WOMEN’S MUNY SOFTBALL LEAGUE

Their first season in this league, our NASA girls are finding the 4-team league tough, but fun. They tramped the World Publishing team 27 to 4, then took a 10 to 1 defeat at the hands of the Sheffield Bronze team last week. Playing each Thursday evening at Kirtland on the lakefront, they are shown in the photo (1 to r) standing: Nancy Finitzer, June Deegan (mgr.), Rose Poultney, Katie Grey, Nancy Klima, Margaret Kurz, Bernice Hartman, Betty Joe Moore, kneeling (1 to r): Fedora Manfredi, Pat O’Donnell, Myrna Nored, Pat Simpson. Others not in photo are Jan Gabrielson, Lois Baukema, Pat Sirosky, Marilyn Kurtz.

PAD MEDAL GOLF TOURNAMENT

Eleven men of the Propulsion Aerodynamics Division have formed their own league, playing a round robin of 10 matches on a handicap basis. The first six will collect prize money at the end of the tournament.

Playing their matches wherever they like, mainly Big Met, the top seven (tie for 2nd) to date are:

<table>
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<tr>
<th>Name</th>
<th>Hdcp.</th>
<th>Pts. won</th>
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<tr>
<td>Johnsen</td>
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<tr>
<td>Steffan</td>
<td>7</td>
<td>4 1/2</td>
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<td>Simon</td>
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<td>Bowditch</td>
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<td>Seashore</td>
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<td>3</td>
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<td>Godman</td>
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<td>2</td>
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</table>

One point is given for a win, ½ pt. for a tie. Shown in their follow-thru form the golfers are (1 to r): Al Ross, Ferris Seashore, Andy Stofan, Dan Peters, Paul Simon, Nick Samanich, Bob Godman, Don Grosbeck. Absent were Fred Steffan, Dave Bowditch and Roy Johnsen.

WESTLAKE MEN’S BLOOPER LEAGUE

NASA’s entry in this seven-team industrial league has an abundance of enthusiasm and ability. In a hitting slump the last game, the boys dropped to a 4 and 4 record. For a lot of action, stop by Clague Park to see their games. Harry Bloomer (3219) can give you the schedule.

Those who played last Monday are (1 to r) standing: John Sheldon, Dick Tischler, Dick Lancashire, Art Brenza, Glynn Lunney, Ed Callaghan, Harry Bloomer, Len Pelka. Kneeling, (1 to r): Bill Scull, Dick Jacobs, Gene Bratolli, Tim Martin, Tom Fox. Absent were Bob Bryan, Lou Gedeon, Morrie Proskine, Norm Baffer, Ed Bisson.
Director Awarded Honorary Degree

Dr. Abe Silverstein was awarded an honorary Doctor of Applied Science Degree by Fenn College at its commencement ceremonies June 14.

The degree was presented by G. Brooks Earnest, Fenn President, who read the following citation:

“Renowned Donor to the success of the Nation’s space achievements, Celebrated Researcher and Administrator, we take great pride in honoring you upon this occasion.

“By virtue of the powers vested in me by the Trustees and Corporation of Fenn College and the State of Ohio and upon recommendation of the general faculty, we confer upon you the honorary degree of Doctor of Applied Science, D.Sc.A., and admit you to all the rights, privileges, and honors pertaining thereto.”

Dr. Silverstein was introduced by Dean Burl Bush, dean of engineering.

Summer Faculty Fellows Arrive

The 12 college professors who received NASA Summer Faculty Fellowships arrived at Lewis last Monday to begin the 10-week program.

The Fellows were welcomed by Dr. Walter T. Olson, Assistant Director for Public Affairs, whose office is directing the program, and by Dr. Abe Silverstein and Mr. Eugene J. Manganello.

The professors, who represent schools in states from New York to South Dakota, will be working on research projects in many Lewis Divisions.

They will also take a special course in Chemical Rocket Technology at Case. Lewis staff members who will serve as instructors for that course are: William H. Roudebusch, Irving E. Sumner, Andrew J. Stofan, William Lewis, Edward W. Otto, Frank J. Zeleznik, Richard S. Brokaw, Frank E. Belles, and Richard J. Priem.

News of NASA

Centaur Contract Signed

Delivery of 14 Centaur launch vehicle flight stages is called for under a $237-million contract recently signed by NASA with General Dynamics/Astronautics.


The contract does not include the vehicle’s inertial guidance system or the RL-10 engines which power Centaur.

Headquarters Staff Changes

Vincent L. Johnson has replaced Dr. Richard B. Morrison as Director of the Launch Vehicle and Propulsion Programs Division of NASA’s Office of Space Science and Applications.

Dr. Morrison will return to his teaching post at the University of Michigan from which he has been on leave since joining NASA in June, 1962. Johnson joined NASA in 1960 and has been program manager for Scout class vehicles, Delta, and Centaur.

A Programs and Resources Division has been established in the Office of Advanced Research and Technology, NASA Headquarters.

Heading the division will be Merrill H. Mose, presently Chief of Technical Planning at the Ames Research Center.

Secretary Receives Award

Mrs. Helen Blumensaadt, of the Air Force Systems Command Scientific-Technical Liaison Office at Lewis, was presented the Air Force’s 20-Year Service Pin and Certificate in ceremonies held recently at Bolling AFB, Washington, D.C.

The presentation was made by Col. Paul A. Brengle, Chief of the Scientific Information Office of the Research and Technology Division. Mrs. Blumensaadt, better known to her friends at the Center as Peggy Lawrence, was the first secretary employed in the Air Force office here. The office was established in 1945.

She liked her work so well that she has stayed on. “There’s something about these Air Force officers,” Peggy says, with that Irish sparkle in her eye. Mrs. Blumensaadt resides in Fairview Park with her husband, Ernie, and her mother, Mrs. Helen M. Carey.

LEWIS NEWS

The Lewis News is dedicated to telling the story of the Lewis Research Center in terms of its people, its purpose, its progress. Published and produced on alternate Fridays by the Office of Public Information, Lewis Research Center, National Aeronautics and Space Administration, 21000 Brookpark Road, Cleveland, Ohio, 44135. Henry T. Jacques, editor. All inquiries and news should be forwarded to this office, Room 218, Administration Building, PAX 3284. Deadline for news items is 10 days prior to publication.
WINNING SQUAD MEMBERS are (left to right, front row): Mishko, Colli, captain, and Stefan; (back row) Getz, Grey, Billy and Cieslewicz. Photos by Marty Brown.

Boosters Are Champions Of Centaur Golf League

For the second consecutive year, Bill Colli's Centaur Booster Team players are the "team champions" of the Centaur Golf League.

In a playoff with George Michalson's Agena team, the Centaur Boosters, first-half winners, squeaked to victory by the margin of one point.

Members of the winning team are: Bob Billy, Gene Cieslewicz, Bill Colli, Peter Getz, Rudy Grey, Bill Mishko and Andy Stefan.

The Boosters rode to victory on the strength of the spectacular play of Cieslewicz, who copped 20 points to the opposition's 4, and Getz's 87, which was his low for the season and netted the champs another 15 points.

Both Bill Burwell and Carl Carrello of the Agena squad grossed 78's in the October 3 playoffs at B o o s t e r s, first-half winner Club. The temperature was below 50 degrees that day.

Individual honors and trophies went to Harold Groth for the sea-

TROPHY WINNERS were Harold Groth (right) and Bill Colli, who received trophies for season's low gross of 39.1 and most points won by an individual -- 115½.

NASA Women's Golf League Selling Cakes

Members of the NASA Women's Golf League are selling those de-licious Claxton Fruit Cakes from Georgia again this year.

The price is the same -- a three pound cake for $3. Order now for pickup on November 15.

Contact any of the following:

Mary Jane Winter, league president, PAX 2115; Alma Halloran, vice president, 6207; Ruth Bert, secretary, 4213; Norma Schulke, treasurer; Rita Roach, 2231; Gladys Lovejoy, 8031; Jo Lubin, 6136.

Halloween Hop Is Tomorrow Night

LeSAC workers will be busy tonight transforming the DEB cafeteria into a bewitching place for the social activities committee's Halloween phantasm -- Dance Macabre.

The dance is set for tomorrow evening, October 30, from 9 p.m. until 2:30 a.m.

It will feature plenty of tricks and treats -- Eddie Platt's band for dancing, the usual refreshments, and surprises galore.

Many distinguished demons will be attending the event. Costumes are encouraged and there'll be prizes in three categories.

It promises to be a night befitting the bewitching and the broom-stick set. Come fly with us for an evening of unusual entertainment.

The next big event on the LeSAC calendar is a MIXER set for November 19 in the Administration Building auditorium. It will be called the "Dinosaur Drag."

Next Staff Social November 5

The next in the series of social get-togethers for staff members is set for Friday, November 5, at the Guerin House. Time is 5 p.m.

Invited to this one are members of the following: Space Power System Division; Field Laboratories Branch of Test Installations Division; and the Technical Information Division.

Road Shows and Film Classics Club

The next meeting of the Lewis Film Classics Club will be held on Friday, November 5, in the DEB auditorium.

Set for screening that evening is a film entitled "Once More With Feeling." It is a comedy produced in the United States in 1960.

The movie stars Kay Kendall and Yul Brunner in the story of a musical genius whose wife wishes to divorce him. The film is based on a very successful Broadway stage production.

The program gets underway with the showing of a short subject "The Wind and The River" at 8 p.m. A social hour follows the films.

Plum Brook Shooters Win In Illinois

The Plum Brook Rifle and Pistol Club team placed second in the .22-caliber Team Pistol Championship competitions, Marksman Class of the Illinois State Championships.

The matches were held recently in Waukegan, Illinois.

