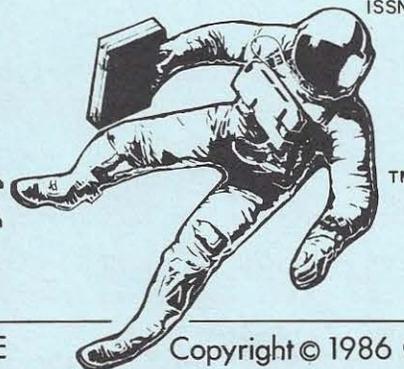


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Reagan Orders New Commercial Launch Policy, Asks For Fourth Orbiter

The New Launch Policy:

On Friday, August 15, President Reagan finally decided that commercial satellite payloads should be launched by the private sector, rather than by National Aeronautics and Space Administration (NASA) Space Shuttle. The new policy is intended to encourage the private launch industry, and to help reduce the large Shuttle payload backlog that has developed.

The Shuttle will henceforth be concentrated on missions requiring its special capabilities. These missions include building and servicing NASA's Space Station, flying Spacelab and other scientific payloads, performing military and other government missions, and carrying commercial payloads requiring manned operations, such as materials processing experiments.

This decision was a light at the end of the tunnel for payload customers and commercial launch vehicle manufacturers and operators. Both have been enduring an agonizing period of uncertainty while the government floundered in an attempt to recover from the Challenger disaster and settle on some sort of new policy. The decision was also a confirmation of the long-recognized fact that the Shuttle has never been, and never could be, a viable commercial vehicle capable of paying its own way.

The details of the decision have yet to be worked out. The administration does not intend to immediately remove all commercial satellite payloads from the Shuttle. At the time of the Challenger disaster, there were about 90 commercial satellites intended to be launched by the Shuttle. Of these, 44 had firm contracts. The rest did not have contracts for various reasons, although some had put down a deposit on the launch fees. In the next month or so, NASA will have to decide exactly how this situation is going to be handled. It is likely that some commercial satellites will still fly on Shuttle, although the number of slots will be severely limited. These satellites may include those whose designs would make it difficult to fly them on expendable launch vehicles (ELVs), or those belonging to foreign countries where American foreign policy would be enhanced by launching them on the Shuttle.

These exceptions account for only a few satellites, leaving many potential customers for a private launch vehicle industry that has been languishing for some time in NASA's subsidized shadow.

Some people have expressed concern that this new policy may be a major mistake. A number of aerospace industry representatives and analysts fear that there will be a sudden glut of satellite customers without a launch vehicle, which will all immediately flock to foreign launch services, such as Arianespace or the Chinese. Others, such as Robert Korkegi of the National Research Council, claim that there is no incentive for American private industry to enter the satellite launch market.

Still others state that the private sector is not up to dealing with the business of building and operating launch vehicles, which is still characterized as requiring billions of dollars.

There are several errors in these analyses:

First, only some of the satellite customers have turned to foreign launchers, a trend that had begun even before the Challenger disaster due to the Shuttle's scheduling problems. All else being equal, many U.S. satellite customers have expressed a preference for launching on a U.S. vehicle.

Second, the appearance of a "glut" of potential customers is totally incompatible with the simultaneous assertion that there is "no incentive" for anyone to enter an industry. This is not only true for the launch market, but for any market. This is an inconsistency that few of the so-called experts seem to have noticed.

Already, the President's decision has resulted in a surge of customer inquiries at American launch vehicle companies. These companies (and their respective launch systems) include those commercializing existing vehicles, such as Martin Marietta (Titan), General Dynamics (Atlas), and McDonnell Douglas and Transpace Carriers, Inc. (Delta). Customer interest and corresponding investor interest has also been directed towards new launch vehicle companies such as Space Services (Conestoga), Pacific American Launch Systems (Liberty), Hughes Aircraft (Jarvis) and the American Rocket Company. Many of these companies have already been encouraged by the Air Force Medium Launch Vehicle (MLV) project (more on this later).

