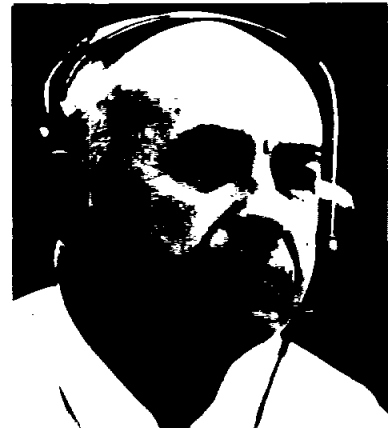


MOSCOW MEETING

## NASA / Soviet To Discuss Compatible Space Docking



DR. ROBERT R. GILRUTH



CALDWELL C. JOHNSON

Five NASA representatives, including three from the Manned Spacecraft Center, will meet with their Soviet counterparts in Moscow next Monday and Tuesday for preliminary technical discussions on possible space docking arrangements between United States and Russian spacecraft.

Dr. Robert R. Gilruth, Director of MSC; Caldwell C. Johnson, chief, Spacecraft Design Office; and Glynn S. Lunney, chief, Flight Directors, Office, will represent the Center in the Moscow talks.

The discussions are an outgrowth of correspondence ex-

changed during the past year between the heads of NASA and the Academy of Sciences of the USSR on ways to develop United States-Soviet space cooperation.

NASA administrator, formally proposed joint consideration of

Dr. Thomas O. Paine, former compatible docking arrangements in a letter July 31 to President M. V. Keldysh of the Soviet Academy. Keldysh replied September 11 proposing the meeting in Moscow and inviting NASA to select dates. On September 25, Dr. George M. Low, acting NASA administrator, accepted Moscow as the site for the talks and suggested the meeting be held October 26-27. Academician Keldysh has confirmed that these dates are acceptable.

Also attending from NASA will be Arnold W. Frutkin, assistant administrator for International Affairs, NASA Headquarters, and George B. Hardy, chief, Program Engineering and Integration Project, Marshall Space Flight Center.



GLYNN S. LUNNEY

APOLLO 14—

## Flight Controllers Begin Simulations

The date was October 15, 1970 . . . F minus 108 days and counting down for a January 31, 1971 launch for Apollo 14.

October 15 was the beginning of simulations in Mission Control Center for the Apollo flight that will land Al Shepard and Ed Mitchell in the mountainous section of the moon called Fra Mauro. The landing is scheduled

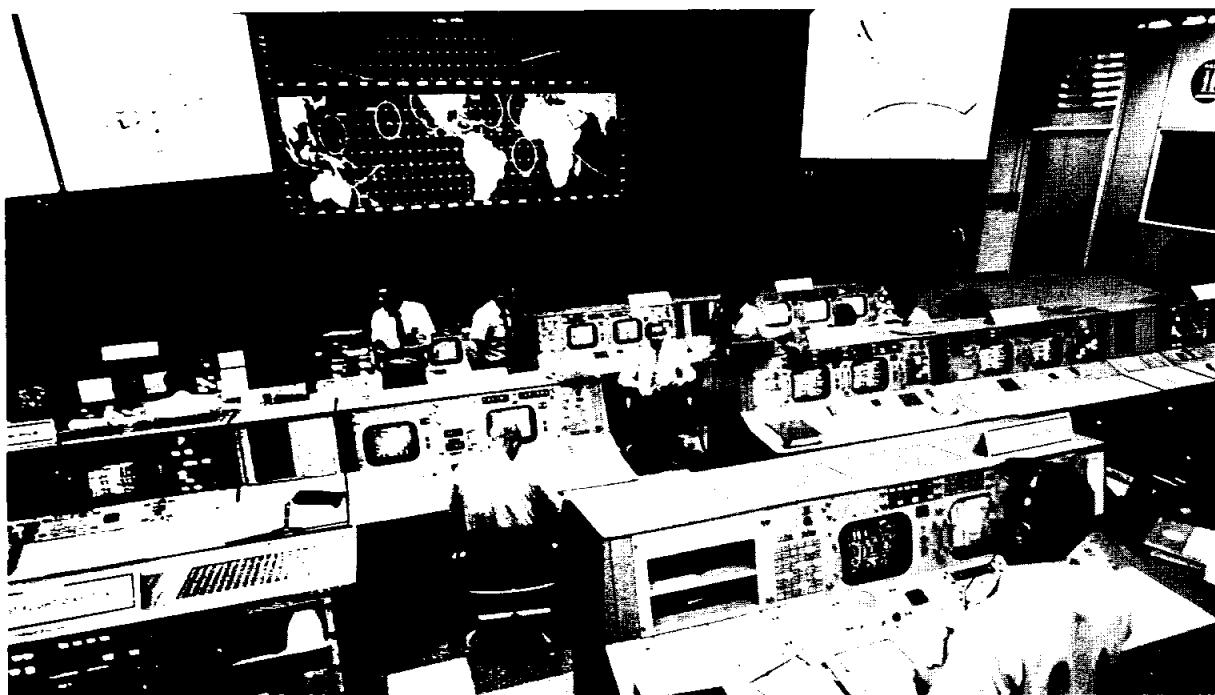
to take place early on the morning of February 5, 1971 when most Americans would normally be asleep, and while Stu Roosa maintains his lonely vigil in lunar orbit.

