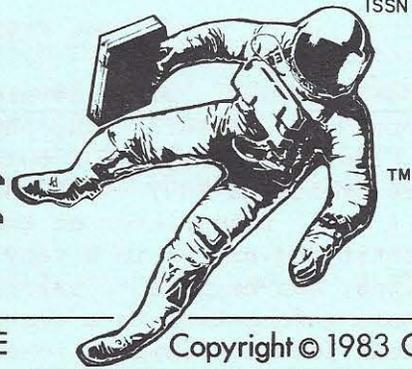


THE COMMERCIAL SPACE REPORT



A MONTHLY NEWSLETTER ON FREE ENTERPRISE IN SPACE

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Dear Subscriber:

Further Details on Private Launch Systems

Space Services, Inc.:

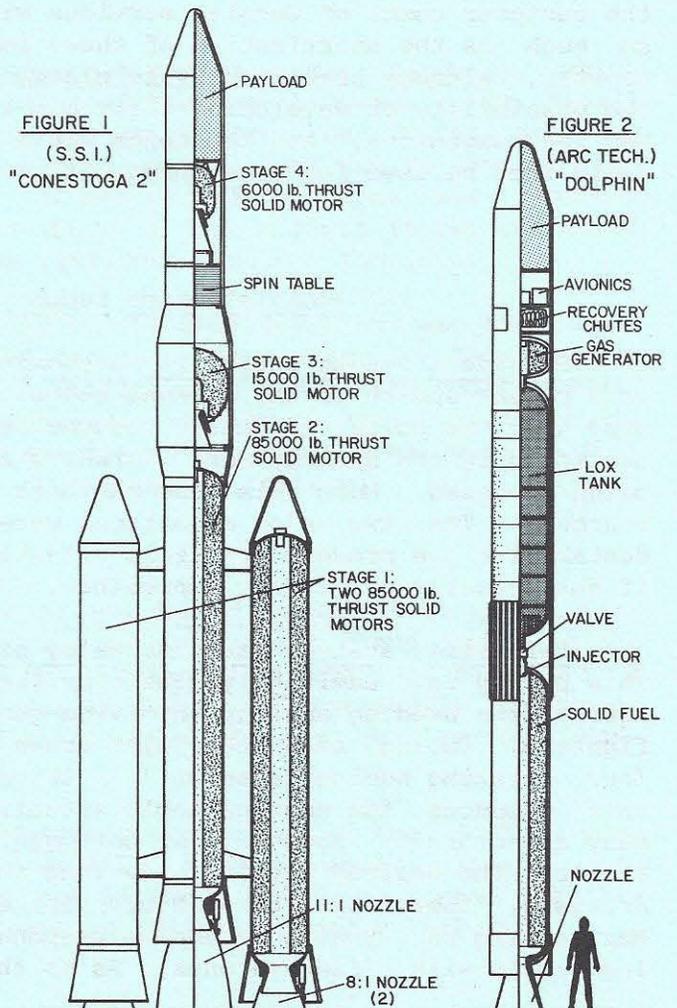
More information on the configuration of SSI's orbital vehicle was released at the recent L-5 Conference on Space Development. The vehicle, "Conestoga 2", shown briefly in a slide presentation by Tony Materna of Space Vector Corp., is pictured in Figure 1, below. (Compare this configuration with that reported in C.S.R., Oct. 1982, p. 2.) Presently, the system is designed to carry about 750 lbs. into a 600-mile polar orbit. An orbital test launch is still scheduled for fall of 1984.

An earth resources satellite network, consisting of 12 satellites in a 5,000 mile orbit (4 equatorial, 8 polar) is one major goal for SSI. For constant data access, the satellites would be able to communicate with each other, and with a ground station, which would always be within range of at least one satellite.

ARC Technologies, Inc.:

A hybrid rocket engine test burn, held in March, used a full-scale 42" dia. motor and was described as "an 80% success." The burn lasted about 45 seconds. Reportedly, during the test, a burn-through resulted in nozzle fragments being ejected out the exhaust. (In a hybrid, burn-through is a common result of uneven solid propellant burning.)

