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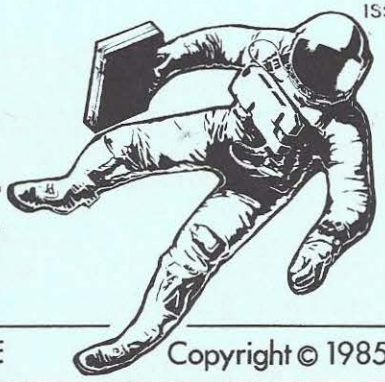


A MONTHLY NEWSLETTER ON FREE ENTERPRISE IN SPACE

Volume 9, No. 11 November, 1985

McDonnell Douglas Partners With 3M For Space Drug Production

McDonnell Douglas has now gotten together with Riker Laboratories, the pharmaceutical division of the 3M Company, to continue efforts to produce and market a new drug in space. McDonnell Douglas had originally been working with Johnson & Johnson's Ortho Pharmaceuticals division, but Ortho decided the drug could be produced more effectively on Earth using genetic engineering techniques, and dropped out of the space project (see last month's C.S.R.)

McDonnell Douglas is continuing its efforts to use its Electrophoresis Operations in Space (EOS) system aboard the Space Shuttle to produce samples of the drug. Another flight of the small mid-deck electrophoresis unit is scheduled to take place November 26th on Shuttle Flight 61-B, aboard the orbiter Atlantis. Charles D. Walker of McDonnell Douglas will be along to operate the apparatus--this will be his third trip into space for EOS. The first large-scale production system, to be located in the Shuttle's payload bay, is scheduled to fly on Flight 61-M which will be launched in July of 1986. This larger system is intended to produce enough of the drug for the major animal and human tests required for approval by the Food and Drug Administration.

The drug to be produced is called erythropoietin, or EPO. EPO is a hormone, normally produced by the kidneys, that stimulates the body's production of red blood cells. This can aid people who suffer from anemia or other disorders having to do with red blood cell levels. In addition to reinforcing insufficient blood cell production, EPO can enable these people and others (such as surgery patients) to avoid whole blood transfusions under many circumstances. This can eliminate many of the potential problems that can be associated with such transfusions, often related to impurities in the whole blood. As an example, one of the most serious of these problems has been the possibility of the transmission of Acquired Immune Deficiency Syndrome (AIDS). A patient producing his own red blood cells may be able to get by with transfusion of plasma alone, which can be sterilized.

A total market in the hundreds of millions of dollars is foreseen for EPO. The drug does not see wide use at present due to impurities involved in its current production process.

Ortho Pharmaceuticals, for its part, entered into an agreement with a biological engineering company called Amgen, located in Thousand Oaks, Calif., to produce EPO using genetic engineering processes. As an added "sweetener" to the deal, Amgen offered to work with Ortho on two other drugs: hepatitis-B vaccine, and a substance called interleuken-II which is used to correct certain immune deficiencies (actually, the hepatitis vaccine rather than the EPO may have decided the issue for Ortho, since it promises to be the most lucrative drug of the three).

McDonnell Douglas and Ortho have not ruled out working together on future space projects.

3M Active In Several Areas of Space Processing

Aside from the Riker/McDonnell Douglas projects, the 3M Company of St. Paul, Minn. is embarking on an ambitious space processing program of its own. The company's current proposal to the National Aeronautics and Space Administration (NASA) calls for participation in up to 72 Shuttle flights over the next ten years for new product development, the largest such proposal any company has yet made. In addition, the company intends to develop with NASA a chemical research plant that would go on board the U.S. Space Station.

3M is already doing experiments on the Shuttle involving complex organic crystals. Flight 51-A, launched in November of 1984, carried an experiment called "Diffusive Mixing of Organic Solutions" or DMOS-1, intended to grow these crystals in zero gravity. Flight 51-I, launched last August, carried another experiment, "Physical Vapor Transport of Organic Solids" (PVTOS), which studied the formation of organic thin films having an ordered crystalline structure. Both experiments were very successful, although overshadowed in the public eye by more spectacular events (Flight 51-A recovered the stranded Palapa B-2 and Westar 6 satellites; Flight 51-I was the mission which repaired the Leasat F-3--see article on page 4).

DMOS-2, the third 3M experiment, is scheduled to fly aboard Atlantis Flight 61-B which, as you recall, is also carrying Charles Walker and the McDonnell Douglas EOS experiments. (An interesting note: it is likely that the two companies rubbed elbows quite a bit during the negotiations at NASA to make room for both experiments on the Shuttle mid-deck. This may have been a factor in the two companies becoming acquainted prior to announcing their joint drug processing project).

Future 3M experiments include a cooperative effort with General Motors to examine the properties of melted polymer materials. This experiment is scheduled for launch in July of 1986.

Although the technical details of the proprietary space-processed crystals and their properties tend to glaze the eyes of the uninitiated, the applications are exciting. 3M hopes its experiments will lead to breakthroughs in telecommunications involving the manufacture of optical devices that are comparable to electronic devices, only much faster. Possible uses include optical switches and computers that process information with light instead of electricity. Among other things, such devices, based on space processed materials, could greatly enhance optical fiber communications systems, a technology that is rapidly setting itself up as the major competitor to communications satellites. It would be ironic if space processed materials were instrumental in reducing the market for communications satellites, which are presently considered by many people to be the only profitable items that can be launched into space.

Fairchild Kills Leasecraft Program

Fairchild Industries, Inc. has put its Leasecraft project on indefinite hold. The Germantown, Md. company has reassigned Leasecraft personnel, and has halted activity on the project.

