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WEEKLY INTELLIGENCE REVIEW (U)

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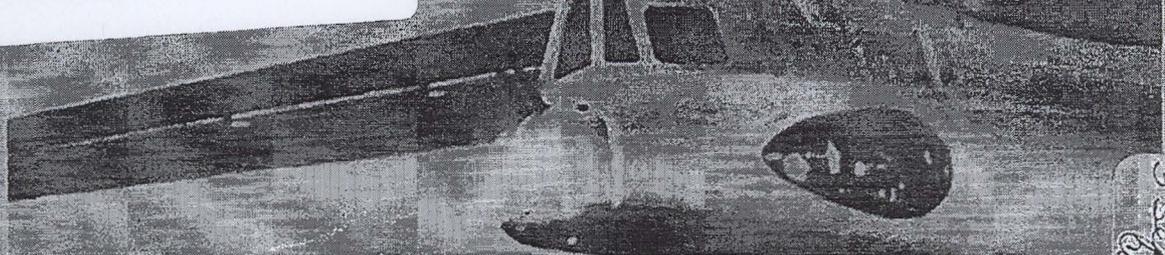
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Weekly
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The WIR in Brief

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Space

SOVIET SPACE VIDEO STILL USES FILM.
OTHER ZOND 3 DETAILS FROM 'RED STAR'
Missions described in more detail than before.
RECENT INTERCEPTS OF SOVIET SPACE-
VEHICLE TRANSMISSIONS
As of 24 August.

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to the appeal

Technical Intelligence Notes

PARIS AIR SHOW A MAJOR SOVIET BID FOR
PRESTIGE AND AIRCRAFT SALES

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COVER: Tail of Soviet BEAR bomber
(USAF Photo) (UNCLASSIFIED)

NOTES: Pages 31, 32, 34, 35, 38, 39, 42
and 43 of this issue are blank.

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space

significant
intelligence
on space
developments
and trends

Soviet Space Video Still Uses Film; Other Zond 3 Details from 'Red Star'

The video system which Zond 3 carried to obtain pictures of the unseen side of the Moon used film, as did those of Luna 3 and Mars 1. This and a number of other details of the Zond 3 mission were given in the 24 August issue of Red Star which quoted speeches delivered at a 23 August press conference in Moscow about Zond 3. Unfortunately, Red Star did not report the question-and-answer period which followed. (Other information on Zond 3 from the Soviet press was given in last week's WIR.)

Following is some of the material from Red Star, as translated and summarized by NORAD. (Parenthetical remarks in quoted material are NORAD's.)

The Video System. Engineer Yu. K. Khodarev, the third speaker at the press conference, gave the most detailed information about the video system of Zond 3. He said:

"There are presently two well-established basic methods for obtaining pictures of planets by means of space apparatus:

"1) Television, in which the image of the planet is obtained with a TV tube at the time of flyby and inscribed in the form of electrical signals on magnetic tape. The image is reconstituted when the transmitted signals are received on Earth.

"2) Phototelevision, in which the image of the planet during flyby is obtained as a photograph on film. The film image is then transmitted to Earth in the form of phototelegraph (facsimile) or TV signals.

"Both systems have their merits and faults.

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"The phototelevision system requires equipment aboard the probe to develop and finish the picture. Also, as is known, the undeveloped photoemulsion is extremely sensitive to cosmic radiation and does not endure lengthy space flight, even with fairly massive shielding.

"However, the photo-TV system has its incontestable virtues: in the first place, it is a relatively simple and reliable method of obtaining a great number of pictures of very high clarity and, in the second place, the clarity of the pictures can be varied during transmission in accordance with the demands of operating conditions.

"These characteristics are extremely useful in working at interplanetary distances. A large number of pictures of reduced clarity can be sent in an accelerated mode and then, after the most valuable are selected, transmission of the desired pictures can be executed with high clarity.

"Work in the Soviet Union has led to a new fine-gauge photo-TV system for photographing and sending images of a planet, a system which can work well on long space flights. The question of protecting the film safely from cosmic rays has been completely resolved.

