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Issue No. 9/66, 4 March 1966

Weekly
Intelligence
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RETURN TO
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The WIR in Brief

Portion identified as non-responsive to the appeal

Space

SOVIETS REPORTEDLY STUNNED BY U.S. SPACE
SUCCESSSES WITH FUEL CELLS

Had not developed fuel cells suitable for space
use and had not expected US to succeed.

SOVIETS PLACE LEADING SCIENTISTS ON U.S.
U.S.S.R. BIOASTRONAUTICS EXCHANGE TEAM
All are outstanding scientists.

Portion identified as non-responsive to the appeal

PHOTORECCO COSMOS 110 DE-ORBITED
ROUTINELY

Brought down after nearly 8 days in orbit.
COSMOS 111 AN APPARENT LUNAR PROBE
FAILURE

Launched within 1 minute of optimum time.
ADDITION OF 3d STAGE COULD OPTIMIZE
HEAVY 2-STAGE 'PROTON' LAUNCHER

An FBI analysis.
COSMOS 110 MAY BE DE-ORBITED, BUT
SOVIETS ARE SILENT ON THIS SCORE

Recovery of dogs would maximize benefits of
the mission.

Portion identified as non-responsive to the appeal

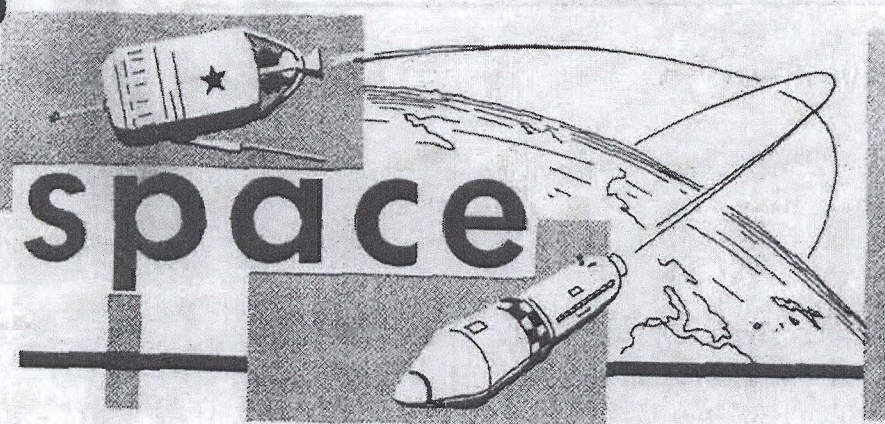
COVER: Soviet ICBA in silo (from Red Star)
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NOTE: Pages 30, 31, 34, 35, 38, 39, 42, 43,
and 44 of this issue are blank.

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space

significant
intelligence
on space
developments
and trends

Soviets Reportedly Stunned by US Space Successes with Fuel Cells

The Soviets were stunned by the successes of the US's Gemini flights last year because they had not developed fuel cells suitable for space flights and apparently had not expected the US to do so yet, according to Professor A. N. Frumkin, Director of the Institute of Electrochemistry in Moscow.

The Soviets have a large fuel-cell R&D program which, judging by Soviet comment, is directed toward space and military applications. Frumkin estimated that the Soviets are 2 years behind the US in fuel-cell development, a reasonable estimate. The US's successes should, however, serve to consolidate Soviet R&D efforts toward this end.

(CIA)

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Soviets Place Leading Scientists on US-USSR Bioastronautics Exchange Team

The Soviets, in concurring recently on the final text of a US-USSR agreement to publish a joint work on space biology and medicine, named 7 outstanding scientists to the editorial board: Sisakyan, Chernigovskiy, Gazenko, Genin, Parin, Pravetsky (possibly Bayevskiy), and Blagonravov. All are key men responsible for the life-science aspects of the Soviet space program, save Blagonravov, who is chairman of the Soviet Committee of Exploration and Utilization of Cosmic Space. Knowledgeable representatives of the Soviet bioastronautics R&D effort, they are in a position to choose the best Soviet authors for each subject area of the combined text.

The unexpected exclusion of Imshenetskiy, an earlier Soviet candidate for co-chairman of the editorial board, may indicate a decreased Soviet priority for exchange of information on space microbiology.

