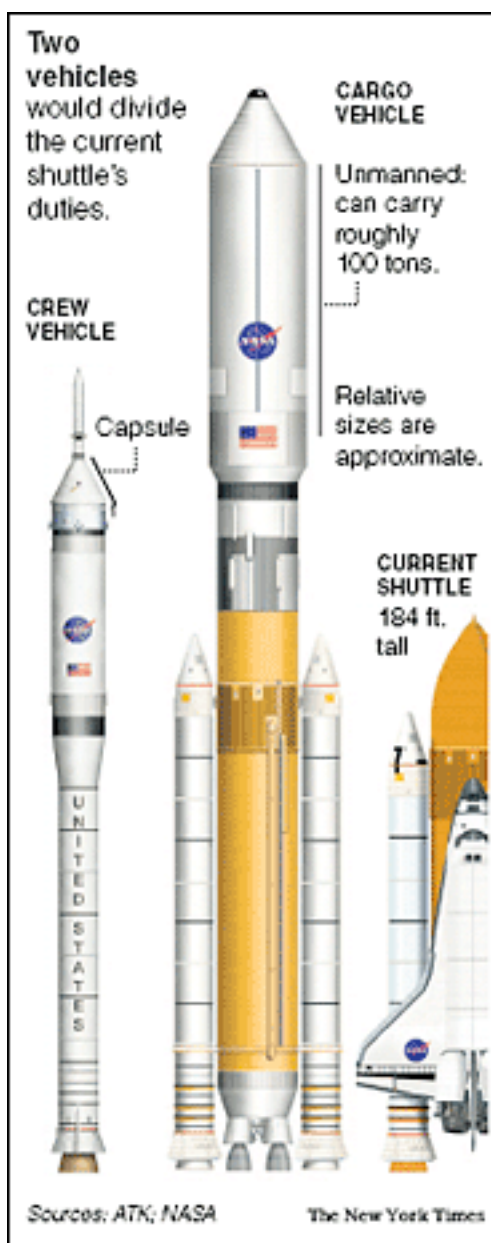


August 2, 2005

Redesign Is Seen for Next Craft, NASA Aides Say

By WILLIAM J. BROAD

For its next generation of space vehicles, NASA has decided to abandon the design principles that went into the aging space shuttle, agency officials and private experts say.



Instead, they say, the new vehicles will rearrange the shuttle's components into a safer, more powerful family of traditional rockets.

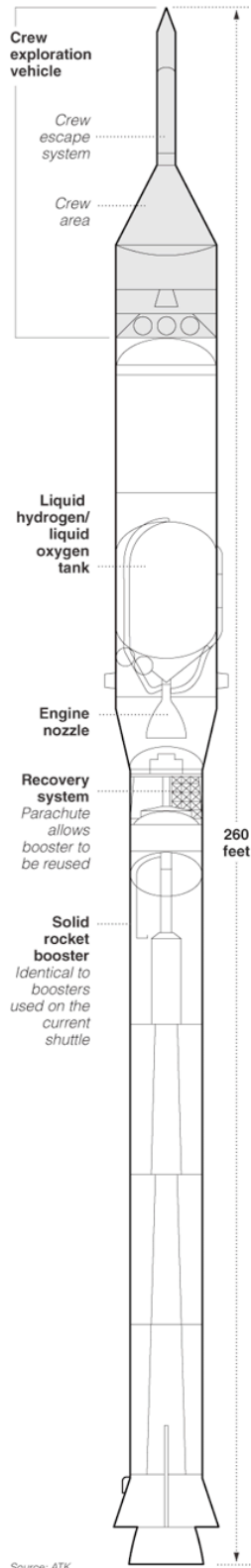
The plan would separate the jobs of hauling people and cargo into orbit and would put the payloads on top of the rockets - as far as possible from the dangers of firing engines and falling debris, which were responsible for the accidents that destroyed the shuttle Challenger in 1986 and the Columbia in 2003.

By making the rockets from shuttle parts, the new plan would draw on the shuttle's existing network of thousands of contractors and technologies, in theory speeding its completion and lowering its price.

"The existing components offer us huge cost advantages as opposed to starting from a clean sheet of paper," the new administrator of NASA, Michael D. Griffin, told reporters on Friday.

Manned Spacecraft Gets a Remake

A proposed design for a manned spacecraft would place the crew exploration vehicle atop a rocket, in a design reminiscent of the missions to the Moon.



The plan, whose origins go back two and a half years, is emerging at a time when it may help deflect attention from the current troubles of the shuttle fleet.

The Discovery's astronauts are to make a spacewalk tomorrow to fix a potentially hazardous problem with cloth filler on its belly.

Future missions have been indefinitely suspended while NASA tries to solve the persistent shedding of foam from the external fuel tank at liftoff.

The plan for new vehicles is to be formally unveiled this month. Its outlines were gleaned from interviews and reviews of trade reports, Congressional testimony and official statements. Some details were reported on Sunday in *The Orlando Sentinel*.

On Friday, Dr. Griffin emphasized the plan's safety, telling reporters that the new generation of rockets would have their payloads up high to avoid the kinds of dangers that doomed the Columbia two and a half years ago and threatened the Discovery last week when insulating foam broke off its fuel tank shortly after liftoff.

