ORTH AMERICAN AIR DEFENSE COMMAND

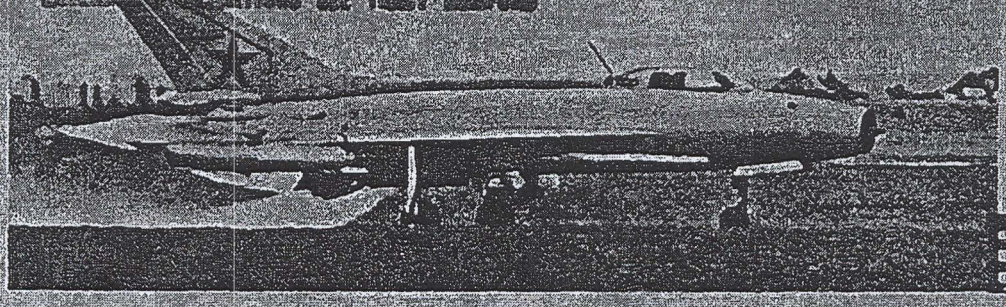
Weekly Intelligence Review (U)

INTELLIGENCE PRIVILEGED INFORMATION

NOT TO BE QUOTED OR DISCUSSED OUTSIDE OF RAND

FOR SPECIFIC QUESTIONS ON POSTER HANDLING OR EXTERNAL PUBLICATIONS SEE THREE BEFORE

OFFICIAL USE ONLY



Issue N
38/61
22 Sep 1

SECRET

[redacted]

NORAD Weekly Intelligence Review

Issue No. 38/61 Date: 22 September 1961

K410.607-15e

The WIR in Brief

Portion identified as non-responsive to the appeal

Portion identified as non-responsive to the appeal

2 ICBMS/SPACE VEHICLES FIRE INTO ANNOUNCED PACIFIC IMPACT AREA 8

Both landed in announced impact area.

Portion identified as non-responsive to the appeal

Space

VENUS PROBE APPARENTLY WAS COMPLETE FAILURE IN REPORTING DATA FROM VICINITY OF VENUS 10

Some details of communications system reported.

EARTH SATELLITE VEHICLES IN ORBIT LISTED 13

Portion identified as non-responsive to the appeal

COVER: Rocket-boosted FISHBED. (OFFICIAL USE ONLY)

NOTE: Pages 2, 28, 29, 32, 33, and 36 of this issue are blank.

FOR OFFICIAL USE ONLY

SECRET

[redacted]

DECLASSIFIED BY NDM

00880617

Portion identified as non-responsive to the appeal

2 ICBMS/SPACE VEHICLES FIRED INTO ANNOUNCED PACIFIC IMPACT AREA

Two Soviet ICBMs or space vehicles have been fired to the 6500-n.m. impact area in the Pacific in the most recent series of Soviet tests.

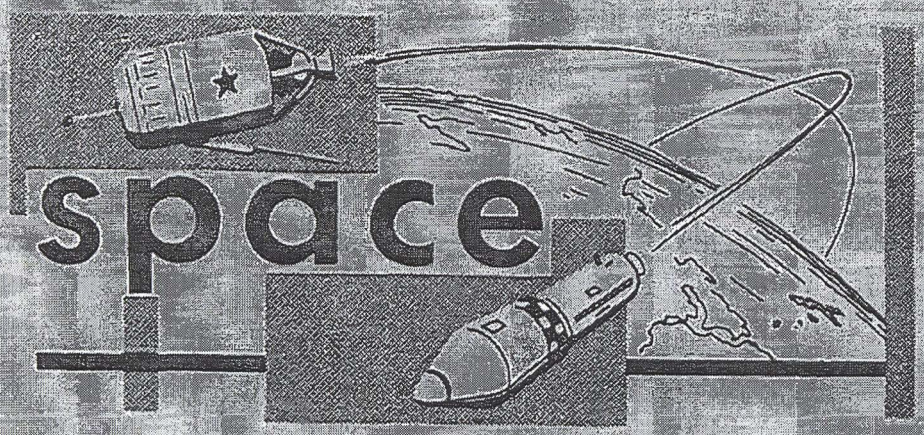
The first launching occurred 13 September, the day on which the Soviet-announced ban on shipping and aircraft in the impact area was to become effective. U.S. aircraft observed the impact at 1627Z (about 30 minutes prior to sunrise) at an estimated position of 1000N-16815W, in close proximity to the 4 Soviet missile-range instrumentation ships.

