy, California. *Mechanical Engineering.*
- Jonathan Cilley Tibbitts, Jr., Central Valley, California. *Civil Engineering.*
- Robert Edward Tokheim, Whittier, California. *Electrical Engineering; Academic Honor.*
- Richard Lee Van Kirk, Glendale, Arizona. *Mechanical Engineering; Honor Key.*
- David Edward Wallis, Jr., Glendale, California. *Electrical Engineering.*
- Thomas Read Warriner, Saratoga, California. *Civil Engineering.*
- James Norman Weaver, Pacific Grove, California. *Electrical Engineering; Academic Honor.*
- Bruce Lambert Wilkinson, Coos Bay, Oregon. *Electrical Engineering.*

MASTER OF SCIENCE IN SCIENCE

Astronomy

Robert Henry Norton, Jr. *B.S., California Institute of Technology, 1957.*

Donald James Taylor. *B.S., California Institute of Technology, 1955.*

Robert LeRoy Wildey. *B.S., California Institute of Technology, 1957.*

Chemistry

Bernhard August Kraus. *B.S., University of Southern California, 1955.*

Chemical Engineering

Robert Philo Chambers. *B.S., California Institute of Technology, 1957.*

Giles Roy Cokelet. *B.S., California Institute of Technology, 1957.*

Allan Morris Goldberg. *B.S., California Institute of Technology, 1957.*

Edwin Murray Perrin. *B.S., University of Alberta, 1957.*

Yui Loong Wang. *B.S., Taiwan College of Engineering, 1956.*

Lawrence Zanford Wieder. *B.S., University of Washington, 1957.*

Geology

Daniel Stephen Barker. *B.S., Yale University, 1956.*

Gilles Betz. *Dipl. d'Ing., École Nationale Supérieure des Mines de Paris, 1956.*

Alain Boulanger. *Dipl. d'Ing., École Nationale Supérieure des Mines de Paris, 1956.*

Guy de Rimonteil de Lombares. *Dipl. d'Ing., École Nationale Supérieure des Mines de Paris, 1956.*

Claude David Fiddler. *A.B., Occidental College, 1954.*

René Edmond Maurice. *Dipl. d'Ing., École Nationale Supérieure des Mines de Paris, 1956.*

Walter Fay Reiss, Jr. *B.A., Whittier College, 1956.*

Dale Rodekohr Simpson. *B.S., The Pennsylvania State University, 1956.*

Arthur Ogilvy Spaulding. *B.S., California Institute of Technology, 1949.*

Geophysics

Thomas Julian Ahrens. *S.B., Massachusetts Institute of Technology, 1957.*

Stewart Wilson Smith. *S.B., Massachusetts Institute of Technology, 1954.*

Roger Dean Summer. *B.A., The Rice Institute, 1956.*

MASTER OF SCIENCE IN SCIENCE

Mathematics

- Peter Linton Crawley. *B.S., California Institute of Technology, 1957.*
George Gerson. *B.S., Queens College, 1951.*
Morton Lowengrub. *B.A., New York University, 1956.*
Howard Calvin Rumsey, Jr. *B.S., California Institute of Technology, 1957.*

Physics

- Harvey Marshall Endler. *B.S., University of Illinois, 1956.*
Millard Alvin Habegger. *B.S., Purdue University, 1956.*
William Breckenridge Lindley. *B.S., California Institute of Technology, 1955.*
John David Rogers. *B.S., California Institute of Technology, 1956.*
Robert Emil Rothe. *B.A., Knox College, 1956.*
Mohammad Hussein Saffouri. *B.S., American University of Beirut, 1956.*

