



*James Lovell*



*Frank Borman*

## GEMINI: 7 SET, 6 UP NEXT

Technicians are putting the final touches today on the Gemini 7 spacecraft and launch vehicle while preparing for the long-duration flight of astronauts Frank Borman and James Lovell, scheduled no earlier than Saturday.

The 7 mission will be the first half of an unprecedented manned space flight double header that will be climaxed by the launch of Gemini 6 no earlier than December 13.

The 6 spacecraft, to be piloted by Wally Schirra and Tom Stafford, is to rendezvous in Earth orbit with Gemini 7.

Despite this rendezvous objective, however, the two missions will be carried out independently. That is, Gemini 7 will be launched and carried out as originally planned.

The Gemini 6 mission will follow a flight plan which is nearly identical to the one prepared for the October 25 launch which was postponed when an Agena target vehicle failed to achieve orbit.

It was decided that the planned schedule of Gemini 7 and the availability of the Gemini 6 launch vehicle and spacecraft, which have already been checked out at pad 19, presented an opportunity to carry out a rendezvous of two manned vehicles—a feat never before attempted.

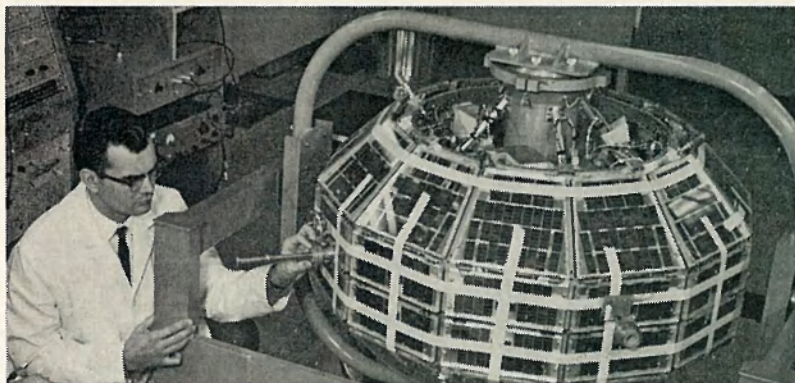
The first several days of the Gemini 7 mission will be devoted to fulfilling a variety of experiments. After about five days the 7 crew will maneuver their spacecraft into a target orbit for Gemini 6.

Following a successful liftoff, Schirra and Stafford will immediately begin maneuvers to achieve rendezvous, which is planned for 6's fourth orbit. After rendezvous, Gemini 6 will fly in formation with 7 for about two revolutions of the Earth.

Gemini 6 will reenter the Earth's atmosphere and land in the Atlantic Ocean roughly two days after liftoff. Gemini 7's flight duration is planned for 14 days, and its landing in the same area is scheduled to take place three days after 6 has landed.

In addition to the rendezvous and long-duration objectives, Gemini 7 will attempt to carry out 20 experiments—all designed to gain data covering a number of subjects under varying flight conditions.

# Doubleheader Satellite Launch Successful At Western Range



**THIS IS Alouette II**, an International Satellite for Ionospheric Studies, that was launched Sunday night by a Kennedy Space Center launch team at the Western Test Range in California. The spacecraft is designed to study the top-side structure of the ionosphere.

## Maternity Count Underway For 19's Prolific Momma

There's a lot of anticipation out at pad 19 these days and it all isn't centered on the upcoming flight of astronauts Frank Borman and James Lovell.

Much of the anxiety concerns the imminent delivery of "Gemini." For the uninitiated, Gemini is the pet cat at 19, and she is momentarily expecting.

Her home for the past year and a half is the tool crib under the ramp near the pad. In that time she has delivered 42 kittens, all of which have been adopted and taken home by launch complex workers.

Howard Downs of the Martin Company, who has kept a watchful eye on Gemini, says she was wild and slowly became tamed through peace offerings of food.

"But there's a big tomcat here we'll never tame," Downs said. As the countdown for Borman and Lovell's flight nears, so too nears the maternity count on Gemini, and workers are ready to evacuate the feline to safer quarters before liftoff time.

