

~~Hx SECRET~~

BYE-93821-75

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1 pg

MEMO TO: [REDACTED]

28 APR 1975

(b)(3) 10 USC ± 424

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. (b)(3) 10 USC ± 424
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. (b)(3) 10 USC ± 424

*Raymond E. Anderson*

RAYMOND E. ANDERSON

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**BYEMAN**  
Control System Only

**SECRET**

BIF003V/2-130394-78  
SHEET 3

# HEXAGON TRANSITION



**SECRET/H**

## 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"

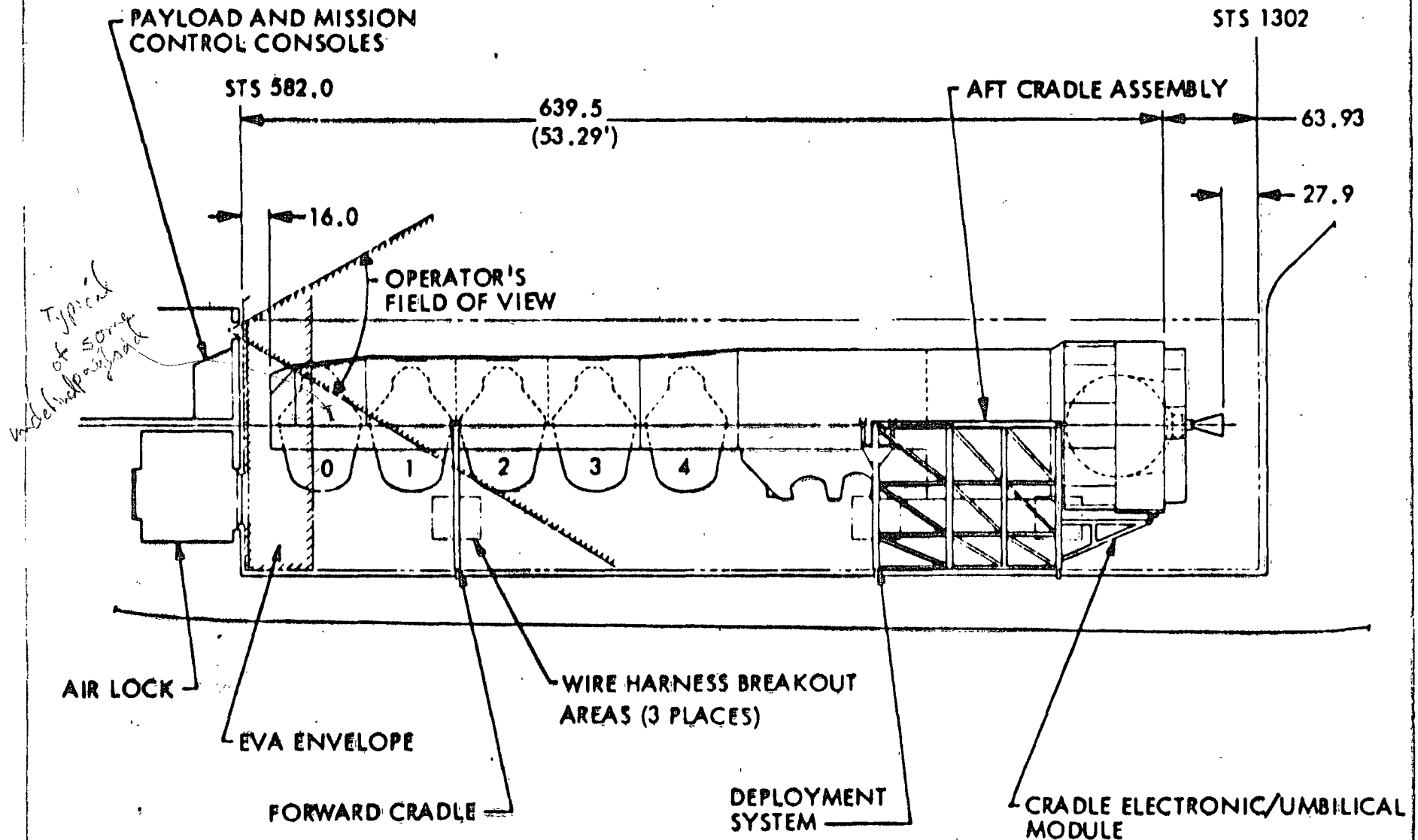
### MINIMUM SV/STS INTERFACES

RETAIN T-34D BACKUP LAUNCH CAPABILITY

**HEXAGON**

**PROGRAM A**

# GENERAL CONFIGURATION - SBA/STS



**HEXAGON**

**HANDLE VIA BYEMAN CONTROL SYSTEM ONLY**

**HEXAGON****PROGRAM A****MASS PROPERTIES (SHUTTLE)***12000 lbs  
pallet*

BASELINE WEIGHT	27,662 (LBS)
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. ADDITIONAL GROWTH ((5TH RV) <i>Typical</i>	2,500
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. STS MODS	<u>200</u>
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SV GROSS WEIGHT	30,362
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. FORWARD CRADLE	1,005
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. AFT CRADLE	2,132
--------------	-------

. SUPPORT FITTINGS & ELECTRONICS	<u>2,028</u>
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PAYLOAD WEIGHT	35,527
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ORBITER CAPABILITY (100 X 140 NM)	36,900
-----------------------------------	--------

PERFORMANCE MARGIN	+1,373
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PAYLOAD CENTROIDS ARE WITHIN ORBITER CG LIMITS

