Space News ROUNDUP!

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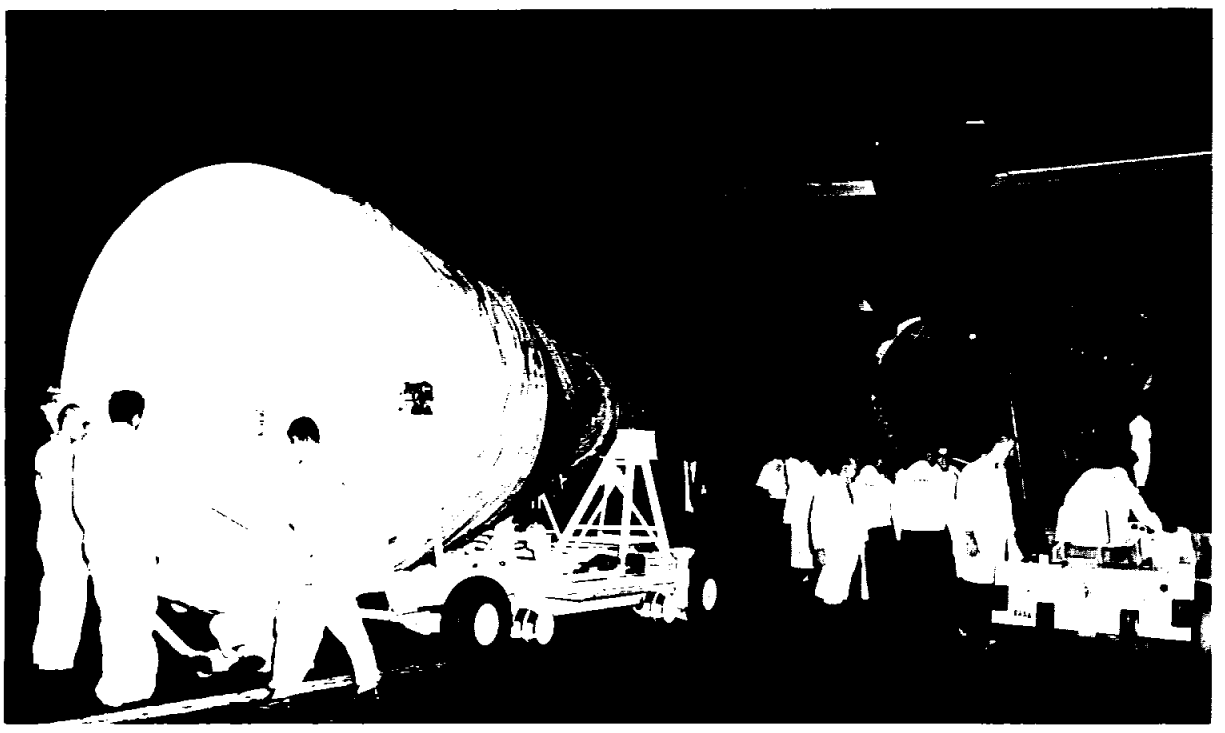
# Gemini Spacecraft For GT-2 Delivered To Cape Kennedy



SECOND GEMINI—The second Gemini spacecraft is shown as crews unload it from the C-133 aircraft at the Cape Kennedy skid strip on September 21. The spacecraft was then transported to the Merritt Island launch area where it is scheduled to undergo receiving and inspection.

Gemini Spacecraft No. 2, scheduled for an unmanned 2,000 mile suborbital flight later this year was delivered to the National Aeronautics and Space Administration at Cape Kennedy, Fla. on September 21, by McDonnell Aircraft.

The two-man spacecraft was landed at the Cape Kennedy skid strip aboard a C-133 aircraft. A trailer truck transported the spacecraft to the Merritt Island launch area where it is scheduled to undergo receiving and inspection at the new Pyrotechnic Installation Building.

The GT-2 spacecraft will be mounted vertically in this building and moved to the Fluid Test Complex for static firing tests. Following successful static tests, the GT-2 spacecraft pyrotechnic will be checked out. The spacecraft will then be transported to Launch Complex 19 for mating with a Gemini launch vehicle and final prelaunch testing.

The spacecraft underwent extensive factory testing during the past nine months at the McDonnell Aircraft plant in St. Louis. Approximately 40 MSC-Florida Operations test engineers and inspectors worked with McDonnell Cape engineers three shifts a day to insure the flight readiness of the spacecraft.

The spacecraft will be boosted by a modified Titan II launch vehicle to an altitude of 103 miles and will travel down the Air Force Eastern Test Range from its Cape Kennedy launch site. Spacecraft separation from the booster will occur, and retrograde rockets will be fired prior to a ballistic reentry during which the spacecraft will be subjected to heating rates higher than on manned flights.

At 10,600 feet, a small drogue chute will open and at approximately 10,000 feet, a large ringsail parachute will be automatically deployed to cushion the Gemini's landing in the Atlantic Ocean.

Equipped with the new McDonnell-developed, light weight heat shield, Spacecraft-2 will be subjected to controlled reentry conditions for the first time, and the systems to be used in manned flight will be in operation on this flight. Two crew-simulator pallets will perform most of the astronaut functions.

A successful first Gemini flight was made on April 8. It was an unmanned orbital mis-

*(Continued on Page 2)*

# MSC United Fund Drive Starts Today, Team Captains To Contact Each Employee

The MSC United Fund drive to raise $47,848 starts today and will continue through October 16 with the team captains in the various areas here at the Center contacting each person.

All employees will be given a pledge card, Tony Yeater, UF chairman at the Center said, and he urges each person to give some serious thought to the drive for funds, and to fill in his pledge card promptly with the most generous amount possible.

Yeater said, "MSC has exceeded its goal the past two years and we want to do it again. The only way is for everyone to do his part."

Some employees have questioned giving to the Harris County United Fund while they live in another county. This problem has been resolved, Yeater stated, by making arrangements for persons in other counties to specify on their pledge card where they would like their pledge to go, and the pledge and/or money will be forwarded to the designated county or city fund.

For example those living in Brazoria County need only specify on the pledge card, and the funds will go to that county's fund drive. Those in the area covered by the Mainland United

*(Continued on Page 2)*

# Local Planetarium Orientation Series Begins Today

A series of orientation sessions at the Burke Baker Planetarium began today in Houston for Flight Crew Support people and any of the astronauts wishing to take a refresher course on celestial bodies.

The sessions will be conducted for five weeks, each Wednesday morning for two and one-half hours and will consist of lectures and projected displays of celestial bodies on the hemispherical ceiling of the planetarium.

# *SA-7 Flight A Success, Re-enters After 59 Orbits*

The orbiting Apollo boilerplate command and service modules along with the vehicle instrument unit and second (S-IV) rocket stage which was launched September 18 from Cape Kennedy, Fla., reentered the atmosphere and disintegrated at 5:59 a.m. CST, September 22.

Performance of the SA-7 launch vehicle was generally better than any other in the Saturn I program, a preliminary evaluation of flight data at the NASA Marshall Space Flight Center indicates.

This seventh in a series of Saturn I vehicles was launched from Launch Complex 37B at 10:22 a.m. CST, September 18.

A "payload" of about 37,000 pounds, plus propellant residuals, was placed into an orbit having a perigee of 112 statute miles, an apogee of 145 statute miles and a period of 88.6 minutes. Re-entry of the package was over the Indian Ocean at 25.3 degrees south and 65.6 degrees east (southeast of Madagascar Island) following 59 orbits.

The satellite orbited three days, 19 hours, and 37 minutes, approximately 0.6 of a day longer than predicted.

Propulsion systems performance was within one per cent of predicted. The guidance and control system, being flown for the first time in its final Saturn I form, functioned exactly as expected.

Vehicle instrumentation performance was considered excellent with only 12 of the 1238 measurements flown on the two stages and instrument unit not functioning.

