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SAVINGS PROJECTIONS

FOR

NRP/STS LAUNCHES

MAY 1973

HEXAGON GAMBIT [redacted]
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QUALIFICATIONS AND ASSUMPTIONS FOR MAY 1973 NRP-STS STUDY

1. The baseline payload program used in the study reflects the best current projections of overhead collection needs.

2. Study period: FY1980 through FY1991 (consistent with latest NASA studies).

3.

4. All STS-launched imagery payloads are retrieved and refurbished

5. A refurbished payload can be retrieved, recycled and relaunched in a minimum time of 9 months.

6. Refurbished payloads cost from 50% to 70% of original and two refurbishments are permitted.

7. Non-recurring STS adaptation costs for payloads to be retrieved/refurbished are 77% of current SV unit cost; recurring costs are 4%/launch (minimum).

8. Non-recurring STS adaptation costs for payloads not designed to be retrieved/refurbished are 50% of current SV unit cost; recurring costs are 4%/launch.

9. Refurbishment costs maintain the production (industry) base. There are no cost penalties for lower production rates associated with refurbished payloads, and there are no increased overhead rates for the lower-cost payloads.

10. STS costs are $10.5M per launch and TUG/OOS costs are $1M per launch. These costs which represent May 1973 NASA estimates include all required services, hardware, and STS refurbishment costs.

11. Only one STS flight is charged for a launch/retrieval operation.

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12. Non-recurring costs for payload growth or normal improvements are not included.

13. The STS is always available to satisfy projected launch/retrieval requirements.

14. There are no launch or on-orbit failures.

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NRP LAUNCH PROJECTION FOR FY1980-FY1991

BASELINE PROGRAM	80	81	82	83	84	85	86	87	88	89	90	91	Total
HEXAGON(2/yr)	2	2	2	2	2	2	2	2	2	2	2	2	24
GAMBIT(2/yr)	2	2	2	2	2	2	2	2	2	2	2	2	24

OPTION 1

HEXAGON(3/yr)	3	3	3	3	3	3	3	3	3	3	3	3	36
TOTAL													

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GAMBIT HEXAGON

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SELECTED CASES FOR COST ANALYSIS

CASE I

Approximates normal transition to STS.

- ETR: FY81
- WTR: FY83

Imagery satellites launched by STS are retrieved, refurbished and reused.

[redacted]

CASE II

CASE I with TUG/OOS replacing Agenas & Transtages.

- TUG/OOS are retrieved, refurbished & reused.
- [redacted]

CASE III

Approximates 12 years of normal steady-state operations.

- No RDT&E costs are included.
- STS used for all payloads.

All imagery satellites are retrieved, refurbished and reused.

[redacted]

CASE IV

[redacted]

[redacted]

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CASE V

CASE III with TUG/OOS replacing Agenas & Transtages.

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PROJECTION OF NRP SATELLITE PURCHASES & REFURBISHMENTS

BASELINE PROGRAM	CASES I & II		CASES III & IV		CASE V		TOTAL OPERATION
	NEW[1]	REFURBISHED	NEW	REFURBISHED	NEW	REFURBISHED	
HEXAGON(2/yr)	12(6)	12	8	16	8	16	24
GAMBIT	12(6)	12	8	16	8	16	24
OPTION 1							
HEXAGON(3/yr)	18(9)	18	12	24	12	24	36

1/ The numbers in parentheses are those new payloads launched from SLV's (i.e., prior to STS transition).

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HEXAGON GAMBIT

NRP-STS LAUNCHES

POTENTIAL PAYLOAD SAVINGS FOR FY 1980-FY 1991 PERIOD

	50% RF		70% RF	
	BASELINE (2 HEX/YR)	OPTION 1 (3 HEX/YR)	BASELINE (2 HEX/YR)	OPTION 1 (3 HEX/YR)
CASE I				
Transition Imagery Refurbishment Agena/Transtage				
CASE II				
Transition Imagery Refurbishment TUG/OOS				
CASE III				
12 yr Steady-State Imagery Refurbishment Agena/Transtage				
CASE IV				
12 yr Steady-State Imagery Refurbishment TUG/OOS				
CASE V[1]/				
12 yr Steady-State Imagery Refurbishments				

1/

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NRP-STS LAUNCHES

POTENTIAL TOTAL SAVINGS FOR FY 1980-FY 1991 PERIOD

[redacted]

