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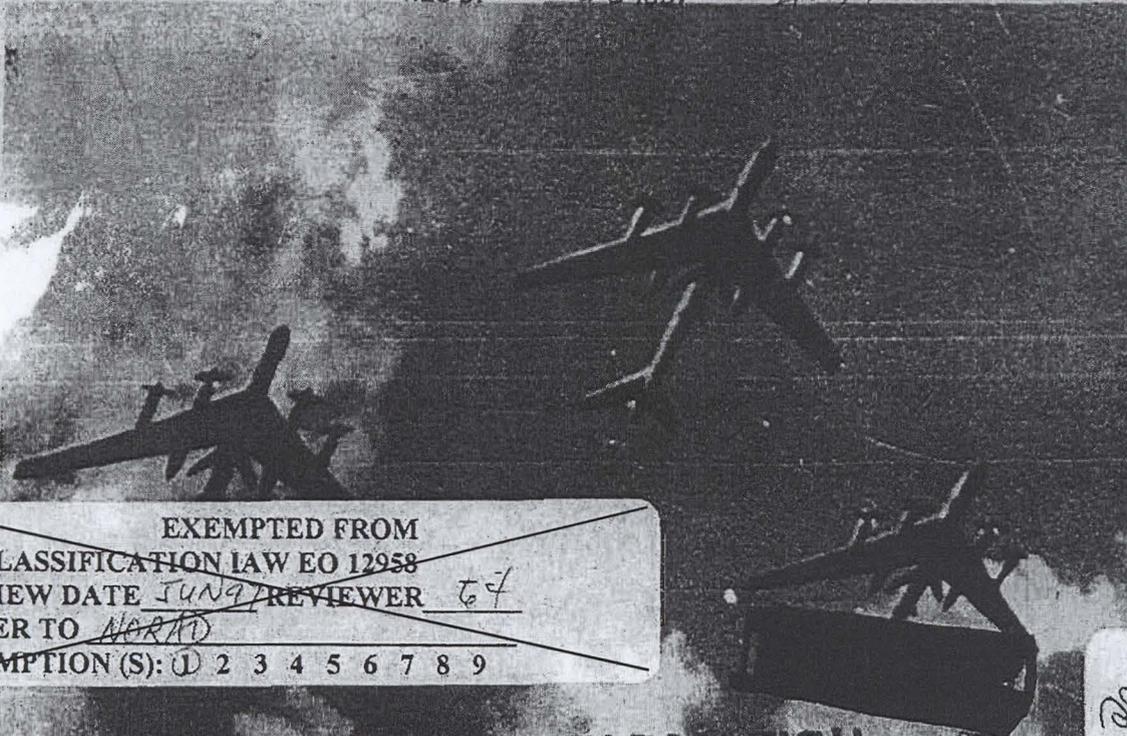
NORTH AMERICAN AIR DEFENSE COMMAND

W O I R

WEEKLY INTELLIGENCE REVIEW (U)

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Weekly
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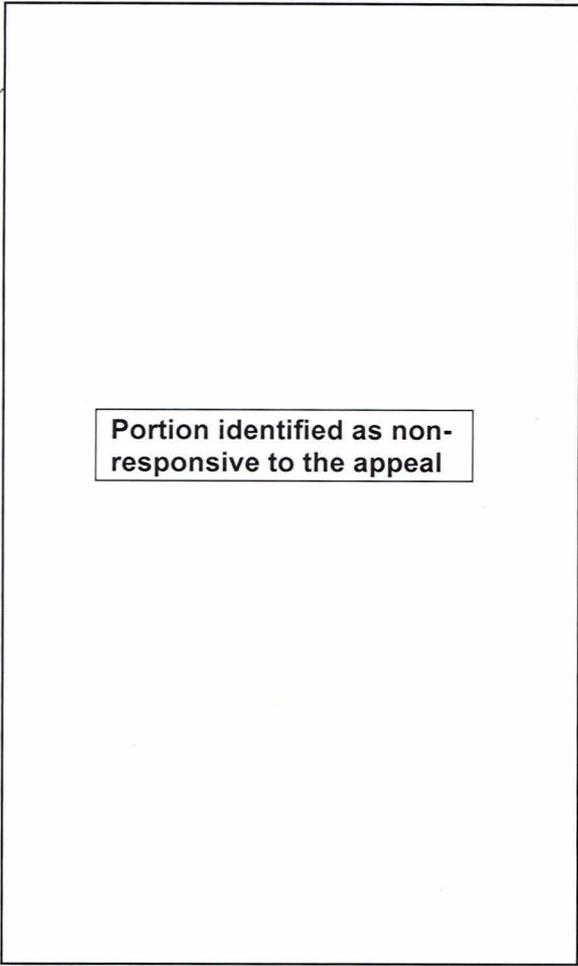
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The WIR in Brief

