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Space News Roundup

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The Space Operations Center

Review draws international participation

Aerospace engineers from the United States and six other nations got an armchair peak last week into the year 2000 and the presence of a new facility in the sky known as the Space Operations Center, or SOC.

The engineers were at the Johnson Space Center to hear final review presentations on the SOC concept, and were briefed by JSC, Boeing Aerospace and Rockwell International representatives. The briefings concluded studies which have focused on different concepts for shuttle-serviced, permanently manned facilities, housing from 2 to 20 persons in low Earth orbit for up to 90 days at a time.

The final review does not signify a go-ahead to construct the facility. Instead, it represents an accounting of what can be done, and provides NASA with several detailed approaches to constructing the first manned space platform of the shuttle era.

One highlight of the industrial presentations was the Rockwell proposal that excess propellants in space shuttle external tanks could be scavenged for use in the SOC before the tanks are jettisoned. Rockwell's concept for conserving fuel could save as much as 40,000 pounds of propellant from each tank and millions of dollars over a ten year launch period. Propellant scavenging would also reduce the number of shuttle flights dedicated to SOC by about ten percent.

Rockwell's 18-month SOC study focused on adapting concepts for use with the Space Shuttle. Boeing concentrated on a SOC design, which was used as the basis for the Rockwell study. JSC also formed a SOC task force which produced a concept of its own for use in the review process (see story, this page).

The Boeing study calls for an evolutionary buildup program, growing as demands increase. Initial space traffic estimates call for a SOC which could accommodate a crew of two to four persons. As more habitation, command and servicing modules are brought into orbit by shuttles, the crew complement could grow to 20 by the year 2000.

Another version of the Boeing study, referred to as the "high-mission" model, is based on an all-out effort, and during this same period would grow to house up to 50 persons.

One Boeing version of SOC, in this case one which would house eight persons, illustrates the range and sophistication of these studies. The platform would consist of two habitat modules, each able to support four people, connected by a docking tunnel which would provide additional berthing ports for orbiters. Two service modules, capable of supporting the crew in an emergency, would also be connected to the assembly.

