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CONTROL NO. BYE 6649/70

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NRL							

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BYEMAN

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....

....

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NRL B-000143-70

TR-1017/70

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GROUP 1
Excluded from automatic downgrading and declassification

DEPARTMENT OF THE NAVY

OFFICE OF THE CHIEF OF NAVAL OPERATIONS

WASHINGTON, D.C. 20350

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IN REPLY REFER TO
OP-923E/rh
BYE 66449/70

5 NOV 1970

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HANDLE VIA BYEMAN CONTROL SYSTEM

From: Director, Program C
To: Director, National Reconnaissance Office

Subj: Program C 7107 Budgetary Status; information concerning

Encl: (1) Revisions in Mission 7107, Budgetary and Technical

1. On 26 October 1970, Program C presented to staff members of the NRO a briefing on POPPY mission 7107 status, including budget deficits, and a proposal for the R&D payload associated with this mission.

2. In accordance with your request, this presentation has been reduced to writing, and is forwarded as enclosure (1).

F. J. HARLFINGER, II

D158

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HANDLE VIA BYEMAN CONTROL SYSTEM

Subj: Revisions in Mission 7107, Budgetary and Technical

Ref: (a) Director Program C ltr to DRNO of 4 May 70,

(b) Director Program C proposal to Dir. NRO of 17 Aug 70, BYE-66387-70
(c) Director Program C Memo to DNRO of 27 Oct 70, BYE-66442-70

Encl: (1) Reproduction of sixteen (16) Viewgraphs used at 26 Oct 70 briefing
(2) Briefing Hand-Out (Table #1) at 26 Oct 70 NRO briefing
(3) Table A, Last four months of FY-70 7106 & 7107

1. Background:

The major emphasis of the Briefing given to the National Reconnaissance Office Staff by a Program C briefing team on 26 October were;

a. The technical aspects of the R&D spacecraft proposed for Mission 7107, to extend the ocean surveillance capability

[redacted]

b. The changes in the architecture of Mission 7107 and in particular, those changes which would enhance the operational capability of Mission 7107 against the Ocean Surveillance requirements.

c. The general cost revisions for FY-71 NRL Budgetary estimates provided in reference (a).

The paper of reference (c) is in answer to the informal questions of the NRO Comptroller dated 14 Sep 70, which relates to some of the material given in this briefing. These related areas will be identified in this paper for clarity. In order that each of the major parts of the briefing of 26 Oct may receive adequate supporting documentation they will be treated in the same sequence used in the briefing and in the same depth of discussion. The briefing was given in order to focus on the most important Mission-Impacting items evident to the Program C Team at this critical point in the mission execution schedule.

2. Technical Aspects of the R&D spacecraft: See Whig 0288 of 031734Nov 70

Chart #1 of enclosure (1) summarizes some information on the ocean surveillance requirements stated in reference (b). It illustrates the fact that rather routine combinations of weighting factors cause the ocean surveillance requirement to become more stringent that the USIB requirement, and the routine requirement is for location to an accuracy of less than [redacted] and a reporting time of less than [redacted] With the augmentation to the POPPY sites of the SEL Systems 86 computer the reporting time requirement will be achieved. The [redacted] routine accuracy and the [redacted] highest priority accuracy is achieved by the existing POPPY system over most of the 3500N.M. horizon to horizon swath width for those intercepts lasting approximately [redacted] or longer.

The second chart, #2 of enclosure (1), lists the radars in two categories. The distinction was made between the radar which a ship routinely must use for maintaining a defensive alert toward hostile ships and planes and those radars which are used in battle conditions. While individual radars might operate in both categories such as [redacted], the weighting of collection priority should first be against the primary radar and supplemented by the secondary radar. The current POPPY system collects and locates almost all of the Primary and Secondary radars. For example, the first shipborne targets the system operated against, in early 1968 were the [redacted] both are [redacted] The emission control exercised on these radars prevents their use in the tracking role that has been so successful operationally against Primary surface [redacted] The R&D spacecraft is a first step in meeting the Navy Ocean Surveillance requirement for locating ships to better than 10N.M. accuracy, with a [redacted] reporting time, to a 95.4% or greater probability of intercept. The R&D spacecraft is to be implemented to develop a [redacted] intercept [redacted]

The next chart #4 of enclosure (1) shows the pictorial representation of the different approaches. The top part of the

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chart shows the intercept circles of the POPPY [redacted] and the [redacted] systems.

