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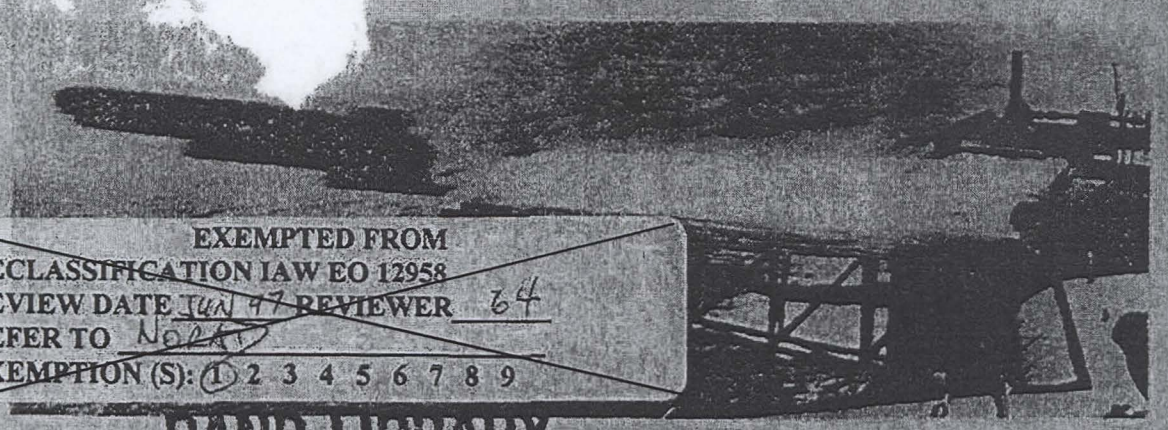

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The WIR in Brief

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Space

COVER: Firing of naval missile (from Red Star) (OFFICIAL USE ONLY)

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significant intelligence on space developments and trends

Soviet Communications Satellites Are Little Threat to Comsat/Intelsat

The Soviet launch of 3 Molniya communications-relay satellites in the past 18 months raises the question of whether the USSR intends to compete in the international communications field with the Free World's Intelsat (International Telecommunications Satellite Consortium), within which the US's Comsat (Communications Satellite Corporation) is the managing agent and dominant force.

The Soviets have the technical means to compete, and considerations of prestige and the opportunities for propagandizing provide some motivation to do so. They would, however, find it difficult to compete with Intelsat. At any rate, the Soviets almost certainly will continue to develop communications satellites for their own civil and military communications.

The Satellite Potential. The considerable potential of satellites for global communications is seen in the fact that the 240 telephone channels of Early Bird, the world's first commercial communications satellite, represents a one-third increase over the capacity of existing transatlantic submarine cables. Alternatively, Early Bird's telephone channels can provide capacity for a 2-way TV channel, or 18 telegraph channels can be derived from each of its telephone channels.

Soviet Prospects. The Molniyas launched to date have been used primarily for domestic telephone, telegraph, and TV traffic, and one of them sucessfully tested relay of color TV between Paris and Moscow. Although their traffic capacity has been much lower than that of Early Bird, Molniya-type vehicles could form the basis for a world-wide communications relay system. A point in their favor is their higher transmitting power, which would reduce the cost of ground stations. But the Molniyas are probably only the forerunners of a more advanced system that could enter operation in late 1967.

Technical considerations aside, the Soviets are not in a particularly favorable position to set up a global satellite communications system.

The USSR has little economic or technical need for a satellite system to handle its own telephone or telegraph traffic. About 90% of this traffic now takes place with Europe, for which new networks of high-capacity microwave radio-relay and coaxial cables are more than adequate and can handle large traffic increases easily. Lines from Moscow to the capitals of Eastern Europe are linked there with comparable mainline systems to Western Europe. As for communications with the underdeveloped countries of the world, Soviet traffic with them is so light that the 10-fold increase expected by 1975 would still not be great enough to warrant the establishment of satellite communications.

Global TV, with its powerful propaganda potential, would be another matter. Perhaps significantly, Soviet pronouncements on the international use of communications satellites have consistently emphasized TV. The mere transmission of Soviet TV programs via a Soviet satellite would afford Moscow a highly visual presence throughout the world, even if the propaganda content of the programs should be subdued or eliminated. However, the prospects for Moscow are not very bright in this area either.