MASTER OF SCIENCE IN ENGINEERING

Aeronautics

- Sanford Abramowitz. *B.Ae.E., New York University, 1956.*
David Elsworth Anderson. *B.S.A.E., West Virginia University, 1954.*
Francis Edward Augustine. *B.Ae.E., The Catholic University of America, 1953.*
Charles Dwight Babcock, Jr. *B.S.A.E., Purdue University, 1957.*
Richard George Batt. *B.S.E., Princeton University, 1955.*
Chester Robert Bauer. *B.Ae.E., New York University, 1942.*
Harold Dean Culver. *B.S., Oklahoma State University of Agriculture and Applied Science, 1955.*
Chester Harold Dale, Jr. *B.S., California Institute of Technology, 1957.*
Leonard Maurice Gaines. *B.S., Parks College of Aeronautical Technology, 1951.*
John Louis Gardner, Jr. *B.E.E., Louisiana State University, 1957.*
Herbert Ray Graham. *S.B., Massachusetts Institute of Technology, 1951.*
Darrel Leigh Hirsch. *B.S., University of Colorado, 1954.*
David Parks Hoult. *S.B., Massachusetts Institute of Technology, 1957.*
Richard M. Jali. *B.S., California Institute of Technology, 1955.*
Donald Harold Landauer. *B.S., University of Kansas, 1957.*
Jean Lemaitre. *Dipl. d'Ing., École Nationale d'Ingénieurs Arts et Métiers, 1957.*
Robert Arthur Mowry. *B.A., Upland College, 1956.*
Jerry Clifford Peck. *B.S., California Institute of Technology, 1957.*
Charles Leslie Statham. *B.S., Louisiana State University, 1957.*
Carl Jules Weyl. *B.S.Ae.E., Indiana Technical College, 1951.*

MASTER OF SCIENCE IN ENGINEERING

Civil Engineering

- Iteil Ike Haissman. *B.S., California Institute of Technology, 1957.*
Joseph Mortimer Kiernan, Jr., Capt., U.S.A. *B.S., United States Military Academy, 1948.*
George Donald Leal. *B.C.E., University of Santa Clara, 1955.*
George Everette Madsen. *B.S., California Institute of Technology, 1955.*
Robert Erich Reuven Pollak. *B.S., The University of Texas, 1957.*
Carl Alan Rambow. *B.S., California Institute of Technology, 1953.*
Rowland Richards, Jr. *B.S.E., Princeton University, 1957.*
Robert Hugh Taylor, Jr. *B.S., University of Colorado, 1957.*

Electrical Engineering

- Peter Kendall Abbey. *B.S., California Institute of Technology, 1957.*
Donn Anthony Allen. *B.S., California Institute of Technology, 1957.*
Majid Arbab. *B.A., Dartmouth College, 1957.*
Eugene Myron Barston. *B.S., California Institute of Technology, 1957.*
Charles Joseph Byrne, Jr. *B.E.E., Rensselaer Polytechnic Institute, 1957.*
Michel Jacques Canu. *Dipl. d'Ing., École Supérieure de l'Aéronautique, 1957.*
Michael Anthony Cowan. *B.S., Purdue University, 1957.*
Harold Ralph Dessau. *B.S., California Institute of Technology, 1957.*
Robert George Dietrich. *B.S., Washington University, 1957.*
Michel Abel Ebertin. *B.E.E., Polytechnic Institute of Brooklyn, 1957.*
Richard William Ehrhorn. *B.S., University of Minnesota, 1955.*
Duane Donald Erway. *B.S., California Institute of Technology, 1957.*
James Norval Giles. *B.S., California Institute of Technology, 1957.*
John Harvey Gliever. *B.S., California Institute of Technology, 1957.*
Lawrence Thompson Gurley. *B.E.E., The Cooper Union School of Engineering, 1957.*
Thomas Chandler Hays. *B.S., California Institute of Technology, 1957.*
Neil Hunter Herman. *B.S., California Institute of Technology, 1957.*
Roy Albert Jensen. *B.S., California Institute of Technology, 1957.*
Lawrence Irwin Kittiver. *B.E.E., The Cooper Union School of Engineering, 1955.*
William John Klenk. *B.E.E., University of Dayton, 1957.*
Allen Klinger. *B.E.E., The Cooper Union School of Engineering, 1957.*
Harold Gordon Knight. *B.A.Sc., University of Toronto, 1957.*
Jean Pierre Lacrouts. *Dipl. d'Ing., École Nationale Supérieure des Télécommunications, 1957.*
Daniel Rutchik Mack. *B.S., California Institute of Technology, 1957.*
Stephen Man-Fa Mak. *B.S., California Institute of Technology, 1957.*
Charles Leo Malone. *B.S., California Institute of Technology, 1957.*

