

# Investigators Pin Down LLRV Accident Cause

Loss of attitude control has been pinpointed by two NASA investigating boards as the cause of the May 6 accident at Ellington AFB in which Neil Armstrong successfully ejected from Lunar Landing Research Vehicle No. 1. The LLRV was destroyed by fire and impact after Armstrong ejected.

The two investigating boards, one looking into the causes of the accident and the other into possible effects of the accident upon the lunar landing program, last week published their findings.

The accident board appointed by MSC Director Robert R. Gilruth found that the pilot was forced to escape a few seconds after the loss of helium pressure in the LLRV propellant tanks caused premature shutdown of the attitude control rocket system. The second board reviewing Apollo program impact potentials uncovered no bad effects on the lunar landing project, particularly the Lunar Mod-

ule for which the LLRV and the Lunar Landing Training Vehicle (LLTV) serve as earthbound training devices for lunar landing crews.

The Review Board agreed with the Accident Board in calling for certain design improvements and operating practices in the LLRV, and urged more stringent control over such flying programs and greater attention to all of NASA's lunar landing simulators.

The accident at Ellington AFB took place shortly after Armstrong began flying the LLRV in a simulated lunar landing.

The mishap occurred when the vehicle reached a hovering position about 30 feet above ground. Due to a loss of thrust from the lift rockets, the LLRV started to descend, but when the pilot shifted controls back to normal Earth flight operations, it began climbing. Then, apparently because the pilot was warned too late of running low on propellant for his attitude control rockets, he lost control of the vehicle. The pilot immediately ejected, when the craft was about 200 feet above ground and beginning to nose up and roll over.

A large quantity of data on operation of the vehicle, collected by telemetry, furnished complete information on the LLRV's complicated control system and components. It showed that the helium was inadvertently depleted earlier than normal.

Both boards noted that the source of trouble was the loss of helium pressure through the hydrogen peroxide tanks and the lift rocket system. This pressure forces the peroxide propellant from the tanks to the lift rockets and the small thrusters operated by the pilot to control attitude.

Among contributing causes, the MSC board concluded that the sensing system in one propellant tank failed to warn the pilot of a low level of propellant, so that he could revert

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# King-Size Angry Alligator



FELLOW TRAVELER—Apollo VII station keeps with its S-IVB second stage booster as the two vehicles cross over Cape Kennedy at 3 hours 16 minutes after liftoff. Apollo VII made the transportation maneuver after separation from the S-IVB stage to simulate docking with the lunar module in later missions. A circular plate attached to a crossbeam in the spacecraft/LM adapter represented the LM rendezvous hatch. The Florida coastline from Flagler Beach southward to Vero Beach can be seen in this photo shot at an altitude of 125 nautical miles.

# Three Elected AIAA Fellows

Apollo Spacecraft Program manager George M. Low, MSC Director of Engineering and Development Maxime A. Faget and astronaut Edwin M. Aldrin Wednesday were elected fellows of the American Institute of Aeronautics and Astronautics.

The three were among 29 AIAA fellows elected for 1968 who were honored Wednesday at the Honors and Awards Banquet and President's Reception during the AIAA Fifth Annual Meeting and Technical Display at the Philadelphia Civic Center.

Fellows are elected by the aerospace professional society for being "persons of distinction in aeronautics and astronautics who have made a valuable contribution to the field."

Papers presented during the October 21-24 AIAA annual meeting included six by MSC managers. The papers and authors were: "Apollo Mission Profiles and Software," by Director of Flight Operations Christopher C. Kraft, Jr. and deputy Sigurd Sjoberg; "Crew Functions and Training," by Director of Flight Crew Operations Donald K. Slayton; "Lunar Exploration Planning," by Director of Science and Applications Dr. Wilmot N. Hess; "Maintenance of Future Spacecraft in Orbit," by Apollo C&SM Project Engineering Division chief Rolf W. Lanzkron jointly with B. Rachlin of General Electric.

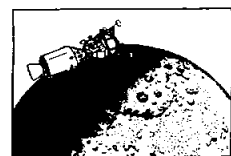
Also, "Entry Vehicles for Space Programs," by SMD Thermal Technology Branch chief David A. Greenshields jointly with J. D. Stewart of General Electric; "On the Possibility of Measuring the Gravitational Red Shift Using a Synchronous Satellite, a Laser, and a Fabry-Perot Interferometer," by Gary A. Ransford of MPAD Mathematical Physics Branch jointly with John W. Rhee of Rose Polytechnic Institute.

Hess also chaired the "Science in Earth Orbit" technical session yesterday afternoon.

