Will the space station go the way of the Shuttle?

Under constant budgetary pressures from the White House and Congress, the leadership of NASA is threatening to cancel the U.S. space station program. Marsha Freeman reports.

In his State of the Union address on Jan. 25, 1984, President Reagan mandated that the National Aeronautics and Space Administration (NASA) build and deploy a permanently manned space station in Earth orbit, within a decade. Now, due to budget slashing by both the Reagan White House and the Congress, that station will be at least two years behind schedule, if it is built at all.

Since the beginning of the space age, the dream of all visionaries was to have man colonize other parts of our solar system. It has always been recognized that in order to do this, we will need transportation to Earth orbit, and a facility there for transfer to interplanetary spaceships, and the scientific research preliminary to living beyond Earth.

The Apollo program gave the aerospace industry the mission to develop the first rockets to take man into space. Leftover Apollo hardware created Skylab as the United States' first space station, in 1973. But a station that will last decades, and can be manned at all times, has always been on the agenda.

Today, there is again a consensus in the space planning community that the next crucial step for man in space is the development of the Moon, and colonization of Mars. Both the National Commission on Space, headed by Dr. Thomas Paine, and presidential candidate Lyndon LaRouche, have laid out the Moon/Mars mission as the political goal of the next millennium.

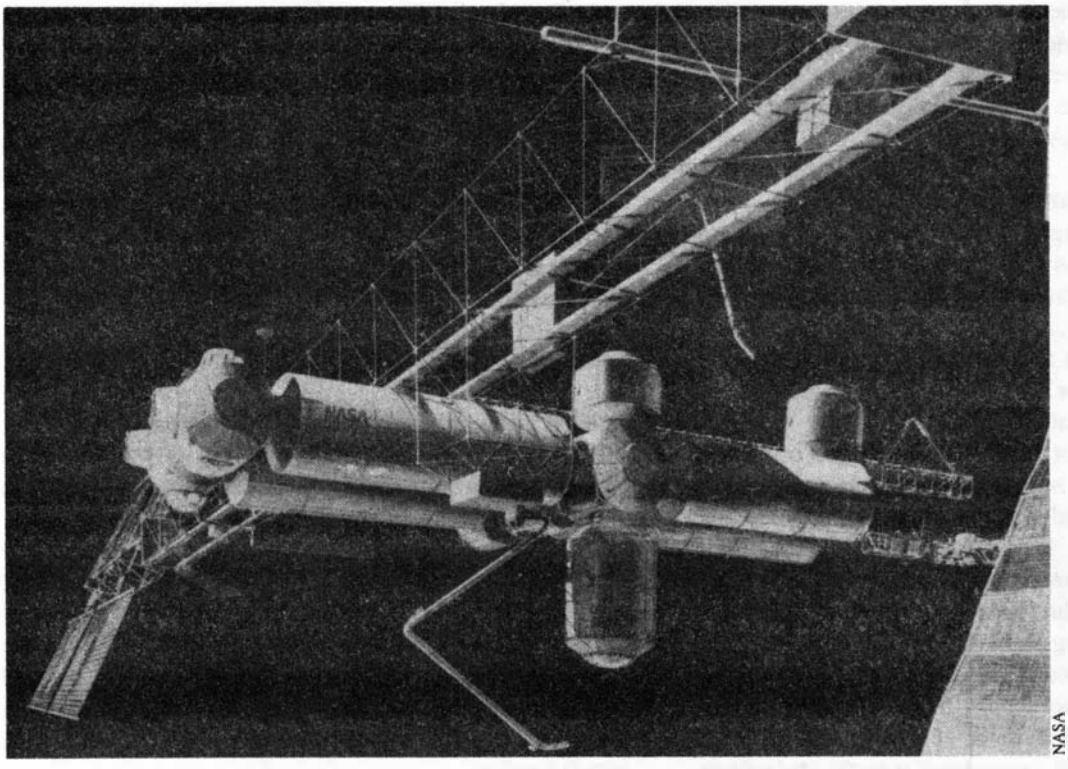
But the long-awaited space station is under siege. Recently, officials of the space agency stated publicly that if the current $767 million request for Fiscal Year 1989 now before the Congress, is cut further (NASA had originally projected a space station budget of $1.8 billion for FY89), they will cancel or indefinitely defer the project. The station has already been downsized and the current design has been described as a "minimal" station. NASA will not shrink the station any further.

