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UNITED STATES INTELLIGENCE BOARD

MEMORANDUM FOR THE UNITED STATES INTELLIGENCE BOARD

SUBJECT : Current Satellite SIGINT Requirements

REFERENCE : USIB-D-41.14/29 (COMOR-D-13/5), 19 April 1963

1. The attached memorandum on the subject from the Chairman, Committee on Overhead Reconnaissance (COMOR), is submitted herewith for consideration by the United States Intelligence Board (USIB) of the COMOR recommendations contained in paragraph 5. thereof.

2. These COMOR recommendations are that the Board:

a. Note Tabs A and B to the attached memorandum. Tab A is a Summary and Evaluation of Results Obtained to Date from SIGINT Satellites. Tab B is a Summary of Satellite SIGINT Requirements and Collection Guidance Provided the NRO by COMOR. These papers are intended to provide the Board an appreciation of the value of the Satellite SIGINT collected and the way in which COMOR has been acting on the Board's behalf in providing requirements to the NRO for the management of satellite SIGINT packages thus far developed.

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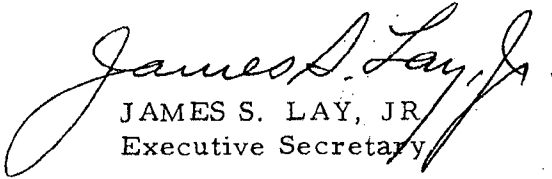
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b. Approve Tab C to the attached memorandum and forward it to the NRO for guidance. Tab C is a proposed statement of Current Satellite SIGINT Intelligence Collection Requirements of a somewhat longer-term nature than the guidance described in Tab B. However, the Chairman, COMOR, advises that Tab C is not intended to be a statement of long-range requirements, which had been the original purpose of the statement submitted for the consideration of the Board in the reference and referred by USIB to NRO for comment.

3. The attached memorandum and the three tabs thereto will be scheduled on the agenda of an early USIB meeting, probably 19 or 26 August.



JAMES S. LAY, JR.  
Executive Secretary

Attachment

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UNITED STATES INTELLIGENCE BOARD  
MEMORANDUM FOR THE UNITED STATES INTELLIGENCE BOARD

SUBJECT: Current Satellite SIGINT Requirements

REFERENCE: USIB-D-41.14/29 (COMOR-D-13/5), 19 April 1963

1. The charter of the Committee on Overhead Reconnaissance contains an instruction by the Board that it should establish requirements for satellite SIGINT collection. Since that instruction was levied, COMOR submitted to the Board on 19 April 1963 its recommendations on long-term satellite SIGINT requirements as a guidance for development of satellite capabilities by the NRO (see reference). Although this report with its recommendations to the Board was not approved by the Board, it had, unlike the recommendations for satellite photo requirements, the full agreement of COMOR. It will be recalled that the Board forwarded this along with the long-range requirements for photo satellite reconnaissance to the Director, National Reconnaissance Office requesting his comments. These comments were received and were the subject of discussions between the NRO and COMOR in the late summer of 1963.

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However, these discussions were dropped when the DIA reported that the Secretary of Defense wished to have a review of the Department of Defense requirements in these areas which were to be submitted to him before going to the Board. Meanwhile, COMOR has endeavored to discharge its responsibilities in this field by advising NRO of requirements for the tasking of present capabilities and by providing interim guidance on objectives and R&D needs.

2. The Board will note that Tab A is a summary and evaluation of the results obtained to date from our satellite SIGINT collection. At Tab B is a summary of the specific recommendations COMOR has made directly to the NRO. In certain cases, technical suggestions better to achieve desired results were forwarded.

3. It is well recognized that the satellite SIGINT effort is in an R&D stage. No one presumes that the existing capabilities are all that we need. All agree that there is a high potential for satellite SIGINT collection in the long-term, earlier in the field of ELINT than in the field of COMINT.

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4. It is in this light that COMOR believes it should advise the Board on its Current SIGINT Satellite Intelligence Collection Requirements interim to the development of a statement of long-term needs. These requirements cover:

- a. General Search
- b. Radar Order of Battle
- c. Directed Coverage:
  - (1) ELINT
  - (2) COMINT
- d. LASER Detection and Recognition.

