


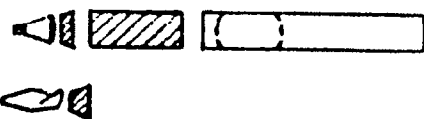



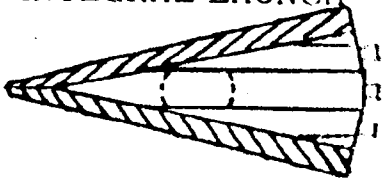
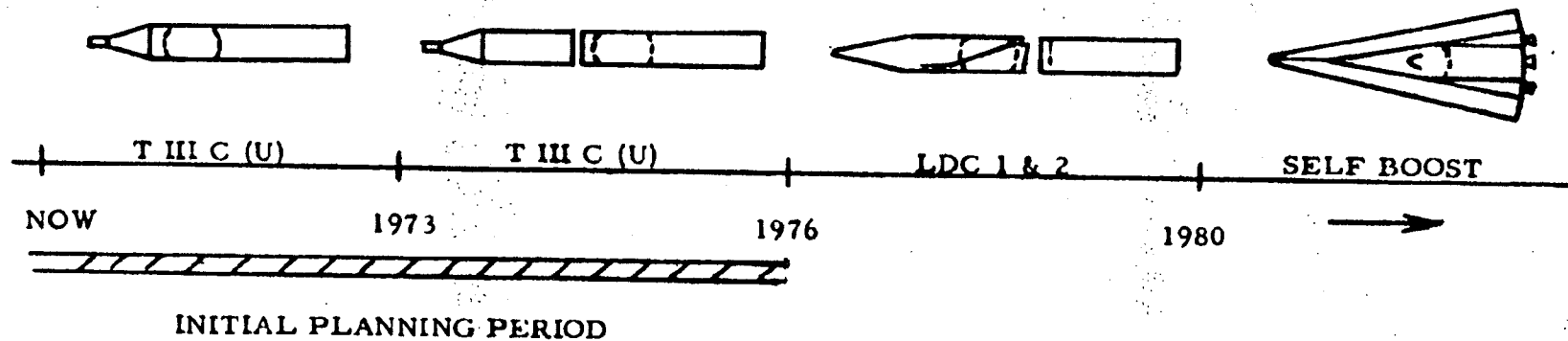


WHS-071-4

POTENTIAL VEHICLE SYSTEM CONCEPTS

<p>I</p> <p>INTEGRAL LAUNCH</p>  <p>Dispose all Segments each Mission.</p>	<p>II</p> <p>INTEGRAL LAUNCH</p>  <p>Retrieve/Reuse R. E. V. each Mission - Dispose all other Segments.</p>	<p>III</p> <p>RENDEZVOUS/RESUPPLY</p>  <p>Dispose R. E. V. + Supply Module (RRV) each Resupply Mission - Revisit/Reuse Orbiting Vehicle for ~ 1 year cycle.</p>	<p>IV</p> <p>RENDEZVOUS/RESUPPLY</p>  <p>Dispose Supply Module each Resupply Mission - Retrieve/Reuse R. E. V. - Revisit/Reuse Orbiting Vehicle for ~ 1 year cycle.</p>
<p>V</p> <p>RENDEZVOUS/RESUPPLY</p>  <p>Retrieve/Reuse R. E. V. + Supply Module (RRV) each Resupply Mission - Revisit/Reuse Orbiting Vehicle for ~ 1 year cycle.</p>	<p>VI</p> <p>RENDEZVOUS/RESUPPLY</p>  <p>Retrieve/Reuse Integrated R. E. V. + Supply Module + Lab - Revisit/Reuse Mission Module Lab ~ 1 year cycle</p>	<p>VII</p> <p>INTEGRAL LAUNCH</p>  <p>Retrieve/Reuse fully Integrated R. E. V. + Lab + Supply Module + Mission Module. Dispose conventional booster only.</p>	<p>VIII</p> <p>INTEGRAL LAUNCH</p>  <p>Retrieve/Reuse fully Integrated R. E. V. + Lab + Supply Module + Mission Module + Propulsion Sys. Dispose propellant tanks and pressurization system only.</p>