Andrew Stofan, the head of the NASA space station office who recently resigned, has informed all those involved in making decisions, that each year of delay increases the ultimate cost of the station at least $1 billion. While no one could make the case that the cutting of near-term budgets and delay of the program will actually "save money," that is the policy being followed in Washington.

In addition to budget problems, the space station program has suffered from interference and attempts to "micro-manage" it on the part of Congress, misguided policies on the part of the Department of Defense, and a Reagan policy that is arrived at through consensus by people who have no business making space policy.

Recently, the President's emphasis has focused on the magical "private sector" commercialization of space. This has produced a situation where there is even less leadership in the government program than before, and the station has been pitted against an imaginary private sector supposedly chomping at the bit.

Unfortunately, the space station is not the first major space program undergoing huge budget cuts, schedule stretchouts, engineering compromises, and missed opportunities. As Andrew Stofan himself has asked, will we learn from experience, or will the space station go the way of the Space Shuttle?



This Martin Marietta concept for Phase I of the space station focuses on the laboratory and habitation modules at the core of the facility. They are connected by four resource nodes. To the right is the Japanese Experiment Module.

The Shuttle experience

Sixteen years ago, and during his first term as NASA administrator, Dr. James Fletcher was at President Richard Nixon's side when he announced that the Space Transportation System would be developed, to shuttle astronauts and scientists back and forth to Earth orbit.

Less than six months after that announcement, the Office of the Budget, then headed by George Shultz, cut the space agency's budget by half a billion dollars, out of a total budget of less than $4 billion. Changes were made in the Space Shuttle design, to "save money," which compromised safety and made Shuttle operations more expensive.

The Shuttle program eventually fell two years behind schedule. As money was cut, crucial sub-system tests were eliminated; problems became unearthed only when they became harder to correct. Engineers and designers did not end up with the kind of reusable spacecraft they thought necessary for the nation, and the program ended up showing $2 billion in cost overruns.

The excuses that were used to stretch out and cost cut the Space Shuttle are not any different from those used today against the space station. Saboteurs claimed that the United States did not need a manned presence in space because robots could do things more cheaply; that the manned program would take money away from science projects; that it would cost too much, considering the budget crisis; and that NASA did not have a clearly defined need for the Shuttle. Today, space station critics have simply added the adage that there is no reason to start a new manned space initiative like the station now, because the Shuttle isn't even flying again yet.

Throughout the 1970s, NASA swallowed each budget cut in the Space Shuttle program, knowing that without the Shuttle, there would be *no* U.S. man-in-space program, since the Apollo-era expendable Saturn V and other manned technology had simply been thrown away. Finally, after years of uncertainty, President Carter was reportedly convinced to provide the money to complete the development because he was told its capabilities were needed to verify arms control agreements.

Today, the space station is at a crossroads. Speaking at a conference on lunar bases in Houston on April 7, Deputy Administrator Dale Myers stated that at NASA, "We think there's a place where the space station should be cancelled." A month before, speaking before the House authorizing committee, Administrator Fletcher said that cuts in the space station budget could force the program to be "abandoned or deferred indefinitely."

He added: "Without the space station, the U.S. space program will be dead-ended."

There is no program now under consideration in the long-range planning of the space program that could be done without a space station. The Space Shuttle stays in orbit for about a week. During that time, only limited knowledge can be gained on the biomedical effect of near-zero gravity on humans and other living things, the new technologies needed for materials processing in microgravity, astronomical and Earth observations that require human judgment and inter-

vention, and other activities.

If the administration and Congress decide to try to squeeze the space station into an inadequate budget, this time they may find that, unlike the Space Shuttle, the program will simply be cancelled by NASA.

The post-Shuttle manned initiative

When the Apollo program was safely on its way to the Moon, a number of groups of planners proposed that the next step in the manned program should be a reusable spacecraft for ready-access to space, and a station where the spacecraft could dock, to carry out a variety of activities. When the Nixon budget allowed for only one initiative, NASA chose to start with the transportation system.

Within days of the first flight of *Columbia* in April 1981, NASA began raising the issue of the station. In an interview with this author, published in *Fusion* magazine after the first flight, Shuttle pilot Capt. Robert Crippen stated, "We need to put a United States man and woman in space permanently. . . . In fact, when John [Young] and I . . . go to Washington, we plan on trying to make that point very heavily both to the administration and the Congress."

In 1982, Administrator James Beggs, speaking before the Detroit Economic Club, said, "I believe that our next logical step is to establish a permanent manned presence in low Earth orbit. . . . We think that such a station can be built and placed in orbit by 1990."