	50% RF		70% RF	
	BASELINE (2 HEX/YR)	OPTION 1 (3 HEX/YR)	BASELINE (2 HEX/YR)	OPTION 1 (3 HEX/YR)
CASE I				
Transition Imagery Refurbishment Agena/Transtage				
CASE II				
Transition Imagery Refurbishment TUG/OOS				
CASE III				
12 yr Steady-State Imagery Refurbishment Agena/Transtage				
CASE IV				
12 yr Steady-State Imagery Refurbishment TUG/OOS				
CASE V1/				
12 yr Steady-State Imagery [redacted] Refurbishments				

1/ [redacted]

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SUMMARY OF COST ANALYSIS

FOR

GAMBIT, HEXAGON, [redacted] PROGRAMS

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USING THE

SPACE TRANSPORTATION SYSTEM

FY 1980 - FY 1991

PREPARED BY

SAFSP-6

FOR

NRO ANALYSIS OFFICE

FEBRUARY 1974

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ASSUMPTIONS AND QUALIFICATIONS

1. All costs are expressed in millions of FY-74 dollars.

2. STS launch costs per flight are: Shuttle - 12.2; Transtage min-mod 15-ft expendable - 4.4.

3. Costs for normal payload growth and improvements are included.

4. There are no cost penalties for smaller block buys or lower production rates associated with refurbishable vehicles.

5. STS launched imagery payloads are retrieved and refurbished twice. [redacted] (b)(1) (b)(3) 10 USC ⊥ 424

6. Launch and retrieval of imagery payloads are assumed on each STS flight.

7. Cost of payload refurbishment is 70% of unit production cost.

8. The STS is always available to satisfy projected launch/retrieval requirements and there are no launch failures.

9. [redacted] Imagery payload on-orbit life is limited by expendables.

10. HEXAGON transition design is min-mod with dual T-IIID/STS launch capability and on-orbit operation life of six months. Four vehicle buy.

11. HEXAGON min-mod cost: Non-recurring is 77% of unit production cost and recurring is 4% of unit production cost.

12. HEXAGON optimized for STS (Block change design) has six recoverable vehicles, a nine-month on-orbit operating life and is capable of two or more reuses. Three vehicle buy.

13. GAMBIT transition design is uprated 90-inch system with dual STS/SLV capability and on-orbit operating life of six months.

14. GAMBIT optimized for STS (block change design) has one year operating life.

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ASSUMPTIONS AND QUALIFICATIONS (CONTINUED)

15.

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17. Backup boosters are provided for the first two years of STS transition in the case of imagery vehicles

SITUATIONS CONSIDERED

CASE I: ETR STS IOC Dec 79, VAFB STS IOC Dec 1982.

CASE II: ETR STS IOC Dec 79, VAFB STS IOC Dec 1985.

CASE III: No STS Operations at VAFB. Imaging Systems Launched on SLVs from VAFB.

CASE IV: All Systems Launched from ETR on STS.

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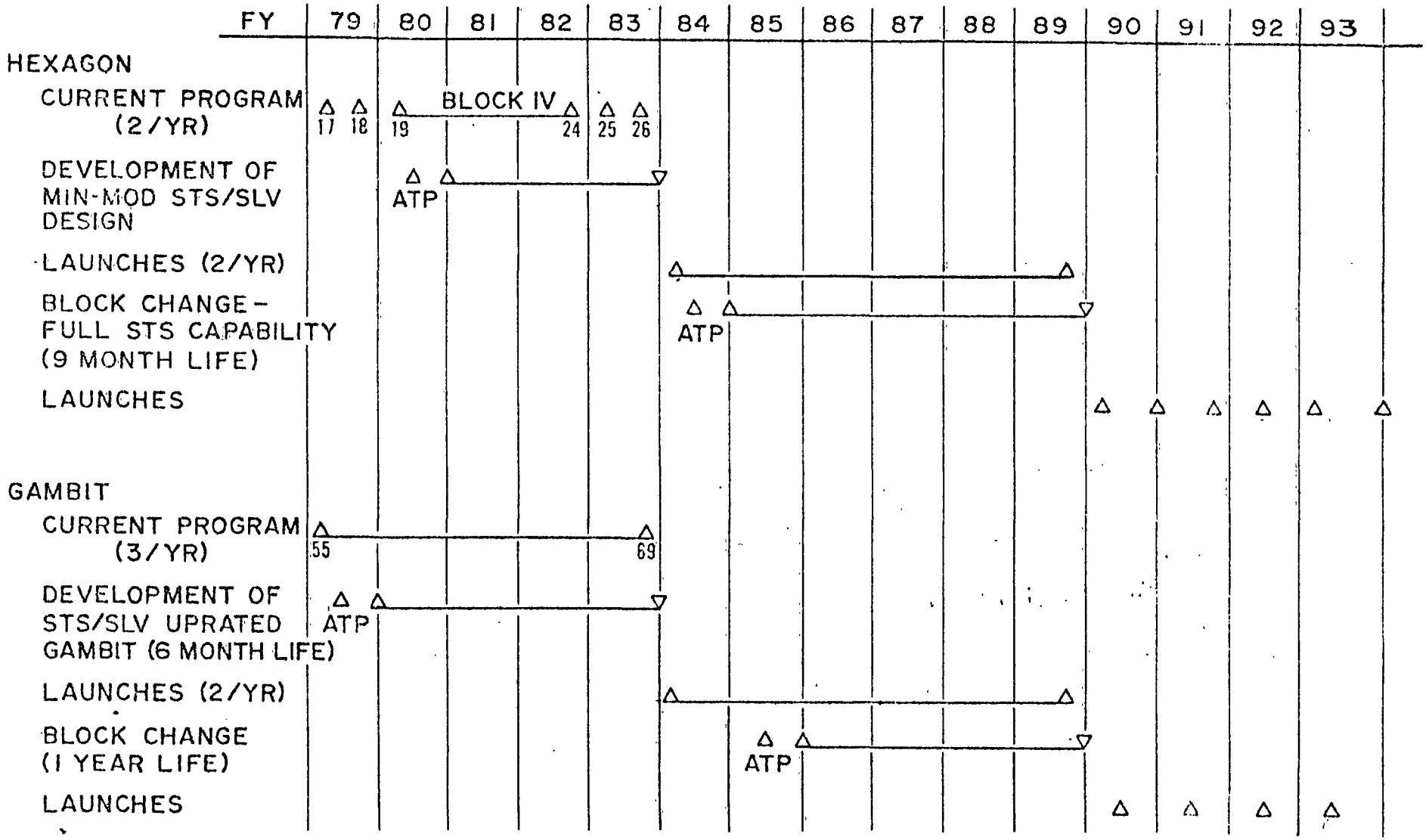
SAFSP STS TRANSITION COST STUDY SCHEDULES
PHOTO SYSTEMS - VAFB IOC - DECEMBER 1982



