

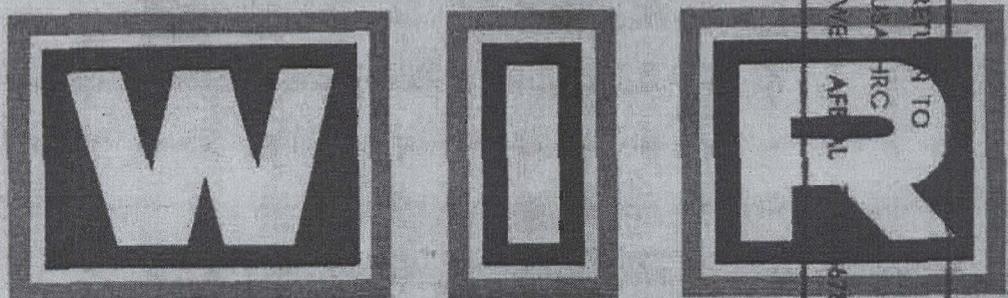
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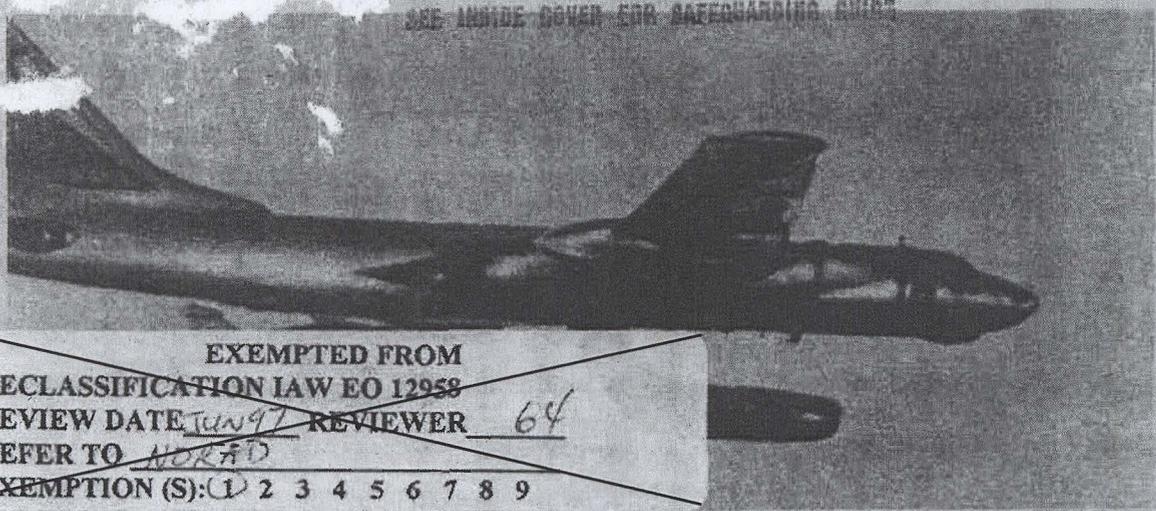
NORTH AMERICAN AIR DEFENSE COMMAND



WEEKLY INTELLIGENCE REVIEW (U)

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The WIR in Brief

Portion identified as non-responsive to the appeal

Portion identified as non-responsive to the appeal

SPACE

VENUS 4 HAS BEEN SILENT FOR 2 WEEKS 7
 But probe may still be operative.

STERILIZATION OF SOVIET PLANETARY PROBES 7
 PROBABLY INADEQUATE
 COSPAR recommendations not met.

WEATHER SATELLITES COSMOSES 144 AND 8
 156 MAY BE NEARING END OF USEFUL LIFE
 Still transmitting but Moscow not forwarding
 data to Washington.

LACK OF REAL-TIME COMMUNICATIONS AMONG 8
 SOLAR OBSERVATORIES COULD AFFECT MANNED
 SPACE FLIGHTS
 Solar-activity predictions would be delayed.

SS-6 SHOWN AT PARIS AIR SHOW CONFIRMS 9
 SOME WESTERN ESTIMATES, CONFOUNDS OTHERS
 May incorporate some advanced technology.

COSMOS 186 DE-ORBITED 11
 On Rev 125

6th MOLNIYA COMMUNICATIONS-RELAY 11
 SATELLITE LAUNCHED
 Is in usual 12-hour eccentric orbit.