To make certain there are no hitches in controlling the mission, the flight controllers will rehearse, rehearse and rehearse again the mission events. The simulations

will sometimes utilize a math model of the mission from the computer, but most of the time will be with Apollo crewmen in their simulators in Houston and at Kennedy Space Center in Florida.

Simulations for Apollo 14 are getting underway a little earlier than normal in order to make it

(Continued on page 4)



FIDO/BSE SIM—The flight dynamic officers (FIDO's) and booster system engineers (BSE) headed up by Apollo 14 lead Flight Director M. P. "Pete" Frank, conduct the first simulation for the mission this past week. Full team flight controller sims began this week.

## Two Fire Prevention Contestants Win Trips to Apollo 14 Launch

The Fire Prevention Week Suggestion Contest winners were announced this week with first place ending in a tie. Bernard A. Marlow Jr., and Hannah L. Thornton each will receive a trip to Kennedy Space Center to observe the launch of Apollo 14.

Judges for the contest were Gen. Frank A. Bogart, Donald K. Slayton and M. L. Raines.

Nine runner-ups each will receive a ten-pound dry chemical fire extinguisher. All other entrants will receive recognition for participating in the contest. A total of 218 entries were judged in the contest.

The nine runner-ups were: John D. Piwonka, Donald R. Garen, Bruce G. Casserly, Harold Spurlin,

Abelino B. Sanchez, Dale A. Nussman, Paul M. Sturtevant, Thomas D. Barry, and Isabelle H. Jacobs.

Manned Spacecraft Center safety officials said suggestions received were informative and imaginative and that during the coming year they will be evaluated for incorporation in the MSC fire prevention program.

Marlow's suggestion was to maintain a positive air pressure in stairwells of buildings to inhibit accumulation of smoke in case of fire and to have a separate ventilating system for the stairwells.

Thornton's suggestion was to put luminescent material on steps in stairwells that would glow in case of a total electrical power failure.

## MSC To Build Dock, Waterway To Handle Skylab Test Articles

The NASA Manned Spacecraft Center announced Tuesday plans for construction of a barge dock and waterway in Clear Lake adjacent to MSC to handle shipments of large Skylab test articles.

It is expected contracts will be awarded and construction begun early in November on the project, which will cost between \$100,000, and \$130,000.

A contract will be awarded by MSC for construction of a barge dock adjacent to NASA Road 1 at the east side of the MSC site. A separate contract will be awarded through the Corps of Engineers for dredging of a waterway 7 feet deep, 60 feet wide and about 3,000 feet long, from the proposed dock to the existing Federal waterway in Clear Lake.

The project is to provide a docking facility and waterway for the S-IVB barge and Skylab test articles being shipped to MSC for testing from NASA's Marshall Space Flight Center, Huntsville, Ala.

The first test article—a 22-foot-diameter, 36-ton Orbital Workshop Dynamic Test Article—is scheduled for delivery to MSC in mid-December for acoustic and vibration testing the first quarter of next year. A second article—an Orbital Workshop one-G trainer weighing 50 tons—is scheduled for delivery the first of April, 1971. Other Skylab test articles, including the Apollo Telescope Mount, the Airlock Module and the Multiple Docking Adapter will also be shipped between MSC and MSFC via barge during 1971.

NASA selected an over-water transportation route for the large, heavy Skylab hardware after a survey showed this to be the most practical means of shipment.