*50% reduction  
no problem**level RV #**32,000 actual*~~SECRET/H~~

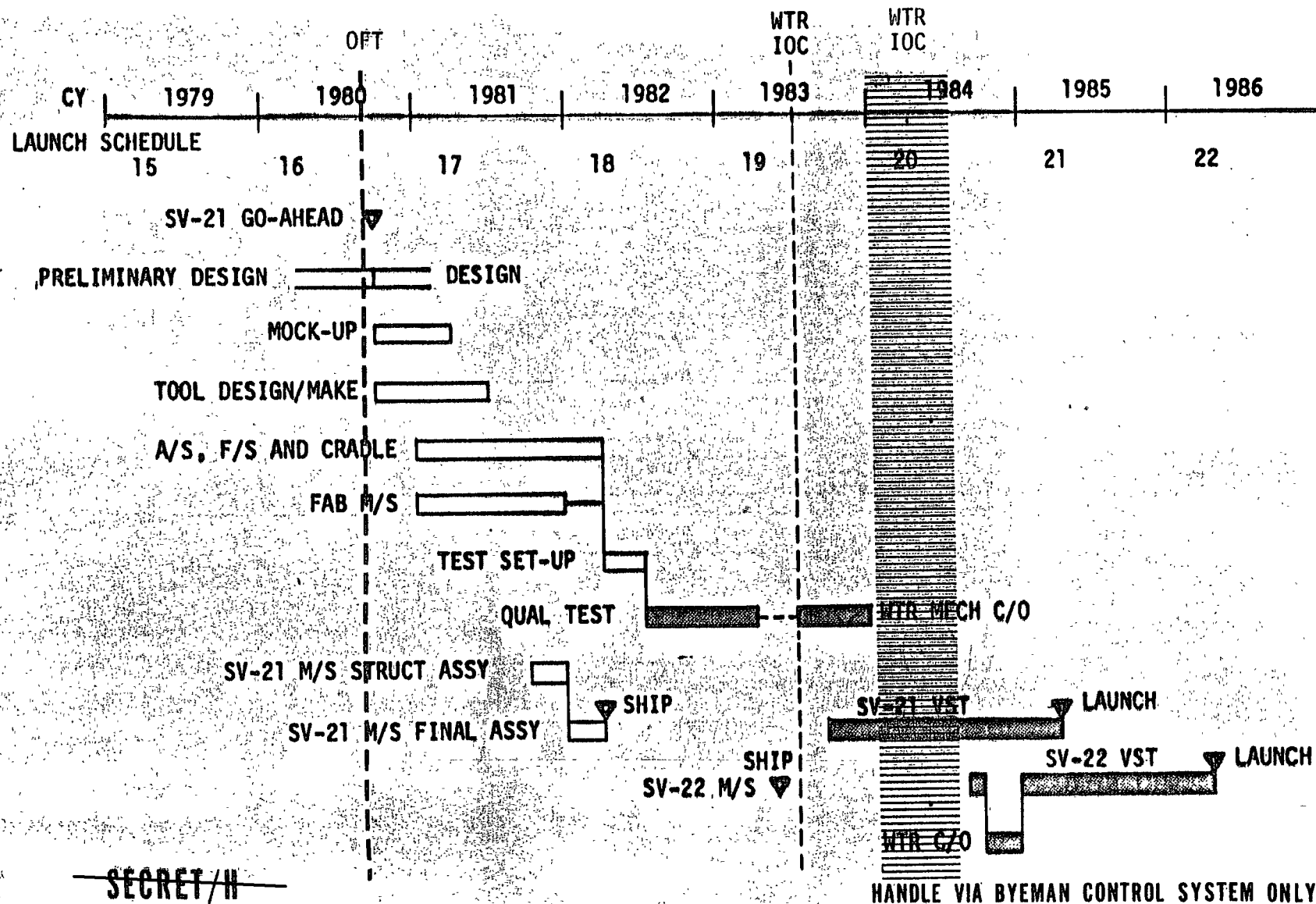
HANDLE VIA BYEMAN SYSTEM ONLY



**HEXAGON**

**PROGRAM A**

**TRANSITION SCHEDULE: SV-21**



(12)

Indicates  
Thrust  
Enhancement  
at WTR

1) 2 SVs in  
blows a  
2nd M/S  
being made

2) 3rd M/S can  
be substituted  
for SV-22

3) Designation  
after ORT  
no longer  