In a September 1982 interview with *EIR*, Associate Deputy Administrator Phil Culbertson stated, "The idea of a space station, besides being very old, was very solid in 1970 when we started detailed work on the Space Shuttle. The Space Shuttle and the space station were considered a matched pair. There was a big debate about which one we should proceed with first. . . . We decided to start with the logistics and the Russians decided to start with the space station." Now it is time to add the "other jewel to the crown," he stated.

As time wore on and interagency groups delayed the decision, the dream of having the station on-line for the 500th anniversary of the discovery of America faded. But NASA's pushing, and the President's genuine support and excitement about space exploration, finally led to the 1984 initiative.

How we got where we are

At the beginning of March of this year, the staff director for the Senate Science, Technology, and Space subcommittee stated that the space station is in "intensive care," and that prospects for the full $967 million request for FY89 are "dim."

From the beginning of the approved space station program, Congress has tried to "micro-manage" the project. When the FY85 station funding was under consideration, a House committee decided that $15 million out of the $155 million total for the station (of an original request of $235 million) must go to study a "man-tended" facility, as opposed to the President's "permanently manned" facility.

At that time, Rep. William Green (R-N.Y.) specifically stated that this should be done so that we would not end up with a half-finished station that would not be used, but would have choices if "we get into a financial bind." In the same budget cycle, the Senate Appropriations Committee directed NASA to complete a study on the role of automation on the station, and barred NASA from awarding phase-two contracts to industry until the study was complete. This set NASA back two months on the station schedule.

By the middle of 1985, it was becoming clear that the station NASA thought could be built for a total of $8 billion, was going to cost more money. This was a result of more detailed planning based on more comprehensive data. That year, the Office of Management and Budget (OMB) put a cap on space station costs, and forced NASA to change the design of the station to try to stay within the $8 billion estimate. NASA changed the station design, and in May of 1985, Dr. Fletcher announced that the station would be "more modest than we'd planned."

The OMB also "suggested" that the FY87 budget for the space station be $100 million, and that the project be delayed three years. As a compromise, the White House agreed to a 12-18 month delay, to accommodate to cuts in the NASA station funding.

At the beginning of 1987, NASA gave a briefing to the OMB on the idea of building the space station in two phases, with phase one costing $12.5 billion, and the second phase, about $4 billion. That seemed like a fairly good position to support, considering that, in January, the Congressional Budget Office proposed to cancel the station and "save" $8.9 billion!

As Gramm-Rudman and budget madness took over Washington, pro-space authorizing committees in the Congress started to scramble to save the station. In December of 1987, the Congress took $100 million from the replacement orbiter for the Space Shuttle fleet, to get the FY88 station budget up to $425 million. Of that, they legislated, $225 million could not be spent before June 1, 1988.

Congressional 'micro-management'

The budget situation has only worsened, both in the amount of money the White House is willing to allow NASA to ask for, and in the Capitol Hill pressure on funding. In January, NASA was told that to be able to spend the remaining $225 million in the FY87 budget, it had to "rescope" the station program because the budgets NASA was planning for in the next two years were unrealistic, and NASA had to tell Congress how the space agency would build the station with less money.

Defense Daily reported on Jan. 15 of this year that the FY88 budget level had set back the launch of the first element of the space station complex by one year. They warned that the "rescoping" study NASA was doing was likely to lead to more "rescheduling."

On Jan. 25, *Aviation Week and Space Technology* magazine reported that NASA's study of "rescoping" the program had produced a possible "savings" of $600 million by delaying the deployment of various integral pieces of hardware, but that this "savings" would only lead to higher operating costs.

The Congress continues to insist that NASA plan for the contingency that funding for the space station might be terminated before completion of the entire complex, and has held $90 million in unspent space station money from last year hostage, pending a NASA plan to establish a man-tended capability as early as possible in the station assembly sequence.

Originally, NASA planned to have a spread of about 12 months between the launch of the first infrastructural element of the station, and the initial man-tended (short visit) capability. Before people can live and work in orbit, the module where they will live, the solar panels that supply their electrical power, the truss structure to which the modules will be attached, the logistics modules with supplies, as well as other pieces, should be in place. The entire configuration should also be structurally symmetrical for purposes of stability.

NASA is being pushed into agreeing to deploy a manned piece, such as the laboratory module, earlier than deemed suitable, because of the Congress's interference into decision making, and their assumption that the entire station will not be built—as if they had no say in the matter.

