SPACEPORT NEWS

Volume 2, Number 44 | NASA Launch Operations Center, Cape Canaveral, Florida | October 31, 1963

PRETTY PATSY Burgess of LOC's Administrative Services Office, reminds us that tonight is Halloween. But if all witches were as bewitching as Patsy, who'd be afraid?

Dr. Debus Slated To Speak

More than 600 persons from nine states and the District of Columbia are expected to attend the Southeast Regional Conference of the Society of American Military Engineers November 7, 8 and 9 at the Cape Colony Motel in Cocoa Beach.

The conference banquet will be held Friday night, with Dr. Kurt Debus, LOC Director, the main speaker.

Theme of the conference, sponsored by the Canaveral Post of the S.A.M.E., is "Engineers in the Space Program".

Following this theme, the conference schedule includes a half-day tour of Cape Canaveral and MILA, as well as speeches and technical papers by leaders in aerospace operations and construction.

The conference will open Thursday, November 7. Following the tour Friday morning, November 8, the deledates will return to the Cape Colony for a luncheon and the formal Southeast Regional meeting. Toastmaster at the luncheon will be Colonel G. A. Finley.

NASA-DOD TO PONDER MANNED SPACE STATION

NASA and the Department of Defense have entered into an agreement to coordinate all advanced exploratory studies and any follow-on actions in the area of a Manned Orbital Research and Development Station.

This agreement represents a coordinated approach to a possible new program although there is no conclusion or commitment that the National interests will require such a station.

The agreement gives formal recognition to the consideration that further significant progress in scientific space research and defense applications "may well require the operation of a manned orbital research and development system larger and more sophisticated than Gemini and Apollo," and that such a system would be a major technical and financial undertaking.

NASA and DOD also agree that insofar as practicable the foreseeable future requirements of both agencies in this area should be encompassed in a single project.

The agreement includes these major provisions:

— Advanced exploratory studies in this area undertaken by NASA and DOD will be coordinated through the Aeronautics and Astronautics Coordinating Board;

—The AACB will evaluate various concepts resulting from the studies;

—The Secretary of Defense and the NASA Administrator will make a joint recommendation to the President as to the National need for such a project, including a recommendation as to which agency should be responsible for directing the project;

—If the Administration decides to proceed with the project, a joint NASA - DOD Board will be established to formulate the specific objectives and approve experiments to be conducted.

NASA FUNDS SHORT AS DRIVE NEARS END

NASA-United Fund contributions neared the two-thirds mark last week as the month-long campaign drew to a close.

Last Thursday a total of $9,500 had been collected toward the $15,000 NASA goal.

Today is the final collection day, and division captains are hopeful for a last minute rush that will push the drive over the top.

Division Office	Participation %	Amount Given or Pledged
Office of the Director, LO-A	90%	$175.00
Technical Staff, LO-TA	100%	35.00
Regional Audit, LO-W	100%	50.00
Community Development, LO-RC2	100%	62.00
Base Operations,	100%	728.00
Public Information, LO-RB	100%	42.00
Launch Supp. Equip. Engr. Div., LO-DA	100%	150.00
Safety Office, LO-SA	100%	88.00
Quality Assurance, LO-QA	86%	122.00
Brown Engineering, 916,000	80%	2550.00
Protocol, LO-RP2	71%	28.00
Asst. Dir. Instrumentation, LO-E	56%	846.50
Facilities Eng. & Const. Div., LO-FA	58%	670.00
Asst. Dir. Administration, LO-G	56%	2013.50
Launch Support Oper. Div., LO-LA	52%	374.00
Goddard Oper. Div., 400000	50%	419.00
Asst. Dir. Plans $ Proj., LO-P	35%	213.00
Asst. Dir. Launch Veh. Oper., LO-V	30%	817.50
Management Services 918000	9%	53.00
Economy Blueprint 919000	24%	216.00
NASA Test Support Office, LO-NA	0	0
JPL Operations Div., 500000	0	0
MSC, 930000	0	0

SPOTLIGHT

THE TIME TO ACT

Next Tuesday is election day.

In many Brevard municipalities citizens will have a chance to elect such local officials as mayors and city councilmen to serve for the coming years.

In addition to the local elections, there are some proposed amendments to the Florida constitution which are to be voted on.

These concern bond issues for higher education needs and more statewide recreational facilities, and the changing of the election year for Florida Governors, so it won't coincide with the presidential elections.

NASA employees would stand to benefit from the higher education bond issue, which if passed, would allow more funds for colleges in the state, including the Space University and Brevard Junior College.

Although this is an off-year election, both the bond issues and the local offices open affect us directly.

We urge you not only to get out and vote, but to study the issues and know what you're voting for. In many areas, local rallies will be held to give voters the chance to listen to and question candidates.

So, if you've got a gripe about the way your community is run, or are interested in its future plans, now's the time to act.

AIR OF PROFESSIONALISM

NASA Administrator James E. Webb, in a recent speech to the National Association of Counties in Denver, touched on the air of professionalism that pervades the space program.