Similar results were achieved in Apollo spacecraft telemetry. All spacecraft objectives were

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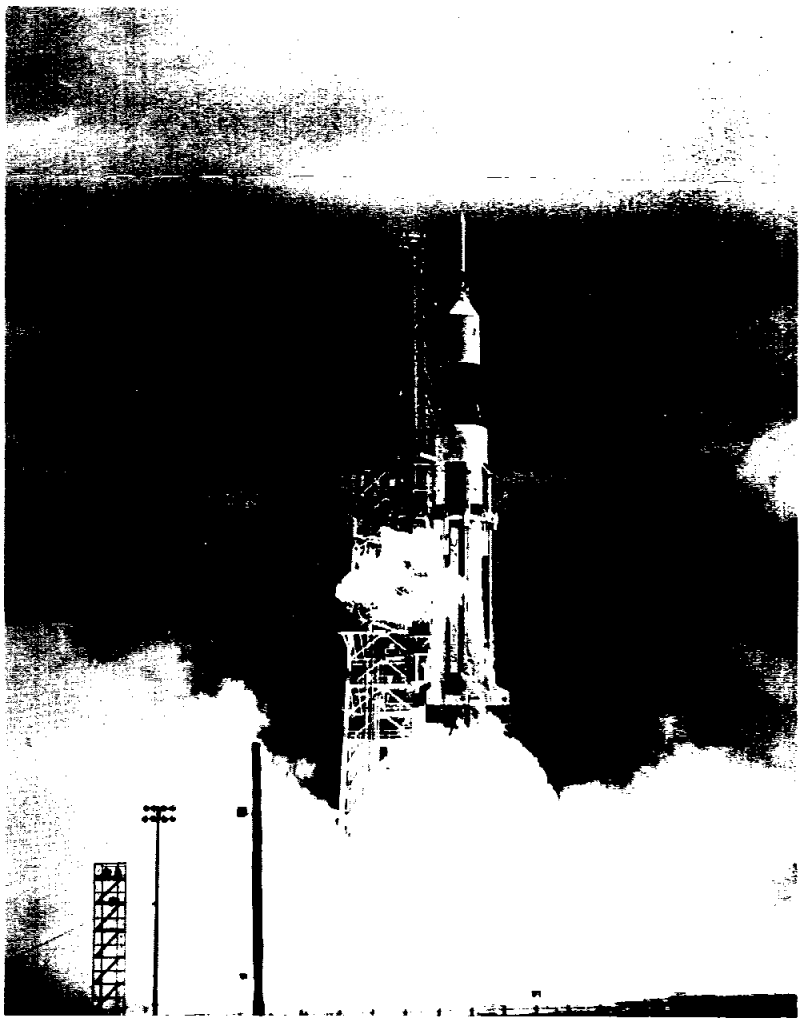


SEVEN STRAIGHT—With a thundering roar the Saturn/Apollo-Seven lifted off the pad at Cape Kennedy, Fla., at 10:22 a.m. CST, on September 18, for the seventh straight successful launching of the largest rocket in the free world.

A NATIONAL MODEL WINNER—Frank Parmenter, of the Planning and Scheduling Office, Technical Services Division, holds the model airplane that won him a place on the team that will represent the United States in the Free-Flight World Championship competition in Finland next year.

# Hobby Pays Off Big For MSC Employee

It isn't often that a hobby leads to a full time profession and also gains you a position on a team to represent the United States in a world-wide competition in Finland.

But that's what happened to Frank Parmenter, Planning and Scheduling Office of the Technical Services Division, and all as a result of a boyhood hobby of building model airplanes.

It all started in a suburb of Chicago (Oak Park) where Parmenter was born and raised. He began his "very intriguing and challenging hobby" as he puts it, of building and flying model airplanes "as a kid." Apparently he became very skilled in his hobby because on the basis of this he was chosen for a job with the National Advisory Committee on Aeronautics.

At one time model airplane building experience was a requirement for apprentices and mechanics hired by NACA. Parmenter joined NACA in December of 1941 as an "under-aircraft model maker" and from there it has led him to his present work in the space program as a supervisory production controller, processing, evaluating, and monitoring fabrication work on mockups and models of spacecraft and various flight hardware.

However, his greatest ambition, to represent the United States in world-wide competion as a member of the American Wakefield model airplane team, was realized when he took first place honors in the central region finals in Winfield, Kans., on September 6. He will join winners of the two other U. S. regions in competition for the Free-Flight World Championship in Finland in July of 1965.

In order to win the honor, Parmenter had to outfly 18 finalists from all over the central region of the U. S. Included in these finalists were five from the Houston area. Of these five, four were from the Manned Spacecraft Center and in addition to Parmenter, included Fred Pearce, George Xenakis, and Don Andrews.

All the finalists had to make eight flights in specified time periods of one and one-half hours during a 12-hour day. The person having the highest score at the end of the eight flights was declared the winner.

The model airplane that Parmenter used to win the regional meet is called "The Langley" and is his own design which he first built in 1955. He has since built about a dozen of this particular model and it was the winner of the Mulvihill model airplane trophy in 1961 when he was first place winner in the King Orange model airplane meet in Miami, Fla.

A rubber powered model, "The Langley" is built to international competition specifications which limit the total wing and tail surface to a maximum of 297 square inches, and the model's minimum weight to eight-ounces. The special rubber motor which weighs 50 grams is given about 600 turns and from a hand launched position provides a motor run of 30 to 40 seconds.

After the motor energy is expended, a special type propeller folds back along the fuselage and the model goes into an adjusted spiral glide and into free flight.

Time endurance flights for the models in competition is three minutes, and Parmenter said that is a mighty long time for them to stay up unless you hit some good thermals. Each flight counts up to 180 seconds depending upon the total flight time in sight of the timekeeper.

Parmenter has been trying since 1953 to get on the Wakefield team to attend the world meet. In 1956 he missed making the team by one second.

In addition to the rubber powered event in the world-wide competion, there are classes in gas powered model airplanes and tow-line glider models. The competition is conducted under the auspices and rules of the Federation of Aeronautical Institutes (FAI) with headquarters in Paris, France.

Parmenter joined MSC in April 1962 and resides with his wife Sandra and three children in Friendswood. They have two boys, Mark 9, and Charlie 5; and a girl, Jean 7. You guessed it, Mark is getting a start in the model airplane field by building hand launched gliders.

Parmenter is also a member and president of the Houston Free Flight Model Airplane Club which has about 40 members and meets the first Monday of each month in the Gulf Publishing Building at Waugh Drive and Allen Parkway in Houston.

The club was formed in 1962 and 12 of the members are with NASA. Parmenter said that membership is open to anyone interested in model airplanes.

## United Fund

(Continued from Page 1)

Fund of Galveston County need only specify the fund drive name along with the city in which they reside and the pledge will be credited to their city and/or county fund drive. By contributing through the MSC/UF drive, the pledges will count toward the MSC goal.

The UF, which combines the 65 major worthy causes in the community into one big cost-saving fund appeal each year, is introducing a new "Pledge-O-Matic" bank draft plan to make it easier for NASA employees to give.

Yeater explained that the pledge is being stressed instead of a cash gift because:

"This is not a single drive but a combination of the 65 most important drives all wrapped into one. Without this united effort, these 65 would be added to the parade of worthy organizations knocking on our doors throughout the year.

"We want to give enough to take care of all 65 so they can go on operating and serving us throughout 1965. We hope every NASA employee will give at least the price of a package of cigarettes each week."

This can be done, Yeater said, by signing the "Pledge-O-Matic" card at the same time as the United Fund pledge card. This is identical to an insurance company bank draft authority; the contributor authorizes his bank to honor a monthly statement from United Fund at the amount he specifies.

Only NASA employees have this opportunity. United Fund and bank people want to see first if a large enough portion of such an employee group will take advantage of the privilege.

The following MSC/UF team captains will be calling on you for your pledge during the next two weeks and they would request your cooperation to help them make a long and sometimes thankless job a little easier.

Phil Hamburger, Office of the Director, Assistant Director's Offices; Roy Alford, Public Affairs Office; Marvin Matthews, Legal Office and NASA Regional Audit Office; Robert G. De Vine, Center Medical Office; Mary Sylvia, Reliability and Quality Assurance; Bob Zimmerman, Personnel; Art Garrison, Procurement and Contracts; Charles Bingman, Management Analysis; Don Blume, Security; Russell C. Connelly, Resources Management.

W. Kemble Johnson, Office of Engineering and Technical Services; John Holland, Photographic; R. F. Hoffman, Engineering; I. Edward Campagna, Facilities; Wesley H. Brenton, Technical Services; John W. Farrell, Maintenance Task Group; Jakey D. Wood, Office of Administrative Services; Betty R. Schick, Office Services; Bernice Slaughter, Logistics; John P. Fallon, Technical Information.

Thomas W. Davis, Paperwork Management; Robert A. Dittman, Gemini Program Office; Curtis C. Collins, Apollo Spacecraft Program Office; W. H. Hilliard, Engineering and Development Directorate; Marion R. Franklin, Information Systems; Cecil Raines, Crew Systems; Henry L. Bent, Computation and Analysis; Carl W. Watkins, Instrumentation and Electronic Systems; Edward S. Ashley, Guidance and Control; John W. Ogden, Structures and Mechanics.

Ronald D. Mercer, Advanced Spacecraft Technology; Darrel A. Vandiver, Propulsion and Power; Alfred J. Ligrani, Flight Support; Jimmy W. McCommis, Flight Control; Grady P. Henderson, Landing and Recovery; William J. Forsyth, Mission Planning and Analysis; John J. Peterson, Astronaut Office; Joseph Algranti, Aircraft Operations; Lee R. Nichols, Flight Crew Support.