# ROUNDUP

NASA MANNED SPACECRAFT CENTER

HOUSTON, TEXAS



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'MAGNIFICENT FLYING MACHINE'—

# Apollo VII Shakedown Meets '101' Percent of Mission Goals

Apollo VII Tuesday splashed down some eight miles from the carrier *Essex* after completing a 260-hour four-and-a-half mil-

lion mile shakedown of the third-generation US manned spacecraft. Crewmen Walter M. Schirra, Jr., Donn F. Eisele and Walter Cunningham were picked up by helicopter and flown to the deck of the *Essex* for the Navy's traditional red-carpet welcome.

Splashdown came at 6:11 am CDT following a perfect de-orbit SPS burn southeast of Hawaii 30 minutes earlier. The spacecraft rolled after landing to the apex-down Stable II position and was flipped by the inflatable uprighting bags to the apex-up Stable I position. Radio or ranging beacon contact with the spacecraft was temporarily lost until uprighting exposed the submerged antennas.

Apollo VII's splashdown was about three-tenths of a mile off the aiming point.

Statistically, Apollo VII becomes the first mission to make good 101 percent of its mission objectives. Additional systems tests and experiments worked out by flight planners in the Mission Control Center were added in real time to account for the extra one percent above the pre-mission objectives.

"I agree with Wally that Apollo VII was a magnificent

flying machine," said Apollo Spacecraft Program manager George M. Low. "We accomplished 101 percent of our objectives through these added tasks."

Minor systems problems cropped up such as sporadic and short-lived dropouts in spacecraft AC main bus voltages, fogging on two of the command module's five windows, crew biomed harnesses with frayed and broken sensor leads and erratic performance of the primary water-glycol coolant loop that handles overload from the space radiators.

### Perfect Mission

"Apollo VII goes into my book as a perfect mission," commented Apollo Program Director Samuel Phillips in a post-splash news conference. "Abnormalities were minimal and it is no surprise to us that the spacecraft worked as well as it did."

When asked about the outlook for Apollo VIII, Phillips said, "We have much work to do before we can decide what option we'll choose for the C-prime mission, but we expect to an-

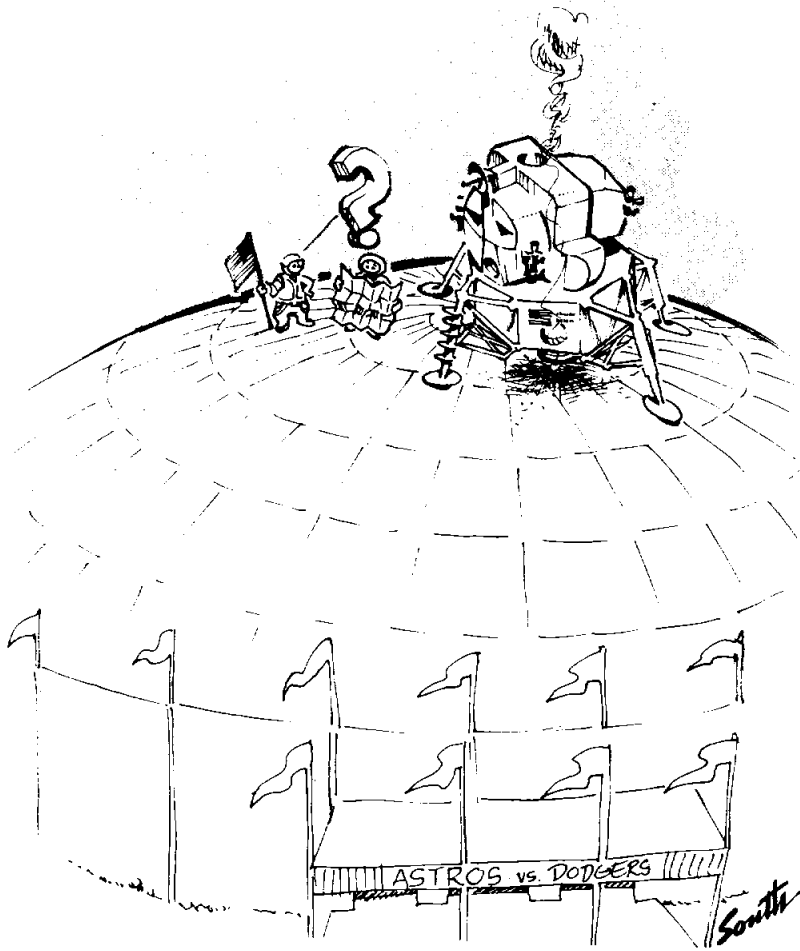
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SPLASHDOWN STOGIES—A dense pall of smoke hovers over flight controller consoles in the Mission Control Center second-floor Mission Operations Control Room (MOCR) as Apollo VII post-splash panatellas are ignited. Left to right are second, first and third-shift flight directors Gene Kranz, Glynn Lunney and Jerry Griffin.

**THE ASTRONUTS**

(filched from TRW Systems Group)



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**President Asks All Agencies To Make Dollar Go Farther**

President Johnson has asked the heads of Federal departments and agencies to make every dollar go farther, and to "Make sure every Federal employee is being used in the most effective way possible."

