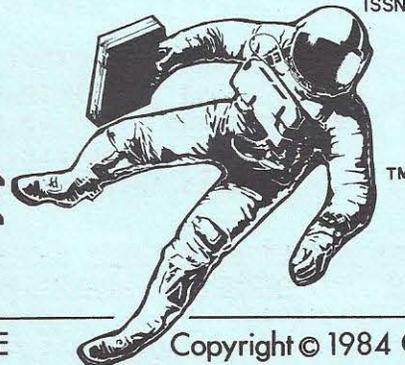


# THE COMMERCIAL SPACE REPORT

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## U. S. Air Force Abandons Commercial Launch Vehicle Acquisition

The Air Force has decided to use conventional government contracting procedures to develop an expendable launch vehicle (ELV) which would supplement the Space Shuttle for military payloads (C.S.R., Mar. 1984, pp. 1-2). Referred to as the "SLV-X" (Space Launch Vehicle), the vehicle's design mission is to place a Shuttle-sized, 10,000 lb. payload into geosynchronous orbit. Under pressure from various sources, the Air Force abandoned its original idea to purchase the new ELVs using a more commercially-oriented procurement approach.

The Air Force's original plan encouraged responses from launch vehicle contractors in the private sector, and had features more in common with private market transactions than with typical government purchasing procedures. Under this plan, the winning contractor would receive a commitment from the Air Force to buy at least ten vehicles over a period of five years. All development funding and procedures would be the responsibility of the contractor, who would eventually recover these costs by amortizing them over the ten vehicles purchased by the Air Force.

This "pay on delivery" approach has a number of advantages for the Air Force and the taxpayer. A minimum amount of government involvement would be required, resulting in less red tape and lower costs. The winning contractor would have an incentive to keep production costs low and lead times short, since no money would change hands until final delivery. In addition, a reasonably priced, privately produced ELV could easily be made available to other payload customers once the Air Force's order had been filled. In fact, if the sales of the SLV-X exceeded the minimum of ten vehicles originally planned, this would allow the contractor to spread development costs over the additional vehicles, resulting in further savings to both the commercial customers and the Air Force.

However, this method of purchasing launch vehicles annoyed a number of factions within the government. Pressure began to build to return to the "pay as you go" procurement methods typical of normal government contracts. Objections were raised both in Congress and the Office of Management and Budgets. A major problem seemed to be that a commercial approach would place much of the development process of the SLV-X outside the control of the government, which would nevertheless be required later to put up the money for the Air Force to buy these vehicles. The government apparently viewed this as buying a "pig in a poke," and wanted an approach that would permit further control of the development process.

In addition to this (although not confirmed by the Air Force), there was also apparently resistance to the commercial approach within the Air Force's own satellite community. The payload people also feared loss of control of the booster design process unless a more standard procurement procedure was used.

NASA too, (one of the bidders) applied pressure to convert the SLV-X project to a more typical government contract. Otherwise, the agency would find itself, if it

won the contract, in a rather difficult situation. Under a "pay on delivery" contract, NASA, unlike a private company, would have to pry development funds out of Congress and continue to do so until the SLV-X was completed. Then what? Does Congress give money to the Air Force who then pays NASA for the launch vehicles? What does NASA do with the money? Give it back to its "investors" in the Congress?

Under attack from these sources and others, the Air Force finally gave in and abandoned the commercial approach. Bids on the SLV-X had already been submitted by General Dynamics/Convair, Martin Marietta, and the National Aeronautics and Space Administration (NASA) under the original Request for Proposals (RFP). These original bids are being returned unopened, and a new RFP should be issued in a few weeks. Speed is essential, since the Air Force wants to launch the first SLV-X by 1988.

Following are some technical details of the SLV-X proposals (see Figure 1). Martin Marietta has designed a growth version of its operational Titan 34D ELV (C.S.R., Mar. 1984, pp. 1-2). Called the T-34D7/C, the vehicle incorporates modifications to the liquid-fuel core and the two outboard solid-fuel boosters in order to increase the payload. A General Dynamics LOX/hydrogen Centaur G-prime (G') is used as an upper stage. Already under development for NASA for planetary missions involving the Shuttle, the Centaur G' is a modification of the operational Centaur D.

