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MEMORANDUM TO FILE 10 March 1970

SUBJ: NRO?NRL/NSA Meeting at NRL on concept for Mission 7107....

1. WHIG CITE # 9976 approval for Mission 7107 as per NRL concept of May '69 with several reservations and some general guidance.... Schedule for this "Standard" concept for Mission 7107 discussed identifying the differences in the 2 yr cycle set by NRO and the time required by NRL to accomplish the effort. The difference is a matter of when the effort starts...the 2 yr cycle is only possible if there is a running start so that the momentum carries across the period of Launch and evaluation after launch of the Mission 7106 effort. This presupposed that the NRO approval would have occured before end of July 1969...This did not happen so the 2 yr cycle is no longer a possibility...it will be more like a 30 Month cycle.

2. Failure of two Spacecraft from Mission 7107 (B & D) discussed by PG Wilhelm and Bob Eisenhauer...Most acceptable explanation now seems to fit an RF Interference (RFI) explanation where the spacecraft may be generating a signal that holds the "M" Relay in one position. Several things are being tried:

18 db increase in signal strength to Bird via NASA higher power and G_T.

100% time in sunlight begins about 18 March and this may help.

The Operational Task using "Timer Bypass" is designed to overcome a sick timer...but with a healthy one the timer gives the "Reset" thus eliminating the Safe method of placing the ELINT system in a continuous "ON" Mode.

3-Quick Summary of Operational impact of loss of "B & D"

[redacted]

Parametric Measurement Options Retained and those now Lost....

4- RAPID REPLACEMENT Concept for "QRC" 7107

Major aspects of this concept given along with differences from the May 69 concept for Mission 7107(which NRO just approved)

ELINT coverage for QRC 7107 and Standard 7107 given

Possible items for use in the R&D Spacecraft for QRC 7107.

RESULTS OF THIS MEETING. General agreement that A QRC concept should be advanced by NRL along the lines of NRO and NSA guidance offered. Suggest that a ½ hour briefing be offered to the NRO to explain the differences between the QRC and the STD concepts. Dr NAKA and Gen Lew Allen et al.

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OUTLINE OF MSG TO NRO RELATIVE TO QRC CONCEPT FOR MISSION 7107.

I BACKGROUND;

May concept (S&D concept) formulated 12 months ago and now with the experience of recent loss of two of the spacecraft of Mission 7106, it is essential that consideration be given to (1) exercising reasonable care in the operational use of the remaining spacecraft to minimize the danger of their premature loss, and (2) modification of the recent NRO recently approved concept for Mission 7107 so that the schedule can be accelerated. This latter concern is critical since the spacecraft of 7105 will be three years old in May 1970 and in a situation where 7106 spacecraft are severely handicapped by loss of two spacecraft and the loss of a considerable portion of the cooperative type operational capability for geo-positioning emitters. The Mission 7107 Study Group convienned by NRO staff member [redacted] have met on three ocassions since early Feb and in climate of outstanding constructive innovation the following concepts have evolved.

II: Quick Reaction Concept for Mission 7107 (QRC-7107)

Orbital aspects remain the same as would be desired for the Standard concept for Mission 7107 (STD-7107), i.e. 500 n.mi circular orbit at an inclination of 70° launched by a Thorad Agena from PMR. 4 primary Birds.

Spacecraft Characteristics:

Structure to be similar to those used for Mission 7106 and 7105 befor that...the 27" diameter, 12-sided multiface with estimated weight of about 185 lbs per spacecraft. Structure to be used has been thoroughly documented in Flight so a minimum 66 design problems are anticipated, and a maximum of available spare parts and fixtures are available to further accelerate the production schedule.

GGS System Three axis Gravity Gradient with Boom and Reaction wheel for Stabilization is proposed since it represents the best system thus far obtained in the POPPY Program for attitude control...complete with Attitude monitor system and memory so instantaneous spacecraft-attitude can be resolved after the data is taken. Design goals will be undertaken to provide for occasional inversions of up-Down and Fore-Aft attitudes of the space-craft. Reaction Wheel and Rod type third-axis systems are proposed.

