

be available if anything ever happened to the Shuttle. Unfortunately, the decision to develop this vehicle was not made until 1984. The new Titan 34D7 will not be ready under present production schedules until late 1988. However, if the methods used in the original development of the Titan, Atlas, and Thor from 1955-59 in the ballistic missile program were used, the new vehicle could possibly be ready within half that time. This method compresses development by working on the various components of the vehicle concurrently, not in series.

Secondly, the practice of engineering payloads so that they are compatible with only one launch vehicle, should be abandoned. For complete redundancy, all payloads should be able to be launched by any vehicle that can lift them to orbit.

Estimates

The estimates in Table 1 on launch requirements were put together in the following way. Estimates on Defense Department launch requirements (excluding requirements for SDI) are taken from remarks of Brigadier-General Kutyna as quoted in *Defense Daily*, July 26, 1985. The same source cites Lieutenant-General Abrahamson stating that: Once the decision to develop the SDI is made, the program will require "roughly" 5 Shuttle missions per year. Deployment will require, he said, at least 24 missions per year. And according to *Space Business News*, April 21, 1986, "A 'baseline architecture' established by the SDI Organization, calls for deployment of 58 million pounds of SDI system over a 23-year period," for an annual average of 40 flights.

In Plan A, development begins in 1992, as suggested by Abrahamson. We estimate that development under a conventional timetable would last four years, then be followed by deployment. Initial SDI deployment in 1996 was also suggested by then-Air Force Undersecretary Edward Aldridge in July 1985 (*Defense Daily*, Aug. 1, 1985).

SDI Plan B is simply a more rapid timetable. It projects development to begin in 1989, followed by deployment in 1992, within a decade of President Reagan's March 23, 1983 speech announcing the program.

Estimates for space-station launch requirements are based on 1) President Reagan's call for initial operating capability by 1994 in his 1984 State of the Union address, and 2) NASA estimates of what would be required to build the station and then supply it afterwards. John Hodge, NASA acting associate administrator for the space station, told the Senate Space Subcommittee (*Defense Daily*, April 24, 1986) that 25 Shuttle flights would be required to orbit the IOC space station (19 for the U.S. portion and 6 for the foreign elements). Thereafter, the program will require 8-10 launches per year. As we go to press, Dr. Hodge has announced that budget cuts have forced a "scale-back" in the U.S. portion of the station, from four to two modules, a change that he states will reduce the launch requirement for the U.S. portion, to 14 Shuttle missions.

Making sure we get back into space

by Marsha Freeman

Both the military and civilian space programs of the United States are facing the most serious challenges in their histories. The Titan, Shuttle, and Delta rockets will not fly again until the cause of their recent failures is known, their security is enhanced to prevent opportunities for any future sabotage, and engineering changes are made to increase their reliability.

But the real challenge to the space program now is not technical, but political. In the dark hour of the post-Sputnik U.S. launch failures, this nation was able to both close the "missile gap" through the ICBM program under Gen. Bernard Schriever, and begin the manned space program that took us to the Moon. After the 1967 fire in the Apollo 1 command module which caused the death of the first three Apollo astronauts, a thorough NASA investigation led to a safer program that produced breathtaking accomplishments. And even in the budget dog-days of the early 1970s post-Apollo period, NASA was able to tackle the formidable task of developing the world's first reusable space ship.

Today, however, a combination of fanatical Gramm-Rudman budget cutters, the *New York Times* and much of the media, and the interference of the Rogers Commission with NASA's ability to make the changes necessary to get back in business, threaten to overwhelm the civilian and military space programs.

From the standpoint of economic security, the United States cannot afford to cede its commercial payloads to China or the Soviet Union, which is where the U.S. launch market may well go. On May 11, China announced that it would launch two U.S. commercial communications satellites by the end of this year. Dr. Fred d'Allest, who heads the Ariane program, announced that the Europeans will not increase their Ariane flights to absorb what the Shuttle would have carried.

There is no reason to put obstacles in the way of getting our expendable rockets and the Shuttle flying as soon as possible. Yet, that is exactly what is happening.