As far as development costs go, the new launch vehicle companies have long been aware that most of the voices warning about the difficulties and billion-dollar expenses associated with entering the launch business were actually coming from NASA and the aerospace industries--in other words, their competition. These new companies believe that spaceflight does not have to be expensive, and feel fully confident that they are capable of competing not only with existing launch systems but also with planned ones like Europe's Ariane 5, Japan's H-1 and H-2, or even England's HOTOL spaceplane.

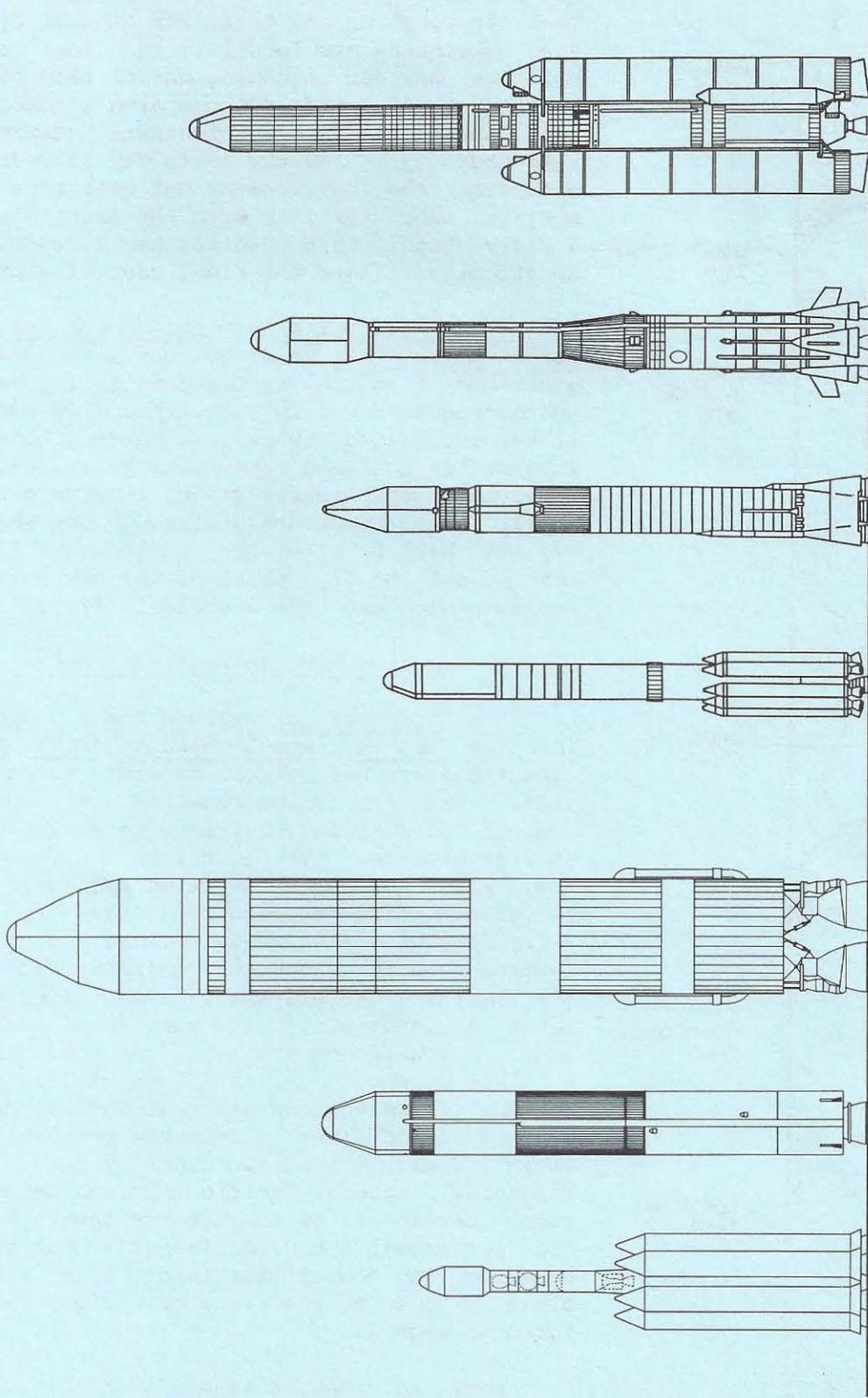
The New Shuttle Orbiter:

The second part of Reagan's new policy statement called for the building of a new Space Shuttle orbiter to replace the lost Challenger. The cost of this new orbiter is estimated to be more than \$2 billion. Some analysts saw this as an odd move, considering that commercial satellite payloads had just been removed from the Shuttle's payload manifest. Weren't three orbiters enough?

