

Apollo IV Flight Data Confirm Spacecraft Met Its Objectives

Evaluation of Apollo IV mission data at MSC continues to confirm initial reports that Spacecraft 017 met all flight objectives without problems.

Detailed systems analyses are still in process, but evidence to date indicates that spacecraft systems operated properly and met all specifications.

Liftoff was at 6:00:01.4 am CST, November 9. The spacecraft landed in the Pacific Ocean at 2:37:08 pm, CST, the same day. The landing was approximately six miles from the recovery ship, *U.S.S. Bennington*.

As planned, the first service propulsion burn was started in zero-g environment with no re-

action control system ullage maneuvers. No adverse affects were noted. The second SPS burn was 13 seconds longer than planned. The longer burn resulted from a switchover to ground control after the burn was started by the onboard guidance and navigation system. Mission Control Center-Houston took command of SPS on/off after Carnarvon tracking site data indicated possible lack of onboard ignition control. The exact history of the burn is still being reviewed, however, it has been determined there was no failure in the onboard systems involved.

Cabin pressure remained between 5.6 and 5.8 psia for the entire mission. This indicates that the cabin leakage rate is negligible and well within specifications. Cabin air temperature appeared to remain stable at 60°F during orbit, increasing to approximately 70°F during re-entry.

Instrumentation data available at this time indicates satisfactory structural performance of the spacecraft and Lunar Test Article 10R during the launch and boost phase of the mission. LTA-10R simulated a lunar module.

(Continued on page 2)



DRY RUN—Pilot James B. Irwin tries on the Crew Systems Division's eight-foot chamber for size in preparation for next week's man-rating tests of the new A6-L Apollo Pressure suit. The new suit incorporates design and material changes recommended by the Apollo 204 Review Board. Richard A. Sandridge of Crew Systems Apollo Support Office assists Irwin.

Fifty MSC Employees To Get Layoff Notices

Layoff notices will go to some 50 to 60 MSC civil service employees during the first week in January as part of a total reduction in force of 125 positions for the current fiscal year. The reduction will be a combination of normal attrition and separations, according to MSC Director Robert R. Gilruth.

The reduction in force will affect some 40 to 50 employees at MSC and 10 to 15 at MSC White Sands Test Facility, N.M. Separation will be effective the first week in February.

Permanent positions authorized for fiscal 1967 are 4704; for fiscal 1968 the authorization has been reduced to 4579. At *Roundup* press time, there were 4613 employees on board.

Personnel Division Chief Floyd Brandon has briefed employees in organizations in which the bulk of the cuts will be made—Engineering Division, Administration Services Division, Technical Services Division, Public Affairs Office and the White Sands Test Facility. Some individual positions may be affected in other areas. Brandon said that Personnel Division will conduct individual counseling outlining employees rights and benefits, such as severance pay, rights of appeal,

“bumping” procedures and downgrading, as soon as the individuals who may be affected can be determined.

Brandon further said that a Retention Register is being prepared based upon eliminated functions and positions which will show an employee's ranking relative to his fellow employees. The Register will be available for examination by any affected employee.

Brandon also outlined plans for establishing an outplacement office at MSC to assist separated employees in relocating either within federal service or in private industry.

A proportional reduction in overall support contractor employee strength is also under way.

Contract Signed For Developing No-Burn Paper

MSC last week awarded an \$11,848 contract to Dynatech Corporation, Cambridge, Mass., for the development and delivery of nonflammable paper. The contract calls for March 1968 delivery of 11x11-in prototype sheets to MSC for evaluation by Crew Systems and Flight Crew Support Divisions.

Made of submicron glass fibers, the nonflammable paper is proposed for use in flight plans and other onboard documents, paper towels, tissue and other paper applications in the Apollo command module. Specifications call for a tensile strength of four pounds for one-inch width, tear strength of 20 grams Elmendorf and a thickness tolerance of from 0.006 in to 0.008 in.

He Got the Job Done



RETIREES—James E. Creel of Engineering Division Construction Management Section receives from MSC Director Dr. Robert R. Gilruth a plaque engraved with an engineering layout of the MSC site. Creel retired in September after 45 years in construction management—16 years of which were in federal service. He was the first MSC employee to move onto the MSC site in 1962 after the first construction contract had been awarded. Creel's office was first a small trailer, then the “Blue Angel” (Bldg 226) MSC Field Headquarters. The first building occupied was, logically, the Fire Station, followed in December 1963 by Bldg 12. The major relocation from temporary locations in Houston followed in February 1964. Prior to joining MSC, Creel managed USAF missile site, runway and hangar construction, AEC facilities and US Army Corps of Engineers river and harbor operations. Even though retired, Creel is still building—a new home in Del Rio where he and his wife will have their permanent address.

Newest Apollo Suit In Man-Rating Test

The new Apollo pressure suit will undergo man-rating next week in a series of verification tests marking the first manned use of altitude chambers at MSC since the Apollo 204 accident earlier this year.

Pilots James B. Irwin and John S. Bull will wear the newly configured A6-L pressure suit during the four hour test runs in the eight-foot altitude chamber in Crew Systems Division. The A6-L suit incorporates design and material changes recommended by the Review Board which investigated the fatal spacecraft fire in January 1967.

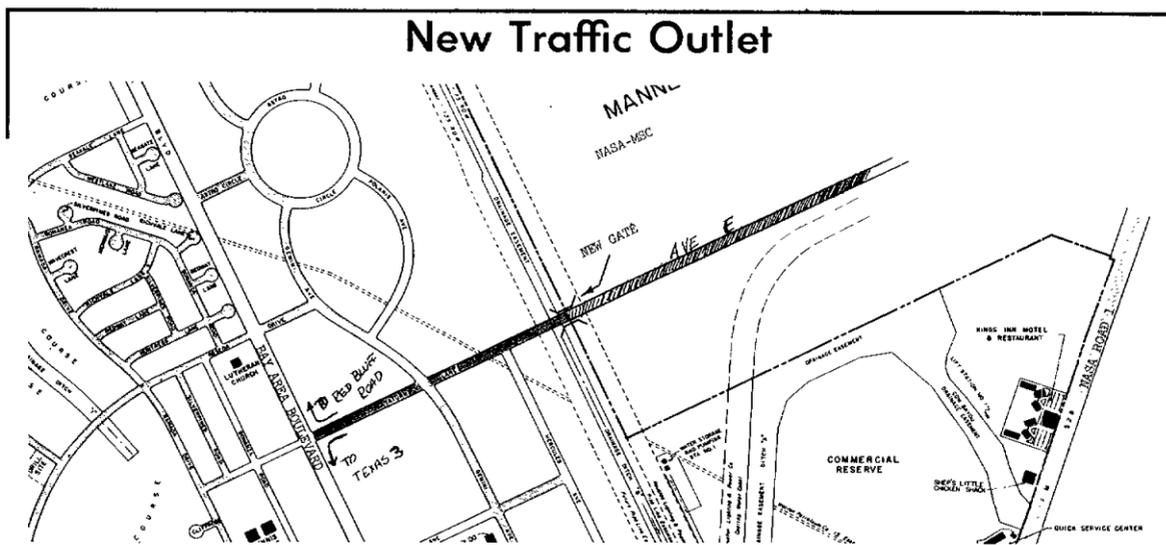
During the manned chamber tests the pressure suit will be under a 100-per cent oxygen system at 3.5 pounds per square inch. The chamber will use ambient air.

This is also the first manned operation of the Crew Systems chambers which were recently equipped with detection alarm systems for hazardous gasses and a fire detection, alarm and suppression system. Installation of the detection, alarm and suppression system also was recently completed in Chambers A and B in the Space Environment Simulation Laboratory.

Irwin is scheduled to begin the four hour test run and Bull is to perform identical tests the following day. These tests are preparatory to manned testing of the Lunar Module Test Article-8 (LTA-8) in Chamber B in the SESL early next year.

The Apollo suits worn by the two men have already been put through unmanned tests in this chamber. These tests, according to Richard S. Johnston, Chief of Crew Systems, qualified the suits for further manned testing. They were performed at altitudes of 150,000 feet in the eight-foot chamber and were conducted over the past several weeks.