The flight vehicle, dubbed "Dolphin," is designed to burn for 100 seconds. This would accomplish a sounding rocket mission for a payload of about 1000 lbs. The vehicle would be launched out of the water and later recovered (C.S.R., Oct. 1982, p. 3). Few details have been released by the company, but we have assembled what is known about hybrids along with information from other sources to produce an artist's conception of the "Dolphin" sounding rocket (Figure 2, at right).



New Navigational Satellite Company

Geostar, Inc. plans development of a satellite navigation system. Headed by Dr. Gerard K. O'Neill (the physicist instrumental in popularizing space colonization), the Princeton, N.J. company intends to launch three satellites into geosynchronous orbits at 70°, 100° and 130° W. Long. in order to cover the continental U.S. A small transceiver on the ground, about the size of a calculator, broadcasts an identifying signal in a very short burst. This signal, received by all three satellites, can be used to calculate the location of the transceiver. The satellites relay this information to a central computing facility on the ground, which performs the actual location computations and sends this data back to the transceiver via the satellites. The transceiver then displays latitude, longitude and altitude.

The system is capable of relaying about 36 characters worth of information. This could allow numerous uses besides navigation, such as emergency beacon location, long-distance paging service, monitoring of simple data from remote sites, alarm systems, and many others.

While this is not a new concept, this venture is an important step forward in space exploitation which directly affects almost everyone. It is one beginning to the future communications revolution which awaits the large space platforms required for the high data transmission rates of real voice and video communications.

Cost is the key factor in this venture. RCA Astro-Electronics, also in Princeton, is doing design work on the satellite. Launch will be by conventional vehicles, possibly Deltas. As yet, we have no exact figures, but it seems likely that startup costs may be quite high. Four satellites, (three plus an operational spare) manufactured and launched by these methods, could cost nearly \$250 million. Most of the customer costs of Geostar services will probably not reflect cost of operations so much as the amortization of these immense start-up expenses. We suggest that Geostar, already seeking private placement financing, would do well to investigate the possibility of developing their own launch capability. This approach may well be less expensive, and the bonus would be a new, company-owned launch system that could then be used for other projects.

* * *

Administration Supports Missile Defense System

President Reagan called for a commitment towards defense against nuclear attack in a recent speech on the Defense budget. This marks a major, and welcome, step away from the policy of Mutual Assured Destruction. Although no specific system was mentioned in the speech, most listeners assumed that space-based energy weapons were being proposed. Much noise and rhetoric against such systems was heard from various sources. The two major objections were that such a system would, by its nature, destabilize the present strategic situation, and that it would be horribly expensive if not actually physically impossible. These objections can be answered in order:

Defensive systems are actually highly stabilizing if parity is maintained. This parity is, admittedly, quite critical. In a lecture at the L-5 Conference, G. Harry Stine used an analogy involving gunfighters and bulletproof vests. Two gunfighters, facing each other with drawn guns and no vests is an unstable situation (our existing nuclear standoff). If only one of the gunfighters has a vest, then this produces the most unstable situation of all (this situation is what worries many objectors). However, if both gunfighters have vests, the situation becomes stable, the desired result. As long as the U.S. and U.S.S.R. maintain equivalent defenses, there will be no first strikes motivated by either panic or confidence. Maintaining parity with defensive weapons should be no more difficult than maintaining parity with offensive ones. As to the second objection:

Energy weapons are not necessarily the cheapest and quickest workable solution to the missile defense problem. The "High Frontier" proposal (C.S.R., April 1982, pp. 1-2; Jan. 1983, p. 2) has long advocated simpler systems as a quick initial defense against nuclear missiles. Such systems could be deployed in five or six years for \$10 - 15 billion. Only later would the more advanced second-generation systems (including energy weapons) be deployed.

Hopefully, this policy change heralds reasonable and effective defense systems that actually defend. Such systems have been supported for some time, both in these pages and elsewhere. If nothing else, at least the concept of Mutual Assured Survival may now get the study it deserves.