Portion identified as non-responsive to the appeal

COVER: BADGER launching ASM (from Soviet
 press) (OFFICIAL USE ONLY)

NOTE: Pages 30, 31, 34, 35, 38, 39, 42, 43,
 and 46 of this issue are blank.

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space

significant
intelligence
on space
developments
and trends

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Venus 4 Has Been Silent for 2 Weeks

[redacted] which the Soviets launched from Tyuratam on 12 June 1967, since 15 September. It is too early to say, however, that this probe is inoperative. The Soviets may have turned off its transmitter temporarily to save electrical power for the all-important data-taking on 18 October, when the probe is due to make its closest approach to its target planet. (See listing on page 32.)

(DIA)

~~(SECRET)~~

Sterilization of Soviet Planetary Probes Probably Inadequate

Soviet sterilization of planetary probes apparently does not meet the standards recommended by COSPAR (International Committee on Space Research). A strict interpretation of COSPAR recommendations requires almost total sterilization of planetary probes, which, under the present state of the art, means total heat sterilization. Apparently because some components of the USSR spacecraft are sensitive to heat, the Soviets evidently have compromised by adopting less strict measures of sterilization.

Information obtained at COSPAR meetings in 1966 and 1967 indicates that the Soviets do not assemble their planetary probes in "clean rooms" to reduce initial contamination, and that they use dry heat for certain solid components, radiation for such items as rubber, lubricants, and heat-sensitive electronic equipment, and gas sterilization.

A Soviet expert on disinfection who attended the July 1967 COSPAR meeting in London indicated that mated surfaces, which cannot be penetrated by the gas used in sterilization, probably have not been sterile, although sampling before mating failed to detect viable contaminants.

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A US source concludes that Soviet planetary probes could have contained viable microbial contaminants. However, any possible contaminants on Venus 3, the only Soviet probe believed to have impacted on another planet, were probably killed by the high temperature of the surface of Venus.

But the growth of microorganisms transported to Mars via probes is possible, and present Soviet sterilization practices probably are not stringent enough to prevent the chances of contamination.

(CIA)

~~(CONFIDENTIAL)~~

Weather Satellites Cosmos 144 and 156 May Be Nearing End of Useful Life

The flow of meteorological satellite data being received from the Soviets over the direct Moscow-Washington communications line has been very sporadic for over a month. No data from Cosmos 156 has been received via Moscow since early September, and only small bits of video and infrared data have been provided by the older Cosmos 144.

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[Redacted] Since there is no evident reason why the Soviets would want to withhold the data deliberately at this time, the most likely explanation is that the Soviets consider the data too poor to pass on to the US. This would indicate that the two Soviet weather satellites probably are nearing the end of their useful lifetime.

Cosmos 144 was launched 28 February 1967, Cosmos 156 on 27 April 1967. A useful payload lifetime of six months or less would make the Meteor system, as the Soviets call their weather satellite system, very expensive.

Replacement satellites should be launched soon if the two vehicles presently in orbit are unable to transmit useful data any longer.

(CIA; NORAD)

~~(SECRET)~~

Lack of Real-Time Communications Among Solar Observatories Could Affect Manned Space Flights

A Soviet scientist attending the COSPAR (Committee on Space Research) meeting in London last July commented several times on the severe lack of facilities within the USSR for communicating real-time data between solar observatories.

A Soviet deficiency in communicating real-time space-environment data between space control and support centers could directly affect the safety of manned space flights, although there are no indications that any harmful effects have been experienced to date. Inadequate communi-





tion of real-time data would lower the effectiveness of any solar activity prediction network, reducing crew safety and the chances of mission success.

A lack of adequate communication facilities between solar observatories has been confirmed by A. B. Severnyy, the leading Soviet solar physicist, although he stated that real-time data could be exchanged if the pressures were high enough.

(CIA)

~~(CONFIDENTIAL)~~

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SS-6 Shown at Paris Air Show Confirms Some Western Estimates, Confounds Others

The West's estimates of the performance and characteristics of the SS-6, the USSR's first ICBM and the workhorse of its space program, were based for nearly 10 years almost entirely [redacted]

[redacted] limited RADINT. Although the first known SS-6 launch occurred in August 1957, it was not until May 1967 (when the Soviets displayed at the Paris Air Show an SS-6 plus a Lunik upper stage and a Vostok payload), that the West had a chance to check its estimates against the evidence available from visual inspection. The Soviets, in the intervening decade, had given out very little usable information on the SS-6. At Paris, the Soviets also put on display the RD-107 rocket engine which powers the SS-6 sustainer and all 4 boosters.

