

PATENTS ISSUED

The following patents were issued to Lewis employees recently:

Patent No. 2,952,304 was issued to I. Irving Pinkel for "Back Structure for Crash Resistant Seat." This is one of two patents obtained by Mr. Pinkel for an airplane seat that will deform elastically with sufficient frictional damping in a crash.

Patent No. 2,943,442 went to Edward F. Baehr for "Rocket Thrust Chamber Construction." This is a combustion chamber comprised of plurality U-shaped channels secured together to form a hollow structure. The channels are wrapped with wire which is secured to the ribs of the channels and forms a tight outer skin for a chamber.

Patent No. 2,944,316 was shared by William Maxwell and Joseph Douglas for "Process of Casting Heavy Slips." This process casting is set forth in detail in NACA TN 3769. In the process, combined gravitational and vibrational forces are used to fill a mold with low-liquid content slip.

Orbit: November 18, 1960

Orbit: March 10, 1961

FOR YOUR INFO

Lockheed Aircraft, in a letter to its stockholders, quoted parts of a news release issued by the FAA on the approval of the modification program for the Electra turbo-props.

We thought you would be interested in the following paragraph from that release:

"The agency (FAA) has employed every means available to it, including the expert technical assistance of the National Aeronautics and Space Administration, generally recognized as the world's leading authority in the aeronautical sciences. In addition, the services of leading aeronautical experts from our aviation industry at large have been employed. Every available scientific and technical resource has been brought to bear to assure the traveling public of the airworthiness of the Electra, before permitting it to return to its originally designed operating speed..."

The NASA investigating team was led by our own I. Irving Pinkel, Chief, Fluid System Components Division.

Names in the News



Irv Pinkel, Chief of the Fluid System Components Division, was treated to a surprise party recently.

The occasion was the first anniversary of a plane crash at Cleveland Hopkins Airport. Mr. Pinkel, who is an eminent authority on airplane safety and crash investigations, was aboard the plane.

Retirement

Porter L. Elliott, who was among the Center's first employees, retired April 30. He joined Lewis on Dec. 10, 1941. At the time of his retirement, he was a construction representative in the Construction Branch of the Plum Brook Station's Engineering Division.

Herbert B. Richards, who joined Lewis in April, 1943, retired last week. He was mechanical equipment operator and worked in the Facilities Operations Division.

Model Aircraft Club Being Formed

An organizational meeting of a Model Aircraft Club for Lewis employees will be held at 5 p.m., Wednesday, May 19, in the 10x10 building conference room. All those interested in joining the club should attend the meeting.

The plane's nose wheel collapsed on landing. There were no serious injuries.

He is shown above with one of the mementos given him at the party — a model of the cracked-up aircraft. To his right are Oscar Schey, Chief of Technical Services, and Lewis Pilot Bill Swann.

Reminder:

Lewis staffers **Milton and Anne Lipes** will discuss their around-the-world trip on Friday, May 21, from 8 to 11 p.m. in the DEB auditorium. Tickets are available in the Ad Building and DEB lobbies.

Note of Thanks

Frances H. Jackson, Facilities Engineering Division, wishes to thank her many friends at Lewis, who gave her such a gay and generous send-off at the time of her retirement.

LEWIS NEWS

Lewis News Winn

Lewis Research Center
National Aeronautics and Space Administration
Cleveland, Ohio

Vol. 2, No. 22

October 29, 1965

The Lewis News was an award-winning newspaper in a contest for industrial newspapers a

The Combined Federal Campaign issued October 6, was cited for its contribution and awarded third place in the cover ca

Henry T. Jacques, editor of the Lewis News, was at the UA's Mid-Campaign Commemorative Dinner on Monday evening, October 25, at the UA

All industrial newspapers published in the Cleveland area were eligible for awards in the three categories

Preliminary judging was done by the Ohio Industrial Editors Association, and the final award was given by a panel of Detroit industrial pu

Service Awards Ceremonies Honor Many

NASA Honorary Service Emblems were presented to 131 Lewis employees during ceremonies held October 22 in the DEB auditorium.

In his opening remarks, Dr. Abe Silverstein complimented the recipients on their dedication and devotion to government service.

The Director then spoke of the recent NASA awards to Bruce T. Lundin, Associate Director for Development; Seymour C. Himmel, Agena Project Manager, and the Agena Team; and presented citations to the two men.

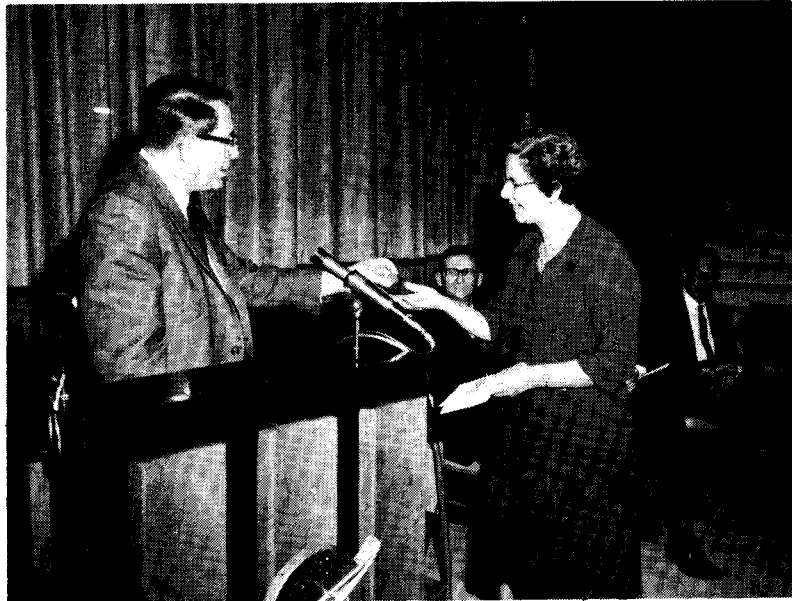
An award for 40 years of service was presented to Esther E. Wagner.

There were 12 named for 30-Year Awards: Josephine M. Case, Percy E. Cheesman, Leona T. Climo, Francis J. Dutee, Mildred C. Huetter, Elwood D. Lowrie, Storm B. Miller, I. Irving Pinkel, Thomas H. Russell, William J. Smothers, L. Richard Turner, and Joseph Wiegus.

The 40- and 30-Year Awards were presented by Dr. Silverstein.

Presentations of 20-Year Awards were made by: Eugene J. Manganiello, Deputy Director, to persons

(Continued on Page 6)



Cited For 40 Years

ESTHER E. WAGNER received the 40-Year Service Award from Dr. Abe Silverstein. Miss Wagner began her government service with the Veterans Administration. She came to work at Lewis in 1942. She has held many jobs here, is now Imprest Fund Cashier.

Photo by Paul Riedel.



I. IRVING PINKEL, (right) Chief of Lewis' Fluid System Components Division, inspect an exterior control panel on the Apollo 204 spacecraft seeking the cause of fire which claimed the lives of Astronauts Grissom, White and Chaffe on January 27.

"What Good Is the SST?"



The question . . . "What good is a supersonic transport?" . . . will be discussed by I. Irving Pinkel, Chief of Lewis' Fluid System Components Division, April 6 at the

Cleveland Engineering Society.

The meeting is sponsored by the design group of the Cleveland Chapter, American Society of Mechanical Engineers.

Pinkel, whose division is involved extensively in research in support of the supersonic transport program, will cover eight basic points concerning the SST: What is it? When will it fly? What

special problems does it present to the designer? How will passengers like it? How will the pilots like it? How will the airlines like it? How will those who don't fly in it like it? And, what good is it?

His talk will be preceded by a social hour at 6 p.m. and dinner at 6:30. Reservations may be made with Miss Edie Maxwell at the Cleveland Engineering Society, 361-3100.