MASTER OF SCIENCE IN ENGINEERING

Electrical Engineering—continued

- Maury Ivan Marks. *B.S., Drexel Institute of Technology, 1957.*
Malcolm McColl. *B.S., Wayne University, 1957.*
William True McDonald. *B.S., California Institute of Technology, 1957.*
Murray Arlen Meldrum. *B.A.Sc., The University of British Columbia, 1956.*
John Hendrick Minkema. *B.S., University of Washington, 1947.*
Edwin Donald Nelson. *B.S., California Institute of Technology, 1957.*
Harry Patapoff. *B.S., California Institute of Technology, 1957.*
Donald Dean Peckham. *B.S., University of Washington, 1957.*
John Chester Porter, Jr. *B.S., California Institute of Technology, 1952.*
Jacques Marcel Rieunier. *Dipl. d'Ing., École Centrale des Arts et Manufactures, 1957.*
Ronald John Rockey. *B.S., California Institute of Technology, 1956.*
Fred Donald Russell. *B.S., California Institute of Technology, 1957.*
Robert Kenneth Schmidt. *B.S., Worcester Polytechnic Institute, 1957.*
Alex Shumka. *B.A.Sc., University of Toronto, 1957.*
Richard Louis Sicol. *B.S., Purdue University, 1956.*
Attila Imre Simanyi. *B.S., California Institute of Technology, 1957.*
Thomas Christian Sorensen. *B.S., California Institute of Technology, 1957.*
Richard Douglas Stark. *B.S., California Institute of Technology, 1957.*
Edwin Couthouy Stimpson, Jr. *B.S., University of Kansas, 1952.*
Robert Clem Titsworth. *B.S., New Mexico College of Agriculture and Mechanic Arts, 1957.*
Edvin Otto Tums. *B.S., Illinois Institute of Technology, 1957.*
Cavour Wei-Hou Yeh. *B.S., California Institute of Technology, 1957.*

Engineering Science

- Olaf Alexander Boedtker. *Dipl. Eng., Swiss Institute of Technology, 1944.*
Abraham Zukerman. *B.S., Parks College of Aeronautical Technology, 1954; M.S., University of Southern California, 1956.*

Mechanical Engineering

- Boris Auksmann. *B.A.Sc., The University of British Columbia, 1955.*
Frank Joseph Berto. *B.A.Sc., The University of British Columbia, 1952.*
John Kalman Dienes. *B.A., Pomona College, 1950.*
Antanas Vytautas Dundzila. *B.S., University of Illinois, 1955.*
Charles Gordon Fullerton. *B.S., California Institute of Technology, 1957.*
Andrew Guttman. *B.M.E., The College of The City of New York, 1957.*
Leighton D. Hanon, Jr. *B.S., California Institute of Technology, 1955.*

MASTER OF SCIENCE IN ENGINEERING

Mechanical Engineering—continued

- John Louis Hokanson. *B.S., Purdue University, 1957.*
- Marcos Intaglietta. *B.S., University of California, 1957.*
- Wilford Dean Iwan. *B.S., California Institute of Technology, 1957.*
- Leon Morris Keer. *B.S., California Institute of Technology, 1956.*
- Mitri Gabriel Khamis. *B.S., Rutgers University, 1957.*
- Henri Marie Lacombe. *Dipl. d'Ing., École Supérieure de l'Aéronautique, 1957.*
- Theodore Edmund Lang. *B.S., California Institute of Technology, 1957.*
- Joe Edward Lingerfelt. *B.S., California Institute of Technology, 1957.*
- Jean François Marin. *Dipl. d'Ing., École Supérieure des Mines de Paris, 1957.*
- Morrow Harris Moore, Jr. *B.M.E., The George Washington University, 1957.*
- Peter Marc Allan Moretti. *B.S., California Institute of Technology, 1957.*
- Ulo Okapuu. *B.E., McGill University, 1957.*
- Richard Walker Patch. *B.S., Purdue University, 1953.*
- William Arthur Petri. *B.A., Alfred University, 1942; M.S., Syracuse University, 1944.*
- Richard Allan Schapery. *B.S., Wayne State University, 1957.*
- Richard Franklin Smisek. *B.S., California Institute of Technology, 1957.*
- Derek Murray Squires. *The College of Aeronautics, Cranfield, 1957.*
- Gunnar Erik Stenberg. *Dipl. Civil Eng., The Royal Institute of Technology, Stockholm, 1956.*
- Richard Anthony Tanzilli. *B.M.E., Pratt Institute, 1957.*
- Thomas Ova Thostesen. *B.S., Iowa State College, 1957.*
- George Humphrey Tichenor, IV. *S.B., Massachusetts Institute of Technology, 1957.*
- Milton George Wille. *B.E.S., Brigham Young University, 1957.*
- James William Workman. *B.S., California Institute of Technology, 1957.*

ENGINEER'S DEGREE

Aeronautical Engineer

Andrew George Fabula. *B.S., Princeton University, 1949; M.S., California Institute of Technology, 1950.*

Danny Frederick Huebner. *B.Ae.E., University of Minnesota, 1955; M.S., California Institute of Technology, 1957.*

Malcolm LeRoy Matthews. *B.S., University of Washington, 1955.*

John Carver McCoy, Lt., U.S.N. *B.S., United States Naval Academy, 1949; B.S., United States Naval Postgraduate School, 1957.*

Kenneth F. Nicholson. *B.S., California Institute of Technology, 1953; M.S., 1954.*

Raymond Wilbur Prouty. *B.Sc., University of Washington, 1950; M.S., 1954.*

Dick Wright Thurston, Lt.(jg), U.S.N. *B.S., United States Naval Academy, 1950; B.S., United States Naval Postgraduate School, 1957.*

Mechanical Engineer

Sterge Theodore Demetriades. *A.B., Bowdoin College, 1950.*

Rolf Constantin Hastrup. *B.S., California Institute of Technology, 1953; M.S., 1954.*

Richard Keith Nelson. *B.S., University of Minnesota, 1952; M.S., 1953.*

DOCTOR OF PHILOSOPHY

- Dang Dinh Ang (Aeronautics and Mathematics). *B.S., University of Kansas, 1955; M.S., California Institute of Technology, 1956.* Thesis: Radiation Problems in Elastodynamics.
- Calvin LaRue Barker (Mechanical Engineering and Physics). *B.S., University of Texas, 1953; M.S., California Institute of Technology, 1954.* Thesis: Experiments Concerning the Occurrence and Mechanism of High-Frequency Combustion Instability.
- Richard William Bell (Aeronautics and Mathematics). *B.A., Oberlin College, 1939.* Thesis: The Elastic Instability of Thin Cantilever Struts on Elastic Supports with Axial and Transverse Loads at the Free Ends.
- Michel A. Bloch (Physics and Mathematics). *Dipl. Ing., Ecole Polytechnique (Paris), 1952.* Thesis: Photoproduction of Pion Pairs in Hydrogen.
- David Frederic Bowersox (Chemistry and Mathematics). *B.A., Grinnell College, 1953.* Thesis: I. The Iodine-Iodine Monocyanide Half Cell Potential. II. Coulometric Studies. III. The Mechanism of the Precipitation of Metal Sulfides by Thiocetamide.
- Harold Stanley Braham (Electrical Engineering and Physics). *B.S., Columbia University, 1950; M.S., 1951.* Thesis: An Investigation of the Use of Feedback Control to Raise the Flutter Speed of an Aeroelastic System.
- Vernon Douglas Burrows (Plant Physiology and Biochemistry). *B.S.A., University of Manitoba, 1951; M.Sc., 1953.* Thesis: Studies on Translocation.
- Warren Van Ness Bush (Chemistry and Chemical Engineering). *B.S.E., Princeton University, 1953.* Thesis: A study of the Boron Trifluoride Complexes of Some Carotenoid Hydrocarbons and the Products of their Hydrolytic and Alcoholic Cleavage.
- Donald Blair Chesnut (Chemistry and Physics). *B.S., Duke University, 1954.* Thesis: I. An X-Ray Diffraction Study of the Crystal Structure of Cyclopropane Carbohydrazide. II. A Theory of Isotropic Hyperfine Interactions in π -Electron Radicals.
- John M. Clark, Jr. (Biochemistry and Chemistry). *B.S., Cornell University, 1954.* Thesis: Studies on Amino Acid Activation and Protein Synthesis.
- Albert Charles Claus (Chemistry and Mathematics). *B.S., Northwestern University, 1952.* Thesis: The Intermetallic Compounds in the Silver-Strontium System and their Crystal Structures.
- Terry Cole (Chemistry and Physics). *B.S., University of Minnesota, 1954.* Thesis: Studies of Free Radicals at 4.2°K by Electron Paramagnetic Resonance.
- Anthony Demetriades (Aeronautics and Physics). *B.A., Colgate University, 1951; M.S., University of Minnesota, 1953.* Thesis: An Experimental Investigation of the Stability of the Hypersonic Laminar Boundary Layer.
- William Bailey DeMore (Chemistry and Physics). *A.B., Emory University, 1952; M.A., 1953.* Thesis: Chemical Processes in Rigid Media at Low Temperatures.
- David Severin Dennison (Biophysics and Biochemistry). *B.A., Swarthmore College, 1954.* Thesis: Studies on Phototropic Equilibrium and Phototropic-Geotropic Equilibrium in Phycomyces.
- Paul Leighton Donoho (Physics and Mathematics). *B.A., The Rice Institute, 1952.* Thesis: The Photoproduction of Positive K Mesons in Hydrogen.

DOCTOR OF PHILOSOPHY

- John Walter Drake (Virology and Embryology). *B.S., Yale University, 1954*. Thesis: Intra-cellular Interactions of Polioviruses: Interference and Multiplicity Reactivation.
- Allen Eugene Fuhs (Mechanical Engineering and Physics). *B.S., University of New Mexico, 1951; M.S., California Institute of Technology, 1955*. Thesis: I. Experimental and Theoretical Studies on Heterogeneous Diffusion Flames. II. Spectroscopic Studies of Flames.
- Derck Alexander Gordon (Chemistry and Mathematics). *B.A., University of Buffalo, 1953*. Thesis: I. Measurement of Diamagnetic Anisotropy in Single Crystals. II. The Crystal Structure of Monomethylurea.
- Ellsworth Herman Grell (Genetics and Biochemistry). *B.S., Iowa State College, 1954*. Thesis: The Genetics and Biochemistry of "red cells" in *Drosophila melanogaster*.
- John Thomas Harding (Physics and Mathematics). *S.B., Massachusetts Institute of Technology, 1953*. Thesis: Electron Paramagnetic Resonance of Nitrogen Afterglow Condensed at 4.2°K.
- Harry James Heimer (Aeronautics and Mathematics). *S.B., Massachusetts Institute of Technology, 1941; Ae.E., California Institute of Technology, 1944*. Thesis: Balanced Flap Type Supersonic Control Surfaces.
- William Joseph Hooker (Engineering Science and Physics). *B.S., Webb Institute of Naval Architecture, 1953; M.S., Cornell University, 1955*. Thesis: Shock-Induced C_2H_2 Pyrolysis and CO Emissivity.
- Robert Eugene Huffman (Chemistry and Physics). *B.S., Agricultural and Mechanical College of Texas, 1953*. Thesis: I. Kinetics of Thermal Decomposition of Nitrogen Dioxide behind Shock Waves. II. Kinetics of the Ferrous Ion-Oxygen Reaction in Sulfuric Acid Solution.
- Robert Katz (Mechanical Engineering and Physics). *B.S., University of Colorado, 1948; M.S., California Institute of Technology, 1954*. Thesis: Performance of Axial Compressors with Asymmetric Inlet Flows.
- James King, Jr. (Chemistry and Physics). *B.S., Morehouse College, 1953; M.S., California Institute of Technology, 1955*. Thesis: I. Magnetic Resonance Studies in Paramagnetic Solutions. II. The Ferrous Iron-Oxygen Reaction in Acidic Phosphate-Pyrophosphate Solutions.
- Luiz Fernando Gouvêa Labouriau (Plant Physiology). *A.B., University of Michigan, 1953; M.S., 1954*. Thesis: Studies on the Initiation of Sporangia in Ferns.
- Arthur Edward Lewis (Geology and Economics). *B.S., St. Lawrence University, 1950; M.S., California Institute of Technology, 1955*. Thesis: Geology and Mineralization Connected with the Intrusion of a Quartz Monzonite Porphyry, Iron Mountain, Iron Springs District, Utah.
- Frank Bryant Mallory (Chemistry and Physics). *B.S., Yale University, 1954*. Thesis: I. Photochemical Reactions of Phenylcyclobutadienoquinone. II. Thermal Reactions of Phenylcyclobutadienoquinone in Methanol. III. The Photochemical Synthesis of Phenanthrenes.
- Ronald Theodore McLaughlin (Civil Engineering and Chemical Engineering). *B.S., Queen's University, 1951; M.S., California Institute of Technology, 1952*. Thesis: On the Mechanics of Sedimentation in Artificial Basins.

DOCTOR OF PHILOSOPHY

- Howard Martin McMahon (Aeronautics and Mathematics). *B.M.E., Santa Clara University, 1950; M.S., California Institute of Technology, 1951.* Thesis: Experimental Study of the Effect of Mass Injection at the Stagnation Point of a Blunt Body.
- Roderic Bruce Park (Biology and Geochemistry). *B.A., Harvard College, 1953.* Thesis: I. The Biosynthesis of Open Chain Terpenes in Plants. II. Fractionation of the Stable Carbon Isotopes in Plants.
- Arthur William Rose (Geology and Geochemistry). *B.S., Antioch College, 1953; M.S., California Institute of Technology, 1955.* Thesis: Trace Elements in Sulfide Minerals from the Central Mining District, New Mexico, and the Bingham Mining District, Utah.
- Thomas Lee Russell (Mechanical Engineering and Physics). *B.S., California Institute of Technology, 1952; M.S., 1953.* Thesis: The Effect of Grain Size on the Yielding Behavior of Very Low Carbon Steel.
- Allan Robert Sanford (Geophysics and Geology). *B.A., Pomona College, 1949; M.S., California Institute of Technology, 1954.* Thesis: I. An Analytical and Experimental Study of Some Simple Geologic Structures. II. Gravity Survey of a Part of the Raymond and San Gabriel Basins, Southern California.
- Franco Scardiglia (Chemistry and Geology). *B.S., University of Illinois, 1954.* Thesis: I. Reactions of Non-activated Aryl Halides with Strong Basic and Nucleophilic Agents. II. Evidence for Cyclohexyne as an Intermediate in the Coupling Reaction of Phenyllithium with 1-chlorocyclohexene. III. Reactions of Non-activated Aryl Halides with Strong Bases at High Temperatures. IV. The Synthesis of Some Four-membered Ring Compounds.
- James Walter Sedin (Electrical Engineering and Physics). *B.S., University of Minnesota, 1951.* Thesis: A Large-Signal Analysis of Beam-Type Cross-Field Traveling-Wave Tubes.
- Wallace Walter Short (Chemical Engineering and Electrical Engineering). *B.S., Missouri School of Mines, 1951; M.S., California Institute of Technology, 1953.* Thesis: I. Heat Transfer Coefficients and Correction for Thermocouples in the Boundary Layer of a Sphere. II. Local Convective Heat Transfer from a Sphere. III. Thermal Transfer in Turbulent Gas Streams. Effect of Turbulence on Local Transport from Spheres.
- Richard Isamu Tanaka (Electrical Engineering and Physics). *B.S., University of California, 1950; M.S., 1951.* Thesis: The Logical Design of a Serial General-Purpose Computer with Micro-Program Capabilities.
- Thomas Tallott Taylor (Physics and Mathematics). *B.S., Purdue University, 1942; M.S., California Institute of Technology, 1953.* Thesis: Electromagnetic Scattering by a Short Right Circular Conducting Cylinder.
- James Alex Lloyd Thomson (Engineering Science and Physics). *B.A.Sc., University of British Columbia, 1951; M.A.Sc., 1953.* Thesis: Emissivities and Absorptivities of Gases.
- Herman Carl Thorman (Aeronautics and Mathematics). *B.S., Purdue University, 1946; M.S., California Institute of Technology, 1952.* Thesis: Boundary Layer Measurements on an Axisymmetric Body with Spin and Yaw.

DOCTOR OF PHILOSOPHY

- William Grant Tift (Astronomy and Physics). *A.B., Harvard College, 1954*. Thesis: Multi-color Photoelectric Photometry of Bright Extragalactic Systems.
- Alvin William Trivelpiece (Electrical Engineering and Physics). *B.S., California State Polytechnic College, 1953; M.S., California Institute of Technology, 1955*. Thesis: Slow Wave Propagation in Plasma Waveguides.
- Donald Lawson Turcotte (Aeronautics and Physics). *B.S., California Institute of Technology, 1954*. Thesis: Flame Stabilization in Turbulent Boundary Layers.
- Wilton Emile Vannier (Immunochemistry and Animal Physiology). *M.D., University of California, 1948*. Thesis: I. House Dust Allergens. II. Experiments on the Distensibility of the Excised Rabbit Bladder.
- James Ira Vette (Physics and Mathematics). *B.A., The Rice Institute, 1952*. Thesis: Production of Neutral Pions in Hydrogen from 500 to 950 Mev.
- George Wallerstein (Astronomy and Physics). *A.B., Brown University, 1951; M.S., California Institute of Technology, 1954*. Thesis: Spectra of Population II Cepheid Variable Stars.
- Lloyd Richard Welch (Mathematics and Physics). *B.S., University of Illinois, 1951*. Thesis: The Rearrangement of Functions and Maximization of a Convolution Integral.
- Norman Patrick Wilburn (Chemical Engineering and Electrical Engineering). *B.S., California Institute of Technology, 1953; M.S., 1954*. Thesis: Preliminary Studies in the Determination of the Volumetric Properties of Nitrogen Using a Ballistic Piston Apparatus.
- Forman Arthur Williams (Engineering Science and Physics). *B.S.E., Princeton University, 1955*. Thesis: Theoretical Studies in Heterogeneous Combustion.
- David James Wilson (Chemistry, Mathematics and Physics). *B.S., Stanford University, 1952*. Thesis: I. Further Investigation of Energy Transfer Processes in the Unimolecular Decomposition of Nitryl Chloride. II. Decomposition of Nitrogen Pentoxide in the Presence of Nitric Oxide. (IV.) Effect of Noble Gases. III. Theoretical Pre-exponential Factors for Hydrogen Atom Abstraction Reactions. IV. Carbon Isotope Effect During Oxidation of Carbon Monoxide with Nitrogen Dioxide.
- Robert Montague Worlock (Physics and Mathematics). *B.A., Carleton College, 1951*. Thesis: Photoproduction of Neutral Pions in Hydrogen from 600 to 800 Mev.
- William Zimmermann, Jr. (Physics and Mathematics). *B.A., Amherst College, 1952*. Thesis: Experiments Concerning the Low-energy States of N^{16} and O^{18} .

CANDIDATES FOR COMMISSIONS
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Awarded annually to "the senior who, in the opinion of the undergraduate Deans, has throughout his years at the Institute made the greatest contribution to the welfare of the student body and whose qualities of leadership, character and responsibility have been outstanding."

(Recipient to be announced)

DON BAXTER, INC. PRIZES IN CHEMISTRY

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First prize: DENNIS G. PETERS

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DON SHEPARD AWARD

Awarded annually to one or more outstanding residents of the Student Houses in order to pursue cultural opportunities which they might otherwise not be able to enjoy.

D. MICHAEL MILDER

RICHARD C. MONTGOMERY

SIGMA XI AWARD

Awarded in recognition of research work of exceptional quality by a graduate student. The nomination for the award, rotated among the Divisions, is made in 1958 by the Division of Physics, Mathematics and Astronomy, to a student in the Mathematics department.

PETER CRAWLEY

