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Human Transportation System (HTS) Study

Final Report

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Appendices
Technical Data

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Preface

This document is intended to summarize much of the technical data produced for or by the Human Transportation System (HTS) Study. Although the NASA-Industry Team (NIT) acquired and produced huge amounts of data for the study, only the data that has been judged most important has been included here. Descriptions of the objectives, ground rules, and processes of the study, analysis of the data, and definitions of many of the terms used here can be found in Volume I.

Contents

Section		Page
C.1.3	ARCHITECTURE COST SUMMARIES	C-32
D	COMPUTATIONAL TOOLS AND MODELS	D-1
D.1.1	ARCHITECTURE EVALUATION TOOL (AET)	D-1
D.1.2	TRANSPORTATION SYSTEMS INTEGRATION TOOL (TRANSIT)	D-3
D.1.3	GROUND OPERATIONS ASSESSMENT MODEL	D-6
D.1.4	COST MODEL	D-8
D.1.5	OTHER TOOLS/MODELS	D-11
E	HUMAN TRANSPORTATION SYSTEM STUDY ARCHITECTURE EVALUATION TOOL(AET) USER'S GUIDE	E-1
F	IMPACT OF NEW BUSINESS APPROACHES	F-1
F.1.1	BACKGROUND	F-1
F.2.1	SURVEY RESULTS	F-2
F.2.1.1	Budget	F-2
F.2.1.2	Management	F-2
F.2.1.3	Operations	F-3
F.2.1.4	Organization	F-5
F.2.1.5	Procurement	F-5
F.2.1.6	Personnel	F-7
F.2.1.7	Policy and Procedures	F-7
F.2.1.8	Requirements	F-9
G	THE IMPACT OF NEW BUSINESS APPROACHES" TASK #4 OF THE HUMAN TRANSPORTATION SYSTEM STUDY	G-1

Tables

Table		Page
B.1.2.1-38	ARCHITECTURE 12 - "IF" B FLIGHT MANIFEST	B-58
B.1.2.1-39	ARCHITECTURE 12 - "IF" C FLIGHT MANIFEST	B-59
B.1.2.1-40	ARCHITECTURE 12 - "IF" D & E FLIGHT MANIFEST	B-60
B.1.2.1-41	ARCHITECTURE 13 - "IF" A FLIGHT MANIFEST	B-61
B.1.2.1-42	ARCHITECTURE 13 - "IF" B FLIGHT MANIFEST	B-62
B.1.2.1-43	ARCHITECTURE 13 - "IF" C FLIGHT MANIFEST	B-63
B.1.2.1-44	ARCHITECTURE 13 - "IF" D & E FLIGHT MANIFEST	B-64
B.1.2.1-45	ARCHITECTURE 14 - "IF" A FLIGHT MANIFEST	B-65
B.1.2.1-46	ARCHITECTURE 14 - "IF" B FLIGHT MANIFEST	B-66
B.1.2.1-47	ARCHITECTURE 14 - "IF" C FLIGHT MANIFEST	B-67
B.1.2.1-48	ARCHITECTURE 14 - "IF" D & E FLIGHT MANIFEST	B-68
B.1.2.1-49	ARCHITECTURE 16 - "IF" A FLIGHT MANIFEST	B-69
B.1.2.1-50	ARCHITECTURE 16 - "IF" B FLIGHT MANIFEST	B-70
B.1.2.1-51	ARCHITECTURE 16 - "IF" C FLIGHT MANIFEST	B-71
B.1.2.1-52	ARCHITECTURE 16 - "IF" D & E FLIGHT MANIFEST	B-72
B.1.2.1-53	ARCHITECTURE 17 - "IF" A FLIGHT MANIFEST	B-73
B.1.2.1-54	ARCHITECTURE 17 - "IF" B FLIGHT MANIFEST	B-74
B.1.2.1-55	ARCHITECTURE 17 - "IF" C FLIGHT MANIFEST	B-75
B.1.2.1-56	ARCHITECTURE 17 - "IF" D & E FLIGHT MANIFEST	B-76
B.1.2.1-57	ARCHITECTURE 18 - "IF" A FLIGHT MANIFEST	B-77
B.1.2.1-58	ARCHITECTURE 18 - "IF" B FLIGHT MANIFEST	B-78
B.1.2.1-59	ARCHITECTURE 18 - "IF" C FLIGHT MANIFEST	B-79
B.1.2.1-60	ARCHITECTURE 18 - "IF" D & E FLIGHT MANIFEST	B-80
B.1.2.2-1	ARCHITECTURE 01A - "IF" C (CTF) FLIGHT MANIFEST	B-82
B.1.2.2-2	ARCHITECTURE 01A - "IF" D&E (CTF) FLIGHT MANIFEST	B-83
B.1.2.2-3	ARCHITECTURE 09 - "IF" A FLIGHT MANIFEST	B-84
B.1.2.2-4	ARCHITECTURE 09 - "IF" B FLIGHT MANIFEST	B-85
B.1.2.2-5	ARCHITECTURE 09 - "IF" C FLIGHT MANIFEST	B-86
B.1.2.2-6	ARCHITECTURE 09 - "IF" D&E FLIGHT MANIFEST	B-87
B.1.2.2-7	ARCHITECTURE 10 - "IF" A FLIGHT MANIFEST	B-88
B.1.2.2-8	ARCHITECTURE 10 - "IF" B FLIGHT MANIFEST	B-89
B.1.2.2-9	ARCHITECTURE 10 - "IF" C FLIGHT MANIFEST	B-90
B.1.2.2-10	ARCHITECTURE 10 - "IF" D&E FLIGHT MANIFEST	B-91
B.1.2.2-11	ARCHITECTURE 19 - "IF" A FLIGHT MANIFEST	B-92
B.1.2.2-12	ARCHITECTURE 19 - "IF" B FLIGHT MANIFEST	B-93
B.1.2.2-13	ARCHITECTURE 19 - "IF" C FLIGHT MANIFEST	B-94
B.1.2.2-14	ARCHITECTURE 19 - "IF" D&E FLIGHT MANIFEST	B-95
B.1.2.2-15	ARCHITECTURE 01 - "IF" C (57&14%) FLIGHT MANIFEST	B-96
B.1.2.2-16	ARCHITECTURE 01A - "IF" C (57%) FLIGHT MANIFEST	B-97
B.1.2.2-17	ARCHITECTURE 01A - "IF" C (14%) FLIGHT MANIFEST	B-98
B.1.2.2-18	ARCHITECTURE 03 - "IF" C (57%) FLIGHT MANIFEST	B-99
B.1.2.2-19	ARCHITECTURE 03 - "IF" C (14%) FLIGHT MANIFEST	B-100
B.1.2.2-20	ARCHITECTURE 05 - "IF" C (57%) FLIGHT MANIFEST	B-101
B.1.2.2-21	ARCHITECTURE 05 - "IF" C (14%) FLIGHT MANIFEST	B-102

Table		Page

Table | Page

Table		Page

Table		Page

Figures

APPENDIX A

MISSION MODEL

Data from the Human Transportation System (HTS) mission model is contained in this section. The mission model is loosely based on the FY90 Civil Needs Database (CNDB) with several modifications to reflect a more current understanding of potential payloads. Each payload in the model has been classified into one of the following mission types:

- Satellite Servicing
- Support Assets (operational infrastructure payloads such as TDRS)
- Base (core science and technology, small payloads)
- Sortie Science (science and technology payload with large return mass requirements such as Spacelab)
- SSF (PMC and expanded)
- ISF

Additional "smoothing" payloads have been added to the model to make up for sharp drop-offs that occur over time in the CNDB. These drop-offs are due to the planning horizons for future missions.

A Department of Defense (DOD) addition to the model has also been developed based on capability, and not on actual payloads. It includes one human-tended mission per year plus expendable launch vehicle flights.

A Space Exploration Initiative (SEI) model has been developed showing only crew flights. No payloads from the FY90 CNDB have been included. It includes a high level (three or four flights a year) and a low level (one or two flights a year) of mission activity.

"If" Scenarios have been developed based on the mission types. The "If" Scenarios are as follows:

If A - Base, DOD, ISF, and Support Assets

If B - If A plus Satellite Servicing and Sortie Science

If C - If B plus SSF PMC

If D - If C plus expanded SSF

If E - If D plus SEI

For more information about the mission model, see Volume I, section 3.1.

Tables A.1.1-1 through A.1.1-3 and figures A.1.1-1 and A.1.1-2 summarize the up and down mass of each "If" Scenario. The DOD and SEI models are also shown. Table A.1.2 lists all the individual payloads in the model.

A.1.1 MISSION MODEL SUMMARY

The following tables and graphs summarize the mass data for each "If" Scenario. They are categorized by mission type and by manned or unmanned requirements. Tables and graphs for both payload mass delivered to orbit and payload mass returned from orbit are included. The data is shown on an annual basis.

A table of the number of manned flights that are added to If Scenario D to make up If Scenario E is included. It includes annual data for both If E-high and If E-low. Also included is a table describing the DOD mission model in terms of mass and flights.

TABLE A.1.1-1.– HTS MISSION MODEL SUMMARY - MASS DELIVERED TO ORBIT (LBS)

Mission Type	Payload Type	Total	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
							If Scenario A										
Base	Manned	139619	65304	11949	26370	13301	10656	5808	6231	0	0	0	0	0	0	0	0
	Man Smooth	120000	0	0	0	0	0	0	0	5000	5000	5000	5000	5000	5000	5000	5000
	Unmanned	123868	9273	33720	11835	12662	3000	21003	32375	0	0	0	0	0	0	0	0
	Unman Smooth	1080000	0	0	0	0	0	0	0	60000	30000	60000	30000	60000	30000	60000	30000
ISF	Manned	106758	0	0	0	0	0	0	0	37381	21970	36440	997	997	997	997	997
Support Asset	Unmanned	91620	4800	14331	22492	16941	11000	17256	4800	0	0	0	0	0	0	0	0
	Unman Smooth	120000	0	0	0	0	0	0	0	5000	5000	5000	5000	5000	5000	5000	5000
Total	Manned	366377	65304	11949	26370	13301	10656	5808	6231	42381	26970	41440	5997	5997	5997	5997	5997
	Unmanned	1415488	14073	48051	34327	29603	14000	38259	37175	65000	35000	65000	35000	65000	35000	65000	35000
	Total	1781865	79377	60000	60697	42904	24656	44067	43406	107381	61970	106440	40997	70997	40997	70997	40997
							If Scenario B										
Sat Service	Manned	163860	0	0	0	6050	13000	0	19050	0	13000	6050	13000	0	19050	2640	13000
	Man Smooth	95000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sortie Science	Manned	850449	78246	55491	188680	143743	123404	121731	139154	0	0	0	0	0	0	0	0
	Man Smooth	1656000	0	0	0	0	0	0	0	69000	69000	69000	69000	69000	69000	69000	69000
	Unmanned	4000	2000	0	2000	0	0	0	0	0	0	0	0	0	0	0	0
If A	Manned	366377	65304	11949	26370	13301	10656	5808	6231	42381	26970	41440	5997	5997	5997	5997	5997
	Unmanned	1415488	14073	48051	34327	29603	14000	38259	37175	65000	35000	65000	35000	65000	35000	65000	35000
Total	Manned	3131686	143550	67440	215050	163094	147060	127539	164435	111381	108970	116490	87997	74997	94047	77637	87997
	Unmanned	1419488	16073	48051	36327	29603	14000	38259	37175	65000	35000	65000	35000	65000	35000	65000	35000
	Total	4551174	159623	115491	251377	192697	161060	165798	201610	176381	143970	181490	122997	139997	129047	142637	122997
							If Scenario C										
SSF PMC	Manned	5780569	0	0	44	44	44	71144	143744	179378	230967	199805	291941	237294	220106	277079	239590
	Unmanned	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300
If B	Manned	3131686	143550	67440	215050	163094	147060	127539	164435	111381	108970	116490	87997	74997	94047	77637	87997
	Unmanned	1419488	16073	48051	36327	29603	14000	38259	37175	65000	35000	65000	35000	65000	35000	65000	35000
Total	Manned	8912255	143550	67440	215094	163138	147104	198683	308179	290759	339937	316295	379938	312291	314153	354716	327587
	Unmanned	1420088	16073	48051	36327	29603	14000	38259	37175	65000	35000	65000	35000	65000	35000	65000	35300
	Total	10332343	159623	115491	251421	192741	161104	236942	345354	355759	374937	381295	414938	377291	349153	419716	362887
							If Scenario D										
SSF Expanded	Manned	1623447	0	0	0	0	0	0	0	0	0	0	98500	72300	66748	125548	82703
If C	Manned	8912255	143550	67440	215094	163138	147104	198683	308179	290759	339937	316295	379938	312291	314153	354716	327587
	Unmanned	1420088	16073	48051	36327	29603	14000	38259	37175	65000	35000	65000	35000	65000	35000	65000	35300
Total	Manned	10535702	143550	67440	215094	163138	147104	198683	308179	290759	339937	316295	478438	384591	380901	480264	410290
	Unmanned	1420088	16073	48051	36327	29603	14000	38259	37175	65000	35000	65000	35000	65000	35000	65000	35300
	Total	11955790	159623	115491	251421	192741	161104	236942	345354	355759	374937	381295	513438	449591	415901	545264	445590

Note: Does not include DoD model.

TABLE A.1.1-1.– HTS MISSION MODEL SUMMARY - MASS DELIVERED TO ORBIT (LBS) (CONTINUED)

Mission Type	Payload Type	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
								If Scenario A									
Base	Manned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Man Smooth	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
	Unmanned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Unman Smooth	60000	30000	60000	30000	60000	30000	60000	30000	60000	30000	60000	30000	60000	30000	60000	30000
ISF	Manned	997	997	997	997	997	997	0	0	0	0	0	0	0	0	0	0
Support Asset	Unmanned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Unman Smooth	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
Total	Manned	5997	5997	5997	5997	5997	5997	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
	Unmanned	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000
	Total	70997	40997	70997	40997	70997	40997	70000	40000	70000	40000	70000	40000	70000	40000	70000	40000
								If Scenario B									
Sat Service	Manned	8690	13000	2640	19050	2640	13000	0	0	0	0	0	0	0	0	0	0
	Man Smooth	0	0	0	0	0	0	6000	13000	6000	13000	6000	13000	6000	13000	6000	13000
Sortie Science	Manned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Man Smooth	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000
	Unmanned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
If A	Manned	5997	5997	5997	5997	5997	5997	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
	Unmanned	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000
Total	Manned	83687	87997	77637	94047	77637	87997	80000	87000	80000	87000	80000	87000	80000	87000	80000	87000
	Unmanned	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000
	Total	148687	122997	142637	129047	142637	122997	145000	122000	145000	122000	145000	122000	145000	122000	145000	122000
								If Scenario C									
SSF PMC	Manned	254589	240022	284359	232011	239037	219045	230683	249361	213626	213809	227153	213809	213626	226992	215542	215725
	Unmanned	0	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0
If B	Manned	83687	87997	77637	94047	77637	87997	80000	87000	80000	87000	80000	87000	80000	87000	80000	87000
	Unmanned	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000
Total	Manned	338276	328019	361996	326058	316674	307042	310683	336361	293626	300809	307153	300809	293626	313992	295542	302725
	Unmanned	65000	35300	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000
	Total	403276	363319	426996	361058	381674	342042	375683	371361	358626	335809	372153	335809	358626	348992	360542	337725
								If Scenario D									
SSF Expanded	Manned	73603	73603	73603	73603	73603	73603	73603	73603	73603	73603	73603	73603	73603	73603	73603	73603
If C	Manned	338276	328019	361996	326058	316674	307042	310683	336361	293626	300809	307153	300809	293626	313992	295542	302725
	Unmanned	65000	35300	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000
Total	Manned	411879	401622	435599	399661	390277	380645	384286	409964	367229	374412	380756	374412	367229	387595	369145	376328
	Unmanned	65000	35300	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000	65000	35000
	Total	476879	436922	500599	434661	455277	415645	449286	444964	432229	409412	445756	409412	432229	422595	434145	411328

Note: Does not include DoD model.

TABLE A.1.1-1.– HTS MISSION MODEL SUMMARY - MASS RETURNED FROM ORBIT (LBS) (CONTINUED)

Mission Type	Payload Type	Total	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
							If Scenario A										
Base	Manned	62479	3764	10599	17420	11951	9006	4808	4931	0	0	0	0	0	0	0	0
	Man Smooth	120000	0	0	0	0	0	0	0	5000	5000	5000	5000	5000	5000	5000	5000
	Unmanned	30	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0
ISF	Manned	13258	0	0	0	0	0	0	0	281	1350	660	997	997	997	997	997
Total	Manned	195737	3764	10599	17420	11951	9006	4808	4931	5281	6350	5660	5997	5997	5997	5997	5997
	Unmanned	30	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0
	Total	195767	3764	10599	17420	11981	9006	4808	4931	5281	6350	5660	5997	5997	5997	5997	5997
							If Scenario B										
Sat Service	Manned	119200	0	0	0	0	12000	0	13000	0	13000	0	13000	0	13000	800	13000
	Man Smooth	95000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sortie Science	Manned	859265	78246	55491	188680	143743	136720	117231	139154	0	0	0	0	0	0	0	0
	Man Smooth	1656000	0	0	0	0	0	0	0	69000	69000	69000	69000	69000	69000	69000	69000
	Unmanned	29110	0	2000	8370	10370	0	0	8370	0	0	0	0	0	0	0	0
If A	Manned	195737	3764	10599	17420	11951	9006	4808	4931	5281	6350	5660	5997	5997	5997	5997	5997
	Unmanned	30	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0
Total	Manned	2925202	82010	66090	206100	155694	157726	122039	157085	74281	88350	74660	87997	74997	87997	75797	87997
	Unmanned	29140	0	2000	8370	10400	0	0	8370	0	0	0	0	0	0	0	0
	Total	2954342	82010	68090	214470	166094	157726	122039	165455	74281	88350	74660	87997	74997	87997	75797	87997
							If Scenario C										
SSF PMC	Manned	3516494	0	0	0	0	0	0	0	31650	43094	34117	177397	154640	160059	175390	156009
If B	Manned	2925202	82010	66090	206100	155694	157726	122039	157085	74281	88350	74660	87997	74997	87997	75797	87997
	Unmanned	29140	0	2000	8370	10400	0	0	8370	0	0	0	0	0	0	0	0
Total	Manned	6441696	82010	66090	206100	155694	157726	122039	157085	105931	131444	108777	265394	229637	248056	251187	244006
	Unmanned	29140	0	2000	8370	10400	0	0	8370	0	0	0	0	0	0	0	0
	Total	6470836	82010	68090	214470	166094	157726	122039	165455	105931	131444	108777	265394	229637	248056	251187	244006
							If Scenario D										
SSF Expanded	Manned	972142	0	0	0	0	0	0	0	0	0	0	0	0	28856	28856	53790
If C	Manned	6441696	82010	66090	206100	155694	157726	122039	157085	105931	131444	108777	265394	229637	248056	251187	244006
	Unmanned	29140	0	2000	8370	10400	0	0	8370	0	0	0	0	0	0	0	0
Total	Manned	7413838	82010	66090	206100	155694	157726	122039	157085	105931	131444	108777	265394	229637	276912	280043	297796
	Unmanned	29140	0	2000	8370	10400	0	0	8370	0	0	0	0	0	0	0	0
	Total	7442978	82010	68090	214470	166094	157726	122039	165455	105931	131444	108777	265394	229637	276912	280043	297796

Note: Does not include DoD model.

TABLE A.1.1-1.– HTS MISSION MODEL SUMMARY - MASS RETURNED FROM ORBIT (LBS) (CONCLUDED)

Mission Type	Payload Type	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
								If Scenario A									
Base	Manned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Man Smooth	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
	Unmanned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ISF	Manned	997	997	997	997	997	997	0	0	0	0	0	0	0	0	0	0
Total	Manned	5997	5997	5997	5997	5997	5997	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
	Unmanned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	5997	5997	5997	5997	5997	5997	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
								If Scenario B									
Sat Service	Manned	800	13000	800	13000	800	13000	0	0	0	0	0	0	0	0	0	0
	Man Smooth	0	0	0	0	0	0	6000	13000	6000	13000	6000	13000	6000	13000	6000	13000
Sortie Science	Manned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Man Smooth	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000	69000
	Unmanned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
If A	Manned	5997	5997	5997	5997	5997	5997	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
	Unmanned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	Manned	75797	87997	75797	87997	75797	87997	80000	87000	80000	87000	80000	87000	80000	87000	80000	87000
	Unmanned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	75797	87997	75797	87997	75797	87997	80000	87000	80000	87000	80000	87000	80000	87000	80000	87000
								If Scenario C									
SSF PMC	Manned	178700	175905	161296	154770	170209	161214	163020	169780	152520	152703	165641	152703	152520	166018	152520	154619
If B	Manned	75797	87997	75797	87997	75797	87997	80000	87000	80000	87000	80000	87000	80000	87000	80000	87000
	Unmanned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	Manned	254497	263902	237093	242767	246006	249211	243020	256780	232520	239703	245641	239703	232520	253018	232520	241619
	Unmanned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	254497	263902	237093	242767	246006	249211	243020	256780	232520	239703	245641	239703	232520	253018	232520	241619
								If Scenario D									
SSF Expanded	Manned	53790	53790	53790	53790	53790	53790	53790	53790	53790	53790	53790	53790	53790	53790	53790	53790
If C	Manned	254497	263902	237093	242767	246006	249211	243020	256780	232520	239703	245641	239703	232520	253018	232520	241619
	Unmanned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	Manned	308287	317692	290883	296557	299796	303001	296810	310570	286310	293493	299431	293493	286310	306808	286310	295409
	Unmanned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	308287	317692	290883	296557	299796	303001	296810	310570	286310	293493	299431	293493	286310	306808	286310	295409

Note: Does not include DoD model.

TABLE A.1.1-2.– HTS SEI MISSION MODEL FOR "IF" SCENARIO E

		Total	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
If E High	Moon	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Mars	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
If E Low	Moon	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mars	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
If E High	Moon	1	2	2	3	4	3	3	3	3	3	3	3	3	3	3	3
	Mars	0	0	0	0	0	0	1	0	1	0	1	0	0	1	0	1
	Total	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
If E Low	Moon	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Mars	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
	Total	0	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2

Note: SEI Crew size for high option is 6 per mission. Crew size for low option is 4 per mission.

TABLE A.1.1-3.– DOD MISSION MODEL

	Total	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Manned Missions	33	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Medium ELV Flights	197	7	6	6	7	5	3	5	6	7	7	6	7	7	6	7
Medium ELV Mass	1521800	58000	54000	60000	52400	32400	18200	38200	42400	52400	52400	48200	52400	52400	48200	52400
Intermediate ELV Flights	66	0	2	3	2	3	4	4	2	2	2	2	2	2	2	2
Intermediate ELV Mass	858000	0	26000	39000	26000	39000	52000	52000	26000	26000	26000	26000	26000	26000	26000	26000
Large ELV Flights	188	6	8	5	6	7	5	6	5	7	6	6	7	6	6	6
Large ELV Mass	6756000	207000	276000	168000	216000	255000	186000	216000	186000	255000	216000	216000	255000	216000	216000	216000

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Manned Missions	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Medium ELV Flights	6	7	6	7	7	6	7	6	7	7	6	7	6	7	7	6
Medium ELV Mass	48200	52200	48200	52400	52200	48200	52200	48200	52400	52200	48200	52200	48200	52400	52200	48200
Intermediate ELV Flights	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Intermediate ELV Mass	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000
Large ELV Flights	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Large ELV Mass	216000	216000	216000	216000	216000	216000	216000	216000	216000	216000	216000	216000	216000	216000	216000	216000

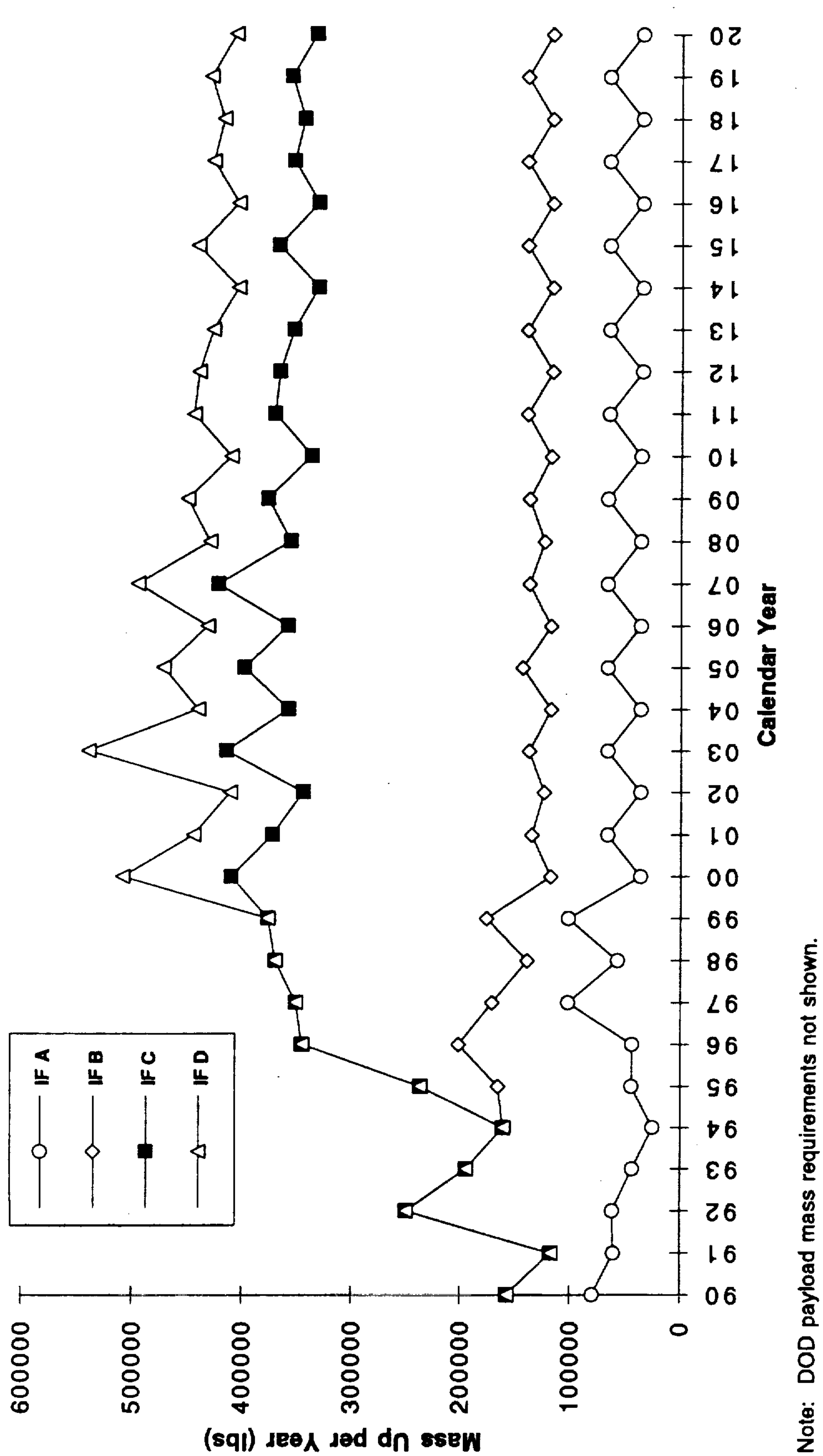

Figure A.1.1-1.– Total mass up per year for each "If" scenario.

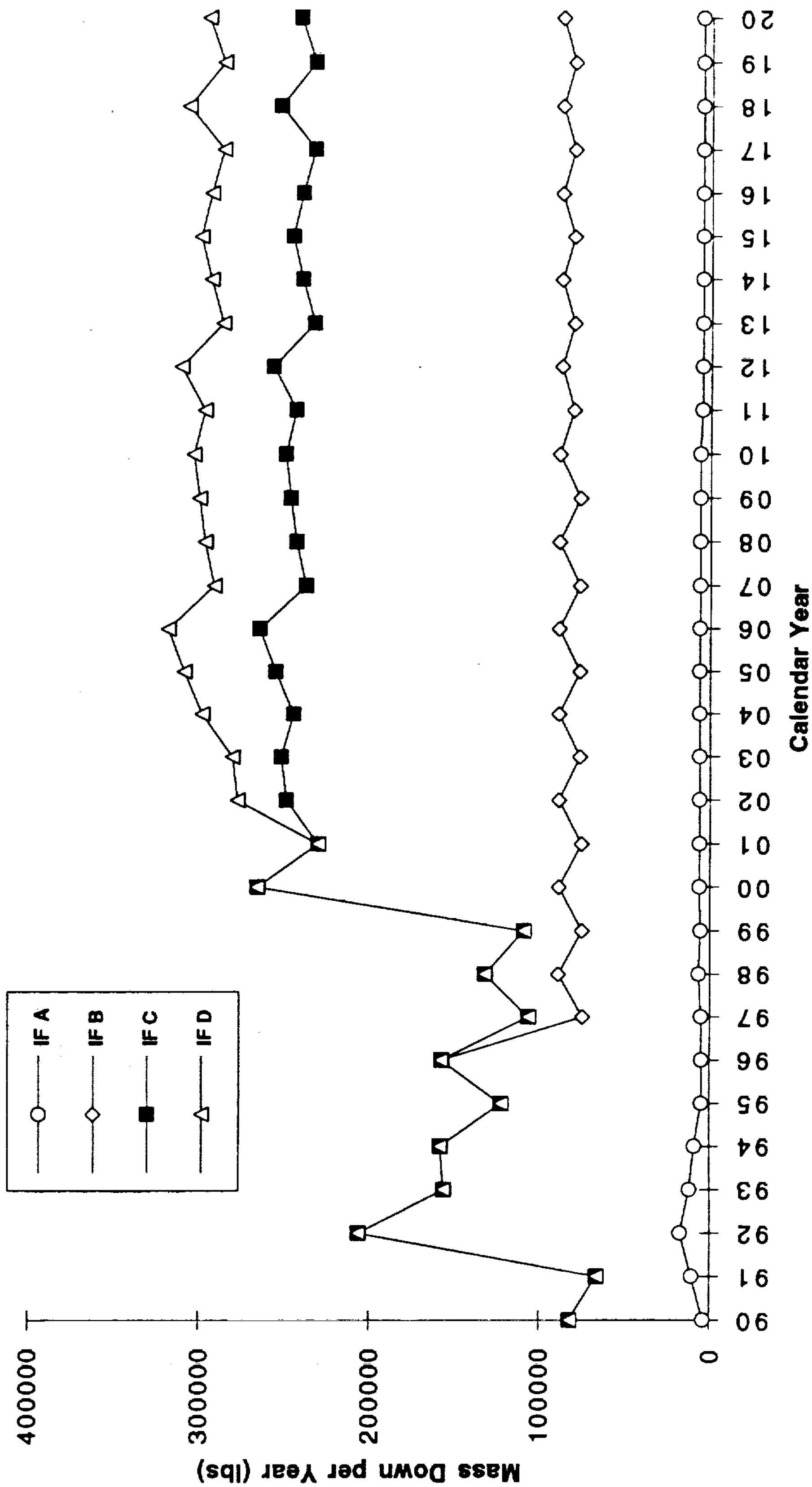

Figure A.1.1-2.– Total mass down per year for each "If" scenario.

A.1.2 MISSION MODEL PAYLOADS

The following table lists the payloads used in the HTS mission model. The payloads are sorted by the HTS Mission Type and then by the Payload Name. This listing does not account for the smoothing done by the NASA Industry Team or the DOD and SEI models.

Below are the possible entries in several of the columns in the list.