The vast majority of Federal employees are not in Washington, he said. "For the most part, our programs are carried out and our costs are incurred by employees who are out in the countryside and cities. These field operations provide a great opportunity for cost reduction."

He told Federal managers, through the chairmen of Federal Executive Boards: "The resources available to the Federal Government are never unlimited. There simply is not enough to do all the things that should be done. Cost reduction is a positive force that enables us to accomplish more of our programs within the resources that are available."

The President's statement followed his signing of Public Law 90-364 which requires significant program readjustments. The Law called for the Federal Government to reduce spending and lending by at least \$6 billion below original estimates for 1969 and restricted hiring until total civilian employment in the Executive Branch is reduced to its June 1966 level.

"More than ever before, the continued strength of this country depends upon our ability to provide for national security, to meet our international obliga-

tions, and to pursue important endeavors here at home within budget limitations that will enable us to maintain a sound and healthy economy. To do this your country is depending on you to reduce expenditures by finding better and less costly ways to accomplish what we have to do."

**JA Companies Seek Advisers**

Adult advisers are needed by the Clear Lake City Junior Achievement Center for counseling JA companies operating at the Center.

The Junior Achievement program teaches high school students the basic concepts of the free enterprise system through practical application by giving them first-hand experience in organizing and operating their own mini-companies.

Each JA company is formed of about 25 teenagers who select a service or product they want to market, appoint managers for production and selling, pay commissions and wages and keep books. Moreover, when the companies are liquidated at the end of the school year, stockholders often receive a return on their investment.

Volunteer advisers should not only be believers in the free enterprise system, but should also be interested in the character building of young people. Advisers with supervisory experience and who can attend regular weekly meetings are preferred.

Would-be JA advisers may volunteer by calling Leon Fuller at Junior Achievement of Houston, JA 3-7371 or B. E. Steadman of Lockheed, HU 8-0080.

**Apollo VIII Crew Practices Egress**

Apollo VIII crewmen Frank Borman, James Lovell and Williams Anders Tuesday took part in slide wire emergency escape training at Kennedy Space Center Launch Complex 39B. Wednesday, the crew underwent launch pad egress training at LC 39A.

The crew today was scheduled for water egress training in the Gulf of Mexico south of Galveston using a boilerplate Apollo command module.

**Your Job in Focus**

**"Use or Lose" Leave**

Employees are reminded that Federal Leave Policy provides that annual leave can be accumulated to a maximum of 30 days (240 hours) which can be carried over from one leave year to the next. (Those employees having an excess of 30 days balance at the end of 1952 are permitted to carry over the balance for which they had credit on that date.) Annual leave balances in excess of the maximum will be lost as of the end of the leave year, January 11, 1969.

**Excused Absence for Voting**

Employees who desire to vote in the general election November 5, 1968, may be excused for a reasonable time for that purpose if their absence will not seriously interfere with operations.

As a general rule, when the polls are not open at least three hours either before or after an employee's regular hours of work, he may be granted an amount of excused absence which will permit him to report for work three hours after the polls open, or leave work three hours before the polls close, whichever requires the least amount of time off.

In the event an employee's voting place is beyond normal commuting distance and vote by absentee ballot is not permitted, the employee may be granted sufficient time off, up to one day, to make the trip to the voting place. Time off in excess of one day will be charged to annual leave or leave without pay.

**Political Badges and Bumper Stickers**

The U.S. Civil Service Commission recently issued a further explanation of the political activity rule as it pertains to the display of political badges, buttons, and bumper stickers by Federal employees. The Commission has ruled that an employee who displays such symbols does not violate the

political activity restrictions that apply to Federal employees, because they have the basic right as citizens to express their opinions publicly or privately on political subjects and candidates.

It is the Commission's view that the customary display of political material to indicate an individual's political preference is a reasonable exercise of the employee's right to express his opinion on a political matter. For example, it generally does not offend the statute to permit use of bumper stickers by employees who park their cars on Federal property. Nor is it contrary to the statute for an employee not in contact with the public to wear a lapel button while on duty.

However, the Commission advises that Federal Agencies may impose reasonable conditions or restrictions on the use of political campaign material by employees on the job. It would be inappropriate, for example, for an employee to display bumper stickers on a car which he used for the conduct of official business. It would also be inappropriate for an employee whose office is visited by the public to display political materials on his personal clothing. Overly ostentatious display of such materials by an employee who represents the Agency before the public may constitute prohibited campaigning. In particular situations, even modest use of such materials away from the public's view may provoke extensive debate among employees and thus detract from proper work performance. The propriety of the display of such materials in specific situations is a matter within the discretion of Agency officials responsible for maintaining a proper atmosphere for carrying out the public business; and Agencies have the authority to prescribe appropriate regulations for the conduct of employees.