(Continued on page 2)



GATE ADDED—The Avenue E West Gate was opened December 1 for traffic into Clear Lake City. The gate joins Saturn Lane, and in turn, Gemini Avenue and Bay Area Boulevard and should alleviate traffic congestion on NASA Road 1. It will be open from 6:45 am to 6 pm and will be limited to vehicles with permanent decals and temporary vehicle passes, government vehicles and badged employees driving rental or loan vehicles. Avenue E speed limit is 35 mph.

Mariner IV Gets Job 3 Years After Launch

Space engineers have sent commands from Earth to two Mariner interplanetary spacecraft operating at widely separated points in the solar system.

The mission of Mariner V, which flew within 2,500 miles of Venus last October 19, was terminated with a command to switch the spacecraft transmitter from a high gain directional antenna to a low gain all-direction antenna.

Ground commands to Mariner IV, which achieved the first close-up photography of Mars in 1965, were sent to check its camera and data storage system. Mariner IV has been operat-

ing for three years in space. Launched November 28, 1964, it has traveled about 1.5 billion miles.

Mariner V is in a solar orbit between the orbits of Venus and Mercury at a position about 74 million miles from Earth and about 60 million miles from the Sun. Its Venus mission has been completed.

It may be possible to renew the Mariner V mission next September when its antennas are pointed once again toward Earth.

Mariner IV, now circling the Sun between Earth and Mars has been commanded to take TV pictures of black space, in order to check on the condition of the camera and the ability of the data storage system to record on magnetic tape after long exposure to the space environment.

Commands to both spacecraft originated in the Space Flight Operations Facility at NASA's Jet Propulsion Laboratory Pasadena, Calif., and were radioed from the Deep Space Network station at Goldstone, Calif.

Both Mariners will remain in solar orbit indefinitely. Mariner IV's stabilizing nitrogen gas supply is expected to run out in the next few weeks. Reception of data will end thereafter when Mariner drifts to the point where its solar panels no longer face the Sun and stop charging its storage batteries.

Co-op of Month



ABORT ANALYST—Bryson M. Pursell, Jr. returned this month to Virginia Polytechnic Institute where he is an aerospace engineering major. During his stint at MSC, Pursell conducted in-depth abort analyses for earth orbital and lunar Apollo and Apollo Applications missions while assigned to the Mission Planning and Analysis Division Flight Analysis Branch. Pursell's supervisor says that "he has performed these tasks in a manner befitting an experienced engineer."

Apollo Suit

(Continued from page 1)

Main test objective is to man rate the newly configured Apollo suit. Irwin and Bull will perform tasks throughout the four hour test program to approximate the work load anticipated in the LTA-8 chamber runs next year.

Clifford Hess, Test Conductor for the CSD chamber tests, said the men will also execute certain tasks in recharging the Portable Life Support System (PLSS). The PLSS will not be worn or used by Irwin and Bull during the chamber tests. The PLSS is on a stand in the chamber and the test subject will adjust the valves and connect fittings.

The redesigned suit, in addition to being much more fire resistant, is also more comfortable and mobile than the original suit.

The redesigned suit has been covered with Beta Fabric, a non-flammable fiberglass cloth, replacing the original outermost layer of Nomex.

Apollo IV Meets Mission Objectives (Continued from page 1)

The Earth Landing System functioned as planned. All parachutes inflated properly, and parachute disconnects operated on landing. One of the main parachutes was recovered and inspection shows it was not damaged. Recovery aids deployed and operated normally.

Heatshield performance was good. Maximum char thickness was three-quarters of an inch. The thermal control coating on the hatch and the hatch seal was intact. Maximum indicated seal temperature was less than 200°F. Charring of the crew compartment heatshield was less than expected based on achieved entry conditions.

During the 4½-hour cold soak to check the spacecraft and its systems at extremes of temperature, the surface of the heatshield away from the sun reached a temperature of approximately -100°F. Temperature on the

sun side reached approximately 140°F.

Entry velocity was .0058 per cent higher than planned because of the longer-than-planned duration of the second SPS burn. Velocity achieved was 36,545 feet per second (24,913 miles per hour). Planned velocity was 36,333 feet per second (24,772 mph). This resulted in higher than planned command module maximum heat rate—620 BTU/Ft.² second versus 586 planned. Maximum expected on lunar return is 480.

Preflight prediction for the command module trim lift-to-drag (L/D) ratio at 400,000 feet was 0.35, with uncertainty limits of +0.06 and -0.03. Preliminary calculations from the G and N system show an average L/D trim of approximately 0.38 at about 40 seconds after the command module passed through 400,000 feet and the dynamic

pressure had built up to where the spacecraft could be considered in a steady state trim condition.

The 0.38 level held until about 20 seconds after the first peak G, when the lowest L/D, approximately 0.35, was calculated. Both of the L/D values are well within expected limits.

Maximum G's on entry were 7.3, compared with the expected 8.33 G's. Peak G's were experienced during the initial entry. On second entry, following "skipout," the spacecraft pulled 4 G's, compared to 4.5 G's expected. The lower G forces resulted from the shallower than planned flight path angle at entry into the atmosphere.

Fuel cell and cryogenic subsystems functioned normally during the mission, and the capability to purge the fuel cells subsequent to the cold soak was satisfactorily demonstrated. Analysis shows the fuel cells produced potable sterile water. Data evaluated to date shows excellent load sharing and thermal control capability of the fuel cells.

Communications system objectives were accomplished. Each Manned Space Flight Network site, the Apollo tracking ship Vanguard, and at least two of the Apollo/Range Instrumentation Aircraft established two-way communications with the spacecraft as scheduled.

The Guidance and Control system and the Mission Control Programmer performed properly throughout the mission. Entry simulations using tracking data verify the guidance commands issued by the G and N system. Range-to-go at drogue parachute deploy calculated by the G and N system was 2.2 nautical miles. Comparisons with the measured landing point indicate better than predicted performance.

Operation of the electrical power subsystem was normal throughout the mission. All available information indicates that the spacecraft sequential devices performed normally, with all functions occurring at the proper times.

Both the command module and the service module reaction control systems operated properly.

Pegasus Satellites Exceed Expected Life

The three Pegasus spacecraft launched by NASA in 1965 have far exceeded the most optimistic expectations and were still operating at the end of a one-year lifetime extension. The extension expired October 1.

They have completed their assigned tasks—to measure the meteoroid environment of near-earth space — and have telemetered back to earth mountains of information on other subjects of vital interest to space scientists.

The Pegasus satellites were launched for the NASA Office of Advanced Research and Technology from Cape Kennedy aboard the last three Saturn I launch vehicles on February 16, May 25 and July 30, 1965.

Scientific results of Project Pegasus are covered in an interim report recently prepared by the NASA-Marshall Space Flight Center's Space Sciences Laboratory.

The planned lifetime for each satellite was 18 months. Shortly after Pegasus I passed its 18th month in orbit, NASA approved

extending the lifetimes for one year.

The three satellites have performed well. The findings have been accepted by scientists with confidence because of the great amount of data on which they are based.

The satellites, by operating far beyond their design lifetimes, have provided worthwhile extra dividends in the form of additional information on Van Allen belt radiation, earth albedo (reflectivity), the solar constant, orbital and gyroscopic motions of rigid bodies, degradation of surface coatings under space environment conditions, thermal control systems, and the lifetime of electronic components in space operations.

Extending the lifetimes of the Pegasus satellites has enhanced the data on hand and given researchers a chance to obtain new data in fields for which Pegasus was not designed originally.

Meteoroid penetrations recorded as of May, 1967 totaled 1,997.

NASA Closes WSO, Reduces Pasadena Staff

NASA has announced it will close its Western Support Office, Santa Monica, Calif., and reduce the size of its Pasadena Office as a result of Fiscal Year 1968 budget reductions. Plans are now being prepared to determine manpower requirements to carry out only those functions that will be continued in the Los Angeles area. Some will be reduced and others eliminated. It is expected that manpower reductions of approximately 120 positions will be made in these offices.

The Western Support Office presently employs 103 people and the Pasadena Office employs 89, a total of 192.

It is planned that functions eliminated from these offices will be carried out at other NASA Centers or at NASA Headquarters. The functions remaining in the Los Angeles area will be handled by the Pasadena office.