Here are some pertinent excerpts from that talk:

"During 1958, this country launched 13 satellites and only five of them worked, which is an average of only 36 percent. Since that time we have had increasing success, reaching 83 percent on all launches last year—54 successes in 65 tries—and 100 percent success in our scientific satellite program. . . .

"Increasing knowledge, increased skill on the part of the technicians in charge of the job, improved spacecraft, boosters and components, all have contributed to this result. The difference between yesterday and today was summed up recently by the Wall Street Journal, when Gordon Cooper was placed in orbit in the final shot of the Mercury series, in these words:

'The space age yesterday stepped over an invisible line from fantastic adventure to disciplined routine . . . '

"An 'air of professionalism pervaded the atmosphere here at Cape Canaveral and leaves its mark on everyone from Major Cooper to the tense men in Mercury Control. It is not easy to describe, but it is impossible not to feel and it is the true mark by which to measure man's march into space'."

SPACEPORT NEWS

Published each week by the National Aeronautics and Space Administration's Launch Operations Center, Cape Canaveral, Florida.

BEA GRAHAM, right, Chairman of the NASA Women's Social Club's Harvest Ball, works on plans with Publicity Chairman Marilyn Krause, center, and Assistant Publicity Chairman Ruth Bernstein.

SPACE ALMANAC

A CHRONOLOGY OF EVENTS IN SPACE EXPLORATION AND RESEARCH.

5 Years Ago

November 6 — Army completed Redstone flight testing with a perfect 250-mile shot.

1 Year Ago

November 1-3 — First NASA-University Conference on the Science and Technology of Space Exploration held in Chicago, with 1,181 educators and scientists representing NASA Headquarters, NASA field installations, and other Government agencies, as well as more than 300 colleges and universities.

November 2 — John Glenn was awarded the Alfred A. Cunningham Trophy for being selected as the Marine Aviator of the Year.

HAZARDOUS GEYSERS

When American astronauts land on the moon, they'd better be sure there haven't been any recent solar flares.

Physicist V. K. Aappa Rav of India believes such flares may create deadly geysers of atomic particles on the lunar surface.

NASA SOCIAL CLUB ANNOUNCES AGENDA

The NASA Women's Social Club—in the midst of a membership drive—have announced plans for a Harvest Ball Saturday night, November 9th at the Patrick AFB Officers Club.

Proceeds from the dance, which will be from 9 p.m. until 1 a.m., will go to the Club's special charity — the Brevard Training Center.

Membership in the Club is open to all women who work for NASA, either with Civil Service or a contractor. Present membership is 40.

Meetings are held the second Wednesday of each month at 7 p.m. at the Holiday Inn, and are preceded by a social hour.

Future Club plans include showing of slides and movies either by members or professional photographers — and also lectures on subjects of interest to the group.

A questionnaire is now being circulated to members covering social activities such as bridge, bowling, horseback riding, fishing, art courses, and ceramics. Depending on membership interest, the Club may sponsor such activities in the future.

For information on the Harvest Ball, call Ruth Bernstein, UL3-6738, or for information on joining the Club, call Mary Driver, UL3-5412.

BABETTE CiSSEL, left, and Mary Waller of LOC sun themselves on the French Riviera, at Nice, during their month-long European tour.

TWO LOC GIRLS ENJOY EUROPEAN EXCURSION

Financial Management Office employees are being treated these days to a first-hand verbal and visual tour of Europe, courtesy of Babette Cissel and Mary Waller.

Babette, an administrative assistant, and Mary, a voucher examiner, have just returned from a month-long continental visit that included stops at London, Amsterdam, Brussels, Cologne, Heidelberg, Baden Baden, Lucerne, Innsbruck, Venice, Bologna, Florence, Assisi, Rome, Siena, Pisa, Rapallo, Nice, Lyon and Paris.

"It was just great," Mary said; Babette concurs.

"The tour was a little regimented, there were 38 of us, so Babette and I went out on our own at most places," Mary added, "and we didn't bring too many souvenirs home, because we spent our money having a good time."

What sights impressed them most?

"I was intrigued with Florence," Babette said, "because I'm a great fan of Michelangelo."

Mary was impressed with the cleanliness of Amsterdam, the friendliness of London, the cheese fondue, a food delicacy in Switzerland, and the costuming—or the lack of it—at the Folies Bergere in Paris.

Both girls said they had seen enough mountains to last them for years. While motoring through the Alps, they counted 320 hairpin turns as they went through the pass.

They encountered no language problems, but had difficulty keeping on schedule with bus departures from city to city.

"We would always wander off and explore on our own," Mary explained, "so finally in Liechtenstein, we bought some little cowbells, and rang them everytime we got lost."

Would they recommend such a trip to others?

"I don't think there's anybody who wouldn't enjoy it," Babette says.

"We don't even want to unpack," Mary added, "we're ready to go again."

TIROS VI DEVELOPS FOCUS TROUBLES

TIROS VI is no longer transmitting useable cloud cover pictures after a record 13 months of successful operation.