On Feb. 25, half of the $90 million hostage money was released, with the understanding that NASA would continue working to figure out how to do what the Congress was requesting. One NASA source described this as "a game of chicken" between the Congress and the space agency, as NASA was to run out of money that week, and Dr. Fletcher was threatening to halt all work on the program.

NASA will receive the other $45 million when Congress receives the "rescoping" plan. This plan, which takes into account the cuts now certain in the FY88 and FY89 budgets, will likely delay the launch of the first station element station another year, to the first quarter of 1995, according to NASA spokesman Mark Hess.

NASA is now nearly $2 billion behind in spending, according to its original 1985 plan. The President, in his recent space policy initiative, pompously said that the space station should have $6 billion allocated over the next three years. But the administration itself has cut NASA's station request by half in each of the past two years, and has not yet put its money where its mouth is.

Industry in space

In 1982, before President Reagan approved the NASA space station program, Dr. Maxime Faget founded Space Industries, Inc. in Houston. Faget worked for NASA since its founding, and holds the patent for the design of the Mercury capsule, which orbited the first Americans in space, and was the basis for the Gemini and Apollo capsule designs.

Space Industries, Inc. (SII) was established to develop and build an Industrial Space Facility (ISF) which is a small, automated, space processing module. The ISF was designed to fit inside the payload bay of the Space Shuttle and be left in orbit as a free flyer. Commercial enterprises were to rent or lease space on board the ISF to produce their products. The factory is designed to work on its own for a period of four to six months, when it will be visited by astronauts from the Shuttle, who will deliver new raw material to the ISF, and remove finished, processed products. The factory will have furnaces and equipment to make new metal alloys, crystals, biological materials, and other commercial materials.

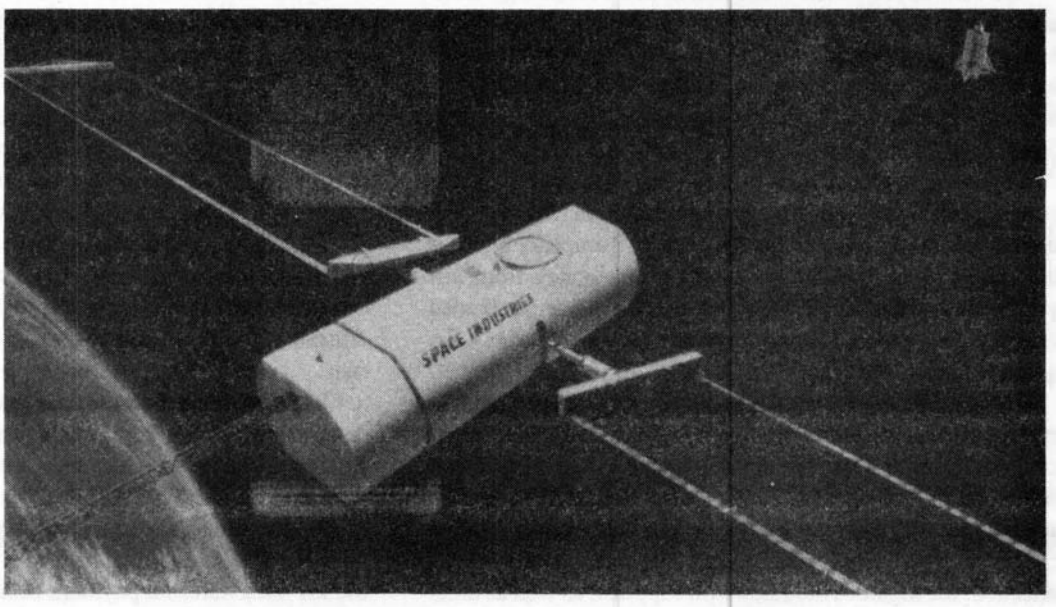
In 1984, NASA announced that a Memorandum of Understanding (MOU) had been signed with SII to explore the feasibility of developing and demonstrating the ISF, just weeks after the space station initiative was approved. In 1985, SII signed a second Memorandum of Understanding with NASA under which the space agency offered to launch the ISF on a deferred payment basis, to be reimbursed when the commercial factory was running and generating revenue.

NASA Administrator James Beggs stated at that time, "We hope the ISF will be the first of many such platforms to be funded and built by private industry that will complement the permanently manned space station and lead eventually to an industrial park in space." SII stated that the technology developed for their automated factory would lay the basis for similar facilities needed later on in the station, and SII and NASA agreed to share such information.

