HOLMES NAMES TWO DEPUTIES

D. Brainerd Holmes, Director of NASA's Manned Space Flight Office, recently named two Deputy Directors - Dr. Joseph F. Shea and George M. Low - in a realignment of the Manned Space Flight Office structure.

Under the new organization, Shea, who formerly headed the OMSF Systems Directorate, becomes Deputy Director for Systems. Dr. William A. Lee, Director of Systems Studies; John A. Gautraud, Director of Systems Engineering; and James E. Sloan, Director of Integration and Checkout, will report to Shea.

Reporting to Low as Deputy Director for OMSF Programs will be the Director of Launch Vehicles, Milton Rosen; the Director of Space Medicine, Dr. C. Roadman; and the Director of Spacecraft and Flight Missions, a post to be filled but currently headed by Low.

William E. Lilly, Director of Administration, will provide administrative support in both major areas.

Previously, all the major directorates reported directly to Holmes. Holmes said the changes are designed to provide speedier action channels and generally strengthen the OMSF organization. Further, it will permit Holmes to administer more effectively operational and institutional matters of the three NASA centers primarily associated with manned space flight. They are the George C. Marshall Space Flight Center, Manned Spacecraft Center and the Launch Operations Center.

FOR SALE: 6400 bu Welbilt air conditioner, thermostat and fresh air damp er. Newcomb, 596-8241.

This full sized wind tunnel model of the Project FIRE reentry package, is mounted in the 9- by 6-foot Thermal Structures Tunnel on a special support motorized to spin it like the actual reentry package will spin in flight.

EXAM OPENED

The Board of U.S. Civil Service Examiners at the Langley Research Center has announced the opening of an examination for Dynamic Modelmaker (Wood WB-12, $3.20 per hour.

No written test is required. Applicants' qualifications will be rated on a scale of 100 and will be judged from a review of their experience, education and training on corroborative evidence secured by the Commission.

Applications may be filed with the Board of U.S. Civil Service Examiners. NASA, Langley Research Center, Langley Station, Hampton, Virginia.

WANTED: Passengers to Florida April 10. Clark, 4891.
WANTED: Passengers to New York City and Allbany leaving on April 18. Strehle, 4811.
WANTED: Driving combination from Swansea Manor to W.A. on 8 shift. Call Trusty, 596-0596.

PROJECT FIRE

Langley Research Center scientists are developing a blunt body like the one in the photograph above to take direct measurements of the intense heat which will suround a returning lunar spacecraft as it reenters the Earth's atmosphere. This research effort is known as Project FIRE.

Project FIRE is a flight reentry research project at very high speeds -- about 25,000 miles per hour -- managed by the Langley Research Center. It is intended to measure heating rates, radio signals "blackout" and materials performance during actual atmosphere entries, with information being gathered by telemetry, radar and optical tracking.

The main temperature readings to be obtained by Project FIRE will be taken by three special instruments known as calorimeters. They are made of beryllium and are instrumented with thermocouples. The first calorimeter will take temperature readings at the beginning of the reentry and will then be destroyed. Beneath it, a special phenolic asbestos heat shield will cover the second calorimeter. At a programmed time, the heat shield will be jettisoned to expose the second calorimeter. Beneath it will be a second heat shield and a third calorimeter.

In this way, scientists will obtain temperature readings during three periods of the reentry heat pulse. The success of the experiment depends on the mechanism for jet tisoning the heat shields, and the wind tunnel tests conducted at Langley are to check its operation.

The four interlocking heat shield sections are jettisoned by springs located near the rim of the reentry package. A pyrotechnic device, fired at the proper instant, releases a latch and allows the springs to eject the heat shield segments. The wind tunnel tests were made in a large blow down wind tunnel at Mach 3 and simulated the correct air pressures FIRE will experience in flight.
NASA APPOINTS RAY W. HOOKER REPRESENTATIVE TO AUSTRALIA

Ray W. Hooker, Chief of Research Models and Facilities Division, has been appointed NASA's senior scientific representative in Australia. He will replace Edwin P. Hartman, who will return from Australia in June for a new assignment at NASA Headquarters in Washington, D.C.

Hooker's primary function in Australia will be liaison with the Department of Supply of the Commonwealth of Australia, the cooperating space agency which constructs, staffs and operates the NASA facilities.

Prior to his leaving for Melbourne in June, Hooker will have an orientation assignment in the Office of Tracking and Data Acquisition at NASA Headquarters.

Born January 3, 1906, in Boswell, Indiana, Hooker was graduated from Pine Village High School in Pine Village, Indiana, in 1924, and received his B.S. degree in Mechanical Engineering (Aeronautics) from Purdue University in 1929.

Hooker joined the Langley staff in February 1930 after working briefly as a design engineer at the Philadelphia Naval Shipyard. He has been engaged in the engineering design and construction of research equipment and facilities during his more than 34 years of Langley service.

In 1942, Hooker was placed in charge of Langley's Construction Section, heading the design and construction activities during the expansion of Langley's newest and largest research complex, the West Area. He became Assistant Chief of the Engineering Division in 1943.

He participated in the site selection and development from 1943 to 1947 of the Pilotless Aircraft Research Station, now NASA's Wallops Station.

He was in part responsible for planning the original Project Mercury station in Australia. As Langley co-manager of the Mercury network project in 1959, he helped develop the chain of manned space flight stations around the world.

In 1960 he was appointed Associate Chief of the Engineering Division and was named to his present position as Chief of the Research Models and Facilities Division in April 1962.

Hooker is a member of the American Institute of Aeronautics and Astronautics, the Engineers' Club of the Virginia Peninsula, the Langley Research Center Supervisors' Club, and the Hampton Roads German Club.