"As long as we put the crew and the valuable cargo up above wherever the tanks are, we don't care what they shed," he said. "They can have dandruff all day long."

Congress would have to approve the initiative, and many questions remain. John E. Pike, the director of GlobalSecurity.org, a private Washington research group on military and space topics, said he wondered how NASA could remain within its budget while continuing to pay billions of dollars for the shuttle and building a new generation of rockets and capsules.

Alex Roland, a former historian of the National Aeronautics and Space Administration who now teaches at Duke University and is a frequent critic of the space program, said the plan had "the aroma of a quick and dirty solution to a big problem."

But supporters say it will let astronauts move expeditiously back into the business of exploration rather than endlessly circling the home planet, and do so fairly quickly.

"The shuttle is not a lemon," Scott J. Horowitz, an aerospace engineer and former astronaut who helped develop the new plan, said in an interview. "It's just too complicated. I know from flying it four times. It's an amazing engineering feat. But there's a better way."

Dr. Horowitz was one of a small group of astronauts, shaken by the Columbia disaster, who took it upon themselves in 2003 to come up with a safer approach to exploring space. Their effort, conceived while they were in Lufkin, Tex., helping search for shuttle wreckage, became part of the NASA program to design a successor to the shuttle fleet.

The three remaining shuttles are to be retired by 2010 under the Bush administration's plan for space exploration, which is intended to return humans to the Moon and eventually Mars.

The new vehicles would sidestep the foam threat altogether, and its supporters say they would have other advantages as well. The larger of the vehicles, for lifting heavy cargoes but not people, would be some 350 feet tall, rivaling the Saturn 5 rockets that sent astronauts to the Moon.

The smaller one, for carrying people, would still dwarf the shuttle, which stands 184 feet high with its attached rockets and fuel tank.

The spaceships would no longer look like airplanes. Their payloads, whether humans or cargo, would ride in capsules at the top rather than alongside the fuel tank - standard practice until the shuttle era. Rather than gliding back to Earth, they would deploy parachutes and land on the ground in the Western United States.

"The goal is not how good the stuff looks," said John M. Logsdon, director of the Space Policy Institute at George Washington University. "It's results. The goal is to get people back to the Moon and eventually onto Mars. And this system, given the budget constraints, is a reasonable way to go."

A main advantage, supporters say, is that the big rocket could lift five or six times as much cargo as the shuttle (roughly 100 tons versus 20 tons), making it the world's most powerful space vehicle. In theory, it would be strong

enough to haul into orbit whole spaceships destined for the Moon, Mars and beyond.

Just as important, officials and private experts say, the small rocket for astronauts would be at least 10 times as safe as the shuttle, whose odds of disaster are estimated at roughly 1 in 100. The crew capsule atop the rocket would rendezvous in orbit with gear and spaceships that the bigger rocket ferried aloft, or with the International Space Station.

"It's safe, simple and soon," said Dr. Horowitz, an industry executive since he left the astronaut corps in October. "And it should cost less money" than the shuttles. Their reusability over 100 missions was originally meant to slash expenses but the cost per flight ended up being roughly \$1 billion.

"We need to get this as simple and affordable as possible," Dr. Horowitz said, "because there's a lot of other things we need to spend our money on when it comes to exploration."

Asked whether the new designs meant NASA was going back to the future, he replied, "You can say, 'Hey, that looks pretty retro,' " but he drew an analogy to passenger jets from decades ago and those of today. "They look the same," he said, "but are completely different."

By drawing on existing technology, the plan is meant to speed President Bush's goal of revitalizing human space exploration. At the same time, it would upend the strategy of NASA's previous administrator, Sean O'Keefe, who wanted to discard the shuttle in favor of military rockets, which would have required costly upgrades to make them safe for humans. And their payloads would have been relatively small, requiring strings of multiple rocket launchings.

Dr. Horowitz said he and two fellow astronauts ended up endorsing the traditional idea of putting payloads atop the rocket instead of on its side, as far as possible from the dangers below. They also envisioned an escape system that would lift the crew capsule out of harm's way if serious trouble arose.

After January 2004, when Mr. Bush announced a national effort to "extend a human presence across our solar system," Dr. Horowitz hit on the idea of using the shuttle's booster rocket as a first stage. He did the math and found it ideal. Moreover, the booster rocket was already approved for human flight and - despite its role in the 1986 Challenger disaster - had earned an excellent

safety record.

The second stage of the crew rocket would feature a updated version of the J-2 engine, which in the 1960's and 1970's helped propel the astronauts to the Moon.

Dr. Horowitz said industry studies put the risk of catastrophic failure for the newly envisioned crew rocket at 1 in 1,000 to 3,000. "It's never going to be like driving your car," he said. "But it's a huge step in the right direction."

After leaving the astronaut corps, he went to work for the booster maker, ATK Thiokol, where he now leads the company's effort to develop the new family of rockets. An ATK Web site, www.safesimplesoon.com, discusses the shuttle-derived vehicles. The giant cargo rocket would feature a large fuel tank atop throwaway shuttle engines and, hanging on its side, a pair of shuttle booster rockets.

Several analysts said that retaining the shuttle contractors would probably help the effort not only financially, but also politically. In Florida alone, a state with blood ties to the White House, the shuttle program employs some 14,000 technicians and engineers, managers and contractors.