HOW LONG WILL YOU LIVE?

— Divide your height in inches by the cube root of your weight to get your Ponderal Index. If your P.I. is lower than 11.7, you're in trouble. If it's 13.5, you're an unusually good risk, according to Dr. Carl Seltzer, a prominent nutritionist.

Apollo Investigation

Related by Pinkel

I. Irving Pinkel, Chief of the Fluid System Components Division, addressed a full house in DEB auditorium on May 15 to relate the investigation of the January 27 Apollo tragedy.

Selected by the Apollo 204 Review Board to serve in the investigation which ended in early April, Pinkel has been actively involved in flight safety work during much of his career here.

In introducing Pinkel, Dr. Abe Silverstein strongly emphasized the need for safety at Lewis. "The work we do will be hazardous," he said, pointing out that "We can lose it overnight by . . . one mistake. We can destroy faster than we can build up."

Illustrating his talk with slides of the burned-out interior of the Apollo space capsule, Pinkel provided a step-by-step analysis of what happened.

He showed how the investigators narrowed down the probable origin of the fire to the teflon-coated wiring under the doorway covering the breathing oxygen purifier. This wiring, he said, was probably chafed by the door, causing an electric arc to start the blaze.

In reconstructing the accident, investigators conjectured that the

Instruction on the Scott Air Packs is given by Dial Boehmer, Plant Protection Office, in classes held twice a day on Monday, Wednesday and Thursday. Training includes seeing a film, hearing about Air-Pack's uses, and then using the equipment itself.

"It's not enough to read procedures on safety," remarked Andy Szuhai, head of the Safety Office. He explained that Project STEEP will consist of simulating an emergency and having the participants follow through on it.

Later, it may be that a group from the Safety Office will walk into your laboratory or test cell to simulate an emergency condition. But if Project STEEP is successful, you'll know what to do.

flow of the fire was toward a break in the floor. Much combustible material in the pure oxygen environment encouraged the blaze.

"This is a lesson learned," Pinkel affirmed. Consequently, a number of corrective measures have been taken. These include the selection of materials which will be difficult to ignite, the development of fire extinguishing equipment for use inside the space capsule and the redesigning of the 'escape hatch.

Pinkel to Talk On Apollo Fire At AIAA Meet

I. Irving Pinkel, chief of the Fluid Systems Components Division, will speak on the investigation of the Apollo 204 fire at the October 19 meeting of the AIAA's Cleveland section.

The talk will be given at 8 p.m. in DEB auditorium, preceded by a social at 6:30 p.m. and dinner in the DEB Cafeteria at 7 p.m. Cost for the social and dinner is \$3.50 per person, but individuals may attend only the presentation.

Pinkel was selected by the Apollo 204 Review Board to serve in the investigation of the tragedy. He will provide a step by step analysis of what the experts believed to have happened.

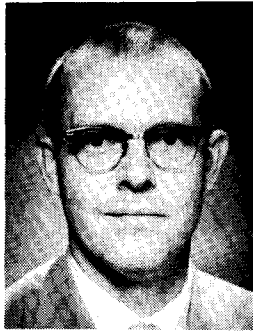
For reservations, contact Virginia Bischoff, PAX 8387.

Lewis News

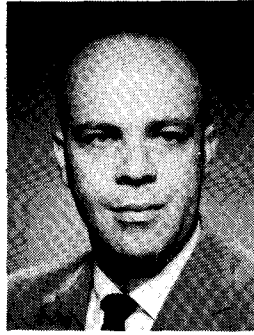
October 13, 1967



Edmund Jonash



William Dunbar



Milton Beheim



Newell Sanders



Dr. Seymour Himmel



Irving Pinkel

New Chiefs Named in Reorganization

LEWIS NEWS

Lewis Research Center Cleveland, Ohio
National Aeronautics and Space Administration
Vol. 5, No. 10 May 10, 1968

Invest in Bonds--Save Painlessly

Savings Bond Drive Is Underway

The 1968 Savings Bond Campaign at Lewis got underway last Monday with an appeal to take a "fresh look" at Savings Bonds and Freedom Shares as an efficient, painless and profitable way to save.

Chairman of this year's campaign, which runs from May 6 to June 14, is Henry C. Barnett, assistant director for Administration. Jack Powell, chief of the Administrative Services Branch, is campaign manager. Donald Cooksey of the Rocket Systems Division will coordinate the solicitation at Plum Brook Station.

At the kick-off meeting on May 6, Powell told division representatives: "We all should support this campaign. Even if people have considered bonds before and rejected them for any reason, they should take a fresh look at them this year. If someone has no other investments, Savings Bonds should be the program for him. If someone has other investments in stocks or deposits in banks, he should invest in bonds to round out and balance his investments."

The advantages of investing in bonds were also emphasized at the meeting by a guest speaker, Charles Martin, Cleveland representative of the Savings Bond Division, U.S. Treasury Department.

What are the real advantages of buying bonds? The regular Series E Bond pays 4.15 percent interest and the new Savings Note (Free-

dom Share) pays 4.74 percent, without any risk to the investor.

In addition, payroll savings is
(Continued on Page 2)



INVEST IN YOUR FUTURE — Miss NASA-Lewis, Carol Chapman, encourages all employees to sign up for Savings Bonds and Freedom Shares when contacted during the 1968 Savings Bond Campaign at Lewis, May 6 to June 14. (Paul Riedel photo)

Major organizational changes establishing three new divisions and an Aerospace Safety Research and Data Institute at Lewis have been announced by Dr. Abe Silverstein.

The reorganization, which reflects the growing emphasis on aeronautics, establishes:

— A new Special Projects Division for research on reduction of jet engine noise and on problems of vertical or short take-off and landing of aircraft. Dr. Seymour C. Himmel was named chief of this division and also assumes the newly-created post of assistant director for Aeronautics. Dr. Himmel has been serving as assistant director for Launch Vehicles since

Jan. 1966. Newell D. Sanders, chief of the Chemistry and Energy Conversion Division, will take on additional duties as assistant chief of the Special Projects Division.

— A new Wind Tunnel and Flight Division for studies of aerodynamic aspects of flight vehicles with emphasis on propulsion problems. Appointed division chief is Milton A. Beheim, moving up from his job as chief of the Aerodynamics Branch, Advanced Systems Division.

— A new Launch Vehicles Division, comprising the previously separate Centaur, Agena and Atlas Project offices. This division, to be headed by Edmund R. Jonash, formerly chief of the Centaur Project Office, will have responsibilities for all of Lewis' launch vehicle programs. William R. Dunbar becomes project manager for Centaur. Edward F. Baehr and H. Warren Plohr continue in their positions as project managers of Atlas and Agena, respectively.

(Continued on Page 3)

Mixer Tonight; Soiree Planned

If you're looking for a swinging time tonight (May 10), come to LeSAC's mod mixer.

How mod? The Lewis Social Dance (LSD) will be bathed in psychedelic lights and feature groovy music by the Dan Zola Combo, a go-go girl, do-it-yourself painting and graffiti, and sundry prizes.

The mixer begins at 9 p.m. and continues 'til 1 a.m. in the Ad. Bldg. auditorium. Refreshments will be served. Dress will be casual.

Tickets are available from LeSAC Boosters, or at the gate, at \$1.75 for employees, \$2.25 for outside guests.

Lewis to Seek Safety Answers

Lewis' newly-established Aerospace Safety Research and Data Institute will be a creative approach to the problem of maintaining the highest safety standards possible in the nation's aerospace program.

In discussing the Institute, I.

Irving Pinkel, who will serve as its director, said it will serve "to assemble both old and new information on safety and organize it into forms most useful and most easily understood by the engineers and technologists who must apply the information. We will help in

interpretation when novel safety problems arise and act as consultants whenever possible."