SCIENCE FAIR WINNER—Sharon Fair from Albuquerque, N. M., winner of a NASA award at the National Science Fair-International in Baltimore, Md., was here for a tour of the Manned Spacecraft Center recently. John Sargent, Flight Simulation Branch, Flight Crew Support Division, explains the Gemini Mission Simulator to the young award winner.

## Gemini

(Continued from Page 1)

sion, but no attempt was made to separate the spacecraft from the launch vehicle, since the primary objective of the flight was to test the structural integrity of the spacecraft and its compatibility with the launch vehicle.

This launch will be the first and only ballistic flight in the Gemini program. Spacecraft-2 will carry all operational systems that will be on Spacecraft-3, and will have fuel cells aboard. This will be a prelude to the first manned Gemini flight (GT-3) due to take place during the first quarter of 1965.

## SA-7 Flight

(Continued from Page 1)

successfully accomplished. All spacecraft subsystems functioned satisfactorily.

No attempt was made to recover the eight booster on-board cameras which impacted 500 miles downrange in a sea made extremely rough by the proximity of Hurricane Gladys. The recovery ship pulled out of the area the day before the launch, and at launch time the waves in that area were running to about 12 feet.

Pictures from the one on-board television camera, showing the jettisoning of the Apollo launch escape system tower, and the separation and ignition of the S-IV stage, were quite good, exceeding past performance.

# NASA-MSC Technical Papers

The following recently published Technical Papers by Manned Spacecraft Center staff members are available at the MSC Library in Building 12.

*"Space and the Moon—Photography's Challenge for Tomorrow;"* John Eggleston, and John Brinkman.

*"Control of Man's Thermal Environment During an Extravehicular Mission;"* Gilbert Freedom. AIAA, Houston, November 1964.

*"The NASA Space Environment Simulation Laboratory at the Manned Spacecraft Center;"* Kurt H. Strass, Richard Piotrowski, and Dale L. Hannaford. AIAA, Pasadena, Calif., (JPL) Nov. 16-18, 1964.

*"Man-Rating Considerations in the Design and Operation of Hard Vacuum Chambers;"* James H. Chappee, and George B. Smith Jr., M.D. AIAA, Pasadena, Calif., (JPL) Nov. 16-18, 1964.

*"Physiological Acceleration Terminology;"* Gerard J. Pesman.

*"Operational Characteristics of the Flight Acceleration Facility of the NASA Manned Spacecraft Center, Houston, Tex.;"* W. L. Lauten, and A. H. Hinners.

*"Hypoxemia Induced by Sustained Forward Acceleration in Pilots' Breathing Pure Oxygen in a Five Pounds Per Square Inch Absolute Environment;"* W. Carter Alexander of MSC and, R. J. Sever and F. G. Hoppin of Naval Air Development Center.

*"Three-Dimensional Guidance Equations for Quasi-Optimum Space Maneuvers;"* Donald J. Jezewski.

*"Landing Rocket — Gliding Parachute Landing Systems for Manned Spacecraft;"* Kenneth L. Suit, John W. Kiler, James K. Hinson. AIAA, Williamsburg-Hampton, Va., Oct. 12-14, 1964.

*"Laboratory and Full-Size Studies With Steerable Parachutes;"* J. W. Kiker, and J. K. Hinson.

*"The Solar Simulation System for the NASA Space Environment Simulation Laboratory at the Manned Spacecraft Center;"* Franklin H. Williams, and D. Swartz. AIAA, Pasadena, Calif., (JPL) Nov. 16-18, 1964.

*"The Data Acquisition System for the Space Environment Simulation Laboratory at the Manned Spacecraft Center;"* Donald C. Cole, and James H. Lane. AIAA, Pasadena, Calif., (JPL) Nov. 16-18, 1964.

*"The Gemini Program—Progress and Plans;"* Charles W. Mathews. AIAA, Houston, Nov. 4-6, 1964.

*"Pertinent Results of the Early Gemini Test Program;"* Scott H. Simpkinson. AIAA, Houston, Nov. 4-6, 1964.

*"Flammability in Zero Gravity;"* John H. Kimzey. AICE, February, 1965.

## *F-111 (TFX) Story To Be Presented Here At Center*

A special one-hour slide presentation on the subject of the F-111 (TFX)—the variable-sweep-wing supersonic fighter—now under development for the U. S. Air Force and U. S. Navy will be presented in the Manned Spacecraft Center Auditorium from 5:30 to 6:30 p.m. on October 12.

The presentation is part of the quarterly meeting of the Texas chapter of the Society of Experimental Test Pilots being held here in this area.

Attendance at the session will require a secret clearance and MSC employees with badges denoting secret clearance will be admitted to the session. Others desiring to attend, that have secret clearance on file with MSC, should contact J. M. Fitzpatrick at CA 7-3135 or Don Gregory at Ext. 32283, not later that October 7.

G. I. Davis, executive assistant to the F-111 program director at General Dynamics/Ft. Worth, will make the talk covering design features and operational capabilities, as well as the requirements which generated the F-111 as it is today. Program status of the F-111 will also be covered.

*"Investigation of Tungsten/Tungsten-26 Percent Rhenium Thermocouples Above 3,500 degrees F. in Oxidizing Environment;"* Earl W. Hicks Jr. ISA Instrument-Automation Conference and Exhibit, N.Y., N.Y., Oct. 12-15, 1964

*"Electrical Power Generation System Requirements for a Logistics Spacecraft;"* C. Dale Haines.

*"Wind Tunnel Heating Rates for Apollo Spacecraft;"* J. J. Bertin, NASA TND.

*"Radiation Dosimetry Aboard the Spacecraft of the Eighth Mercury Atlas Mission (MA-8);"* Carlos S. Warren, and William L. Gill, NASA TND-1862.

*"Study of Powered Descent Trajectory for Manned Lunar Landings;"* Floyd V. Bennett, and Thomas G. Price, NASA TND-2426.

## NASA Presented President's Safety Award


NASA SAFETY AWARD—Dr. Robert R. Gilruth, director of MSC, and John Kanak, assistant chief for Safety here at the Center hold a replica of the 1963 President's Safety Award presented to NASA by President Johnson for its outstanding record of performance and accomplishment in occupational injury prevention. Dr. D. O. Coons (left), chief, Center Medical Office and Dr. Charles A. Berry, chief of Center Medical Programs look on. The plaque was sent to Dr. Gilruth and the safety office with congratulations for a job well done from Dr. George E. Mueller, associate administrator for Manned Space Flight.

# Astronaut Carpenter Assumes New Duties

Astronaut Scott Carpenter reported to work Monday, September 17, as executive assistant to Manned Spacecraft Center Director Robert R. Gilruth, a position he will hold for an indefinite time while convalescing from injuries suffered in a motor scooter accident.

The job Carpenter will fill temporarily is one being vacated by Raymond Zavasky who has accepted a new position in the Research Contracts and Information Office at NASA's Langley Research Center, Hampton, Va.

Carpenter is recovering from a compound fracture of the left forearm and a fracture and dislocation of the left great toe. The accident occurred July 16 near Hamilton, Bermuda where Carpenter was preparing to take part in the Navy Sea Lab Project.

Carpenter's arm is now in the fourth cast and appears to be mending nicely. It may be some months, however, before he regains full use of the arm due to the seriousness of the break. While hospitalized this summer, doctors broke and reset a bone in Carpenter's right foot which had mended improperly after an auto accident in his youth.

## *AIAA Meeting Reset For Oct. 16*

The meeting of the Houston chapter of the American Institute of Aeronautics and Astronautics scheduled for October 12, has been postponed until Friday, October 16, it was announced by AIAA officials.

Meeting time and location will be announced later.

Newton W. (Bill) Cunningham, Ranger program manager from NASA headquarters will present the program for the meeting. Slides and a movie of the Ranger pictures will be shown.

Members, guests and other interested parties are invited to attend this AIAA session.

## MSC Graduate Study Program Registration Held

U of H REGISTRATION—Registration was conducted here at the Center on September 18 for the fall session of the MSC Graduate Study Program. Sarah Lonon, from the University of Houston registers (l. to r.) David L. Brown, Terry Reese, and Frank Stafford. All are in the Structures and Mechanics Division, Landing and Technology Branch. The courses are in advanced engineering and science and will be taught here at the Center.

# COST REDUCTION CORNER

All payroll checks are now mailed directly from the Regional Disbursing Office in Kansas City, Mo., to the individual payees with the resultant saving of $5,254 for the first quarter of FY 65.

Prior to this new money saving method, checks were received from the Regional Disbursing Office on Saturday evening following the close of the pay period; bonds were received the following Monday.

Manual preparations, now eliminated to effect the savings, included: hand collation; printing of individual mailing slips; individual notations to the check request register for all dispositions; entry of check number on each page of register; stuffing, sealing and sorting.

This savings was put into effect by the Administrative and Finance Office, Resources Management Division.