Thus, the freedom of Federal employees to express their political opinions by the display of political symbols is not absolute. It is subject to reasonable limitations that may be justified by the terms of the political activity restrictions, and by the Agency's interest in conducting the public business in an orderly and efficient manner.

**LTA-8 in Tests For Lunar Flights**

Vacuum chamber testing of Lunar Module Test Article 8 this week was scheduled in the MSC Space Environment Simulation Laboratory Chamber B to help clear the way for manned lunar missions with the vehicle.

Prime test crewmen Gerald Gibbons and Glennon Kingsley, Grumman consulting pilots, were schedule for a seven-and-a-half hour test Wednesday and a 12-hour test today. The tests simulate a lunar mission with crew ingresses in a vacuum representing the manning, activation, checkout and operation of the LM in Lunar orbit, descent to the lunar surface and ascent from the moon.

**Sweet-Tooth for the United Fund**



**PLEDGE CAKE**—Employees of the Reproduction Services Branch in Bldg 227 take a cake break to kick off the United Fund drive in their office. The large cake, replete with the United Fund symbol of a smiling Sun, was the Branch's unique way of reminding everyone to fill out and turn in their UF pledge cards and help MSC go over its 1968 goal of \$70,000. In past years' drives, MSC has never failed to meet or exceed its goals.

# Roundup Swap-Shop

(Deadline for Swap-Shop classified ads is the Friday preceding Roundup publication date. Ads received after the deadline will be run in the next following issue. Ads are limited to MSC civil service employees and assigned military personnel. Maximum length is 20 words, including name, office code and home telephone number. Send ads in writing to Roundup Editor, AP3. Ads will not be repeated unless requested.)

**FOR SALE/RENT—REAL ESTATE**

New 3-2-2 white brick in Glen Cove, carpets, builtins, central air/heat, pier and boat ramp access. Equity \$2500. Roy Huckaby, 877-2889.

3-1½-1, paneled den, patio, fenced, trees, assume 4½% GI, equity, \$100/mo. Thompson, 946-7768.

Spanish 3-bdr in El Camino South, \$2000 equity, 1-¾ bath, den, fireplace, 2-car garage, fenced. Osborn, 488-0328.

Rent 3-bdr, LR, DR, 2-bath, den. 1008 Dusky Rose, Pasadena, \$195/mo. Roy Eason, 944-4052.

**FOR SALE—AUTOS**

Must sell 64 Pontiac station wagon, clean, power, air, autotrans, \$1050. Marlow, 946-3497.

64 T-Bird, xlnt condition, diamond blue, \$1495. Ed Michael, NB 591-2468.

63 Impala 4-dr sedan, 283 V8, autotrans, power, new brakes and shocks, clean, original owner, \$650. A. Behrend, HU 7-1298.

66 maroon Olds Toronado, air, power windows/brakes/steering, tilt-telescope steering column, cruise control, AM/FM, 32,000 miles. Bernie Oczkowski, WA 6-7898.

1965 Ford station wagon, air, radio, \$1050. 66 Volkswagen sedan, \$1200. D. C. Cheatham, Kemah 877-1201.

57 Ford station wagon, original owner, less than 30,000 miles on V8 engine, good second car, \$1050. Lindsey, HU 8-3744.

68 Mustang hrdtp V8, air, autotrans, pwr steer, \$2,575; or, 66 Mustang GT, air, V8, 4-speed, discs, mags, ovals, \$1650. Krpec, MI 5-6089.

67 Cutlass Supreme, turnpike cruising pkg, transistor ign, 400 cu in, air, pwr, discs, radials, \$2500. NRW \$4500. Mike Thomas, 3201 (no home phone).

Merlyn Mk IV, C sports racing class, tube chassis, Hewland 5-speed transaxle, Holbay 109E Ford dry sump engine, spares, trailer. J. Hirasaki, 591-3779.

65 V8 Chevy pickup, well used, good work or hunting vehicle, \$750 or best offer. H. Jamison, GR 3-4941.

68 Impala station wagon, luggage rack, air, AM/FM stereo. Floor upholstery throughout. E. E. Aldrin, HU 2-7982.

1960 Oldsmobile Dynamic 88, 4-dr sedan, jet-away trans, air, radio, heater, good running, mechanically sound. \$350. Young, 932-5102.

67 Cougar XR-7, GT pkg, 390 cubes, genuine leather interior, 4-speed, discs, stereo, air, pwr, perfect. \$2800. H. C. Mandell, 877-2925.

68 Impala sports sedan, 7000 miles, full power, air, AM/FM, 327 engine, turbohydromatic. Paul Weitz, 591-3071.

64 Dodge 4-dr, factory air, extra clean, Firestone 500s, \$695. B. Spencer, 944-0139.

67 Ford Galaxie 500, 2-dr hrdtp, radio, heater, air, pwr steer/brakes, WSW, \$2195. Millie Dolive, MI 3-7825.

68 Pontiac 9-passenger Safari wagon, air, all power, bit engine, \$3700. Jim Lovell, 877-3250.

**FOR SALE—MISCELLANEOUS**

30-in Dixie gas range, \$30. Ross Ferland, 877-1888.

GE Mobile Maid portable dishwasher. All mechanical and electrical functions operate but tub seal leaks, \$30. J. E. Hannigan, 534-4292.

Quarter-type gelding, eight years old, ideal for teenager. W. Smith, Alvin OL 8-4957.

Rhapsody Conn organ, 25 bass, 2 manual keyboards, 27 tones, contained speakers, hand-rubbed red mahogany. Cost \$2400, sell \$1200. David Bell, 591-2340.

Wooden playpen, assortment of drapes, youth bed. Killingsworth, 488-1689.

Sony TC-530 stereo tape recorder, xlnt condition, retail \$399-sell \$260. Bill Wood, 932-5663.

New ½-hp Westinghouse 1720-rpm motor suitable for power saw, drillpress, etc. R. B. Lang, HU 8-0149.

Five-inch long persistence phosphor cathode ray tube, type 5ABP7. R. B. Lang, HU 8-0149.

Impedance bridge similar to General Radio 650A, measures R, L, C to one percent, xlnt condition. R. B. Lang, HU 8-0149.

Two 12-in walnut veneer speaker enclosures 16x23¼x17-¾, insulated, xlnt. \$120 new-sell \$50. Nobles, 944-4153.

HO trains, three engines, \$500 in equipment, on two 4x8 tables, wonderful Christmas for boy, \$150. Lindsey, HU 8-3744.

Bedroom suite: 2 pc, \$25. 3 pc, \$35. Two vinyl chairs, \$10 each, both for \$15. J. Sutton, 932-3979.

Barbell set: 5½-foot bar, 140 pounds weights, two 16-in dumbbell bars, exercise bench, new, \$50. Merrifield, 591-2437.

Large heavy couch and matching chair, need covers, \$50. Mike Bledsoe, 471-2600.

GE built-in dishwasher, \$25. Drapes, rod for sliding glass door, \$18. Antique kitchen chair, \$20. Wagner, 877-2679.

HO model trains: new diesel engines, \$5. Freight cars, \$1. HO sets with power, \$20. M. J. Bledsoe, 471-2600.

Astra 600 9mm autopistol, holster, extra clip, NRA xlnt, \$55. Jim Townsend, 591-2545.

LS-16 sailboat, galvanized trailer, 3½-hp outboard, many extras, all xlnt condition. Ed Simon, 488-4043.

Rent my Cessna Commuter or Skyhawk, aircraft maintained to highest standards, modest rates. Neel Tilton, GR 9-1176.

Percale sheets, \$2; muslin sheets, \$1.50; flat and fitted pillowcases, 2/\$.50; thermal double-bed blankets in wrappers, \$5. Avent, 946-1737.

GE electric range/oven, white, like new, \$75. Young, 932-5102.

GE 19,600-BTU window air conditioner, 220-v, three years old, \$125. Young, 932-5102.

Four adult Astroworld tickets, full admission, regular \$3.50 each-sell \$2.50. Bryan Davis, 862-3533.

16-ft. Falcon fiberglass boat, 40-hp Evinrude, tilt trailer, Selectomatic start/steering, battery, windshield, like new. Bryan Davis, 862-3533.

GE electric range, 2 ovens (1 window), 4 top heater elements, timer, cost \$269-sell \$95, xlnt condition. Kelly, HU 8-0511.

Wards upright freezer, \$150. 12-ft Jon boat, \$65. Both like new. Spencer, 944-0139.

Explorer Scout uniform, worn only twice, 28-in waist, 14 reg shirt, cap, tie, belt. M. L. Squires, 534-3137.

Royal portable typewriter, older model in good condition, exclnt for beginning student. M. L. Squires, 534-3137.

Keystone 8mm magazine-load camera, projector, screen, other accessories incl telelens, \$125. John Farrell, HU 7-0722.

Volkswagen "Bug" frame-type trailer-hitch, 200-lb capac, fits 66 on back, \$8. Norman Brock, 932-5292.

30-in Sears coppertone gas range, top center grill, auto oven/broiler, see-thru oven door, less than year old, \$100 firm. Norman Brock, 932-5292.

Heathkit model V-4A VTVM and H-V probe, \$6. Dinette table 36x72, \$15. R. L. Stubblefield, 877-4745.

Two armchair schooldesks, \$4 ea. Roy Eason, 1407 Blackburn, Pasadena, 944-4052.

New Coast Guard-approved boat ventilation kit, \$7. M. Baker, 472-0996.

**WANTED**

Request anyone who has climbed Orizaba, Popocatepetl or Ixtaccihault contact John H. Cooper, 944-7049.