labeled early

4) SV-22 used  
to V out  
WTR prior  
to SV-21  
launch

**SECRET/H**

SV-21 TRANSITION FUNDING

(b)(1)  
(b)(3) 10 USC ± 424

FY	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>TOTAL</u>
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BUDGET  
SUBMISSION

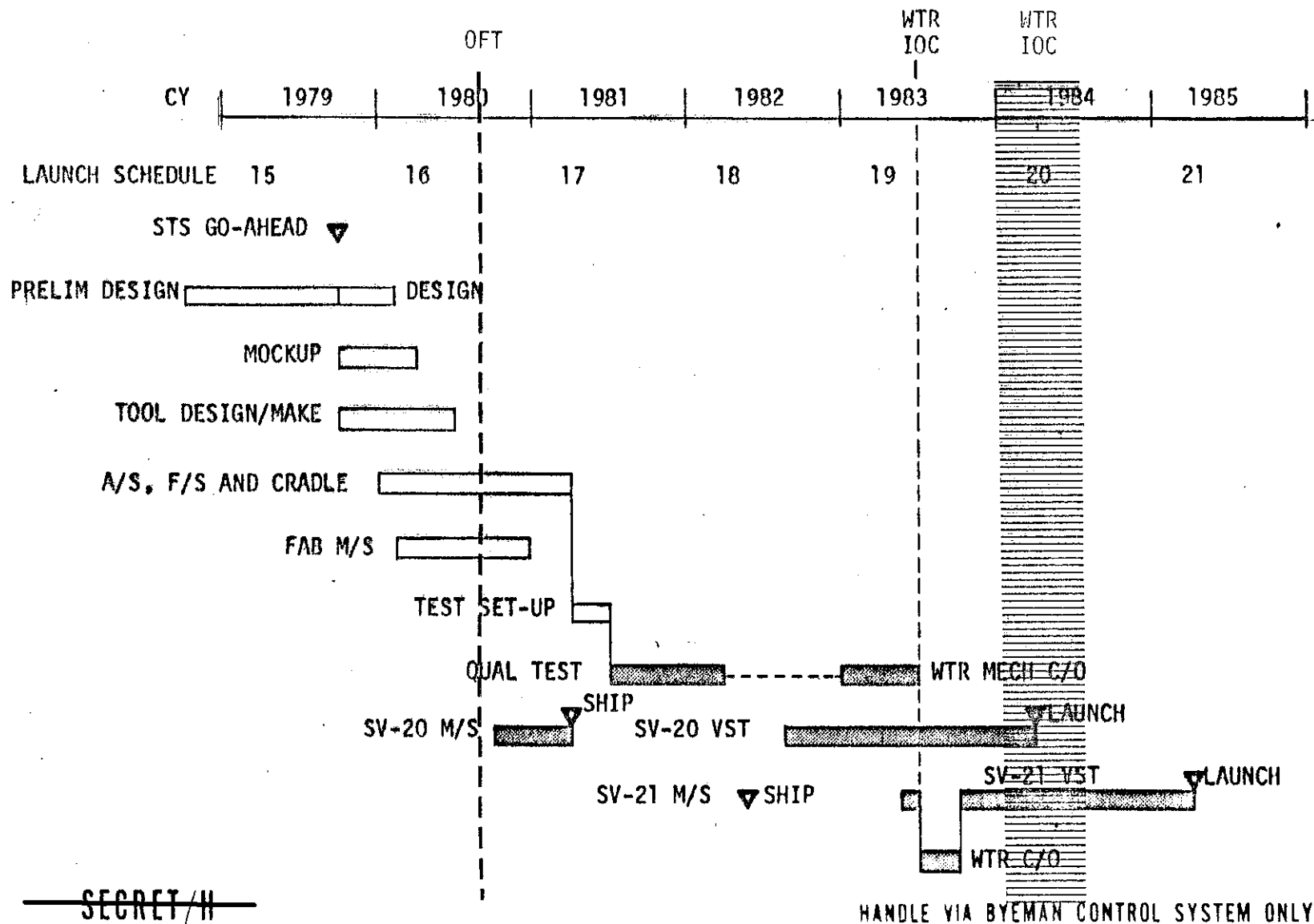
*all non-recurring  
1980's  
sub budget  
submissions*