The equipment shown at Paris tended to confirm Western estimates in general, but there have been some differences, and a few questions remain unanswered.

The West's estimate that the SS-6 was of partial-parallel configuration -- a long central sustainer unit surrounded by 4 shorter strap-on boosters -- was confirmed. However, the RD-107 engine itself included 4 thrust chambers, not the single chamber estimated, although [redacted]

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The Soviets said at Paris that each RD-107 engine delivers 102 metric tons (220,000 pounds) of thrust, which may be correct. This is about 11% more than the 198,000 pounds which had been estimated; however, the hardware shown at Paris also was heavier than had been estimated, so the Western estimates of payload/range capability are still believed to be essentially valid.

The delivered specific impulse was said by the Soviets to be 314 seconds, a value which agrees exceptionally well with the [redacted]

The propellant volumetric ratio, as determined from visual inspection of SS-6 tankage at Paris, is consistent with what might be expected from a LOX/kerosene propellant. The Soviet said that the





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propellant is a LOX-hydrocarbon, a category which would include kerosene. However, the West had estimated that the SS-6 uses a LOX/amine propellant

The SS-6 displayed at Paris was probably a recent version, not representative of the original (1957) hardware. Over the years, [redacted] data has shown a 7% increase in flow rate -- and thrust.

The Soviets gave the combustion-chamber pressure as 60 atmospheres (880 pounds psi), which would be unusually high for a 1957 product.

The expansion-area ratio (engine nozzle-to-throat ratio) of 20-to-1 is the same for the nozzles of all five RD-107 engines. This may be desirable for ease of fabrication, but from the standpoint of engine performance it represents a compromise between sea-level and high-altitude operation. In US two-stage tandem-configuration vehicles, for instance, an expansion ratio of 8 to 12 is normal for booster engines, which are ignited at almost sea level and provide thrust in flight through the atmosphere; sustainer engines, which operate beyond the atmosphere, have ratios of 20 to 30.

The announced thrust for the RD-107 checks mathematically for the given chamber pressure, the estimated propellants, and the expansion-area ratio as determined by visual inspection. However, by US standards, the announced specific impulse, though it agrees with [redacted] is exceptionally high in relation to these other factors. This is an important unresolved problem. It suggests an advanced technology resulting from the use of a special hydrocarbon fuel and/or an additive or from technological advances yielded by combustion research, a field which the Soviets have studiously explored.

The Soviets said that the RD-107 engine was developed in 1957 by the GDL (Gas Dynamics Laboratory), an organization established in Leningrad in 1929 but not heard from since 1933. At this time it was moved to Moscow and combined with a jet-propulsion study group to form the "First Scientific Research Institute" (NII-1). It is estimated that NII-1 may have done the theoretical work for design of the SS-6 propulsion system, with prototype production and testing executed at the nearby Khimki complex (Khimki Experimental Design Bureau, Khimki Factory 456, Khimki Rocket Propulsion Center). Or the rocket-propulsion studies previously carried out at NII-1 may have been merged with and moved to the Khimki complex. Soviet attribution of design of the SS-6 propulsion to the long-defunct Gas Dynamics Laboratory could be an attempt at outright deception, possibly to conceal the role played by Khimki.

Retrospect and Prospect. Although originally designed as an ICBM, the SS-6 has been the workhorse of the Soviet space program. For nearly a decade it gave the USSR a space payload-weight advantage which



enabled it to execute numerous prestigious missions (manned space flight and lunar probes) much earlier than the US could. The SS-6 has successfully launched more than 150 spacecraft, including all the Soviets' manned craft, all their lunar and interplanetary probes, all their military reconnaissance, Molniya communications-relay, and weather satellites, and a number of other types of spacecraft.

It has proved to be very reliable as a space booster, a fact which will probably impel the Soviets to keep on building and launching SS-6s for some time to come, despite the fact that more efficient vehicles can now be designed and produced. The Soviets are loathe to give up a tried and proven system, when it can do the job, for a better but untested system.
(NORAD; CIA) (Drawings & photos, pages 33-37.)

~~(SECRET)~~

Cosmos 108 De-orbited

Cosmos 180, a photorecce satellite which was launched from Plesetsk at about 1030Z, 26 September, was de-orbited early on Revolution 126, at about 0535Z, 4 October, nearly 8 days after launch. It impacted in the USSR at about 0556Z.

