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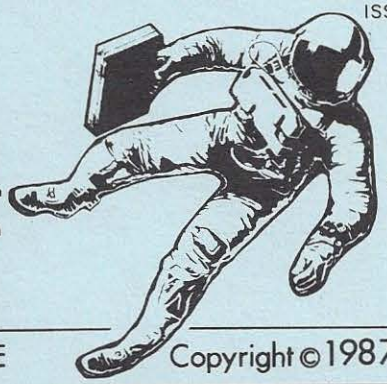

A MONTHLY NEWSLETTER ON FREE ENTERPRISE IN SPACE

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Aerospace Engineers Form New Private Rocket Company

Some old hands in the space business have gotten together to form a new private launch vehicle company. The E-Prime Aerospace Corporation (EPAC), located in Titusville, Fla., was founded February 20, 1987. The founders of the company are a group of engineers and managers hailing from NASA and the aerospace industry. A number of EPAC's principals, such as the company's launch director Dr. Robert Gray, are coming out of retirement. Others are younger, but the company boasts that its staff averages 25 years apiece of aerospace experience.

EPAC is developing a series of expendable launch vehicles based on solid-fueled rocket motors that are either existing or easily developed. The vehicles come in two basic classes: EPAC-A, for smaller payloads; and EPAC-B for larger ones. By combining solid motors in a variety of ways, EPAC claims that it will be able to launch a payload into low earth orbit weighing anywhere between 3,500 to 35,000 lbs. Payloads to geosynchronous transfer orbit (GTO) range from 637 to 5,000 lbs.

EPAC has released the configuration of the EPAC-A launch vehicle. It is almost identical to the configuration of NASA's Scout rocket, except that the Algol solid-fueled motor normally used as a first stage is replaced by a modified Morton-Thiokol Castor IV solid-fueled motor. This new version of the Castor IV will have a gimballed nozzle for steering. The Castor motors currently in production are used as boosters for the McDonnell-Douglas Delta launch vehicle, and are equipped with rigid, slanted nozzles (the Delta steers using its liquid-fueled gimballing core engine). The EPAC-A uses other Thiokol solid-fueled motors as its upper stages: a Castor II motor for a second stage, a Star 31 motor for a third stage, and a Star 20 for an optional fourth stage.

The configuration of the larger EPAC-B family of vehicles has not been released, since negotiations with potential vendors are still in progress.

It is interesting to compare the EPAC-A configuration to that of Space Services' Conestoga II launch vehicle. The Conestoga design also incorporates the modified, steerable Castor IV motors, using two of them as a first stage, and another one (with a larger nozzle) as its second stage. The Conestoga also uses Thiokol Star motors in its upper stages: a Star 48 for a third stage, and a Star 30 for a fourth stage (other Star motors can be used as a fourth stage, depending on payload requirements).

EPAC is currently planning to use three launch sites for its vehicles: Cape Canaveral, Vandenberg Air Force Base, and the Cape York area of Australia (the Australia site is located only 12 degrees south of the Equator). Company plans call for two launch pads each at both Cape Canaveral and Cape York, and one pad at Vandenberg. Negotiations are under way, and EPAC already has an Australia office in Queensland.

EPAC's development costs are estimated at around $10 to $12 million. Start-up funding came from the company's founders, which include Raymond J. Cerrato, EPAC's president, a former NASA engineer; Robert Davis, company chairman, formerly with Boeing; and Murray J. Bailey, an Australian businessman, who is now head of EPAC's Australia office.

Additional financing is expected to come from Ponderosa Ventures of Vancouver, British Columbia, a venture capital firm. Although EPAC company representatives have stated that the development money is already "in hand," representatives from Ponderosa still put the funding in the "pending" category.

The company's current schedule is ambitious--plans call for the first launch of an EPAC-A vehicle in as little as 12-14 months, and first launch of an EPAC-B vehicle in only 18-24 months.

EPAC has not officially released the names of any customers, but the company says it has been talking to both NASA and the Department of Defense, and already has a customer signed up for their first launch. Australia reportedly also has six payloads that are candidates for an EPAC flight.

EPAC claims that their vehicle will fly for less than half the price of liquid-fueled rockets with comparable lift. EPAC quotes launch prices for the EPAC-A at somewhere between $10 and $14 million, depending on the mission and payload. EPAC also claims that its launch price for the EPAC-B will be around $25 million for an Atlas/Centaur class payload (about 5,200 lbs. to GTO), about half the going rate on current liquid-fueled ELVs (see story on Atlas/Centaur later in this issue). There is, naturally, considerable interest on this point among aerospace industry representatives as well as from potential customers. Some in the industry think it unlikely that a large solid-fueled launch vehicle could be that much cheaper than an equivalent liquid-fueled vehicle (all else being equal, liquid propellants are much less expensive than solid fuel). We will see who is right--all of the data is not yet in. Naturally I am rooting for the private sector. It wouldn't be the first time the aerospace mainstream has had their noses rubbed in their cost assumptions, and with luck it won't be the last.

EPAC plans to release more information on customers and vehicle designs, as well as a payload user's handbook, sometime this month. The company can be reached at: E-Prime Aerospace Corp., 302 S. Washington Ave., Titusville, FL 32781. Tel.: (305) 269-0900.