In this regard, COMOR has attached as Tab C a statement of current requirements which it recommends the Board approve and forward to the NRO. It will be noted that these statements of requirements also include the minimum technical parameters necessary to fulfill our needs. It has not attempted to advise on the engineering aspects in achieving these parameters.

5. Recommendations. That the Board:

- a. Note Tabs A and B and

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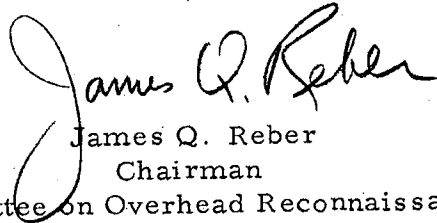
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b. Approve Tab C and forward it to the NRO  
for guidance.

  
James Q. Reber  
Chairman  
Committee on Overhead Reconnaissance

Attachments (3)

Tab A  
Tab B  
Tab C

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TAB A

Summary and Evaluation of Results  
Obtained to Date from SIGINT Satellites

Introduction

1. This paper is presented to review the data collected by SIGINT satellites and to summarize the intelligence contributions made by the SIGINT satellite program. In evaluating this summary of results, it must be recognized that both processing and collection in this program are still in many respects in the research and development stage.

General Search

2. Objective: The prime objective of the General Search portion of the SIGINT satellite program is to collect data on new or unusual signals, particularly those in developmental stages prior to operational deployment.

Comment: The present General Search System (POPPY) has contributed toward the satisfaction of this requirement.\* The POPPY systems have no on-board location

\*CIA considers that although the POPPY system, in the 3300 mc region and below, has a potential for collection of ROB data and has provided a minimum input to satisfy General Search requirements, it should not be

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TAB A Cont

finding capability, although processing techniques are under development which may enable the production of reasonably accurate locations on a small percentage of the vast number of intercepts made by the system.

3. Results: The more significant results in attempts to meet the General Search objective of collecting data on new and unusual signals are listed below:

- a. A signal in the 550 - 620 megacycle range [REDACTED] is suspected to have ABM associations and may have emanated from the Sary Shagan area. It was intercepted on 7 August 1961. Although subsequent attempts have been made to acquire [REDACTED] no further intercepts have occurred.

classified as a satisfactory General Search system. The results achieved to date, as noted in paragraph 3 below, support this view because of the paucity of significant signal data acquired by the POPPY payloads (especially in the critical area above 3300 mc). CIA believes that future launches for General Search purposes should have a satisfactory capability for fulfilling requirements stated in Tab C.

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b. An unusual S-Band signal [REDACTED] is calculated to have a frequency between 3170 and 3280 megacycles and a PRF of 2000 pulse per second. The first intercept was made in February 1963 and numerous intercepts have occurred subsequently. This signal has the characteristics of a tracking or guidance radar and may be SAM related. The majority of intercepts appear to be emanating from emitters located in the general area of Moscow.

c. The Sary Shagan related 98 pps signal [REDACTED] was intercepted by [REDACTED] in September and October 1963 and subsequently by [REDACTED] on several occasions.

d. There have been numerous intercepts of new/unusual signals of lesser significance. For instance, in February and March of 1964, [REDACTED] intercepted at least 11 signals which may represent a new PRF made in TALL KING radars. In addition, a

8

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report describing 37 signals collected by [REDACTED] in  
January and February 1964 has recently been released.  
These signals appeared in various frequency bands and  
are considered to be of interest on the basis of their un-  
usual characteristics or because they could not be readily  
identified. Further signals of interest collected by  
POPPY missions include the L-Band [REDACTED] the unknown  
S-Band signal that resembles an [REDACTED] radar;  
and the C-Band [REDACTED] intercepts by [REDACTED] in  
April 1964.

4. Additional useful by-products of POPPY are:
- a. Contributions to an understanding of the  
Soviet radar environment in the S-Band and lower frequen-  
cies through the large number of known radar types inter-  
cepted. Two reports have been issued on this subject by  
NSA. Additional reports are in preparation.
  - b. Over 10,000 signals have been identified to  
emitter type from POPPY data. From this data, SAC has

9

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produced locations on approximately 1000 emitters, of which 300 have been termed new locations and inserted into the JCS SIOP . It is recognized that these locations are subject to varying degrees of accuracy and must be considered to have a sizeable CEP. Locations for TALL KING radars have provided guidance for the development of "MOON BOUNCE" collection and location techniques.

