NASA ready to implement Shuttle recovery plan

Following the Challenger disaster, NASA and the Rogers Commission have drawn up plans to return to space. But will the money be there? Marsha Freeman reports.

Contrary to media propaganda, there is broad agreement by the Rogers Commission, charged with investigating the Space Shuttle Challenger's accident and the leadership of NASA, that the Shuttle can be ready to fly again by July 1987. In fact, if it were necessary for national security, a "quick fix" on the solid rocket boosters could be done, and a crack military team deployed, to fly the Shuttle under optimal weather conditions, to deploy, for example, a reconnaissance satellite.

NASA technical experts worked closely with the Presidential Commission on the Space Shuttle Challenger Accident, headed by William Rogers, throughout their 120-day investigation. The Commission's recommendations were, therefore, not a surprise to the space agency, and when the report was released to the public on June 6, NASA Administrator James Fletcher had already initiated implementation of many of the recommendations.

On June 14, President Ronald Reagan met with Dr. Fletcher at the White House, and directed him to report back in 30 days on how and when the NASA recovery plan will be put into effect. Fletcher will have to estimate for the President what the time and cost will be to put the Shuttle back in operation.

But the obstacle to meeting NASA's timetable, and getting the Shuttle up and flying as soon as possible, is political, not technical. The Donald Regan faction in the White House staff, and also the anti-science mob on Capitol Hill, are willing to sacrifice the whole of the U.S. space program to seal a deal with the Soviets, who continue to blame the Challenger accident on the "military" use of the Shuttle.

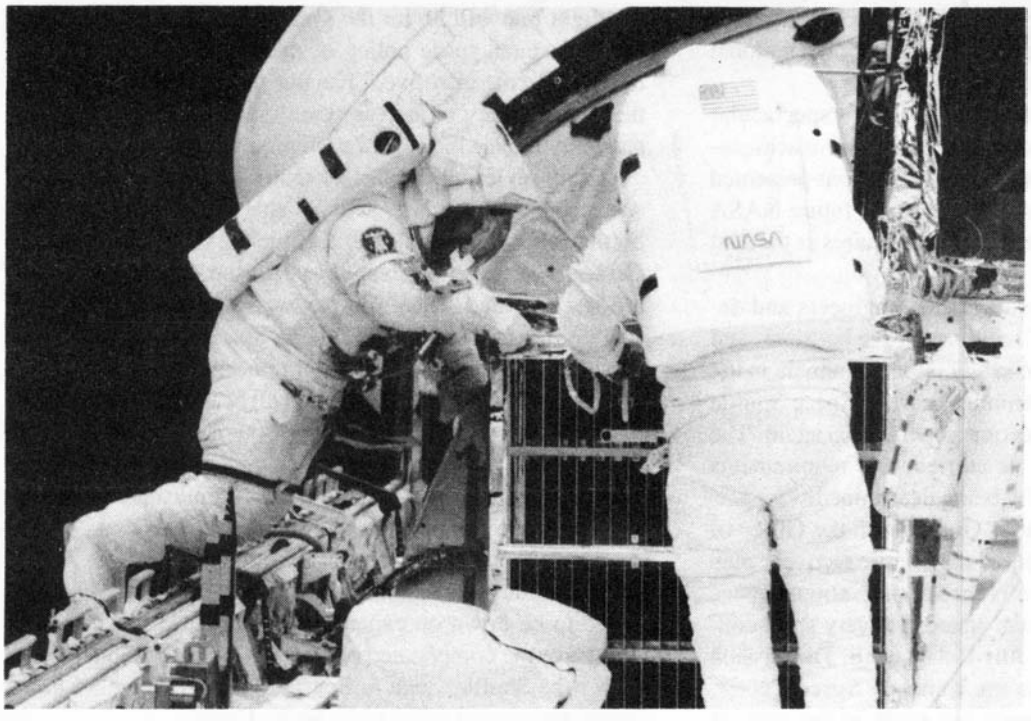
Congress has opted to stage a series of "media events," under the guise of oversight hearings. Sen. Ernest Hollings (R-S.C.), the head of the Space, Science, and Technology Subcommittee of the Senate Commerce Committee, for example, even called for a criminal investigation and indictment of key NASA management personnel, who were involved in the Challenger launch decision. This attack has been joined by ranking Democrats on the subcommittee, and by members of the House.

The Commission's recommendations

In his letter of transmittal to the President accompanying the Commission's report, Rogers stated that the Commission "fully recognizes that the risk associated with space flight cannot be totally eliminated." He concludes on an optimistic note, that "the nation's task now is to move ahead to return to safe space flight and to its recognized position of leadership in space." Holding true to that commitment, there is nothing the Commission recommends that would necessarily delay NASA's plan to resume the space program.