Leasecraft was designed as an unmanned commercial satellite which customers would rent to fly their experiments or materials processing facilities (C.S.R., Feb. 1983, pp. 3-4). Once placed into orbit by the Shuttle, Leasecraft would use its own propulsion system to move into a higher orbit for operation. The satellite would rendezvous with later Shuttle flights to replenish materials and expendables, or to change out modules for a new customer.

What follows is a short, simplified history of the decline of the Leasecraft project:

In September of 1983, Fairchild and NASA signed a Joint Endeavor Agreement (JEA). The agreement specified that the first Leasecraft would be launched on NASA's Space Shuttle in 1987 without cost to Fairchild. NASA would also throw in one free retrieval mission. For its part, Fairchild would bring in commercial customers for following missions, which would pay their own way.

As time went by, the potential customers, particularly in the materials processing field, failed to materialize. One possibility was McDonnell Douglas' EOS project. It was anticipated that EOS would eventually move from a mid-deck experiment to the payload bay, and then on to a free-flyer like Leasecraft. Fairchild officials pointed out that pharmaceutical processing aboard a free-flyer could cost as little as one-sixth as much as similar processing aboard the Shuttle. Negotiations began, but the process moved slowly, and McDonnell Douglas was also looking at competing free-flyers, such as RCA Astro Electronics' space platform, later dubbed "Omnistar." No other customers seemed forthcoming.

Eventually, towards the end of 1984, NASA itself began to look like the only possible customer for the "commercial" Leasecraft. The space agency was looking for such a system to fly three or four of its own payloads beginning in 1987. Fairchild sent in an unsolicited proposal offering Leasecraft as the only platform for the job. At this point RCA objected to this "sole source" approach, and NASA obliged by issuing an official request for proposals which opened the job up for competitive bids. Both companies submitted proposals in March, but RCA was still somewhat irked, since Fairchild had the advantage of the JEA's free flights to aid in Leasecraft's development, a goodie that NASA refused to offer to RCA.

Around this time, Fairchild became a major voice in opposition to raising Shuttle prices to their market level, or anything approaching it.

Meanwhile, McDonnell Douglas was getting behind schedule on its EOS project. At the same time, it was improving the efficiency of its Shuttle-carried EOS equipment. Both factors further delayed the choice of a contractor for a free-flying platform. Leasecraft was still without a commercial customer. In August, Space Industries Inc. signed a launch agreement with NASA for its intermittently manned orbital Industrial Space Facility, another attractive system for potential free-flyer customers (C.S.R., Aug. 1985, pp. 2-6).

Finally, Ortho Pharmaceuticals withdrew from the McDonnell Douglas EOS project. The largest potential commercial customer for Leasecraft seemed on shaky ground. Fairchild began to have second thoughts about Leasecraft.

NASA rejected RCA's proposal, and approached Fairchild to renegotiate terms. Unfortunately, the terms were not good. The lease arrangements were not all that Fairchild hoped for. However, the major sticking point was insurance. Fairchild was unable to obtain insurance from the commercial insurance market, still reeling from huge losses over the past year (ironically, Leasecraft, which was self-propelled, recoverable, and launched into low orbit from the hitherto reliable Shuttle, should logically be classified as a very good insurance risk). Fairchild asked NASA itself, and by extension the government, to insure Leasecraft for $100 million against catastrophic loss, and for up to $75 million in "termination liability insurance" (to repay Fairchild should NASA cancel the program). NASA turned down the loss insurance flat, and offered to pick up only about $40 million worth of termination liability coverage.

So now, unable to protect the estimated $100 million investment that would be required, Fairchild has put Leasecraft into limbo and moved on to more promising and profitable projects. The joint endeavor agreement still holds--if a customer is ever found, Leasecraft may return. Until then, it remains as an example of a good commercial concept that, through a number of factors including simple bad luck,

decayed until the only place left for it was a precarious position at NASA's already overcrowded public trough.

Repaired Satellite Flies Into Operational Orbit

The Hughes/Navy Leasat F-3 successfully fired its solid-fueled kick motor and powered its way into geosynchronous orbit. The satellite had been literally "hot-wired" back into operation by space-suited astronauts on Shuttle Flight 51-I last August after the satellite failed to activate (C.S.R., June 1985, pp. 5-6; Sept. 1985, p. 4).

It had been feared that the long inactive period in low earth orbit would cause the satellite's solid rocket fuel to freeze and crack, resulting in an explosion. As it was, after allowing some weeks for the satellite to slowly warm up, the command to fire was given on October 27, and the motor fired without mishap. Leasat F-3 arrived on station in geosynchronous orbit on Nov. 1, and will undergo testing throughout the month.

The September C.S.R. also reported the unrelated failure of Leasat F-4, and the fines that the Navy will levy on Hughes if four operational satellites are not in place by March of 1986 (three satellites are already in place, counting the F-3). However, Hughes has decided to launch its spare Leasat (F-5) in September of 1986. The company apparently feels that it is more important to take the time to debug its last remaining satellite than to rush it into operation just to avoid the fines.

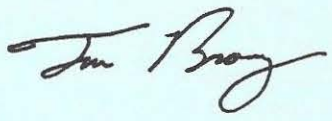
Space Seeds Doing Fine, Thank You

The tomato seeds that are presently floating in orbit aboard NASA's Long Duration Exposure Facility (LDEF) are probably still okay, according to George W. Park, Vice President of the George W. Park Seed Co. Last month I reported that the delay in the recovery of the LDEF might result in the demise of these seeds and the loss of experimental data.

In fact, according to Park, the additional time in space may actually improve the experiment, making it easier to detect mutations and other effects of space exposure on the seeds. Park also pointed out something I should have realized--that if a year in space wasn't going to kill these seeds, two years is not likely to make much difference.

So far, no other companies with experiments aboard the LDEF have reported in.

Until next time,



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