Stalling at the White House

It is now nearly four months since the loss of the Challenger, yet there has been no definitive statement from the White House on whether the lost orbiter will be replaced. Minimally, work must begin to build an orbiter, expand the number and quality of expendable vehicles, fund the fix that

will be required on the boosters, budget the cost of the investigation, and replace the non-orbiter equipment that was lost on the failed mission.

If the administration had moved swiftly after the January accident, a fiscal year 1986 supplemental budget request could have been presented to and acted upon by the Congress, to begin to build a replacement orbiter. Both the Air Force and new NASA administrator James Fletcher have stated this is absolutely necessary.

The White House Senior Interagency Group for Space

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(SIG-Space) has been deliberating for months on how to respond to the launch emergency. This group, which is headed by the national security adviser, includes the Defense Department, NASA, the Joint Chiefs of Staff, the Central Intelligence Agency, the Office of Management and Budget, and the Departments of Commerce and Transportation. Virtual warfare exists between the conflicting points of view represented within the group.

Budget battle

As a result, the House Science and Technology Committee reported the FY87 NASA budget out of committee without making any changes in the pre-Challenger request. They do state in their Feb. 25 committee report on the proposed budget: "The Committee notes that if a decision is made to replace Challenger with a new orbiter, approximately \$800 million will be required to meet that expense in fiscal year 1987. The Committee recommends that such amount be allocated . . . unless the full cost of the vehicle has been previously provided in a fiscal year 1986 supplemental."

At Senate hearings on March 27, Jake Garn, the chairman of the Senate Appropriations subcommittee responsible for NASA's budget, stated that he could not understand what was holding up the White House decision. "The green-eye-shade types with their black armbands are unable to make a commitment," he complained. Since then, his subcommittee has taken the initiative and voted for a FY86 supplemental budget request for NASA. The committee used the guidelines presented by NASA witnesses during hearings, and on May

15, Garn stated that a \$526 million add-on to the FY86 budget would be voted by the committee.

NASA comptroller Thomas Newman outlined the recovery plan, which included \$626 million for the cost of the accident investigation, and the corrective actions needed to resolve the list of safety-related problems with the Shuttle system. Newman estimated it would cost \$250 million just for the solid rocket booster joint redesign. This figure does not include the money needed to replace the Challenger.

Garn trimmed the NASA request by \$100 million, as he did not think all the money could be spent by NASA by the end of the current fiscal year Sept. 30. According to the Senate subcommittee staff, some of the \$526 million will also be used to keep the Rockwell International orbiter production plant in California "warm" so that a replacement orbiter can be started with the same workforce that built the other four.

How to kill the Shuttle

One option to fund the replacement orbiter that the SIG-Space is reportedly considering, is to have NASA pay for building the Shuttle by cutting all other programs over three years. This would make the Shuttle virtually NASA's only program; NASA would have four orbiters, and no science or technology payloads to put inside them. This would also write off the space-station.

Dr. Fletcher strongly opposed this approach in testimony before the House Appropriations subcommittee on May 15. He told chairman Edward Boland (D-Mass.) that it would be "disastrous" to cut space station funding, just as the program is gearing up.

Already, due to cuts in funding, the timetable for the beginning of the space station deployment has been pushed back from 1992 to 1993.

Dr. Fletcher stated, "We have set our sights on the future, but make no mistake: that future could be in jeopardy if we do not respond effectively to our immediate challenge—to restore this nation's launch capabilities."

Another attempt to try to find a way to go going without paying for it, has been the suggestion that the Shuttle be turned into a largely military system, not launching any communications or other commercial payloads. This scenario would eliminate the need for the fourth replacement orbiter, and supposedly "save" the government all that money—a proposal promoted by the SIG-Space representatives from the Department of Transportation, who are trying to make 25-year-old expendable rockets "compete" commercially with the Shuttle, in accordance with the President's foolhardy policy to privatize these launch vehicles.

Air Force Secretary Aldridge, Dr. Fletcher, and the Congress have opposed this policy. Commercial use of the Shuttle plays the same role in the national defense as a merchant marine fleet. Both are a necessary back up capability which can be called upon in time of emergency. Aldridge has stated emphatically that the DOD should not be the only user of the

Shuttle system, even though military payloads are now backlogged.