The team, consisting of Plum Brook staffers Jim Steadman, Bob Zeno, Mike Puskavich and George Thomas, also captured second place in the three-gun team championship.

The honors completed a successful outdoor season for the club. Their team also won the Ohio State Marksman Class Championship, in matches held at Belden, Ohio, in July.

Individuals interested in joining the Plum Brook Rifle and Pistol Club should come to the YMCA in Sandusky on Friday evenings, when the club will be practicing, or should contact the club president, Jim Steadman, at the Plum Brook Station.
Llama Club Speaks Up

The 1966 LeSAC workers, with Jim Modarelli as chairman, completed the year with two very successful events. The Winter Formal on December 10 at the Cleveland Convention Center drew approximately 1200 adults. The Children’s Christmas party on December 18 entertained almost 2000 children and 1500 parents.

The Mechanical Systems Branch is the new designation for the Propulsion and Flow Systems Branch in the Centaur Project organization. The Centaur Structures and Materials Branch has been abolished. Branch supervisors include: Rinaldo J. Brun, chief; Andrew J. Stofan, head of the Propellant Systems Section; and Martin J. Braun, head of the Pneumatics and Hydraulics Section.

Naomi Miller thanks her friends for their many get well cards and flowers sent to her during her recent stay at the hospital. She has now returned to work in the Office of the Assistant Director for Administration.

Murray B. Gordon, employee-management cooperation officer and program chairman for the Cleveland Chapter of the Federal Bar Association, was program chairman for the recent PBA Labor-Management Relations Institute. On December 7 at the Hotel Pick-Carter, approximately 150 participants heard a five-part program climaxd by a National Labor Relations Board member who spoke on “The Future of Collective Bargaining.”

Climax of the Lewis Ski Club meeting on December 7 was the ski fashion show when five attractive employees — Marilyn Edwards, Dorothy Davidson, Johanne Debesis, Janet Lucas, and Linda Peterson — appeared as models.

Arthur Prior of the Facilities Operations Division and his family express their sincere appreciation to their friends who sent cards of sympathy at the time of the death of his wife, Mary Frances. They also appreciated the many contributions made to the American Cancer Society and to Roswell Park Memorial Institute in Buffalo, N. Y.

Bernard J. Blaha of the Advanced Systems Division and his family also express their appreciation to friends at Lewis for their kind sympathy and flowers sent at the time of the death of their father.

Alan Studnicka of the Test Installations Division and his bride wish to thank his fellow workers in the Fuels and Rockets Section and other friends throughout the center for their wedding gift — an AM-FM clock radio.

X-15 Record Raised to 4233 MPH

Engineers at NASA’s Flight Research Center, Edwards, Calif., have raised the record speed made by Major William J. Knight, USAF, in the X-15. Maximum speed has been increased from 4150 mph to 4233 mph and the Mach number has been increased from 6.1 to 6.33 times the speed of sound.

The previously-released figures were obtained from raw flight data. The new figures have been refined by NASA engineers to include the effects of pressure, altitude, winds aloft, and temperature.

Maj. Knight set the unofficial record in X-15 No. 2, with its external propellant tanks, on November 18. The previous X-15 speed record of 4104 mph (Mach 5.92) was set by the late Joseph Walker on June 27, 1962.

Bridge Club Plays On

Marge and Stan Smith took first place in the December 14 session of the Lewis Duplicate Bridge Club. Marty and Lloyd Crotser were second.

Jim Crouse, Bridge Club coordinator for the Activities Council, announced that the Club would meet next on Tuesday, December 27. Play begins promptly at 7:45 p.m. in the Foyer of the Ad Building Auditorium.

GAS LASER interferometer, operated by Richard B. Lancashire, engineer in the Gaseous Electronics Section, Thermionics Branch, Electro-Pulsion Division, measures plasma particle density in a thermionic diode. Thermionic diodes are under consideration for use in nuclear reactors to produce electrical power for future spacecraft. Plasma particle density is determined with the interferometer by measuring the difference between the frequencies of two laser beams, one of which passes through the thermionic diode. Photo by Paul Riedel

Faculty Fellowship Program Planned

Again in 1967, NASA will sponsor specialized summer programs of research and study for talented young college and university faculty members in engineering and science.

LEWIS AND CASE Institute of Technology are among the seven research centers and 10 adjacent universities which will cooperatively conduct the summer program.

Faculty members will not only have an opportunity to engage in vital space research at the NASA centers, but will participate in parallel seminar-type studies at the universities.

THIS IS THE FOURTH year such summer programs have been sponsored by NASA.

The programs are expected to update and revitalize the participants' direct knowledge of the space program, to stimulate an exchange of ideas between faculty personnel and NASA professionals, and ultimately to enrich educational and research activities of the members' parent institutions.

DEVELOPED BY NASA in cooperation with the American Society for Engineering Education, the programs will be undertaken for 10 weeks in the summer of 1967 and will include about 225 young faculty members.

Dr. Edward J. Morgan, associate professor of engineering at Case, and Dr. Walter T. Olson, assistant director for public affairs at Lewis, are co-directors of the program here.

Leko To Head Nasairs Flying Club For 1967

Robert Leko is the new president of the Nasairs Flying Club following elections earlier this month.

Other new officers of the Lewis employees’ organization include: Andrew Leavitt, vice president; Marsha Petrus, secretary; Marguerite Jereb, treasurer; Paul Kuebeler, operations officer; and Cay Sidwell, Jr., maintenance officer.

Leko pointed out that the flying club is open to all NASA-Lewis employees and members of their immediate families whether they are students or licensed pilots.

The club now has two aircraft — a Cessna 140 and a Cessna 172. Further information on the club is available from Mike Anelik, PAX 8207, or Leko 7283. Ancik is the retiring president of the Nasairs.

Film Club Will View ‘Woman In the Dunes’

First movie program of the new year for the Film Classics Club will start at 8 p.m. Friday, January 6, at the DEB auditorium.

“Woman in the Dunes,” a Japanese drama released in 1964, is the feature film. With English subtitles, the movie is a moral commentary on human choice. Villagers trap a prisoner who must shovel sand. After escape becomes possible, he decides to remain a prisoner. “The Americans” is the short subject for this program.

A social hour with refreshments in the DEB cafeteria follows the show.
OART reorganization to streamline aerospace role

The major research and technology office within NASA has been reorganized to provide increasing emphasis on improving aeronautical research and more effective support of space programs.

The Office of Advanced Research and Technology (OART) will retain its name under the reorganization, which was effective October 27. Roy P. Jackson, formerly of Northrop Corporation, became Associate Administrator for OART this week. The reorganized elements of OART will not require additional staffing.

The change in OART organizational units is largely a reflection of emerging technologies and applications as well as new and expanded project-oriented efforts in both space and aeronautics. Aeronautical research, for example, had been centered in one division. Now under the management of Deputy Associate Administrator Neil Armstrong, there will be three offices and three divisions concerned exclusively with specific aspects of aeronautical research. Complementary support of aeronautical research will continue to be provided from other OART offices and divisions in such areas as controls, information systems, materials and structures.

On the aeronautics side, the new organizational units and chiefs are as follows:
- Advanced Technology Experimental Transport (ATET) Program Office, G. G. Rayzen;
- Jet Propulsion Program Office, A. W. Hummel;
- Airbreathing Propulsion Program Office, R. H. Johnson.

The reorganization to increase emphasis on improving aeronautical research and more effective support of space activities.

Engineers seek ways to restart thruster

"The SERT II spacecraft launched on February 3, 1970, to endurance test electric rockets in space. A total of 2011 hours of operation on the second thruster prior to developing a short circuit," says William Hawes, Acting Manager for the project.

The second thruster shutdown on Oct. 17 appears to be similar to the one experienced on the first thruster which quit after more than five months (3732 hours) of operation.

Slow erosion of the thruster's accelerator grid apparently resulted in a tiny pinhole of metal breaking off and bridging the small gap between the two grids. This short circuited the engine's high voltage power supplies.

SERT II project engineers here have been devising novel ways to dislodge the splinter of molybdenum causing the short. One method has been to "bump" the thruster at its gimbal stop in an attempt to jar the loose metal.

Ground controllers plan to continue attempts to revive the thruster for several more weeks. In late November, the spacecraft will be in the earth's shadow for a portion of each orbit. After this eclipse period, attempts to re-start the ion rockets will be resumed.

Harold Kaufman, Assistant Chief of the Electromagnetic Propulsion Division, who is in charge of the ion thruster experiment, says "The mission has accomplished its part in the overall electric propulsion program, although it has fallen short of its six month's endurance goal. The erosion problem can be solved by relocating the neutralizer. Electric propulsion is ready for application to future space missions."

Useful scientific information has been gathered from the early SERT II experiments as well.

Sanford Jones considered his surface contamination and emissive probe experiments "very successful." The surface contamination experiment, consisting of test patches of solar cells located near each ion rocket revealed severe contamination problems as molybdenum sputtered from the grid during the first few days of ion rocket operation. Electric propulsion-type spacecraft of the future must be designed so the solar arrays are located out of the exhaust path of the ion beam. Jones' other experiment, probe measurements of the net charge of the spacecraft and surrounding plasma to determine the potential, or voltage difference between the two, shows no electrical incompatibility. Electric propulsion will not interfere with experiments on future spacecraft.

Two other experiments were managed by William Nieberding of the I & C Division. A miniature electrostatic accelerometer (ME-SA), an extremely sensitive device, measured the thrust of the ion engine to within one percent of the 0.006-pound thrust level. A radio

(Continued on page 5)

Six promoted in latest reshuffle

Recent retirements and transfers of personnel have resulted in new organizational appointments.