HTS Mission Types:

- Base
- ISF
- Satellite Servicing
- Sortie Science
- SSF
- Support Assets

Payload Requirements:

- R - Human-Tended at Receipt
- U - Untended

Destination:

- DS C/A - Deep Space: Comets/Asteroids
- DS MAR ORB - Deep Space: Mars Orbit
- DS MAR SUR - Deep Space: Mars Surface
- DS MER - Deep Space: Mercury
- DS OTH - Deep Space: Other
- DS PHO SUR - Deep Space: Phobos Surface
- DS SAT - Deep Space: Saturn
- DS SOL - Deep Space: Sun
- EAR OTH - Earth Orbit (Other)
- GEO - Geosynchronous Earth Orbit
- LEO OTH - Low Earth Orbit: Other
- LEO POL - Low Earth Orbit: Polar Orbit
- LEO SS OB - Low Earth Orbit: Space Station (On Board)
- LEO SS RM - Low Earth Orbit: Space Station Remote Orbit
- LEO SYN - Low Earth Orbit: Sun Synchronous Orbit
- LEO TV - Low Earth Orbit: Transportation Vehicle
- LUN ORB - Lunar Orbit
- LUN SUR - Lunar Surface

Payload Type:

- D - Payload delivery only
- R - Payload retrieval
- L - Launch vehicle attached payload
- S - Payload servicing

Discipline/Sub-discipline:

- SA - Science and Applications
  - A - Astrophysics
  - C - Communications and Information Systems
  - ES - Earth Sciences and Applications
  - GSA - Generic Science and Applications
  - LS - Life Sciences
  - MS - Microgravity Science and Applications
  - SP - Space Physics
  - SS - Solar System Exploration
- TD - Technology Development
  - AR - Automation and Robotics
  - ETM - Energy and Thermal Management Systems
  - FM - Fluid Management
  - GTD - General Technology Development
  - HS - Humans In Space
  - IS - Information Systems
  - SE - Space Environmental Effects
  - SO - In-Space Operations
  - STR - Space Structures
- FAC - Facilities
  - C - Communications
  - SSI - Space Station Freedom Infrastructure

TABLE A.1.2.– MISSION MODEL PAYLOADS

Payload Name	HTS Mission Type	P/L Req	Destination	P/L Type	Dis/ Subdis	Total Flts	1st Yr of Flt	Delivery Mass /Flight	Delivery Mass Total	Retreival Mass /Flight	Retreival Mass Total
ADAPTIVE MARS LANDING	Base	R	LEO OTH	D	TD/SO	1	1996	- 1300	1300	0	0
Advanced Communications Technology Satellite	Base	U	GEO	D	SA/C	1	1992	6067	6067	0	0
Advanced Composition Explorer	Base	U	EAR OTH	D	SA/A	1	1997	1400	1400	0	0
ADVANCED VERY LONG BASELINE INTERFEROMETRY	Base	U	LEO SS RM	D	SA/A	1	2005	4410	4410	0	0
Advanced X-Ray Astrophysics Facility	Base	R	LEO SS RM	D	SA/A	1	1997	29700	29700	0	0
AMELIORATION OF BONE-MASS LOSS IN MICROGRAVITY	Base	R	LEO TV	L	SA/LS	2	1990	500	1000	500	1000
ANTIBIOTICS SE84-7	Base	R	LEO TV	L	SA/LS	1	1995	55	55	55	55
ARC-JET EXPERIMENT	Base	U	LEO OTH	D	TD/SO	1	1996	100	100	0	0
ASTROCULTURE-1	Base	R	LEO TV	L	SA/LS	2	1992	30	60	30	60
ATTITUDE SENSOR PACKAGE	Base	R	LEO TV	L	TD/SO	1	1991	275	275	275	275
B-Z WAVES SE84-1	Base	R	LEO TV	L	SA/MS	1	1996	45	45	45	45
BEARING SE85-1	Base	R	LEO TV	L	SA/MS	1	1993	52	52	52	52
BIOCRYST	Base	R	LEO TV	L	SA/MS	33	1991	180	5940	180	5940
BIOPROCESSING WITH MATERIALS DISPERSION APPARATUS	Base	R	LEO TV	L	SA/MS	2	1990	74	148	74	148
BIOREACTOR DESIGN TEST	Base	R	LEO TV	L	SA/LS	3	1992	264	792	264	792
BIOSERVE GENERIC BIOPROCESSING APPARATUS	Base	R	LEO TV	L	SA/LS	2	1991	160	320	160	320
BIOSERVE GENERIC BIOPROCESSING APPARATUS	Base	R	LEO TV	L	SA/LS	4	1990	160	640	160	640
BLOOD RHEOLOGY EXPERIMENT/LYMPHATICS/BONE DYNAMICS	Base	R	LEO TV	L	SA/LS	3	1992	59	177	59	177
BUTTERFLY SE84-9	Base	R	LEO TV	L	SA/LS	1	1995	25	25	25	25
CANEX-2	Base	R	LEO TV	L	TD/SO	1	1992	1045	1045	895	895
CAPILLARY SE83-2	Base	R	LEO TV	L	SA/LS	1	1992	45	45	45	45
Cassini Saturn Orbiter	Base	U	DS SAT	D	SA/SS	1	1996	11300	11300	0	0
CEMENT SE85-2	Base	R	LEO TV	L	SA/MS	1	1994	40	40	40	40
CENTRIFUGAL FLUIDS MANAGEMENT	Base	R	LEO TV	L	SA/LS	2	1992	35	70	35	70
CHROMATOGRAPHY SE84-6	Base	R	LEO TV	L	SA/MS	1	1991	30	30	30	30
Combined Release and Rad Effects SAT - A	Base	U	GEO	D	SA/SP	1	1990	3940	3940	0	0
Comet Rendevous/Asteroid Flyby	Base	U	DS C/A	D	SA/SS	1	1995	13000	13000	0	0
CONCAP-2	Base	R	LEO TV	L	SA/MS	2	1990	500	1000	500	1000
CONSORTIUM OF MATERIALS DEV'T IN SPACE FACILITY	Base	R	LEO TV	L	SA/MS	3	1992	450	1350	450	1350
CONSORTIUM SPACEHAB FACILITY	Base	R	LEO TV	L	SA/MS	3	1991	680	2040	680	2040
CONVECTION SE81-9	Base	R	LEO TV	L	SA/MS	1	1990	40	40	40	40
CRYOGENIC FLUID MANAGEMENT EXP	Base	U	LEO OTH	D	TD/FM	1	1997	8000	8000	0	0
CRYSTALS BY VAPOR TRANSPORT EXPERIMENT	Base	R	LEO TV	L	SA/MS	3	1991	360	1080	360	1080
CZ-103, LIMITED DURATION SPACE ENV MAT EXPOSURE	Base	R	LEO TV	L	TD/SE	15	1990	500	7500	50	750
CZ-105, CANDIDATE MATERIALS SPACE EXPOSURE EVAL	Base	R	LEO TV	L	TD/SE	1	1991	500	500	500	500
CZ-121, LUNAR SURFACE CANDIDATE MATERIALS EXPOSURE	Base	R	LUN SUR	D	TD/SE	1	2000	400	400	400	400
CZ-131 DEEP SPACE CANDIDATE MATERIALS EXPOSURE	Base	U	DS OTH	D	TD/SE	1	1993	30	30	30	30
DIRECTIONAL SOLIDIFICATION OF CUPB ALLOYS	Base	R	LEO TV	L	SA/MS	2	1992	900	1800	900	1800
DOPED NON-LINEAR OPTIC SUBSTANCES	Base	R	LEO TV	L	SA/MS	3	1990	25	75	25	75
DRUG DELIVERY	Base	R	LEO TV	L	SA/LS	2	1990	40	80	40	80
Earth Observing System Synthetic Aperture Radar	Base	U	LEO SYN	D	SA/ES	1	1998	2867	2867	0	0
EARTHWORM SE82-1	Base	R	LEO TV	L	SA/LS	1	1994	18	18	18	18
EUROPEAN RETRIEVABLE CARRIER	Base	U	LEO OTH	D	SA/MS	3	1991	9690	29070	0	0
Expendable Explorer Program Follow-on Payloads	Base	U	LEO OTH	D	SA/A	5	2001	11000	55000	0	0
EXT DURATION SPACE ENV CANDIDATE MATERIAL EXPOSURE	Base	R	LEO TV	L	TD/SE	4	1992	500	2000	500	2000
Extreme Ultraviolet Explorer	Base	U	LEO OTH	D	SA/A	1	1991	7030	7030	0	0

TABLE A.1.2.- MISSION MODEL PAYLOADS (CONTINUED)

Payload Name	HTS Mission Type	P/L Req	Destination	P/L Type	Dis/ Subdis	Total Flts	1st Yr of Flt	Delivery Mass /Flight	Delivery Mass Total	Retreival Mass /Flight	Retreival Mass Total
Fast Aureole Snapshot Explorer	Base	U	LEO OTH	D	SA/A	1	1993	298	298	0	0
FERROFLUIDS SE85-3	Base	R	LEO TV	L	SA/MS	1	1997	30	30	30	30
FLIGHT TELEROBOTIC SERVICER DEMO TEST FLIGHT	Base	R	LEO TV	L	TD/AR	2	1991	0	0	0	0
FLOATING ZONE PROC OF SEMICONDUCTOR-METAL EUTECTIC	Base	R	LEO TV	L	SA/MS	5	1991	500	2500	500	2500
FLUID DYNAMICS STUDIES	Base	R	LEO TV	L	TD/FM	2	1990	25	50	25	50
Follow-On Payloads TBD (Earth Probes-Delta Class)	Base	U	LEO OTH	D	SA/ES	7	1997	11000	77000	0	0
Follow-On Payloads TBD (Earth Probes-Scout Class)	Base	U	LEO OTH	D	SA/ES	8	1995	594	4752	0	0
Follow-On Payloads TBD (Small Explorer Program)	Base	U	LEO OTH	D	SA/A	28	1997	440	12320	0	0
FROG EGGS SE84-5	Base	R	LEO TV	L	SA/LS	1	1996	30	30	30	30
FROZEN STARTUP OF A HEAT PIPE IN MICROGRAVITY	Base	R	LEO TV	L	TD/SE	1	1991	200	200	200	200
FUEL CELL	Base	R	LEO TV	L	TD/ETM	6	1991	500	3000	500	3000
FUNGUS SE85-4	Base	R	LEO TV	L	SA/LS	1	1993	20	20	20	20
Gamma Ray Observatory	Base	R	LEO OTH	D	SA/A	1	1990	35000	35000	0	0
GELATION OF SOLS: APPLIED MICROGRAVITY RESEARCH	Base	R	LEO TV	L	SA/MS	3	1991	54	162	54	162
GENERIC BIOPROCESSING APPARATUS	Base	R	LEO TV	L	SA/LS	2	1992	100	200	100	200
GEO Platform (Mission To Planet Earth)	Base	U	GEO	D	SA/ES	1	2002	12700	12700	0	0
Geopotential Research Mission	Base	U	LEO POL	D	SA/ES	1	1998	4851	4851	0	0
GOLDFISH BLOOD SE82-20	Base	R	LEO TV	L	SA/LS	1	1993	45	45	45	45
GRANULES	Base	R	LEO TV	L	SA/LS	2	1991	610	1220	610	1220
Gravity Probe-B	Base	U	LEO POL	D	SA/A	1	1999	5500	5500	0	0
GREY CRESCENT SE83-8	Base	R	LEO TV	L	SA/LS	1	1996	30	30	30	30
HEAT PIPE EXPERIMENT	Base	R	LEO TV	L	TD/ETM	1	1993	275	275	275	275
High Energy Transient Experiment	Base	R	LEO OTH	D	SA/A	1	1994	300	300	0	0
Hubble Space Telescope	Base	R	LEO SS RM	D	SA/A	1	1990	24705	24705	0	0
IMMUNE SE83-1	Base	R	LEO TV	L	SA/LS	1	1991	35	35	35	35
IN VITRO BONE SE83-7	Base	R	LEO TV	L	SA/LS	1	1994	30	30	30	30
IN-FLIGHT CONTAMINATION EXPERIMENT	Base	R	LEO TV	L	TD/SE	1	1993	1000	1000	1000	1000
INVESTIGATIONS INTO POLYMER MEMBRANES PROCESSING	Base	R	LEO TV	L	SA/MS	4	1990	10	40	10	40
ION ARC SE82-16	Base	R	LEO TV	L	SA/SP	1	1990	40	40	40	40
ISTP Geotail	Base	U	EAR OTH	D	SA/SP	1	1992	1500	1500	0	0
ISTP Polar	Base	U	EAR OTH	D	SA/SP	1	1993	1650	1650	0	0
ISTP Solar and Heliospheric Observatory	Base	U	DS SOL	D	SA/SP	1	1995	4409	4409	0	0
ISTP Wind	Base	U	LUN ORB	D	SA/SP	1	1992	1500	1500	0	0
ITA MATERIALS DISPERSION APPARATUS	Base	R	LEO TV	L	SA/MS	6	1990	70	420	70	420
Large Deployable Reflector	Base	R	LEO SS RM	D	SA/A	1	2001	54000	54000	0	0
Lidar In-Space Technology Experiment	Base	R	LEO TV	L	SA/ES	1	1993	0	0	0	0
LIFESAT	Base	U	LEO SS RM	D	SA/LS	7	1994	3000	21000	0	0
LIQUID ENCAPSULATED MELT ZONE OF INDIUM	Base	R	LEO TV	L	SA/MS	2	1992	200	400	200	400
LOW TEMP SOLIDIFICATION OF HIGH EFF ORG CRYSTAL	Base	R	LEO TV	L	SA/MS	2	1992	500	1000	500	1000
Lunar Observer	Base	U	LUN ORB	D	SA/SS	1	1997	5500	5500	0	0
LUNAR RELAY	Base	U	LUN ORB	D	FAC/C	1	2009	3749	3749	0	0
Mars Network	Base	U	DS MAR ORB	D	SA/SS	2	1998	9393	18786	0	0
Mars Observer - Enhancement	Base	U	DS MAR ORB	D	SA/SS	1	1992	2380	2380	0	0
Mars Observer-Backup	Base	U	DS MAR ORB	D	SA/SS	1	1997	2380	2380	0	0
MARS RELAY	Base	U	DS MAR ORB	D	FAC/C	2	2014	3749	7498	0	0
Mars Sample Return	Base	U	DS MAR SUR	D	SA/SS	4	2001	7700	30800	0	0

TABLE A.1.2.– MISSION MODEL PAYLOADS (CONTINUED)

Payload Name	HTS Mission Type	P/L Req	Destination	P/L Type	Dis/ Subdis	Total Flts	1st Yr of Flt	Delivery Mass /Flight	Delivery Mass Total	Retreival Mass /Flight	Retreival Mass Total
Mercury Dual Orbiter	Base	U	DSMER	D	SA/SP	1	2000	11025	11025	0	0
MICRO HEAT PIPE EVALUATION	Base	R	LEO TV	L	TD/SE	1	1991	25	25	25	25
MICRO-ORGANISMIC REACTOR	Base	R	LEO TV	L	SA/LS	3	1992	30	90	30	90
MICROGRAVITY PLANT GROWTH	Base	R	LEO TV	L	SA/LS	4	1990	500	2000	500	2000
MICROWAVE POWER TRANSMISSION-PHASE II	Base	R	LEO TV	L	TD/ETM	1	1992	500	500	500	500
MUSCLE STIMULATION SE84-4	Base	R	LEO TV	L	SA/LS	1	1992	35	35	35	35
NEURONS SE84-3	Base	R	LEO TV	L	SA/LS	1	1996	30	30	30	30
NON-INVASIVE DUAL PHOTON BONE DESITOMETER MINIAT.	Base	R	LEO TV	L	SA/LS	2	1991	200	400	200	400
NONLINEAR OPTICAL & TRIGLYCINE SULFATE CRYST GROW.	Base	R	LEO TV	L	SA/MS	2	1992	500	1000	500	1000
Nuclear Astrophysics Explorer	Base	U	LEO OTH	D	SA/A	1	1999	11000	11000	0	0
OATS SE82-10	Base	R	LEO TV	L	SA/LS	1	1995	30	30	30	30
Orbiting Solar Laboratory	Base	U	LEO SYN	D	SA/SP	1	1997	7500	7500	0	0
ORGANIC MATERIALS AND OTHERS	Base	R	LEO TV	L	SA/MS	35	1993	500	17500	500	17500
ORGANIC MATERIALS AND OTHERS	Base	R	LEO TV	L	SA/MS	14	1993	200	2800	200	2800
OSTEOGENSIS SE84-8	Base	R	LEO TV	L	SA/LS	1	1993	20	20	20	20
OXIDE STRENGTHENED HIGH TEMPERATURE ALLOYS	Base	R	LEO TV	L	SA/MS	2	1992	900	1800	900	1800
PAPER CHROMATOGRAPHY SE85-7	Base	R	LEO TV	L	SA/SP	1	1997	20	20	20	20
PHOTONICS FLIGHT SYSTEMS	Base	U	LEO OTH	D	TD/IS	1	1996	1700	1700	0	0
PHYSICAL VAPOR TRANSPORT CRYSTAL GROWTH	Base	R	LEO TV	L	SA/MS	3	1991	500	1500	500	1500
PHYSICAL VAPOR TRANSPORT OF ORGANIC SOLIDS	Base	R	LEO TV	L	SA/MS	1	1991	190	190	190	190
PHYSIOLOGICAL SYSTEMS EXPERIMENT	Base	R	LEO TV	L	SA/LS	5	1990	120	600	120	600
PLANT CELL GROWTH	Base	R	LEO TV	L	SA/LS	3	1990	120	360	120	360
PLANT GRAVITY SE82-12	Base	R	LEO TV	L	SA/LS	1	1995	50	50	50	50
Polar Orbiting Platform 1/EOS 1	Base	U	LEO POL	D	SA/ES	1	1997	28000	28000	0	0
Polar Orbiting Platform 1A/EOS 1A	Base	U	LEO POL	D	SA/ES	1	2001	28000	28000	0	0
Polar Orbiting Platform 1B/EOS 1B	Base	U	LEO POL	D	SA/ES	1	2007	28000	28000	0	0
Polar Orbiting Platform 2/EOS 2	Base	U	LEO POL	D	SA/ES	1	1999	28000	28000	0	0
Polar Orbiting Platform 2A/EOS 2A	Base	U	LEO POL	D	SA/ES	1	2003	28000	28000	0	0
Polar Orbiting Platform 2B/EOS 2B	Base	U	LEO POL	D	SA/ES	1	2008	28000	28000	0	0
POLYMER COMPOSITES	Base	R	LEO TV	L	SA/MS	2	1990	60	120	60	120
POLYMER MORPHOLOGY	Base	R	LEO TV	L	SA/MS	1	1991	210	210	210	210
POLYMERIZATION WITH LIGHT UNDER MICROGRAVITY	Base	R	LEO TV	L	SA/MS	2	1991	120	240	120	240
POWER CONVERTER	Base	R	LEO TV	L	TD/ETM	6	1991	110	660	110	660
PROTEIN CRYSTAL GROWTH IN A MICRO-G ENVIRONMENT	Base	R	LEO TV	L	SA/MS	10	1990	32	320	32	320
PROTEIN CRYSTAL GROWTH IN A MICRO-G ENVIRONMENT	Base	R	LEO TV	L	SA/MS	7	1990	150	1050	150	1050
PROTEIN CRYSTAL GROWTH IN A MICROGRAVITY ENVIRON.	Base	R	LEO TV	L	SA/MS	15	1991	176	2640	176	2640
QUAIL EGGS SE85-5	Base	R	LEO TV	L	SA/LS	1	1997	40	40	40	40
RADISH ROOTS SE84-10	Base	R	LEO TV	L	SA/LS	1	1992	55	55	55	55
RESEARCH AND TECHNOLOGY EXP (FBM)	Base	U	LEO OTH	D	TD/FM	1	1996	6585	6585	0	0
RESEARCH AND TECHNOLOGY EXP (SO)	Base	U	LEO OTH	D	TD/SO	14	1997	6585	92190	0	0
RETURN FLUX EXPERIMENT	Base	R	LEO TV	L	TD/SE	1	1994	1000	1000	1000	1000
Roentgensatellite	Base	U	LEO OTH	D	SA/A	1	1990	5333	5333	0	0
S.P.E., FUEL CELL THERMAL & WATER MGMT TESTING	Base	R	LEO TV	L	TD/ETM	1	1994	500	500	500	500
SHUTTLE RADIATOR ASS'Y DEMO/2 PHASE THERMAL SYSTEM	Base	R	LEO TV	L	TD/ETM	0	0	0	0	0	0
Solar Anomalous Magnetospheric Particle Explorer	Base	U	LEO OTH	D	SA/A	1	1992	388	388	0	0
SOLAR ARRAY MODULE PLASMA INTERACTION EXPERIMENT	Base	R	LEO TV	L	TD/SE	1	1994	1000	1000	1000	1000

TABLE A.1.2.– MISSION MODEL PAYLOADS (CONTINUED)

Payload Name	HTS Mission Type	P/L Req	Destination	P/L Type	Dis/ Subdis	Total Flts	1st Yr of Flt	Delivery Mass /Flight	Delivery Mass Total	Retreival Mass /Flight	Retreival Mass Total
Solar Probe	Base	U	DS SOL	D	SA/SP	1	2000	2205	2205	0	0
SOLIDIFCATION PROCESS MODELING VERIFICATION	Base	R	LEO TV	L	SA/MS	2	1992	500	1000	500	1000
SOLUTION CRYSTAL GROWTH	Base	R	LEO TV	L	SA/MS	3	1991	160	480	160	480
Space Infrared Telescope Facility	Base	U	EAR OTH	D	SA/A	1	1998	9600	9600	0	0
SPACE REPRODUCTION SE85-6	Base	R	LEO TV	L	SA/LS	1	1997	30	30	30	30
SPACE STATION HEAT PIPE ADVANCED RADIATOR ELEMENT	Base	R	LEO TV	L	TD/ETM	2	1991	885	1770	885	1770
SPACECRAFT GLOW INVESTIGATION EXPERIMENT	Base	R	LEO TV	L	TD/SE	1	1994	1000	1000	1000	1000
Spartan - 201	Base	R	LEO TV	L	SA/SP	1	1992	7000	7000	0	0
STUDENT EXPERIMENTS	Base	R	LEO TV	L	SA/GSA	92	1998	55	5060	55	5060
Submillimeter Wave Astronomy Satellite	Base	U	LEO OTH	D	SA/A	1	1993	400	400	0	0
THIN CRYSTAL SE83-10	Base	R	LEO TV	L	SA/MS	1	1992	35	35	35	35
Total Ozone Mapping Spectrometer	Base	U	LEO OTH	D	SA/ES	1	1993	594	594	0	0
Ulysses	Base	R	DS SOL	D	SA/SS	1	1990	935	935	0	0
Upper Atmosphere Research Satellite	Base	U	LEO OTH	D	SA/ES	1	1991	17000	17000	0	0
Waves In Space/OMV	Base	R	LEO TV	L	SA/SP	1	1995	1000	1000	0	0
WORM HEAT SE82-18	Base	R	LEO TV	L	SA/LS	1	1994	20	20	20	20
ZEOLITE CRYSTAL GROWTH	Base	R	LEO TV	L	SA/MS	3	1992	150	450	150	450
INDUSTRIAL SPACE FACILITY - AUXILLARY MODULE #2	ISF	R	LEO OTH	D	SA/MS	1	1998	21500	21500	0	0
INDUSTRIAL SPACE FACILITY - MODULE #1	ISF	R	LEO OTH	D	SA/MS	2	1997	36000	72000	0	0
INDUSTRIAL SPACE FACILITY I	ISF	R	LEO OTH	R	TD/SO	1	1997	0	0	281	281
INDUSTRIAL SPACE FACILITY I	ISF	R	LEO OTH	D	TD/SO	1	1997	281	281	0	0
INDUSTRIAL SPACE FACILITY III	ISF	R	LEO OTH	R	TD/SO	1	1998	0	0	1100	1100
INDUSTRIAL SPACE FACILITY III	ISF	R	LEO OTH	D	TD/SO	1	1997	1100	1100	0	0
INDUSTRIAL SPACE FACILITY IV	ISF	R	LEO OTH	R	TD/SO	1	1998	0	0	250	250
INDUSTRIAL SPACE FACILITY IV	ISF	R	LEO OTH	D	TD/SO	1	1998	250	250	0	0
INDUSTRIAL SPACE FACILITY V	ISF	R	LEO OTH	R	TD/SO	1	1999	0	0	220	220
INDUSTRIAL SPACE FACILITY V	ISF	R	LEO OTH	D	TD/SO	1	1998	220	220	0	0
INDUSTRIAL SPACE FACILITY VI	ISF	R	LEO OTH	R	TD/SO	11	2000	0	0	557	6127
INDUSTRIAL SPACE FACILITY VI	ISF	R	LEO OTH	D	TD/SO	11	2000	557	6127	0	0
INDUSTRIAL SPACE FACILITY VII	ISF	R	LEO OTH	R	TD/SO	12	1999	0	0	440	5280
INDUSTRIAL SPACE FACILITY VII	ISF	R	LEO OTH	D	TD/SO	12	1999	440	5280	0	0
Explorer Next	Sat Servicing	R	LEO OTH	S	SA/A	8	1996	13000	104000	13000	104000
Hubble Space Telescope Servicing	Sat Servicing	R	LEO SS RM	S	SA/A	6	1993	6050	36300	0	0
Large Deployable Reflector	Sat Servicing	R	LEO SS RM	S	SA/A	4	2003	2640	10560	800	3200
X-Ray Timing Explorer	Sat Servicing	R	LEO OTH	S	SA/A	1	1994	13000	13000	12000	12000
AEROASSIST FLIGHT EXPERIMENT	Sortie Science	R	LEO TV	L	TD/SO	1	1994	11200	11200	11200	11200
Astronomical Obs./Broad-Band X-Ray Telescope	Sortie Science	R	LEO TV	L	SA/A	2	1990	21000	42000	21000	42000
Atmospheric Lab For Appl and Science - 1	Sortie Science	R	LEO TV	L	SA/ES	1	1991	20000	20000	20000	20000
Atmospheric Lab For Appl and Science - 2	Sortie Science	R	LEO TV	L	SA/ES	11	1992	10000	110000	10000	110000
AUTONOMOUS RENDEVOUS/DOCKING	Sortie Science	R	LEO TV	L	TD/SO	1	1998	3900	3900	3900	3900

TABLE A.1.2.– MISSION MODEL PAYLOADS (CONTINUED)

Payload Name	HTS Mission	HTS Type	P/L Req	Destination	P/L Type	Dis/ Subdis	Total Flts	1st Yr of Flt	Delivery Mass /Flight	Delivery Mass Total	Retreival Mass /Flight	Retreival Mass Total
CONTROL OF FLEXIBLE STRUCTURES I	Sortie	Science	R	LEO TV	L	TD/STR	1	1994	3000	3000	3000	3000
CRYOGENIC FLUID MANAGEMENT	Sortie	Science	R	LEO TV	L	TD/FM	1	1993	4000	4000	4000	4000
Diffuse X-Ray Spectometer	Sortie	Science	U	LEO OTH	D	SA/A	2	1991	2000	4000	2000	4000
DIRECTIONAL SOLIDIFICATION OF CADMIUM TELLURIDE	Sortie	Science	R	LEO TV	L	SA/MS	2	1992	5000	10000	5000	10000
ELECTRIC THRUSTER	Sortie	Science	R	LEO TV	L	TD/ETM	1	1993	4000	4000	4000	4000
EUROPEAN RETRIEVABLE CARRIER	Sortie	Science	U	LEO OTH	R	SA/MS	3	1992	0	0	8370	25110
FLIGHT DEMO OF MICROWAVE POWER TRANSMISSION-PH. I	Sortie	Science	R	LEO TV	L	TD/ETM	1	1992	1500	1500	1500	1500
FLOAT ZONE CRYSTAL GROWTH OF CDTE	Sortie	Science	R	LEO TV	L	SA/MS	2	1993	5000	10000	5000	10000
International Microgravity Laboratory	Sortie	Science	R	LEO TV	L	SA/GSA	4	1990	27246	108984	27246	108984
ITA STANDARDIZED EXPERIMENT MODULE	Sortie	Science	R	LEO TV	L	SA/MS	2	1992	1250	2500	1250	2500
LIDAR IN-SPACE TECHNOLOGY EXP	Sortie	Science	R	LEO TV	L	TD/IS	1	1993	2500	2500	2500	2500
MARS ENTRY/EARTH RETURN AEROBRAKING	Sortie	Science	R	LEO TV	L	TD/SO	1	1997	7800	7800	7800	7800
MICROGRAVITY ACTUATOR SYSTEM	Sortie	Science	R	LEO TV	L	TD/AR	2	1991	1400	2800	1400	2800
NORMAL FREEZING FURNACE	Sortie	Science	R	LEO TV	L	SA/MS	8	1991	5000	40000	5000	40000
OPTICAL COMMUNICATIONS	Sortie	Science	R	LEO TV	L	TD/IS	1	1996	2300	2300	2300	2300
ORBITAL MANEUVERING VEHICLE	Sortie	Science	R	LEO TV	L	TD/AR	1	1995	18000	18000	13500	13500
OSSA Mixed Cargo	Sortie	Science	R	LEO TV	L	SA/GSA	10	1996	30000	300000	30000	300000
PRIME (IS)	Sortie	Science	R	LEO TV	L	TD/IS	3	2000	9000	27000	9000	27000
PRIME (IS)	Sortie	Science	R	LEO TV	L	TD/IS	3	2000	4500	13500	4500	13500
PRIME (SE)	Sortie	Science	R	LEO TV	L	TD/SE	2	2002	9000	18000	9000	18000
PRIME I (AR)	Sortie	Science	R	LEO TV	L	TD/AR	1	1996	4500	4500	4500	4500
PRIME I (FBM)	Sortie	Science	R	LEO TV	L	TD/FM	1	1998	4500	4500	4500	4500
PRIME II (AR)	Sortie	Science	R	LEO TV	L	TD/AR	3	1999	9000	27000	9000	27000
PRIME II (ETM)	Sortie	Science	R	LEO TV	L	TD/ETM	1	2006	9000	9000	9000	9000
PRIME II (FBM)	Sortie	Science	R	LEO TV	L	TD/FM	2	2003	9000	18000	9000	18000
RANKINE CYCLE POWER SYSTEM	Sortie	Science	R	LEO TV	L	TD/ETM	1	1995	4000	4000	4000	4000
SATELLITE SERVICER SYSTEM	Sortie	Science	R	LEO TV	L	TD/AR	1	1995	4500	4500	4500	4500
Shttl Pallet Sat Cryo IR Spect Tel For Atmosphere	Sortie	Science	R	LEO TV	L	SA/ES	1	1993	7700	7700	7700	7700
Shttl Pallet Sat-Orb & Retrvbl Far & Extr UV Spect	Sortie	Science	R	LEO TV	L	SA/A	1	1992	7700	7700	7700	7700
Shuttle Radar Lab	Sortie	Science	R	LEO TV	L	SA/ES	3	1992	12000	36000	12000	36000
Shuttle Relativity Explorer (STORE)	Sortie	Science	R	LEO TV	L	SA/A	1	1994	500	500	5000	5000
Space Life Sciences	Sortie	Science	R	LEO TV	L	SA/LS	4	1990	30000	120000	30000	120000
SPACE POWER 100	Sortie	Science	R	LEO TV	L	TD/ETM	1	1997	9000	9000	9000	9000
SPACE TECH EXP PALLET (AR)	Sortie	Science	R	LEO TV	L	TD/AR	3	2000	4500	13500	4500	13500
SPACE TECH EXP PALLET (ETM)	Sortie	Science	R	LEO TV	L	TD/ETM	2	2002	4500	9000	4500	9000
SPACE TECH EXP PALLET (FBM)	Sortie	Science	R	LEO TV	L	TD/FM	4	1996	4500	18000	4500	18000
SPACE TECH EXP PALLET (IS)	Sortie	Science	R	LEO TV	L	TD/IS	3	1997	4500	13500	4500	13500
SPACE TECH EXP PALLET (SE)	Sortie	Science	R	LEO TV	L	TD/SE	4	1995	4500	18000	4500	18000
SPACEFLYER UNIT	Sortie	Science	R	LEO OTH	R	SA/GSA	1	1994	0	0	8816	8816
SPACEHAB	Sortie	Science	R	LEO TV	L	SA/MS	7	1992	10854	75978	10854	75978
SPACELAB-D SERIES	Sortie	Science	R	LEO TV	L	SA/GSA	2	1992	23996	47992	23996	47992
SPACELAB-J FMPT	Sortie	Science	R	LEO TV	L	SA/MS	1	1991	25706	25706	25706	25706
SPARTAN-TARGET	Sortie	Science	R	LEO TV	L	TD/AR	1	1995	4500	4500	4500	4500
SUBSCALE ORBITAL FLUID TRANSFER EXPERIMENT	Sortie	Science	R	LEO TV	L	TD/FM	1	1992	4000	4000	4000	4000
SUPERFLUID HELIUM ON-ORBIT TRANSFER DEMONSTRATION	Sortie	Science	R	LEO TV	L	TD/FM	1	1992	3080	3080	3080	3080
TELEMEDICINE	Sortie	Science	R	LEO TV	L	SA/LS	1	1992	2800	2800	2800	2800

TABLE A.1.2.- MISSION MODEL PAYLOADS (CONTINUED)