POSSIBLE MOL GROWTH PERSPECTIVE





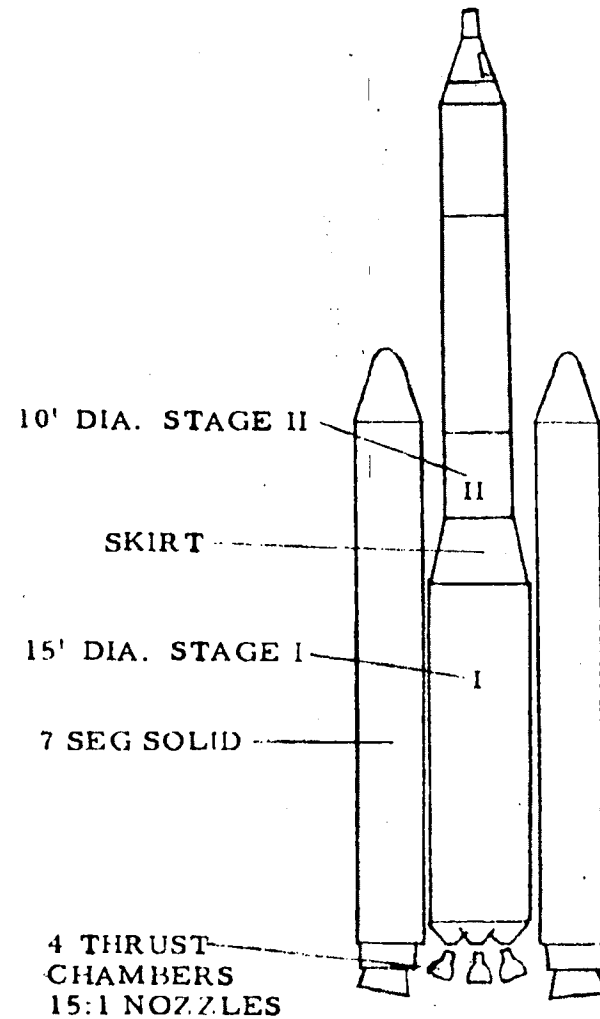
WHS-171-7

LARGE CORE TITAN III
STAGE I

- PAYLOADS ($i = 80^\circ$; 80/130 ORBIT)
 - .. LDC 1/7 SEG. --44,000 LBS.

- THIC (U) DEVELOPMENT PROVIDES
 - .. 15:1 NOZZLES
 - .. 7 SEGMENT SOLIDS

- LDC 1 CHANGES
 - .. STRUCTURES
 - .. PROPULSION SYSTEM
 - .. CONTROL SYSTEM



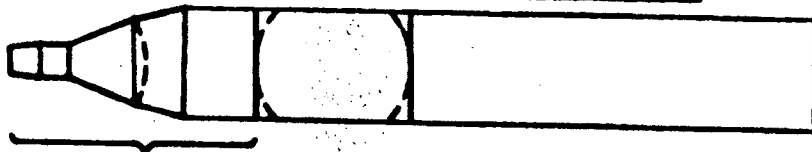
~~SECRET~~ SPECIAL HANDLING

WHS-871-8

10
7

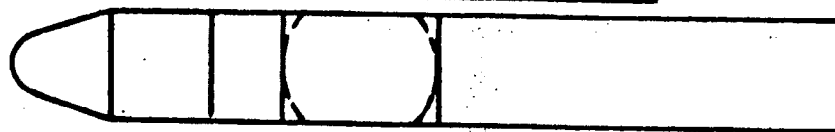
RESUPPLY VEHICLE DERIVATION FROM MOL HARDWARE