# Giannini Developing Nucleonic Propellant Gagin

Among the awesome engineering requirements of the Apollo Program is one that on the surface is mundane: a gas gage.

But in the weightlessness of outer space performing this function calls for—not a mere advance in the state-of-the-art—but a new technology.

Giannini Controls Corporation is utilizing the penetrability and scatter characteristics of radioisotopes to gage the amount of propellant remaining for the Apollo spacecraft's reaction control engines.

This nucleonic approach to an unprecedented problem is one of the more dramatic of the many ways in which Giannini Controls is participating in the National Aeronautics and Space Administration's exploration program.

In a zero-gravity environment, which will prevail over much of the cislunar round trip, the propellant may assume any imaginable geometric configuration, rather than collecting in the bottom of the tanks. Therefore, conventional gaging systems are inadequate.

Giannini Controls, before top officials of NASA and North American Aviation, recently tested successfully the prototype of the nucleonic propellant gaging system the company is producing for Apollo under a multimillion dollar contract from North American.

The system utilizes gamma rays emitted by tiny radioactive sources located at various points on the exterior of the tanks. Attenuation of the rays as they pass through the tanks is proportional to the mass of the propellant, providing data from which a microelectronic computer automatically displays in tenths of pounds the quantities of fuel and oxidizer remaining.

The recent tests, conducted under simulated zero-gravity conditions, covered the quantity sensors fitted on the fuel and oxidizer tanks; the microelectronic computer, which translates the signals for data display on the digital readout; and associated equipment. Fuel and oxidizer tanks were simultaneously gaged from full to empty, with the display readings continuously compared to actual quantities, which were determined by weighing fluid equivalents of the propellant.

This same technology, being developed by the company's Control/Nucleonics Division, is currently being evaluated for gaging the quantity of propellant in LEM's reaction control system, and in its Ascent and Descent Engine tankage.

For a NASA-Langley Program, Giannini is developing nucleonic techniques for measuring the density of the air at the upper limits of the atmosphere, and the rate of density change, information vital to controlling advanced re-entry vehicles.

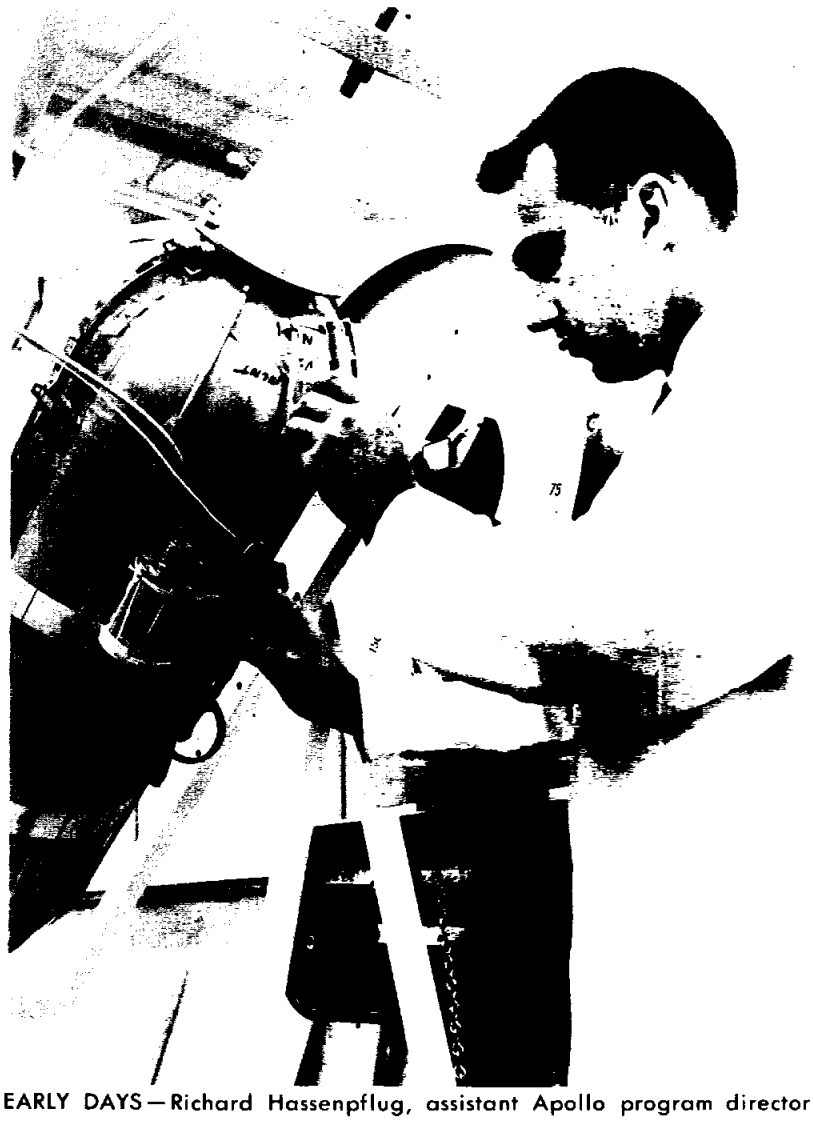
Also, under evaluation by NASA is a Giannini proposal for a lunar altimeter for LEM, another application of nucleonic techniques. This system, according to Giannini engineers, has the advantages of being immune to disturbance from the scattering of lunar dust or the exhaust of the Moon Bug's engines as the craft approaches touch-down on the moon's surface. Such an altimeter also is capable of determining the com-

DONALD H. PUTNAM president, Giannini Controls Corporation

ZERO-G GAGING—Inspecting computer component of early prototype of Apollo RCS gaging system are (l. to r.) Donald E. Wright, advanced program manager; R. W. Honebrink, division general manager; and Richard Hassenpflug, assistant Apollo Program director. All are with Giannini Controls Corporation's Control/Nucleonics Division.


DONALD E. WRIGHT advanced program manager of Giannini Controls Corporation's Control/Nucleonics Division. Wright headed development of the radioisotope fuel gaging system for Apollo.

PRIOR TO COUNTDOWN—Shown with the Nike-Apache that lofted Giannini Controls Corporation's nucleonic air density measuring system 442,000 feet into the sky are (l. to r.) Earl Peterson and Dave Hakewessell, both of Giannini, and Charles Drummond of NASA-Langley. This, the system's first test, proved highly successful.



EARLY DAYS—Richard Hassenpflug, assistant Apollo program director at Giannini Controls, makes minute adjustment to one of the early models of the reaction control propellant gaging system.

# g System For Apollo

pactness of the moon's surface.

In addition to equipment based on nucleonic technology, the company's Instrument Division is providing 18 gyros for each of the Gemini/Titan launch vehicles. A six-pack of Giannini gyros will perform the vital function of detecting any irregularities in the spacecraft's path during launch, and if necessary, trigger the malfunction detection system's signal to the astronauts to "punch out" to safety.

Giannini Controls also is supplying ground support equipment for NASA's space programs. Banks of television monitors supplied by the Conrac Division provide eyes to the men in the blockhouse during lift-off, and visually presented the epoch-making photographs of the Ranger moon shot.

Datex Corp., a subsidiary of Giannini Controls, provided data handling equipment for the various tracking stations which maintained contact with the orbiting vehicles of Project Mercury, and similar Datex equipment is currently being installed for the Gemini and Apollo Programs.

Giannini's Astromechanics Research Division is currently working on fluid state flight control systems capable of withstanding the unprecedentedly harsh environments to which our next generation of tactical space vehicles will be subjected. Though still in the advanced development stage, fluid controls may provide the only acceptable substitute for conventional electronic, pneumatic and hydraulic systems under the extremes of temperature and vibration which will be inherent in tomorrow's boosters.