Radar Order of Battle (ROB)

5. Objective - The ROB portion of the effort is directed at those emitters whose parameters are sufficiently defined to permit a methodical program for acquiring location data, performing periodic sampling of emitter activity, and detecting emitter phase out.

Comment: Because the [REDACTED] vehicles are designed to collect data from a relatively small area at any given time, they are able to provide more accurate locations on a larger percentage of intercepted signals than POPPY.

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6. Results:

a. Thus far in the ROB program, [REDACTED]

[REDACTED] have yielded 207 orbits of useable data.

[REDACTED] launched in [REDACTED] had a lifetime of

11 days and collected data on 118 orbits. Nearly

2000 radar locations have been produced by the [REDACTED]

[REDACTED] to date, about one-half of these from

[REDACTED] Of the 2000 total, 247 are carried as

new locations. It has been estimated that one-third

of the radar positions in the SIOP have been identified

and located by satellite intercepts. The locations produced

are considered to be accurate generally to [REDACTED] and

refinements to the location technique have permitted the

derivation under controlled conditions of locations with

less than a [REDACTED] CEP. Accuracy is less than "desirable"

which is [REDACTED] but "acceptable" when [REDACTED] is achieved.

b. Using parametric information derived from

the General Search Program, it has been possible to re-

analyze [REDACTED] data and determine that [REDACTED] collected

11

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[REDACTED] on at least two occasions. These  
intercepts also emanated from the Moscow  
general area.

c. Confirmation and/or identification of 66  
out of the approximately 170 known or suspected TALL  
KING radar sites both on the periphery and in the  
interior of the Soviet Bloc have been provided from  
SIGINT satellite intercepts.

Directed Coverage

7. Objective - Directed Coverage missions are designed  
to provide information on specific high priority targets and as a  
follow-up to General Search results.

8. Results:

a. [REDACTED]

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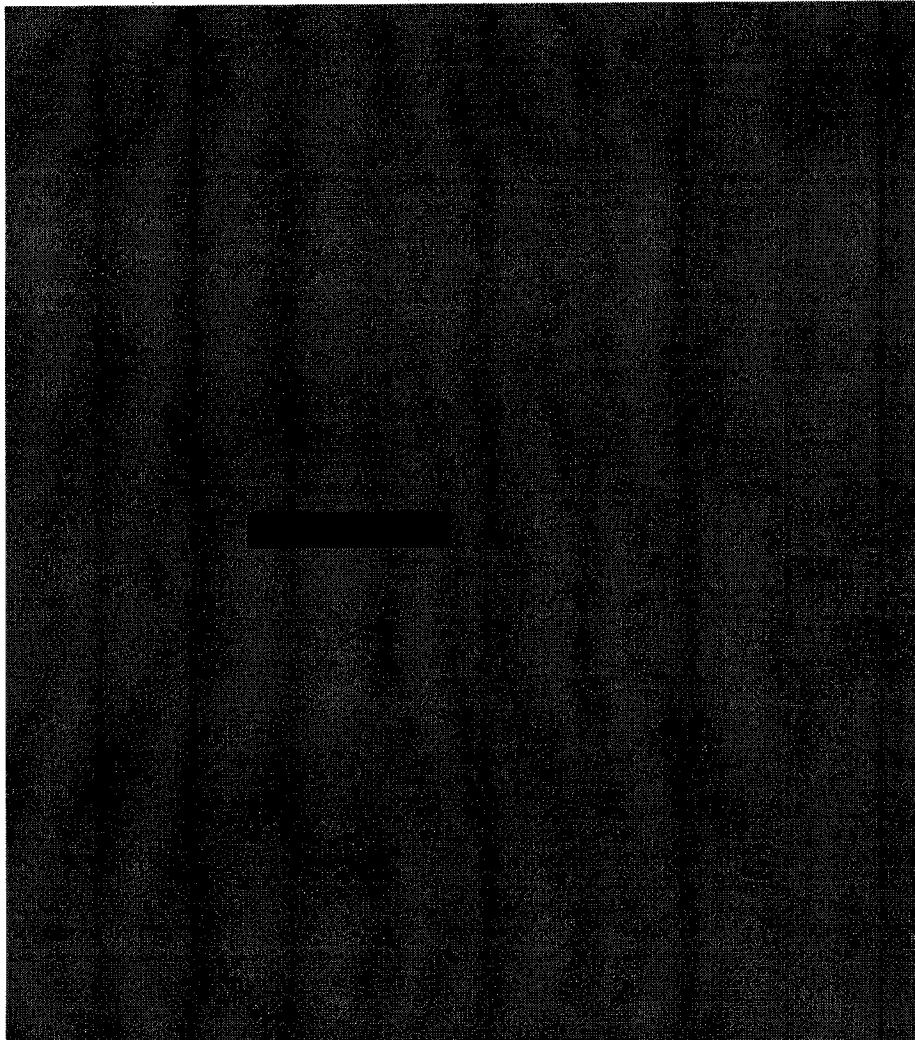
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b. COMINT - At the present state-of-the-art,  
satellites are somewhat limited in the area of COMINT  
collection in that a single vehicle orbiting at currently  
utilized altitudes cannot provide the continuity of coverage