Pinkel stated the Institute has four major objectives:

— Evaluate existing information on safety and place it in computer storage in a systematic way for easy retrieval;

— Add to the body of existing information through research programs sponsored and supported by the Institute;

— Prepare several types of reports including safety advisories, safety summaries and educational material.

— Provide consultants to assist in the analysis of safety problems and the application of safety data to a particular job.

Pinkel says the Institute will start with a core program designed to meet NASA immediate safety interests. This core program will be prepared in cooperation with both NASA's operating elements and those of NASA's prime contractors.

Artists Asked to Submit Work

An Arts and Crafts Exhibit will be featured at the June 16 "Old-Fashioned Sunday Afternoon in the Park" LeSAC event, displaying work by Lewis employees and members of their immediate families.

The exhibit will feature painting (opaque and transparent media) and crafts using clay, fiber, metal, glass, etc. Persons may submit any number of framed paintings and crafts, but a maximum of five matted paintings. The deadline for submitting items is June 12.

Purpose of the exhibit "is to encourage crafts, creativity and staff appreciation of art, and to stimulate hobby interests," according to Jim Daus, head of the Special Presentations Section. Daus is in charge of the Arts and Crafts Exhibit for LeSAC. Others on his committee are Thomas Clark, Mary Brady, and Paul Kick.

Anyone interested in displaying his work may contact one of the above committee members for information and exhibit forms.

The exhibit will debut at the LeSAC event, which will be held outside the Guerin House, and then will be displayed during the following week in the cafeterias.

Many Visitors at Lewis in Typical Day

Each month literally thousands of visitors are received at Lewis. Their missions vary. Most are here on official business to meet with Center scientists and engineers, management, and procurement personnel. Still others come to tour our research and development facilities.

Visitor figures through July 31 reflect this busy activity. This year there have been visits by 21,162 individuals, 60 foreign guests, and 5,120 people on 117 formal tours.

August 22 was a particularly busy day for receiving foreign guests (see photos). Lewis was visited by three representatives of the Indonesian Air Force and Army who were interested in personnel management and photogrammetry. Masatami Iwamoto of the Mitsubishi Electric Co., Japan, saw research on superconducting magnets. Dr. Franc Hindelang, member of the Advisory Group for Aerospace Research and Development, NATO, from Germany lectured here on shock wave research. Colonel S. Inglesby of the South African Air Force discussed aviation safety for military aircraft with I. Irving Pinkel, chief of the Aerospace Safety Research and Data Institute.



James Connors (standing) chats with Mrs. Hudelson, Council on World Affairs, and Indonesian visitors.



Dr. John Evvard welcomes Dr. Fran Hindelang of Germany to the Center.



Japanese visitor, Masatami Iwamoto.



Col. Inglesby discusses military aircraft safety with Irving Pinkel (left).

Lewis shares pride in Apollo program

(Begins Page One)

ment which draws the boiling cold hydrogen into the pumps. Previous research conducted on this component at Lewis' Plum Brook Station near Sandusky, Ohio, helped verify data of the Marshall Center that showed the inducers would permit a desired low pressure in the fuel tank.

Lewis also assisted a Marshall task group in achieving combustion stability in the F-1 engine. Dr. Richard Priem, experienced in advanced rocket combustion, was one of this group studying the "rocket screaming", a phenomenon caused by strong resonant pressure waves and which can destroy a rocket engine in seconds.

One other area of consultation with Marshall during the F-1 development was on fabrication of the thrust chamber. Walter Russell, a fabrication specialist served on the committee to review the materials and processes for the fabrication of the furnace-brazed thrust chamber and its jacket.

Staff members also lent their technical knowledge to other areas of the Apollo propulsion systems. Early studies were conducted at Lewis on the type or storable propellants to be carried on the upper stage of the Saturn V vehicle and on the spacecraft.

The Center's unique Zero-Gravity Facility was called upon to do two jobs for the Apollo program. In mid-1960, engineers used this facility to help solve the problem of restarting the Service Module's propulsion system in space. Using surface tension phenomena observed during these studies, Lewis engineers assisted in designing a retainer for the propellant in the fuel tank. This retainer would keep enough propellant at the bottom of the tank to ensure that propellant would enter the pump and restart the engine.

The Zero-Gravity Facility was used to help solve a similar problem in the SIVB third stage of the Saturn V for the Marshall Center. In flight when the SIVB engine shuts down, auxiliary hydrogen-peroxide thrusters are turned on to settle the sloshing propellants. During the coast phase the propellants are maintained in the bottom of the fuel tank by the thrust obtained when

boiled off hydrogen gas is ducted through a small thruster system. Studies in the Zero-G Facility were able to determine the proper size of these various thrusters.

One of the astronaut's concerns about how weightlessness in space might affect fuel cell performance drew helpful information from Lewis too. Fuel cells are carried aboard the Service Module to provide electric power to spacecraft systems. Consequently, Lewis researchers investigated this area and made known to the Manned Spacecraft Center that the condenser of the fuel cell did not depend on gravity to operate properly. Lewis also was asked by MSC to determine the heat transfer characteristics of the condenser; this information was used in a computer simulation of the spacecraft's electrical power subsystem.

During 1967 Lewis engineers were consulting on the overall combustion and system stability of the Lunar Module ascent engine, the critical propulsion system for the Ascent Stage which returns the astronauts from the moon to lunar orbit. John Wanhainen, a chemical rocket expert, was part of a task group to overcome the high frequency combustion instability noted in the engine. Two other engineers, Robert Dorsch and Leon Wenzel, ran analog computer analyses of low frequency combustion instability characteristics.

The Center's 8x6-foot transonic and 10x10-foot supersonic wind tunnels were used in extensive tests on models of Saturn booster stages. The first such tests were made in the late 1950's when engineers studied base flow and heating tests on the SIB booster, the eight-engine first stage of the Saturn I. The 1/45th scale model had real, working rocket engines of 250 lbs. thrust each. Data were taken over a range of speeds from takeoff to Mach 3.5 and of altitudes from sea level to 150,000 feet. This simulation of actual flight conditions provided valuable information on the pressure and heat loads experienced on the base and engine's compartment of the SI vehicle.

In the 1964-1966 period base flow and heating also were studied in both wind tunnels for the SI C first stage of the

Saturn V. Also, the force required to move the engine nozzles for directional control had to be measured. These measurements helped determine the size of the actuators required to gimbal the engines.

In all manned missions, safety of the public, the astronauts, and the operating crew, is a major concern to the NASA. In case a mission must be terminated early, one of the first options the astronauts have is to employ the Launch Escape Vehicle and Tower which stands atop the Command Module. This escape system propels the Command Module out and away from the Saturn V. During 1964 tests were made on the system in the Lewis Research Center's 8x6 tunnel at the request of the Manned Spacecraft Center. In the tunnel, a model of the escape system attached to the Command Module was released at various angles to determine its stability under simulated flight conditions.