Combined water and overland routes were also considered but were found to be imprac-

tical because of the high cost and the need to move large numbers of overhead electric, telephone and traffic light cables along the overland portion of the route.

The barge dock will be constructed of steel and concrete and will be 60 feet long. A 30-foot concrete apron will be constructed between the dock and NASA Road 1 to permit hauling test articles from the dock, across the road and through the MSC east gate on a tractor-trailer rig.

Spoil material dredged from the channel in Clear Lake will be pumped through a pipeline, under NASA Road 1 into a relatively low 22-acre area of the MSC site north of Building 222.

## Soviet Cosmonauts Arrive In Houston, Tour MSC Today

Soviet Cosmonauts Andriyan Nicolayev and Vitaley Sevastianov, who spent 18-days in earth-orbital flight in Soyuz 9 last June, were scheduled to have visited Houston and the Manned Spacecraft Center this week.

They were scheduled to have arrived at Ellington AFB from Marshall Space Flight Center, Wednesday afternoon, followed by visits to astronauts' homes. Thursday they were to have attended the AIAA conference at Astroworld Convention Hall in the morning and meet with Houston Mayor Louie Welch in the afternoon, followed by a tour of Houston and attend the AIAA banquet.

Today a briefing and tour of the Manned Spacecraft Center is planned for the cosmonauts. A private dinner party is scheduled this evening. The cosmonauts and party are scheduled to depart Houston for Los Angeles Saturday morning.

# FSD Completes MCC Internal Validation for Apollo 14



**VALIDATION SUPPORT**—Flight Support Division engineers are shown as they were validating command, telemetry and tracking data this past week in the Instrumentation Support Team area, during the MSC internal validation.



**MONITORING**—FSD engineers monitor in the Data Control Area of CCATS (communications, command and telemetry systems) to verify the computer is receiving, processing and routing data properly during MCC internal validation last week.



**COMPUTER CONTROL**—FSD RTCC (Real Time Computer Complex) control area engineers during internal validation testing monitor data processing and routing of data to proper destinations in Mission Control Center.

An audible alarm to alert flight controllers of potentially hazardous conditions onboard the Apollo spacecraft, has been added in Mission Control Center to augment the caution and warning system used on past flights.

The critical limit/event alarm system was implemented by the Flight Support Division of the NASA Manned Spacecraft Center as part of the preparations for the MCC internal validation to ready the control center for the upcoming Apollo 14 simulations and mission.

Augmentation of the dual limit sense/alarm requirement was based on the Apollo 13 Review Board recommendations and was developed as a part of the Real Time Computer Complex (RTCC). Flight controller requirements for the system were supplied by the Flight Control Division.

Eleven consoles in Mission Control are equipped with a varying number of visual and audible alarms to warn when a given parameter exceeds a preset value. Four of the consoles are in the Mission Operations Control Room and the remainder are located in the staff support rooms located around the main control room.

The eleven consoles are all systems engineering consoles and include the following flight control functions concerned with the command and service module (CSM) and the lunar module (LM): CSM environmental/electrical communications engineer (EECOM); CSM guidance/navigation/control systems engineer (GNC); LM environmental/electrical systems engineer (CONTROL).

Software and hardware for the critical alarm system were tested this week during the MCC internal validation to certify that the control center is all up and ready to support simulations for Apollo 14.

When a parameter monitored by one of the above groups of flight controllers indicates an alarm (out-of-limits or event) an audible alarm will sound and a red indicator on the console will light.

The audible alarm is an 800-cycle-per-second tone interrupted six times per second emitting a bleeping sound which transmits a sense of urgency. All critical lights for this system are grouped on the consoles to avoid possible confusion with other warning lights.

The above tone was selected because it does not interfere with the normal voice transmissions. Once an event has exceeded limits, the alarm sounds for a preset period and then turns off, but the warning light remains on until the event is back within limits.

Reconfiguration of MCC for Apollo 14 started in May of this year in accordance with mission requirements. This required implementing all events, analogs, digital television, and communication requirements that are unique or different for Apollo 14.

Work on the Dual Limit/Sense/Alarm System was begun the latter part of July. The internal MCC validation after weeks of individual system testing was completed October 13 by the Flight Support Division.

MCC internal validation testing includes integrating the RTCC, CCATS (communications, command and telemetry system), display systems, and the Apollo simulators at Kennedy Space Center in Florida. The Apollo simulators in Houston were tied-in and validated earlier to facilitate flight controller proficiency sims which began early in September.