* * *

Update: Soviet Progress in Space

The following items list a number of milestones in the Soviet space program. (The systems discussed are illustrated in Figure 3 (p. 4) along with some U.S. launch vehicles for comparison.)

Second Spaceplane Test:

Another test of a subscale, unmanned Soviet "spaceplane" took place March 15. The 2000 lb. Cosmos 1445 duplicated in most respects the flight of Cosmos 1374 (C.S.R., July 1982, pp. 1-2). It was launched from Kasputin Yar, made just over one orbit, and splashed down in the Indian Ocean. While most sources hold that a 40,000 lb. operational version of this vehicle is intended for manned sortie missions or space station support, others believe that the spaceplane may actually be a space weapon intended to attack surface naval targets like aircraft carrier groups.

Evidence cited for the spaceplane being a weapon includes the Kasputin Yar launch site, normally used for unmanned military flights, and the unusual water landings in the Indian Ocean. Used as a weapon, the spaceplane could be launched from somewhere in the Soviet Union. It would then reenter the atmosphere, guide itself aerodynamically to its target (with considerable crossrange capability), and detonate its nuclear warhead.

As yet, no available proof for this notion exists. Until such proof surfaces, it is probably safe to assume that the vehicle will be, in fact, a small space transport. Figure 3 shows the spaceplane mounted on an unspecified Soviet booster.

Large Shuttle Under Development:

A shuttle-type vehicle with perhaps twice the payload of the U.S. shuttle is being developed in the Soviet Union according to the Department of Defense 1983 report on Soviet military power. This is a new vehicle, not the same spacecraft as the spaceplane mentioned above. (The smaller vehicle is now referred to as a "spaceplane" rather than a "shuttle" to distinguish between the two systems.)

The Soviet shuttle has some similarities to the U.S. shuttle, with a large external tank and strap-on boosters. The D.O.D. report pictures the Soviet orbiter as considerably different from the U.S. model (dart-shaped, with swept-back wings), but other sources report that the vehicle actually has a double-delta wing configuration almost identical to that of the U.S. orbiter. This latter duplication of U.S. technology (a typical Soviet procedure) seems more likely (see Figure 3).

Still, there are also major differences between the U.S. and Soviet shuttles. The Soviet system mounts its main engines on the external tank rather than on the orbiter, to be discarded along with the tank. (The orbiter would still require its

own smaller engines for orbital maneuvering.) A second major difference is that the strap-on boosters are liquid fueled, unlike the U.S. system's solid fuel boosters.

The following table compares features of the U.S. and Soviet shuttle systems:

	<u>U.S. Shuttle</u>	<u>Soviet Shuttle</u>
Payload (112 mi. Orbit)	65,000 lbs.	132,277 lbs.
Total System Launch Wt.	4.85 million lbs.	3.3 million lbs.
Liftoff Thrust	6.9 million lbs.	4-6 million lbs.
Orbiter Length	122.2 ft.	109 ft.
Orbiter Wingspan	78.1 ft.	76 ft.
Ext. Tank Length	164 ft.	213 ft.