(NORAD)

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6th Molniya Communications-Relay Satellite Launched

The Soviets launched their 6th operational Molniya-type communications-relay satellite from the Tyuratam missile test range at about 0500Z 3 October. The payload was ejected from its parking orbit into the usual highly eccentric 12-hour orbit at about 0620Z.

This new craft and two other Molnias which apparently have been operational recently are expected to relay TV coverage of the 7 November Moscow celebration of the 50th anniversary of the Bolshevik Revolution to some eastern and northern regions of the USSR via newly completed Orbita ground relay stations and, possibly, to foreign countries.

(NORAD)

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Soviet Payloads Which May Still be Transmitting (26 Sep 67)

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<u>Name</u>	<u>Probable Mission</u>	<u>Launch Date</u>	<u>Date of Last Intercept</u>	<u>Type of Transmission</u>
4th Molniya	Communications Relay	20 Oct 66		
Cosmos 144	Meteorological	28 Feb 67		
Cosmos 156	Meteorological	27 Apr 67		
5th Molniya	Communications Relay	24 May 67		
Cosmos 163	Scientific	05 Jun 67		
Venus 4	Venus probe (scientific)	12 June 67		
Cosmos 166	Scientific	16 Jun 67		
Cosmos 173	Scientific	24 Aug 67		
Cosmos 174	Communications Relay	31 Aug 67		
Cosmos 176	Scientific	12 Sep 67		
Cosmos 180	Photorecce and ELINT	26 Sep 67		

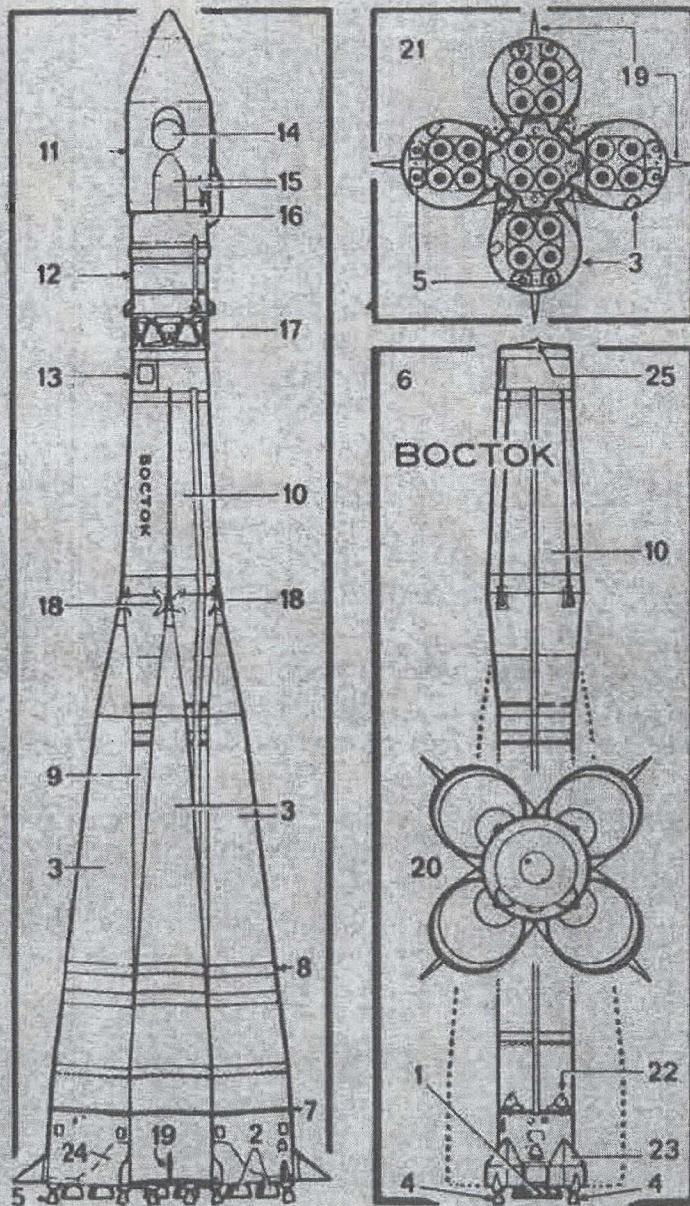
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SS-6 ICBM
 plus
 Lunik 3d Stage
 plus
 Vostok Space
 Payload,
 Paris Air
 Show, 1967



