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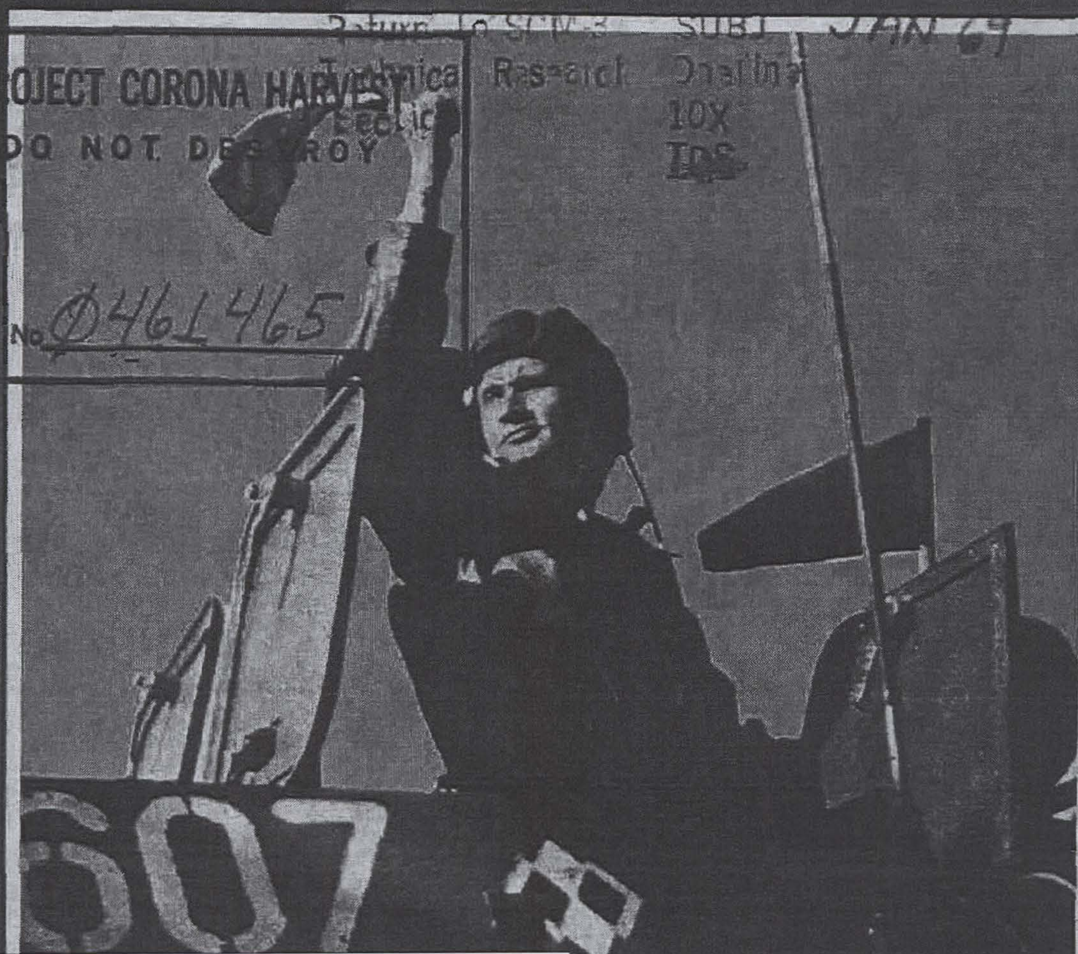

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Polish tank officer directs traffic during a Warsaw Pact exercise. For an appraisal of Eastern European ground force components of the Pact, see article beginning on page 12. [U]

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FOREWORD

MISSION: The mission of the monthly *Defense Intelligence Digest* is to provide all components of the Department of Defense and other United States agencies with timely intelligence of wide professional interest on significant developments and trends in the military capabilities and vulnerabilities of foreign nations. Emphasis is placed primarily on nations and forces within the Communist World.

