

Code 5 **Cantrol System**BYE-51911-70
12 August 1970

TOP SECRET HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

From: Director, Naval Research Laboratory, Washington, D. C. 20390

To: Director, Program "C"

Subj: POPPY Support to the Ocean Surveillance requirement

Ref: (a) CNO 171853Z JUL 1970

Encl: (1) NRL BYE-51910-70, Subj: POPPY Support to the Ocean Surveillance requirement, Copies 1 and 2 of 4 copies

1. In response to reference (a), enclosure (1) is forwarded.

H. O. LORENZEN By direction

PAGE 1 OF 1 PAGE COPY 2 OF 9 COPIES



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Introduction

Four alternatives for site enhancement for ocean surveillance are provided, with Alternative A being the proposed NSA approach. Alternative B is substituting the priority sorting (PDE) for the additional Quality Control (QC) analysis complex. Alternative C is the new generation computer with an additional QC position. Alternative D, the NRL favored approach, has the new generation computer, and the priority sorter. The analysis-time required is outlined for each approach the first time it is discussed. Alternative D is favored on this basis.

The discussion on the ZI site is tenative, without knowking the full details of where the site will be, what condition the equipment from is in, etc. In the cost comparison of the C and D Alternatives with the A and B Alternatives, further savings can result if the SEL-810 Computer is required at another POPPY site. In addition to the ZI site, others which might need a computer are (not for location alalysis, just for digitizing) or second computers for for national processing.

The requirements for Ocean Surveillance have continued to build in importance since the time that the architecture for Mission 7107 was completed. It is now essential that the capability of Mission 7107 for Ocean Surveillance be assessed. The Naval Research Laboratory would like to consider certain small changes in the Frequency coverage particularily in the "S-Band" and "X-Band" so that the ship signals would be better addressed in the design capability of Mission 7107. In order for the Laboratory to assess the Mission 7107 capability against the various Ocean Surveillance threats we must have the best information of the number of occurances versus RF observed and accuracy of collection system in reading frequency, particularily for the "YANKEE" class Submarine threat and selected Ship Missile threats.

NRL is investigating the possibility of employing the fifth spacecraft of Mission 7107 for providing certain operational capabilities in the Ocean Surveillance arena, and a proposal along these lines is forthcoming.

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Alternative A

Α.	Approa	ch

- 1. Second 810A to (3 months)
- 2. Second Q.C. to (5 months)

B. Cost Bld. Personnel Recurring Cost \$37K Digital 4.14,850 15 136.2 personnel 180,000 23.0 equipment Analog \$ 594,850 159.2 K/year Total \$ 631,850 27 Total

C. Capability

<u>Site</u> <u>National</u> <u>Ocean Surveillance</u> <u>N</u>	SA Nat'l processing)
Slight Increase Increased N	o Change
Decreased Increased In	creased ·
Decreased Increased In	ncreased

D. Future Potentials

Limited future growth

E. Risk

None

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Processing for "L" Band or "S" Band

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Approach A using Q.C. augmentation

Cumulative Time in Minutes	<u>Steps</u>
0	Start intercept
16	End intercept, start to prepare for processing
31	Trailer identification, rewind tape, move to analog Q.C. room, run analog Q.C.
76	<pre>End of Q.C., start computer processing by reformatting tape</pre>
96	Reformatting complete, start R.F. band sort
104	Second pass starts
108	End R.F. band, sort, start PRF sort
120	Second pass ends
123	End PRF sort, start collapsing data into bursts
148	Finish collapsing data into bursts, start listing and review
163	Complete burst listing, start running Doppler PRI and
173	End Doppler PRI, start locations
183	First location
193	Second location
203	Third location
208	Start of third pass

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Processing "X" Band at

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Approach A using Q.C. augmentation

Cumutative Time in Minutes	Steps			
0	Start intercept			
16	End intercept, prepare for processing			
31	Tape Trailer added, tape rewound, transfer to Q.C. room, start analog Q.C.			
91 .	End analog Q.C., start reformatting			
104	Start second pass			
120	End second pass			
191	End reformatting, start band sort			
208	Start third pass			
224	End third pass			
251	End band sort, start PRF sort			
312	Start fourth pass			
326	End PRF sort, start collapsing data to bursts			
328	End fourth pass			
416	Start Fifth pass			
432	End fifth pass			
451	Finish burst collapsing, start listing and review			
501	End listing and review. start obtaining doppler PRF and			
520	Start sixth pass			
531	End obtaining doppler PRF and start running locations			
536	End sixth pass			
541	First location			
551	Second location			
561	Third location			

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OPTION FUNDING (A)

A. One Time Cost Equipment Recieving Equipment Processing Equipment Operations Operations Building Air Conditioning Electrical Power Berthing TOTALS FY 71 FY 72 FY 73 FY 74 180 37 37 37 37 37 415 632 B. Annual Cost (Recurring)	<u>FY 75</u>	180 415
Equipment Recieving Equipment Processing Equipment Construction Operations Building Air Conditioning Electrical Power Berthing TOTALS Equipment 180 415 37 37 37 632		
Recieving Equipment 180 Processing Equipment 415 Construction Operations Building Air Conditioning Electrical Power Berthing TOTALS Recieving Equipment 180 415 37 632		
Processing Equipment 415 Construction Operations Building Air Conditioning Electrical Power Berthing TOTALS 632		
Processing Equipment 415 Construction Operations Building Air Conditioning Electrical Power Berthing TOTALS 632		
Operations Building 37 Air Conditioning Electrical Power Berthing —— TOTALS 632		
Building 37 Air Conditioning Electrical Power Berthing 632		
Air Conditioning Electrical Power Berthing TOTALS 632		
Electrical Power Berthing TOTALS 632		37
Berthing TOTALS 632		
TOTALS 632		
B. Annual Cost (Recurring)		632
·		
Personnel 136 136 136 136	1 36	. 680
Equipment O&M 23 23 23 23	23	115
Facilities O&M (Utilities, TDY)		
(Supplies, etc.)		
TOTALS <u>159</u> <u>159</u> <u>159</u> <u>159</u>	159	795
TOTALS 791 159 159 159	159	1427
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<u>Alternative B</u>

Α.	<u>Approach</u>				enutifi 93216Hi
	1. Second 810 t	o (3 m	onths)		•
	2. <u>P</u> erishable <u>D</u>	ata <u>E</u> xtractor to			(7 months)
В.	Cost				
	Equipment	Bld.	<u>Personnel</u>	Recu	ırring
	Digital 414,850 Analog 150,000 \$ 564,850		15	<u>10</u> e	ersonnel quipment /year
	Total\$ 601,850				
C.	<u>Capability</u>				
	Site	<u>National</u>	Ocean Surveill	ance	(Cost effect on NSA Nat'l processing at NSA)
		Slight Increase Increased Increased	Increased Increased Increased		No Change No Change No Change
D.	<u>Future Potential</u>				

E. Risk

Limited future growth

Slight - Perishable Data Extractor is same basic hardware and techniques as used in two previous generation formatting systems.

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Processing of "L" or "S" Band

Approach B using Perishable Data Extractor (PDE)

Cumulative Time in Minutes	<u>Steps</u>
0	Start intercept, start data to computer with RF band sorted, reformatted for computer PRI sorting.
16	End pass, reformatting and sorting, start collapsing data into bursts
41	Finish burst collapsing, start burst listing and review
56	Finish review, start running doppler PRI and Δt calculations
66	End At calculations, start locations
76	First location
86	Second location
96	Third location Stop for next pass
104	Start next pass

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Processing "X" Band at

Approach B using Perishable Data Extractor

Cumulative Time in Minutes	<u>Steps</u>			
0	Start intercept, start data to computer with R.F. band sorted, and reformatted (density is too high to run PRF sort simultaneously)			
16	End - pass, R.F. band sort, and reformatting, start PRF sort			
91	End RRF sort, start collapsing data into bursts			
104	Start second pass			
120	End second pass			
208	Start Third pass			
216	Finish collapsing data into bursts, start bursts listing and review			
224	End third pass			
266	End burst <u>listing</u> and review, start obtaining Doppler PRF and			
296	Finish Doppler PRF and start first location			
306	First location			
312	Start fourth pass			
316	Second location			
326	Third location			
328	End fourth pass			

