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Dear Subscriber:

Critical Ariane Flight Successful

Ariane 6 launched two satellites into geosynchronous transfer orbits on June 16. The satellites were ECS-1, a general communications satellite; and Amsat, a communications satellite for amateur radio operators.

This launch marks the first successful commercial flight of an Ariane rocket for the European Space Agency (ESA). The fifth launch, containing a similar payload of two satellites, suffered a third stage failure and crashed. (C.S.R., Oct. 1982, p. 1). An earlier test launch, Ariane 2, also failed to reach orbit, but did not contain a commercial payload.

The success of Ariane 6 was considered critical for the entire Ariane program. Had this flight failed, it could have spelled disaster for the Ariane as it is likely that commercial customers would have begun looking elsewhere for their space transportation needs. As it is, many potential customers were waiting for the outcome of the Ariane 6 launch before confirming their orders.

ESA Satellite Launched on USA Rocket

ESA's Exosat, planned as an Ariane payload, was launched by a Delta rocket (a major Ariane competitor) instead. This slightly embarrassing situation is due to the failure of Ariane 5, and the resulting uncertainty about the launch date for Ariane 6 (originally slated to carry Exosat). The ESA worried that Ariane 6's flight might be delayed past the May launch window for Exosat. To play it safe, it was decided in February to use the McDonnell Douglas 3914 Delta instead. The ESA had, with excellent foresight, designed the X-ray astronomy satellite to be compatible with either the Ariane or the Delta, allowing the switchover to be made in the three months before the launch.

The ESA took advantage of this opportunity to tighten up its launch schedule as well. Shifting the Exosat to another launch system was one way to allow the agency to move other Ariane payloads up on the schedule, and get to the operational launches (those involving paying customers) that much sooner.

Competition for Intelsat VI

The Intelsat VI program has created intense competition in the launch vehicle industry. Intelsat VI is a large, advanced communications satellite. Eventually, as many as 16 may be orbited. At present, five are under construction, and are due to be launched in 1986.

NASA's space shuttle will launch at least two of these five satellites, according to a recent decision by Intelsat (the International Telecommunications Satellite Organization). A decision on the other three is expected in September. Aside from

the shuttle, the other vehicles bidding for Intelsat VI launches are ESA's Ariane, and the Martin Marietta Titan 34D (presently being marketed as a private launch system by Martin Marietta and FEDEX SpaceTran). The competition for Intelsat narrows down to a few basic issues: Price, reliability and availability. An informal analysis of the contest on these points follows (bear in mind that this analysis applies to one payload only--Intelsat VI):

Price:

NASA has entered the low bid at about \$50 million for each satellite launch. Ariane has bid about \$55 million per launch, and Titan about \$75 million. Unfortunately for the competition, the shuttle's operational costs are subsidized to a great extent. The actual launch costs are far higher. The shuttle's external fuel tank alone costs almost \$40 million per copy.

Reliability:

The Titan has achieved a 98% success rate with a record of 119 successful launches out of 122. Ariane's success rate is presently 67%, with four good launches out of six. The space shuttle has made seven successful orbital flights out of seven, for a success rate of 100%.

These statistics should be taken with a grain of salt. Ariane's low rate is not really fair, since early failures on a launch system under development are not unusual. There are not many launch systems that would be able to boast a high success rate after only six flights. Viewed in the same light, the shuttle's 100% rate looks even more impressive, since the shuttle is not only a new system, but one considerably more complex than either Ariane or Titan. The shuttle's designers, builders and operators deserve considerable credit for the fact that all seven missions so far have launched and returned safely. However, from a commercial reliability standpoint this record is not quite as impressive if you consider the large number of minor problems that have plagued the program. Anomalies encountered in earlier flights, such as the APU problem on STS-2, could have seriously jeopardized commercial payload missions if any had been on board.

Many successes over many flights is the only way to prove reliability. By this standard, Titan looks best. By a similar standard, we would have to say the jury is still out on shuttle and Ariane although it is likely that their record will improve as the number of flights increases, just as with any other system.

Availability:

Shuttle and Titan are flying systems, with launch slots ready. The Ariane version required to launch an Intelsat VI is still under development and has not yet been tested. This puts shuttle and Titan ahead, and seemingly about even in the availability contest. However, another important factor for a customer is knowing there will be a launch vehicle ready to go when he needs one, and shuttle and Titan should be examined in this area of availability as well.