The work of these two offices has included contract administration, financial management and disbursement, public affairs, personnel services, procurement and administration of the NASA contract with the California Institute of Technology for the operation of the Jet Propulsion Laboratory.

Ames Meteorite Tests May Change Theories

More hard rock may be flying freely in space in the form of speeding meteoroids than scientists previously believed.

Meteor research in a high-temperature wind tunnel at the NASA Ames Research Center, Mountain View, Calif., may revise present theories about the composition and abundance of meteoroids in the solar system.

If indications prove correct, that rock-like debris occurs more often in space than previously calculated, plans for space mission extending into many months may need revision.

Greater protection against these high-speed rock projectiles would be necessary on long missions where the probability of a meteoroid hit would be highest. Such added precautions would be reflected in the design of spacecraft and in protective space suits for men in space.

Millions of objects enter the Earth's atmosphere every day, most of them minute in size. For every pound-sized meteoroid, there are tens or hundreds of ounce-sized entering projectiles, and millions of smaller bodies.

Nearly all of this entering space debris burns up in the atmosphere. These particles are often visible at night as meteors. A few stone and iron meteorites (fallen meteors) reach the Earth's surface.

Measurements of light emitted by meteors, plus studies of their trajectories have suggested that most meteors are loose aggregations of sand-like material which rapidly disperse as they strike the atmosphere. Such sandy meteorites have never been found on Earth, since they cannot survive entry into the atmosphere.

The quantity of light emitted by a meteor shows the rate at which it loses mass. Its velocity can be measured by a camera with a rotating shutter, its density by calculations based on these measurements.

Observations suggesting that meteors are sand-like, combined with studies of meteor and comet trajectories, have also indicated that most meteors are remains of broken up comets. This fits the current theory that comets are like "dirty snowballs" made mostly of ice, frozen ammonia

and methane, with some rock and sand.

Recent Ames wind tunnel experiments suggest that this space snowball theory doesn't fit all meteoroids. While most meteors rapidly become five or 10 times less dense after entering the atmosphere, some of them lose density initially and then seem to become more dense again.

Research by a group of scientists headed by H. Julian Allen, Director of Ames, provided new evidence. Other Ames experimenters included Charles Shepard, Howard Stine and Barrett Baldwin.

While running ablation studies of spacecraft heat shields these scientists noticed that light emissions from heat shield vaporization were much like those from meteor entry. The group decided to study meteor entry conditions by simulating them in the wind tunnel.

In subsequent experiments, the researchers conducted melting or ablating tests on one stony meteorite and a number of samples of gabbro, a common, meteor-like Earth rock, at simulated speeds up to 35,000 mph, within the meteor speed range.

The tunnel tests showed that the heat of entry into the Earth's atmosphere melts the surface of these rocks, boils off what little water they contain, and expands their other gasses. This expansion, ten to 1,000-fold, converts the exterior rock layer to foam.

The frothing rock forms a kind of blunt heat shield which flows around the sides of the rock, eventually breaking off.

The rock foam is 2-20 times less dense than the unheated rock. Thus, each time a piece of froth breaks off, the average density of the remaining rock projectile rises radically. This frothing and breaking-off of many meteors (about 15 per cent) appears to account for the rapid loss and later abrupt rise in density.

The Ames researchers further believe that many other rock meteors retain their froth during visible flight and therefore show a reduced average density. Hence, they believe a majority of meteoroids may be composed of hard rock.

The scientists speculate contrary to old theories, many more meteors originate in the rocky asteroid belt, or that material in the luminous clouds of comets contains much more solid rock.

Based on this new information, the probability of meteoroids puncturing spacecraft is about six times greater than previous estimates from observation of meteors. This means that extra protection from small meteoroids may have to be provided for large spacecraft on future long-distance space missions. This discovery does not affect the measurements of meteoroid puncture rates made from satellites.

Chilean Consul Speaks Monday To Spanish Club

Chile—one of the most unique countries of the western hemisphere—will be the subject of the program at the next meeting of the MSC Spanish Club. The honorable Benjamin M. Renoret, Consul of Chile, will be the guest speaker and will present slides and movies of his country.

The program should be fascinating because Chile—besides being one of our most progressive Latin neighbors—comprises a combination of scenery and peoples almost as varied as our own. Occupying a narrow strip of land along the western coast of South America, Chile extends for over 2000 miles. From Antofagasta, in the arid copper mining region of the north of Chile, through the towering Andes to the capitol city of Santiago, nestled in a green Andean valley, through the beautiful lake region of southern Chile which rivals Switzerland in its picturesque beauty, to the frozen reaches of Tierra del Fuego, Chile offers a panorama of geography second to none.

This program will be presented at the next meeting of the club, Monday, December 11, at 5:15 pm in Bldg 13, Room 108. All MSC and contractor employees and their families are invited to attend.

At the last meeting of the club, held on November 27, Jose Perez presented a slide-illustrated lecture on Mexico City and showed interesting archeological features of Mexico. Information on classes will be given at a later date.

Todos son bienvenidos a nuestras juntas.

Spreading the Word



PEOPLE HAVE GOT TO CARE—Manned Flight Awareness program representative Al Chop outlines for a group of West Coast aerospace industry people the need for individuals at all levels of flight hardware production to know that what they build will be depended upon by crewmen in spaceflight missions. Many industries conduct employee motivational programs as an adjunct to the NASA Manned Flight Awareness program, with varying manners of recognition for high-quality work.



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FREEDOM
PLAN**

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Caroling the Tree Alight



CHORALEERS—As a prelude to the annual MSC Christmas Tree lighting ceremony, the Bay Area Chorus will present a program of Christmas music December 17 in the MSC Auditorium at 5 pm. Accompanied by the Bay Area Orchestra, the Chorus will sing "Fanfare for Christmas Day," by Martin Shaw, "Greenwillow Christmas," by Frank Loesser; light numbers such as Leroy Anderson's "Sleigh Ride" and the Spanish carol "Fum, Fum, Fum"; classic Christmas music such as "O Magnum Mysterium" and Mendelssohn's "There Shall a Star Come Out of Jacob." As a finale, the Chorus and Orchestra will perform Mozart's "Gloria." Following the concert the lights on the MSC Christmas tree in the esplanade in front of Bldg 2 will be turned on. The tree is sponsored and decorated by the Clear Lake Junior Chamber of Commerce.

Receives SSP



Karen Chapman
Public Affairs Office

Velvet, plumes and rapier gave way to buckskin and Bowie knife in Central Texas German settlements



THE SPIRIT and character that distinguish today's Texan were distilled over many years from a great many different kinds of people. Not all pioneers were unschooled, leatherclad woodsmen. Freedom, and the chance for a new life in a new world, brought aristocrat and frontiersman alike to Texas. Those who adjusted most painfully to the new life were the princes and courtiers who came straight from the pomp and ceremony of Old World drawing rooms.

Such a group formed the membership of the *Adelsverein*, an organization of German noblemen who encouraged immigration of their countrymen to Texas. Commissioner general of the society in 1844 was Prince Carl zu Solms-Braunfels.

Prince Carl himself met a party of Germans who landed at

Galveston in the fall of 1844. From Galveston, they were carried by small craft to Indianport (later Indianola), christened Carlshafen by the Prince. There the party, cold and cheerless, spent a bleak first Christmas in Texas.

As a home for the newcomers, a large land grant (the Fisher-Miller grant) had been bought about 300 miles inland between the Colorado and San Saba Rivers. Early in 1845 the first caravan of immigrants pushed inland, but soon became discouraged when they realized the great distance to the land grant. They stopped at Victoria and McCoy's Creek while Prince Carl rode to San Antonio in search of a nearer place to settle.

At San Antonio, the Prince was told of an area around the Comal Springs where water was plentiful and land was fertile.

He visited the place, was pleased with its beauty, and bought a two-league tract from its Spanish owners for less than a dollar an acre. Moving forward from the vicinity of Victoria, the colonists arrived at Comal Springs in March, 1845. They named their settlement New Braunfels, in honor of Prince Carl's ancestral home.

During the months that followed, thousands of Germans landed at Carlshafen, only to hear the discouraging news that there was no way to move them inland. War had broken out with

Mexico, and teamsters could secure higher paying contracts for military work. Housing was poor on the coast, and there was little to eat. Some tried to make the perilous journey inland on foot. Exposure and hunger brought on an epidemic, and a chronicler of the time reported, "The trail from the coast town to the colony was lined with German graves."