Want to join or start carpool from Strawberry Hills area, 8-4:30. Dorothy Hamilton, 472-2118.

Used deepfreeze in good condition. W. Smith, Alvin OL 8-4957.

Used chord organ in good condition. Leota White, MI 3-3141.

10 to 12-ft Jon boat, buy or trade. Marlo Krisberg, 944-4319.

Roommate to share 1-bdr apt in Webster, \$80/mo. Mike Thomas, HU 3-2301 (no home phone).

Mini-bike in good condition, reasonable. Mildred Lillpop, Baytown 424-5137.

Approx 150-lb barbell and dumbbell set. Stan Avent, 946-1737.

Anyone interested in soccer call W. H. Weber, Ext 3995.

## Sailing Club Sets Regatta Nov. 2

The Clear Lake Sailing Club November 2 will hold its second 1968 regatta at the Harris County Clear Lake Park T-head. Local sailing groups have been invited to attend, and competition in six classes and two handicapped-open classes is planned.

Winners in each class will receive trophies; the number of trophies per class to be determined by the number of qualifying boats. The skippers' meeting will be held at 10 am and registration should be completed before the meeting. Registration is \$2.50 for each entry.

The Club is providing family-day refreshments such as hot dogs, coffee and soft drinks. Further regatta information can be got from Owen Garriott at 591-3376, Jay Legendre at 591-2976, or Chuch Bailey at 944-3871.

## Boards Pinpoint LLRV Accident Causes

(Continued from page 1)  
safely to normal Earth operation.

It also said the operating crew in the ground control van had inadequate warning of the abnormally low propellant supply, and that the crew failed to diagnose the loss of pressure in the tanks; that the pilot failed to shift one control handle at a critical point, and that the high and gusty winds prevailing had an adverse effect on propellant consumption.

In its report on the case, the Review Board criticized the design of the control system because it failed to protect against loss of helium pressurization into the lift rocket system. The combination of circumstances produced the rapid and complete loss of helium pressurization.

The MSC Board listed 16 recommendations—six of them directly concerned with improvements in the LLRV and its systems—and called for a safety review of the entire LLRV program; operational criteria for wind conditions and for use of the two attitude control systems in combination; for control van

crew and operations; for a computer and other improvements in the control van; for review of pilot training; modification of the pilot's handbook; addition of fire and rescue equipment and added manpower, particularly for use on the control van team.

The Review Board said additional sensing probes to measure propellant level—one of the most important items in the cause of this accident—should be installed before any more flights of either the LLRV or its advanced version, the Lunar Landing Training Vehicle (LLTV).

That Board also called for a master warning light in better position for pilot vision, for safety wind criteria for all such flights, and for establishment of better communications, responsibilities and emergency procedures in the astronaut training program.

In addition, the Review Board said all critical vehicle systems in the program should be examined, and criteria set up clearly for their operation, including "red-lines" and "go-no go" limits.

## Flu Incidence Expected Light

While the US Public Health Service expects "little or no A2 influenza in the United States during the 1968-69 season, except possibly on the Pacific Coast," the USPHS does recommend selective use of influenza vaccine.

Mass inoculation of MSC employees is not planned for the 1968-69 season, but employees over 45 or who have a chronic illness may, at their option, receive inoculations at the MSC Dispensary from November 1 through December 15. Persons planning travel should be immunized during October.

Influenza inoculations are available on a drop-in basis Monday through Friday from 10 to 11:30 am and 3 to 4:30 pm at the MSC Dispensary, and from 8 am to 4:30 pm at the satellite dispensary at Ellington AFB.