He has been active in civic affairs in Hampton and other

PROJECT FIRE SPACECRAFT LAUNCHED SUCCESSFULLY

NASA launched a heavily-instrumented 200-pound Project FIRE spacecraft on a ballistic trajectory to gather scientific information on reentry heating from Cape Kennedy on April 14. The Atlas-D rocket blazed away at 4:42 p.m. to propel the Project FIRE payload on a high-arching path more than 500 miles in space.

Project FIRE is a project of Langley Research Center under over-all direction of NASA's Office of Advanced Research and Technology. Primary purpose was to obtain direct measurements of reentry heating at a speed of 25,000 mph, somewhat in excess of the velocity at which a vehicle enters the Earth's atmosphere after a journey to the Moon.

These measurements will form guideposts for the correct interpretation of research results obtained in laboratory facilities and in flight experiments at lower speeds.

The reentry spacecraft was a blunt-faced vehicle with a conical afterbody. It is similar to the shapes of manned
Virgil I. Grissom, the second American in space, and John W. Young, a former Navy test pilot, have been selected as the first crew to fly a Gemini spacecraft into orbit later this year. Grissom is shown in the photograph on the left during one of his visits to the Center. Explaining the Visual Docking Simulator to him are Byron Jaquet (center) and Donald Riley (left), both of Space Mechanics Division. In the photograph on the right Young (right) inspects the Visual Docking Simulator with Astronaut Charles Conrad. Backup pilots are Walter M. Schirra Jr. and Thomas P. Stafford.

PROJECT FIRE SPACECRAFT
(Continued from page 1)
spacecraft for which flight data at lower orbital reentry speeds (about 17,500 mph) have been gathered. In addition, large amounts of laboratory data has been collected on similar shapes.

A velocity package using the solid propellant Antares II rocket motor (also used as the third stage of the Scout launch vehicle) added the speed needed to drive the reentry payload back into the atmosphere at 25,000 mph. It was the first time a space payload had reentered at about the speed that will be encountered by a manned vehicle returning from the Moon.

As heat estimated at 20,000 degrees charred the vehicle, instruments in its interior radioed information to Ascension Island and to ships and planes stationed in the South Atlantic Ocean impact area off the west coast of Africa. Cameras and other optical devices recorded the meteor-like dive.

The maximum surface temperatures recorded during reentry on four Project Mercury manned orbital missions was about 11,000 degrees.

GODDARD ESSAY CONTEST
The opening of the Robert H. Goddard Historical Essay Award Competition for 1964 has been announced by the National Rocket Club of Washington, D.C.

This annual nationwide competition, with a $200 prize, is open to any U.S. citizen and the entry deadline is November 1.

Essays may treat any significant aspects of the historical development of rocketry and astronautics, and will be judged on their originality and scholarship.

Information on how to submit essays may be obtained from the Awards Program Office, telephone 2384.

AUSTRALIAN REPRESENTATIVE
(Continued from page 1)
communities in the Virginia Peninsula community. His favorite hobby is sailing, and in addition to being a member of numerous sailing societies, he is a member and former Commodore of the Hampton Yacht Club.

Hartman was the first senior scientific representative in Australia. He arrived there in March 1960 and is now completing his second 2-year tour.

He has represented NASA during the development of modern space communications, tracking and telemetry as exemplified by the scientific satellite, manned space flight, deep space and optical network ground stations in Australia, and during the construction of tracking and data acquisition facilities soon to become operational at Carnarvon and Canberra.

Hartman holds a degree of Master of Science in Mechanical Engineering from the California Institute of Technology. He is completing 34 years of NACA-NASA service.

ELECTION PLANNED APRIL 28
The Activities Association's annual election for District Representatives to the General Assembly will be held at the Center on Tuesday, April 28. No primary election will be held and representatives elected to the General Assembly will serve from July 1, 1964 to June 30, 1965.

The Center is divided into districts of approximately 70 to 100 employees. A representative is elected for each district.

Voting shall be by secret ballot. Each employee may vote for one candidate from his district. In the larger districts where two representatives are to be elected, employees will vote for two candidates. Ballots will be placed in sealed ballot boxes and each employee shall sign a register upon casting his ballot.

There will be no voting by proxy and persons on leave lose their opportunity to vote.

FOR SALE: 1957 8 x 58 Marlette Mobile home. Block, 244-2991.
FOR SALE: 8-foot fiberglass dinghy. Hubbard, LY 6-7041.
REENTRY HEATING EXPERIMENT LAUNCHED ON SCOUT VEHICLE

A NASA flight experiment to find out how well a spacecraft heat shield material will perform during reentry was successfully launched on a Scout vehicle at 2:06 a.m. EDT August 18 from Wallops Island.

The reentry experiment, devised by scientists of Langley Research Center, was conducted to learn how low-density charring ablator materials withstand the intense heat generated by a spacecraft during reentry.

The experiment had two objectives. In the first, NASA researchers wanted to further the understanding of such materials for future manned and unmanned spacecraft by comparing flight with ground test data. The selected material is one being considered for use as the Apollo heat shield.

The second objective was to provide a basis for assessment of the material even though the Scout reentry environment will be different and in some important technical respects more severe than the Apollo reentry environment.

The low-density charring ablator material test was the fourth flight in NASA's Scout reentry heating project sponsored by the Office of Advanced Research and Technology. Information received from radar and telemetry stations will permit determining how well the material withstood the heating when the spacecraft sped through the atmosphere at about 19,000 miles per hour. A tape recorder in the spacecraft recorded the heating, and tapes will be sent to the Center's laboratory for study.

AUTUMN LEAVES DANCE

The Activities Association will open the fall social season with an Autumn Leaves Dance on Friday, September 11 at the Activities Building. Dancing will be from 9 p.m. until 1 a.m.

Music will be furnished by The Sportsmen under the leadership of Eddie Fleenor, Light Machine Shop. Two other members of the band are Center employees - Charlie Mendel, Spacecraft Structures Section, featured on the alto sax, and Kenny Seals, Research Projects and Models Section, on the tenor sax. Willie Wise is pianist and Bob Smith is drummer.

