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Intelligence Sources and Methods Involved

NATIONAL SECURITY INFORMATION

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DIRECTOR OF CENTRAL INTELLIGENCE
SIGINT COMMITTEE
SIGINT OVERHEAD RECONNAISSANCE SUBCOMMITTEE

SORS 8./24
16 October 1981

MEMORANDUM FOR: Members, SIGINT Overhead Reconnaissance Subcommittee

SUBJECT: Impact of FARRAH-I Launch Delay (S/B)

Attached for your information is a copy of the Chairman, SIGINT Committee, memorandum on the impact of FARRAH-I launch delay.

[redacted]

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SORS 8./24

SUBJECT: Impact of FARRAH-I Launch Delay (S/B)

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DCI/ICS/OSC/SORS/[redacted]/dbl/x6606 (16 October 1981)

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DIRECTOR OF CENTRAL INTELLIGENCE
SIGINT Committee

Office of the Chairman

14 October 1981

MEMORANDUM FOR: Director, Intelligence Community Staff

SUBJECT: Impact of FARRAH-I Launch Delay ~~(S/B)~~

REFERENCE: NRO SIGINT Committee Member Memo, Subject: FARRAH-I, BYE-28383-81, 18 September 1981. ~~(S/B)~~

1. On 18 September 1981, the NRO SIGINT Committee Member advised the SIGINT Committee that a problem encountered during FARRAH-I testing will cause a delay in its availability for launch from January 1982 until late April 1982 (Ref). Consequently, the SIGINT Overhead Reconnaissance Subcommittee (SORS) prepared the following assessment of the intelligence impact if HEXAGON-17 is launched without FARRAH-I, thereby delaying its launch until February or March 1983. ~~(TS/B)~~

2. Although the current on-orbit ELINT satellites are able to satisfy a wide ranging number of intelligence requirements for search, technical intelligence (TI), operational ELINT (OPELINT), electronic order of battle (EOB), and COMINT, all have one or more system problems (particularly URSALA and RAQUEL) and are not capable of performing many important aspects of the FARRAH-I mission. These problems are discussed in more detail in the Appendix. ~~(TS/B/TK)~~

3. FARRAH-I will provide a significant incremental capability over the current URSALA and RAQUEL missions. It will provide TI data including waveform internals, wideband spectrum analyses data, and video outputs on both pulsed and CW signals and for both DF and omni data. This is differentiated from RAQUEL which provides these internals only for high duty cycle/CW signals. This capability will enhance both the search and net technical assessment capabilities against modulated pulse signals. Specific features in FARRAH-I which improve search and technical mission production include:

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b. More accurate technical parameter measurements (especially compared to RAQUEL) thus supporting a more thorough weapons system capabilities assessment, improved determination of operating mode changes, specific emitter identification (SEI), and ECM equipment reprogramming and system design.

c. Improved geolocation accuracy with monopulse for CW in addition to pulse; reduction of ambiguities in associating signals with specific equipment.

d. Greater sensitivity to detect low power and power managed emitters (e.g., pulse doppler and CW).

e. Recovery of the 14-16 GHz band lost on RAQUEL.

f. Configuration flexibility to support multiband weapon system component association.

g. Worldwide search and the increased probability of detecting new and unusual signals. ~~(TS/B/TK)~~

4. There will be a significant negative intelligence impact if FARRAH-I is delayed until 1983. This impact, with respect to technical ELINT, Operational ELINT, and COMINT, is contained in the following paragraphs:

a. Technical ELINT Impact

1) The continued lack of search and technical intelligence coverage in the 14-16 GHz frequency range and the declining search capability at other frequencies are of great concern to weapon system analysts. This has resulted in reduced ability to perform technical measurements needed to analyze radar performance and establish system vulnerabilities.

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[redacted]

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25X1 In light of the degraded state of Mission 7300 capability, the need for FARRAH-I collection is critical.

3) Mainbeam TI provides information on effective radiated power and antenna pattern; features not collected as part of operational ELINT. These parameters which can be collected by FARRAH-I are used to determine the radar's role, function, theoretical detection range, target discrimination capability, and other estimates. 25X1

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4) Current Mission 7300 systems do not possess the improved sensitivity offered by FARRAH-I. This is important for the detection of low power radar systems. Because of the sensitivity and buffer overflow problems, and the need to have pre-detected recordings, pulse doppler phased array radar signals associated with the 25X1 cannot be analyzed in any detail from Mission 7344 data.