In the Launch Vehicles Division, the Agusta organization has been phased out, and the Division has been grouped under the Atlas/Centaur and Titan/Centaur Project Offices, with the Business Management and Program Resources Office, the Structures Branch and the Systems Analysis Branch serving both offices. W. Russell Dunbar has been appointed Associate Chief to Edmund Jonash, Charles Tiege has become Chief of the Business Management and Program Resources Office. Daniel Shramo heads up the Atlas/Centaur Project Office, and Andrew Stefan is Acting Manager of the Titan/Centaur Project Office. Martin Brun is now Acting Chief of the Mechanical Systems Branch of the Atlas/Centaur Project Office.

George Barber, a Finance and Accounting Officer retiring with a rank of Major from the U.S. Army after 22 years service, was appointed Chief of the Payroll Branch, succeeding Rita Roach Kohl, who retired recently.

Ted Guzik, Assistant to the Chief of the Fabrication Division for the past three years, has been appointed Chief of the Sheetmetal Branch. Guzik succeeds John Aurebach, who retired recently.

Lewis Cleveland CFC pledges 106% of goal

Even though the Cleveland United Appeal Campaign this year fell short of its goal by 8%, generous Lewis employees pledged 6% more than their fair share, giving $4500 more than was collected last year. This year the average gift to the CFC was $46.87, nearly $2.50 more than last year. About 80% will go to Greater Cleveland United Appeal.

Collection Unit

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(Continued on page 3)
Preparation for Titan flight nearly complete

The culmination of the hopes and hard work of hundreds of Lewis employees and thousands of contractor employees at General Dynamics/Convair, Martin Marietta and dozens of subcontractors across the country will occur January 24 with the launch of the first Titan III/Centaur from Kennedy Space Center.

Titan/Centaur Project Manager Andrew J. Stefan says the objectives of the proof flight are to demonstrate the capability to support missions such as Viking and three-burn Centaur synchronous orbit missions. The vehicle will carry a 3402 kilogram (7,500 pound) dynamic model of the Viking spacecraft and lander and a 113.4 kilogram (250 pound) Lewis-developed SPHINX spacecraft. The total mission will cover a period of more than 7 hours and call for four separate burns of the Centaur engines. A typical Viking launch trajectory will be flown during the initial phase of the proof flight. The second Centaur burn will be 51 seconds in duration, instead of the 316 seconds required for Viking, to limit the vehicle to a relatively low Earth orbit. The shortened burn durations, however, will be sufficient to provide an adequate exercise of the guidance system, both hardware and software, to estimate the injection accuracy of a Viking type mission; the propellants left will permit subsequent propellant management experiments.

The second Centaur coast period will be 80 minutes to simulate a mission with a long duration parking orbit. The SPHINX spacecraft will be separated following third burn of the Centaur engines. The mission will be completed following a fourth burn demonstrating a capability of the vehicle to perform many varied missions. With a successful proof flight of Titan III/Centaur the vehicle will share with Atlas/Centaur the job of boosting this country's medium and heavy spacecraft into Earth orbit or onto interplanetary trajectories until the Space Shuttle becomes operational near the end of this decade.

The new launch vehicle can place up to 15,876 kilograms (35,000 pounds) in low Earth orbit, 6904 kilograms (15,000 pounds) in a transfer orbit, 3175 kilograms (7,000 pounds) in a synchronous orbit and accelerate an 3928.8 kilograms (8,000 pounds) payload to Earth escape velocity. Lewis, which has management responsibility for Titan III/Centaur, began the effort to integrate the two vehicles in the mid-1960's. The development was undertaken because NASA recognized the need to fill a per-

TV talk host emcees

Lewis ALERT program

Fred Griffith, host of the popular "Morning Exchange" program on WEWS-TV, Channel 5, will serve as moderator for the Lewis ALERT forum's January 31, program, "The Future of Cleveland." The program will feature a panel of five community leaders who will offer predictions for the city's progress in industry, finance, labor, education and overall community growth. The five panelists are Paul A. Miller, President, Eaton Corporation; M. Brock Weir, President and Chief Executive Officer, Cleveland Trust Company; Frank J. Valenta, President, AFL-CIO Cleveland Federation of Labor; Dr. Walter C. Wasti, President, Cleveland State University; and James C. Davis, Chairman, Great Lakes Growth Association. The program will take place at 4:30 p.m. in DEB Auditorium.

Griffith will provide connecting commentary and present a summary of the panel's predictions. Questions from the audience will follow the panel presentation. The panelists' projections will be made to about 1985 and should give Lewis staff an interesting and provocative view of what Cleveland will be like at the end of the decade.

Griffith began his career in 1951 and joined WDOK, Medina, in 1959 as a newspaper, interviewer and news director. More details on the program will appear in the next issue of the Lewis News.

Manganiello retires

Eugene J. Manganiello, Director of Center Development, announced his retirement this month. Manganiello was recognized for his many technical and management contributions in 1970 when he received NASA's Exceptional Service Medal for Leadership. He served as Deputy Director of Lewis for 11 years beginning in December 1961 and served as Acting Director during most of 1961.

He joined the staff of the NACA at the Langley Research Center in September 1936 as an aircraft power-plant research engineer. In December 1942, Manganiello transferred to Lewis as Head of the Heat Transfer Section, and in 1945 was named Chief, Thermodynamics Branch. He was appointed Assistant Chief of Research at Lewis in 1949. Manganiello spent more than 30 years with the Society of Automotive Engineers serving in more than 15 top-level national posts and a number of local ones. His outstanding service and leadership to the Society and engineering discipline it represent were recognized with his election to serve as President of the Society of Automotive Engineers serving in more than 15 top-level national posts and a number of local ones. His outstanding service and leadership to the Society and engineering discipline it represent were recognized with his election to serve as President of the Society of Automotive Engineers serving in more than 15 top-level national posts and a number of local ones. His outstanding service and leadership to the Society and engineering discipline it represent were recognized with his election to serve as President of the Society of Automotive Engineers serving in more than 15 top-level national posts and a number of local ones. His outstanding service and leadership to the Society and engineering discipline it represent were recognized with his election to serve as President of the Society of Automotive Engineers serving in more than 15 top-level national posts and a number of local ones. His outstanding service and leadership to the Society and engineering discipline it represent were recognized with his election to serve as President of the Society of Automotive Engineers serving in more than 15 top-level national posts and a number of local ones. His outstanding service and leadership to the Society and engineering discipline it represent were recognized with his election to serve as President of the Society of Automotive Engineers serving in more than 15 top-level national posts and a number of local ones. His outstanding service and leadership to the Society and engineering discipline it represent were recognized with his election to serve as President of the Society of Automotive Engineers serving in more than 15 top-level national posts and a number of local ones.
Many to witness Titan


Major Titan III/Centaur missions

(Through mid-1970s)

September 1974 — Helios, the joint U.S.-West German solar probe. The 740-pound spacecraft will make a two year orbit around the Sun for a series of scientific observations.

August 1975 — Two Viking-Mars orbiter-lander spacecraft to be launched 10 days apart. The orbiters will map Mars surface and the landers will search for life forms and analyze the Martian soils and atmosphere in preparation for a manned mission to the Red Planet.

December 1975 — A second Helios spacecraft.

August 1977 — Two Mariner spacecraft for flyby missions past the planets Jupiter and Saturn.

Titan flight...

(Continued from page 1)

To proceed with the Viking mission, NASA has selected Titan II/Centaur as the launch vehicle. At that time, overall management, development and production of the new vehicle was transferred to Lewis for delivery to the Kennedy Space Center.

A third major contractor, Lockheed Missiles and Space Company was awarded a contract in 1970 to develop the Centaur standard shroud. According to Lovell, stain says, "The development effort is a classic demonstration of cooperative and sup- proper interface between the government agency and its contractors. Hundreds of Lewis employees have been or are now involved in test- ing, development and prob- lemsolving projects."

Lewis employees and groups who worked on the program will be recognized in the next issue of the Lewis News.

The Titan III/Centaur has an overall height of 48.8 feet (150 meters) and a liftoff weight of 640,000 kil- ograms (1.4 million pounds). The Titan III booster consists of a two-stage core vechicle and two solid rocket motors, each 10 feet in diameter and 85 feet long. The two solids provide a thrust of 10.6 million newtons (2.4 million pounds) at liftoff.

Both stages of the Titan III core vehicle burn a combina- tion of nitrogen tetroxide and a 50/50 combination of hydrazine and unsmymetrical dimethylhydrazine.

The first stage, measuring 3 feet (9 meters) in diameter by 19.2 meters (63 feet) long, produces a thrust of 2.3 million newtons (523,000 pounds) of thrust as the first stage burns. The second stage, which is 3 meters (10 feet) in diameter by 7.2 meters (24 feet) in length, re- duces 445,000 newtons thrust (100,000 pounds).

A 3 meter (10-foot) diame- ter, 2.8 meter (9.5-foot) long interstage adapter connects the Centaur to the Titan III.

Manganiello retires...

(Continued from page 1)

Full vacancies...

(Continued from page 1)

He was promoted to super- visor in 1956 and moved through the ranks to the po- sition of Chief of the Facili- ties Engineering Division, the position he held at the time of his latest appointment. He holds a Bachelor’s degree in mechanical engineer- ing from the University of Michigan.

Wharton began at Lewis in 1958, after two years after graduating from Kent State with a Bachelor’s degree in Business Administration. Highlights of his Lewis ten- ure include work in the Pro- curement Division; serving as assistant to the assistant director for Administration, and as secretary-treasurer of the Cleveland Federal Exe- cutive Board in FY-68.

He was chief of the Equip- ment and Instrument Utili- zation Branch just prior to being named as acting Divi- sion Chief.