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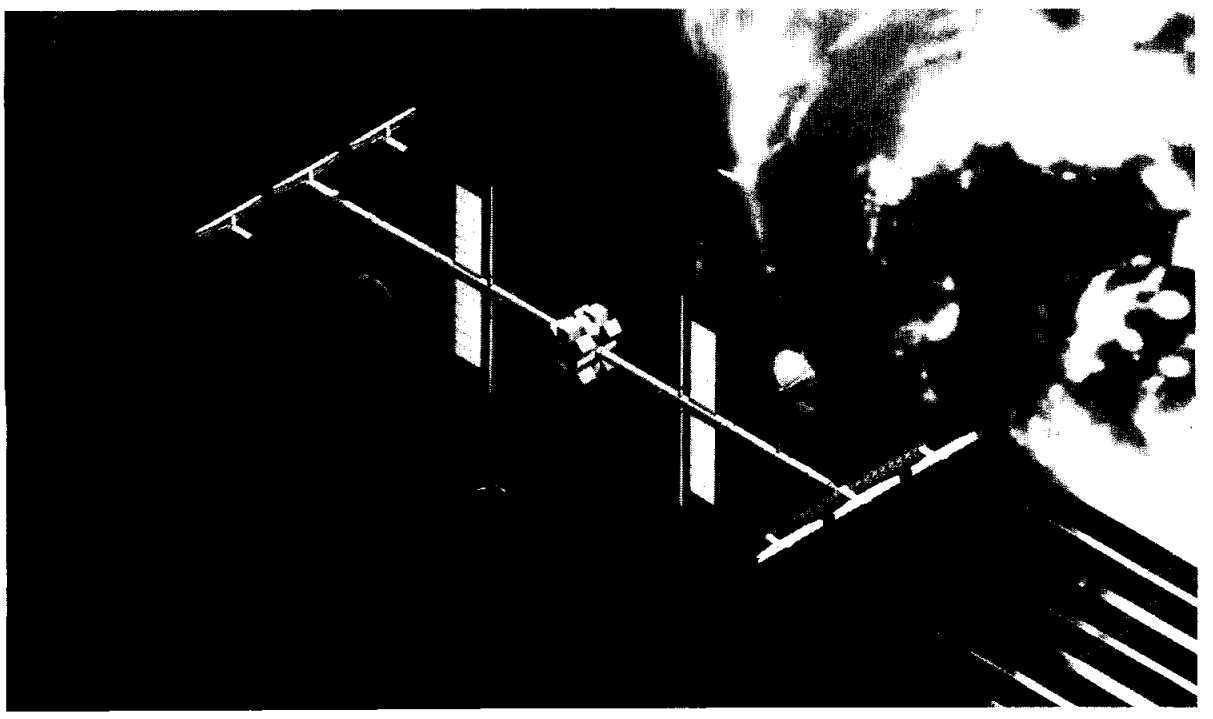
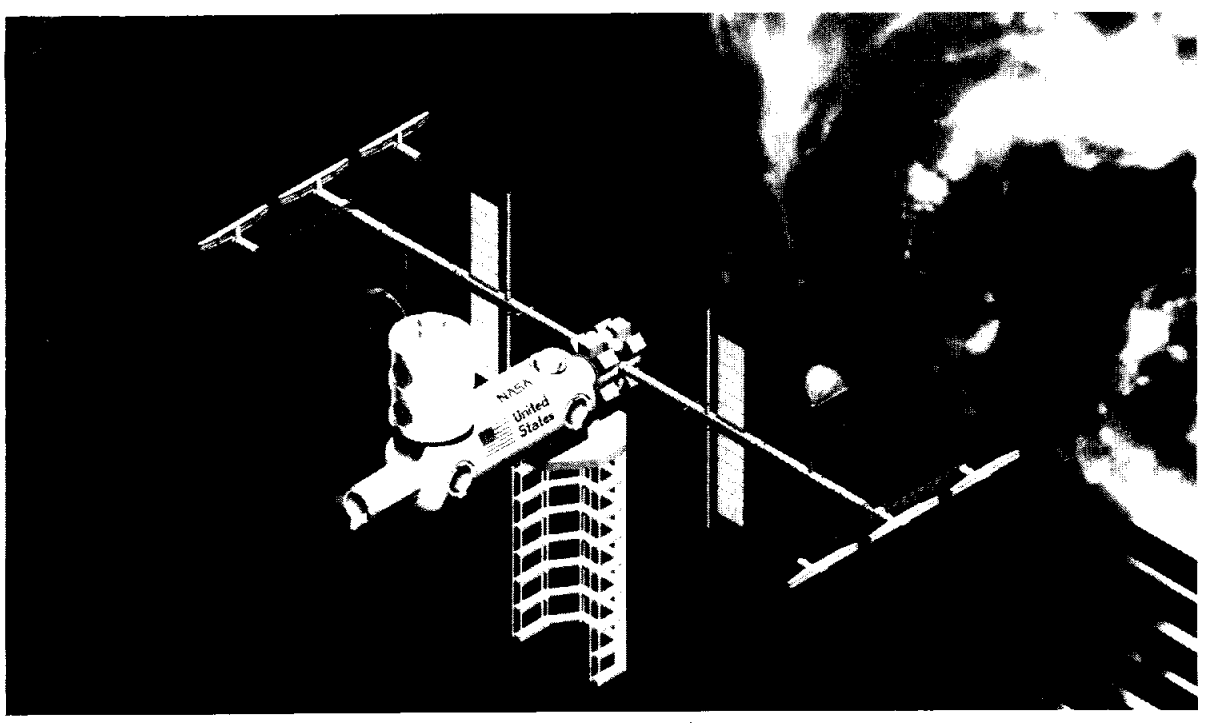
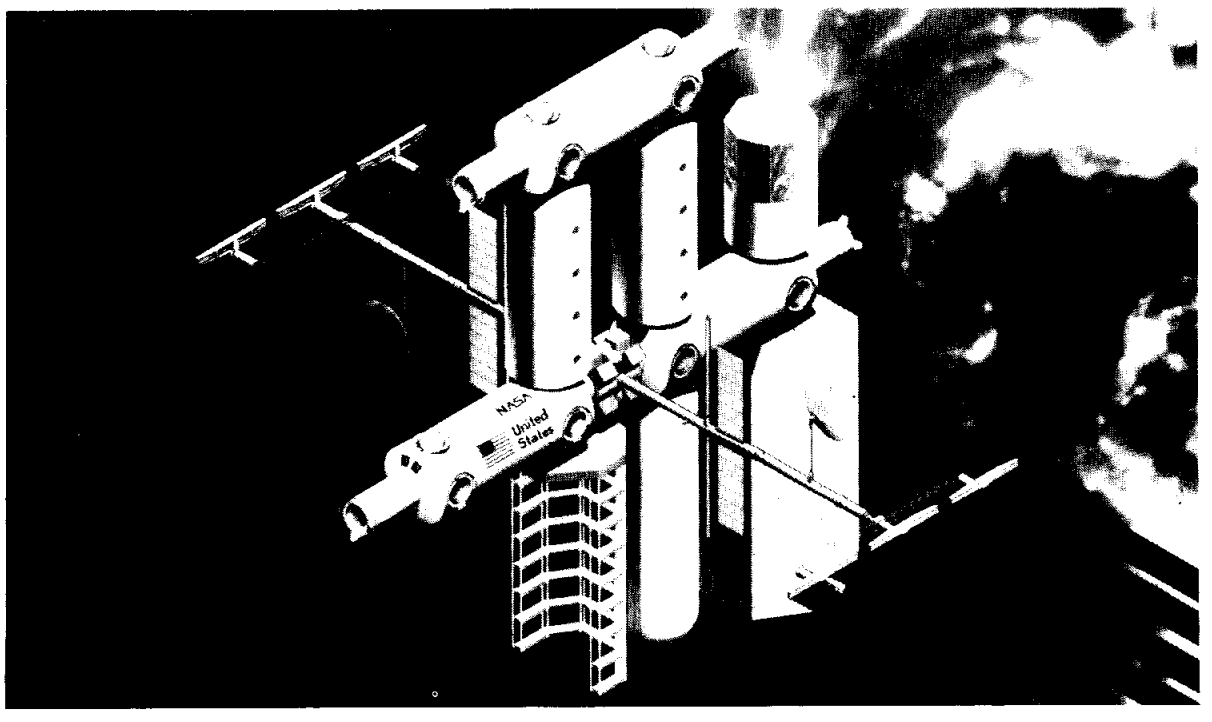


First hardware to begin the Space Operations Center is the energy section (center), which unfolds its booms and solar panels once in orbit. The slim tube-like structures on either side of the energy module are reaction control thrusters. The energy module operates on its own until a command module is brought up to join it.



In this view, the first command module is in place and SOC is now capable of command, control and communications, stabilization, data management and life support. A structure for servicing satellites and orbital transfer vehicles is under construction, and a space applications science module has also been installed.



After about eight launches, the center has been brought to the completion of Phase III, and is now capable of permanently housing eight people. A second servicing and hangar module for orbital transfer vehicles and satellites is in place, and three habitation modules have also been added to the assembly. The SOC would have a minimum life of around ten years.

JSC proposes three-phased construction

The JSC study group for Space Operations Center (SOC) planning is recommending a three-phase, multi-launch construction schedule for placing the permanently-manned facility in low Earth orbit.

The JSC design calls for a SOC which operates continuously with a crew of from 8 to 12 people for a minimum of ten years. SOC materials would be delivered and assembled by the space shuttle, operating in a low Earth orbit between 230 and 280 statute miles. A full-up, 8 to 12 person operations center would weigh in at about 245,000 pounds and would be 436 feet long, measuring from the tips of its solar panels.

The SOC concept is seen as providing the United States with a marshalling yard in space, capable of handling large and complex payloads, servicing and storage of orbital transfer vehicles, and maintenance of satellites. While it would be something of a space garage, providing storage for such things as reusable cryogenic upper stages for geosynchronous operations, the SOC would also be an invaluable science applications platform, JSC planners say.

Besides furthering space biomedical studies begun on Skylab, the base would allow the nation to move into a vast new array of space based activities, including zero-g manufacturing, highly sophisticated communications and detailed remote sensing of the planet's resources.