The Chart at the bottom shows the accuracy of location as a function of the distance off the orbit track. The [redacted] system meets the accuracy requirements over most of the intercept area except for that area close to the flight line. This is the area where a [redacted] system supplements the location capability of the POPPY system. The location capability of a [redacted] does not meet the ocean surveillance accuracy requirement over a very wide swath width. This is where the superior feature of the [redacted] system is evident. [redacted]

[redacted]

The next chart #6, of enclosure (1), shows the specific band and design goals for the Mission 7107 R&D Spacecraft, which need to be tested in order that it may be [redacted]

3. Changes to Mission 7107:

The next chart #7, of enclosure (1) highlights both planned and proposed features of the Ocean Surveillance augmentation effort.

Chart #8 of enclosure (1) lists specific changes proposed for Mission 7107. Some of these changes are directly applicable in support of Ocean Surveillance. The X-Band Comb-Filter consists of 20 contiguous filters, each with a 20 MHz band width. A separate command is required for each filter. This feature provides a means to de-clutter x-band. [redacted] coverage in all of the primary spacecraft in L-Band, S-Band, C-Band and X-Band allows geopositioning in the frequency bands of the major ship radars so that the Total Weapon-System can be simultaneously intercepted by Mission 7107. The upper band edge of the Band #8 filter to be used in the 7107A & B spacecraft is being raised 40 MHz to match the frequency of the [redacted] emitter and provide in this [redacted] the ability to intercept this emitter in one collection band.

The proposed frequency coverage for the ELINT systems of Mission 7107 are shown in the Chart #9 of enclosure (1).

4. Cost Revisions to reference (a):

The cost details for the Mission 7107 budget revision are shown in enclosure (2) and are provided with the following additional clarification:

Column #1 7106 Failure Analysis:

The differences are shown by line item, between what had been estimated in reference (a) for Mission 7106 during the last four months of FY-70, and what was actually experienced. The increased expenditure on 7106 was a direct result of the failure analysis of 7106 requiring more resources than had been estimated. Enclosure (3) shows, by line item, how the funds were actually expended between Mission 7106 and 7107 during this last four month period of FY-70. The previous estimate, of reference (a), is also listed for convenience. Note the difference between 7106-experienced and 7106-estimates is shown in Column #1 of enclosure (2). There are several significant differences:

Items I-G and II-C: NRL SALARIES & OVERHEAD, shows a large re-distribution toward 7106, from 7107, reflecting the heavier sustained burden imposed by the failure analysis on the distribution of NRL personnel effort. All of the other increases in the 7106 area (I-E, -H, II-A, -D and III-A) represent purchase of additional test equipment components, materials and environmental tests associated with the 7106 failure analysis.

Item I-D CONTROL SYSTEMS, representes components for the 7107 command system. Since the 7106 command system was under investigation, many procurements for command system components for Mission 7107 were necessarily delayed. The remainder of the redistribution in 7107 (Items I-A, -B, -H, II-D and Carryover) are further reflection of the fact that the people at NRL were heavily committed on 7106 and were not able to work on 7107 at the speed and intensity estimated in reference (a).

Column #2 PRICE ESCALATION:

Figures listed in this column of enclosure (2) show the difference between what the line items had been estimated to cost and what they actually cost. Some outstanding examples of these increases are:

Command Receivers - up 64%
Gravity Gradient Dampers - up 54%
Batteries - up 54%

These high percentage increases are quite common in the aerospace industry where the escalation seems to be even worse than in other sectors of the economy. The Program C technical team could not evaluate the magnitude of this price escalation until the last few months when they started to "test the market place" in depth.

Column #3 RECOMMENDED REDUNDANCY:

After completing the 7106 failure analysis, Program C recommends that the redundancy and redesign be included in the command system, power supply, ELINT systems and in other critical areas of the system design so as to attempt to preclude the same type of failures which have occured in Mission 7106. The $45K item in Item I-G is for per-diem labor from the NRL Engineering Services Division to assist the regular POPPY Team in implementing these improvements in redundancy into the systems of Mission 7107.

Column #4 INCREASED OPERATIONAL REQUIREMENTS:

This column of enclosure (2) requires further explanation and therefore several additional viewgraphs were developed for that purpose for the 26 October NRO briefing and are provided as Charts #10 & 11 of enclosure (1).

I. PAYLOAD:

A. Electronic Equipment.

This item is detailed in Chart #10 of enclosure (1) into the following four separate categories:

(1) Band Extension.....$220K

These costs are being experienced in order to complete the frequency coverage for Mission 7107 from 154 Mhz to 18.0 GHz by the addition of three (3) General Search (non-geoposition capable) bands from 10.5 to 12.5 GHz, from 15.1 to 16.0 GHz and from 16.0 to 17.0 GHz. Each of these collection systems embraces a wider RF spectrum than have been incorporated in this part of the Spectrum before; thus requiring considerable development effort and time. These three bands have the lowest priority in the procurement of ELINT components for Mission 7107 and therefore tenatively included on the basis of being available for inclusion in the spacecraft testing and production schedule.