Admission will be $2.50 per couple with setups furnished. A limited number of tickets will be sold and no tickets will be available at the door. Group reservations of six or more couples may be made by calling the Activities Building, telephone 4583.

Tickets may be purchased until noon on September 11 from the following persons: Pat Warren, Building 584, telephone 2314; Dick Kurtz, Building 586, phone 2362; Pete Lawson, Building 1232, phone 4538; Ronnie Amole, Building 1232, phone 4489; Carolyn Eby, Building 1195, phone 3254; Sandra Lawson, Building 1251, phone 4420; Pamela James, Building 1244, phone 3461, and Humbert Rockey, Building 1230, phone 4807.

KILGORE APPOINTED HEAD OF UNITED FUND EFFORT

Edwin C. Kilgore, Chief of Flight Vehicles and Systems Division, has been appointed chairman of the Center's eleventh annual United Fund Drive scheduled for September, it was announced this week by Dr. Floyd L. Thompson, Director.

Assisting Kilgore in the campaign will be William B. Mayo, Chief of Mechanical Service, who will be vice-chairman, and Anshal I. Neihouse, Office of the Director, who will be chairman of advanced solicitations.

Kilgore stated that an intensive one-day campaign of all staff members will be held on Friday, September 25. The general solicitation will be preceded by advanced solicitation of key personnel during the week of September 14.

During the drive held last year staff members pledged or contributed a total of $60,869.25 to organizations benefitting under the solicitation program. This represented donations from 94.6 percent of the staff.

Kilgore is a native of Coeburn, Virginia. He graduated from Chattanooga High School in Chattanooga, Tennessee, and received his B.S. degree in Mechanical Engineering from Virginia Polytechnic Institute in 1944.

He started his career with NASA on April 5, 1944 as a Mechanical Engineer in East Engineering Section. He became Assistant Chief of Engineering Service Division on January 29, 1960 and was appointed Chief of Flight Vehicles and Systems Division on May 10, 1962.

CENTER CHANGES TIME SEPT. 6

Effective at 12 midnight on Sunday, September 6; Daylight Saving Time will end in this area. Accordingly, at midnight September 5, all clocks will be moved back one hour to conform to Eastern Standard Time.

The midnight shift will report for duty at 12 o'clock EST and complete the 8-hour shift at 8:30 a.m. EST. The 11 p.m. and 11:30 p.m. shifts will report to duty on Daylight Time and complete the 8-hour shift on Standard Time.

With the change in time, supervisors and time and attendance clerks are requested to insure that each person working the night shift accounts for a full 8 hours on duty. Employees called out for any emergency duty will be paid for the actual number of hours worked. This also applies to overtime payment.
NASA successfully launched a 320-pound spacecraft on a ballistic flight August 18 from Wallops Island. Left photo - The Scout vehicle which launched the reentry heating experiment is shown being erected at Wallops. Right photo - The heat reentry experiment, devised by scientists of the Langley Research Center, is shown being mated to Scout.

REENTRY HEATING EXPERIMENT
(Continued from page 1)

spacecraft stored temperature readings and ablation measurements gathered by thermocouples and sensors during a one minute period of communications blackout caused by ionization. After the spacecraft passed through the reentry portion of the flight, the tape recorder relayed the data to ground stations at Wallops Island, Langley Research Center, Bermuda, and ships.

Aircraft in the reentry area recorded the flight on cameras.

The Scout launch vehicle carried the 320-pound spacecraft to an altitude of about 130 miles before the two upper stages and a 17-inch spherical rocket motor propelled the payload down into the atmosphere. Total flight time was 11 minutes. The spacecraft landed in the Atlantic Ocean about 12 miles from the predicted impact point about 1,200 miles down range. There was no attempt at recovery.

NASA scientists will begin immediately to assess the information received from telemetry.

The term “ablation” has come into engineering use during the past ten years. It describes a complex process which takes place on the forward face of a heat shield during the very high energy conditions of atmosphere entry.

Charring ablator heat shields are composed of plastic resin materials reinforced with various added organic or inorganic substances.

Heat shields of charring ablation material protect a spacecraft in several ways. At the beginning of reentry heating they begin to decompose chemically, absorbing some heat in the process. During decomposition, gases are evolved and act as an insulating blanket as they pass over the heat shield surface. Finally, at the surface, a charred layer of coke-like material develops, capable of operating at very high temperatures to radiate heat away from the spacecraft. The uncharred lower layers provide an insulating effect throughout the reentry.

FOR SALE:
- Bicycle, tricycle and swing. Robinson, 247-1324.
- 100 x 200-foot lot on Mohawk Rd. E. C. Yates, PA 3-9324.
- 1957 50 x 80-foot Marlette mobile home - $1895. Block, 244-2991.
EMPLOYEE CONDUCT ON THE JOB

The manner in which an employee conducts himself on the job is frequently relevant to the proper, economical, and efficient accomplishment of his official duties and responsibilities. In addition, those employees who are in direct contact with the public play a most significant role in determining the public's attitude toward the Federal service, both by the manner in which they serve the public and the way in which they conduct themselves generally in the view of the public.

Employees are expected during duty hours consistently to apply themselves to the duties of their positions and to give full value in services rendered to NASA and the public. Illness, wasting time, or failure to be at work on assigned tasks will not be tolerated. Instructions of supervisors must be carried out promptly or within established dead- lines insofar as possible.

Employees may not use Federal property of any kind for purposes insofar as they do not directly relate to the duties of their positions. Instruction of supervisors must be obeyed.

Generally speaking, employees of the Federal Government are expected not only to be efficient, but also to conduct themselves in a manner which will reflect favorably on the employer. Although the Government does not wish to circumscribe the private lives of its employees, it does expect them to be honest, reliable, trustworthy, and of good character and reputation. They are expected to be loyal to the Government and to NASA.