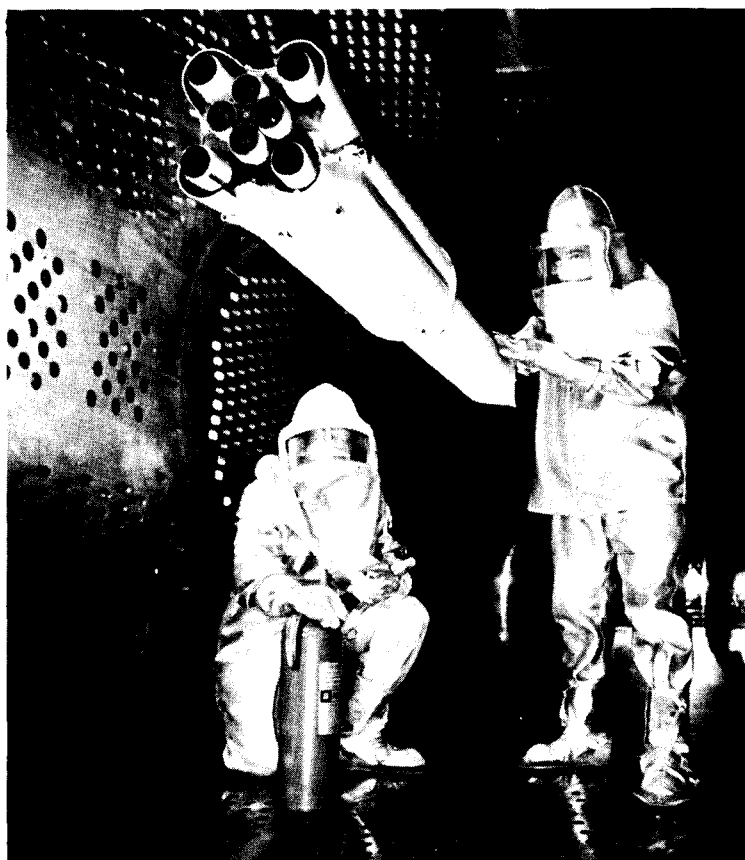
Safety was the subject that brought I. Irving Pinkel, now Lewis' Assistant Director for Aerospace Safety, to serve as a consultant to the Apollo 204 Review Board. In that capacity and as a member of the team which investigated the causes of the spacecraft fire which took the lives of three astronauts early in 1967, Pinkel helped to recommend changes in the capsule to prevent a future tragedy.

Through extensive consulting on fracture mechanics, Lewis professionals have assisted in improving both the more than 140 pressure vessels of the Saturn V, and the SII fuel tank. Particular contributions by Lewis materials scientists to the construction of pressure vessels included improved test methods, and methods of design and analyses based on new concepts in fracture mechanics technology. Other materials scientists and engineers provided fracture research data on the critical weldments of the SII fuel and on the tank material itself; they also recommended cryogenic proof tests, and suggested flight conditions to reduce win loads on the vehicle.

Thus, Lewis scientists and engineers, like thousands of others who have served the Apollo team, have their hopes riding high with Apollo 11.



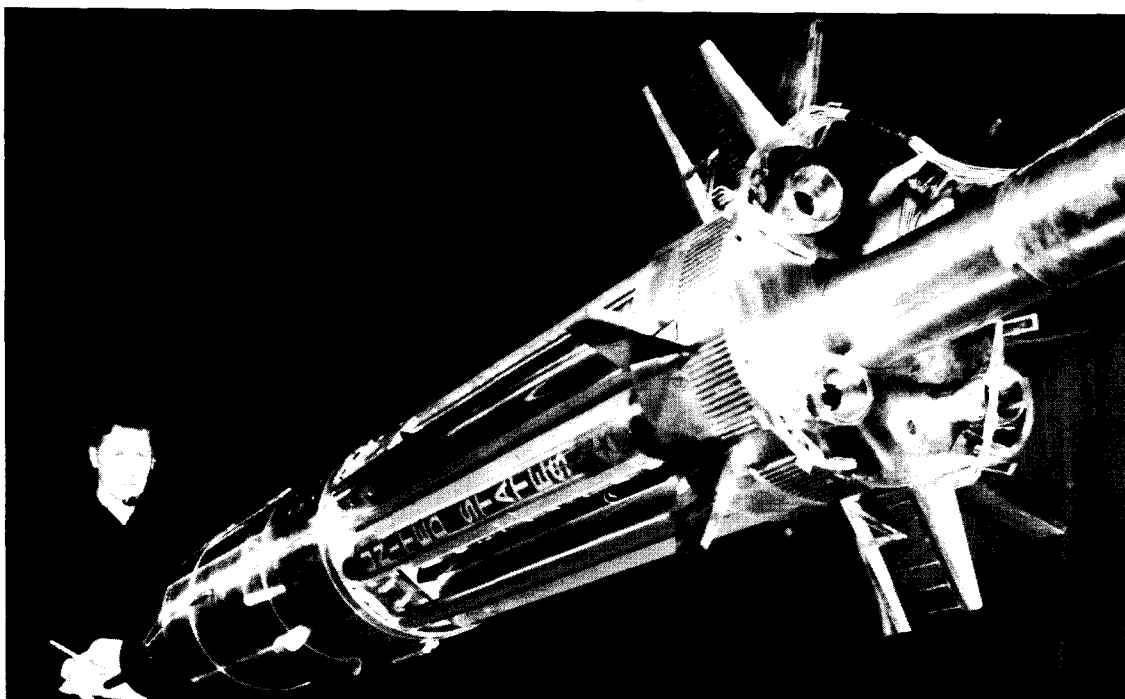
On July 21 astronaut Neil Armstrong is scheduled to plant the American flag on the lunar soil, in view of millions the world over via direct TV broadcast.



Lewis technicians checked out a model of the one and a half million pound thrust Saturn booster which was being readied for base heating problem studies in the Center's supersonic wind tunnel.



Dynamic stability tests of the Apollo command module and its launch escape system were performed in the Lewis 8x6-foot transonic wind tunnel. Scale models were used in the tests.



A 1/20th scale model of the Saturn 1-B launch vehicle was finally checked before aerodynamic and load tests were conducted in the Lewis 10x10-foot supersonic wind tunnel. Lewis supported Marshall Space Flight Center in the Apollo Saturn testing.

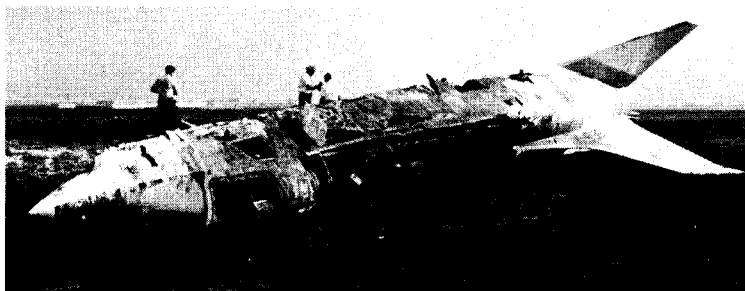
Rescue squad acts...

(Continued from Page 1)

tion Branch, suffered from smoke inhalation and was taken to Fairview Hospital.

Currently a Lewis Board of Accident Investigation is studying the crash to determine its causes. I. Irving Pinkel, Assistant Director for Aerospace Safety, was appointed by the Director to head the Board. Other Lewis members of the Board include: Robert

R. Hibbard, member of Lewis' Standing Accident Investigation Committee; Anthony A. Mastronuzzi, F-8 Crew Chief; and William H. Swann, Chief of Aircraft Operations Branch. Also on the Board are Gary E. Krier, NASA-Edwards Research Pilot; James Martin, Flight Systems Program Manager for NASA Headquarters; and Thomas K. McDill, representing the National Transportation Safety Board.



The charred TF-8A chase plane fuselage, with wings sheared from the crash, came to rest on its left side off the landing strip at Cleveland Hopkins Airport.

(Martin Brown photo)



Dan Keliher (standing) tells it as he sees it to members of the effective speaking course. Dr. James Ross, Instructor, is seated at far left. (Paul Riedel photo)

Technical staff learns to

Tell it like it is

Speaking with marbles in your mouth isn't the only method of learning to speak correctly. It may help your diction but it won't do anything for your delivery.

Dr. James Ross, Chairman of the Speech Department at Baldwin-Wallace College, Berea, Ohio, is teaching 36 Cleveland and Plum Brook employees to speak another way. The course, Effective Speaking, is being taught at the Mitchell House. Dr. Ross says he is stressing the delivery and voice aspects of effective speaking. "Most of the

students have a technical background. They know what they are talking about and are well organized. It's just a matter of teaching them how to say it."