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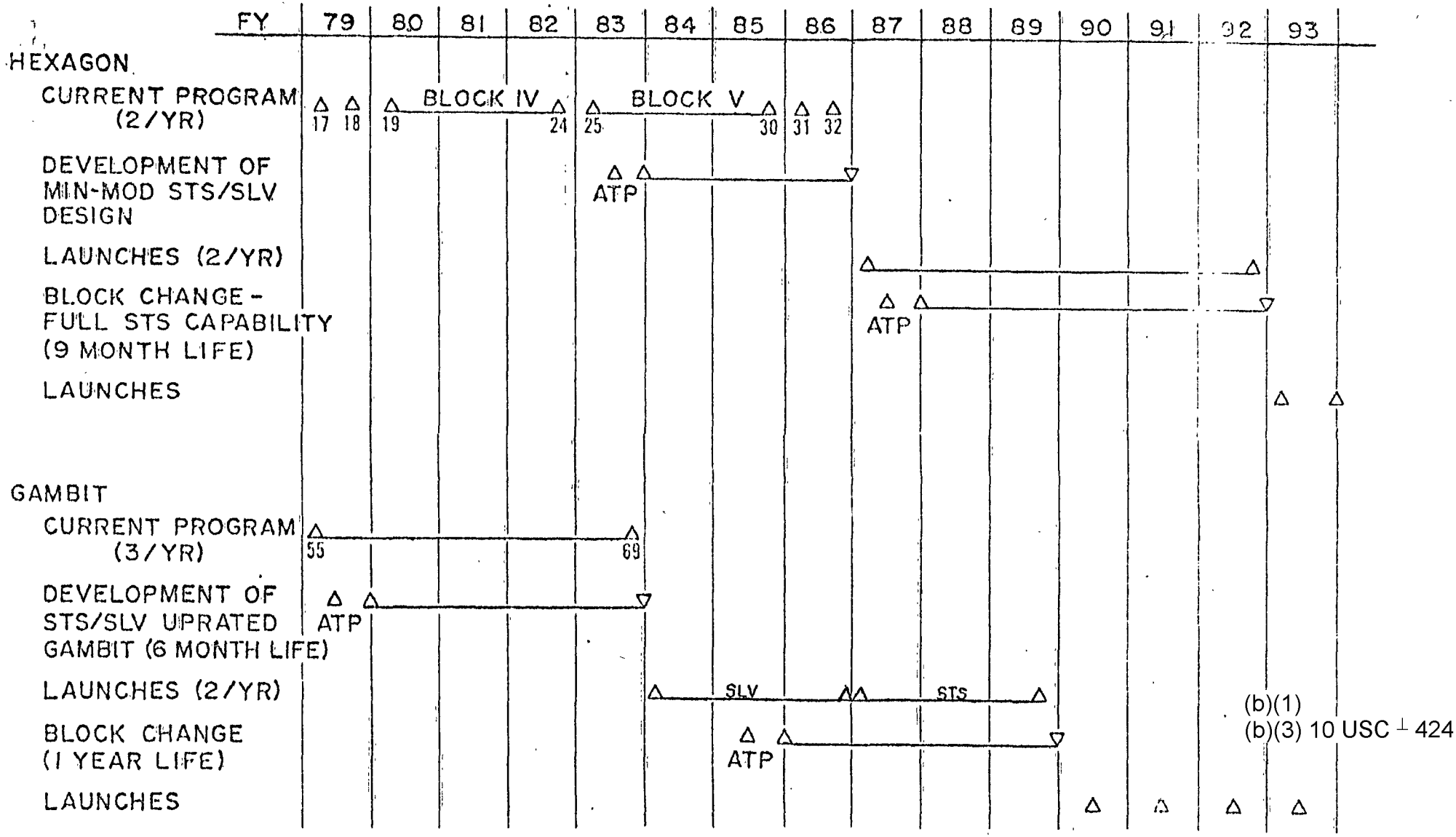
SAFSP STS TRANSITION COST STUDY SCHEDULES

