

15 June 1961

MENCRATION FOR : Deputy Director (Plane)

THROUGH

: Acting Chief, Development Projects Division

SUBJECT

: Interference with COMMA Recovery Operations

1. This morentum is for your information.

that the Soviets may be able to either interfere with our successful recovery operations or physically recover the especial thouselves. I am not sure of the specifies in Dr. Lond's equeum since this was reported by the himself received the query second hand from I understand is still intending to raise this question with you at your moving on Friday, 16 June. The following is a summary of the system and its method of operation.

3. The AGENA vehicle contains the following equipment:

An 8-band receiver, 2850 ace, which receives commands to perform various functions from the ground.

A transmitter, 2920 mes, which sends back acknowledgement of the receipt of commands.

A telemeter transmitter, 237.8 mos, which monitors events in the AGEMA and sends back confirmation that commands have been executed.

A CV reder beacon, 232.4 mcs, to mid in tracking by ground reders.

The above equipments are turned on and off automatically by the AGENA programmer tape. Hominally the above equipment would be off, unable either to receive or send, except when in range of our ground station network. In addition, an AFL beacon sending on 162 and 216 use as an acquisition and tracking aid, is on continuously. A flashing light is also programmed on and off at times when the AGENA is expected in view of Buithequien network ground stations.



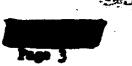
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In Accordance with E. O. 1295b

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- 4. The recovery capsule contains its own belook and belowstry for verification of recovery event congresse. Grand scattel stations this to track and a _ACREA are located at Additional tracking and telemeter emitering stations (unable to sommed) are installed on Christens and Torne Islands and in the recovery ferce vehicles. The extent of our ability to command the ASSEA is, for example, as follows for a noticel one-day exerction consisting of 17 a Control could be LINELL, STORY n maas 2 fysk 6 and 7 from ses 10 and 11 17cm 13 and 14 from passes 15 and 16 from and pass 17 from
- 5. On the omitted passes, we are not in range to emert control and the vehicle equipment is in the "off" condition. The times when AUGMA receiver transmitter equipment is "on" are shown in the attached diagrams of the normal plaumed orbit for the most recent (unsuccessful) AROOM shot.
- 6. As mentioned previously, the functions performed by the AGMA crist, such as turning coners on and off, vehicle eriestation, initiation of recovery sequence, etc., are initiated by a pre-punched programmer tape. In order that the essentials on the tape will be executed at the proper time in relation to the actual orbit achieved by the vehicle, and in order to make other adjustments in the timing of insumme of certain operational commands, the ground stations mentioned previously transmit an encoded signal to accomplish those functions. These commands can be sent only at times when the AGMA equipment is open to receive in order that the commands will be executed.
- 7. Bix commands are used. These commands are actually continuous of four separate and distinct tonce which are sent in pre-set sequence. Command 1 is used to govern advance or retard directions for the function in question. Command 2 governs the extent of the advance or retard. For example, it is accessary to adjust the programmer tage to the orbit period achieved from the one programmed. This is done by the use of equands. Command 3 adjusts the program tage to correspond precisely with pre-selected earth latitudes for the initiation of various functions. Command 4 adjusts the comman V over I setting. Command 5 has been used as an enable or disable signal for recovery on alternate passes. Since DISCOVENER IX, when the programmer timing temporarily stopped, the automatic ejection command has been eliminated from the sequence and the positive issuance of command 5 is the sale means of initiating the sequence of recovery events. Command 6, which is now eliminated, was a skip or repeat command which would in effect

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either report or cont a program sequence on a given pass. In a representative flight economic 5 and 6 were formerly used in launching to time the start and extent of AGEMA engine burning. This has been eliminated with DISCOVERER XXII, which incorporates the Sell Telephone Labo guidance system.

- 8. Once on orbit, commands I through 4 are sent as appropriate to adjust tape to the actual orbit period achieved, set easers V over I, control camera active passes according to intest weather information, etc. The recovery sequence begins with a final versior timing adjustment on the pass prior to the recovery pass. Command 5 is them sent to initiate recovery on the succeeding orbit.
- 9. To illustrate this more electly, the program for DISCOVERER IXIV, uneucocceral, is used. In this instance the tage was cut to permit recovery on the following and only the following pesses: 10, 15, 16, 17, 25, 26, 30, 31, 32, 33, 40, 41, 46, 47, 48, 55, 56, 57, 62, 63, 64, 77, 78, 79. The last three would delay recovery until the fifth day. Recovery is programmed on those passes, and those coly, to include a nominal recovery, alternate recovery orbits as needed by inexact achievement of pre-pleaned crbit, and emergency recovery critic, including recovery at might to take care of coorgancy situations. So long as the orbit achieved falls within the extreme limits of our ability to communicate with the AGERA, the recovery area would fall within either the Borth or South Pacific Goog areas. The extreme case in the progress for DISCOVERER St is cetit 57 on the third day and presuming the highest limiting estital period. In this case the recevery capsule sould descend over a track in the North Pacific, east of Japan, extending about 600 miles across the Chubotsk Peninsula and into the Arctic. This would be a night time descent. Under such circumstances, for others than curselves to effect expedie separation, it would be necessary to know the times when the vehicles. will transmit and receive, the appropriate frequencies which will be used, and the functions commanded by the various signals next. In the worst case, the vehicle could be sent a command to initiate the capsule separation on orbits 2 and 17 when out of range of our stations. These commade can be sent from the Chukstek Feminsula area. However, in the case of orbit 2, re-entry could not take place until orbit 10 and the impact area would be the South Pacific at night. In the meantime we would have orbits 5 through 9 to determine that a false commend had been inserted and to transmit mullification of this. If the command were issued on orbit 17, we would have no opportunity to counterment, but the re-entry would take place in the South Pacific area during daylight along a track processing 180 degrees west longitude, or in mid-occept.



SECRET

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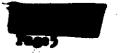


10. Remy attempts to exploit this situation would probably be rather noticeable inseasch as our recovery forces consist of the following:

A planned minimum of 7 0-119's and, if possible, 1 0-130 recovery aircraft.

- 4 NG-191 rader tracking aircraft
- 3 BC-54 telemetry receiver aircraft
- 1 Electra telemetry receiver sirerest
- 3 telemetry receiving and tracking surface ships aligned north and south on nominal receivery track
 - 2 rader tracking ships offset from recovery track
 - 1 destroyer for recovery from the seem
- of effort, including the gathering of the assessmy information mentioned above, and by positioning surface ships either off the Atlantic coast or in the Pacific off California and/or between Remail and Alaska, it would be possible to disrupt our recovery operations. On the other hand, it seems unlikely that within the extreme limits of the AZEMA orbits which possible our successful recovery, it would be possible to simultaneously negate our attempts and perfers a successful recovery of one's own. In a situation where the AZEMA vehicle reaches an orbit beyond the bounds which permit our planned successful recovery, it is possible to communicate with the vehicle and to initiate the recovery sequence at locations also where them described above. However, the exact gaographic alignment would depend entirely upon the degree of eccentricity of the orbit. So far we have had but one instance of this which was DISCOVERSE VIII.
- 12. The automatic initiation of the recovery sequence has been eliminated from the program tape after the experience of DISCOVERER XX when the program timing failed temperarily, causing the entire sequence to be about one/half cycle cub of phase.
- 13. We have quarted both OSI and HEA as to whether strange transmissions on our frequencies have been heard at times when our vehicles were aloft. Although incomplete, so far we have had magntive reports. We did, quite a few mouths ago, request HED to look





into the possibility of changing the command keying sequence. This was rejected because of the possibility of human error in transmission of commands which would differ in function from one shot to the next.

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Attachment:

Chart (w/copy 1 only)

Distribution: