[redacted]

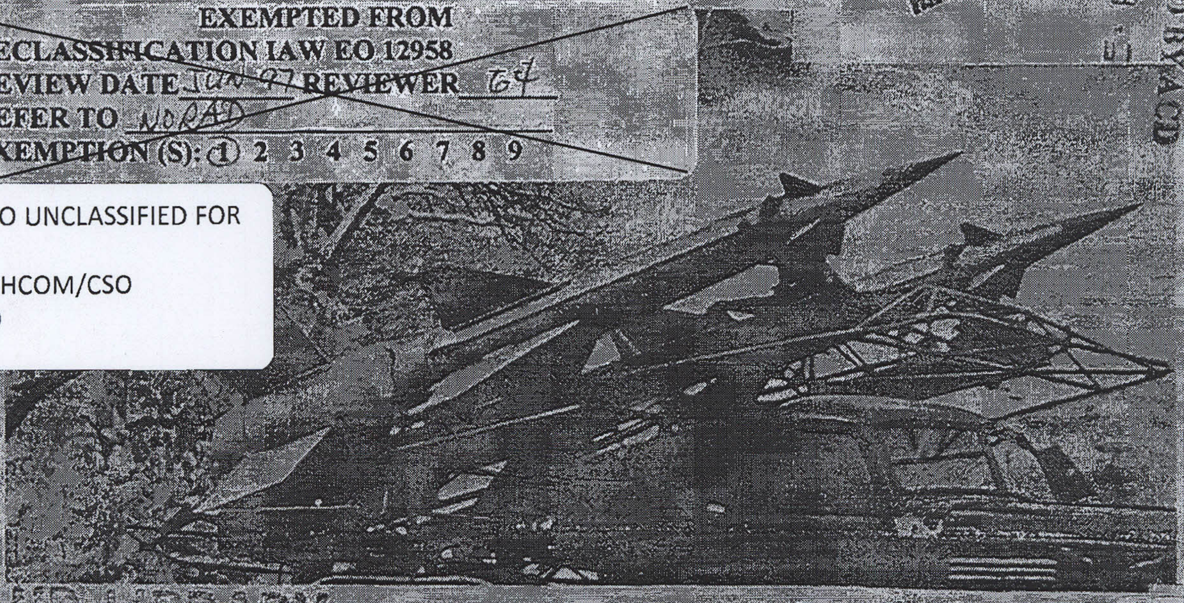
~~SECRET~~

~~SECRET~~

NORTH AMERICAN AIR DEFENSE COMMAND

W I R

WEEKLY INTELLIGENCE REVIEW (U)



FOR OFFICIAL USE ONLY

18-65
30 April 1965

PRIVILEGED INFORMATION

SEE INSIDE COVER FOR SAFEGUARDING GUIDE

~~SECRET~~

SPECIAL HANDLING REQUIRED
This document is releasable only
to U.S. and Canadian Nationals

~~EXCLUDED FROM AUTOMATIC
REGRADING; DOD DIRECTIVE 5200.10
DOES NOT APPLY~~

~~SECRET~~

WIR 18/65
30 Apr 1965

[redacted]

~~SECRET~~

[redacted]

RETURN TO HQ [illegible]

2-24-78

5410. 607-210

NORAD Weekly Intelligence Review

Issue No. 18/65, 30 April 1965

The WIR in Brief

COVER: GOA air-defense missiles ~~GANEF tactical air defense missile~~ (Photo OFFICIAL USE ONLY; this caption ~~SECRET~~) (Red Star photo)

NOTE: Pages 22, 23, 26, and 27 of this issue are blank.

Correction in 28/65 WIR, p. 1

00880675

FOR OFFICIAL USE ONLY

~~SECRET~~

~~SECRET~~

[redacted]

Soviet R&D of Chemical* Rocket Propulsion

Based on a CIA study.

Chemical missile-propellant research and development in the USSR cover a broad spectrum of compounds of potential propellant interest but have yielded no unique or outstanding accomplishments. In most major areas, the Soviet Union appears to be following the US lead, a situation that will remain unchanged in the foreseeable future. The bulk of known Soviet work involves chemicals whose energy values are relatively low for rocket propellants.

Combustion Research. Soviet thermochemistry of propellants is on a par with US research. Soviet fundamental and applied combustion research, which has been of good quality, continues on a high level. In recent years, published Soviet studies of solid-propellant combustion have become more numerous, but these efforts are routine and represent no real technological achievements.

Oxidizers. Soviet chemists have been actively investigating possible oxidizers; some of their research is on a par with US work, the rest of it lags behind US state of the art.