The 14-hour course teaches class members how to best explain what is new and interesting in their area of specialization. The students analyze their voice quality and enunciation through the use of audio tape recordings. Two video-tape recordings are made to highlight strong personal characteristics as well as weaknesses.

Most speeches are organized and outlined prior to the class. However, impromptu or "off the cuff" speeches also are made. The students must be prepared to answer questions after each presentation.

Stan Rea of the Training Branch says the Effective Speaking Course is part of an overall program to improve the techniques of communication. "This is a pilot course that may be the forerunner to additional courses for other employees beginning next fall," he said.

Staff probes Apollo 13

The investigation of the Apollo 13 explosion in the Service Module during the second day in its flight to the Moon has marshalled a team of NASA and industry experts in every field of mission work. Impartial scientists and engineers are helping those in government and contractor positions of Apollo responsibility to determine the cause of the electrical failure which put the spacecraft on a 1/3 power source and forced Mission Control to return astronauts Lovell, Swigert and Haise to Earth after a single loop around the moon.

here, has been appointed an observer to the Apollo 13 Failure Review Board. Also investigating the engineering aspects of the failure are Dr. Seymour Himmel, Assistant

Director for Rockets and Vehicles, Edward Baehr, Assistant Chief of the Launch Vehicles Division; and William F. Brown, Chief of the Strength of Materials Branch.

Explore tomorrow

Want something different to do this Saturday (May 23)? Why not attend the technical conference & picnic being held by Lewis' Aerospace and Electronics Explorer Post.

Beginning at 9:30 a.m. in the DEB auditorium, each group will present papers and give demonstrations of their R & D activities. A bring-your-own picnic will be held at noon at the picnic grounds, followed by a tour of Explorers work areas and projects.

Irving Pinkel, Director of the Aerospace Safety Research and Data Institute

Savers profit...

(Continued from page 1)

the lockwasher. His suggestion helps solve the



Staff conference set

To learn the inside story of the Apollo 13 failure, come to the combination staff conference and meeting of the American Institute of Aeronautics and Astronautics (AIAA), October 12 at 5:30 p.m. in the DEB Auditorium.

I. Irving Pinkel, Director of the Aerospace Safety Research and Data Institute will be the main speaker at the dual function. His talk will cover the Apollo 13 accident review.

Among Pinkel's many honors are the Laura Taber

Barber Award, the Flight Safety Foundation Award and the NACA Distinguished Service Medal. He has served on subcommittees on Aircraft Fire Prevention and Flight Safety, among others. In 1967 and again in 1970 he served on investigating teams of the Apollo 204 and Apollo 13 accidents.

The staff conference is open to all employees. Call Carole Demongeot, PAX 5268 before October 9 for reservations for the AIAA dinner.



October 9, 1970



Pinkel elected AIAA Fellow

I. Irving Pinkel, Assistant Director for Aerospace Safety, is one of 29 new Fellows of the American Institute of Aeronautics and Astronautics (AIAA) who will be honored October 22, at Houston, Texas. Neil Armstrong, Apollo 11 commander and first man on the moon, is elected a Fellow and also will be honored at that time.

Fellows are persons of distinction in aeronautics and astronautics who have made notable and valuable contributions to the arts, sciences or technology in their field. They are nominated and elected by Fellows residing in the United States.

The AIAA is a technical society whose 32,000 professional members work on the nation's space, aviation, marine and defense programs. About 7,000 students at more than 100 American universities and colleges are also members.

Pinkel entered government service in 1935 as a
(Continued on page 2)

Pinkel...

(Continued from page 1)

physicist with the Bureau of Mines, Pittsburgh, Pennsylvania, where he was engaged in research on the problem of synthesizing liquid fuels from coal. In 1940 he was appointed to the staff of Langley Research Center as a physicist to study non-stationary aerodynamic forces and airplane flutter. Transferring to Cleveland in 1942 when the Center was established, he studied hydraulics problems of aircraft engine lubrication systems operating at high altitudes.

Until recently, he directed research on rocket propellant and electric power generation systems for space vehicles, compressors and turbines for advanced aircrafts engines and lubrication systems for rotating machines for these systems.

Pinkel was graduated with honors from the University of Pennsylvania. As an undergraduate he was elected to Phi Beta Kappa, Sigma Xi, honorary scientific society and Pi Mu Epsilon, honorary mathematics fraternity.

Pinkel and his wife, Anne live in Fairview Park. They have two sons who are in graduate school.

Lewis based, NASA-wide

Safety Institute progresses

The safety of everyone from a technician on a shop machine to an astronaut working in space is the concern of the Aerospace Safety Research and Data Institute. Since its establishment at Lewis in late 1968, this NASA-wide Institute has concentrated on identifying safety hazards, writing and compiling technical information on these problems, and forming and operating a Safety Data Bank.

When the Institute was formed, it was staffed by professionals who had a background in coping with safety problems and the dissemination of information. I. Irving Pinkel, an authority on aircraft safety and a Lewis engineer and manager for more than 25 years, was selected as Director. Pinkel gathered twenty specialists in the fields of fire technology, nuclear systems, chemical engineering, cryogenics, aeronautics and others to cover the many phases of work. Charles Goldstein is Chief of the Computerized Information Systems Branch. George Mandel heads the Information Services and Publications Branch. Recently, Harold Schmidt has been named to manage the Oxidizer Systems Safety Project Office of the Institute. This office will evaluate NASA's oxygen handling systems, trying to define hazards in storing, transporting and using oxygen.

One of the Institute's biggest challenges is the establishment of the Safety Data Bank. This library will contain safety-related information which will be keyed to a system organized on a problem-oriented basis. The system outlines failure causes, effects and corrective measures. The bank will have available on request the reference sources for many aspects of safety problems, with references available through sources across the nation. Already files are being developed on cryogenic fluids, airport and heli-

port planning, nuclear safety, aircraft operation and fire hazards. The bank is relying upon information available at other government and industrial centers as well as at the Lewis bank to disseminate safety information.

"The task of the Institute is enormous," comments Pinkel, "but the progress to date in defining our mission and analyzing some critical areas has been encouraging."



PINKEL



GOLDSTEIN



MANDEL



SCHMIDT

Fantasy ranks high at children's parties

Plenty of plaudits are in order for the hard working crew and cast who brought this year's Christmas play to nearly 2000 children at the LeSAC party last Sunday and Monday, December 13 and 14.

Written by Erwin Edelman, the play was staged by Lewis' Performing Arts Theater under the direction of Charles "Chip" Kelsey. The elaborate set for "A Christmas Fantasy" was designed by Sandra Hines, and built and wired for light and sound by LeSAC members and helpers headed by Ned Hannum. Those workers included: Al Wisniewski, Robert Billy, Jack Colegrove, Dan Prok, Paul Laisure, and Bruce Zambory.

Actors who turned in six performances to delight and dazzle youngsters, were: Lou Revnyak as Prince Sinister; Dick Goldman and Jerry Ulas as the children; Jack Schneider, the dog; Honey Lou Harris, the Raggedy Ann doll; Ralph Slavik and Jeanette Holley as the father and mother; and Marge Alley with her rock group from her neighborhood.

Behind the scenes, lighting was done by Frank Klemenic and Roman Kruchowy; sound effects, Al Pavli; and live music on the Cordovox by James Saran.

The stage crew was comprised of Ned Hannum, Robert Hoover, Chuck Zalabak, and Jeff Alley. Jeanette Holley was in charge of costumes, assisted by Ellen Nachman; and Dorothy Karito in charge of properties. The make-up team included Sue Overton, Teri Horvath and Carol Mongerson.