After the MOU was announced, the *Houston Post* characterized the agreement as a "sweetheart deal," since no other commercial space customer is allowed to defer launch payments. Dr. Faget stated at a press conference, however, "NASA is not supplying us any seed money for this project." SII explained that the Industrial Space Facility could become a part of the overall space station complex, in the mid-1990s. The MOU stated, "The ISF is viewed by NASA as a complementary capability to the space station. NASA will take full advantage of the ISF's capabilities if appropriate, cost effective, and consistent with NASA policies."

In 1985, this author did an interview, published in *EIR*, with Dr. Joe Allen, executive vice president of SII, who was an astronaut for 18 years. At that time, before the *Challenger* explosion, SII planned to orbit its first space factory module in 1989, five years before the space station would be deployed. Allen stated, "If there is anything unique in what we're doing, it is that we have very, very optimistic hopes of doing it using privately invested dollars, not to be confused with the investment of tax dollars through the appropriations and authorizations of the Congress."

As work on the ISF progressed, and the commercial space community had to adjust to a two-year Space Shuttle downtime and economic and financial uncertainty in general, however, SII's hopes of attracting paying customers to lease space on their ISF began to evaporate.



Space Industries' Industrial Space Facility, which will have solar panels for its own power supply, will be deployed from the Space Shuttle.

A good idea gone political

In early 1987, the Houston Area Research Center's Space Technology and Research Center committed itself to putting together design teams from faculty and graduate students at four participating universities to conduct initial studies of fluid mechanics in microgravity, to lay the basis for future commercial corporate participation. It became clear that the technology available for microgravity materials processing had not matured to the point where investors would risk venture capital on space manufacturing.

Recently former NASA space station head Andrew Stofan summarized for *Aviation Week* magazine what happened in mid-1987 to the ISF proposal: "Originally, Max [Faget] came in with a commercial venture. . . . NASA said it would give him a free lunch. He would pay us back later out of his profits. He went out and could not find any customers. He could not raise any money, so he came back to NASA and asked for money or a guarantee to raise money. When NASA didn't jump at it, [his staff] went through the political process."

The "political process" meant going to Washington and lobbying the "free enterprise" White House economic advisers, and Capitol Hill. In September, SII spokesmen made a presentation to administration officials, and called for government-guaranteed loans, to get their project off the ground. Of course, the White House's radical free marketeering space policy specifically prohibits loan guarantees, as subsidies.

In November of last year, the House Appropriations subcommittee, considering the FY88 budget, directed the Department of Defense and NASA to study "an industrial space facility, including requirements, contracting strategies, and arrangements for cooperative utilization." The micro-managers in Congress again reared their ugly heads. Before Christmas, the Congress had directed NASA to spend $25 million to explore the leasing proposal.

Meanwhile, in December NASA released its report and stated, "The use of the Industrial Space Facility would require generous augmentations to the NASA budget, increase the risk of failure during payload operation, and meet few scientific requirements of the agency." The handwriting on the wall was becoming clearer—Congress would try to pull funding out of the already-crippled space station program, to have NASA support a man-tended materials processing factory instead. On Dec. 31, Fletcher wrote to James Baker protesting the idea that NASA would be called upon to bail out the ISF.

At a meeting on Jan. 7, reported two days later in the *New York Times*, the White House Economic Policy Council proposed to the President that the government use federal funds to lease part of the ISF, since industry was not willing to do so. Writer William Broad remarked, "Experts . . . said such a leasing agreement . . . might mark the end of the beleaguered NASA space station."

Broad continued, "Some congressmen, disappointed with the space agency's recovery from the *Challenger* disaster and eager to cut the federal government's budget deficit, have already said they would scrap the big station in favor of the small one."

At the Economic Policy Council meeting, the proposal put forward was for NASA to spend $140 million per year, for five years, starting in 1991, to lease 70% of the space on the ISF. Hardly coincidentally, this $700 million, over five years, is exactly what the ISF is supposed to cost to build.

Feeling the slide toward the inevitable, Fletcher had sent a letter Jan. 6 to the House Appropriations Committee protesting that there are "serious policy, legal, schedule, and budgetary difficulties" with this proposal, and that NASA "does not now have identified needs that would justify a

major commitment."

One NASA official, summarizing the outcome of the Economic Policy Council decision, stated, "We would be directed to spend money we don't want to spend, to build something we don't want to build, for purposes for which there are no requirements in that time frame."