NASA planners see the SOC growing in incremental stages. An initial space shuttle launch would place an energy section or module in orbit as part of Phase I construction. The short cylindrical structure would contain two booms which would unfold into a system of solar arrays, antennas, a reaction control system and radiators. The central section would contain batteries, propellant tanks, and internal power conditioning and switching equipment. It would also be equipped with a small computer to operate independently until the first command module arrives and is berthed to it. The energy section would weigh between 34,500 and 43,400 pounds on Earth.

A second launch would bring up the first command module, which when joined to the energy section would complete Phase I of the buildup. At this point the basic SOC housekeeping functions would be available: power, communications, command, control, stabilization, data management and life support. Unattended manned operation would be possible for short periods. The SOC would also be equipped with multi-stage orbital transfer vehicles as early as this stage of the program.

The command module design has one docking port and nine berthing ports, with airlocks, a command and control station, guidance and control, and life support with accomodations for two.

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Space News Briefs

Week of March 22 eyed for STS-3

NASA officials have set the week of March 22 as the target period for launch of the third Space Shuttle mission. In a pre-flight status briefing at the Kennedy Space Center Jan. 15, launch officials said all three fuel cells are back aboard *Columbia*, and that rollout from the Orbiter Processing Facility is now scheduled for Feb. 5. Integrated tests between the *Columbia* and the STS-3 payloads will be conducted in the OPF on Jan. 26 and 27, with an interface between Mission Control at JSC and the payloads scheduled for Jan. 28. Rollout from the Vehicle Assembly Building to the launch pad is planned for Feb. 21, with a countdown demonstration following around the first of March. Officials said the fuel cell difficulties which shortened STS-2 were not generic. Upon close inspection, no problems were found in fuel cells two and three, but one of three small aspirators in fuel cell one contained a metal sliver which caused a backup of water into the hydrogen separator portion of the device. The aspirator, which was likened to the type of small pumps used in aquariums, is used to send water from the fuel cell into the water tank. The sliver probably originated in the manufacturing process, officials said. Work on the thermal protection tiles was also reported to be almost complete, with 400 tiles rebonded and 49 cavities left on the spacecraft. Of the 449 tiles removed to date, 170 had flight damage, 202 were densified, 18 underwent engineering evlauation, and another 29 were found to have miscellaneous problems.

Challenger *assembly continues for summer rollout*

Only three major pieces remain to be installed on Orbital Vehicle 099, the *Challenger*, as it nears readiness for rollout at Rockwell International's Palmdale, CA facility. *Challenger's* elevons, forward reaction control system module and body flap will be installed during the winter and spring months. Over 20,000 thermal protection system tiles are on the spacecraft, with another 6-7,000 tiles due for installation before the scheduled rollout in June. Rigging is now underway on the payload bay doors, which were mated last week. The radiators will go on later this month. As of press time, nearly all of the 46 panels of the wing leading edges had been fastened into place, and the reinforced carbon-carbon nose cap will be installed later in the month. Wiring of the spacecraft is reported to be essentially complete. The orbital maneuvering system pods, which are complete structural and propulsive units, are scheduled for delivery from McDonnell Douglas in February and March. They will be shipped to the Kennedy Space Center in late summer, after *Challenger* has arrived, and will be mated there. The first major component for *Challenger's* sister ship, OV 103, the *Discovery*, is scheduled to arrive at Palmdale from the General Dynamics plant in San Diego this month. The mid-body, a complete structural unit, will be mated with *Discovery's* wings in October of this year. The delivery date for *Discovery* is September, 1983.

Marshall studies telescope cooling system

A large infrared telescope cooling system is now undergoing thermal performance tests at NASA's Marshall Space Flight Center for a planned 1984 flight aboard Spacelab 2. The Helium-Cooled Infrared Telescope Experiment will scan newly forming stars and other sources of infrared radiation, and the instrument will have to be kept as cold as possible — about minus 450 degrees Fahrenheit — so that it does not measure the infrared within itself. Liquid helium, the coolant which will accomplish this task, will be stored during the mission in a 250-liter container called a dewar, in a system similar to the dewar in a thermos bottle, although far more sophisticated. This dewar contains vacuum jackets, insulation, thermal radiation shields and a highly complicated plumbing system. Vaporized helium will be drawn from the liquid in the dewar and circulated about the telescope to keep the instrument near absolute zero, where all molecular action ceases. One primary focus of the tests at Marshall is an effort to determine how long the cooling system can store such a cold liquid. Scientists want the cooling system to last for several weeks, because the dewar will be filled with liquid helium around two weeks before the apparatus is sent into orbit.

Lewis begins strategic materials program

A long range research program is getting underway at the Lewis Research Center designed to reduce the nation's dependence on foreign countries for its supply of high performance strategic materials. COSAM, for Conservation of Strategic Aerospace Materials, is intended to provide alternative concepts and materials which might reduce the aerospace industry's consumption of cobalt, columbium, chromium and tantalum. The heart of the program is basic research on the performance of aerospace alloys and identifications of possible substitutes. The alloys are important to the production of high performance components for jet aircraft propulsion systems, but various factors have contributed to very high increases and fluctuations in their cost. Cobalt, for instance, rose in price by 900% from $5.50 per pound in 1977 to more than $50 per pound in 1980. Today the standard price is $15 per pound, but another price hike could come at any time. During the period from 1972 to 1980, the cost of chromium leaped 400%, columbium prices rose by 1,300%, and tantalum by 1,480%. Fundamental metallurgical research will be carried out at Lewis in the areas of high strength iron alloys, aluminides, protective coatings, composites and dissimilar metal joining, as well as low cycle fatigue, thermal fatigue, cyclic oxidation and hot corrosion.

ESA embarks on large satellite program

The European Space Agency and eight participating nations have given final approval for the main development phase of the European Large Telecommunications Satellite (L-SAT) program. Current plans call for a launch in the first half of 1986 of the multi-payload platform aboard the Ariane rocket, with the added capability of flight aboard America's Space Shuttle. L-SAT will carry several payloads designed to meet the communications requirements of the 1980s and 1990s. One of those payloads, a two channel television package suitable for high power direct-to-home broadcasting in the 11.7 to 12.5 GHz band, is seen as providing the possibility for transmission of cable programing over the whole of Europe. The satellite will also provide European and intercontinental communications trunk services, as well as integrated services for developing countries. Some 40 industries from 12 nations will have responsibilities at the subsystem or equipment level in a structure managed by the prime contractor, British Aerospace. The nations participating in the L-SAT program are Austria, Belgium, Canada, Denmark, Italy, The Netherlands, Spain and the United Kingdom.

