~~Hx SECRET~~

BYE-93821-75
Cy 2
1 pg

MEMO TO: [redacted] 28 APR 1975 (b)(3)

Subject: Program Office Involvement in Shuttle Activities

1. Recently, [redacted], of your office, completed a Shuttle transition plan that included provisions for the HEXAGON system. It became obvious during our discussions with him that the overall transition problem had been underestimated. I think future transition plans or actions could be more realistic if my office participated a little closer in the formative stage. To this end I have designated [redacted] as my Shuttle "Experts." I would appreciate it if you would use them to provide the SP-7 slant to the Shuttle.

2. Despite the conclusions drawn by my contractors in the past Shuttle studies conducted by SP-6, I feel the most useful way for HEXAGON to use the Shuttle is to replenish the expendables in orbit. Once I have a good vehicle in orbit, I sure don't want to bring it back to let the contractors tear it apart and rebuild it.

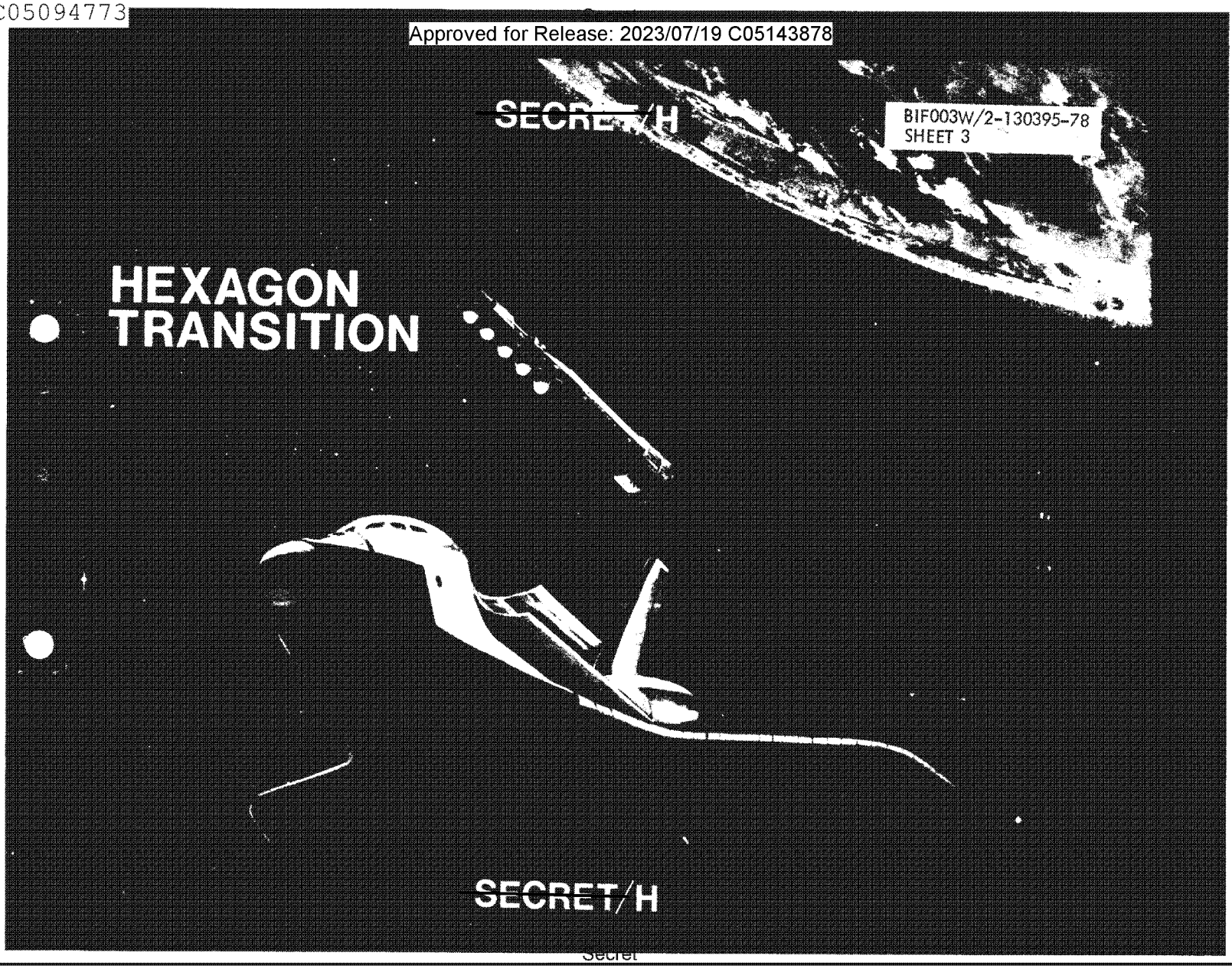
3. ~~4.~~ If you need assistance from any of the HEXAGON contractors, I am sure [redacted] can get their cooperation.