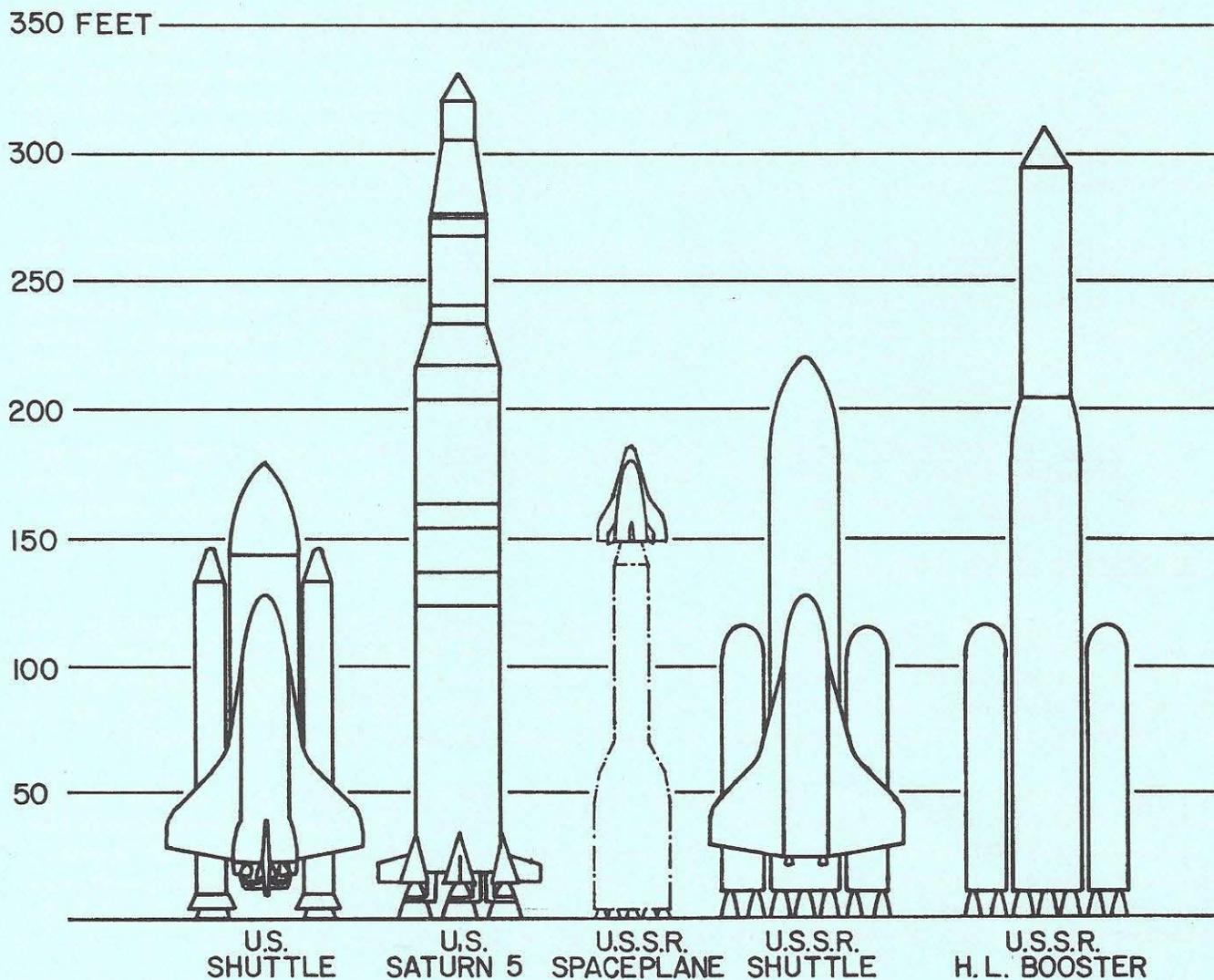


FIGURE 3

The estimated payload of the Soviet shuttle is based on Defense Dept. analysis. Details of the analysis are not available, and, since it is in the best interests of the D.O.D. to exaggerate Soviet capabilities, this payload figure should probably be taken with a grain of salt. However, there are several factors which could produce such an increased payload. These include the larger external fuel tank, more efficient liquid boosters rather than solids, and an orbiter which may be lighter for its size than the U.S. orbiter.

The Soviet orbiter will be ferried on a modified Bison bomber in the same way as the U.S. orbiter is ferried on a modified 747.

"Saturn Five" Sized Heavy-Lift Launcher:

More details on the Soviet "Heavy-Lift" ("H. L.") launch vehicle (C.S.R., July 1982, p. 2) were also included in the report. The latest configuration incorporates a central core over 300 ft. tall, and two or more 115 ft. liquid fueled strap-on boosters. The vehicle has an estimated payload of 287,000 - 331,000 lbs. (compared to 280,000 lbs. for the U.S. Saturn 5).

The mission of this vehicle is primarily launching of gigantic space stations. The D.O.D. report states that the Soviets wish to maintain a permanent, manned, military presence in space. It has also been pointed out that this vehicle would be quite effective in launching massive space weapons systems.