**You Help RED CROSS when You Share the United Way**

**CONJURE UP SAVINGS!**



**HOO DOO? YOU DO**

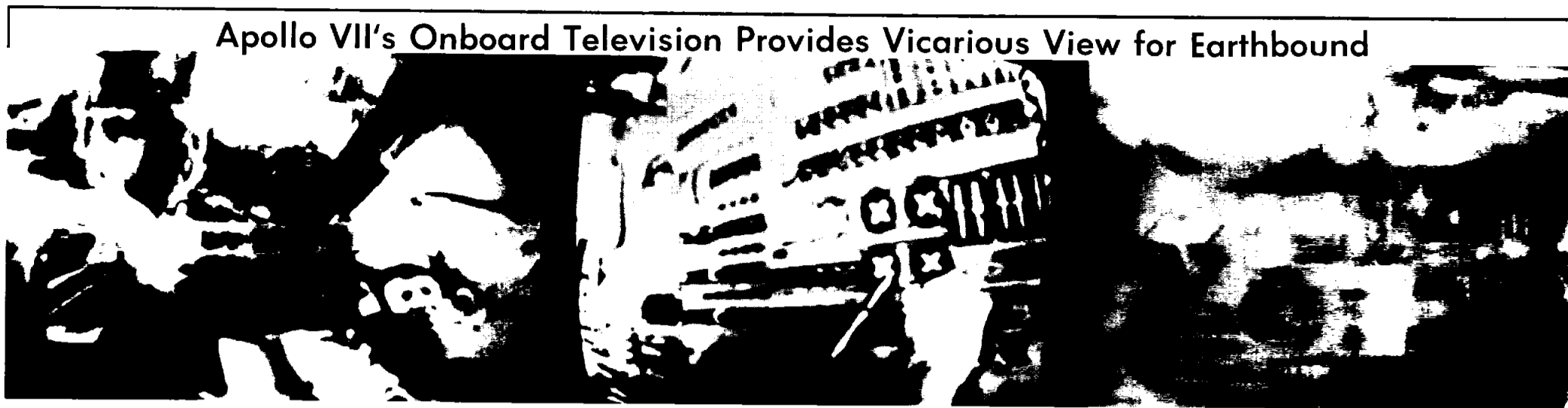
**COST REDUCTION PROGRAM**

## New Journeymen



TURNED OUT—Journeyman certificates from MSC and from the US Department of Labor were awarded October 1 to 10 MSC apprentices who "turned out" after a four-year program of on-the-job-training in Technical Services Division shops and 1152 hours of related classroom training. Front row, left to right are new journeymen Marvin F. Williams, Donald M. Jordan, Clarence J. Fisher, William H. Sigafosse, Jesse T. Adkins and Lawrence Hayman. Back row: Technical Service Division chief Jack Kinzler, Director of Administration Philip H. Whitbeck, MSC Deputy Director George S. Trimble, MSC Technical Institute Board of Governors chairman Paul E. Purser, Garland B. Moreland, and Percy H. Alison.

## Apollo VII's Onboard Television Provides Vicarious View for Earthbound



ON THE TUBE—Earthbound followers of Apollo VII were able to share to some extent the crew's experience through the use of the slow-scan onboard television. In the left photo, Apollo VII command module pilot Donn Eisele grins as commander Wally Schirra holds a sign in front of the camera saying, "Keep those cards and letters coming in, folks!" In center photo, lunar module pilot Walt Cunningham makes a grab for a pen drifting free in the cabin's zero-G during a guided tour of the cabin on the mission's fourth day. Cunningham, in right photo, stands by the lunar module pilot displays and controls. The navigation and

guidance panel and the sextant and scanning telescope are visible in the center portion of the photo. Apollo VII's onboard television camera was the second time TV had been carried aboard a US manned spaceflight. Faith 7, flown May 15-16, 1963 by Gordon Cooper, carried a small TV camera that scanned at the rate of one frame each two seconds. The first use of TV aboard a manned spaceflight was aboard the Soviet Union's Vostok I mission April 12, 1961—the first manned orbital flight—piloted by the late Yuri Gagarin.

## Apollo VII Shakedown Meets '101%' of Mission Goals

(Continued from page 1)

announce our decision by mid-November." Options referred to by Phillips are whether to fly Apollo VIII (C/SM 103, Saturn V 503) in earth orbit, to a 4000-mile apogee, circumlunar or lunar orbit mission.

Phillips continued, "Apollo is now in the manned flight phase, and I have every confidence that we can fly the first lunar landing mission by the end of next year."

When asked if he would be willing to fly Apollo VII to the Moon, Flight Crew Operations director Donald K. Slayton said at an eighth-day press conference, "I would be willing to fly Apollo VII anyplace. I think it's better than an outstanding mission. We're all pleasantly surprised at the way it is going, and minor systems problems are reasonably well understood at this time."

Perhaps the outstanding performer of Apollo VII's systems was the 20,000-pound thrust Service Propulsion System engine which faultlessly reignited for eight test and maneuvering burns to produce close-to-nominal values.

### Manual Steering

In the fifth SPS burn in the 105th revolution, Schirra took the tiller during the last 30 seconds of the burn in a test of manual thrust vector control. The 1460-feet-per-second burn began under direction of the spacecraft guidance and navigation system and was aimed toward measuring SPS performance and determining the accuracy of the propellant utilization and gauging system.

The Apollo VII crew performed some additional spaceflight pioneering as they tracked navigational stars and earth landmarks using the sextant and scanning telescope in the spacecraft's navigation bay. The tests were a precursor to the navigational methods to be used in lunar missions when ground stations will be unable to relay accurate position and orbit information to a spacecraft in lunar orbit.

Although Apollo VII did not carry a lunar module in the spacecraft/LM adapter, the crew performed a simulated transposition and docking with the S-IVB stage following separation. A target plate mounted on a crossbeam in the SLA represented the LM's rendezvous hatch in the dry-run which was filmed by the crew in motion pictures and stills.