BASELINE M/AM VEHICLE



GEMINI B
+
LABORATORY
UNPRESSURIZED
COMPARTMENT

BASELINE AM VEHICLE



DRV &
FILM HANDLING
SYSTEM

+
BASELINE SUBSYSTEM
COMPONENTS

RENDEZVOUS RESUPPLY VEHICLE

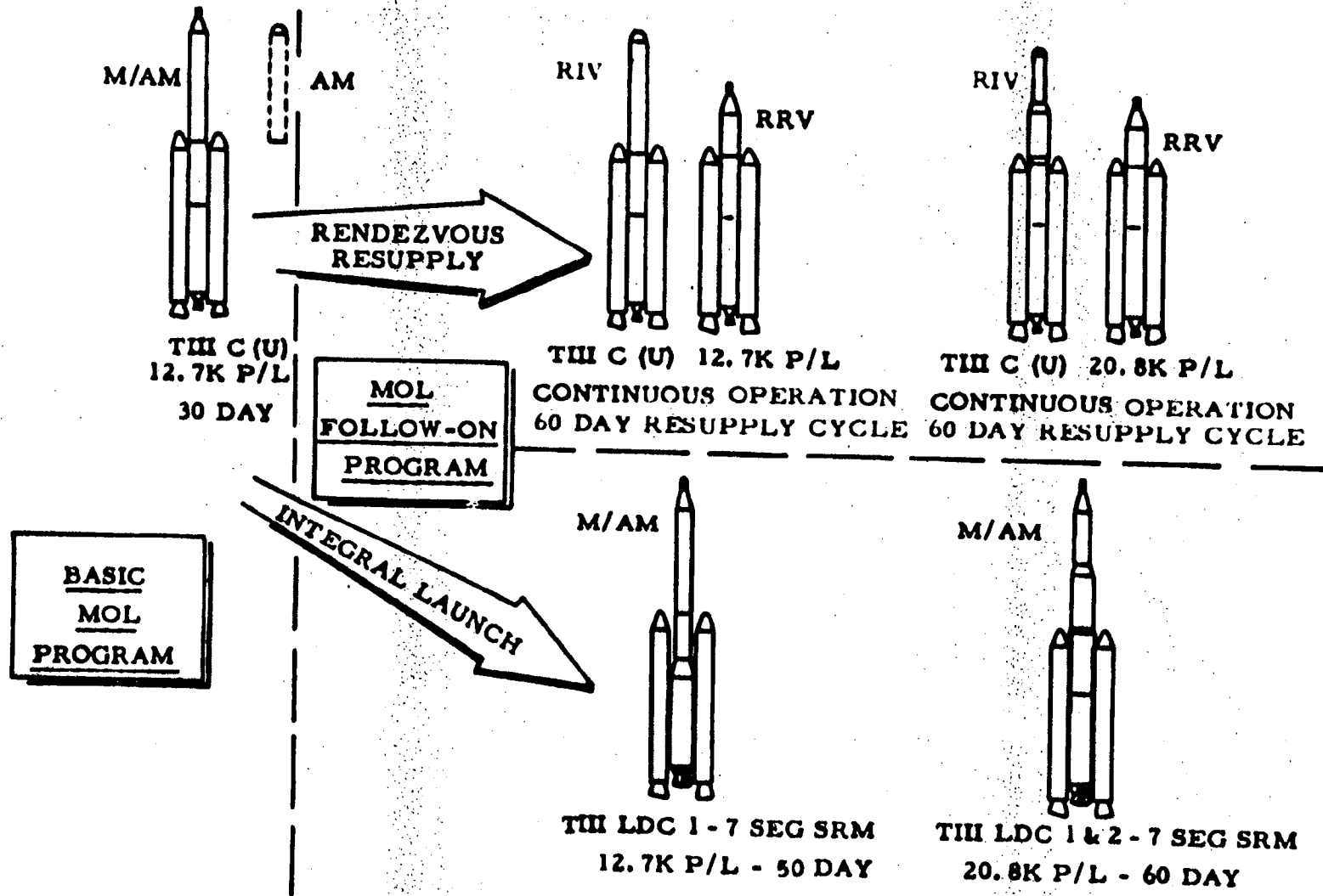


GEMINI B +
LAB U.C. | EXTENDED
DURATION
MODULE

~~SECRET~~ SPECIAL HANDLING

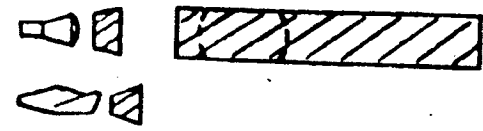
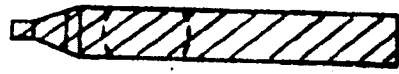
GROWTH AVENUES

WHS-671-9



WHS-171-20

EARLY INTEGRAL LAUNCH SYSTEMS



I DISPOSE AT MISSION TERMINATION
(INTEGRAL LAUNCH)

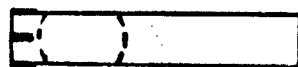
II RETRIEVE/REUSE REV
(INTEGRAL LAUNCH)

CONCEPT	I		II	
	GEMINI B (WATER LANDING)	GEMINI B (LAND LANDING)	LDC 1	LIFTING BODY (MEDIUM L/D)
REV TYPE	T III C (U)	T III C (U)	LDC 1	LDC 1
LAUNCH VEHICLE	31.0 K	31.0 K	42.0 K	42.0 K (i=90°)
LAUNCH WEIGHT (i=90°)	Baseline	Baseline	Baseline	Baseline
P/L TYPE	30 Days	15 Days	40 Days	30 Days
MISSION DURATION	Current Phase II	NASA Mod. Test	NASA Model Test	Model Tests & Studies