The Soviet shuttle and heavy-lift booster seem to have some features in common. An illustration from the D.O.D. report (from which Figure 3 was largely derived) apparently indicates a striking similarity between the Soviet shuttle's external tank/strap-on booster configuration and the configuration of the heavy-lift booster's core module and strap-ons.

In fact, it may be that both booster systems use identical hardware, which would be a stroke of genius on the part of the Soviet space program. One detail supporting this hypothesis is that an estimated weight for the Soviet orbiter, 174,000 lbs. (assuming for the sake of argument a weight identical to that of the 150,000 lb. U.S. orbiter and 24,000 lbs. of OMS propellant) plus its reported payload of 132,277 lbs., adds up to 306,277 lbs., a figure right in the center of the Soviet heavy-lift booster's payload range (287,000 - 331,000 lbs.).

Admittedly, the above is based primarily on the configurations as they were pictured by the D.O.D., and the apparent relationship between the two boosters may be only a coincidence created by the artist. Still, such a dual-use booster would be an extremely elegant solution to launch problems, similar to many U.S. proposals for development of a heavy-lift booster from existing U.S. shuttle hardware, and it would be unlike the Soviets to overlook such an economical feature.

New Addition To Double Size of Salyut 7:

A large space station module was launched and docked to Salyut 7 early last month. The module, designated Cosmos 1443, was launched March 9 and docked to the Soviet space station in a manner similar to the docking of Cosmos 1267 to Salyut 6 in 1981. The Soviets say the recent addition to Salyut 7 (presently unmanned) contains additional laboratory space, and a full load of cargo such as food supplies, instruments, and scientific equipment.

The module weighs almost as much as Salyut 7 according to the Soviet news agency Tass. The Soviets are preparing for another lengthy manned mission, and claim to see no physiological reasons ruling out missions even longer than the 211-day record stay of cosmonauts Anatoly Berezhovoy and Valentin Lebedev last year.

The military potential of Soviet spaceflight seems to be a primary issue, usually discussed in terms of how this potential might affect the existing strategic situation on the surface of the earth. Since much of the information on Soviet space projects is filtered through the U.S. Department of Defense, this is hard to avoid.

This earth-related military aspect is important. (For example, referring to the earlier item on space weaponry, the Soviet advances in space should be examined in light of the U.S.S.R.'s extensive beam weapons and anti-satellite programs.)

However, we cannot let it blind us to other, more subtle possibilities.

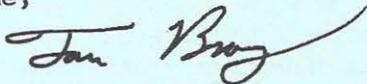
The Soviets may be able to use space to become a powerful economic force. This is as pressing a danger as the threat of military attack. That one's will can be imposed on others as effectively with economic force as with military power is shown by numerous examples such as OPEC, Japan, and, for that matter, the United States. This publication has already discussed the technological lead which could result from just the civilian aspects of their space program (C.S.R., May 1982, pp. 2-3). This lead alone may be enough to shut us out of space. A Soviet military space potential adds another aspect to this.

Space weapons can be utilized for economic ends in ways quite unrelated to the present arms race on earth. Any agency which acquires exclusive control of a critical economic fulcrum, such as a trade route, a source of energy, or a source of raw materials--and space is all of these--can exert enormous economic leverage without the creative productivity that requires a free society for its fullest expression. The techniques of boycott, blockade, or embargo are all unrelated to productivity. The example of OPEC is, again, a case in point.

The Soviets can conquer space using these military methods. Any weapons they place up there can do more than attack the West or defend the East...they may also be used to blockade us from the universe. There would be no way to take that high ground away from them. Such a military/economic strategy should not be overlooked.

As we have said before, if the hare does not race, the tortoise will win. The U.S.S.R. lacks the technology and economic resources of a free country, but they are determinedly plodding towards the goal of the political and economic conquest of space. Once there, they will have only to harvest the wealth of the solar system while others remain behind by reason of either inaction or forceful exclusion. If the U.S.S.R. gains a monopoly on the vast resources of space, it won't take missiles to wreck the United States. The greatly enriched Soviets might do it economically. They have always known that the best victories are won without firing a shot.

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 the exploration and exploitation of space.

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