Payload Name	HTS Mission Type	P/L Req	Destination	P/L Type	Dis/ Subdis	Total Flts	1st Yr of Flt	Delivery Mass /Flight	Delivery Mass Total	Retreival Mass /Flight	Retreival Mass Total
TETHER SATELLITE SYSTEM #1	Sortie Science	R	LEO TV	L	TD/ETM	5	1991	1985	9925	1985	9925
United States Microgravity Lab	Sortie Science	R	LEO TV	L	SA/MS	4	1992	29000	116000	29000	116000
United States Microgravity Payload	Sortie Science	R	LEO TV	L	SA/MS	7	1992	9000	63000	9000	63000
WAKE SHIELD FACILITY	Sortie Science	R	LEO TV	L	SA/MS	4	1992	2500	10000	2500	10000
ACOUSTIC CONTROL TECHNOLOGY	SSF	R	LEO SS OB	S	TD/HS	4	2000	57	228	57	228
ACOUSTIC CONTROL TECHNOLOGY	SSF	R	LEO SS OB	R	TD/HS	1	2000	0	0	93	93
ACOUSTIC CONTROL TECHNOLOGY	SSF	R	LEO SS OB	D	TD/HS	1	1999	93	93	0	0
ACRC AT SPACE STATION	SSF	R	LEO SS OB	R	FAC/SSI	6	2002	0	0	9500	57000
ACRC AT SPACE STATION	SSF	R	LEO SS OB	D	FAC/SSI	9	1999	10000	90000	0	0
ADVANCED ADAPTIVE CONTROL	SSF	R	LEO SS OB	S	TD/STR	1	2000	1	1	0	0
ADVANCED ADAPTIVE CONTROL (EXTERNAL)	SSF	R	LEO SS OB	R	TD/STR	1	2000	0	0	342	342
ADVANCED ADAPTIVE CONTROL (EXTERNAL)	SSF	R	LEO SS OB	D	TD/STR	1	1999	342	342	0	0
ADVANCED ADAPTIVE CONTROL (INTERNAL)	SSF	R	LEO SS OB	R	TD/STR	1	2000	0	0	254	254
ADVANCED ADAPTIVE CONTROL (INTERNAL)	SSF	R	LEO SS OB	D	TD/STR	1	1999	254	254	0	0
ADVANCED AUTOMATION TECHNOLOGY	SSF	R	LEO SS OB	R	TD/AR	1	2004	0	0	110	110
ADVANCED AUTOMATION TECHNOLOGY	SSF	R	LEO SS OB	D	TD/AR	1	2001	110	110	0	0
ADVANCED OPTICAL RECEIVING STATION	SSF	R	LEO SS OB	S	TD/IS	3	2007	363	1089	360	1080
ADVANCED OPTICAL RECEIVING STATION	SSF	R	LEO SS OB	R	TD/IS	1	2008	0	0	2200	2200
ADVANCED OPTICAL RECEIVING STATION	SSF	R	LEO SS OB	D	TD/IS	1	2007	2200	2200	0	0
Advanced Protein Crystal Growth Facility	SSF	R	LEO SS OB	S	SA/MS	14	1999	1760	24640	1760	24640
Advanced Protein Crystal Growth Facility	SSF	R	LEO SS OB	D	SA/MS	1	1998	1400	1400	0	0
ADVANCED RADIATOR CONCEPTS	SSF	R	LEO SS OB	R	TD/ETM	1	2004	0	0	400	400
ADVANCED RADIATOR CONCEPTS	SSF	R	LEO SS OB	D	TD/ETM	1	2002	400	400	0	0
ADVANCED STRUCTURAL DYNAMICS AND CONTROL	SSF	R	LEO SS OB	D	TD/STR	1	2002	1034	1034	0	0
ADVANCED STRUCUTRAL DYNAMICS AND CONTROL	SSF	R	LEO SS OB	R	TD/STR	1	2002	0	0	1034	1034
Advanced X-Ray Astrophysics Facility	SSF	R	LEO SS OB	S	SA/A	4	2003	4400	17600	2860	11440
Animal/Plant Vivarium	SSF	R	LEO SS OB	D	SA/LS	1	2007	30000	30000	0	0
Astromag	SSF	R	LEO SS OB	D	SA/SP	3	2000	17600	52800	0	0
Astrometric Telescope Facility	SSF	R	LEO SS OB	D	SA/SS	1	2000	14960	14960	0	0
ATTACHED EXP (ETM) III	SSF	R	LEO SS OB	R	TD/ETM	0	0	0	0	1916	0
ATTACHED EXP (ETM) III	SSF	R	LEO SS OB	D	TD/ETM	1	2020	1916	1916	0	0
ATTACHED EXP (IS)	SSF	R	LEO SS OB	R	TD/IS	1	2020	0	0	1916	1916
ATTACHED EXP (IS)	SSF	R	LEO SS OB	D	TD/IS	1	2019	1916	1916	0	0
ATTACHED EXP (SE) II	SSF	R	LEO SS OB	R	TD/SE	0	0	0	0	1916	0
ATTACHED EXP (SE) II	SSF	R	LEO SS OB	D	TD/SE	0	0	1916	0	0	0
AUTONOMOUS SERVICING ROBOT	SSF	R	LEO SS OB	S	TD/AR	1	2005	88	88	0	0
AUTONOMOUS SERVICING ROBOT (EXTERNAL)	SSF	R	LEO SS OB	R	TD/AR	1	2005	0	0	4400	4400
AUTONOMOUS SERVICING ROBOT (EXTERNAL)	SSF	R	LEO SS OB	D	TD/AR	1	2005	4400	4400	0	0
AUTONOMOUS SERVICING ROBOT (INTERNAL)	SSF	R	LEO SS OB	R	TD/AR	1	2005	0	0	385	385
AUTONOMOUS SERVICING ROBOT (INTERNAL)	SSF	R	LEO SS OB	D	TD/AR	1	2004	385	385	0	0
Biomedical Facility	SSF	R	LEO SS OB	S	SA/LS	0	0	300	0	0	0
Biomedical Facility	SSF	R	LEO SS OB	D	SA/LS	0	0	3000	0	0	0
Biotechnology Facility	SSF	R	LEO SS OB	S	SA/MS	11	2002	1320	14520	1320	14520
Biotechnology Facility	SSF	R	LEO SS OB	D	SA/MS	1	2003	3080	3080	0	0

TABLE A.1.2.– MISSION MODEL PAYLOADS (CONTINUED)

Payload Name	HTS Mission Type	P/L Req	Destination	P/L Type	Dis/ Subdis	Total Flts	1st Yr of Flt	Delivery Mass /Flight	Delivery Mass Total	Retreival Mass /Flight	Retreival Mass Total
CELSS SS Module Project "EDENS"	SSF	R	LEO SS OB	D	SA/LS	1	2005	24000	24000	24000	24000
CELSS Test Facility	SSF	R	LEO SS OB	S	SA/LS	16	2003	500	8000	0	0
CELSS Test Facility	SSF	R	LEO SS OB	D	SA/LS	1	2003	1440	1440	0	0
Centrifuge Facility	SSF	R	LEO SS OB	S	SA/LS	64	1997	660	42240	0	0
Centrifuge Facility	SSF	R	LEO SS OB	D	SA/LS	1	1997	4400	4400	0	0
Clouds and Earth Radiant Energy System	SSF	R	LEO SS OB	D	SA/ES	1	2001	198	198	0	0
COATINGS MAINTENANCE TECHNOLOGY	SSF	R	LEO SS OB	S	TD/SO	1	2001	100	100	7	7
COATINGS MAINTENANCE TECHNOLOGY (EXTERNAL)	SSF	R	LEO SS OB	R	TD/SO	1	2001	0	0	31	31
COATINGS MAINTENANCE TECHNOLOGY (EXTERNAL)	SSF	R	LEO SS OB	D	TD/SO	1	2000	31	31	0	0
COATINGS MAINTENANCE TECHNOLOGY (INTERNAL)	SSF	R	LEO SS OB	R	TD/SO	1	2001	0	0	880	880
COATINGS MAINTENANCE TECHNOLOGY (INTERNAL)	SSF	R	LEO SS OB	D	TD/SO	1	2000	880	880	0	0
Cosmic Dust Collection Exp	SSF	R	LEO SS OB	S	SA/SS	13	2000	80	1040	80	1040
Cosmic Dust Collection Facility	SSF	R	LEO SS OB	D	SA/SS	1	1998	3300	3300	0	0
CZ-111, LONG DURATION SPACE ENV MATERIALS EXPOSURE	SSF	R	LEO SS OB	D	TD/SE	5	1997	188	940	188	940
CZ-115, SPACE MATERIALS EVALUATION FACILITY	SSF	R	LEO SS OB	D	TD/SE	1	1997	3000	3000	3000	3000
DEEP SPACE OPTICAL COMM. AND RANGING (EXTERNAL)	SSF	R	LEO SS OB	R	TD/IS	1	2006	0	0	495	495
DEEP SPACE OPTICAL COMM. AND RANGING (EXTERNAL)	SSF	R	LEO SS OB	D	TD/IS	1	2006	495	495	0	0
DEEP SPACE OPTICAL COMM. AND RANGING (FF)	SSF	R	LEO SS OB	R	TD/IS	1	2006	0	0	242	242
DEEP SPACE OPTICAL COMM. AND RANGING (FF)	SSF	R	LEO SS OB	D	TD/IS	1	2006	242	242	0	0
DYNAMIC STABILIZATION FREE FLYING ROBOT	SSF	R	LEO SS OB	S	TD/AR	1	2004	88	88	0	0
DYNAMIC STABILIZATION FREE FLYING ROBOT (EXTERNAL)	SSF	R	LEO SS OB	R	TD/AR	1	2004	0	0	1100	1100
DYNAMIC STABILIZATION FREE FLYING ROBOT (EXTERNAL)	SSF	R	LEO SS OB	D	TD/AR	1	2004	1100	1100	0	0
DYNAMIC STABILIZATION FREE FLYING ROBOT (FF)	SSF	R	LEO SS OB	R	TD/AR	1	2004	0	0	4400	4400
DYNAMIC STABILIZATION FREE FLYING ROBOT (FF)	SSF	R	LEO SS OB	D	TD/AR	1	2004	4400	4400	0	0
DYNAMIC STABILIZATION FREE FLYING ROBOT (INTERNAL)	SSF	R	LEO SS OB	R	TD/AR	1	2004	0	0	385	385
DYNAMIC STABILIZATION FREE FLYING ROBOT (INTERNAL)	SSF	R	LEO SS OB	D	TD/AR	1	2001	385	385	0	0
Exobiology Active Collector	SSF	R	LEO SS OB	S	SA/LS	14	1999	1000	14000	1000	14000
Exobiology Active Collector	SSF	R	LEO SS OB	D	SA/LS	1	1998	5000	5000	0	0
Exobiology Facility	SSF	R	LEO SS OB	S	SA/LS	16	2002	500	8000	0	0
Exobiology Facility	SSF	R	LEO SS OB	D	SA/LS	1	2002	880	880	0	0
FLIGHT CREW HEALTH	SSF	R	LEO SS OB	S	TD/HS	39	2000	136	5304	7	273
FLIGHT CREW HEALTH	SSF	R	LEO SS OB	R	TD/HS	1	2009	0	0	980	980
FLIGHT CREW HEALTH	SSF	R	LEO SS OB	D	TD/HS	1	2000	980	980	0	0
FLIGHT DYNAMICS IDENTIFICATION	SSF	R	LEO SS OB	S	TD/STR	1	1999	1	1	0	0
FLIGHT DYNAMICS IDENTIFICATION (EXTERNAL)	SSF	R	LEO SS OB	R	TD/STR	1	2000	0	0	330	330
FLIGHT DYNAMICS IDENTIFICATION (EXTERNAL)	SSF	R	LEO SS OB	D	TD/STR	1	1998	330	330	0	0
FLIGHT DYNAMICS IDENTIFICATION (INTERNAL)	SSF	R	LEO SS OB	R	TD/STR	1	1999	0	0	250	250
FLIGHT DYNAMICS IDENTIFICATION (INTERNAL)	SSF	R	LEO SS OB	D	TD/STR	1	1998	250	250	0	0
Fluid Physics/Dynamics Facility	SSF	R	LEO SS OB	S	SA/MS	9	2004	440	3960	440	3960
Fluid Physics/Dynamics Facility	SSF	R	LEO SS OB	D	SA/MS	1	2003	3080	3080	0	0
Gravitational Biology Facility	SSF	R	LEO SS OB	S	SA/LS	56	1999	4000	224000	0	0
Gravitational Biology Facility	SSF	R	LEO SS OB	D	SA/LS	1	1999	770	770	0	0
GROWTH COMPOUND SEMICINDUCTOR CRYSTALS	SSF	R	LEO SS OB	R	TD/SO	1	2003	0	0	440	440
GROWTH COMPOUND SEMICONDUCTOR CRYSTALS	SSF	R	LEO SS OB	S	TD/SO	7	2002	440	3080	440	3080
GROWTH COMPOUND SEMICONDUCTOR CRYSTALS	SSF	R	LEO SS OB	D	TD/SO	1	2001	440	440	0	0
GROWTH OF THIN SINGLE CRYSTAL WAFERS	SSF	R	LEO SS OB	S	TD/SO	7	2005	2	14	2	14

TABLE A.1.2.– MISSION MODEL PAYLOADS (CONTINUED)

Payload Name	HTS Mission Type	P/L Req	Destination	P/L Type	Dis/ Subdis	Total Flts	1st Yr of Flt	Delivery Mass /Flight	Delivery Mass Total	Retreival Mass /Flight	Retreival Mass Total
GROWTH OF THIN SINGLE CRYSTAL WAFERS	SSF	R	LEO SS OB	R	TD/SO	1	2007	0	0	440	440
GROWTH OF THIN SINGLE CRYSTAL WAFERS	SSF	R	LEO SS OB	D	TD/SO	1	2005	440	440	0	0
Heavy Nuclei Collector	SSF	R	LEO SS OB	D	SA/SP	1	1998	7480	7480	0	0
HIGH STABILITY HYDROGEN MASER CLOCKS	SSF	R	LEO SS OB	R	TD/IS	1	2009	0	0	1100	1100
HIGH STABILITY HYDROGEN MASER CLOCKS	SSF	R	LEO SS OB	D	TD/IS	1	2000	1100	1100	0	0
IN-SITU CONTAMINANT ANALYSIS	SSF	R	LEO SS OB	S	TD/HS	1	1997	225	225	11	11
IN-SITU TRACE CONTAMINANT ANALYSIS	SSF	R	LEO SS OB	R	TD/HS	1	1998	0	0	250	250
IN-SITU TRACE CONTAMINANT ANALYSIS	SSF	R	LEO SS OB	D	TD/HS	1	1997	250	250	0	0
Large Area Modular Array Of Reflectors	SSF	R	LEO SS OB	D	SA/A	1	2000	12000	12000	12000	12000
Laser Atmospheric Wind Sounder	SSF	R	LEO SS OB	S	SA/ES	4	2002	875	3500	0	0
Laser Communications Transceiver	SSF	R	LEO SS OB	D	SA/C	1	1998	250	250	250	250
LDR STRUCTURAL EXPERIMENT	SSF	R	LEO SS OB	S	TD/STR	1	2001	726	726	660	660
LDR STRUCTURAL EXPERIMENT (EXTERNAL)	SSF	R	LEO SS OB	R	TD/STR	1	2001	0	0	2200	2200
LDR STRUCTURAL EXPERIMENT (EXTERNAL)	SSF	R	LEO SS OB	D	TD/STR	1	2001	2200	2200	0	0
LDR STRUCTURAL EXPERIMENT (INTERNAL)	SSF	R	LEO SS OB	R	TD/STR	1	2001	0	0	220	220
LDR STRUCTURAL EXPERIMENT (INTERNAL)	SSF	R	LEO SS OB	D	TD/STR	1	2001	220	220	0	0
Lighting Imaging Sensor	SSF	R	LEO SS OB	D	SA/ES	1	2001	44	44	0	0
LIQUID STREAM TECHNOLOGY TEST BED	SSF	R	LEO SS OB	S	TD/SO	1	2001	200	200	13	13
LIQUID STREAM TECHNOLOGY TEST BED	SSF	R	LEO SS OB	R	TD/SO	1	2001	0	0	1000	1000
LIQUID STREAM TECHNOLOGY TEST BED	SSF	R	LEO SS OB	D	TD/SO	1	2001	1000	1000	0	0
LOW ACCELERATION PROPULSION TECHNOLOGY	SSF	R	LEO SS OB	R	TD/FM	1	2003	0	0	55	55
LOW ACCELERATION PROPULSION TECHNOLOGY	SSF	R	LEO SS OB	D	TD/FM	1	2001	55	55	0	0
MANNED OBSERVATION TECHNIQUES	SSF	R	LEO SS OB	S	TD/HS	38	2001	130	4940	7	266
MANNED OBSERVATION TECHNIQUES (EXTERNAL)	SSF	R	LEO SS OB	R	TD/HS	1	2011	0	0	440	440
MANNED OBSERVATION TECHNIQUES (EXTERNAL)	SSF	R	LEO SS OB	D	TD/HS	1	2001	440	440	0	0
MANNED OBSERVATION TECHNIQUES (INTERNAL)	SSF	R	LEO SS OB	R	TD/HS	1	2011	0	0	130	130
MANNED OBSERVATION TECHNIQUES (INTERNAL)	SSF	R	LEO SS OB	D	TD/HS	1	1999	130	130	0	0
MATERIALS RESUPPLY	SSF	R	LEO SS OB	R	TD/SO	1	2004	0	0	440	440
MATERIALS RESUPPLY	SSF	R	LEO SS OB	D	TD/SO	1	2004	440	440	0	0
MICROBIOLOGICAL MONITOR FOR APP. IN SPACE VEHICLES	SSF	R	LEO SS OB	S	TD/HS	37	2000	396	14652	22	814
MICROBIOLOGICAL MONITOR FOR APP. IN SPACE VEHICLES	SSF	R	LEO SS OB	R	TD/HS	1	2009	0	0	440	440
MICROBIOLOGICAL MONITOR FOR APP. IN SPACE VEHICLES	SSF	R	LEO SS OB	D	TD/HS	1	2000	440	440	0	0
MICROELECTRONICS DATA SYSTEM EXPERIMENT	SSF	R	LEO SS OB	S	TD/SE	39	2011	220	8580	220	8580
MICROELECTRONICS DATA SYSTEM EXPERIMENT	SSF	R	LEO SS OB	R	TD/SE	0	0	0	0	440	0
MICROELECTRONICS DATA SYSTEM EXPERIMENT	SSF	R	LEO SS OB	D	TD/SE	1	2011	440	440	0	0
Modular Combustion Facility	SSF	R	LEO SS OB	S	SA/MS	10	2003	880	8800	880	8800
Modular Combustion Facility	SSF	R	LEO SS OB	D	SA/MS	1	2002	1400	1400	0	0
Modular Containerless Processing Facility	SSF	R	LEO SS OB	S	SA/MS	12	2001	22	264	22	264
Modular Containerless Processing Facility	SSF	R	LEO SS OB	D	SA/MS	1	2000	1760	1760	0	0
MS F/O	SSF	U	LEO SS OB	D	TD/SO	2	2004	300	600	0	0
OPTICAL SPATIAL TRACKING OF DISTANT S/C (EXTERNAL)	SSF	R	LEO SS OB	R	TD/IS	1	2002	0	0	440	440
OPTICAL SPATIAL TRACKING OF DISTANT S/C (EXTERNAL)	SSF	R	LEO SS OB	D	TD/IS	1	2002	440	440	0	0
OPTICAL SPATIAL TRACKING OF DISTANT S/C (FF)	SSF	R	LEO SS OB	R	TD/IS	1	2002	0	0	66	66
OPTICAL SPATIAL TRACKING OF DISTANT S/C (FF)	SSF	R	LEO SS OB	D	TD/IS	1	2002	66	66	0	0
OPTICAL SPATIAL TRACKING OF DISTANT S/C (INTERNAL)	SSF	R	LEO SS OB	R	TD/IS	1	2002	0	0	44	44
OPTICAL SPATIAL TRACKING OF DISTANT S/C (INTERNAL)	SSF	R	LEO SS OB	D	TD/IS	1	2002	44	44	0	0

TABLE A.1.2.- MISSION MODEL PAYLOADS (CONTINUED)

Payload Name	HTS Mission Type	P/L Req	Destination	P/L Type	Dis/ Subdis	Total Flts	1st Yr of Flt	Delivery Mass /Flight	Delivery Mass Total	Retreival Mass /Flight	Retreival Mass Total
OPTICAL SPATIAL TRACKING OF DISTANT SPACECRAFT	SSF	R	LEO SS OB	S	TD/IS	1	2002	11	11	1	1
OUTREACH INTERNAL EXPERIMENT	SSF	R	LEO SS OB	R	TD/SO	1	1998	0	0	350	350
OUTREACH INTERNAL EXPERIMENT	SSF	R	LEO SS OB	D	TD/SO	1	1998	350	350	0	0
OUTREACH INTERNAL EXPERIMENT	SSF	R	LEO SS OB	R	TD/SO	1	2000	0	0	500	500
OUTREACH INTERNAL EXPERIMENT	SSF	R	LEO SS OB	D	TD/SO	1	1999	500	500	0	0
Pinhole/Occulter Facility	SSF	R	LEO SS OB	S	SA/SP	2	2007	463	926	0	0
Pinhole/Occulter Facility	SSF	R	LEO SS OB	D	SA/SP	1	2003	5940	5940	0	0
Plasma Interaction Monitoring System	SSF	R	LEO SS OB	D	SA/SP	4	1997	220	880	0	0
POLYMER MATRIX COMPOSITES	SSF	R	LEO SS OB	R	TD/SE	1	1998	0	0	44	44
POLYMER MATRIX COMPOSITES	SSF	R	LEO SS OB	D	TD/SE	1	1998	44	44	0	0
PRESSURIZED EXP I	SSF	R	LEO SS OB	S	TD/GTD	7	2004	150	1050	150	1050
PRESSURIZED EXP I	SSF	R	LEO SS OB	R	TD/GTD	1	2006	0	0	333	333
PRESSURIZED EXP I	SSF	R	LEO SS OB	D	TD/GTD	1	2004	333	333	0	0
PRESSURIZED EXP II	SSF	R	LEO SS OB	S	TD/GTD	14	2006	300	4200	300	4200
PRESSURIZED EXP II	SSF	R	LEO SS OB	R	TD/GTD	2	2008	0	0	666	1332
PRESSURIZED EXP II	SSF	R	LEO SS OB	D	TD/GTD	2	2006	666	1332	0	0
PRESSURIZED EXP III	SSF	R	LEO SS OB	R	TD/GTD	2	2009	0	0	999	1998
PRESSURIZED EXP III	SSF	R	LEO SS OB	D	TD/GTD	2	2007	999	1998	0	0
PRESSURIZED EXP III	SSF	R	LEO SS OB	S	TD/GTD	14	2007	450	6300	450	6300
PRESSURIZED EXP IV	SSF	R	LEO SS OB	R	TD/GTD	5	2011	0	0	1332	6660
PRESSURIZED EXP IV	SSF	R	LEO SS OB	D	TD/GTD	6	2009	1332	7992	0	0
PRESSURIZED EXP IV	SSF	R	LEO SS OB	S	TD/GTD	42	2009	600	25200	600	25200
PRESSURIZED EXP V	SSF	R	LEO SS OB	R	TD/GTD	4	2014	0	0	1665	6660
PRESSURIZED EXP V	SSF	R	LEO SS OB	D	TD/GTD	5	2012	1665	8325	0	0
PRESSURIZED EXP V	SSF	R	LEO SS OB	S	TD/GTD	31	2012	750	23250	750	23250
QUANTIZED VORTEX STRUCTURES IN SUPERFLUID HELIUM	SSF	R	LEO SS OB	S	TD/FM	1	2001	132	132	9	9
QUANTIZED VORTEX STRUCTURES IN SUPERFLUID HELIUM	SSF	R	LEO SS OB	R	TD/FM	1	2001	0	0	440	440
QUANTIZED VORTEX STRUCTURES IN SUPERFLUID HELIUM	SSF	R	LEO SS OB	D	TD/FM	1	2001	440	440	0	0
RISK-BASED FIRE SAFETY	SSF	R	LEO SS OB	R	TD/SO	1	2000	0	0	220	220
RISK-BASED FIRE SAFETY	SSF	R	LEO SS OB	D	TD/SO	1	2000	220	220	0	0
ROBOT FOR SCIENCE LABORATORIES	SSF	R	LEO SS OB	R	TD/AR	1	2009	0	0	275	275
ROBOT FOR SCIENCE LABORATORIES	SSF	R	LEO SS OB	S	TD/AR	39	2000	250	9750	14	546
ROBOT FOR SCIENCE LABORATORIES	SSF	R	LEO SS OB	D	TD/AR	1	1999	275	275	0	0
SATELLITE DOPPLER METEOROGICAL RADAR	SSF	R	LEO SS OB	D	TD/IS	1	1998	2200	2200	0	0
Small and Rapid Response Payloads	SSF	R	LEO SS OB	D	SA/GSA	17	1999	660	11220	660	11220
SOLAR ARRAY/ENERGY STORAGE TECHNOLOGY	SSF	R	LEO SS OB	S	TD/ETM	7	2004	136	952	9	63
SOLAR ARRAY/ENERGY STORAGE TECHNOLOGY	SSF	R	LEO SS OB	R	TD/ETM	1	2005	0	0	616	616
SOLAR ARRAY/ENERGY STORAGE TECHNOLOGY	SSF	R	LEO SS OB	D	TD/ETM	1	2003	616	616	0	0
Space Physiology Facility	SSF	R	LEO SS OB	S	SA/LS	56	1999	300	16800	0	0
Space Physiology Facility	SSF	R	LEO SS OB	D	SA/LS	1	1999	770	770	0	0
Space Station Attached Payloads	SSF	R	LEO SS OB	D	SA/A	9	2004	4200	37800	0	0
Space Station Backscatter Ultraviolet Spectrometer	SSF	R	LEO SS OB	D	SA/ES	13	1992	44	572	0	0
SPACE STATION ENVIRONMENTAL CHARACTERIZATION	SSF	R	LEO SS OB	S	TD/SE	8	2019	200	1600	13	104
SPACE STATION ENVIRONMENTAL CHARACTERIZATION	SSF	R	LEO SS OB	D	TD/SE	1	2018	56	56	0	0
Space Station Furnace Facility	SSF	R	LEO SS OB	S	SA/MS	13	2000	4620	60060	4620	60060
Space Station Furnace Facility	SSF	R	LEO SS OB	D	SA/MS	1	1999	5940	5940	0	0

TABLE A.1.2.– MISSION MODEL PAYLOADS (CONTINUED)

Payload Name	HTS Mission Type	P/L Req	Destination	P/L Type	Dis/ Subdis	Total Flts	1st Yr of Flt	Delivery Mass /Flight	Delivery Mass Total	Retreival Mass /Flight	Retreival Mass Total
Space Station Generic Attached Payload	SSF	R	LEO SS OB	D	SA/ES	10	2000	1200	12000	0	0
SPACE STATION RMS MANIPULATOR EXPERIMENT	SSF	R	LEO SS OB	R	TD/AR	1	1998	0	0	55	55
SPACE STATION RMS MANIPULATOR EXPERIMENT	SSF	R	LEO SS OB	D	TD/AR	1	1998	55	55	0	0
Space-Based Antenna Test Range	SSF	R	LEO SS OB	S	SA/C	13	2006	0	0	0	0
Space-Based Antenna Test Range	SSF	R	LEO SS OB	D	SA/C	1	2005	1768	1768	0	0
SPACECRAFT MATERIALS AND COATINGS	SSF	R	LEO SS OB	S	TD/SE	39	1998	257	10023	257	10023
SPACECRAFT MATERIALS AND COATINGS	SSF	R	LEO SS OB	R	TD/SE	1	2008	0	0	1000	1000
SPACECRAFT MATERIALS AND COATINGS	SSF	R	LEO SS OB	D	TD/SE	1	1998	1000	1000	0	0
SPACECRAFT STRAIN AND ACOUSTIC SENSORS	SSF	R	LEO SS OB	R	TD/STR	1	2011	0	0	33	33
SPACECRAFT STRAIN AND ACOUSTIC SENSORS	SSF	R	LEO SS OB	R	TD/STR	1	2011	0	0	55	55
SPACECRAFT STRAIN AND ACOUSTIC SENSORS (EXTERNAL)	SSF	R	LEO SS OB	D	TD/STR	1	2001	33	33	0	0
SPACECRAFT STRAIN AND ACOUSTIC SENSORS (INTERNAL)	SSF	R	LEO SS OB	D	TD/STR	1	2001	55	55	0	0
SPATIAL PERCEPTION AUDITORY REFERENCING	SSF	R	LEO SS OB	S	TD/HS	39	2008	200	7800	13	507
SPATIAL PERCEPTION AUDITORY REFERENCING	SSF	R	LEO SS OB	R	TD/HS	1	2018	0	0	220	220
SPATIAL PERCEPTION AUDITORY REFERENCING	SSF	R	LEO SS OB	D	TD/HS	1	2008	220	220	0	0
SS STRUCTURAL CHARACTERIZATION EXPERIMENT	SSF	R	LEO SS OB	S	TD/STR	39	1998	33	1287	0	0
SS STRUCTURAL CHARACTERIZATION EXPERIMENT 2	SSF	R	LEO SS OB	D	TD/STR	5	1997	53	265	0	0
SS STRUCTURAL CHARACTERIZATION EXPERIMENT 3	SSF	R	LEO SS OB	R	TD/STR	1	2008	0	0	53	53
SSF LOGISTICS - ADDED AFTER EMCC	SSF	R	LEO SS OB	S	FAC/SSI	19	2002	29748	565212	28856	548264
SSF LOGISTICS - ADDED AFTER EOC	SSF	R	LEO SS OB	S	FAC/SSI	17	2004	43855	745535	24934	423878
SSF LOGISTICS - ADDED AFTER LVC	SSF	R	LEO SS OB	S	FAC/SSI	14	2007	29748	416472	28856	403984
SSF LOGISTICS - POST PMC	SSF	R	LEO SS OB	S	FAC/SSI	22	2000	22068	485496	8990	197780
SSF LOGISTICS - POST PMC	SSF	R	LEO SS OB	S	FAC/SSI	22	2000	21787	479314	15944	350768
SSF LOGISTICS - POST PMC	SSF	R	LEO SS OB	S	FAC/SSI	4	2000	13527	54108	13121	52484
SSF LOGISTICS - POST PMC	SSF	R	LEO SS OB	S	FAC/SSI	33	2000	29748	981684	28856	952248
SSF MB-01	SSF	R	LEO SS OB	S	FAC/SSI	1	1995	37300	37300	0	0
SSF MB-02	SSF	R	LEO SS OB	S	FAC/SSI	1	1995	33800	33800	0	0
SSF MB-03	SSF	R	LEO SS OB	S	FAC/SSI	1	1996	35800	35800	0	0
SSF MB-04	SSF	R	LEO SS OB	S	FAC/SSI	1	1996	35800	35800	0	0
SSF MB-05	SSF	R	LEO SS OB	S	FAC/SSI	1	1996	35300	35300	0	0
SSF MB-06	SSF	R	LEO SS OB	S	FAC/SSI	1	1996	36800	36800	0	0
SSF MB-07	SSF	R	LEO SS OB	S	FAC/SSI	1	1997	35300	35300	0	0
SSF MB-08	SSF	R	LEO SS OB	S	FAC/SSI	1	1997	32300	32300	0	0
SSF MB-09	SSF	R	LEO SS OB	S	FAC/SSI	1	1997	30800	30800	0	0
SSF MB-10	SSF	R	LEO SS OB	S	FAC/SSI	1	1997	36300	36300	0	0
SSF MB-11	SSF	R	LEO SS OB	S	FAC/SSI	1	1998	24300	24300	0	0
SSF MB-12	SSF	R	LEO SS OB	S	FAC/SSI	1	1998	45300	45300	0	0
SSF MB-13	SSF	R	LEO SS OB	S	FAC/SSI	1	1998	45300	45300	0	0
SSF MB-14	SSF	R	LEO SS OB	S	FAC/SSI	1	1998	31300	31300	0	0
SSF MB-15	SSF	R	LEO SS OB	S	FAC/SSI	1	1999	35300	35300	0	0
SSF MB-16	SSF	R	LEO SS OB	S	FAC/SSI	1	1999	42800	42800	0	0
SSF MB-17	SSF	R	LEO SS OB	S	FAC/SSI	1	1999	25300	25300	0	0
SSF MB-18	SSF	R	LEO SS OB	S	FAC/SSI	1	2000	28500	28500	0	0
SSF MB-19	SSF	R	LEO SS OB	S	FAC/SSI	1	2000	70000	70000	0	0
SSF MB-20	SSF	R	LEO SS OB	S	FAC/SSI	1	2001	39200	39200	0	0
SSF MB-21	SSF	R	LEO SS OB	S	FAC/SSI	1	2001	33100	33100	0	0