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Photorecce Cosmos 109 De-orbited Routinely

Cosmos 109, the Soviets' fourth photoreconnaissance satellite of 1966, was de-orbited on Revolution 127 at about 0613-0618Z, 27 February, after nearly 8 days in orbit. It thus follows the pattern of almost all Soviet photorecce vehicles of the past 2 years, which were de-orbited on Revolutions 126, 127, or 128, after nearly 8 days in orbit. (See chart on page 40.) (NORAD)

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Cosmos 111 an Apparent Lunar Probe Failure

The Soviets launched Cosmos 111 from Tyuratam at about 1105Z, 1 March 1965. TASS announced that the vehicle was a scientific satellite which was accomplishing the Cosmos mission of study of the near-Earth space environment, but Cosmos 111 is believed to have been a lunar probe which failed.

- It was injected into an apparent parking orbit, a near-circular low-altitude orbit. Parking orbits have been used



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only with lunar and interplanetary probes and Molniya-type communications satellites.

- Its orbital inclination of 51.8 degrees was the same as that used for the parking orbit in the last 2 previous Soviet lunar attempts (Lunas 8 and 9).
- Launch occurred within 1 minute of the optimum time for a lunar probe launch for 1 March, although it is believed that a 2 March launch would have been more favorable.

The Soviets apparently failed, however, in their attempt to inject the payload into lunar transfer trajectory from the parking orbit. The payload was probably intended either to make a second Soviet softlanding on the Moon or to orbit the Moon and transmit video photography of its surface to the Earth.

Cosmos 111 was the Soviets 2d lunar-probe attempt this year, the 13th since the present series of probes was inaugurated in January 1963, and the 19th since the first Soviet attempt in December 1958. Three of these accomplished their primary missions successfully, and six others enjoyed some limited success -- at least to the extent of leaving the Earth's gravitational field.

(NORAD)

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Addition of 3d Stage Could Optimize Heavy 2-Stage 'Proton' Launcher

The rocket with which the Soviets launched their Proton satellites is, [] a 2-stage vehicle which could be optimized for heavier space payloads or for higher orbits by the addition of another stage. Each of the 2 Protons launched to date weighed 12.2 metric tons (26,901 pounds), according to Soviet announcements, the heaviest satellites launched to date.

Present Configuration. The exact configuration of the Proton launcher is not known, but a postulated configuration and an estimate of its basic performance is shown on page 33. This configuration is consistent with both Soviet announcements of payload weight and thrust and with []

[] It is assumed:

- That the 12.2-ton Proton was the maximum payload weight for the low orbits into which the 2 Protons were injected.
- That the launch vehicle was of tandem rather than clustered configuration, since the former normally yields the superior mass fraction. However, a clustered configuration would have been a perfectly valid assumption.



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- That the propellants were LOX and hydrocarbon.

FTD has estimated the performance of two optimized 3-stage versions, one in which a 3d stage is added atop the 2-stage Proton, another in which the Proton serves as the 2d and 3d stages for a much larger 1st stage below it.

Addition of a 3d Stage. The chart on page 36 shows that an optimized 3d stage installed atop the 2-stage Proton launcher could inject a payload of about 37,000 pounds into a circular orbit of about 100 n. m. -- about 4,000 pounds more than the Proton launcher alone.

The chart also shows the performance that could be expected if the 2d stage of the SS-10 ICBM is used as the 3d stage and if it is assumed that its burn time is optimized for this purpose. The payload-altitude curve for the SS-10, it will be noted, is nearly optimum, and affords much more favorable payload/altitude combinations than the 2-stage Proton used alone. The 2d stage of the SS-10 was selected for this comparison because there is a possible compatibility of size between it and the 2d (upper) stage of the Proton launcher.

Addition of a Large 1st Stage. The Proton launcher possibly could serve as the top 2 stages of a 3-stage launcher. The chart on page 37 shows performance for 4 such configurations in which the 1st stage weighs 3 million, 4 million, 5 million, or 6 million pounds. It appears from this chart that the orbital payload capability of this 3-stage vehicle, in which the 1st stage weighs 6 million pounds, would approach that of the US's Saturn V, that is, a payload of about 240,000 pounds.