Other tests to be conducted prior to the mission include interface with the Apollo Launch Data System (ALDS) which is the telemetry system at KSC. This test was completed this week.

The MCC/Launch Pad interface test with the Goddard Space Flight Center MILA Unified S-Band (USB) station is scheduled early in December, this will be followed by the launch vehicle redundancy tests and the flight readiness test (FRT).

Two days of testing in the middle of January of next year will be required for the MCC/Network Validation. This testing will be completed three days prior to the CDDT (Countdown demonstration tests) at KSC. These tests will consist of running communications, command telemetry, air/ground, and tracking tests with each station on the MSFN (Manned Space Flight Network.) When this is completed the entire data system will be ready to support the Apollo 14 mission.

## Apollo 14 Crew Train In Gulf

Water egress training for the Apollo 14 crew is scheduled tomorrow in the Gulf about five miles off Galveston Island.

Al Shepard, commander, Stu Roosa, command module pilot, and Ed Mitchell, lunar module pilot will go through an exercise similar to what will take place on the actual recovery in the Pacific some 765 n. miles south of Pago Pago, next February.

The Landing and Recovery Division will conduct the Gulf exercises from the deck of the NASA Motor Vessel Retriever.

A U.S. Coast Guard helicopter will pickup the crew from their raft alongside the Apollo spacecraft and return them to Ellington AFB to complete the exercise.



**OUCH**—See it doesn't really hurt, anyway not much, I think? Flu is no respecter of persons, so take a lesson from Mildred Meade of PAO and get the flu immunization shot being offered to all on-site employees of MSC. Evelyn West, RN, Kelsey-Seybold chief nurse, administers the shot in the MSC Dispensary, Building 8.

# Flu Shots Available to All On Site

Influenza immunizations are available to all NASA Manned Spacecraft Center federal and contractor on-site employees.

Annual immunization is especially urged for individuals with chronic heart or respiratory diseases and employees over 45 years of age, according to Dr. Duane Catterson, Medical Research and Operations Directorate.

Persons who did not get immunizations last year should take the first injection now and a second in 60 days. Those who had the immunization last year should get a booster the first part of November.

Influenza inoculations are available on a drop-in basis Monday through Friday from 10-11:30 a.m. and 3-4:30 p.m., at

the MSC Dispensary in Building 8. Inoculations are also being given at the Ellington Air Force Base MSC Satellite Dispensary in Building 339, from 8 a.m. to 4:30 p.m. daily.

As a precaution, individuals allergic to eggs or egg products must not take these immunizations. Those who are pregnant should get immunizations from their personal physician.



**BLOOD DRIVE SUCCESSFUL**—The October 15 MSC Blood Drive for use by the Brooke Army Medical Center here and abroad, collected a total of 272 pints of blood. Above, some of the 232 donors that gave blood in Building 7-A are shown. An additional 40 donors gave blood at the Ellington AFB Bloodmobile location.

**Take stock in America**  
Buy U.S. Savings Bonds

## Roundup Swap-Shop

(Deadline for Swap-Shop classified ad is Thursday of the week preceding Roundup publication date. Ads are limited to MSC civil service employees and assigned military personnel. Maximum length is 15 words, including name, office code and home telephone number. Send ads in writing to Roundup Editor, AP3)

