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Soviet Efforts To Enter the Commercial Launch-Services Market

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An Intelligence Assessment

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An Intelligence Assessment

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Division [redacted] 25X1

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Soviet Efforts To Enter the Commercial Launch-Services Market

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Key Judgments

Information available as of 1 April 1988 was used in this report.

The Challenger accident and a rash of other Western launch failures in the period 1985-87 have seemingly handed Moscow a window of opportunity to break into the commercial space launch-services market. Moving aggressively to press its advantage, the USSR has embarked on a sophisticated—by Soviet standards—marketing campaign to woo Western customers. Moscow has backstopped its sales drive with an exceptionally strong launch package, emphasizing the reliability, frequency, safety, and low price of its services. Specifically, the Soviets claim they can support 10 commercial Proton launches per year and that a launch could be arranged within 18 to 24 months after a contract is signed. Moscow is pricing its launches at less than one-half the rates charged by Western competitors and is offering insurance.

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The grounding of the US shuttle and the inability of other Western vendors to shake off problems have left a backlog of some 75 satellites—with a launch price tag of about $7 billion—potentially available for launch by the USSR. Over four-fifths of these, however, already have launch contracts or reservations with at least one non-Soviet launch service. We estimate 13 payloads—mostly for US customers—do not have a launch contract with any vendor at present. The Soviets publicly announced in late 1987 that they have signed three commercial contracts with Western firms, but they have not revealed the names of their clients.

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We believe that Moscow, despite its aggressive sales pitch, is likely to generate no more than one or two hard currency launches in the next five years. Contracts would probably come from Third World countries or from a financially strapped company and might be part of a deal to deliver an operating satellite in space. The probability of a Soviet launch for the United States or a West European country seems slim as long as the Western technology embargo holds. If, however, Western launch services continue to have difficulties or are plagued by new problems, the outlook for the USSR to gain a foothold could improve. Indeed, the longer the launch crisis persists, the better the Soviet chances are to break down Western technology-transfer barriers. Moscow, too, has recently suffered a series of launch failures, and, if such problems continue, its chances of acquiring a Western launch contract would diminish.

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Although no ally has yet broken ranks with the United States on the technology-transfer issue, the Soviets are mounting a full-court press to erode the influence of the Coordinating Committee for Multilateral Export Controls (COCOM) controls. Moscow is confident that just one contract with a Western firm would help it gain a foothold in the market. To this end, the Soviets are:

- Feeding the debate within COCOM by arguing that the USSR is only a transshipment point on the route to space and that satellites delivered to Moscow would be temporary exports and, therefore, exempt from existing restrictions.
- Offering to streamline launch procedures and minimize the time a satellite would actually be in the USSR.
- Poising to exploit West European exports of indigenously built satellites to the Third World

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The recent decision by the United States to allow a US firm to fly a microgravity experiment aboard the USSR's Mir space station is being viewed by some in the West as the first crack in the dike against barriers to Soviet launches of Western payloads. The decision has bolstered critics of US policy who are seeking a precedent to send their satellites into space on Soviet vehicles. More than ever a continued inflexible US approach to commercial launches by Moscow could spawn greater opposition by West European and US businessmen. The longer the launch crisis persists, the more any opposition would be likely to intensify.

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If the current Soviet bid to enter the launch-services market proves unsuccessful over the next several years, it is unlikely to spell the end of Soviet efforts. Moscow is clearly taking a long-term approach, hoping that other opportunities will open. The benefit of their steady approach to space development has probably convinced the Soviets that their commercial forays will bear fruit over the long haul.

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Moreover, because of their extensive domestic launch schedule, the Soviets are in a stronger position than their competitors to weather an expected downturn in demand—the result of saturation in the cable television market, developments in fiber-optic communications, and unused capacity on existing satellites—and could more quickly gear up for any recovery in the launch-services market later in the 1990s.

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Scope Note

This paper examines Moscow's current efforts to win Western customers and its prospects for success. Special attention is given to the Soviet launch package, the obstacles in Moscow's path, and implications for the United States if the USSR is successful. 25X1

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Figure 1
Milestones in the Commercial Launch Market

1981	January	• Moscow publicly announces that arrangements can be made to launch satellites on Soviet vehicles.
	April	• First US space shuttle launch.
	December	• European Space Agency (ESA) completes developmental launches of Ariane launch vehicle.
1982	May	• India signs agreement with Soviets to launch three remote-sensing satellites beginning in 1986.
1983	May	• US decision to turn over production of expendable launch vehicles to private industry.
	August	• Soviet Proton launch vehicle is included on Inmarsat list of candidate vehicles for satellites to be launched in 1988-89.
1984	January	• First launch of China's Long-March-3 vehicle.
	March	• ESA completes demonstration launches.
	May	• Arianespace begins commercial operations.
1985	July	• Inmarsat decision excludes Proton.
	August	• US Titan launch failure.
	September	• Ariane-III launch failure.
	October	• *Glavkosmos* established.
1986	January	• Challenger accident.
	April	• Second Titan launch failure.
	May	• Delta launch failure.
		• Ariane-II launch failure.
	August	• Presidential decree removes shuttle from most commercial business.
	November	• Proton launch failure (second-stage malfunction).
1987	January	• Soviets make demarche to the United States on the US policy banning the export of spacecraft to the Soviet Union for launch.
		• Proton launch failure (fourth-stage malfunction).
	February	• Titan resumes launch operations.
	April	• Proton launch failure (fourth-stage malfunction).
	July	• Atlas Centaur launch failure.
	August	• China launches first commercial payload for France; Martin Marietta signs contract with Intelsat to launch two communications satellites in 1989-90.
	September	• Arianespace resumes launch services.
	October	• Second successful Titan launch; Soviet seminar for prospective customers at Paris Air Show.
	November	• US businessmen visit Baykonyr Space Center; Inmarsat reopens bids.
	December	• West German firm signs contract with *Glavkosmos* to launch microgravity materials-processing experiment.
1988	January	• Proton failure (third-stage malfunction).
	February	• US firm signs agreement with *Glavkosmos* to perform materials-processing experiments on board Soviet space station Mir beginning in 1989; Soviets exhibit at Space Commerce 88, claiming five contracts; Proton failure (fourth-stage malfunction).
	March	• Soviets launch Indian remote-sensing satellite on a Vostok under commercial contract; McDonnell Douglas wins contract to launch second-generation Inmarsat satellite.

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Soviet Efforts To Enter the Commercial Launch-Services Market

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Setting the Stage

Confident that its space industry was coming of age, the USSR in 1982 decided to bid for the launch of a second generation of International Maritime Satellite Organization (Inmarsat) satellites, one of the first and few international launch contracts open to commercial vendors.[1] This opportunity resulted from the strong voice Moscow anticipated it would have in the decisions and the provisions of the Inmarsat Convention requiring that equipment and services be acquired through open and competitive bidding. Competing against the US space shuttle and the developmental West European Ariane launch vehicle, Moscow offered its proven launch vehicle, the Proton.[2]

The Soviets viewed entry into the commercial arena as a way to earn much-needed hard currency, as well as a way to get in on the ground floor of a market that many forecasters predicted would burgeon in the late 1980s. Perhaps more important, Moscow saw the signing of a contract to launch a Western satellite as the ultimate validation of its position in the international space community and as an avenue to win the prestige and respect it thought it deserved. Because of their cutrate prices, strong domestic launch record, and significant voting strength in the Inmarsat organization, the Soviets calculated that chances to obtain at least one potential launch contract were good.