But the weakness in the Commission report, is its failure to place the blame on Congress and numerous administrations, for the penny-pinching in the space program which led to a situation where safety concerns could not be remedied due to budget cutbacks.

There was also no attempt by the Commission to question then-acting NASA Administrator William Graham, who as the head of the agency was ultimately responsible for the decision to launch. In fact, Graham had prevented the launch of the Challenger the Sunday preceding the Jan. 28 lift-off, for questionable reasons, but was not on the scene when the decision to launch was actually made. Graham's role in the Challenger accident has been covered up in all investigation, so far.



When will the United States return to space? Here, astronauts aboard the Space Shuttle Challenger, on an April 1984 mission, replace a faulty component of a satellite in the Shuttle's cargo bay.

NASA

The Commission made nine recommendations, stipulating that "no design options should be prematurely precluded because of schedule, cost or reliance on existing hardware."

First is the question of redesigning the Solid Rocket Booster. On June 12, the head of the NASA team studying booster redesign options, John Thomas, reported in congressional hearings that an array of alternative designs will be ready "in the next few weeks." This evaluation was seconded by Morton Thiokol engineer Alan McDonald, who is leading the industry redesign group, and by Arnold Aldrich, who heads the Shuttle program at the Johnson Space Center. Three days before, the team of Thiokol engineers had arrived at the NASA Marshall Space Flight Center in Huntsville, to present their preliminary recommendations to the NASA engineering team.

The Rogers Commission also recommended that an "independent oversight" panel be constituted to "review and evaluate certification requirements; provide technical oversight of the design, test program, and certification; and report to the Administrator of NASA on the adequacy of the design and make appropriate recommendations."

Before the public release of the report, Dr. Fletcher had requested the National Research Council to establish such an oversight group, and on June 9 the NRC announced its composition. The panel is made up primarily of retired industry experts in various fields of space technology, including propulsion, materials, structural analysis, and propellant combustion.

The Commission recommended a review of Shuttle management structure, as Rogers had stated at the beginning of the investigation that the NASA decision-making process was "flawed." Nearly a month before the release of the report, Dr. Fletcher announced that former Apollo program manager Gen. Sam Phillips (ret.) will do a review of agency-wide NASA management. Dr. Fletcher expects that the Phillips review will be done within eight months.

In addition, on June 11, NASA announced that astronaut Navy Captain Robert Crippen, a veteran of four Space Shuttle missions, will "head a small group which will examine the overall Space Shuttle program management." This meets the Commission's recommendation that the astronauts be more involved in every aspect of Shuttle operations.

Soon after taking over as head of the Office of Space Flight on Feb. 20, 1986, Adm. Richard Truly began a thorough review of all "criticality items" and potential hazards. These are possible single-point failures in the system that can cause the "catastrophic" loss of crew and orbiter. Such a review was the third recommendation of the Commission.

The fourth was the establishment of an Office of Safety, Reliability, and Quality Assurance. On June 17, Dr. Fletcher reported at Senate hearings that this would be established soon.

Other recommendations included improvement in landing safety, reporting, communication, performance, and maintenance. The question of a crew escape system was left up to NASA, as the Commission stated, "NASA should make all efforts to provide a crew escape system for use during controlled gliding flight." The Commission recognized, however, that there is no known or imagined escape system that could have saved the Challenger crew.

The most important among the Commission's nine recommendations is the "concluding thought" at the end: "The Commission urges that NASA continue to receive the support of the Administration and the nation. The agency constitutes

a national resource that plays a critical role in space exploration and development. It also provides a symbol of national pride and technological leadership.

"The Commission applauds NASA's spectacular achievements of the past and anticipates impressive achievements to come. The findings and recommendations presented in this report are intended to contribute to the future NASA successes that the nation both expects and requires as the 21st century approaches."

While several dozen teams of NASA engineers and designers are making the "fixes" required for the boosters, and are reviewing all of the Shuttle safety issues, planners in the Office of Space Flight are examining how the Space Shuttle system will function when it becomes operational again. The flight rate, payloads that will be carried, and requirements for launch capability are all now being determined.

NASA representative Charles Gunn, from the Office of Space Flight, on June 17 presented the Shuttle recovery plan of the agency, at the annual conference of the National Space Club in Washington, D.C. Gunn stated that very strict constraints will be imposed for the July 1987 launch. The mission will be a daytime launch from the Kennedy Space Center. NASA has had to launch missions at night in the past, in order to deploy satellite payloads to extremely precise positions in orbit. In this first mission, the payload will not require a night launch.