The S-IVB stage served later in the mission as a rendezvous target in a simulation of a lunar orbit rendezvous situation in which the lunar module ascent stage failed to reach the desired altitude because of early engine shutdown or some other condition requiring "rescue" by the command module of the landing crew.

Toward the end of the mission, the crew asked Mission Control for additional targets of opportunity for exposing unused film in the synoptic terrain and weather photography experiments.

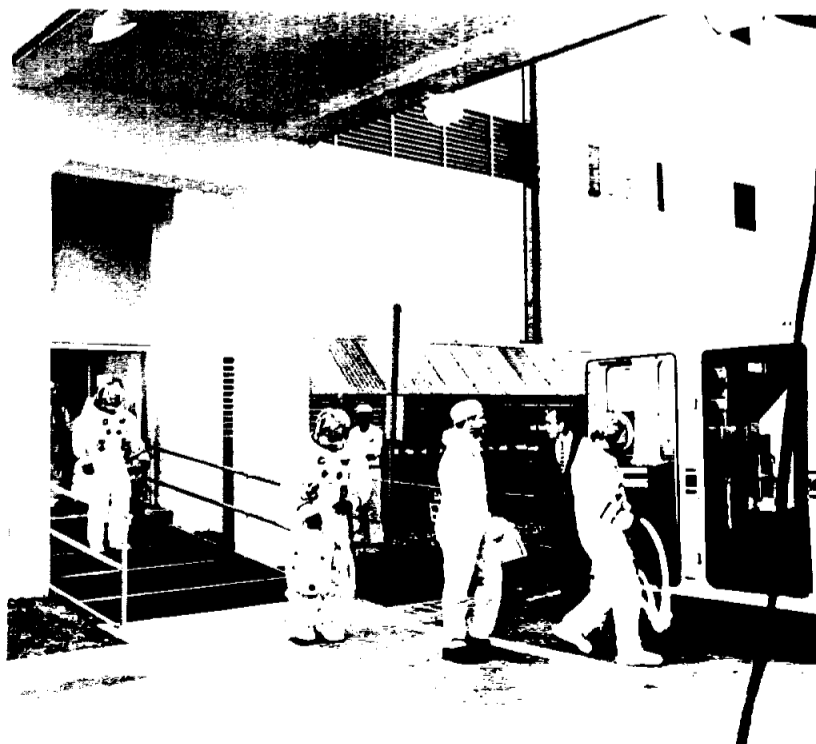
Major Apollo VII mission events are listed in the unofficial box score at right.

### Apollo VII Events Box Score

Event	Ground Elapsed time in	
	Planned hr:min:sec	Actual hr:min:sec
Launch Phase		
Liftoff	10:00 amCDT	10:02:45 CDT
First stage cutoff	00:02:23	00:02:15
S-IVB J2 ignition	00:03:26	00:02:25
Launch escape system jettison	00:02:43	00:02:44
S-IVB cutoff	00:10:15	00:10:19
Insertion	00:10:25	00:10:34.5
(Orbit: planned 123x153 nm, actual 122.6x153.5 nm; inclination 31.64°)		
Orbital Phase		
CM/S-IVB separation	02:54:55	02:55:10
SM RCS phasing burn	03:20:00	03:20:00
1st SPS burn	26:25:00	26:25:00
2nd SPS burn	28:00:50	28:01:06
Terminal phase initiate	29:17:00	29:17:00
Post-rendezvous separation	30:20:00	30:20:00
3rd SPS burn	75:47:58	75:47:58
4th SPS burn	120:43:00	120:43:00
5th SPS burn	165:00:00	165:00:00
6th SPS burn	210:08:00	210:08:00
7th SPS burn	239:06:00	239:06:00
8th SPS burn (deorbit)	259:39:16	239:39:16
Entry phase		
400K feet	259:53:23	(Figures
Begin blackout	259:56:14	unavailable
End blackout	259:59:08	at Roundup
Drogue deploy	260:03:24	press time)
Main chute deploy	260:04:00	
Landing	260:10:04	260:09:45
Spacecraft on board carrier Essex at 8:59 CDT October 22, 1968		



SOUND AND FURY—Apollo VII lifts off Kennedy Space Center Launch Complex 34 at 10:03 CDT October 11 en route to a successful 10.8-day shakedown of the Apollo command and service modules in their first manned flight. Aside from pesky headcolds suffered by crewmen Walter M. Schirra, Jr., Donn F. Eisele and Walter Cunningham, and minor "glitches" in spacecraft systems, the mission was logged as another in the "textbook" category.



ALL ABOARD FOR PAD 34—Apollo VII astronauts Walter M. Schirra, Jr., Walter Cunningham and Donn F. Eisele leave the Kennedy Space Center Manned Spacecraft Operations Building to board the crew transfer van that will take them to Launch Complex 34 during the prelaunch countdown. The crew had earlier completed their preflight physical examinations, eaten breakfast and had donned their pressure suits before making the trek to the pad.