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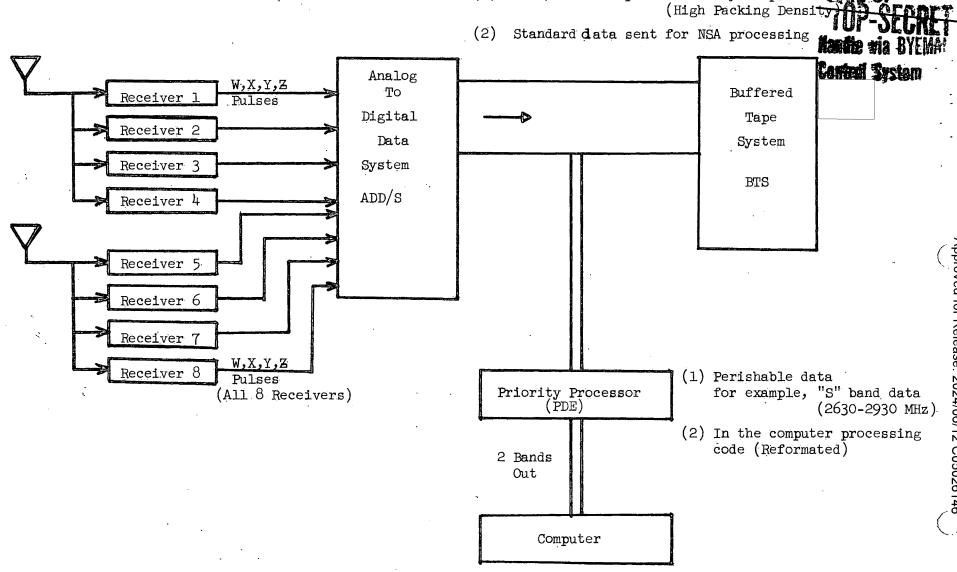
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	<u>FY 71</u>	FY 72	FY 73	<u>FY 74</u>	<u>FY 75</u>	TOTALS
A. One Time Cost						
Equipment Reveiving Equipment Processing Equipment	150 415					150 415
Construction Operations Building Air Conditioning Electrical Power Berthing	37					37
TOTALS	602					602
B. Annual Cost (Recurring)	-					
Personnel Equipment O&M Facilities O&M (Utilities, TDY) (Supplies, etc.)	84	84	84	84	84	420 50
TOTALS	94	94	94	94	94	470
TOTALS	696	94	94	94	00 94 00 SECT	1072
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POPPY Site Enhanced With Priority Processor (PDE)

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All data multiplexed in very compact code

Handle via BYEMAR Control Control





Α.	Approach			•
	1. Second 810A used for train	to (3 mo	onths - temporary ship installed in van)	oment of computer
	2. Second Q.C.	to		
		-	(10 months iginal computer is ava	at this time ilable for
В.	Cost			
	Equipment	Bld.	Personnel	Recurring
	Digital 973 K (115K Software) Analog <u>180 K</u> \$1153 K		15 6 6 27 Total	136 K personnel 46 K equipment 182 K/year
C.	Capability			•
	Site	National	Ocean Surveillance	NSA (Cost effect on)
		Increased (400%) Reduced Reduced	Increased (10-1) Increased Increased	Reduced Increased Increased
D.	Future Potential			
	Large			
Ε.	Risk			•"
	None - new compextra time	outer only deployed	d when ready, schedu	
	CAUG TIME			BYE-51910-70 Handle via BYEMAN
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Processing of "X" Band at

Handle via BYEMAN Control System

Approach C using new computer and Q.C. augumentation

Cumulative Time in Minutes	Steps
0	Start intercept
16	End intercept, prepare for processing
31	Tape trailer added, tape rewound, transfer to Q.C. room, start analog Q.C.
91	End analog Q.C., start reformatting
104	Start second pass
120	End second pass
191	End reformatting, start hand sort
208	Start third pass
224	End third pass
251	End band sort, start PRF sort
259	End PRF sort, start collapsing data to bursts
272	End collapsing data into bursts, start burst listing and review
282	End review, start obtaining doppler PRF and
285	End running doppler PRF and start locations
286	First location
287	Second location
288	Third location

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C C C C C C C C C C C C C C C C C C C	<u>FY 71</u>	<u>FY 72</u>	<u>FY 73</u>	<u>FY 74</u>	<u>FY 75</u>	TOTALS -
A. One Time Cost						
Equipment Receiving Equipment Processing Equipment	180 973					Approved 973 (vec
Construction Operations Building Air Conditioning Electrical Power Berthing		·				Approved for Release: 2024/06/12 C05026146
TOTALS	1153					1153 12
B. Annual Cost (Recurring)	1100					C050
Personnel Equipment O&M Facilities O&M (Utilities, TDY) (Supplies, etc.)	136 46	57 46	57 46	57 46	57 46	3655 230
TOTALS	_172	103	103	103	103	<u> 2584</u>
TOTALS	1202	103	103		103	1737 (5 yr cost)
		-	-EANDOP	Handle vi Control S B Y e -		<u>්</u>

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Alternative D

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Α.	<u>Approach</u>			Control :	System
	1. Second 810A used for train		nonths - temporary t installed in van)	shipment	of computer
	2. Perishable Da	ata Extractor to		(7	months)
		ration computer to		nths - at ti is availabl	_
В.	Cost				
	Equipment	Bld.	Personnel	Recurring	
	Digital\$ 1173 K (115 K software)		15 (1 year)	84 K (1 y 33 K equ 117 K	r. only) personnel ipment
C.	<u>Capability</u>				
	Site	National	Ocean Survei	<u>llance</u>	NSA (Cost effect on)
		Increased (400%) Increased Increased) Increased (10 Increased Increased)-1 <u>)</u>	Reduced No change No change
D.	Growth Potential				
	Large				
E.	Risk				
	Slight - see Alter	rnatives B and C	-1400		7-51910-70
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Processing of "X" Band at

Approach D using new computer and Perishable Data Extractor

Cumulative Time in Minutes	Steps
0	Start intercept, R.F. band sorting and reformatting
16	End intercept, start PRF sort
24	End PRF sort, start collasping data into bursts
37	Finish collapsing data into bursts, start burst listing and review
47	End review, start obtaining doppler PRF and
50	End running doppler PRF and , start locations
51	First location
52	Second location
53	Third location

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OPTION FUNDING

	FY 71	<u>FY 72</u>	<u>FY 73</u>	FY 74	FY 75	TOTALS
A. One Time Cost						
Equipment Receiving Equipment Processing Equipment	1173					20 Approve
Construction Operations Building Air Conditioning Electrical Power Berthing						Approved for Release: 2024/06/12
TOTALS	1173					
B. Annual Cost (Recurring)						C05026146 84
Personnel Equipment O&M Facilities O&M (Utilities, TDY) (Supplies, etc.)	84 33	33	33	33	33	84 6 6 165
TOTALS	117	33	33	33.	33.	249
TOTALS	1075	3 3	33	33	33	1422

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ZI Facility

Control System

The establishment of a new facil <u>ity can be</u>	made at minimum cost, if alternatives
C or D are chosen as the current	computer would be <u>available</u> for this
site. Further, a large percentage of the an	alog equipment from would be
available.	

For the basic site the following is an estimate of the funding necessary to either buy new equipment or refurbish equipment from other sites, however, without a careful inspection of returned equipment these are tentative.

Analog	165 K
Digital	158 K
Flooring, air	
conditioning	35 K
Installation	<u>14 K</u>
	372 K

If Option C or D were not approved then an additional 415 K would be required for the installation, or

> 372 K 415 K

787 K

Considering the other work load, availability of equipment, and refurbishing time, it is estimated that approximately 10 months would be required to make the installation, however, without knowing the actual site this is a tentative estimate.

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OFFICE	SIGNATURE	DATE	TIME	DATE	TIME	NAME & OFFICE SYMBOL	DATE	
NRL								
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Access to this	document	will be	restricte	d to those	persons
	cleared for	the sp	ecific pro	jects;	

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WARNING

This document contains information affecting the national security; of the United States within the meaning of the espionage laws U. S. Code Title 18, Sections 793 and 794. The law prohibits its transmission or the revelation of its contents in any manner to an unauthorized person, as well as its use in any manner prejudicial to the safety or interest of the United States or for the benefit of any foreign government to the detriment of the United States. It is to be seen only by personnel especially indoctrinated and authorized to receive information in the designated control channels. Its security must be maintained in accordance with regulations pertaining to BYEMAN Control System.

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DEPARTMENT OF THE NAVY OFFICE OF THE CHIEF OF NAVAL OPERATIONS . WASHINGTON, D.C. 20350

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY IN REPLY REFER TO Op-092/kfg BYE 66391/70 . 19 AUG 1970

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MEMORANDUM FOR THE DISTRIBUTION LIST

Subj: Navy Ocean Surveillance Requirement

Encl: (1) Op-092 BYE 66385/70 of 17 August 1970

- 1. Enclosure (1) is a statement of the Navy Ocean Surveillance requirement to be performed by SIGINT Satellite Systems, and was forwarded in response to a charge from the Director, National Reconnaissance Office to the Director, Program C.
- The enclosure is forwarded for your information and retention.