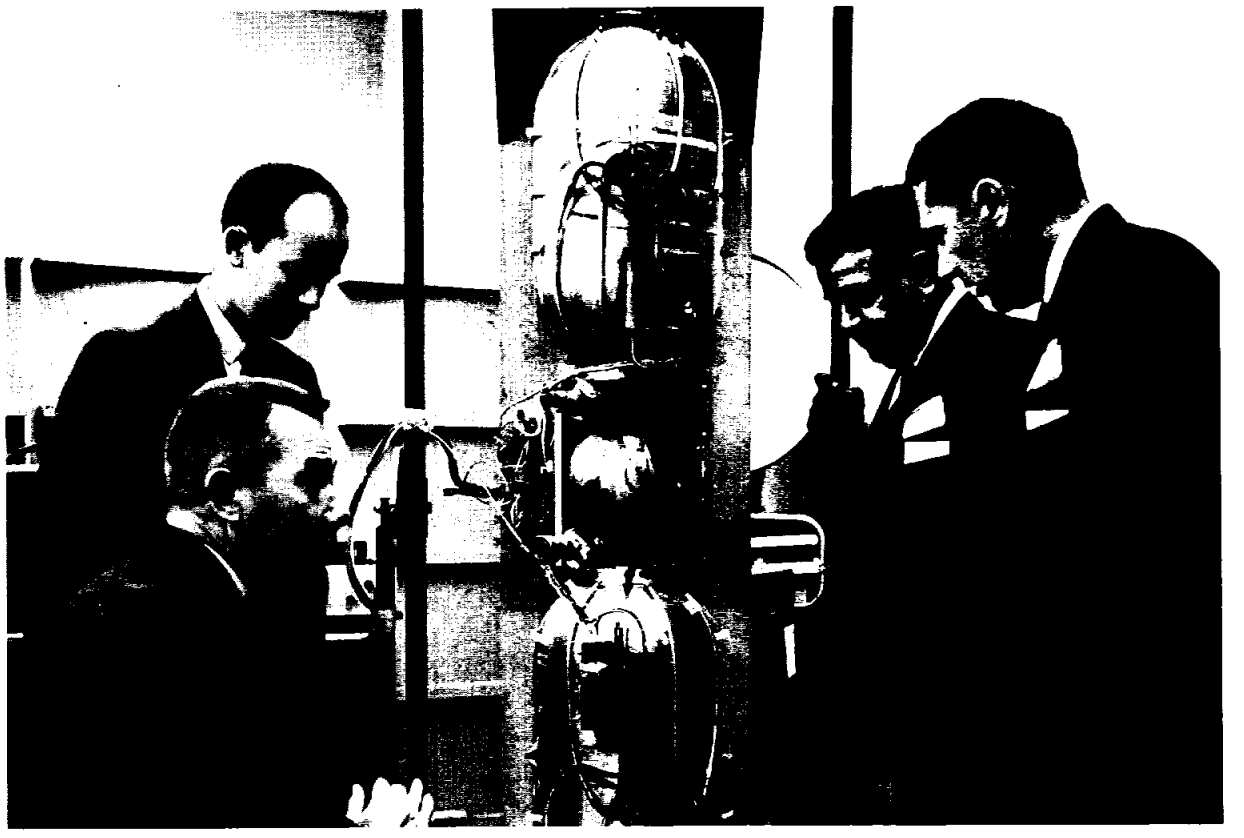
Fluid state controls will be able to function reliably in such environments because they operate without moving mechanical or electronic parts and use readily available gases—such as air or combustion products—as the working fluid. They also will be immune to the radiation bombardment of nuclear reactors, an environmental factor that deteriorates many electronic instruments.

Fluid state technology uses a low energy control flow to modulate the magnitude of a high energy supply flow. The flow amplification is analogous to the electronic transistor, with control flow corresponding to base current and supply flow to emitter current.

Headquartered in Duarte, Calif., Giannini Controls consists of nine divisions and subsidiaries. Major facilities, in addition to the West Coast, are located in Connecticut, New York, Pennsylvania and England. The company supplies aerospace and military markets with a broad line of measurement and control equipment, including, in addition to that listed above, air data instrumentation, arming and fuzing systems, flight data recorders and many others.

**EDITOR'S NOTE: This is the thirty-third in a series of articles designed to acquaint MSC personnel with the Center's industrial family, the contractors who make MSC spacecraft, their launch vehicles and associated equipment. The material on these two pages was furnished by the Public Relations Department, Giannini Controls Corporation.**

PROPELLANT BURNING RATE—Among the many advanced technologies under study at Giannini Controls Corporation is the use of microwaves to measure the burning rate of solid propellants. Photo above was taken just after project engineers ignited the propellant sample.



PROTOTYPE TESTS—Inspecting prototype of the Apollo reaction control propellant gaging system during recent tests are (clockwise from lower left), R. W. Honebrink, general manager, Control/Nucleonics Division, Giannini Controls Corp.; Robert Reed, North American Aviation's Space & Information Systems Division; Tony Sellitto, MSC resident Apollo office at S&ID; and J. E. Mihelich, S&ID. Tests were conducted at Giannini Controls' Duarte (Calif.) complex. The portion of the gaging system shown includes the scintillator rods (long silver appendages which embrace the elongated propellant tanks), fibre optics (thick black wires attached to the scintillators), and the photomultiplier tubes (attached to the merged ends of the fibre optics).

*On Industry Space Program Discoveries—*

## *Revisions Made In NASA Invention Policy, Aim Is To Stimulate Commercial Development*

NASA recently announced major revisions of its policy and regulations for considering waivers to contractors of the commercial rights to inventions resulting from space program work.

Also being changed, to accommodate the revisions in patent waiver policy, are certain portions of the agency's procurement regulations. In both instances, the new regulations became effective Monday, September 28.

James E. Webb, NASA administrator, in announcing the changes, said: "These new regulations implement the President's patent policy memorandum of last October and strike what we believe is an equitable balance between the public interest and that of our contractors. They also should aid NASA's active program of stimulating prompt commercial development and use of space program discoveries."

The Space Act of 1958, which created NASA, provides for government ownership of all inventions made under NASA contracts, unless the administrator determines that the public interest would be served by waiving commercial rights to the contractor. In such a case, a royalty-free license is retained for any government use of the invention.

With rare exceptions, it has been NASA's policy in the past to consider each invention separately, after it had been made and reported, in determining whether the public interest would be served by waiver. However, the October Presidential memorandum specified circumstances under which the public interest would better be served by advance waiver.

Thus NASA has instituted the practice of waiving commercial rights in inventions to contractors and subcontractors at the time of contracting, if the NASA Contracting Officer determines that the contract or subcontract is of the type defined in the Presidential memorandum.

If the Contracting Officer makes no such finding the contractor still may, immediately after signing the contract, petition for a blanket waiver. The petition would be considered and acted upon by NASA's Inventions and Contributions Board.

Where no blanket waiver is acquired the contractor may, as in the past, petition on particular inventions after they have been reported. These also would require ICB action.

Officials anticipate that waivers at the time of contract, by assuring contractors of title to inventions, will encourage and accelerate efforts to identify and report technological advances, thereby increasing the flow and dissemination of technical information derived from the space program.

Questions concerning NASA's new patent policy may be referred to Marvin F. Matthews, the Manned Spacecraft Center's Patent Counsel.

## Eastern Test Range Head Visits MSC

CONTROL CENTER VISITOR—Recent visitors from Florida to the Manned Spacecraft Center were (l. to r.) Col. Max R. Carey; Maj. Gen. Vincent G. Huston, commander Eastern Test Range; shown with Christopher C. Kraft, assistant director for Flight Operations; and Douglas Wilson, Philco technician. The group examines a slide file which is part of the display control equipment in the Manned Spaceflight Control Center's digital TV converter system. Slides from this file and others can be called up by the consoles for display on the closed circuit TV in the control room.

The SPACE NEWS ROUNDUP, an official publication of the Manned Spacecraft Center, National Aeronautics and Space Administration, Houston, Texas, is published for MSC personnel by the Public Affairs Office.

Director . . . . . Robert R. Gilruth
Public Affairs Officer . . . . . Paul Haney
Chief, News Services Branch . . . . . Ben Gillespie
Editor . . . . . Milton E. Reim

# On The Lighter Side


# Welcome Aboard

One hundred and twelve new employees joined the Manned Spacecraft Center during the last reporting period. Ninety were assigned here in Houston, 13 to Cape Kennedy, Fla., two to St. Louis, Mo., and seven to White Sands Operations.

RELIABILITY AND QUALITY ASSURANCE DIVISION: Irvin S. Alexander, Eugene F. Allen, Harry W. Dobson, William H. Brown (Cape Kennedy, Fla.), Calvin M. Dean, and John R. Mullins.

AUDIT OFFICE: Sidney A. Randolph.

OFFICE SERVICES DIVISION: Juan B. Gonzales, and David D. Wilson.

LOGISTICS DIVISION: John W. Harrison, and Shirley A. Welsh.

LEGAL OFFICE: Jeannette E. Jones.

CENTER MEDICAL OFFICE: Ellis G. Aboud, Victor G. Benson, and James E. Powell.

PERSONNEL DIVISION: Sharon L. Emerick, Sherrill E. Koch, Rebecca Jo Long, and Dorothy D. Stevens.

PROCUREMENT & CONTRACTS DIVISION: Shirley A. Dunphy, Robert E. Easley, Aleta W. Jones, and Lillian H. Johnson.

RESOURCES MANAGEMENT DIVISION: Bertil E. Larson, and Gatha D. Walker.

SECURITY DIVISION: Woody A. Kelley.

ENGINEERING DIVISION: Paul F. Graf, Stanley R. Robinson, and James H. White.

FACILITIES DIVISION: Ruby V. Kinchen, Essie F. Larkin, and Malcolm A. McEachern.