5) Technical quality intercept of developmental 25X1

etc., is absolutely essential for the formation of accurate, complete threat estimates. Precise threat profiles are required by the Services to develop combat doctrine and materiel to effectively counter, degrade, or destroy the threat systems. Additionally, these estimates enable the Services to evaluate the vulnerabilities of their own weapons systems. Lack of the precise data which could be provided by FARRAH-I, requires reliance on mirror image technology estimates, best guesses or other indirect methods. ~~(TS/B/TK)~~

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b. Operational ELINT Impact

1) Mission 7300 is the primary source of ELINT I&W for the southern hemisphere since [redacted] coverage is limited to the ground station transpond radius. Potential coverage of [redacted] 25X1
[redacted] for example, drops from 116 minutes per day 25X1
down to 76 with the reduction from 3 to 2 Mission 7300 satellites. [redacted] potential to cover this region is approximately 1 minute per day. Prior to the [redacted] invasion, Missions 7300 and [redacted] 25X1
[redacted] 25X1
[redacted] The routine wide area 25X1
search data provided by low orbiting systems were used [redacted] and imagery collection.

[redacted] 25X1

3) [redacted] 25X1
[redacted] Mission 7300 25X1
was the sole collector for slightly more than half of these sites. This data is used by the Strategic Air Air Command (SAC) to cue imagery collection, update the EOB volumes for which SAC has responsibility, and update or change SIOP routes. [redacted] 25X1
[redacted] 25X1
[redacted] It is essential that this data continue 25X1
to be provided to SAC for EOB updates and SIOP route planning.

4) The Air Defense Command (ADCOM) is charged with the responsibility to provide attack warning verification of threats to U.S. satellites. Mission 7300 data on Soviet ABM radar status is essential to ADCOM's mission of space defense.

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5) Both the [redacted] system pose direct threats to frontline Army helicopters and Air Force close air support aircraft. The [redacted] battlefield surveillance radar is an important component of the threat artillery system. All three targets are usually well forward; thus their identification and location outlines the forward elements of both first and follow-on force echelons. This permits cueing of other assets to assist in jamming or destruction operations. However, because of the loss of the [redacted] frequency band on Mission 7345, [redacted] is the only system capable of collecting these signals. The increased sensitivity of FARRAH-I should allow sidelobe intercept thus providing a greater probability to detect the signals on a pass-by-pass basis.

6) Any reduction in Mission 7300 capability seriously reduces coverage of current generation [redacted] Deployments of these systems are monitored almost exclusively by Mission 7300 [redacted] This capability is becoming increasingly important as noted by the recent deployment of an [redacted]

7) Until the launch of FARRAH-I, Mission 7344 is the only satellite capable of encrypted direct transpond operations to a mobile Tactical ELINT Processor (ITEP) located in Europe or other areas where unencrypted direct transpond operations are not permitted. The loss of this capability would severely degrade timely, responsive, contingency satellite support to deployed tactical forces, such as the Rapid Deployment Joint Task Force (RDJTF). (TS/B/TK)

c. COMINT Impact

1) The loss of analog intercept from Mission 7300 would result in a lack of insight into the development [redacted]

2) Without FARRAH-I, evaluation of the [redacted] and [redacted] activity would be limited, reducing the accuracy of I&W assessments.

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3) Without FARRAH-I there would be a loss of an effective ERP capability for all CW targets. This would limit intelligence community assessment of the functions of new and unusual communications CW signals.