TABLE A.1.2.– MISSION MODEL PAYLOADS (CONTINUED)

Payload Name	HTS Mission Type	P/L Req	Destination	P/L Type	Dis/ Subdis	Total Flts	1st Yr of Flt	Delivery Mass /Flight	Delivery Mass Total	Retreival Mass /Flight	Retreival Mass Total
SSF MB-22	SSF	R	LEO SS OB	S	FAC/SSI	1	2002	26000	26000	0	0
SSF MB-23	SSF	R	LEO SS OB	S	FAC/SSI	1	2002	11000	11000	0	0
SSF MB-24	SSF	R	LEO SS OB	S	FAC/SSI	1	2003	69500	69500	0	0
SSF MB-25	SSF	R	LEO SS OB	S	FAC/SSI	1	2003	26300	26300	0	0
SSF MB-26	SSF	R	LEO SS OB	S	FAC/SSI	1	2004	9100	9100	0	0
SSF MB-27	SSF	R	LEO SS OB	S	FAC/SSI	1	2004	23800	23800	0	0
SSF MB-28	SSF	R	LEO SS OB	S	FAC/SSI	1	2005	26000	26000	0	0
SSF MB-29	SSF	R	LEO SS OB	S	FAC/SSI	1	2005	10700	10700	0	0
SSF MB-30	SSF	R	LEO SS OB	S	FAC/SSI	1	2006	75000	75000	0	0
SSF MB-31	SSF	R	LEO SS OB	S	FAC/SSI	1	2006	10000	10000	0	0
SSF MB-32	SSF	R	LEO SS OB	S	FAC/SSI	1	2007	56000	56000	0	0
SSF UF-01 (LOGISTICS)	SSF	R	LEO SS OB	S	FAC/SSI	1	1997	14361	14361	10095	10095
SSF UF-02 (LOGISTICS)	SSF	R	LEO SS OB	S	FAC/SSI	1	1997	9365	9365	9084	9084
SSF UF-03 (LOGISTICS)	SSF	R	LEO SS OB	S	FAC/SSI	1	1997	9365	9365	9084	9084
SSF UF-04 (LOGISTICS)	SSF	R	LEO SS OB	S	FAC/SSI	1	1998	16200	16200	9894	9894
SSF UF-05 (LOGISTICS)	SSF	R	LEO SS OB	S	FAC/SSI	1	1998	19037	19037	13276	13276
SSF UF-06 (LOGISTICS)	SSF	R	LEO SS OB	S	FAC/SSI	1	1998	19037	19037	13276	13276
SSF UF-07 (LOGISTICS)	SSF	R	LEO SS OB	S	FAC/SSI	1	1999	21125	21125	14671	14671
SSF UF-08 (LOGISTICS)	SSF	R	LEO SS OB	S	FAC/SSI	1	1999	21125	21125	14671	14671
Stratospheric Aerosol and Gas Experiment	SSF	R	LEO SS OB	D	SA/ES	1	2000	132	132	0	0
SURGERY TECHNOLOGY DEVELOPMENT	SSF	R	LEO SS OB	R	TD/HS	1	2001	0	0	220	220
SURGERY TECHNOLOGY DEVELOPMENT	SSF	R	LEO SS OB	D	TD/HS	1	2001	220	220	0	0
THERMAL INTERFACE TECHNOLOGY	SSF	R	LEO SS OB	R	TD/SO	1	2001	0	0	1760	1760
THERMAL INTERFACE TECHNOLOGY	SSF	R	LEO SS OB	D	TD/SO	3	2000	1760	5280	0	0
THERMAL SHAPE CONTROL	SSF	R	LEO SS OB	R	TD/STR	1	2005	0	0	220	220
THERMAL SHAPE CONTROL	SSF	R	LEO SS OB	D	TD/STR	1	2005	220	220	0	0
TRANSIENT UPSET PHENOMENA IN VLSI DEVICES	SSF	R	LEO SS OB	R	TD/IS	1	2004	0	0	220	220
TRANSIENT UPSET PHENOMENA IN VSLI DEVICES	SSF	R	LEO SS OB	S	TD/IS	15	2000	22	330	22	330
TRANSIENT UPSET PHENOMENA IN VSLI DEVICES	SSF	R	LEO SS OB	D	TD/IS	1	2000	220	220	0	0

TABLE A.1.2.– MISSION MODEL PAYLOADS (CONCLUDED)

Payload Name	HTS Mission Type	P/L Req	Destination	P/L Type	Dis/ Subdis	Total Flts	1st Yr of Flt	Delivery Mass /Flight	Delivery Mass Total	Retreival Mass /Flight	Retreival Mass Total
Tropical Rainfall Mapping Mission - SS	SSF	R	LEO SS OB	D	SA/ES	0	0	1100	0	0	0
Tropical Regions Imaging Spectrometer	SSF	R	LEO SS OB	D	SA/ES	0	0	0	0	0	0
TWO-PHASE FLUID BEHAVIOR AND MANAGEMENT	SSF	R	LEO SS OB	S	TD/FM	2	1998	13	26	1	2
TWO-PHASED FLUID BEHAVIOR AND MANAGEMENT	SSF	R	LEO SS OB	R	TD/FM	1	1998	0	0	440	440
TWO-PHASED FLUID BEHAVIOR AND MANAGEMENT	SSF	R	LEO SS OB	D	TD/FM	1	1998	440	440	0	0
Ultra High Resolution Extreme UV Spectroheliograph	SSF	R	LEO SS OB	D	SA/SP	1	1999	594	594	0	0
Variable Gravity Large Centrifuge Facility	SSF	R	LEO SS OB	D	SA/LS	1	2007	20000	20000	0	0
VHSIC FAULT TOLERANT PROCESSOR	SSF	R	LEO SS OB	R	TD/IS	1	1999	0	0	55	55
VHSIC FAULT TOLERANT PROCESSOR	SSF	R	LEO SS OB	S	TD/IS	2	1998	22	44	22	44
VHSIC FAULT TOLERANT PROCESSOR	SSF	R	LEO SS OB	D	TD/IS	1	1998	55	55	0	0
X-Ray Background Survey Spectrometer	SSF	R	LEO SS OB	D	SA/A	2	1998	3900	7800	3900	7800
GEOSTAR	Support Assets	R	GEO	D	SA/ES	3	1992	0	0	0	0
Geosync Operational Environmental Satellite	Support Assets	U	GEO	D	SA/ES	4	1991	2646	10584	0	0
INTERNATIONAL MARITIME SATELLITE	Support Assets	U	GEO	D	SA/C	2	1992	10141	20282	0	0
Laser Geodynamic Satellite - II	Support Assets	U	EAR OTH	D	SA/ES	1	1991	1980	1980	0	0
Mobile Satellite	Support Assets	U	GEO	D	SA/C	1	1993	2000	2000	0	0
NOAA Series	Support Assets	U	LEO SYN	D	SA/ES	6	1990	4800	28800	0	0
Radarsat	Support Assets	U	LEO SYN	D	SA/ES	1	1994	11000	11000	0	0
SATCOM	Support Assets	R	GEO	D	SA/C	1	1993	0	0	0	0
TRACKING AND DATA RELAY SATELLITE SYSTEM	Support Assets	U	GEO	D	FAC/C	11	1991	4905	53955	0	0

APPENDIX B

ELEMENT/SYSTEM/ARCHITECTURE DATA

The following section contains data relating to the various elements, systems, and architectures in the study. In most cases, this data is considered either input data (data produced by or for the study that is required for the various study analysis processes and models) or intermediate data (data that is produced by the various study processes or models to be used by other study processes or models). The architecture level data that is produced as the final step of the analysis process is summarized in Appendix C.

Section B.1.1 shows the architecture descriptions and definitions. Section B.1.2 shows the results of the manifesting process for determining architecture flight rates based on the mission model. Secion B.1.3 summarizes the results of the ground operations process. Sections B.1.4-B.1.9 summarize the attribute-related data. Section B.1.10 summarizes data for an additional operations related attribute developed during the study.

B.1.1 ARCHITECTURE DEFINITIONS

The following tables show the systems used to populate each of the original 18 architectures in the study by year and by function. Systems are shown in 5-year blocks starting in the year 2000. A 5-year phase-out or phase-in time is assumed. Architectures must meet four basic functions: personnel up, personnel down, cargo up, and cargo down. Systems are added to each function over the study time-frame according to the architecture intent. In many cases, a system fulfills multiple functions.

Also included for each architecture are notes concerning the ground rules and philosophies regarding manifesting for each architecture.

Note that evaluation of Architecture 15 was deferred due to lack of data concerning foreign systems. Although some analysis was done on Architecture 9, cost data was not available. Architecture 10 was not evaluated until late in the study extension period. Another architecture based on an air launched concept, Architecture 19, was added, but is not included here since it came late in the study extension.

TABLE B.1.1-1.– ARCHITECTURE 1: HTS REFERENCE OPTION
Current Systems over entire study time-frame

Function	2000	2005	2010	2015
People Up	• Shuttle	• Shuttle	• Shuttle	• Shuttle
People Down	• Shuttle • ACRV	• Shuttle • ACRV	• Shuttle • ACRV	• Shuttle • ACRV
Cargo Up	• Shuttle • Delta, Atlas, Titan	• Shuttle • Delta, Atlas, Titan	• Shuttle • Delta, Atlas, Titan	• Shuttle • Delta, Atlas, Titan
Cargo Down	• Shuttle	• Shuttle	• Shuttle	• Shuttle

Rev. 9 2-19-92

- This architecture represents the transportation systems currently meeting the agency's needs.
- Shuttle meets all manned transportation needs.
- Shuttle meets all cargo return needs.
- The ACRV is a simple rescue vehicle for personnel transport down from the SSF.
- The Shuttle transports the ACRV to and from SSF.
- A base level of preplanned product improvement as defined by the NIT included in base Shuttle costs.

Manifesting Philosophy

- All SSF goes via Shuttle
- Manifesting priority of unmanned payloads on unmanned launch vehicles is preferred.

TABLE B.1.1-2.– ARCHITECTURE 2: SHUTTLE EVOLUTION OPTION
Evolution of Current Systems

Function	2000	2005	2010	2015
People Up	• Shuttle Evolution	• Shuttle Evolution	• Shuttle Evolution	• Shuttle Evolution
People Down	• Shuttle Evolution • ACRV	• Shuttle Evolution • ACRV	• Shuttle Evolution • ACRV	• Shuttle Evolution • ACRV
Cargo Up	• Shuttle Evolution • RCV • Delta, Atlas, Titan Evolution	• Shuttle Evolution • RCV • Delta, Atlas, Titan Evolution	• Shuttle Evolution • RCV • Delta, Atlas, Titan Evolution	• Shuttle Evolution • RCV • Delta, Atlas, Titan Evolution
Cargo Down	• Shuttle Evolution • RCV	• Shuttle Evolution • RCV	• Shuttle Evolution • RCV	• Shuttle Evolution • RCV

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- This architecture represents the evolution of transportation systems currently meeting the agency's needs.
- Shuttle Evolution meets all manned transportation needs.
- Shuttle Evolution meets all cargo return needs.
- The ACRV is a simple rescue vehicle for personnel transport down from the SSF.
- The Reusable Cargo Vehicle (RCV) is an unmanned, modified orbiter for carrying and deploying payloads into space.
- The Shuttle transports the ACRV to and from SSF.
- The NIT defined the level of Shuttle evolution consistent with the philosophy of making significant improvements in the attribute values. This list includes 90-day orbiter, LRBs, modified ET, advanced TPS, EMAs, Light Weight Orbiter (new vehicles only), Single I-Load, SSME Limit at 100%, and Ejection Seats.
- DAT evolution does not include Cargo Transfer Function.

Manifesting Philosophy

- All SSF goes via Shuttle
- Manifesting priority of unmanned payloads on unmanned launch vehicles is preferred.

TABLE B.1.1-3.– ARCHITECTURE 3: ALTERNATE ACCESS OPTION
NLS, without Alternate Access, with ACRV

Function	2000	2005	2010	2015
People Up	• Shuttle	• Shuttle	• Shuttle	• Shuttle
People Down	• Shuttle • ACRV	• Shuttle • ACRV	• Shuttle • ACRV	• Shuttle • ACRV
Cargo Up	• Shuttle • NLS-1, -2, CTV • Delta, Atlas, Titan	• Shuttle • NLS-1, -2, -3, CTV • Delta, Atlas	• Shuttle • NLS-1, -2, -3, CTV • Delta	• Shuttle • NLS-1, -2, -3, CTV • Delta
Cargo Down	• Shuttle	• Shuttle	• Shuttle	• Shuttle

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- This architecture represents the cargo-driven departure from architecture #1. This is compared with #4 to determine the benefit of the alternate access consideration.
- This architecture initiates development of an NLS booster family to provide the cargo up function prior to assessment of that booster's desirability to fulfill the manned boost function in the future.
- Shuttle meets all manned transportation needs.
- Shuttle meets only those cargo up needs that cannot be satisfied by the NLS and DAT families.
- Shuttle meets all cargo return needs.
- The ACRV is a simple rescue vehicle for personnel transport down from the SSF.
- The Shuttle transports the ACRV to and from SSF.
- Titan is phased out one period after the NLS-2 becomes operational.
- Atlas is phased out one period after the NLS-3 becomes operational.
- A cargo transfer vehicle is required beginning in 2000 for any cargo transported to a specific location via an NLS element.

Manifesting Philosophy

- For cargo up, payloads are off-loaded from Shuttle to NLS where possible.

TABLE B.1.1-4.– ARCHITECTURE 4: ALTERNATE ACCESS
Reusable PC, with Alternate Access, with ACRV

Function	2000	2005	2010	2015
People Up	• Shuttle • RPC to SSF • NLS-2	• Shuttle • RPC to SSF • NLS-2	• Shuttle • RPC to SSF • NLS-2	• Shuttle • RPC to SSF • NLS-2
People Down	• Shuttle • RPC from SSF • ACRV	• Shuttle • RPC from SSF • ACRV	• Shuttle • RPC from SSF • ACRV	• Shuttle • RPC from SSF • ACRV
Cargo Up	• Shuttle • NLS-1, -2, CTV • Delta, Atlas, Titan • CRV	• Shuttle • NLS-1, -2, -3, CTV • Delta, Atlas • CRV	• Shuttle • NLS-1, -2, -3, CTV • Delta • CRV	• Shuttle • NLS-1, -2, -3, CTV • Delta • CRV
Cargo Down	• Shuttle • CRV	• Shuttle • CRV	• Shuttle • CRV	• Shuttle • CRV

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- This architecture represents the incremental addition of a second personnel system over architecture #3, providing alternate access.
- This architecture introduces an reusable PC with minimum cargo only for those missions to and from SSF or in other LEO missions where personnel are required. The representative concept for the RPC is the Boeing biconic PLS.
- This architecture initiates development of an NLS booster family to provide the cargo up function in conjunction with providing the manned boost function.
- The RPC uses the NLS-2 as its launch vehicle.
- Shuttle meets all manned transportation needs not met by the RPC and serves as the Alternate Access back-up for the RPC.
- Shuttle meets only those cargo up needs that cannot be satisfied by the NLS and DAT families.
- Cargo return needs are met by the Shuttle or the CRV.
- The SSF emergency crew return function is handled by the ACRV.
- Titan is phased out one period after the NLS-2 becomes operational.
- Atlas is phased out one period after the NLS-3 becomes operational.
- A cargo transfer vehicle is required beginning in 2000 for any cargo transported to a specific location via an NLS element.

Manifesting Philosophy

- The only use for Shuttle is non-SSF, man-at-receipt payloads.

TABLE B.1.1-5.– ARCHITECTURE 5: SEPARATION OF PEOPLE AND CARGO/ WHICH MANNED BOOSTER? OPTION
People and Cargo Together (Reusable PC with Integral Cargo), without ACRV, MLS-HL Booster

Function	2000	2005	2010	2015
People Up	• Shuttle • CLV • MLS-HL	• CLV • MLS-HL	• CLV • MLS-HL	• CLV • MLS-HL
People Down	• Shuttle • CLV	• CLV	• CLV	• CLV
Cargo Up	• Shuttle • CLV • MLS-HL, -X • Delta, Atlas, Titan • CRV	• CLV • MLS-HL, -X • Delta, Atlas • CRV	• CLV • MLS-HL, -X • Delta, Atlas • CRV	• CLV • MLS-HL, -X • Delta, Atlas • CRV
Cargo Down	• Shuttle • CLV • CRV	• CLV • CRV	• CLV • CRV	• CLV • CRV

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- This architecture introduces a reusable PC with integral cargo only for those missions to and from SSF or in other LEO missions where personnel and cargo are required together. This architecture, along with #6 and #7, addresses the desirability of separating people and cargo.
- The architecture addresses launch of manned vehicles by developing a new system, the Manned Launch System (MLS), specifically designed (and sized) for manned applications.
- The representative concept is the JSC Crew and Logistics Vehicle (CLV) with 15,000 lb up/down cargo capability.
- The CLV provides people up/down (primarily to SSF) as well as cargo up/down.
- The CLV uses the MLS-HL as its launch vehicle.
- Shuttle is phased out by 2005.
- The SSF emergency crew return function is handled by the CLV.

Manifesting Philosophy

- Limit CLV to SSF crew rotation events or other missions where man is required for sortie missions.
- Cargo delivery to SSF can be carried on CLV or CRV.

TABLE B.1.1-6.– ARCHITECTURE 6: SEPARATION OF PEOPLE AND CARGO/ WHICH MANNED BOOSTER? OPTION

Separate Launch of People and Cargo (Reusable PC and Reusable Cargo Return Vehicles)

Function	2000	2005	2010	2015
People Up	• Shuttle • RPC • MLS-X	• RPC • MLS-X	• RPC • MLS-X	• RPC • MLS-X
People Down	• Shuttle • RPC	• RPC	• RPC	• RPC
Cargo Up	• Shuttle • MLS-X, -HL • CRV • Delta, Atlas, Titan	• MLS-X, -HL • CRV • Delta, Atlas	• MLS-X, -HL • CRV • Delta, Atlas	• MLS-X, -HL • CRV • Delta, Atlas
Cargo Down	• Shuttle • CRV	• CRV	• CRV	• CRV

Rev. 9 2-19-92

- This architecture introduces a reusable PC only for those missions to and from SSF or in other LEO missions where personnel and cargo are required together. This architecture, along with #5 and #7, addresses the desirability of separating people and cargo. This architecture also determines how well the MLS meets people up/down requirements for new boosters.
- The architecture addresses launch of manned vehicles by developing a new system, the Manned Launch System (MLS), specifically designed (and sized) for manned applications.
- People up and cargo up are launched on separate MLS launch vehicles.
- The SSF emergency crew return function is handled by the RPC.
- After Shuttle phase-out, cargo and SSF logistics return is handled by the CRV.

Manifesting Philosophy

- Limit RPC to SSF crew rotation events or other missions where man is required for sortie missions.
- Cargo delivery to SSF is carried on CRV.

TABLE B.1.1-7.– ARCHITECTURE 7: SEPARATION OF PEOPLE AND CARGO OPTION
PC and Cargo on Same Launch Vehicle (Reusable PC with Non-Integral Cargo), without ACRV, MLS-HL Booster

Function	2000	2005	2010	2015
People Up	• Shuttle • RPC • MLS-HL	• RPC • MLS-HL	• RPC • MLS-HL	• RPC • MLS-HL
People Down	• Shuttle • RPC	• RPC	• RPC	• RPC
Cargo Up	• Shuttle • RPC w/LRV • CRV • MLS-HL, -X • Delta, Atlas, Titan	• RPC w/LRV • CRV • MLS-HL, -X • Delta, Atlas	• RPC w/LRV • CRV • MLS-HL, -X • Delta, Atlas	• RPC w/LRV • CRV • MLS-HL, -X • Delta, Atlas
Cargo Down	• Shuttle • CRV • LRV	• CRV • LRV	• CRV • LRV	• CRV • LRV

Rev. 9 2-19-92

- This architecture introduces a reusable PC with cargo (non-integral) in a separate module only for those missions to and from SSF or in other LEO missions where personnel and cargo are required together at the destination. This architecture, along with #5 and #6, addresses the desirability of separating people and cargo.
- The RPC w/cargo provides people up/down as well as cargo up.
- A Logistics Return Vehicle (LRV) or a Cargo Return Vehicle (CRV) is required to meet the return cargo requirements.
- The RPC uses the MLS-HL as its launch vehicle.
- Shuttle is phased out by 2005.
- The SSF emergency crew return function is handled by the RPC.

Manifesting Philosophy

- Limit RPC to SSF crew rotation events or other missions where man is required for sortie missions.
- Cargo delivery to SSF can be carried on RPC/LRV or CRV.

TABLE B.1.1-8.– ARCHITECTURE 8: ADVANCED TECHNOLOGY PHASING (SSTO)

Function	2000	2005	2010	2015
People Up	• Shuttle • SSTO	• SSTO	• SSTO	• SSTO
People Down	• Shuttle • ACRV • SSTO	• ACRV • SSTO	• ACRV • SSTO	• ACRV • SSTO
Cargo Up	• Shuttle • SSTO • Delta, Atlas, Titan/CTF	• SSTO • Delta, Atlas, Titan/CTF	• SSTO • Delta, Atlas, Titan/CTF	• SSTO • Delta, Atlas, Titan/CTF
Cargo Down	• Shuttle • SSTO	• SSTO	• SSTO	• SSTO

Rev. 9 2-19-92

- The architecture uses a near-term single stage to orbit (SSTO) concept with a cargo capability to address vehicle technology and phasing issues.
- The SSTO provides people up/down as well as cargo up/down.
- The SSTO has an unmanned cargo up/down capability.
- SSF emergency crew return is accomplished by the ACRV starting at PMC.
- A cargo transfer function of some kind is required beginning in 2000 for any cargo transported to a specific location via a DAT element.
- SSTO (near-term technology) concept defined by the NIT.

TABLE B.1.1-9.– ARCHITECTURE 9: ADVANCED TECHNOLOGY PHASING OPTION TSTO (DEFERRED)

Function	2000	2005	2010	2015
People Up	• Shuttle	• Shuttle • TSTO	• TSTO	• TSTO
People Down	• Shuttle • ACRV	• Shuttle • TSTO • ACRV	• TSTO • ACRV	• TSTO • ACRV
Cargo Up	• Shuttle • Delta, Atlas, Titan/CTF	• Shuttle • TSTO • Delta, Atlas, Titan/CTF	• TSTO • Delta, Atlas, Titan/CTF	• TSTO • Delta, Atlas, Titan/CTF
Cargo Down	• Shuttle	• Shuttle • TSTO	• TSTO	• TSTO

Rev. 9 2-19-92

- The architecture uses a two stage to orbit (TSTO) concept with a cargo capability to address vehicle technology and phasing issues.
- The TSTO provides people up/down as well as cargo up/down.
- SSF emergency crew return is accomplished by the ACRV starting at PMC.
- A cargo transfer function of some kind is required beginning in 2000 for any cargo transported to a specific location via a DAT element.
- TSTO concept to be defined by LaRC (near-term technology).

TABLE B.1.1-10.– ARCHITECTURE 10: ADVANCED TECHNOLOGY PHASING OPTION (SSTO)

Function	2000	2005	2010	2015
People Up	• Shuttle	• Shuttle	• Shuttle • SSTO	• SSTO
People Down	• Shuttle • ACRV	• Shuttle • ACRV	• Shuttle • ACRV • SSTO	• ACRV • SSTO
Cargo Up	• Shuttle • Delta, Atlas, Titan/CTF	• Shuttle • Delta, Atlas, Titan/CTF	• Shuttle • SSTO • Delta, Atlas, Titan/CTF	• SSTO • Delta, Atlas, Titan/CTF
Cargo Down	• Shuttle	• Shuttle	• Shuttle • SSTO	• SSTO

Rev. 9 2-19-92

- The architecture uses an advanced single stage to orbit (SSTO) concept with a cargo capability to address vehicle technology and phasing issues.
- The SSTO provides people up/down as well as cargo up/down.
- Shuttle is phased out before 2015.
- SSF emergency crew return is accomplished by the ACRV starting at PMC.
- A cargo transfer function of some kind is required beginning in 2000 for any cargo transported to a specific location via a DAT element.
- SSTO (advanced technology) concept to be defined by NASP/JPO.

TABLE B.1.1-11.– ARCHITECTURE 11: ACRV COMMONALITY
Reusable PC, with Alternate Access, without ACRV

Function	2000	2005	2010	2015
People Up	• Shuttle • RPC to SSF • NLS-2	• Shuttle • RPC to SSF • NLS-2	• Shuttle • RPC to SSF • NLS-2	• Shuttle • RPC to SSF • NLS-2
People Down	• Shuttle • RPC from SSF	• Shuttle • RPC from SSF	• Shuttle • RPC from SSF	• Shuttle • RPC from SSF
Cargo Up	• Shuttle • NLS-1, -2, CTV • Delta, Atlas, Titan	• Shuttle • NLS-1, -2, CTV • Delta, Atlas	• Shuttle • NLS-1, -2, CTV • Delta, Atlas	• Shuttle • NLS-1, -2, CTV • Delta, Atlas
Cargo Down	• Shuttle	• Shuttle	• Shuttle	• Shuttle

Rev. 9 2-19-92

- This architecture reflects the use of the RPC for the SSF emergency crew return function, rather than ACRV.
- The RPC is used only for those missions to and from SSF or in other LEO missions where personnel are required.
- The RPC uses the NLS-2 as its launch vehicle.
- This architecture initiates development of an NLS booster family to provide the cargo up function in conjunction with providing the manned boost function.
- Shuttle meets all manned transportation needs not met by the RPC.
- Shuttle meets only those cargo up needs that cannot be satisfied by the NLS and DAT families.
- Shuttle meets all cargo return needs.
- Titan is phased out one period after the NLS-2 becomes operational.
- A cargo transfer vehicle is required beginning in 2000 for any cargo transported to a specific location via an NLS element.
- There are always to be 2 RPCs at SSF (EMCC) for emergency return. This implies 180 day quiescent stay time.

Manifesting Philosophy

- An RPC remains docked to SSF. The crew goes up on a fresh RPC and the return crew returns on the old RPC.
- Same as 12 & 13.

TABLE B.1.1-12.– ARCHITECTURE 12: ACRV COMMONALITY OPTION
Reusable PC, with Alternate Access, with ACRV
NLS Booster

Function	2000	2005	2010	2015
People Up	• Shuttle	• Shuttle • RPC to SSF • NLS-2	• Shuttle • RPC to SSF • NLS-2	• Shuttle • RPC to SSF • NLS-2
People Down	• Shuttle • ACRV	• Shuttle • RPC from SSF • ACRV	• Shuttle • RPC from SSF	• Shuttle • RPC from SSF
Cargo Up	• Shuttle • NLS-1, -2, CTV • Delta, Atlas, Titan	• Shuttle • NLS-1, -2, CTV • Delta, Atlas	• Shuttle • NLS-1, -2, CTV • Delta, Atlas	• Shuttle • NLS-1, -2, CTV • Delta, Atlas
Cargo Down	• Shuttle	• Shuttle	• Shuttle	• Shuttle

Rev. 9 2-19-92

- This architecture introduces an reusable PC with minimum cargo only for those missions to and from SSF or in other LEO missions where personnel are required. The RPC is introduced later in time and an ACRV is required at SSF PMC. This ACRV is phased out after the RPC IOC.
- The RPC uses the NLS-2 as its launch vehicle.
- This architecture initiates development of an NLS booster family to provide the cargo up function prior to assessment of that booster's desirability to fulfill the manned boost function in the future.
- Shuttle meets all manned transportation needs not met by the RPC.
- Shuttle meets only those cargo up needs that cannot be satisfied by the NLS and DAT families.
- Shuttle meets all cargo return needs.
- The ACRV is a simple rescue vehicle for personnel transport down from the SSF. It is phased out after the RPC comes on-line. The RPC may be derived from the ACRV.
- Titan is phased out one period after the NLS-2 becomes operational.
- A cargo transfer vehicle is required beginning in 2000 for any cargo transported to a specific location via an NLS element.
- There is either a dedicated ACRV or an RPC always at SSF for emergency return. This implies 180 day quiescent stay time for the RPC at EMCC.

Manifesting Philosophy

- An RPC remains docked to SSF. The crew goes up and returns on the same RPC.
- Same as 11 & 13.

TABLE B.1.1-13.– ARCHITECTURE 13: COMMONALITY/WHICH MANNED BOOSTER? OPTION

Reusable PC, with Alternate Access, with ACRV

NLS Booster

Function	2000	2005	2010	2015
People Up	• Shuttle • RPC to SSF • NLS-2	• Shuttle • RPC to SSF • NLS-2	• Shuttle • RPC to SSF • NLS-2	• Shuttle • RPC to SSF • NLS-2
People Down	• Shuttle • RPC from SSF • ACRV	• Shuttle • RPC from SSF • ACRV	• Shuttle • RPC from SSF • ACRV	• Shuttle • RPC from SSF • ACRV
Cargo Up	• Shuttle • NLS-1, -2, CTV • Delta, Atlas, Titan	• Shuttle • NLS-1, -2, CTV • Delta, Atlas	• Shuttle • NLS-1, -2, CTV • Delta, Atlas	• Shuttle • NLS-1, -2, CTV • Delta, Atlas
Cargo Down	• Shuttle	• Shuttle	• Shuttle	• Shuttle

Rev. 9 2 19 92

- This architecture introduces a reusable PC with minimum cargo only for those missions to and from SSF or in other LEO missions where personnel are required. This architecture shows the cost of developing two systems to provide the people down (emergency crew return) function. This architecture also determines how well the NLS meets people up/down requirements for new boosters.
- The RPC uses the NLS-2 as its launch vehicle.
- This architecture initiates development of an NLS booster family to provide the cargo up function in conjunction with providing the manned boost function.
- Shuttle meets all manned transportation needs not met by the RPC.
- Shuttle meets only those cargo up needs that cannot be satisfied by the NLS and DAT families.
- Shuttle meets all cargo return needs.
- The ACRV is a simple rescue vehicle for personnel transport down from the SSF.
- The Shuttle transports the ACRV to and from SSF.
- Titan is phased out one period after the NLS-2 becomes operational.
- A cargo transfer vehicle is required beginning in 2000 for any cargo transported to a specific location via an NLS element.

TABLE B.1.1-14.– ARCHITECTURE 14: WHICH MANNED BOOSTER? OPTION
Reusable PC, with Alternate Access, with ACRV
Titan Derivative

Function	2000	2005	2010	2015
People Up	• Shuttle • RPC to SSF • MR Titan IV+	• Shuttle • RPC to SSF • MR Titan IV+	• Shuttle • RPC to SSF • MR Titan IV+	• Shuttle • RPC to SSF • MR Titan IV+
People Down	• Shuttle • RPC from SSF • ACRV	• Shuttle • RPC from SSF • ACRV	• Shuttle • RPC from SSF • ACRV	• Shuttle • RPC from SSF • ACRV
Cargo Up	• Shuttle • Delta, Atlas, Titan/CTF	• Shuttle • Delta, Atlas, Titan/CTF	• Shuttle • Delta, Atlas, Titan/CTF	• Shuttle • Delta, Atlas, Titan/CTF
Cargo Down	• Shuttle	• Shuttle	• Shuttle	• Shuttle

Rev. 9 2-19-92

- The architecture addresses whether the right booster for manned vehicles is to evolve current systems rather than to develop a new system. This architecture determines how well the Titan meets people up/down requirements for new boosters.
- This architecture uses a reusable PC with minimum cargo only for those missions to and from SSF or in other LEO missions where personnel are required.
- The RPC uses a derived, man-rated Titan as its launch vehicle.
- Shuttle meets only those cargo up needs that cannot be satisfied by the DAT family.
- Shuttle meets all cargo return needs.
- The ACRV is a simple rescue vehicle for personnel transport down from the SSF.
- The Shuttle transports the ACRV to and from SSF.
- A cargo transfer function of some kind is required beginning in 2000 for any cargo transported to a specific location via the DAT elements.