The payload will likely be the spare Tracking and Data Relay Satellite, which is a twin of the one lost on the Challenger mission. NASA does not want to fly a new class of payloads on this mission, and the TDRS is also needed to upgrade in-orbit communications between the Shuttle and the ground crews, as well as for unmanned satellites. It is also a prerequisite for use of the Vandenberg launch site in California.

The launch will only be done under "conservative" weather conditions. At the time of any Shuttle launch, there must be good weather not only in Florida, but at the sites that would function as launch-abort airstrips, if the loss of one or two orbiter engines meant that the crew could not attain orbit, but had to land.

The crew will consist only of NASA personnel, and the engines will not be pushed to their maximum thrust levels. Landing will be at the lakebed at the Edwards Air Force Base in California, where the weather is generally good, and there is a virtually unconstrained landing area.

Gunn warned, however, that there are "threats" to achieving this July 1987 target. Certainly the redesigned and rebuilt booster will have to be tested and certified. There could be a delay if the National Research Council oversight panel, members of the Rogers Commission, or the Congress place obstacles in the way of getting the job done.

Gunn added an item called "budget availability" in his presentation, which is certainly going to be the major, and possibly only, real obstacle to fulfilling the NASA plan.

One of the major questions NASA must solve, is what the flight rate will be for the system. In th
House's stated space policy of making the Shuttle "operational and cost-effective," has put tremendous pressure on the space agency to increase the flight rate, in order to substantially reduce the cost of each mission.

Gunn reviewed the factors that will limit the frequency with which each orbiter will be able to fly. One potential bottleneck is the complex of facilities at the Kennedy Space Center, where the orbiter, boosters, and external fuel tank are stacked, and where the payloads are placed inside the orbiter and payload bay. Kennedy Space Center is also the site of orbiter refurbishment after returning from space.

The veteran orbiter Columbia will be used at the Kennedy Space Center to develop and check out new processing procedures. The payloads that will be flying on the Shuttle in the future, he pointed out, will be more complicated on the average than the payload mix of the past four years.

The reason is that many of the simpler payloads, particularly military and commercial satellites, will be reconfigured to be flown on expendable, unmanned rockets. This will leave the complicated payloads which are uniquely suited for the Shuttle, such as Spacelab, and these will require longer processing times at the Space Center.

Gunn pointed out that landings done in California, rather than Florida, add six days to the operation, because the orbiter has to be ferried back across the country. The Rogers Commission and numerous witnesses at congressional hearings have strongly recommended that NASA procure a second ferry plane, so that any mishap with the single one that now exists, does not leave an orbiter stranded in California, or en route.

A key factor limiting flight rate is the continuing disastrous situation regarding spare parts. NASA has been forced to cannibalize engines and other parts from orbiters to meet tight schedules, because there has been no proper inventory of spare parts. This process significantly increases the risks in the program. Gunn indicated that NASA will use this year of stand-down to build up a spare-parts inventory.

At the present time, NASA plans to fly six or seven Shuttle missions in the first 12 months of resumed operations. Between the first, second, and third flights, there will be a minimum eight-week launch interval. This will allow a thorough review of the performance of the solid rocket boosters, after they are recovered, and of other systems.

There is planned to be a six-week minimum launch interval for the rest of the flights the first year, with an improved orbiter turnaround time planned for the second year. Between 9 and 11 flights are planned for the second year, where a four-week rocket motor inspection and analysis period will be allowed. By the third year, 12-15 flights may be possible, but that would require an ambitious average of five flights per orbiter.

Two major policy questions which still need to be answered by the White House, are whether there will be a fourth orbiter, and whether NASA will be able to continue to launch

commercial and foreign payloads.

NASA is planning its payload manifest for the next three years, based on "critical national security needs," and major NASA payloads, such as the TDRS satellite, the planetary and space science programs, and Spacelab. Other payloads from the Pentagon, NASA, other U.S. government agencies, as well as commercial and foreign payloads, will take a lower priority.

Payloads may also have to be reassessed, according to Gunn, because the booster redesign could add several thousand pounds of weight to that component, which would reduce payload capability by 100-200 pounds.

In answer to a question at the Space Club conference, Gunn stated that there are currently 32 communication satellites under commercial contract to be launched on the Space Shuttle. These payloads represent about $1 billion in potential revenues to NASA. There are also foreign policy considerations, in whether or not to provide launch services for the commercial satellites that have been ordered from other nations.

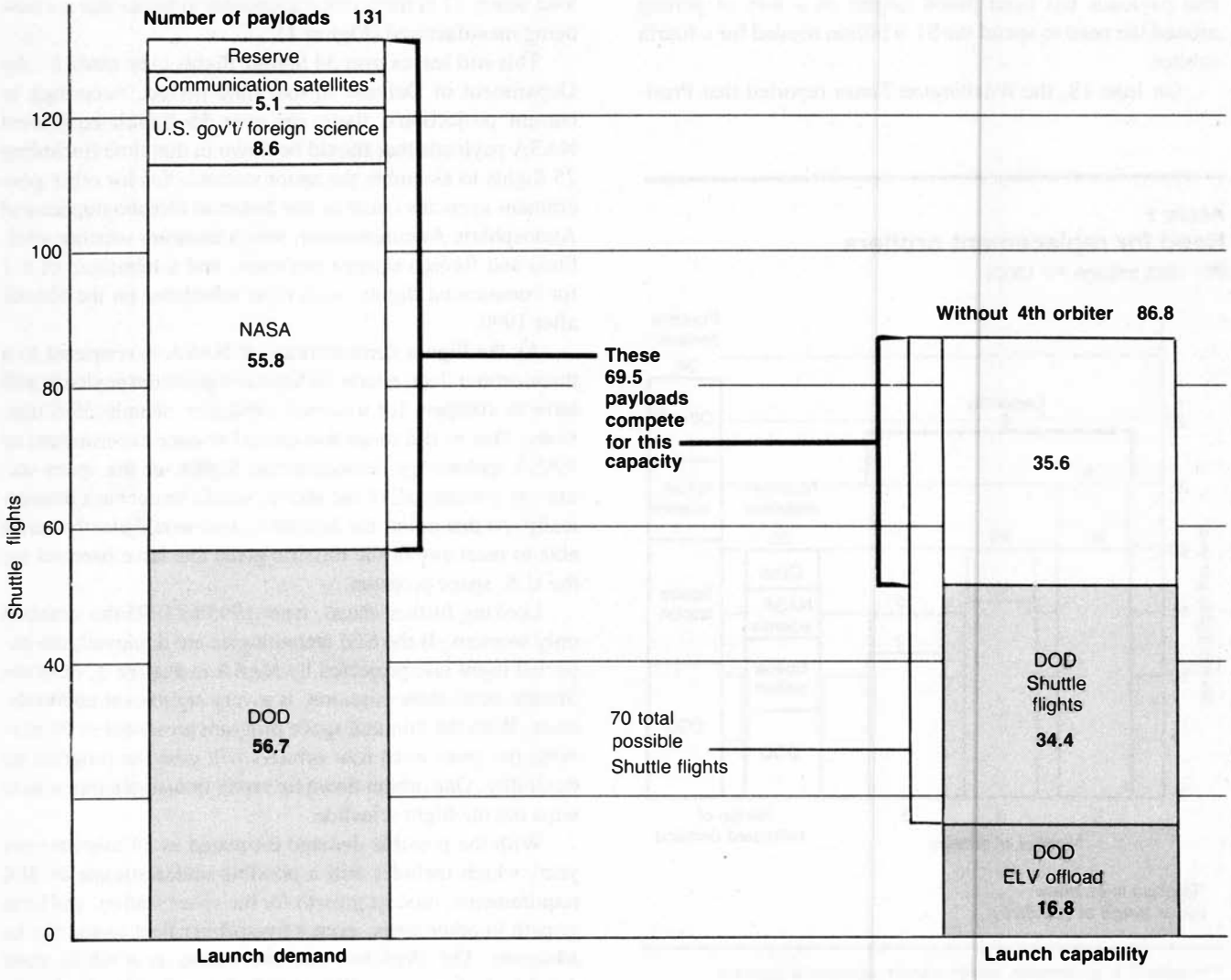
Before the Challenger accident, NASA had been planning to launch an equivalent of 18.2 full Shuttles containing communication satellites between 1986 and 1992. Each launch could carry one or two satellites. In the preliminary post-Challenger launch schedule presented by Gunn, this has been reduced to 7.7 Shuttle-equivalent payloads.