Nonetheless, there was little chance that reason would prevail. The administration's economic gurus were looking for a way out of the space station commitment; certain figures on Capitol Hill such as Sen. William Proxmire (D-Wisc.) became ISF supporters for the same reason; and the Commerce Department space commercialization fanatics saw the ISF as an opportunity to assert their position in a power-grab for making space policy. On Jan. 27, *Defense Daily* commented that the aerospace industry and NASA see the lease plan as "window-dressing for what is, in effect, a subsidy."

The real reason for the sudden rush of congressional support for the small space factory was made clear in a Jan. 21 letter to Dr. Fletcher from Proxmire and Edward Boland (D-Mass.) who heads the House subcommittee that appropriates NASA's budget. They state: "It was our contention originally, and we have maintained that position for the past four years, that the space station that NASA wanted to build—and, in fact, even the descoped station which NASA is currently hoping to build—would increasingly be subject to the vicissitudes of an ever tightening budget crisis."

The letter ended, not with a promise but with a threat—"It would be our hope that you will bring together . . . new proposals for the use of the ISF and a rescoping and reallocation of resources devoted to the basic Block I [phase-one] space station. . . . $90 million shall be held in reserve [hostage] until these issues are settled." Very simple. NASA would not get the money that had already been authorized and appropriated to continue the work on the space station, unless it submitted to this ingenious government-subsidized free enterprise.

In the meantime, on Feb. 11, the White House released President Reagan's unheralded new National Space Policy, "designed to guide United States' activities in space well into the future," according to the White House. This "policy" was arrived at by the same consensus of ignorance, namely, the Senior Interagency Group (SIG)—Space, that delayed the decision to replace the Shuttle orbiter *Challenger* for eight months.

SIG (Space), as it is known, includes three agencies involved in space policy—namely NASA, the Department of Defense, and the National Security Council—and a host of superfluous government departments, such as Commerce, Office of Management and Budget, Transportation, and others that have no business making space policy, and represent special interests or other agendas.

Aside from countless platitudes about maintaining U.S. leadership in space and expanding human presence beyond Earth orbit, the policy "recognizes the existence of a separate commercial sector" and instructs all government sectors to "encourage, to the maximum extent feasible, the development and use of the United States' private sector capabilities without direct Federal subsidy."

The White House pressure, combined with congressional blackmail, had its effect. On Feb. 24, NASA announced that it will seek to lease 70% of a "commercially developed space facility" (CDSF) for five years, to be orbited no later than the end of 1993, to be deployed on a single Shuttle launch, and operate in a free-flying mode (without astronaut intervention) for up to six months at a time. Since it is illegal for NASA to commit to such a non-competitive project, a request for proposals has been issued, and more than 40 companies have shown interest in competing to build this commercially developed space facility.

Actually, assuming NASA had all the money it needed, there are real experiments that can be done on such a mantended facility. At a conference sponsored by the aerospace industry in early March, Al Diaz from NASA reported that the space agency will use the CDSF to qualify six facilities that will later be used on the space station. These include a multizone furnace, combustion chamber, fluid physics/dynamics facility, containerless processor, advanced protein crystal growth facility, and an apparatus for biotechnology research.