TABLE B.1.1-15.– ARCHITECTURE 15: ALTERNATE ACCESS OPTION
Use of Foreign Systems, Europe (Deferred)

Function	2000	2005	2010	2015
People Up	• Shuttle	• Shuttle • Hermes • Ariane V	• Shuttle • Hermes • Ariane V	• Shuttle • Hermes • Ariane V
People Down	• Shuttle • ACRV	• Shuttle • Hermes • ACRV	• Shuttle • Hermes • ACRV	• Shuttle • Hermes • ACRV
Cargo Up	• Shuttle • Delta, Atlas, Titan • Ariane V	• Shuttle • Hermes • Delta, Atlas, Titan • Ariane V, CTV • LRV	• Shuttle • Hermes • Delta, Atlas, Titan • Ariane V, CTV • LRV	• Shuttle • Hermes • Delta, Atlas, Titan • Ariane V, CTV • LRV
Cargo Down	• Shuttle	• Shuttle • Hermes • LRV	• Shuttle • Hermes • LRV	• Shuttle • Hermes • LRV

Rev. 9 2-19-92

- This architecture represents an alternative approach to Alternate Access where foreign systems would only be used in the event of a stand-down of domestic systems. There would be a cost (with respect to all attributes) associated with having those systems available for U.S. use and able to be used to carry payloads (including crew) to a specific destination.

TABLE B.1.1-16.– ARCHITECTURE 16: NEW CONCEPT OPTION
Air-Launched PC

Function	2000	2005	2010	2015
People Up	• Shuttle	• Shuttle • ALPC	• ALPC	• ALPC
People Down	• Shuttle • ACRV	• Shuttle • ALPC • ACRV	• ALPC • ACRV	• ALPC • ACRV
Cargo Up	• Shuttle • AL Booster • Delta, Atlas, Titan	• Shuttle • AL Booster w/CTF • Delta, Atlas, Titan/CTF • LRV	• AL Booster w/CTF • Delta, Atlas, Titan/CTF • LRV	• AL Booster w/CTF • Delta, Atlas, Titan/CTF • LRV
Cargo Down	• Shuttle	• Shuttle • LRV	• LRV	• LRV

Rev. 9 2-19-92

- This architecture represents a new air-launched mode for personnel transport.
- A representative concept is the Rockwell AMSC.
- The ACRV is a simple rescue vehicle for personnel transport down from the SSF.
- A cargo transfer function of some kind is required beginning in 2005 for any cargo transported to a specific location via the DAT elements.
- The Shuttle transports the ACRV to and from SSF until 2010.

TABLE B.1.1-17.– ARCHITECTURE 17: NEW CONCEPT OPTION
Reusable Ultralight Personnel Carrier (RUPC)

Function	2000	2005	2010	2015
People Up	• Shuttle • RUPC • MR Titan II +GEM	• RUPC • MR Titan II +GEM	• RUPC • MR Titan II +GEM	• RUPC • MR Titan II +GEM
People Down	• Shuttle • RUPC • ACRV	• RUPC • ACRV	• RUPC • ACRV	• RUPC • ACRV
Cargo Up	• Shuttle • Titan IV, CTF • Delta, Atlas • LRV	• Titan IV, CTF • Delta, Atlas • LRV	• Titan IV, CTF • Delta, Atlas • LRV	• Titan IV, CTF • Delta, Atlas • LRV
Cargo Down	• Shuttle • LRV	• LRV	• LRV	• LRV

Rev. 9 2-19-92

- The architecture presents an alternative concept for transporting crew to and from SSF.
- This architecture uses a reusable ultra-light PC with minimum cargo only for those missions to and from SSF or in other LEO missions where personnel are required.
- The RUPC uses a derived, man-rated Titan as its launch vehicle.
- Shuttle is phased out prior to 2005.
- LRV meets all cargo return needs after Shuttle phase out.
- The ACRV is a simple rescue vehicle for personnel transport down from the SSF.
- A cargo transfer function of some kind is required beginning in 2000 for any cargo transported to a specific location via the Titan vehicle.

TABLE B.1.1-18.– ARCHITECTURE 18: NEW CONCEPT OPTION
TSTO - Beta II

Function	2000	2005	2010	2015
People Up	• Shuttle	• Shuttle • Beta II	• Beta II	• Beta II
People Down	• Shuttle • ACRV	• Shuttle • Beta II • ACRV	• Beta II • ACRV	• Beta II • ACRV
Cargo Up	• Shuttle • Delta, Atlas, Titan/CTF	• Shuttle • Beta II • Delta, Atlas, Titan/CTF	• Beta II • Delta, Atlas, Titan/CTF	• Beta II • Delta, Atlas, Titan/CTF
Cargo Down	• Shuttle	• Shuttle • Beta II	• Beta II	• Beta II

Rev. 9 2-19-92

- The architecture uses a two stage to orbit (TSTO) concept with a cargo capability to address vehicle technology and phasing issues.
- The TSTO provides people up/down as well as cargo up/down.
- SSF emergency crew return is accomplished by the ACRV starting at PMC.
- A cargo transfer function of some kind is required beginning in 2000 for any cargo transported to a specific location via a DAT element.
- TSTO concept to be defined by Air Force/Wright Labs.

B.1.2 MANIFESTING/MISSION CAPTURE DATA

This subsection includes data related to the manifesting and mission capture analysis of each architecture. All data shown comes from the TRANSIT model. More detail concerning TRANSIT can be found in section D.1.2 of Appendix D. Details concerning manifesting for each architecture can be found in Volume I, section 3.3.

B.1.2.1 Baseline Manifests

Tables B.1.2.1-1 through B.1.2.1-60 contain the manifests for the 15 HTS baseline architectures. Each architecture has a manifest for each If Scenario A through C, and one manifest for If Scenario D and E, for a total of four manifests. Each manifest covers the period from 1992 through 2020 and is divided by east coast (low inclination) and west coast (high inclination) launches. Both NASA and Department of Defense DOD launches are shown.

The architectures included are as follows:

1 - Reference
2 - Evolution
3 - Alternate Access (NLS, no RPC)
4 - Alternate Access (NLS, RPC)
5 - Separation of People and Cargo/Which Human Booster (MLS, CLV)
6 - Separation of People and Cargo/Which Human Booster (MLS, RPC, personnel and cargo on separate launches)
7 - Separation of People and Cargo (MLS, RPC, personnel and cargo on the same launch)
8 - Advanced Technology Phasing (SSTO)
11 - ACRV Commonalty (NLS, RPC, no ACRV)
12 - ACRV Commonalty (NLS, RPC, short term ACRV replaced by RPC)
13 - ACRV Commonalty/Which Human Booster (NLS, RPC, ACRV)
14 - Which Manned Booster (Human Rated Titan IV+, RPC)
16 - New Concept (Air Launched AMSC)
17 - New Concept (Titan II + GEMs, RUPC)
18 - New Concept (Beta II TSTO)

Manifests for other architectures, including Architectures 9, 10, and 19 can be found in Appendix B, section B.1.2.2.

TABLE B.1.2.1-1.– ARCHITECTURE 01 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	38						2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	47	1	4	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan III	1	1																												
	Titan IV/Centaur	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centaur	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	**76**	**2**	**5**	**3**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-2.– ARCHITECTURE 01 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas I																														
	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	76						2	3	4	3	3	4	4	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	**119**	**7**	**9**	**9**	**8**	**6**	**6**	**3**	**4**	**3**	**3**	**4**	**4**	**3**	**5**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
	Titan III	1	1																												
	Titan IV/Centaur	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	**29**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centaur	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	**148**	**8**	**10**	**10**	**9**	**7**	**7**	**4**	**5**	**4**	**4**	**5**	**5**	**4**	**6**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-3.– ARCHITECTURE 01 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	219						2	9	9	11	9	9	10	10	10	9	11	9	9	9	10	10	9	9	10	9	9	9	9	9
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	**271**	**7**	**9**	**9**	**8**	**10**	**11**	**9**	**9**	**11**	**9**	**9**	**10**	**10**	**10**	**9**	**11**	**9**	**9**	**9**	**10**	**10**	**9**	**9**	**10**	**9**	**9**	**9**	**9**	**9**
	Titan III	1	1																												
	Titan IV/Centaur	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	**29**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centaur	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Shuttle	**300**	**8**	**10**	**10**	**9**	**11**	**12**	**10**	**10**	**12**	**10**	**10**	**11**	**11**	**11**	**10**	**12**	**10**	**10**	**10**	**11**	**11**	**10**	**10**	**11**	**10**	**10**	**10**	**10**	**10**

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-4.– ARCHITECTURE 01 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	257						2	9	9	13	10	12	14	12	11	11	13	11	10	11	12	11	10	11	11	11	10	11	11	11
	Titan IV/Centau	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	309	7	9	9	8	10	11	9	9	13	10	12	14	12	11	11	13	11	10	11	12	11	10	11	11	11	10	11	11	11
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	338	8	10	10	9	11	12	10	10	14	11	13	15	13	12	12	14	12	11	12	13	12	11	12	12	12	11	12	12	12
IF E Changes																															
Additives	Shuttle	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	**Shuttle**	389	8	10	10	9	11	12	10	10	14	11	13	15	14	13	14	16	15	15	15	17	15	15	15	16	15	14	16	15	16
Additives	Shuttle	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	**Shuttle**	357	8	10	10	9	11	12	10	10	14	11	13	15	14	13	13	15	13	12	13	14	13	12	13	13	13	12	14	13	14

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-5.– ARCHITECTURE 02 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	4							1	1		1		1																	
	Atlas Evolution	19									1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	5							1	3				1																	
	Delta Evolution	30									1	1	1	2	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	9						2	2	2	1	1	1																		
	Shuttle Evolution	29									1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Cent	6							3	1	1		1																		
	Titan Evol/Cent	35									1	1	2	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	5				1			1	1		1		1																	
	Atlas Evolution	19									1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	8	2					1	1	3				1																	
	Delta Evolution	30									1	1	1	2	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	18	1	4	2	1	1	2	2	2	1	1	1																		
	Shuttle Evol	29									1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan III	1	1																												
	Titan IV/Centaur	7				1			3	1	1		1																		
	Titan Evol/Cent	35									1	1	2	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	25	3	2	3	4	4	2	2	2	1	1	1																		
	Atlas Evolution	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	33	6	4	2	1	3	3	4	4	3	2	1																		
	Delta Evolution	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	Shuttle Evol	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	20		2	3	3	2	3	3	2	1	1																			
	Titan IV/Centaur	17	2	2	2	1	2	1	2	2	1	1	1																		
	Titan Evolution	41									1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan Evol/Cent	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	26	2	5	3	2	2	3	3	3	1	1	1																		
	Total Shuttle Ev	50									2	2	2	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2
	Shuttle+Evol	76	2	5	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	1										1																			
	Delta Evolution	4														1				1				1				1			
	Titan IV/NUS	4						2		2																					
	Titan Evolution	20										2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	6		1	2		1	1				1																			
	Delta Evolution	4														1				1				1				1			
	Titan IV/NUS	4						2		2																					
	Titan Evolution	20										2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	6			1	1	1	1	1	1																					
	Delta Evolution	27									1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	Titan Evolution	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-6.– ARCHITECTURE 02 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	4							1	1			1		1																
	Atlas Evolution	19									1	1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	5							1	3				1																	
	Delta Evolution	30									1	1	1	2	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	12						2	3	4	1	1	1																		
	Shuttle Evolution	56									1	1	2	3	2	4	2	3	3	3	2	3	3	3	3	3	3	3	3	3	3
	Titan IV/Cent	6							3	1	1		1																		
	Titan Evol/Cent	35									1	1	2	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	5				1			1	1			1		1																
	Atlas Evolution	19									1	1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	8	2					1	1	3				1																	
	Delta Evolution	30									1	1	1	2	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	**55**	**7**	**9**	**9**	**8**	**6**	**6**	**3**	**4**	**1**	**1**	**1**																		
	Shuttle Evol	**56**									**1**	**1**	**2**	**3**	**2**	**4**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
	Titan III	1	1																												
	Titan IV/Centaur	7				1			3	1	1		1																		
	Titan Evol/Cent	35									1	1	2	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	25	3	2	3	4	4	2	2	2	1	1	1																		
	Atlas Evolution	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	33	6	4	2	1	3	3	4	4	3	2	1																		
	Delta Evolution	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	**8**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**																					
	Shuttle Evol	**21**									**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
	Titan IV/NUS	20		2	3	3	2	3	3	2	1	1																			
	Titan IV/Centaur	17	2	2	2	1	2	1	2	2	1	1	1																		
	Titan Evolution	41									1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan Evol/Cent	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	**63**	**8**	**10**	**10**	**9**	**7**	**7**	**4**	**5**	**1**	**1**	**1**																		
	Total Shuttle Ev	**77**									**2**	**2**	**3**	**4**	**3**	**5**	**3**	**4**	**4**	**4**	**3**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
	Shuttle+Evol	**140**	**8**	**10**	**10**	**9**	**7**	**7**	**4**	**5**	**3**	**3**	**4**	**4**	**3**	**5**	**3**	**4**	**4**	**4**	**3**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	1										1																			
	Delta Evolution	4														1				1				1				1			
	Titan IV/NUS	4						2		2																					
	Titan Evolution	20										2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	6		1	2		1	1				1																			
	Delta Evolution	4														1				1				1				1			
	Titan IV/NUS	4						2		2																					
	Titan Evolution	20										2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	6			1	1	1	1	1	1																					
	Delta Evolution	27									1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	Titan Evolution	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-7.– ARCHITECTURE 02 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	4							1	1		1		1																	
	Atlas Evolution	19									1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	5							1	3				1																	
	Delta Evolution	30									1	1	1	2	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	37						2	9	9	8	4	4	1																	
	Shuttle Evolution	126									1	2	4	5	6	7	6	6	7	6	6	7	7	7	7	7	7	7	7	7	7
	RCV	83									1	2	3	4	4	4	4	4	5	5	4	5	5	4	4	4	4	4	4	4	5
	Titan IV/Cent	6							3	1	1		1																		
	Titan Evol/Cent	35									1	1	2	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	5				1			1	1		1		1																	
	Atlas Evolution	19									1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	8	2					1	1	3				1																	
	Delta Evolution	30									1	1	1	2	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	89	7	9	9	8	10	11	9	9	8	4	4	1																	
	Shuttle Evol	126									1	2	4	5	6	7	6	6	7	6	6	7	7	7	7	7	7	7	7	7	7
	RCV	83									1	2	3	4	4	4	4	4	5	5	4	5	5	4	4	4	4	4	4	4	5
	Titan III	1	1																												
	Titan IV/Centaur	7				1			3	1	1		1																		
	Titan Evol/Cent	35									1	1	2	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	25	3	2	3	4	4	2	2	2	1	1	1																		
	Atlas Evolution	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	33	6	4	2	1	3	3	4	4	3	2	1																		
	Delta Evolution	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	Shuttle Evol	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	20		2	3	3	2	3	3	2	1	1																			
	Titan IV/Centaur	17	2	2	2	1	2	1	2	2	1	1	1																		
	Titan Evolution	41									1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan Evol/Cent	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	97	8	10	10	9	11	12	10	10	8	4	4	1																	
	Total Shuttle Ev	147									2	3	5	6	7	8	7	7	8	7	7	8	8	8	8	8	8	8	8	8	8
	Total RCV	83									1	2	3	4	4	4	4	4	5	5	4	5	5	4	4	4	4	4	4	4	5
	Shuttle+Ev+RCV	327	8	10	10	9	11	12	10	10	11	9	12	11	11	12	11	11	13	12	11	13	13	12	12	12	12	12	12	12	13

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	1										1																			
	Delta Evolution	4														1				1				1				1			
	Titan IV/NUS	4						2		2																					
	Titan Evolution	20										2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	6		1	2		1	1				1																			
	Delta Evolution	4														1				1				1				1			
	Titan IV/NUS	4						2		2																					
	Titan Evolution	20										2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	6			1	1	1	1	1	1																					
	Delta Evolution	27									1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	Titan Evolution	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-8.– ARCHITECTURE 02 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	4							1	1		1		1																	
	Atlas Evolution	19									1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	5							1	3				1																	
	Delta Evolution	30									1	1	1	2	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	41						2	9	9	11	5	4	1																	
	Shuttle Evolution	126									1	2	4	5	6	7	6	6	7	6	6	7	7	7	7	7	7	7	7	7	7
	RCV	97									1	2	3	4	5	5	5	6	5	5	5	6	5	5	5	5	5	5	5	5	5
	Titan IV/Cent	6							3	1	1		1																		
	Titan Evol/Cent	35									1	1	2	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	5				1			1	1		1		1																	
	Atlas Evolution	19									1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	8	2					1	1	3				1																	
	Delta Evolution	30									1	1	1	2	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	93	7	9	9	8	10	11	9	9	11	5	4	1																	
	Shuttle Evol	126									1	2	4	5	6	7	6	6	7	6	6	7	7	7	7	7	7	7	7	7	7
	RCV	97									1	2	3	4	5	5	5	6	5	5	5	6	5	5	5	5	5	5	5	5	5
	Titan III	1	1																												
	Titan IV/Centau	7				1			3	1	1		1																		
	Titan Evol/Cent	35									1	1	2	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	25	3	2	3	4	4	2	2	2	1	1	1																		
	Atlas Evolution	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	33	6	4	2	1	3	3	4	4	3	2	1																		
	Delta Evolution	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	Shuttle Evol	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	20		2	3	3	2	3	3	2	1	1																			
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	1	1	1																		
	Titan Evolution	41									1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan Evol/Cent	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	101	8	10	10	9	11	12	10	10	11	5	4	1																	
	Total Shuttle E	147									2	3	5	6	7	8	7	7	8	7	7	8	8	8	8	8	8	8	8	8	8
	Total RCV	97									1	2	3	4	5	5	5	6	5	5	5	6	5	5	5	5	5	5	5	5	5
	Shuttle+Ev+RC\	345	8	10	10	9	11	12	10	10	14	10	12	11	12	13	12	13	13	12	12	14	13	13	13	13	13	13	13	13	13
IF E Changes																															
Additives	Shuttle Evol	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	Shuttle Evol	198									2	3	5	6	8	9	9	9	11	11	10	12	11	12	11	12	11	11	12	11	12
Additives	Shuttle Evol	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	Shuttle Evol	166									2	3	5	6	8	9	8	8	9	8	8	9	9	9	9	9	9	9	10	9	10

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	1										1																			
	Delta Evolution	4														1				1				1				1			
	Titan IV/NUS	4						2		2																					
	Titan Evolution	20										2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	6		1	2		1	1				1																			
	Delta Evolution	4														1				1				1				1			
	Titan IV/NUS	4						2		2																					
	Titan Evolution	20										2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	6			1	1	1	1	1	1																					
	Delta Evolution	27									1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	Titan Evolution	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-9.– ARCHITECTURE 03 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centau	1				1																									
HTS Model	Atlas IIAS	7							1	1	1	1	1	1	1																
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	38						2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centau	7							3	1	1		2																		
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	8				1			1	1	1	1	1	1	1																
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	47	1	4	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centau	8				1			3	1	1		2																		
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	1	1	1													
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	NLS-20	29														1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	157									2	3	4	5	6	7	9	7	9	8	10	8	9	8	10	8	9	8	10	8	9
	Total Shuttle	76	2	5	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-20	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	68									1	2	1	3	2	4	3	4	4	4	3	4	3	5	3	4	3	4	4	4	3

TABLE B.1.2.1-10.– ARCHITECTURE 03 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	7							1	1	1	1	1	1	1																
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	76						2	3	4	3	3	4	4	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centau	7							3	1	1		2																		
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	8				1			1	1	1	1	1	1	1																
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	119	7	9	9	8	6	6	3	4	3	3	4	4	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centau	8				1			3	1	1		2																		
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	1	1	1													
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	NLS-20	29														1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	157									2	3	4	5	6	7	9	7	9	8	10	8	9	8	10	8	9	8	10	8	9
	Total Shuttle	148	8	10	10	9	7	7	4	5	4	4	5	5	4	6	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-20	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	68									1	2	1	3	2	4	3	4	4	4	3	4	3	5	3	4	3	4	4	4	3

TABLE B.1.2.1-11.– ARCHITECTURE 03 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centau	1				1																									
HTS Model	Atlas IIAS	7							1	1	1	1	1	1	1																
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	206						2	9	9	10	9	8	10	8	10	9	10	9	8	9	9	9	8	9	9	8	8	9	9	8
	Titan IV/Centau	7							3	1	1		2																		
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CTV																														
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	8				1			1	1	1	1	1	1	1																
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	258	7	9	9	8	10	11	9	9	10	9	8	10	8	10	9	10	9	8	9	9	9	8	9	9	8	8	9	9	8
	Titan IV/Centau	8				1			3	1	1		2																		
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	1	1	1													
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	2	2																			
	Titan IV/Centau	18	2	2	2	1	2	1	2	2	2	1	1																		
	NLS-20	29														1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	38										1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	235									2	5	7	9	10	11	13	12	13	12	14	12	13	12	14	12	13	12	14	12	13
	Total Shuttle	287	8	10	10	9	11	12	10	10	11	10	9	11	9	11	10	11	10	9	10	10	10	9	10	10	9	9	10	10	9
	Total CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-20	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	68									1	2	1	3	2	4	3	4	4	4	3	4	3	5	3	4	3	4	4	4	3

TABLE B.1.2.1-12.– ARCHITECTURE 03 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centau	1				1																									
HTS Model	Atlas IIAS	7							1	1	1	1	1	1	1																
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	230						2	9	9	10	8	11	9	10	11	11	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Titan IV/Centa	7							3	1	1		2																		
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CTV	4									1	1		1				1													
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	8				1			1	1	1	1	1	1	1																
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	282	7	9	9	8	10	11	9	9	10	8	11	9	10	11	11	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Titan IV/Centa	8				1			3	1	1		2																		
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CTV	4									1	1		1				1													
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	1	1	1													
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	2	2																			
	Titan IV/Centa	18	2	2	2	1	2	1	2	2	2	1	1																		
	NLS-20	29														1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	38										1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	239									3	6	7	10	10	11	13	13	13	12	14	12	13	12	14	12	13	12	14	12	13
	Total Shuttle	311	8	10	10	9	11	12	10	10	11	9	12	10	11	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	Total CTV	83									2	3	3	5	4	4	4	6	4	4	4	4	4	4	4	4	4	4	4	4	4
IF E Changes																															
Additives	Shuttle	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	Shuttle	362	8	10	10	9	11	12	10	10	11	9	12	10	12	13	14	13	14	15	14	15	14	15	14	15	14	14	15	14	15
Additives	Shuttle	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	Shuttle	330	8	10	10	9	11	12	10	10	11	9	12	10	12	13	13	12	12	12	12	12	12	12	12	12	12	12	13	12	13

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-20	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	68									1	2	1	3	2	4	3	4	4	4	3	4	3	5	3	4	3	4	4	4	3

TABLE B.1.2.1-13.– ARCHITECTURE 04 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centau	1				1																									
HTS Model	Atlas IIAS	7							1	1	1	1	1	1	1																
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	38						2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centa	7							3	1	1		2																		
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	8				1			1	1	1	1	1	1	1																
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	47	1	4	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centa	8				1			3	1	1		2																		
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	1	1	1													
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centa	17	2	2	2	1	2	1	2	2	2	1																			
	NLS-20	29														1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	**157**									2	3	4	5	6	7	9	7	9	8	10	8	9	8	10	8	9	8	10	8	9
	Total Shuttle	**76**	2	5	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-20	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	**68**									1	2	1	3	2	4	3	4	4	4	3	4	3	5	3	4	3	4	4	4	3

TABLE B.1.2.1-14.– ARCHITECTURE 04 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centau	1				1																									
HTS Model	Atlas IIAS	7							1	1	1	1	1	1	1																
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	76						2	3	4	3	3	4	4	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centa	7							3	1	1		2																		
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	8				1			1	1	1	1	1	1	1																
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	119	7	9	9	8	6	6	3	4	3	3	4	4	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centa	8				1			3	1	1		2																		
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	1	1	1													
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centa	17	2	2	2	1	2	1	2	2	2	1																			
	NLS-20	29														1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	157									2	3	4	5	6	7	9	7	9	8	10	8	9	8	10	8	9	8	10	8	9
	Total Shuttle	148	8	10	10	9	7	7	4	5	4	4	5	5	4	6	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-20	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	68									1	2	1	3	2	4	3	4	4	4	3	4	3	5	3	4	3	4	4	4	3

TABLE B.1.2.1-15.– ARCHITECTURE 04 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	7							1	1	1	1	1	1	1																
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	95						2	9	9	9	6	5	4	3	4	2	3	3	4	2	3	3	3	3	3	3	3	3	3	3
	NLS-50/RPCmin	84									4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CRV	136									1	3	5	7	7	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	10							3	1	2	1	3																		
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	31												1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	8				1			1	1	1	1	1	1	1																
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	147	7	9	9	8	10	11	9	9	9	6	5	4	3	4	2	3	3	4	2	3	3	3	3	3	3	3	3	3	3
	NLS-50/RPCmi	84									4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CRV	136									1	3	5	7	7	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	11				1			3	1	2	1	3																		
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	31												1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	1	1	1													
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	23		2	3	3	2	3	3	2	2	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	NLS-20	29														1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50	38										1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	**452**									**6**	**11**	**15**	**20**	**21**	**23**	**24**	**23**	**24**	**23**	**25**	**23**	**24**	**23**	**25**	**23**	**24**	**23**	**25**	**23**	**24**
	Total Shuttle	**176**	**8**	**10**	**10**	**9**	**11**	**12**	**10**	**10**	**10**	**7**	**6**	**5**	**4**	**5**	**3**	**4**	**4**	**5**	**3**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
	Total RPCmin	**84**									**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-20	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	**68**									**1**	**2**	**1**	**3**	**2**	**4**	**3**	**4**	**4**	**4**	**3**	**4**	**3**	**5**	**3**	**4**	**3**	**4**	**4**	**4**	**3**

TABLE B.1.2.1-16.– ARCHITECTURE 04 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	7							1	1	1	1	1	1	1																
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	111						2	9	9	8	6	6	4	3	5	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/RPCmin	85									4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CRV	153									1	3	5	7	8	9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CTV	4									1	1		1				1													
	Titan IV/Centau	10							3	1	2	1	3																		
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	31												1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	8				1			1	1	1	1	1	1	1																
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	163	7	9	9	8	10	11	9	9	8	6	6	4	3	5	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/RPCmir	85									4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CRV	153									1	3	5	7	8	9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CTV	4									1	1		1				1													
	Titan IV/Centau	11				1			3	1	2	1	3																		
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	31												1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	1	1	1													
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	2	2																			
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	NLS-20	29														1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	475									7	12	17	21	22	24	25	25	25	24	26	24	25	24	26	24	25	24	26	24	25
	Total Shuttle	192	8	10	10	9	11	12	10	10	9	7	7	5	4	6	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Total RPCmin	85									4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
IF E Changes																															
Additives	NLS-50/RPCmin	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	NLS-50/RPC	136									4	4	5	4	5	5	6	6	7	8	7	8	7	8	7	8	7	7	8	7	8
Additives	NLS-50/RPCmin	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	NLS-50/RPC	104									4	4	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	5	6

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33		.	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-20	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	68									1	2	1	3	2	4	3	4	4	4	3	4	3	5	3	4	3	4	4	4	3

TABLE B.1.2.1-17.– ARCHITECTURE 05 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	9						2	2	2	1	1	1																		
	MLS-HL/CLV	29									1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centaur	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	18	1	4	2	1	1	2	2	2	1	1	1																		
	MLS-HL/CLV	29									1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-HL/CLV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	26	2	5	3	2	2	3	3	3	1	1	1																		
	MLS-HL/CLV	50									2	2	2	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2
	MLS-HL	115									3	4	5	6	7	6	6	6	7	6	6	5	6	5	5	5	6	5	5	5	6
	MLS-X	47									1	1	1	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-18.– ARCHITECTURE 05 - "IF" B FLIGHT MANIFEST

Launch Site: **EAST**

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	15						2	3	4	2	1	2	1																	
	MLS-HL/CLV	115									1	2	3	4	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	Titan IV/Centaur	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	58	7	9	9	8	6	6	3	4	2	1	2	1																	
	MLS-HL/CLV	115									1	2	3	4	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-HL/CLV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	66	8	10	10	9	7	7	4	5	2	1	2	1																	
	MLS-HL/CLV	136									2	3	4	5	6	8	6	7	7	7	6	7	8	7	8	7	8	7	8	7	8
	MLS-HL	201									3	5	7	8	10	11	9	10	11	10	9	10	12	10	11	10	12	10	11	10	12
	MLS-X	47									1	1	1	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2

Launch Site: **WEST**

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-19.– ARCHITECTURE 05 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	48						2	9	9	11	7	6	4																	
	MLS-HL/CLV	195									2	4	6	7	9	10	10	10	10	10	9	10	12	10	11	11	11	10	12	10	11
	MLS-HL/CRV	89									1	2	3	4	5	6	5	7	5	4	4	5	5	4	4	4	4	4	4	4	5
	Titan IV/Centaur	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	100	7	9	9	8	10	11	9	9	11	7	6	4																	
	MLS-HL/CLV	195									2	4	6	7	9	10	10	10	10	10	9	10	12	10	11	11	11	10	12	10	11
	MLS-HL/CRV	89									1	2	3	4	5	6	5	7	5	4	4	5	5	4	4	4	4	4	4	4	5
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-HL/CLV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	108	8	10	10	9	11	12	10	10	11	7	6	4																	
	MLS-HL/CLV	216									3	5	7	8	10	11	11	11	11	11	10	11	13	11	12	12	12	11	13	11	12
	MLS-HL/CRV	89									1	2	3	4	5	6	5	7	5	4	4	5	5	4	4	4	4	4	4	4	5
	MLS-X	47									1	1	1	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2
	MLS-HL	370									5	9	13	15	19	20	19	21	20	18	17	19	22	18	19	19	20	18	20	18	21

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-20.– ARCHITECTURE 05 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	58						2	9	9	12	10	7	7	2																
	MLS-HL/CLV	225									2	4	6	7	9	11	12	11	12	12	11	12	14	12	13	13	13	12	14	12	13
	MLS-HL/CRV	114									1	2	3	4	5	7	6	8	6	6	6	6	6	6	6	6	6	6	6	6	6
	Titan IV/Centaur	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	110	7	9	9	8	10	11	9	9	12	10	7	7	2																
	MLS-HL/CLV	225									2	4	6	7	9	11	12	11	12	12	11	12	14	12	13	13	13	12	14	12	13
	MLS-HL/CRV	114									1	2	3	4	5	7	6	8	6	6	6	6	6	6	6	6	6	6	6	6	6
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-HL/CLV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	118	8	10	10	9	11	12	10	10	12	10	7	7	2																
	MLS-HL/CLV	246									3	5	7	8	10	12	13	12	13	13	12	13	15	13	14	14	14	13	15	13	14
	MLS-HL/CRV	114									1	2	3	4	5	7	6	8	6	6	6	6	6	6	6	6	6	6	6	6	6
	MLS-X	47									1	1	1	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2
	MLS-HL	425									5	9	13	15	19	22	22	23	23	22	21	22	25	22	23	23	24	22	24	22	24
IF E Changes																															
Additives	MLS-HL/CLV	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	MLS-HL/CLV	297									3	5	7	8	11	13	15	14	16	17	15	17	18	17	17	18	17	16	19	16	18
Additives	MLS-HL/CLV	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	MLS-HL/CLV	265									3	5	7	8	11	13	14	13	14	14	13	14	16	14	15	15	15	14	17	14	16

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-21.– ARCHITECTURE 06 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	7						2	2	2	1																				
	MLS-X/RPCmin	31									1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	MLS-HL/CRV	31									1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centaur	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	16	1	4	2	1	1	2	2	2	1																				
	MLS-X/RPCmin	31									1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	MLS-HL/CRV	31									1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-X/RPCmin	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MLS-HL/CRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	24	2	5	3	2	2	3	3	3	1																				
	MLS-X/RPCmin	52									2	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2
	MLS-HL/CRV	52									2	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2
	MLS-HL	117									3	5	6	6	7	6	6	6	7	6	6	5	6	5	5	5	6	5	5	5	6
	MLS-X	99									3	4	4	5	5	5	7	5	5	5	7	4	4	4	6	4	4	4	6	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-22.– ARCHITECTURE 06 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	12						2	3	4	1	1	1																		
	MLS-X/RPCmin	81									1	2	3	4	3	5	3	4	4	4	3	4	5	4	5	4	5	4	5	4	5
	MLS-HL/CRV	81									1	2	3	4	3	5	3	4	4	4	3	4	5	4	5	4	5	4	5	4	5
	Titan IV/Centaur	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	55	7	9	9	8	6	6	3	4	1	1	1																		
	MLS-X/RPCmin	81									1	2	3	4	3	5	3	4	4	4	3	4	5	4	5	4	5	4	5	4	5
	MLS-HL/CRV	81									1	2	3	4	3	5	3	4	4	4	3	4	5	4	5	4	5	4	5	4	5
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-X/RPCmin	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MLS-HL/CRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	63	8	10	10	9	7	7	4	5	1	1	1																		
	MLS-X/RPCmin	102									2	3	4	5	4	6	4	5	5	5	4	5	6	5	6	5	6	5	6	5	6
	MLS-HL/CRV	102									2	3	4	5	4	6	4	5	5	5	4	5	6	5	6	5	6	5	6	5	6
	MLS-HL	167									3	5	7	8	8	9	7	8	9	8	7	8	10	8	9	8	10	8	9	8	10
	MLS-X	149									2	4	6	7	6	8	8	7	7	7	8	7	8	7	10	7	8	7	10	7	8