Space Services To Launch Navigation Satellites

Space Services, Inc. (SSI) of Houston, Texas has reached an agreement in principle with a private satellite company to launch five geosynchronous navigation satellites beginning in late 1988. The company, Starfind Inc., located in Laguna Niguel, Calif., would be Space Services' first commercial customer.

Starfind's satellites, weighing 350 lbs. each, will be launched aboard SSI's Conestoga II solid-fueled expendable launch vehicle, currently under development. The Conestogas will be flown from a pad at the Wallops Island rocket facilities in Virginia.

The Starfind satellites will use a new positioning and navigation technique to provide a customer's location on the earth's surface within 12 feet. The new technique, developed and patented by Starfind, differs from the methods normally used by satellite navigation systems.

Other systems, such as the one under development by the Geostar company, rely on some form of triangulation to fix the position of a customer. This requires the

use of at least two satellites. In contrast, a Starfind satellite uses an array of as many as 36 long, narrow receiving antennas mounted on the satellite itself. These antennas, combined with the motion of the satellite itself, allow a single satellite to precisely ascertain the position of a signal generated by low-powered transmitter carried by a customer on the earth's surface.

Starfind's technique requires only one satellite to work. This means that the Starfind navigation system can become operational--and profitable--after only one launch. It also means that fewer satellites are needed to build a world-wide navigation capability. As currently planned, the first Starfind satellite will be placed in a 22,300-mile geosynchronous orbit over South America to cover the both of the American continents and adjacent oceans. The second launch, six months later, will cover Europe. Three more operational satellites and two spares will follow at three-month intervals to provide the aforementioned worldwide coverage.

If all goes well, Starfind will be able to launch its first satellite by the end of 1988, and has already reserved a Conestoga launch slot for that time. However, Starfind's contract with Space Services is contingent upon both Federal Communications Commission (FCC) approval of the Starfind technology, and the acquisition of additional financing.

Some observers (including competitors such as Geostar), are skeptical about Starfind's technology and about the company's chances of getting the FCC clearances required in time for a 1988 launch. Starfind counters such skeptics by pointing to ground-based experiments, conducted using a setup that was the reverse of the normal Starfind configuration: the company used a ground-based array to locate the position of existing satellite transmitters in orbit. Reportedly, the tests were successful. As for navigating its way through the FCC bureaucracy, Starfind claims that the process is already well under way.

The ground-based transmitters are expected to run about $200.00 each--cheap enough to make the system available to just about everyone. Potential customer uses for the system include ship and plane navigation, locating stolen vehicles or missing children, and many others. Starfind has already been approached by the U.S. Army, which has expressed an interest in the system.

General Dynamics Betting On Commercial Launch Market

General Dynamics intends to invest its own money to begin construction of 18 Atlas/Centaur launch vehicles for the commercial payload market. Of course, General Dynamics is not releasing the amount of money that this investment represents, but it is undoubtedly in the hundreds of millions of dollars--an indisputable demonstration of the company's confidence that the Atlas is a major contender in the commercial space race.

General Dynamics has been fighting a long and frustrating battle trying to market the Atlas/Centaur to both commercial and government customers. The company only recently received the go-ahead from NASA and the government to commercialize the Atlas, after months of delays. Added to this was the loss of the Air Force's Medium Launch Vehicle (MLV) contract, which went to McDonnell Douglas and its new Delta 2 launch vehicle (C.S.R., Jan. 1987, pp. 1-3). Finally, the Atlas has always been priced higher than other expendable launch vehicles (one reason it lost the MLV contract).

General Dynamics is countering these setbacks with an aggressive marketing campaign involving pricing, advertising, and customer incentives.

First and foremost, the price of an Atlas launch has been reduced to $59 million for a payload of 5,200 to 5,900 lbs. into GTO, less than the approximately

$65 million that Atlas launches used to cost. This gives the Atlas a price range of $10,000 to $11,350 per pound into GTO. No firm commercial launch price has been released for the Delta 2, Atlas' major U.S. competitor in the ELV market, but some sources have reported figures in the $40 to $45 million range. Early versions of the Delta 2 will be able to put 3,190 lbs. into GTO, while later versions will be able to carry 4,010 lbs. Assuming the Delta 2 launch prices are correct, and going from optimistic assumptions ($40 million for 4,010 lbs.) to pessimistic ones ($45 million for 3,190 lbs.), this would give the Delta 2 a price range of $10,000 to $14,100 per pound into GTO. These figures show the Atlas as competitive with the Delta 2, and even potentially cheaper (of course, if E-Prime can deliver on a price of $25 million for a similar payload, then all bets are off).

In addition to competitive pricing, General Dynamics is engaging in widespread advertising. Ads are appearing in publications such as Aviation Week and Space Technology, stressing the strong points of the Atlas/Centaur launch system. This include an excellent launch reliability record, an accurate guidance system for precise orbital placement (extending a satellite's operational lifetime), and the flexibility gained by dedicating each flight to only one payload.

Finally, General Dynamics is offering other incentives to potential customers such as reasonable insurance, and the promise of a free reflight if the rocket fails.

It remains to be seen whether General Dynamics' bet pays off. The stakes include not only the hundreds of millions which the company will spend in constructing 18 Atlas/Centaur vehicles, but an additional $100 million which General Dynamics is investing to improve manufacturing facilities and to develop larger payload shrouds to accommodate larger customer payloads.

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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