Partly as a result of an obsession with secrecy as well as clumsy marketing efforts, the Soviet sales pitch was met with a cool reception. During the negotiating phase, Soviet officials were strongly criticized for not submitting adequate technical information, deficiencies in operating procedures, and a refusal to allow Western access to Soviet assembly and checkout facilities and launchsites. Moreover, US and West European firms bidding to construct the Inmarsat satellites were concerned that the Soviets would have an opportunity to inspect the satellites and acquire advanced technology. Nor could Moscow use its clout in Inmarsat; its voting ability had been reduced because large usage by Soviet ships of the organization's facilities had not materialized.

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A Second Chance

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In the wake of the 1986 Challenger accident and a rash of other Western launch failures in the period 1985-87, Moscow has been handed a second opportunity to win a slice of the launch business. This time the Soviets appear better prepared. Learning from their failed attempt to gain the Inmarsat contract, the Soviets in 1985 established a new agency, *Glavkosmos,* with clear lines of authority and seemingly attuned to the needs of Western customers. Its head, Aleksandr Dunayev, exhibits the drive and vision needed to trumpet Soviet space capabilities in the commercial arena. Soviet efforts to win customers coincided with General Secretary Gorbachev's openness campaign, which directly countered former charges of secrecy leveled against the USSR. These efforts were bolstered by the general economic and trade outreach that is a major component of Gorbachev's economic and political agenda.

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The USSR has become a visible player in the launch market, evidenced by a media blitz in Western aerospace trade journals and newspapers and a strong presence at recent trade shows. Moscow is moving

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[1] Inmarsat provides worldwide communications by satellite for the international maritime community. The organization, established in 1979, consists of 43 member countries with each country's voting strength based on its use of the organization's facilities.

[2] The Ariane family of launch vehicles is produced, marketed, and launched by Arianespace, a semiprivate company supported by the 13 member states of the European Space Agency.

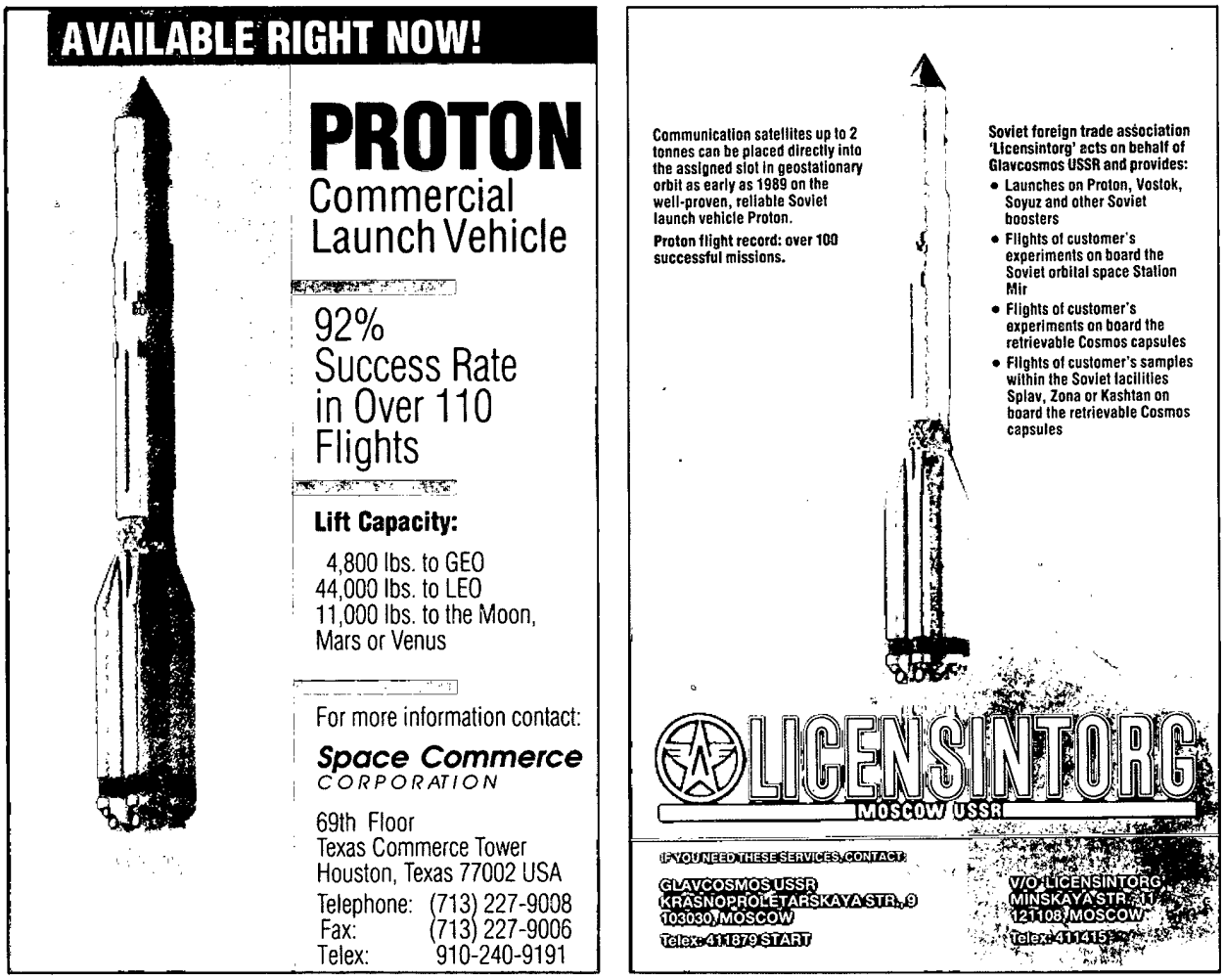

Figure 2. Advertisements for Soviet launch services.

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aggressively to woo customers and is orchestrating a sophisticated campaign by Soviet standards (see figure 2). The Soviets have hired Western marketing firms to advertise and locate customers, conducted a series of special conferences for potential clients, and taken the unprecedented step of opening facilities of the normally off-limits Baykonyr Space Center.[4] Moscow is making a special play for Third World customers, including offering additional discounts.

Comments made by potential customers who are currently having discussions with Moscow attest to the Soviets' newfound sophistication and accommodation.

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What Moscow Is Offering

Moscow's campaign to enter the launch market is backstopped by a strong and comprehensive service package. Responding directly to the needs of potential customers, Soviet officials are emphasizing reliability, low price, an insurance package, and a schedule of frequent launches

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[4] since 1986 the Soviets have hired the following commercial marketing firms: the Kokusai Koeki Company of Japan, Commercial Space Technologies and Jardine Glanvill of Interplanetary, Ltd., of the United Kingdom, Jardine Matheson of Hong Kong, and Space Commerce Corporation of the United States

Launch Vehicles

The Soviets currently are offering six different launch vehicles and a sounding rocket to customers and indicating that another launch vehicle will become available when it completes its developmental test program (see inset and figure 3). Although not all have strong commercial application, the Soviets are offering a variety of launch vehicles that provide a range of options, in contrast to the more limited current stable of Western vehicles. Moscow has had years of experience with its vehicles, posting the world's most frequent launch record. In 1987 the Soviets launched nearly 100 satellites into orbit, compared with only 15 launches in the rest of the world.

The Proton (SL-12/13) is the largest operational launch vehicle in the Soviet fleet and is the primary vehicle being offered for commercial launch services. According to *Glavkosmos* chief Dunayev, it will be ready for commercial use in August 1988.