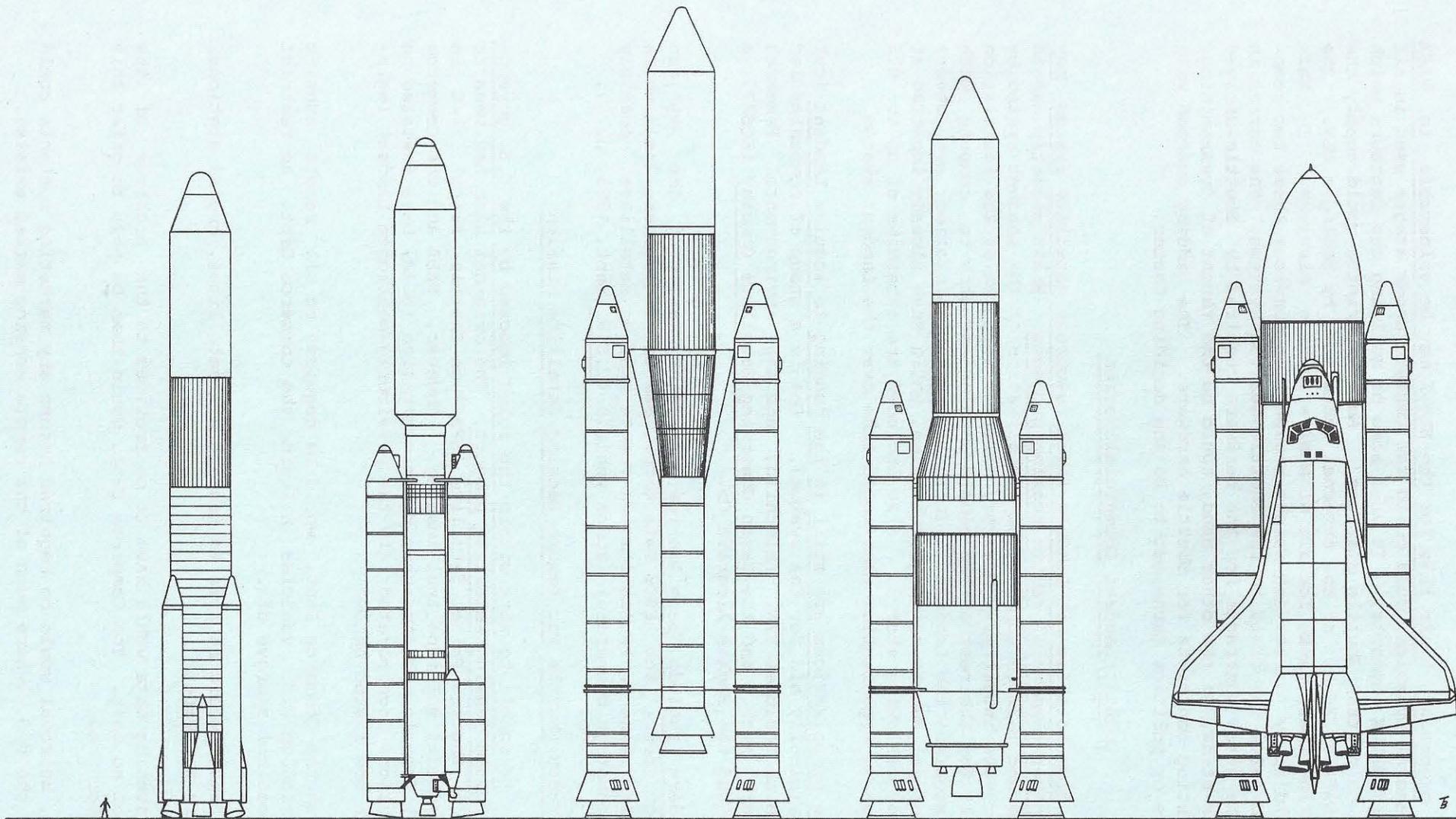
General Dynamics would create a growth version of its operational Atlas/Centaur ELV. Modifications to this new vehicle, the Atlas II/C, would include adding two more booster engines to the liquid-fueled Atlas, and four solid-fuel strap-on boosters. The Atlas II/C would also use General Dynamics' Centaur G' as an upper stage.

NASA's vehicle, still in the conceptual stage, is based on the Space Shuttle's Solid Rocket Boosters (SRBs), and is called the SRB-X. The present concept utilizes two 4-segment SRBs as outboard boosters. The core vehicle contains a 2-segment SRB lower stage, a modified Titan 34D second stage, and a Centaur D upper stage.

The Boeing Aerospace Corp. is investigating its own version of a Shuttle-derived vehicle and may also submit a bid to the Air Force. The Boeing unmanned launch vehicle (ULV) would use two SRBs mounted normally on a Shuttle external tank. However, instead of a Shuttle orbiter mounted on the side of the external tank, the ULV would have a Space Shuttle Main Engine (SSME) mounted at the tank's base, possibly in a recoverable capsule. The payload would then be mounted on the top of the tank. This version of the ULV has a payload to low earth orbit of about 78,000 lbs. and could, with a suitable upper stage, easily satisfy the Air Force's geosynchronous mission requirements. Growth versions of the ULV, by mounting up to four SSMEs on the vehicle, could place up to 267,000 lbs. into low earth orbit.