"The Moon was photographed with Zond 3's equipment on 20 July, between 0424 and 0532 hours, Moscow time.

"The command to begin photography was sent from the Earth at 0357 hours as the station neared the Moon. All later operations were conducted automatically without intervention from the Earth. Immediately after the command, the orientation system began to search for the Moon and to turn the probe in such a way that the lens of the photo-TV system was pointed at the lighted part of the Moon. Simultaneously, the photo-TV system began its preparatory operations. In 14 minutes the system for unreeling and rewinding the film had been switched on.

"Photography of the Moon began at the 28th minute and continued for a little more than an hour. The film was automatically developed, simultaneously with photography. The developed film, in a form suitable for transmission, went directly to the transmitting system.

"Time between pictures was about 2.25 minutes. In all, about 25 photos of the lunar surface were received. The number of pictures was limited by the fact that the equipment on Zond 3 was intended for photographing a planet. However, in choosing the angle of view of the lens, the photographs overlapped and the clarity of the 25 photos was more than adequate for defining details.

"The camera lens had a focal length of 106.4mm and a relative aperture (speed) of 1.8. Photography was made on a special film 25mm wide with exposures of 1/100th and 1/300th second.



"Images were transmitted during communications sessions with Zond 3's highly directional parabolic on-board antenna, which was designed for transmitting over great distances.

"It took 34 minutes to transmit each frame of 1100-line clarity. This time was chosen for use in working at interplanetary distances.

"The time of transmission per frame and clarity could be varied. All frames were sent in an accelerated mode of reduced clarity with a speed of 1 frame each 2.25 minutes. The quality of all frames could thus be evaluated and those with the most interesting subject matter chosen.

"Repeat transmissions of images of greatest interest at various points of the flight currently are being conducted. Repeat transmissions will be conducted from still greater distances in the future."

Trajectory and Positional Data. Professor A. I. Lebedinsky, the second speaker on the program, gave some information about the probe's trajectory and additional missions accomplished with respect to the Moon.

He said that at 12:00 o'clock (Moscow time, presumably) on the day of the conference (23 August) the probe was 7,175 million km from the Earth and that it would pass close to the orbital path of Mars but would not approach that planet because the launch date was not suitable for that purpose. With respect to positional data, he also said that photography began when the probe was 11,570 km from the Moon, that Zond 3 at its closest was 9,220 km from the Moon, and that photography ceased when the probe was 9,960 km from the Moon. (Some of these figures differ slightly from those previously announced by the Soviets. See last week's WIR.)

Lebedinsky said that the probe was launched on a trajectory "forward" of the Earth's orbital path around the Sun. The speed of the probe was thus added to the Earth's orbital speed, causing the probe to go into a higher orbit, which would take it farther from the Sun. (Lebedinsky did not say why the Soviets wanted a heliocentric orbit of high aphelion.) He did confirm previous Soviet statements that the launch was timed in such a way that the probe could photograph that part of the unseen side of the Moon not covered by the photography of Luna 3 in 1959, that this region would be at such an angle with respect to the Sun's rays that measurements of shadows in the photography would enable computation of heights of the mountains there, and that photography of some features of the visible side of the Moon could be included for reference purposes. (See diagrams on page 37, last week's WIR.) Lebedinsky said that every portion of the newly photographed part of the Moon was photographed at various angles, thus giving supplementary information about the relief of the Moon's surface and its reflective characteristics.





Other Lunar Missions. Lebedinsky said that, in addition to regular photography, Zond 3 photographed the spectrum of the lunar surface at wavelengths of 3500-2500 Angstrom units (in the ultraviolet region) and executed spectrophotometry in the ultraviolet region at 2700-1900 Angstrom units and in the infrared at 4-3 microns. The optical axes of these instruments, he said, were aligned with the optical axis of the photographic camera, so that the spectral data could be correlated as to location of the sources. The results of this research, he said, is being processed and will be published in scientific journals.