"We can't let anything happen to Gemini," Downs says. "She's our good luck mascot."

### FARAWAY BIRTHPLACE

Michael Collins, one of the Gemini 7 backup pilots, was born in Rome, Italy.

### TALL AND HEAVY

Overall height of the Gemini launch vehicle and spacecraft is 109 feet.

Dual satellites were launched by the Kennedy Space Center from facilities at the Western Test Range in California Sunday night.

The two spacecraft — Alouette II and Explorer XXXI — are studying ionospheric structure, electron densities and temperatures, very low frequency radio waves and associated effects and phenomena, cosmic noise, and the intensities of cosmic particles.

Robert H. Gray, Assistant KSC Director for Unmanned Launch Operations, directed the flight, and Joseph Swartz, Manager of the Western Test Range Operations Division, was assistant launch director. Spacecraft coordinator was George Fike.

"It was a completely successful mission in spite of the sophistication of the trajectory and orbit injection requirements," Gray said. "The flight involved two independent satellites. Each had to be injected separately into orbit which required complex maneuvering of the Agena stage to meet orientation, spin rate and separation requirements."

Gray also noted that a number of Canadian officials, at the launch site to witness the flight of the Canadian-built Alouette II, were highly pleased with the success of the mis-



**KSC DIRECTOR, Dr. Kurt H. Debus**, cut into a specially-baked cake Monday honoring his birthday. Meanwhile, Center employees circulated a massive greeting card and presented it to him, complete with hundreds of signatures.

### High Percentage

NASA awarded \$148 million in contracts under \$25,000 each in fiscal 1965. The amount received by small business firms totalled \$84 million, or 57 percent.

sion.

The 320-pound Alouette II is designed to study the top side structure of the ionosphere, while the Explorer XXXI is to make related measurements, as both satellites orbit the Earth in close proximity.



**CROWN PRINCE Gustaf Oscar Carl Eugen Bertil of Sweden**, right, was briefed on Saturn operations Monday by Deputy KSC Director Albert F. Siepert. The Crown Prince toured Spaceport facilities during his visit to the area.

## SPACEPORT



## NEWS

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# Astronauts' Menu Controlled For Calcium Tests

Gemini 7 astronauts James Lovell and Frank Borman and backup pilots Ed White and Michael Collins are on the most exacting diet ever imposed on U.S. spacemen.

Actually, the term diet is a misnomer. The astronauts can eat virtually all they require—and they hit about 3,000 calories a day—as long as their intake remains controlled.

In fact, great pains are taken to insure that every pat of butter, every gram of salt and sugar is measured and recorded.

This experiment is being run to test the effects of extended space flight on human bone physiology. On the basis of ground-based experiments, it is theorized that long periods of weightlessness may cause a significantly greater loss of calcium from the body than is being ingested, and doctors want to substantiate or disprove this.

To do it, the astronauts' food intake must be strictly controlled before, during and after a flight. This is called a metabolic study. If there is a change in the bodily processes, such as a calcium deficit, it can thus be traced to factors caused by space flight rather than by improper food intake.

## Negative Calcium

Dr. Paul A. Lachance, of NASA's Manned Spacecraft Center, says tests of humans immobilized in bed for long periods of time have shown a negative calcium reading. That is, the subjects lose more calcium than taken in.

Since the Gemini spacecraft confines are extremely restrictive, doctors want to know if a similar or greater loss of calcium will occur with astronauts on long-duration flights.

Over long periods of time such calcium losses could conceivably make a person more susceptible to the development of kidney stones and changes in bone structure. Of course, the medics are not worried about astronauts on two-week flights, but if and when the day comes for interplanetary flybys, which might involve missions in cramped quarters for several months or more, a loss of calcium could become a serious prob-

lem.

"Gemini 7 will be the only flight in this program in which we'll try this particular experiment," Dr. Lachance said, "but we'll do it again in the Apollo program."

Should the studies show there definitely is a change in bone physiology through loss of calcium, part of this could be offset on longer flights through a specially designed diet.

"What we really want to show," Dr. Lachance said, "is whether or not this could be a problem. The experiment requires a precise knowledge of what the astronauts' eat every day."

Dietitian Jeanne Reid, who plans the experiment menus, says each pilot gets one gram of calcium a day. This principally comes from milk and dairy products.

Involved in the study are Dr. G. Donald Whedon (principal investigator) and Miss Reid, of the National Institute of Health; Dr. Leo Lutwak (co-principal investigator), of Cornell University; Dr. Lachance, MSC investigator; Dr. Russell Conley, MSC flight surgeon; Dr. Keith Smith of Wright Patterson AFB; and technical support personnel from the Miami Valley Hospital Research Division in Dayton, Ohio.



**CLINICAL chemist Jim Murphy, left, and Dr. Paul Lachance of MSC, check test results involving special metabolic diet of the Gemini 7 astronauts.**



**DIETITIAN Jeanne Reid of the National Health Institute in Washington, measures amount of salt that will be allotted to each Gemini 7 astronaut and backup pilot for the day. The spacemen eat under a controlled diet while participating in a metabolic experiment.**

## Pineapple Upside-Down Cake Off Limits During Training

"They're big eaters and they sure like their meat," dietitian Jeanne Reid says of Gemini 7 pilots James Lovell and Frank Borman and their backups, Ed White and Michael Collins.

It's her job to plan their meals, know exactly what their daily intake is, and make sure this intake remains constant. She even weighs ice cubes individually and measures daily allotments of salt and sugar, so precise are the requirements of their metabolic menus.

"They get plenty to eat," Miss Reid points out. "Their daily caloric intake is about 3,000, but with all their exercises and work this caloric level is within normal range.

"They like plain food, and each one can eat a half-pound file of beef without any trouble. That's a pretty good size piece of meat," she says.

Borman and Lovell are both one egg eaters, whereas the backup crew members each eat two eggs in the morning, and Miss Reid must break and pre-weigh their eggs, for a small one might vary in weight from a large one by

five to 10 grams.

The dietitian said all food to be used during the experiment was bought by case lot so the diet could be more precisely controlled. For instance, if the astronauts have canned peaches one night, they will get peaches from the same lot number—that is ones that were packed and canned at the same time from a given crop—the next time they have them.

"They're very good about sticking to their daily menu," Miss Reid says. "The only time they look anxious is when visitors have some fancy desserts. They are restricted to such desserts as canned fruits, ice cream or sherbet, but often other astronauts will eat with them, and, of course, they are not restricted to the experiment menu.

"I remember one day the visitors had some pineapple upside down cake, and I know the Gemini 7 crew would have liked some, but there was no way we could accurately control this type of dessert so that each pilot would get the some amount of nutrients per serving."

# Spacecraft Rendezvous Explained

The first problem for Gemini 6 pilots Wally Schirra and Tom Stafford, following their launch into orbit, will be to find the target vehicle—in this case the Gemini 7 spacecraft of astronauts James Lovell and Frank Borman.

"When Gemini 6 comes within 500 to 600 miles of this target, the pilot will switch radar to a search mode," said Rocco Sannicandro, KSC's lead systems communications engineer for Gemini 7.

"The astronauts will know when contact has been made with the target," Sannicandro said, "when a lock-on light begins flashing. As they get closer, or point more directly to the target, their lock-on light will eventually stay on continuously."

At this time the pilot knows that the reply from the Gemini 7 transponder contains range, range rate, elevation and azimuth. Looking at the range and range rate indicator and comparing it with the flight director indicator will tell him exactly where the target is.