CAPTAIN! NAVY

DISTRIBUTION LIST:

Director, Defense Intelligence Agency (DIAXX)

Director, National Security Agency

Commander, Naval Security Group Command Commanding Officer, Naval Research Laboratory

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DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

HANDLE VIA BYEMAN -CONTROL SYCTEM ONLY IN REPLY REFER TO Op-092/kfg
BYE 66385/70

17 AUG 1970

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HANDLE VIA BYEMAN CONTROL SYSTEM

MEMORANDUM FOR THE DIRECTOR, NATIONAL RECONNAISSANCE OFFICE

Subj: Navy Ocean Surveillance Requirement

- 1. The United States Intelligence Board recently approved a statement of the requirement for ocean surveillance to be performed by SIGINT Satellite systems. This statement of requirement is general in nature, and does not delineate fully the requirement, which is predicated by the necessity of providing Command with information which is essential to the successful prosecution of its missions. The timely collection, processing and dissemination of ocean surveillance information provides Command with strategic warning through indications of changes in normal patterns of activity, and provides information necessary for planning and conducting naval operations. In order to assist the National Reconnaisesance Office in planning for support of this requirement, the following additional detail is provided.
- 2. The Ocean Surveillance requirement is bounded by limits which dictate locating and reporting on the position of threat emitters within500 nautical miles of friendly forces within 20 minutes, to an accuracy of 5 nautical miles, and locating and reporting of all shipborne emitters within 6 hours, to an accuracy of 50 nautical miles. The requirement for time-liness of reporting is governed by an interplay of four variables; viz., proximity of own forces to area of interest, geographic area, political climate, and platform.
- 3. The following weighting factors for these variables are provided to define the requirement:
- a. Own forces: Within area 0.4; within 200 nautical miles 0.3; within 500 nautical miles 0.2; within 1500 nautical miles 0.1.
- b. Geographic area: Mediterranean, Tonkin Gulf 0.3; North Sea, GI/UK Gap, Norwegian Sea, Sea of Japan, Barents Sea 0.2; Eastern Atlantic, North Pacific 0.1; South Pacific, Indian Ocean (0.05).

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- c. Political Climate: Hot war 0.3; Limited war 0.2; Tension 0.1; Calm 0.0
- d. Platform: SSBN, SSB -0.5; SSGN, CLG, DLG, SSG -0.4; CHG, DDG -0.3; PGM, Small Missile combatants 0.2; Major non-missile naval units 0.1; High interest auxiliaries 0.05; Other auxiliaries 0.0.

Specifically, for any combination of the four variables with a total factor of 0.8 or greater, the most stringent locational accuracy and reporting timeliness is required. For any combination of the four variables totaling 0.3 or less, the least stringent locational accuracy and reporting timeliness is required.

(See Annex A for detailed requirements for locational accuracies and reporting timeliness required for all value combinations.)

4. The probability of intercept, given that an emitter is radiating, varies with the situation. Generally, the following probabilities define the requirement:

Probability of Intercept	Situation
99.7%	Missile equipped unit is capable of launching strike against friendly forces.
95.4%	Conventionally armed naval force within 500 nautical miles of friendly forces
68.3%	For all other cases

5. The requirement specified above is applicable for collection by SIGINT Satellite systems, and is representative of the ocean surveillance requirement for space systems. As more information is obtained, and state of the art advances are made, the requirement will become more definitive.

/s/ F. J. HARLFINGER

ANNEX A - Locational Accuracy and Reporting

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LOCATIONAL ACCURACY AND REPORTING TIMELINESS CRITERIA

Weighting Factor: (a) + (b) + (c) + (d) = KW

I; 0 (a) 0.40: Importance placed upon proximity of own forces, to area of primary interest

OWN FORCES:

- (1) 0.40: Major friendly forces within area of primary interest
- (2) 0.30: Major friendly forces within 200 NM of area of primary interest
- (3) 0.20: Major friendly forces within 500 NM of area of primary interest
- (4) 0.10: Major friendly forces over 1500 NM from area of primary interest
- II 0 (b) 0.30: Improtance placed upon operation arena GEOGRAPHIC AREA:
- (1) 0.30: Eastern Mediterranean, Tonkin Gulf
- (2) 0.20: North Sea, Sea of Japan, Norwegian Sea, GI/UK Gap, Barents Sea
- (3) 0.10: Eastern Atlantic, North Pacific
- (4) 0.05: South Pacific, Indian Ocean
- (5) 0.00: Antartic, South Indian Ocean
- III 0 (c) 0.30: Importance placed upon political climate POLITICAL CLIMATE:
- (1) 0.30: Hot war situation
- (2) 0.20: Limited war situation
- (3) 0.10: Tension
- (4) 0.00: Calm

Page 1 of 2

ANNEX A

- IV 0 (d) 0.50: Importance placed upon platform PLATFORM:
- (1) 0.50: SSBN, SSB
- (2) 0.40: SSGN, CLG, DLG, SSG
- (3) 0.30: CHG, DDG
- (4) 0.20: Small SSM Combatants
- (5) 0.10: Major Non-missile Naval Units
- (6) 0.05: High Interest Auxiliary Units
- (7) 0.00: Other Auxiliary Units

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ANNEX A



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TO EXT Approved for Release: 2024/06/12 C05026146 C 2 Q Paper

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HANDLE VIA BYEMAN CONTROL SYSTEM

MEMORANDUM FOR THE DIRECTOR, NATIONAL RECONNAISSANCE OFFICE Subj: Navy Ocean Surveillance Requirement

- The United States Intelligence Board recently approved a statement of the requirement for ocean surveillance to be performed by SIGINT Satellite systems. This statement of requirement is general in nature, and does not delineate fully the requirement, which is predicated by the necessity of providing Command with information which is essential to the successful prosecution of its missions. timely collection, processing and dissemination of ocean surveillance information provides Command with strategic warning through indications of changes in normal patterns of activity, and provides information necessary for planning and conducting In order to assist the National Reconnaissance naval operations. Office in planning for support of this requirement, the following additional detail is provided.
- 2. The Ocean Surveillance requirement is bounded by limits which dictate locating and reporting on the position of threat emitters within 500 nautical miles of friendly forces within

		and locating
and reporting of all shipborne emi	tters within	to
an accuracy of	The requirement	ent for
timeliness of reporting is governed	d by an interp	play of
four variables; viz., proximity of	own forces to	o area of
geographic area, interest, rocks interest, political area, pol	ical climate,	and platform.

- 3. The following weighting factors for these variables are provided to define the requirement:
- a. Own forces: Within area 0.4; within 200 nautical miles 0.3; within 500 nautical miles 0.2; within 1500 nautical miles 0.1.
- b. Geographic area: Mediterranean, Tonkin Gulf 0.3; North Sea, GI/UK Gap, Norwegian Sea, Sea of Japan, Barents Sea- 0.2; Eastern Atlantic, North Pacific 0.1; South Pacific, Indian Ocean (0.05).
- c. Political Climate: Hot war 0.3; Limited war 0.2; Tension 0.1; Calm 0.0
- d. Platform: SSBN, SSB 0.5; SSGN, CLG, DLG, SSG 0.4; CHG, DDG 0.3; PGM, Small missile combatants 0.2; Major non-missile naval units 0.1; High interest auxiliaries 0.05; Other auxiliaries 0.0.

Specifically, for any combination of the four variables with a total factor of 0.8 of greater, the most stringent locational accuracy and reporting timeliness is required. For any combination of the four variables totaling 0.3 or less, the least stringent locational accuracy and reporting timeliness is required.

(See Annex A for detailed requirements for locational accuracies and reporting timeliness required for all value combinations.)

4. The probability of intercept, given that an emitter is radiating, varies with the situation. Generally, the following probabilities define the requirement:

Probability of Intercept

Situation

99.7%

Missile equipped unit is capable of launching strike against friend forces.

95.4%

Conventionally armed naval force within 500 nautical miles of friendly forces

68.3%

. For all other cases

5. The requirement specified above is applicable for collection by SIGINT Satellite systems, and representative of the ocean surveillance requirement for space systems. As more information is obtained, and state of the art advances are made, the requirement will become more definitive.

Annex A- Locational Accuracy and Reporting Timeliness Criteria



LOCATIONAL ACCURACY AND REPORTING TIMETINESS CRITERIA

Weighting Factor: ((a) + (b) + (c) + (d) = Kw

0<(a)<0.40: Importance placed upon proximity of own forces, to area of primary interest

Own Forces:

- (1)Major friendly forces within area of primary interest
- (2) 0.30: Major friendly forces within 200 NM of area of primary interest
- (3) 0.20: Major friendly forces within 500 NM of area of primary interest
- 0.10: Major friendly forces over 1500 NM from area of (4)primary interest
- 0<(b)<0.30: Importance placed upon operation arena

Geographic Area:

- 0.30: Eastern Mediterranean, Tonkin Gulf (1)
- North Sea, Sea of Japan, Norwegian Sea, GIUK Gap, 0.20:
- Barents Sea, Eastern Atlantic, North Pacific (3)0.10:
- South Pacific, Indian Ocean (4)0.05:
- (5)0.00: Antarctic, South Indian Ocean
- III Importance placed upon political climate 0 < (c) < 0.30:

Political Climate

- 0.30: \cdot (1) Hot war situation
- ··(·2) 0.20: Limited war situation
- (3) 0.10: Tension
- (4)0.00: Calm
- IV 0<(d)<0.50: Importance placed upon platform

PLATFORM

- 0.10: Major non-missile (1)·(5) 0.50: SSBN, SSB ··· naval units -/
- (2)SSGN, CLG, DLG, SSG (6) 0.40:
 - 0.05: High interest auxiliary
- (3) units (6) 0.30: CHG, DDG.
- 0.00: Other auxiliary units Small SSM Combaants (7) 0.20: (4)
 - ANNEX A

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to CNO.