Staff offices align

The realignment of staff offices at Lewis has been approved by NASA Headquarters and Planning, consisting basically of the former Office of Development Eval-

Aerospace Safety Research, Data Institute

by I. Irving Pinkel

A computerized information handling system has been developed by the Aerospace Safety Research and Data Institute which permits easy storage and retrieval of information of a variety of types. The user can operate interactively with the system to be assisted in the information search. New information files can be established quickly to meet the developing demands for information management. Computer output can be arranged in formats most convenient for study, reporting, or publication. The NASA Office of Space Science and Applications (OSSA) has selected this data management system for the earth resources program. Other government agencies are adopting the system for their purposes, and the system is operating at Carnegie-Mellon University.

Growing out of ASRDI's work on the effects of lightning strikes on aircraft is a portable instrument for measuring the susceptibility of an air-



plane's electrical circuits to lightning induced voltages and currents. The measurement is made with safe low-voltage transients applied to locations on the aircraft where lightning might strike. It is being used on Navy aircraft in an experimental program to judge the vulnerability of the airplane's delicate circuits to lightning strikes.

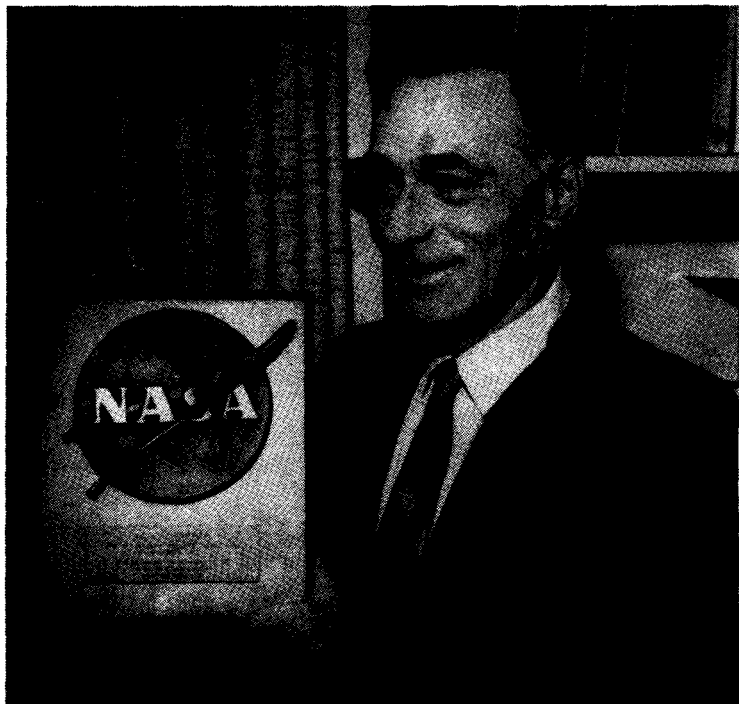
Another ASRDI contribution has been made by ASRDI in establishing a statistical basis for determining how absorption spectroscopy can be used to detect the presence of a group of dangerous gases in spacecraft atmospheres in the presence of other extraneous gases which are unknown. These unknown gases interfere with the detection of the dangerous gases. This statistical approach allows an estimate to be made of the confidence level in the spectroscopic analysis for the dangerous gases as function of the number of spectral lines used in making the analysis.

ASRDI joined the personnel of Ames Research Center to promote the development of a unique carbon monoxide (CO) detector for inhabited spacecraft. The instrument exploits the special fluorescent properties of normal CO and a common CO isotope. It measures CO accurately in

parts per million in the presence of other contaminants in the cabin atmosphere which normally interfere with such measurement. A flight version is being prepared by NASA's Manned Spacecraft Center for use on Skylab.



The NASA Earth Resources Program will use the Lewis data management system for study, reporting or publication.



Lewis says 'Thanks'

I. Irving Pinkel, Director of Aerospace Safety Research & Data Institute, displays the bronze plaque he presented to Jerry Lederer, NASA Safety Director, upon his retirement. The plaque, from friends at Lewis, reads: "For his inspiring life long leadership and dedication to aerospace safety." Pinkel presented the plaque to Lederer at NASA Headquarters, January 14. (John Marton photo)

THE LEWIS NEWS presents the Lewis Research Center story in terms of its people, its purpose and its progress. Published on alternate Fridays, the News is produced by the Public Information Office, Lewis Research Center, National Aeronautics and Space Administration, 21000 Brookpark Road, Cleveland, Ohio 44135.

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Editor Charles Mitchell



June 16, 1971

Four top managers among 60 retirees

Three division chiefs and one director are among the more than 60 employees who have chosen to retire by the end of June. Other stories and pictures of retirees appear on pages four, five, and six. Retirees not featured in this issue of the Lewis News will be featured in the June 30 issue.

I. Irving Pinkel, Director, Aerospace Safety Research and Data Institute, was appointed to the staff at the Langley Research Center in 1940. When Lewis was built in 1942, he transferred here to study hydraulics problems of aircraft lubrication systems operating at high altitudes. He has directed research on rocket propellant and electric power generation systems for space vehicles, compressors and turbines for advanced aircraft engines, and lubrication systems for rotating machines for these systems. Most recently he has headed a group of scientists specializing in aerospace safety research.

Pinkel graduated with honors from the University of Pennsylvania in 1934. He is an Ohio Professional Mechanical Engineer, has served on the former NACA Subcommittees on Meteorological Problems, Icing Problems, Aircraft Fire Prevention, Flight Safety, and the NASA Research Technology Advisory Subcommittee on Aircraft Operating Problems. He has been a Special Lecturer, Case Institute of Technology Graduate School and is a Fellow of the Ameri-



Pinkel



Johnsen



Hinz



Sanders

can Institute of Aeronautics and Astronautics.

He and his wife, Anne, are looking forward to traveling at their leisure. They have two sons in graduate school.

Irving Johnsen joined the Langley Research Center in 1940 and transferred to Lewis in July 1943, where he directed research on components for advanced turbojet engines. In his most recent position as Chief, Chemical Propulsion Division, he has been responsible for the Center's research and technology in the field of chemical rockets. This includes advanced spacecraft propulsion systems, supporting technology for the Space Shuttle, zero-gravity re-

(Continued on page 3)



Project Eve head visits

Former Lewis employee Dr. Irving Pinkel (left) and Evelyn Bonder met with Center Director Dr. Bruce T. Lundin prior to touring Lewis. Mrs. Bonder heads Project Eve, a vocational and counseling service for women of Cuyahoga Community College. "I want to find out the types of work women are involved in at Lewis and what career opportunities and training programs Lewis offers its women employees. This information will be provided to those women who come to us seeking career opportunities," she explained. (Martin Brown photo)

Oshkosh showcases NASA, Lewis work

Continued from page 1

They include Bill Waters, in charge of coordinating the preparation of display panels and models; Bonnie Kaltenstein, scheduling and staffing; Bob Redinger, packing and shipping; Mitch Sojack, publications tent; John Shaw, NASA press tent, and Bernie Cieslak, craftsmanship tent, where technical craftsmen such as model makers will show off their talents in a special display.

Providing primary technical support for exhibits and hardware are Paul Adam, Bob Davies, Joe Defazio, Dave Hubbard, Russ Keller, Stu Lowenthal, Jim Lucas, Joe Shaw, Dave Vincent, and Howard Wine.

Three distinguished Lewis scientists of the past will be honored as "outstanding aeronautical researchers." They are Abe Silverstein, for accomplishments as Lewis Director; Irv Pinkel, for his

early pioneering work in hydrogen fuel engines and aircraft crash fire research; and John Evvard, key researcher in supersonic flow studies and ion engine work.

Distinguished NASA attendees will also include NASA Administrator James M. Beggs, OAST Director Jack Kerrebrock, and the Langley, Ames and Lewis Center Directors.

Up in the skies of the small Wisconsin town, NASA's AD-1 oblique wing aircraft will make an appearance, along with rebuilt WWII aircraft and sky writing planes that will attempt to create the world's largest billboard, a smoke message 1,000 feet high and six to eight miles long.