A malfunction in the focus current regulator is causing distortion in the pictures received from the satellite.

TIROS VI was launched from Cape Canaveral Sept. 18, 1962 and has operated more than three times its expected lifetime. Original life expectancy of TIROS satellites was expected to be from three to four months.

During its 13 months of operation, TIROS VI recorded a long list of accomplishments. Along with TIROS V, it supported the flights of Astronauts Walter Schirra and Gordon Cooper. It detected sand storms in Saudi Arabia; ice conditions in the southern and northern hemispheres; 13 hurricanes — including the recent Flora — typhoons and tropical storms; and provided more than 300 weather advisories to countries all over the world, based on some of the 67,000 cloud cover pictures sent back to Earth from the weather satellite.

TIROS VII, launched June 19, 1963, continues to provide excellent cloud cover pictures.

ICY PROBLEM

Soviet astronomers, geochemists, glaciologists and other specialists are trying to solve an icy mystery.

Sometime last month an 11-pound chunk of ice fell in Russia near Domodedono, and splintered when it hit the Earth.

The scientists believe it came from outer space. In fact, they're sure it isn't of atmospheric origin, since clear, sunny weather prevailed the day it fell, and there were no planes over the area.

Kelley Gives Talk

Dr. Albert Kelley of NASA's Office of Advanced Research and Technology, Washington, was featured speaker yesterday at the dedication of the new Barnes Engineering Building in Melbourne.

He spoke on electronics and guidance control.

Ion Engine Development Underway

The ion engine — a system of advanced propulsion that holds great promise for interplanetary missions — is now so well advanced in research and development that NASA can begin planning flight tests for it.

One designed by Harold R. Kaufman, scientist - investor at the NASA Lewis Research Center, is described as the most efficient electric rocket engine yet developed.

New Missions Seen

While much remains to be done, Kaufman said if the electric propulsion systems "live up to expectations, their use will make possible many space missions that are impractical with chemical rockets."

His engine generates only a few ounces of thrust, but a cluster of them could accelerate a moving spacecraft at ever - increasing velocities in interplanetary space. More powerful chemical rockets would be needed to launch the vehicle on its path.

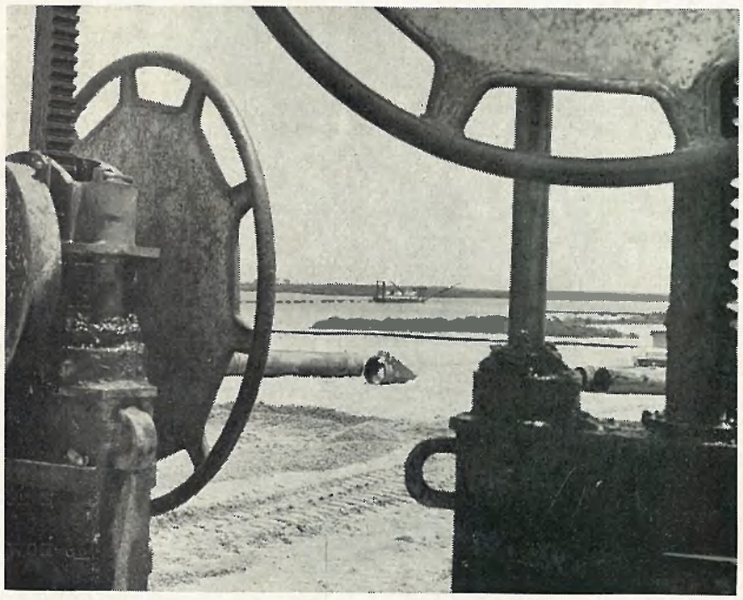
Except for the cathode, the Kaufman engine is durable enough to operate for a 400-500 day period.

Ion engines use an electrostatic field to accelerate charged particles and expel them in an ion beam, thereby producing thrust. They offer very large increases in the specific impulse — the efficiency of propellant utilization. However, the extra weight of the propulsion system is an engineering problem.

NASA Grants

NASA has given grants and graduate training aid to over 100 colleges in 36 states.

12 Million Cubic Yards Of Fill Pumped Up



DREDGE AT WORK in channel is framed by heavy machinery on land. These valves in the foreground divert the water discharge, pumped up from the river bottom.

One year ago today giant dredges began carving a 125-foot-wide canyon across the mucky bottom of the Banana River.

For more than nine months whirling cutter heads bit hungrily into the bottom, slicing a 10-foot-deep, 12-mile-long swath from south of the Orsino - Cape Causeway, to the VAB site and to Complex 39's Pad A.

And, as this access channel for Saturn V barges was being fashioned, powerful hydraulic pumps coughed up tons of sand and shell—nine million cubic yards of it—for fill.

