'Konversiya': Changes in a new and turbulent era

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> Will anyone dare make a forecast this space year for the former Soviet Union, once a leader in this field and now plunging deeper and deeper into crisis?
>
> Sergei Leskov, *Izvestia*, 4 January 1992

The disintegration of the Soviet Union was caused by former Soviet President Gorbachev's politics of Perestroika and hastened by the attempted coup which failed to dislodge him from the seat of power. Leaders of the Russian Federation, Belarus and the Ukraine, then agreed to create the Commonwealth of Independent States (CIS) (with the exception of Georgia who abstained from becoming a member), and declared the Union dissolved and no longer a geopolitical or international entity. Instead of creating one strong political entity, eleven independent states formed a weak Commonwealth.

The future of the CIS is not assured. The participating republics' interests are conflicting because of their strong divergeance in history, culture, economic development and geographical positions. It will be a demanding task to unite them through mutual concessions. Until now, the Commonwealth has narrowly survived by negotiating for greater political, economic and military cooperation. Skilled negotiation, cooperation and concession-making has also been applied to space related affairs. Conflicts between the participating republics have made the going rough, and the governments of the new states have very little space to maneuver. Their visions of how the CIS has to survive the immediate future do not necessarily converge. This applies especially to the two most important members of the CIS: the Russian Federation and the Ukraine. According to many in the Ukraine's capital, Kiev, the CIS was formed as a multilateral divorce covenant to regulate the sharing out of the estate of the former Soviet empire.

The vacuum left by the collapse of the former communist government has not yet been fully filled by the powers that be. Difficulties also beset any government attempts to convert the centrally guided economy to a free market economy. However, the Commonwealth is almost bankrupt and can only undertake a successful conversion with financial support from the West and Japan. This support (a grand total of about $24 billion has been promised) must not be overestimated and according to economists is akin to a drop in the proverbial bucket. Germany has set aside almost four times as much money for her unification, already has a booming free market economy but still cannot solve her biggest problems satisfactorily.

Moreover, the CIS is confronted with an even greater obstacle to success. It inherited a social system that, according to Western standards, is in many respects crippled. A large percentage of civilians have been raised in a system where the State decides, and have therefore become prisoners of the generally accepted bureaucracy-induced lethargy. They are apprehensive and uncooperative towards proposed changes. The future of the CIS-republics and their chances to grow into modern, democratic states, will be dependent upon their success in solving economic problems inherited from communism.

The spiralling political confusion and economic crises within the CIS has placed the future of Russian/CIS space at stake. Moreover, it seems that future space developments in the CIS are not only strongly dependent on political and economic factors, but also on the availability of infrastructure, and production and launch facilities. Epitomising the current situation is the space launch centre Tyuratam in Kazakhstan and the Zenit launch vehicle production line in the Ukraine. Despite space agreements and established national space agencies, it is not clear where to find the seat of authority. Various agreements on space matters between CIS-republics, like those signed in Minsk, Alma-Ata and Tashkent, do not take effect because the

The sign reads: "Baikonur forever." This has become a very debated issue after the creation of the CIS.

C.M. van den Berg

mechanism to enforce them is lacking. Therefore, for any project to progress, bilateral agreements are signed between republics that own space infrastructure or space installations, or otherwise want to participate. But, agreements made in June 1992 between the Presidents Yeltsin and Nazerbayev on the use of space centre Tyuratam in Kazakhstan, contrast violently with press statements made by the Minister of Science and New Technologies of Kazakhstan, that his government is determined to expropriate the scientific department of Tyuratam which belonged to the former Soviet Union. "Military scientists just have to change to civil programs" stated the Minister. For CIS-republics it doesn't pay to nationalize complexes or production enterprises. It results in the acquisition of a lot of expensive material which becomes worthless the moment it is withdrawn from the whole of the space programme. Such actions only hamper the space efforts of other republics (Minsk agreement), and cause unnecessary friction. Current circumstances presuppose elaborate methods for the participation of CIS-republics to create a CIS space infrastructure and allocation of resources to make space programs possible. If this path isn't followed, only the Russian Federation which owns about two thirds of the CIS space infrastructure, will be able to continue on its own.