Glavkosmos officials claim that the Soviets are currently producing 12 to 15 Protons per year and that a stock of four or five is available for commercial use. We know the Soviets used between nine and 13 Protons annually during the period 1982-87.

Dunayev claimed at an October 1986 meeting of the International Astronautical Federation that the Soviets will be able to support 10 Proton launches per year beyond their domestic needs.

[5] Geosynchronous orbits are used for communication satellites to provide continuous coverage. Satellites are positioned approximately 36,000 kilometers above the Equator in a fixed relationship to the earth

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We anticipate that the domestic use for the Proton also will increase, but, unless it increases dramatically, the new production rate should be sufficient to handle projections for commercial launches in the early 1990s. Because the Soviets undoubtedly are able, moreover, to predict their domestic launch requirements for the Proton several years in advance, they almost certainly would be able to adjust production and domestic launch schedules to accommodate commercial contracts.

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In addition to availability, Moscow is also touting the Proton's reliability record, claiming that since 1970 only 11 failures—out of 108 launches—have occurred, making it one of the industry's best records.[6] This strong showing has been diluted, however, because five Proton failures have occurred out of 18 launches since late 1986. Two of these failures were attributed to the testing of a new fourth stage that Moscow states is not intended for commercial use. Two failures were the result of malfunctions of the second and third stages and may indicate problems with quality control on the manufacturing line. The most recent was attributed by TASS to a separation problem,

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Launchsites and Procedures

Commercial launches will be made from the Baykonyr Space Center

Bolstering efforts to win contracts, the Soviets are showing new openness

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[6] This figure is for the SL-12 and does not include developmental launches before 1970.

[7] Baykonyr Space Center is the Soviet name for what the US Government designates as the Tyuratam missile and space complex

The Vertikal is launched from the Kapustin Yar missile and space test center and the Kosmos can be launched from either Kapustin Yar or the Plesetsk missile and space test center. The Tsyklon is currently launched only from Plesetsk, but it could use an SL-11 pad at Baykonyr.

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Soviet Space Launch Vehicles Offered for Commercial Use

In brochures advertising their launch vehicles, the Soviets have supplied information and parameters for their commercial launch vehicles. The orbital parameters and satellite weights are typical for the nonmilitary spacecraft the vehicles launch, which the Soviets would be willing to discuss in public:

- *The Soyuz is a three-stage multipurpose vehicle that can place up to 7,000 kilograms into a 200-kilometer circular orbit. Our analysis indicates it is used to boost the Soyuz manned spacecraft and Progress cargo vehicles and could launch large Western Earth-resources or materials-processing satellites into orbit.*

- *The Molniya is a four-stage version of the Soyuz vehicle capable of putting a 1,500-kg satellite into highly elliptical orbits with apogees of 36,000 km. The Soviets also claim it is capable of putting payloads up to 1,500 kg into geostationary orbit, but we have not seen this capability demonstrated.*

[redacted]

No Western commercial customers, however, currently require highly elliptical orbits.

- *The Vostok is a three-stage version of the Soyuz vehicle capable of putting a 1,840-kg satellite into a 650-km sun-synchronous orbit or a 4,730-kg satellite into a 200-km circular orbit. We believe in addition to launching small Earth-resources satellites, the Vostok could be used to launch small materials-processing payloads.*

- *The Kosmos is a two-stage vehicle capable of lifting a payload of 450 kg into a 500-km orbit.* [redacted] *we believe this vehicle has been used to launch small Interkosmos scientific payloads and could be used to launch similar Western satellites.*

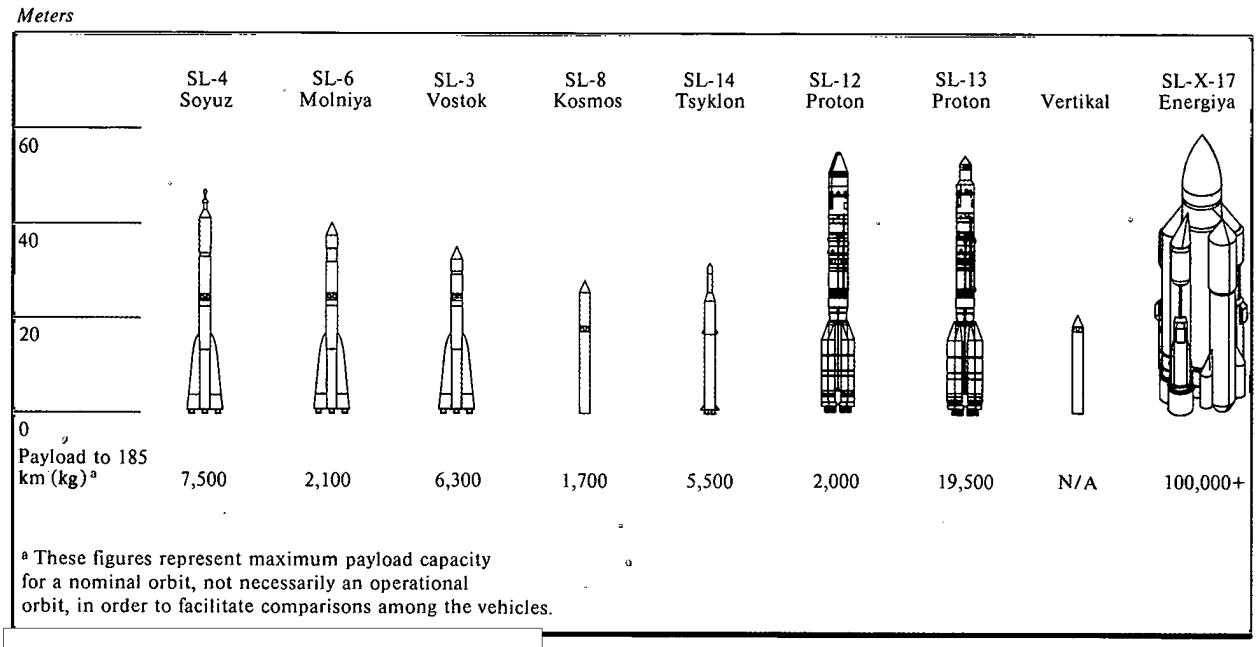
- *The Tsyklon is a three-stage vehicle capable of inserting a payload of 4,000 kg into circular and elliptical orbits. TASS announcements indicate it has launched Soviet oceanographic resource, weather, and other scientific satellites. Other than launching scientific payloads, no commercial demand for this particular vehicle currently exists.*

- *The Proton vehicle is capable of lifting payloads up to 20,000 kg—space-station-class size—to low-Earth orbit. Moscow claims it is capable of lifting 2,000 kg without the need of an apogee motor to geostationary orbit at 35,780 km from Earth. Most Soviet and Western communications satellites weigh less than 2,000 kg, including the Hughes HS376, the RCA/GTE GStar, and the European Eutelsat, which account for over half the Western satellites launched into geostationary orbit.* 25X1

- *The Vertikal is a single-stage sounding rocket that is used as a geophysical and astrophysical exploration vehicle for investigation of the upper atmosphere. The Soviets claim that the Vertikal, with a recovery capsule, could fill a growing market for launching materials-processing experiments needing only five to seven minutes of microgravity. We know the Vertikal has been used for about 15 years for a variety of Soviet domestic scientific missions.*

- *The Energiya vehicle has two stages and is capable of lifting 100-ton payloads into low-Earth orbit. It is still under development and has been launched only once.* [redacted] 25X1 25X1

Figure 3
Soviet Space Launch Vehicles Offered for Commercial Use



[a] These figures represent maximum payload capacity for a nominal orbit, not necessarily an operational orbit, in order to facilitate comparisons among the vehicles.