Friedman and Wharton

The NASA Headquarters Employees Club has sponsored two overseas trips for the coming year—one, an eight-day tour of Mexico, the other a 17-day tour of the Orient.

The Mexican tour, May 4-21, will include a visit to Mexico City, Tuxac and Acapulco. The 17-day tour to the Orient, August 8-24, will in- clude visits to Hong Kong and Bangkok.

Detailed information can be obtained from Bernard Maggin, Code RK, NASA Headquarters.
Knowledge, team work, hard work equal Titan Centaur success

Harold Zueigbaum, KSC, Andrew J. Stefan, Paul C. Winslow, Kenneth A. Adams, William R. Dunbar, and Dr. Seymour C. Himmel.

The flawless flight of the first operational Titan Centaur launch vehicle was the reward for scores of Lewis engineers, technicians and administrative support people who have been preparing for the launch for more than a year.

The nation's newest and largest unmanned launch vehicle hurled the International spacecraft Helios I around the Sun. It will penetrate the outer corona, 4 million miles, closer than Mercury or any manned vehicle hurled into an elliptical orbit around the Sun. It will penetrate the outer corona of the Sun coming to within 28 million miles, closer than Mercury or any man-made object has ever gone. The Helios portion of the mission with two burns of the Centaur engines also showed the Titan Centaur's readiness to launch the two Viking spacecraft to Mars next summer. After the Helios separation sufficient propellants remained in the Centaur to perform engine start experiments to verify theory and model test results showing that a cryogenic rocket stage can be restarted after a zero gravity coast.

The first experiment demonstrated the Centaur engine restart capability after a one hour zero gravity coast for application to the Mariner Jupiter Saturn mission scheduled for 1977. The second experiment was designed to obtain Centaur thermal control and propellant management data for long duration zero gravity coasts. During the three-hour coast period the propellants were again permitted to move freely in the tank and the vehicle was programmed to perform a roll maneuver approximately every half hour. This maneuver provided uniform space heating of the Centaur components. At the end of the coast the propellant was again positioned at the engine inlets by firing small hydrazine thrusters. An engine start was obtained with only about 80 per cent of the liquid hydrogen pressure normally used.

In commenting on the flight, Andrew J. Stefan, Director of Launch Vehicles for Lewis said, "With the successful flight of Helios and the post Helios experiments performed by Centaur, the Titan Centaur and its associated launch support equipment has shown its operational versatility to support a variety of unmanned spacecraft programs."

The development of a new rocket combination and the operation of it for a variety of missions requires the best efforts of thousands of people. Lewis, in having management responsibility for Atlas Centaur and Titan Centaur has a unique role which requires orchestrating the efforts of many organizations. Although ultimate responsibility for what happens rests with Lewis, NASA centers and private industry have equally vital roles.

One partner in the effort is the Unmanned Launch Operations Directorate (ULO) of the John F. Kennedy Space Center. Director John J. Neilon and Manager, Centaur Operations, John Gossett and their staffs are assigned responsibility for checkout and launch operations once the vehicle reaches the Cape.

Contractors such as Martin Marietta, United Technology Corporation, Aerojet General, General Dynamics, Honeywell, Teledyne and others perform the actual manufacturing, integration, testing and launch activities according to the specifications of their contracts.

Paul C. Winslow, Manager of the Titan Centaur Office, stresses, "Every single person is important — administrative, technical, engineering, and management personnel." Overall, Lewis launch vehicle activities fall under the direction of Dr. Seymour C. Himmel, Associate Director, Flight Programs. One of Dr. Himmel's responsibilities is coordinating the lab-wide support received by the Launch Vehicle's Directorate. William R. Dunbar is Chief Engineer for Flight Programs.

A mission engineer is assigned to each mission. Kenneth A. Adams was mission engineer for the Helios launch. His job was to be the interface between spacecraft and launch vehicle systems teams. He represented Winslow in activities involving the mission and was assisted by Lawrence J. Ross, who had started out as mission engineer for Helios but was promoted to Assistant Division Chief of the Vehicles Engineering Division in the recent reorganization.

Richard A. Flage, Launch Operations Project Engineer, coordinates activities with the Kennedy Space Center in scheduling day to day activities associated with check out and launch. He is responsible for organizing Lewis launch team activities and insuring that everyone has the necessary communications channels and data they need.

Vehicle Engineers, in this case John L. Collins for the Titan booster, and Richard C. Kalot for the Centaur stage, are responsible to coordinate all activities associated with acceptance and checkout of their stage. They track the day-by-day progress, problems and resolution of the time of the factory acceptance, testing, checkout through the Cape and launch.

Systems engineers are technically responsible for the design, production and flight management of their portion of the system such as guidance, hydraulics, and propulsion. They follow each system through those stages and gather the operational results for use on succeeding vehicles.

Systems analysts are
responsible for calculating the effects of various loads on the launch vehicle such as wind velocity and direction. They operate the wind monitoring system, define the vehicle’s capability and performance, and provide the range safety officers with trajectories and information so that they will know what to expect.

In addition to the specific mission managers, the various supervisors in the Launch Vehicle Directorate provide day-to-day guidance to the personnel in their areas. Raymond J. Rulis, Chief of the Vehicles Engineering Division manages the systems engineers. His supervisory staff includes James E. Patterson, Chief of the Computer Guidance Branch; William J. Middendorf, Chief, Electronics and Flight Control Branch; Maynard I. Weston, Chief, Ground Systems Branch; William E. Goette, Chief, Mechanical Systems Branch; Floyd Z. Smith, Chief, Structures Branch; and Teledyne Resident Office head James L. Swave.

Section heads in this division include Roger S. Palmer, Donald F. Garman, Jerome A. Johnson, Edwin E. Procasky, Richard C. Dillon and William A. Groesbeck.

Others on hand to apply their knowledge to speeding the Titan Center on its way included: John L. Feagin, DCU Software; J. Robert J. Schroeder, Titan Liquid Propulsion; Kenneth W. Baud, Boost Pumps/H/O ECS; Merle Jones, Centaur Pneumatics/Air Conditioning; Raymond F. Lacovic, Thermo/Insulation Systems; Thomas W. Godwin, Hydraulics; Konstanty Semenchuk, Propellant Utilization; John B. Nechvatal, Centaur Electrical; Charles W. Eastwood, Structures; Thomas L. Seeholzer, CSS Bolt-ons; Baxter L. Beaton, Titan Electrical; Edwin S. Jers, Titan Flight Control; Thomas P. Cahill, CSS Systems; Reino J. Salmi, Solid Rocket Motors; Edwin J. Braun and the General Dynamics Corporation Resident Office headed by Richard E. Ju-mont.

Reliability and Quality Assurance is essential throughout. Walter F. Dankhoff, Director of that office, Robert M. Jabo, and Stephen Szpatura were on hand at the Cape.

In addition to the many engineers working in each discipline, both in the launch team going to the Cape and those remaining at Lewis to provide back up, hundreds of other Lewis employees helped make Titan Centaur’s first mission a success. The Space Power Facility personnel at Plum Brook helped analyze boost pump problems which occurred on TC-1, zero gravity facility personnel and engineers from Spacecraft Technology Division provided much data concerning behavior and design of propellant handling systems for zero gravity mission, and the list goes back to early firings of hydrogen-oxygen engines in the 1950’s.

"It can only be summed up as a team effort," Stofan says. "That is what has brought success to Lewis and the nation’s space program and that is the way it will remain strong."
The year of 1974 saw an increased need for an effective reliability and quality assurance program to support the Center's vehicle programs and operations. There was increased activity in the Center's launch vehicle and flight program, with the introduction of the Titan/ Centaur into NASA's stable of launch vehicles, has required increased activity on the part of the Reliability and Quality Assurance Directorate to support that program. In addition, during the year 1974, NASA took on the responsibility for the procurement and operation of the Atlas stage. This also has required increased efforts and activity in the R&QA area. In the aeronautics area, several of the engine programs advanced to the point where a final result in hardware that will ultimately be test flown. An example of this type of engine program is the modification of the JTBD Refan Engine Program which is in the ground test phase, but it will be flown on the DC-9 early in 1975. There were also new starts in the Aeronautics area which required considerable attention in the reliability and quality assurance aspects, the QCSEE action is a good example of this type of program. In space flight programs most of the reliability and quality assurance activity was directed toward the important CTS spacecraft project. In addition, there was continued activity in support of some of the major spacecraft subsystem hardware development, such as the thrusters and power processors.

To meet these needs and challenges the scope of the R&QA activities were broadened in 1974 and the Directorate was reorganized to make maximum use of its manpower. The reorganization basically was to establish two fundamental offices: one office responsible for reliability and quality engineering functions, the other office responsible for audits, both of the contractors and internal, as well as the development and implementation of product assurance systems in general. This latter office also has assumed the responsibility of a new function, systems safety, that was assigned to the quality assurance directorate in 1974. Besides the two functional offices, there are two offices responsible for the product assurance activities: one for vehicles and the other for the Center's aeronautics and spacecraft products. Although the responsibility for the Lewis Awareness Program was assigned to the R&QA

(Continued on page 10)
Ray facility with a capability up to 15 kv was placed into operation in SPLL to aid the development of regulated high voltage solar array technology. It is presently being used to investigate the application of this technology to electric thruster systems. Component new technology for film type capacitors which enables a substantial increase in energy density was used in the 30-cm thruster power processor to minimize weight and size.

Of special significance is an 18-200 award which was received for the Lewis-directed high voltage schottky diode technology development. Computerized methods for the modeling and analysis of power processing systems are being developed. These will provide design tools which will significantly reduce the design and development costs of sophisticated power processing for both aerospace and terrestrial power systems.