**AUTOS**

- 65 Mercury comet, 4-dr sedan, radio, heater, air, good cdt, Pete, 733-2245 after 5 pm.
- 66 GMC ¾ ton, 4 speed, V-6 and 8' camper w/stove, sink and water tank. Sell together or separately, best offer. Campagna, 591-2974.
- 68 Chevy pickup, Fleetside, LWB, air, custom cab, deluxe camper cover, xln cdt, 19,000 mi. \$1900. Dobson, 471-4191.
- 69 Galaxie 500, 4-dr sedan, loaded, low mileage, like new, must sell, \$2,395. Roach, 645-7932 after six pm.
- 63 Plymouth Station Wagon, good cdt. Jones, 667-7402 or 665-8113.
- 68 Dodge Dart, 2-dr hardtop, V-8, auto, air, vinyl top, glassbelt, wide ovals, NADA wholesale \$1550. Call 424-8041 Baytown.
- 65 Buick Electra 225, all power, air, xln cdt, \$1395. Berleth, 626-2329.
- 59 Biscayne 4-dr Chevrolet, w/air, power, other extras, good buy, Kennedy, 862-5168.
- 62 Chrysler 300, 2-dr hardtop, all power, clean. George, 862-5168.
- 63 Corvair convertible, heat, air, radio, runs good \$275. Cooper, 944-2680.
- 63 VW 1200 Sedan, one owner, xln cdt, \$595. Turner, 482-1328.
- 69 VW, 11,000 mi., xln cdt, under warranty. Gearhart, 488-6016.
- 63 MGB, white w/red top, exln cdt, \$700. Hughes, 534-5030 Dickinson.
- 65 Ford Custom, deluxe interior, loaded, immaculate, \$1000. Burdick, 944-6518.
- Volkswagen wheels, 2 each w/tires and hub caps, all for \$25. Thompson, 471-2646.
- Nylon tubeless 4-ply tires, 8x45x15, four each, 10,000 mi. of wear, plenty tread, \$4.00 each. Plauche, 474-2660.
- 66 Chrysler, 4-dr vinyl hardtop w/pwr & air, 327 w/auto shift, \$695. Downs, 488-6045 after 5 pm.
- 65 Olds, loaded, AM-FM radio, immaculate, blue book \$1095, sell for \$825. Pierce, 591-2807

- 65 Dodge 880, \$900. or 67 Dodge Coronet, special order, all heavy equipment, \$1400. Both in good condition. Wilmeth, 925-2793, Alta Loma.

**PETS**

- AKC miniature Schanuzer pups, 7 weeks old, puppy shots, wormed. Hoskins, 774-3587.
- Afghan hound puppies, AKC, exln bloodlines. Jacobs, 474-3135.
- Three Halloween (black) kittens, FREE. Scott, 591-2175.

**REAL ESTATE**

- Mobile home, 14' x 68', central A&H, carpet, furnished, priced right. White, 966-2196.
- All-brick Old English home, 2 spacious bedrooms, one luxurious Roman bath, log burning fireplace, Clear Lake City. Call 488-3751.
- For rent, 1 bdrm furnished apt. Bayfront, carpeted, prefer single adult, bills paid, \$110/mo. Hill, 471-4305.
- For rent, furnished efficiency apt, carport, private yard, Bay View, 1-2 adults only, \$100/mo. Hill, 471-4305.
- Large wooded lot, 80' x 200', Dickinson, all utilities, \$4500 firm, Plauche, 474-2660.
- Mobile Home, Skyline, 12x50', 2-bdrm, mahogany panelled, low equity and payments. Kennedy, 862-5168 or 944-0224.
- Beach cottage, 2-BR, furnished, fireplace, private dock, Clear Lake Glen Cove, for rent. Call Stoker, 877-2978.
- Nassau Bay, contemporary, wooded corner, 4-2½-4, good price and loan. Hughes, 591-2287.

**MISCELLANEOUS**

- Boat, 10-ft aluminum flat bottom, Ouachita, xln cdt, \$35. Johnston, 877-4895.
- Reel type power mower, xln cdt, \$25.
- Sauna bath heater, complete w/controls, new. Freezer, 20 ft, upright, xln operating cdt. Campagna, 591-2974.
- Dining room suite, complete w/table (3 extra leaves) 6 chairs, buffet, and china cabinet, \$695. Call 649-2569.
- Bicycle, 10" sidewalk, and training wheels \$7.50. Tricycle, 15" \$5.00. Rosenbaum, 474-4386.
- Guitar, 6-string beginners, cover, strap, instruction book, like new, \$25. Smylie, 877-2606.
- Bowling shoes, Brunswick, Ladies size 8, perfect cdt, \$4.00. Five-drawer chest, Child Craft, light maple, very nice, Two butterfly chairs for patio. Labklotz, 488-1514.
- Pair ornate gold leafed mirrors, like new, 31"x22", \$40. for both. Oval wool hooked rug, 15'x20', \$35. Call 649-2569.
- 3-cushion sofa, like new, \$80. Adams, 534-3243, Dickinson.
- Kroehler Sofa, 2 matching chairs \$75. Formica table, 4 chairs \$50. Blonde step and cocktail tables \$10. Regenburgh, 932-6646.
- Membership in Clear Lake Country Club \$100 plus transfer fee. Spiker, 488-1117.
- Formica desk with chair \$40. Selig chair \$15. Titano "Tiger" Accordion, almost new \$250. Walnut/leather contemporary chair w/ottoman, cost \$250 sell for \$100. Cooper, 944-2680.
- Lionel electric train, engine w/5 cars, transformer, 23 pieces of track, xln cdt, \$20. Puffer, 534-5648, Dickinson.
- Remington Model 742, auto 30-06 w-pwr Leopold scope w/Redfield mounts, detachable swivels & sling, xln cdt, \$150. Black gelding Shetland pony w/new child's bridle and saddle \$75. Smith, GR 9-3848 after 5:30 pm.
- Blond, modern bedroom suite, bdl bd w/bookcase hdbd, dbl dresser w/large mirror, \$40. Kavanaugh, 534-4854.
- Classical guitar \$65, call Steve Gorman, 521-9805.
- Clarinet, Bundy, w/case, mint cdt, cost \$185, sell for \$110. Sponhul, 488-2327.