JSC proposal

(Continued from page 1)

One airlock would be equipped with a hyperbaric chamber. Each command module can support a crew of four in an emergency. The module would weigh about 45,000 pounds on Earth.

During Phase II, a manipulator arm, similar to that used on the space shuttle, would be mounted on the command module to help install other sections during subsequent buildup phases.

The third launch would bring a second command module, which would be installed on the other end of the energy section and would duplicate command functions.

Each of the next two launches to SOC would bring up habitation modules, each accommodating a crew of four. The habitation modules have two berthing ports, and would weigh between 25,600 pounds and 28,200 pounds on Earth.

By the seventh launch, a docking tunnel would be placed between the two habitation modules, providing a second egress. By this time, SOC would have entered Phase III, and could be permanently occupied by eight people. With some additional support equipment, the center could handle flight support for space shuttles, space construction and satellite servicing.

During the latter phases of construction, unpressurized hangars would take shape, protecting the orbital transfer vehicles and providing an enclosed space for maintenance.

By this time, SOC would be capable of housing mixed crews in full comfort. Crews would be rotated every 90 days, and their accommodations while in orbit would include crew quarters, a dining table, a galley, a gym of sorts and medical facilities. One of the habitation modules would be equipped similar to a doctor's office, while another would have facilities more like that of a convential hospital emergency room.

JSC has also identified "segmented construction" as one of the more promising methods for erecting SOC. Under this plan, it would take five components to build one module. Each piece would be a basic structural component, a concept which would simplify and speed up the manufacturing process, both on Earth and in space.

SOC would be capable of guidance, navigation and control through use of its reaction control thrusters, mounted on either side of the energy section. These could be used to keep the SOC stable or raise its altitude. In addition, SOC could communicate with orbiting spacecraft and space-walking astronauts through an intercom, closed circuit television and through various caution and warning signals.

Power would be provided by six solar arrays on the two booms extending from the energy section. Nickel-hydrogen batteries would provide power while the station was in occultation, blocked from the rays of the sun by the Earth.

Final review

(Continued from page 1)

For transportation in orbit, the station would have a complement of two orbital transfer vehicles, and two unpressurized hangars in which they could be stored and serviced. There would also be an equipment handling system outfitted with a work station for astronauts similar to "cherry pickers" used on Earth. In addition, the SOC would have various manipulator arms and grappling systems, along with large solar arrays and communication antennas.

Other results of the Boeing and Rockwell studies include these findings:

- Instrument and equipment testing, which will be conducted over the years to advance space technology, will in the near future be carried out on free flying satellites and in the payload bays of orbiters. Many such missions could be better accommodated on manned space stations, the reports concluded.
- The payoff from fewer shuttle launches and increased use of upper stages would offset the cost of a space operations center. A SOC would cut down the time space shuttles spend in orbit, thus possibly reducing the size of the fleet. A SOC would also reduce the number of shuttle flights for certain missions, such as satellite servicing and space construction. Support equipment could be left safely in space at the SOC and eliminate costly transportation to and from the Earth.
- The orbital transfer vehicles, or OTVs, would be an integral part of space operations. They should be entirely space-based, and would be capable of performing in both LEO (Low Earth Orbit) and GEO (Geosynchronous Earth Orbit). Instead of using a great amount of fuel to slow the OTVs as they make the speedy trip back from GEO, engineers are proposing that another method be used. In this concept, the OTVs would take advantage of orbital mechanics to sweep in close to the Earth and use the very fringes of the planet's atmosphere to slow down for rendezvous with SOC.
- Assuming that after 1990 shuttle orbiters will be operated on a one-month turnaround, no more than five orbiters will be needed by the year 2000.
- Most shuttle flights in the coming years will operate on a "volume limited" basis. Rockwell and Boeing concluded that achieving faster orbiter turnaround is more important than increasing payload capability beyond the current 65,000 pound limit.
- From 1989 through 1991, crew sizes will be determined by the number of missions dedicated to space construction, the industrial teams said. Science and applications missions will also require support, and by 1992, satellite servicing missions will be commonplace. Other forecasts said that by 1993 the volume of science and applications missions will demand equal time with pure construction flights, and that from 1994 through 1997, those science missions will be on the increase. Space construction missions are then forecast to dominate for the remainder of the century, and the satellite servicing workload will probably increase as well. As a result of these developments, it may be desirable to construct a second SOC to handle science and applications, leaving the initial SOC crew free to handle flight support and space construction missions.

In its report, Rockwell assured NASA that all of these plans could be carried through with existing technology, but modified equipment, such as handling and positioning aids on the remote maneuvering arms, might be necessary.

"SOC is the way to go," a Rockwell representative said. "It can save more than 200 shuttle flights over a 20-year SOC life, reduce flight rates by more than 20 percent, and reduce the orbiter fleet by at least one bird."

Two key administrative changes announced at JSC

Two key changes are being made effective today in the organization of JSC to reflect NASA's move into operations of the Space Transportation System by the end of the year.

The position of associate director within the Office of the Director has been created to provide additional top management support in the coming years, when 66 operationsl flights of the Space Shuttle are expected by the end of fiscal year 1987.

Henry E. "Pete" Clements, formerly Technical Assistant to the Director, has been designated Acting Associate Director. As such, he will be the third ranking official at JSC.

Clements, who has worked at JSC since 1962, has been Technical Assistant to the Director since 1976. During the mid-1960s, he was responsible for the completion of the Mission Control Center, and for its preparation to handle Gemini flights and Apollo tests through Apollo 7. He also served at NASA Headquarters from 1971 to 1975 as an executive officer in the Office of the Administrator.

In addition, the functions and personnel of the former STS Operations Program Office are being merged into the Space Shuttle Program Office. Glynn S. Lunney will continue as manager of the Program Office, with responsibility for the combined functions of the two organizations.

The current personnel assignments and organizational mail codes will remain in effect until the announcement of detailed organizational changes. The merger of the two offices is designed to reflect the progress of the STS program from testing to operational phases.