HARVEY NEW CONSULTANT

R. Mose L. Harvey, director of the University of Miami Center for Advanced International Studies and professor of government, has been sworn in as part-time consultant to NASA. Consultant also to the United States State Department's icy Planning Council, Harvey will serve NASA in the field of international affairs.

He is a veteran of State Department service in the U.S. overseas, having served as deputy chief of mission counselor of Embassy in Helsinki, Finland (1957-59) as deputy and acting U.S. Representative to the Internal Atomic Energy Agency in Vienna, Austria (1959-61). Harvey, 54, is a native of Friendship, Georgia, and a Phi Kappa, magna cum laude graduate of Emory University, Atlanta, where he also received a master's degree. He received his doctorate in 1938 with highest distinction at the University of California.

ASTER EGG HUNT APRIL 17

Activities Association's Annual Easter Egg Hunt for children of Center employees will be held on Saturday, April 17 at 1:30 p.m. in the Activities area.

The annual event is free for NASA children. Two areas are marked off - one for the smaller children and one for the larger children. Parents are requested to stay out of the hunting vicinity as the children have the pleasure of finding the eggs. The hunt will continue until the supply of eggs has been used.

SALE: 3-bedroom rancher with separate dining room, family room, located in Riverside, Earl, 877-9104.

Final preparations are now underway at the John F. Kennedy Space Center for the Project Fire launch scheduled for the second quarter of the present calendar year. Ray Huloway Jr., Mechanical Service Division, is shown at KSC making adjustments during the checkout of a dynamic balancing machine which was recently moved from Langley Center and erected at KSC to support Project Fire. Precise balancing of the Project Fire spacecraft, which will be spun during flight at a rate of about three revolutions per second, is essential to the success of the mission. The 2,400-pound spacecraft, consisting of the velocity package, Antares II rocket motor, adapter, and reentry package, will be assembled at KSC and the Langley machine will be used to provide the required on-site balancing capability.

PROFESSORS TO VISIT HERE

Dr. James B. Eades, Head of the Department of Aerospace Engineering, Virginia Polytechnic Institute, will visit the Center on Thursday, April 15 to discuss their graduate program in Aerospace Engineering.

Dr. John W. Cep, Head of the Department of Mathematics, North Carolina State College, will visit the Center on Friday, April 16 to discuss their graduate program in Mathematics.

Accompanying Dr. Cep will be Dr. Ian N. Seddon, Professor of Mathematics at the University of Glasgow. Dr. Seddon, who is serving as a visiting lecturer at N.C. State, will give a lecture at 1:30 p.m. in the East Projection Room. His subject will be "Integral Transform Methods and Applications to Engineering Problems."

Dr. Thomas L. Reynolds and Dr. Sydney H. Lawrence, members of the Mathematics Department at the College of William and Mary, will also be at the Center on April 16 to discuss alterations in the departmental requirements for a M.A. degree in Mathematics.

Persons interested in attending the lecture by Dr. Seddon or in conferring with any of the above professors are requested to call the Training Office, 2547.

FOUND: Slide rule near West Gate. Robertson, 3349.
WANTED: Ride to New York City or Conn. any week-end before May. Meyers, 2538.
500 ENTER NASA CONTEST

Approximately 500 entries were received at the Center in the NASA-wide contest to provide NASA with a Cost Reduction Symbol and Slogan. Local contests were held at each installation with the deadline set for May 28.

The local contests will offer monetary awards up to $250 each for a slogan and a symbol and the winners of local contests will compete for grand prizes of $500.

Dr. Floyd L. Thompson, Center Director, has authorized U.S. Star Spangled Savings Bonds in the following denominations as prizes in the Center contest: A $500 bond will be awarded for a single entry which contains both a winning slogan and a winning symbol. If a single entry is not judged a winner for both symbol and slogan, two winners will be selected, one for the winning slogan and one for the winning symbol. Each of these winners will be awarded two $75 Star Spangled Savings Bonds. Four $25 bonds have been authorized for runner-up prizes if the judges determine there are entries eligible for this consideration.

The panel of judges will be selected from the Incentive Awards Committee and the winners will be announced in a future issue of Langley Researcher.

PROJECT FIRE SUCCESSFULLY LAUNCHED FROM CAPE KENNEDY

NASA scientists reported complete satisfaction with all test phases of the Project FIRE II reentry heating experiment launched from Cape Kennedy at 4:35 p.m. on May 22.

The blunt-faced reentry spacecraft reached the necessary speed of 25,400 miles per hour as it was propelled back into the atmosphere near Ascension Island in the South Atlantic Ocean. The spacecraft traveled a distance of 5,140 miles.

This was the second heavily-instrumented, 200-pound Project FIRE spacecraft launched by NASA to expand scientific knowledge of reentry heating.

First of two FIRE flights took place from Cape Kennedy April 14, 1964, and was the fastest controlled in-flight reentry experiment ever conducted. The spacecraft reached a speed of more than 25,800 miles per hour and telemetered a large mass of important direct measurements of reentry heating.

Primary purpose of the second flight was to gather more data than the first experiment provided during the period of highest heating.

Project FIRE is managed by the Langley Research Center, under the general direction of NASA's Office of Advanced Research and Technology. Project FIRE has helped resolve some of the differences between various reentry heating theories and flight results have been used in the interpretation of research data resulting from laboratory experiments.

A review of flight results indicates that the Atlas launch vehicle, the velocity package, the FIRE II reentry package, and data gathering equipment on and near Ascension Island all performed extremely well.

A preliminary examination of the telemetry data from the Ascension Island tracking station clearly indicates that heating rate information both total and radiative was received during the reentry, including the critical period of peak heating. Telemetry records also indicate that all test check points occurred as scheduled and the thermocouples on the beryllium calorimeters returned temperature readings for the three different reentry periods programmed into the flight.