(2) [redacted] Measurement Improvements.....$155K

These costs are invisioned to provide the improvements in the spacecraft ELINT Systems in support of greater calibration uniformity in the [redacted] of Mission 7107. This is to be accomplished by use of improved [redacted]

Another area of payloas improvement planned for Mission 7107 is in the area of utilizing greater Frequency resolution in the collection systems between 9,200 and 9,400 MHz (X-Band) in the 7107 A & B spacecraft. This innovation has great potential for reduction of the data density down to a manageable amount in this very dense part of the radar spectrum. This is achieved by using a series of vary narrow (20 MHZ) contiguous filters with complete command flexibility, both to eliminate undesired signals and to select the most important signals from the background. Note that this last item was included in reference (c).

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(3) K_u Band Geopositioning.....$40K

This improvement in the Mission 7107 operational capability is in direct response to a request by both the NSA and the NRO staff in support of the [redacted] It merely adds one additional collection system to the K_u Band coverage approved for reference (a). This new band is a spare from Mission 7106 and does not require development, only a slight adjustment of the pass band characteristic so that it will cover 14.8 to 15.1 GHz and be flown in 7107 C & D. Thus the [redacted] or geopositioning coverage in K_u band will cover not only the 14.5 to 14.9 GHz region proposed in reference (a) but will be extended to include the 14.8 to 15.1 GHz region also.

(4) Ranging system.....$80K

The most important error source resulting from the use of the present ephemeris data is the calculation of the linear distance between the spacecraft for use in the [redacted] location technique. This expenditure is for an electronic [redacted] ranging system which will accurately and directly measure this distance and thus eliminate this presently significant error source.

B. Control Systems.

(1) Enlarged command system.....$45.K

A much expanded command system is needed to operate the 7107 spacecraft because of additions such as the third transmitter, greater tasking flexibility on the parametric measurement options, and increased redundancy. This cost of $45K is essentially to double the number of commands from 80 to 160 discrete commands for each of the spacecraft of Mission 7107.

C. NRL

(1) Salaries & Overhead.....$44.5K

Once again this is the cost of Per Diem labor in the NRL Engineering Services Division to assist the permanent POPPY team in providing some parts of the improved systems described in Column #4.

II. GROUND STATION:

This item is detailed in Chart #11 of enclosure (1) into the following categories

A. Electronics.

(1) QC Analysis.....$126K

This item is in direct response to the operational requirement to screen each magnetic tape at the collection site prior to selecting certain ones for forwarding back to NSA for further analysis. It is imperative that all sites make their measurements alike and with the same resolution. Therefore a New-Quality Control (QC) Analysis complex has been under preparation at NRL. The prototype of this complex has been shipped to [redacted] for further evaluation and operational shake-down prior to finalizing the design and documentation. These funds are required to update the QC complex at each of the [redacted] will utilize the majority of the QC Equipment now on hand with several small units to be produced at the NRL Electronic Model shops and some repackaging to streamline the operation of these system and eliminate cabling changes during their useage.

(2) System Calibration.....$25K

These costs are directed toward the improvement in the measurement and calibration of the [redacted] in each of the receiver channels prior to data collection. In order to improve the geopositioning accuracy it is essential that the instrumental error be determined accurately and independant of the site noise environment; such a technique is provided by this improved calibration system.

B. Antenna.

(1) System Calibration.....$20K

This improvement will permit test signals to be fed into the system via radiation from a small remote test antenna. Thus the calibration data will include the effects of the receiving antennas as well as the other system components.

C. NRL Salaries and Overhead.

(1) Per-Diem labor.....$30K

This labor charge is directly applicable to the NRL Engineering Services Division for assistance to the permanent POPPY Team in providing the labor to implement the improvements in the ground station electronic systems.

D. A-TO-D Systems.

(1) [redacted] A/DDS.....$140.6K

This item is one that relates to reference (c) and is necessary for the operational implementation of the [redacted] site as a POPPY collection site. No A/DDS system was installed nor programed for the site at [redacted] so there is none available for [redacted] The omission of the A/DDS was an oversite in reference (b), the paper which proposed the "Augmentation of Program C for Ocean Surveillance". The procurement of the [redacted] A/DDS should proceed in FY-71 so as to be available to expedite the development of the advanced Priority or Perishable Date-Extractor (PDE).