The eventual loss of space centre Tyuratam means a bigger disaster for Russian space than the above mentioned division in infrastructure would imply. A couple of the most important examples makes this clear. Tyuratam (45.6° latitude) is the only launch centre from where Russia conducts manned and geostationary launches and the Zenit and Energiya launch vehicles can be launched. If the launch centre Plesetsk (on Russian territory 62.8° latitude) is used to resupply the space station Mir, an additional reorientation of the spacecraft of 62.8° – 51.6° = 11.2° has to take place because Mir orbits the Earth with an inclination to the equator of 51.6°. The launch vehicle for such payloads (SL-4 Soyuz) is not powerful enough to orbit the payload of about 7 metric tons and achieve this reorientation. Simply put, Tyuratam is all-important for the functioning of the Russian manned space program. The development of a more powerful dedicated launch vehicle or manrating the Zenit will take at least four to six years. Besides, there are no operational launchpads for the Zenit at Plesetsk.

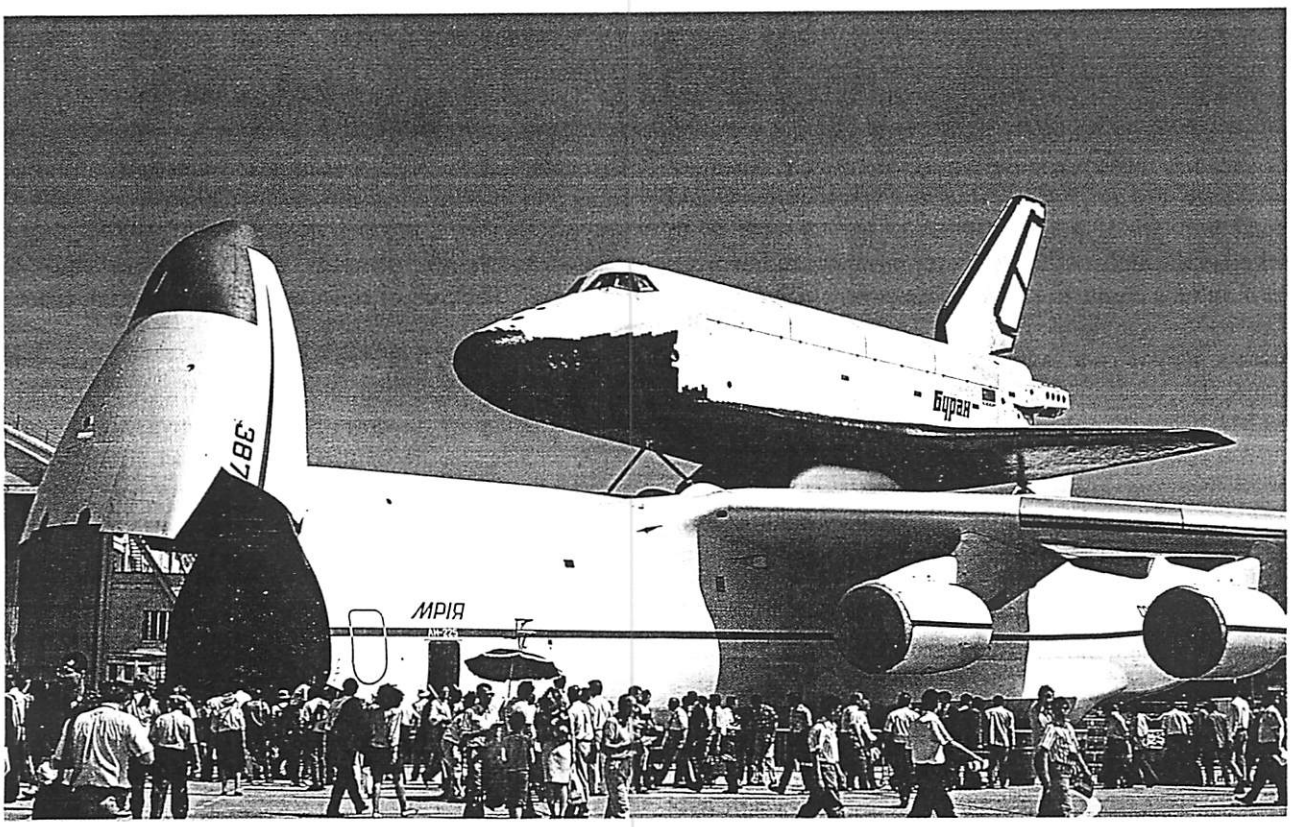
Russia launches her geostationary payloads (most of which are communication satellites) and 12-hour circular orbit payloads (GLONASS navigation system) with the Proton launch vehicle from Tyuratam spacecentre. Proton can also be primarily launched from Plesetsk providing an extra reorientation of the spacecraft of 11.2° is performed and compensated for with lighter payloads or a more powerful launch vehicle. Some of the other space programs that are