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-23.– ARCHITECTURE 06 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	42						2	9	9	8	8	4	2																	
	MLS-X/RPCmin	165									5	6	7	8	7	9	7	8	8	8	7	8	9	8	9	8	9	8	9	8	9
	MLS-HL/CRV	209									2	4	6	8	10	11	10	12	11	10	10	11	12	11	12	11	12	11	12	11	12
	Titan IV/Centaur	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	94	7	9	9	8	10	11	9	9	8	8	4	2																	
	MLS-X/RPCmin	165									5	6	7	8	7	9	7	8	8	8	7	8	9	8	9	8	9	8	9	8	9
	MLS-HL/CRV	209									2	4	6	8	10	11	10	12	11	10	10	11	12	11	12	11	12	11	12	11	12
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-X/RPCmin	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MLS-HL/CRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	102	8	10	10	9	11	12	10	10	8	8	4	2																	
	MLS-X/RPCmin	186									6	7	8	9	8	10	8	9	9	9	8	9	10	9	10	9	10	9	10	9	10
	MLS-HL/CRV	230									3	5	7	9	11	12	11	13	12	11	11	12	13	12	13	12	13	12	13	12	13
	MLS-HL	295									4	7	10	12	15	15	14	16	16	14	14	15	17	15	16	15	17	15	16	15	17
	MLS-X	233									7	8	9	11	10	12	12	11	11	11	12	11	12	11	14	11	12	11	14	11	12

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-24.– ARCHITECTURE 06 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	41						2	9	9	11	5	3	2																	
	MLS-X/RPCmin	166									5	6	8	8	7	9	7	8	8	8	7	8	9	8	9	8	9	8	9	8	9
	MLS-HL/CRV	269									3	6	9	12	13	14	13	14	14	13	13	14	15	14	15	14	15	14	15	14	15
	Titan IV/Centaur	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	93	7	9	9	8	10	11	9	9	11	5	3	2																	
	MLS-X/RPCmin	166									5	6	8	8	7	9	7	8	8	8	7	8	9	8	9	8	9	8	9	8	9
	MLS-HL/CRV	269									3	6	9	12	13	14	13	14	14	13	13	14	15	14	15	14	15	14	15	14	15
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-X/RPCmin	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MLS-HL/CRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	101	8	10	10	9	11	12	10	10	11	5	3	2																	
	MLS-X/RPCmin	187									6	7	9	9	8	10	8	9	9	9	8	9	10	9	10	9	10	9	10	9	10
	MLS-HL/CRV	290									4	7	10	13	14	15	14	15	15	14	14	15	16	15	16	15	16	15	16	15	16
	MLS-HL	355									5	9	13	16	18	18	17	18	19	17	17	18	20	18	19	18	20	18	19	18	20
	MLS-X	234									7	8	10	11	10	12	12	11	11	11	12	11	12	11	14	11	12	11	14	11	12
IF E Changes																															
Additives	MLS-X/RPCmin	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	MLS-X/RPCmin	238									6	7	9	9	9	11	10	11	12	13	11	13	13	13	13	13	13	12	14	12	14
Additives	MLS-X/RPCmin	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	MLS-X/RPCmin	206									6	7	9	9	9	11	9	10	10	10	9	10	11	10	11	10	11	10	12	10	12

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-25.– ARCHITECTURE 07 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	'otal	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	9						2	2	2	1	1	1																		
	MLS-HL/LRV/RPCmin	29									1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centaur	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	18	1	4	2	1	1	2	2	2	1	1	1																		
	MLS-HL/LRV/RPCml	29									1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-HL/LRV/RPCml	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	26	2	5	3	2	2	3	3	3	1	1	1																		
	MLS-HL/LRV/RPCml	50									2	2	2	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2
	MLS-HL	115									3	4	5	6	7	6	6	6	7	6	6	5	6	5	5	5	6	5	5	5	6
	MLS-X	47									1	1	1	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2

Launch Site: WEST

	Vehicle Name	'otal	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-26.– ARCHITECTURE 07 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	14						2	3	4	2	1	2																		
	MLS-HL/LRV/RPCmin	159									2	4	6	8	7	9	7	8	8	8	7	8	9	8	9	8	9	8	9	8	9
	Titan IV/Centaur	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	57	7	9	9	8	6	6	3	4	2	1	2																		
	MLS-HL/LRV/RPCml	159									2	4	6	8	7	9	7	8	8	8	7	8	9	8	9	8	9	8	9	8	9
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-HL/LRV/RPCml	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	**65**	8	10	10	9	7	7	4	5	2	1	2																		
	MLS-HL/LRV/RPCml	**180**									3	5	7	9	8	10	8	9	9	9	8	9	10	9	10	9	10	9	10	9	10
	MLS-HL	**245**									4	7	10	12	12	13	11	12	13	12	11	12	14	12	13	12	14	12	13	12	14
	MLS-X	**47**									1	1	1	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	**49**									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-27.– ARCHITECTURE 07 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	46						2	9	9	8	6	6	4	2																
	MLS-HL/LRV/RPCmin	227									2	4	6	8	11	13	11	12	12	12	11	12	13	12	13	12	13	12	13	12	13
	MLS-HL/CRV	127									1	2	2	4	5	7	7	8	7	7	7	7	7	7	7	7	7	7	7	7	7
	Titan IV/Centaur	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	98	7	9	9	8	10	11	9	9	8	6	6	4	2																
	MLS-HL/LRV/RPCml	227									2	4	6	8	11	13	11	12	12	12	11	12	13	12	13	12	13	12	13	12	13
	MLS-HL/CRV	127									1	2	2	4	5	7	7	8	7	7	7	7	7	7	7	7	7	7	7	7	7
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-HL/LRV/RPCml	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	106	8	10	10	9	11	12	10	10	8	6	6	4	2																
	MLS-HL/LRV/RPCml	248									3	5	7	9	12	14	12	13	13	13	12	13	14	13	14	13	14	13	14	13	14
	MLS-HL/CRV	127									1	2	2	4	5	7	7	8	7	7	7	7	7	7	7	7	7	7	7	7	7
	MLS-HL	440									5	9	12	16	21	24	22	24	24	23	22	23	25	23	24	23	25	23	24	23	25
	MLS-X	47									1	1	1	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-28.– ARCHITECTURE 07 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	46						2	9	9	10	6	6	4																	
	MLS-HL/LRV/RPCmin	227									2	4	6	8	11	13	11	12	12	12	11	12	13	12	13	12	13	12	13	12	13
	MLS-HL/CRV	179									2	4	5	8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Titan IV/Centaur	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	98	7	9	9	8	10	11	9	9	10	6	6	4																	
	MLS-HL/LRV/RPCml	227									2	4	6	8	11	13	11	12	12	12	11	12	13	12	13	12	13	12	13	12	13
	MLS-HL/CRV	179									2	4	5	8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-HL/LRV/RPCml	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	106	8	10	10	9	11	12	10	10	10	6	6	4																	
	MLS-HL/LRV/RPCml	248									3	5	7	9	12	14	12	13	13	13	12	13	14	13	14	13	14	13	14	13	14
	MLS-HL/CRV	189									2	4	5	8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	MLS-HL	502									6	11	15	20	26	27	25	26	27	26	25	26	28	26	27	26	28	26	27	26	28
	MLS-X	47									1	1	1	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2
IF E Changes																															
Additives	MLS-X/RPCmin	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	MLS-X	98									1	1	1	2	3	3	6	4	5	6	7	6	5	6	7	6	5	5	8	5	6
SEI High Total	RPCmin	299									3	5	7	9	13	15	14	15	16	17	15	17	17	17	17	17	17	16	18	16	18
Additives	MLS-X/RPCmin	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	MLS-X	66									1	1	1	2	3	3	5	3	3	3	5	3	3	3	5	3	3	3	6	3	4
SEI Low Total	RPCmin	267									3	5	7	9	13	15	13	14	14	14	13	14	15	14	15	14	15	14	16	14	16

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-29.– ARCHITECTURE 08 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	2							1	1																					
	Delta II	14							1	3				2				2				2				2				2	
	Shuttle	7						2	2	2	1																				
	SSTO(Rocket)	73									3	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	3				1			1	1																					
	Delta II	17	2					1	1	3				2				2				2				2				2	
	Shuttle	16	1	4	2	1	1	2	2	2	1																				
	SSTO(Rocket)	73									3	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	41	6	4	2	1	3	3	4	4	4	4	3	2	1																
	Shuttle	8	1	1	1	1	1	1	1	1																					
	SSTO(Rocket)	91									1	1	2	3	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	24	2	5	3	2	2	3	3	3	1																				
	SSTO(Rocket)	164									4	5	6	7	8	9	9	9	9	9	9	8	8	8	8	8	8	8	8	8	8

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	12		2	2	1	1	2	2	2																					
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	SSTO(Rocket)	27									1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	SSTO(Rocket)	27									1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1

TABLE B.1.2.1-30.– ARCHITECTURE 08 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	5							1	1	1	1	1																		
	Delta II	18							1	3	1	1	1	3				2				2				2				2	
	Shuttle	15						2	3	4	2	1	2	1																	
	SSTO(Rocket)	212									2	4	7	9	10	12	10	11	11	11	10	11	12	11	12	11	12	11	12	11	12
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	6				1			1	1	1	1	1																		
	Delta II	21	2					1	1	3	1	1	1	3				2				2				2				2	
	Shuttle	58	7	9	9	8	6	6	3	4	2	1	2	1																	
	SSTO(Rocket)	212									2	4	7	9	10	12	10	11	11	11	10	11	12	11	12	11	12	11	12	11	12
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	41	6	4	2	1	3	3	4	4	4	4	3	2	1																
	Shuttle	8	1	1	1	1	1	1	1	1																					
	SSTO(Rocket)	91									1	1	2	3	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	66	8	10	10	9	7	7	4	5	2	1	2	1																	
	SSTO(Rocket)	303									3	5	9	12	14	17	15	16	16	16	15	16	17	16	17	16	17	16	17	16	17

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	12		2	2	1	1	2	2	2																					
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	SSTO(Rocket)	27									1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	SSTO(Rocket)	27									1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1

TABLE B.1.2.1-31.– ARCHITECTURE 08 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	6							1	1	1	1	1	1																	
	Atlas/CTF	4									1	2	1																		
	Delta II	19							1	3	1	1	1	3	1			2				2				2				2	
	Shuttle	41						2	9	9	8	5	5	3																	
	SSTO(Rocket)	560									3	9	15	21	27	32	31	30	29	29	30	31	31	29	31	31	30	29	32	30	30
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	7				1			1	1	1	1	1	1																	
	Atlas/CTF	4									1	2	1																		
	Delta II	22	2					1	1	3	1	1	1	3	1			2				2				2				2	
	Shuttle	93	7	9	9	8	10	11	9	9	8	5	5	3																	
	SSTO(Rocket)	560									3	9	15	21	27	32	31	30	29	29	30	31	31	29	31	31	30	29	32	30	30
	Titan III	1	1																												
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	41	6	4	2	1	3	3	4	4	4	4	3	2	1																
	Shuttle	8	1	1	1	1	1	1	1	1																					
	SSTO(Rocket)	91									1	1	2	3	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	101	8	10	10	9	11	12	10	10	8	5	5	3																	
	SSTO(Rocket)	651									4	10	17	24	31	37	36	35	34	34	35	36	36	34	36	36	35	34	37	35	35
	Total CTF	83									2	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	12		2	2	1	1	2	2	2																					
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	SSTO(Rocket)	27									1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	SSTO(Rocket)	27									1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1

TABLE B.1.2.1-32.– ARCHITECTURE 08 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	6							1	1	1	1	1	1																	
	Atlas/CTF	4									1	2	1																		
	Delta II	19							1	3	1	1	1	3	1			2				2				2				2	
	Shuttle	49						2	9	9	10	6	6	5	2																
	SSTO(Rocket)	656									3	9	15	21	27	38	37	36	35	35	36	37	37	35	37	37	36	35	38	36	36
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	7				1			1	1	1	1	1	1																	
	Atlas/CTF	4									1	2	1																		
	Delta II	22	2					1	1	3	1	1	1	3	1			2				2				2				2	
	Shuttle	101	7	9	9	8	10	11	9	9	10	6	6	5	2																
	SSTO(Rocket)	656									3	9	15	21	27	38	37	36	35	35	36	37	37	35	37	37	36	35	38	36	36
	Titan III	1	1																												
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	41	6	4	2	1	3	3	4	4	4	4	3	2	1																
	Shuttle	8	1	1	1	1	1	1	1	1																					
	SSTO(Rocket)	91									1	1	2	3	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	109	8	10	10	9	11	12	10	10	10	6	6	5	2																
	SSTO(Rocket)	747									4	10	17	24	31	43	42	41	40	40	41	42	42	40	42	42	41	40	43	41	41
	Total CTF	83									2	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
IF E Changes																															
Additives	SSTO(Rocket)	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	SSTO(Rocket)	798									4	10	17	24	32	44	44	43	43	44	44	46	45	44	45	46	44	43	47	44	45
Additives	SSTO(Rocket)	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	SSTO(Rocket)	766									4	10	17	24	32	44	43	42	41	41	42	43	43	41	43	43	42	41	45	42	43

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	12		2	2	1	1	2	2	2																					
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	SSTO(Rocket)	27									1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	SSTO(Rocket)	27									1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1

TABLE B.1.2.1-33.– ARCHITECTURE 11 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	38						2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centau	7							3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	47	1	4	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centau	8				1			3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	**112**									**2**	**3**	**4**	**5**	**6**	**5**	**7**	**5**	**6**	**5**	**7**	**5**	**6**	**5**	**7**	**5**	**6**	**5**	**7**	**5**	**6**
	Total Shuttle	**76**	**2**	**5**	**3**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	**49**									**1**	**2**	**1**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**

TABLE B.1.2.1-34.– ARCHITECTURE 11 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	76						2	3	4	3	3	4	4	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centau	7							3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	119	7	9	9	8	6	6	3	4	3	3	4	4	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centau	8				1			3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	112									2	3	4	5	6	5	7	5	6	5	7	5	6	5	7	5	6	5	7	5	6
	Total Shuttle	148	8	10	10	9	7	7	4	5	4	4	5	5	4	6	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-35.– ARCHITECTURE 11 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	198						2	9	9	10	9	8	9	8	10	9	10	9	8	8	8	8	8	8	8	8	8	8	8	8
	NLS-50/RPCmin	84									4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	10							3	1	2	1	3																		
	NLS-50/AUS	31												1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	250	7	9	9	8	10	11	9	9	10	9	8	9	8	10	9	10	9	8	8	8	8	8	8	8	8	8	8	8	8
	NLS-50/RPCmir	84									4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	11				1			3	1	2	1	3																		
	NLS-50/AUS	31												1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	25		2	3	3	2	3	3	2	2	3	1	1																	
	Titan IV/Centau	20	2	2	2	1	2	1	2	2	2	2	1	1																	
	NLS-50	36											1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	36											1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	266									5	6	9	11	14	13	15	14	14	13	15	13	14	13	15	13	14	13	15	13	14
	Total Shuttle	279	8	10	10	9	11	12	10	10	11	10	9	10	9	11	10	11	10	9	9	9	9	9	9	9	9	9	9	9	9
	Total RPCmin	84									4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-36.– ARCHITECTURE 11 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	221						2	9	9	10	8	9	9	9	9	9	9	10	10	9	10	10	10	10	10	10	10	10	10	10
	NLS-50/RPCmin	85									4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CTV	4									1	1		1				1													
	Titan IV/Centau	9							3	1	2	1	2																		
	NLS-50/AUS	31												1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	273	7	9	9	8	10	11	9	9	10	8	9	9	9	9	9	9	10	10	9	10	10	10	10	10	10	10	10	10	10
	NLS-50/RPCmir	85									4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CTV	4									1	1		1				1													
	Titan IV/Centau	10				1			3	1	2	1	2																		
	NLS-50/AUS	31												1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	26		2	3	3	2	3	3	2	2	3	2	1																	
	Titan IV/Centau	21	2	2	2	1	2	1	2	2	2	2	2	1																	
	NLS-50	35												1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	35												1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	269									6	7	8	12	14	13	15	15	14	13	15	13	14	13	15	13	14	13	15	13	14
	Total Shuttle	302	8	10	10	9	11	12	10	10	11	9	10	10	10	10	10	10	11	11	10	11	11	11	11	11	11	11	11	11	11
	Total RPCmin	85									4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
IF E Changes																															
Additives	NLS-50/RPCmin	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	NLS-50/RPCmin	136									4	4	5	4	5	5	6	6	7	8	7	8	7	8	7	8	7	7	8	7	8
Additives	NLS-50/RPCmin	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	NLS-50/RPCmin	104									4	4	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	5	6

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-37.– ARCHITECTURE 12 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	38						2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centau	7							3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	47	1	4	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centau	8				1			3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	112									2	3	4	5	6	5	7	5	6	5	7	5	6	5	7	5	6	5	7	5	6
	Total Shuttle	76	2	5	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-38.– ARCHITECTURE 12 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

Group	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	76						2	3	4	3	3	4	4	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centau	7							3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	119	7	9	9	8	6	6	3	4	3	3	4	4	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centau	8				1			3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	112									2	3	4	5	6	5	7	5	6	5	7	5	6	5	7	5	6	5	7	5	6
	Total Shuttle	148	8	10	10	9	7	7	4	5	4	4	5	5	4	6	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

Group	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

C-2.

TABLE B.1.2.1-39.– ARCHITECTURE 12 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	201						2	9	9	11	9	8	10	8	10	9	10	9	8	8	9	8	8	8	8	8	8	8	8	8
	NLS-50/RPCmin	64														4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	7							3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	253	7	9	9	8	10	11	9	9	11	9	8	10	8	10	9	10	9	8	8	9	8	8	8	8	8	8	8	8	8
	NLS-50/RPCmi	64														4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	8				1			3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	25		2	3	3	2	3	3	2	2	3	1	1																	
	Titan IV/Centau	20	2	2	2	1	2	1	2	2	2	2	1	1																	
	NLS-50	36											1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	36											1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	249									2	3	6	7	10	13	15	14	14	13	15	13	14	13	15	13	14	13	15	13	14
	Total Shuttle	282	8	10	10	9	11	12	10	10	12	10	9	11	9	11	10	11	10	9	9	10	9	9	9	9	9	9	9	9	9
	Total RPCmin	64														4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-40.– ARCHITECTURE 12 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	227						2	9	9	10	8	10	9	10	11	10	10	10	9	10	10	10	10	10	10	10	10	10	10	10
	NLS-50/RPCmin	64														4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CTV	4									1	1		1				1													
	Titan IV/Centau	5							3	1	1																				
	NLS-50/AUS	36									1	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	279	7	9	9	8	10	11	9	9	10	8	10	9	10	11	10	10	10	9	10	10	10	10	10	10	10	10	10	10	10
	NLS-50/RPCmir	64														4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CTV	4									1	1		1				1													
	Titan IV/Centau	6				1			3	1	1																				
	NLS-50/AUS	36									1	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	26		2	3	3	2	3	3	2	2	3	2	1																	
	Titan IV/Centau	21	2	2	2	1	2	1	2	2	2	2	2	1																	
	NLS-50	35												1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	35												1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	253									3	4	6	8	10	13	15	15	14	13	15	13	14	13	15	13	14	13	15	13	14
	Total Shuttle	308	8	10	10	9	11	12	10	10	11	9	11	10	11	12	11	11	11	10	11	11	11	11	11	11	11	11	11	11	11
	Total RPCmin	64														4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

IF E Changes

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Additives	Shuttle	3													1	1	1														
Additives	NLS-50/RPCmin	48															1	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	Shuttle	311	8	10	10	9	11	12	10	10	11	9	11	10	12	13	12	11	11	10	11	11	11	11	11	11	11	11	11	11	11
SEI High Total	NLS-50/RPCmir	112														4	5	6	7	8	7	8	7	8	7	8	7	7	8	7	8
Additives	Shuttle	2													1	1															
Additives	NLS-50/RPCmin	17															1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	Shuttle	310	8	10	10	9	11	12	10	10	11	9	11	10	12	13	11	11	11	10	11	11	11	11	11	11	11	11	11	11	11
SEI Low Total	NLS-50/RPCmir	81														4	5	5	5	5	5	5	5	5	5	5	5	5	6	5	6

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-41.– ARCHITECTURE 13 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	38						2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centau	7							3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	47	1	4	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centau	8				1			3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	112									2	3	4	5	6	5	7	5	6	5	7	5	6	5	7	5	6	5	7	5	6
	Total Shuttle	76	2	5	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-42.– ARCHITECTURE 13 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	76						2	3	4	3	3	4	4	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centau	7							3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	119	7	9	9	8	6	6	3	4	3	3	4	4	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centau	8				1			3	1	1		2																		
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	**112**									**2**	**3**	**4**	**5**	**6**	**5**	**7**	**5**	**6**	**5**	**7**	**5**	**6**	**5**	**7**	**5**	**6**	**5**	**7**	**5**	**6**
	Total Shuttle	**148**	**8**	**10**	**10**	**9**	**7**	**7**	**4**	**5**	**4**	**4**	**5**	**5**	**4**	**6**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	**49**									**1**	**2**	**1**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**

TABLE B.1.2.1-43.– ARCHITECTURE 13 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	205						2	9	9	10	9	9	9	8	10	9	10	9	9	9	9	9	8	8	9	8	8	8	9	8
	NLS-50/RPCmin	84									4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	10							3	1	2	1	3																		
	NLS-50/AUS	31												1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	257	7	9	9	8	10	11	9	9	10	9	9	9	8	10	9	10	9	9	9	9	9	8	8	9	8	8	8	9	8
	NLS-50/RPCmir	84									4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	11				1			3	1	2	1	3																		
	NLS-50/AUS	31												1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	25		2	3	3	2	3	3	2	2	3	1	1																	
	Titan IV/Centau	20	2	2	2	1	2	1	2	2	2	2	1	1																	
	NLS-50	36											1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	36											1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	266									5	6	9	11	14	13	15	14	14	13	15	13	14	13	15	13	14	13	15	13	14
	Total Shuttle	286	8	10	10	9	11	12	10	10	11	10	10	10	9	11	10	11	10	10	10	10	10	9	9	10	9	9	9	10	9
	Total RPCmin	84									4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-44.– ARCHITECTURE 13 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	226						2	9	9	10	8	9	9	10	11	10	10	10	10	9	10	10	10	10	10	10	10	10	10	10
	NLS-50/RPCmin	85									4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CTV	4									1	1		1				1													
	Titan IV/Centau	9							3	1	2	1	2																		
	NLS-50/AUS	32											1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	278	7	9	9	8	10	11	9	9	10	8	9	9	10	11	10	10	10	10	9	10	10	10	10	10	10	10	10	10	10
	NLS-50/RPCmi	85									4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-50/CTV	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	NLS-HL/CTV	4									1	1		1				1													
	Titan IV/Centau	10				1			3	1	2	1	2																		
	NLS-50/AUS	32											1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	26		2	3	3	2	3	3	2	2	3	2	1																	
	Titan IV/Centau	21	2	2	2	1	2	1	2	2	2	2	2	1																	
	NLS-50	35												1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	35												1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	270									6	7	9	12	14	13	15	15	14	13	15	13	14	13	15	13	14	13	15	13	14
	Total Shuttle	307	8	10	10	9	11	12	10	10	11	9	10	10	11	12	11	11	11	11	10	11	11	11	11	11	11	11	11	11	11
	Total RPCmin	85									4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
IF E Changes																															
Additives	NLS-50/RPCmin	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	NLS-50/RPCmin	136									4	4	5	4	5	5	6	6	7	8	7	8	7	8	7	8	7	7	8	7	8
Additives	NLS-50/RPCmin	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	NLS-50/RPCmin	104									4	4	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	5	6

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.1-45.– ARCHITECTURE 14 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	38						2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	47	1	4	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	**78**	**2**	**5**	**3**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-46.– ARCHITECTURE 14 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	76						2	3	4	2	3	4	3	2	5	3	4	4	4	3	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	119	7	9	9	8	6	6	3	4	2	3	4	3	2	5	3	4	4	4	3	3	3	3	3	3	3	3	3	3	3
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	148	8	10	10	9	7	7	4	5	3	4	5	4	3	6	4	5	5	5	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-47.– ARCHITECTURE 14 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	199						2	9	9	9	8	10	9	7	10	9	9	9	7	8	9	8	8	8	9	8	8	9	9	8
	MR T IV+/RPCmi	84									4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/CTF	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	251	7	9	9	8	10	11	9	9	9	8	10	9	7	10	9	9	9	7	8	9	8	8	8	9	8	8	9	9	8
	MR T IV+/RPCm	84									4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan III	1	1																												
	Titan IV/CTF	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	280	8	10	10	9	11	12	10	10	10	9	11	10	8	11	10	10	10	8	9	10	9	9	9	10	9	9	10	10	9
	Total T/RPCmir	84									4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Total CTF	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-48.– ARCHITECTURE 14 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	233						2	9	9	11	10	11	12	10	12	9	9	11	9	9	10	10	10	10	10	10	10	10	10	10
	MR T IV+/RPCmi	85									4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	T IV/CTF	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	285	7	9	9	8	10	11	9	9	11	10	11	12	10	12	9	9	11	9	9	10	10	10	10	10	10	10	10	10	10
	MR T IV+/RPCm	85									4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan III	1	1																												
	Titan IV/CTF	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	314	8	10	10	9	11	12	10	10	12	11	12	13	11	13	10	10	12	10	10	11	11	11	11	11	11	11	11	11	11
	Total T/RPCmir	85									4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Total CTF	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
IF E Changes																															
Additives	MR T IV+/RPCmi	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	MR T IV+/RPCm	136									4	4	5	4	5	5	6	6	7	8	7	8	7	8	7	8	7	7	8	7	8
Additives	MR T IV+/RPCmi	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	MR T IV+/RPCm	104									4	4	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	5	6

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-49.– ARCHITECTURE 16 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	18						2	2	2	2	2	2	2	2	2															
	AMSC	26														1	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	27	1	4	2	1	1	2	2	2	2	2	2	2	2	2															
	AMSC	26														1	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	13	1	1	1	1	1	1	1	1	1	1	1	1	1																
	AMSC	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	40	2	5	3	2	2	3	3	3	3	3	3	3	3	2															
	AMSC	42														2	4	4	4	4	4	2	2	2	2	2	2	2	2	2	2

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-50.– ARCHITECTURE 16 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	33						2	3	4	2	2	3	3	2	4	2	3	2	1											
	AMSC	269														4	8	12	16	17	17	19	20	19	20	19	20	19	20	19	20
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	76	7	9	9	8	6	6	3	4	2	2	3	3	2	4	2	3	2	1											
	AMSC	269														4	8	12	16	17	17	19	20	19	20	19	20	19	20	19	20
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	13	1	1	1	1	1	1	1	1	1	1	1	1	1																
	AMSC	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	89	8	10	10	9	7	7	4	5	3	3	4	4	3	4	2	3	2	1											
	AMSC	285														5	9	13	17	18	18	20	21	20	21	20	21	20	21	20	21

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	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-51.– ARCHITECTURE 16 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	80						2	9	9	9	8	9	8	7	8	5	3	2	1											
	AMSC	334														6	12	18	21	21	21	23	24	23	24	23	24	23	24	23	24
	Titan IV/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	T IV/CTF/LRV	214														3	7	10	14	15	16	16	15	14	15	16	14	14	16	15	14
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	132	7	9	9	8	10	11	9	9	9	8	9	8	7	8	5	3	2	1											
	AMSC	334														6	12	18	21	21	21	23	24	23	24	23	24	23	24	23	24
	Titan IV/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	T IV/CTF/LRV	214														3	7	10	14	15	16	16	15	14	15	16	14	14	16	15	14
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	13	1	1	1	1	1	1	1	1	1	1	1	1	1																
	AMSC	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	145	8	10	10	9	11	12	10	10	10	9	10	9	8	8	5	3	2	1											
	AMSC	350														7	13	19	22	22	22	24	25	24	25	24	25	24	25	24	25
	LRV	214														3	7	10	14	15	16	16	15	14	15	16	14	14	16	15	14

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	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-52.– ARCHITECTURE 16 - "IF" D & E FLIGHT MANIFEST

Launch Site: **EAST**

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	95						2	9	9	11	8	10	10	9	10	7	5	3	2											
	AMSC	334														6	12	18	21	21	21	23	24	23	24	23	24	23	24	23	24
	Titan IV/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	T IV/CTF/LRV	281														3	7	10	14	16	22	22	21	20	21	22	20	20	22	21	20
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I																														
	Atlas IIAS	27	1	1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	147	7	9	9	8	10	11	9	9	11	8	10	10	9	10	7	5	3	2											
	AMSC	334														6	12	18	21	21	21	23	24	23	24	23	24	23	24	23	24
	Titan IV/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	T IV/CTF/LRV	281														3	7	10	14	16	22	22	21	20	21	22	20	20	22	21	20
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	13	1	1	1	1	1	1	1	1	1	1	1	1	1																
	AMSC	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	160	8	10	10	9	11	12	10	10	12	9	11	11	10	10	7	5	3	2											
	AMSC	350														7	13	19	22	22	22	24	25	24	25	24	25	24	25	24	25
	LRV	281														3	7	10	14	16	22	22	21	20	21	22	20	20	22	21	20
IF E Changes																															
Additives	AMSC	48															1	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	AMSC	398														7	14	21	25	26	25	28	28	28	28	28	28	27	29	27	29
Additives	AMSC	17															1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	AMSC	367														7	14	20	23	23	23	25	26	25	26	25	26	25	27	25	27

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	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-53.– ARCHITECTURE 17 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	11						2	2	2	1	1	1	1	1																
	Titan II/RUPC	42									2	3	3	3	3	3	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1
	Titan IV/CTF	21									1	2	2	2	2	2	2	2	2	2	2										
	T IV/CTF/LRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	20	1	4	2	1	1	2	2	2	1	1	1	1	1																
	Titan II/RUPC	42									2	3	3	3	3	3	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1
	Titan III	1	1																												
	Titan IV/CTF	21									1	2	2	2	2	2	2	2	2	2	2										
	T IV/CTF/LRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	Titan II/RUPC	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	T IV/CTF/LRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	28	2	5	3	2	2	3	3	3	1	1	1	1	1																
	Total RUPC	63									3	4	4	4	4	4	4	4	4	4	4	2	2	2	2	2	2	2	2	2	2
	Total CTF/LRV	42									2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total CTF only	21									1	2	2	2	2	2	2	2	2	2	2										

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	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-54.– ARCHITECTURE 17 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	15						2	3	4	2	1	1	2																	
	Titan II/RUPC	137									2	4	6	6	7	9	7	8	8	8	7	6	7	6	7	6	7	6	7	6	7
	Titan IV/CTF	24									1	2	3	2	2	3	2	2	3	2	2										
	T IV/CTF/LRV	113									1	2	3	4	5	6	5	6	5	6	5	6	7	6	7	6	7	6	7	6	7
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	58	7	9	9	8	6	6	3	4	2	1	1	2																	
	Titan II/RUPC	137									2	4	6	6	7	9	7	8	8	8	7	6	7	6	7	6	7	6	7	6	7
	Titan III	1	1																												
	Titan/CTF	24									1	2	3	2	2	3	2	2	3	2	2										
	Titan/CTF/LRV	113									1	2	3	4	5	6	5	6	5	6	5	6	7	6	7	6	7	6	7	6	7
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	Titan II/RUPC	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan/CTF/LRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	66	8	10	10	9	7	7	4	5	2	1	1	2																	
	Total RUPC	158									3	5	7	7	8	10	8	9	9	9	8	7	8	7	8	7	8	7	8	7	8
	Total CTF/LRV	134									2	3	4	5	6	7	6	7	6	7	6	7	8	7	8	7	8	7	8	7	8
	Total CTF only	24									1	2	3	2	2	3	2	2	3	2	2										