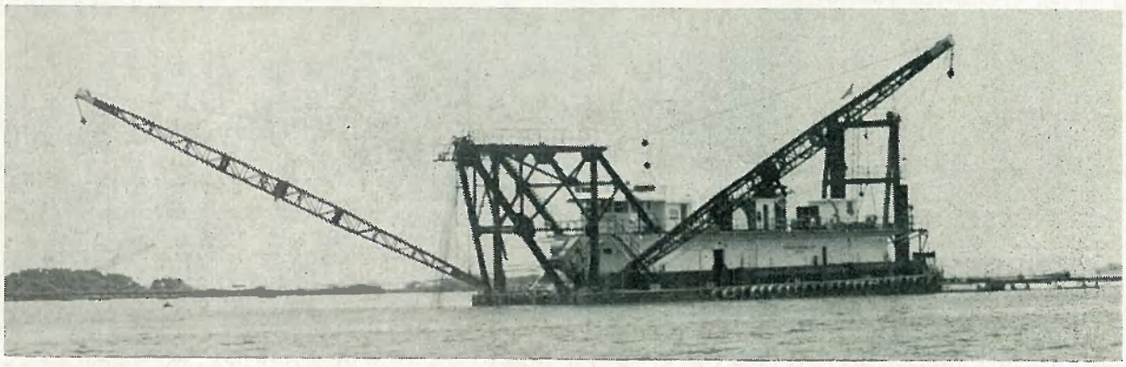
A major portion of this fill went into the 187-foot-wide, 6.7-foot-high crawlerway, which stretches more than three miles from the VAB site to Pad A.

At the Pad, countless tons of fill were pumped in to mold an 80-foot-high "pyramid" of sand and shell surcharge.

This was one of the "highest" known pumping operations ever completed. To provide this mountain of fill, dredges dug 40 feet down into the Pin Tail Creek area just south of the Pad A site.

Gahagan Dredging Company held the prime contract for this work and for pumping up three million cubic yards of fill for the Indian River Causeway.

They completed work on the access channel in August and on the causeway earlier this month. Soon after the first of the year more dredge work will get underway—for an access channel and crawlerway to Complex 39's Pad B.



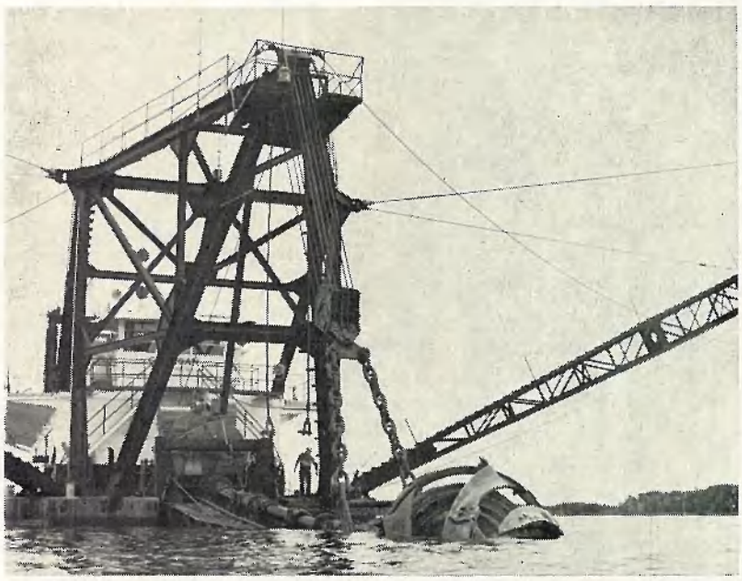
LIKE A GIANT, sea-going beetle with huge antennae, a dredge cuts a 10-foot-deep swath along the Banana River.

News Photos by Russ Hopkins

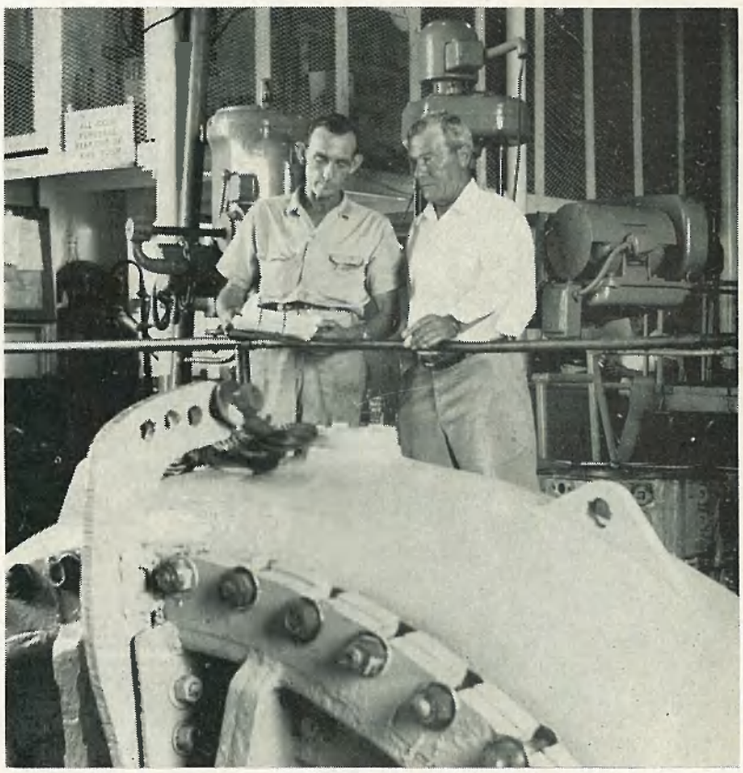
SAND AND SHELL from the river may be pumped for a half-mile or more through this floating pipe line, to a fill area.