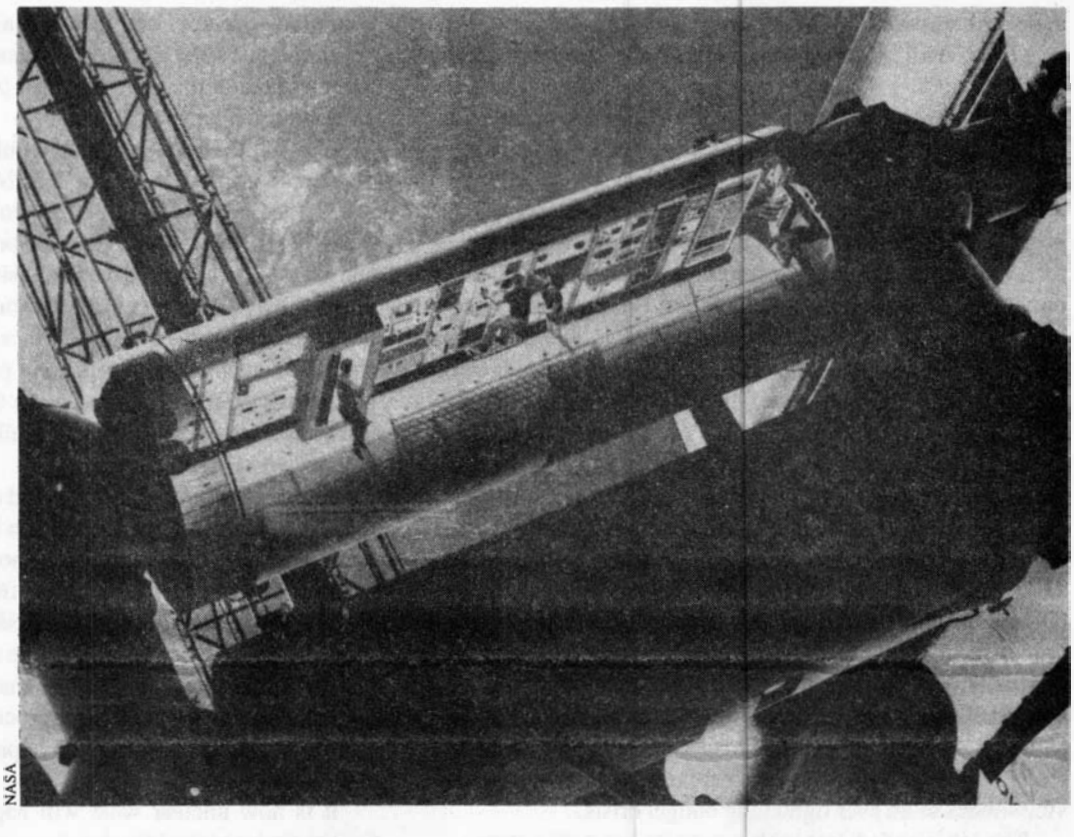
It is now unclear what will happen to the commercial facility that is picked for development in terms of the NASA budget. Though the House Appropriations Committee had included $25 million in FY88 in the NASA budget for the ISF, that money was never authorized! This small wrinkle will have to be worked out between the congressional committees.

At a hearing on March 25, Dale Myers of NASA stated that the government lease payments "are only to begin upon delivery and certification of a flightworthy CDSF, no later than 1993." But, as *Defense Daily* comments, the government will authorize money before then, in order to give private investors "confidence" in the project.

A small, automated space factory is certainly a worthwhile capability to have. If it can be orbited before the space station, all the better. But if it is used as an excuse to delay or eliminate the space station, it is not a capability, but a political football. It should not be advertised as proof that "private enterprise" is ready to commercially develop space industries, because that cannot be done until the government provides the needed transport, other infrastructure, and R&D base to make that real.

The military misses the boat

Four months after the President's announcement of the Strategic Defense Initiative (SDI) on March 23, 1983, then Undersecretary of Defense for Research and Engineering Richard De Lauer stated that there is no military use for the space station that cannot be done better by unmanned space-



U.S. space station laboratories and technology will provide an environment for basic research that will be crucial for materials processing, biology and life science research, and other experiments, potentially for both civilian and military applications.

craft. Revealing the real reason why the Defense Department would not support NASA's lobbying for a station, De Lauer stated, "We will hold your coat. But the minute you volunteer you end up funding it."

This position, holding that the station would have no military use, which the Defense Department held up until 16 months ago, somehow ignores the fact that the Soviets have had their military men in space stations for the past 15 years, and have had at least two entirely dedicated military stations.

In October 1983, Dr. Fletcher led a study to investigate the technology needs for the brand-new SDI. His study concluded that manned flights would be needed for the construction and support of large orbiting radars, command and tracking systems, and directed energy systems.

At the same time, the Air Force Scientific Advisory Board, the Naval Research Board, and the Army Science Board also completed a similar joint study and found that new military missions "justify Defense Department participation on a manned national space station as a user interested in exploiting technology opportunities and minimizing technological surprise." The report recommended, "Should a decision be made to proceed with a space station, the Defense Department [should] assume the role of a user of the station for purposes of Research, Development, Testing, and Engineering." But the leadership of the Defense Department continued to insist that no military requirements for the station had been identified.

Between 1981, when James Beggs and Hans Mark came in to head the space agency and started the fight for the next step in manned spaceflight, through January 1984, when President Reagan announced the station program, until the end of 1986, the defense establishment never changed its position on the space station.

At the end of 1986, the Defense Department completed a study to lay the basis for revising the 1982 national security space policy, in light of the SDI, the *Challenger* accident, and cutbacks in the military budget. The Defense Department was impressed with the Soviet military work on the *Salyut 7* station, in areas such as ocean surveillance, reconnaissance, command and control, and the servicing of spacecraft in orbit that had all been demonstrated by the Russians.