[redacted]

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5. In conclusion, technical quality, low orbit collection is absolutely essential in order to maintain the minimal amount of information for analysis of the threat weapons systems which, in turn, supports development of effective countermeasures and EW systems. Also, further degradation of Mission 7300 would severely limit worldwide OPELINT coverage. This ability cannot be compensated by [redacted] Therefore, a delay in launch of Mission 7346 would have an adverse impact upon both technical intelligence and worldwide OPELINT. ~~(TS/B/TK)~~

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[redacted]

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ATTACHMENT
BYE-2154-81

STATUS OF CURRENT ON-ORBIT ELINT SATELLITES

1. Mission 7300

a. URSALA III (Mission 7343) has lost the use of all of its recorders. At present, this system is operating in a transpond mode and is only capable of collecting signals within an 1100 nm radius of a Satellite Control Facility (SCF) [redacted] This is further constrained by the "north-looking" telemetry downlink antenna being inoperative, thus limiting collection to slightly more than 50% of the acquisition circle. Because of the location of SCF [redacted] Mission 7343's role is essentially a limited ocean surveillance system with some residual Third World collection capability. Collection against the Eastern USSR/Warsaw Pack is not accomplished due to the unencrypted downlink of Mission 7343. These constraints limit collection to a nominal 50 minutes per day.

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b. URSALA IV (Mission 7344) has recently experienced an apparent failure of the omni antenna inhibit circuitry. This prevents reliable processing of pulsed singals for geopositioning; CW data can still be collected and processed. Until this most recent problem, Mission 7344 was the healthiest spacecraft in this program. Even so, Mission 7344 has lost the use of 1 of its 3 recorders and has a nominal 210 minutes of collection per day. During periods of low sun angle (normally the October thru February timeframe), this collection is reduced to as low as 150 minutes per day. In the event normal Mission 7344 capability is restored, and should 1 of the 2 remaining recorders fail, then there is a likelihood that readout/readin cycles would be limited in an effort to prolong the life of the recorder, similar to Mission 7345. Also, Mission 7344 is currently the only satellite capable of direct encrypted transpond to the mobile Tactical ELINT Processor (ITEP). Thus, loss of this capability would severely limit operational ELINT support.

c. RAQUEL-1A (Mission 7345) is the only system designed for full frequency collection of signals from 12 to 18 GHz. This system has lost the use of 2 of its 3 on-board recorders and its collection capability in the 14 to 16 GHz band. In order to prolong the life of the last remaining recorder, this mission is limited to 28 readout-readin cycles per week, which translates to 50 to 80 minutes of collection per day. Although this system is valuable for OPELINT support in the 12-18 GHz range, these problems dictate that collection be optimized for TI. Even so, TI is severely constrained.

d. The overall impact of these degradations, as reflected in OPELINT collection, shows that during January 1981, prior to Mission 7343 degradation, combined Mission 7300 collection was approximately 630 minutes per day worldwide. This collection was done during a period of low sun angle (less collection time available). During August 1981, a high sun angle period (maximum collection available) and after the Mission 7343 degradation, the Mission 7300 collection was approximately 390 minutes per day worldwide.

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Because of the Mission 7344 problem, this collection time has reduced further to approximately 190 minutes per day worldwide. Figure 1 shows a history of Mission 7300 problems relative to the FARRAH-I launch date. ~~(TS/B/TK)~~

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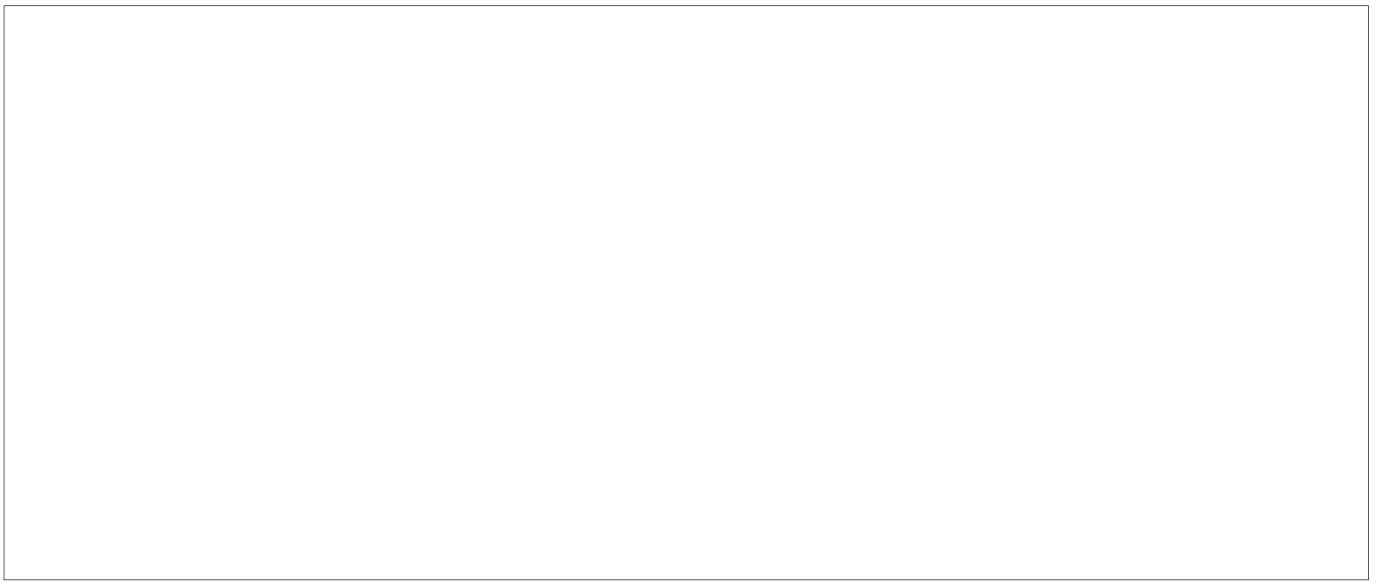