Raymond E. Anderson

RAYMOND E. ANDERSON

~~Hx SECRET~~

Handle Via
BYEMAN
Control System Only



CURRENT TRANSITION PLAN

- HISTORY
- CONFIGURATION
- SCHEDULE
- FUNDING

EARLY TRANSITION

SHUTTLE EXPLOITATION

HISTORY

TRANSITION ON SV-21

HEXAGON IS NOT PRESENTLY AN APPROVED AND FUNDED TRANSITION PROGRAM

SV-21 IS CARRIED AS BASELINE

- ESTABLISHED IN 1976 BUDGET SUBMISSION
- BASED ON WTR IOC

CONFIGURATION RATIONALE

- EARLY STUDIES INVESTIGATED RETRIEVAL/REFURBISHMENT AND REDESIGN FOR SHUTTLE OPTIMIZATION (1972-1973)

- SUBSEQUENT NRO PHILOSOPHY STRESSED MINIMUM REDESIGN OF TRANSITION PAYLOADS

- MIX UNCERTAINTY IN MID-TO-LATE 1980's

TRANSITION GROUND RULES

MINIMUM SV MODIFICATIONS

- BOOSTER SUBSTITUTION
- NO RETRIEVAL OR REUSE

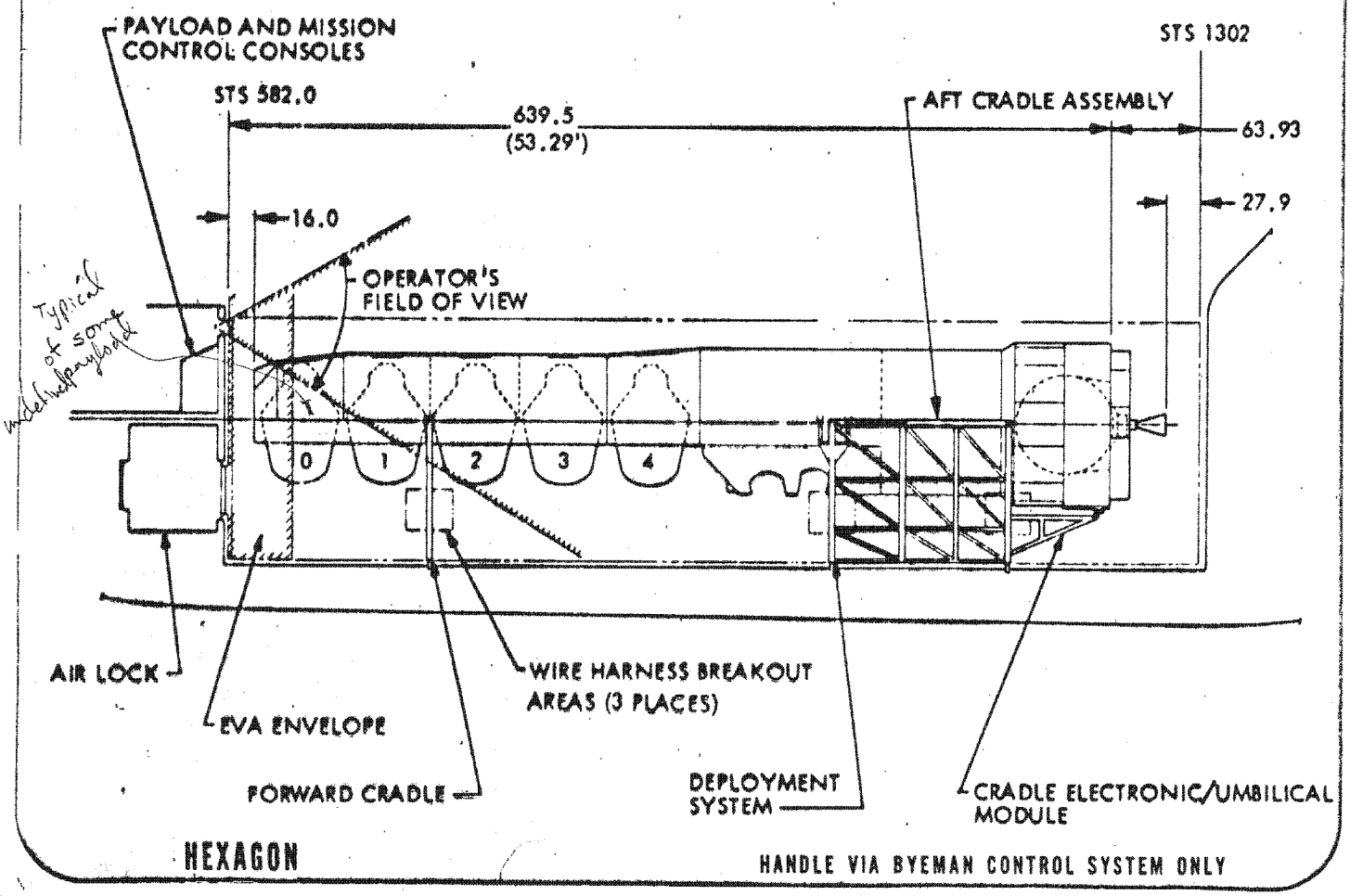
RETAIN PRESENT SV CAPABILITIES - should not infringe on present/ also should not increase and call that increase "Transition Costs"

MINIMUM SV/STS INTERFACES

RETAIN T-34D BACKUP LAUNCH CAPABILITY

HEXAGON
PROGRAM A

GENERAL CONFIGURATION - SBA/STS



HEXAGON

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HEXAGON
PROGRAM A

MASS PROPERTIES (SHUTTLE)

1200# S. Gant pallets

BASELINE WEIGHT	27,662 (LBS)	
. ADDITIONAL GROWTH (5TH RV) Typical	2,500	may add load
. STS MODS	200	
SV GROSS WEIGHT	30,362	
. FORWARD CRADLE	1,005	Rqmt. reduction capability
. AFT CRADLE	2,132	
. SUPPORT FITTINGS & ELECTRONICS	2,028	
PAYLOAD WEIGHT	33,527	
ORBITER CAPABILITY (100 X 140 NM)	36,900	Vol XIV # 32,000 actual
PERFORMANCE MARGIN	+1,373	

PAYLOAD CENTROIDS ARE WITHIN ORBITER CG LIMITS

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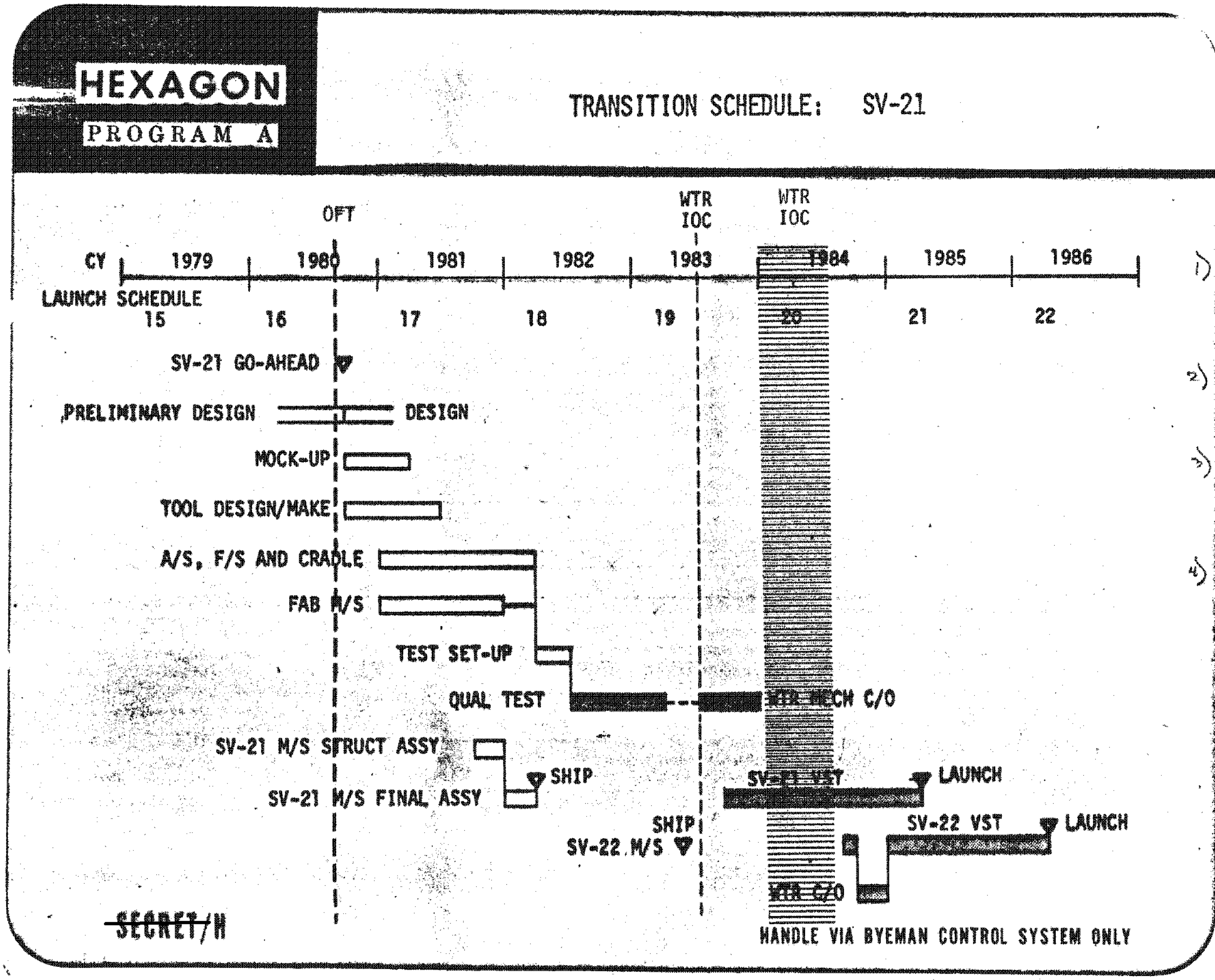


C12 · Indicates Thrust Enhancement at WTR

1) 2 SVs in [illegible]

2) 3rd M/S [illegible] for SV-2[illegible]

3) Design [illegible] after OFT [illegible]

4) SV-22 [illegible] WTR prior to SV-21 launch

SV-21 TRANSITION FUNDING

(MILLIONS)

FY	1980	1981	1982	1983	1984	TOTAL
BUDGET SUBMISSION	5.9	13.8	10.1	8.5	1.7	40.0

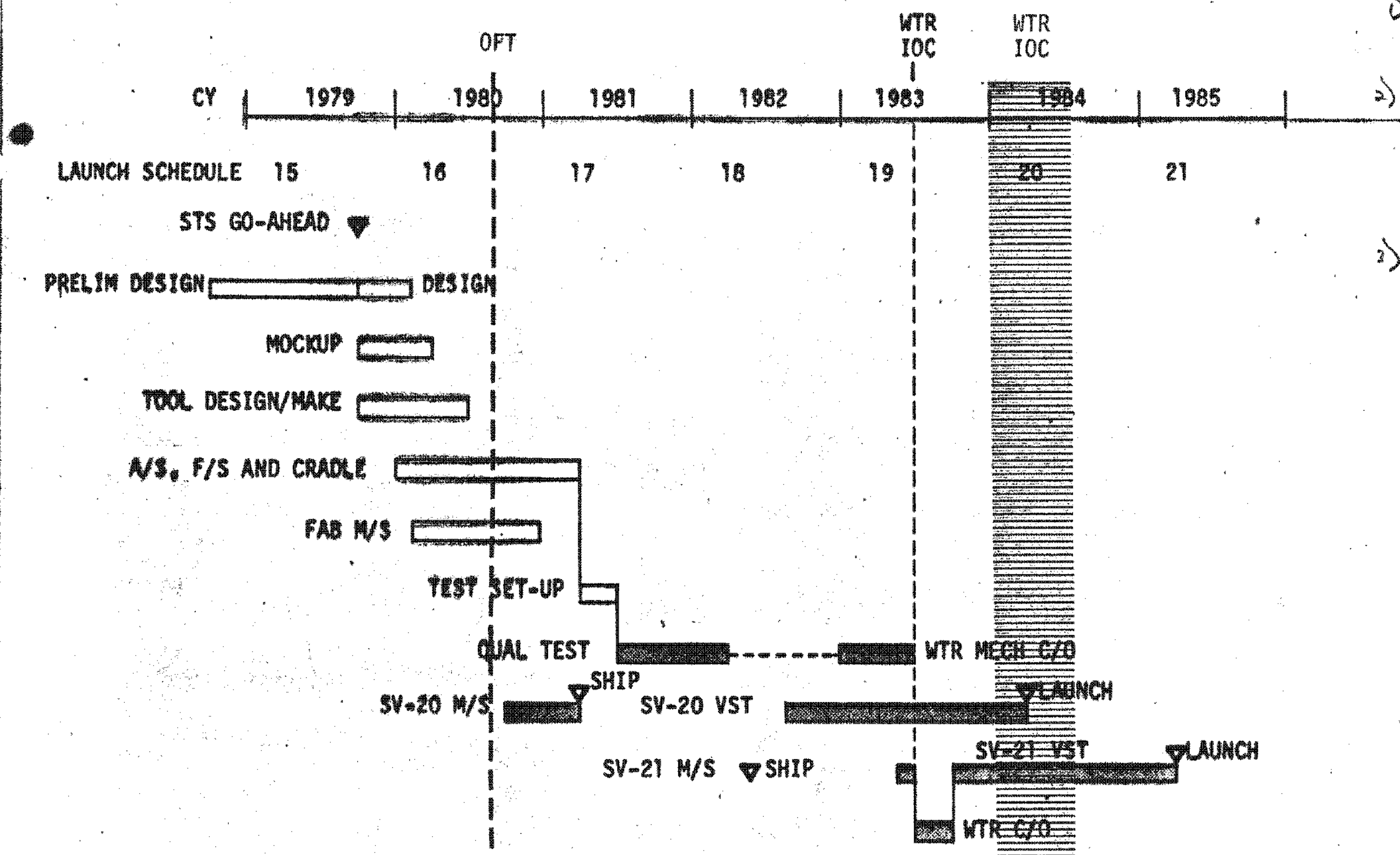
1) all non-recurring costs
2) Last budget submission

EARLY TRANSITION

TO SHUTTLE

HEXAGON
PROGRAM A

TRANSITION SCHEDULE: SV-20



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TRANSITION COSTS (SV-20)

FY	1979	1980	1981	1982	1983	1984	TOTAL
NON RECURRING	1.6	14.6	12.6	5.5	4.3	.7	39.3
T-34D		(13.8)	(17.8)	(10.3)	(4.1)	-	(46.0)
SHUTTLE	-	-	-	-	35.0	-	35.0
	1.6	.8	(5.2)	(4.8)	35.2	.7	28.3

Jim Hill accepted this credit/debit approach.

NOTE: - COST IMPACT ON 34D PROCUREMENT UNKNOWN
- TO PROTECT AGAINST SLIP IN WTR IOC, MAY BUY BOOSTER
- STS STUDY LINE HAS $.5M AUTHORIZED IN FYs 79, 80

EARLY TRANSITION (SV-20)

RISK:

- TECHNICAL - OFT COMPLETED AFTER VEHICLE DESIGN
- STS AVAILABILITY - DELAYED IOC AT WTR

TRANSITION GO-AHEAD REQUIRED OCT '79

LONG LEAD ENGINEERING REQUIRED OCT '78

- ADDITIONAL $1.1M IN FY '79

POTENTIAL EXPLOITATION OF SHUTTLE

given re-newed interest we would:

UPDATE PREVIOUSLY ACCOMPLISHED STUDIES

RETRIEVE/REFURBISH SPACECRAFT ("MIN MOD")

- REDUCE RECURRING COSTS

most of the technical elements of the old study are still valid.

majority of effort would be in the costing studies.