affected or become impossible (in the near future) when Tyuratam is lost are: Space station modules for Mir launched with Proton; ALMAZ radar satellite (Proton); Military satellites launched with the Tsyklon derivative SL-11; Buran space shuttle and Polyus space factory shuttled with Energiya; and the anti-satellite (ASAT) program. In the coming years, Russia will not be able to meet the cost of the changes necessary for the continuation of the former Soviet space program, not taking Tyuratam into account. Additionally, the position of Russian space is being undermined by foreign space agencies and countries that are willing, under the cover of cooperation, to drain the Federation of her space technologies.

Public debates on the then Soviet space program started in the spring of 1989 with disclosures of allocations from the national budget. It was announced that the space budget for 1990 would be cut by 10%. The budget for 1991 ended up being about 25% lower than that of 1989. However, because of the strong growth in inflation and the unreliability of Russian statistical data, no real value can be attributed to these figures. In 1992, the growth in inflation continues unabated and the space program of the former Soviet Union is on the brink of collapse. Money is becoming more scarce and less valuable, and is only allotted quarterly. Out of the estimated 800,000 employees in the space industry, about 700,000 are threatened with lay-offs. Money is so scarce that capital spacegoods can't be preserved for the future. The only hope for CIS space is to economize outright and attract foreign currency.

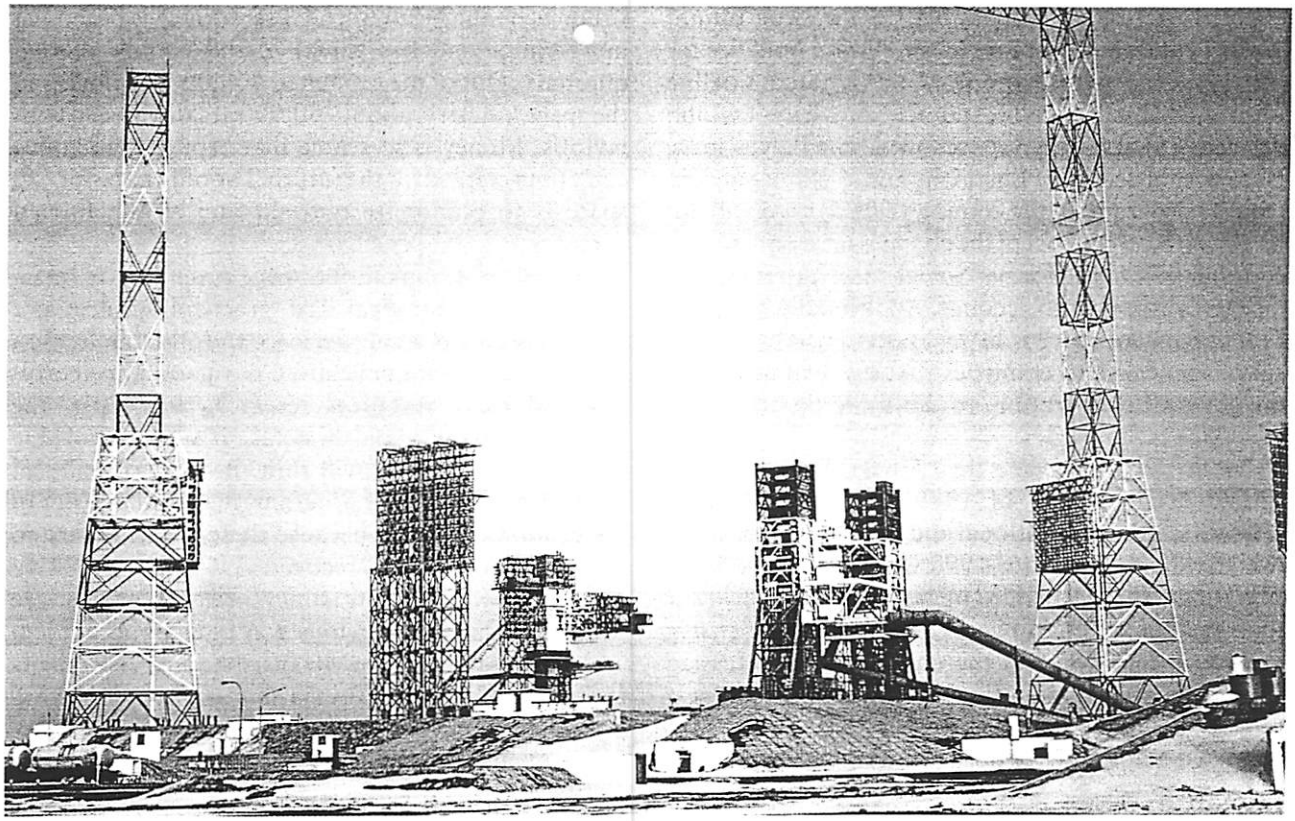
Considerable cuts in the space program are inevitable. First, theoretical and practical sciences are affected, secondly, applied science and other application programs like communication, navigation, meteorology and Earth resources research, and lastly, the military programs and systems. It's very probable though that priorities will shift. Because of political developments, military programs may well lose out to application programs because these are necessary to enable the economy to recover.