There is no practical need to send Soviet TV programs to Europe by satellite. Intervision, the Communists' international TV relay system, already serves Eastern Europe adequately, and Western Europes's counterpart, Eurovision, is already linked with Intervision. In one 3-month period of 1965, for example, about 290 Intervision programs were fed into Eurovision. However, the Soviet appetite for prestige might override economic considerations. The experimental transmissions of color TV between Moscow and Paris conceivably could be the first step in the joint Franco-Soviet development of a European color TV system based on France's SECAM. Much, of course, will depend on the attitude of the French, who are known to be critical of US dominance of Intelsat.

Other developed Free World areas, such as Australia, Canada, and the US probably can also be ruled out. Japan, which presents the biggest TV audience in Asia, has already turned down overtures to participate directly in the Soviet communications satellite system. (However, a new ground station on Sakhalin, just north of Hokkaido, could encourage indirect Soviet-Japanese cooperation.)

The remaining areas -- mostly the underdeveloped areas of Asia, Africa, and Latin America -- may be of greater interest to the Soviets because of their propaganda potential, but they also pose problems far more complex:

1) The number of receivers in any one country is small. The total of 2 million for all these countries -- widely dispersed over two hemispheres -- does not exceed the number in sparsely populated Australia. (See next page.)

2) Most of the receivers belong to the wealthiest people, who presumably would not be strongly tempted to turn the dial to a Communist program. (On the other hand, these people would be key targets because they are also the most influential.)

3) Because over-all telecommunications are poorly developed in these nations, service would not be nationwide unless the Soviets were willing to subsidize an expansion of their telecommunications nets and to erect the ground stations to receive signals from the satellites.

The World's TV Sets (end of 1965)	
US	68 million
Western Europe	47 million
USSR	16 million
Eastern Europe	9 million
Japan	18 million
Canada	5 million
Australia	2 million
Latin America	10 million
Other Asian, Middle East & African nations	2 million
	177 million

And, in general, there are such problems as: technical incompatibility of Soviet TV with some foreign systems; language barriers; and timezone differences.

There has also been speculation that the USSR might try to compete with Intelsat in the communications field by charging less for relaying international telephone and telegraph traffic. This is a real possibility, if political outweigh practical considerations with the Soviets. But here again, success seems unlikely. Intelsat is already in operation, and an improved very-high-capacity, truly global system will go into operation by early 1968. Finally, Intelsat members, the main customers for international communications, have a vested interest in the profitability of their own system. Intelsat now claims 50 members, including practically all of the industrialized nations of the Free World, and by 1968 membership may total 60 or more nations. The clientele of a Soviet-sponsored system would probably be confined to the Communist nations and to a few underdeveloped nations which would want TV -- even Soviet-subsidized TV -- for a status symbol.

Soviet Alternatives. Soviet recognition of the high cost of and meager returns from competing with Intelsat probably explains the USSR's insistence that the UN assert jurisdiction over international satellite communications. Lacking other attractive alternatives, the Soviets may view the imposition of UN authority as the most effective way of restraining Intelsat and US dominance in this field. Moreover, a system controlled and supervised by the UN might give the USSR entree to US R&D in satellite communications on which more than $200 million has been spent.

In any event, the Soviets probably will push ahead with development of its own satellite communications system, to improve its own domestic civil and military communications and to inaugurate an international system of its own of some kind. The Soviets may hope that, through operation of a

rival system, they will be able to exert leverage either for entry into Intelsat on advantageous terms or for persuading other countries to back UN control of satellite communications.
(CIA)
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Cosmos 129 is Another Recce Satellite

Cosmos 129 which the Soviets launched from Plesetsk at about 1215Z, 14 October, is the first Soviet reconnaissance satellite to be launched since 27 August. Before that date, the Soviets had launched an average of two per month since 1 January 1966. Cosmos 129 is the fourth satellite launched from Plesetsk, the sixteenth successful Soviet recce satellite this year. It will probably be deorbited 22 October.

Its primary mission has been assessed as medium-resolution photo-reconnaissance. The launch point and orbital inclination permit the vehicle to make a pass over Newfoundland on Rev 3 and over New Orleans-Detroit-North Bay on Rev 4. Such launches from Plesetsk would provide the Soviets with coverage of targets in North America a full two revolutions, or three hours earlier, than 65-degree launches from Tyuratam.
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Lunar Probe May Be Launched Soon

The Soviets may launch a lunar probe at about 0934Z, 23 October, when the "launch window" (the period of minimum propulsion requirements) next opens for such an event.