The DSB Herzfeld Committee has completed its study of the capabilities of existing NRO ELINT collection and processing systems to perform ocean surveillance. Their preliminary findings indicate that the Navy's POPPY system has by far the greatest potential for meeting the requirements of an interim system.

It is my understanding that adaptation of the POPPY system to ocean surveillance is being inhibited by tasking and funding problems: namely, that tasking for strategic collection is being reflected as a limitation on tasking for ocean surveillance, and that funding is being reflected as an internal Navy matter, with the source of funds unidentified to date.

If there are in fact problems in either or both of these areas

--or in any related area, for that matter--wherein DDR&E could possibly

be of assistance, we would appreciate being advised at an early date,

for we believe that the course of action being advocated by the Herz
feld Committee is basically feasible and desirable. The tasking prob
able

lem could very well be traced to under-utilization of the spacecraft,

and the amount of funds required for the interim improvements being

recommended appears to be reasonable in relation to the reported im
portance of the Navy's requirement.

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million dollars.

The veness of the current POPPY system in an ocean surveillance role can be significantly improved by expanding and re-orienting the tasking assignments to take advantage of built-in existing system capability. A second major improvement can be obtained through the introduction of Priority Data Extractors at the three present collection sites. In conjunction with the PDE's, the introduction of an SEL 86 high-speed computer at the site in West Germany, should be able to where xxxxxx data density is highest xxx provide operational intelligence within of collection. The combination of the PDE's and the high-speed computer could result in an overall increase (on the order of four times the present processing capability on national requirements and ten times the present capacity for ocean surveillance). It has been estimated that the foregoing improvements of POPPY to achieve an early (approximately one year from start) satellite capability for ocean surveillance would cost a total of about one and

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DEPARTMENT OF THE NAVY OFFICE OF THE CHIEF OF NAVAL OPERATIONS WASHINGTON, D.C. 20350

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IN REPLY REFER TO
BYE 66387/70

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MEMORANDUM FOR THE DIRECTOR, NATIONAL RECONNAISSANCE OFFICE

Subj: Proposal for POPPY Support to Ocean Surveillance

Ref: (a) NRO verbal requirement, subject as above

Encl: (1) POPPY Support to the Ocean Surveillance Requirement

1. In accordance with reference (a), various alternatives, including the alternative submitted by the Director, National Security Agency, were examined in context with the proposal forwarded to the Deputy Secretary of Defense by the Secretary of the Navy on 11 June 1970. The enclosed study is a recommended alternative to the Secretary of the Navy proposal, and is forwarded herewith.

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Copy to:
Director, NSA
Director, DIA
Director, NRL
COMNAVSECGRU

F. J. HARLFINGER, II Director, Program "C"

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Page 1 of 1 pages
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POPPY SUPPORT TO THE OCEAN SURVEILLANCE REQUIREMENT

- 1. On 11 June 1970, the Secretary of the Navy forwarded to the Deputy Secretary of Defense a proposal for Ocean Surveillance Processing Centers, utilizing the POPPY Elint Satellite. The Deputy Secretary of Defense requested comments from various officials of the Department of Defense. Several of these officials, notably the Director of the National Security Agency, while endorsing the requirement, suggested alternative methods of solution. The Director, National Reconnaissance Office requested that the Director, Program C, examine alternatives to the Secretary of the Navy proposal, and forward to him a recommended alternative.
- 2. The Program Director's staff met with interested parties from the National Reconnaissance Office, the National Security Agency, the Defense Intelligence Agency, the Naval Security Group, and the Naval Research Laboratory. A recommended alternative to the Secretary of the Navy proposal is presented in this paper. Although each of the above listed agencies provided representation and valuable assistance in the preparation of this alternative proposal, the paper has not been formally endorsed by these agencies.
- In Tab A, an austere augmentation of existing Navy manned overseas field activities is addressed. The recommendation for augmentation of these field activities specifies the a new Perishable acquisition of a new computer for Data Extractor for each site; and the temporary deployment of Personnel augmentation an existing computer van to is not required for sites other than at this site, 15 enlisted personnel are required. Initial operational dates begin as early as 1 January 71; and the total capability will be operational by 1 July 72. Total costs, both recurring and non-recurring for FY 71 is \$1,246,000. Annual recurring costs are \$33,000. The increase in processing capability derived from this augmentation for national tasking is 400% and 80% for the other two sites. The increased capability for ocean surveillance processing is 1000% at and 80% for the other sites. It is also recommended that consideration be given to acquiring a new generation computer in FY 75. Cost of each for in FY 73 and for poth

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computer is approximately \$858,000. It is also indicated that modifications to mission 7107 can greatly enhance POPPY's collection capability for ocean surveillance. Specific proposals in this regard will be forwarded within 60 days.

- 4. In Tab B, it is recommended that a POPPY ground facility be established at Although it is recognized that other sensors provide coverage of the North Atlantic, it is shown that such a facility can provide significant input to the ocean surveillance requirement, and that such a facility can be obtained at minimum costs, utilizing, to a large extent, refurbished equipment from Such a facility would serve both operational and training functions, and could be operational in October 72. Total non-recurring costs are \$1,187,000 (including \$815,000 Navy milcon). Total yearly recurring costs are \$275,000.
- 5. In Annex A, four alternative augmentations are examined in detail, and rationale for the alternative selected is verified. In Annex B (to be forwarded within 60 days), specific proposals for optimizing POPPY mission 7107 against the ocean surveillance requirement is discussed. Annex C contains a comparison of available computers, including the Model 86, and a functional diagram of the Perishable Data Extractor. Annex D justified the requirement for a facility on the eastern U. S. coast, examines alternative sites, and recommends building the POPPY ground facility at
- 6. Due to the uncertainty associated with establishment of an austere communications facility at and the on-going deliberations in Congress, establishment of a POPPY ocean surveillance facility has not been addressed in this paper. Rather, it is believed that the Secretary of the Navy proposal delineates the minimum expenditure of funds necessary for the site. It is therefore recommended that such a facility be addressed in conjunction with the on-going Congressional deliberations, and not in conjunction with this specific paper.
- 7. In summary, the paper presents an alternative by which both national and ocean surveillance processing capabilities of the POPPY satellite system are significantly increased at low cost. Additionally, acquisition of the new generation equipment permits extensive system growth. Minimal augmentation of existing personnel strengths are required by this proposal.

Site

National

Increased 400%

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TAB A

OVERSEAS SITE AUGMENTATION

	•	
	commended augmentation of the existing Navy	
	indicates an immediate deplo)y-
ment of an	existing SEL 810A computer van to and	1
the dealers	ment of one Perishable Data Extractor (PDE) to	
tue debroy		\neg
	The additional	
computer w	ould be utilized until the acquisition of an SEL	- ·
Model 96 a	computer, at which time the SEL 810A would be	
Moder of C	omputer, at which time the SEL SIOA would be	
returned to	o CONUS for use in a CONUS facility. After on-si	.te
check out	and engineering evaluation, including determinati	on
of such it	ems as mean time between failures, the SEL 810A v	7a n
or such it	ents as mean come between ratidles, the ball story	·
could be r	eturned to CONUS for other uses. The PDE's would	1
become an	integral part of the processing facility at each	
	The recommended equipment augmentation, therefor	~e .
	The recommended equipment augmentation, onerer	,
is:		
Site	Equipment	
	Perishable Data Extractor, SEL Model 8	310A*,
	Perishable Data Extractor	
	Perishable Data Extractor	
*Tempo	rary deployment of existing equipment,	
	ng delivery of Model 86	
benar	ng delivery of model oo	•
,		
deployment	ditional maximum capability to be derived from of this equipment, in terms of processing, is	
summarized	r belom:	
	NSA	
	NSA	

Increased 80% (approx) Incr. 80%

Increased 80% (approx) Incr. 80%

Ocean Surv

Incr. 1000%

(Hdqtrs Process)

Reduce Cost

No change

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The increased capability for is derived from increased computer capacity, coupled with digital formatting accomplished by the Perishable Data Extractor (PDE). example, utilizing the Model 86 permits processing of X-band signals within approximately 50 minutes after intercept, with additional locations becoming available approximately at one This compares with the maximum current minute intervals. processing capability in X-band, utilizing existing equipment, of 9 hours, with additional locations at intervals of approximately 10 minutes. Increased collection capability is recommended, and can be obtained by optimizing frequency band assignment in mission 7107, by employing the fifth spacecraft of mission 7107 for providing certain operational capabilities in the ocean surveillance arena, by utilization of the third transmitter in each of the four primary spacecraft for ocean surveillance, and by including S-band coverage in the X-band This combination of improvements could increase collection opportunity by 40-50 percent. Detailed proposals concerning these recommended changes to 7107 spacecraft will be forwarded to the NRO within 60 days.