They have shown clearly that they can use ammonium perchlorate operationally in composite-type solid propellants.

Soviet work on advanced fluorine oxidizers is sparse and does not refer to any promising candidates.

After pursuing an extensive program for some time, the Soviets have apparently given up their attempt to develop cryogenic liquid-ozone as a propellant ingredient. Solid derivatives of ozone (the ozonides and superoxides of alkali metals) also have been the subject of extensive and original study and are still considered potential oxidizers but are more likely to be used as sources of breathing oxygen for space-environment systems.

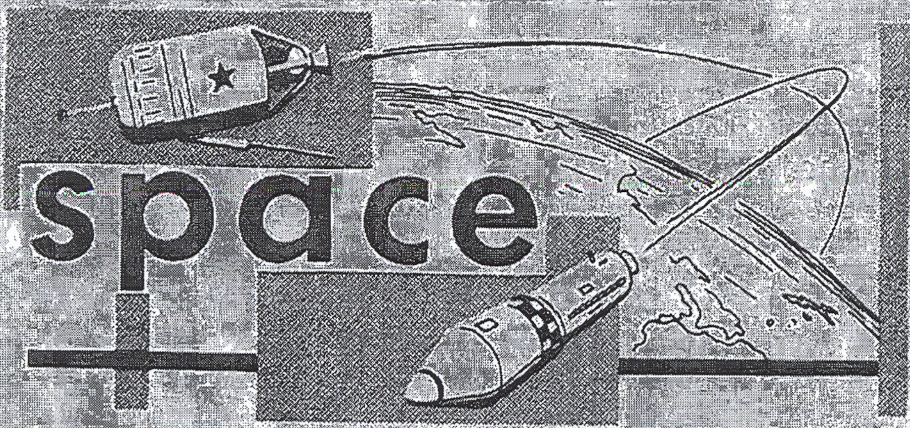
Fuels. Soviet development of ingredients for potential fuels will probably do more than will Soviet oxidizer development in producing propellant systems of improved performance.

Soviet interest in liquid hydrogen and hydrazine is evidenced by work on problems attendant to their use. Developments concerning a method of adding aluminum and boron slurries to liquid fuels clearly demonstrate a capability and desire to use these materials as additives to increase the energy of fuels. A similar interest in beryllium is not apparent. The Soviets are expending considerable effort of high technical quality in developing organic nitro-compounds, but there is no indication of practical achievements in terms of propellant ingredients.

*Not included: electrical, nuclear, and photon propulsion.

Prospects. Future Soviet propellants for both liquid and solid systems will probably be oriented toward the use of simple, readily available high-energy materials. Future liquid systems probably will use hydrogen fuel, and solid systems probably ammonium perchlorate oxidizer with polymeric binders, such as polyurethanes, polynitro-olefins, or nitrocellulose-nitroglycerin. Metal additives (aluminum, boron, and beryllium) probably will be used in both liquid and solid systems.
(CIA)
(~~SECRET~~ NO FOREIGN DISSEMINATION -- Releasable to US, UK, Can, Aus & NZ)

Portion identified as non-responsive to the appeal



significant intelligence on space developments and trends

Molniya 1 Apparently Succeeded Where Cosmos 41 Failed

The Soviet news agency TASS has announced that Molniya 1, which was launched 23 April 1965, is a communications satellite and that it has successfully relayed TV programs between Moscow and Vladivostok, which are some 3500 n.m. apart. Moscow's claim is probably correct, since Molniya 1's orbital parameters are favorable for such a mission.

The new vehicle probably represents the Soviets' second attempt at this particular mission. The first attempt appears to have been made on 22 August 1964, when Cosmos 41 was launched into an orbit very similar to that of Molniya 1's, using an identical propulsion vehicle configuration.

Launch, Propulsion, and Orbital Parameters. Molniya 1 was launched from Tyuratam at about 0155Z, 23 April 1965, by an SS-6 ICBM booster-sustainer. It was initially injected into orbit by a heavy Venik third stage and, toward the end of Zero Orbit, it was reinjected into a higher orbit of much greater eccentricity by a fourth stage of the type used to inject interplanetary probes into transfer trajectories toward Mars or Venus. Its orbital parameters, as derived by SPADATS, are compared below with the initial parameters of Cosmos 41, which also was launched by an SS-6, a Venik third stage, and an interplanetary fourth stage:

	Molniya I	Cosmos 41
Inclination to Equator	65 degrees	64 degrees
Period	11 hrs, 48 min.	11 hrs, 55 min.
Apogee	39,380 km (21,265.2 n.m.)	39,885 km (21,521.7 n.m.)
Perigee	500 km (268.4 n.m.)	394.37 km (212.8 n.m.)