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that is usually associated with COMINT intercept.

However, satellites do provide a capability to sample the contents of numerous COMINT emitters, as well as a location capability. There is also the possibility that the continuity problem may be solved, perhaps by a sequential series of satellites, [REDACTED]

[REDACTED] Although little success has been attained from R&D COMINT missions to date, the probable location of [REDACTED] ground-to-air command data link emitter on Kildin Island computed from doppler measurements performed on data collected by the NEW JERSEY I vehicle on 1 August 1962 has been reported.

c. Radar

(1) The [REDACTED] signal which is of current high interest was first intercepted by [REDACTED] during valid ABM activity on the Sary Shagan Anti-Missile Test Center that involved a high altitude nuclear explosion. The WILD BILL

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Mission 7216, which was configured especially for the signal, was successful in intercepting the [REDACTED] on 26 June 1963 also during valid ABM activity on the SSATC. Three subsequent intercepts were made in September and October by the POPPY General Search vehicle, [REDACTED] as previously mentioned, and two LONG JOHN vehicles designed for the [REDACTED] made three intercepts in November and five in December, producing high quality data. This series of [REDACTED] satellite intercepts would seem to be the most valuable produced by any of the directed coverage missions launched to date. These proved to be of collateral value to the "MOON BOUNCE" program as intercepts of the same signal were accomplished during January and February of this year utilizing the Naval Research Laboratory facilities at the Chesapeake Bay Annex.

15

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(2) Other significant contributions

by directed coverage packages are the 12.5 pps  
signal intercepts by the WILD BILL vehicle in  
June 1963 in conjunction with the first satellite  
[REDACTED] intercepts. The significance of this  
signal is not known at present.

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TAB B

Summary of Satellite SIGINT Requirements and Collection  
Guidance Provided the NRO by COMOR

1. The Committee on Overhead Reconnaissance established a SIGINT Working Group composed of experts from the various agencies participating on COMOR as a means of giving careful attention to the preparation of requirements and technical guidance for the NRO in satellite SIGINT collection, as well as to develop requirements for other overhead reconnaissance of denied areas (for the most part confined to [REDACTED] reconnaissance effort).

2. In order to give the Board some appreciation of the nature of the requirements and guidance provided to the NRO, the following summary is submitted.

Part I

Tasking of Existing Available Satellite  
SIGINT Capabilities

1. The NRO as a routine procedure advises the SIGINT Working Group of the parameters of planned satellite SIGINT collection capabilities. In some instances the NRO, recognizing that choices could and should be made in the available technical aspects, has requested guidance. The guidance provided by COMOR's Working Group

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has indicated priority targets (with the necessary geographic location or emitter frequency) and has recommended the exercise of certain technical options which might best contribute to the satisfaction of intelligence requirements. An indication of the kind of advice provided is indicated below:

a. General Search

(1) On 26 February the NRO was advised of the intelligence requirement for the methodical search of the 30--18,000 mcs. frequency spectrum to avoid technological surprise. The first priority was given to a dynamic collection capability in orbit for covering the 100--10,000 mcs. with further emphasis on the 100--8,500 mcs. Second priority was given to periodic sampling of frequency between 30--100 mcs. and above 10,000 mcs.