The probe could be either:

- A lunar soft-lander to obtain close-up photography of areas of the Moon's surface not shown in Luna 9 or Surveyor 1 photography; or
- A lunar orbiter to photograph prospective lunar landing sites from relatively low altitudes.

In connection with the latter possibility, neither of the two Soviet lunar orbiters launched to date (Luna 10 and Luna 11) have obtained this type of photography. Only the US's Lunar Orbiter has done so. Luna 10 probably did not carry cameras. Luna 11 may have been intended to photograph the Moon's surface from low altitudes, since its payload weight exceeded that of Luna 10's by an amount which could be explained by the addition of photographic equipment. The Soviets, however, have not announced

receipt of any photography from Luna 11 and have not admitted that its mission included photography. If Luna 11 was to take pictures but failed to do so, the 2 months which have now elapsed would probably be long enough for the Soviets to have determined the probable cause of failure and to have prepared another payload for launch.

The Soviet lunar-launch record for this year is as follows:

31 Jan	Luna 9	Softlander; obtained first close-up photography of the Moon's surface; first to transmit data from the lunar surface.
01 Mar	Cosmos 111	Probe which failed to be injected into lunar trajectory. Probably intended to be a lunar orbiter. Announced as a scientific research satellite.
31 Mar	Luna 10	Lunar orbiter. First man-made vehicle to be placed in orbit around the Moon. Transmitted data on radiation and on the Moon's magnetic field. Tracking provided Soviets with data on shape of Moon.
08 Aug	Luna 11	Same as Luna 10, except that it was slightly heavier -- probably carried photographic equipment which failed to work properly.

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Nuclear Rocket for Deep-Space Probes Studied but Apparently Not Decided on Yet

The USSR is conducting research which could support the development of a nuclear rocket engine for exploring interplanetary space, but, unlike the US, it apparently has not yet decided to go ahead with the development of such an engine.

The Soviets must develop either a nuclear rocket engine or some form of electrical propulsion, using a nuclear power source, if they are to explore the planets (all indications are that they plan to do so) yet do not wish to be bound by the severe payload limitations imposed by chemical -- conventional -- rocket propulsion. (Both systems would be launched from the Earth by a chemical booster and would operate only in space.)

The nuclear rocket engine offers no technical advantage over electrical propulsion, but it may have a time advantage. The first nation to develop either system successfully would have a significant payload advantage over a nation having only chemical-rocket propulsion, hence a greater capability for exploring the planets. The Soviets would need about 5-10 years to develop a nuclear-rocket engine, depending upon the state of their technology (including what they may have learned from the US) and the priority they give such a

program. However, Soviet electrical propulsion is in the early stages of development and probably is at least 10 years away from operation. Thus, should they decide to assign a high priority to electrical propulsion, it is not likely that the Soviets would be able to develop a working system in time to be competitive with the US nuclear rocket propulsion system, flight-testing of which is to begin in 1972.

The major problems in developing a nuclear-rocket engine include determination of what materials are to be used in the rocket core, how to fabricate them, and how to configure an optimum core which will have structural integrity.

Basic Soviet research which could support the development of a nuclear-rocket engine is indicated by:

- A significant amount of high-temperature-materials research similar to that conducted by the US in developing a liquid-hydrogen-cooled graphite-moderated reactor. For example, the Soviets have studied the interaction of hydrogen and graphite at 4,000 degrees F., one of the serious problems involved. A Soviet paper on this subject said that this study might serve as a criterion for selecting materials for nuclear power and rocket technology.
- A report that the first large-scale plants to produce liquid hydrogen would be built soon. These would be needed for either a nuclear rocket engine or a hydrogen-fueled chemical rocket, or for both.
- Assignment of a special group of students in 1960 to a program of training in general propulsion and nuclear physics at Moscow Aviation Institute.

The absence of a decision to go ahead with development of a nuclear rocket engine is suggested by:

- A lack of information that the Soviets have a program to static-test a nuclear rocket engine or that they have begun to manufacture suitable materials for such a test.
- Complaints by the students specially trained in general propulsion and nuclear physics that, upon graduation in 1963, many of them could not get jobs which exploited this special training.

(CIA)
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