U. S. NAVAL RESEARCH LABORATORY
WASHINGTON 25, D. C.

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Aug 1963
(FY-64)

Basic Budget Breakdown for NRL Costs on 7100 "Program C"

ITEMS	5430	5170
I. SATELLITE FABRICATION	1,000 K	3,570 K
2. LAUNCH COSTS	20	300
3. Operational Costs	50	200
4. Collection and Quality Control Analysis Costs	1,150	---
	800 K	1490
R/D	270 K	5,630

RESEARCH AND DEVELOPMENT COSTS:

1. Extension of Frequency Coverage	180 K	---
2. Command System	30	100
3. Earth Stabilization System	--	30
4. Frequency Measurement	25	---
5. [redacted]	25	10
6. Reliability Improvement	20	150
	280 K	290 K 490.00
		$ 6,780.

Satellite Costs

Fabrication	4,570 K
Launch Site	320 K
Operational	250 K
R+D	490 K
	5,630 K

Ground Station Costs

Fabrication and Updating	800 K
R+D	270 K
	1070

OK

Grand Total 6,700 K.

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	5170 Costs R & D	5170 Costs Fabrication	5430 Costs R & D	5430 Costs Fabrication	Totals:
1. Vehicle—Satellite Costs					
a. 7103	$185K	$1,500K	$100K	$300K	
b. 7104	165K	2,000K	100K	400K	
C. Payload & Vehicle Integration Costs					
7103		$150K			
7104		200K			
D. Costs of Cover Experiments					
7103B		$ 25K			
7114		30K			
System Tests and Support Costs					
a. Launch CPS (FMR)		$300K			$35K
3. Command and Control Costs:					
a. Interrogation					
7103 & 7104	$50K	$50K	50K	$50K	
[redacted]					
b. Data Collection					
7103		$50K	$100K	$350K	
7104		50K	$120K	$400K	

6,700K

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Budget Estimates submitted with the May-Paper of FY 64 Program.

		5430	5170
Fabrication	$4570K	$1,000K	$3,570 K
PMR site	320K	20	300K
Operational	250K	50	200K
R & D	490K	200K	290K
Ground Station Costs:			
Fabrication and UpDating	800K	800K	
R & D	270K	270K	
	$6,700K	$2,340K	$4360K

Figures to be submitted for [redacted] on or about 14 August 1963 for meeting to allocate FY 64 Funds at NRO.

		5170 R & D/	Fabrication	5430 R & D /	Fabrication
1. a.	7103 (3.Payloads)	$125 K	$1,500K	$100K/	$300K
b.	7104 (4 Payloads)	165 K	2,000K	$100K/	$400K

C. Payload & Vehicle Integration

7103 . . . . . $150K

7104 . . . . . $200K

D. Costs of Cover Experiment

7103B . . . . . $ 25K

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2. Systems Test and Support

a. Launch OPS (PMR). 7103.&.7104 . . $ 300K 20K $35K

3. COMMAND AND CONTROL COSTS	5170 R & D/ Fabrication	5430 R & D / Fabrication
a. Interrogation.(7103.&.7104)	$ 50K/$150K	$50K/ $ 50K
b. Data Collection (7103)	....50K $100K	$100/ $350K
(7104	$50K	$120K/$400K

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	$170 Costs R & D	$170 Costs Fabrication	5430 Costs R & D	5430 Costs Fabrication	Totals:
1. Vehicle--Satellite Costs					
A. 7103.	~~$165K~~	$1,500K	$100K	$300K	
B. 7104.	165K	2,000K	100K	400K	
	290K	3500K			
C. Payload & Vehicle Integration Costs					
7103.	$150K				
7104.	200K				
	350K				
D. Costs of Cover Experiments					
7103B.	$ 25K				
7104	30K				
2. System Tests and Support Costs					
A. Launch OPS (PMR)	$300K.				$35K
3. Command and Control Costs:					
A. Interrogation					
7103 & 7104. .	$50K	$50K	50K	$50K	
~~7104xxxxxxxxxxx~~					
B. Data Collection					
7103.		$50K	$100K	$350K	
7104.		50K	$120K	$400K	
	340K	4325	470	1535	

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Budget Estimat[redacted]tted with the May-Paper of FY 64 Program.

		5430	5170
Fabrication	$4570K	$1,000K	$3,570 K
PMR site	320K	20 XXX	300K
Operational	250K	50	200K
R & D	490K	200K	290K
Ground Station Costs:			
Fabrication and UpDating	800K	800K	
R & D	270K	270K	
	$6,700K	$2,340K	$4360K

Figures to be submitted for [redacted] on or about 14 August 1963 for meeting to allocate FY 64 Funds at NRO.