(2) Development of Advanced PDE with PRF Selection.....$185.0K

This item also was given in reference (c) as an item for the augmentation of Program C in support of Ocean Surveillance The original PDE is capable of selecting the data from one specific spacecraft collection-band and makes it available to the computer for analysis. The development of this advanced PDE with PRF selection is required in order to select certain emitter families within the specific spacecraft-collection band to be further sorted so that the computer will be relieved of the time consuming PRF selection. This instrument will for the most part be schematically ahead of the Analog to Digital Data System (A/DDS) but with many diverse interfaces with it. It is recommended that the development of this instrument be undertaken on a priority basis and that it be accompanied with the A/DDS production for [redacted]. The PDE proposed in reference (b) will not become obsolescent by this device, just enhanced by the capability for performance of [redacted]

III SERVICES:

B. Computer Services.

(1) Ephemeris (NWL).....$65K

Continuing analytical investigations in the general area of ephemeris data utilization has led to several potentially significant improvements in the accuracy of emitter location by [redacted] method. These investigations, being carried out by highly competent and experienced personnel at the Naval Weapons Lab., require an additional $65K to carry out the next phase.

Generally, the technique by [redacted]

[redacted]

Column #5 BASIC 7107 COST INCREASE:

Shown in enclosure (2) is the sum total of Columns 2, 3, and 4 and as such represents the basic 7107 cost increase.

Column #6 ORIGINAL ESTIMATE 7107 (16 Month period):

This is the sum of the last 4 months of FY-70 plus the 12 months of FY-71 as originally estimated in reference (a). Therefore adding Column #5 to Column #6 results in Column #7 which is the new estimate (without the R&D spacecraft) for Mission 7107 in the 16 month period.

Column #8 R&D PAYLOAD:

This deals with the cost of the R&D payload that has been previously discussed in this paper and further amplified in reference (c). Charges 12 and 13 of enclosure (1) were developed

to show greater detail on the individual line items of Column #8. Referring to Chart #12:

I. PAYLOAD:

A. Electronic Equipment.

(1) Downward Looking DF.....$255.K

This is the estimated cost of the receivers, antennas and onboard processing equipment associated with the [redacted]

(2) L, S, & X-Band [redacted].....$80K

This is the cost of refurbishing spare components from Mission 7105 and 7106. These units are included in the R&D spacecraft for the purpose of supplementing the standard [redacted] capability of the primary Ocean Surveillance collection of Mission 7107.

(3) S-Band Comb-Filter.....$75.K

[redacted]

characteristics. The S-Band Comb Filter will provide another identifying parameter (Radio Frequency) as a substitute for the Scan characteristic as a sorting criteria.

(4) Hi-Accuracy Attitude Sensing.....$170.K

The need for high accuracy attitude sensing for a spacecraft doing any type of DF location is obvious. The approach to be used here to sense YAW and PITCH is unique and potentially very accurate. It relies on reflecting a light beam off the 7107D spacecraft which is several hundred miles away from the R&D Spacecraft, and is always precisely "on the flight line".

(5) Basic TM/DL Data.....$205.K

This is all of the standard electronic systems required on an operational POPPY spacecraft such as transmitters, telemetry, encoders, sensors and memories, etc.

B. Stablization Systems.

(1) Hi-Accuracy Attitude Controls.....$265.K

This is a Reaction Wheel system which has an infrared horizon sensor attached to it. The IR sensor detects pitch errors and feeds this error signal through a speed control circuit in such a way as to minimize the pitch error. This type of system is potentially accurate to fractions of a degree as required for the DF System.

(2) Electric ARC Thruster.....$105.K

This type of microthruster eliminates the one component of the present ammonia-vapor microthruster which has been the most unreliable; i.e., low leak-rate valves. In the electric arc thruster a capacitor bank is discharged across the end of a metal wire (the fuel) thus expelling metal molecules which are accelerated in a magnetic field. This system is potentially very accurate, predicitable, controllable and fail-safe (it can not leak).

(3) Gravity Gradient Boom and Dampers.....$40.K

Required, with the reaction wheel to form the attitude control system.

C. Control Systems.

(1) Stored Command System.....$135.K

This system represents a significant advance in the POPPY Program. This first developmental system will be able to operate the R&D Spacecraft through all of its desired operational modes for a period in excess of twelve hours. This type of system provides considerable flexibility in the operational

Chart #13 of enclosure (1) gives some further detail on the remainder of the items listed in Column #8...specifically:

II. GROUND STATION SYSTEMS FOR R&D SPACECRAFT:

A. Monitor and Record Command Status.....$232.K

This cost is for the development of the ground station

hardware and software to accomplish the monitoring and recording as well as the generation of the stored commands.