The move is essentially the capstone of a JSC reorganization which began in 1975. At that time, the STS Operations Office was established to allow the Shuttle Program Office to concentrate its efforts on preparing for the first four test flights. STS-1 was considered the most critical of those flights, and with it an item for the history books, the Program Office is now able to devote more attention to scheduling and integration for operational missions. During the six years from 1975 to 1981, it was the STS Operations Office which represented JSC in making schedules for customers and payloads on post-development missions.

NASA
Space News Roundup

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Editor..... Brian Welch

Interview

Walter Cronkite

A candid discussion with the elder statesman of broadcasting

He arrived at JSC by helicopter — arranging for Walter Cronkite to fly into Clear Lake City on Metro with 20 wide-eyed fellow travelers who have always wanted to meet him simply would not do, his producer explained — and minutes after touching down he was whisked to Bldg. 9A with an unmarked NASA security car as escort.

With Cronkite, it is as if observing a head of state. The former CBS anchorman himself portrays no such ideas of self-importance. He is amiable, easy to talk to, nods to technicians here and there as he shakes hands with those who approach him. The grip is firm, the eye contact sincere. But normally staid supervisors in 9A lined the windows of their offices to catch a glimpse of him, and even in this cavernous room, there was little doubt where the center of activity was. Cronkite had arrived, and his reputation had preceded him.

He came to JSC to film a spot for an upcoming segment of his CBS series *Universe*, and the topic this day was the Remote Manipulator System (RMS). Mission Specialist Bonnie Dunbar patiently explained the operation of the RMS trainer to him over the course of a 90-minute taping session. Before it was over, he took the controls himself, saying, "If you can play Pac Man, I guess you can do this too."

After the taping, he agreed to answer some questions:

Roundup: From what you've seen of the course of nations, talking with world leaders and understanding the politics by which nations interact with each other — when people begin to talk about a new era in space transportation, and easier access to space, do you think that type of thing can help ease world tensions in any way?

Cronkite: Well, not inherent into itself, no, I don't think so. It still depends upon man to make use of space in the proper way to achieve that kind of international comity through space travel. When we cooperate, as we did with the Apollo Soyuz Test Project with the Soviet Union, it's of *major* help. It shows that man can cooperate to further advance science and technology and improve life on Earth for all of us. But if they want to use that space for war, why, they'll use it for war.

Roundup: Do new areas to explore, potential new riches to reap — do those types of things tend to ease the situation here on Earth do you think?

Cronkite: Well, I think there again it's the same thing. We see the problem with the Law of the Sea right now, where we can't get together on a law for the sea because of selfish interests of various nations and what they want out of the vast mineral deposits to be exploited on the sea floor. There's no question those minerals are there, there's no question of the advantages of man getting out into space. It's really a question of how man chooses to use those opportunities to his advantage or disadvantage.

Roundup: You've seen a great many launches. How do you compare, or do you compare, a Saturn V to the Space Shuttle?

Cronkite: I think the Saturn V is a little more exciting as far as noise and vibration goes. Those who have seen the Shuttle and have not seen a Saturn V are pretty impressed with the Shuttle, of course. And indeed it is a noisy and spectacular sight.

Wired for sound and on camera, Walter Cronkite "flies" the remote manipulator arm in the Bldg. 9A trainer in the photo at left. Top right, Cronkite responds to a question, while in the photo at middle right, the camera zooms in for a closeup. At bottom right, Cronkite and Astronaut Bonnie Dunbar pause while sound levels are checked. *Photos by Charles Clendaniel.*

Roundup: Does the light show of a solid rocket booster liftoff excite you to a certain degree?

Cronkite: Yes, yeah, sure, it does. I think the most thrilling part was being able to follow the spaceship's ascent through the exhaust of those solid rockets, which you couldn't see, of course, before, when there wasn't any such thing. So you could follow the gyrations of it all the way up.

Roundup: In your profession, communications, you've see quite a number of different projects within your network and others, and within politics, which have to do with communicating with people and getting ideas across. At the same time you've probably also had the opportunity to observe spinoffs that seem to come out of NASA technology, and the budget cuts which have dogged the agency for several years. Question: In light of those things, is NASA beating it's own drum loudly enough?

Cronkite: No, I've never felt it does. But then, that's been explained to me by some NASA administrators down through the years as being a very difficult thing to do because of complications with patents and copyrights that reside with individual contractors, rather than in NASA. The difficulty of claiming successes with spinoff products from the space program that really have come from the laboratories and workshops of individual contractors seems to be the problem. I've never understood why that problem can't be bridged. It seems to me you could get around it. But there is still some question about that.

Roundup: There is a new policy which has come about in the last year or so whereby it may be possible to allow for investment from the private sector in space, and still allow them to have the proprietary information they need to justify such investments. What sort of things can you foresee coming out of that kind of agreement?

Cronkite: Well one of the things is a perfect ball bearing. That's, I think, the most obvious one. You probably couldn't make enough of them to speed railroad transport, for instance, or that kind of thing, but very finely tuned machinery would be possible. And maybe someday, when we get the real space platforms up there, many other things will be possible. But in the weightless environment, it ought to be possible to finally make the perfect ball bearing. When you do, you're going to come very close to perpetual motion. Close — of course you'll never totally achieve that, but you'll come a lot closer.

Roundup: Do you think, then, that a permanently manned space platform is the only logical next step in near-Earth activities?

Cronkite: I don't think there's any question about it. No question. I'm confident that we'll prove through the Shuttle that some of these manufacturing processes, healing processes even, whatever, are feasible, can be done, in an experimental stage, and when we do, it's logical to build the platform to do it on a regular basis. With commercial and private investments.

Roundup: If push comes to shove in the 1980s, which are beginning to look bleak for government agencies, would you think that near-space, Shuttle-type activities should take precedence over things like planetary exploration and the search for intelligent life elsewhere in the universe?

Cronkite: Oh boy, that's a judgement call I wouldn't want to make. I don't know . . . I don't think we ought to have to make that decision. I think the whole project in space is so vital to our future that we shouldn't have to make that Solomon's choice. The Space Shuttle is the next obvious move to near-space, and to not exploit it would be a terrible mistake. To slow it down would be a mistake. The program ought to be speeded up if anything. And I think to abandon the deep space probes would be a crime. So my judgement is you don't want to make that decision at all. You make another decision. You make the decision that this is more important than some of the military expenditures.