3. The cost, both one time, and recurring, of adopting this proposal is summarized below:

COSTS (IN THOUSANDS OF DOLLARS)

		•		pec			
A.	One Time Cost	FY 71	FY 72 (FY 73	FY 74		TOTAL
	Equipment	1147	•	₋ 858*	1 4	858*.63/	
	·	Spec.	:	574	•		(-2.8-2-3) *
В.	Annual Cost	- 1	Ċ		16	•	2352
	(Recurring)			(110R)	1101	120K	
	Personnel	84	0**(0**	0**	0**	84 424K
· ·	Equipment	33	33 🔞	33 27	3366	33 96 K	
			1	66			0.17
	•		!	,	1762		
	\mathtt{TOTAL}	1264	33	3-3	176 33	33*	1396
			•	(-891) *		(-8-9-1-)-*	(-3 11 2')'*
				750 K		847	(7070)
	* After evalua	ation of	f SEL Mode			it	(3,070)
	is recommend	ded tha	t conside:	ration be	e given	to deploy	
	ment of a Mo				73, and		
	in FY 75.				•		

** A small increase in the personnel manning level of may be required on a full time basis in view of the increased capabilities for processing, locating and reporting attendant with the Model 86.

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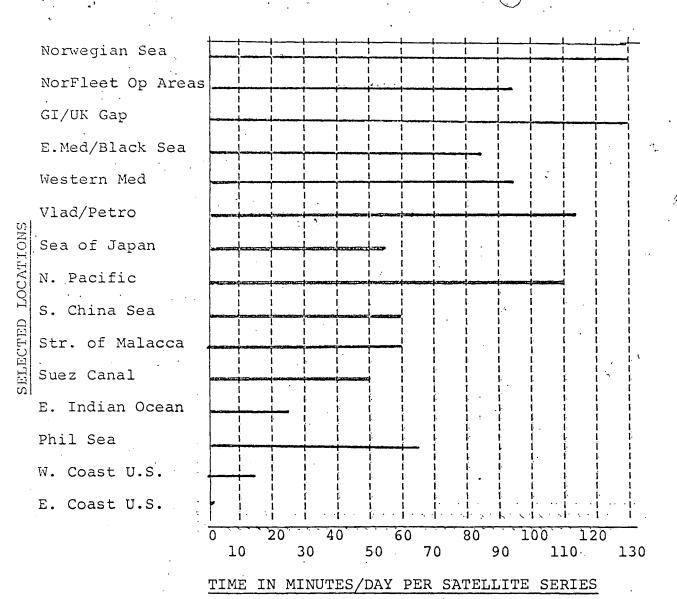
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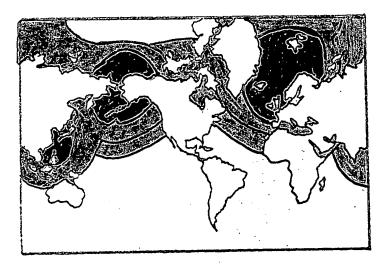
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Advantages of implementing this proposal, from a cost standpoint, are that initial costs are small, and additional annual recurring costs are negligible.

4. Personnel required to implement the recommended augmentation are 15 enlisted personnel at who would be utilized to man the augmented SEL 810A. As experience is gained with the SEL 86, a slight increase in the CCP billet authorization for 2 is a distinct possibility. Justification for this increase will be submitted via the normal CCP channels.





RED - 60-130 Minutes

GREEN - 15-60 Minutes

BLUE - 0-15 Minutes

			SC	CHEDULE	•				
	SEP70 NOV70	JAN71	MAR71	MAY71	JUL71	JAN72	JUL72	JAN74	JUL74
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Equipment	· · · · · · · · · · · · · · · · · · ·		,		,				
SEL 810A SEL 86	C· ' D B	E	Ċ	D	C ¹ E	C2	•		
PDE	В	С	D	E					
Personnel	F	Έ		•		Ģ3			
racilities	A NONE REQUIRED				· .				
Equipment		· .				,			• • •
PDE	B	C .	D	E	an inc. San mass.	7 .	P.C		Capture of the Captur
SEL 86 Personnel	NONE REQUIRED	٠ .	. (*	•		A	BC		
rersonner	A	•					Agreement of the second of the		
Facilities	NONE REQUIRED								
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PDE SEL 86	В	С	D	E					ABCDE
Personnel	NONE REQUIRED					•		ge k	. · ·
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1 _{To CONUS}	2 _{Van} to CONUS		quired		·		1 O I	IANDLE VI.	A BYEMAN OP

SITE

AMOUNT

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FUNDING (FY-71)

0110	ANOUNT	
Equipment		
SEL 810A Van (Ship, Re-Ship)	24,000	/
SEL 86 Computer, including shipment and install	858,000	
Software	115,000	
PDE	50,000	
Personnel*	84,000	
Equipment O&M	27 11,000	<i>=</i> 7
Sub-Total	1,142,000	
	•	
assigned missions at Equipment		
PDE	50,000	
Equipment O&M	<u>rī,000</u>	3
Sub-Total	53 61,000	:
Equipment	rs.	
PDE	50,000	
Equipment O&M		
Sub-Total	61,000	
NAL POLISONAL (SITE COST STATE)	\$1,264,000	
TOTAL	71,204,000	

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TAB B

CONUS OCEAN SURVEILLANCE FACILITY

1. Summary. The desirability of obtaining an ocean surveillance processing and training facility on the east coast of the continental United States has been examined. The facility has been determined to represent a valid requirement, due in large measure to the lack of coverage of known ballistic missile hold areas for Soviet SSBN's, the increasing scale of Soviet surface unit deployments into this area, and the necessity for establishing a training facility to standardize operating procedures, and to relieve operational units of the necessity of conducting large scale on the job training. A careful survey of available facilities on the East Coast indicates an optimum location at This decision was influenced by the following factors; availability of support and security facilities; availability of communications; low RFI; and maximum coverage of the major threat areas.

Total cost of this facility is \$1,462,000, itemized as follows:

Non-recurring

Equipment \$372,000* Building \$815,000

Recurring

Personnel \$250,000 Equipment O&M \$25,000

*Predicated on acquiring new equipment, refurbishing equipment from and utilization of the SEL 810A currently deployed to Command and interrogation functions will be accomplished from the engineering facility.

Personnel necessary to provide a cadre for training, and to man the operational site, total 1 officer and 42 enlisted personnel, as itemized below:

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Officer in Charge	
Material Maintenance Men	(5)
Digital Processors	(6)
Collection Operators	(16)
Collection Supervisors	(4)
Analogue Pre-processing/	(4)
And Analysis	
Senior Supervisor/Analysts	(3)
Training Supervisors	(4)

2. Coverage. Unique coverage provided by a ground processing facility at for selected geographic areas is provided below:

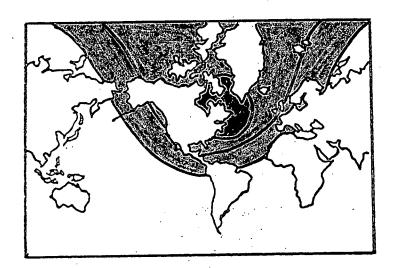
Cuba: 30-50 minutes per day
Mid-Atlantic: 50-80 minutes per day

Soviet SSBN Patrol: 50-100 minutes per day Panama Canal: 10-30 minutes per day

RED - 100 plus minutes

GREEN - 30-100 minutes

BLUE - 0-30 minutes



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EQUIPMENT

The following primary listing of equipment would be available at Some of the equipment, such as the 810A computer, would be acquired from other equipment would be refurbished; still other equipment must be acquired new.