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Joseph F. Carroll

JOSEPH F. CARROLL
Lt General, USAF
Director

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Flightflying Forebears . . .

ROCKETS: FIRST STEP TOWARD MISSILE PRODUCTION

Developments in the art and science of rocketry and their relationship to follow-on endeavor in the missile-production field appear to have followed a closely similar pattern in a number of countries.

A STUDY of the history of missile/space production in the Soviet Union reveals a three-phased development process, in the basic, initial phases of which the research rocket plays a vital role. This process has been repeated without apparent significant variation in the overall French missile/space program and is recurring once again in the fledgling Japanese program. The observed pattern comprises:

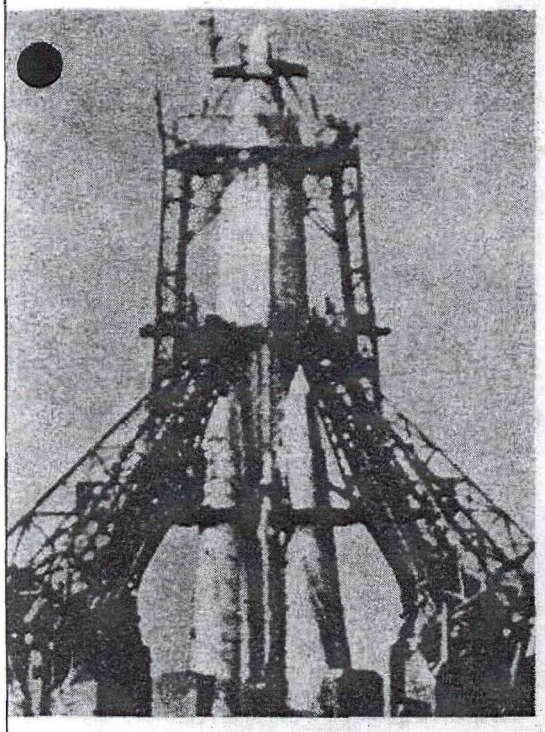
- Extensive initial investigation of unguided rocket activity.
- Upper atmospheric research, in which the rocket is given a mission and subsequently structured to obey rudimentary commands.
- Advanced research in materials, guidance, flight characteristics, and associated categories, leading to modern weaponry and to sophisticated and extensive space programs.

Soviet developmental pattern

The first formal organization in the USSR for rocket and space research was the Society for Studying Interplanetary Communications, founded by K. E. Tsiolkovskii and others in 1924. On 25 November 1933, the first Soviet rocket, Gird-10, was fired. The first sounding, or meteorological, rocket was launched by the USSR in May 1949.

In the intervening years, it should be noted, the Soviet rocket program had received a major contribution in the person of German rocket scientists commandeered into service at the end of World War II. The Germans had come to realize the military value of rockets toward the end of the war and had begun to devote considerable attention to the subject. The USSR was therefore in a position in the early post-war years to undertake an accelerated program of rocket development that had direct missile/space applications. For the most part, these were limited to meteorological investigations based on vertical firings—virtually all that the state of the art allowed at the time.

The Soviet rocket program reached a third milestone in the launching of Sputnik I in October 1957. The propulsion system used for this launch was the forerunner of the SS-6, used so successfully in most subsequent space launchings and, for a time, the



Soviet launch vehicle of type that probably orbited Sputnik 3 [U]

only ICBM propulsion system that the Soviets had available for deployment.

The scientific process

The early rockets were the media through which the components for missiles were developed and finalized. During this initial phase, major problems appeared in guidance systems, and there were difficulties regarding the materials needed for airframes, nozzles, and reentry vehicles. The early solution of these problems, using inexpensive systems, facilitated the development of guided missiles.

One of the important factors in the rocket development program was the establishment of a firm scientific and industrial base, including research and development (R&D) facilities for the design of advanced propulsion units, boosters, and missiles. Part of the design/development segment of the program involved the fabrication of prototype and flight-test vehicles. Progress in this area, in turn, was dependent on the development and refinement of techniques of material handling and processing, fabrication, and quality control.

