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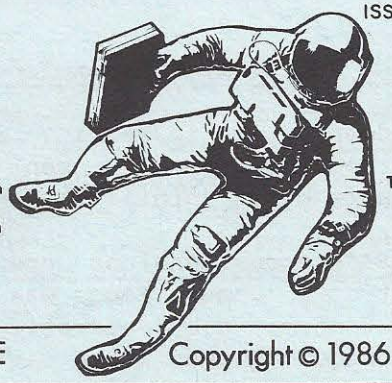

A MONTHLY NEWSLETTER ON FREE ENTERPRISE IN SPACE

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The Challeger Tragedy: Causes and Consequences Part II

The long-range consequences of the Challenger disaster are only just now beginning to seep past the initial tragedy. By and large, the American space program has been stopped dead in its tracks. One fourth of the entire Shuttle fleet has been destroyed. Every payload scheduled to fly on Challenger is now left waiting on the tarmac, and no payload will fly on the remainder of the fleet until the accident investigation is finished, and any needed design changes are made. This process could take up to two years.

Of course all manned flights have stopped. There is no longer any alternative in the Free World to the Space Shuttle for manned spaceflight. Payloads requiring some form of human intervention are stranded. This includes most materials processing experiments, a major commercial space application. Space science is affected in some areas as well, such as life sciences experiments. Nothing can be done about this until the Shuttle flies again.

The real bitter pill that must be swallowed by potential space users is that many of the payloads now gathering dust on the ground do not require the Space Shuttle. They might have been launched by other launch systems, currently represented by a number of different expendable launch vehicles (ELVs) such as the Delta, the Atlas/Centaur, and the Titan. However, due to a concentrated, almost obsessive effort on the part of the National Aeronautics and Space Administration (NASA), none of these launch vehicles is currently able to take up the slack.

The reason for this situation is simple. As has been documented in past issues of this newsletter, NASA has dedicated itself to making the Space Shuttle the United States' sole method of launching all payloads into space, whether or not such payloads could be launched by any other existing launch vehicle. Commercial payloads, government payloads, science payloads, military payloads--all of these were to fly only on the NASA Space Shuttle.

The tactics used by NASA and its government and industrial allies to bring about this goal have been documented. They included political pressure, a subsidy (borne by the American taxpayer) of about $200 million for each Shuttle flight which allowed NASA to underprice all American ELV launch prices, and even actual threats to those NASA contractors which also manufactured ELVs (C.S.R., Dec. 1984, pp. 1-2).

These tactics were crushingly effective. No company was ever able to successfully commercialize any ELV. Even government payloads were few and far between for these vehicles. General Dynamics, builder of the Atlas, and Martin Marietta, builder of the Titan, both failed to locate commercial customers and abandoned their efforts in order to concentrate on government and military contracts. Transpace Carriers, Inc. (TCI), a company formed to commercialize the Delta, also had difficulties (more on this later). Production facilities were shut down and mothballed. Employees were laid off. The Shuttle consolidated its monopoly.

Then the Challenger exploded.

Suddenly, panic set in, and panic is the only word I can find to describe it. The United States government space program began milling wildly about like the inhabitants of an anthill that has been kicked apart by a small boy.

NASA's upper echelons were already in disarray even before the disaster. NASA administrator James Beggs was indicted in December on charges unrelated to NASA. William Graham, a bureaucratic rival of Beggs, was named acting administrator. A power struggle ensued which was ongoing during the Challenger disaster and has still not been completely resolved. Beggs has resigned, reportedly under assurances that Graham will not be named as his permanent replacement. James Fletcher, who was administrator from 1971 to 1977, has been named by the White House for the job. He has not yet been confirmed in the position, and apparently doesn't even want it.

The middle and lower levels at the space agency are shocked and demoralized, many of them resentful of the bureaucrats in charge. A front-page article in the April 2 Wall Street Journal, titled "After-Burn," is worth reading for details of the infighting going on between technicians, bureaucrats, astronauts and others.

The call has gone out for another Shuttle orbiter. The answer has come back from Rockwell and NASA that an orbiter, assembled with the help of some existing structural spare parts, would require three years and over $2 billion dollars. Assembling another orbiter from scratch would require five years, and God knows how much money. Whether the money will be forthcoming from Congress remains to be seen.

The call has also gone out for expendable launch vehicles. In some cases it's too late. Many existing ELVs are already assigned payloads, mostly military or government. The lead time for new Titan 34D, Atlas or Delta ELVs is over two years, once production is cranked up again.