- Deer Rifle, 300 savage, lever action, 4-pwr weaver scope sling, case, like new, \$135. Haines, 926-4333.
- Sears dishwasher \$155, Dryer \$125, Refrigerator \$195, Washer \$50. Downs, 488-6045.
- Nimrod tent camper w/attachable screen porch, sleeps four, no inside kitchen facilities, \$263. Downs, 488-6045.
- Dickinson Country Club membership \$300. Hughes, 534-5030.
- Kanmore portable dishwasher, \$60. Hicks, 487-0191.

**WANTED**

- Hobby type paint sprayer. Messenger, 471-1079.
- Need ride to MSC from Southwest Houston, Sharpstown area, 8-4:30 shift. George, 774-5949 after 5:30 pm.
- 28 watt Heathkit stereo amplifier, model AA111. Glenn, 932-4050.
- Aluminum fishing boat that can be transported on car top, Rosenbaum, 474-4386.
- Hi-Fi Tuner, must be in A-1 condition, prefer AM only. Musgrove, 488-3966.
- Ride on 8-4:30 shift, from So. Shaver (Briarcliff Apts), share expenses or pay extra. Baker, 944-2549.

## Lunarfins to Begin New Scuba Class

A new training class in skin and scuba diving is being formed by the MSC Lunarfins Club with the enrollment limited to the first 20 persons to apply.

The course will consist of 16 hours of lectures and about 19 hours of practical swimming pool exercises to give the student confidence in himself and his equipment. Upon completion of the course, the student will be certified for ocean diving.

Total cost of the course is \$29 and includes: pool fees, instruction manual, certification diploma, card and patch, year membership in NASA Lunarfins, use of club equipment during training, reduced boat charter rates and equipment rental, reduced rates thru club on equipment purchases.

In addition, for adults only, weekly activities such as water safety instruction, underwater hockey, and open swimming is available.

For additional information contact Bill Moran, EXT. 2041 or Eric Magunsson, EXT. 3433



**SUPER BRANCH AWARD**—Flight control division circulates awards within the division for outstanding achievements by branches. The current recipients of the awards were for the United Fund Drive. Richard Hoover and Robert Meyers (L. to R.) Mission Simulations and Requirements accepted the first place Super Branch Award for 100% participation and 143% of dollar goal for the UF. Charles Harlan of Flight Control Operations accepted the second place award for 100% participation and 129% of dollar goal in the UF drive. Eugene Kranz, chief Flight Control Division presented the awards.



**FIRE RISK TOUR**—During Fire Prevention Week, a fire risk management tour of MSC Building 228 was taken by safety personnel. The building toured, houses the MQF (Mobile Quarantine Facility), and is one of the MSC facilities where maximum precautions are taken against fire. On the tour are (l. to r.) Richard Holzappel, J. E. Powell, M. L. Raines manager of Safety Office, Jack French, Ed Ashley, Robert Chilton, and M. A. McWilliams, MSC Fire Chief.

## MSC Golf Assoc. Holds Tournament

The MSC Golf Association held a tournament at Hermann Park October 17 and Max Engert had the low gross score for the day with a 77. John Jones and Bill Shropshire tied for low net in the championship flight with 67's. Dave Dyer was third with 69, and Jean Peterson and Norm Cooper split fourth place with 70's.

Pete Smetek won the first flight with a 65. Jim Smith was second with 66; Tom Cassias third, 70; and Daryl Chilcutt, fourth, 72. Dave Harris won the second flight with a 64 and Jim Neal was second with 66. Sam Sandborn, Bob Lacy, and Walter Meek tied for third with 71's.