PHOTO SYSTEMS - VAFB IOC - DECEMBER 1985



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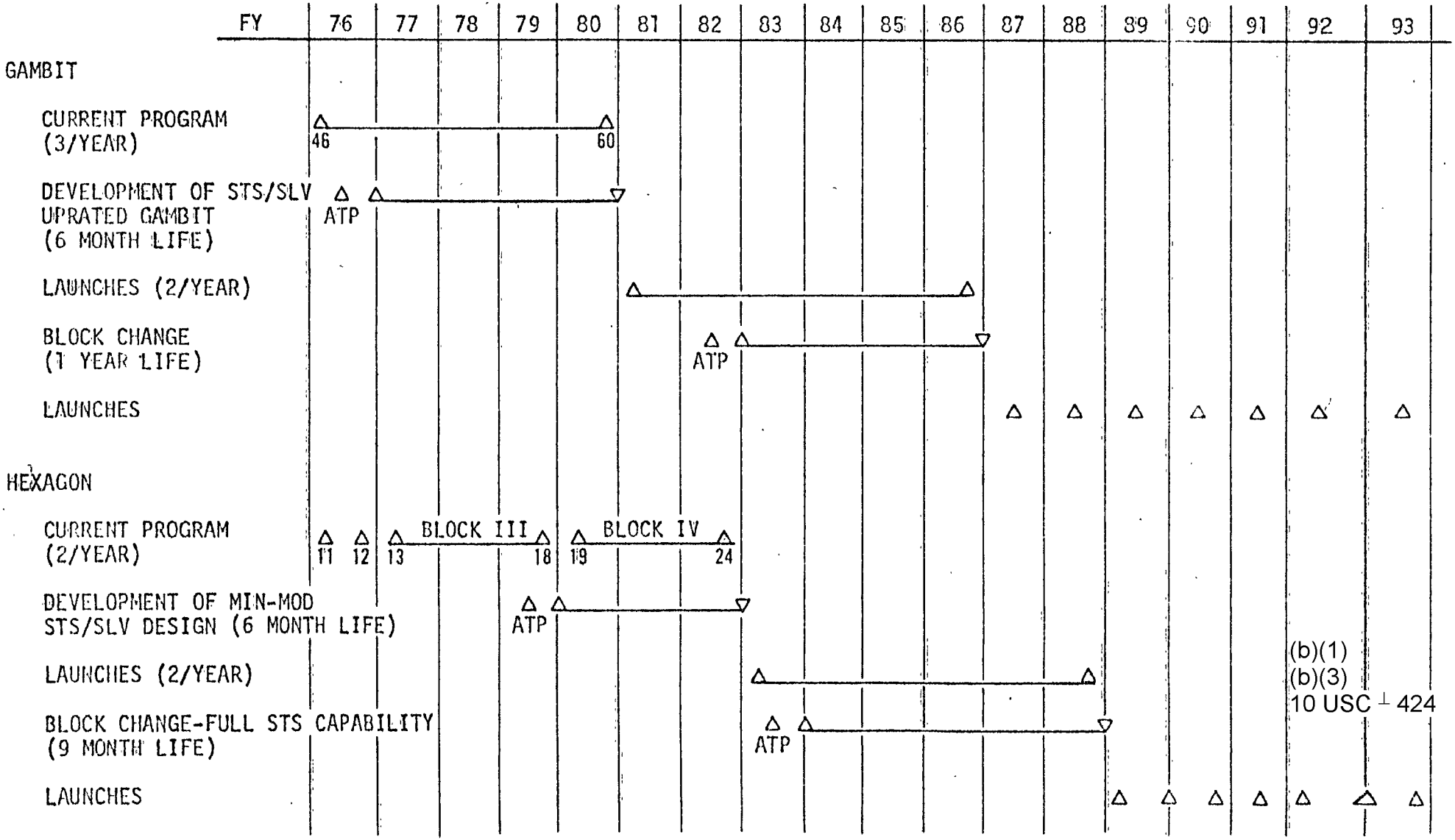
SAFSP STS TRANSITION COST STUDY SCHEDULE
(PHOTO SYSTEMS - ETR)



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SAFSP STS TRANSITION COST STUDY

(FY 1980 - FY 1991)

CASE I - VAFB IOC DECEMBER 1982*

SYSTEM	BASELINE COST	DELTA COST
HEXAGON		
GAMBIT		

*With SLV Backup capability.

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SAFSP STS TRANSITION COST STUDY

SUMMARY OF SAVINGS (FY 1980 - FY 1991)

	CASE I	CASE II	CASE III	CASE IV
With SLV Backup Capability				
Without Backup Capability				

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SAVINGS PROJECTIONS

FOR

NRP/STS LAUNCHES

MAY 1973

HEXAGON GAMBIT
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QUALIFICATIONS AND ASSUMPTIONS

1. The baseline payload program used in the study reflects the best current projections of overhead collection needs.

2. Study period: FY 1980 through FY 1991 (consistent with latest NASA studies).

3. [redacted]

4. Only direct program costs (FY73 dollars) for payload and launch are considered. Costs for potential payload growth or normal improvements are not included.

5. All STS-launched imagery payloads are retrieved and refurbished, [redacted]

6. A refurbished payload can be retrieved, recycled and relaunched in a minimum time of 9 months.

7. Refurbished payloads cost from 50% to 70% of original and two refurbishments are permitted.

8. Non-recurring STS adaptation costs for payloads to be retrieved/refurbished are 77% of current SV unit cost; recurring costs are 4%/ new payload ~~launch~~ (minimum).

[redacted]

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QUALIFICATIONS AND ASSUMPTIONS (CONTINUED)

9. Non-recurring STS adaptation costs for payloads not designed to be retrieved/refurbished are 50% of current SV unit cost; recurring costs are 4%/~~launch~~. new payload.

10. Refurbishment costs maintain the production (industry) base. There are no cost penalties for lower production rates associated with refurbished payloads, and there are no increased overhead rates for the lower-cost payloads.

11. STS costs are $10.5M per launch and TUG/OOS costs are an additional $1M per launch. (These costs, the May 1973 NASA estimates, include all required launch vehicle hardware and services.)