Roundup: But practically, how can NASA do that?

Cronkite: Well, I think it's basically got to be through public relations. You have to keep convincing the public that this is important. I think the public is concerned about many of the cutbacks in our expenditures and they must be made aware of what this means to NASA.

Roundup: Are you convinced that making the public aware does have a direct translation to money in the budget?

Cronkite: Oh, I don't think that's in doubt at all. Yes I am. I think it's probably the fact that an awful lot of congressmen don't hear at all from their constituents about the space program. It doesn't take many letters to convince a congressman that there's interest out there. But if there are no letters, and he hears nothing from his constituents, well, he fells free to vote that one down. I think feedback could help.

Roundup: In your talks with leaders around the world, has a consensus emerged that you are aware of with regard to the utilization of space?

Cronkite: I think it's along the lines of 'I wish we would.' As a matter of fact, I think a lot of them are trying to stir up more interest, even more overseas than here. They know they can't match this effort, of course. But they can contribute to other efforts. The Ariane rocket they're working on has widespread appeal to the people of Western Europe. They're working on it right now.

Roundup: Do you see Japan as an up and coming nation in space?

Cronkite: I wouldn't be surprised. Certainly they'll be getting into space very shortly.

Roundup: And then there is the question, as you brought up at the very first, of what can be done in space. And things don't look altogether risk-free for large space platforms with talk of orbiting battle stations and the like. Do you foresee a danger of moving into a confrontational posture in space? If so, what can we do about it?

Cronkite: Well, I thought that we were moving along toward that non-politicizing of space, keeping it free of weaponry. But I think we've slipped somewhat in that regard. We hear tales of killer satellites, although I don't know that there's that much evidence really. They remain allegations for the most part. We do know that there's a sizeable military interest in the Shuttle program and I would hope that in arranging any reapproachment with the Soviet Union at all, that would be one of the first points where we could get together and say 'Let's stop it now, before it goes too far.' Nations can get a vested interest. One gets a leadership role, which the other feels it has to match. It has to be stopped pretty quickly.

Roundup: You've no doubt met a number of astronauts, from the Mercury days on down to the Shuttle. What strikes you about this new generation of astronauts? Is it the presence of women? Is it their technical sophistication?

Cronkite: I suppose the most striking thing is that they are just average Joes and Janes. That has nothing to do with them — it has to do with the public attention focused on them. The earlier astronauts were in such a bath of publicity constantly that they couldn't act and react as human beings many times. This group here can to a greater extent.

Roundup: It's been said that you, James Michener and Jacques Cousteau are the first three people in line for a Shuttle ride if and when civilians are allowed to go up. Now that you've got a little RMS time, do you think that puts you up to number one on the list?

Cronkite: (Laughing) I'd sure love to think that I was going to get a ride in the Shuttle some time.

Roundup: Have you ever seriously thought that it might be possible?

Cronkite: Yeah, I thought it was almost a certainty when the development program was on its original schedule. Now I'm questioning whether they're going to get around to correspondents in time for me.

Roundup: Can you take three g's?

Cronkite: Oh I think so. You know, on the simulator I landed the Shuttle a couple of times with John Young. I greased her in pretty well. He gave me high marks.

Roundup: Well maybe with all of this simulator time you'll make it.

Cronkite: (Laughing) Maybe so. Maybe so.

Bulletin Board

Astronomy brown bag meetings set

A wide-ranging schedule of topics has been finalized for the JSC Astronomy Brown Bag Seminar meetings during the remainder of January and February. The seminars are held each Wednesday from noon to 1 p.m. in Bldg. 31, Room 193. On Jan. 27, Victor Bond of the Mission Planning and Analysis Division will discuss new computational methods in orbital mechanics. On Feb. 3, Tom Connell of Singer-Link will speak about the "intergalactic medium," and on Feb. 1, Mitch Polt from Rockwell International will discuss optical pulsars. On Feb. 17 there will be an open discussion at the seminar, and the following week, on Feb. 24, Ron Weber from the Lunar and Planetary Institute will speak about supernovae.

Golf Association tournament is Feb. 15

The 1982 season for the JSC Golf Association will begin with a team Fun Tournament Feb. 15 at the El Dorado Country Club. Golf meets will be spread throughout the year with two other fun tourneys, eight medal play tournaments to decide flight winners, and the 36-hole event at the end of the season to determine the Association championship. Member's dues of $34 cover the prize money for the 12 tournaments and league operating expenses. Applications have been mailed to 1981 members, and others needing applications may obtain them from Association president Larry Magers at x7204. Feb. 8 is the deadline to enter the El Dorado tournament.

TSPE changes location of program

The Bayou Chapter of the Texas Society of Professional Engineers, which is sponsoring an Engineering Week program on Feb. 18, has changed the location of the meeting from the Gilruth Recreation Center to the Bldg. 2 auditorium. The program will focus on professional engineering registration, and will feature Wendell Beard, P.E., and Joe Paul Jones, President of the TSPE, which is an affiliate of the National Society of Professional Engineers. The program will still begin at noon Feb. 18 in the new location.

JSC Skin and Scuba Club will meet

The JSC Skin and Scuba Club, the "Lunarfins," will hold its next regular monthly meeting at 7:30 p.m. Jan. 28 at the Clear Lake Park Bldg., located at 5001 NASA Road 1. All interested persons are welcome. For more information, call A. R. Rocha at x4393.

Black History Month observance planned

In observance of National Black History month, JSC will present a program commemorating the 56th annual recognition of the contributions black Americans have made to American life and culture. This year's programs will be held Feb. 11 and 12. A luncheon will be held from 11:30 a.m. to 1 p.m. Feb. 11 at the Gilruth Recreation Center with George Smith, president of Smith Pipe Co., as the keynote speaker. Two workshops are planned for the following day in the Bldg. 30 auditorium. The first workshop will run from 9:30 to 11:30 a.m. and the second will be held from 1 to 3 p.m. For more information, call Izella Dornell, x4551, Vanessa Jamison, x5121, or Allotta Taylor, x5266.