Several significant milestones were passed during 1975 for Electric Propulsion. Ion thruster No. 2 on the SERT II spacecraft was successfully restarted, producing a 200 mA ion beam after six years in space. The 8-cm, one milli-pound, ion thruster completed 15,000 hours of cyclic operation, with no performance degradation. The thruster is being examined to provide information pertinent to the 8-cm engineering model thruster system flow-on contract. A cathode from the previous 9715 hour SIT-5 life test is still on test, having made 26,000 hours of test time.

The 30-cm primary propulsion ion thruster completed a 10,000 hour life test. Examination of the thruster has provided data for the design of the Engineering Model Thruster (EMT) which is slated to go into a 15,000 hour life test in January. A power processor contract was entered into to produce an Electrical Prototype Power Processor Unit (EP/PPU) for the 30-cm primary propulsion system and in-house development of flight-type units will start early in 1976.

Ion Beam Application Research (IBAR), a new and important program, was initiated this past year and has discovered several applications of thruster technology. Presently being explored are the manufacture of high energy density capacitors, potential applications to the Controlled Thermoneutral Reaction (CTR) System. Space Manufacturing techniques and improvements to thermal control for shuttle braking systems. This program that applies a well understood space technology to a wide range of applications may be a most important development of the electric propulsion program. Lewis has contributed in yet another unique way to the application of high technology. The Lewis proposal, first made in 1973, to use part of the wide-bodied jet fleet to supply a need for meteorological data from the tropics and the southern hemisphere has gone through several important stages of development. In 1974 a no time-line demonstration was conducted by NOAA/NA SA/NASA (National Center for Atmospheric Research) resulting in an international experiment in the South Atlantic. The results according to NCAR were impressive and indicated the potential of this concept as a supplementary global observing system. In 1975 this concept received further evaluation as part of the NASA Data Systems Test (DST). Thirteen wide-bodied aircraft flying global routes provided meteo- rological data within a 24-25 hour time line (where t is the time the measurement was made) to the National Meteorological Center (NMC) in Suitland, Maryland.

Based on the excellent results obtained during the 1974/1975 tests, NOAA and NASA have entered into a joint program to develop a transmitter-receiver package for wide-bodied jet aircraft. This system will provide a direct near real-time link from commercial aircraft to a NMC via satellite relay and make possible the first in real-time global meteo- rological observing system. Lewis is currently designing the transmitter-receiver package and expects to provide an airborne demonstration by October 1976.

Enthusiasm for this Lewis program has been generated both at the national and international levels. The World Meteorological Organization convened a meeting in December 1975 to discuss how best to implement the Lewis concept into an operational system on a worldwide basis.

Launch Vehicles

Andrew J. Stofan,
Director

At the start of 1976, the Launch Vehicles Directorate faced a very busy year with seven scheduled launches. These launches consisted of four with Atlas/Centaur and three with Titan/Centaur. Subsequently, one Atlas/Centaur and one Titan/Centaur launch slipped into early 1978. Overall 1977 was highly rewarding. Four of the five launch attempts were totally successful, resulting in attainment of all flight objectives.

An attempted launch of an Intelsat IV communications satellite on February 20 ended in failure due to a malfunction in the Atlas booster staging electrical disconnect system. An intensive failure investigation resulted in a number of design changes. These changes were incorporated and the last of the series of eight Intelsat IV's was successfully launched by Atlas/Centaur (AC-35) on May 22. Seven of the eight reimbursable Atlas/Centaur launches for COMSAT Corporation on behalf of the International Telecommunications Satellite (INTELSAT) consortium of over 90 countries were successful.

All seven satellites are now operational in geostationary orbit providing telephone and television service in the Atlantic, Pacific and Indian Ocean regions. On August 20 and September 9, 1976, two Titan/Centaur, TC-4 and TC-3 successfully launched the Viking 1 and Viking II spacecraft into their correct Mars transfer orbits. The original scheduled launch data was delayed from August 11 to August 20, first due to a faulty valve in one of the solid rocket motors on the Titan and secondly due to a depleted battery on the Viking orbiter. The isolation and successful resolution of these problems necessitated that the launch team literally work around the clock to support the August 20 and September 9 launches of the two Vikings.

Viking I will arrive at Mars on June 19, 1976, and Viking II will arrive at Mars on August 7, 1976, after traveling in excess of 400 million miles.

Each of the two Viking spacecraft includes an orbiter and lander system. The Viking lander system will be placed on the surface of Mars by approximately July 4, 1976, and a planned 60 day landed mission will be accomplished. The Viking II lander will be placed on the surface of Mars no earlier than September 4, 1976, for a similar 60 day landed mission.

Of the eight science investigations to be conducted on the surface of Mars, the most significant is the biology investigation to determine if life exists on Mars. The first in a series of six next generation Intelsat IVA spacecraft was successfully launched by the AC-36 vehicle on September 25. Each Intelsat IVA spacecraft has a capability to support the current world wide communication needs of the earlier Intelsat IVA satellites. The Intelsat IVA system will become operational in the Atlantic Ocean region in spring of 1976 following launch of the second spacecraft in January. The AC-36 launch was also the first of the world wide aircraft D-1AR series. The D-1AR Centaur incorporates reliability improvements and additional redundancy features.

The successful launch of Viking I and II and the subsequent launch of Intelsat IVA within a time frame of 37 days was a first for the Lewis Launch Vehicles Directorate.

Four Directorate personnel received the NASA Headquarters Exceptional Service Medal. In addition NASA Headquarters issued a Titan/Centaur Group A for accomplishments the Titan/Centaur team made towards the success of the Viking mission.

The year 1976 is scheduled to include four Atlas/Centaur launches; two for Titan and two for Intelsat. Titan/Centaur will launch another Helios probe for mid-latitude exploration of interplanetary space in proximity of the Sun. (29 AU)
Three Lewis products included among top 100

Three Lewis products included among top 100 by Lewis, are included Magazine's list of the 100 among Industrial Research vol. 13 no. 20 October 1, 1976. Dr. James W. Blue of Lewis; Thickness Measuring Radar developed by Dale W. Cooper and John Heighsway of Lewis and Dr. Roger S. Vickers of Stanford Research Institute; and Ceramic Thermal Barrier Coating developed by Dr. James W. Blue of Lewis; Thickness Measuring Radar developed by Dale W. Cooper and John Heighsway of Lewis and Dr. Roger S. Vickers of Stanford Research Institute; and Ceramic Thermal Barrier Coating developed by Dr. James W. Blue of Lewis and Dr. Roger Vickers of Stanford. The three products are a Continuous Production Cyclotron Target developed by Dr. James W. Blue of Lewis; Thickness Measuring Radar developed by Dale W. Cooper and John Heighsway of Lewis and Dr. Roger S. Vickers of Stanford Research Institute; and Ceramic Thermal Barrier Coating developed by Dr. James W. Blue of Lewis and Dr. Roger Vickers of Stanford. The three products are a Continuous Production Cyclotron Target developed by Dr. James W. Blue of Lewis; Thickness Measuring Radar developed by Dale W. Cooper and John Heighsway of Lewis and Dr. Roger S. Vickers of Stanford Research Institute; and Ceramic Thermal Barrier Coating developed by Dr. James W. Blue of Lewis and Dr. Roger Vickers of Stanford. The three products are a Continuous Production Cyclotron Target developed by Dr. James W. Blue of Lewis; Thickness Measuring Radar developed by Dale W. Cooper and John Heighsway of Lewis and Dr. Roger S. Vickers of Stanford Research Institute; and Ceramic Thermal Barrier Coating developed by Dr. James W. Blue of Lewis and Dr. Roger Vickers of Stanford. The three products are a Continuous Production Cyclotron Target developed by Dr. James W. Blue of Lewis; Thickness Measuring Radar developed by Dale W. Cooper and John Heighsway of Lewis and Dr. Roger S. Vickers of Stanford Research Institute; and Ceramic Thermal Barrier Coating developed by Dr. James W. Blue of Lewis and Dr. Roger Vickers of Stanford. The three products are a Continuous Production Cyclotron Target developed by Dr. James W. Blue of Lewis; Thickness Measuring Radar developed by Dale W. Cooper and John Heighsway of Lewis and Dr. Roger S. Vickers of Stanford Research Institute; and Ceramic Thermal Barrier Coating developed by Dr. James W. Blue of Lewis and Dr. Roger Vickers of Stanford. The three products are a Continuous Production Cyclotron Target developed by Dr. James W. Blue of Lewis; Thickness Measuring Radar developed by Dale W. Cooper and John Heighsway of Lewis and Dr. Roger S. Vickers of Stanford Research Institute; and Ceramic Thermal Barrier Coating developed by Dr. James W. Blue of Lewis and Dr. Roger Vickers of Stanford.
Lantz chairs local ASME

Richard L. Lantz, design engineer in the Engineering Design Division, has been elected to serve as chairman of the Cleveland Section, American Society of Mechanical Engineers (ASME). ASME is a national technical organization founded to promote and advance the practice of mechanical engineering. The Cleveland Section boasts a membership of 800 with Lewis having the largest numbers of members among local employers.

Services provided to the local members of ASME include monthly meetings, tours, employment assistant and continuing education seminars.

“The Cleveland Section also has taken steps to involve its members in community action. As part of the Ohio Council which consists of ASME sections in the state, it provides engineering input to proposed legislation. The Cleveland Section also has a community liaison committee chaired by Robert C. Bill of Lewis,” Lantz said.

Other Lewis employees currently active in the Cleveland Section, ASME are Dennis P. Townend, vice president, Internal Affairs; Andrew M. Mitchell, Continuing Education Committee; and Herbert W. Scibbe, a member of the Program Committee.