	5170 R & D/	Fabrication	5430 R & D /	Fabrication	
1. a. 7103 (3.Payloads)	$125 K	$1,500K	$100K/	$300K	= 2125
b. 7104 (4 Payloads)	165 K	2,000K	$100K/	$400K	= 2665

C. Payload & Vehicle Integration

7103 . . . $150K XXXXX . . . 350

7104 . . . $200K XXXXX

D. Costs of Cover Experiment

7103B . . . $ 25K 25

2. Systems Test and Support

a. Launch OPS (PMR). 7103.&.7104 . . $ 300K . . . 20K XXx $35K 355K

3. COMMAND AND CONTROL COSTS	5170 R & D/ Fabrication	5430 R & D / Fabrication	
a. Interrogation.(7103.&.7104)	$ 50K/$ 50K	$50K/ $ 50K	200
b. Data Collection (7103)	$XXXK . . . $50K	$100/ $350K	500
(7104		$120K/$400K	570

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HANDLE VIA BYEMAN-TALENT CONTROL SYSTEMS JOINTLY

6,790K

100Kbit ? 200Kbit

1. Of the three generations of crypto equipment the ~~kkx~~ firsttwe can be eliminated on the basis of power consumption. The third generation equipment (utilizing integrated electronics packages) is the only one that can be seriousl[illegible]ered.

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2. Thisk equipment could be reasonably programmed for missions commencing about two years hence.

3. A certain amount of digitizing and multiplexing equopment would be required. The amount would be significantly less than in the crypto, but large compared to the amount now used. Therefore this equipment would have to use modern techniques. Presumably one would use the same integrated electronics packages as used in the crypto.

4. Certain fringe benefits would accrue from the digitization required to go into the crypto, including--
1. Better PRI measurement accuracy
2. Ability to include PW, subband, etc. information by PCM
3. Better applicability to semiautomatic forward processing
4. Elimination of Audice at NSA.

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5. Disadvantages include--
1. Power consumption up slightly (but within limits)
2. Higher component count
3. Failure of the crypto fails entire mission
4. Maximum prf probably lowered
5. Development of new flight and ground hardware necessitated

RECOMMENDATIONS

1. Current efforts to require crypto should continue to be resisted,

2. We should face up to the possibility that we might be required to use the third generation crypto two years hence.

3. By one year hence we should have developed within NRL the necessary multiplexing and digitizing gear (not necessarily packaged in flight configuration) using the same components NSA uses in the crypto.

4. Twelve to eighteen months from now we will be in a position to take a choice between
a) making no changes
b) flying the digitizer-multiplexer
c) flying both the digitizer-multiplexer and the crypto
in 1965/6 packages.

5. The time has probably come, apart from crypto considerations, to plan to use more modern components in the flight packages. In a sense the crypto requirement gives us a good reason for reconsidering the flight package design philosophy which was very sound in 1958 but which is possibly obsolescent now.

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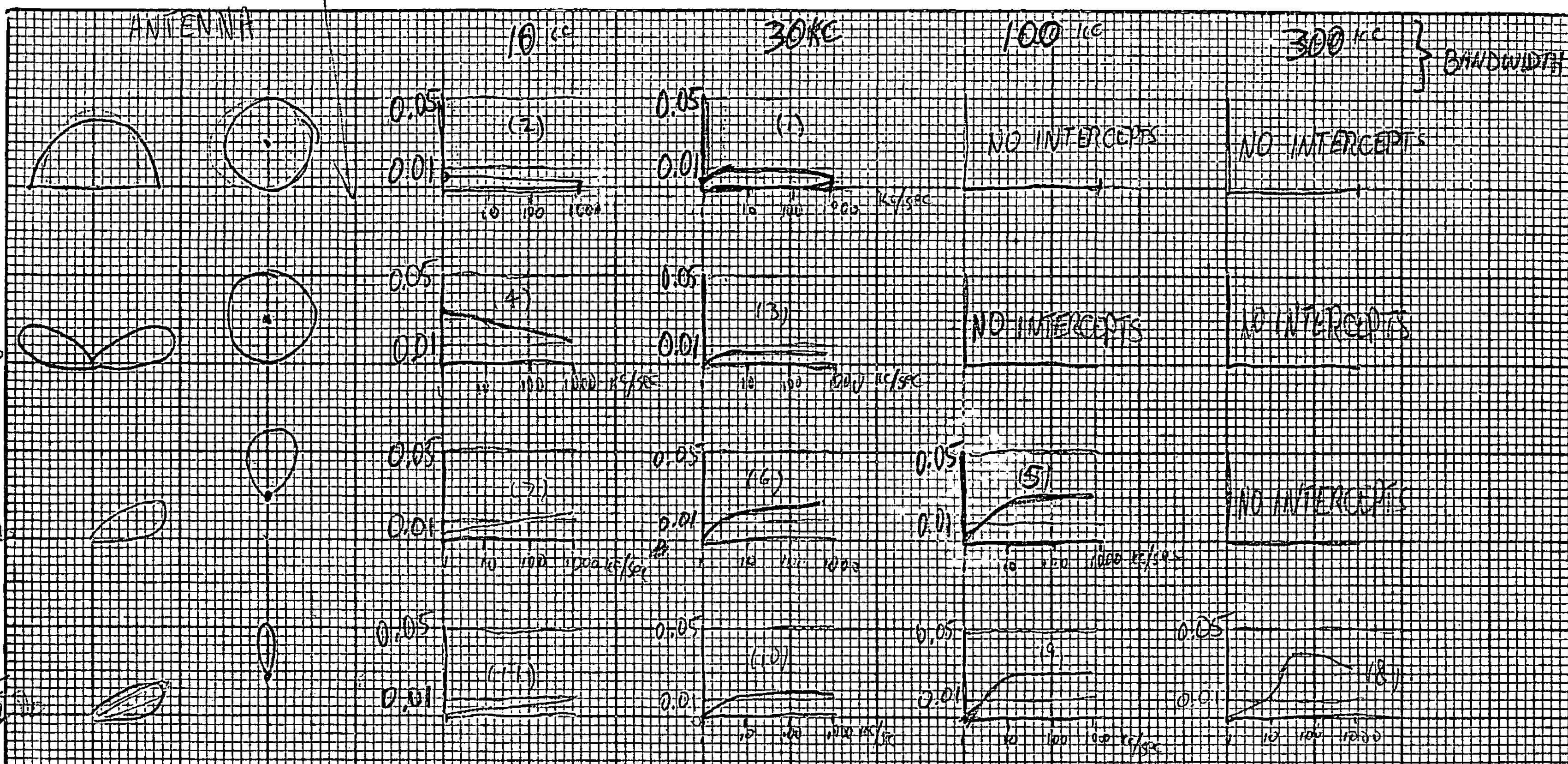
E[illegible]
CONTROL SYS[illegible]/66/BSLY