The Roundup is an official publication of the National Aeronautics and Space Administration Manned Spacecraft Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for MSC employees.

## Simulations

(Continued From Page 1)

possible for the flight controllers and support personnel to take a break for the Christmas holidays.

The first simulation on October 15 was conducted by M. P. "Pete" Frank, the lead flight director for Apollo 14. The flight control team led off with a FIDO/BSE simulation. Flight dynamics officers (FIDO) and booster system engineers (BSE) were faced with a series of launches and

translunar injection exercises utilizing a mission math model supplied by the computers.

The other two flight directors for the mission, Gerald Griffin and Milton Windler and their teams of flight controllers get into the act in the weeks that follow with at least four 8 to 10-hour simulation sessions scheduled each week.

During the early simulations the Apollo 15 crewmen will substitute for the usual math model type simulations and get in a little advance training in the Hous-

ton simulators. Dave Scott's crew is scheduled to take part in five simulations the first three weeks of MCC simulations.

Simulations the first three weeks with the command module and lunar module trainers at Houston and KSC include LM activation and descent, launch, LM ascent, LM decent, lunar orbit insertion/descent orbit insertion, translunar insertion and translunar coast. The first sim with Shepard's crew in the KSC simulators was scheduled for October 22.

Other simulation sessions scheduled later will include lunar surface exercises by the crew, extravehicular (EVA) sims at Flagstaff, Arizona, reentry, lunar orbit insertion aborts, transearth insertion, lunar photo sims, and some sims open for crew option in selection of the subject.

The flight controller teams will also take part in the countdown demonstration tests scheduled for late January or about 10 days before the terminal count is started for the January 31 launch.

assist the arriving shuttle.

Assuming a single shuttle launch per month in support of the station it is estimated that one year and five months will pass before the Module Station is completely operable.

However, the facility is capable of supporting reduced complements of personnel seven months after first launch.

The build-up sequence is as follows:

Launch No. 1: Airlock and Manipulator Element. The elements contain reaction control units, propellant, electrical power, communications, and an environmental control life support system.

Launch No. 2: the Central Assembly Element will be docked to the AE/ME combination. Activation will be accomplished by EVA.

Launch No. 3: the electric Power Boom is the next element scheduled for activation.

Launch No. 4: the first BSE is next up for activation. This element contains crew staterooms and additional life support equipment.

Launches 5 and 6: additional BSE's containing staterooms.

Launch No. 7: BSE containing the galley and wardroom. With this module, the station can accommodate up to six personnel.

Launches 8 through 17 will include experiment modules, additional crew facilities and storage for supplies.

Weight of a fully operational station is approximately 250,000 pounds. It will fly a circular orbit approximately 275 miles above Earth inclined 55 degrees to the equator.

Inhouse study results have been delivered to North American Rockwell; Space Division; Seal Beach, California with instructions to make additional analysis and report to MSC Jan. 31, 1971.



SIM CONTROL—Simulation Control engineers in a room overlooking the Mission Operations Control Room monitor the activity during the first simulation by flight controllers for the Apollo 14 mission. They also determine when and what faults will be inserted in the simulation.

## MSC STUDY SHOWS—

### Shuttle Could Orbit, Assemble Economical 12-Man Space Station

A innovative study detailing how an economical space station might be assembled using the shuttle vehicle as the chief method of transportation recently was concluded at the NASA Manned Spacecraft Center.

Called a Modular Space Station, the Earth orbiting facility could accommodate up to 12 scientific personnel and crewmen.

The inhouse study was conducted by MSC personnel assigned to the Engineering and Development Directorate. Work was performed by the Advanced Earth Orbital Missions Office under Ralph D. Hodge.

Clark Covington was project engineer.

Supporting him were James C. Jones, Spacecraft Design Office, engineering in charge of preliminary design; Don Blevins and Jerome Grayson, power systems; James Jaax and Dowsie W. (Bill) Morris Jr., Crew Systems Division; Philip C. Glynn and Fred Stebbins, structures; Marion L. Pringle, Information Systems Division and Robert Kosinski, Space Electronics Systems Division.

The study calls for a station consisting of multiples of five basic modules; called elements. These are: (1) the Airlock Ele-

ment (AE), (2) the Manipulator Element (ME), (3) Central Assembly Element (CAE), (4) an Electric Power Boom, and (5) a Basic Structural Element.