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about their launch facilities. In November 1987 the Soviets allowed US businessmen to tour Baykonyr, including Proton assembly and checkout facilities, a launchpad, separate commercial fueling and assembly halls, and a clean room (see figure 5). The Soviets plan to have a series of other excursions to the center in the summer of 1988.

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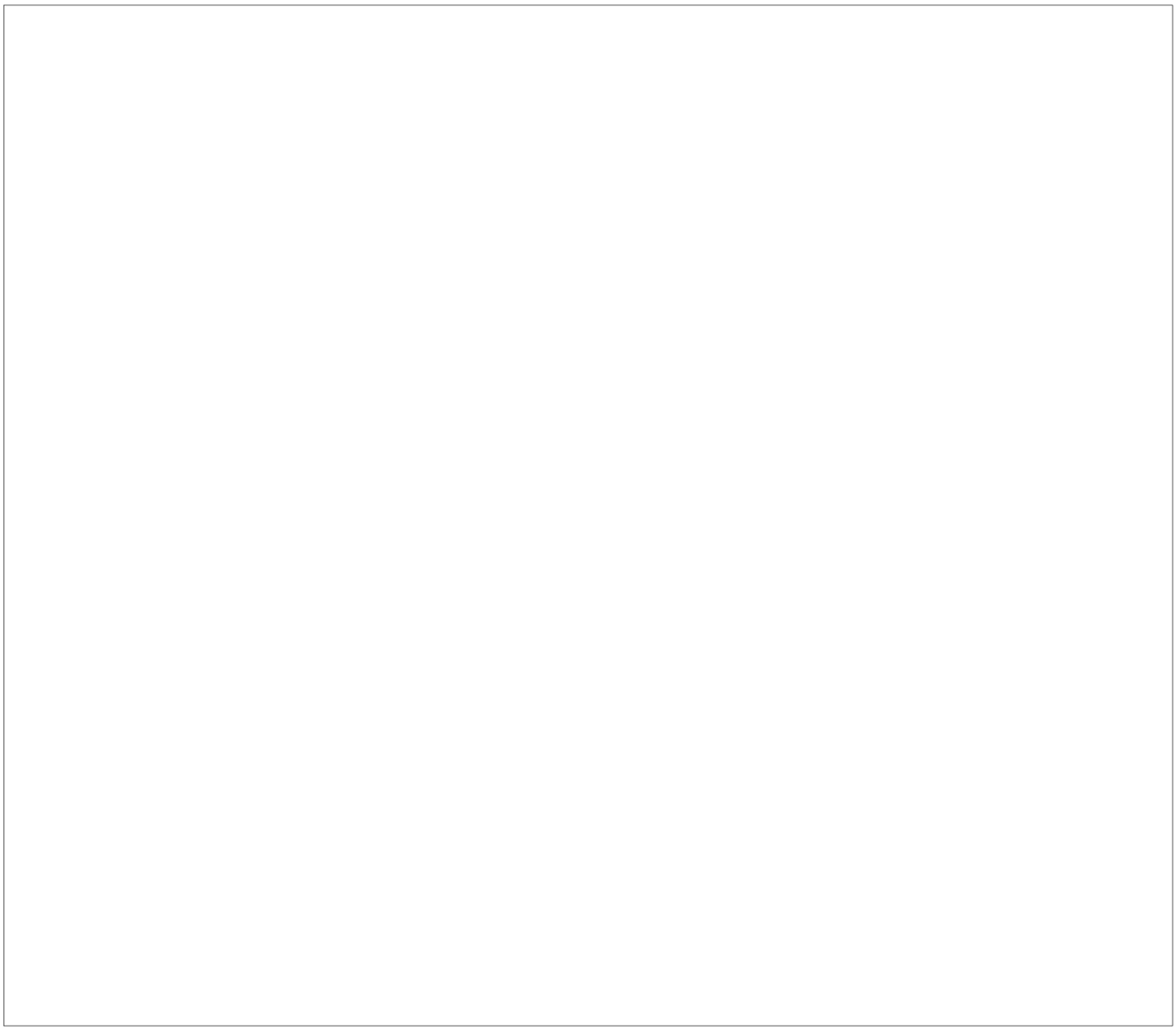
In meetings with potential Western customers, the Soviets have described the clean room, ground support equipment, procedures for mating satellites with launch vehicles, and the actual launch process and environment. To further assuage customer concern, the Soviets are also offering to provide simulations of launch trajectories and X-ray testing of satellites during integration procedures. The Soviets have promised to make available their network of fixed and mobile stations to monitor telemetry from the satellites during launch and orbit injection as well as in orbit. Moscow is assuring potential Western customers, whose satellites are sensitive to acoustic or vibrational effects during launch, that payloads will not encounter conditions vastly different from those of Western launch vehicles, a claim we believe is probably correct. To entice customers, the Soviets are also offering two different shrouds—the aerodynamic covers for satellites during launch—and have stated that a third shroud is under development to be compatible with Ariane-IV payloads such as the larger US



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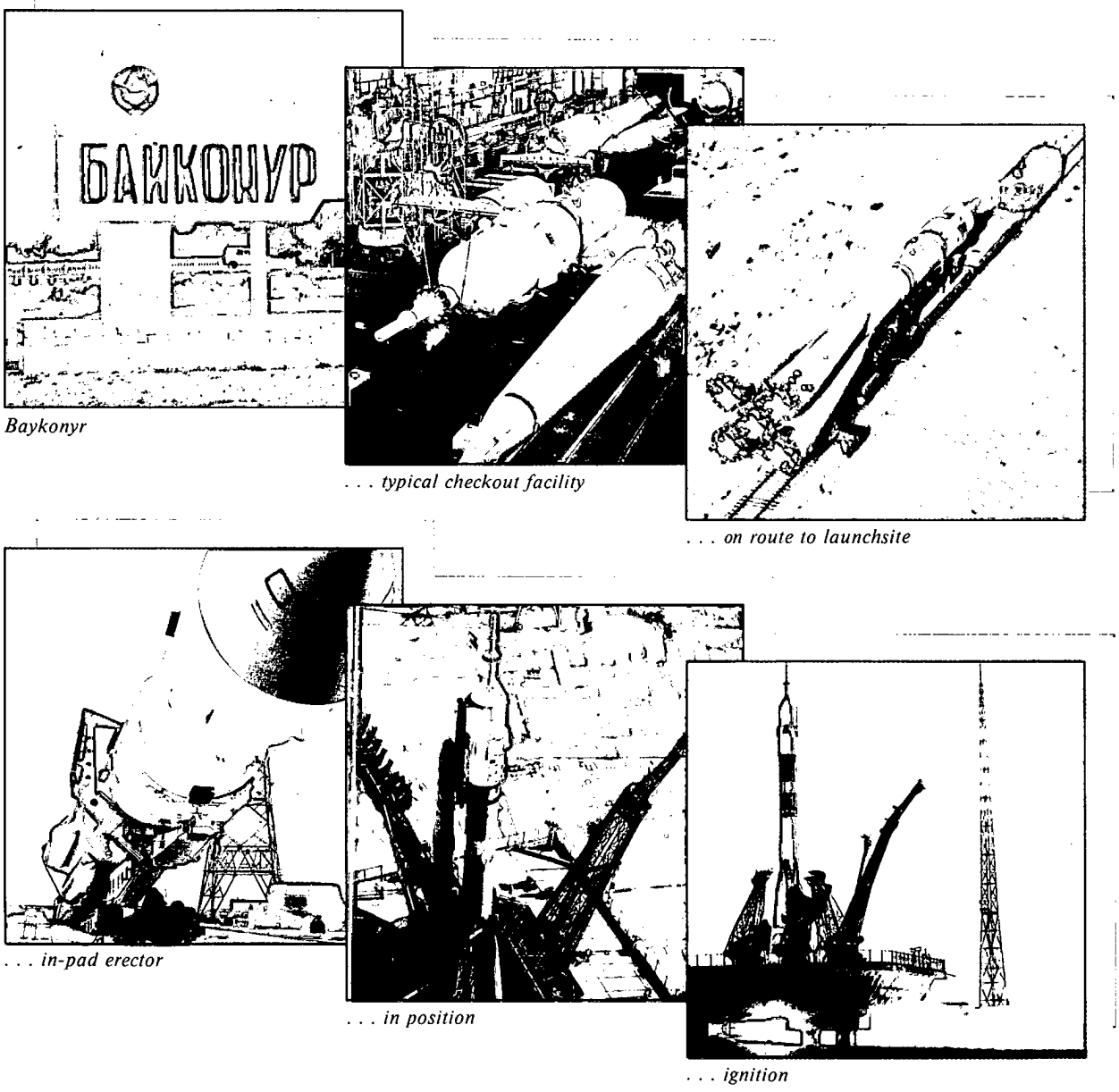
communications satellites. They have offered, moreover, to make alterations to the shrouds if required for particular satellites.