Digital

SEL 810A computer mainframe
TM-11 Digital Tape transporters (3)
Magnetic Tape Control Unit
Moveable Head Disc
Fixed Head Disc and Controller
Anelex Line Printer
Graphics display console
High speed paper tape reader/punch
Paper tape spooler
X-Y plotter
Perishable Data Extractor
Support Spare Package

Sub-Total - \$165,000

Analog

CEC GR 2800 analog tape recorder
Tektronics 565 oscilloscope (W/3 A-1 PI)
Distribution Amplifier (DA-1)
CEI speaker
ESL pulse rate synthesizer
Video disc recorder
Brush Oscillographic recorder (8 ch)
Astrodata 6200 time code translator
Electronic counter HP 5216A
Test Oscillator HP-204C
Timing Generator Tek 184
Audio signal monitor AMO1
Oscillographic recording camera Polaroid manual
Support spare package
RS-1A Receiver (9)

Sub-Total - /\$158,000

Flooring, air-conditioning, installation, and incidental costs

Sub-Total - \$ 49,000

TOTAL - (\$372,000)

SCHEDULE

	*SITE CONSTRUCTION	Decision - Be	egin Const	ruction		Complete		
	PERSONNEL	4	CCP Subm	 ssion - Appr	oval Ident. Order	Report-		LITY
			1	i 1	Train			E E
Apr	EQUIPMENT		. 	1 			·	CAPA
proved	SEL 810A			i 1 I	 	Ship 8107	Install& Checkout	ONAL
for Rele	Refurbish		Refurbish	1				RATIO
ase: 202	. Refurbish			Refurbish		Ship-	Install& Checkout	ase. zoz
4/06	Order New Equipment			1 1	Order-)		71L
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*Pacing Factor

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FUNDING

1. As indicated in paragraph 1 above, non-recurring funding totals \$1,187,000, while recurring funding totals \$275,000.

Non-reci	irring

Equipment

\$372,000

Building

\$815,000

Recurring

Personnel

\$250,000

Equipment O&M \$ 25,000

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Introduction

HANDLE VIA BYEMAN CONTROL GYSTEM DALY

Four alternatives for site enhancement for ocean surveillance are provided. with Alternative A being the proposed NSA approach. Alternative B is substituting the priority sorting (PDE) for the additional Quality Control (QC) analysis complex. Alternative C is the new generation computer with an additional QC position. Alternative D, the NRL favored approach, has the new generation computer, and the priority sorter. The analysis-time required is outlined for each approach the first time it is discussed. Alternative D is favored on this basis.

The discussion on the ZI site is tenative, without knowking the full details of where the site will be, what condition the equipment from in, etc. In the cost comparison of the C and D Alternatives with the A and B Alternatives, further savings can result if the SEL-810 Computer is required at another POPPY_site. In addition to the ZI site, others which might need a computer are (not for location alalysis, just for digitizing) or second computers for for national processing.

The requirements for Ocean Surveillance have continued to build in importance since the time that the architecture for Mission 7107 was completed. It is now essential that the capability of Mission 7107 for Ocean Surveillance be assessed. The Naval Research Laboratory would like to consider certain small changes in the Frequency coverage particularily in the "S-Band" and "X-Band" so that the ship signals would be better addressed in the design capability of Mission 7107. In order for the Laboratory to assess the Mission 7107 capability against the various Ocean Surveillance threats we must have the best information of the number of occurances versus RF observed and accuracy of collection system in reading frequency, particularily for the "YANKEE" class Submarine threat and selected Ship Missile threats.

NRL is investigating the possibility of employing the fifth spacecraft of Mission 7107 for providing certain operational capabilities in the Ocean Surveillance arena, and a proposal along these lines is forthcoming.

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Alternative A

HANDLE VIA BYEMAN

A. Approach

- 1. Second 810A to (3 months)
- 2. Second Q.C. to (5 months)

B. Cost		Bld.	Personne	<u>Recurr</u>	Ing Cost
^N □ Digital	414,850	\$ 37K	15	136.2	personnel
Analog	180,000		6	23.0	equipment
V	\$594,850		_6	159.2	K/year
Total	\$631,850		27 Total	A STATE OF THE STATE OF	

C. Capability

<u>Site</u>	<u>National</u>	Ocean Surveillar	nce NSA	Nat'l processing
	Slight Increa	se Increased	No C	hang e 🔆 🖟
7		Increased 🧺	Incre	ased
	Decreased	Increased	Incre	ased

D. Future Potentials

Limited future growth

E. Risk

None

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Processing of "L" or "S" Band

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HANDLE VIA BYEMAN CONTROL BYSTEM ONLY

Approach B using Perishable Data Extractor (PDE)

Cumulative	· ·	Sugar Contract
Time in Minutes	Steps	
0	Start intercept, start data to computer with RF band sorted, reformatted for computer PRI sorting	. "
, 16	End pass, reformatting and sorting, start collapsing data into bursts	
41	Finish burst collapsing, start burst listing and revie	w
56	Finish review, start running doppler PRI and At calcu	lations
66	End Δt calculations, start locations	
76	First location	
86	Second location	1
96	Third location	
	Stop for next pass	
104	Start next pass	

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HANDLE VIA BYEMAN

Processing "X" Band at

Approach A using Q.C. augmentation

Cumutative		
Time in Minutes	<u>Steps</u>	
86 + 008		
0	Start intercept	
16 16	End intercept, prepare for processing	•
31	Tape Trailer added, tape rewound,	transfer to Q.C.
	room, start analog Q.C.	
91_ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	End analog Q.C., start reformatting	3
104	Start second pass	
120	End second pass	
19.1	End reformatting, start band sort	
208	Start third pass	
-224	End third pass	$\mathcal{A}_{\mathcal{A}}$
251 6	End band sort, start PRF sort	
312	Start fourth pass	•
326	End PRF sort, start collapsing data	to bursts
328	End fourth pass	
416	Start Fifth pass	
432	End fifth pass	•
451	'Finish burst collapsing, start listing	ng and review
501	End listing and review, start obtain	ning doppler PRF and
	:	
520	Start sixth pass	
531	End obtaining doppler PRF and	, start running
	locations	要不够多 么。
. 536 📜 - 🦠	End sixth pass	
541	First location	
551	Second location	
561	Third location	
	· · · · · · · · · · · · · · · · · · ·	

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HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

	<u>FY 71</u>	FY 72	FY 73	FY 74	<u>FY 75</u>	TOTALS f
A. One Time Cost						
Equipment	180					
Recieving Equipment Processing Equipment	415					180 415
Construction Operations						ved TOT
Building Air Conditioning	37					37 Re eas
Electrical Power Berthing						e. 2024
TOTALS	632					632
B. Annual Cost (Recurring)						020
Personnel Equipment O&M	136 23	136 23	136 23	136 23	136 23	680 115
Facilities O&M (Utilities, TDY) (Supplies, etc.)						
TOTALS	159	159	159	159_	159	795
TOTALS	791	159	159	159	159	1427

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Alternative B

HANDLE VIA BYEMAN CONTROL SYCIEM ONLY

A.	Appr	oach

- 1. Second 810 to (3 months)
- 2. Perishable Data Extractor to (7 months)

B. Cost

Equipment	Bld. Personnel	Recurring
Digital 414,850 Analog 150,000 \$ 564,850		84 personnel 10 equipment 94 K/year

C. Capability

Total \$ 601,850

<u>Site</u>		National	Ocean Surveillance	NSA Nat'l processing at NSA)
		Slight Increase	Increased	No Change
		Increased	Increased	No Change
	<i>:</i> "	Increased	Increased	No Change

D. Future Potential

Limited future growth

E. Risk

Slight - Perishable Data Extractor is same basic hardware and techniques as used in two previous generation formatting systems.

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Processing "X" Band at

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HANDLE VIA BYEMAN CONTROL BYSTEM ONLY.

Approach B using Perishable Data Extractor

Cumulative Time in Minutes	<u>Steps</u>
0	Start intercept, start data to computer with R.F. band sorted, and reformatted (density is too high to run PRF sort simultaneously)
16	End - pass, R.F. band sort, and reformatting, start
The Total Control	PRF sort
91	End PRF sort, start collapsing data into bursts
104	Start second pass .
120	End second pass
208	Start Third pass
216	Finish collapsing data into bursts, start bursts listing and review
224	End third pass
266	End burst listing and review, start obtaining Doppler
	PRF and
296	Finish Doppler PRF and start first location
306	First location
312 X	Start fourth pass
316	Second location
326	Third location
328	End fourth pass