Lewis engineers interested in becoming a member of ASME may call Lantz, PAX 5271, for further details.

DONATE WHEN THE BLOODMOBILE COMES TO LEWIS.
A LIFE MAY DEPEND ON IT.

Center happenings

Memorial Match
The Lewis Sportsmen Club held its seventh annual James W. Useller Memorial Match last month at the Lewis firing range. Proceeds from the match were used to purchase books for the Club’s library.

The late James W. Useller was an active member of the club and was internationally recognized for his work in aeronautics and propulsion. The match winner’s name was placed on the Useller Cup which is displayed in the Utilities Building.

Yoga, Anyone
Lewis employees and family members will again have an opportunity to develop greater awareness, flexibility, and dedication to completely relax. On Monday, October 4, Elaine Sarkan will resume beginner and intermediate Yoga classes in the DEB Cafeteria. The intermediate group, for those who attended previous sessions, will meet immediately after work. Beginners class will start at 7:00 P.M. After six weeks of basic instruction, beginners will join the intermediate group. To participate just wear loose fitting clothes, bring a mat or quilt and a desire for self-improvement. For further information, call Mrs. Sarkan at PAX 8437.

Autumn Outing
Mrs. Jeanne Squire of Berea, Past President of the National Federation of Business and Professional Women’s Clubs (BFNW) Inc. will be the keynote speaker at BFNW’s district meeting on October 17. She will speak on “Profiles on Women.”

A Combined meeting of District 5 (Cuyahoga County) and District 6 (Kent area) will be held at the Holiday Inn in Kent, Ohio. NASA-Lewis BFNW members are to meet at 10:30 A.M. at the Bagley Road - I-71 K-Mart parking lot to form a convoy to Kent. Following the District meeting, a combination business meeting, brainstorming session and light buffet supper will be held at the Kent Holiday Inn for Lewis BFNW members. Reservations are due by Friday, October 8, contact Annie Easley, PAX 2232, or Susan Button, PAX 5260.

Friendly Persuasion
Jack Wagner, Claire Dexter and Herman Barnett will present convincing, persuasive methods of communications at the NASA-Lewis Llama Club meeting on Wednesday, October 6.

Dinner is at 5:00 P.M. and the Program begins at 6:15 P.M. For dinner reservations, call Rose Hudac, PAX 2150, by noon Friday, October 1, 1976. All interested potential public speakers are welcome to attend.

Credit Union Closes
The Century Credit Union office located in W113 ERB, will be closed October 4 thru October 8, 1976 to install on-line electronic data processing equipment. The office will reopen on October 12 with faster and more complete service for its members.

Notes of Appreciation

“I would like to thank everyone who expressed sympathy upon the death of my sister, Mrs. Hanna Rauschkolb.”

Sheldon Heimel

“I wish to express my gratitude to all those who offered kind expressions of sympathy following the death of my beloved mother.”

Leonard Razzolla

THE LEWIS NEWS presents the Lewis Research Center story in terms of its people, its purpose and its program. 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. This should be placed into PAX 3284, or sent to Room 118, Ad Bldg., Mail Stop 311, Delivered at ten days prior to publication.

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Technical Services...

(Continued from page 5)

accepted that there is currently a skill imbalance across the Center in that there are not enough technicians to fully support the work load defined by the professionals. At the same time, it appears that we may also have too many ongoing operations. I'm told that we have more than 600 potentially hazardous operations covered by the Lewis safety permit system. Looking ahead, we are pressing for more and more automated and unattended operations.

A major effort has been launched in the property management areas to identify underutilized or inactive equipment for recycling through the agency equipment visibility system and to conduct an effective triennial equipment inventory. Currently, Lewis has 28,000 controlled or tagged items, valued at $102,000,000.

The Center has an aggressive program on the reduction of its energy consumption and has to date attained notable results. The focus of attention is now on the large technical facilities. A major systems engineering study is currently being made by Grumman on the central process air systems to provide a system for computerized monitoring and control of operations. In the propulsion wind tunnels which are major energy consumers, an attack is being waged to systematically reduce operating times. Today, energy conservation is the name of the game in all our operations!

F-100 turbofan engine.

During the year, the Safety Office has conducted an effective OSHA compliance program through the Technical Services Building Managers. Using OSHA check-sheet procedures, we are completing a survey of the Center in the following four areas: General Shop Safety (Machine Tools), Electrical Code Compliance, Architectural Standards (Buildings) and Environmental Health. Remedial actions have been taken or, where appropriate, are being initiated through Engineering Services.

Launch Vehicles

The year 1976 has been another productive and eventful year for the Launch Vehicles Directorate in fulfilling this current year commitments and in preparing for the coming years demanding launch schedule.

All four missions launched during the year were successful, resulting in attainment of all flight objectives.

On January 15, 1976, the Titan/Centaur (TC-5) launch vehicle completed its fourth operational mission by placing the Helios B solar probe into an elliptical orbit around the Sun. After achievement of this primary objective, Centaur continued into an experimental flight phase to demonstrate its capability to sustain long zero gravity coasts and multiple engine starts. Approximately 4000 pounds of propellants remained in the Centaur vehicle at separation of the Helios spacecraft. Centaur used these propellants to demonstrate its capability for synchronous orbit injection, multiple coast/ restart during extended flight, thermal control techniques, tank pressure control and main engine restart with low tank pressurization levels and low propellant residuals. During the experimental phase Centaur successfully demonstrated 5 main engine burns separated by coasts varying from 5 to 315 minutes.

The TC-5 flight was the most complex unmanned mission ever undertaken. Including the primary mission, a total of seven Centaur main engine burns were performed, clearly establishing that Centaur is capable of performing complex advanced missions.

On January 29, 1976, just 14 days after the launch of TC-5, another in the series of Intelsat global communications spacecraft was successfully launched on AC-37. In addition, on May 13, 1976, and July 22, 1976, AC-38 and AC-40 launched 2 COMSTAR spacecraft into geosynchronous orbits which will be operated by American Telephone and Telegraph Corporation for domestic communications.

Titan/Centaur launch vehicle systems activities in support of the two Mariner-
Launch Vehicles... (Continued from page 6)

acceptance of the Titan III boosters, Centaurs, and Shrouds for the TC-6 and TC-7 (MJS launch vehicles) were also completed this year. All hardware, except for the second Centaur, have been delivered to Kennedy Space Center and launch vehicle preparation activities for next August’s launches have commenced.

A major engineering effort started 2½ years ago was recently completed and provides significant improvements to the factory and launch site computer controlled launch and checkout equipment. The hardware modification consisted of replacing the out-dated failure prone Xerox 930 computers with current state-of-the-art Harris computers. A complete recoding of the entire CCLS software, compatible with the new hardware was developed and demonstrated. The new computer software and hardware provided for a highly reliable system, a significant reduction in physical hardware, faster instruction execution time and the ability to time share up to six separate vehicle checkout tenant programs simultaneously.

This year also produced significant improvements to the airborne Digital Computer Unit (DCU). A new planar construction memory was designed and incorporated into the unit. The improved design provides for simplicity and producibility and results in case of component accessibility. In addition a new state-of-the-art innovation; paralyene passivation of hybrid, microelectronic piece parts was pioneered, developed, tested and phased into production with the first production DCU incorporating this modification undergoing acceptance testing in December. The Centaur DCU is presently the first and only major airborne hardware in the space industry to incorporate this passivation technique.

Additional significant tasks completed this year were an extensive review of quality and workmanship of hardware and the qualification levels for airborne hardware to assure that acceptable reliability levels are maintained. An in depth review of vehicle testing at the launch site was conducted which has resulted in a shorter period for this effort.

In November, launch vehicle systems management for the SEASAT-A Mission was assigned to the Directorate. The SEASAT-A spacecraft is an ocean dynamics surveillance satellite scheduled for launch from the Western Test Range in May 1978. It will provide information on ice fields, wave heights, water temperatures, etc. for use in near real time by the weather service, maritime industry and other interested agencies. The program is being managed by the Jet Propulsion Laboratory for NASA. The launch vehicle consists of a refurbished Atlas-F booster provided by the U.S.A.F. through their contractor General Dynamics, an Agena upper stage provided by JPL through Lockheed and a 10 foot diameter fairing provided by Lewis through Lockheed.

The year 1977 promises to be an eventful year with six launches scheduled with a nine month period. These are AC-45 HEAO-A in April, AC-39 INTELSAT IV-A in June, TC-6 and TC-7 MJS-77 in August, AC-43 INTELSAT IV-A Follow-on in October and AC-44 FLTSATCOM in November. The objective of the HEAO (High Energy Astronomy Observatory) mission is to study some of the most intriguing mysteries of the Universe, such as black holes, pulsars, neutron stars and supernovae. The observatories will scan and map the sky for cosmic, gamma and X-rays emanating from these phenomena. The two Intelsat missions will further supplement the worldwide communications network and the FLTSATCOM Mission will be first in a series to establish a space military communications network.

Space Systems and Technology

The year 1976 started with a very major milestone in the first month of the new year. That milestone was the successful launch of the Communications Technology Satellite (CTS) at 6:21 p.m. EST on January 17, 1976. CTS is a joint program between the United States and Canadian governments. The spacecraft was developed by the Communications Research Centre (CRC) in Ottawa, Canada. Lewis has management responsibility for the United States portion of the program which included development of a high-power Transmitter Experiment Package, spacecraft environmental testing, provided by the launch vehicle, the launch services, and manages the U.S. experiments.

Following the successful launch in January, the satellite performed a number of planned maneuvers and was placed on station at 116° west longitude at synchronous altitude on January 29th. Following successful initial on-station tests, the CTS spacecraft was ready to start its important task as a major experimental facility for the experimenta tion in and the commercial development of the 12 GHz satellite broadcast band at high power.