Suddenly, after five years of disinterest if not hostility to the idea of "military men in space," the Defense Department wanted to be given assurances by NASA that it would not be excluded from use of the station. The department study asked that finalizing international negotiations with our allies be put on ice until the Defense Department's own role had been more fully articulated.

The problem was that when the Defense Department would not join NASA in building and paying for the station, Reagan instructed James Beggs to enlist the participation of Western Europe, Japan, and Canada in sharing in the con-

struction and operational costs of the complex.

These allies are now committed to contribute more than $4 billion, two modules, and other critical equipment to the station. On the one hand, there is no way work on the station can be made "secure" from a military standpoint, as there will be nationals from many nations aboard the facility at all times, and there is no capability to totally segregate the multitude of activities going on simultaneously.

On the other hand, our partners do not want the station to turn into a military project, which none of them have agreed to, and which may jeopardize the civilian research they are planning to conduct. In addition, if there were SDI testing and other military activities on board the station, it could certainly become a target for the Russians in a time of hostilities or pre-war positioning.

Instead of getting in on the ground floor of a crucial new manned space capability, the Defense Department has clumsily tried to muscle its way into assured access to the facility, long after the program was already under way. This raised a tremendous stink among our international partners, NASA, and the State Department.

On April 7 of this year, after the Defense Department and NASA had reached agreement to allow military research on the station, but to prohibit the installation of weapon systems, Secretary of Defense Weinberger wrote a letter to George Shultz, stating that the United States "must be prepared to go forward alone" if our allies are not willing to allow the Defense Department to "conduct national security activities on U.S. elements of the space staion without the approval or review of other nations."

What this led to—in addition to a destabilization and postponement of ongoing negotiations with Canada, Japan, and the European Space Agency—was a fracas in the Congress between the "peaceniks" and the "pro-SDI conservatives," as the space station budget was being slashed, anyway.

Why the military needs a space station

During 1987, the American Institute of Aeronautics and Astronautics (AIAA) did a study for the Air Force Space Technology Center at Kirtland Air Force Base on the potential military missions for the station. They described how it could function as a fuel depository for power requirements, life support, laser reactants, nuclear particle beams, and similar types of systems.

The station crew can do repair work, and the SDI systems "may not be feasible unless they can be maintained on-orbit to assure their proper operation and availability." With a space station, "space junk" could be turned into decoys and shields, which could cut costs, the AIAA report suggested, and outlined experiments that could be done on the station in various phases. They also pointed out that a totally new, dedicated military station could probably be built at a cost of $3.5 billion, after the NASA station is finished.

This approach, which is the most reasonable, has also been suggested by NASA Deputy Administrator Dale Myers. Speaking at an Air Force Association national symposium last May, Myers said, "The demand on the station could be such that the Defense Department may well want to begin thinking seriously about a dedicated space station of its own, possibly in polar orbit. I believe the requirement for such a station will continue to grow with the development and testing of the SDI and its massive infrastructure, the increasing general military importance of space, the foreseeable need for the replacement, maintenance, and updating of military spacecraft in orbit, and given the fact of an existing Soviet space station program that seems primarily military in character."

"If such a requirement does materialize," Myers offered, "NASA contractors would be able to utilize the experience gained from the development and deployment of the present NASA station to produce a second for the Defense Department at a very attractive 'discount.' " Just as the military should have built its own fleet of Space Shuttle orbiters which would be flying now, a dedicated military space station is crucial.

After seven years, the Department of Defense recently released a report to the Senate and House Armed Services Committees on military uses of the space station. The toned-down report said that the station is a national resource, "dedicated primarily to civil space activities, but available to the DoD in accordance with national priorities and international commitments."

The report lists several possible operational applications of research envisioned as candidate activities on the space station. These include: direct, real-time visual observation of land, sea, and airborne features and activities for battle management, surveillance, and other support; location of oceanographic, terrestrial, and meteorological phenomena to develop and evaluate a "space sextant" for accurately establishing latitude and longitude; visual observation of naval and commercial shipping activity, and monitoring of arms control agreements; operational characterization of space debris and its control or removal; support of military operations, including direct support of a field commander, to make recommendations for decisions and tactics for combat exercises; and visually detect missiles launched from land, sea, and airborne platforms. Dozens of other manned military space missions can easily be imagined.

There is no time left for this nation to decide if it is going to build a space station. If it is not built, the Soviets will add constant manned space capability to the list of military areas where they have no competition.

All of the long-range plans that have been promulgated over the past two years will become meaningless if the Space Shuttle, like a railroad, makes no "stops" in space. There is no point in continuing with what we have, if there is no plan to build for the future.