Results of this last FIRE test will be useful to designers of spacecraft entering the atmosphere at speeds up to and beyond that of the Apollo Command Module on its return from lunar flights.

The reentry spacecraft flown in the second Project FIRE was a blunt-faced vehicle with a conical afterbody, similar in nearly all respects to the first reentry vehicle. Large amounts of laboratory data exist on similar shapes, and the blunt-face closely resembles the shapes of U.S. manned spacecraft on which information has been accumulated at lower reentry speeds.

(Continued on page 3)
NASA Launches Project FIRE

(Continued from page 1)

The launch vehicle for Project FIRE was an Atlas-D. A velocity package using the solid propellant Antares II rocket motor (also used as the third stage of the Scout launch vehicle) added the speed needed to drive the reentry payload back into the atmosphere at 25,000 mph.

During reentry most of the speed (kinetic energy) of the reentering vehicle is changed to heat (thermal energy). Reentries at lunar and planetary return speeds generate significantly greater heat, and higher heating rates, than entries at orbital speeds.

At the speed Project FIRE attains, the temperature of the gases in the shock wave just ahead of the blunt reentry body approaches 20,000 degrees Fahrenheit. This temperature is an indication of the energy being transferred from the speeding vehicle into the surrounding air. The energy transferred is great enough to break diatomic gas molecules into individual atoms and to ionize many atoms.

Several chemical and physical changes then take place in the hot gas area just ahead of the reentering vehicle. Atoms may combine with atoms of a different element instead of their original diatomic twins. New gas components, not originally present, may be generated and with them new physical characteristics.

¹ At satellite reentry speeds and below, convective or friction heating is predominant. Convective heating takes place when heat passes directly from the air to the vehicle flying through it. It occurs in smaller amounts at all flight speeds in the atmosphere.

At higher speeds, radiative heating becomes more important. Unlike convective heating, radiative heating does not depend on direct contact, but is analogous to the heat emitted from the burning of an electric stove which can be felt several feet away.

Project FIRE was conceived by NASA as the major national effort to obtain first-hand scientific information on the magnitude of heating to be expected during 25,000 mph reentries. The first experiment provided the data over three important segments of the heating curve. Flight 2 defined more completely the heating curve, particularly at the highest heating condition. This will have useful engineering applications in a variety of national programs and will increase the value of ground experiments and analyses.

Project FIRE is a research investigation of NASA's Office of Advanced Research and Technology, headed by Dr. Raymond L. Bisplinghoff. Project FIRE is a responsibility of the OART Space Vehicles Division, headed by Milton B. Ames Jr., Program Chief is Ralph W. May Jr., and Flight Project Officer is Ballard E. Quass.


The Atlas-D lifted off Pad 12, Cape Kennedy, at 4:55 p.m. on May 22 carrying the second 200-pound Project FIRE spacecraft on a ballistic trajectory to expand scientific knowledge of reentry heating. A velocity package using the solid propellant Antares II rocket motor added the speed needed to drive the reentry payload back into the atmosphere at 25,000 mph.

Books for Sale

The following books are for sale at the NASA Exchange Book Store in Building 386:


"Dynamics of Flight," by Etkin.

"Handbook of Physics," by Condon and Odishaw.

"Control System Synthesis," by John Truxall.

"Operational Mathematics," by Churchill.


"Electronic Processes in Materials," by Azaroff and Brophy.


"Laboratory Experiments in Organic Chemistry," by Adams, Johnson and Wilcox.


"Introduction to Solid State Physics," by Kittel.


ANNOUNCEMENTS

NEWLY WEDS... Betty Tholl, Full-Scale Research Division, and Thayer Sheets, Personnel Division, were married on June 19 at Aldersgate Methodist Church. Russell Sorrells, Full-Scale Research, served as usher... Carolyn DeAlba, Flight Mechanics and Technology Division, took her final vows with Joseph H. Kopelson, Analysis and Computation Division, on Tuesday, July 13, to discuss the graduate program I am meeting on Tu

REPRESENTATIVE TO VISIT HERE... Rollin Slinger, Field Representative of the Indemnity Benefit Plan, will visit the Center on July 13 from 3 p.m. until 4 p.m. Employees having problems or questions concerning their plans may call Lois Harris, 2523, for an appointment.

NEW HEIRESS... Announcing the birth of a seven pound, eleven ounce daughter, Laura Ann, on June 7 is Sheldon Schaffer on June 2. Remona Reel, Administrative Services Division, was married to Delmas Sturgill on June 19. Wedding bells rang on Saturday, June 26 when Russell Sorrells, Full-Scale Research, took his final vows with Lucile Faulkner, Hampton, at the home of the bride's uncle in Petersburg, Tennessee.

ENGAGEMENT... Making plans to desert the bachelor ranks is James E. Gardner, Structures Research Division. He is engaged to Sandra Ann Richards, Newport News, and plans call for an August wedding.

LITTERING... Staff members are reminded that the depositing, dumping or otherwise disposing of trash, garbage, or other unsightly matter on Langley Air Force Base and other areas under the jurisdiction of the commander, Langley Air Force Base, except in a proper receptacle for same, is prohibited.

PROFESSOR TO VISIT HERE

Dr. James B. Eades, Head of the Department of Aerospace Engineering, Virginia Polytechnic Institute, will visit the Center on Tuesday, July 13, to discuss the graduate program in Aerospace Engineering. Employees interested in an interview with Dr. Eades should call the Training Office, telephone 2611, for an appointment.