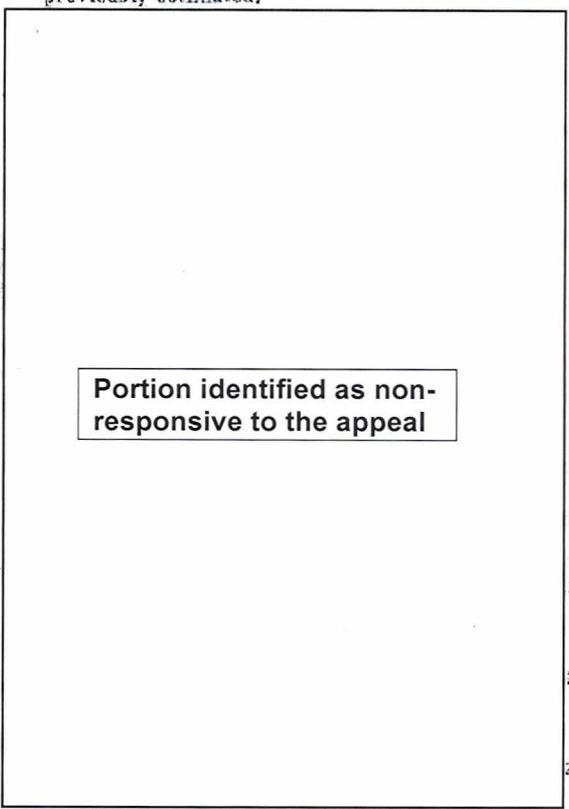
Technical Intelligence Note:

ESTIMATES OF PROGRESS OF SOVIET SOLID-PROPELLANT PROGRAM REVISED

Current performance probably slightly better than previously estimated.



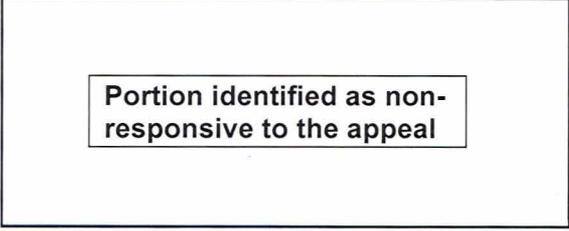
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Space

RECCE SATELLITE COSMOS 168 LAUNCHED
12th recce craft this year.
VENUS 4 MAY HAVE BETTER PROSPECTS FOR
SUCCESS THAN PREDECESSORS; BETTER GUID-
ANCE GEAR ABOARD



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COVER: BEAR bombers carrying ASMs
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NOTE: Pages 26, 28, and 29 of this issue are
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significant
intelligence
on space
developments
and trends

Recce Satellite Cosmos 168 Launched

The Soviets launched Cosmos 168 from Tyuratam at about 0600Z, 4 July, into an orbit with an inclination of 51.87 degrees. Its mission is assessed as medium-resolution photoreconnaissance and collection of ELINT, although it was injected into orbit by the heavy Venik stage normally used with high-resolution photorecce satellites.

A total of four Cosmoeses with medium-resolution photorecce and ELING missions have now been injected into orbit by the Venik upper stage; their launch dates have been:

<u>1966</u>	<u>1967</u>
8 June	8 June
14 July	4 July

The Soviets' purpose in using the heavier propulsion system to launch medium-resolution photorecce satellites has not been determined, but they may have done so to enable the payload to carry more instrumentation or equipment.

This is the Soviets' 12th launch of a photorecce satellite this year, the 7th with a medium-resolution camera system.

(NORAD)

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Venus 4 May Have Better Prospects of Success Than Its Predecessors; Better Guidance Gear Aboard

Venus 4, a Venus probe which the Soviets launched on 12 June, may have better prospects for success in completing its mission than its predecessors. [redacted] improved tracking and command devices, similar to those which probably contributed to last year's Soviet successes with lunar probes, are aboard.

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The specific mission of the probe still is not known, but it is probably a close flyby or an impactor mission.

(CIA; NORAD)

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technical intelligence NOTES

items of interest
on technical developments
around the world

$$\int_0^3 \frac{dx}{(x+1)^2} = \frac{3}{10} \sqrt{10}$$

Estimates of Progress of Soviet Solid-Propellant Program Revised

The chart on page 27 shows an FTD estimate of the probable solid propellants in the Soviet inventory and possible future developments. This chart extends the forecast shown in a previously published chart on this subject (p. 29, WIR 46/66) and revises the availability dates and performance figures, which are now expressed as standard theoretical specific impulse (rather than sea-level specific impulse).

The new estimate credits the Soviets with slightly higher impulses in double-base propellants and aluminized composites, from a low of 205 seconds for the double-bases to a high of 265 seconds for aluminized composites. The newer composite formulations will probably be adaptable to casting, a process required for ICBM propellants. A third current probability is the use of nitramine additives (e. g., RDX, HMX) as partial or total replacement for ammonium perchlorate oxidizer in aluminized composites and modified double-base propellants, specifically in the double-base matrix. These substances, particularly HMX, can raise the specific impulse to 270 seconds and reduce the burning rate and still retain reasonably good mechanical properties.

Block 6 of the chart on page 27 represents efforts to substitute beryllium (Be) for aluminum in modified double-base or composite-type propellants, which could raise specific impulses to 290 seconds. Because beryllium and its combustion products are toxic, such propellants would probably be used only for upper rocket stages which burn in space, to avoid contamination of the atmosphere.