The addition of a large 1st stage, however, is less likely than the addition of a 3d stage. Soviet design practice is probably similar to the US's -- launch vehicles are built and tested from the bottom up rather than from the top down.

(FTD)

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Cosmos 110 May Be De-orbited, But Soviets are Silent on this Score

The Soviets have not as of this writing (1700Z, 1 March) said anything about whether they will de-orbit their latest space kennel, Cosmos 110, which was launched 22 February. If, however, they are to collect the most valuable data produced by the experiment, they will have to recover this satellite.

Soviet announcements make it appear that the purpose of the flight, which passes through a lower portion of the Van Allen radiation belts, is



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to study the effects (including the genetic effects) of space radiation on higher animals, such as dogs, and possibly, to determine the effectiveness of shielding which may be incorporated in the satellite. Another possible mission is to determine the effects of prolonged weightlessness on higher animals. In either case, the experiments would be most successful if the animals are recovered and made available for laboratory study.

Cosmos 110's orbital parameters are not favorable for an early de-orbit attempt. De-orbit at this time would call for either:

- Impact in darkness.
- Use of an unaccustomed recovery area if daytime impact is desired.

However, by 15 March 1966, Cosmos 110's orbit will have shifted sufficiently to allow daylight impact in the normal recovery areas.

The Soviets have never de-orbited a vehicle with an apogee as high as Cosmos 110's (488 n.m.), but are believed capable of doing so.

A recent Soviet announcement said that each dog aboard Cosmos 110 is in a separate compartment. This is a possible indication that two different types of radiation shielding or other environmental gear are being compared for their relative effectiveness.

Radiation levels presently encountered by Cosmos 110 are believed to be safe for prolonged exposure in a capsule but should intensify as the vehicle's shift in perigee brings it closer to the Equator.

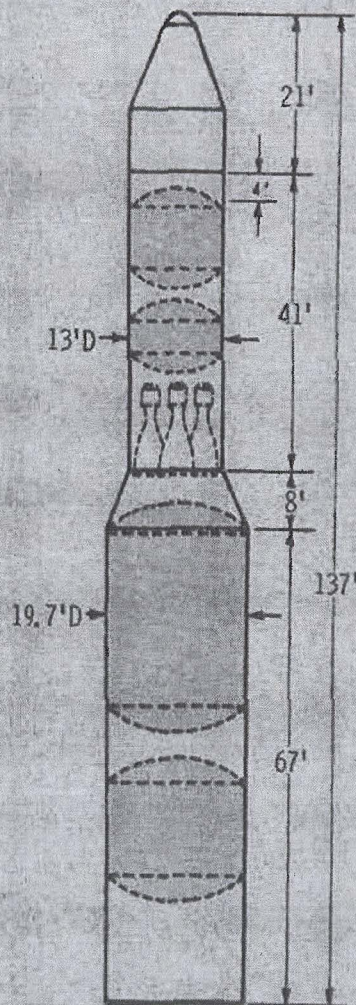
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Possible Configuration of 2-Stage Vehicle
Which Orbited the Proton Spacecraft
(assuming a tandem configuration)

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Parameters*

First Stage

Thrust (sea level)	1,850,000 lbs
Lift-off Weight	1,140,000 lbs
Propellant Weight	875,000 lbs

Second Stage

Thrust (vacuum)	400,000 lbs
Lift-off Weight	205,000 lbs
Propellant Weight	162,000 lbs