Meanwhile, New Braunfels, beset with disease and financial difficulties, hung on for existence. Prince Carl returned to Germany in 1845 and was suc-

The history of Texas from its earliest exploration through its colonization and growth into a republic, and finally as a state of the Union, is an extremely interesting history. Through the courtesy of Humble Oil and Refining Company, articles from Humble's *Texas Sketchbook* will appear in the *Roundup* during the next several months. The articles were written by F. T. Fields. Pencil sketches and watercolors accompanying the articles are by the noted Texas artist E. M. "Buck" Schiwetz. Many of the places described in the series are within weekend driving distance of MSC.

ceeded by Baron von Meusebach, who later became known simply as John O. Meusebach.

Meusebach, a man of great energy and ability, put the colony on its feet. His first big job was to make room for the immigrants who continued to arrive from Germany in a heavy stream. In December, 1845, he dispatched from New Braunfels a surveying party of 36 men to establish a wagon road 75 miles farther inland to the Pedernales River, where he had bought land for a new settlement.

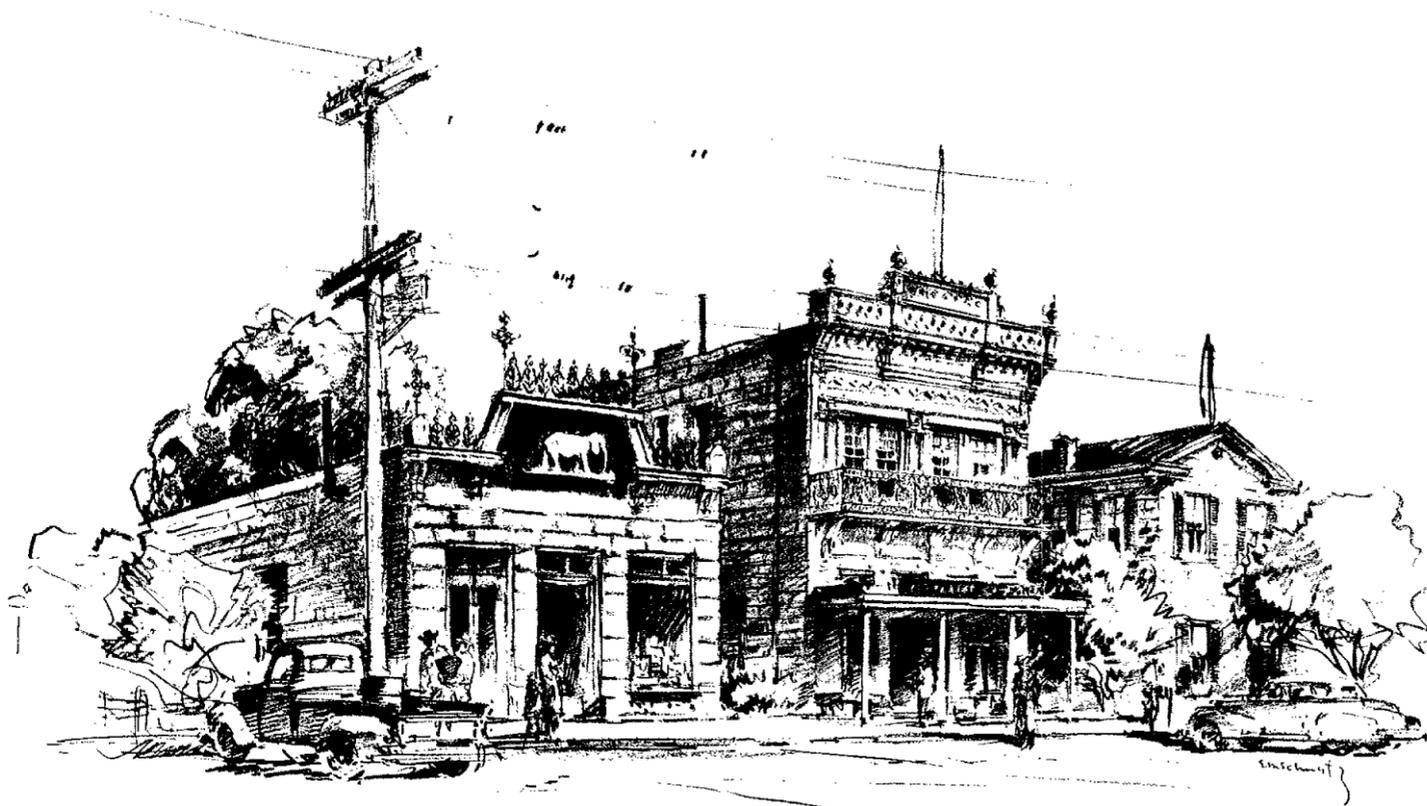
In May, 1846, the first group of weary colonists from New Braunfels arrived at the new place, a pleasant valley in the Texas hill country. They named it Fredericksburg, in honor of Frederick the Great of Prussia, himself a member of the *Adelsverein*.

Fredericksburg had its troubles. Cholera or some similar scourge took scores of its people, and it was only through the superb diplomacy of its leaders that the town was saved from destruction by the Indians. As it was, no one was safe on the streets at night, and many a settler in his front yard became a target for Indian arrows. Meusebach, an able diplomat as well as a great leader and businessman, went boldly into the camp of the Comanches and negotiated a treaty in 1847. The Indians, through their chiefs Buffalo Hump, Old Owl, and Santanna, had a high regard for the rocklike qualities of Meusebach. They called him "El Sol Colorado" (The Red Sun), for his flowing red beard. To their credit, the Comanches as a tribe honored the treaty, but bands of hot-headed braves continued to steal horses, burn homes, and scalp travelers. One historian summed up Fredericksburg's long struggle for existence with a salute to the pioneers:

"The courage and perseverance of these early German pioneers is worthy of the highest praise. Here they were thousands of miles from their native country, not only in a foreign land, but in the solitude of a wilderness, with dangers of all kinds lurking around them, but unflinchingly did they bear all the numerous inconveniences and hardships incident to pioneer life. Their unreserved love of freedom was the bright star shining above them through all the dark hours and troubles of the first years of frontier life, and assisted these intrepid men and women to battle against and finally conquer seemingly insurmountable obstacles."

Fredericksburg Today

One of the most colorful of Fredericksburg landmarks today is a reconstruction in native stone of the original *Vereins Kirche*—a combination church, fort, school, and meeting place of the pioneers. Built in 1846, the eight-sided structure was affectionally called the *Kaffeemuehle*, because it resembled an old-fashioned coffee mill. The



Store Fronts, Fredericksburg

building today is used as a library and museum, and contains an interesting collection of tools, weapons, clothes, cooking utensils, and household goods used by the pioneers. It also houses a collection of personal effects of one of Fredericksburg's "favorite sons" of the present, Fleet Admiral Chester W. Nimitz.

An inscription on the cornerstone of the *Vereins Kirche* speaks eloquently and accurately of the hardships suffered in early days:

"Theirs was the trouble life,
The conflict and the pain;
The grief, the bitterness of
strife,
The honor without stain."

Fredericksburgers built their homes like they built their churches to last. Stone and cedar were plentiful in the surrounding hills, and builders followed faithfully the architecture of homes they had left behind them on the Rhine. Scores of these houses, many of them more than a hundred years old, remain to give the town a quaint Old-World atmosphere.

Visitors are always interested in the town's old "Sunday Houses." These were built in the old days by farmers who lived in the country, to be used on weekends when the family came to worship. After services, the house would be closed and shuttered until the family returned the following Saturday. Modern roads and the automobile have made "Sunday Houses" unnecessary today, but many of them still stand to give shelter to Fredericksburg families.

Just as the people preserved German architecture, they clung to traditional folkways and social customs. The *Ball der Verheiraten*, a dance for married couples, remains popular. The *Kindermaskenball*, originally a masked ball for children, is now attended by everyone at Fredericksburg, although at nearby Stonewall the children still maintain exclusive rights to this celebration.

There are the *Schuetzenbund*, a shooting club; the *Skattourner*, a tournament of the people's favorite card game of *Skat*; and the annual *Saengerfest*, featuring folk songs and traditional dances.