Several ways of attracting foreign currency are possible. The most obvious way is charging foreign cosmonauts to fly to the Mir space station. Astronauts from Japan, England, Austria and Germany have paid for this service and the French-sponsored 12 day Antares mission (July) highlighted Russian/French



H. Smid

Buran Space Shuttle. Proud visitor to LeBourget/Paris in 1989. Will a Russian/CIS Space Shuttle ever fly again?



C.M. van den Berg

Energiya Space Launchpad at Tyuratam/Baikonur Space Launch Centre in Kazahstan. Will there ever be another Energiya launch?

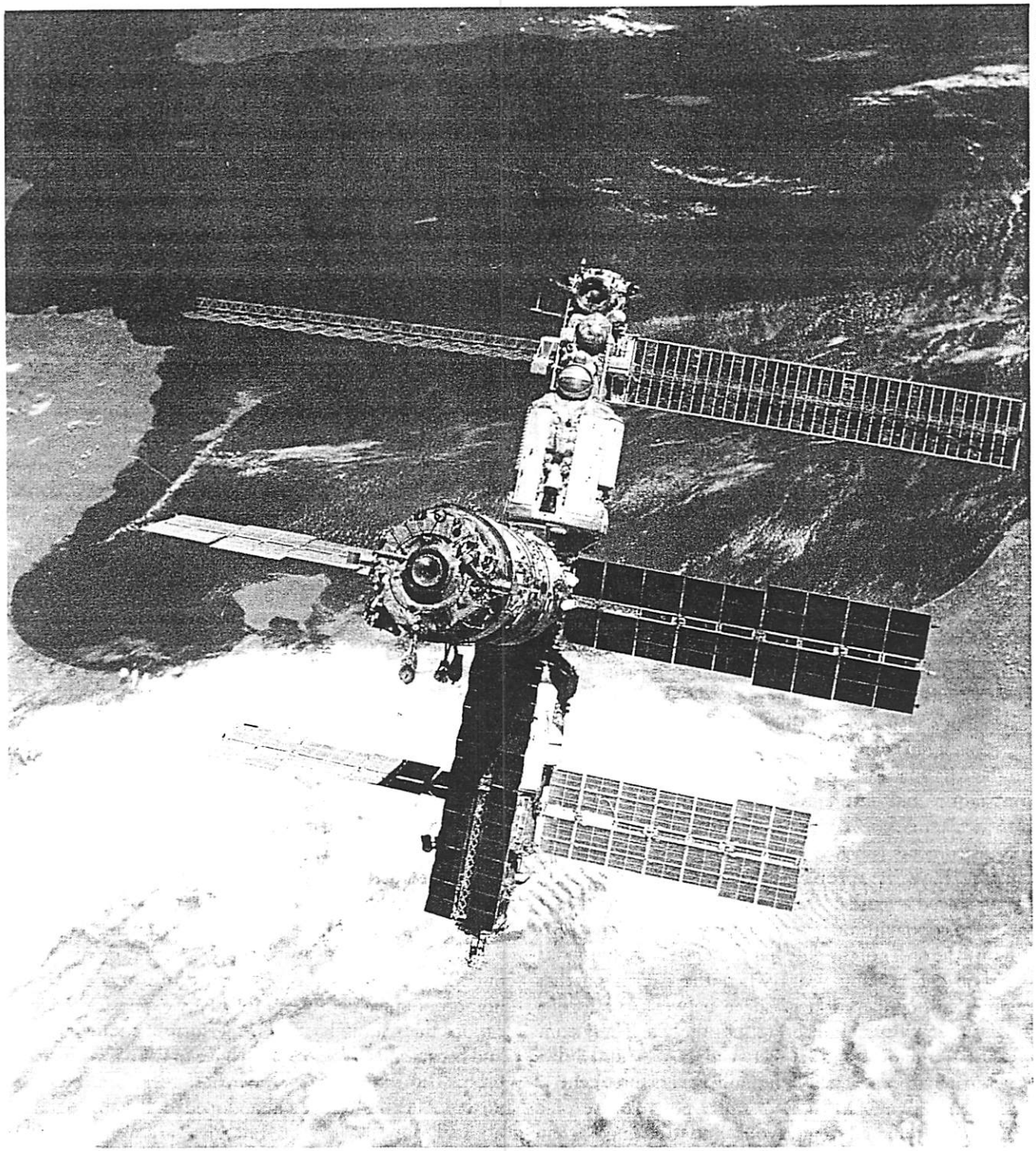
cooperation in the manned space program. There is a flight scheduled for an Israeli cosmonaut, and negotiations are underway with Chile and South Korea. NASA has been proposed a USA/Russian astronaut exchange mission, but it is doubtful whether this would yield a financial profit. There are also doubts as to whether the flight of the Japanese journalist made a profit (it didn't for Japan; the TV company for which Akiyama flew to Mir went bankrupt). The English Juno flight was, for the Russians, a financial debacle, but on the other hand, the Austrian, French and German manned flights to Mir brought in dearly needed foreign currency.

Another method of raising cash is the sale of space hardware and knowledge to foreign customers. This appears to be a solution that will bring some short-term relief. Almost all space hardware is on offer. Two striking bargains which were recently snapped up on the international space market were the rocketmotors from the aborted Russian moon program and the space-dedicated nuclear reactor "Topaz." Some discrepancies of Russia's dealings with the US emerged during this sell-off. America bought two unfueled Topaz reactors including the laboratory equipment to test them on the ground. The Strategic Defense Initiative Organization reportedly paid $13 million for the hardware assessed at $1 billion (Russian estimate of cost to develop the reactors). On the other hand, the Americans obstructed the sale of a state-of-the-art cryogenic rocketmotor to the Indian Space Research Organization and imposed sanctions on both India and the Russian counterpart Glavkosmos, on the grounds that the sale would violate the Missile Technology Control Regime which the Russians have said they'd adhere to. The loss of this sale cost the Russian space program about $140 million.