*Assuming LOX/hydrocarbon
propellant combination

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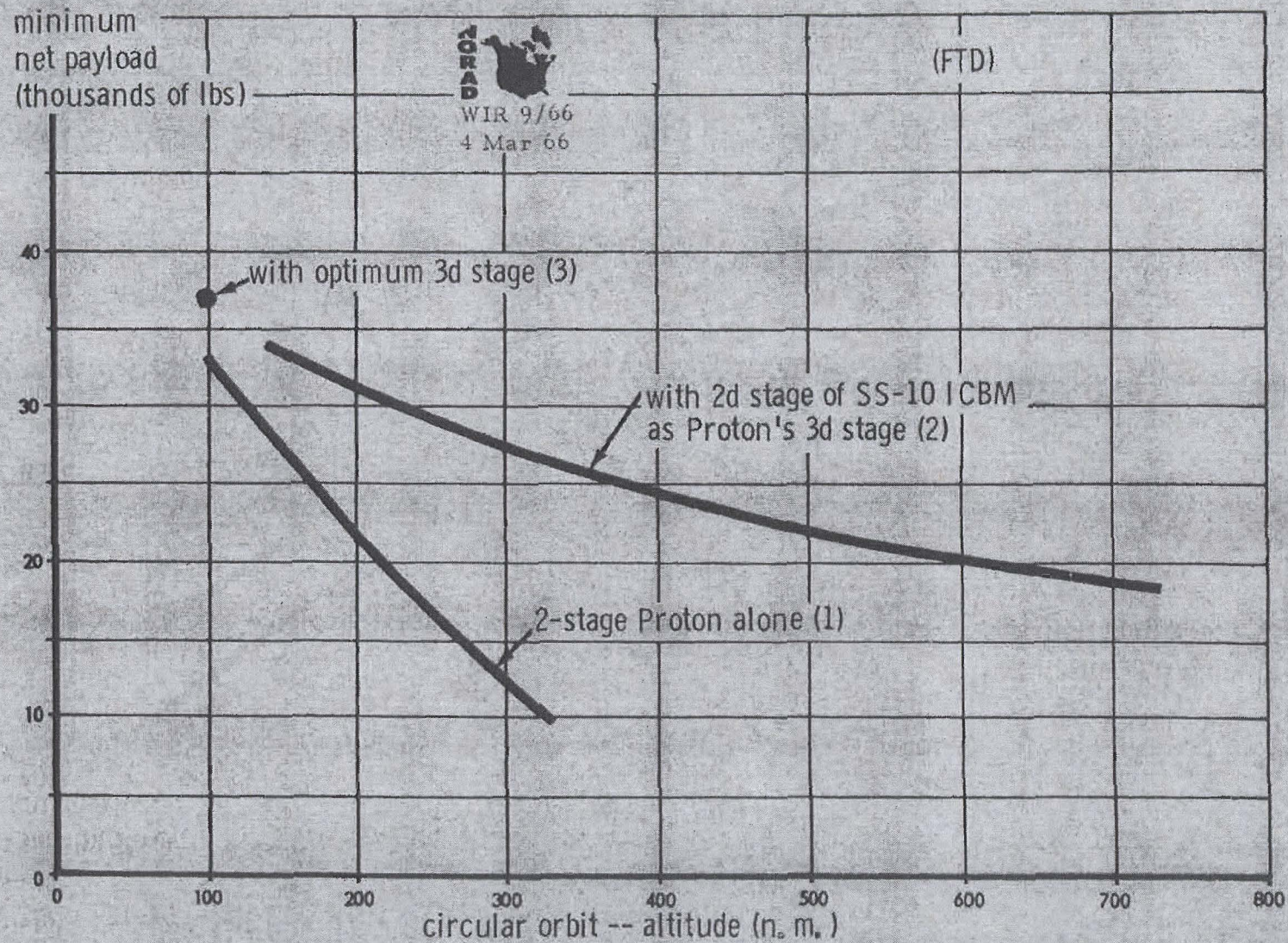
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Possible Payload/Altitude Capabilities of 2-stage Proton Launcher