Every year, on Easter Eve, Fredericksburg kindles its "Easter Fires" on the surrounding hills. Wide-eyed children call them "rabbit fires," where bunnies blend the dyes and cook the eggs that are found in youngsters' Easter nests the next morning.

To many Fredericksburgers, the most beautiful and appealing sound in the world is the *Abendglocken*, or evening bells, which ring at 6 o'clock in the evening as a signal for everyone to stop working.

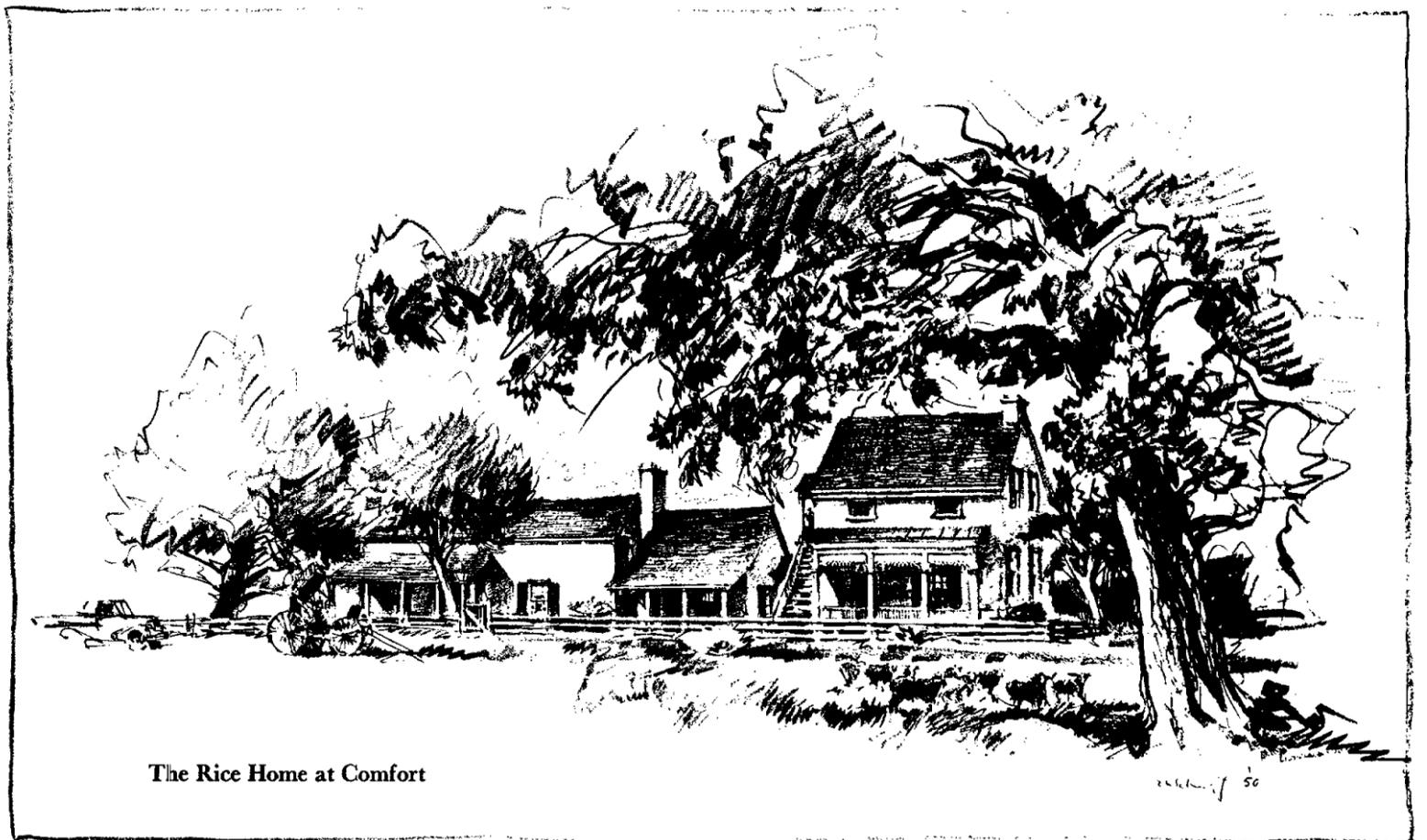
The character of the people has been as carefully preserved as their customs and traditions. The same qualities and virtues that made the German pioneers good colonists have made their children and grandchildren good Texans.



House on Seguin St.—New Braunfels

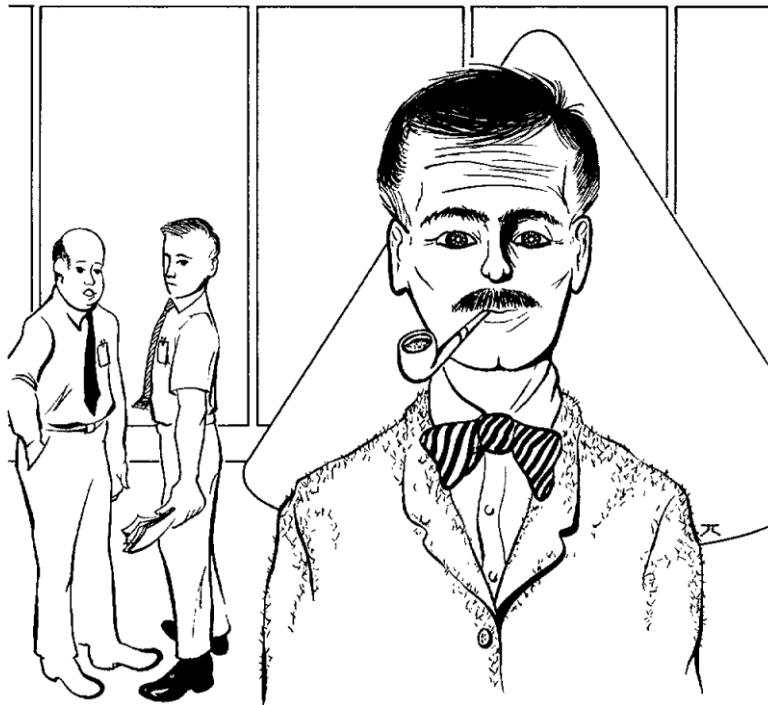


The Tatsch House,
Fredericksburg



The Rice Home at Comfort

On The Lighter Side



Visiting professor? No, he's a new astronaut.

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Director Dr. Robert R. Gilruth
Public Affairs Officer Paul Haney
Editor Terry White
Staff Photographer A. "Pat" Patnesky

I feel compelled to write . . .

North Braddock, Pa.
November 9, 1967

Dear Sirs:

I thought I would write and express my gratitude to the many, many people who are dealing with reaching the moon.

You men are respected for your superb intelligence, patience, love and patronage to the U.S. You are responsible for all of our space flights and tests.

I am concerned about my country, and at times I am saddened by some of the goings-on in the United States. I realize that you men are trying to bring the U.S. to be a peaceful, productive, rich country.

You deserve much, much more credit than you generally receive. My letter to you is a letter of great appreciation and deep concern.

I love my country. I love NASA and all it stands for.

In my eyes, I see a bright future in space, but even more by the landing of the first man on the moon.

I have great confidence in all you do. I back NASA with every hope, prayer and dream.

Our great tragedy of our three astronauts was a sad thing. My heart was heavy, but my mind strong.

I am so very glad that NASA has continued space testing and the landing of a man on the moon.

Thank you, NASA, for all of your wonderful contributions to space and to the United States.

May I say that it will be an honor when the biggest day comes. I will join with you in great celebration.

God bless all of NASA, and I know millions of Americans will take pride in feeling the way I do. I speak for everyone.

Sincerely yours,
Josephine Rossi

Straight Talk from your Credit Union

By Paul M. Sturtevant

How many of you use your Credit Union for savings? How many of you have the one share so you may borrow money from your Credit Union?

There are a couple of big advantages in having a savings account at your Credit Union. First, of course, is that you will have cash when you need it. That saves you interest money. Second, and apparently a lot of you don't know of this big advantage, you can use your savings to make a loan and again you are saving the interest costs.