Resentment is building up in Russia towards the selling-out of space technology and hardware. Vladimir Nikitskiy, deputy director of NPO Energiya, noted that: "The chance of a broad international space cooperation will be lost when the space powers do not negotiate as equals." His remark was not only aimed at the US, but also at ESA, whose Director-General, Jean-Marie Luton, announced an extra investment of three times $50 million as part of a broadening of Russian/ESA cooperation. In return, ESA expects a significant contribution, in the future, of Russian knowledge and products to the European manned space program (Hermes), and the opportunity to study the possibilities of working together on projects such as the ESA Free-Flyer and CIS Mir-2 space station. Also, the proposed American cash injection into the Russian

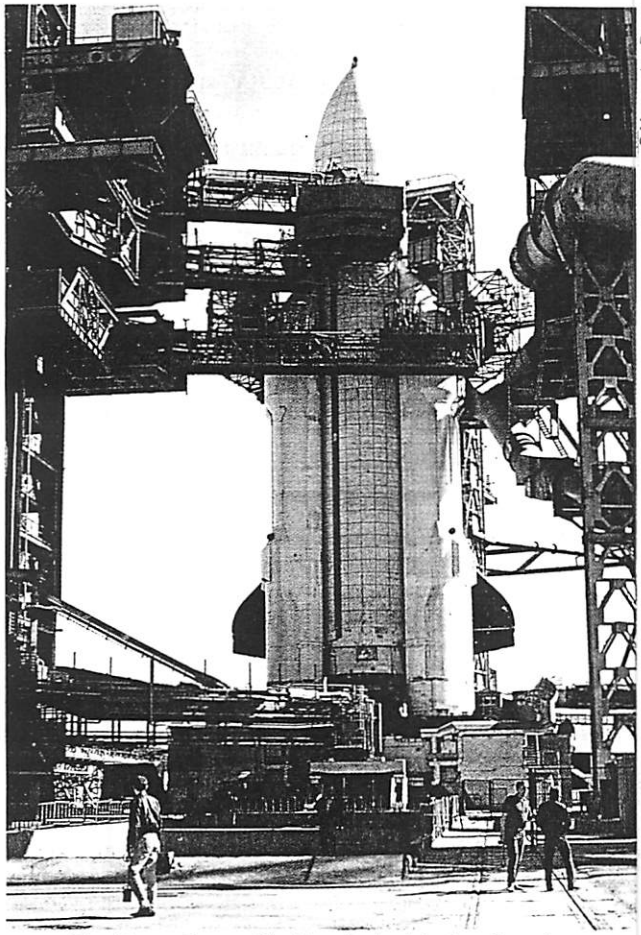
nuclear program that has elements of "Star Wars" technology was condemned in the Komso-molskaya Pravda as an American conspiracy to rob Russian secrets. Less controversial is the US study determining whether the Soyuz-TM could function as an Assured Crew Return Vehicle (ACRV) for their manned spacestation program. This could save NASA about 80% in R&D costs for a rescue spacecraft.

However, the Soyuz-TM/ACRV study is only one section of the space agreement that was signed during the summit of Presidents Yeltsin and Bush, on June 17, 1992. Other clauses in that agreement include the flight of a



Energiya USA

Former USSR's space station MIR in orbit above Tunisia and Libya's Mediterranean coastline.



C.M. van den Berg

The Buran Space Shuttle attached to the Energiya space launch vehicle. Two of the four booster rockets also used as the first stage of the Zenit space launch vehicle are also visible.

Russian cosmonaut on a US space shuttle mission (probably STS-60/Spacehab in October 1993), an American astronaut's visit and possible 90-day stay in Mir. The agreement also covers the docking of a US space shuttle to the Mir spacestation in the mid 1990s, allowing the Russians to bid on the launch contract for a (Made in America) Inmarsat-3 communications satellite, and adding US instruments (probably on a lander) to the Mars-94 mission. However, problems like "technology transfer" aren't solved yet and it is still unclear how Americans are going to cope with their own space industry where layoffs are the order of the day. It is therefore hard to predict how, in the coming years when the excitement has diminished, cooperation in space between the former adversaries will materialize. For the time being, only a one year, $1 million contract between NASA and NPO Energiya has been signed. It initially covers three general areas: the Soyuz-TM/ACRV study; possible use of a Russian automated rendezvous and docking system (APAS); and the possible use of the Mir spacestation for long lead-time life sciences experiments in support of Space Station Freedom.