III. FACILITIES AT NRL FOR R&D SPACECRAFT:

A. Anechoic Chamber modifications.....$230K

The most important part of a successful system is the accurately measured and documented antenna patterns The present NRL anechoic chamber needs to be modified and improved to adequately perform these measurements. At present, the chamber "distorts" an antenna pattern measured to a degree which is unacceptable in

B. Magnetic and Optical Alighment.....$60.K

In order to align this highly accurate antenna system with the even more accurate attitude sensors, a magnetic and optical alignment facility, which NRL presently does not have, is required.

Charts #14, 15 and 16 of enclosure (1) are provided to summarize the financial status of Mission 7107. Chart #14 simply shows the percentage of each of the five (5) items which added together constitute the deficit (without the R&D Spacecraft) of $2,815.8 K. The only one of the five items which has not been previously discussed is the $98.8K. These funds were withheld, or deferred, from the Mission 7107 financial approval by the NRO. The reason for the deferral apparently was because it was noted that item II-C (NRL SALARIES & OVERHEAD) had increased in the reference (a) estimate for FY-71 by approximately 32% over the amount for FY-70. However the total NRL Salary and Overhead figure for both Payload and Ground station (I-G and II-C) had only increased 11% resulting mainly from a substantial Civil Service raise. The remainder of the increase in the Ground Station personnel costs is in reality a reassignment of some personnel who in FY-70 had worked on the Payload and in FY-71 would be working in the Ground Station area. Referring to the line items of Chart #15 of enclosure (1), a direct comparison can be made with enclosure (2) and (3) as follows:

Line 1 is Column #6 of enclosure (2)
Line 2 is Column #2 of enclosure (2)
Line 3 is Column #3 of enclosure (2)
Line 4 is Column #4 of enclosure (2)

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HANDLE VIA BYEMAN CONTROL SYSTEM

Line 5 is Column #7 of enclosure (2)
Line 6 is Column #8 of enclosure (2)
Line 7 is Column #9 of enclosure (2)
Line 8 is Second Column of enclosure (3)
Line 9 is Column #1 of enclosure (2)
Line 10 is Fourth Column of enclosure (3)
Line 11 is the 7107 portion of the MIPR #FY-7616-71-0031. This is in the amount requested for 7107 in FY-71 as per reference (a) minus the $98.8K which was withheld pending further justification.

Chart #16 of enclosure (1) is the deficit both with and without the R&D Spacecraft for Mission 7107.

BASIC PROBLEM

USIB REQUIREMENT -- 10 NM/24hr.--6 hr reporting

NAVY OCEAN SURVEILLANCE (General):	WEIGHT
A. Ship Location within 500 nm of US ship	.2
B. Mediterranean, Tonkin Gulf, North/ Norwegian/Barents Sea of Japan GI/UK Gap	.2
C. Political Climate (Tension)	.1
D. Any Missile Carrying Craft	.2
	0.7

10 NM or Less Location Acc.
(1 Hr reporting time).

CHART #2
Enclosure (1)

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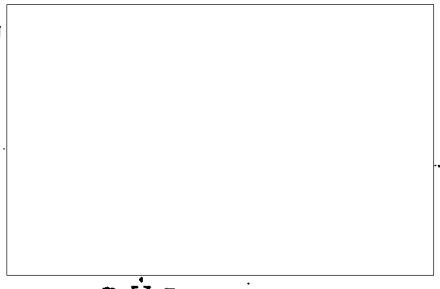
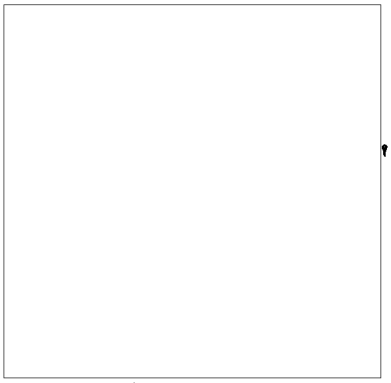
__PRIMARY RADARS__



etc.

All Surface Search
a. Circularly Scanning
b. High Power

..Secondary Radars..



etc.

All have various roles
a. Sector Scanners
b. Low & High Power

CHART #2

17 August Ltr of Program Augmentation for Ocean Surveillance:

1. Improvements in Spacecraft NOI solely for Ocean Surveillance but enhance total impact of program:
   A- Increased timliness of response to user.
   B- Greater use of the X-Band possible.
   C- [redacted] emitter now matched to Band #8 of 7107A/B.

2. SEL-86 Systems for Pacific can both be programmed for FY-73, 6 mo. apart.

3. [redacted] will remain primarily an In-Flight Evaluation site. Some Operational Commands can originate here, but not all visible.

[redacted] should have its own interrogation capability to be selfsupporting.