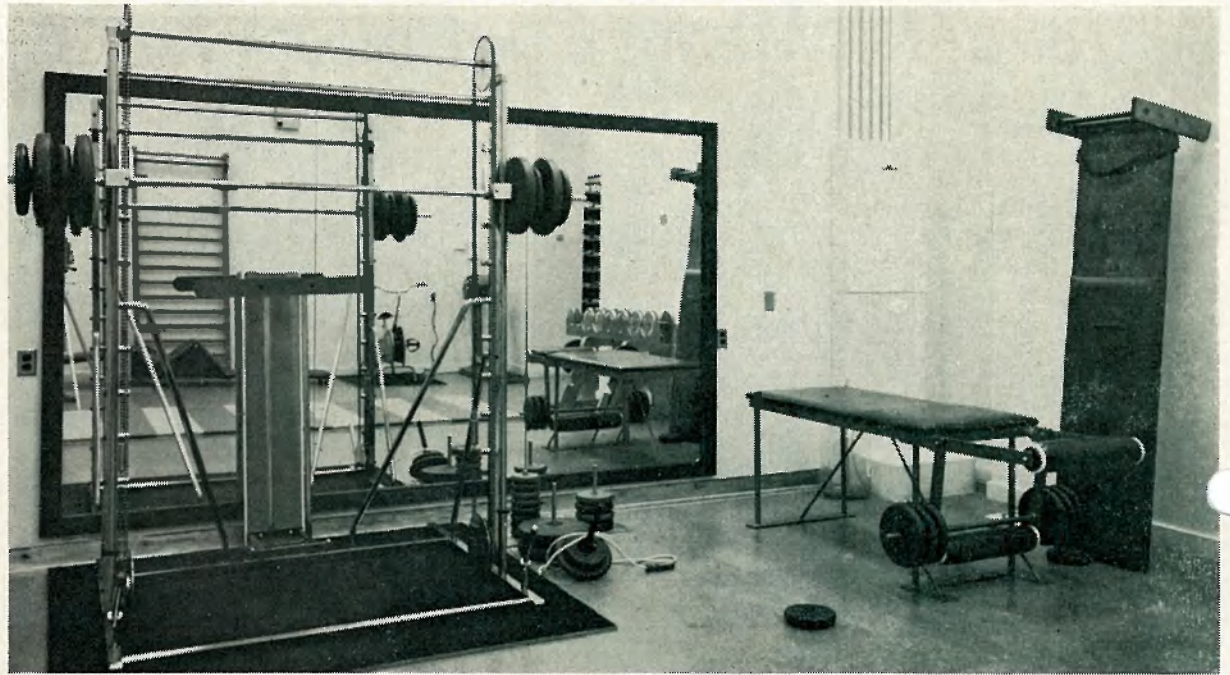
## Nose To Nose

"The transponder which Gemini 6 will look for is located at the nose of Gemini 7," Sannicandro explained. Therefore, the mission will require that the two spacecraft approach each other nose to nose until they are less than 20 miles apart.

However, since voice communications could be established long before radar contact, their relative position could be verbally directed. This will be required throughout the rendezvous portion of the flight.

When the two spacecraft are within 20 miles of each other, the Gemini 7 pilots will turn on their acquisition lights, and reorient their spacecraft so that the light can be seen by the approaching Gemini 6.

Using these two high intensity lights as their new target the Gemini 6 pilots will continue their approach until they get within waving distance.



**TO KEEP** in shape while training at the Kennedy Space Center for future flights, astronauts have use of a newly-equipped physical conditioning room. It is located in the astronauts' quarters at the Manned Spacecraft Operations Building. Included in the area are weightlifting barbells, an exercise cycle, a medicine ball, exercise bars and bands and a punching bag. Gemini 7 pilots James Lovell and Frank Borman frequently make use of the new facility as their launch day nears.

## Foreign Flavor

That the Gemini flights here are open to an international audience will take on an added flavor this Saturday when astronauts James Lovell and Frank Borman are scheduled to be launched into orbit.

About 80 foreign ambassadors to the United States from nations around the world have accepted invitations to the Kennedy Space Center to witness the flight.



**KSC'S** G. Merritt Preston, left, Deputy Mission Director for Launch Operations, and Chris Kraft, Deputy Mission Director for Flight Operations huddle in blockhouse during pre-launch sessions. For the Gemini 7 and 6 flights, Kraft will be in the Mission Control Center at Houston, and Preston will be in the MCC at Cape Kennedy.



**LENORA** Booth, of the Launch Support Equipment Engineering Division, proudly displays the Sustained Superior Performance award she recently received. She was nominated for it while serving with Plans, Programs and Resources.

## More Parking Spaces On Tap in LOC Area

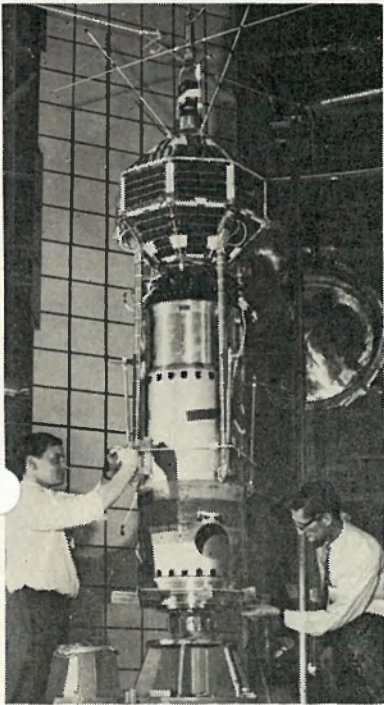
An additional 380 parking spaces for workers at the Kennedy Space Center's moon launch complex on Merritt Island will be built as part of a project on which bids will be opened today.

The parking area, complete with lighting system, will be located southeast of the Launch Control Center and is expected to be completed by February.

The bids will be opened at 2 p.m. by the Canaveral District of the U. S. Army Corps of Engineers, as design and construction agent for NASA.

As part of the same work package, a 11,000-square-yard storage area will be built adjacent to the Saturn V vehicle unloading dock at the barge turning basin.

Approximate cost of the work is \$150,000.



TECHNICIANS prepare French-built scientific satellite—FR-1—for launch from Kennedy Space Center Western Test Range facilities. The flight will be under the direction of Robert H. Gray, Assistant KSC Director for Unmanned Launch Operations.

## Engineers' Sessions Begin In January

Registration for the third annual Professional Engineers Review Sessions, scheduled to begin in the local area this January, will be held through December 17.

KSC personnel may pick up registration forms in room 1214 of the Headquarters Building. Fee for all or part of the 16 sessions is \$25.

The sessions will be held weekly from 5:30 to 8:30 p.m. and will range from a general orientation to review of mathematics, physics and chemistry. Eight sessions will be devoted to "boning up" on the individual's particular discipline. Areas such as electrical, mechanical, civil, or industrial engineering, will be covered.

All sessions will be conducted at the Corps of Engineers Building on Merritt Island. Purpose is to suggest to students the various ways of preparing for the Florida Professional Engineers License. A registered engineer in this state is required to pass a written examination administered by the State Board of Engineer Examiners.

## Association Officers Elected

Election of representatives from each primary organizational element at KSC to the Activities and Welfare Association of the NASA Exchange was held Monday and results were tabulated and announced Tuesday.

Elected were: Information Systems — Herbert C. Kiesling, Rueben L. Wilkinson and Brantley Loumans, with Don Barrett as alternate; Unmanned Launch Operations—Rosemary Rowland and Lester Rudy, with Edward P. Beatty as alternate.

Space Operations — Larry W. Bell, Ed A. Timmons, Sarah H. Galloway and Bruce W. Laubenheimer, with W. R. Durrett as alternate; Administration — Thomas M. Davis, Elizabeth A. Johnson, Bill J. Martin, Richard T. Nagle and Dorothy J. Parker, with William R. Harris as alternate.