By making a "share backed" loan you get a loan at three quarters of one per cent instead of the 1% rate which is normal for credit unions. Why don't you get on a basis of saving regularly. It's an awfully good feeling!

Save by mail . . . use our "Round trippers". Call the credit union for details, Ext. 2066.

Credit Union Repossesses Auto

Though we did everything within our power to prevent it, we had to repossess an automobile financed by the Credit Union.

Your Credit Union bends over backwards to help you, but there is one thing we cannot do . . . make your payments for you. Each individual has a responsibility to insure that his credit status is the very best he can possibly have. Payments must be made as agreed and every effort must be made to keep your payments timely.

Contest Ends . . . New Contest Soon

The monthly contest for tickets to local entertainment events ended with Stan Goldstein being the last lucky winner. A new contest will be announced soon.

JIM THRIFT SAYS: Help carry the ball on reducing costs



JOIN THE COST REDUCTION TEAM

NASA, Germany Share In Cosmic Dust Probes

A new type of cosmic dust detector which may prove useful in space experiments will be tested in a cooperative project of the German Ministry for Scientific Research (BMwF) and NASA.

Purpose of the project is to measure the influx of cosmic dust into the Earth's atmosphere and the registration of meteoroids by means of a detector based on charge emission developed by the Max Planck Insti-

tute of Nuclear Physics, Heidelberg, Germany.

The detectors will be launched on two Nike-Apache sounding rockets from the European Space Research Organization's range at Kiruna, Sweden in May or June, 1968.

Under the agreement BMwF will provide two payload packages for the scientific experiment and ground support equipment, and will conduct the launchings with possible assistance from European Space Research Organization and Swedish Space Research Committee personnel.

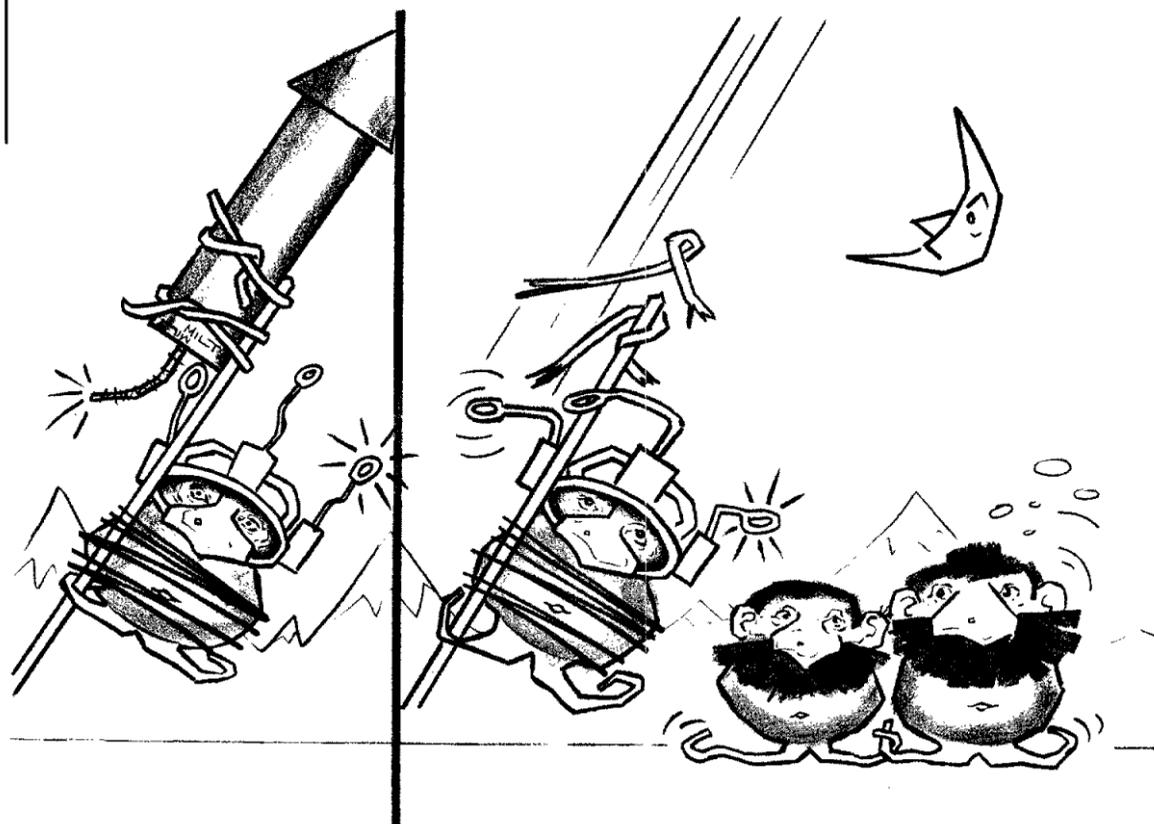
NASA will provide two Nike-Apache sounding rockets, a rocket launcher and any required training of German technicians in rocket preparation and launching.

Each agency will bear the cost of discharging its own responsibilities under the agreement. The results of the project will be made freely available to the world scientific community.

The cosmic dust detection project continues the cooperation in space research for peaceful scientific purposes begun in 1965 between BMwF and NASA.

Deadline for application for admission to the University of Houston graduate school spring term is December 15.

Long fight with short stick . . .



Zuckerman Gets University Prize

Robert Zuckerman of Apollo Spacecraft Program Office - Bethpage was awarded the Long Island University Management Engineering Department's H. J. Plock Prize.

The Plock Prize, established in 1965 honoring the Department's first chairman, is awarded annually to a graduate student in management engineering who has demonstrated exceptional scholastic ability and who has made a contribution to the field.

Roundup Swap-Shop

(Deadline for classified ads is the Friday preceding Roundup publication date. Ads received after the deadline will be run in the next following issue. Send ads in writing to Roundup Editor, AP3. Ads will not be repeated unless requested. Use name and home telephone number.)

FOR SALE/RENT—REAL ESTATE

3-1-1 brick at 3518 Mattye Maye, Pasadena, cyclone fence, window A/C, central heat, tile bath, attic fan. Monthly payment only \$89.50 total; 5 1/4 FHA. Equity \$1000. Lois Boozer, GR 2-8038 after 6.

FOR SALE—AUTOS

66 Chrysler Newport, blue, factory air, radio, brakes, power steering. Excellent condition, \$2295. D. E. Iloff, HU 6-3974.

62 Chevrolet Biscayne, 4-door, 6 cylinder, with air conditioner, radio and heater. Extra clean. Paul Stokholm 932-3753 after 5.

66 Datsun sta. wgn., radio, heater, white-walls, all vinyl interior, excellent condition, 28 mpg. J. D. Roberts, GR 9-3929.

63 T-Bird, Landau, Caspian blue, excellent condition, air, power, new tires, 50,000 mi. Best offer. Duane Mosel, 644-7210.

55 Oldsmobile, 2 door hardtop red & white, air, power brakes, R/H, excellent mechanical condition. Ben McGhee, MI 9-7715.

66 VW fastback, sunroof, AM-FM, white-walls etc., see to appreciate, \$1600. Steve Gorman, 649-4872.

66 Oldsmobile 4-4-2, scarlet red inside and outside, top condition, 23,000 miles, loaded with extras, new red and white lined extra wide oval tires, radio with reverb, 4 and 8 track stereo 6 speakers, air conditioned, heater. Tach, vacuum gauge, both lights and gauges for amps, oil pressure, and temperature. Reclining right seat, tilt-out steering wheel, Hurst 4-in-the-floor, full console, bucket seats, 3.9:1 differential, automatic trunk release. Selling to buy a new 4-4-2. Best offer gets this beauty. Stan Spaeth, 944-3170.

67 Chevy Impala fordor hardtop, 6200 miles, full power, air. P. J. Weitz, 591-3071.

60 Plymouth 4 door sedan, 395 cu. in. V-8, 3 speed automatic transmission, power steering and brakes, new paint. \$425. Jerry Vick, HU 7-2237.

59 Chevrolet station wagon, clean, good rubber, V-8, automatic, air (needs freon) \$200. J. P. Lockridge, 946-0233.

65 Lincoln Continental, excellent condition, four new tires, desert sand 4 door, fully equipped and priced to sell, with excellent financing available. \$2895 full price. Rose Frayer, HU 8-1453. Leaving area Dec. 15.