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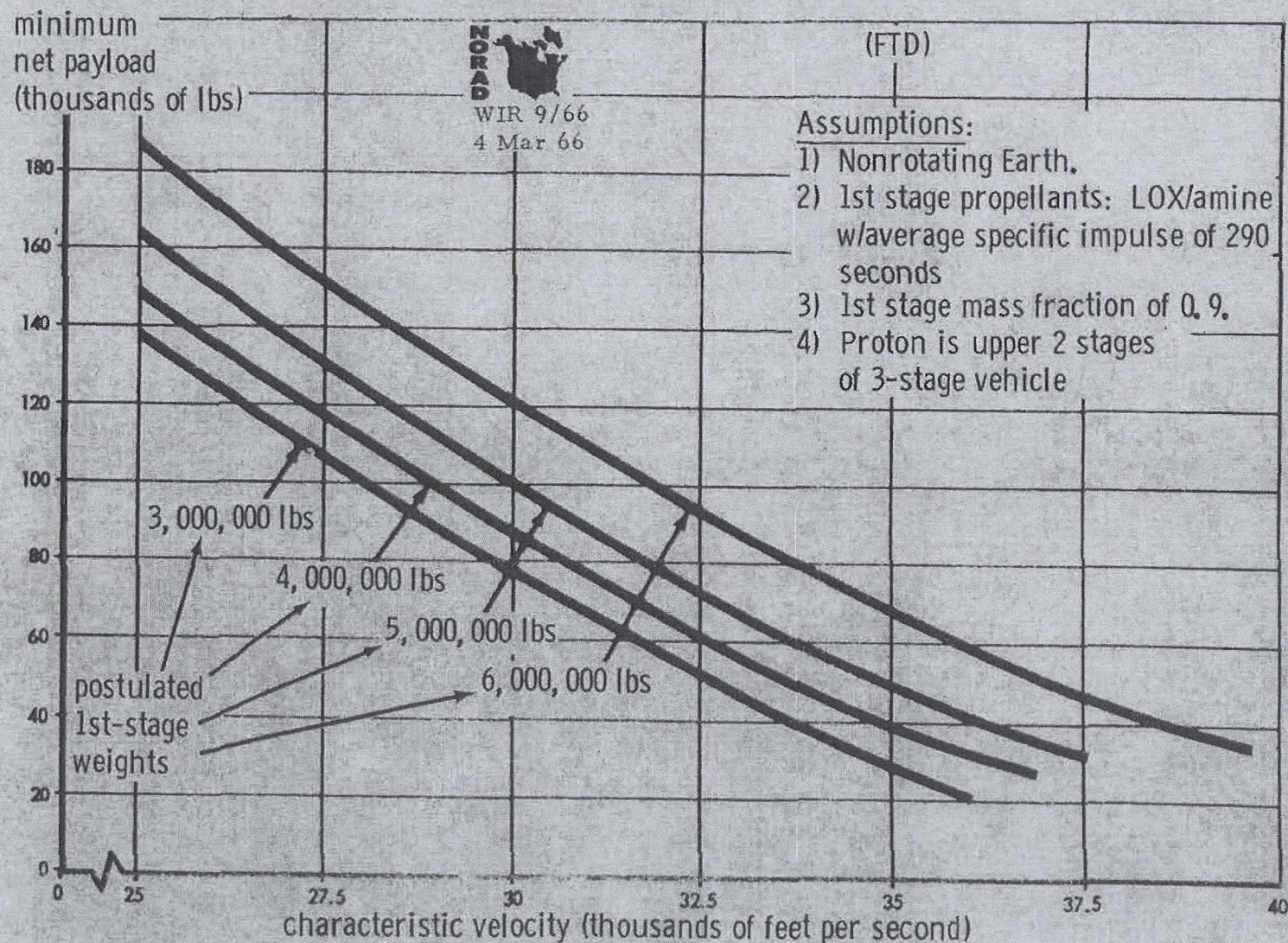
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Possible Payload/Velocity Capabilities of 2-Stage Proton Launcher Plus Various Theoretical 1st Stages

