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C E N T R A L I N T E L L I G E N C E A G E N C Y

8 June 1962

MEMORANDUM TO RECIPIENTS

The attached papers have been prepared for use by the Committee on NSC Action Memorandum #156, scheduled for Tuesday 12 June 1962.

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HANDLE VIA [redacted] CHANNELS

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[redacted]

8 June 1962

MEMORANDUM

SUBJECT: Soviet Capabilities for Passive Countermeasures Against US Photographic Reconnaissance Satellites

1. The Soviets are clearly concerned over the present and future potentialities of various US satellite photographic reconnaissance systems, and may undertake passive measures to counter these systems.* Camouflage and deception are the main techniques available to the Soviets for this purpose. [redacted]

2. First priority in any such effort would probably be given to protection of important Soviet military strengths. The only recent evidence of Soviet interest in this field relates to missile forces. Other important targets such as urban industrial areas, nuclear production and storage complexes, and military airfields, present far more difficult problems for camouflage and deception. However, concealment of small key elements may be attempted.

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* This paper is concerned only with capabilities of present US systems and takes no account of potential improvements in these systems.

TOP SECRET [redacted] RUFF [redacted]

[redacted]

3. The most detailed description available of the camouflage and deception techniques which might be employed at fixed sites appeared in a classified Soviet military journal published in September 1961, which discussed, inter alia, passive countermeasures against aircraft and satellite reconnaissance. According to this article, camouflage measures include concealment through the use of natural environment, artificial materials, and dummy structures. Deception techniques mentioned include the use of simulated sites, decoy thermal objects, and special radar reflectors to divert [redacted] The article advocated use of camouflage [redacted] as well as operational missile sites.

4. Except for crude attempts, detected several years ago, to camouflage one surface-to-air missile site in East Germany and a missile site in the Crimea, we have no evidence that any of these techniques have been employed to date. A change in the appearance of one Soviet MRBM site at Yel'sk between [redacted] missions of June 1961 and April 1962, initially suggested the possibility of camouflage. However, upon more detailed analysis, we have concluded that this change was caused by an increase in natural vegetation and by the greater shadow in the April 1962 coverage. The lack of any attempt to conceal roads, rail lines,

housing and support facilities at this and other sites or the main service road also weighs against the likelihood that deliberate camouflage has been attempted. We feel confident that none of the ICBM or MRBM sites observed in good-quality photography are dummies, and analysis of the whole body of [redacted] photography of missile sites has uncovered no evidence that any of them are dummies.

5. The chances of any large scale and successful concealment seem very remote at present in the light of our observation of numerous strategic missile complexes under construction [redacted] progress observable in repeated coverage [redacted] and distinctive. They involve extensive installation of roads and support buildings as well as launchers themselves. In the case of ICBM complexes, extensive rail support is also installed. Complete concealment of missile complexes against overhead observation would be extremely difficult and expensive, and during the construction [redacted] period, which lasts many months, virtually impossible. Thus, we do not believe that the Soviets could achieve much success by these means against [redacted] photography of the quality and frequency now being

obtained. For similar reasons, we do not believe the Soviets could effectively deceive us through the widespread construction of dummy sites.

6. We do not exclude future Soviet attempts to thwart US photographic intelligence collection and to compound targeting problems by the use of camouflage and deception. For the present, however, Soviet efforts to enhance the survivability of missile forces have taken other directions. Missile complexes have [redacted] over the USSR, launch sites have been [redacted] and surface-to-air missile sites have been deployed at ballistic missile complexes to provide protection against air attack and reconnaissance. Security measures have included concealment from ground observation and the imposition of strict communications security procedures. More urgent survivability measures are now indicated by evidence suggesting construction of hardened ICBM launchers and by attempts to reduce reaction times throughout the missile forces. No effort at hardening MRBM/IRBM sites has been observed. In addition to the survivability measures already described the Soviets apparently are relying on the use of alternate launching positions to protect these forces.

[redacted]

7. We conclude that for the next few years Soviet efforts to assure survivability of long range missile forces are more likely to emphasize the reduction of physical vulnerability and the improvement of operational capabilities than the widespread use of camouflage or deception. We believe it even less likely that the Soviets would attempt concealment of other major targets.

[redacted]

[redacted]

[redacted]

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[redacted]

C E N T R A L I N T E L L I G E N C E A G E N C Y

OFFICE OF NATIONAL ESTIMATES

8 June 1962

SUBJECT: SOVIET CAPABILITIES TO COUNTER HOSTILE SATELLITES

THE PROBLEM

To assess Soviet capabilities to [redacted] US reconnaissance satellites -- with and without the use of nuclear weapons -- during the next year or so.

DISCUSSION

1. The Soviet leaders almost certainly perceive an urgent requirement to develop a capability to counter US reconnaissance satellites. They know the general objectives of US satellite programs and realize their potential military uses. They may not know precisely what success US reconnaissance satellite programs have had to date. However, extrapolation from U-2 photographic capabilities, combined with an analysis of recent US open-source references

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[redacted]

to satellite programs and official statements of relative military strength, would have led them to conclude that the present US capability is significant. Therefore, although we have insufficient evidence to determine that the USSR is or is not developing an anti-satellite capability, we believe it almost certain that such a program exists.