EARLY TRANSITION  
TO SHUTTLE

**HEXAGON**

**PROGRAM A**

**TRANSITION SCHEDULE: SV-20**



# TRANSITION COSTS (SV-20)

FY	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>TOTAL</u>
NON RECURRING							
T-34D							
SHUTTLE							

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

*31m 41d needed  
to complete  
approach.*

(b)(1)  
(b)(3) 10 USC 424

## 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  IN FY '79

(b)(1)  
(b)(3) 10 USC  $\pm$  424

## POTENTIAL EXPLOITATION OF SHUTTLE

*re-newed interest in would:*

### UPDATE PREVIOUSLY ACCOMPLISHED STUDIES

#### RETRIEVE/REFURBISH SPACECRAFT ("MIN MOD")

- . REDUCE RECURRING COSTS

#### REDESIGN SPACECRAFT (OPTIMIZED)

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

### PALLETIZE CAMERA SYSTEM FOR SHUTTLE USE

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

*majority of effort would  
be in the costing  
studies.*

*possibly 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 the 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

*external payload  
Gambit and Thermal  
Imager*

- . SHARED RIDES

- . INCLINATION
- . TIME OF LAUNCH
- . ALTITUDE
- . MISSION LENGTH (CONSIDER EXTENDING)
- . PREVIOUS COVERAGE
- . ABOUT 20% OF LAUNCH COST

*at 300k/day*

*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

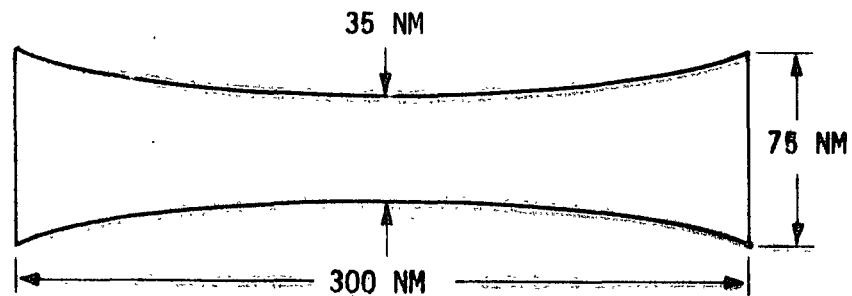
*- Sensor System  
- Palletized  
- Orbiter Palletized*