The U.S. Air Force, long before the disaster, proposed constructing an ELV to complement the Shuttle. The Air Force had even then anticipated scheduling and reliability problems with the Shuttle fleet and wanted a backup for national security missions. James Beggs, NASA administrator at the time, was quite effective at blocking this legitimate and foresighted request (C.S.R., Mar. 1984, pp. 1-2; July 1984, pp. 1-4). Only when the President stepped in did the Air Force get authority to build ten vehicles, called Complementary Expendable Launch Vehicles (CELVs). Even then, NASA attempted to insure that the CELV would use expensive Shuttle technology (as it was, the contract was won by the Martin Marietta Titan 34D7).

So, fortunately for the nation, and despite NASA's best efforts, an ELV is already under production that can handle Shuttle-sized military payloads. Once in production, it may also become available for commercial and other non-military payloads. It will still be late in 1988 before the first one rolls off the line, but that is earlier than it would have been if the process was not already begun. In light of the Shuttle loss, the Air Force has now requested ten more CELVs.

Transpace Carriers, Inc., the Delta marketing company, should be doing well under the current circumstances. It isn't. TCI signed an agreement with NASA in 1984 giving TCI exclusive marketing rights to the Delta. TCI was to get control of 11 NASA Deltas (vehicle numbers 182 through 192) on the McDonnell Douglas production line at various stages of assembly. For two years afterward TCI, burdened by NASA's Shuttle prices, searched for customers.

The agreement deadline expired and was extended several times. Then in December of 1985, NASA told TCI that it needed some spares from the 11 Deltas for two Deltas owned by NASA (Nos. 180 and 181) and designated for Strategic Defense Initiative work. TCI consented, and signed an amendment to that effect.

Suddenly, after the Challeger explosion, NASA "reinterpreted" this amendment to mean that NASA had resumed control of all 11 on-line Delta launchers. This put TCI in a bad situation. Using the first of these Deltas, No. 182, TCI could launch a payload as soon as September of 1987. If all 11 vehicles became unavailable, TCI would have to start production of new Deltas, which would cost the company another $100 million, throw the earliest launch date up to 1989, and essentially put the company out of business.

It is now a standoff, with time working against TCI. NASA wants TCI to show customer contracts, final financing arrangements, and binding contracts with Delta contractors before TCI gets its vehicles back. Naturally it is nearly impossible for TCI to assure customers and financiers that their payloads will be launched while NASA continues to waffle on the agreement. Now all NASA has to do is use this Catch-22 stall until the TCI runs out of time and money and collapses. Then, although the agency denies it, it is likely that NASA will use the Deltas themselves to launch stranded Shuttle payloads.

Private alternative launch companies in the U.S. are also still struggling, striving to find investors in a market poisoned by subsidized Shuttle fares. The situation may improve now, but even if funding became immediately available, vehicles such as Pacific American's Phoenix, Third Millennium's Space Van, Truax Engineering's Excalibur, and the American Rocket Company's hybrid launch system are still a few years away. Space Services' Conestoga is available sooner, but has too small a payload to help most of the stranded Shuttle customers. Still, the efforts are encouraging, and it is hoped that entrepreneurs may still be able to find solutions for the short term.

Now, after the disaster, certain elements of NASA appear to be more supportive of the ELV industry instead of obstructive. In a memo on March 7, Acting Administrator Graham announced a moratorium on bidding on future communications satellite launches. Some feel this may be a first move towards restricting Shuttle launches to those payloads which actually require a Shuttle launch. This change of heart may encourage the U.S. launch industry, but there are some problems. First, Graham is only acting administrator and it is uncertain as to whether this policy will stick (judging by TCI's predicament, not all segments of NASA support private ELVs). A bureaucracy can have a change of heart nearly as often as Imelda Marcos has a change of shoes, and ELV manufacturers may be leery about going to the expense of tooling up again only to have the Shuttle come bouncing back into the market with its subsidized prices just as the ELVs are beginning to roll off the line. Second, many satellite people may just switch to Europe's Arianespace and the Ariane launch vehicle, something that would do neither the ELV marketers nor NASA much good.

Europe's Arianespace will try to absorb as many of the lucrative communications satellite customers as it can. Arianespace is working hard to open slots for new customers, with eight launch opportunities currently available in 1987 and 1988. If no other viable U.S. launch vehicle presents an alternative, the customers have no other choices. Those with satellites that are too heavy, or designed only for Shuttle launch, are stuck until the Shuttle flies again.