FILL HAS BEEN used to mold the crawlerway and an 80-foot mound of surcharge at Complex 39's Pad A. Four stockpiles have also been set aside for future use.

Since Dredges Began Operating Year Ago

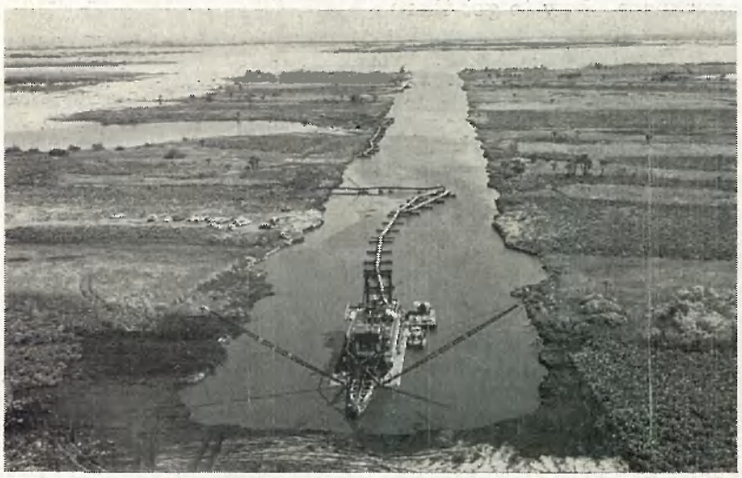


A DREDGE is a complex vessel, laden with heavy machinery. Here, its cutter head whirs along the Banana River bottom, carving out a 1-foot-deep access channel.



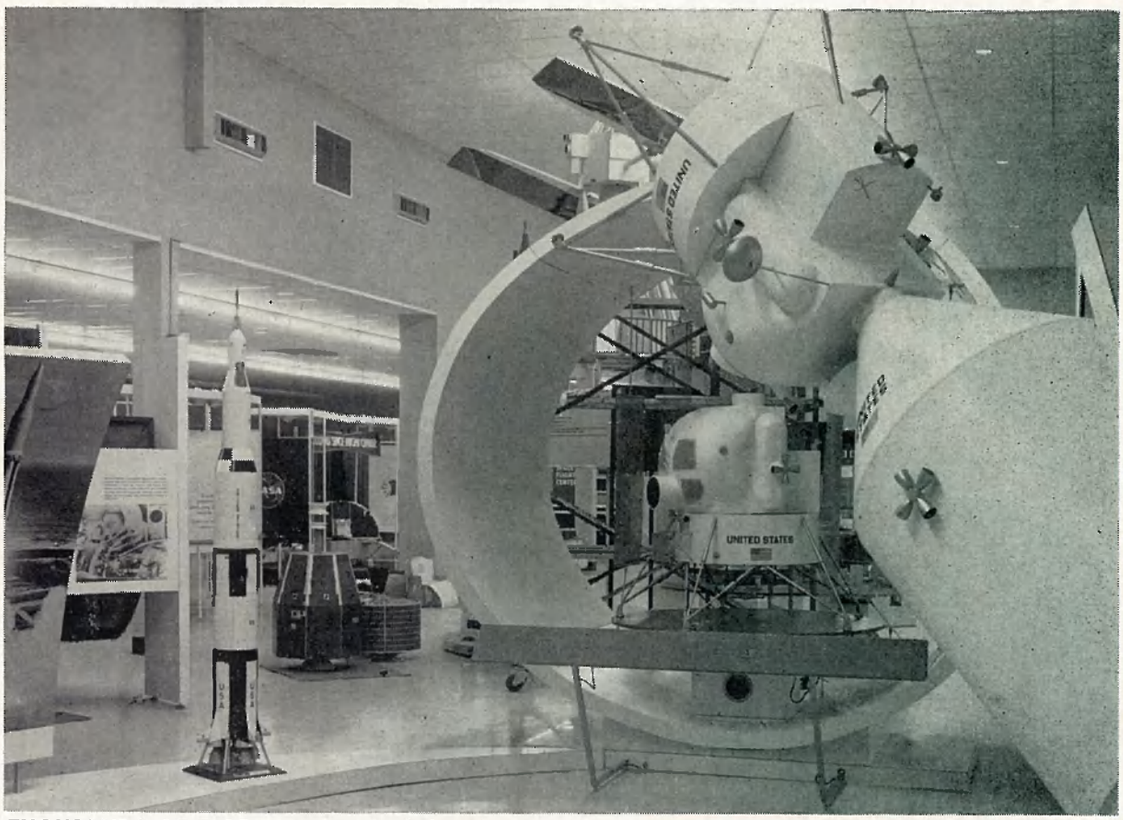
CHESTER EDGE, left, chief engineer, and Captain Fritz Fredritisen, check engine room of a dredge.