While it is certainly true that the simpler communication satellite deployments, which have been done for 20 years on

FIGURE 1

The Shuttle program: demand vs. capability

(FY 1986 through FY 1992)



*None after FY 1990

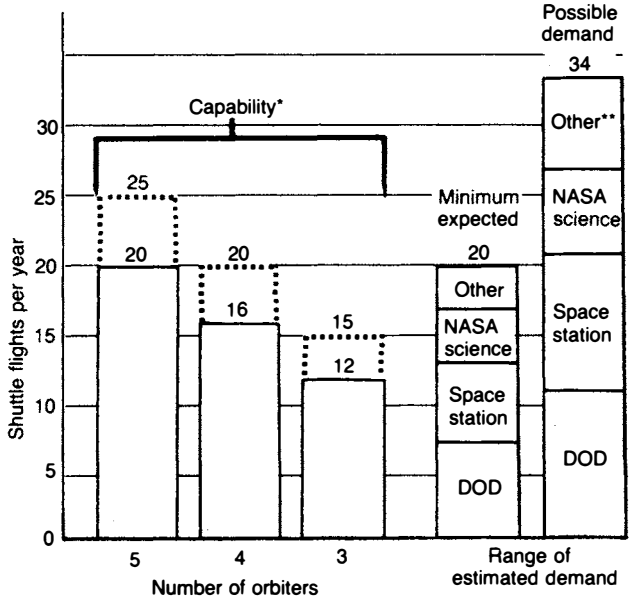
expendable launch vehicles, do not generally need the manned Shuttle, there are other issues involved in ending these payloads. These include the economic and security considerations involved in allowing a large share of satellite launch services to proceed without the United States—particularly as the Soviet Union has now offered its rockets for commercial payloads of other nations.

Though the White House has stressed creating a private expendable launch industry, even without the Shuttle, no U.S. aerospace company has been able to offer these services at a price that is competitive with the government-supported European Ariane rocket. The May 30 failure of an Ariane also indicates the need to ensure that there are multiply-redundant free-world launch capabilities.

Though the three-orbiter fleet, which will be all that is available for the next three years even if a decision is made to replace the Challenger, may not be able to support a large number of commercial payloads, it makes no sense to develop a policy which categorically takes the Space Shuttle out of the communication launch loop. The barring of commercial payloads has been posed largely as a way of getting around the need to spend the $1.9 billion needed for a fourth orbiter.

On June 18, the *Washington Times* reported that President Reagan will release a National Security Defense Directive soon, which ceases commercial payloads on the Shuttle. This directive was apparently drafted by the White House Economic Policy Council. While the launching of payloads to bring money into the federal Treasury is not NASA's primary mission in space, it is ludicrous to prohibit this capability from being used.

FIGURE 2
Need for replacement orbiters
(FY 1993 through FY 1995)



*Dashed lines show upper range of capability

**Includes U.S. government, foreign science, commercial payloads, opportunities, and reflights

How many orbiters do we need?

As *EIR* has documented, without a fourth Space Shuttle orbiter, there is little likelihood that there can be a robust space science program, a space station by 1994, and the development or deployment of the Strategic Defense Initiative, even if the Shuttle launches no commercial payloads.

Immediately following the loss of the Challenger, the Air Force made absolutely clear that though it could bump all other payloads from the Shuttle manifest in order to meet national security requirements, it would not do so. The military has stated that out of the estimated 56.7 Shuttle-equivalent missions it will need between now and 1992, it can offload nearly 17 of them onto expendable vehicles that are now being manufactured (**Figure 1**).

This still leaves over 34 Shuttle flights to be made for the Department of Defense in that time period. According to current projections, there are over 55 Shuttle-equivalent NASA payloads that should be flown in that time (including 25 flights to assemble the space station), 8.6 for other government agencies (such as the National Oceanographic and Atmospheric Administration, which launches weather satellites) and foreign science payloads, and a minimum of 5.1 for commercial flights, with none scheduled on the Shuttle after 1990.

As the Figure demonstrates, if NASA is restricted to a three-orbiter fleet, nearly 70 Shuttle-equivalent payloads will have to compete for a launch capability of only 35.6 missions. This would mean that crucial science experiments, or NASA technology demonstration flights, or the space station, or possibly all of the above, would be cut back dramatically. At that point, the Shuttle system would clearly not be able to meet any of the mission goals that have been set for the U.S. space program.

Looking further ahead, from 1993 to 1995 the situation only worsens. If the SDI technologies are deployed, the expected flight rate projected by NASA in **Figure 2,** of seven Shuttle-equivalent missions, is a very significant underestimate. With the minimal space program presented as 20 missions per year, even four orbiters will give the program no flexibility. One orbiter down for repair or maintenance would wipe out the flight schedule.

With the possible demand estimated as 34 missions per year, which includes still a possible underestimate of SDI requirements, modest growth for the space station, and little growth in other areas, even a five-orbiter fleet would not be adequate. The President and the nation as a whole must decide whether there will be a U.S. space program at all.