Incidentally, Arianespace is raising prices by 20%, a move they claim is not due to market demand, but to "changes in the value of the dollar" (right).

Some feel that there is currently a communications satellite transponder "glut," so that customers may not be as desperate as Arianespace hopes. Others disagree, pointing out that there is still a backlog of satellites waiting to be launched and costing their owners money every minute they're not in orbit. As it looks now, the communications satellite industry as a whole will probably come through this crisis relatively untouched.

The loss of Challenger was a considerably larger blow to the space science community. What was to have been the Year of Space Science is now postponed indefinitely. Payloads stranded include the Hubble Space Telescope, which was to have been launched in October, and the Galileo and Ulysses probes, due for launch through a narrow time window in May, which will now have to wait at least another year.

An undercurrent of resentment harbored by many space scientists against the government's expensive approach to manned spaceflight has now burst out into the open, expressing itself as a wild opposition to manned spaceflight in general. However wrong this attitude might be, it is at least understandable: after all, scientists have seen many of their own space projects vanish into the fiscal maw of the Space Shuttle while other nations planned and executed new planetary missions.

The scientists railing against manned spaceflight are missing the point. The problem is not manned spaceflight, but the way NASA went about it. NASA took an expensive manned space system and expanded it to fill niches where a manned system may have been inappropriate while ignoring the alternatives.

The President's Commission investigating the accident has developed a rather myopic viewpoint, concentrating on dissecting O-rings and bureaucratic chains of command. Their purpose, aside from jostling each other for television time, is apparently to discover what went wrong physically so that the design and the launch decision process can be corrected.

The Commission is also missing the point. What must be investigated is not only the accident, but the policies which allowed the accident to cripple our nation's advancement into space. Accidents happen. They are not confined to NASA, or to the public sector. Neither, for that matter, is bureaucratic bungling. However, when an airliner crashes, the entire air transport business does not shut down. There are alternatives to one airline. There are even alternatives to air transportation. NASA ignored two important rules for launch vehicle systems:

First: a tranportation system using reusable vehicles must have enough vehicles so that an accident does not severely compromise the capacity of the fleet taken as a whole. This is true of airlines, and it is true of space vehicles (imagine the airline industry operating with only three or four airplanes). However, given a system as expensive as the Shuttle--$2 billion per copy--and the fact that the whole program is carried on the back of the taxpayer, it is inane to conclude from this that the solution to this problem would have been to build more Shuttles. As a reusable, the Shuttle is an economic dead end. The real solution would have been to encourage alternatives, both reusable and non-reusable, and preferably privately funded. NASA did just the opposite.

Second: a space transportation system should be capable of either manned or unmanned operations (I support manned spaceflight, but it is a waste of money to carry people on missions where they aren't necessary). The Shuttle cannot fly unmanned, and as mentioned earlier, NASA has done little to support existing unmanned launch alternatives.

Some examples of how others, both governments and private companies, have designed their space programs:

The European Space Agency (ESA) is developing the Ariane family of expendable launch vehicles into a system which will eventually be able to fly either unmanned or with the manned Hermes orbiter on top. Should the manned capability be compromised (for example, by the crash of a Hermes on landing, or by possible Ariane safety questions), the unmanned Ariane would still be able to fly. Thus, ESA's eggs are not in one basket. The program can survive losses (it already has--Arianespace's most recent Ariane failure was just last September).

The Soviet space program also has a variety of space systems. The U.S.S.R.'s space fleet consists of several types of ELV of various sizes, a manned Soyuz capsule which flies aboard the ELV (and has been in use since 1967), and a series of Salyut space stations. As planned, the Soviet fleet will soon incorporate two types of winged reusable orbiter, and even larger ELVs and space station components (more on this later). Will they work? No one knows. The Soviets only know that if the first Soviet shuttle falls into the ocean, at least their space program can go ahead using other systems. Again, all the eggs are not in one basket (it irks the hell out of me to have to hold up the Soviets as an example of how to do things).

The British Aerospace Dynamics Group has proposed a Horizontal Takeoff and Landing vehicle (HOTOL). This fully reusable, single-stage vehicle, resembling a supersonic airplane, is designed to take off and land at airports and uses a combination of airbreathing engines and rockets to achieve orbit (C.S.R., Sept. 1984, p. 2; Jan. 1985, pp. 3-5). It is initially designed to be flown unmanned, and can be later upgraded to manned operations. This leads to lower startup costs and greater flexibility. It is uncertain at this time how may HOTOLs would be built. It is possible that British Aerospace will repeat NASA's mistake and build only a few, rendering the system as vulnerable to accidents as the Shuttle. (A detailed article covering both HOTOL and ESA's Hermes is scheduled for a future issue).

Pacific American Launch Systems' proposed Phoenix launch vehicle (C.S.R., Oct. 1984; Sept. 1985) is also designed for manned or unmanned operations, for the same reasons as the HOTOL. Pacific American intends to build the reusable Phoenix in quantities sufficient to protect payload customers against a major upheaval in the event of loss of a vehicle.

All of the foregoing programs recognize one important fact: no space vehicle can fly forever without incident. The Shuttle was particularly vulnerable. Spare parts were traded around to keep one or two orbiters operational. Investigations are revealing numerous problems with brakes, valves, tiles, and other systems. A Space Shuttle Main Engine (SSME) melted down during a static test in March of 1985--the first rocket engine to have a major failure after it had been man-rated. The Shuttle depends for transportation from the Edwards landing site to the Kennedy Space Center on a modified 747 carrier airplane. One airplane. Should something happen to it, the Shuttle program would be stuck, and 747s aren't indestructible either. Not only are all of our eggs in one basket, the basket was frayed. Yet, NASA still insisted on the Shuttle's monopoly.

What can NASA have been thinking? What reasoning was behind a policy that deliberately placed the entire space program hostage to four technologically complex and experimental launch vehicles to the exclusion of all else? Such a monopoly makes no sense. No further orbiters were being built. Did NASA think that the Shuttle was immortal? How long were they counting on going without an accident?

Given NASA's attitude, the current lack of American launch capability was inevitable, and the real investigation that needs to be done is why such a suicidal policy was carried out in the first place--and what can be done, now that we have a moment to pause and examine our course, to prevent such policies in the future. Alternatives are necessary. There are (if the Graham memo on communications satellites is any sign) those at NASA who may finally have seen the light and are willing to admit the necessity of alternatives to the Shuttle. It is vital to make sure that this attitude is encouraged, particularly when the questions of future Shuttle prices, more orbiters, and anticompetitive policies are discussed. We don't need to repeat old mistakes.

Next Month: Where Do We Go From Here? The Report of the National Commission On Space, and the Aerospace Plane Project.

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Soviets Launch New Space Station

On February 19, the U.S.S.R. launched a new variety of space station called "Mir" (Peace). 56 feet long and 13 feet wide, Mir is larger than the Salyut-7. The new station reportedly features a separate "cabin" for each of about six crew members, containing a chair, a desk and a sleeping bag. The rest of the station is also more luxurious, at least compared to Salyut.

The most important feature is a multiple-port docking module at one end of the station. This will allow Mir to dock with up to four permanent modules, leaving two ports for docking with Soyuz crew modules or Progress resupply modules. Currently, Mir is in orbit near Salyut-7 and its companion module Cosmos 1,686. A two-man crew was launched to Mir on March 13 in Soyuz T-15, followed by a Progress module March 28, and it is expected that another two-man crew will be launched to Salyut-7. Some form of linkup between the two stations is possible.

The Soviets have been quite cocky lately, apparently enjoying showing up the stricken NASA by launching the Soyuz T-15 on "live" television (a time delay was hooked in, no doubt in case a sudden bout of "technical trouble" was called for). When you consider that in September of 1983 the crew of Soyuz T-10 escaped the flaming annihilation of their booster on the launch pad only by the grace of God and an abort rocket, the cockiness is even more apparent.

U.S. Defense Dept. sources claim that the Soviets may finally launch their new space shuttle either late this year or early in 1987. If they can accomplish this before the U.S. Shuttle gets back into space, it will be still one more coup. If they rush it too much, they, like NASA, may find they have pulled on Murphy's nose once too often. In either case, I don't expect to see their launch on live TV.

DOT Releases New Regulations For Launch Vehicle Companies

The Department of Transportation (DOT) has issued new licensing policies and procedures to guide private-sector launch vehicle companies. Interested parties can find the document listed in the Federal Register for February 26 on pp. 6870-6883. Comments are due by April 28.

Until next time,

Tom Brosz

The Commercial Space Report (C.S.R.) is published monthly, and endeavors to report and analyze developments in the field of private initiatives in space transportation and exploitation.

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