DUMP SUPERINTENDENT Joe Miller, left, and Wally Ericson take a minute's break as river bottom pours through pipe into a fill area.

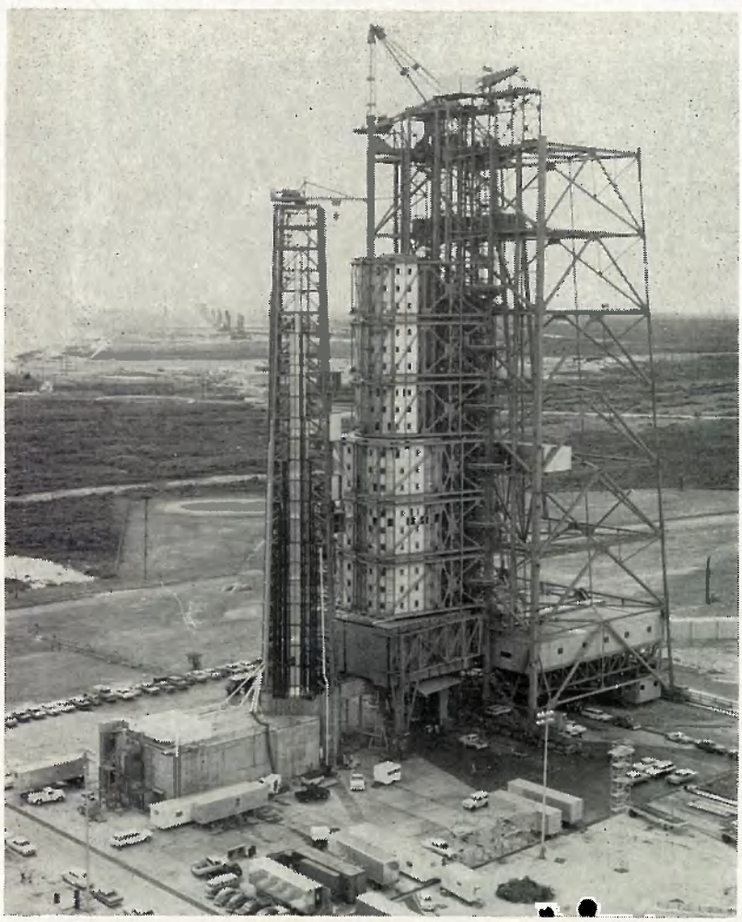


END OF THE LINE for dredging operations was at the barge turning basin near the site of the Vertical Assembly Building.

SLASHING THE WATER in a frenzy of motion, the dredge's great cutter head unrelentlessly slices into the river bottom.



THOUSANDS OF FLORIDIANS visited the giant NASA space exhibit which was open through Tuesday in Orlando's Exposition Park. Above is the Apollo spacecraft, right, with the Lunar Excursion Module (LEM) attached.



SCENIC VIEW shows Launch Complex 37's Pad B in foreground, looking south down Cape row of service structures. SA-5 is undergoing checkout tests inside the structure at 37.

Dear Sir:

I would like to congratulate you on the progress you are making with your missiles. As I see it, you only have two problems remaining to conquer space—how to get there and how to get back.

Stanley T.
Morgantown, W. Va.

Ranger Rescheduled

The launch of Ranger 6 by NASA from Cape Canaveral has been rescheduled from the last quarter of this year to the first quarter of 1964.

Deficiencies were found by NASA's Jet Propulsion Laboratory in a number of small transistor diodes from the same shipment of these devices as were installed in the Ranger 6 spacecraft.

CONTRACT AWARDED FOR THE GATHERING OF LUNAR SAMPLES

Texas Instruments, Inc. of Dallas has been awarded a $194,600 contract by the Manned Spacecraft Center to study the best methods of gathering scientific information and lunar samples once the Apollo space team lands on the moon.

Major objectives of the study include measurements which will add to the success of future Apollo and other missions and measurements which will contribute to the fundamental knowledge of the moon.

The study is to be completed by May 30, 1964 and out of it will come the optimum methods for planning lunar scientific exploration once the Apollo flight missions are undertaken.

In the study, Texas Instruments was asked to define methods of determining lunar surface temperature, topography, bearing strength of the moon's surface, temperature, geological formation, chronological age, mineral content and search for water. For the purpose of the study certain flight mission criteria have been assumed.

The study asked for plans for two Apollo flights each of four hours working time on the moon. Only one astronaut will be outside the spacecraft at any given time, during these two proposed flights. The study also will cover flights with expected stay times up to one week on the lunar surface and the possibility that both astronauts may be out of the LEM at the same time.