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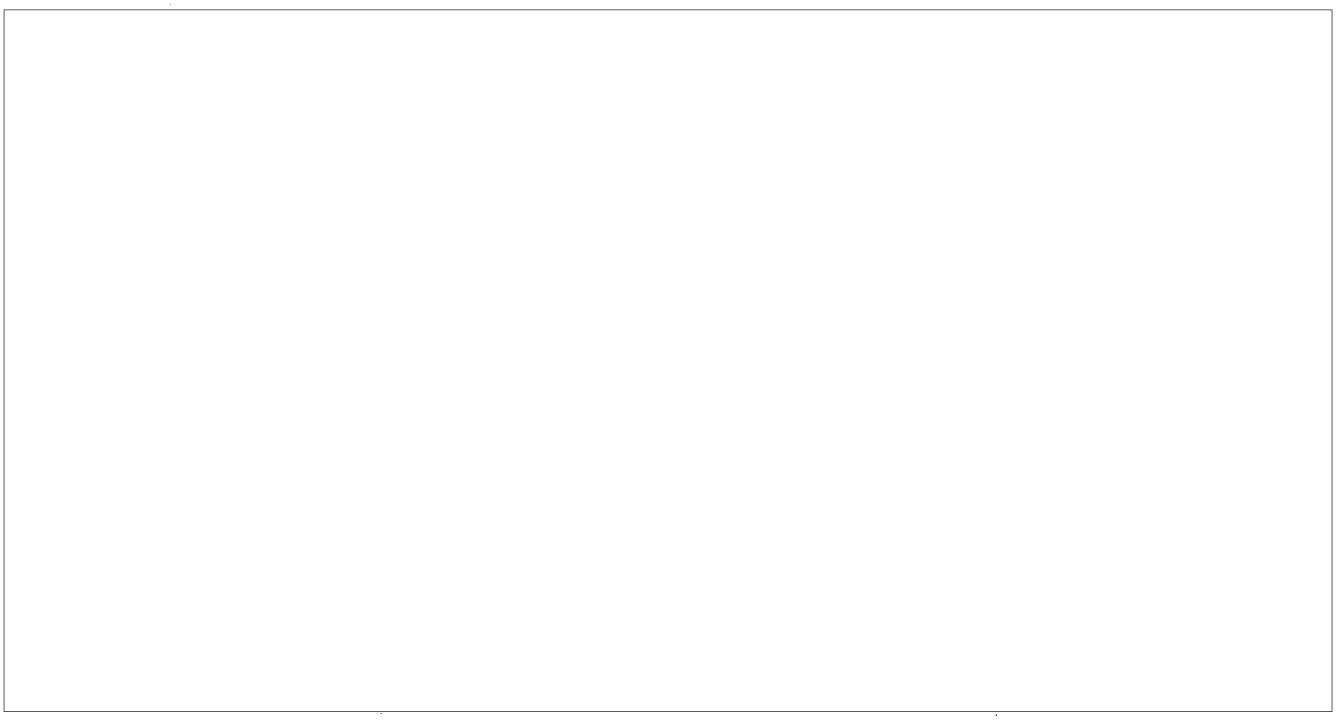