The second launching occurred on 17 September. The missile impacted

at about 1030N-16815W, also "in the vicinity of" the 4 range vessels at about 1623Z, during twilight conditions.

SECRET

Portion identified as non-responsive to the appeal



significant intelligence on space developments and trends

VENUS PROBE APPARENTLY WAS COMPLETE FAILURE IN REPORTING DATA FROM VICINITY OF VENUS

The Soviet Venus probe launched 12 February 1961 apparently was a complete failure from the standpoint of adding to human knowledge of the planet Venus. This probability is indicated by:

- The lack of a Soviet claim that signals had been received from the probe after 27 February. (The probe made its closest approach to Venus about 19-20 May.)
- The mid-June visit of 2 Soviet scientists to the U.K.'s huge radiotelescope facility at Jodrell Bank in what appeared to be a "desperation measure" to "recover" probe signals.
- Failure of the visit to result in the recovery of any signals.

The probe undoubtedly was a propaganda success for the Soviets, despite the fact that it was a failure scientifically.

The Venus probe was supposed to collect measurements of magnetic field, cosmic radiation, the composition of space matter, and meteor impacts with the probe; store the data between scheduled transmission periods; and transmit the data on schedule to Soviet monitoring stations. Soviet announcements did not state clearly where the measurements would be made, but it is generally assumed that they would be made both en route and at the time that the probe made its closest approach to the planet.

Two Soviet scientists, Dr. Alla Massevich (Director of the Soviet Space Vehicle Tracking Stations) and Dr. Yuliy Khodorov (an expert on the Venus probe) visited Jodrell Bank in June on the invitation of its director, Sir Bernard Lovell, to discuss possible Venus-probe signals which had been received. (WIR 24/61) The visitors were also on hand to aid Professor Lovell in attempts to intercept probe signals during the period 10-14 June. After discussions of Lovell's intercepts, it was concluded that the signals were not valid Venus probe signals.

The visitors also gave some information about the ground facility which was to receive the probe signals and about the scheduling and modulation of transmission from the probe.

The Receiving Facility. The Soviet visitors claimed that they were using a very sensitive electron-beam parametric amplifier to accept signals from the receiving antenna complex. This claim suggests high Soviet competence in this area, since the apparent U.S. counterpart of this amplifier was demonstrated only as a laboratory developmental model in 1960 and was acclaimed as one of the four major U.S. achievements in electron device developments for that year.

Although the Soviets claim to be using an unusually sensitive receiving technique for monitoring the probe, conventional techniques should have been adequate if the probe's transmitter, using the reported directional antenna, functioned properly, and if Western estimates of the probe's transmitting power were correct. However, electronic malfunctions may have produced much weaker signals (at the earth) than had been anticipated, thus dictating the use of advanced signal-detection techniques (such as correlation detection) as an extreme measure to recover the data.

(Correlation detection techniques are used in Western communications and radar sets to improve usability of received signals. A memory device in a correlation detector stores all possible characters or signal types which may be desired. The detector compares the received signal with those stored and decides which signal (if any) was received.)

The Soviets are credited with a high degree of capability in this type of detection and in the application of information theory to the recovery of weak signals in the presence of noise. They apparently have been accumulating much experience which could be applied to techniques for reception of signals from such Soviet space experiments as Lunik III and the Venus probe.

Since some types of signals are amenable to correlation detection even after recording, one purpose of the visit of Drs. Massevich and Khodorov may have been to assure that tapes of the probe signals made at Jodrell Bank would be as amenable as possible to later correlation detection.