There were several reasons given to justify the construction of a new orbiter. Most of them hinged on the assumption that three orbiters were not enough to handle the Shuttle's mission commitments (listed at the beginning of this article).

However, the most important reason given for the construction of a fourth orbiter was that even if three orbiters were sufficient to handle the Shuttle's commitments, almost all analysts agree that two orbiters most certainly are not. Only a fool would assume that there would never be another Shuttle accident, or at the very least a problem requiring an orbiter to be grounded for a while. Given the U.S. government's assumption (valid or not) that the Shuttle is going to be the only manned spacecraft available to the United States for many years, it is sensible to round out the fleet now. Orbiters, expensive now, are not going to get any cheaper.

Paying for the new orbiter will be a problem--the administration has requested startup funding for FY 1987 of about \$270 million. The source of the rest of the money has yet to be decided. The military for its part, despite its proclaimed need



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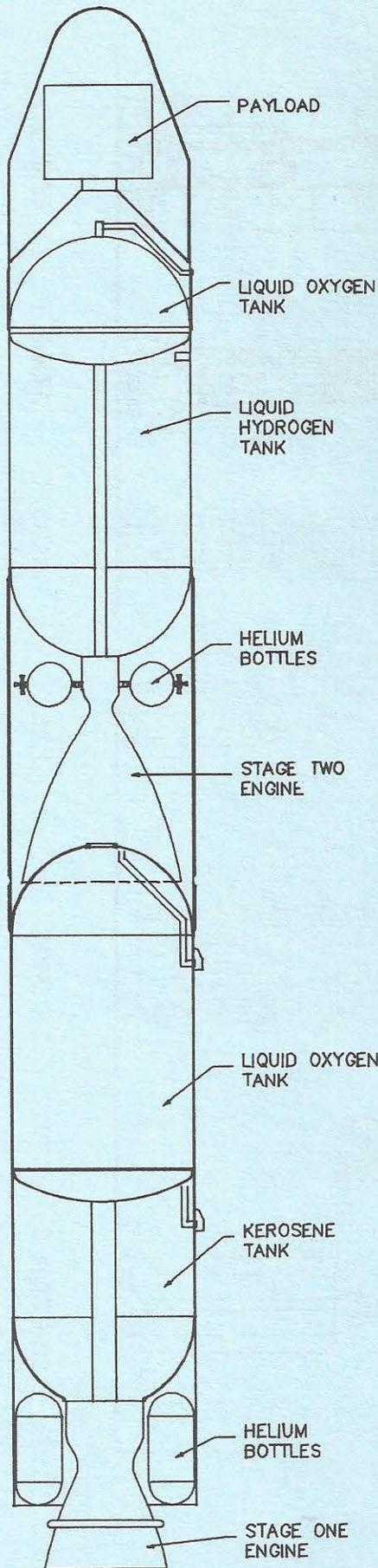
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LAUNCH VEHICLE

for the Shuttle, has been extraordinarily reluctant to cough up any money for another orbiter. It's beginning to look like the rest of the billions may end up coming out of NASA's less-than-substantial hide ("those aren't meteorites, son, those are space scientists jumping off buildings..."). Yearly costs may be reduced by spreading the development out over more time, but, as those familiar with the Shuttle's past history know, this practice has a tendency to drastically inflate the final cost of a project.

The President's new policy has at least broken the silence which has been, to date, the government's only major response to the American space program's crisis situation. In addition, it has encouraged the private sector, both those involved in building commercial ELVs, and those involved in the manufacture of Shuttle orbiters. Still, many of us are waiting to see what the results will be after the government finishes sorting out the fine print of the new policy, a process which may take a while to finish.