(PROBABILITY/~~DAY~~) (ASSUMING CONTINUOUS TRANSMISSION)

IF SHEET IS READ THIS WAY (HORIZONTALLY) THIS MUST BE TOP. IF SHEET IS READ THE OTHER WAY (VERTICALLY) THIS MUST BE LEFT-HAND SIDE.



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GRAPH BY

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CONTROL

CROSS SECTION/GRAPH
PRNC-NRL-36-433

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54R06-24 Mr. Lorenzen

POSSIBLE DESIGN. THIS ONE KEEPS TOTAL POWER REQUIREMENTS THE SAME AND USES MINIMAL MUX-LOOP.

	PRESENT SYSTEM	POSSIBLE 2 YEARS FROM NOW
PROBABILITY OF INTERCEPT OF DATA LINK	MODERATELY LOW	SOMEWHAT HIGHER
SECURITY OF DATA LINK IF INTERCEPTED	RATHER POOR	GOOD
REDUNDANCY	SOME	VERY LITTLE
COMPONENT COUNT	LOW	HIGH
MAXIMUM PRF	6 KC	2.5 KC (HIGHER MAXIMUM AVAILABLE AT SACRIFICE OF PRI ACCURACY
PRI ACCURACY	MEASURED WITH A PRECISION OF 17 μSEC BY ANDED ACCURACY IS ACTUALLY COARSER & DEPENDS ON S/N RATIO OF DATA LINK	7 μSEC
CENTROMETER PULSE WIDTH	NO	YES, BUT AT COST OF COARSENING PRI MEASUREMENT
CAPABILITY AGAINST INTERLEAVED PULSE TRAINS	FAIRLY GOOD	FAIRLY GOOD AGAINST LOW PRF, NOT QUITE AS GOOD AS PRESENT SYSTEM
ABILITY TO DETECT COMMON MODULATOR DRIVING XMTRS IN DIFFERENT BANDS	YES	NO
ABILITY FOR NSA TO PROCESS	POOR	PROBABLY GOOD
EASE OF FORWARD PROCESSING MODIFICATIONS TO GROUND STATIONS	DIFFICULT	RELATIVELY EASY BUT REQUIRES DIFFERENT EQUIPMENT

SUBSTANTIAL

POWER BUDGET

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	PEAK	AVERAGE OVER MISSION (Assume 100 pulses/sec AVERAGE OVER MISSION)	COMMANDED BUT NO DATA	LONG TERM AVERAGE (ASSUME 4 MISSIONS/DAY)
PRESENT SYSTEM				
HOUSEKEEPING	2.7	2.7	2.7	2.7
DA[redacted]S	1.3	1.3	1.3	0.3
DATALINK XMTR	4.8	.1	—	0.9
	8.7	4.0	3.9	2.9
PROPOSED				
HOUSEKEEPING	2.7	2.7	2.7	2.7
DATALINK SYSTEM	0.6	0.6	0.6	0.1
CRYPTO	1.5	1.5	1.5	0.2
DATALINK XMTR	4.8	2.4	2.4	0.3
	9.6	7.2	7.2	3.3

HANDLE VIA BYEMAN CONTROL SYSTEMS ONLY

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(OVER)

Approved for Release: 2024/06/08 C05025931
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SINCE SOLARCELL AVERAGE IS 5-9 WATTS

HERE OK FROM CELL AREA STANDPOINT

SINCE AVERAGE OVER MISSION HAS GONE FROM 4 TO 7 WATTS, NEED TO CHECK STORAGE BATTERY CAPACITY, I.E. NEED AN EXTRA 0.1 AMPERE-HOUR OR SO

ASSUME MUX WILL BE MADE OUT OF SAME COMPONENTS AS CRYPTO

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