Best Little Gem Show comes to League City

The Clear Lake Gem & Mineral Society will present its seventh annual Gem and Mineral Show on Feb. 6 and 7 at the Civic Center, 400 W. Walker in League City, from 9 a.m. to 9 p.m. on Saturday and from 10 a.m. to 6 p.m. on Sunday. "The Best Little Gem Show in Texas" provides a little something for everyone, according to show organizers. Demonstrations of stone cutting and polishing, silversmithing and faceting of gemstones will take place throughout the show to illustrate how a dull, uninteresting rock can be transformed into a polished stone of exceptional beauty. For further information, contact D. M. Robinson at 483-4471 or 534-4696.

Rec Center has more classes, events

Registration is being accepted in the following leisure time classes at the Gilruth Rec Center.

Karate — Taekwando is the name of the game in this class which meets on a continuing basis on Mondays and Wednesdays from 5:30-7:00 p.m. Cost is $18.00 per month.

Ladies Exercise — Designed to get you in shape after the holidays, this class meets on Tuesdays and Thursdays from 5:15-6:15 p.m. Cost is $12.00 per month.

Square Dancing — Vacancies still exist in the square dance class which meets on Thursdays from 7:30-9:00 p.m. Cost is $25.00 per couple.

Defensive Driving — Learn to drive safely in the Houston traffic and qualify for a 10% reduction in your auto insurance at the same time. Next class meets Saturday, 27 February from 8:00 a.m. to 5:00 p.m. Cost is $18.00 per person. No phone registrations and class is limited.

Adult Beginning Tennis — Designed specifically for the adult beginner who wants to learn to play tennis, this 8 week course meets on Tuesdays from 5:15-6:45 p.m., beginning February 9. Cost is $24.00 per person.

Adult Intermediate Tennis — This course, designed for the adult who has had some formal instruction and desires to refine a particular aspect of their game, meets on Thursdays, from 5:15-6:45 p.m., beginning February 11. Cost is $24.00 for this 8 week session.
Other announcements are as follows:

1982 EAA Cards are now available for contractor employees at the Rec Center. You may obtain a new card by presenting your badge. At the same time, you may obtain a card for your spouse. Dependent cards are obtained by separate application, and dependents must be at least 16 years old to use the Rec facility.

EAA Dinner Theatre — Tickets are now on sale at Building 11 for the next edition of the EAA Dinner Theatre. The play "Little Mary Sunshine", by Rick Besoian is a turn of the century melodrama. Social hour is at 7:00 p.m., roast beef dinner at 8:00 p.m. and the play begins at 9:00 p.m. Cost is $10.00 per person and seating is limited. Performance dates are 29th and 30th of January.

Children's Movie — Tickets are now on sale at Building 11 for the next children's movie to be held from 10:00 a.m. to 12:00 Noon on February 6th. Feature presentation is the Walt Disney movie "The Aristocats". Cost of $1.00 includes the movie, cartoons, popcorn and coke.

JSC vs UH/CLC and Ellington AFB — Due to the success of our year long one on one competition with UH/CLC, we have expanded the program this year to also compete against neighboring Ellington AFB. Sports under consideration include basketball, volleyball, table tennis, softball, tennis, flag football, golf, racquetball and running. If you are interested in representing JSC in any of these sports, call Carl McCollum at x3944.

Club Data — The Rec Center would like to compile data on all of the clubs which are available to JSC employees. If you are a member of a club at JSC, please call Carl McCollum at x3944 so we can make your club information available to all employees.

Cookin' in the Cafeteria

Week of January 25 - 29, 1982

Monday: French Onion Soup; BBQ Sliced Beef; Parmesan Steak; Spare Rib w/Kraut; Chili & Macaroni (Special); Ranch Style Beans; English Peas; Mustard Greens. Standard Daily Items: Roast Beef, Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday: Split Pea Soup; Meatballs & Spaghetti; Liver & Onions; Baked Ham w/Sauce; Corned Beef Hash (Special); Buttered Cabbage, Cream Style Corn, Whipped Potatoes.

Wednesday: Seafood Gumbo; Cheese Enchiladas; Roast Pork w/Dressing; BBQ Link (Special); Pinto Beans; Spanish Rice; Turnip Greens.

Thursday: Beef & Barley Soup; Roast Beef w/Dressing; Fried Perch; Lasagne w/Meat; Chopped Sirloin; Chicken Fried Steak (Special); Whipped Potatoes; Peas & Carrots; Buttered Squash.

Friday: Seafood Gumbo; Fried Shrimp; Baked Fish; Beef Stroganoff; Fried Chicken (Special); Okra & Tomatoes; Buttered Broccoli; Carrots in Cream Sauce.

Week of February 1 - 5, 1982

Monday: Cream of Potato Soup; Franks & Sauerkraut; Stuffed Pork Chop; Potato Baked Chicken; Meat Sauce & Spaghetti (Special); French Beans; Buttered Squash; Buttered Beans. Standard Daily Items: Roast Beef, Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday: Navy Bean Soup; Beef Stew; Liver w/Onions; Shrimp Creole; Smothered Steak w/Dressing (Special); Corn, Cabbage, Rice, Peas.

Wednesday: Seafood Gumbo; Roast Beef; Baked Perch; Chicken Pan Pie; Salmon Croquette (Special); Mustard Greens; Italian Green Beans; Sliced Beets.

Thursday: Beef & Barley Soup; Beef Tacos; Diced Ham w/Lima Beans; Stuffed Cabbage (Special); Ranch Style Beans; Brussels Sprouts; Cream Style Corn.

Friday: Seafood Gumbo; Fried Shrimp; Deviled Crabs; Ham Steak; Salisbury Steak (Special); Buttered Carrots; Green Beans; June Peas.

* Menu subject to change without notice.

Roundup Swap Shop

Ads must be under 20 words total per person, double spaced, and typed or printed. Deadline for submitting or cancelling ads is 5 p.m. the first Wednesday after publication. Send ads to AP3 *Roundup*, or deliver them to the Newsroom, Building 2 annex. No phone-in ads will be taken. Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads.

Property & Rentals

For rent: One bedroom in a three bedroom house in Friendswood, kitchen and laundry privileges, all bills paid, $170/mo. Call Jeff, x7429 or 482-5393.

For lease: 2-2-2 condo, 2 bars, fireplace, all appliances, storm windows. Call 488-2804 after 5 p.m.

For rent: 3-2-2 two story brick, Miramar Seabrook, rental available Feb. 1, $475. Call 333-3527.

