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From: NRL

To: TOG

Subject: NSA Technical Requirements for GRAB

Ref: (a) NSA Technical Requirements for GRAB

1. A summary of the comments on NSA's Technical Requirements for GRAB (Reference (a) ) are outlined paragraph by paragraph.

2. Most of these items were discussed in detail at a meeting on 24 January attended by Messers Misner and Wald of NRL and Messers DeCourt, Potts, Conlon, Struve [redacted] Dr. Getchel and [redacted] of NSA.

3. In the first paragraph the statement is made that all the requirements listed must be fulfilled. There is serious doubt if all the requirements can be fulfilled, however, every effort will be made to comply in-so-far as practical.

4. Paragraph 2

(a) This requirement for a recorder to play 1/2 inch tape is a COSA-5 problem.

(b) The pulse width separator required again is a COSA-5 problem.

(c) The methods of obtaining the required accuracy from the tapes outlined are in the reverse order of desirability. Number 3 is the most desirable solution to the time accuracy problem. If the 60 KC signal which will be available on the tape can serve as a clock standard the best results will be obtained. This again is a COSA-5 problem.

(d) NRL will furnish the tapes requested in the near future.

(e) The problem of providing the three "absolutely Distinctive signals" located so they will be intercepted on each pass is an extremely difficult problem. Remembering that many of the passes do not encompass the same portions of the earth's surface, this would result in our agreeing to have these absolutely unique signals provided by the Russians. It is understood that COSA-5 and ONI are attempting to locate in their data, targets with distinctive characteristics which might be utilized. Our limited search disclosed within the United States

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control only four equipments appear to have been built whose frequency lay in the two L-band frequency limits. Two of these were no longer operable, a third in Southwestern U. S. was being removed because of obsolescence and the only remaining one was located in Thule Greenland. This might be of limited usefulness if it is still in operating conditions. ONI is attempting to ascertain its operating status. ONI has also suggested that if the Russian Missile Range ships are operating during the period we are concerned with, their position is accurately known, they are equipped in these L-bands and could be used as unique targets of known locations.

Any program of attempting to provide these unique signals is completely out of the question for the Navy and beyond the scope of this project for the first shot.

This problem will continue to be studied by the intelligence community in the hope of providing the signals desired.

Perhaps another source of data which may assist in the solution of this problem would be the exact crossing times when the satellite passes over the SPASUR stations. It is felt that this data could be readily provided.

(f) It will not be possible to provide the tapes made by flying aircraft at L-band. The scarcity of signals would make this exercise of little meaning. Even at S-band the problems of side lobes present at altitudes of even 30,000 feet would make the records entirely different than those encountered in the normal satellite atmosphere. Also the signal densities would not be representative either. NRL feels this exercise would require an effort which is beyond the scope of accomplishment with the present schedule. It can not be met in advance of the May and July shots. It is felt this request does not represent a valid requirement and would not provide the data desired either.

4. Paragraph 3 (a) requests changes and improvements in the ephemeris tapes. NRL will relay these requirements to NASA and it is felt there is no problem getting them in the future tapes.

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(b) Again requests a test out involving the three signals of "absolutely distinctive" characteristics as outlined in paragraph 2c. Again this exercise will depend on the availability of such signals and perhaps the one we have a hope of getting would be the one at Thule Greenland. It should be remembered that these two L-bands are not frequencies employed by U. S. radars.

5. Paragraph 4 the tone requested will be provided by COSA-5 at the time they make the signal tape duplicate.

6. Paragraph 5 seems to be an attempt on the part of NSA to provide an out for the accuracy of processing etc if anyone of these technical requirements is not fulfilled. It is our feeling that Director, NSA and the cognizant Navy offices view this project as an experimental program in which the opportunity to learn is very great and only by mutual "best efforts" on the part of NSA and the Navy can these problems be solved. The limitations of this program are well recognized and we will attempt to improve its shortcomings as we gain experience in the operation and processing.

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FROM: NSA

TO: TOG

SUBJECT: TECHNICAL REQUIREMENTS FOR GRAB

1. The requirements presented below must be fulfilled in order for NSA to process the data expected from GRAB II & III accurately and on a timely basis. They are presented in the order in which they must be completed.

2. All of the following must be completed at least two weeks prior to the launch of GRAB-2:

a. A playback recorder capable of handling the half-inch, seven-channel magnetic tape at 30 IPS must be installed and checked out in the AUDICO area (MPRO-313).

b. A pulse-width separating device which will pass only pulses of either one of the two widths to be produced, the desired width to be selected by a simple two-position switch, must be fabricated, installed, and checked out in the same area.

c. One of the following methods for maintaining time accuracy must be completed and checked out in connection with the recorder mentioned in A above:

- (1) Circuitry to adapt the output of the present 3160 servo unit to control the capstan speed of the recorder, or
- (2) A replacement servo unit capable of using one of the timing tracks on the tape to control the capstan speed, or

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(3) Modification  CO to accept, as an external clock, one of the timing signals on the tape.

d. Advance samples of the tapes to be provided should be produced under laboratory conditions and forwarded to NSA for checkout of equipment and programs.

e. At least three sources of absolutely distinctive signals should be located so that they will be intercepted on each pass. These are essential in order to determine the accuracy of and adjust both the ephemeris and the results to be obtained from the data.

f. Further sample tapes should be produced under conditions which closely simulate actual operations, using aircraft, and both intercepting and transmitting at the maximum distances which can be achieved.

3. The following must be completed, and results forwarded to NSA for testing, as soon as possible after launch, and before the first operational interrogation:

a. Sample ephemeris tapes must be produced in the precise format specified in Appendix A.

b. At least one practice interrogation must be made in the area of the signal sources referred to in paragraph 2E above, and the results forwarded to NSA for testing.

5. A separate tone of approximately 5,000 cps should be inserted in the data tracks of the tapes, after the start of the timing signals but before any data is recorded. The precise real time of the cut-off of this tone must be included on the label on the tape.

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5. COSA-5 has agreed to assume responsibility for the requirements presented in paragraphs 2a, 2b, and 2c, and can provide the service noted in paragraph 4. FRID-03, NPHO, and COSA will jointly ensure accurate and rapid processing of the data if and only if all of the above requirements are met. Failure to take any of the required actions will result in serious delay, loss of accuracy, or incompleteness in the NSA response.

FOR THE DIRECTOR, NATIONAL SECURITY AGENCY:



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