(2) In addition, the NRO was requested to obtain on a routine basis an approximate one-hour intercept sample daily over the Sino-Soviet Bloc.

18

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b. Directed Coverage

(1) Specific requirements were provided along with technical guidance and information tolerances necessary to fulfill the stated requirements for telemetry, ABM radar, SAM systems, [REDACTED]

[REDACTED] Soviet COMINT Systems.

(2) Geographic areas were recommended for all directed coverage missions unless tasked against one specific target. The following geographic areas illustrate:

- (a) Sary Shagan Missile Test Range
- (b) Tyura Tam Missile Test Range
- (c) Kapustin Yar Missile Test Range
- (d) Shuang Chenz Tzu Missile Test Range
- (e) UKA - Kamchatka Peninsula
- (f) Soviet Baltic Coast
- (g) Moscow area
- (h) Kola Peninsula
- (i) Soviet-Chinese Border areas

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c. Radar Order of Battle. The NRO was advised of:

- (1) The need for a quarterly update of the deployment of ROB targets (emitters).
- (2) The frequency band in priority order of the maintenance of the ROB.
- (3) The collection information tolerances required.
- (4) A priority need to maintain a quarterly update of the TALL KING Radar Order of Battle.

Part II

Interim Guidance on Satellite SIGINT  
Target Objectives and R&D Needs

1. In April of 1963 the COMOR Working Group prepared specific technical suggestions which COMOR requested the NRO to take into account pending the development by COMOR for the Board of the long-range satellite SIGINT requirements. This paper included comments on the then projected schedule for satellite SIGINT collection,

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the distribution of payloads between the General Search and Directed Coverage payloads, the allocation of frequency bands for ROB, a recommendation on additional frequencies to be covered; the importance of the [REDACTED] COMINT signal, the desirability of the collection against the [REDACTED] objectives, the desirability of an effort against the [REDACTED] radio telephone, the need for continuing efforts to obtain TALL KING location and lobe structure information, and comment on the Directed Coverage for AEM guidance signals. The NRO responded to these suggestions, commenting in turn on each as to what were the possibilities and indicating which suggestions could be adopted at that time.

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TAB C

Current Satellite SIGINT Intelligence  
Collection RequirementsIntroduction

1. This paper presents the Current Satellite SIGINT Intelligence Collection Requirements, and supersedes all similar requirements papers, and, will be augmented by Collection Guidance documents. In determining these requirements no reference was made to a particular satellite SIGINT system or systems to which the requirements might be applied. It should be noted that the collection tolerances contained in this paper are desired goals, and that they do not consider state-of-the-art limitations or cost factors.

2. In outlining the requirements for the satellite SIGINT collection program, attention is invited to the references at the end of each section. These refer to sections of the USIB-approved Priority COMINT Requirements (PCR) and the USIB-approved ELINT Requirements List (ERL), respectively, USIB-S-9.3/10, 19 June 1963, USIB-S-9.3/6, 10 May 1963.

22

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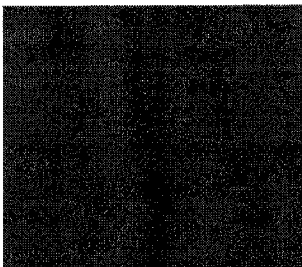
TAB C Cont

General Search Category

3. The objective of the General Search Category is to maintain in orbit a continuous capability to collect data on new and unusual signals, particularly those in developmental stages prior to operational deployment. This General Search capability should produce valid positive and negative data. In order to satisfy the stated objective, the following requirements exist:

- a. Geographic Coverage: The Sino-Soviet Bloc.
- b. Periodicity of Coverage: Daily at random periods of time to insure environmental sampling of the entire 30-12,000 mc frequency spectrum.
- c. Frequency Coverage (30-12,000 mc)

in priority order:





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TAB C Cont

4. Parametric Information Tolerances (Pulsed Emitters);
- a. Detection of signals with a signal-to-noise ratio of 15 db from emitters at the horizon with a radiating power of 100 KW at 3500 mc linearly decreasing to 20 KW at 10,000 mc.
  - b. Measurement and Identification of radiated main lobe signals with  $\pm 10$  db.
  - c. Measurement of PRF within  $\pm 1\%$  at rates up to 5000 pps and within  $\pm 5\%$  above 5000 pps.
  - d. Measurement of signal frequency within  $\pm 5\%$ .
  - e. Measurement of pulse width within  $\pm 10\%$ .
  - f. Measurement of beam width within  $\pm 25\%$ .
  - g. Measurement of scan rate within  $\pm 1\%$ .
  - h. Determination of signal intercept time within  $\pm$  one second.
  - i. Determination of signal emitter location within  $\pm$  [REDACTED] miles.

24

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TAB C Cont

5. Parametric Information Tolerances (Non-Pulsed):
  - a. Capability to detect CW emitters.
6. Relationship of Requirements to PCR and ERL:
  - a. The General Search objectives stated above are consistent with the ERL Requirements related to Priorities 1A, 2C, 3A, 3D, and 3E.

Radar Order of Battle Category

7. The objective of the Radar Order of Battle (ROB) Satellite Category is the identification and location of emitters, the parameters of which are sufficiently defined, to permit a methodical effort toward acquiring location data, periodic sampling of emitter activity, and detecting emitter phase-out. In order to satisfy the stated objective the following requirements exist:

- a. Geographic Coverage: The Sino-Soviet Bloc.
- b. Periodicity of Coverage: Quarterly.
- c. Frequency Coverage, in order of priority:

25

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(COMOR-D-69/10)  
10 August 1964  
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TAB C Cont

- 150 - 175 mc
- 4930 - 5095 mc
- 2600 - 3250 mc
  
- 700 - 915 mc
  
- 550 - 680 mc
- 6550 - 6700 mc
- 8000 - 8100 mc
- 103 - 110 mc



d. Parametric Information Tolerances:

- (1) Location -  $\pm$  [REDACTED] Necessary;  
 $\pm$  [REDACTED] Desirable.
- (2) Measurement of emitter frequency  
 $\pm$  5%.
- (3) Measurement of PRF  $\pm$  3%.
- (4) Measurement of scan rate  
 $\pm$  10%.
- (5) Measurement of pulse width  
 $\pm$  10%.

e. Relationship of Requirements to PCR and ERL:

- (1) The ROB objectives stated above are consistent with the ERL requirements related to Priorities 2A, 2D, and 3A.

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TAB C Cont

Directed Coverage Category

8. The objective of the Directed Coverage Category is to provide information on specific high priority emitters and geographical areas. In order to satisfy the stated objective, the following requirements exist:

a. ELINT Requirements:

(1) VHF Telemetry: To detect, recognize, and locate telemetry transmissions associated with the development, testing, deployment, and operation of Soviet offensive missile systems.

((1)) Geographic Coverage:

Sino-Soviet Bloc. (Specific geographic areas of interest to be provided by the SROI.)

((2)) Periodicity of Coverage:

Continuous coverage with specific collection guidance to be provided as appropriate.

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TAB C Cont

((3)) Frequency Coverage:

60 - 80 mc. Band center frequencies:

61 mc  
66 mc  
71 mc  
76 mc

((4)) Parametric Information

Tolerances:

((a)) Recovery of data

of sufficient quality to permit  
the production of telemetry  
analogs for conversion into  
useable intelligence data.

((b)) Measurement of

emitter frequency of sufficient  
accuracy to identify the noted  
frequency bands.

((c)) Location: Necessary

+ [REDACTED] Desired + [REDACTED]

28

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(COMOR-D-69/10)  
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TAB C Cont

(2) ABM Emitters: To detect, recognize,  
and locate emissions emanating from the HEN series  
or other systems considered associated with the Soviet  
Anti-Ballistic Missile Program.

((1)) Geographic Coverage: Sino-  
Soviet Bloc. (Specific geographic areas of  
interest to be provided by the SROI.)

((2)) Periodicity of Coverage:  
Repeated coverage for continuity with  
specific collection guidance provided as  
appropriate.