1. Sustainer engine with four nozzles
2. Booster engine with four nozzles
3. Strap-on boosters (four)
4. Sustainer vernier engines
5. Booster vernier engines
6. Sustainer (over-all view)
7. Lower booster fittings
8. Upper booster fittings
9. Lower sustainer propellant tank
10. Upper sustainer propellant tank
11. Vostok fairing
12. Lunik upper stage (one nozzle)
13. Instrument unit
14. Emergency ejection hatch
15. Fairings
16. Vostok/Lunik interstage
17. Lunik/SS-6 interstage
18. Booster attachment points
19. Stabilization/control fins
20. Top view
21. Bottom view
22. Engine fittings
23. Vernier fairings
24. Engine shields
25. Top of booster section

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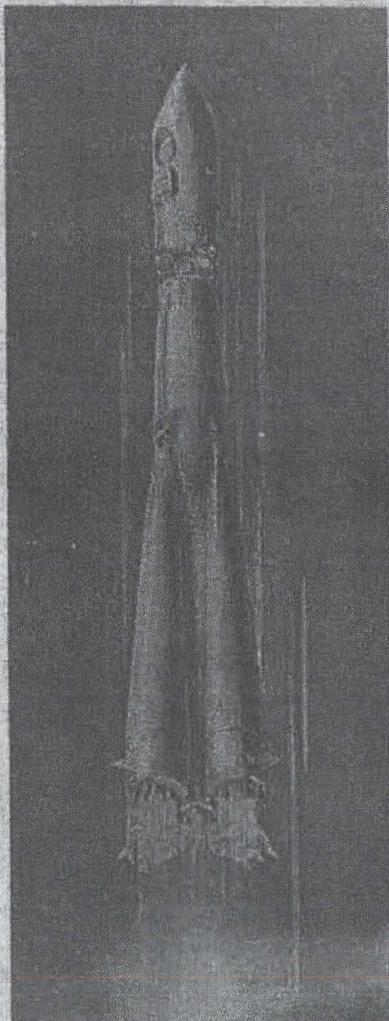
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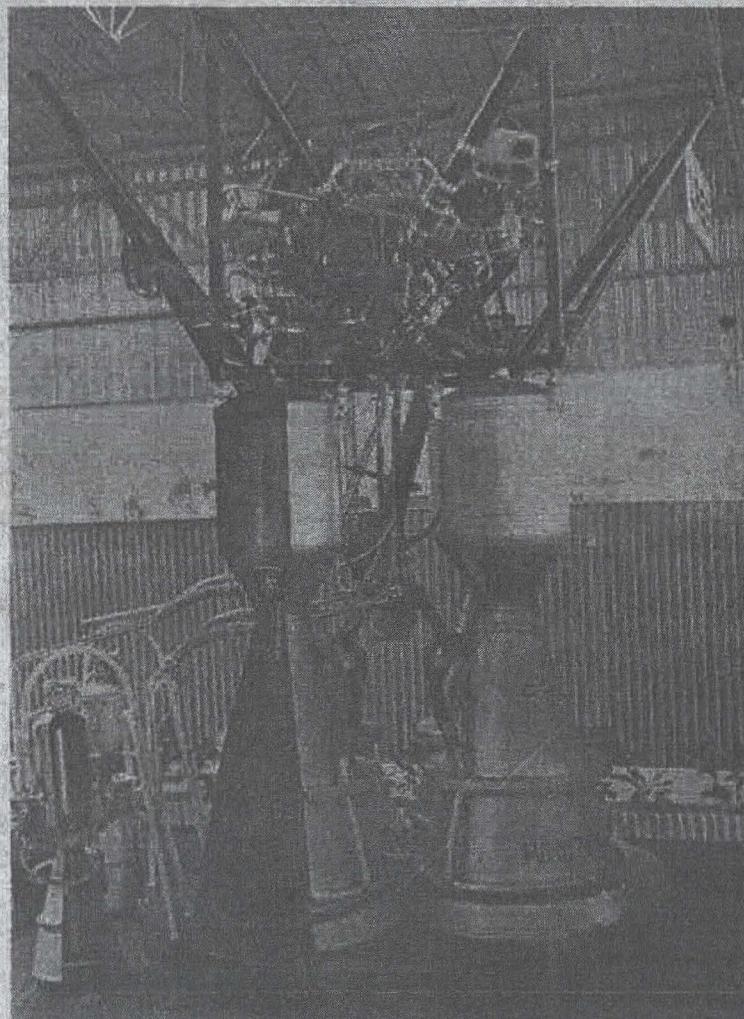
66825 6-67 CIA