TECHNICAL SERVICES DIVISION: Jesse T. Adkins, Percy H. Alison, Jerry D. Allen, Max B. Barnett, Clarence J. Fischer, Eddie A. Willis, and William A. Wohnhaas.

MSC-WHITE SANDS OPERATIONS (New Mexico): Arita M. Bowers, Lee E. Mountfort, Lula Richardson, and Mary L. Thornton.

ASTRONAUT OFFICE: Anne L. Johnson.

FLIGHT CREW SUPPORT DIVISION: Bailey M. Holman, Jeanne N. Lee, and Alfred F. Readiger.

INFORMATION SYSTEMS DIVISION: Daniel R. Cook, Roger L. Hodgkins, Stephen Riter, Joel A. Slayton, and Gary J. Smith.

CREW SYSTEMS DIVISION: Faye J. Grubbs, H. Russell Hair II, and Sonja M. Schmidt.

COMPUTATION & ANALYSIS DIVISION: Martha M. Alison, James E. McGhee, Fred M. Speed, Jon S. Symes, and Donald L. Ward.

INSTRUMENTATION & ELECTRONIC SYSTEMS DIVISION: James D. Derbonne, Reinhold J. Dietz Jr., M. Elayne Gassett, Herbert S. Kobayashi, George T. Lewis, Douglas S. Lilly, and Calvin W. Thomas.

GUIDANCE & CONTROL DIVISION: John F. Hanaway.

PROPULSION & POWER DIVISION: Billy J. Lee, Dwayne P. Weary, James A. Wiltz, Janet F. Grubbs (WSO, N.M.), Jacqueline D. Wallace (WSO, N.M.), and Duane L. Duston (WSO, N.M.).

STRUCTURES & MECHANICS DIVISION: William W. Boyd, Jeri L. Brown, Ronda J. Crawley, John T. Dugan, Horst K. Ehlers, Kenneth Idomir, Jack F. Lands Jr., and Terrence G. Reese.

ADVANCED SPACECRAFT TECHNOLOGY DIVISION: Keith A. Richardson, Thomas O. Ross, Virginia A. Smith, and James E. Townsend.

FLIGHT CONTROL DIVISION: William C. Boyd, F. W. Brizzolara Jr., Charles F. Deiterich, William E. Fenner, and Richard H. Sutton Jr.

LANDING & RECOVERY DIVISION: William G. Robinson.

MISSION PLANNING & ANALYSIS DIVISION: James H. Adams.

FLIGHT SUPPORT DIVISION: George E. Metcalf.

GEMINI PROGRAM OFFICE: Edward L. Binan (St. Louis, Mo.), Virginia S. Bottoms, Robert Buckley, Kenneth G. Martin, and John D. Phillips (St. Louis, Mo.).

APOLLO SPACECRAFT PROGRAM OFFICE: Doris O. Wells.

MSC-FLORIDA OPERATIONS (Cape Kennedy, Fla.): Esta P. Bakas, Joseph F. Battaglia, James I Crowell, Martin A. Czaban, Clifford L. Dillon, Jose Garcia, Billy T. Hervey, Eric E. Olseen, James L. Pugh, Robert B. Sieck, Horace E. Thayne, and Stephen Wakely.

# SPACE QUOTES

"The success of the Ranger VII exploration has been greeted with enthusiasm and interest around the world. Men of all nations recognize this is one of the greatest extensions of human knowledge about the lunar surface to occur in many centuries.

"The American people can be justly proud. We started behind in the Space Age. But we placed our trust in our open society and free system. Our achievements in peaceful exploration of space give us all cause to be proud, grateful and confident.

"Since the beginning of our space effort, the United States has invited and urged all nations to make this vital new exploration a joint venture of international cooperation. More than 60 countries now work together voluntarily in this pursuit. We continue to hope that the extent of such international cooperation will be enlarged and that all nations will join through the United Nations to place the peaceful realms of space off-limits to the designs of aggressors on earth.

"The responsibility placed upon us by our role is great and continuing. I am sure the American people will continue to support what is necessary to assure leadership. In return they will rightfully expect that our program hold to the orderly and responsible course which has brought such outstanding success in such a short period."

*President Lyndon B. Johnson*

# MSC PERSONALITY

## *Dr. Robert Duncan Directs Development Of S/C-Guidance*

The responsibility for the development of guidance and control systems for current and future manned spaceflight projects is the job assigned to the Guidance and Control Division under the direction of Dr. Robert C. Duncan, division chief.

Duncan is an active member of the United States Navy with the rank of commander and is on loan to the NASA Manned Spacecraft Center from the Navy and the Department of Defense. He joined MSC in March of this year, but this was not his first association with NASA. Since 1960 he has been a member of NASA's Research Advisory Committee on Guidance and Control.

Before joining NASA, Duncan was for three years a special assistant to the director of defense research and engineering in the office of the Secretary of Defense. In addition to serving in Washington, D. C., Duncan has held other top level advisory positions in the Navy as well as serving as a pilot of Naval fighter and attack aircraft.

Included in Duncan's division's area of activity in guidance and control is the establishment of preliminary design requirements, through the design and development of system hardware, to the laboratory test evaluation and acceptance of system hardware.

Duncan's division has been delegated the responsibility by the manager of the Apollo Spacecraft Program Office for the development of the Apollo guidance and control system.

In 1945 Duncan was awarded a BS degree from the U. S. Naval Academy and in 1953 he was awarded a BS degree in aeronautical engineering from

DR. ROBERT C. DUNCAN

the U. S. Naval Postgraduate School. He received a Masters degree in aeronautical engineering from the Massachusetts Institute of Technology in 1954, and in 1960 he was awarded his Doctors degree from MIT in the field of guidance and control.

He has authored seven technical papers including one entitled *"1964 State of the Art – Navigation, Guidance and Control,"* which was presented before the American Institute of Aeronautics and Astronautics (AIAA). A book entitled *"Dynamics of Atmospheric Entry,"* written by Duncan, was published in 1962.

In 1953 he won the student award, for his outstanding scholastic record in engineering and science, presented by the Institute of Aeronautical Sciences. He is a member of AIAA and a member of the AIAA Technical Committee for Guidance and Control. He is also a member of Sigma Gamma Tau, the national honorary aeronautical society; and this year was awarded the Legion of Merit for outstanding achievement in the field of guidance and control.

He was born in Jonesville, Va., and attended Beavercreek High School in Alpha, Ohio. He is married to the former Rosemary Fleming of Pensacola, Fla. The couple has four children: Melissa 14, Babette 12, Robert 9, and Scott 2. The family resides in Nassau Bay.

Duncan said his hobbies included stamp collecting, playing golf and fishing, but fishing is the only one he has been able to find time for, and not too much time for that, even though he lives close to fishing waters.

# *Drop Tests Jolt Law Of Gravity*

The National Aeronautics and Space Administration has checked up on the law of gravity and found it needs some revision.

Contrary to popular and scientific belief a smooth spherical object doesn't fall straight down, but rather in a corkscrew pattern, the NASA experiments showed.

After dropping a plastic ball in a tank of water and tracing its fall, an Israeli geophysicist at the University of California at Los Angeles, Dr. Uri Shafrir, tested his findings by dropping a sphere in still air and measuring its fall. He has been working under grants from NASA and the National Science Foundation.

The metal sphere was dropped out of a helicopter 10,000 feet over Point Arguello, Calif. A sky-diver jumped out after it.

With a motion picture camera built into his helmet, he managed to stay within 20 to 40 feet of the sphere during the fall.

A smoke grenade inside the sphere trailed out red smoke, revealing that the object fell in a corkscrew pattern.

Dr. Shafrir's work may be applied to the launching of ballistic missiles by NASA and the Air Force.

# Joint Anglo-American Exhibit To Open In Houston, Oct. 5

A joint Anglo-American scientific exhibition is to be presented in Houston beginning on October 5 as part of the "Britain in Texas 1964 Festival."

Formal opening of the exhibition will be at 2 p.m. next Monday in the Main Building at 1212 Main Street with Dr. Robert R. Gilruth, director of MSC, and the British ambassador jointly taking part in the opening ceremonies.

The exhibit is being prepared by the British government and the British Department of Scientific and Industrial Research in cooperation with the National Aeronautics and Space Administration. Theme of the exhibition will be British and United States collaboration in the space age with particular emphasis on joint efforts in the field of communications and communication satellites.

A widely varied consignment of British exhibits has been shipped from London for the exhibition. The British exhibits will include models of the great radio telescope now nearing completion at Cambridge for study of the universe, the centrifuge used by the staff of the Royal Air Force Institute of Aviation Medicine, a stellar optical interferometer, a circulating water tunnel, a supersonic wind tunnel, and 140,000,000 volt linear accelerator.