The visitors said that the reception facility is in the Crimea (this is probably true) and is under the Institute of Radio Electronics. Its antennas consist of eight 16-meter-diameter paraboloids on altazimuthal mountings. (This mounting consists of vertical and horizontal axes, both of which must be used for tracking objects in the celestial sphere. Optical observatories customarily use other mounting types.) Probably there is a means of beam-switching in groups of 4. Signals from the paraboloids are fed into the electron-beam parametric amplifier and the local oscillator, which is programmed to follow the Doppler shift of the received signals. This combination should give the Crimean installation about the same over-all sensitivity

as the Jodrell Bank radiotelescope which has a larger effective antenna area but no "pre-amplification" of the signal.

The receiving facility is probably the new and highly publicized Cosmic Space Communications Center. Publicity released in connection with the launching of the Venus probe stressed the Center's special electronic gear and its large antennas which, controlled by an electronic computer, could be aimed with an accuracy of a few angular minutes.

Transmitting Schedule and Modulation Techniques. Three transmitters and a controlling automatic timer were aboard the probe, according to the Soviet visitors. The transmitters could be switched on by the timer or on command from the ground. Timer intervals were given as 24, 72, or 120 hours (1, 3, or 5 days), but the schedule for various stages of the trip was not clear. Presumably, as the probe got farther from the earth, the longer schedules would be used to allow for maximum charging of the solar cells of the chemical batteries supplying electricity to the transmitters.

Each transmission was to last for 90 minutes, with no modulation during the first 17 minutes (presumably to allow for adjustment of the receiver on the earth). During the remaining 73 minutes, a series of audio tones in the range of 1350-1700 cycles per second was to be sent. It is probable that only one tone was to be sent at a time, with on-off keying. This type of modulation would improve earth reception of the signals but would prevent simultaneous use of the same antenna facility for sending commands to the probe. Drs. Massevich and Khodorov did not indicate the origin of these commands.

The Soviets apparently planned for a high degree of ground control of probe transmissions: during the visit to England, Dr. Massevich asked Moscow for a materially different modulation program from the probe with a different duration of transmission.

Circumstances Surrounding the Launch. Of possible significance to the failure of the probe's communications is the possibility that the launch was made under some pressure. The most favorable launch date for a Venus probe early this year would have been 13 January. The Soviet launch was made 30 days later -- 12 February. Each day's delay beyond 13 January increased the velocity requirements of the vehicle. As the delay approached its 30th day, the Soviets were nearing the limits of their estimated launch capabilities, and they may have made the launch under circumstances involving some risk that the probe's mission would not be fulfilled.

The next most favorable date for a Venus probe will be 16 August 1962, for a Mars probe 16 November 1962.

(See graph on page 27.)

~~SECRET~~ NOFORN Except U.S., U.K., Can, Aus & N.Z.

EARTH SATELLITE VEHICLES IN ORBIT LISTED

A listing of satellite vehicles in orbit as of 1200Z, 20 September 1961, is shown on page 30. The data shown, however, has been computed for 1200Z, 22 September 1961, by NORAD SPADATS (Space Detection and Tracking System).

Principal difference between this listing and the one published in last week's WIR is the addition of Discoverer XXXI.