Launch of Manned Vostok Spacecraft
by SS-6 ICBM Booster-Sustainer
(below trusswork) and Lunik Upper
Stage (above trusswork)
(Soviet drawing at Paris Air Show)



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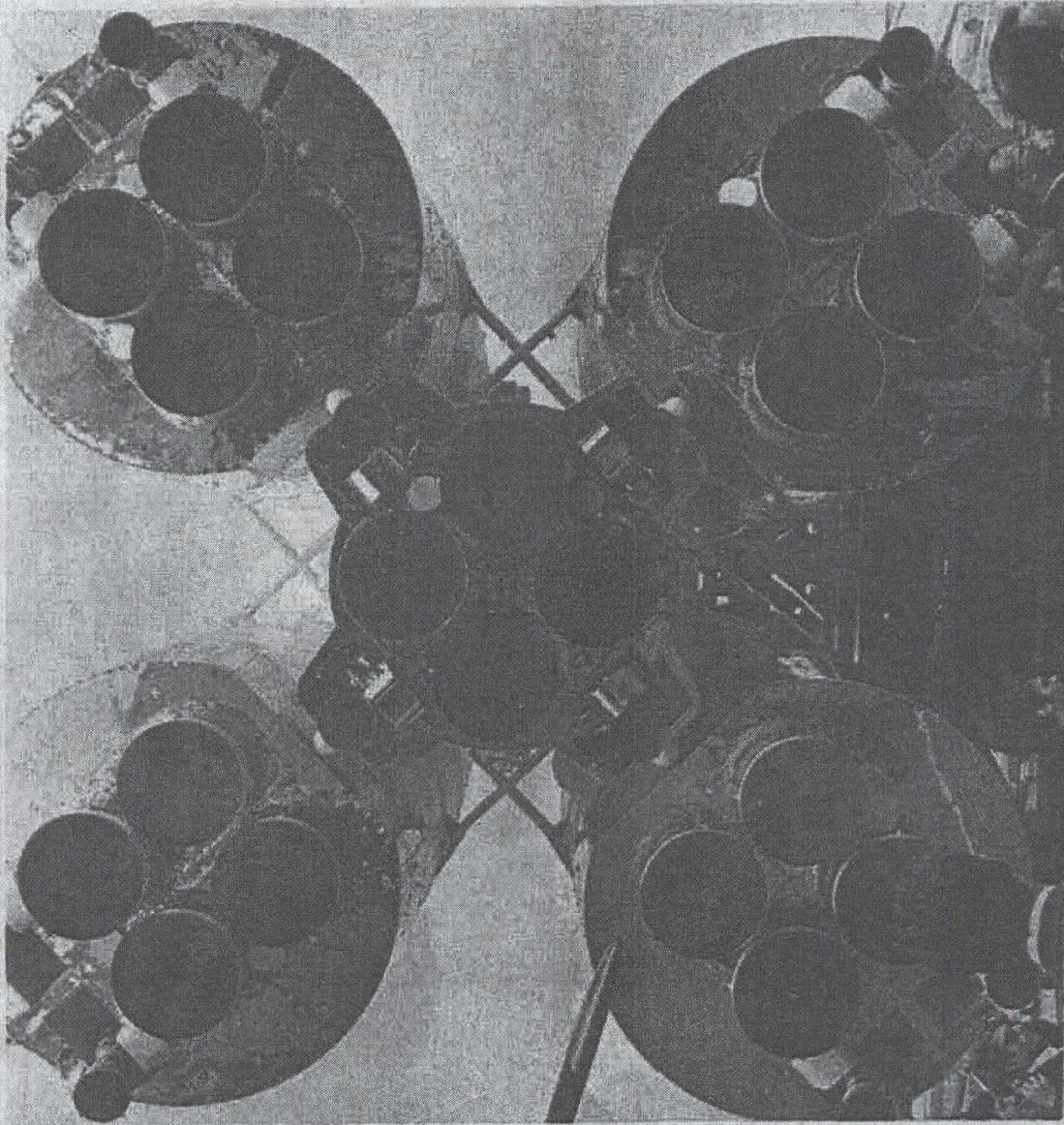
RD-107 Engine, Including Vernier
Engines (at left) at Paris Air Show, 1967



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SS-6 ICBM
Booster-
Sustainer
(rear view)
(Paris Air
Show 1967)



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6 Oct 67

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