DEVELOP. STATUS:	Current Phase II	Current Phase II	Current Phase II	Current Phase II
REV	Current Phase II	Current Phase II	Current Phase II	Current Phase II
LM	Current Phase II	Current Phase II	Martin/UTC In-	Martin/UTC In-
MM	Current Phase II	Current Phase II	House Design	House Design
LV	Current Phase II	Current Phase II	House Design	House Design
DEVELOPMENT CYCLE	5 Yr	2 Yr	3 Yr	5 Yr
Δ NON RECURRING COST ABOVE BASELINE OPT. #6	0	130 M\$	190 M\$	450 M\$
RECURRING COST	78.2 M\$	79.7 M\$	87.2 M\$	99.2 M\$
INITIAL LAUNCH	--	77.2 M\$	84.7 M\$	87.2/78.2 M\$
REFURBISHED VEH. LAUNCH				(60%-30% Refurb.)

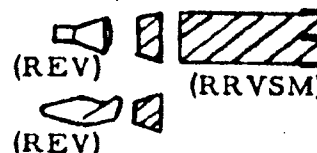
INITIAL RENDEZVOUS SYSTEM



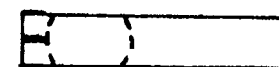
(RRV)



(RIV)



(RRVSM)



RIV

III REVISIT RIV - DISPOSE OF RRV EACH RESUPPLY CYCLE (RENDEZVOUS/RESUPPLY)

IV REVISIT RIV - DISPOSE OF RRV SUPPLY MODULE - RETRIEVE/REUSE REV (RENDEZVOUS/RESUPPLY)