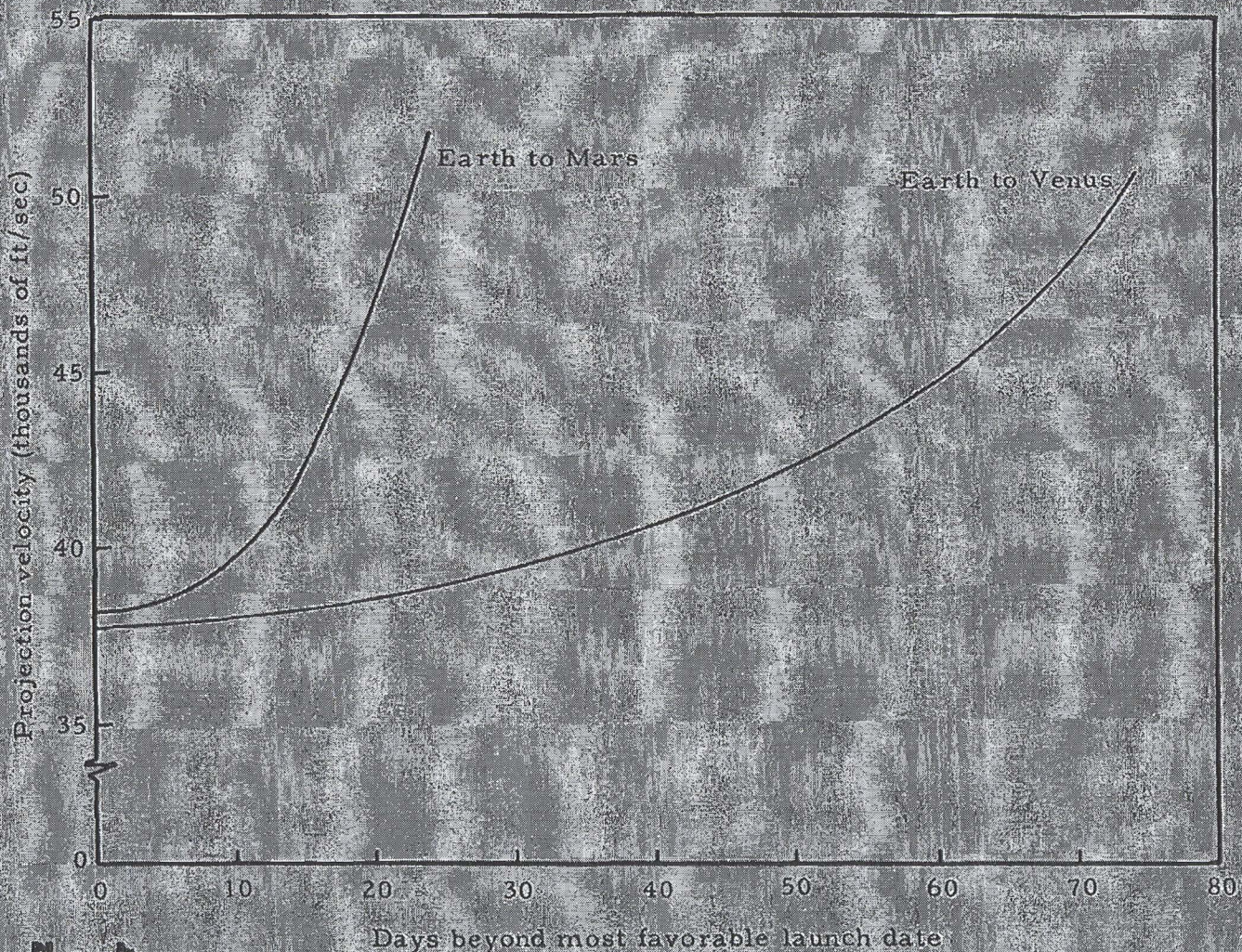
Mercury V, it may be noted, was not included in last week's listing or in the current one. It was fired into orbit and the capsule recovered prior to the time-and-date cut-off for last week's listing.

Readers familiar with the Greek alphabet may have noticed last week that the alphabet was "used up" with the assignment of the designation "1961 Omega" to Discoverer XXX. This fact will not, of course, halt operations at Canaveral, Vandenberg, or Tyuratam. Mercury V became "1961 Alpha Alpha," and Discoverer XXXI was named "1961 Alpha Beta," and the next vehicle will be called "1961 Alpha Gamma." If the alphabet is "used up" a second time in this fashion, then the third go-around will begin with "1961 Beta Alpha," "1961 Beta Beta," "1961 Beta Gamma," and so on.

Carrier rockets, pieces of satellites, and vehicles orbiting the sun are not shown in the listing on page 30. Vehicles orbiting the sun were last listed in WIR 26/61.

UNCLASSIFIED
OFFICIAL USE ONLY

Velocity Penalty for Launching After Most Favorable Dates (for Venus and Mars Probes)



OFFICIAL USE ONLY
UNCLASSIFIED

WIR 38/61

Earth Satellite Vehicles in Orbit as of

1200Z, 20 SEPTEMBER 1961 (computed for 1200Z, 22 September 1961)

Rocket casings & pieces of satellites not listed

Smithsonian Designation	Common Name	Launch Date	Inclination to Equator	Period (minutes)	Apogee (statute miles)	Perigee (statute miles)	No. of Orbits Completed	Transmitting Frequency (mc/s)
1958 Alpha	Explorer I	1 Feb 58	33.19	106.2	1100.4	217.0	14532	
1958 Beta 2	Vanguard I	17 Mar 58	34.24	133.9	2452.4	403.6	13812	
1959 Alpha 1	Vanguard II	17 Feb 59	32.88	125.3	2037.3	354.2	10880	
1959 Delta	Explorer VI	7 Aug 59		INSUFFICIENT OBSERVATION				
1959 Eta	Vanguard III	18 Sep 59	33.38	129.7	2321.9	309.8	8142	
1959 Iota 1	Explorer VII	13 Oct 59	50.31	101.1	669.3	343.6	10103	
1960 Beta 2	Tiros I	1 Apr 60	48.39	99.1	466.4	428.9	7829	
1960 Gamma 2	Transit 1B	13 Apr 60	51.28	94.9	410.7	228.7	7967	
1960 Epsilon 1	Sputnik IV	15 May 60	65.02	92.2	298.5	174.7	7657	
1960 Zeta 1	Midas II	24 May 60	33.00	94.3	317.2	293.5	7415	
1960 Eta 1	Transit 2A	22 Jun 60	66.77	101.6	649.3	389.2	6478	
1960 Eta 2	Greb Capsule	22 Jun 60	66.77	101.6	656.7	380.8	6478	
1960 Iota 1	Echo I	12 Aug 60	47.26	116.7	1166.2	741.4	4986	
1960 Nu 1	Courier 1B	4 Oct 60	28.30	106.9	755.1	599.0	4754	
1960 Xi 1	Explorer VIII	3 Nov 60	49.98	112.5	1407.9	262.0	4135	
1960 Pi 1	Tiros II	23 Nov 60	48.57	98.2	461.2	378.0	4444	
1961 Alpha 1	Samos II	31 Jan 61	97.40	94.9	340.7	294.8	3544	
1961 Delta 1	Explorer IX	16 Feb 61	38.36	118.2	1533.2	460.5	2655	
1961 Epsilon 1	Discoverer XX	17 Feb 61	80.91	94.0	403.1	175.4	3294	
1961 Zeta	Discoverer XXI	18 Feb 61	80.74	95.1	494.6	154.3	3216	
1961 Kappa	Explorer X	25 Mar 61		INSUFFICIENT OBSERVATION				
1961 Lambda 1	Discoverer XXIII	8 Apr 61	82.31	92.9	331.6	183.1	2567	
1961 Lambda 2	Capsule	8 Apr 61	81.94	98.3	711.4	126.0	2399	
1961 Nu	Explorer XI	27 Apr 61	28.80	107.8	1106.8	302.1	1974	
1961 Omicron 1	Transit 4A	29 Jun 61	67.00	103.8	620.2	547.1	1183	
1961 Omicron 2	SR 3 & Injun	29 Jun 61	67.00	103.8	619.4	548.3	1183	
1961 Pi 1	Discoverer XXVI	7 Jun 61	82.93	93.1	381.5	142.3	1173	
1961 Rho 1	Tiros III	12 Jul 61	47.84	100.3	510.6	456.5	1034	
1961 Sigma 1	Midas III	12 Jul 61	91.17	161.5	2197.0	2084.3	641	
1961 Upsilon 1	Explorer XII	15 Aug 61	33.92	1592.9	48058.5	183.1	33	
1961 Omega 1	Discoverer XXX	12 Sep 61	82.52	92.2	337.6	136.6	151	
1961 Alpha Beta	Discoverer XXXI	9 Sep 61	82.70	90.8	244.2	144.8	73	

50X1 and 3, E.O.13526