Reservations and Prices

Soviet officials have stated that a launch on the Proton can be arranged within 18 to 24 months after a contract is signed. Addressing other concerns, the Soviets are offering mission flexibility, claiming that turnaround time between launches from the same pad can be trimmed to only 10 days. 25X1

the time between launches could approach four weeks. In contrast, at the US space shuttle's peak performance period in 1985, turnaround time averaged five weeks. During the same period, the Ariane's average time between launches was 10 weeks. 25X1 25X1 25X1

Figure 5
Soviet Launch Preparation Procedure[a]



Baykonyr

. . . typical checkout facility

. . . on route to launchsite

. . . in-pad erector

. . . in position

. . . ignition

[a] It is Soviet practice to mate the satellite and launch vehicle in a horizontal position, erecting the unit only when it reaches the launchpad. The Soviets claim that it will take about five hours to transport a satellite and launch vehicle to the launching pad and to erect it.

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Another attractive aspect of the Soviet launch package is its cutrate price. Soviet offers come at a time when most of its competitors' prices are rising because of previous launch failures and increased costs for added safety procedures. Dunayev stated at an October 1986 meeting of the International Astronautical Federation that the cost of a Soviet launch would depend on a combination of satellite size and weight, its orbital parameters, and the value of the payload. Fees cited by Moscow—payable in US dollars—cover a wide range:

- $30 million for a launch of a standard communications satellite (625 kg) to geosynchronous orbit by the Proton. This represents 20- to 50-percent savings per launch over Ariane or the US shuttle. Soviet trade representatives even hinted that the price could be lowered to $15-20 million for an initial launch.

- For clients who contract for multiple Proton launches, $22 million for the first launch, $27 million for the second, and $33 million for the third.

- $26 million for a launch of an unspecified satellite to low-Earth orbit aboard the Proton.

- $10 million for launch of any satellite on a Soyuz. This price is about one-fourth of what a launch of a comparable satellite on a US or Arianespace launch vehicle would cost.

- Special rates for Third World countries. Moscow, however, has not indicated how large these discounts will be.

Insurance

Reducing risk has become a major concern to customers who have been battered by continuing launch failures from Western vendors, and the Soviets are responding by offering an insurance package with their launch-service contracts. Soviet officials report that *Ingosstrakh,* the USSR's insurance agency, will provide a reflight guarantee and indemnification if a satellite is damaged or fails to reach orbit. Costs for such service will be about 30 percent of the launch and payload value—charges that are lower than those currently available from Western insurers. Moscow is able to hold down its insurance rates in part because of its lower price for launch services. 25X1

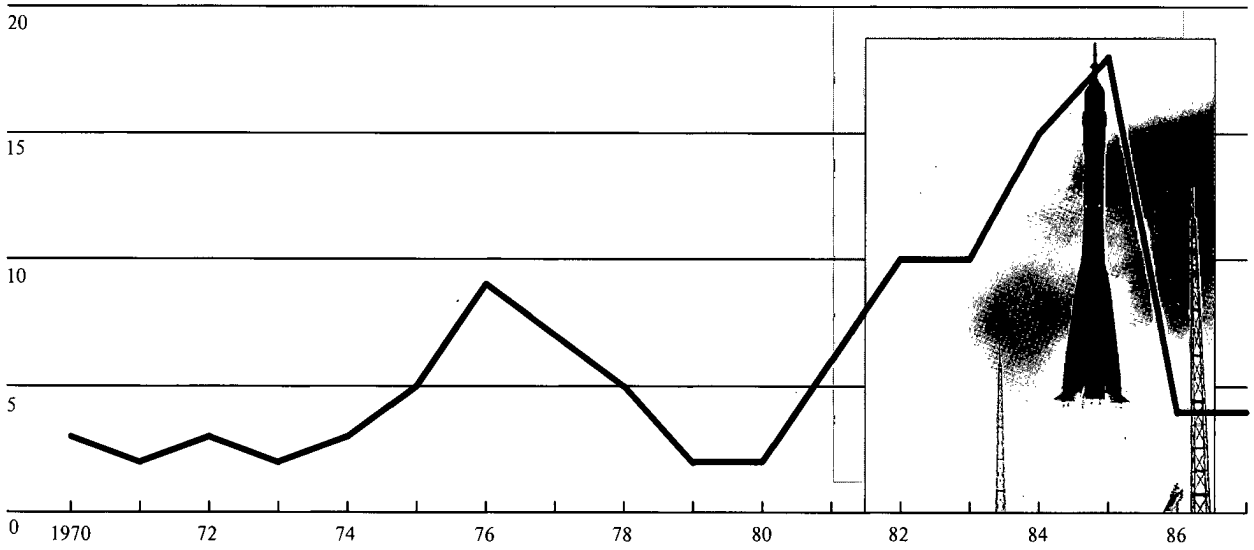
The recent rash of launch problems with the Proton, however, may force the Soviets to seek ways to reduce their liability for commercial launches. 25X1 25X1 25X1 25X1
Glavkosmos representatives met with US officials in late 1987 to discuss how launch-service insurance liability works in the West, signaling a possible change in Soviet policy. To minimize risk, the Soviets could turn to the three insurance companies they own in the West—Garant A. G. in Vienna, Schwarzmeer und Ostee A. G. in Hamburg, and the Black Sea and Baltic Company, Ltd. in London—which provide coverage for general trade dealings. These companies allow the Soviets to arrange reinsurance with Western companies, a policy that spreads the risk to Western firms. 25X1 25X1 25X1 25X1

How the Competition Stacks Up

Moscow's prospects of winning Western launch contracts have improved over the past two years in large part because of the difficulties of its major competitors. World launch suppliers put a total of only four commercial satellites into orbit in 1987—one-third of the annual commercial launch rate in 1981-85 (see figure 6). Launch vendors across the board continue to be plagued by a number of problems, which are seriously hampering their attempt either to break into the commercial market or to meet commitments to existing customers:

- A Presidential decree—promulgated in August 1986 as a result of the Challenger accident—has effectively taken the US shuttle out of commercial ventures for the present. The shuttle—which provided almost 40 percent of total Western civilian launches in 1985—will now carry only payloads important to national security and foreign policy as well as other sensitive scientific cargo. Press reports indicate the shuttle may be unable to meet even its scaled-back launch schedule. 25X1

Figure 6
Western Commercial Satellites
Launched to Geosynchronous Orbit



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- Troubles at Arianespace—the current leader in launches and reservations—persist, and [redacted] the organization is scrambling to hang on to customers made nervous by its recent launch failures and subsequent delays. [redacted] problems have been traced to flaws in the design of the critical third-stage ignition system. We judge that, although Arianespace may be able to launch several payloads without a hitch, it will not be able to achieve the sustained and rapid launch rate its launch manifest requires until problems with the third stage are completely ironed out.