Spacecraft time is equally shared by the United States and Canada, and a variety of communications experiments are under way by both countries. The U.S. experiments can be grouped into three categories: public service, industrial, commercial and technology. Experiments in the public service area include: telemedicine, tele-education, emergency communications, library networking, and public broadcast networking. Location of experimenters range from the Atlantic to the Pacific seaboards.

In addition to the long term experiments underway, a number of demonstrations have been held to expose this new communication tool to greater visibility. Lewis has built a Transportable Earth Terminal (TET) which includes a 3m (10ft.) antenna mounted on a small trailer. TET has demonstrated live broadcasts from Lewis to a number of locations such as the Museum of Science & Industry in Chicago, Lincoln, Nebraska, and Kal amazoo, Michigan.

A Small Earth Terminal Station (SETS) is set up at Lewis to demonstrate operation of CTS with a low cost permanent installation. A number of small sized antennas are part of the equipment (5.2m to 0.6m in diameter). It was this facility that was used in the Alaska North Shore ice imaging experiment reported in the Lewis News of October 29, 1976. (Continued on page 8)

Daniel J. Shramo, Director

(Author provided signatures are not legible for transcription.)
Feedback to staff from INFORUM II

Dr. Bruce T. Landin

This is the second INFORUM FEEDBACK column which serves as a means of reporting management responses to questions and concerns expressed at the DIRECTORS INFORUMS, part of the Lewis Awareness Program. (INFORUM is a coined word meaning a place where information is exchanged, gathered, and disseminated.) Many of these responses contain additional information to that expressed at the INFORUM. Center Director Bruce T. Landin listened to concerns on the general topic, "What do you see in the future of Lewis and how does it help or hinder your work?" The concerns and responses follow.

Staff: Available points for promotions.

Dr. Landin: We are, of course, operating under a controlled ceiling on the average grade of all Lewis GS schedule employees. At present, our normal attrition and turnover of the staff provides approximately 175 promotion "points" per year. While this is not enough to provide a promotion to everyone who would like one, it is, in my opinion, sufficient for a sound promotion program for the present staff of the center.

Headquarters view of our efforts to enter new (i.e., other than aerospace) areas of work.

Very positive, at the Assistant Director's level, but with some concern by Office of Aeronautics and Space Technology about the availability of staff here at Lewis to support both their programs and ERDA at (1) an important growth area for the agency, (2) a good utilization of government capabilities in the national interest, and (3) establishing processes that show how the capabilities of one agency can be used to help another agency.

Why does it seem that the number of approvals required to do anything seems to be always increasing?

(Continued on page 7)

Dr. Seymour C. Himmel

Associate Director Dr. Seymour C. Himmel solicited thoughts and concerns related to the following question: "What programs would you personally like to see adopt-
ed, continued, or dropped?" Staff: Lewis should know more about what future (20-
30 years) communications satellites are planned so that we can plan our R&T pro-
gram.

Dr. Himmel: Lewis is deeply involved in systems studies designed to identify the communications services needed, the market for such services and the technological requirements of these services. As in any applications activity much interaction with the potential user of the service(s) is required, and an economic and/or technical justification must be established. The process is, understandably, lengthy, iterative and involved. The Applications Division has recently proposed a number of new initiatives in communications that have attracted considerable interest. Lewis should know more about the steps being planned to phase out expendable launch vehicles with the phasing in of Shuttle.

It is the Agency's plan to phase out all expendable launch vehicles other than the Scout and sounding rockets by the end of 1980 when the Space Shuttle is scheduled to become operational. In the intervening period, the expendable vehicles will continue to provide transportation into space for NASA, commercial and foreign spacecraft. No performance improvement development work is to be undertaken for the expendable vehicles. Only such developments as are required to maintain the operational reliability of the vehicles is to be authorized. As the work load decreases, personnel will be reassigned to other duties.

Role Lewis may play in the Space Shuttle.

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William Dey, Jr.

The Director of Administration, William Dey, Jr. discus-
sion session focused on concerns related to "What are the obstacles to getting your work done at Lewis?" Staff: The Headquarters role regarding more centralization.

Mr. Dey: The strength of NASA as an Agency has al-
lways been its utilization of its operations and the relative autonomy of the field Centers. There has been no move to centralize oper-
ations, but there does seem to be at times a move to limit or at least to control the autonomy of the field centers. For the most part this is evident in the increasing need to account for resources and report our routine activities to Headquar-
ters. To a great extent this change is necessitated by what we might characterize as an environmental change. The glamour of the Apollo Program and the swell of public support that attend-
ed it has vanished and NASA now finds itself in a highly competitive quest for the federal R&D dollar. That this results in the need for greater accountability and control at the Agency level should come as no surprise. This quite naturally raises the specter of overall centralization. The trick is to achieve the first without simultaneously resorting to the other. Apart from the obvious need for greater ac-
countability and control there seems to be a general understanding at NASA Headquarters that the field centers represent an impor-
tant and vital part of the Agency's capability. There is every reason to hope that we will find a workable balance which will protect our capability and sharpen our ability to compete for support.

Lewis is becoming a "slave" to ERDA.

While there certainly is no intent to become subservi-
tent to ERDA, we must, of course, be responsive to their needs and be sure we fulfill our commitments to ERDA.

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Andrew J. Stofan

Andrew J. Stofan, Director of Launch Vehicles, heard staff comments on concerns related to "How can we utilize skills and talents more effectively at Lewis?" Including yours.

Lateral assignments should be publicized and made available to general staff. Posting of lateral transfers (i.e., where a merit promo-
tion is not applicable) has been used on an experimen-
tal basis recently to fill several vacancies. In applying for a lateral transfer, an individual may make his spec-
tal talents and interests known to the supervisor where the vacancy exists. In the future, the posting of lateral transfers will be one of the ways in which a position may be filled.

Aerospace at Lewis is in de-
cline phase. Personnel may be in weak position. Skills and expertise should be pro-
perly utilized in other areas. Should carefully plan transition. A method should be developed to rotate individuals to prevent boredom or lack of challenge after 5-6 years in same assignment.

Aerospace related work at the Center is in a decline. The utilization of the skills of the Center are constantly being evaluated so that they are always increasing.

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Dr. Edward A. Zak

Zak began his Lewis career in 1964 in the Procure-
ment Division before transferring to the Chief Coun-
sel Office in 1970. He earned a B.A. degree in classical languages from John Carroll University, graduating magna cum laude. He also earned a Master's degree in ancient history from John Carroll before earning a law degree from Cleveland State University where he also graduated cum laude.

Zak has taught part-time at Ursuline College, Pepper Pike and is an amateur pho-
tographer. He and his wife, Charlotte, live in North Olmsted.

Give blood
to sustain life.


The LEWIS NEWS presents the Lewis Research Center story in terms of its role in the space and aeronautics program. 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. News items should be phoned into PAS 3284, or sent to Room 120, Administration Bldg., Mail Stop 3131. Deadline is ten days prior to publication.
INFORUM II...

Dr. Lundin

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William Dey, Jr.

(Continued from page 2)

It's called institutional aging. It is something that we must stay alive to and fight at every turn. Your comment encourages me to keep at it. We have sold service as our large technology program of not, such an effort would even if possible, which it is not, such an effort would be counterproductive and a detriment to our future. The places where our country needs advanced technology and where we have an extant capability, such as propulsion, power and energy conversion, must, in the end, be provided by and/or operated by industry. For us to try to compete with this industry would not only fail to be supported by the national administration but would destroy the support we must have from industry. I understand the appeal of the suggested approach, but the bare facts are that there is not exactly an "Apollo situation" in our future. Our future resides more in an expanded NACA than in "building another Centaur" to go to the moon. Downward communications are not working well enough to reach the working level. I agree. Recent surveys and studies have shown that this is a problem at all centers and, indeed, in all organizations of our size. Memos to staff and bulletin boards aren't enough. That is why we have State of the Center and State of the Directorate talks, followed by interviews and discussions. Our Lewis News is, I believe, the best in NASA. These Informs are a further effort to improve communications. Any other ideas would be welcome.

Is there any way to inform the staff about a reorganization before it happens? Probably not. A reorganization of the Center must, of course, be approved by Headquarters. In the nature of things, I cannot inform the total staff, and thus make it public, until that approval is obtained. And once that approval, even informal, is obtained the word gets out through the Headquarters system with great speed. I understand and regret that many of you were uncertain about your future assignment for a few weeks. This time was spent, properly, I think, in the effort to find the best possible match between individual interests and the programmatic needs of the Center. Once again, I enjoyed this "Inforum" and found the discussion both informative and helpful. I would like to thank all who took the time and effort to participate.

Andrew J. Stefan

(Continued from page 2)

DONATE WHEN THE BLOODMOBILE COMES TO LEWIS.
A LIFE MAY DEPEND ON IT.

Heat loss...

(Continued from page 1)

Cleveland City Council as eligible for three percent federally financed loans from HUD.

Interpretation of the thermographs show that rooftops of the majority of Cleveland homes overfitted are losing too much energy due to inadequate attic insulation. The infrared thermographs were color coded to show relative heat loss rates in each dwelling.

The Department of Community Development had members of the department's weatherproofing program on hand to explain how qualifying citizens of Cleveland can acquire three percent loans to weatherproof their homes, and for very low income homes, how to apply for grants for the same purpose.

Also participating in the weatherproofing program in the rotunda was the East Ohio Gas Company which had special displays on how homeowners can weatherproof their homes themselves with the proper materials or have it done through recommended contractors. Those homeowners whose homes actually appeared in the demonstration imagery were told what action to take.