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-55.– ARCHITECTURE 17 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	46						2	9	9	9	6	5	4	1	1															
	Titan II/RUPC	221									6	8	10	10	11	13	11	12	12	12	11	10	11	10	11	10	11	10	11	10	11
	Titan IV/CTF	94									1	2	3	4	6	7	6	6	7	6	6	4	4	4	4	4	4	4	4	4	4
	T IV/CTF/LRV	395									4	8	12	16	19	19	22	21	19	20	21	22	22	20	22	22	21	20	23	21	21
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	98	7	9	9	8	10	11	9	9	9	6	5	4	1	1															
	Titan II/RUPC	221									6	8	10	10	11	13	11	12	12	12	11	10	11	10	11	10	11	10	11	10	11
	Titan III	1	1																												
	Titan IV/CTF	94									1	2	3	4	6	7	6	6	7	6	6	4	4	4	4	4	4	4	4	4	4
	T IV/CTF/LRV	395									4	8	12	16	19	19	22	21	19	20	21	22	22	20	22	22	21	20	23	21	21
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	Titan II/RUPC	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	T IV/CTF/LRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	106	8	10	10	9	11	12	10	10	9	6	5	4	1	1															
	Total T/RUPC	242									7	9	11	11	12	14	12	13	13	13	12	11	12	11	12	11	12	11	12	11	12
	Total CTF/LRV	416									5	9	13	17	20	20	23	22	20	21	22	23	23	21	23	23	22	21	24	22	22
	Total CTF only	94									1	2	3	4	6	7	6	6	7	6	6	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-56.– ARCHITECTURE 17 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	52						2	9	9	11	6	6	5	3	1															
	Titan II/RUPC	221									6	8	10	10	11	13	11	12	12	12	11	10	11	10	11	10	11	10	11	10	11
	Titan IV/CTF	94									1	2	3	4	6	7	6	6	7	6	6	4	4	4	4	4	4	4	4	4	4
	T IV/CTF/LRV	476									4	8	12	16	20	24	27	26	24	25	26	27	27	25	27	27	26	25	28	26	26
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	104	7	9	9	8	10	11	9	9	11	6	6	5	3	1															
	Titan II/RUPC	221									6	8	10	10	11	13	11	12	12	12	11	10	11	10	11	10	11	10	11	10	11
	Titan III	1	1																												
	Titan IV/CTF	94									1	2	3	4	6	7	6	6	7	6	6	4	4	4	4	4	4	4	4	4	4
	T IV/CTF/LRV	476									4	8	12	16	20	24	27	26	24	25	26	27	27	25	27	27	26	25	28	26	26
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	Titan II/RUPC	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	T IV/CTF/LRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	112	8	10	10	9	11	12	10	10	11	6	6	5	3	1															
	Total T/RUPC	242									7	9	11	11	12	14	12	13	13	13	12	11	12	11	12	11	12	11	12	11	12
	Total CTF/LRV	497									5	9	13	17	21	25	28	27	25	26	27	28	28	26	28	28	27	26	29	27	27
	Total CTF only	94									1	2	3	4	6	7	6	6	7	6	6	4	4	4	4	4	4	4	4	4	4
IF E Changes																															
Additives	Titan II/RUPC	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	Titan II/RUPC	293									7	9	11	11	13	15	14	15	16	17	15	15	15	15	15	15	15	14	16	14	16
Additives	Titan II/RUPC	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	Titan II/RUPC	261									7	9	11	11	13	15	13	14	14	14	13	12	13	12	13	12	13	12	14	12	14

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.1-57.– ARCHITECTURE 18 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	7							1	1	1	1	1	1	1																
	Delta II	19							1	3	1	1	1	3	1			2				2				2				2	
	Shuttle	17						2	2	2	2	2	2	2	2	1															
	TSTO(BETA II)	53														3	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	8				1			1	1	1	1	1	1	1																
	Delta II	22	2					1	1	3	1	1	1	3	1			2				2				2				2	
	Shuttle	26	1	4	2	1	1	2	2	2	2	2	2	2	2	1															
	TSTO(BETA II)	53														3	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	61	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	3	2	1											
	Shuttle	13	1	1	1	1	1	1	1	1	1	1	1	1	1																
	TSTO(BETA II)	66														1	1	2	3	4	5	5	5	5	5	5	5	5	5	5	5
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	39	2	5	3	2	2	3	3	3	3	3	3	3	3	1															
	TSTO(BETA II)	119														4	5	6	7	8	9	8	8	8	8	8	8	8	8	8	8

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	TSTO(BETA II)	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1

TABLE B.1.2.1-58.– ARCHITECTURE 18 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	8							1	1	1	1	1	1	1	1															
	Delta II	20							1	3	1	1	1	3	1	1		2				2				2				2	
	Shuttle	24						2	3	4	2	2	3	3	2	3															
	TSTO(BETA II)	126														3	7	8	8	8	7	8	9	8	9	8	9	8	9	8	9
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	9				1			1	1	1	1	1	1	1	1															
	Delta II	23	2					1	1	3	1	1	1	3	1	1		2				2				2				2	
	Shuttle	67	7	9	9	8	6	6	3	4	2	2	3	3	2	3															
	TSTO(BETA II)	126														3	7	8	8	8	7	8	9	8	9	8	9	8	9	8	9
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	61	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	3	2	1											
	Shuttle	13	1	1	1	1	1	1	1	1	1	1	1	1	1																
	TSTO(BETA II)	66														1	1	2	3	4	5	5	5	5	5	5	5	5	5	5	5
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	80	8	10	10	9	7	7	4	5	3	3	4	4	3	3															
	TSTO(BETA II)	192														4	8	10	11	12	12	13	14	13	14	13	14	13	14	13	14

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	TSTO(BETA II)	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1

TABLE B.1.2.1-59.– ARCHITECTURE 18 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	10							1	1	1	1	1	1	1	1	1	1													
	Atlas/CTF	4									1	2	1																		
	Delta II	22							1	3	1	1	1	3	1	1	1	3				2				2				2	
	Delta/CTF	1									1																				
	Shuttle	77						2	9	9	9	8	9	8	7	8	4	3	1												
	TSTO(BETA II)	323														3	9	15	21	21	23	24	23	22	24	23	23	22	24	23	23
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	11				1			1	1	1	1	1	1	1	1	1	1													
	Atlas/CTF	4									1	2	1																		
	Delta II	25	2					1	1	3	1	1	1	3	1	1	1	3				2				2				2	
	Delta/CTF	1									1																				
	Shuttle	129	7	9	9	8	10	11	9	9	9	8	9	8	7	8	4	3	1												
	TSTO(BETA II)	323														3	9	15	21	21	23	24	23	22	24	23	23	22	24	23	23
	Titan III	1	1																												
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	61	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	3	2	1											
	Shuttle	13	1	1	1	1	1	1	1	1	1	1	1	1	1																
	TSTO(BETA II)	66														1	1	2	3	4	5	5	5	5	5	5	5	5	5	5	5
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	142	8	10	10	9	11	12	10	10	10	9	10	9	8	8	4	3	1												
	TSTO(BETA II)	389														4	10	17	24	25	28	29	28	27	29	28	28	27	29	28	28
	Total CTF	84									3	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	TSTO(BETA II)	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1

TABLE B.1.2.1-60.– ARCHITECTURE 18 - "IF" D & E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	11							1	1	1	1	1	1	1	1	1	1	1												
	Atlas/CTF	4									1	2	1																		
	Delta II	24							1	3	1	1	1	3	1	1	1	3	1	1		2				2				2	
	Delta/CTF	1									1																				
	Shuttle	95						2	9	9	11	8	10	9	10	11	7	5	4												
	TSTO(BETA II)	418														3	9	15	21	28	31	32	31	30	32	31	31	30	32	31	31
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	12				1			1	1	1	1	1	1	1	1	1	1	1												
	Atlas/CTF	4									1	2	1																		
	Delta II	27	2					1	1	3	1	1	1	3	1	1	1	3	1	1		2				2				2	
	Delta/CTF	1									1																				
	Shuttle	147	7	9	9	8	10	11	9	9	11	8	10	9	10	11	7	5	4												
	TSTO(BETA II)	418														3	9	15	21	28	31	32	31	30	32	31	31	30	32	31	31
	Titan III	1	1																												
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	61	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	3	2	1											
	Shuttle	13	1	1	1	1	1	1	1	1	1	1	1	1	1																
	TSTO(BETA II)	66														1	1	2	3	4	5	5	5	5	5	5	5	5	5	5	5
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	160	8	10	10	9	11	12	10	10	12	9	11	10	11	11	7	5	4												
	TSTO(BETA II)	484														4	10	17	24	32	36	37	36	35	37	36	36	35	37	36	36
	Total CTF	84									3	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
IF E Changes																															
Additives	TSTO(BETA II)	48															1	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	TSTO(BETA II)	532														4	11	19	27	36	39	41	39	39	40	40	39	38	41	39	40
Additives	TSTO(BETA II)	17															1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	TSTO(BETA II)	501														4	11	18	25	33	37	38	37	36	38	37	37	36	39	37	38

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	TSTO(BETA II)	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1

B.1.2.2 Other Manifests

Tables B.1.2.2-1 through B.1.2.2-29 are the manifests developed by the NASA Industry Team (NIT) for architectures other than the 15 HTS baseline architectures, including architectures developed for the two sensitivity analyses mentioned below.

(1) The down-weight reduction sensitivity architectures have manifests for 57 percent and 14 percent of the mission model down-weight requirements for Space Station Freedom. Sortie Science was also eliminated. All are for If Scenario C only.

(2) The Shuttle Evolution II sensitivity architecture utilizes a modified evolutionary path from the original Shuttle evolution in Architecture 2. This includes a crew escape module and hybrid rocket boosters.

The architectures included are as follows:

- Architecture 1a - Derivative of Architecture 1 that includes a cargo transfer function for Titan IV. (Tables B.1.2.2-1 and B.1.2.2-2)
- Architecture 9 - Advanced Technology Phasing (AMLS) - Partially evaluated late in the study. (Tables B.1.2.2-3 through B.1.2.2-6)
- Architecture 10 - Advanced Technology Phasing (NDV) - Evaluated late in the study. (Tables B.1.2.2-7 through B.1.2.2-10)
- Architecture 19 - New Concept (Boeing Air Launched Vehicle) - Developed and evaluated late in the study. (Tables B.1.2.2-11 through B.1.2.2-14)

- Down-Weight Sensitivity Architectures (Tables B.1.2.2-15 through B.1.2.2-27):
  Architecture 1 (same manifest for 57% and 14% cases)
  Architecture 1a
  Architecture 3
  Architecture 5
  Architecture 6
  Architecture 7
  Architecture 17

- Shuttle Evolution II Sensitivity Architecture (Tables B.1.2.2-28 and B.1.2.2-29):
  Architecture 2 (Ifs B and C)

TABLE B.1.2.2-1.– ARCHITECTURE 01A - "IF" C (CTF) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	211						2	9	9	10	9	10	9	9	11	8	8	10	9	9	9	9	9	9	9	9	9	9	9	8
	Titan IV/CTF	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	263	7	9	9	8	10	11	9	9	10	9	10	9	9	11	8	8	10	9	9	9	9	9	9	9	9	9	9	9	8
	Titan IV/CTF	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Shuttle	292	8	10	10	9	11	12	10	10	11	10	11	10	10	12	9	9	11	10	10	10	10	10	10	10	10	10	10	10	9
	CTF	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.2-2.– ARCHITECTURE 01A -" IF" D&E (CTF) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	240						2	9	9	11	9	11	11	9	11	11	11	11	10	11	10	10	10	11	11	10	10	11	11	10
	Titan IV/CTF	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	292	7	9	9	8	10	11	9	9	11	9	11	11	9	11	11	11	11	10	11	10	10	10	11	11	10	10	11	11	10
	Titan IV/CTF	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	321	8	10	10	9	11	12	10	10	12	10	12	12	10	12	12	12	12	11	12	11	11	11	12	12	11	11	12	12	11
	CTF	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
IF E Changes																															
Additives	Shuttle	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	Shuttle	372	8	10	10	9	11	12	10	10	12	10	12	12	11	13	14	14	15	15	15	15	14	15	15	16	14	14	16	15	15
Additives	Shuttle	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	Shuttle	340	8	10	10	9	11	12	10	10	12	10	12	12	11	13	13	13	13	12	13	12	12	12	13	13	12	12	14	13	13

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.2-3.– ARCHITECTURE 09 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	7							1	1	1	1	1	1	1																
	Delta II	11							1	3	1	1	1	3	1																
	Shuttle	16						2	2	2	2	2	2	2	2																
	AMLS	46														3	3	5	3	3	3	4	2	2	2	4	2	2	2	4	2
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	8				1			1	1	1	1	1	1	1																
	Delta II	14	2					1	1	3	1	1	1	3	1																
	Shuttle	25	1	4	2	1	1	2	2	2	2	2	2	2	2																
	AMLS	46														3	3	5	3	3	3	4	2	2	2	4	2	2	2	4	2
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	2	1														
	Delta II	61	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	3	2	1											
	Shuttle	13	1	1	1	1	1	1	1	1	1	1	1	1	1																
	AMLS	95														1	2	4	5	6	7	7	7	7	7	7	7	7	7	7	7
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	38	2	5	3	2	2	3	3	3	3	3	3	3	3																
	AMLS	141														4	5	9	8	9	10	11	9	9	9	11	9	9	9	11	9

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.2-4.– ARCHITECTURE 09 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	7							1	1	1	1	1	1	1																
	Delta II	11							1	3	1	1	1	3	1																
	Shuttle	26						2	3	4	3	2	3	4	3	2															
	AMLS	69														3	3	6	4	4	3	6	4	4	4	6	4	4	4	6	4
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	8				1			1	1	1	1	1	1	1																
	Delta II	14	2					1	1	3	1	1	1	3	1																
	Shuttle	69	7	9	9	8	6	6	3	4	3	2	3	4	3	2															
	AMLS	69														3	3	6	4	4	3	6	4	4	4	6	4	4	4	6	4
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	2	1														
	Delta II	61	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	3	2	1											
	Shuttle	13	1	1	1	1	1	1	1	1	1	1	1	1	1																
	AMLS	95														1	2	4	5	6	7	7	7	7	7	7	7	7	7	7	7
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	82	8	10	10	9	7	7	4	5	4	3	4	5	4	2															
	AMLS	164														4	5	10	9	10	10	13	11	11	11	13	11	11	11	13	11

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.2-5.– ARCHITECTURE 09 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	11							1	1	1	1	1	1	1	1	1	1	1												
	Atlas/CTF	4									1	2	1																		
	Delta II	17							1	3	1	1	1	3	1	1	1	3	1												
	Delta/CTF	1									1																				
	Shuttle	79						2	9	9	9	7	9	9	8	7	5	4	1												
	AMLS	150														2	4	6	8	9	10	13	10	10	11	13	10	10	11	13	10
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	12				1			1	1	1	1	1	1	1	1	1	1	1												
	Atlas/CTF	4									1	2	1																		
	Delta II	20	2					1	1	3	1	1	1	3	1	1	1	3	1												
	Delta/CTF	1									1																				
	Shuttle	131	7	9	9	8	10	11	9	9	9	7	9	9	8	7	5	4	1												
	AMLS	150														2	4	6	8	9	10	13	10	10	11	13	10	10	11	13	10
	Titan III	1	1																												
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	2	1														
	Delta II	61	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	3	2	1											
	Shuttle	13	1	1	1	1	1	1	1	1	1	1	1	1	1																
	AMLS	95														1	2	4	5	6	7	7	7	7	7	7	7	7	7	7	7
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	144	8	10	10	9	11	12	10	10	10	8	10	10	9	7	5	4	1												
	AMLS	245														3	6	10	13	15	17	20	17	17	18	20	17	17	18	20	17
	Total CTF	84									3	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.2-6.– ARCHITECTURE 09 - "IF" D&E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	11							1	1	1	1	1	1	1	1	1	1	1												
	Atlas/CTF	3									1	2																			
	Delta II	17							1	3	1	1	1	3	1	1	1	3	1												
	Delta/CTF	1										1																			
	Shuttle	98						2	9	9	11	8	11	11	10	11	8	5	3												
	AMLS	188														2	4	7	9	12	13	16	13	13	14	16	13	13	14	16	13
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	12				1			1	1	1	1	1	1	1	1	1	1	1												
	Atlas/CTF	3									1	2																			
	Delta II	20	2					1	1	3	1	1	1	3	1	1	1	3	1												
	Delta/CTF	1										1																			
	Shuttle	150	7	9	9	8	10	11	9	9	11	8	11	11	10	11	8	5	3												
	AMLS	188														2	4	7	9	12	13	16	13	13	14	16	13	13	14	16	13
	Titan III	1	1																												
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	2	1														
	Delta II	61	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	3	2	1											
	Shuttle	13	1	1	1	1	1	1	1	1	1	1	1	1	1																
	AMLS	95														1	2	4	5	6	7	7	7	7	7	7	7	7	7	7	7
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	163	8	10	10	9	11	12	10	10	12	9	12	12	11	11	8	5	3												
	AMLS	283														3	6	11	14	18	20	23	20	20	21	23	20	20	21	23	20
	Total CTF	83									2	5	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
IF E Changes																															
Additives	Shuttle	1													1																
Additives	AMLS	50														1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	Shuttle	164	8	10	10	9	11	12	10	10	12	9	12	12	12	11	8	5	3												
SEI High Total	AMLS	333														4	8	13	17	22	23	27	23	24	24	27	23	23	25	26	24
Additives	Shuttle	1													1																
Additives	AMLS	18														1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI High Total	Shuttle	164	8	10	10	9	11	12	10	10	12	9	12	12	12	11	8	5	3												
SEI Low Total	AMLS	301														4	7	12	15	19	21	24	21	21	22	24	21	21	23	24	22

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.2-7.– ARCHITECTURE 10 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	12							1	1	1	1	1	1	1	1	1	1	1	1											
	Delta II	18							1	3	1	1	1	3	1	1	1	3	1	1											
	Shuttle	26						2	2	2	2	2	2	2	2	2	2	2	2	2											
	SSTO(Air)	29																			3	4	2	2	2	4	2	2	2	4	2
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	13				1			1	1	1	1	1	1	1	1	1	1	1	1											
	Delta II	21	2					1	1	3	1	1	1	3	1	1	1	3	1	1											
	Shuttle	35	1	4	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2											
	SSTO(Air)	29																			3	4	2	2	2	4	2	2	2	4	2
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	49	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1							
	Delta II	77	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	3	2	1							
	Shuttle	18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											
	SSTO(Air)	60																			1	2	3	5	7	7	7	7	7	7	7
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	53	2	5	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3											
	SSTO(Air)	89																			4	6	5	7	9	11	9	9	9	11	9

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	26		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1											
	Atlas E	1		1																											
	Delta II	20			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	1									
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	SSTO(Air)	26																			1	2	2	3	3	2	3	2	3	3	2
	SSTO(Air)	26																			1	2	2	3	3	2	3	2	3	3	2

TABLE B.1.2.2-8.– ARCHITECTURE 10 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	15							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1								
	Delta II	23							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1								
	Shuttle	42						2	3	4	2	2	3	3	2	4	2	3	3	3	2	2	2								
	SSTO(Air)	73																			1	3	5	7	8	9	8	7	8	9	8
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	16				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1								
	Delta II	26	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1								
	Shuttle	85	7	9	9	8	6	6	3	4	2	2	3	3	2	4	2	3	3	3	2	2	2								
	SSTO(Air)	73																			1	3	5	7	8	9	8	7	8	9	8
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	49	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1							
	Delta II	77	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	3	2	1							
	Shuttle	18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											
	SSTO(Air)	60																			1	2	3	5	7	7	7	7	7	7	7
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	103	8	10	10	9	7	7	4	5	3	3	4	4	3	5	3	4	4	4	2	2	2								
	SSTO(Air)	133																			2	5	8	12	15	16	15	14	15	16	15

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	26		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1											
	Atlas E	1		1																											
	Delta II	20			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	1									
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	SSTO(Air)	26																			1	2	2	3	3	2	3	2	3	3	2
	SSTO(Air)	26																			1	2	2	3	3	2	3	2	3	3	2

TABLE B.1.2.2-9.– ARCHITECTURE 10 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	15							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1								
	Atlas/CTF	4									1	2	1																		
	Delta II	23							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1								
	Delta/CTF	1									1																				
	Shuttle	119						2	9	9	9	7	9	8	7	9	8	8	8	8	6	6	4	2							
	SSTO(Air)	167																			3	7	11	15	19	20	18	17	19	20	18
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	16				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1								
	Atlas/CTF	4									1	2	1																		
	Delta II	26	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1								
	Delta/CTF	1									1																				
	Shuttle	171	7	9	9	8	10	11	9	9	9	7	9	8	7	9	8	8	8	8	6	6	4	2							
	SSTO(Air)	167																			3	7	11	15	19	20	18	17	19	20	18
	Titan III	1	1																												
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	49	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1							
	Delta II	77	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	3	2	1							
	Shuttle	18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											
	SSTO(Air)	60																			1	2	3	5	7	7	7	7	7	7	7
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	189	8	10	10	9	11	12	10	10	10	8	10	9	8	10	9	9	9	9	6	6	4	2							
	SSTO(Air)	227																			4	9	14	20	26	27	25	24	26	27	25
	Total CTF	84									3	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	26		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1											
	Atlas E	1		1																											
	Delta II	20			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	1									
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	SSTO(Air)	26																			1	2	2	3	3	2	3	2	3	3	2
	SSTO(Air)	26																			1	2	2	3	3	2	3	2	3	3	2

TABLE B.1.2.2-10.– ARCHITECTURE 10 - "IF" D&E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	16							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							
	Atlas/CTF	3									1	2																			
	Delta II	24							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1							
	Delta/CTF	1										1																			
	Shuttle	148						2	9	9	11	9	10	10	10	11	11	10	11	10	9	8	6	2							
	SSTO(Air)	235																			3	9	15	21	27	28	26	25	27	28	26
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	17				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							
	Atlas/CTF	3									1	2																			
	Delta II	27	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1							
	Delta/CTF	1										1																			
	Shuttle	200	7	9	9	8	10	11	9	9	11	9	10	10	10	11	11	10	11	10	9	8	6	2							
	SSTO(Air)	235																			3	9	15	21	27	28	26	25	27	28	26
	Titan III	1	1																												
	Titan/CTF	79									1	2	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	49	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1							
	Delta II	77	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	3	2	1							
	Shuttle	18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											
	SSTO(Air)	60																			1	2	3	5	7	7	7	7	7	7	7
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	218	8	10	10	9	11	12	10	10	12	10	11	11	11	12	12	11	12	11	9	8	6	2							
	SSTO(Air)	295																			4	11	18	26	34	35	33	32	34	35	33
	Total CTF	83									2	5	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
IF E Changes																															
Additives	Shuttle	13													1	1	2	2	3	4											
Additives	SSTO(Air)	38																			3	4	3	4	3	4	3	3	4	3	4
SEI High Total	Shuttle	231	8	10	10	9	11	12	10	10	12	10	11	11	12	13	14	13	15	15	9	8	6	2							
	SSTO(Air)	333																			7	15	21	30	37	39	36	35	38	38	37
Additives	Shuttle	6													1	1	1	1	1	1											
Additives	SSTO(Air)	13																			1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	Shuttle	224	8	10	10	9	11	12	10	10	12	10	11	11	12	13	13	12	13	12	9	8	6	2							
	SSTO(Air)	308																			5	12	19	27	35	36	34	33	36	36	35

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	26		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1											
	Atlas E	1		1																											
	Delta II	20			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	1									
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	SSTO(Air)	26																			1	2	2	3	3	2	3	2	3	3	2
	SSTO(Air)	26																			1	2	2	3	3	2	3	2	3	3	2

TABLE B.1.2.2-11.– ARCHITECTURE 19 - "IF" A FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	9	1	4	2	1	1																								
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	2							1	1																					
	Delta II	4							1	3																					
	ALV-A	52									2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2
	Shuttle	6						2	2	2																					
	ALV-B/RPCmin	32									2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/CTF/LR	32									2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	3				1			1	1																					
	Delta II	7	2					1	1	3																					
	ALV-A	52									2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2
	Shuttle	15	1	4	2	1	1	2	2	2																					
	ALV-B/RPCmin	32									2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan IV/CTF/LR	32									2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	33	3	2	3	4	4	2	2	2	2	2	2	2	2	1															
	Delta II	37	6	4	2	1	3	3	4	4	4	3	2	1																	
	ALV-A	105										1	2	3	4	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	Shuttle	8	1	1	1	1	1	1	1	1																					
	ALV-B/RPCmin	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	T IV/CTF/LRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	23	2	5	3	2	2	3	3	3																					
	ALV-B/RPCmin	53									3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2
	TIV/CTF/LRV	53									3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2
	Total ALV	210									5	6	7	10	9	10	11	13	11	11	11	12	10	10	10	12	10	10	10	12	10

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Titan IV/NUS	4						2		2																					
	ALV-A	5										1				1				1				1				1			
	ALV-B	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
	Titan IV/NUS	4						2		2																					
	ALV-A	5										1				1				1				1				1			
	ALV-B	20										2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	16		2	2	1	1	2	2	2	1	2	1																		
	Atlas E	1		1																											
	Delta II	7			1	1	1	1	1	1	1																				
	Titan IV/NUS	19	3	2	2	1	2	1	2	2	2	1	1																		
	ALV-A	49										1	2	2	3	2	3	2	3	3	2	3	2	3	3	2	3	2	3	3	2
	ALV-B	38										1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ALV-High Incl	112										5	3	6	5	7	5	6	5	8	4	7	4	8	5	6	5	7	5	7	4

TABLE B.1.2.2-12.– ARCHITECTURE 19 - "IF" B FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	2							1	1																					
	Delta II	4							1	3																					
	ALV-A	52									2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2
	Shuttle	10						2	3	4	1																				
	ALV-B/RPCmin	120									3	5	6	6	5	7	5	6	6	6	5	6	6	6	6	6	6	6	6	6	6
	Titan IV/CTF/LR	120									3	5	6	6	5	7	5	6	6	6	5	6	6	6	6	6	6	6	6	6	6
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	3				1			1	1																					
	Delta II	7	2					1	1	3																					
	ALV-A	52									2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2
	Shuttle	53	7	9	9	8	6	6	3	4	1																				
	ALV-B/RPCmin	120									3	5	5	6	5	7	5	6	6	6	5	6	6	6	6	6	6	6	6	6	6
	Titan IV/CTF/LR	120									3	5	6	6	5	7	5	6	6	6	5	6	6	6	6	6	6	6	6	6	6
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	33	3	2	3	4	4	2	2	2	2	2	2	2	2	1															
	Delta II	37	6	4	2	1	3	3	4	4	4	3	2	1																	
	ALV-A	105										1	2	3	4	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	Shuttle	8	1	1	1	1	1	1	1	1																					
	ALV-B/RPCmin	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	T IV/CTF/LRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	61	8	10	10	9	7	7	4	5	1																				
	ALV-B/RPCmin	141									4	6	7	7	6	8	6	7	7	7	6	7	7	7	7	7	7	7	7	7	7
	TIV/CTF/LRV	141									4	6	7	7	6	8	6	7	7	7	6	7	7	7	7	7	7	7	7	7	7
	Total ALV	298									6	9	11	14	12	15	14	17	15	15	14	17	15	15	15	17	15	15	15	17	15

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Titan IV/NUS	4						2		2																					
	ALV-A	5										1				1				1				1				1			
	ALV-B	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
	Titan IV/NUS	4						2		2																					
	ALV-A	5										1				1				1				1				1			
	ALV-B	20										2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	16		2	2	1	1	2	2	2	1	2	1																		
	Atlas E	1		1																											
	Delta II	7			1	1	1	1	1	1	1																				
	Titan IV/NUS	19	3	2	2	1	2	1	2	2	2	1	1																		
	ALV-A	49										1	2	2	3	2	3	2	3	3	2	3	2	3	3	2	3	2	3	3	2
	ALV-B	38										1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ALV-High Incl	112										5	3	6	5	7	5	6	5	8	4	7	4	8	5	6	5	7	5	7	4

TABLE B.1.2.2-13.– ARCHITECTURE 19 - "IF" C FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	2							1	1																					
	Delta II	4							1	3																					
	ALV-A	52									2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2
	Shuttle	41						2	9	9	9	5	4	3																	
	ALV-B/RPCmin	193									3	5	7	10	9	11	9	10	10	10	9	10	10	10	10	10	10	10	10	10	10
	ALV-A/CTF	86									1	2	3	4	5	4	4	8	5	4	4	5	5	4	4	4	4	4	4	4	4
	ALV-B/CTF	11									1			1	1			1	1			1	1			1	1			1	1
	T IV/CTF/LRV	406									5	10	15	20	19	21	22	23	20	21	21	22	21	20	21	22	20	20	22	21	20
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	3				1			1	1																					
	Delta II	7	2					1	1	3																					
	ALV-A	52									2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2
	Shuttle	93	7	9	9	8	10	11	9	9	9	5	4	3																	
	ALV-B/RPCmin	193									3	5	7	10	9	11	9	10	10	10	9	10	10	10	10	10	10	10	10	10	10
	ALV-A/CTF	86									1	2	3	4	5	4	4	8	5	4	4	5	5	4	4	4	4	4	4	4	4
	ALV-B/CTF	11									1			1	1			1	1			1	1			1	1			1	1
	T IV/CTF/LRV	406									5	10	15	20	19	21	22	23	20	21	21	22	21	20	21	22	20	20	22	21	20
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	33	3	2	3	4	4	2	2	2	2	2	2	2	2	1															
	Delta II	37	6	4	2	1	3	3	4	4	4	3	2	1																	
	ALV-A	105										1	2	3	4	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	Shuttle	8	1	1	1	1	1	1	1	1																					
	ALV-B/RPCmin	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	T IV/CTF/LRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	101	8	10	10	9	11	12	10	10	9	5	4	3																	
	ALV-B/RPCmin	214									4	6	8	11	10	12	10	11	11	11	10	11	11	11	11	11	11	11	11	11	11
	ALV/CTF	97									2	2	3	5	6	4	4	9	6	4	4	6	6	4	4	5	5	4	4	5	5
	TIV/CTF/LRV	406									5	10	15	20	19	21	22	23	20	21	21	22	21	20	21	22	20	20	22	21	20
	Total ALV	468									8	11	15	23	22	23	22	30	25	23	22	27	25	23	23	26	24	23	23	26	24

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Titan IV/NUS	4						2		2																					
	ALV-A	5										1				1				1				1				1			
	ALV-B	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
	Titan IV/NUS	4						2		2																					
	ALV-A	5										1				1				1				1				1			
	ALV-B	20										2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	16		2	2	1	1	2	2	2	1	2	1																		
	Atlas E	1		1																											
	Delta II	7			1	1	1	1	1	1	1																				
	Titan IV/NUS	19	3	2	2	1	2	1	2	2	2	1	1																		
	ALV-A	49										1	2	2	3	2	3	2	3	3	2	3	2	3	3	2	3	2	3	3	2
	ALV-B	38										1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ALV-High Incl	112										5	3	6	5	7	5	6	5	8	4	7	4	8	5	6	5	7	5	7	4