For rent: condo in Jackson Hole, Wyoming, sleeps 6, everything except food provided, available Feb. 14-21. Call N. G. Roy, x3421 or 488-3967 evenings.

For sale: 80 acres, or can be subdivided into 40 acre tracts, Burnet Co., trees, creek, hunting, owner financing. Call Steve, x2001.

For sale: 2 BR frame house with 1,100 sq. ft. building, near Gulf Fwy., suitable for income, small business, etc. Call 944-6513.

For sale: 4/10 acre in Breckenridge, Colorado, easy access, water and septic permit, fully wooded and flat terrain, $28,000. Call Beck, x4366.

For lease: 55' boat slip at Wharf in League City, $125/mo. or $140/mo. with utilities. Call Irene, 795-4300.

For rent: Galveston By-The-Sea condo, 2 BR, furnished, for rent by day, week or month. Call Clements, 474-2622.

Cars & Trucks

For sale: 1973 Dodge Maxivan, air, PS/PB, AM/FM, 360 V8, 67K miles, $2,500. Call 482-7156.

For sale: 1972 Mustang parts: hood, 302 intake, Autolife 2100D carb, front valence (Mach 1), bumpers, left door, front console interior parts. From restored car. Call M. Drews, x4326 or 996-0413.

For sale: 1963 VW Bug, nearly perfect, collector quality. Call 486-4112 after 5 p.m,

For sale: 1978 Toyota Landcruiser, 46K miles, mag wheels, lift kit, hard top w/sun roof, soft top, $5,500. Call 333-5536 after 6 p.m.

Cycles

1981 Honda CR125R motocross, never raced, excellent condition, $1,100. Call 332-5394.

1976 Suzuki RM 370, leathers, helmet, gloves, boots, all good condition, $360. Call John, x5553 or 944-4997.

1975 three wheeler, black. Call 986-5602.

Boats & Planes

1975 Raycraft 16' bass boat, just overhauled 1976 Johnson O/B, plus drive on trailer. Good price. Call x4730 or 481-2023.

FAA pilot ground school, $10. Instructor 2 seat trainer available, low rates, Gulf Coast Aero Club. Call Mark, x4436 or 480-2634.

Video & Audio

Akai GX-28D dual motor reel to reel, glass and xtal ferrite heads, auto reverse, 7" with 2 take up reels and 11 tapes, $355. Call M. Drews, x4326 or 996-0413.

Sony TC-K71, 3 head cassette, sendust and ferrite heads, closed loop, dual motor/capstan, $275. Call M. Drews, x4326 or 996-0413.

JBL speakers, 14" woofer, 2" tweeter, walnut enclosure with stands, perfect condition, $250/pair. Call 488-3966.

Hitachi AM/FM stereo Datsun Z car radio, $40. Pioneer under dash FM/8 track car radio, $40. Call Speier, 333-2263.

Computers

BASE 2 home computer printer, tractor and friction feed, 10 character sizes, upper and lower case, graphics, 53 software commands, all 4 interfaces, $250. Call 482-5176.

Wanted

Roomate to share house close to JSC starting Feb. March or April. Call Chuck, 480-1835 evenings.

Used B&H slide cube projector for spare parts. Call Dick Mayo, 534-3114.

Want to join carpool from Astrodome area to JSC, hours 8-4:30. Call Cathy, x6364.

Want someone to ride with from Kings Park Apt. No. 323 to JSC. Hours 7:30 a.m. to 4 p.m. Willing to stay until 4:30. Call Debra at x5595.

Large dog house. Call x2945.

Want female roomate, non-smoker, to share 2-1 1/2 apartment in Webster w/same. $150 including utilities, plus $125 deposit. Call Kay, 483-5049.

Want skiers interested in trip to Red River over Washington's Birthday weekend, Feb. 13-15. Call Ann Pettit at x4905 for more information.

Pets

Looking for beautiful silver AKC registered female toy poodle for breeding and pick of litter. Call 333-2717 evenings.

Male German Shepherd, $25. Call x2353 or 334-1645.

Musical Instruments

Music Mate Electronic Keyboard, four octaves, dynamic and pitch controls, $295. Call 474-3127.

Silvertone electric bass guitar, single pickup, good condition, $100. Call 474-3389.

Upright piano, good condition, $500. Call 482-3989.

Household Articles

Double bed, new, never used, $150. Call Marian, x4991 or 482-7019 after 5 p.m.

Brunswick pool table, 1" slate, make offer. Call x4730 or 481-2023.

Whirlpool dishwasher, $10. Call 482-7156.

Room-size carpets, $20 to $250, drapery rods, single bed, child's cabinet, miscellaneous baby articles. Call Beck, x4366.

Apartment-size washer and electric dryer. Washer rolls to kitchen sink for easy hook up. New—$600, will sell for $300. Call Rita, x2417 or 480-5130.

Wall gas heater, light fixtures, medicine cabinet, drapery rods, make offer. Call 333-4669.

Used sofa w/matching love seat. Brown vinyl, separate cushions, fair condition, $70 sofa, $50 love seat, $100 for both. Call Gary, x4941.

Miscellaneous

Fly to Denver for only $99, Jan. 29 or later, on special discount ticket, only 1 available. Call Alter, x5111 or 474-4447 after 8 p.m.

Found: San Juan Capistrano medallion in Bldg. 1 lobby. Owner may claim by calling x3831 or x3741.

One Pan Am Airways 2 for 1 boarding pass. Make offer or swap for ??? Call Jim Whitmore, x7241 or 7242.

Garage sale, Jan. 16-24. Camping equipment, tools, 3 person raft, tow chains, clothes, etc. Call John, x5553 or 944-4997.

Snow chains, 78 x 15, used one time, $20. Call John, 5553 or 944-4997.

Large wooden airline approved shipping crate for dogs, $10. GE record player, plays but needs cleaning, $25. Call 947-0319 after 5 p.m.

LWB aluminum camper top, needs some work, $40; pool table, $40; car-top carrier, $40; 1965 Mustang, $2,000. Call Ray, x5961 or 488-2316.

Yourdon's book, Techniques for Program Structure & Design. I received 2 copies. Call Jim, x4947.

Assorted scuba gear, 16' fiberglass canoe, $250; Conn guitar, $150; two 10 speed racing bikes, $150 and $75; call for details at 481-5203 after 6:30 p.m.