Furthermore, it looks as if Russia has already offered its space technology for sale to Japan and has proposed joint space projects to hasten the drafting of a space treaty between the two countries. According to the Japanese daily "Yomiuri Shimbun," Japan has tentatively accepted the offer. Yuri Koptev, President of the Russian Space Agency, when asked, said that the transfer of information and technology applies to the space shuttle Buran and the launch vehicle Energiya. The treaty also makes provisions for the sale of data from biological and medical space experiments including the manned space program.

Yet another way to attract foreign currency is to commercially launch satellites or develop launch vehicles. In the past, the idea of launching Western satellites with Russian built launch vehicles was abandoned due to the regulations that forbode the transfer of Western technology to communist countries (COCOM). These regulations are somewhat more relaxed now, but despite huge discounts, no orders have been booked. China, on the other hand, is a "most favored nation" by the US and has already launched a Western satellite with an indigenous launch vehicle.

A number of companies in the Russian Federation have started investing in a conversion program to make commercial launch vehicles out of existing SS-18 and SS-25 (Start-1) strategic rockets. Such a program drew attention earlier, but the then proposed rocket was the SS-20 (Start). It must be remembered that, apart from technical difficulties (a satellite is not a nuclear warhead), such rockets (will) fall under disarmament treaties and probably have to be destroyed. Moreover, the commercial offer to launch the Zenit launch vehicle from a space launch centre to be built in Australia (Cape York), fell through. Not only is Western investment in the project too low, but three Zenit launch failures in a row have minimized confidence in this space transportation system. Even the most powerful rocket in the world, the Energiya, shares in this Russian rocket technology confidence crisis because its four boosters are equal to Zenit's first stage which exploded in at least one of the three launch failures. Energiya has been proposed to NASA as the vehicle to ferry large parts of the spacestation Freedom. It would drastically reduce the amount of space shuttle flights to build the station. NASA has turned this offer down as non-economical because of the many expensive modifications that would have to be performed to the station, and because the station would have to use a less efficient orbit. The future of Energiya has, therefore, become unsure. After the Russians abandoned the Buran program, no real options for the Energiya are very credible anymore.

Energiya USA

The one-year, $1 million contract signed between NASA and NPO Energiya will cover three areas initially : the Soyuz-TM/ACRV study; possible use of a Russian automated rendezvous and docking system (APAS); and the possible use of the Mir space station for long lead-time life sciences experiments. Energiya USA, recently established in Herndon, Virginia, will coordinate NPO Energiya's efforts in the US.

A final means of injecting foreign cash into Russian space programs is the possibility of renting-out space ground facilities. Japan, for example, negotiates the building of a space control station on Russian soil. Whether these negotiations will bear fruit will also depend on the relation between the two countries—a new quarrel about the Koeril Islands could unsettle everything.

Finally, Russian/CIS space is threatened from within. In an effort to create order in the chaos resulting from the break-up of the Soviet Union, nine republics in the CIS, 30 December 1991, in Minsk, came to terms on the continuation of the Soviet Space Program. The basis of this treaty (reconfirmed during the head of state meeting in Tashkent, 15 May 1992) is in executing space programs using existing space centers and other infrastructural facilities. However, President Kravchuk of the Ukraine laid claim to the Zenit production line ("25% investment has to yield 25% profit"), and Kazakhstan demands compensation for more than thirty years of environmental pollution of the steppes around Tyuratam, the most important CIS space launch centre, which it threatens with closure. Rocket parts (mainly first stages which produce hundreds of tons of often poisonous waste) tumbling down after launches from Tyuratam constitute the polluting majority.

It is obvious that in the last decade of this century the Russian/CIS space program has to be converted (konversiya) from a secret operation by the military and the Academy of Sciences to an open and profitable program. During recent years, parts of this conversion have already been witnessed. Pricetags for goods or services, competitive with regard to Western systems, were attached to launch vehicles, communications and observation satellites/products and the space station Mir. This commercial process is irreversible. To ensure success, the Russian/CIS space program has to establish an effective management organization and develop broad support in all layers of society to make the transition as smoothly and rapidly as possible. Yet changing the society's economic priorities (food, health care, energy) are the first priority.

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