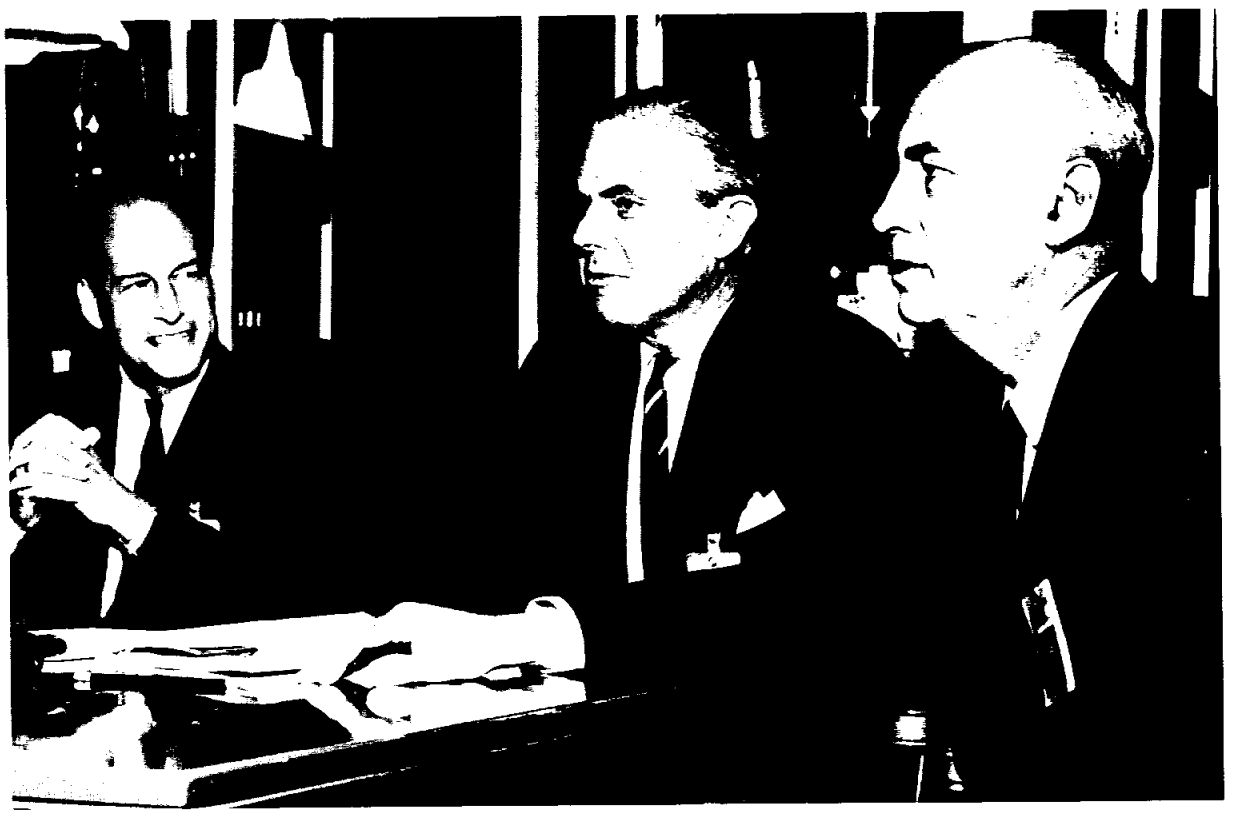
## *Syncom III Becomes First "Stationary" Satellite In Orbit*

Syncom III, the world's first stationary satellite, is in such a precise orbit that its rotational speed matches that of the Earth almost perfectly.

The Earth revolves at the rate of 1436.068 minutes each day, while Syncom revolves at 1436.158. This means Syncom is only five seconds off a perfect match with the Earth's rotational speed. The Earth does not rotate completely each 24 hours, but each 23 hours 56 minutes 4.09 seconds.

The spacecraft is "on-station" at 180 degrees. It's position over the Equator is relatively motionless at the 22,300 mile altitude. It drifts less than a mile and a half a day or 1/100th of a degree. At the same time its position over the Equator, inclined .095 degrees means it drifts north and south less than six miles a day.

Syncom III's apogee is 22,311 miles and the perigee is 22,164 miles.



DISTINGUISHED VISITOR TO MSC—The Earl of Bessborough, Frederick Ponsonby (center), Joint Parliamentary Under-Secretary of State for Education and Science, Great Britain was here at MSC to speak to key staff members on "Scientific Britain" last week. He is shown with Dr. Robert R. Gilruth (right), director of MSC, and George M. Low, deputy director of MSC.

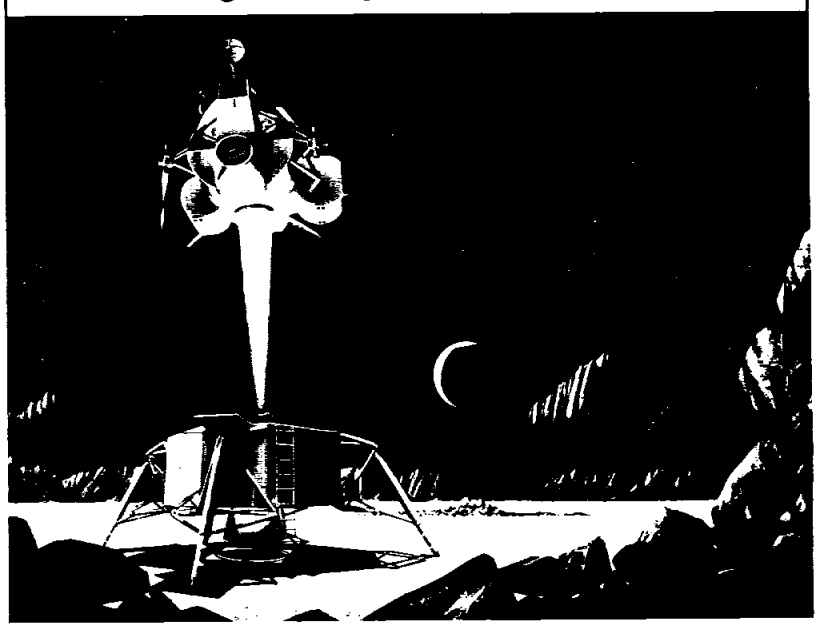
## Astronaut Eisele Wears Special Sling For Shoulder Injury

Astronaut Don Eisele, who suffered posterior dislocation of the left shoulder during weightless flight training September 15 at Wright-Patterson AFB in Ohio, will have to wear a special sling for his arm for about two more weeks.

The injury was sustained as the KC-135 jet training plane pulled out of a controlled dive which creates weightless conditions within the airplane.

Eisele was taken to the Wright-Patterson AFB hospital where the dislocation was reduced. He remained in the hospital overnight, and flew back to Houston the next day. He has since been attended by flight surgeons attached to the MSC medical office and is currently on limited duty.

## Test Firings Verify LEM Ascent Engine



LEM ENGINE VERIFIED—Test firings have verified the basic design of nearly every major component of the ascent rocket engine for Project Apollo's Lunar Excursion Module built by Textron's Bell Aerosystems Co. A series of test firings of approximately 400 seconds each have been conducted.

APOLLO HEAT SHIELD TEST—Temperature ranges up to 15,000 degrees (F.) on Apollo ablative heat shield material during a test (inset) at MSC's Arc Jet Laboratory. James Parker, engineer with MSC, examines charred sample that has been tested by the intense heat. Other samples (cut in half) are shown on the table.

## White Sands Operations Issues First Permanent Badges

BADGE NUMBER ONE—With the changeover from temporary to permanent identification badges at White Sands Operations in Las Cruces, N.M., getting into high gear, Badge Number One goes to WSO Acting Manager Paul Purser, special assistant to Dr. Robert R. Gilruth. The badge, turned over to Purser by security guard Diane Bell, is the first of more than 600 being processed under the supervision of WSO security officer N. G. "Sandy" Sandoval, right.

## *Space News Of Five Years Ago*

Oct. 1, 1959—NASA total employees reached 9,347.

Oct. 2, 1959—Funds were approved by NASA headquarters for major changes to the Mercury spacecraft which included: egress hatch installation; astronaut observation window installation; rate stabilization and control system; main instrument and panel redesign; and installation of reefed ringsail landing parachute.

—Specifications for the Mercury pressure suit were issued.

Oct. 4, 1959—A Little Joe launch vehicle carrying a boilerplate Mercury spacecraft (LJ-6) was successfully launched from Wallops Island.

—Lunik III, Russia's translunar earth satellite began photographing trip around the moon.

Oct. 8, 1959—Pioneer IV reached first aphelion (estimated 107,951,000 miles) in its orbit around the sun at 8 p.m. EST. Since launch on March 3, Pioneer IV was tracked by JPL's Goldstone tracking station to 407,000 miles from earth.