Chart #2
Enclosure (2)

ARCHITECTURE CHANGES IN MISSION 7107
to enhance Ocean Surveillance:

1. Complete Frequency Coverage to 18 GHz.
2. Geopositioning capability extended to K_u Band.
3. 4-Way Coverage of Shipborne spectrum.
   a-Improves time over target.
   b-Allows intercept of Total Weapon System.
4. Band #8 raised 40 MHz to embrace [redacted]
5. Comb-Filter in X-Band.

Enclosure (1)

1 OCT 70

ELINT COVERAGE PROPOSED FOR MISSION 7107 (QRC-24)

Band No.	Spacecraft 7107A & B	Band No.	Spacecraft 7107C & D
1	154-165 MHz	1	200-350 MHz
2	165-200	2	350-450
3	550-815	3	450-550
4	815-970	4	815-970
5	1800-2100	5	970-1205
6	2100-2580	6	1205-1800
7	2580-2680	7	2100-2580
8	2680-2840	8	2680-2930
9	2840-2930	9	6400-6725
10	2930-3120	10	6700-7900
11	3120-3300	11	7900-8600
12	3300-3600	12	8600-9100
13	3600-4050	13	9100-9340
14	4050-4850	14	9340-9400
15	4850-5250	15	9400-9600
16	5250-5850	16	9600-10,500
17	5850-6725	17	(C) 10.5-12.5 GHz * (D) 15.0-16.0 GHZ *
18	(A) 17.0-18.0 GHZ (B) 12.5-14.5 GHZ	18	14.5-14.8 GHz
19	9.2-9.6 GHZ CHANNELIZED	19	14.8-15.1 GHZ
		20	(D) 16.0-17.0 *
		21	35 GHZ

Enclosure (1)

* Based on availability.

INCREASED OPERATIONAL REQUIREMENTS

1- PAYLOAD:

A. Electronic Equipment

1. Band Extension . . . . $220.0 K
2. Parametric Measurement Improvement. 155.0
3. K_u- Band Geopositioning 40.0
4. Ranging System 80.0

B. Control Systems

1. 160 Commands . . . . . .$45.0 K

C. NRL Salaries & Overhead. .$44.5 K

CHART #1
Enclosure (1)

II - GROUND STATION:

A. Electronics
1. QC/Manual Analysis. . $126.0 K
2. Systems Calibration . 25.0

B. Antenna
1. Systems Calibration . $ 20.0 K

C. NRL Salaries & Overhead
1. Per diem Labor . . . .$ 30.0 K

D. A-to-D Systems
1. [redacted] A/DDS. .$140.6 K
2. PDE with PRF Selection 185.0 K

Total $526.6 K

III - SERVICES:

B. Computer services
1. Ephemeris (NWL). . . .$ 65.0 K

CHART III
Enclosure (1)

R & D PAYLOAD FOR MISSION 7107

I - PAYLOAD:

A. Electronic Equipment

1. Downward Looking DF	$255.0 K
2. L,S,& X-Band [redacted]	80.0
3. S-Band Comb-Filter	75.0
4. Hi-Accur. Attitude Sensing	170.0
5. Basic TM/DL Data	205.0
	$785.0 K

B. Stabilization Systems

1. Hi-Accur. Attitude Control	$265.0 K
2. Electric ARC Thruster	105.0
3. Gravity Gradient Boom and Dampers	40.0
	$410.0 K

C. Control Systems

1. Stored Command System	$135.0 K

CHART #12
Enclosure (1)