In his May 15 testimony, Fletcher responded to a *Washington Post* article on eliminating commercial Shuttle payloads, by saying, "While I am administrator of NASA, that will not happen. Of course, they could let me go."

Under these circumstances, the idea of having "private industry" pay for the needed orbiter has once again surfaced. This would involve turning over the marketing of commercial payloads to fly on the replacement orbiter, to the company that built the vehicle. However, since the administration is trying to establish a commercial expendable rocket industry which would have to compete with the Shuttle, some have insisted that the Shuttle get entirely out of the commercial satellite launch market altogether! So much for the "commercial" fourth orbiter.

New NASA leadership

Since November, NASA has suffered under the incompetent leadership of William Graham. On May 6, the Senate voted 89-9 to confirm the nomination of Dr. Fletcher to return to the job of NASA administrator, and on May 12, President Reagan conducted the swearing-in ceremonies.

Although Graham is now only deputy to the administrator, the Donald Regan faction in the White House that placed Graham in the sensitive NASA job in November, is continuing to sabotage the Shuttle program. On May 16, White House spokesman Larry Speakes reported that at a meeting of the National Security Council, Regan questioned whether the money for a fourth orbiter might not be better spent on a new-generation spacecraft—which would not be ready until the turn of the century.

Speakes reported that President Reagan has "asked for more information" on whether to build the orbiter, how many expendable launch vehicles to build, over what period of time. All of this information has come out in public congressional hearings since February!

In the week since he has taken over the reins at the space agency, Dr. Fletcher has taken an uncompromising stand on the space-station schedule, the need for a new orbiter, and has set July 1987 as the target date for the next Shuttle mission.

Fletcher has apparently decided to pre-empt any management recommendations by the Rogers Commission, when its report is given to President Reagan the first week in June. In a surprise move, Fletcher announced during hearings on May 13, that retired Gen. Samuel Phillips would be heading an independent panel to review "the way NASA manages its programs."

General Phillips was the project manager for the Apollo program from 1964 to the first successful lunar landing in July 1969. Dr. Fletcher estimates that the Phillips panel could complete its review in about eight months—enough time before the Shuttle is ready to fly again to make any recommended changes.

NASA responds to the New York Times

On April 23 and 24, the New York Times published a series of articles by Stuart Diamond, accusing NASA of mismanagement, fraud, and lying to Congress over the past 15 years. On April 25, NASA issued a formal response to the charges. We excerpt:

The NASA-industry-university team has put together an unrivaled 28-year achievement record through the dedication and competence of proven professionals. It is in this context that the Challenger tragedy and the *New York Times* allegations, many of which are misleading and taken out of context, should be assessed. These allegations, many 10 and 15 years old, are primarily based on NASA's own self-audits, for which corrective action has been taken, or is in progress. . . .

. . . The development of the Space Shuttle, a unique advance in technology, ran at an approximate 30% overrun rate from a budget estimate made in 1971, remarkable in view of the technical and economic uncertainties encountered in developing a totally new space transportation system.

At the same time, it should be acknowledged that the agency often operated under tight fiscal constraints. These constraints necessarily caused changes in both operational and management approaches.

The Space Shuttle flying today is not the configuration on which NASA based its budget estimates in 1971. Many of the features originally planned to reduce operational requirements had to be dropped due to cost or technical considerations and this, coupled with increased mission complexity and lower flight rates, has significantly affected the initial cost-per-flight targets.

The article alleges that NASA predicted that the cost of lifting Shuttle cargo into orbit would be \$100 a pound. ". . . The cost is now \$5,264 a pound for the total program and \$2,849 a pound for operations alone. Discounting for inflation, the corresponding rise is 9 to 19 times. . . ." This comparison is factually incorrect and misleading. Cost per pound is really only a partial indicator of the Shuttle's utility, since many payloads are volume and not weight limited and the figure does not consider the value of many of the Shuttle payloads which simply cannot be launched on any other vehicle. . . .