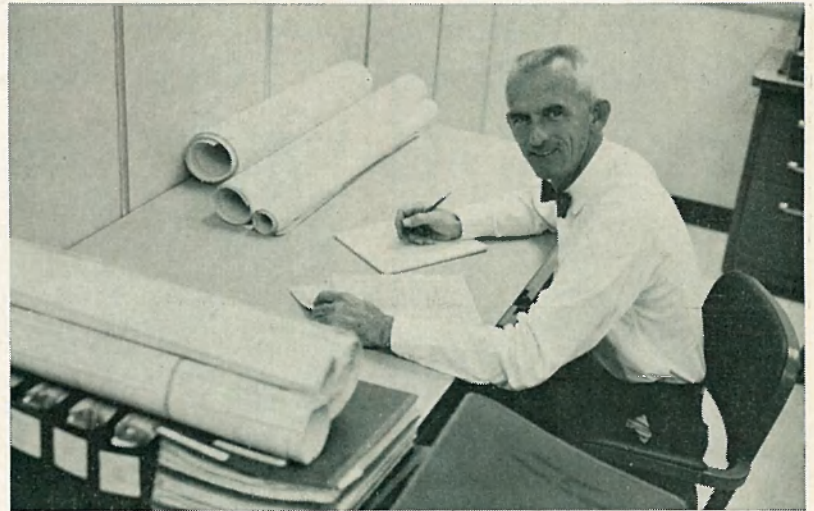
Plans, Programs and Resources — Carol Copeland and N. R. Wirman, with Pat Mongillo as alternate; Engineering Development—John Feussner, Jack Bing and John Kull, with Ed Taylor as alternate.

Launch Vehicle Operations —R. E. Lealman, L. B. Russell, Lois J. Stanley and Kelly A. Fiorentino, with Norm M. Carlson as alternate; Support Operations—Robert N. Green, Jewel T. Campbell, Vernon L. Jansen, and James F. Russo, with Sidney Harbin as alternate.

Quality Assurance and Safety — Jack Cagle and George L. Walters, with John L. Claxton as alternate; Director's Office, Technical Staff and Public Affairs Office—James S. Loy, with Kay Shankles as alternate.

Purpose of the Activities Association is to develop athletic, recreation and social activities which present an opportunity for social contact between government and industry employees in a manner devoid of any official conflicting interests.

**You can't undo accidents, but you can prevent them.**



TOM MILLSAPS, of KSC's Cable Systems section, has won a Sustained Superior Performance award in his first year with NASA.

## MILLSAPS PRESENTED SSP IN FIRST YEAR ON JOB

Tom Millsaps, of the Kennedy Space Center's Cable Systems section, has been presented a Sustained Superior Performance award for work accomplished during his first year with civil service.

Millsaps, who had 13 years of communications experience in industry before joining NASA in June 1964, is Chief of KSC's Installations and Maintenance unit.

Shortly after he reported for duty the communications contractor's cable systems organization began a manpower build up in response to increased cable installation and maintenance requirements.

Millsaps, although relatively unfamiliar with the area and with procedural matters, applied himself in excellent fashion to the challenge of providing technical and management guidance to his contractor counterparts during this critical period.

The continuing reputation of the cable systems activity for unexcelled quality performance is due in large part to the outstanding and sustained superior performance of Millsaps in all areas of his work.

His boss, Tom Ewouds, said, "he has become an extremely valuable member of the KSC communications team and is frequently requested to provide information or advice to branch and other Center personnel."

A native of Ashboro,

North Carolina, and a mechanical engineering graduate of N. C. State, Millsaps lives at 761 Sharon Drive, Titusville, with his wife, Virginia and their three children: Mary Gail, 10; Kathy, 6; and Tommy, 4.

## IEEE Officers Named

The Canaveral Chapter of the Institute of Electronics and Electrical Engineers (IEEE) Communication Technology Group has elected its new slate of officers for the coming year.

Elected were: Dr. B. E. Keiser, Manager, Plans and Programs, KSC Communications Project (RCA)—chairman; Lawrence Lerner, Pan American, vice chairman; Rollo Christensen, Radiation, Inc., secretary; and R. K. Snelling, Southern Bell Telephone & Telegraph Company, treasurer.

The group is composed of engineers and scientists working in, or interested in communications. Most of them are members of the IEEE.

## Record In Jeopardy

Gemini 7 astronauts James Lovell and Frank Borman will have to go at least 190 hours and 57 minutes to break the long-distance space flight record, currently held by Gemini 5 pilots Gordon Cooper and Charles Conrad.



If you have an extra toy or canned good to spare and would like to share some Christmas cheer with those in need, you will now have the opportunity.

TWA employees in the KSC mail and postal section have set up a special Christmas tree and are now collecting non-perishable food and new toys to put under the tree.

Everything collected will be turned over to the Salvation Army for distribution to needy families in the local area.