The scientific payload will weigh at least 215 pounds. It is planned to be carried in an area outside the environmental quarters of the LEM and will be exposed to space flight hazards for periods up to a week. The payload must be capable of withstanding extremes in temperature and the shock of launch and landing.

When the space pilots depart from the moon, the study calls for them to leave measuring instruments that will send information to earth for periods up to six months.

Onboard Training System To Keep Astronauts Busy

What happens to the finely-tuned skills of spacecraft pilots after many weeks in orbit or during a long interplanetary voyage?

Two scientists of NASA's Langley Research Center have looked into the question and conclude it is imperative to have some sort of onboard trainer for maintaining and polishing pilot skills.

Techniques astronauts will need to practice would include precise alignment of their spacecraft for reentering the atmosphere, accurate steering to accomplish rendezvous and docking in space, and many others.

Certainly pilot training is nothing new, but there is a significant difference between spacecraft and other flight vehicles. Many spacecraft mission phases are single events which occur once per voyage after relatively long periods of coasting flights. By contrast, in other vehicles the majority of pilot operations are either repetitive or can be practiced on large ground-based simulators when a need arises.

With a keen eye for critical weight limits, Langley aerospace engineer Richard Reid and psychologist Dr. Rayford T. Saucer have proposed a training device built into the spacecraft itself.

Weighing no less than two pounds, their electronic trainer would employ the spacecraft's own instrument display panel as well as its sensors and control systems.

They believe it would provide the crew with a dynamic simulation capable of maintaining skill at a high pitch in a way that would be real and not only realistic.

Bankers Hear Plans

LOC Deputy Director Albert F. Siepert, and William Clearman, Chief of the Saturn V Projects Office, briefed 125 members of the Mortgage Bankers Association on NASA operations Sunday at the Cape Colony Inn.

Siepert outlined the space age's impact on the Canaveral area, and praised community leaders for their foresight in keeping pace with civic needs of the expanding population.

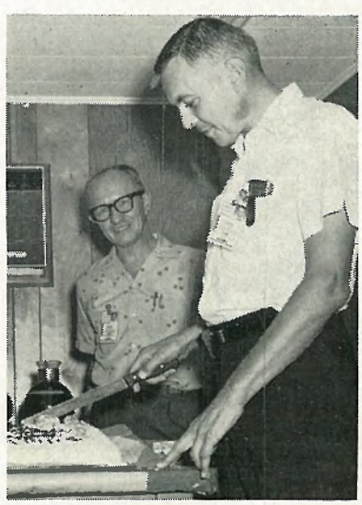
Clearman briefed the bankers on layout and operation of Launch Complex 39.

NASA TO NEGOTIATE FOR LEM SYSTEMS

NASA has announced it will negotiate with MIT, AC Spark Plug Division of General Motors Corp., Raytheon Co., Kollsman Instrument Corp., and Sperry Gyroscope Co. to develop, fabricate and test the guidance and navigation system for the Lunar Excursion Module (LEM) of the Apollo spacecraft.

Estimated cost of the total work to be performed by the five contractors is expected to exceed $60 million. The Manned Spacecraft Center also will have management responsibility of the contracts for the LEM work.

The technical approach which is to be followed in the development of the LEM guidance and navigation system will, in so far as possible, be identical to the command and service module system. As many parts, components and subsystems as possible will be directly interchangeable between the two systems.



MARTY EIBAND, one of the original Project Mercury engineers, was feted at a farewell party last week prior to his departure to the Goddard Space Flight Center in Greenbelt, Maryland. Here, an associate watches as Marty cuts the cake.

COOPER'S-EYE-VIEW of Himalayas in the India-Nepal-Tibet border area, as seen from Faith Seven.

Cooper's Views 'Possible'

Sightings of ground objects such as those observed by Astronaut Gordon Cooper during his 22-orbit flight last May are not impossible if atmospheric conditions are ideal and the observer is highly experienced in making high altitude observations.

This was the report from Dr. S. Q. Duntley and Dr. John H. Taylor of the University of California's Visibility Laboratory, San Diego, in a study made for the Manned Spacecraft Center.

This study was initiated as a result of the controversy caused by the statements of some scientists that Astronaut Cooper could not have seen what he claimed to have seen.

Cooper said he saw, for instance, what he believed to be buildings with smoke issuing from them over Tibet. The report stated that lighting conditions which prevailed at the time of his observations were such that the sides of a house should have been brightly lit and these areas should have formed high contrast with the terrain.

"Using terrain reflectance data which we believe to be applicable to Tibet, we have found that if a brilliantly lighted building site had a projected area of 138 square feet in the direction in which Major Cooper was looking, it could have produced an optical signal capable of being visually detected," the report said.

Cooper also said he saw a train track. He said he observed an interruption in the track with a trail of white smoke issuing from its northeastern end. This he interpreted to be the train. Cooper said that the train track was darker than the terrain.

"The long dark streak across the countryside should have been visually detectable," Dr. Duntley wrote, "and the streak of white smoke should have been even more visible."