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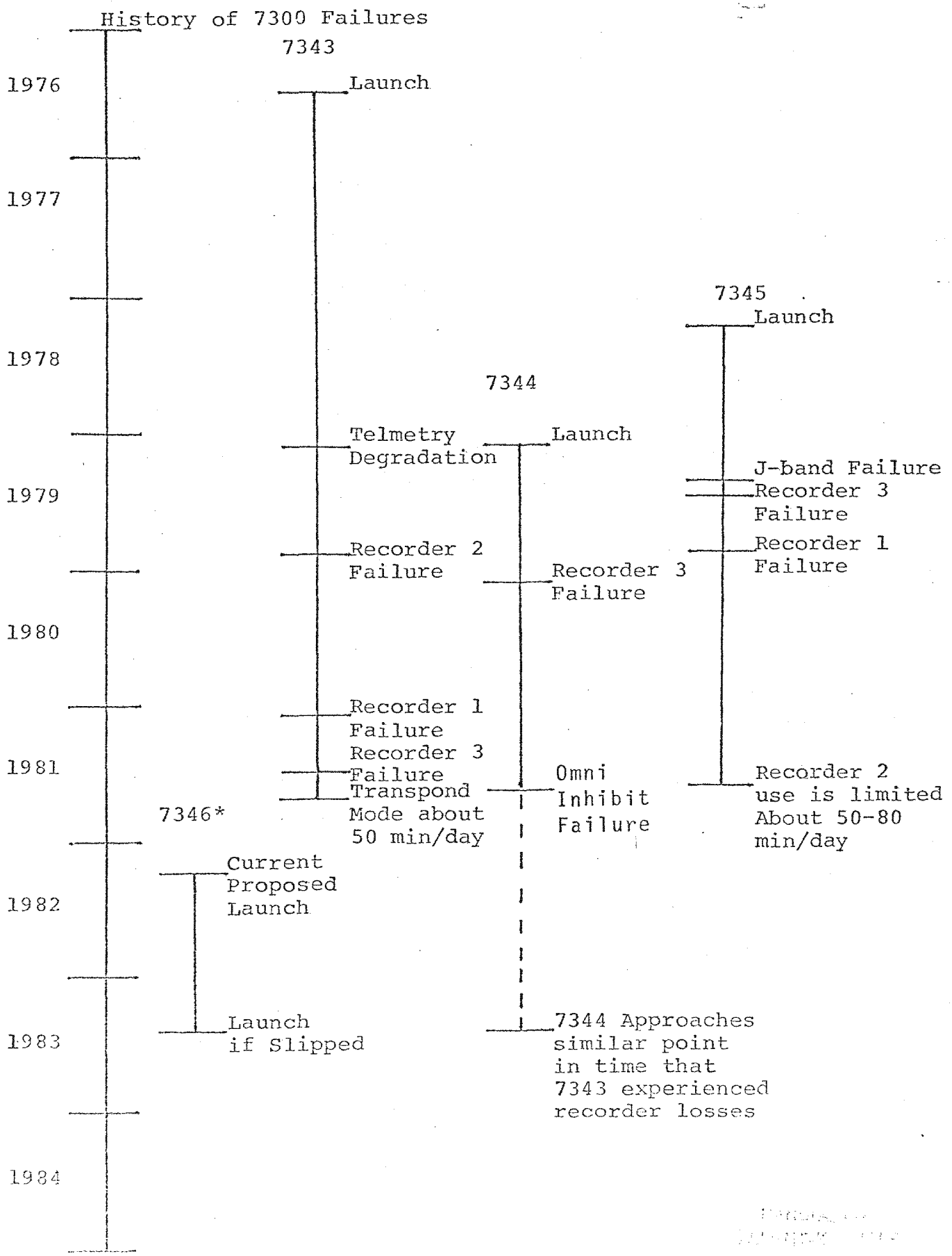

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Figure 1

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[redacted] ~~HEXAGON~~ 25X1

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