REDESIGN SPACECRAFT (OPTIMIZED)

- RETRIEVE/REFURBISH VS ON-ORBIT RESUPPLY
- ADDITIONAL RVs AND FILM
- NEAR REAL TIME READOUT

PALLETIZE CAMERA SYSTEM FOR SHUTTLE USE - presently underway

WIDE AREA SEARCH PAYLOAD (WASP)

PALLETIZED PANORAMIC CAMERA SYSTEM

- FIXED IN CARGO BAY
- UTILIZES ORBITER SUBSYSTEM
- RELATIVELY SMALL AND UNCOMPLICATED
- STATE-OF-THE ART TECHNOLOGY

} as an integrated recon. system orbiter & sensor

- as compared to other system. about 7K lbs

FIELD MAINTAINED (WTR)

- QUICK CALL-UP CAPABILITY

WASP SCENARIOS

STANDING SEARCH

- SUPPLEMENTAL BROAD AREA COVERAGE (2.5 MILLION SQ NM PER MISSION)
- BROAD AREA COVERAGE IN DIFFICULT WEATHER AREAS (E.G., CHINA IN THE FALL)
- COVERAGE OF HIGH DENSITY TARGET AREAS (E.G., MOSCOW AREA)

SPECIAL MISSIONS (SYNOPTIC COVERAGE)

- TRANSIENT ACTIVITY
  - MOBILE MISSILES
- MILITARY TRAINING EXERCISES
- CRISIS ASSESSMENT
- COLOR AND IR FALSE COLOR
  - CC & D
  - ECONOMIC INTELLIGENCE
    - CROP ASSESSMENT
    - EARTH RESOURCES

} would have filtering capability for color ratioing.

SHUTTLE UTILIZATION

SEARCH

- CONSIDER NRO DEDICATED LAUNCH IN CONJUNCTION WITH MULTIPLE SORTIE PAYLOADS } mentioned pallet-sat Gambit and Thermal Cameras
- SHARED RIDES
  - INCLINATION
  - TIME OF LAUNCH
  - ALTITUDE
  - MISSION LENGTH (CONSIDER EXTENDING) ≈ $300K/day
  - PREVIOUS COVERAGE
  - ABOUT 20% OF LAUNCH COST ~ based on weight & volume.

WASP STUDY

CONTRACTORS:

GE - VALLEY FORGE

ITEK - BOSTON

STUDY COMPLETION - SEPTEMBER 1978

OBJECTIVES:

- DETERMINE TECHNICAL FEASIBILITY OF ORBITER AS PLATFORM
- DETERMINE EXTEND OF DEPENDENCY ON ORBITER SUBSYSTEMS
- DEVELOP PHILOSOPHY OF TESTING AT ALL LEVELS - Sensor System
  - Palletized
  - Orbiter & Palletized

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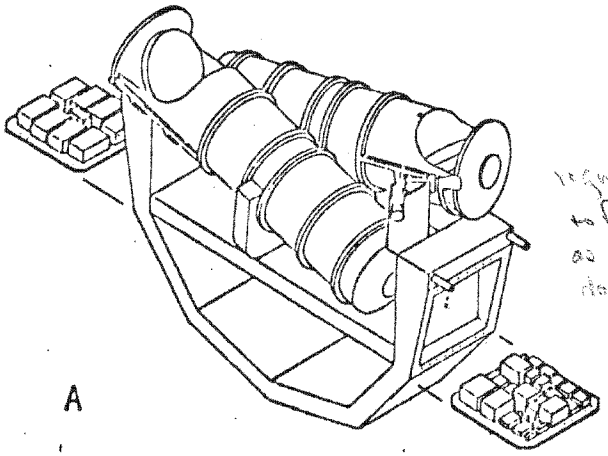
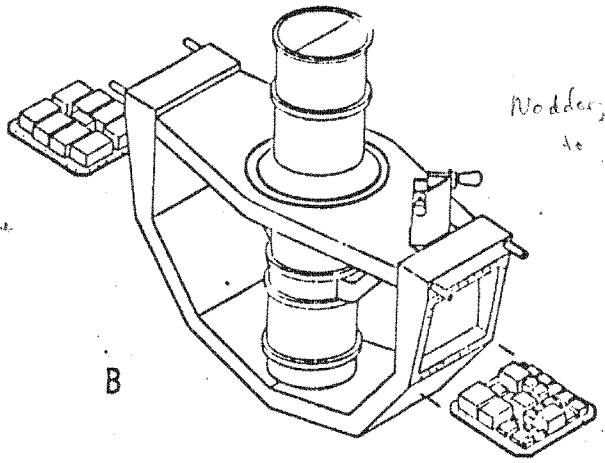
CONFIGURATION CONCEPTS



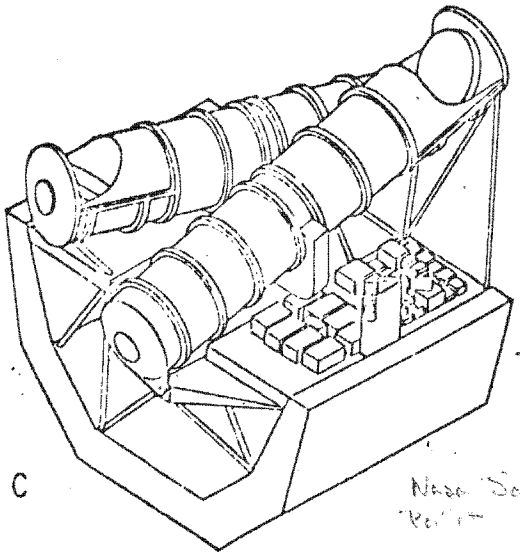
A

required orbiter to fly sideways as well as upside down



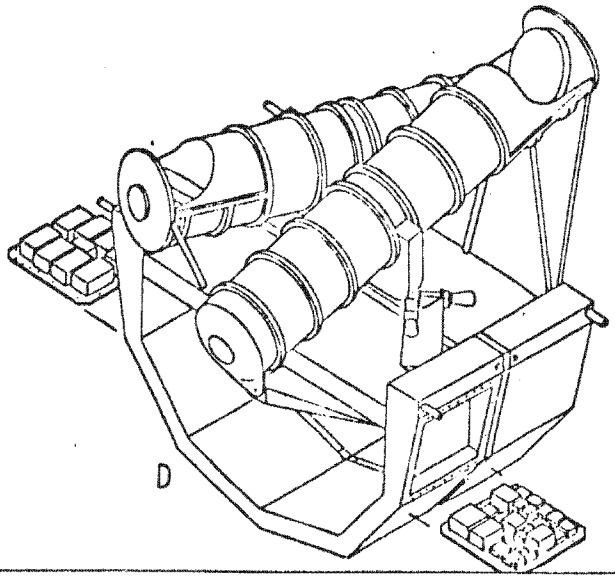
B

Nodding similar to Corona



C

Nose Section



D

2 STPs

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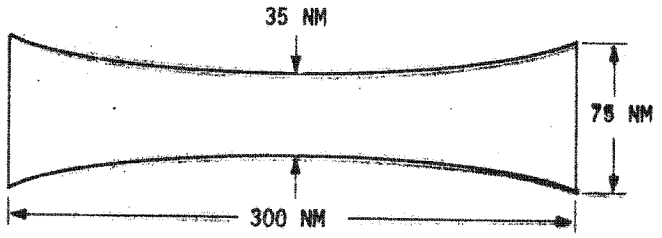
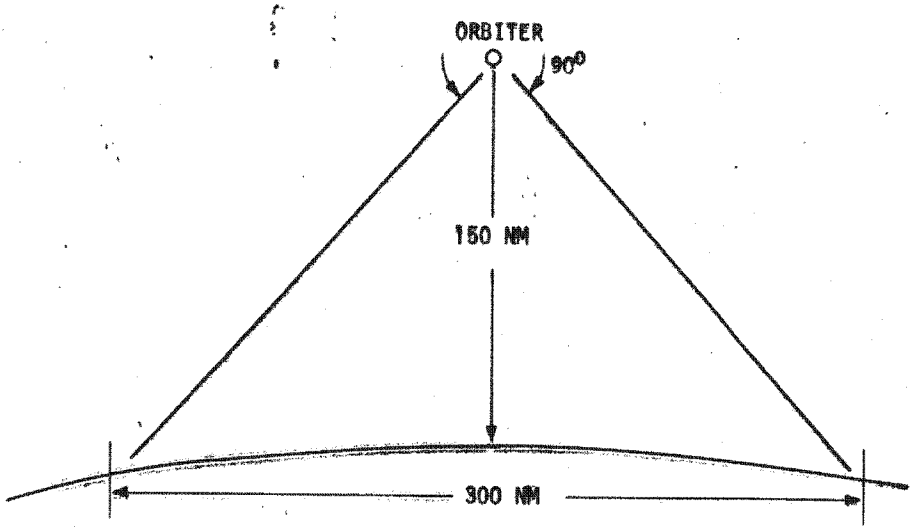
PROGRAM A

WASP MAX GROUND COVERAGE



- 80% TIME NIIRS 4
- FULL STEREO



DESIGN EFFORT

ORBITER IS A STABLE PLATFORM

OPERATING ENVELOPE

- ALTITUDE 125-180 NM
- INCLINATION ABOVE 50^{o}
- MISSION LENGTH 7-30 DAYS

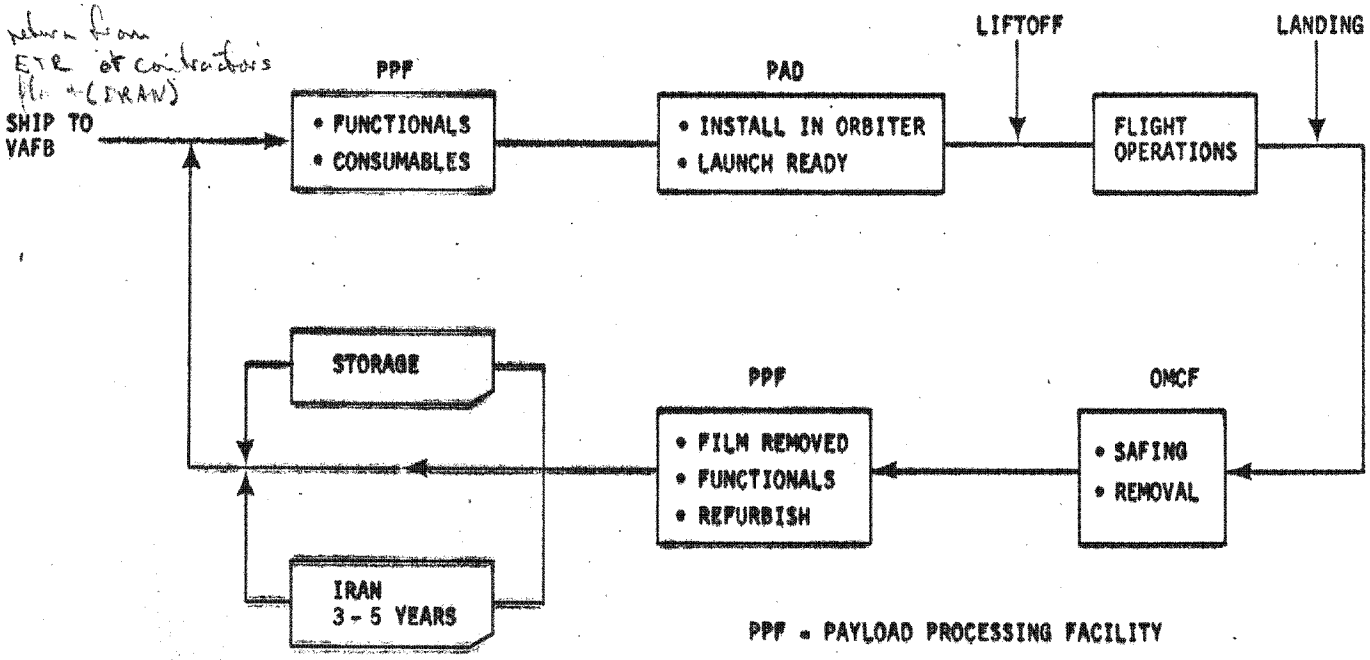
TARGETING NOT CONSTRAINED BY FILM LIMITATION (7 DAY MISSION)

TEST PHILOSOPHY

- PATTERNED AFTER AIRCRAFT RECONNAISSANCE PROGRAMS
- ON-BOARD SENSORS
  - ELIMINATES COLLIMATION TESTING
  - IDENTIFY SUSPECT COMPONENTS — using PSD Analysis
- MODULAR DESIGN ALLOWS EASY BLACK BOX REPLACEMENT

HEXAGON
PROGRAM A

WTR WASP HARDWARE FLOW



PPF = PAYLOAD PROCESSING FACILITY

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WASP PROGRAM COST ELEMENTS

- 3 WASP REQUIRED
  - 1 QUAL (POSSIBLE TO REFURB FOR FLIGHT) - need at Contractor's plant to keep Spare program going
  - 2 FLIGHT
- PAYLOAD PROCESSING FACILITY - existing facilities test second - build next. small contractor support team
- SPARES PROGRAM = on hand, a complete set of qualified blade boxes.
- LAUNCH