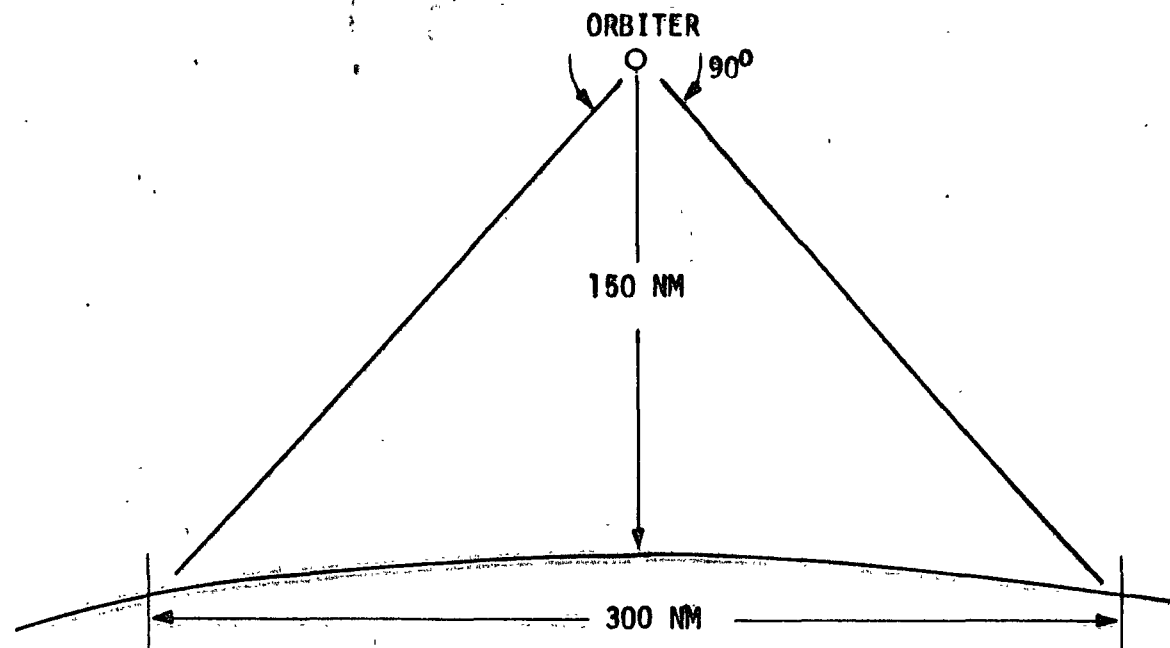
**HEXAGON**

**PROGRAM A**

**WASP MAX GROUND COVERAGE**



- 80% TIME NIIRS 4
- FULL STEREO



## DESIGN EFFORT

ORBITER IS A STABLE PLATFORM

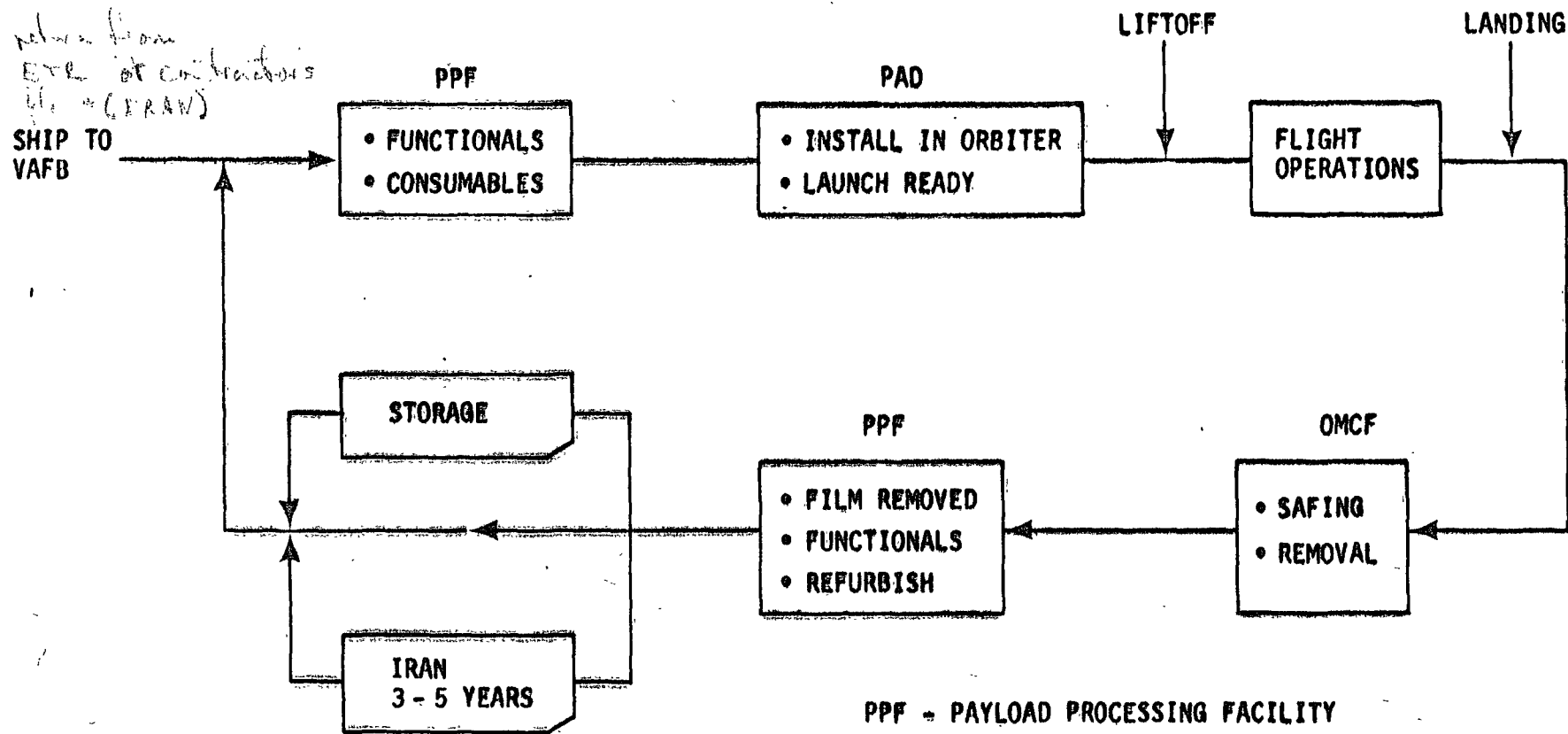
### OPERATING ENVELOPE

. ALTITUDE	125-180 NM
. INCLINATION	ABOVE 50°
. 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 *to do VSB Analysis*
- . MODULAR DESIGN ALLOWS EASY BLACK BOX REPLACEMENT

**HEXAGON****PROGRAM A****WTR WASP HARDWARE FLOW**~~SECRET/H~~

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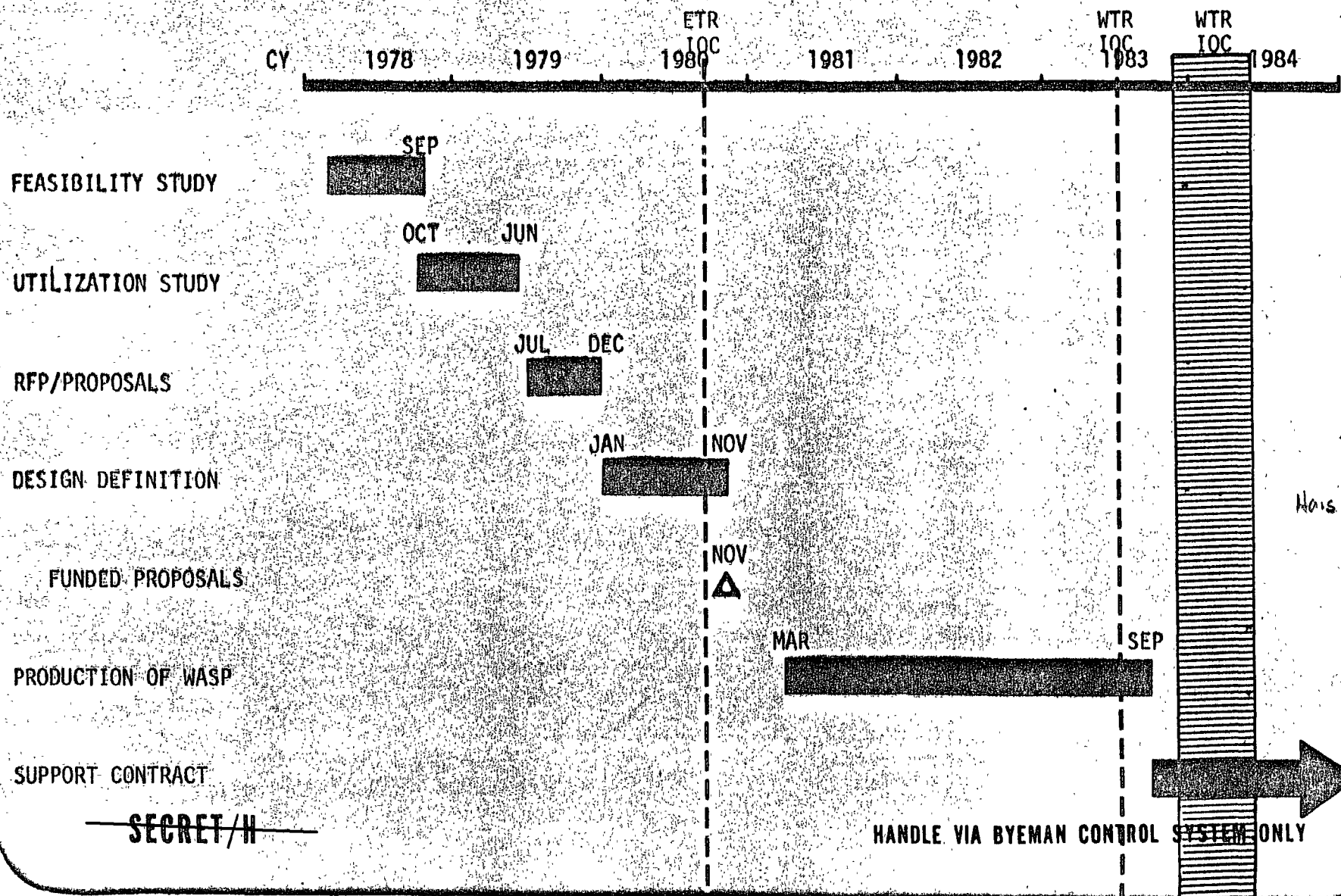
## WASP PROGRAM COST ELEMENTS