Other Missions. M. V. Keldysh, President of the Soviet Academy of Sciences and the first speaker on the program, said that Zond 3 also carried instrumentation for studying the magnetic characteristics of near-Earth and interplanetary space, the solar wind, low-frequency radiowaves of the Galaxy, micrometeorites, and cosmic rays.

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NORAD comment: (Begin SECRET) All indications are that Zond 3 is exactly what the Soviets said it was in their first announcement: a collector of data on the space environment and a test bed for systems to be used on "prolonged space flights," that is, interplanetary flights.

The Soviets obviously are getting ready to launch one or more probes of the planet Venus in October or November, when the "launch window" for that planet is open.

None of the 13 known Soviet interplanetary probe attempts has succeeded in returning any information about its target planet back to Earth. Most of them have been propulsion failures; the communications systems of the others have all failed long before nearing their target planets. None has transmitted successfully to Earth for more than 5 months.

The West [redacted] any signals from Zond 3 since shortly after injection into heliocentric orbit.

(Red Star, NORAD)

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50X1 and 3, E.O.13526

Recent Intercepts of Soviet Space Vehicle Transmissions

Following is a 24 August listing of the most recently reported intercepts of transmissions from Soviet space vehicles which may still be active:





<u>Vehicle</u>	<u>Date of Launch</u>	<u>Signal Characteristics</u>	<u>Date of Most Recent Intercept</u>
Molniya 1	23 Apr 65	50X1 and 3, E.O.13526	
Cosmos 71	16 Jul 65		
Cosmos 72	16 Jul 65		
Cosmos 75	16 Jul 65		
Proton 1	16 Jul 65		
Cosmos 76	23 Jul 65		

It may also be noted that:

- Cosmos 79, a photoreconnaissance vehicle launched after the date of the above-referenced report, is transmitting; it will probably be recovered 2 September.
- All Soviet payloads launched into Earth orbit before 23 April 1965 and still in orbit (see listing in last week's WIR) apparently have ceased transmitting.
- Only 3 of the 5 payloads launched by a single vehicle on 16 July are known to be transmitting.
- The Soviet deep-space probe Zond 3 is probably transmitting,

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(Various ELINT sensors; NORAD)

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technical intelligence NOTES

items of interest
on technical developments
around the world

Paris Air Show a Major Soviet Bid for Prestige and Aircraft Sales

Soviet participation in the Paris Air Show, which was held 10-21 June, was a major effort to gain prestige and to garner much-needed foreign exchange through sales of transport aircraft and helicopters. This air show, held once every two years, is perhaps the most prominent exhibit of its type now held anywhere.

The Soviet line-up included 7 transports, 3 helicopters, a glider, a nonflying 4-foot model of a supersonic transport, and a Vostok space capsule.

From the standpoint of prestige, the stars in the Soviet exhibit were the Vostok, the world's largest aircraft (AN-22), the world's largest helicopter (MI-6), and the 4-foot model of the TU-144 supersonic transport.

All the flying transports and helicopters displayed were said to be available for sale, except for the GLASSIC/IL-62 and CRUSTY/TU-134, which will be offered next year, and the COCK/AN-22, which will be available in two or more years, after it reaches full production.

Prices were quoted on some of the older transports:

COOT/IL-18D	\$2.24 million
COOKPOT/TU-124	\$1.43 million
COKE/AN-24	\$.95 thousand

No price was quoted on the CUB/AN-12.

The aircraft reportedly could be bought on a cash, credit, or barter basis; preferred was cash in convertible currency, for which appreciable discounts were offered.

The COKE and COOKPOT have been in service since 1961. The COOT and CUB shown at Paris were improved models of aircraft which have been in service, respectively, since 1958 and 1959.

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The Soviet exhibit no doubt did much to stimulate foreign interest in Soviet aircraft. The USSR for years has been trying to sell its aircraft in the world market, which traditionally has been ruled by the US and UK and, to a lesser extent, by France. To date, most Soviet exports of civil transports and helicopters have gone to Communist nations.

Photos and some details of the Soviet aircraft displayed at Paris are shown on pages 36, 37, 40, and 41.)

(NORAD)

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