Reservoting 100 mi

EAUDOD

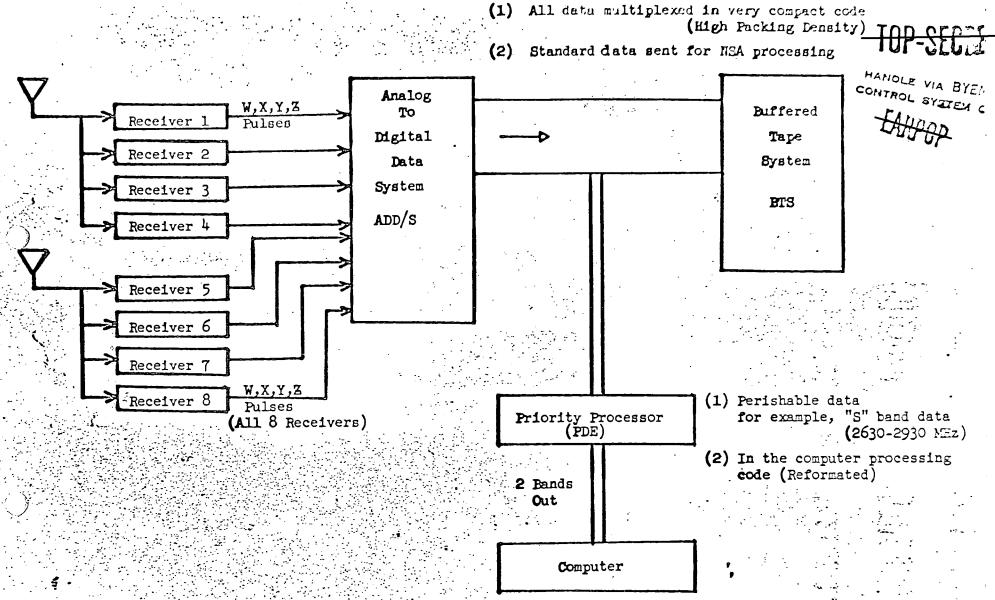
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OPTION	FUNDING	(B)

	FY 71	<u>FY 72</u>	<u>FY 73</u>	FY 74	FY 75	TOTALS
A. One Time Cost						
Equipment						
Reveiving Equipment	150					150
Processing Equipment	415					415
		art find i Tierra graffe find find - Tagair find i graffe find i sa - Tagair find i graffe find i sa			的是在这个人的。 等在,这是人会的。	
Construction						
Operations	37					
Building	37					37
Air Conditioning Electrical Power					T.	
Berthing						
					garine State Comment	·
TOTALS	602					602
B. Annual Cost (Recurring)						
						420
Personnel	84	84	84	84	84	420
Equipment O&M	10	10	10	10	10	50
Facilities O&M (Utilities, TDY)						
(Supplies, etc.)						· · · · · · · · · · · · · · · · · · ·
						456
TOTALS	94	94	94	94	94	<u>470</u>
	696	94	94			1072

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POPPY Site Enhanced With Priority Processor (PDE)

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Alternative C

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٠,		y'.	CONTROL	L BYSTEM ONLA
A.	Approach		,	
;` ; · \ ; · \	1. Second 810A to used for training and check		mporary shipment of in van)	computer
	2. Second Q.C. to			
•	3. Second generation computer return training computer an		(10 months at this nputer is available f	
•	another site)			
В.	Cost			
·. ·	Equipment Bld.	Personnel	<u>v</u>	
•	Digital 973 K (II5K Software) Analog 180 K	15 6		personnel equipment year
٠	\$ 1153 K	27 Total		
C.	Capability			
	Site National	· .		(Cost effect on
	Increased (40 Reduced Reduced	00%) Increase Increase Increase	ed Inc	uced reased reased
D.	Future Potential			
•	Targe			, ye

E. Risk

None - new computer only deployed When ready, schedule has two months extra time

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

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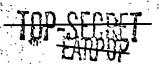
TOP-SECRET

Processing	of	"X"	Band	at
OCCDO**	~	71	TVYIIG	ц

HANDLE VIA BYEMAN CONTROL BYSTEM ONLY.

Approach C using new computer and Q.C. augumentation

	ulat in M	ive nutes	Steps		
	0	· · ·	Start intercept		
1	16		End intercept, prepare for processing	ıg .	
	31		Tape trailer added, tape rewound, tr room, start analog Q.C.		Q.C.
	91	,	End analog Q.C., start reformatting		erakan di kacamatan di Kabupaten di Kabupaten di Kabupaten di Kabupaten di Kabupaten di Kabupaten di Kabupaten Kabupaten di Kabupaten di Kabupat
	104		Start second pass		
	120		End second pass		
	191		End reformatting, start hand sort		
	203		Start third pass	, ,	•
	224		End third pass		
	251		End band sort, start PRF sort		
	259		End PRF sort, start collapsing data	to bursts	
	272		End collapsing data into bursts, sta	rt burst 1	isting and
	•		review		
	282		End review, start obtaining doppler	PRF and	
	285	n 2	End running doppler PRF and	start loca	tions
• •	286		First location	8 11 July 3	
3.	287		Second location		
	288		Third location		



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HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

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OPTION FUNDING (c)

٠		<u>FY 7</u>	<u>1 FY 72</u>	FY 73	FY 74	FY 75	TOTALS
A.	One Time Cost						÷
•	Equipment						
	Receiving Equipment	180					180 ≥
	Processing Equipment	973					973 Approved
	Construction						₹ <u>`</u>
٩	Operations Building						Release
•	Air Conditioning Electrical Power					3	Ψ
•	Berthing						4/06/
TO	TALS	1153					1153
В.	Annual Cost (Recurring)						2024/06/12 C05026146 1153
•	Personnel Equipment O&M	136 46	•	57 46	57 46	57 46	365:
	Facilities O&M (Utilities, TDY) (Supplies, etc.)				•		
TO	TALS		2 103	103	103	103	584
TO	TALS	1202	2 103	103	103	103	1737
					- All UP	70P-S	(5 yr cost)

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

Alternative D

A. Approach			;	
1. Second 810 used for tra	A to 3 aining and checkou	months - tempora ut installed in var	-	computer
2. Perishable	Data Extractor to		.67 mos	oths)
	eration computer tand e		nonths - at this A is available fo	
6. Cost				
Equipment Digital \$1173 K (115 K softwar 100 K POF 1173 200 Capability		Personnel 15 (1 year)	Recurring 84 K (1 yr. 6 33 K equipm 117 K	only) personnel ent
<u>Site</u>	National Increased (400) Increased Increased	Ocean Surv %) Increased (Increased Increased	(10-1) Re	SA (Cost effect on educed or change or change
Courth Potential Large	al .			
Slight = see Alt	ternatives B and C			

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Processing for "L" Band or "S" Band

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

Approach A using Q.C. augmentation

Cumulative		•
Time in Minutes	Steps	
0	Start intercept	
16	End intercept, start to prepare for processing	•
31	Trailer identification, rewind tape, move-to analog	
14 () () () () () () () () () (Q.C. room, run analog Q.C.	
76	End of Q.C., start computer processing by reformat	ting james
	tape	
96/	Reformatting complete, start R.F. band sort	
104	Second pass starts	
108	End R.F. band, sort, start PRF sort	•
120	Second pass ends	151
123	End PRF sort, start collapsing data into bursts	
148	Finish collapsing data into bursts, start listing and	review
163	Complete burst listing, start running Doppler PRI ar	id :
		· · ·
173	End Doppler PRI, start locations	
(2) 製作183 分では計算	First location	
193 🐪	Second location	
203	Third location	
208	Start of third pass	
	,我们就是一个时间,我们们还是有好的。""我们的,我们的人,我们的人,我们就会看到这个人,我们的人,我们就是我的人的人,我们就会不会一个人,我们的人,我们就会不	

HANDLE VIA BYEMAN

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Processing of "X" Band at

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HANDLE VIA BYEMAN Control sy<u>c</u>tem only

Approach D using new computer and Perishable Data Extractor

Cumulative Time in Minutes	Steps
0	Start intercept, R.F. band sorting and reformatting
16	End intercept, start PRF sort
(4.13)。 24 (4.14)。 (4.54)	End PRF sort, start collasping data into bursts
37	· Finish collapsing data into bursts, start burst listing
	and review
47	End review, start obtaining doppler PRF and
50	End running doppler PRF and start locations
51	First location
52	Second location
	Third location

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V FUNDING	M

	OPTION FUNDING				HANDLE V	A EYEMAN
					CONTROL S	YSTEM ON
	FY 71	FY 72	FY 73	FY 74	FY 75	TOTALS
. One Time Cost						• •
Equipment						
Receiving Equipment	1173					117
Processing Equipment	11/3	ار پهرون پهرونو کار در				11/0
Construction						2
Operations —						-
Building						
Air Conditioning						
Electrical Power						
Berthing				:	-	
OTALS	1173					117
• Annual Cost (Recurring)						117:
Personnel	84					84
Equipment O&M	33	33	33	33	33	165
Facilities O&M (Utilities, TDY)						3.
(Supplies, etc.)						
					C	٠.
DTALS	<u>117</u>	<u>33</u>	33	<u>33</u>	33_	249
				•	· · · · · · · · · · · · · · · · · · ·	
OTALS	1075	33	33	33 ,	33	1422
			· ,	1	YOU OF	the tracking

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ZI Facility

·		LIVINGER AIN DIFFINAL	j
The establishment of a new facility can be	made at minimum cost,	ifanteriativotem onl	,
C or D are chosen as the current	computer would be avai	lable for this	
site. Further, a large percentage of the an	alog equipment from	would be	
available.			
·			

For the basic site the following is an estimate of the funding necessary to either buy new equipment or refurbish equipment from other sites, however, without a careful inspection of returned equipment these are tentative.