II - GROUND STATION SYSTEMS FOR R&D PAYLOAD

A. Monitor & Record Command Status.. $232.0 K

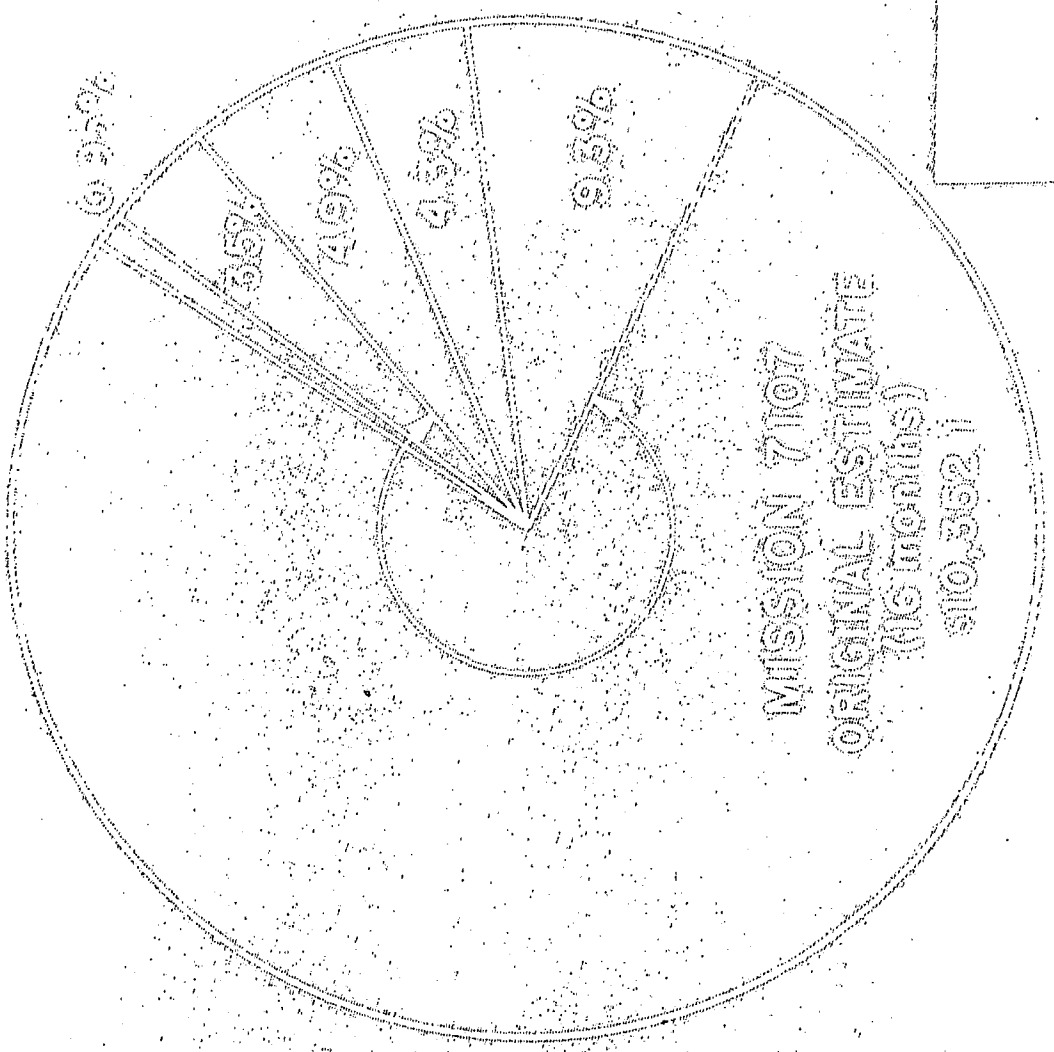
III - FACILITIES @ NRL FOR R&D PAYLOAD

A. Anechoic Chamber Modifications....$230.0 K

B. Magnetic & Optical Alignment..... 60.0

CHART #13

Approved for Release: 2024/06/12 C05026166



SUMMARY OF MISSION 7107 Financial Status

1. Original Budget Estimate (16 Mo)...	$10,352.1 K
2. Inflation.....	625.4
3. Redundancy & Reliability.....	550.0
4. Increased Operational Requirements.	1,176.1
5. New Estimate (NO R&D P/L) (16 Mo)..	12,703.6 K
6. R&D Payload.....	2,062.0
7. New Estimate (with R&D P/L)(16Mo)..	$14,765.6 K

FUNDS FOR MISSION 7107

8. FY-70 (4 Months).....	$ 2,754.7 K
9. 7106 Failure Analysis.....	-365.5
10. Last 4 Month FY-70 costs for 7107...	$2,389.2 K
11. 7107 portion of MIPR #FY7616-71-0031..	7498.6 K
	$9,887.8 K

Changed to Enclosure (1)

Approved for Release: 2024/06/12 C05026166

NAVAL RESEARCH LABORATORY FINANCIAL PROGRAM
DEFICIT FOR MISSION 7107

1. With R&D P/L	2. Without R&D P/L
$14,765.6 K	$12,703.6K
- 9,887.8	- 9,887.8
$ 4,877.8 K	$ 2,815.8 K

CHART # 16
Enclosure (2)