- The Chinese, who also are trying to break into the market and are competing directly with the Soviets for price-conscious customers, have a limited launch record. Beijing has placed only three satellites—all domestic—into geosynchronous orbit since January 1984 and has suffered one launch failure during the same period. Although the Chinese plan to increase the production of launch vehicles dramatically by the mid-1990s, their current stock of vehicles permits them to accommodate only a handful of customers.

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- Production of expendable launch vehicles (ELVs) by private US firms for commercial use is under way, but these companies have yet to get any satellites off the ground. Western press reports indicate that Martin Marietta—which plans to begin providing commercial launch services on a limited basis in late

1988—has suffered delays with one of its Titan rockets. Two additional US firms, General Dynamics and McDonnell Douglas, are not scheduled to launch civilian payloads into space until 1989

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Pressures From Pent-Up Demand

The grounding of the US shuttle, the inability of Arianespace to shake off its problems, and the time required to get the US private ELV industry in operation have left a backlog of 110 to 120 satellites—mostly telecommunications—that currently need a ride into space.[8] Because of foreign policy and national security considerations, however, some 45 of these almost certainly will be held until a launch with an appropriate government launch service can be arranged. At most, this leaves some 75 satellites—with a launch price tag of about $7 billion—potentially available for launch by the USSR (see table). Four-fifths of these satellites, however, already have contracts or reservations with at least one launch service.[9] Arianespace announced at a recent commercial space conference that it has firm contracts to launch 45 satellites. Press reports indicate that US private launch-service firms have signed on customers for a minimum of 20 payloads. Two satellites have reservations with the Chinese, although Western analysts consider these shaky because of financial troubles that have plagued Beijing's clients. On the basis of available data, we estimate that approximately 13 payloads—mostly for US customers—do not have a launch contract with any vendor at present.

Western Nonmilitary Satellites Potentially Available for Soviet Launch

	Number of Satellites	Number With Reservations on Non-Soviet Launch Vehicles
Total	**75**	**62**
US commercial	22	17
Telecommunications	19	14
Radio navigation	2	2
Other	1	1
Multinational	10	10
Intelsat	7	7
Inmarsat	3	3
Foreign	43	35
Telecommunications	29	24
Direct broadcast	10	8
Remote sensing	4	3

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Substantial revenue losses, satellite maintenance, and storage costs created by the backlog are taking a growing toll on Western customers still in the launch queue. Open-press reporting indicate that this economic burden has prompted satellite owners to examine Soviet offers more closely. Western aerospace industry analysts estimate that forgone earnings from a standard commercial telecommunications satellite can amount to as much as $300 million per year. In addition, some Western firms must pay for specialized spacecraft storage, depreciation of spacecraft assets, refurbishment of satellite components that deteriorate, and expensive leasing of backup capacity—costs that can, climb to $200-450 million annually.

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A small number of customers are motivated by even more daunting economic considerations. Scrambling to replace satellites in orbit that are near the end of their working lives, a few satellite owners face the

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[9] Even before the launch crisis, it was not uncommon for satellite owners to make reservations with more than one launch service. Multiple contracts assured satellite customers that payloads would not be bumped or delayed if launch vendors ran into snags. For this added protection, customers were willing to spend a negligible nonrefundable reservation fee. Because of increased uncertainty in the launch field today, even greater numbers of firms are following this practice. With this proliferation of dual and triple reservations, however, data on the percentage of satellites with reservations may appear inconsistent on the surface when compared with statistics on reservations by launch suppliers.

prospect of bankruptcy if their efforts to get replacements into space are unsuccessful. Most of these firms, however, already have launch reservations.

A Future Glut?

Our analysis suggests Moscow may have only a limited time in which to press its advantage. Barring a series of new launch failures, industry experts predict Western suppliers can easily accommodate the current launch backlog within the next five years. Beyond that period, however, demand for new launches probably will diminish drastically.[10] We estimate the number of additional satellites that will need to be launched annually could decrease from 12—the yearly launch rate achieved in 1981-85—to as few as seven per year in the mid-to-late 1990s.[11] Numerous factors, including many generated by the launch crisis itself, are likely to contribute to this dropoff in demand:

- Cable television, which has driven the rapid rise in demand for transponders on communications satellites to date, appears to be nearing a saturation point, according to Western business forecasters. Any growth in this market during the 1990s is likely to be modest.

- New technology promises to extend the working lives of many satellites by reducing the rate of fuel consumption needed to keep them operational. Because replacement satellites will not have to be sent up as often, orders for new launches may decline.

- Fiber-optic telephone and data-transmission networks—already in operation across the Atlantic and scheduled for broad expansion in the early 1990s—threaten to penetrate segments of the telecommunications market previously dominated by satellites, siphoning off additional demand for launches. 25X1 25X1 satellite operators face 25X1 their strongest competition from fiber optics on lucrative high-capacity trunk routes between major population centers.

- Prospects for rapid growth in demand for remote-sensing data and materials processing in space—which aerospace analysts had earlier predicted would fuel a sharp jump in the need for satellite launches in the early 1990s—have faded.

- Burned by recent launch delays, Western communications satellite operators appear more willing to lease transponder space on satellites already in orbit, rather than launch their own payloads. Moreover, once the current 25X1 backlog of launches is cleared, unused satellite capacity will rise to 50 percent, making leasing more attractive. 25X1

The future contraction of the market will come at a time when competition among Western launch vendors is likely to heat up. By the mid-1990s, the US shuttle fleet should be operating at full capacity, and at least two of the major US ELV firms and possibly two additional small firms with ELVs geared to more specialized services are expected to be in operation. Arianespace, with six vehicles of varying capability, is slated to provide a comprehensive package of launch services, and the Japanese will be just entering commercial service with a family of at least four versions of a medium-lift launch vehicle. In the same time frame, the Chinese may have successfully completed a 25X1 few commercial launches. 25X1

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[10] Only a breakthrough in a satellite-oriented market with strong commercial applications—such as expansion of specialized telecommunications services or in materials processing—could reverse this trend.

[11] Because requests for US domestic communications satellites are usually filed with the Federal Communications Commission up to five years in advance, FCC documents have proved to be an excellent proxy for analysts and launch suppliers to determine potential launch demand. Current FCC data indicate only a handful of new applications has been submitted for the 1995-2000 period.

The Technology Embargo—An Insurmountable Obstacle?

Although current pressures improve Moscow's chances for making inroads in the market, technology-transfer concerns on the part of the West remain a major obstacle in its path. Specifically, West European governments (except Iceland), Canada, and Japan together with the United States, have agreed in the Coordinating Committee for Multilateral Export Controls (COCOM) to deny the export of militarily sensitive technology to the Soviet Union and define the launch of a satellite by the Soviets as such an export. Hoping to feed the controversy within COCOM, the Soviets are encouraging US and West European firms to fight the restrictions on satellite technology exports by arguing that the USSR is only a transshipment point on the route to space and that satellites delivered to Moscow would be temporary exports—exceptions to existing guidelines, according to Moscow's interpretation.

Although the debate continues, no ally has yet broken ranks with the United States over the issue. Nonetheless, evidence is mounting that opposition to the US position is growing. At a February 1988 commercial symposium in Switzerland, for example, West European businessmen characterized the embargo as a move to protect fledgling US private launch services. According to Department of State reporting, a 1987 Inmarsat report officially criticized the US position on Western use of the Proton.[12]

West European industry representatives claim to be willing to abide by COCOM controls only as long as the United States can keep US firms from contracting with Moscow. The recent US Government decision to allow a US company, Payload Systems, to fly a microgravity experiment aboard the USSR's Mir space station is being viewed by some in the West as the first crack in the dike against the transfer of some space-related technology.

Moscow probably believes that just one contract with either a Western firm or Third World nation for the launch of a Western-built satellite or a satellite built with Western hardware will vitiate the effectiveness of US and COCOM controls and will break down the barriers to commercial success for its launch services. To this end, the Soviets also are encouraging Third World opposition to the embargo by appealing to those countries that own or plan to purchase Western-built satellites and are interested in a low-cost launch. Moreover, Moscow is poised to exploit the opportunities created by potential West European exports of satellites to Third World countries, a move that could mean the eventual circumvention of COCOM controls altogether. With the United States cut out of the picture and a more lenient West European view of what is militarily sensitive technology, the potential exists for Moscow to break into the market by launching a West European–built satellite for a Third World customer.

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in October 1987 the Soviets were offering to Third World countries package deals that would deliver an operating Soviet-built satellite in space. The Soviets also are probably looking to two contracts they have signed with West German and US firms for materials-processing experiments in space to improve their reputation as a reliable business partner that can be trusted not to interfere with or inspect the customer's technology.

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Playing both ends against the middle, the Soviets are offering guarantees and touting new procedures to protect satellite technology. For example, they claim to be streamlining procedures in order to minimize the time that a satellite will have to be in the USSR. Soviet trade officials have indicated that a Western satellite could be launched three weeks after it arrives in the country and only three days after it has been mated to its launch vehicle. to facilitate this quick turnaround the Soviets are even considering a plan to send the launch vehicle adapter to the customer for mating to the satellite before it is

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[12] Inmarsat is encouraging a West European consortium to consider building a satellite with no US parts or components for a possible Proton launch.

shipped to the USSR for launching. In addition, customs inspections are to be waived, satellites can be sealed in containers for transit through the Soviet Union, and representatives of the manufacturer will be allowed to remain in control of the satellite at all times

The Soviets, however, are not assuming that these guarantees will assuage Western concerns and are investigating the possibility of alternative launchsites outside the USSR as a way to circumvent the restrictions in the longer term:

- in February 1987 Roal'd Sagdeyev, Director of the Soviet Space Research Institute, said that Soviet and Indian officials had discussed the possibility of building a joint launch facility in India. General Secretary Gorbachev also suggested such a possibility during his 1985 visit to India.

- The *Jakarta Post* reported on 28 July 1987 that the Indonesian Minister of Tourism, Posts, and Telecommunications announced that Indonesia is planning to build a commercial launch center for lease to any country, that it will be built in cooperation with one or more countries, and that Jakarta is collecting information on launch capabilities from China, the Soviet Union, West European countries, and the United States.

- Moscow has expressed interest in a proposed Australian spaceport at Cape York. The Soviets have offered to ship a Proton there to launch a future Australian telecommunications satellite. Sagdeyev suggested to members of a US delegation touring Soviet launch facilities in November 1987 that the Soviets would be willing to ship Proton launch vehicles to Australia to launch US satellites.

- The Soviets have proposed that the United Nations sponsor a World Space Organization to help Third World nations develop space capabilities. The proposal calls for an international space center with training and launch facilities. in May 1987 Dunayev said that the Soviets' choice for the site of such a complex would be India.

- Brazilian radio reported that, during his September 1987 visit, Foreign Minister Shevardnadze proposed that a Proton be shipped to Brazil to launch a telecommunications satellite.

Because all these launchsites are nearer to the Equator than current Soviet launchsites, they would allow Moscow to launch larger communications satellites to geosynchronous orbit with the Proton than they could from Baykonyr. 25X1

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What the Soviets Stand To Gain

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Moscow has strong incentives to make commercial use of its launch capabilities. On the basis of Soviet data, we estimate that under the most favorable circumstances the USSR could earn up to $300 million per year from the sale of such services to Western customers over the next decade.[13] Although small when compared with Soviet hard currency energy revenues, which totaled $13-14 billion in 1987, even modest launch earnings could bolster Moscow's longstanding campaign to reorient its export portfolio away from raw materials and pave the way for increased Soviet access to other high-technology markets. In particular, Soviet trade officials have indicated they expect commercial launches to spur exports of other—and potentially more lucrative—space products and services. Allowing no opportunity to go to waste, Moscow is aggressively marketing, along with its launch services, the sale of high-resolution civilian satellite photography, the rental of manufacturing and research laboratories in space for materials processing, and the lease or sale of Soviet Gorizont telecommunications satellites. Experience garnered on the trade front by the Soviets and their exposure in international circles will not go to waste. Lessons learned could make the Soviets more formidable competitors in high-technology markets down the road. 25X1

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[13] This figure is derived by multiplying the price the Soviets are most often quoting for launch aboard the Proton of a standard satellite to geosynchronous orbit ($30 million) by the maximum number of commercial launches (10) they claim the Proton can accommodate without shortchanging Soviet domestic needs in the 1990s. Because the Proton in certain cases can handle two satellites at once, it is possible for revenues to be even higher 25X1

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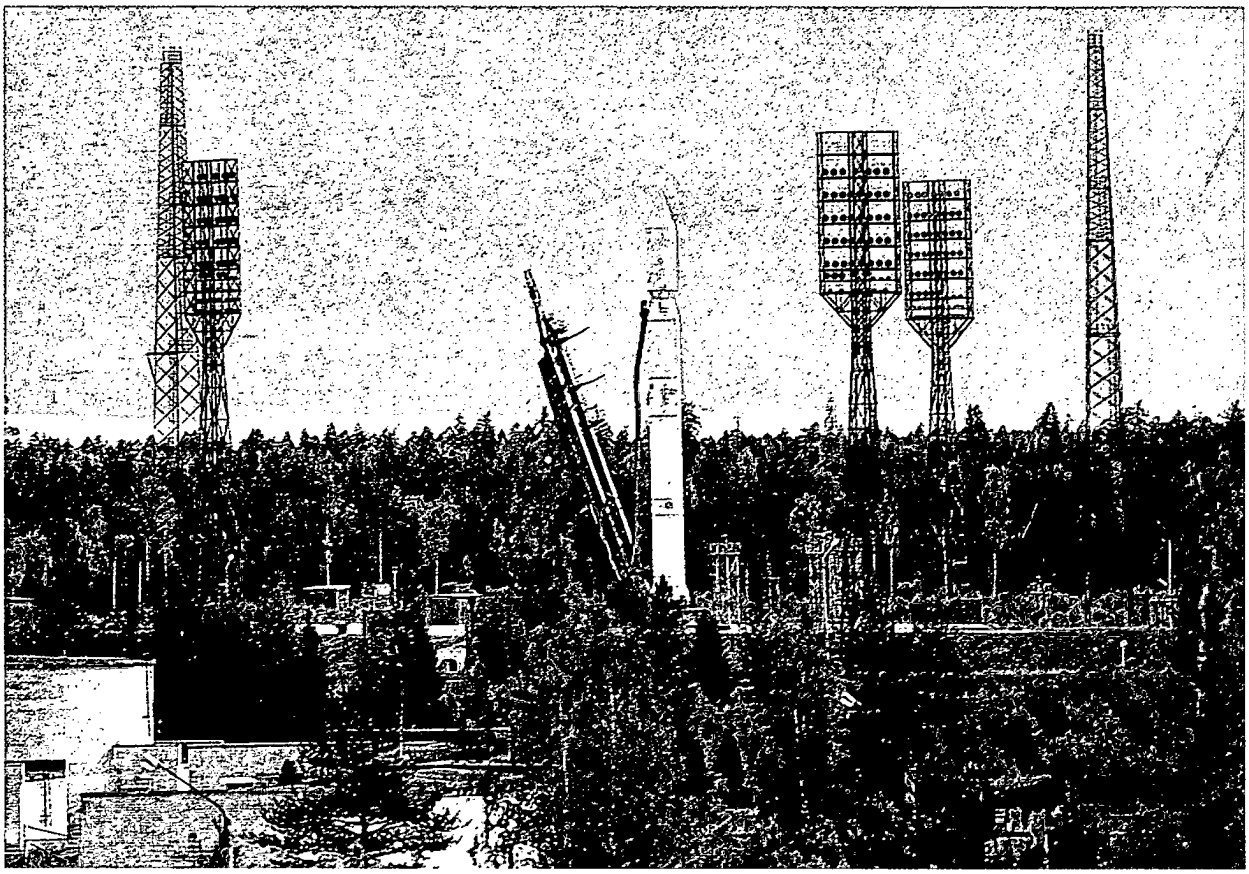

Figure 7. Soviet Tsyklon launch vehicle during launch preparations. 25X1

Hands-on access to Western satellites—though very much limited by security arrangements—could provide the opportunity for Soviet confirmation of often conflicting data available from Western publications

Information required for normal launch procedures, moreover, would provide the Soviets with additional valuable data. Access to more sophisticated Western checkout methods could be used to improve Soviet quality control procedures.

Soviet officials have said they will need the following information on the satellites to be launched to prepare a commercial contract, perform a launch, and avoid losses by either side:

- Drawings of electrical circuits and other potential hazards to launchsite personnel and integrity of the launch vehicle.
- Design drawings with overall dimensions.
- Propellant and pressure tank data.
- Communications system operating frequencies.
- Description of mission and capabilities.
- Trajectory and attitude statistics at time of separation. 25X1
- Location and parameters of umbilical connector.
- Structural parameters, including volume, mass, and center of gravity. 25X1

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These parameters are required by any prudent launch authority and should not be considered unusual by Western satellite owners. But this information could reduce Soviet uncertainty with certain types of exotic weapons—such as laser, neutral particle beam, and 25X1

radiofrequency weapons—that could be used against similar satellites in a future crisis. Detailed knowledge of satellite frequencies, , and of specific internal configuration and packing density, available to Moscow through the X-ray testing the Soviets are offering commercial customers, also would increase Soviet ability to interfere with Western communications satellites.

Participation in the commercial space market would also increase Soviet political prestige and influence, particularly in the Third World. Moscow will probably push every commercial opportunity to underscore its space accomplishments and to advertise the level of scientific sophistication its programs have achieved. Soviet officials see the commercial arena as another forum in which to highlight the peaceful nature of their space program, contrasting it to the "military" nature of the US space program, particularly the Strategic Defense Initiative.

Outlook

On balance, prospects are not bright for Moscow to launch a Western satellite any time soon, as long as the technology embargo continues to hold. Although the Soviets publicly claimed in late 1987 that they had signed three commercial contracts with Western firms, they have refused to reveal the names of the firms, raising questions about the credibility of this claim. COCOM controls have held the Soviets to only one commercial launch, the Indian remote-sensing satellite placed in orbit in March 1988.[14] The launch for New Delhi, moreover, offers Moscow little help in wooing other customers. Although the Indian satellite reportedly contained some US and French parts, the issue of COCOM circumvention was not raised because of the predominance of indigenous Indian technology and components. Moscow continues to pursue customers for its launch services in Western Europe—Finland, Eutelsat (a European consortium), and the European Space Agency—the United States, and the Third World, including Mexico, Brazil, Nicaragua, Indonesia, and Thailand.[15]

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If the current scenario of supply and demand continues to play out, we estimate that, under the best possible circumstances, Moscow could generate one or two hard currency launches in the next five years. Any contracts would probably come from Third World countries or from a financially strapped company and might include the delivery of an operating satellite in orbit. the Soviets have offered such a package to Pakistan, the United Arab Emirates, and Indonesia. The chance of a Soviet launch for the United States or a West European country seems slim.

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If, however, Western launch services continue to have difficulties or are plagued by new problems, the outlook for the USSR to gain a foothold in the market would improve. Indeed, the longer the launch crisis persists, the better the Soviet chances are to break down COCOM barriers. If Arianespace or US launchers, for example, suffer more launch failures over the next two to five years, some customers would consider Soviet offers more seriously, and major satellite owners and operators could step up efforts to relax COCOM controls. Publicized Soviet launch failures would have a converse effect.

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The Payload Systems decision bolsters critics of US policy who are seeking a precedent to send their own payloads into space on Soviet vehicles. Indeed, this action is likely to arouse renewed opposition to technology restrictions that may prove difficult for the United States to counter. Igor Alekseyev, an official of the Soviet foreign trade firm that is marketing Soviet launch services, reported the Payload Systems case has sparked strong interest in Moscow's services, especially from the West Europeans who feel betrayed by the US action. The Soviet representative claimed

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[14] The launch for India, a country for whom the Soviets have previously launched satellites under a cooperative program, was the first paid for by New Delhi.

[15] Soviet space officials have visited the United States, and, according to statements made by a Foreign Ministry spokesman at a 15 October 1987 press conference, both General Motors and General Electric have expressed interest in Soviet launch-service proposals.

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at a February 1988 commercial space symposium that Moscow has signed five firm contracts with unspecified customers to launch microgravity experiments and has begun serious negotiations with more than 100 other clients for satellite launches and other space services.

If the USSR's current bid to enter the launch market proves unsuccessful over the next several years, it is unlikely to spell the end of Soviet efforts. Moscow is clearly taking a long-term approach, hoping that other opportunities will open up. Because of its extensive domestic launch schedule, Moscow is in a stronger position than its competitors to weather a downturn in the launch-services market, and it can more quickly gear up to any growth in demand. The benefit of their steady approach to space development probably has convinced the Soviets that their commercial forays will bear fruit over the long haul

Implications for the United States

How close US allies are to breaking with the United States over the transfer of Western satellites to the USSR will depend in part on any additional decisions that allow US companies to fly experiments on Soviet sounding rockets or on the Mir space station. Even if such decisions are made on a case-by-case basis, and are not stated policy, they will probably cause problems within the Western alliance. A continued hardline approach could also fuel greater opposition by the West Europeans, who already believe the US line on technology transfer is motivated by national pride and a need to provide protection for private US launch services.

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