A NASA flight experiment - Project FIRE - created a brilliant meteoric display in the night-time skies near Ascension Island as a heavily-instrumented reentry package was driven into the atmosphere at more than 25,400 miles per hour. During the successful experiment, extensive heating measurements were recorded and telemetered to ground stations by the 200-pound spacecraft. The long horizontal streak in this composite photograph shows the FIRE II spacecraft plunging into the atmosphere at a speed higher than that to be experienced by a space vehicle returning from a lunar mission. It is the trail left by the FIRE reentry package and the separated Antares II rocket motor which provided the very high speed required. Both objects travelled a similar path during reentry. A brief burst of light at the far right records the firing of small tumble rocket motors to assure wide separation between the instrumented spacecraft and the Antares II. First radiation from air heated by the reentering objects begins at about 300,000 feet altitude. Flares associated with the break-up of the Antares motor and with the removal of heat shields from the reentry package are apparent near the middle of the main reentry track. The lower streaks were made by the Atlas launch vehicle and the velocity-package airframe shell as they reentered at a steeper angle some 50 seconds later and at a lower speed. The Project FIRE reentry package was blown along a 5,000 mile ballistic trajectory by an Atlas D launch vehicle from Cape Kennedy on May 22. Project FIRE was managed by the Langley Research Center.

APPRENTICE HONOR ROLL

Seventeen apprentices completed the spring semester with an average of 97 of better. Members of the honor roll are as follows:


NASA SCHEDULES SIXTH SCOUT REENTRY EXPERIMENTS PROJECT

NASA has extended the Scout Reentry Heating Project to include one more ballistic flight and has invited industry to submit proposals for the design of the spacecraft.

The sub-orbital reentry experiment is scheduled for 1967 and will be the sixth in the Langley Research Center project.

The sixth reentry experiment was approved after a NASA review of hypersonic boundary layer research indicated a firm need for additional flight information for comparison with heating data obtained in ground tests. The experiment will return vital information on reentry heating conditions on a slender cone at flight conditions typical of those to be encountered by advanced spacecraft.

The experiment will require the launching of a 13-foot long, pointed cone from Wallops Island using a modified three-stage Scout launch vehicle with no heat shield.

Reentry would take place near Bermuda at a velocity between 12,000 and 13,000 miles per hour.

The contractor will be required to build a flight qualified spacecraft, plus a prototype and one backup.

Four flights have been made in the Scout Reentry Heating Project and the fifth is scheduled for early next year. The fourth flight was a test of the Apollo charring ablator heat shield material (August 18, 1964).

ACTIVITIES ASSOCIATION'S NEW YEAR'S DANCE TOMORROW NIGHT

Center socialites are invited to usher out the old year and welcome the new one at the Activities Association's annual New Year's Dance tomorrow night at the Activities Building.

This outstanding social event will be semi-formal which means the ladies may wear long or short dresses and their escorts may wear business suits, tuxedos, or tails.

Only a limited number of tickets will be sold and admission will be six dollars per couple. Free setups and seasonal favors will be furnished. Reservations may be made by calling the Activities Building, telephone 4583. No reservations will be held after 10 o'clock.

Music for the affair will be furnished by Charlie Johnson and his band from 9 p.m. until 1 a.m.

Tickets may be purchased from the following members of the Executive Board: Humbert Rockey, Building 1230; Charles Clarke, Building 641; Linda Johnson, Building 1218; Roy Henley, Building 720-B; Joe Sieffring, Building 1230; Betty Sheets, Building 1251; Marvin Leffel, Building 1230; Rosalyn Smith, Building 648, and Dick Kurtz, Building 586.

SOCIAL SECURITY NUMBERS REQUIRED ON SAVINGS BONDS

It is the objective of the Treasury Department to have all U.S. Savings Bonds issued by Government disbursing offices under the Payroll Savings Plan inscribed to show the social security account number of the owner and the co-owner or beneficiary.

This will have two effects on NASA employees: (1) Those who are now participants under the payroll allotment for purchasing bonds will be requested to furnish the social security number of their co-owner or beneficiary. A form for this purpose will be distributed with the pay checks on January 3, 1966. (2) In the future, commencing January 3, all requests for payroll allotments or changes in present designations should show the social security number of the owner and co-owner or beneficiary (TD forms 2254 United States Savings Bond Authorization for Purchases and Requests for Change). Revised forms will have a place for the social security number, but the Center has been requested to use the present supply of forms by placing the number opposite the names on the form.

The Treasury Department regulation requires when bonds are cashed that the social security number be shown on the face of each bond cashed. Inscribing the number at the time of issuance will save the labor of writing it at the time the bond is cashed.

Forms for obtaining social security account numbers (SS forms) or answers to any questions, may be obtained from the Payroll Office, telephone 2284 or 2303.
Edward A. Hudgins, Analytical and Computation Division, was instrumental in the rescue of three crew members of a Navy H-34 helicopter which crashed into foggy Chesapeake Bay on the morning of Saturday, February 12.

**CENTER EMPLOYEE ASSISTS IN RESCUE OF THREE IN HELICOPTER CRASH AT SEA**

Edward A. Hudgins, experimental electronics mechanic in the Analytical and Computation Division, was instrumental in the rescue of three crew members of a Navy H-34 helicopter which crashed into foggy Chesapeake Bay the morning of February 12.

Hudgins, who is in the Input-Output Equipment Development Section of the Data Systems Branch, was at his home at 628 West Ocean View Avenue, Norfolk, when he heard a helicopter flying overhead - then go suddenly silent.

Sensing that something was wrong, Hudgins rushed to the beach outside his house and called out across the bay. Through the fog came the answering sounds of the downed crewmen who were out of the helicopter and struggling for survival in the water, about 700 feet offshore.

Hudgins and a neighbor launched a 12-foot aluminum dinghy into the 38-degree water and began paddling out into the bay, all the while using the voices of the flyers to guide them on their mission of mercy. Visibility was described by Hudgins as just about zero.

There were four survivors swimming in the water when Hudgins and his companion arrived.