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ELINT COLLECTION COVERAGE PROPOSED FOR QRC-7107 concept.

BAND #	7107A & 7107B			7107C & 7107D		
1	154	to	165 MHz	200	to 350 MHz	
2	165		200	350	450	
3	550		815	450	550	
4	815		970	815	970	••••
5	970		1400	970	1205	
6	1400		1800			
7	1800		2100	1800	2100	••••
8	2100		2580	2100	2580	••••
9	2580		2680	4850	5250	
10	2680		2800	5250	5850	
11	2800		2930	6400	6725	••••
12	2930		3120	6720	7900	
13	3120		3300	7900	8600	
14	3300		3600	8600	9100	
15	3600		4050	9100	9340	
16	4050		4850	9340	9400	
17	5850		6720	9400	9600	
18	14. - 1 . / 14. -1 . /			9600	10800	

NOTE •••• Denotes Commonality of coverage among all four Spacecraft.
Band #1 in 7107A & B not included due to space and antenna limitations
2 in 7107C & D " " " " " " " "
Band # 5 in 7107C & D to have high sensitivity relative to #3 of A & B

SLX & PWX to be available in every band of all Spacecraft.
All Spacecraft to have Three (3) Data Link Transmitters and each Transmitter to utilize a

The operational philosophy for POPPY has for years provided far more operational capability and versatility than have been capitalized on during their lifetime. It is better that the spacecraft have more features than needed rather than the limiting case where features are needed that were not built into the spacecraft. Still it is a good idea to keep the design features well oriented toward the needs of the community, particularily in a QRC development cycle.

Polarization measurement capability to be of the greatest usefulness requires the signal to be (1) Locatable, (2) relative difference between signal levels seen on two orthogonal linear polarized collection antennas be made on a pulse by pulse basis. Orthogonal antennas which are linear polarized can be provided in several portions of the spectrum on each spacecraft. However the frequency bands aboe 1800 MHz provide the only practical potential sue to the limited space for the vertical polarized collection monopole mounting.

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AGENDA FOR NRL MEETING ON ARCHITECTURE OF MISSION 7107 concept:

1. BACKGROUND;

Previous meetings = 9 Feb 1970 @ 4C1000
? 27 Feb @ NSA
10 Mar @ NRL this meeting.....

WHIG CITE 9976 = Approval (with reservations) for 7107...

Areas of concern which remain:

A- Schedule seemingly understood by NRO is a 24 month development cycle following the launch of Mission 7106 (Launch of '07 = Sept 71) This 2-yr cycle was acceptable only if the "Green Light" was given NRL in July 1969 so that a running-start could have been available for the long lead-time items of the 7107 design, and the sub-systems effort could have progressed throughout the lauch-phase and orbital evaluation phase of Mission 7106. This did not transpire however, so that the two year cycle is no longer a realistic estimate.....

2. Summary of Failure of 7106B and 7106D .....P.G. WILHELM

3. Operational impact of the loss of these spacecraft...MAYO

Dual Coverage remaining:

154-165	820-920	2680-2930	6700-6720
165-200	835-970	2930-3120	
350-450	1800-2100	3120-3300	
550-650	2100-2580		

Parametric Measurement Options Remaining: SLX [redacted] in every part of spectrum. High Sensitivity Option OK 7106C = 550-650 &835-970

Parametric Measurement Options Lost= [redacted] & Hi-Sens@1800-2580. Coverage from 14.8 to 15.1 GCs.

4. Potential for Removing or Reducing the Risk of total loss of the remaining [redacted] from mission 7106...
Taking from [redacted] using Timer-Bypass mode,(twice/day)

5. Danger of total loss of Mission 7106 indicates that a Rapid Replacement effort should be undertaken rather than the standard 24-30 month cycle for Mission 7107.....

Thus the QRC Concept for Mission 7107 which can be ready for Launch by 15 months after approval.

The Major elements of this QRC Concept are:

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