Obviously, for any system, reliability ties directly in with availability. If a system is reliable, it will not only do the job, but it will do it when you want it done. One factor is scheduling difficulties arising from delays caused by minor technical problems. The shuttle has had a number of such delays, largely due to the fact that it is a new and complex system, still under shakedown. On the whole, therefore, the Titan system ought to have fewer technical delays than the shuttle by virtue of being an older, less complex, more tested system. The other factor is delays and cancellations caused by major launch failures. Such a failure of a Titan vehicle would require the same sort of schedule juggling as Ariane did after its failure. The lost vehicle would probably not seriously affect the entire roster of

customers. The shuttle is more sensitive in this area. A reusable system, by its nature, eliminates many launch slots (rather than just one) when a vehicle is lost. With a large fleet of vehicles, accommodation of displaced payloads is not that difficult. With a fleet of only four or five vehicles, loss of one throws a major monkey wrench into the entire payload roster, with numerous customers suddenly without a launch slot. For these reasons, it seems safe to say that Titan is the best bet in the availability category--at least until the data is in on the upgraded Ariane.

The final decision on Intelsat VI is impossible to predict. From the cursory analysis shown here, it appears to break down to a matter of price versus reliability and availability. Are these latter two factors, vital though they may be in the communications satellite business, worth the considerable sum of \$20 million extra per launch? That's the question the Intelsat Board will have to answer this year.

Titan and Intelsat

The Titan bid is a major step forward for private enterprise in space. It represents the first market entry of an American privately owned and operated launch system. If the commercial Titan is selected to launch a payload for a large communications satellite organization such as Intelsat, it would go a long way towards legitimizing private launch activities in the eyes of other established payload customers.

If the Titan is not selected, the vehicle's future may not be bright. Government funding of Titan production is due to wind down by 1986, and unless another profitable market is found for the vehicle, the production line could be shut down. Reopening it later could be prohibitively expensive. Although Martin Marietta has identified a number of other possible payload customers for Titan, and even made proposals on some, the Intelsat VI contract is presently regarded as a mainstay of the Titan commercial program. We await the next decision of the Intelsat Board with considerable interest.

* * *

Soviets Enter Satellite Launching Market

The Soviet Union is offering to sell launches on its Proton booster to Inmarsat (the International Maritime Satellite Organization, of which the U.S.S.R. is a major participant) for Inmarsat's second-generation data relay satellites. These satellites will provide data services for shipping and other offshore industries.

The launch price and payload capacity of Proton make it a definite contender. The launch price quoted by the Soviets is \$24 million, quite reasonable. Also, the Proton is capable of placing a payload directly into a near-geosynchronous orbit, rather than a transfer orbit. Therefore, satellites launched on a Proton would not require the extra propulsion system (usually a solid-fuel "kick motor") to enter a circular geosynchronous orbit.

The Soviet attitude seems an odd mixture of suspicion and eagerness to sell. Launch facility locations and certain technical details are not being released until a commitment has been made to buy Proton services. However, Soviet representatives say that they are willing to make considerable modifications to accommodate Inmarsat's needs. It is not yet known whether the Soviets will offer its launch systems for any other market in the near future, but converting a major Soviet military/industrial resource into a source of foreign exchange is a concept that could have a positive effect on the Soviet economy.

Pharmaceutical Processing in Space Continues

The McDonnell Douglas electrophoresis experiment delivered promising results aboard the sixth space shuttle flight. As mentioned in the March, 1983 Report (p. 3), the objective in this test (done in cooperation with the Johnson & Johnson Co.) was to evaluate a new, higher-voltage processor. Reportedly, the test produced over 700 times more material in a given time than is possible on earth. Purity levels were comparable with those attainable on earth.

The proprietary drug involved could receive FDA approval by 1985. The drug is reported to be a new treatment for a disease caused by a certain protein deficiency in the body. It is estimated that up to 10% of the demand for this drug could eventually be produced by free-flying processors in space.

A McDonnell Douglas engineer is scheduled to fly on Mission 12 next year. The engineer, Charles D. Walker, will operate the electrophoresis experiments to begin acquiring material for medical testing on human subjects.

The Eli Lilly pharmaceutical firm is also interested in space processing. Lilly was identified as a possible customer in the course of the Booz Allen study mentioned last issue.

McDonnell Douglas will use a Leasecraft as a free-flying space factory according to reliable sources. Leasecraft is a modular satellite system under development by Fairchild Space and Electronics Co. The automated system would be released by the space shuttle into orbit where it would produce pharmaceuticals using the electrophoresis process. Products would be recovered by the shuttle on a later flight. (C.S.R., Feb. 1983, p. 3-4; Mar. 1983, p.1-2)

Corrections and Further Information: Space Transportation Companies

Transpace, Inc., has a new office in Washington. The address is: Transpace, Inc., Suite 1110, 666 11th St. NW, Washington, DC 20001. Telephone: (202) 347-5060. The old post office address listed last month is still valid.

The General Dynamics Atlas/Centaur payload is 5,200 lbs. delivered into a geosynchronous transfer orbit, not 4,200 lbs. as given in last month's issue.

The new name of the former Space Transportation Co, is Space Projects, Inc., not Space Projects Co. Klaus Heiss and Thomas Huntington are no longer associated with the firm, which is being reorganized by its parent firm, William Sword & Co., Inc. At press time, the company still intended to pursue its interest in the fifth shuttle orbiter.

Until next time,



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