Standardized BSE modules make up the main part of the station. These assemblies, each similar to the other, are designed to provide maximum station flexibility. They can be used as a control center, crew staterooms, medical laboratories, life support modules, and experiment modules.

The basic cannister is approximately 14 feet in diameter and 29 feet long. BSE is toroidal in nature, with docking ports at each end. Floors run perpendicular to the diameter of the cannister. Depending upon the type of equipment installed, BSE's might weigh from 11,400 to 16,500 pounds—well within the launch capacity of the shuttle.

Integral to station buildup are the Airlocks, the Manipulator and Central Assembly Elements. ME has four arms: two are called long-reach arms, and the others are called small-reach arms. Primary function of the station-attached ME is to aid in removing the payload to the modular station.

The ME also might be used as a mechanical docking device to as-



MSC ARTIST—Raymond J. Bruneau, MSC artist puts the finishing touches to a drawing of an economical space station that could be made operational using a shuttle as the chief means of transportation. Bruneau has been employed, at the Center for nearly nine years, and during that period he has applied his artistic skill to numerous eye-catching concepts for Gemini, Apollo, Skylab and future programs.

## MSC Picnic Plaudits

The MSC annual picnic "Oktoberfest at Camp Manison October 10 was hailed as the best one to date with over 7,000 people in attendance.

The hungry and thirsty crowd consumed two tons of beef, 1,280 pounds of sausage, 1,500 pounds of potato salad, 300 gallons of beans, 250 pounds of onions, 17 gallons of pickles, 120 bushels of popcorn, 300 gallons of soda pop syrup, 600 loaves of bread, and barrels and barrels of beer.

Credit goes to many people who helped organize and work to make the picnic such a success. To name a few: Gordon Hughton, chairman; Susan Cardenas, co-chairman; Marilyn Bockting, secretary; Ron Hayes, legal advice;

Dave Bell, tickets; Carol Schrader and Betty Cornett, entertainment; Mary Yarbrough, publicity; ITT personnel and Pat Hughton for publicity artwork; and Geraldine Taylor, Eddie Todd, Carol Robb and Harlan Starns each selling over 300 tickets to the picnic. Many more deserve credit but the names are too numerous to mention. The committee heads express their thanks to all who assisted.

No injuries were reported at the picnic but somehow Cliff Charlesworth came away with a couple of sprained ankles from participating in a ball game.

The treasure hunt for the kiddies and the Burgundy Street Band with rock and roll music were both big successes.

The "dunk tank" operated for only two hours because of the chilly weather but nevertheless earned \$78.90 for the Harris County Boys Home.

Participants in taking their turn for a dunking in the cold water were: Charlotte Ober, Jamye Flowers, Ed Mitchell, Bob Overmeyer, Joe Engle, Rusty Schweickart, Paul Weitz, Gene Cernan, Joe Allen, June Roach, Connie Lenczewski, Carol Robb, Joanne Sanchez, Jeannie Hulo, and Mary Yarbrough. (Gail Gannon chickened out). Ron Kubicki and Jack Schmitt were the hawkers for the event.

Expenses for the picnic not covered by the ticket sales were subsidized by the NASA MSC Exchange Council from profits made by the vending machines around the Center.

## MSC Basketball Organizing Teams

An MSC Basketball League organizational meeting will be held at 5 p.m., Monday, November 2, in Rm. 320 A, Building 2. All team representatives are requested to attend for a discussion of league structure and playing nights.

Active military personnel are eligible to participate. For additional information contact Dennis Doherty, vice president, EAA Athletics, at EXT. 2964.

## IEEE Meet U of H Speaker, Film On Erectable Antenna

The Aerospace and Electronic Systems group of the IEEE (Institute for Electronic and Electrical Engineers) Houston chapter will highlight their next meeting with a speaker and demonstration of a "Space Erectable Antenna".

The meeting will be at 7 p.m., October 29 at the University of Houston in the third floor faculty lounge of the Cullen Engineering Building.

John Fager, manager of the Advanced Space Communication Systems Group, General Dynamics, San Diego, Calif., will be the speaker.

A discussion of large space erectable antenna systems which utilize frequencies up to 30 GHz will be presented. Items to be covered include operational parameters (gain, beamwidth, etc.) and antenna structures built of new materials (such as graphite composites.) A short movie and a model demonstrating antenna deployment will be shown and discussed.

Coffee and doughnuts will be served. Guests are welcome. For additional details call John Gorman at EXT. 5104.