Mercedes-Benz 220S 4-door, automatic transmission, power steering, power brakes, radio, white walls, 15,000 miles. A. Doyle, 591-2941.

FOR SALE—MISCELLANEOUS

Kenmore washer, regular and delicate cycles, in good condition. Thompson, HU 6-7768.

Happiness is a Bassett Beautiful AKC registered Basset Hound puppies. Deposit will hold for Christmas. Gary W. McCollum, HU 7-2047.

Argus Matchmatic M3 movie Camera; 8mm; three lens—normal, wide angle and telephoto; M3 exposure meter; custom carrying case. Total price: \$25. Walter Fruland, MI 5-2897.

65 Allstate "Compact" Motorscooter, 60 c.c., 3200 mi., good condition, includes helmet, \$75. N. Lingle, GR 4-2400 after 5.

26" boys industrial heavy-duty Schwinn bike. Will sell for \$20. Carol Lines, GR 3-1332.

Knight AM-FM tuner, \$25. Knight 35-watt amplifier, \$25. Garrard "88" turntable, \$25. University 15" Di-faxial speaker with enclosure, \$20. Or all for \$75 including console to house above units. Gerald Janicke, 944-2399.

Two walnut bookcases, \$10 ea. 19" portable TV with UHF, \$45. 21" table model TV with stand, \$20. Couch (need covering) \$10. DX-40 transmitter, xclnt, \$35. Heath VFO, \$10. Simpson tube tester, \$15. HQ-110 receiver, \$100. Frank Blattner, 946-6623.

Youth Craft golf clubs and bag. J. C. Higgins 2 woods, putter, 3, 5, 7, 9 irons. All for \$25. John W. Harris, 591-2129.

Dishwasher, perfect condition, \$50; child's pedal surrey, \$20; Summer tux, 39 long, \$5. Ben Locher, GR 1-4387.

7 1/2 mo. old Toy Terrier, male, will give to acceptable party. Wesley W. Kookan, GR 2-0807.

Just in time for Christmas! Beagle puppies, purebred, available December 15. Mary Dunn, GR 9-1295.

Attention amateur producers: to make your own *avant garde* movies, a 16mm Bell & Howell camera with 1.9 lens, \$200 new, guaranteed in excellent condition, complete with lite bar and 4 hoods (\$35). A. A. Verrengia, OV 1-1872.

Persian kittens, deposit will hold for Christmas. R. Ritz, Nassau Bay, 591-2433.

GE refrigerator, good condition, \$35. L. H. Ballinger, MI 9-2473.

Universal sewing machine and cabinet like new, \$75. Maple baby bed/mattress, \$15. Casco play pen, \$8. Plastic baby tub, \$1. Car bed, \$3. Deep fat fryer, \$10. B. D. Sturm, GR 2-6787.

Surfboard, nine-foot six-inch, fiberglassed, excellent condition, sacrifice, \$45. G. R. Rafuse, 932-2468 evenings.

5 piece bedroom set, maple, good condition. 1-4 (poster walnut) bed with mattress and springs, excellent cond. J. D. Roberts, GR 9-3929.

Fish aquarium, two 10 gal. tanks complete with stand, pump, filters, one light, etc. \$35. A. S. Giralda, WA 1-7212.

Collins 75A-4 W/3KC filter and Halli-crafter HT-37, both excellent condition, \$400 and \$250 or best offer. A. S. Giralda, WA 1-7212.

Mobile Home, 3 bedroom, henslee central heat and air conditioned. Ronnie Moulder, 912 Gary, Pasadena, GR 3-7552.

21' South coast sloop, 8 months old, cost \$3200 new, mint condition. Asking \$2500. Will accept trailer and centerboard in trade. R. Hymer, MI 9-0416.

35mm camera, Leica 3F with f/1.5, 50mm Summarit lens. Excellent condition, \$125: 8mm movie camera, Bolex zoom reflex P1. Pan Cinar 8mm to 40mm zoom lens. Trigger handle. Variable speed 12-64 fps, variable focus, fade in-out. Leather carrying case. Like new, \$275. E. J. Kenyon, 534-3454.

15 cu. ft. upright freezer and 12 cu. ft. refrigerator, good condition. W. G. Glover, 877-3384 after 4:30.

New white "Kalamazoo" (including reverberator) electric guitar and shoulder strap and 10-foot cord and carrying case and a matched "Kalamazoo" 15-watt portable amplifier/speaker combination includes, 2 phono jacks, 3-separate switches for volume, tremolo and tone control. \$200 value for \$150. Ben Reina, HU 8-1326.

Dynakit stereo amplifier SCA-35, 35 watt, factory wired. Half price \$70. Mint condition. Frank Blattner, 946-6623.

10' by 12' light avocado green nylon carpet, with rubber rug pad. Very good condition. Must sell, Ron Sickler, 591-2229 (Nassau Bay) after 5.

Argus 500-watt slide projector, 4" lens, no remote control, 8 slide trays included, excellent condition. Lee Moore, MI 5-8612.

Automatic dishwasher, portable, Kenmore stove, both like new. C. D. Haines, MI 3-7134.

Miniature silver male poodles 8 weeks old December 21. Will hold for Christmas present. Ideal for children. Puppy shots, wormed, tails clipped and dew claws removed. Price \$40 each. Jack Fuller, 946-0275.

Quartermare, 5 years old, good cowhorse, not for child, registered, \$350 or trade. Lenora Patterson, 487-3695.

Hound dog pups, 6 months old, blue tick \$25, red tick \$30, female. Lenora Patterson, 487-3695.

Christmas presents, only two left. Shetland Sheepdogs, "Shelties" AKC, Tri-color, champion blood lines, 6 weeks old, \$75. Patricia M. Day, 944-7446.

Trailmaster Honda 90cc, 1965, like new, 2300 miles, adult rider, red, buddy seat, mirrors, rack, helmet; make nice Christmas gift for hunter, camper, or school boy. \$250. Underhill, 946-8390 after 6.

Yellow Jacket Cruiserette Mark 55 Mercury motor, big wheel trailer, life jackets, anchor, skis. No rot, needs a little work. \$325. Underhill, 946-8390 after 6.

Two five-foot love seats, olive color, excellent condition, \$40 each. Two 9 by 12 gold carpets, tremendous value, \$90. Bar: 4 foot of leather, wood and chrome; two matching swivel stools, \$125. Golf cart and bag, \$40. L. Hartzog, 591-3933.

Interested in Viviane Woodward cosmetics? Flossie D. Leggett, 591-4591 after hours.

Chihuahua puppies 8 weeks old. AKC registered. Females only. \$35 each. Gwen Seate, 932-5593.

Limited to P & C Division personnel and their guests. Tickets to Fifth Annual Christmas Party to be held at EAFB Officer's Club —\$2.50 each.

WANTED

Boys 26-in. and girls 26-in. bicycles. Frank Blattner, 946-6623.

Would the party that removed the small toy robot from my desk in Rm. 2067, Bldg. 30, please return same. No questions asked. "Robbie Come Home." M. Jones, phone 591-3818.

Moved into empty house; want furniture, TV, Hi-Fi outfit or components, air conditioner, dryer, and a sailboat. If not working, will still be considered. 946-7193.

Stacks of Snacks



SMORGASBORD—Party snack trays or cold buffets can be bought from the MSC Cafeteria for holiday season parties. Snack trays include a variety of luncheon meats and cheeses, dips and chips. Cold buffets feature ham, roast beef, American and Swiss cheese, chicken slices, corned beef, potato salad, Spanish slaw, relish tray, bread and condiments. Snack trays may be ordered two days in advance and cold buffets one week in advance. Call cafeteria manager Robert Corley at 5905 for prices and placing of orders.

Golfers End '67 Play, Plan 12 Tournaments in '68

The final 1967 MSC Golf Association tournament was played November 11, and final standings in each flight were as follows: Championship flight—Max Engert 233, Dana Boatman 224; First Flight—Bob Kosinski 204, Norm Cooper 200; Second Flight—Lou Leopold 184, John Jones 182; Third Flight—Charles Levy 164, Jim Neal 158. Trophies will be awarded to first and second place in each flight.