In conclusion, Dr. Duntley emphasized that the calculations reported "are based upon assumption concerning the target, the background, and the atmospheric conditions which we believe to have prevailed on the occasions when Major Cooper reported seeing the objects. If these conditions did exist, then the visual sighting of these objects by Major Cooper from an orbital altitude of 86 nautical miles have a definite probability."

Stork Time in Reproduction

The stork has visited the Reproduction Division five times in the last few weeks.

Vital statistics are as follows:

PROUD PARENTS	DATE	Sex & NAME	TOTAL TONNAGE
Mr. & Mrs.:			
Earl Pittard	9/6	Girl, Linda Louise	8 lbs., 2 oz.
Calvin Yeary	9/30	Boy, Jessie Lee	7 lbs., 9 oz.
Charles Yates	10/20	Boy, Scott Anthony	9 lbs., 10½ oz.
		DAILY DOUBLE	
Jack Pavick	10/22	Boy, Stevie Michael	7 lbs. 8½ oz.
Al Lucke	10/22	Girl, Johna Christine	7 lbs., 9 oz.

JIM BOY, YOU REMEMBER LITTLE JEANIE FROM NEXT DOOR...

* * * *

FUTURE TIME MACHINE POSSIBLE

There is a possibility, arising from Einstein's Theory of Relativity, of a time machine being built for travel into the future.

Soviet Academician A. Landau believes, by applying the theory, a clock on a spaceship would run more slowly than a clock on Earth (see Counting Down column at right). As this happens, all physical, chemical and biological processes would also slow down.

Thus, if a spaceship could be built to travel at a speed close to that of light, an astronaut, on returning from a flight would find his contemporaries advanced in years while he is still young.

Perhaps, (note cartoon), he would be greeted upon his return by the little girl next door, who, in the interval of his travels, has grown up to enhance his welcoming committee.

In other words, the astronaut would have actually made a trip into the future. For example:

A visit to the star Sirius, which is six light years away, would take 15 years by Earth calculations—if the spaceship traveled at the speed of light—186,000 miles per second.

But by the ship's clock, the astronaut would make the round trip in nine years. Thus upon his return he would be six years younger than his contemporaries. If the speed of the spacecraft were increased, it would be possible to travel further into the future.

However, chances are of such a flight anytime soon seem remote. To fly a one-ton spaceship at such a speed would require an amount of energy equivalent to several months output from all the power stations on Earth.

CENTAUR CONTRACT DETAILS COMPLETED

Specific details of a contract for the completion of a second Centaur launch pad at Cape Canaveral are complete.

Under the contract, valued at $14,451,485, General Dynamics/Astronautics, prime contractor for the Centaur space launch vehicle, will activate the facility — called Pad 36B — at Centaur Launch Complex 36, which already has one Centaur launch pad.

Launch Pad 36A has been used once, in May 1962, during the first attempted launch of Centaur. The mission failed 55 seconds after launch. A second research and development flight is imminent.

Centaur is the nation's first high-energy space launch vehicle. Its primary mission is to land exploratory Surveyor spacecraft on the moon to make preliminary lunar surface studies in preparation for later manned landings.

The "brick and mortar" portion of Pad 36B was constructed by Continental Consolidated Corp., Jacksonville. Fla., under the direction of the Army Corps of Engineers.

The second launch complex will include a service tower, or gantry, propellant storage tanks and transfer lines, and various electrical systems to test and activate the vehicle, fuel it by remote control, and launch it.

LEON E. BRITT, left, and J. B. Stone, of the Launch Support Operations Division, were presented with service awards last week—Britt for 10 years and Stone for one.

New Addition

Eloise Chandler of Traffic Services had a seven pound, 12 ounce baby girl, Sharon Louise, last week.

NASA will test the adapted portion of Einstein's Relativity Theory that time will actually slow down for astronauts rocketing in space at great speeds, by placing an atomic clock in the nose cone carrying the EGO (Eccentric Geophysical Observatory) satellite next year.

The unique clock will be synchronized with an earth-bound time piece and then will be electronically checked once it is in orbit to see if space travel actually does slow time down.

* * *

In the "what won't they think of next department," there is a new hat that makes its own electricity — to run a motor — to turn a fan — to cool your fevered brow!

Solar cells produce the electricity to work the motor and fan, which are in the crown of the hat. The sunnier it gets the faster the fan turns. The manufacturer calls it a coolie hat for hot heads.

* * *

A one-man space scooter that may someday allow an astronaut to crater-hop on the moon, is under development.

The 40-pound experimental vehicle is being tested with safety tethers and has lifted a 210-pound operator on a jet of air for horizontal and vertical maneuvers 20 feet above the ground.

Such a lunar scooter would allow explorers to hop over rough terrain where walking is difficult and where surface vehicles would stall.

As a crater-hopper it would permit spacemen to span or descend into fissures or crevasses on the moon.

* * *

Next time you read about an economy run to see how far a vehicle can stretch its fuel, consider some of the bargains NASA still has in space. Take Echo I, for example. It has logged more than 420,000,000 miles on its orbital treadmill.