- . 3 WASP REQUIRED
  - . 1 QUAL (POSSIBLE TO REFURB FOR FLIGHT) *work on 1 wasp's plan to*
  - . 2 FLIGHT *keep spares program going*
- . PAYLOAD PROCESSING FACILITY *existing facilities first  
second - build new.  
small contractor support team*
- . SPARES PROGRAM *= on hand, a complete set of qualified black boxes.*
- . LAUNCH

**HEXAGON**

**PROGRAM A**

**"WASP" ACQUISITION PLAN**



1) "Mark"  
Competitive  
program  
2) 2 Competi  
tions  
a) Design  
b) Production

Have Mark  
Have Mark  
Have Mark's est.  
250m  
100m. Anglin  
more a.c.  
we didn't  
do our job

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HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

7. 10. 11  
15 10 11

## HEXAGON SHUTTLE STUDY

- ESTABLISHED SV-19 AS BASELINE VEHICLE
- FOUR CONFIGURATIONS UNDER STUDY
  - "ZERO MOD" (BOOSTER SUBSTITUTION)
  - ABORT SURVIVABLE
  - RETRIEVAL/REUSE
  - SHUTTLE EXPLOITATION (9,000 LBS ADDED CAPABILITY)
    - PAYLOAD IMPROVEMENT
    - NEAR REAL TIME READOUT
    - LONGER LIFE (2 YRS)
    - SURVIVABILITY AIDS
- ALL ASSOCIATES INVOLVED: (LMSC, PE, MDAC, GE)

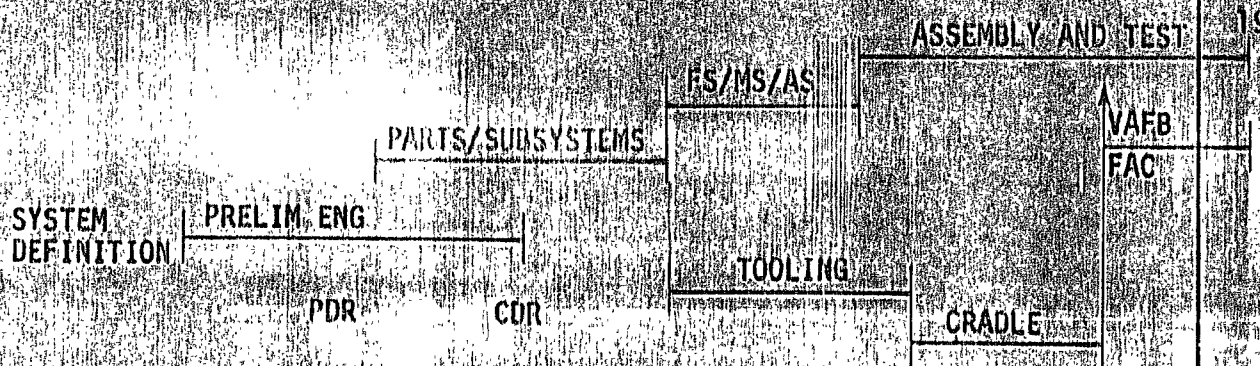
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HANDLE VIA BYEMAN  
CONTROL CHANNELS ONLY