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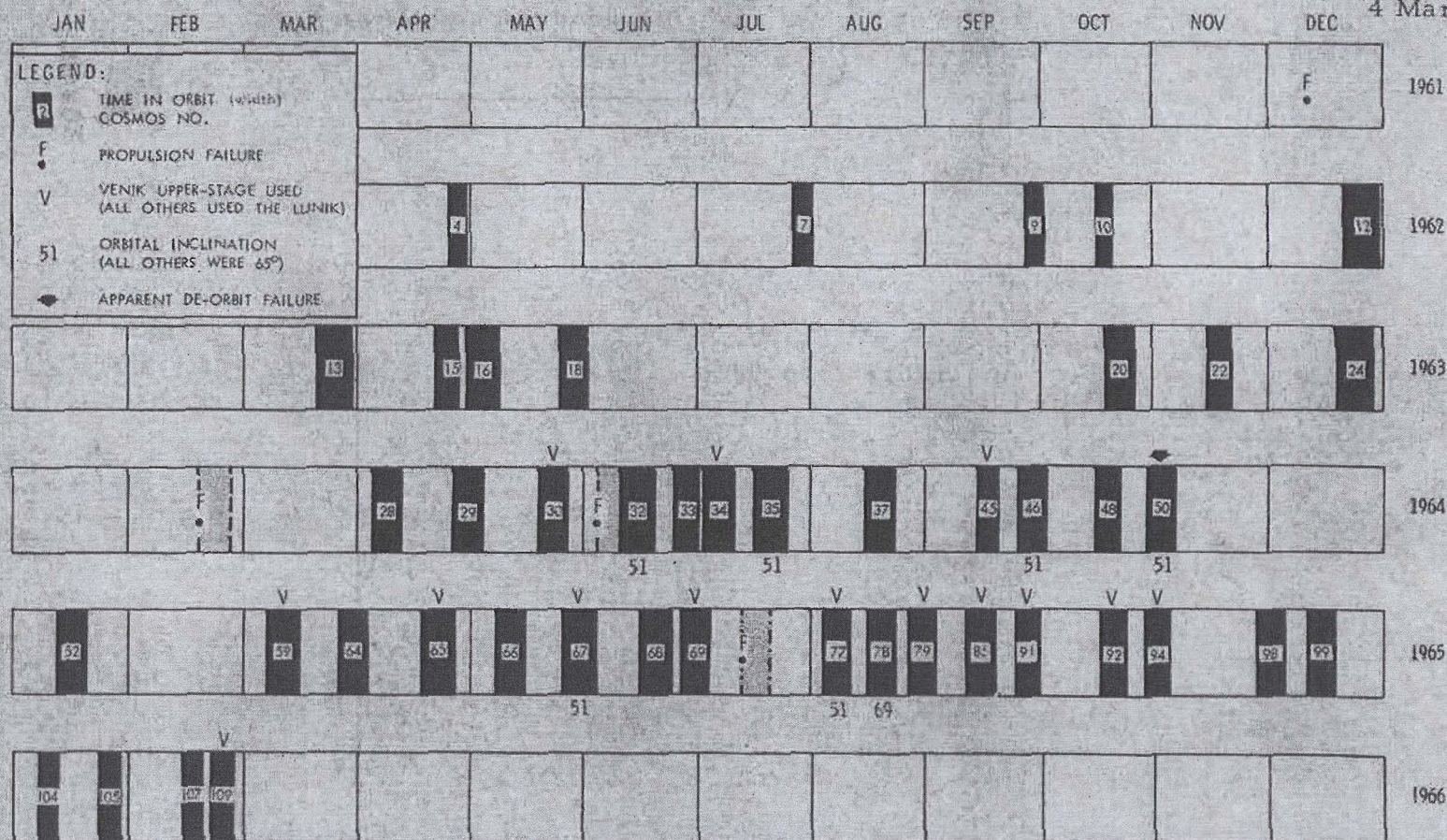
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1. Launches were timed so that payloads passed over U.S. southern Canada, and other targets in daylight when payloads were at perigee.
2. Perigees were relatively low.
3. Payloads were stable with reference to the Earth's surface.
4. Payloads were active when passing over areas of potential microwave interest.

6. All vehicles were de-orbited and presumably recovered (allowing film recovery) except for Cosmos 90, which exploded when de-orbit was attempted.

All were launched by SS-6 RCHM, injected into orbit by upper stage. Launch-injected payloads weighed as-

bout 15,000 lbs., carried camera system of 20-30' resolution. Venk-injected payloads weighed up to a bout 15,000 lbs., carried camera system of 3-8' resolution. Camera systems would occupy only a fraction of payload weight and volume, so equipment for other missions could be carried. At least 1 apparently collected F-4INT. Some believed to have taken part in development of IR and/or UV systems for detecting missile launches. Most 1964 and 1965 missions lasted 8 days. Note infrequency of launches in early days, before system became operational.