In gratitude for the spotlight, Lewis is donating an early experimental jet engine to the Experimental Aircraft Association's aviation museum. Jim Lucas, a member of the Fluid Mechanics and Acoustics Division, "discovered" the 1946 vintage Westinghouse turbine sitting in a crate on the lab and proposed the contribution.

Via Air describes the show

as the "world's greatest aviation event," flying some of the most advanced, state-of-the-art aircraft.

For example, it reports, Quickie Aircraft Company's "Free Enterprise" will be among the most exotic planes on display. The aircraft was designed and built for an unprecedented attempt to fly non-stop, no-refuel, around the world.

"Burt Rutan's new powered sailplane, The Solitaire, and his much-publicized 'Grizzly' bush plane will be highlights.

One of the world's fastest recreational airplanes, Doc Brokaw's 'Bullet', and one the the lightest, Molt Taylor's 'Paper Airplane', will also attract a great deal of attention. The 'Paper Airplane' is constructed around a core of a type of cardboard fiber and has a unique, reversible propeller."

Wittman Field is the site and it will become the world's busiest airport July 31 through August 7 as EAA salutes the "A" for Aeronautics in NASA.



Experimental wood model makers Randy Kwasny (left), Bob Reminder, Herb Lawrence and Edwin Hagedorn assemble a display model of a quiet-running, fuel-efficient engine for the Oshkosh Air Show. The four craftsmen work in Lewis' Experimental Models Branch.



In charge of display logistics for Oshkosh, Bob Redinger (left) and Phil Meng inspect two rotary aircraft engines being crated for shipment to the 30th annual air spectacular.

Paul Farace photo

News Notes

Aerospace detective to address AIAA

Well-known accident investigator I. Irving Pinkel will speak at the October 21 meeting of the Northern Ohio Section of the American Institute of Aeronautics and Astronautics (AIAA). In his presentation, "The Engineer Scientist Turns Detective to Investigate Accidents. What Does He Do?" Mr. Pinkel will present the logic used to reconstruct the essential features of an accident from the evidence. He will review some well-known airplane and spacecraft accidents with motion pictures and detailed photos.

Pinkel was on the original staff of the Lewis Research Center, having begun his Government scientific service in 1935. In his 32-year career with NACA and NASA, he served as chief of several research divisions. Following his participation in the investigation of the 1967 Apollo fire, he established the NASA Safety Research and Data Institute.

Pinkel is the recipient of the NACA Distinguished Service Medal and the Distinguished Researcher Award from the Experimental Aircraft Association. He also is an AIAA Fellow.

The meeting, to be held in the NASA Lewis DEB Cafeteria, will begin at 5:30 p.m. with an attitude adjustment hour, followed by dinner at 6:30 p.m. and the program at 7:30 p.m. Cost of the dinner is \$7.00 for AIAA members and family, \$6 for student members and \$8 for non-members. For dinner reservations, call Karen Beyer at PAX 8275 or PBX 6995 by October 18. The program is free to all.

Supersonic Combustion Pioneered At Lewis Thirty Years Ago

By Walter Olson

Glancing through the doorway of the Ad. Bldg. auditorium a few weeks ago, I saw an artistic rendition of a snazzy aircraft seeming to fly right off the projection screen at me. From my hurried glimpse, the concept looked familiar: hypersonic flight sustained by supersonic combustion. And then it hit me that my recognition of the concept was stimulated by analyses, experiments, sketches, and models from more than 30 years ago! Once again I was impressed with the technical pioneering that has pervaded the Lewis Research Center since its beginning.

In 1952, Irving Pinkel and John Serafini noted that heat addition to supersonic streams should produce useful aerodynamic effects, for example, combustion under a

supersonic wing should produce lift efficiently. Following this prediction, Melvin Gerstein, head of the Combustion Fundamentals Section, suggested to Edward Fletcher that he see if combustion could be established in a supersonic stream. Starting in 1952, Fletcher and others in the combustion group had developed experience with spontaneously flammable fuels, such as aluminum borohydride, for ignition of jet engines at high altitudes. With this fuel, Fletcher and Robert Dorsch demonstrated for the first time combustion in a supersonic stream and reported the results in April, 1955.

Test conditions in the 3.84-in. by 10-in. wind tunnel that they used covered Mach numbers from 1.5 to 4, resulting in static pressures and temperatures as low as 0.15 psi and -327°F. Harrison Allen, Jr. and Fletcher tried a variety of other fuels, but not all would burn stably in the low pressures and temperatures of this wind tunnel.

Subsequently, Fletcher, Dorsch, and Allen were joined by Serafini, Pinkel, and Murray Dryer and the group studied the

aerodynamic effects of heat addition about flat plates, about various aerodynamic bodies, and under a supersonic wind in the 1 ft. by 1 ft. and 10-ft. by 10-ft. supersonic wind tunnels. These later experiments also confirmed the conclusion in the earliest work.

Those seeking more detail will find a summary with full bibliography by Edward Fletcher in "Eleventh Symposium (International) on Combustion," 1966, The Combustion Institute, Pittsburgh, pp 729-737.

The foregoing results prompted creation of sketches and models of hypersonic aircraft. But ideas can be too early for development, as well as too late. So work on supersonic combustion and hypersonic flight languished. Until now. Contemporary practitioners in this field might want to acknowledge this early pioneering work at Lewis.

Walter Olson, who served as Lewis' director of Technology Utilization and Public Affairs, retired in 1981. He is currently director of Build Up Greater Cleveland for the Greater Cleveland Growth Association.



30 years after Apollo 11

Glenn retiree Dr. Robert Graham shares his memories of mankind's giant leap

BY KRISTIN K. WILSON

IT happened at 4:17 p.m. ET on July 20, 1969. After 4 days traveling through the cold darkness of space, Apollo 11 astronauts Neil Armstrong and Buzz Aldrin arrived at the Moon. Seconds after the spider-legged Eagle lander touched down on the Sea of Tranquility, 38-year-old commander Armstrong radioed back to Earth.

"Houston, Tranquility Base here. The Eagle has landed."

With those words it was confirmed. The United States had beaten the Russians to the Moon. But the significance of the event went far beyond winning the "space race." Mankind had opened another door in the evolution of civilization.

"It was an exciting time," NASA Glenn retiree Dr. Robert Graham recalled during a lecture at the Visitor Center on July 17. "We invited friends over to the house, and we all gathered around the TV set. It was a very emotional evening for me."

The grainy, black and white images that flickered on the television drove home to Graham the enormity of what he and his colleagues at the then NASA Lewis Research Center had accomplished. Their pioneering research in liquid hydrogen, liquid oxygen rocket systems made the lunar landing possible.

Advanced propellant technology research began at the Center long before the Apollo program. Graham said that as early as the late '40s, in fact, researchers at the Cleveland facility—then part of the National Advisory Committee for Aeronautics

(NACA)—were running investigations of the hydrogen-oxygen propellant combination in very small thrust chambers.

Over the course of the next decade, rocket engineers experimented with a variety of thrust chamber designs to achieve high combustion efficiency and smooth burning. They also measured heat transfer rates within the thrust chamber and demonstrated how to cool the chamber and nozzle with liquid hydrogen.

"It was an outstanding team effort. When NASA was formed in 1958, we had already tested 20,000-pound-thrust hydrogen rockets," Graham said. "Because of the success of those tests here at the Center, we—and especially Dr. Abe Silverstein—became strong advocates for the use of hydrogen for space missions."

Silverstein, who at that time was associate director of the Cleveland facility, was called to Washington to plan missions for the fledgling space agency. That new role, Graham said, enabled Silverstein to take the high-energy propellant program to the next level.

With planetary exploration as the primary agenda, NASA Lewis propulsion experts collaborated with Pratt & Whitney on the development of the 15,000-pound-thrust liquid hydrogen, liquid oxygen engine designated the RL-10. Two of these engines were used to power the Atlas-Centaur launch vehicle, also managed by the Center, that successfully boosted early-unmanned exploration missions such as Surveyor and Mariner. Those missions, Graham said, validated the use of the high-energy propellant.