CONCEPT	III	IV	
REV TYPE	GEMINI B (WATER LANDING)	GEMINI B (LAND LANDING)	LIFTING BODY (MEDIUM L/D)
LAUNCH WEIGHT (i=96.4°)	30.0 K	30.0 K	30.0 K 41.4 K
LAUNCH VEHICLE TYPE	T III C (U)	T III C (U)	T III C (U) LDC 1
P/L TYPE	Baseline	Baseline	Baseline
MISSION DURATION	Cont. OPS - 1 yr Res. Cy. - 60 days	Cont. OPS - 1 yr. Res. Cy. - 53 days	Cont. OPS - 1 yr Res. Cy. - 45 days Cont. OPS - 1 yr Res. Cy. - 90 days
DEVELOP. STATUS	Current Phase II	NASA Model Tests	Mod. Test & Studies
REV	Current Phase II	Current Phase II	Current Phase II
LM	Current Phase II	Current Phase II	Current Phase II
MM	Current Phase II	Current Phase II	Current Phase II
LV	Current Phase II	Current Phase II	Current Phase II
DEVELOP. CYCLE	3 yr	3 yr	5 yr 5 yr
ΔNRC ABOVE OPT #6	203 M\$	323 M\$	603 M\$ 673 M\$
RC			
RIV	66.2 M\$	66.2 M\$	66.2 M\$ 71.7 M\$
RRV (NEW REV)	43.8 M\$	45.3 M\$	59.3 M\$ 69.8 M\$
RRV (REFURB REV)*	---	42.8 M\$	47.3/38.3 M\$ 57.8/48.8 M\$

*Cost based on 60%/30% Refurbishment

WHS-171-22

LIFTING BODY RE-ENTRY VEHICLE
RENDEZVOUS SYSTEM



RRV



RIV



RRV (MMM)



RIV (MM)

V REVISIT RIV
RETRIEVE/REUSE RRV
(RENDEZVOUS/RESUPPLY)

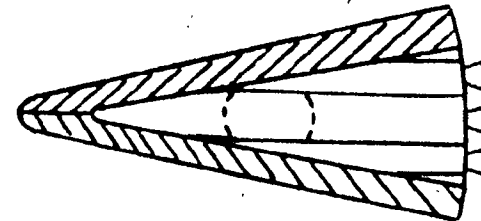
VI REVISIT MM
RETRIEVE/REUSE MMM
(RENDEZVOUS/RESUPPLY)

CONCEPT	V	VI
LAUNCH VEHICLE TYPE	LDC 1	LDC 1 & 2
LAUNCH WEIGHT (i=96.4°)	41.4 K	47.0 K
P/L TYPE	Baseline	Baseline
MISSION DURATION	Continuous to 1 Yr - 60 Day Resupply Cycle	Continuous to 1 Yr - 50 Day Resupply Cycle
DEVELOPMENT STATUS	Technology Studies Current Phase II Current Phase II Martin/UTC In-house Design	Technology Studies Components in Phase II Components in Phase II Preliminary Studies
DEVELOP. CYCLE	7 Yr.	7 Yr.
ΔNRC ABOVE OPT. #6(ROM)	770 M\$	1,170 M\$
RC		
RIV	71.7 M\$	58.0 M\$
RRV (NEW)	71.0 M\$	93.0 M\$
RRV (REFURB)*	51.0/36.0 M\$	67.0/46.0 M\$

*Based on 60%/30% Refurbishment Cost

WHS-171-23

ADVANCED INTEGRAL LAUNCH SYSTEM



VII RETRIEVE/REUSE COMPLETE M. O. V.
(INTEGRAL LAUNCH)

VIII RETRIEVE/REUSE COMPLETE
M. O. V.
(INTEGRAL LAUNCH)

CONCEPT	VII	VIII
LAUNCH VEHICLE TYPE	LDC 1 & 2+156" SRM	Strap-On Tankage
LAUNCH WEIGHT	62 K	~70 K
MISSION DURATION	60 Day	60 + Day
DEVELOPMENT STATUS	Vehicle/Technology Studies Major Subsystems - Phase II	Proposed by Industry
DEVELOPMENT CYCLE	8 Year	10/12 Year
Δ NRC ABOVE OPTION #6	1,230 M\$	1,500 to 2,000 M\$
RECURRING COSTS		
INITIAL	133 M\$	200 M\$
REFURB.	93/63 M\$ (60%-30% Refurbish.)	30 M\$ (~10% Refurbish.)