High-energy hydrides of such metals as aluminum and beryllium are not likely to be available for another six years (Block 7, page 27). Beryllium hydride propellants will probably have greater specific impulse (290-310 seconds vs. 275-290 seconds for aluminum hydrides) but, of course, will be usable only in upper staging, because of their toxicity.

Solid propellants of still higher energies (305-325 seconds) may become available by about 1980, probably using beryllium hydride at the fuel, advanced perchlorates as oxidizers, and nitrofluorine compounds as binders. Some research has been accomplished in this area but the complexities and sensitivities of the preparations are posing problems.

The picture on hybrid propellants is less clear. (Hybrids are propellants in which either the fuel or the oxidizer is a solid and the other is a liquid.)

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They have been praised on the one hand for their potential restart, throttling, and high-performance capabilities, and criticized on the other as compounding the bad features of both liquid and solid propellants. The Soviets are aware of both sides of this issue. Indications are that much development will be required.

(FTD)

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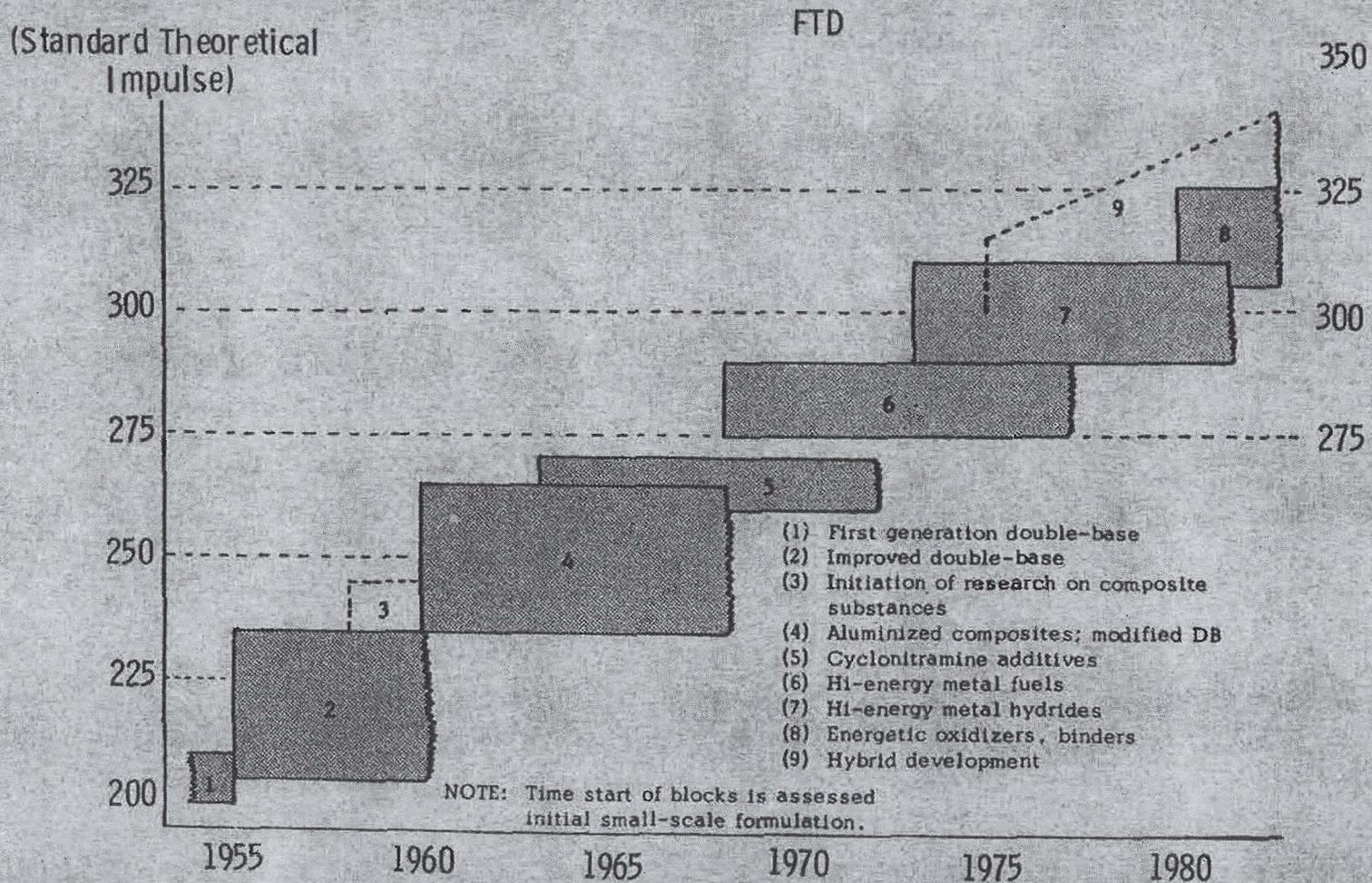


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Probable Soviet Solid-Propellant Program
 (a revision and extension of the chart on p. 29, WIR 46/66)

Solid blocks: capabilities
 Dotted lines: research or development only



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