The newly elected 1968 Association executive committee held its first meeting November 27. Officers are: President John E. Jones, Jr., Vice President Roy White, Tournament Chairman Bill Sweeney, Rules Chairman Sam Glorioso, and Trophies and Awards Chairman Dave Rosen. Appointed 1968 treasurer was Lorrann Remmich. The Association is seeking a volunteer handicap chairman for the coming year.

Among changes made in Association 1968 rules were requirements that all shots will be played "as they lie," and that all MSCGA competition will be from the long tees. Changes in handicap methods are under consideration also.

The 1968 MSCGA season begins in February and 12 tournaments are planned, nine of which will count toward trophies.

The other three tournaments will be a "scramble", a "Scotch Foursome," and a "four ball" tournament just for the fun of it instead of for trophy points.

As in 1967, there will also be a four-ball and an individual play league, both on a match-play basis.

The Association's membership drive begins this month and ends in January.

Lunarfins Have Busy Summer, Get Film Honors

During the summer, the MSC Lunarfins were active in their goal to discover the underwater world in the Gulf around the 30-mile rigs, Lake Canyon, and Travis Lake. Several members were lucky enough to scuba dive in the clear waters of the Caribbean.

Several club members had entries in the Texas Gulf Coast Council of Diving Clubs Underwater Film Festival held in Houston in November. Categories included slides, stills, and movies. Subject for a majority of the films was photographed from the Gulf to the Isla de Cozumel off the Yucatan Peninsula, the Bahamas, and the Florida Keys.

Danny Sebasta of the Lunarfins took first honors in the color stills with a series taken in the Caribbean with his Rolleimarin.

For the winter months, underwater hockey is being played at the Tropicana Swim Club on Telephone Road every Monday night.

The Lunarfins Skin and Scuba Diving Club will have its annual Christmas Party December 15 for members and their guests. Members are asked to make reservations as soon as possible. For further information and for reservations, contact Fred Toole at 2021, or Veit Hanssen at 6347.

NASA-ERC Develops Visual Speech Device

A NASA research effort to employ voice commands for spaceborne computers may be of value in developing a device for teaching deaf persons to speak more clearly.

The research was performed under contract to NASA's Electronics Research Center, Cambridge, Mass., by Dr. Huseyin Yilmaz, a program director at Arthur D. Little Inc., Cambridge.

Dr. Yilmaz built an electronic machine, based upon an analysis of human speech, that permits spoken word profiles to be visually displayed on a small oscilloscope.

Based on this project and similar studies, NASA scientists hope to categorize and encode speech patterns. The objective is to see if instruments can be developed which would permit, for example, an space pilot to maneuver his spacecraft with a voice command.

Dr. Yilmaz' associates experimented with his machine on a group of deaf and partially deaf children in Lexington and several deaf adults, all of whom had been receiving other types of speech training. The machine also was used to advantage in a class of retarded children and in the case of a high school youth who stuttered severely.

A totally deaf adult who had never been able to produce the sound of a broad "a" correctly was able to do so after only 10 minutes of practice with the machine.

Hess Delivers December 15 Science Lecture

Dr. Wilmot N. Hess, Director of Science and Applications will be the speaker at the monthly science lecture December 15.

This is the third in a series of lectures sponsored by the Science and Applications Directorate. Hess will speak at 3:30 pm in Building 1 auditorium on the subject "Origin of Radiation Belts."



Small engine lathe. Prefer standard brand. Small vertical or horizontal mill. Prefer size 0, 1. Drill press with or without milling attachment, bench grinder. HU 8-0149.

Wanted, pool table for Christmas. For use by young teens in garage playroom. Bob Gordon, HU 6-0704.

Line Forms to the Left



OPEN HOUSING—More than 1000 people attended the November 20-22 MSC Federal Credit Union open house at the CU's new quarters in the Bldg 11 cafeteria. Hostess Ann Isbell, right, observes visitors signing cards for door prize drawings. Winners of prizes were Pat Doyle, Anne Brenton, Johnny Yates, Dixie Wood, Harold H. Doiron, Elwyn H. Yeater and Leon Ballinger.

Webb Lauds MSC For '67 Cost Cuts

Dr. Robert R. Gilruth, Director
Manned Spacecraft Center
Houston, Texas 77058

Dear Bob:

Dr. Seamans and I are pleased with the results of the NASA Cost Reduction Program effort during Fiscal Year 1967. I know that the cost reduction accomplishments reflected in the Fiscal Year 1967 reports to the President would not have been possible without your sincere and vigorous support.

I am sure that you derived a considerable amount of personal satisfaction from the fact that the Manned Spacecraft Center achieved cost reductions of \$40,885,720 during Fiscal Year 1967. We cannot emphasize too strongly the importance of meeting established goals in this important effort. Please pass along to all of your personnel my thanks for their contributions to the Cost Reduction Program.

Our cost reduction efforts during Fiscal Year 1968 will be more important than ever before. The budgetary constraints which NASA faces in the next few years make it absolutely vital that we obtain maximum results with fewer dollars. Your continuing personal support of the Cost Reduction Program will contribute immeasurably in helping to ease the impact of reduced budgets on your operations. We will closely follow your efforts in the days ahead to support and improve the NASA Cost Reduction Program at Manned Spacecraft Center.

Sincerely yours,
James E. Webb
Administrator

Pioneer C Sun Probe Launch Window Opens

The United States will launch Pioneer C, third in the current series of Pioneer interplanetary spacecraft, into orbit around the Sun from Cape Kennedy, Fla., no earlier than December 13.

The probe will seek a clear definition of the tail of the Earth's magnetosphere, and monitor solar events as the Sun reaches the climax of its 11-year cycle in 1969. The spacecraft will be named Pioneer VIII on successful launch.

The window for the first planned launch opens at 8:08 am December 13 and closes at 8:43 am CST. The window opens slightly later the next two days and the open time decreases to about 20 minutes. Pioneer C

reports and data from Pioneers VI and VII will be important in predicting "solar weather" in Earth's protective magnetic envelope, the magnetosphere.

The two previous probes are now 144 million and 68 million miles, respectively, away from Earth and are still returning data which will be valuable during coming manned Apollo flights.

Spectacular advances in long-distance data retrieval by NASA's Deep Space Network and unexpected long-life performance of these spacecraft make these reports possible from widely separated points in the solar system.

Pioneer C will fly an "out" mission in the plane of the Earth's orbit, crossing the Earth-Sun line about two million miles outside Earth orbit. In this location it will measure the magnetosphere to determine its exact shape. The "wagging tip" of the tail of the magnetosphere was seen in September 1966, by Pioneer VII, 3.5 million miles outside Earth's orbit.

Five of seven experiments are major improvements over those on Pioneer VII. Two new types of experiments are an interplanetary dust detector and an instrument to study electric fields in space.

Dr. Bell Speaks At AIAA Meet, Shows LRL

Dr. Persa R. Bell, chief of the Lunar and Earth Sciences Division, will be the featured speaker at the December 11 meeting of the Apollo Section of the American Institute of Aeronautics and Astronautics. Bell will describe the newly-completed MSC Lunar Receiving Laboratory at the meeting and later conduct a tour of the facility.

The meeting begins at the Nassau Bay Hotel with a hosted social hour at 6 pm, dinner (\$3.25/person) at 6:45, Bell's talk at 7:30 and tour of the LRL at 8:15.

To make reservations, call Lea Dunaway at 591-2621 or HU 8-3117.

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Wally Schirra
NASA Astronaut

IN FLYING AIRPLANES I'VE BECOME
PRETTY FAMILIAR WITH THE PHRASE

THE POINT OF NO RETURN

IT MEANS THAT TIME IN YOUR FLIGHT
WHEN YOU CAN NO LONGER TURN BACK.

WHEN WE COMMIT OUR SPACECRAFT
WE EXPECT A FULL MISSION.
YET WHAT WE GET OUT OF APOLLO
DEPENDS UPON WHAT WE PUT INTO IT.

CARE, ATTENTION, INTEGRITY, AND PRIDE
ARE IMPLIED REQUIREMENTS NOT FOUND
ON BLUEPRINTS OR JOB SPECS.

APOLLO'S SUCCESS DEPENDS
UPON PEOPLE WHO CARE.

KEEP  THE SYMBOL OF EXCELLENCE
MANNED FLIGHT AWARENESS