12. Only one STS flight is charged for a launch/retrieval operation.

13. The STS is always available to satisfy projected launch/retrieval requirements.

14. There are no launch or on-orbit failures.

[redacted]

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[redacted]

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NRP LAUNCH PROJECTION FOR FY1980-FY1991

BASELINE PROGRAM	80	81	82	83	84	85	86	87	88	89	90	91	Total
HEXAGON(2/yr)	2	2	2	2	2	2	2	2	2	2	2	2	24
GAMBIT(2/yr)	2	2	2	2	2	2	2	2	2	2	2	2	24

OPTION 1

HEXAGON(3/yr)	3	3	3	3	3	3	3	3	3	3	3	3	36
TOTAL													

[redacted] GAMBIT HEXAGON [redacted]

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SELECTED CASES FOR COST ANALYSIS

CASE I

Approximates normal transition to STS.

- ETR: FY81
- WTR: FY83

Imagery satellites launched by STS are retrieved, refurbished and reused.

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CASE II

CASE I with TUG/OOS replacing Agenas & Transtages.

- TUG/OOS are retrieved, refurbished & reused.

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SELECTED CASES FOR COST ANALYSIS (CONTINUED)

CASE III

Approximates 12 years of normal steady-state operations.

- No RDT&E costs are included.
- STS used for all payloads.

All imagery satellites are retrieved, refurbished and reused.

CASE IV

CASE III with TUG/OOS replacing Agenas & Transtages.

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- TUG/OOS are retrieved, refurbished and reused.

CASE V

CASE III with TUG/OOS replacing Agenas & Transtages.

PROJECTION OF NRP SATELLITE PURCHASES & REFURBISHMENTS

BASELINE PROGRAM	CASES I & II		CASES III & IV		CASE V		TOTAL OPERATION
	NEW[1/]	REFURBISHED	NEW	REFURBISHED	NEW	REFURBISHED	
HEXAGON(2/yr)	12(6)	12	8	16	8	16	24
GAMBIT	12(6)	12	8	16	8	16	24
OPTION 1							
HEXAGON(3/yr)	18(9)	18	12	24	12	24	36

1/ The numbers in parentheses are those new payloads launched from SLV's (i.e., prior to STS transition).

[redacted] HEXAGON GAMBIT [redacted]

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NRP-STS LAUNCHES

POTENTIAL PAYLOAD SAVINGS FOR FY 1980-FY 1991 PERIOD

	50% RF		70% RF	
	BASELINE (2 HEX/YR)	OPTION 1 (3 HEX/YR)	BASELINE (2 HEX/YR)	OPTION (3 HEX/Y
CASE I				
Transition				
Imagery Refurbishment				
Agena/Transtage				
CASE II				
Transition				
Imagery Refurbishment				
TUG/OOS				
CASE III				
12 yr Steady-State				
Imagery Refurbishment				
Agena/Transtage				
CASE IV				
12 yr Steady-State				
Imagery Refurbishment				
TUG/OOS				
CASE V[1/]				
12 yr Steady-State				
Imagery				

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NRP-STS LAUNCHES

POTENTIAL TOTAL SAVINGS FOR FY 1980-FY 1991 PERIOD

	50% RF		70% RF	
	BASELINE (2 HEX/YR)	OPTION 1 (3 HEX/YR)	BASELINE (2 HEX/YR)	OPTION 1 (3 HEX/YR)
CASE I				
Transition Imagery Refurbishment Agena/Transtage				
CASE II				
Transition Imagery Refurbishment TUG/OOS				
CASE III				
12 yr Steady-State Imagery Refurbishment Agena/Transtage				
CASE IV				
12 yr Steady-State Imagery Refurbishment TUG/OOS				
CASE V[1]/				
12 yr Steady-State Imagery				

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SUMMARY OF POTENTIAL NRP SAVINGS

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	12-YR TRANSITION	12-YR STEADY-STATE
PAYLOAD SAVINGS		
TOTAL SAVINGS		

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DEADHEADING COSTS

ASSUMPTIONS

1. Only refurbishable satellites are considered.
2. Two STS flights - launch and recovery are charged/satellite.
3. Satellites are not recovered after the second refurbishment.

	Baseline (2 HEX/YR)	Option 1 (3 HEX/YR)
CASES I & II		
CASES III & IV		
CASE V		

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