Approved for Release: 2024/06/12 C05026166

TABLE I

	7106 FAILURE ANALYSIS	PRICE ESCALATION	RECOGNIZED REDUND-ANCY	INCREASED OPER. REQ.	BASIC 7107 COST INCREASE	ORIGINAL ESTIMATE (16 MO.)	NEW ESTIMATE (NO R&D)	R&D PAYLOAD	NEW ESTIMATE (WITH R&D)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I. PAYLOAD (DEVEL.-RECUR.)									
A. Electr. Equip. (Data & T.M.)	---	$ 174.6	$ 155.0	$ 495.0	$ 824.6	$ 1,754.5	$ 2,579.1	$ 785.0	$ 3,364.1
B. Stabilization Systems	---	142.0	130.0	---	272.0	383.5	655.5	410.0	1,065.5
C. Power Systems	---	31.9	95.0	---	126.9	154.8	281.7	60.0	341.7
D. Control Systems	---	61.2	125.0	45.0	231.2	310.4	541.6	135.0	676.6
E. Compat. & Envir. Tests	$ 15.0	---	---	---	---	157.0	157.0	10.0	167.0
F. Mech. Struct. & Fab.	---	9.8	---	---	9.8	282.0	291.8	20.0	311.8
G. NRL Salaries & O.H.	256.0	---	45.0	44.5	89.5	2,385.2	2,474.7	80.0	2,554.7
H. Misc. Mat., Travel & Shpmt.	15.0	68.0	---	---	68.0	1,123.0	1,191.0	40.0	1,231.0
	$ 286.0K	$ 487.5K	$ 550.0K	$584.5K	$1622.0K	$ 6,550.4K	$ 8,172.4K	$1540.0K	$ 9,712.4K
II. GROUND STATION (INVESTMENT)									
A. Electronics (Rec.Rec.&Time)	$ 25.0	$ 31.0	---	$ 151.0	$ 182.0	$ 621.0	$ 803.0	$ 232.0	$ 1,035.0
B. Antenna Systems	---	2.7	---	20.0	22.7	63.2	85.9	---	85.9
C. NRL Salaries & O.H.	15.0	---	---	30.0	30.0	883.7	913.7	---	913.7
D. Misc. Mat.,Travel & Shpmt.	24.5	34.2	---	---	34.2	686.8	721.0	---	721.0
E. A - to - D Systems	---	---	---	325.6	325.6	---	325.6	---	325.6
	$ 64.5K	$ 67.9K	---	$ 526.6K	$ 594.5K	$ 2,254.7K	$ 2,849.2K	$ 232.0K	$ 3,081.2K
III. FACILITIES (INVESTMENT)									
A. Test Equip. & Facilities	$ 15.0	---	---	---	---	$ 573.0	$ 573.0	$ 290.0	$ 863.0
	$ 15.0K	---	---	---	---	$ 573.0K	$ 573.0K	$ 290.0	$ 863.0
IV. SERVICES (OPERATIONAL)									
A. Oper. Field Ass't	---	$ 70.0	---	---	$ 70.0	$ 715.0	$ 785.0	---	$ 785.0
B. Computer Services	---	---	---	$ 65.0	$ 65.0	$ 259.0	$ 324.0	---	$ 324.0
	$ ---	$ 70.0	---	$ 65.0	$ 135.0K	$ 974.0K	$ 1,109.0K	---	$ 1,109.0K
	$ 365.5K	$ 625.4K	$ 550.0K	$1,176.1K	$2,351.5K	$10,352.1K	$12,703.6K	$2,062.0K	$14,765.6K

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~~TOP SECRET~~

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

TABLE - A -

~~TOP SECRET~~

HANDLE VIA BYEMAN CONTROL SYSTEM

Enclosure (3)

	Last 4 Months of FY-70			
	Reference (a) Estimated		Experienced	
	7106	7107	7106	7107
I. PAYLOAD (Devel.-recur)				
A. Electr. Equip. (Date&TM)	----	1558.8	-----	1533.4
B. Stabil. Systems	----	135.0	-----	125.0
C. Power Systems	----	-----	-----	------
D. Control Systems	----	172.0	-----	------
E. Compat & Envir Tests	----	----	15.0	------
F. Mech. Struct & Fab.	----	9.0	-----	9.0
G. NRL Salaries and OH	84.0	595.7	340.0	395.0
H. Misc. Mat. Travel & Shpmt	65.0	194.2	80.0	150.9
	149.0K	2664.7K	435.0K	2213.3K
II. GROUND STATION (Investment)				
A. Electronics (Rec. Record & Timing)	50.0	----	75.0	----
B. Antenna Systems	-----	----	------	----
C. NRL Salaries	135.0	70.0	150.0	----
D. Misc. Mat Travel & Shpmt	65.5	20.0	90.0	----
E. A-D Systems	100.0	----	100.0	----
	350.5K	90.0K	415.0K	----
III. FACILITIES (Investment)				
A. Test Equip. & facilities	---	----	15.0	----
	---	----	15.0K	----
IV. SERVICES (operational)				
A. Operational Field Ass't.	100.0	---	100.0	---
B. Computer Services	50.0	---	50.0	---
	150.0k	---	150.0K	---
CARRYOVER.	----	---	-----	(175.9K)
	649.5	2754.7	1015.0	2389.2
TOTALS =	3404.2K		3404.2K	

~~TOP SECRET~~

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY