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LM SIGINT SATELLITE SCHED

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Working Paper

4 May 1964

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MEMORANDUM FOR: Chairman, COMOR

SUBJECT: SIGINT Satellite Scheduling

1. The proposed SIGINT Satellite Scheduling and the proposed payload equipments presented by NRO (s) and noted in Tab A to CSWG-M-31/64 have been carefully reviewed. In general, it is believed that the majority of the scheduled systems should contribute to the fulfillment of existing intelligence requirements. Comments and recommendations considered to be applicable for technical guidance for Missions 7157 and 7104 follow.

2. Mission 7157

a. Comments - The acquisition of general search information should be aided by the placement of an analog recorder on the Mission 7157 digital payload. This action is a useful interim measure.

b. Recommendation - That 6 Mc. predetection recording preferably, or at least [illegible] analog recording be planned for use on all future 699 BK (P-315) [illegible] Missions.

3. Mission 7104

a. Comments - The primary objective of guarding against Soviet technological electronics breakthrough requires the methodical general search of the electronic spectrum from 60 Mc. to 12,000 Mc. with a high sensitivity intercept system of sufficient reliability to produce valid positive and negative data. Mission 7104 is proposed to employ an intercept system covering the frequency range up to 9500 Mc. with a system limited in sensitivity to -55 dbm. The probability of the detection of new and unusual emitters above

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[redacted] such as the 7103 Series is far below an acceptable margin. Even below 3250 Mc. the 710X Series systems have been relatively limited to the acquisition of signals from high power circularly scanning radars and have produced no important intelligence data on emitters above 3250 Mc. Mission 7103, after heavy tasking since launch date of 11 January 1964, apparently intercepted a [redacted] signals in the 4650-5150 Mc. range on 11 March 1964. Evaluation of these intercepts indicates that [redacted] was intercepted and it is possible that [redacted] radar was intercepted, inasmuch as the time intervals between intercepts would allow the noted parameter shifts. No indication of emitter [redacted] or emitter location within usable limits could be determined. Approximately [redacted] radars are estimated to be operational and a reasonable assumption would indicate that at least 500 of these [redacted] radars operate in the C Band. The 11 March 1964 [redacted] interception, after two months of tasked orbits, indicated that the Mission 7103 equipment functioned as programmed, but it is of no usable value to the intelligence community. Thus Mission 7103 has demonstrated the extremely low probability of main lobe intercepts from even high powered radars such as the [redacted] type. Since new and/or unusual emitters will not be radiating nor deployed in such quantity as the [redacted] radars, the probability of the detection of such new and/or unusual signals by the less than adequate sensitivity Mission 7104 system is extremely unlikely. NSA has reported no evidence of intercepted signals by Mission 7103's 3800-4800 Mc. receiver. The lack of intercepts in this frequency band by the low sensitivity Mission 7103 system may inadvertently cause the publication of negative intelligence. Such a conclusion could be misleading and promote a dangerous assumption. This condition also applies to Mission 7104 particularly in the higher frequency ranges and could cause false negative intelligence to be generated.

b. Recommendations - (1) That plans for developing the proposed low sensitivity 7104 crystal video receiving system to cover the frequency range above 3250 Mc. should be terminated. (2) That a receiving system with a sensitivity of at least -90 dbm at S Band and -100 dbm at X Band and with a horizon to horizon scan capability be developed for general search purposes.

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Paragraph [redacted] ires Methodical general Search of the electronic spectu m from 60 to 12,000 mc."

The POPPY System approach is consistent with only slight difference(85 to 9 500 mc) in frequency coverage. The plan for POPPY is to extend a demonstrated collection technique, upward in frequency; search out the [redacted] type Medium and High Power emitters in all frequency bands and enhance the NSA automatic processing complex by providing data format which is compatible. (Methodical) evelution of the Planned discrete and deliberate steps have been taken in the POPPY collection system to provide a uniform high quality data without hiatus due to overambitious collection schemes. Some of the Cardinal principles of the POPPY System are: (1)high system-reliability and ultimate long life, (2) Crystal Video type receivers with Unity probability of intercept (3)no False data due to internally generated spurious signals., (4) sensitivity consistent with the Garden-Variety signals which are expected and known to exist in the frequency range of the respective collection experiments, (5) preservation of the Pulse Repetition Frequency and the Antenna Scan Rate of the emitter.

"Mission 7104 .....limited in sensitivity to -58dbm."

The sensitivity of the experiments for 7104 Mission will in fact be tailored for a specific target in each collection bands....4900 to 5300 Mc will have about-65 to -70dbm; 8800 to 9100 to 9500 Mc bands are expected to have sensitivies of about -70 to -80dbm. In general, the sensitivities of Mission 7104 has a planned increase in sensitivity as the frequency of the collection bands increase, in order to assure detection of the lower power emitters anticipated. Specific Information on the characteristics of each "Target signal" for each collection experiment would be helpful in assuring that POPPY will continue to be responsive to the Communities requirements.

[redacted]

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"by the limited sensitivity systems such as the 710X series is far below an acceptable margin". State the [redacted] Power and Transmitter Antenna Gain and the antenna scan characteristics [redacted]. . . . in other words set the priority sequence on the emitters in each band and define the characteristics of the new and unusual signal which is the Target.

Tasking for Mission 7103 commenced on 24 January 1964 and since the orbits were so circular and for other reasons, the tasking was not at all heavy, the record will show how many times the [redacted] C-band experiment was tasked prior to 11 March. The 3800 to 4800 mc band lack of data does not mean that there are absolutely no emitters of less power than capable of being intercepted by a collection scheme with about -55 dbm sensitivity. Definition of the Threat is again the point in question. No one else has reported a Target in this band nor have they defined the characteristics of the unknown emitter for which POPPY should be designed.

Recommendations..... No low sensitivity POPPY 7104 receiving system is being contemplated but what is low??? again, Define the characteristics of the Target.

-90 dbm @ S-band....seriously who will process this??? and HOW??

The problems of -100 dbm at XBand are far less than the -90 @ Sband, but this requirement is not consistent with the POPPY effort at this time....try -75 to -80dbm first and then if the results are negative try for higher sensitivty....the major problem is one of a difference in the basic intercept philosophy. POPPY must preserve both the PRF and the Antenna SCAN RATE in order to enhance the NSA routines in the machine processing area. Interception of the minor lobes of an emitter will to the major extent hide the antenna scan periodicity and thus make it extremely difficult if not impossible to distinguish one emitter from all others of the same PRF without additional information such as DF, Pulse Duration or high-resolution frequency-information along with the PRF data.

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Recommendations (Continued)

"With a horizon to [redacted] scan capability ~~is~~ be developed for general search purposes"....sounds familiar but ~~I~~ don't think this will solve the problems of (1) unity probability of intercept (2) Long Life, (3) Spurious signals due to harmonics and inhibited signals leaking through.....

POPPY systems have demonstrated (1) consitent data with a very HIGH CONFIDENCE FACTOR (no spurious content) (2) high resolution of PRF and Antenna SCAN RATE (3) [redacted] with great potential (4) very little change of collection experiment performance with age of the experiment . (5) long useful life (June 1962 for 7101 and it is still marginally useful).

Any frequency scanning system would consume so much power it is doubtfullif more than one or two bands could be covered in one/payload POPPY and this would seriously reduce the probability of intercept, system reliability and ultimate useful life as well as greatly increase the possibility of spurious data and complete lack of confidence in the product.

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