Initial MLV Contracts Awarded

The Air Force has awarded Phase I contracts for the Medium Launch Vehicle (MLV) project (described in more detail in last month's issue). The Air Force received six bids, and awarded \$5 million contracts to each of four winning bidders. The four were General Dynamics, which proposed the Atlas/Centaur; Martin Marietta, which proposed the Titan 34D, Hughes Aircraft, with its Jarvis rocket, and McDonnell Douglas, which proposed a modified version of the Delta. Two bidders were not selected for Phase I contracts. One was Space Services, Inc., which proposed its solid-fueled Conestoga 5. The identity of the other bidder is not certain (some sources say that Martin Marietta put in an additional, separate proposal for a Titan II with a special upper stage). Other companies, such as Pacific American Launch Systems, developer of the Liberty launch vehicle, did not submit a bid for Phase I, but plan on entering the competition later (the vehicles, along with an Ariane for comparison, are pictured on page 3).

More information is now available on the some of the new vehicles discussed last month: Pacific American's Liberty and Hughes' Jarvis.

Liberty:

Pacific American's Liberty launcher is a two-stage ELV using pressure-fed engines (see illustration at left). The vehicle is 15 feet

in diameter, allowing the accommodation of payloads designed to fit in the Shuttle payload bay. The first stage is fueled by kerosene and liquid oxygen (LOX). Its engine operates at 250 psi chamber pressure. The second stage is fueled by liquid hydrogen and LOX, with an engine operating at 100 psi chamber pressure. The propellant tanks, built from aluminum, are pressurized by helium gas stored in high-pressure graphite composite bottles. The engines are ablatively cooled, with a carbon-phenolic liner and a filament-wound composite outer shell.

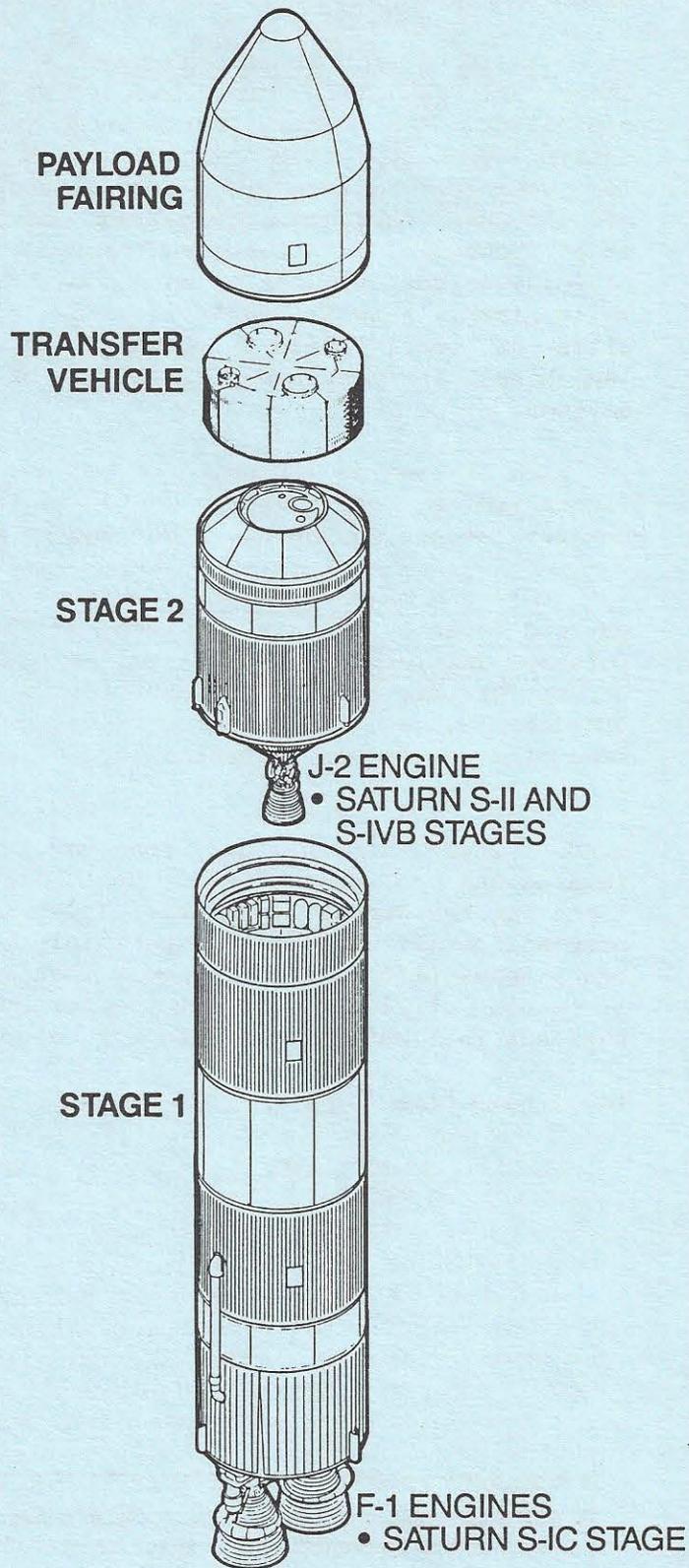
The systems and structure are designed for simplicity and low cost. The vehicle is designed for launch from a simple, water-cooled "milkstool" style launch stand, requiring no gantry facilities.

The payload capacity of the Liberty is about 20,000 lbs. into low earth orbit or about 4,400 to 6,600 lbs. into geosynchronous transfer orbit. Estimated launch price will be about \$25 million, and private funding is being raised for the project.

Jarvis:

Hughes' Jarvis ELV will be a three-stage vehicle (see illustration at right). The diameter of the vehicle is 28 feet, a diameter dictated by Hughes' desire to use existing Shuttle External Tank tooling to build its tanks. The first stage will burn RP-1 and LOX in two Rocketdyne F-1 engines, originally used on the first stage of the Saturn 5. The second stage will burn liquid hydrogen and LOX in a single J-2 engine. The third stage is an orbital transfer vehicle burning storable propellants. This transfer vehicle can act as a sort of orbital taxi, capable of leaving several satellites in several different orbits. Used for GPS missions alone, Jarvis could carry up to six GPS satellites at once.

Payload capacity of the Jarvis is 85,000 lbs. to low earth orbit, or 17,500 lbs. into geosynchronous orbit. The cost of a launch is expected to be in the neighborhood of \$150 million. Hughes is seeking at least \$1 billion in development costs from the government, an action which takes a lot of the luster off of the



JARVIS

Jarvis' label as a vehicle developed by private industry. But then, Hughes has never specifically touted the Jarvis as a private launch system.

It is difficult to understand why Hughes is building such a large vehicle. There are few (if any) commercial payloads that are large enough to need such capability. The Shuttle, for example, rarely flies any single payload requiring its entire launch capacity. Most payloads can be easily be flown individually on smaller vehicles requiring much less development money. And, despite Hughes' use of off-the-shelf hardware and tooling, Jarvis' increased scale does not seem to make it more economical on a per-pound basis. Using Liberty as an example, and with the payload and cost figures given above, Jarvis' cost to low earth orbit is \$1,765/lb. while Liberty's is \$1,250/lb.. And, although the Jarvis can launch six GPS satellites at once, while the Liberty can only launch one, the Jarvis' \$150 million launch cost is exactly six times that of the Liberty, resulting in no apparent cost savings.

One billion is not going to be easy to pry out of the Federal Budget for a new launch system, particularly on top of the cost of a new Shuttle orbiter. There is, however, an ace in the hole that Hughes may be able to play.

Only one major mission is currently recognized by the government as requiring a payload capacity at least as large as that of the Jarvis, and that is the Strategic Defense Initiative (SDI). Neither Hughes nor anyone else has publicly mentioned Jarvis for this application, but the vehicle could handle many of the large payloads SDI demands, and the SDI program may be the only one capable of coming up with the kind of money Hughes is asking for.

There is no evidence that Hughes developed Jarvis with SDI specifically in mind. Still, it would go a long way towards explaining the company's confidence in funding and the reason for the vehicle's immense size. In fact, SDI may be the best niche for the Jarvis launcher. It would make its development a much more sensible proposition (it would almost certainly be cheaper to build than some of the Shuttle-based Heavy Lift Booster concepts that have been proposed for the SDI mission), and it would still not rule out the system for any potential commercial or scientific payloads that may someday need its capabilities.

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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