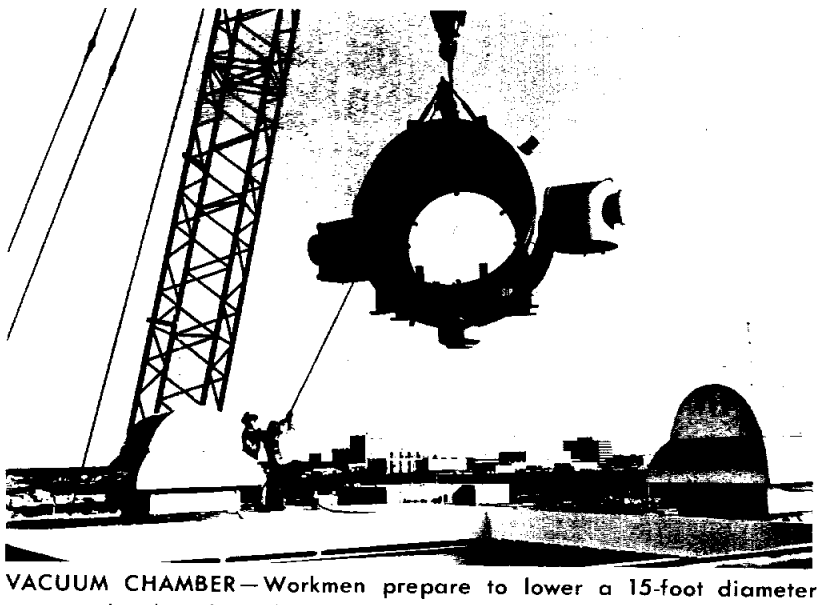
Oct. 13, 1959—Explorer VII achieved orbit on this date and began providing significant geophysical information on solar and earth radiation, magnetic storms, and micrometeorite penetration. This satellite also successfully demonstrated a method of controlling internal temperatures.

Space News ROUNDUP!

SECOND FRONT PAGE

GO! — Astronaut Walter Cunningham starts the ride down the incline in the Dilbert Dunker.

BOARDING — Astronaut Edwin E. Aldrin boards the life raft with a Gemini pressure suit on.



VACUUM CHAMBER — Workmen prepare to lower a 15-foot diameter vacuum chamber through an opening in the roof of Building 351 in the Thermochemical Test Area here at the Manned Spacecraft Center. The chamber will be used by the Thermochemical Test Branch of the Propulsion and Power Division to perform evaluation and development testing of a hazardous nature on spacecraft systems and subsystems in areas of power generation, cryogenic and propellant technology, and thermal control systems.

# *'Dilbert Dunker' Gives Astronauts A Ride In Florida Water Survival Training Course*

A signal bell rang. The instructor's thumb jerked upward. A mock-up aircraft cockpit clattered down an inclined track into 12 feet of water and overturned. Some 15 seconds later, a man in a silver pressure suit surfaced 10 feet from the track.

Such was a typical run of the Navy's "Dilbert Dunker" at the U.S. Naval Air Station, Pensacola, Fla. as 12 of the 14 NASA astronauts in the third group underwent water survival training.

The one-day course was conducted by Jack A. Martin of the Naval School Pre-flight Swimming and Water Survival Division.

The Dilbert Dunker is a device used by the Navy to train naval aviators in techniques for escaping from aircraft after a water crash. NASA astronauts receive the same training to prepare them for emergency escape after spacecraft water landings.

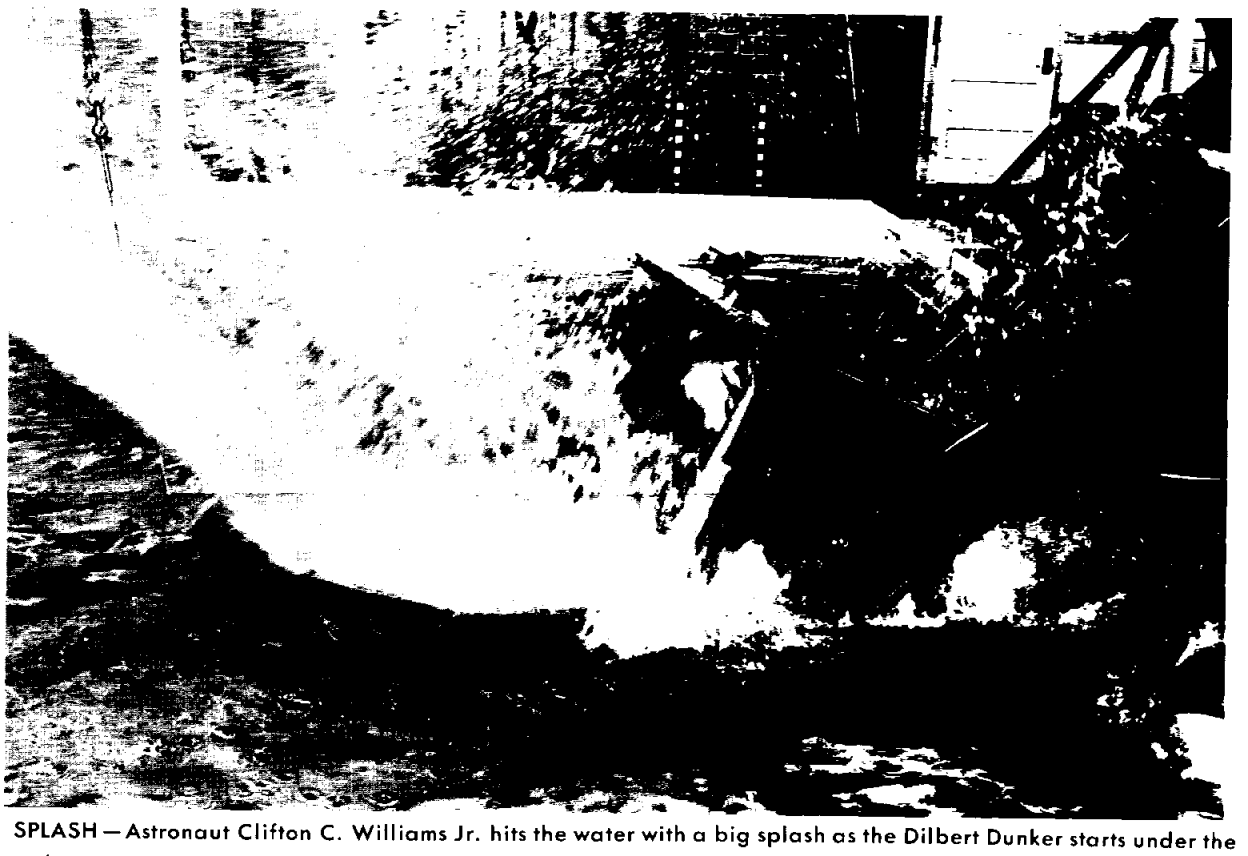
Each astronaut rode the Dunker into the water twice; once wearing flight coveralls and parachute, and once wearing a Gemini pressure suit.

In addition to the training in the Dunker, the astronaut group was instructed in the proper techniques for releasing parachute harnesses after water landing, mounting helicopter rescue slings and seats, and boarding a life raft.

Astronauts in the third group attending the course at Pensacola were: Edwin E. Aldrin, Charles A. Bassett, Alan L. Bean, Eugene A. Cernan, Roger B. Chaffee, Michael Collins, Walter Cunningham, Theodore C. Freeman, Richard F. Gordon Jr., Russell L. Schweickart, David R. Scott and Clifton C. Williams Jr.

Astronauts William A. Anders and Donn Eisele were unable to attend the course.

LIFTED CLEAR — Astronaut David Scott is lifted clear of the water by the helicopter lift.



SPLASH — Astronaut Clifton C. Williams Jr. hits the water with a big splash as the Dilbert Dunker starts under the water.

# Gemini Celestial Device Developed For MSC

A device to give an out-of-the-window star view that will be visible to the Gemini astronauts has been developed by the U. S. Army Map Service for the Manned Spacecraft Center.

The device, called a Gemini celestial display, was received recently by the Spacecraft Operations Branch of the Flight Crew Support Division.

Slight modifications to the celestial device will be made by Bill Anderson, engineer in the Spacecraft Operations Branch, to increase its operational capabilities.

The device presents an out-the-window star view on a real-time basis or it can be used to select a star view that will be in view at any future time during a Gemini flight.

Designed for use with zero or 180 degree yaw and for a plus 10, to a minus 30 degree pitch in the attitude of the spacecraft, the device will be applicable to any of the scheduled Gemini flights.

A time scale on the celestial device is adjustable for orbits of 88, 89, 90, or 91 minutes to compensate for changes in orbital time periods.

The device also has adjustments to accommodate any ascending node from zero to 24 hours, and to compensate for orbital perturbations.

CELESTIAL DEVICE — Bill Anderson, Spacecraft Operations Branch of the Flight Crew Support Division, examines the Gemini celestial display device that was developed for MSC by the U. S. Army Map Service.