NASA Lewis expertise, as well as its facilities in Cleveland and at Plum Brook Station in Sandusky, continued to play a vital role as NASA set its sights on a manned lunar landing. Technology pioneered at NASA Lewis nearly 3 decades earlier, culminated in the development of the Saturn V rocket that launched Apollo 11 to the



NASA Glenn archive images

Dr. Robert Graham (center) recruited Neil Armstrong (seated) in 1955 as a test pilot for the National Advisory Committee for Aeronautics. Irving Pinkel (top left), then associate chief of the Physics Division, hired Armstrong.

Moon. A contribution, Graham said, "the Center should be extremely proud of."

For Graham, the connection to Apollo 11 transcends his work in the rocket laboratory.

"In 1955, the Agency asked me to help recruit ambitious guys interested in being test pilots for the X-15 rocket-propelled plane project," Graham said. "I was pleasantly surprised to have someone from Purdue University, where I did graduate work, show interest."

That someone was 25-year-old Neil Armstrong, and Graham said his first meeting with him was something he will never forget.

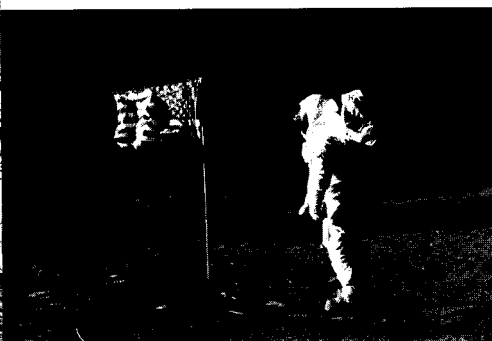
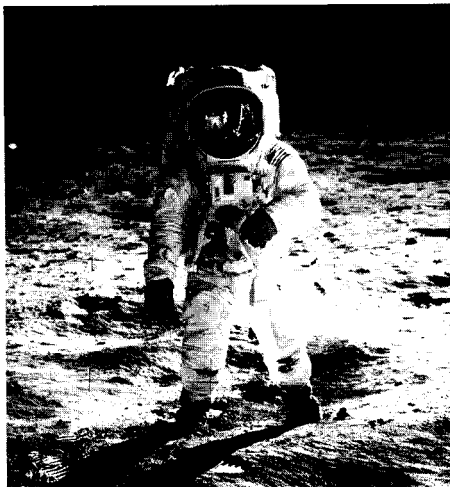
"Neil Armstrong showed up for the interview, sat down, and said 'My life's ambition has been to be a test pilot for NACA,'" Graham recalled. "I was so impressed with the guy. He knew exactly what he wanted to do with his life."

Armstrong, who had logged over 1,500 hours of flight time in jet aircraft as a Navy pilot, was quickly hired by Irv Pinkel, then associate chief of the Physics Division. After 6 months in Cleveland, Armstrong was transferred to NASA Dryden in California to fly the X-15.

And what if Graham hadn't recognized the potential hidden in Armstrong? Whose foot would have been the first to step down into the lunar dust?

"That's a good question," Graham chuckled. ♦

More information on NASA Glenn's contributions to Apollo 11 is available on the Internet:
<http://www.grc.nasa.gov/WWW/PAO>



Calendar

Continued from Page 6

AFGE MEETING: AFGE Local 2182 will hold its next monthly membership meeting on Wednesday, May 7 at 5 p.m. at Denny's Restaurant, 25912 Lorain Road, North Olmsted.

GIVE THE GIFT OF LIFE: The Bloodmobile will be set up in the Administration Building Auditorium from 8:30 a.m. to 3:30 p.m. on the following dates:

- May 7 and 8
- July 8, 9 and 10

LESA MEETING: LESA/IFPTE, Local 28, will hold its next monthly membership meeting on Wednesday, May 14, at noon in the Employee Center.

NASA GLENN OPEN HOUSE VISITOR CENTER ACTIVITIES: Glenn opens its doors to the public on May 17 and 18 to celebrate NASA's 50th anniversary. The Visitor Center will have special programming for this event. For more information, contact the Visitor Center at 216-433-9653.

DONATIONS FOR JASON KOLECKI: Jason Kolecki, Jr., grandson of Joseph Kolecki, who retired from Glenn last year with more than 38 years of service, has been diagnosed with Acute Myelogenous Leukemia. He is undergoing extensive chemotherapy at Rainbow Babies and Children's Hospital. Donations to assist the family in paying medical bills can be deposited into a temporary savings account, number #95777, at the Century Federal Credit Union under Joseph Kolecki's name until an account can be set up in Jason's name.

In Memory

Pinkel: A Distinguished Career of Enlightenment

Irving I. Pinkel, 94, a distinguished scientist who served nearly three decades at NASA Glenn, passed away on March 13 in San Diego, Calif. Pinkel made significant contributions to aerodynamics, supersonic flight, aircraft icing and fluid systems designs, but is best known for his work in safety for space flight and aircraft operations.



Pinkel

Pinkel began his NASA career in 1940 at NACA Langley in Norfolk, Va., before transferring in 1942 to work on the hydraulics challenge of engine lubricating systems at the new NACA Aircraft Engine Research Facility in Cleveland. By 1949, Pinkel inherited responsibility for the icing program that he helped revive by launching a new research program in cooperation with commercial airlines and the U.S. Air Force. During the 1950s, he directed the

center's Aircraft Fire Prevention Program that involved controlled crashing of over 40 full-scale aircraft at an airfield in Ravenna, Ohio, to understand the sources of fire and the nature of its life-threatening impact. The program led to the development of design principles and systems to reduce the incident of crash fires, increase the survival of passengers in all but the most severe crashes, and improve seat designs that reduce the effects of impact, which became the basis for federal standards.

As a result of his crash fire expertise, Pinkel was appointed to the accident investigation team for the Apollo 1 launch pad fire and was similarly involved in the Apollo 13 onboard explosion. In response to their findings, the NASA Administrator James Webb asked Pinkel to create and head an internal agency called the Aerospace Safety Research and Data Institute to serve as a clearinghouse for safety information, primarily for NASA and its contractors.

Pinkel received the NACA Distinguished Service Medal (1957) and the NASA Sustained Superior Performance Award (1963). Other significant awards include the Flight Safety Foundation Award (1953); the Laura Taber Barbour Air Safety Award (1956); and the American Institute of Aeronautics and Astronautics' Systems Safety and Effectiveness Award (1980).

After retirement, Pinkel and his family moved from Fairview Park to San Diego, where he spent several years as a safety consultant for Boeing, investigating aircraft crashes all over the world.

Thomas C. Murray, 66, who served as the ODIN Delivery Order Contracting Officer's Technical Representative for Information Technology (IT) Operations in the Office of the Chief Information Officer, passed away suddenly on February 27. Murray joined NASA in 1980 as a computer programmer in the Computer Services Division (now the Office of the Chief Information Officer) where he remained throughout his 28-year NASA career.

Basil P. Kluchnik, 79, who retired in 1986 with 38 years of NASA service, died on March 11. Kluchnik began his NASA career in the Apprentice Program and advanced to management in several areas. They include head of the Environmental and Computer Service Section of the Test Installations Division, which he held prior to retirement; chief of the Equipment and Instrument Utilization Branch; and chief of the Equipment Management Branch. Kluchnik was also an avid golfer and played in many leagues at the center.

Frank E. Webb, 81, who retired in 1987 with 24 years of NASA service, died on March 17. Webb was an engineering technician who worked in the Engineering Design Division at the time of retirement. He also served in the Facilities and Test Engineering Division. Webb was a veteran of World War II where he served with the U.S. Army/Air Force.