Soviet R&D facilities consisted originally of a few liquid-rocket test stands supporting modest R&D units at Plants NII-88 and 456 in Moscow and a small plant at Zagorsk—facilities which eventually proliferated into a group of installations at Kuybyshev, Voronch, Krasnoyarsk, Dnepropetrovsk, and Omsk, to name only the major sites that now play an important role in the production of the more sophisticated propulsion systems.

In brief, the overall history of the Soviet program reveals that the design and development of facilities and the technology of testing and production were as critical to the unfolding missile/space production program as the development of the propulsion system itself. A rather similar account can be given of the experience of the

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French and the Japanese. However, just as the USSR profited from the experience of Germany in rocket development, so France and Japan have benefited from the cumulative technological knowledge gained during the experiments undertaken and successfully completed in the more advanced space-oriented countries, and their initial rocket phases have progressed that much more successfully and speedily.

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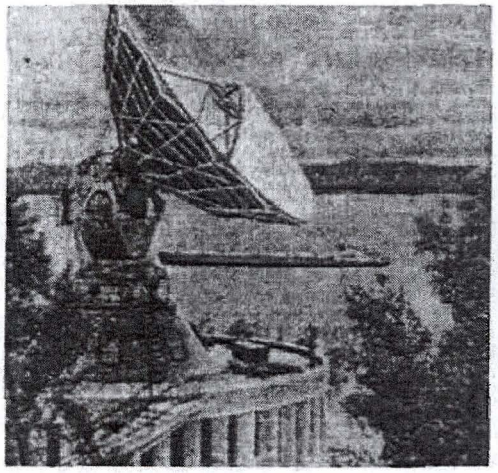
SOVIET ORBITA TELEVISION NETWORK NOW OPERATIONAL

THE Orbita ground television receiving station network, which was deployed into hard-to-reach areas of the USSR on a high-priority basis during 1967 and 1968, is now operational. Each of the 22 Orbita stations is a receive-only site for television programs transmitted from Moscow and Vladivostok and relayed by the nonsynchronous orbital Molniya-1 communications satellite system.

The Soviets claim that the new receiver network increases the national viewer potential of its television programs by 20 million persons. In addition to being a direct mode for propaganda, the network provides significant potential benefits both from an economic and military standpoint. For example, in the past, Soviet Armed Forces command-and-control communications from Headquarters in the Moscow area to outlying areas—particularly the Arctic, sub-Arctic, and Pacific maritime regions—have been subject to an inherent time lag because of atmospheric interference. This new mode of communications now overcomes delay and provides a real-time capability through visual radio relay of commands both on a strategic and tactical level.

Operation of this unique communications entity is based on the use of Molniya-1 communications satellite system transmitter/receiver ground stations in the Moscow and Vladivostok areas as originating transmitters. The Moscow Television Center and, less frequently, the Vladivostok television studio broadcast programs which a Molniya-1, acting as a "tower in the sky," relays to Orbita sites. The Orbita sites, by either cable or one-hop ground radio relay links, relay the programs to nearby local area transmitting stations which rebroadcast the programs to their audiences.



In addition to improving the capability of the Soviet communications system in the densely populated western USSR, the Orbita net has opened sparsely populated areas in the Arctic/sub-Arctic and east of the Ural Mountains to more reliable communications. The Orbita network has been deployed concurrently with a tropospheric scatter network and is compatible for use in conjunction with the tropo net. These two networks in turn are compatible with the Molniya-1 communications satellite system; the combination will have a dramatic impact on the nation's telecommunications capacity. To enhance this excellent communications mix, at least some of the existing Orbita stations are expected to acquire a transmitting capability modification. This will enable them to transmit and receive messages and facsimile traffic while continuing to serve as television receivers. [S]