The infrared and other weatherproofing showings, coincided with beginning of the "C'mon Downtown" program sponsored by the Greater Cleveland Growth Association and the Cleveland Press.

Women bowling champs

The Scranjets emerged as champions of the NASA Ladies Bowling League after a grueling 33 weeks which saw them move down their opponents in 141 games while losing 89.

Winning team members are (left to right, front row) Sadie Kinter, captain, and Lois Geyer. Back row, left to right, Kathy Leffew, Marge Gantner, Kay Lahbibach and Gloria Leiner. Ms. Leiner led the team with a sparkling 162 average and also garnered a 611 three-game high series during the season.

Heat loss...

(Continued from page 1)

Lewis has and continues to play an important consultative role for the Space Shuttle. In particular we are actively involved in supporting the Space Shuttle Main Engine Program in turbomachinery, bearing, seals and materials. Our assistance is much appreciated. ERDA should use Lewis for fusion work. Lewis is no longer conducting any significant level of effort on fusion although some of our basic plasma physics work may contribute. ERDA already has a massive program on fusion in a number of the former AEC laboratories. With our limited manpower and the lack of a unique capability or competence, it is not advisable or advantageous for us to enter this field.

Dr. Himmel

(Continued from page 2)
Stofan named deputy, goes to Headquarters

Andrew J. Stofan, Director of Launch Vehicles at Lewis, has been named Deputy Associate Administrator for the Office of Space Sciences at NASA Headquarters effective, January 8.

In his new position, Stofan will be helping direct all of NASA's space flight programs aimed at scientific investigations of the solar system using ground-based, airborne, and space techniques; scientific experiments to be conducted by man in space and development and use of light and medium class launch vehicles.

Stofan began his professional career at the Lewis Center in 1958 as a research engineer and in 1962 was assigned to the propellant systems section of the Centaur Project Office, becoming head of the section in 1966.

In 1967 he was named project manager of the B/1, B2 test programs; assistant project manager, Improved Centaur in 1969 and project manager of the Titan/Centaur vehicle in 1970. In this post, he was responsible for all activities associated with the design and development of the Titan/Centaur launch vehicle, until he was named director of launch vehicles in 1974.

Congratulations!

William Richter, Jr., flanked by Marge Petryk (left) and Mary Lou Eschenfelder of the Century Federal Credit Union, seems more pleased with kisses planted firmly on both cheeks than the check presented to him. Richter won $75 in a drawing sponsored by some credit unions, including Century Federal, and Cleveland-area car dealers. The joint public relations venture was aimed at increasing car sales through loans obtained from the participating credit unions. Richter works in the Engineering Design Division. (Martin Brown photo)

Scouts honor two

William R. Loomis of the Fluid System Components Division and Alfred J. Nachtigall of the Materials and Structures Division were two of Greater Clevelanders receiving the Silver Beaver Award, scouting’s highest local award for exceptional volunteer service and leadership.

The two received the award at a recent appreciation dinner sponsored by the Greater Cleveland Boy Scouts Council in Euclid.

Loomis, a former Eagle Scout with two sons, also Eagle Scouts, has been active in scouting for over 40 years. He has served in various capacities over that period, including nine years as a cub master where he organized religious programs. Loomis is currently advancement chairman of BSA’s Cleveland Southwest District.

As chairman, he is responsible for promoting the advancement of some 1100 Scouts in 43 scout units. Under Loomis’s leadership, 176 Scouts have attained Eagle badges.

In addition to his scouting activities, Loomis is a retired major in the U.S. Air Force Reserves and is active in many other community activities. He holds a Bachelor’s degree in chemical engineering from the University of Illinois.

(Continued on page 2)
Engineering Services...

(Continued from page 4)

tallation of this demonstration 200 KW facility, the largest wind turbine in operation in the United States. Plans for similar installations in Culebra, Puerto Rico, and Block Island, Rhode Island, are under way.

- Research Analysis Center construction drawings and specifications are complete. Construction funds for this new computer and office building, to be located on the old picnic grounds, are expected in October 1978. Occupancy is planned for late 1980.

- High Pressure Facility is coming closer to operation. One of the two compressors for supplying 600 psi air to turbine and combuster research facilities is installed and the second compressor is being assembled. Facility checkout is planned for the first quarter of 1978 and first combuster tests are scheduled for July.

- Energy Savings are the basis for several projects including (1) using Freon refrigeration units in place of liquid nitrogen at EPL, (2) a Utility Control System to monitor and automatically control heating and air conditioning (including turn-down at nights and on weekends) in many of the Center's buildings, (3) study of four large representative buildings at the Center to determine economical methods of reducing heat losses, and (4) addition of modern instrumentation and controls on central air supply equipment to improve the efficiency, safety, and reliability of equipment for equipment operation.

- Photovoltaic Power System for Indian village in southern Arizona. Working with the Solar Energy Division, the world's first installation will be made to provide photovoltaic power for an entire village to be used for pumping water, home lighting, washing machine, and sewing machine.

- Electronic Blueprint Services will be provided with modernization of our Plan Files and Reproduction Unit to provide reduced size plots for self-service, save postage, reduce printing costs, and the prints will be a more convenient size to handle. Self-service facilities will be improved and a cross-indexed filing system will be provided. As a relative newcomer to the Engineering Services Directorate I have found the staff to be dedicated, hardworking, and eager to provide engineering and design services to the rest of the Center. I have found it a pleasure to work with them. I have also met with personnel from research and service organizations from throughout the Center to obtain comments on how Engineering Services can better serve their needs. I welcome additional comments from anyone at the Center.

Launch Vehicles

ANDREW J. STOFAN, DIRECTOR

Continuing the 11-year operational program, the Launch Vehicles Directorate used both Atlas Centaur and Titan Centaur vehicles to place four spacecraft in orbit.

Atlas Centaurs AC-39 and AC-45 were launched in May and August. AC-39 carried an Intelsat IVA, the third of the second generation of Intelsat IV communications satellites intended to expand the global communications network.

AC-45 carried the High Energy Astronomy Observatory (HEAO-A) into a circular earth orbit, using a direct ascent mode. This satellite was the first of three to be launched. Weighing almost three tons, it was one of the heaviest unmanned spacecraft ever launched to date by the Atlas Centaur.

Following observatory separation from the Centaur, a special boost pump experiment was conducted to demonstrate a reduced engine pre-start sequence for the Titan RL-10 engines. Use of a shorter pre-start sequence requires less propellant and allows increased performance.

In August and September, Titan Centaurs TC-7 and TC-6 started the Voyager spacecraft on their long journeys to Jupiter and Saturn. The launches concluded the Titan Centaur program which also successfully launched two Helios spacecraft (a joint U.S.-West German effort) and the spectacular Viking missions to Mars in previous years. Lewis is proud to have had a part in these historic missions.

Lewis was assigned launch vehicle system management responsibility for the SEAT/SA mission because of its experience with the Atlas and Agena vehicles and previous working relationships with the Air Force and other NASA Centers involved.

On September 29, 1977, shortly after a successful Atlas Centaur AC-43 carrying an Intelsat IVA payload exploded, failing to accomplish its mission, the Atlas booster spontaneously exploded immediately due to a fire in the Atlas engine section. The Range Safety officer sent a crew of eight to destroy the Centaur up-stage. A detailed failure investigation established that the cause of the failure was a rupture of a line in the Atlas hot gas generator system, which provides gas at 650 psi and 1250°F to drive the turbopumps on the two Atlas outboard booster engines. Recovery of the system by Cape Canaveral divers proved to be the key in determining the failure mode. Further study and analysis of the defective material established that the brazing process specifications required modification to preclude this type of failure from recurring. Corrective action has been implemented.

A significant development which was completed last year was a new Computer Controlled Test Set (CCTS) to test the Teledyne Digital Computer Unit (DCU). The DCU is the airborne computer on the Atlas Centaur launch vehicle. The development program for the CCTS resulted from NASA/Lewis concern for the existing limitations and reliability of the present test equipment used to evaluate the DCU. The CCTS upgrades the quality of the test equipment and minimizes operator intervention during the test. It also provides additional test capabilities and data visibility to enhance failure identification and isolation. Furthermore, the new test set has the future capability to evaluate the IUS computer to be used on Space Shuttle.

Towards the latter part of last year, NASA Headquarters assigned management responsibility for the integration of the Titan/IUS launch vehicle, which will serve as a back-up for Shuttle flights. In addition, NA-SA Headquarters is considering the advisability of granting procurement authorities to Intelsat. In other Atlas Centaur and Titan Centaur vehicles to serve as back-up vehicles for the Shuttle.

In December, Andrew J. Stofan, Launch Vehicles Director, announced that he has accepted a position at NASA Headquarters as Deputy Associate Administrator for the Office of Space Sciences.

In 1978, seven launches are planned. These are two FLTSATCOM's for the U.S. Navy Satellite Communications Network; one Intelsat IVA which is the last in a series prior to the scheduled launches of the Intelsat V series; two Pioneer Venus planetary probes; HEAO-B, the second in a series of High Energy Astronomical Observatory probes and one COMSTAR to add to the existing Domestic Satellite Communications Network.

During the past year, there was much activity on the Centaur Parts Improvement Program. The Launch Vehicles Directorate, in concert with the Office of Reliability and Quality Assurance, is running a program to improve the quality of selected electronic parts used in Atlas and Centaur spacecraft. This many faceted program included: visiting the semiconductor vendor facilities to investigate facilities, processes, and device construction details; coordinating meetings with representatives of the three involved contractors; monitoring activities at the independent company which performed screening tests on parts to be used by the Centaur contractors; and reviewing the results of detailed disassembly inspections of sample quantities of each type of part to be used in the manufacture of flight electronic equipment.