Transmissions.

50X1 and 3, E.O.13526

This is only one of many frequencies which are suitable for spaceborne communications relay. Its choice may have been dictated by the Soviets' predilection for using reliable, off-the-shelf equipment wherever possible, rather than new but unproven equipment specially tailored to the mission. Thus, the Soviets may have installed in Molniya 1 the same type transmitter used in Mars 1, which successfully sent signals to the Earth from a distance of 106 million km (57 million n.m. on nominally the same frequency.

Suitability of Orbit for Communications Relay. Molniya 1's orbital period of 706 minutes, only 10 minutes short of one half of a sidereal day, means that it reaches apogee and perigee over essentially the same points of the Earth's surface twice each day. Its apogee subpoint is half way between Moscow and the Kamchatka Peninsula. Thus, twice daily, Molniya reaches apogee at a point which lies within line-of-sight of practically the entire Soviet Union, enabling it to relay communications, using interference-free VHF or UHF, between any two points in the USSR.

Molniya's orbital period is 10 minutes less than ideal, a fact which will cause its Earth trace to move eastward about 5 degrees per day. With an Equatorial inclination of about 65 degrees, its apogee will drift southward at 0.08 degree per day. An inclination of 63.4 degrees would be ideal for keeping apogee at the same northern latitude. TASS claims, however, that Molniya 1 has a mechanism for correcting its orbit. Only a small amount of thrust would be needed to keep the new Soviet vehicle on station.

Review and Preview. It is not possible at this early date to evaluate the technical sophistication of Molniya 1, but it may well be that the Soviet satellite is no more advanced technologically than the US's early communications satellites, Relay 1 (launched 13 December 1962) and Telstar-1 (launched 10 July 1962), except that the Soviet vehicle reportedly has a station-keeping capability not possessed by the early US relay satellites, and Molniya's orbital parameters may be somewhat better for its purpose.

The Soviets' relative tardiness in launching communications-type satellites probably results not so much from technological backwardness as from the low priority which the USSR has given to utilitarian-type satellites.
(SPADATS, various ELINT sensors; NORAD)
(~~SECRET~~ NO FOREIGN DISSEMINATION Except US, UK & Canada)

Cosmos 65 Photorecce Satellite De-Orbited in Routine Fashion

Cosmos 65, which the Soviets launched from Tyuratam at about 0951Z, 17 April, was de-orbited on Revolution 127; it impacted in the USSR between 0756Z and 0806Z, 25 April, after nearly 8 days in orbit. This is the 16th TT-launched Cosmos de-orbited on Revolutions 126-128.

Cosmos 65's mission was probably photoreconnaissance, although it could easily have carried equipment for performing additional missions.
(SPADATS; NORAD)
(~~SECRET~~ NO FOREIGN DISSEMINATION -- Releasable to US, UK & Canada)

Soviets Study Maraging Steels, Probably for Large, Solid-Propellant Space Boosters

A Soviet effort to develop maraging steels appears to have commenced in 1962, with the probable intention of using them in building large, solid-propellant rocket-motor cases for space boosters. The US first developed such steels in the 1959-1960 time period for this same application. For example, motor cases for the 156"- and 260"-diameter motor cases currently are being fabricated from maraging steels which contain 18 percent nickel, 9 percent cobalt, and 5 percent molybdenum.

Maraging steels belong to a family of high-quality deep-hardening nickel steels that are heat treated in a two-step process. The heated steel is cooled rapidly to a high, critical temperature and then cooled slowly to room temperature. A one-step rapid cooling would cause the metal to crack. These steels are favored for large, solid-propellant motor cases because of their outstanding fabrication characteristics. Readily weldable, they are also adaptable to a simple post-weld heat treatment. They exhibit an attractive combination of strength and toughness. However, their relative expensiveness tends to limit their use to high-priority applications, such as the space or missile programs.

The Soviets are not likely to have maraging steels available for large, solid-propellant motor cases until the 1967-1968 period. There are no known indications of a serious effort on their part to develop melting, rolling, or joining techniques -- areas in which the US experienced extensive developmental difficulties. Soviet work to date appears to have been limited to preliminary laboratory evaluation of mechanical properties, as they are affected by heat treatment.
(FTD)
(~~CONFIDENTIAL~~ NO FOREIGN DISSEMINATION -- Releasable to NATO, Aus & NZ)