**SAFSP**

# TRANSITION PLAN

										SHUTTLE IOC (DEC 82)		
CY	77	78	79	80	81	82	83	84	85			
PRESENT SCHEDULE	13	14	15	16	17	18	19	20	21	22		
BLK START		IV			V							
BASLINE	13	14	15	16	17	18	19	20	21			
BLK START		IV			V							



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HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

" ZERO MOD" VEHICLE  
(BOOSTER SUBSTITUTION)

- o NO CHANGE TO SV
- o SYSTEM DEFINITION (SV - CRADLE - SHUTTLE)
  - LOADS ASSESSMENT / ALLEVIATION
  - COMMUNICATIONS / OPERATIONS
  - FACILITIES IMPACT
  - PRELIMINARY ICD (OCTOBER 1977)
- o PRELIMINARY ENGINEERING (RI INTERFACE)
  - CRADLE DESIGN
  - AGE CHANGES

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HANDLE VIA BYEMAN  
CONTROL CHANNELS ONLY

## HEXAGON SHUTTLE TRANSITION

- ORIGINAL STUDY CONDUCTED IN 1973-1974 (SP-6)
  - "MIN MOD" VEHICLE, CONCEPT INCLUDED REUSE
  - "BEST REDESIGN" VEHICLE, OPTIMIZE HEXAGON FOR SHUTTLE  
(ESTIMATES OF REQUIREMENTS, CAPABILITIES)
- NEW STUDY/TRANSITION PLANNING NOW UNDERWAY (SP-7)
  - NEW HEXAGON CONFIGURATION STUDY
  - TRANSITION TIMELINES ARE BEING GENERATED
  - UPDATING COST ESTIMATES

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HANDLE VIA BYEMAN  
CONTROL CHANNELS ONLY

## HEXAGON SHUTTLE TRANSITION

ORIGINAL STUDY CONDUCTED IN 1973-1974 (SP-6)

- "MIN MOD" VEHICLE, CONCEPT INCLUDED REUSE
- "BEST REDESIGN" VEHICLE, OPTIMIZE HEXAGON FOR SHUTTLE  
(ESTIMATES OF REQUIREMENTS, CAPABILITIES)

TRANSITION PLANNING NOW HANDLED IN SP-7

- NEW HEXAGON CONFIGURATION STUDY PRESENTLY UNDERWAY
- TRANSITION TIMELINES ARE BEING GENERATED
- UPDATED/REALISTIC COST ESTIMATES

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HANDLE VIA BYEMAN  
CONTROL CHANNELS ONLY

## HEXAGON SHUTTLE STUDY

- 1. ESTABLISHED SV-19 AS BASELINE VEHICLE
- 2. FOUR CONFIGURATIONS UNDER STUDY, IMPLEMENTATION ON SV-21
  - "ZERO MOD" (BOOSTER SUBSTITUTION)
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  - SHUTTLE EXPLOITATION (9,000 LBS ADDED CAPABILITY)
    - o PAYLOAD IMPROVEMENT
    - o NEAR REAL TIME READOUT
    - o LONGER LIFE (2 YRS)
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- 3. ALL ASSOCIATES INVOLVED: (LMSC, PE, MDAC, GE)

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HANDLE VIA BYEMAN  
CONTROL CHANNELS ONLY



## OTHER STS ACTIVITY

- HEXAGON REQUIREMENTS ARE ASSISTING IN:
  - VAFB GROUND FACILITY SIZING/OPERATIONS
  - DOD SECURITY PLANNING
  - DOD SAFETY REQUIREMENTS
  - STS MISSION SUPPORT PLANNING AT JSC
- INTERFACE WITH THE STS (RI AND LMSC)
  - ENVIRONMENTS (IN THE ORBITER BAY)
  - ORBITAL OPERATIONS

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HANDLE VIA BYEMAN  
CONTROL CHANNELS ONLY