2. We estimate that the Soviets recognize that a number of intercept techniques are feasible [redacted] components of intercept systems [redacted] facilities, missiles, and warheads from other systems. We believe that a relatively simple system could be developed with these components. It would be based on near vertical intercept shots following determination of the target satellite's orbit after a few passes. However, we would expect that the complex communications between tracking and control stations necessary to determining orbits, would have to be proved out by extensive practice prior to an actual intercept attempt. Such practice has not been identified in COMINT; nor is there certainty that it would be.

[redacted]

I. TRACKING FACILITIES

3. Although we have not identified a system for tracking non-Soviet satellites in [redacted], we have noted Soviet interest in passively tracking US satellites on a number of occasions. We believe that adequate radars and passive tracking facilities are available to enable the Soviets to determine within several miles the orbital parameters of US satellites within the first six passes. The capabilities of Soviet equipments are enhanced by the comparatively large radar cross section and [redacted] satellites. [redacted] if desired, the Soviets cannot rely upon such factors for their anti-satellite system.

II. INTERCEPT VEHICLES

4. A relatively simple solution to the intercept problem is to [redacted] launch a ballistic missile on a near vertical trajectory so as to intercept the satellite at or near apogee of the missile. The USSR could use an existing operational medium or intermediate range missile or the intercept vehicles probably fired on a number of occasions from Sary Shagan and Kamchatka against incoming target missiles.

[redacted]

For an early attempt, we believe that the Soviets would more likely use an MRBM or IRBM, which have proven reliability and large radii of action for the intercept.

III. WARHEADS

5. Conservative calculations indicate that the lethal radii of the various types of radiation produced by a nuclear burst in space are measured in tens of miles for weapons of medium yield. Therefore, to nullify a satellite with radiation [redacted] ments would not be [redacted] if the intention is to [redacted] or burn out the circuitry in a reconnaissance satellite. It is most likely that such intercepts would be attempted in uninhabited areas unless serious risks of retinal burns to populations are accepted. The USSR could also use a fragmentation warhead or a cloud of pellets, but the extremely high accuracy requirements would probably necessitate a number of intercept attempts after the satellite had been in orbit for a day or two. An intercept by fragmentation warheads need not become public knowledge, whereas use of nuclear warheads would almost certainly have international repercussions.

[redacted]

IV. CONCLUSION

6. At present, the USSR probably has the hardware and the know-how necessary for devising a method of intercepting a US reconnaissance satellite. However, we have no evidence that the Soviets have actually integrated the components for this purpose. They could have such a capability in being; if not it could be acquired soon. An early capability is more likely to require the use of a nuclear than a fragmentation warhead, although it would be difficult politically to use nuclear warheads repeatedly. [redacted] ballistic missile systems are developed further, Soviet ability to counter hostile satellites will increase. The USSR will probably be able to intercept US satellites of current models within the next year or so. The odds favoring such an interception would diminish with the adoption of available countermeasures.

8 June 1962

MEMORANDUM FOR THE DIRECTOR OF CENTRAL INTELLIGENCE

SUBJECT: Soviet Knowledge of US Reconnaissance Satellite Programs

1. Statements by Soviet officials and articles in the Soviet press and publications reveal only such specific knowledge of the US reconnaissance programs as has been readily available from open sources in the US press and technical journals. Such information relates to the SAMOS and MIDAS in considerable detail and in lesser degree to the DISCOVERER series although the [redacted] clearly described. Specific details [redacted] have included the size of an object on the ground that can be identified from the photography, the method used in recovering the photographs, the organization for processing the photography as well as for [redacted] incorporating the results in SAC target folders. [redacted]

2. Through their intercept and tracking facilities, the Soviets can determine the orbital parameters of US satellites of present models. By intercepting telemetry from the satellites, they can probably verify the radiation measurements and other experiments are being conducted, and can learn of the functioning of certain components. With the possible exception of [redacted] collecting satellites, we believe that the Soviets cannot conclusively determine whether

[redacted]

or not other satellites have, in fact, reconnaissance missions. On the other hand, we are sure that they are estimating with a considerable degree of confidence but obviously not with certainty, that many US satellites have this mission.

3. In view of Soviet monitoring of the programs and their ready access to voluminous technical information in the US press and technical publications there can be little doubt of their knowledge that [redacted] photography is probably much less precise [redacted] of the quality of U-2 photography plus what they get from analysis of recent US open-sources on satellite programs and official statements, they probably conclude that the [redacted] is substantial.

[redacted]

Soviet Ability to Acquire Knowledge by Monitoring the Vehicle During Its Flight

4. [redacted] by SAMOS and DISCOVERER is telemetered on demand as the satellite passes over US ground monitoring stations and presumably could be intercepted by Soviet monitoring facilities. Because of the telemetry system used it is extremely doubtful that the Soviets could read the data contained in SAMOS transmissions and impossible in the case of DISCOVERER.