((3)) Frequency Coverage: In  
priority order:

- 155 - 165 mc [REDACTED]
- 1100 - 2400 mc
- 150 - 200 mc

N. B. - The suspect ABM related emitter [REDACTED] (550 - 620 mc) has not  
been intercepted since its initial appearance in August 1961 despite  
numerous attempts to do so. Therefore, it is deemed advisable not to  
include [REDACTED] as an ABM Directed Coverage target until additional  
information becomes available to indicate that this emitter is in fact  
active within the USSR.

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(COMOR-D-69/10)  
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TAB C Cont

((4)) Parametric Information

Tolerances:

((a)) Frequency:  $\pm 1\%$ .

((b)) PRF:  $\pm 1\%$ .

((c)) PW:  $\pm 5\%$ .

((d)) Location:  $\pm$  [REDACTED]

((e)) Time of Intercept:

$\pm 1$  milsec.

((f)) Scan Rate:  $\pm 1\%$ .

((g)) Power within:  $\pm 1$  db.

((h)) Beam width:  $\pm 5\%$ .

((i)) Pulse to Pulse Stability:

$\pm 10$  usecs.

((j)) Lobe structure

((k)) Intrapulse modulation to

determine range resolution.

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(COMOR-D-69/10)  
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((5)) Relationship of Requirements  
to PCR and ERL:

((a)) The Directed Coverage

objectives stated above are consistent  
with the ERL requirements related to  
Priorities 1A, 1B, 1C, 2A, 2B, 2C, 3C,  
and 3E.

b. COMINT Requirements: Detection and recognition  
of the following COMINT targets with the capability to furnish the noted  
information:

(1) [REDACTED] To define deployment and  
provide information concerning schedules, frequency  
allocations, and channel activity, and to recover  
sufficient textual content to allow determination of  
users and types of communication:

((1)) Geographic Coverage:

Sino-Soviet Bloc.

((2)) Periodicity: Sustained

coverage for a 60 to 90 day period.

31

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TAB C Cont

((3)) Frequency Coverage:

1500 - 1800 mc.

((4)) Parametric Information

Tolerances:

((a)) Location: + [REDACTED]

((b)) Frequency: + 1%.

((c)) Presence or absence

of signal activity.

(2) [REDACTED] To sample emissions for determining extent and purpose of employment, and to recover sufficient textual content to allow determination of users and types of communication.

((1)) Geographic Coverage:

Sino-Soviet Bloc.

((2)) Periodicity: Sustained

coverage for a 60 to 90 day period.

((3)) Frequency Coverage:

60 to 70 mcs.

32

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(COMOR-D-69/10)  
10 August 1964  
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((4)) Parametric Information

Tolerances:

((a)) Presence or  
absence of signal activity.

((b)) Location: + [REDACTED]

(3) [REDACTED] To determine precise  
locations and inter-relationship of [REDACTED] emitters,  
including the passing of redundant data in adjacent  
channels.

((1)) Geographic Coverage:

Sino-Soviet Bloc.

((2)) Periodicity: Sustained

coverage for a 60 to 90 day period.

((3)) Frequency Coverage: 100 - 200 mcs.

((4)) Parametric Information

Tolerances:

((a)) Location: + [REDACTED]

((b)) Recovery of sufficient  
signal content to identify the users.

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(4) Relationship of Requirements to

PCR and ERL: The Directed Coverage COMINT

requirements stated above are consistent with

PCR requirements related to Priorities IB1,

and IB2.

LASER Category

9. A LASER detection and recognition category is required to maintain cognizance of Soviet LASER developments and applications. This capability should cover the broadest range of frequencies, within the progressions of the state-of-the-art, to achieve the highest probability of detecting and recognizing Soviet use of LASERs for ranging and tracking satellites and missiles. The use of the RUBY LASER with an output of .69 microns can reasonably be assumed to be the initial LASER used, although diverse types of LASERs operating from .61 to 3.2 microns may be anticipated. Therefore coverage of the useable frequencies within the .61 to 3.2 micron range should be accomplished. The capability should acquire useable data which will provide information on the frequency, type, and mode of operation of any LASER signals intercepted.

10. The LASER detection and recognition objectives are consistent with the ERL Requirements related to Priorities 1C, 2B, and 3A.

34

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