It will be interesting (and instructive) to see who comes out of this competition with the Air Force contract. If development costs have anything to do with the outcome, (operational costs will probably be similar for all of the competing systems) no Shuttle-derived vehicle (such as the NASA SRB-X or the Boeing ULV) would stand a chance against the Atlas or Titan derivatives, which require only relatively minor modifications to perform the Air Force mission. Estimated development costs for the Shuttle-derived vehicles range up to \$1.5 billion. Cost estimates on the Atlas or Titan derivatives are not available, but could be nowhere near as high. In addition, the lead time for either the Atlas or Titan systems would be much less than for a Shuttle-derived vehicle. However, it is well known that politics can play a more important role than price or lead time. Originally, NASA tried to kill the SLV-X program entirely, thus eliminating a threat to the Space Shuttle. The agency may still be hoping for this, but failing that, its objective would be to make sure that the SLV-X program utilizes Shuttle hardware, regardless of the cost.

(TEXT CONTINUED ON PAGE 4)



**ATLAS 2/C**  
*General Dynamics*

**TITAN 34D 7/C**  
*Martin Marietta*

**SRB-X**  
*NASA*

**ULV (modified)**  
*Boeing*

**SHUTTLE**  
*NASA*

**SHUTTLE-EQUIVALENT  
LAUNCH VEHICLES  
FIGURE 1**

The companies proposing their ELVs for the SLV-X may be vulnerable to NASA pressure tactics. General Dynamics would build the Centaur upper stages used in all of the above-mentioned SLV-X concepts. It will also be building the Centaurs which will be used by NASA on certain Shuttle missions. Martin Marietta would supply the Titan stage used in NASA's SRB-X, or the external tanks used by Boeing's ULV. The company already builds these tanks for all of NASA's Shuttle missions. In this situation, NASA could apply "carrot-and-stick" pressure to convince these two companies to back off and leave the field to the Shuttle-derived systems. The carrot in this case would be the juicy contracts for the hardware required by Shuttle-derived launch vehicles. The stick, on the other hand, could be the threat of "reexamining" these companies' existing contracts for Shuttle hardware. The bidding outcome will tell us whether price or politics turns out to be the deciding factor.

#### Update: Landsat Commercialization

Legislation to commercialize the Landsat earth resources satellite system may create problems for other commercial remote sensing projects. Bills recently passed by Congress (HR-5155 and S-2292) support commercialization of the Landsat system by turning it over to private industry. However, certain features of the legislation may make it difficult for the rest of the remote sensing industry to compete with the company that acquires the Landsat. Included in the legislation are severe restrictions on commercial remote sensing activities, which have already impacted at least one company (see following story). Also included are subsidies of up to \$75 million for the fortunate organization that would take over the Landsat system.

Only two private organizations are still in the running to acquire Landsat (out of the seven that originally bid for the system). One is a group of companies led by Eastman Kodak (which includes TRW, Fairchild, and the Environmental Research Institute of Ann Arbor, Mich.) and the Earth Observing Satellite Company (EOSAT), a joint venture of RCA and the Hughes Aircraft Co.

Eliminated bidders include Space America, (a joint venture of the American Science and Technology Corp., the AEROS Data Corp., and Space Services, Inc.) which intends to continue its plans to launch its own remote sensing satellites, possibly on Space Services' Conestoga commercial launch vehicle (C.S.R. Sept. 1983, p. 1).

#### Sparx Drops Shuttle For Remote Sensing Satellite Mission

The Sparx Corp. is unable to work within the rules imposed by the U.S. government on its private remote sensing satellite project. The original plan had been to launch the company's Shuttle Pallet Satellite (SPAS) on Shuttle flight 41-G in October to begin commercial multispectral imaging. However, NASA and the Commerce Department's National Oceanic and Atmospheric Administration (NOAA) have insisted on applying the restrictions incorporated into the previously-mentioned Landsat legislation, some of which are listed below:

- A license from the Commerce Dept. would be required on all remote sensing satellites carried on U.S. vehicles (allowing the Commerce Dept. to restrict satellites it does not approve of).
- The Commerce Dept. would be able to inspect all satellites, ground stations, and data analysis software.
- All remote sensing data would have to be provided to the archives of the Commerce Dept. at no cost. The Commerce Dept. would then be able to offer this data to anyone for free.
- Commerce Dept. approval would be required before any marketing contacts could be made outside the U.S. (where much of the remote sensing market exists).

To make commercial remote sensing viable, Sparx (or any other company) must be able to have proprietary control over the data and be able to sell it exclusively to customers on the open market. U.S. policy on commercial remote sensing, as codified in the Landsat legislation, will prevent this by effectively straitjacketing remote sensing companies that wish to fly their satellites aboard a U.S. launch vehicle.

Rather than submit to this, Sparx will take its launch business elsewhere-- specifically to Europe's Ariane launch vehicle. The company intends to launch its satellite aboard an Ariane, possibly in 1987. The problems caused by this switch-over will delay the start of the Sparx SPAS program by several years, and could add \$40 million to the program's costs.

#### Update: Truax Engineering

Truax Engineering of Saratoga, Calif. conducted a static firing of the flight engines of the company's experimental "Private Enterprise" rocket on July 7. The burn lasted nearly a minute, and tested the four small rocket engines' swiveling capability, which will eventually be required to steer the vehicle in flight.

Flightweight propellant tanks are presently under construction, and some avionics have yet to be acquired. When the rocket is completed, a series of static tests and unmanned flights will precede the manned flight which will take volunteer astronaut Fell Peters on a short suborbital flight to an altitude of about 65 miles. The rocket is intended to test the concept of water-recoverable liquid boosters, while the manned flight is intended to generate publicity and funding to begin the next stage of development in a long-range plan which Truax hopes will lead to large, low-cost orbital boosters (C.S.R., Sept. 1983, pp. 1-4).

The media, while giving the Private Enterprise project considerable attention, have largely overlooked Truax's orbital booster concepts. One result is that the Private Enterprise manned suborbital stunt is often perceived by the public as a project standing alone, with no lead-ins to future, more practical projects. Some media personnel have even assumed that the tiny, 25-foot Private Enterprise rocket is in fact an orbital system! Truax Engineering is seeking additional funding, and this narrow media viewpoint is not much help.

#### Recommended Publication

Aviation Week and Space Technology devoted its June 25, 1984 (Vol. 120, No. 26) special issue to the commercialization of space. The magazine contains over 140 pages of information on the subject, with articles on private space transportation, materials processing, communications satellites, NASA involvement, investment potential, and much more. This issue is a must for anyone interested in the subject of private enterprise in space. Check it out of your library, or, better yet for reference purposes, order it from the publisher. Write: Aviation Week & Space Technology, McGraw-Hill Building, 1221 Avenue of the Americas, New York, NY 10020 (Attn.: Deborah Arena). Price is \$8.00 in the U.S., and \$9.00 elsewhere.

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#### "Weapons In Space": Some Comments

There has been considerable activity lately promoting some form of ban on weapons in space. In fact, this controversy has become a major point of division in many pro-space organizations. There are two items which should be clarified before the debate can be continued in any meaningful sense:

Item one: if the subject is going to be debated, the debaters had better be specific. Many of those discussing "space weapons" are lumping into this category

anything in space that can be used for an offensive or defensive purpose.

If you favor or oppose anti-ballistic missile systems in space, then say so. If you favor or oppose anti-satellite weapons, or space-to-ground kinetic projectiles, or vacuum-hardened BB guns, then say so. A debate dealing only in the vague concept of "space weapons" is useless.

Right now, the space weapons debate risks falling into a semantic morass--the same one inhabited by those "anti-nuke" polemics who draw no distinction between enormously different technologies developed for enormously different ends. In the eyes of such people neutron bombs, radiopharmaceuticals, atomic power plants, isotope smoke detectors--anything that has the word "nuclear" in front of it is damned, regardless. A similar vagueness is developing around the concept of space weapons. I support the right of self-defense in space, or anywhere else. If others wish to disagree, then I insist that they come out of their morass and onto the dry land of specific moralities and technologies to debate their point.

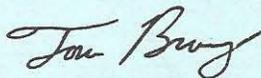
This brings up item two. There are many people who insist that specifics are not important because they feel that no weapons of any kind have a place in the future of mankind in space. I might as well squelch this particular argument right off. There will be weapons in space.

For one thing, many of the normal activities in space will involve large-scale uses of energy (for example, propelling a spacecraft at the velocities required to exploit the solar system, or deflecting an asteroid off of a collision course). Such energies usually have the potential for being converted to weapons. In fact, an object moving at orbital velocity packs the kinetic energy of 15 times its weight in dynamite if it strikes a relatively stationary object, so technically anything in space could be considered a weapon if it's in the wrong place at the wrong time.

However, the real truth of the matter is that weapons have always been necessary wherever there are human beings. There is always a need for self-defense. There are already weapons systems designed to protect satellites from attack, and the next Soviet space station is expected to be defended by kinetic and directed energy weapons--in my opinion a reasonable precaution for any major space installation, military or not. Similar armaments will someday be required to guard the security of large-scale communities and industries in space.

Envisioning a sphere of human activity in a state of total disarmament is hopelessly naive. I hope that those who are laying plans for eventually working and living in space realize this for the sake of the people who will someday turn those plans into reality, and may be called upon to defend what they build.

Until next time,



*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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