Analog	165 K	
Digital	158 K	
Flooring, air	٠٠	
conditioning	35 K	(270ct)
Installation	14 K	see BYE 6.442-70 (270ct)
	372 K	- 44 gr for Blue Gougeless
		755-

If Option C or D were not approved then an additional 415 K would be required for the installation, or

> 372 K 415_K

Considering the other work load, availability of equipment, and refurbishing time, it is estimated that approximately 10 months would be required to make the installation, however, without knowing the actual site this is a tentative estimate.

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		1/4/5	S. S. S.	4/4	20 14 14 15 15 15 15 15 15 15 15 15 15 15 15 15	\$ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	3/3/6			10 Q			
•	1.	14/2 × 2	N. S.	4/4			2/2/2	ĝ/					
FIRST DELIVERY DATÉ	5/7c	78	1/8	9/66	1/69	7/68	1/8	2/65	4/68	7/67			
MENTHLY (KS)	2-1-13-4	1.5-20	7-14	5-25	2.2	4.1	2.5-18	3-17	6-38	6-30			
TYPE CF	SHILL TO MODIUM SUGNIFIC	>			REAL		->	-7	MED. TO	>		,	
,	/		,	ì	,				SCIENTIFI	-		-	
CACTE TOTAL	1											·	
I. TIME (MS)	• 6	. 6.5	. 2	1,0	-85	1.75	1.9	1175	1.3				1
7. DWE (A?)	1.2	2.0	4	1.75	1.7	1175	3.8?	3,5	.,	3.5			
# OF 3. ACCUMULATORS	5	7	4	lb ·	16	2	2			16		·	
# CF BITS		37.65	18.00	32.	37.65	13,71	12.69	13,71	26.67	26.55			
PER US	53.33	34162	1 4 100	341	3 1.43	13171	14107	13171	0.6141	36,00	,		< /
BY CPU	111	//											
STERAGE CHORACTERISTICS		()											
CHORNGICKINI	 												4
" CAPACITY	5-131	4-131	32K	8-64	8-131	8-64	8-3a	8.39	8-262	8-263			
WORD SIZE	33	4-131 32	32K	8-64 32	8-131	8-64	8-3a a4	8-39	8-262 24	8-262			
" CAPACITY													
1. CAPACITY WORD 2. SIZE FLOAT-RINT	33	32	36	32	32		a 4	24	2.4	36			
CAPACITY WORD SIZE FLOAT-RINT PRECISION ANSTRUCTION	33	32	36	32	32		a 4	24	2.4	36			Longing described by the second secon
CAPACITY WORD SIZE FLOAT-RINT PRECISION MISTRUCTION SET	33 34 m	32	36	32 56	32 50	มน	39	34 36	36	36 27 365			or ever the remainder of the first three terrestration and the reservoir the
I. CAPACITY WORD I. SIZE FLOAT-RINT PRECISION MSTRUCTION SET I. OP CODES INDIRECT ADDRESSING INDEX	33 34 56 151 0	32 56 89	36 27 125	32 56	32 50 144 00	24 48	39 	36 164 8	36 	36 27 365 co			en en de consecuelos comos de constituidos en encimientos en la menor en los desendos en la como consecuelos d
I. CAPACITY 2. SIZE FLOAT-RINT 3. PRECISION ANSTRUCTION SET 1. OP CODES INDIRECT 2. ADDRESSING INDEX INDEX 3. REGISTERS	33 34 m 56 151 00	32 56 89	36 27 125 1	32 56	32 50	24 48 ∞ 1 XB	39 111 00 3	36	36	36 27 365			de est en en de en er est en man de merite barrante menerie des estados de entre de entre de entre en entre de
I. CAPACITY WORD I. SIZE FLOAT-RINT PRECEION ANSTRUCTION SET I. OP CODES INDIRECT I. ADDRESSING INDEX INDEX REGISTERS WESSE MESSE MESS	33 34 m 56 151 00 3 3 m	32 56 89 1	36 27 125	32 56 109	32 50 144 00	24 48 0	39 111 00 3	36	36 20) cc	36 27 365 0			and become a first of contract of the contract of contract of the contract of
I. CAPACITY 2. SIZE FLOAT-RINT 3. PRECISION ANSTRUCTION SET 1. OP CODES INDIRECT 2. ADDRESSING INDEX INDEX 3. REGISTERS	33 34 m 56 151 00 3 3 m	32 56 89 1 7	36 27 125 1	32 56 109	32 50 144 00 7	24 48 ∞ 1 XB	39 111 00 3	36 164 8	36 20) &	36 27 365 00			des manusculles als and entre somb as ease a de comma d'accesse de montante de anno de la comme de deserves de
I. CAPACITY WORD I. SIZE FLOAT-RINT PRECEION ANSTRUCTION SET I. OP CODES INDIRECT I. ADDRESSING INDEX INDEX REGISTERS WESSE HESSE THESINE	33 34 m 56 151 00 3 3 m	32 56 89 1 7 XE XAP	36 27 125 1	32 56 109	32 50 144 00 7	24 48 ∞ 1 XB	39 111 00 3	36 164 8 3 XE CIM	36 20) &	36 27 365 00			house, addressed the colours and seems the second activity becomes and activity of the contrast of the contras
CAPACITY WORD INSTRUCTION INSTRUCTION INSTRUCTION INDIRECT INDEX INDEX INDEX INDEX INDEX INDEX INDEX INDIRECT INDEX INDE	33 34 m 58 151 00 3 \$6 m xap	32 56 89 1 7 XE XAP	36 27 125 1 7	32 56 109 ALL XAP	32 50 144 00 7 XE cim	24 48 ∞ 1 XB AAPS	39 111 & 3 xbe m	36 164 8 3 XE	36 20) & 3 ALL 8	36 27 365 00 15 XE XP			the second secon
I. CAPACITY WORD 2. SIZE FLOAT-RINT PRECISION MSTRUCTION SET I. OP CODES INDIRECT I. ADDRESSING INDEX 3. REGISTERS EXTENSIVE CHARACTERISTICS TRANSFER	33 34 m 56 151 00 3 \$EM XAP	32 56 89 1 7 XE XAP	36 27 125 1 7 ALL	32 56 109 ALL XAP	32 50 144 00 7 XE CIM	24 48 0 1 XB AAPS	39 111 00 3 201M	36 164 8 3 XE CIM	36 20) & 3 ALL 8	36 27 365 0 15 XE XP			the second secon
I. CAPACITY WORD 2. SIZE FLOAT-RINT PRECISION MSTRUCTION SET I. OP CODES INDIRECT I. ADDRESSING INDEX 3. REGISTERS EXTENSIVE— CHARACTERISTICS TRANSFER 1. CMANNELS TRANSFER 2. RATE	33 34 m 56 151 00 3 3 x e M x x p	32 56 89 1 7 XE XAP	36 27 125 1 7 ALL 3	32 56 109 ALL XAP	32 50 144 00 7 XE cim 8	24 48 ∞ 1 XB AAPS 4	39 111 00 3 XBE TO CIM	36 36 38 3 XE C I I I I I I I I I I I I I I I I I I	36 30) cc 3 FF: ALL 8	36 27 365 00 15 XE XP			
I. CAPACITY WORD 2. SIZE FLOAT-RINT 3. PRECISION MISTRUCTION SET I. OP CODES INDIRECT I. ADDRESSING INDEX 3. REGISTERS EXTENSIVE WESS TYPE CHARACTERISTICS TRANSFER ALGEBRAK LOMPILER COMPILER	33 34 m 58 151 00 3 \$EM XAP	32 56 89 1 7 XE XAP 192 6:4M	36 27 125 1 7 ALL 3 ?	32 56 109 ALL XAP	32 50 144 00 7 XE CIM 8 200K	24 48 0 XB AAPS 4 56K	39 111 00 3 23 21M 8 3.1M	36 36 37 37 37 37 37 37 4 4 4 4 4 4 4 4 4 4 4	36 20) 00 3 8 4.4M YES	36 27 365 00 15 XE XP 188 108 108			one to the control of
ALGEBRAK	33 34 m 56 151 00 3 3 m XAP 10 5 m	32 56 89 1 7 XE XAP	36 27 125 1 7 ALL 3	32 56 109 ALL XAP	32 50 144 00 7 XE cim 8	24 48 ∞ 1 XB AAPS 4	39 111 00 3 XBE T CIM 8	36 164 80 3 XE CIM 4 111M YES GRT	36 30) cc 3 FF: ALL 8	36 27 365 00 15 XE XP			abender de meestande beste de meestande de meestande de meestande de meestande de meestande de meestande de meestade de meesta