A fifth crew member, whose body was recovered later that day, lost his life in the crash of the helicopter - which was submerged in the water except for a portion of the tail section.

One of the four survivors was rescued, with some difficulty.

(Continued on page 3)

The fifth Scout reentry heat experiment was successfully launched from Wallops Island on February 9. The purpose of the flight was to determine how well phenolic nylon spacecraft heat shield material performs under actual reentry conditions. The above photograph shows the Scout liftoff from Wallops. The experiment was designed and managed by scientists of the Langley Research Center.
SCOUT REENTRY TEST AT WALLOPS
(Continued from page 1)

tic, the density of which is made quite low by mixing in it millions of microscopic plastic spheres known as micro-balloons. It is classified as a charring-ablation material.

NASA officials reported the experiment provided essential test data by radio to downrange ships and aircraft.

A continuous real-time telemetry channel furnished data before and after the one-minute communications blackout period caused by reentry. The aircraft photographed the visible portion of the reentry.

A delay telemetry system, used successfully on previous reentry flights to transmit blackout-period information, failed to operate, apparently due to a transmitter malfunction. However, the continuous channel, by furnishing data on post-blackout conditions (temperatures and measurements of material consumption) will permit evaluation of total performance and correlation with previous ground tests.

This was the fifth flight in the Langley Center's Scout Reentry Heating Project sponsored by NASA's Office of Advanced Research and Technology (OART).

Langley staff members who served as key officials for the Scout Reentry Heating Project were:
- Reentry Heating Experiment - Joseph M. Hallissy, Jr., Project Manager; William A. Brooks, Jr., Experiment; Marvin B. Dow, Experiment; Milton L. Williams, Technical Project Engineer; Charles E. Feller, Instrumentation Project Engineer, and John N. Daniel, Tracking and Data Acquisition Engineer.

Scout Launch Vehicle - Roland D. English, Head of Scout Project Office, and James D. Church, Operations Manager.

CENTER EMPLOYEE ASSISTS IN RESCUE
(Continued from page 1)

ficacy, by another helicopter. The other three were pulled into two small boats - the most severely injured crewman rode in the boat operated by Hudgins and his neighbor and the remaining were pulled aboard another small boat which had reached the scene.

To enhance their chances of success, the two small boats remained together during the rescue and while they were on the way home. Before reaching the shore, they met up with a motor boat with three Norfolk policemen who were proceeding to the scene to offer assistance.

Together, the three boats headed for the safety of the shore - guided by the fog with the help of a compass which Hudgins had borrowed for the purpose from one of the fliers, who had thoughtfully included it in his survival kit.

CIVIL SERVICE EXAMS OPEN

The Board of U.S. Civil Service Examiners has announced the opening of an examination for Clerk-Typist, GS-3. The closing date for filing is March 21.

Persons interested in applying may obtain application forms from the NASA Board of U.S. Civil Service Examiners, telephone 4681.

FOR SALE: Siamese kittens. Harris, 398-6512.
FOR SALE: 1959 Ford, 6 cylinders, 4-door sedan, radio and heater, automatic transmission. Shideler, 828-5955.

Robert L. Girouard, President of the Langley Federal Credit Union, signs the contract for a 4,000 square-foot Credit Union Building to be erected by the Cochran Construction Company. Looking on with interest are five members of the Board of Directors. They are (from left): A. W. Carter, B. T. Deem, Secretary; Bernard Ellis, Chairman of the Building Committee; James C. Tingle Vice-President, and A. L. Braslaw. Construction details were discussed at the 30th Annual Membership Meeting on February 21. The completion date has been set for August 30, 1968.

NASA COVERTS APOLLO CONTRACT

NASA announced the conversion of its contract with Grumman Aircraft Engineering Corp., Bethpage, New York, for development of the Lunar Excursion Module to a cost-plus-incentive agreement.

Under terms of the new four-year contract, Grumman will deliver 15 flight articles, 10 test articles and two mission simulators. This adds four flight articles to the contract. The contract, ending December 31, 1969, will complete the Lunar Excursion Module (LEM) requirements for the Apollo Moon-landing program. Total cost is $1.019 billion.

The contract provides profit incentive for outstanding performance, cost control and timely delivery as well as potential profit reductions if performance, cost and schedule requirements are not met.

Grumman was selected by NASA in November 1962 to develop the LEM, the vehicle designed to carry the first Americans to the lunar surface. Cost of the work, added to the new agreement, totals $1.42 billion.

This conversion marks the second major Apollo contract conversion by NASA within the past two months. The agency announced January 21 that it had signed a contract conversion with North American Aviation, Inc., for development of the Apollo Command and Service Modules.

That contract conversion was in the amount of $971,300,000 and covered a one year period ending in December this year. Total cost of the NAA contract is $2.2 billion.

CREDIT UNION AUCTION: Two repossessed automobiles will be sold at auction on Tuesday, March 1 at 1:30 p.m. just outside NASA Gate 4. Up for sale will be a 1963 Ford Galaxie 2-door hardtop and a 1965 red Chevelle Malibu Sport Coupe with four-on-the-floor.
NASA SETS LAUNCH DATE FOR REENTRY F EXPERIMENT

A flight experiment in aerodynamic heating at speeds up to 13,500 miles-per-hour will be launched Thursday, April 25 by NASA from Wallops Station. The experiment was designed by Langley Research Center.

Purpose of the experiment, known as Reentry F, is to measure heat transfer in a slender cone at hypersonic speeds for comparison with ground studies. Scientists are unable, even with the best available laboratory facilities, to simulate all at once complex variable governing aerodynamic heating. For that reason flight experiments are needed to provide a basis for useful ground test results. The objective is to obtain in flight fundamental research data on aerodynamic heating and the transition from laminar (smooth) to turbulent flow in the boundary layer.

The payload of Reentry F is a graphite-tipped beryllium cone 13 feet long, tapering from 0.1 inch at the nose to 27.3 inches at the base. When it separates from the rocket third stage, the cone and its internal instruments will weigh 800 pounds. It will be launched on a Scout rocket.

Reentry F is the sixth flight in a reentry heating series sponsored by the Office of Advanced Research and Technology (OART).

For this experiment, three of the Scout’s four stages will be used. Two will fire on the ascending portion of the flight trajectory, and the third will drive the instrumented payload to hypersonic speeds after it has passed its apogee (highest point) and is descending into the atmosphere.

Aerodynamic heating, the phenomenon which causes a meteor to flare as it streaks into the Earth’s atmosphere, is reasonably well understood in relation to flight of high speed aircraft, missiles and spacecraft. Much research and engineering has been done to protect flight vehicles against its effects — heat shields of manned spacecraft are well-known examples.

The less familiar term “boundary layer” refers to the layer of air close to the surface of a moving object in flight. The moving object carries a very thin sheet of air molecules held to its surface by friction. These molecules rub against their neighbors, generating heat which increases as speeds go higher.

When the molecules nearest the vehicle surface slide smoothly over their closest neighbors, the boundary layer is said to be “laminar” or smooth. Designers would prefer to have smooth attached boundary layers over the entire surface, for they reduce air friction and heating.

The boundary layer is sensitive to many factors including speed, pressure, vehicle shape, surface roughness and temperature. Instead of remaining smooth, it frequently begins a churning or turbulent motion, and the “scrubbing” action in the turbulent zone greatly increases aerodynamic heating.

When the factors which cause turbulent boundary layers and higher heating rates are more thoroughly understood through research, designers of many types of hypersonic vehicles will benefit by being better able to promote or prolong smooth, laminar boundary layer conditions.

The following Langley staff members are key officials for the Scout Reentry F Project:

- Eugene C. Draley, Assistant Director for Flight Projects;
- Earl C. Hastings, Project Manager of Reentry F;
- James C. Scouler, Operations Director; John N. Daniel, Tracking and Data Acquisition; R. D. English, Head of Scout Project Office; B. Leon Hodge, Operations Director; Robert A. Schmidt, Payload Coordinator; and E. Eugene Hall, Systems Integration Engineer.

Members of the Wallops team are Robert T. Duffy, Test Director, and Tom W. Perry, Project Engineer.

DAYLIGHT TIME EFFECTIVE APRIL 28

Staff members are reminded that in accordance with the Daylight Saving Time Bill, all clocks in Virginia will be moved forward one hour at 2 a.m. on Sunday, April 28. Daylight Saving Time will be observed for a period of six months. Accordingly, clocks will be moved back one hour at 2 a.m. on Sunday, October 27.


FOR SALE: 1967 Triumph Bonneville T-120 motocycle; 6,000 btu, 110-volt Emerson air conditioner - $90; 2 KLH model 17 speaker systems - $98, floor model sunlamp - $10. Shomo, 229-7016.
LOCAL AIAA SECTION PLANS DINNER-DANCE FOR MAY

The Hampton Roads Section of the American Institute of Aeronautics and Astronautics will have a dinner-dance as its final meeting of the season on Friday, May 17 at the Activities Building.

Richard R. Heppe, Special Assistant to the Director of Engineering at the Lockheed-California Company, will be guest speaker. The title of his talk will be “A Designer’s Look at What’s Ahead in Aeronautics.”

Heppe’s look at what’s coming is based on knowledge and plans growing from Lockheed’s diverse military and commercial programs. He will discuss current progress and future plans in both military and commercial vehicles as well as in the rotary and fixed wing fields.

Heppe has been active through a series of technical and engineering management assignments in the conception and development of every new airplane of the Lockheed-California Company during the past 20 years.

The meeting will be preceded by a social hour at 6:30 p.m., followed by dinner at 7:30, the talk at 8:30, and dancing thereafter to the music of The Cruisers.

Reservations may be made by calling Brian O’Hare, 877-3634; Bernard Spencer, 722-6476; or Conrad Willis, 838-0696. Guests are cordially invited to attend.

LANGLEY AWARDS CONTRACTS FOR PLANNING MARS MISSIONS

Langley Research Center has awarded three advanced study contracts to provide basic information for planning possible future unmanned explorations of Mars.

Three aerospace companies have been selected to conduct separate five-month studies of different aspects of an unmanned interplanetary mission. None of the proposed contracts involves actual missions or hardware.

The firms are the Martin Marietta Corporation, Denver, Colorado; The Boeing Company, Seattle, Washington; and the McDonnell-Douglas Corporation, St. Louis, Missouri. Each contract is approximately $100,000.

Martin will analyze trajectory, guidance and navigational requirements of two approaches to Mars—a direct landing from an Earth launch versus a landing on the planet’s surface from a Mars orbit.

In addition, Martin will provide information on the subsystems needed for both types of entry spacecraft, and

(Continued on page 3)

REENTRY F VEHICLE LAUNCHED SUCCESSFULLY FROM WALLOPS

NASA launched a Scout reentry experiment in aerodynamic heating at 12:19 a.m. EST April 27 from Wallops Island.

The purpose of the experiment, known as “Reentry F,” was to measure heat transfer rates on a slender cone at hypersonic speeds for comparison with ground studies. Primary objective was to obtain in flight fundamental research data on aerodynamic heating and the transition from laminar (smooth) to turbulent flow in the boundary layer.

The payload was a graphite-tipped beryllium cone 13 feet long, tapering from 0.1 inch at the nose to 27.3 inches at the base, and weighing 800 pounds.

The experiment was designed by Langley Research Center. Reentry F was the sixth flight in a reentry heating series sponsored by NASA’s Office of Advanced Research and Technology (OART).

Among the key Langley personnel responsible for the

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