If you have anything to contribute, let the TWA mail boy who serves your area know. He will pick it up and place it under the tree. They prefer the gifts wrapped, and if they are toys to state which age group and sex they are best suited for.

\* \* \*

A ground test version of the Saturn V launch vehicle booster (S-IC-T stage) was static fired for its full flight duration of about 2-1/2 minutes last week at the Marshall Space Flight Center.

The stage, designed by MSFC and the Boeing Co., generated its full thrust of 7.5 million pounds, equivalent, at maximum flight velocity, to about 160 million horsepower.

Ground tests such as this, in which more than 1,000 measurements of booster and test stand performance are recorded, help pave the way for the first flight of the Saturn from the Kennedy Space Center, planned for 1967. The firing was the 13th since the S-IC static firing program started last April.

\* \* \*

Dear Sir:

I would like to go up in space for the 14-day mission. I am a boy 12 years old. You let monkeys go up, why don't you let boys go up? Besides, I am older than the three year old monkeys that go up.

Robert T.  
Muncie, Indiana.

## KSC's Own Spaceman?



Sherman Holloway

It wasn't S. W. Holloway's fault. He was minding his own business, how could they blame him?

Holloway, a driver for GSA, had just delivered a truck load of oxygen to the Hypergolic Building on Merritt Island. As usual, he was donning a pair of orange coveralls.

At the building he stepped outside of his truck cab and walked up to the Gemini 6 spacecraft, which was undergoing checkout tests. He peered inside the window to see how things looked.

About that time a group of people appeared at the door of the Hypergolic Building, and Holloway went back toward his truck. One of the men who had just entered the building walked up to Holloway.

"Will you sign your autograph for me?" He asked.

"Sure," was the answer.

The man looked down at the fresh signature. It read "Sherman W. Holloway."

The man scratched his head and then asked, "are you an astronaut?"

"No," Holloway replied, "I'm a truck driver!"

## Astronauts Flight Tested Long Before Launch Day

Astronauts James Lovell, Frank Borman, Wally Schirra and Tom Stafford have flown and reflown their missions numerous times already — long before their Gemini 7 and Gemini 6 spacecraft ever leave the ground.

Their flights are practice ones, carried out in the Gemini simulator located in the Mission Control Center at Cape Kennedy. The simulator is a land-locked Gemini spacecraft that does practically everything but fly.

Basically, their trial runs are divided into four different phases. The first of these is considered a launch simulation. This is picked up about six minutes before liftoff, and covers the powered portion of flight, booster cut off and separation, and turn around.

The second area is called orbital phase training, in which orbital systems checks are made, sighting of various stars on a special celestial display is tried, and sighting of land masses is simulated.

The third phase involves the onboard computer and the manual data insertion for velocity readings and rendezvous practice, where the astronauts jockey their spacecraft toward a target vehicle.

The final phase of flight involving the simulator concerns retro-fire and reentry. This is practiced down to main chute deployment and landing.

Astronauts spend many hours in the simulator during the weeks prior to their actual flights. Average sessions last from two to six hours, and during most of them the astronauts are fully suited.

Engineers and technicians can throw in "flight hazards" unexpectedly at the pilots during a simulated flight to test their reaction and methods of solving the problems.

Efforts are made to familiarize the astronauts with as many different flight conditions as possible long before they ever leave the ground.



SARA COOPER of the KSC mail room shows cachet designs that will adorn envelopes mailed from the Center on the launch days of Gemini 7 and 6. Employees wishing to receive these cachets should send stamped, addressed envelopes to the mail room in inner-office envelopes with a note to hold for the launch day. For further information call 2411.

## Brush After Every Meal . . . But!

When it comes to brushing teeth, Gemini 7 astronauts James Lovell and Frank Borman have to watch things carefully in the days before their flight. They aren't allowed to swallow any toothpaste!

They are on a precise diet for their flight which calls for exactly one gram of calcium per day in their food. There is a percentage of calcium in toothpaste and if they swallowed even a small amount it might offset their total intake for the day.

So doctors have cautioned them to brush as often as they wish, but to be careful with their toothpaste.