[redacted]

[redacted]

5. [redacted] It is considered unlikely that these transmissions can be intercepted by Soviet monitoring stations but the possibility cannot be excluded. There are no known instances in which the Soviets have alluded to their capabilities in these fields.

6. DISCOVERER II may possibly have been recovered by Soviet personnel on Spitsbergen [redacted] apparently landed [redacted] friendly personnel. This capsule was equipped for biomedical experiments but contained no live specimens. In the event that Soviet personnel recovered the capsule it contained no equipment or photographic film which would have disclosed reconnaissance [redacted] capability.

7. Soviet recovery of any future capsule in this series is unlikely. Only by a combination of complete system malfunction and their own good fortune could the Soviets recover a capsule. A Soviet attempt at triggering the de-orbiting process might possibly prevent US recovery but would not accomplish descent on Soviet

[redacted]

territory. The command transmitter and receiver system is active during orbit only when within range of US tracking stations. Any attempt at control of a satellite by a command signal from Soviet ground stations would be detected by US stations and its effect negated. Even if a successful eject command was sent by the Soviets the capsule would descend into the Pacific and sink.

Information Revealed in Open Soviet Sources

8. A lengthy article [redacted] Plans and International Law [redacted] journal, International Affairs, published in October 1960 includes specific details which have appeared in US open sources.

9. The following excerpts are pertinent quotes by G. Zhukov and other Soviet writers from US publications:

"The SAMOS system is scheduled to become operative in 1962. The plan is to put a number of these spy satellites into a polar orbit to keep the territory of the USSR and the other Socialist countries under constant surveillance."

[redacted]

[redacted]

"Available lenses and TV equipment will make possible photographs equivalent to what can be seen from an altitude of 100 feet."

"Its functions will be to spot missile launching pads, airfields, industrial plants and any massive build-up of Communist military equipment."

"The SAMOS project is closely related to the development of [redacted] latter is to [redacted] sensitive to rays emitted by hot gases formed during the launching of rockets."

"SAMOS satellites detect missile bases, MIDAS will register the launching of missiles."

"Closely related to SAMOS and MIDAS is the program for employing DISCOVERER satellites for intelligence purposes. DISCOVERER satellites are intended to solve the problem of bringing containers with photographic intelligence back to earth."

[redacted]

"The main purpose of the DISCOVERER program was to perfect the launching, orbiting, and retrieving of the sky-spy containers."

"SAMOS II launched on 31 January 1961. However, the satellite's equipment worked for only two weeks and its capsule with photographic equipment could not be returned to earth."

10. [redacted] January 1962 has an article, "American Spies in Space." This article presents details on the firings, orbits, missions, and other details concerning SAMOS, MIDAS and DISCOVERER.

Other Information Available from US Press Sources

11. Exhaustive details are available in Aviation Week and Space Technology relating to the manufacture, performance characteristics and construction details, including photography of components, of the AGENA vehicle which launches SAMOS, MIDAS, and DISCOVERER. Missiles and Rockets reporting on the launching of SAMOS III stated that:

[redacted]

"Its polar orbit will carry it over the Soviet Union at frequent intervals. Ground stations will be able to turn its camera on by radio as the satellite crosses Russia or other points on the earth surface."

"Such a flood of photographs is expected from the camera carrying satellite that a photoanalysis unit at the Air Force test center at Sunnyvale, California is being enlarged by between 30 and 50 people. [redacted] day to process photographs of [redacted]

"At the same time a photo unit will be activated at Strategic Air Command Headquarters, Offutt Air Force Base, Nebraska, to undertake target-planning activities from the SAMOS photos for use by Strategic Air Command bomber and [redacted] missile crews."

"A UPI story stated that the SAMOS satellite actually would be of greater espionage value than the MIDAS. The SAMOS, which sends televised pictures back to earth, can detect a missile being set up on the ground, even before a launch.

[redacted]

Soviet Clandestine Collection

12. A Soviet engineer with AMTORG in New York asked an FBI source to get for him 100-foot reels of 35mm film containing photographs taken by TIROS I. Seven rolls of such film with an accompanying pamphlet identifying each photograph were subsequently delivered to him by the FBI source. Our evidence of other clandestine collection efforts has not pointed so specifically to targets related to the US reconnaissance [redacted]

[redacted]

Estimated Soviet [redacted]

13. Soviet accomplishments in the field of optics, camera geometry, films and film processing are probably not equal to those of the US. They have not had the experience in building [redacted] systems such as have been built and tested by the US and [redacted] may not have learned certain techniques now familiar to [redacted] technicians.

14. Soviet scientists apparently were impressed by the high quality of photography recovered from the U-2 in 1960. Statements by Soviet officials and scientists subsequent to this incident bear out the impression that there was surprise at the information being

[redacted]

collected. Extrapolating from this knowledge of US technology in 1960 Soviet scientists can readily calculate that when the US has a fully operational system in this field it will permit photographic resolution of objects 10 to 20 feet on a side.

[redacted]