TABLE B.1.2.2-14.– ARCHITECTURE 19 - "IF" D&E FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	2							1	1																					
	Delta II	4							1	3																					
	ALV-A	52									2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2
	Shuttle	45						2	9	9	9	6	4	5	1																
	ALV-B/RPCmin	193									3	5	7	10	9	11	9	10	10	10	9	10	10	10	10	10	10	10	10	10	10
	ALV-A/CTF	86									1	2	3	4	5	4	4	8	5	4	4	5	5	4	4	4	4	4	4	4	4
	ALV-B/CTF	11									1			1	1			1	1			1	1			1	1			1	1
	T IV/CTF/LRV	507									5	10	15	20	25	27	28	29	26	26	27	28	27	26	27	28	26	26	28	27	26
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	6	1	1		1		1	1	1																					
	Delta II	7	2					1	1	3																					
	ALV-A	52									2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2
	Shuttle	97	7	9	9	8	10	11	9	9	9	6	4	5	1																
	ALV-B/RPCmin	193									3	5	7	10	9	11	9	10	10	10	9	10	10	10	10	10	10	10	10	10	10
	ALV-A/CTF	86									1	2	3	4	5	4	4	8	5	4	4	5	5	4	4	4	4	4	4	4	4
	ALV-B/CTF	11									1			1	1			1	1			1	1			1	1			1	1
	T IV/CTF/LRV	507									5	10	15	20	25	27	28	29	26	26	27	28	27	26	27	28	26	26	28	27	26
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	33	3	2	3	4	4	2	2	2	2	2	2	2	2	1															
	Delta II	37	6	4	2	1	3	3	4	4	4	3	2	1																	
	ALV-A	105										1	2	3	4	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	Shuttle	8	1	1	1	1	1	1	1	1																					
	ALV-B/RPCmin	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	T IV/CTF/LRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	105	8	10	10	9	11	12	10	10	9	6	4	5	1																
	ALV-B/RPCmin	214									4	6	8	11	10	12	10	11	11	11	10	11	11	11	11	11	11	11	11	11	11
	ALV/CTF	97									2	2	3	5	6	4	4	9	6	4	4	6	6	4	4	5	5	4	4	5	5
	TIV/CTF/LRV	528									6	11	16	21	26	28	29	30	27	27	28	29	28	27	28	29	27	27	29	28	27
	Total ALV	468									8	11	15	23	22	23	22	30	25	23	22	27	25	23	23	26	24	23	23	26	24
IF E Changes																															
Additives	ALV-B/RPCmin	51													1	1	2	2	3	4	3	4	3	4	3	4	3	3	4	3	4
SEI High Total	ALV-B/RPCmin	265									4	6	8	11	11	13	12	13	14	15	13	15	14	15	14	15	14	14	15	14	15
Additives	ALV-B/RPCmin	19													1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
SEI Low Total	ALV-B/RPCmin	233									4	6	8	11	11	13	11	12	12	12	11	12	12	12	12	12	12	12	13	12	13

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Titan IV/NUS	4						2		2																					
	ALV-A	5										1				1				1				1				1			
	ALV-B	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
	Titan IV/NUS	4						2		2																					
	ALV-A	5										1				1				1				1				1			
	ALV-B	20										2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	16		2	2	1	1	2	2	2	1	2	1																		
	Atlas E	1		1																											
	Delta II	7			1	1	1	1	1	1	1																				
	Titan IV/NUS	19	3	2	2	1	2	1	2	2	2	1	1																		
	ALV-A	49										1	2	2	3	2	3	2	3	3	2	3	2	3	3	2	3	2	3	3	2
	ALV-B	38										1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	ALV-High Incl	112										5	3	6	5	7	5	6	5	8	4	7	4	8	5	6	5	7	5	7	4

TABLE B.1.2.2-15.– ARCHITECTURE 01 - "IF" C (57&14%) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	20	1	4	2	1	5	7																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	158							6	6	8	6	6	7	7	7	6	8	6	6	6	8	8	7	7	8	7	7	7	7	7
	Titan IV/Centau	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	178	1	4	2	1	5	7	6	6	8	6	6	7	7	7	6	8	6	6	6	8	8	7	7	8	7	7	7	7	7
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Shuttle	207	2	5	3	2	6	8	7	7	9	7	7	8	8	8	7	9	7	7	7	9	9	8	8	9	8	8	8	8	8

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.2-16.– ARCHITECTURE 01A - "IF" C (57%) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	147						2	7	7	8	7	8	7	5	6	6	5	7	6	5	7	6	6	6	6	6	6	6	6	6
	Titan IV/CTF	54									1	1		2	3	4	2	5	2	2	3	2	3	3	3	3	3	3	3	3	3
	Titan IV/Centau	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	199	7	9	9	8	10	11	7	7	8	7	8	7	5	6	6	5	7	6	5	7	6	6	6	6	6	6	6	6	6
	Titan IV/CTF	54									1	1		2	3	4	2	5	2	2	3	2	3	3	3	3	3	3	3	3	3
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Shuttle	228	8	10	10	9	11	12	8	8	9	8	9	8	6	7	7	6	8	7	6	8	7	7	7	7	7	7	7	7	7
	CTF	54									1	1		2	3	4	2	5	2	2	3	2	3	3	3	3	3	3	3	3	3

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.2-17.– ARCHITECTURE 01A - "IF" C (14%) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	139						2	7	7	8	6	6	6	5	6	5	5	6	5	5	6	6	6	6	6	6	6	6	6	6
	Titan IV/CTF	74									1	2	3	4	4	4	4	5	4	4	4	4	3	3	4	4	3	3	4	4	3
	Titan IV/Centau	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	191	7	9	9	8	10	11	7	7	8	6	6	6	5	6	5	5	6	5	5	6	6	6	6	6	6	6	6	6	6
	Titan IV/CTF	74									1	2	3	4	4	4	4	5	4	4	4	4	3	3	4	4	3	3	4	4	3
	Titan III	1	1																												
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Shuttle	220	8	10	10	9	11	12	8	8	9	7	7	7	6	7	6	6	7	6	6	7	7	7	7	7	7	7	7	7	7
	CTF	74									1	2	3	4	4	4	4	5	4	4	4	4	3	3	4	4	3	3	4	4	3

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.2-18.– ARCHITECTURE 03 - "IF" C (57%) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	4							1	1	1	1																			
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	140						2	7	7	8	5	6	5	5	7	6	5	6	5	5	6	6	6	6	6	6	6	7	6	6
	Titan IV/Centau	7							3	1	1		2																		
	NLS-50/CTV	31									1	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
	NLS-HL/CTV	31									1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	8				1			1	1	1	1	1	1	1																
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	192	7	9	9	8	10	11	7	7	8	5	6	5	5	7	6	5	6	5	5	6	6	6	6	6	6	6	7	6	6
	Titan IV/Centau	8				1			3	1	1		2																		
	NLS-50/CTV	31									1	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
	NLS-HL/CTV	31									1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	1	1	1													
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	2	2																			
	Titan IV/Centau	18	2	2	2	1	2	1	2	2	2	1	1																		
	NLS-20	29														1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	38										1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	218									3	6	7	8	9	10	12	10	12	11	13	11	12	11	13	11	12	11	13	11	12
	Total Shuttle	221	8	10	10	9	11	12	8	8	9	6	7	6	6	8	7	6	7	6	6	7	7	7	7	7	7	7	8	7	7
	Total CTV	62									2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-20	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	68									1	2	1	3	2	4	3	4	4	4	3	4	3	5	3	4	3	4	4	4	3

TABLE B.1.2.2-19.– ARCHITECTURE 03 - "IF" C (14%) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	4							1	1	1	1																			
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	137						2	7	7	7	5	6	6	5	6	5	5	6	5	5	6	6	6	6	6	6	6	6	6	6
	Titan IV/Centau	7							3	1	1		2																		
	NLS-50/CTV																														
	NLS-HL/CTV	60									1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	8				1			1	1	1	1	1	1	1																
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	189	7	9	9	8	10	11	7	7	7	5	6	6	5	6	5	5	6	5	5	6	6	6	6	6	6	6	6	6	6
	Titan IV/Centau	8				1			3	1	1		2																		
	NLS-HL/CTV	60									1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	NLS-20	16														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	NLS-50/AUS	34									1	1	1	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	35	3	2	3	4	4	2	2	2	2	2	2	2	2	1	1	1													
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	2	2																			
	Titan IV/Centau	18	2	2	2	1	2	1	2	2	2	1	1																		
	NLS-20	29														1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	NLS-50/AUS	38										1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	216									2	5	7	8	9	10	12	10	12	11	13	11	12	11	13	11	12	11	13	11	12
	Total Shuttle	218	8	10	10	9	11	12	8	8	8	6	7	7	6	7	6	6	7	6	6	7	7	7	7	7	7	7	7	7	7
	Total CTV	60									1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	NLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	20		2	2	1	1	2	2	2	1	2	2	1	2																
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	NLS-20	19														1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	NLS-50	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total NLS	68									1	2	1	3	2	4	3	4	4	4	3	4	3	5	3	4	3	4	4	4	3

TABLE B.1.2.2-20.– ARCHITECTURE 05 - "IF" C (57%) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	32						2	7	7	7	5	2	2																	
	MLS-HL/CLV	119									2	4	6	5	5	6	5	5	6	5	5	6	7	6	7	6	7	6	7	6	7
	MLS-HL/CRV	106									1	2	3	4	5	6	6	7	5	5	6	5	6	5	6	6	5	5	7	5	6
	Titan IV/Centau	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	84	7	9	9	8	10	11	7	7	7	5	2	2																	
	MLS-HL/CLV	119									2	4	6	5	5	6	5	5	6	5	5	6	7	6	7	6	7	6	7	6	7
	MLS-HL/CRV	106									1	2	3	4	5	6	6	7	5	5	6	5	6	5	6	6	5	5	7	5	6
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-HL/CLV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	**92**	**8**	**10**	**10**	**9**	**11**	**12**	**8**	**8**	**7**	**5**	**2**	**2**																	
	MLS-HL/CLV	**140**									**3**	**5**	**7**	**6**	**6**	**7**	**6**	**6**	**7**	**6**	**6**	**7**	**8**	**7**	**8**	**7**	**8**	**7**	**8**	**7**	**8**
	MLS-HL/CRV	**106**									**1**	**2**	**3**	**4**	**5**	**6**	**6**	**7**	**5**	**5**	**6**	**5**	**6**	**5**	**6**	**6**	**5**	**5**	**7**	**5**	**6**
	MLS-X	**47**									**1**	**1**	**1**	**2**	**2**	**2**	**4**	**2**	**2**	**2**	**4**	**2**	**2**	**2**	**4**	**2**	**2**	**2**	**4**	**2**	**2**
	MLS-HL	**311**									**5**	**9**	**13**	**13**	**15**	**16**	**15**	**16**	**16**	**14**	**15**	**15**	**18**	**15**	**17**	**16**	**17**	**15**	**18**	**15**	**18**

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	**49**									**1**	**2**	**1**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**

TABLE B.1.2.2-21.– ARCHITECTURE 05 - "IF" C (14%) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	32						2	7	7	7	5	2	2																	
	MLS-HL/CLV	124									2	4	6	7	5	8	5	5	6	5	5	6	7	6	7	6	7	6	7	6	8
	MLS-HL/CTF	97									1	2	3	4	5	5	5	7	5	5	5	5	5	5	5	5	5	5	5	5	5
	Titan IV/Centau	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	84	7	9	9	8	10	11	7	7	7	5	2	2																	
	MLS-HL/CLV	124									2	4	6	7	5	8	5	5	6	5	5	6	7	6	7	6	7	6	7	6	8
	MLS-HL/CTF	97									1	2	3	4	5	5	5	7	5	5	5	5	5	5	5	5	5	5	5	5	5
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-HL/CLV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	92	8	10	10	9	11	12	8	8	7	5	2	2																	
	MLS-HL/CLV	145									3	5	7	8	6	9	6	6	7	6	6	7	8	7	8	7	8	7	8	7	9
	MLS-HL/CTF	97									1	2	3	4	5	5	5	7	5	5	5	5	5	5	5	5	5	5	5	5	5
	MLS-X	47									1	1	1	2	2	2	4	2	2	2	4	2	2	2	4	2	2	2	4	2	2
	MLS-HL	307									5	9	13	15	15	17	14	16	16	14	14	15	17	15	16	15	17	15	16	15	18

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.2-22.– ARCHITECTURE 06 - "IF" C (57%) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	22						2	7	7	5	1																			
	MLS-X/RPCmin	127									5	5	6	6	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	MLS-HL/CRV	126									3	6	7	6	5	7	5	5	6	5	5	6	7	6	7	6	7	6	7	6	8
	MLS-HL/CTF	96									1	2	3	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	5	5
	Titan IV/Centau	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	74	7	9	9	8	10	11	7	7	5	1																			
	MLS-X/RPCmin	127									5	5	6	6	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	MLS-HL/CRV	126									3	6	7	6	5	7	5	5	6	5	5	6	7	6	7	6	7	6	7	6	8
	MLS-HL/CTF	96									1	2	3	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	5	5
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-X/RPCmin	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MLS-HL/CRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	**82**	**8**	**10**	**10**	**9**	**11**	**12**	**8**	**8**	**5**	**1**																			
	MLS-X/RPCmin	**148**									**6**	**6**	**7**	**7**	**6**	**8**	**6**	**7**	**7**	**7**	**6**	**7**	**8**	**7**	**8**	**7**	**8**	**7**	**8**	**7**	**8**
	MLS-HL/CRV	**147**									**4**	**7**	**8**	**7**	**6**	**8**	**6**	**6**	**7**	**6**	**6**	**7**	**8**	**7**	**8**	**7**	**8**	**7**	**8**	**7**	**9**
	MLS-HL	**308**									**6**	**11**	**14**	**14**	**15**	**16**	**14**	**14**	**16**	**14**	**14**	**15**	**17**	**15**	**16**	**15**	**17**	**15**	**17**	**15**	**18**
	MLS-X	**195**									**7**	**7**	**8**	**9**	**8**	**10**	**10**	**9**	**9**	**9**	**10**	**9**	**10**	**9**	**12**	**9**	**10**	**9**	**12**	**9**	**10**

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	**49**									**1**	**2**	**1**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**

TABLE B.1.2.2-23.– ARCHITECTURE 06 - "IF" C (14%) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	27						2	7	7	6	3	2																		
	MLS-X/RPCmin	127									5	5	6	6	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	MLS-HL/CRV	119									1	3	4	6	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	MLS-HL/CTF	67									1	2	3	3	4	3	4	4	4	3	4	4	4	3	3	3	3	3	3	3	3
	Titan IV/Centau	7							3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	79	7	9	9	8	10	11	7	7	6	3	2																		
	MLS-X/RPCmin	127									5	5	6	6	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	MLS-HL/CRV	119									1	3	4	6	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	MLS-HL/CTF	67									1	2	3	3	4	3	4	4	4	3	4	4	4	3	3	3	3	3	3	3	3
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	8															2				2				2				2		
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-X/RPCmin	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MLS-HL/CRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	87	8	10	10	9	11	12	8	8	6	3	2																		
	MLS-X/RPCmin	148									6	6	7	7	6	8	6	7	7	7	6	7	8	7	8	7	8	7	8	7	8
	MLS-HL/CRV	140									2	4	5	7	6	8	6	7	7	7	6	7	8	7	8	7	8	7	8	7	8
	MLS-HL	272									4	8	11	13	14	14	13	14	15	13	13	14	16	13	14	13	15	13	14	13	15
	MLS-X	195									7	7	8	9	8	10	10	9	9	9	10	9	10	9	12	9	10	9	12	9	10

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.2-24.– ARCHITECTURE 07 - "IF" C (57%) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	5							1	1	1	1	1																		
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	26						2	7	7	5	2	2	1																	
	MLS-HL/LRV/RPCmin	127									5	5	6	6	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	MLS-HL/CRV	57									1	2	2	3	3	2	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3
	MLS-X/CTF	96									1	2	3	4	5	5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5
	Titan IV/Centau	7							3	1	1		2																		
	MLS-X	26												1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	6				1			1	1	1	1	1																		
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	78	7	9	9	8	10	11	7	7	5	2	2	1																	
	MLS-HL/LRV/RPCml	127									5	5	6	6	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	MLS-HL/CRV	57									1	2	2	3	3	2	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3
	MLS-X/CTF	96									1	2	3	4	5	5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	26												1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-HL/LRV/RPCml	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	86	8	10	10	9	11	12	8	8	5	2	2	1																	
	MLS-HL/LRV/RPCml	148									6	6	7	7	6	8	6	7	7	7	6	7	8	7	8	7	8	7	8	7	8
	MLS-HL/CRV	57									1	2	2	3	3	2	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3
	MLS-X/CTF	96									1	2	3	4	5	5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5
	MLS-HL	270									8	10	12	13	13	13	12	12	14	13	12	13	15	13	14	13	15	13	14	13	15
	MLS-X	161									2	3	4	7	8	8	10	9	8	8	10	8	8	8	10	8	8	8	10	8	8

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.2-25.– ARCHITECTURE 07 - "IF" C (14%) FLIGHT MANIFEST

Launch Site: EAST	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	5							1	1	1	1	1																		
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	34						2	7	7	6	5	3	3	1																
	MLS-HL/LRV/RPCmin	125									5	5	6	6	5	7	5	5	6	5	5	6	7	6	7	6	7	6	7	6	7
	MLS-X/CTF	137									1	2	4	5	6	7	8	9	7	8	7	7	8	7	7	8	7	7	8	7	7
	Titan IV/Centau	7							3	1	1		2																		
	MLS-X	26												1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	6				1			1	1	1	1	1																		
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	86	7	9	9	8	10	11	7	7	6	5	3	3	1																
	MLS-HL/LRV/RPCml	125									5	5	6	6	5	7	5	5	6	5	5	6	7	6	7	6	7	6	7	6	7
	MLS-X/CTF	137									1	2	4	5	6	7	8	9	7	8	7	7	8	7	7	8	7	7	8	7	7
	Titan III	1	1																												
	Titan IV/Centau	8				1			3	1	1		2																		
	MLS-X	26												1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1
	MLS-HL	26									1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	MLS-HL/LRV/RPCml	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	22		2	3	3	2	3	3	2	1	2	1																		
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	2	1																			
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MLS-HL	39										1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	94	8	10	10	9	11	12	8	8	6	5	3	3	1																
	MLS-HL/LRV/RPCml	146									6	6	7	7	6	8	6	6	7	6	6	7	8	7	8	7	8	7	8	7	8
	MLS-X/CTF	137									1	2	4	5	6	7	8	9	7	8	7	7	8	7	7	8	7	7	8	7	7
	MLS-HL	211									7	8	10	10	10	11	9	9	11	9	9	10	12	10	11	10	12	10	11	10	12
	MLS-X	202									2	3	5	8	9	10	13	12	10	11	12	10	11	10	12	11	10	10	13	10	10

Launch Site: WEST	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	4						2		2																					
	MLS-HL	10										1		1		1		1		1		1		1		1		1		1	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	MLS-X	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total MLS	49									1	2	1	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2

TABLE B.1.2.2-26.– ARCHITECTURE 17 - "IF" C (57%) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	35						2	7	7	7	4	3	3	1	1															
	Titan II/RUPC	127									5	5	6	6	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	Titan IV/CTF	83									1	2	3	4	4	5	4	6	5	4	4	4	5	4	4	4	4	4	4	4	4
	T IV/CTF/LRV	187									2	4	6	8	8	8	10	10	8	11	10	11	10	9	11	11	10	9	11	10	10
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	87	7	9	9	8	10	11	7	7	7	4	3	3	1	1															
	Titan II/RUPC	127									5	5	6	6	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	Titan III	1	1																												
	Titan IV/CTF	83									1	2	3	4	4	5	4	6	5	4	4	4	5	4	4	4	4	4	4	4	4
	T IV/CTF/LRV	187									2	4	6	8	8	8	10	10	8	11	10	11	10	9	11	11	10	9	11	10	10
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	Titan II/RUPC	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	T IV/CTF/LRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	95	8	10	10	9	11	12	8	8	7	4	3	3	1	1															
	Total T/RUPC	148									6	6	7	7	6	8	6	7	7	7	6	7	8	7	8	7	8	7	8	7	8
	Total CTF/LRV	208									3	5	7	9	9	9	11	11	9	12	11	12	11	10	12	12	11	10	12	11	11
	Total CTF only	83									1	2	3	4	4	5	4	6	5	4	4	4	5	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.2-27.– ARCHITECTURE 17 - "IF" C (14%) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	52	7	9	9	8	10	9																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	23							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	35							1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	33						2	7	7	7	4	3	1	1	1															
	Titan II/RUPC	127									5	5	6	6	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	Titan IV/CTF	134									1	3	5	7	7	7	7	9	8	7	6	7	7	6	6	7	7	6	7	7	7
	T IV/CTF/LRV	124									1	3	5	6	5	5	6	6	6	6	6	6	7	6	8	7	7	6	8	7	7
	Titan IV/Centaur	41							3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	24				1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	38	2					1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	85	7	9	9	8	10	11	7	7	7	4	3	1	1	1															
	Titan II/RUPC	127									5	5	6	6	5	7	5	6	6	6	5	6	7	6	7	6	7	6	7	6	7
	Titan III	1	1																												
	Titan IV/CTF	134									1	3	5	7	7	7	7	9	8	7	6	7	7	6	6	7	7	6	7	7	7
	T IV/CTF/LRV	124									1	3	5	6	5	5	6	6	6	6	6	6	7	6	8	7	7	6	8	7	7
	Titan IV/Centau	42				1			3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	64	3	2	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	111	6	4	2	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	Titan II/RUPC	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	T IV/CTF/LRV	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	61		2	3	3	2	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan IV/Centau	56	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	93	8	10	10	9	11	12	8	8	7	4	3	1	1	1															
	Total T/RUPC	148									6	6	7	7	6	8	6	7	7	7	6	7	8	7	8	7	8	7	8	7	8
	Total CTF/LRV	145									2	4	6	7	6	6	7	7	7	7	7	7	8	7	9	8	8	7	9	8	8
	Total CTF only	134									1	3	5	7	7	7	7	9	8	7	6	7	7	6	6	7	7	6	7	7	7

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	5										1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	10		1	2		1	1				1				1				1				1				1			
	Titan IV/NUS	24						2		2		2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	33			1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	57	3	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.2-28.– ARCHITECTURE 02 - "IF" B (CEM) FLIGHT MANIFEST

Launch Site: EAST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Atlas I	4	1	1		1		1																							
	Atlas IIAS	1				1																									
	Delta II	3	2					1																							
	Shuttle	43	7	9	9	8	6	4																							
	Titan III	1	1																												
	Titan IV/Centaur	1				1																									
HTS Model	Atlas IIAS	4							1	1			1		1																
	Atlas Evolution	19									1	1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	5							1	3				1																	
	Delta Evolution	30									1	1	1	2	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	12						2	3	4	2	1																			
	Shuttle-CEM	67									1	2	4	4	3	5	3	4	4	4	3	3	3	3	3	3	3	3	3	3	3
	Titan IV/Centaur	6							3	1	1		1																		
	Titan Evol/C	35									1	1	2	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
NASA Total	Atlas I	4	1	1		1		1																							
	Atlas IIAS	5				1			1	1			1		1																
	Atlas Evolution	19									1	1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Delta II	8	2					1	1	3				1																	
	Delta Evolution	30									1	1	1	2	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
	Shuttle	55	7	9	9	8	6	6	3	4	2	1																			
	Shuttle-CEM	67									1	2	4	4	3	5	3	4	4	4	3	3	3	3	3	3	3	3	3	3	3
	Titan III	1	1																												
	Titan IV/Centau	7				1			3	1	1		1																		
	Titan Evol/C	35									1	1	2	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2
DoD Total	Atlas IIAS	25	3	2	3	4	4	2	2	2	1	1	1																		
	Atlas Evolution	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Delta II	33	6	4	2	1	3	3	4	4	3	2	1																		
	Delta Evolution	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Shuttle	8	1	1	1	1	1	1	1	1																					
	Shuttle-CEM	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Titan IV/NUS	20		2	3	3	2	3	3	2	1	1																			
	Titan IV/Centau	17	2	2	2	1	2	1	2	2	1	1	1																		
	Titan Evolution	41									1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Titan Evol/C	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Total Shuttle	63	8	10	10	9	7	7	4	5	2	1																			
	Total Shuttle E	88									2	3	5	5	4	6	4	5	5	5	4	4	4	4	4	4	4	4	4	4	4
	All Shuttle+CEM	151	8	10	10	9	7	7	4	5	4	4	5	5	4	6	4	5	5	5	4	4	4	4	4	4	4	4	4	4	4

Launch Site: WEST

	Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Mixed Fleet	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	5		1	2		1	1																							
HTS Model	Delta II	1										1																			
	Delta Evolution	4														1				1				1				1			
	Titan IV/NUS	4						2		2																					
	Titan Evolution	20										2		2		2		2		2		2		2		2		2		2	
NASA Total	Titan II	3			1		1	1																							
	Atlas E	1		1																											
	Delta II	6		1	2		1	1				1																			
	Delta Evolution	4														1				1				1				1			
	Titan IV/NUS	4						2		2																					
	Titan Evolution	20										2		2		2		2		2		2		2		2		2		2	
DoD Total	Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
	Atlas E	1		1																											
	Delta II	6			1	1	1	1	1	1																					
	Delta Evolution	27									1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
	Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
	Titan Evolution	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE B.1.2.2-29.– ARCHITECTURE 02 - "IF" C (CEM) FLIGHT MANIFEST

Launch Site: EAST

Mixed Fleet

Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Atlas I	4	1	1		1		1																							
Atlas IIAS	1				1																									
Delta II	3	2					1																							
Shuttle	52	7	9	9	8	10	9																							
Titan III	1	1																												
Titan IV/Centaur	1				1																									

HTS Model

Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Atlas IIAS	4							1	1		1		1																	
Atlas Evolution	19									1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Delta II	5							1	3				1																	
Delta Evolution	30									1	1	1	2	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
Shuttle	39						2	9	9	8	5	4	2																	
Shuttle-CEM	135									1	2	4	6	7	8	7	8	8	7	7	7	7	7	7	7	7	7	7	7	7
RCV/ASRB	83									1	2	3	4	4	4	4	4	5	5	4	5	5	4	4	4	4	4	4	4	5
Titan IV/Centaur	6							3	1	1		1																		
Titan Evol/C	35									1	1	2	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2

NASA Total

Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Atlas I	4	1	1		1		1																							
Atlas IIAS	5				1			1	1		1		1																	
Atlas Evolution	19									1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Delta II	8	2					1	1	3				1																	
Delta Evolution	30									1	1	1	2	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3	1
Shuttle	91	7	9	9	8	10	11	9	9	8	5	4	2																	
Shuttle-CEM	135									1	2	4	6	7	8	7	8	8	7	7	7	7	7	7	7	7	7	7	7	7
RCV/ASRB	83									1	2	3	4	4	4	4	4	5	5	4	5	5	4	4	4	4	4	4	4	5
Titan III	1	1																												
Titan IV/Centau	7				1			3	1	1		1																		
Titan Evol/C	35									1	1	2	1	2	1	3	1	2	1	3	1	2	1	3	1	2	1	3	1	2

DoD Total

Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Atlas IIAS	25	3	2	3	4	4	2	2	2	1	1	1																		
Atlas Evolution	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Delta II	33	6	4	2	1	3	3	4	4	3	2	1																		
Delta Evolution	78									1	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Shuttle	8	1	1	1	1	1	1	1	1																					
Shuttle-CEM	21									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Titan IV/NUS	20		2	3	3	2	3	3	2	1	1																			
Titan IV/Centau	17	2	2	2	1	2	1	2	2	1	1	1																		
Titan Evolution	41									1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Titan Evol/C	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Total Shuttle	99	8	10	10	9	11	12	10	10	8	5	4	2																	
Total Shuttle E	156									2	3	5	7	8	9	8	9	9	8	8	8	8	8	8	8	8	8	8	8	8
Total RCV	83									1	2	3	4	4	4	4	4	5	5	4	5	5	4	4	4	4	4	4	4	5
All Shuttle+RC'	338	8	10	10	9	11	12	10	10	11	10	12	13	12	13	12	13	14	13	12	13	13	12	12	12	12	12	12	12	13

Launch Site: WEST

Mixed Fleet

Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Titan II	3			1		1	1																							
Atlas E	1		1																											
Delta II	5		1	2		1	1																							

HTS Model

Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Delta II	1										1																			
Delta Evolution	4														1				1				1				1			
Titan IV/NUS	4						2		2																					
Titan Evolution	20										2		2		2		2		2		2		2		2		2		2	

NASA Total

Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Titan II	3			1		1	1																							
Atlas E	1		1																											
Delta II	6		1	2		1	1				1																			
Delta Evolution	4														1				1				1				1			
Titan IV/NUS	4						2		2																					
Titan Evolution	20										2		2		2		2		2		2		2		2		2		2	

DoD Total

Vehicle Name	Total	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Titan II	39		2	2	1	1	2	2	2	1	2	2	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1
Atlas E	1		1																											
Delta II	6			1	1	1	1	1	1																					
Delta Evolution	27									1	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	2	1	1	2	1
Titan IV/NUS	18	3	2	2	1	2	1	2	2	1	1	1																		
Titan Evolution	39									1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

B.1.3 GROUND OPERATIONS FLOW DATA

This subsection contains data relating to the ground operations flow analysis. The analysis included developing top level ground processing diagrams for each system, then developing spreadsheet models from the diagrams. The spreadsheet models produced attribute data and data required for cost analysis, including required new facilities and fleet size for reusable vehicles. The flow diagrams and summaries of fleet and facility requirements are included here. Printouts from the spreadsheets used in the analysis are not included because of space limitations.

B.1.3.1 Ground Processing Flow Diagrams

On the following Figures, (B.1.3.1-1 through B.1.3.1-27) show the summary level ground processing flow schematics for each element and system used to populate the various architectures. This includes existing vehicles, such as Shuttle and ELV's, and proposed vehicle concepts. Pertinent information contained in the schematic includes the identification of the major components of the system, the unique facilities and their number used in the processing flow, and the processing times (in work days) and shift information associated with the flow's critical path. These flows were used in determining the Launch Schedule Confidence attribute. The flows were also used to determine fleet size, for reusable elements, and facility requirements for all elements. Flow choke-points were determined which defined the minimum processing flow rates per element or system.

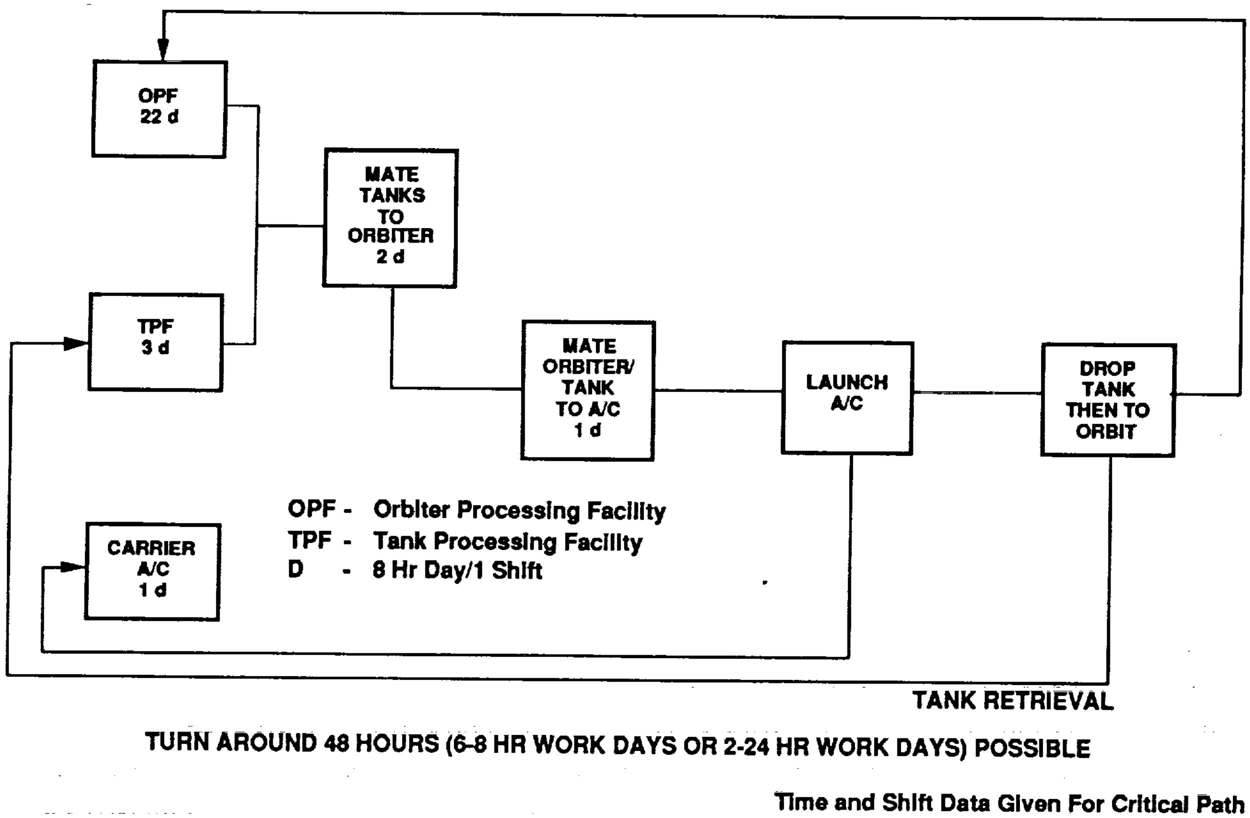

Figure B.1.3.1-1.– Advanced Military Spacecraft Capability (AMSC) processing.

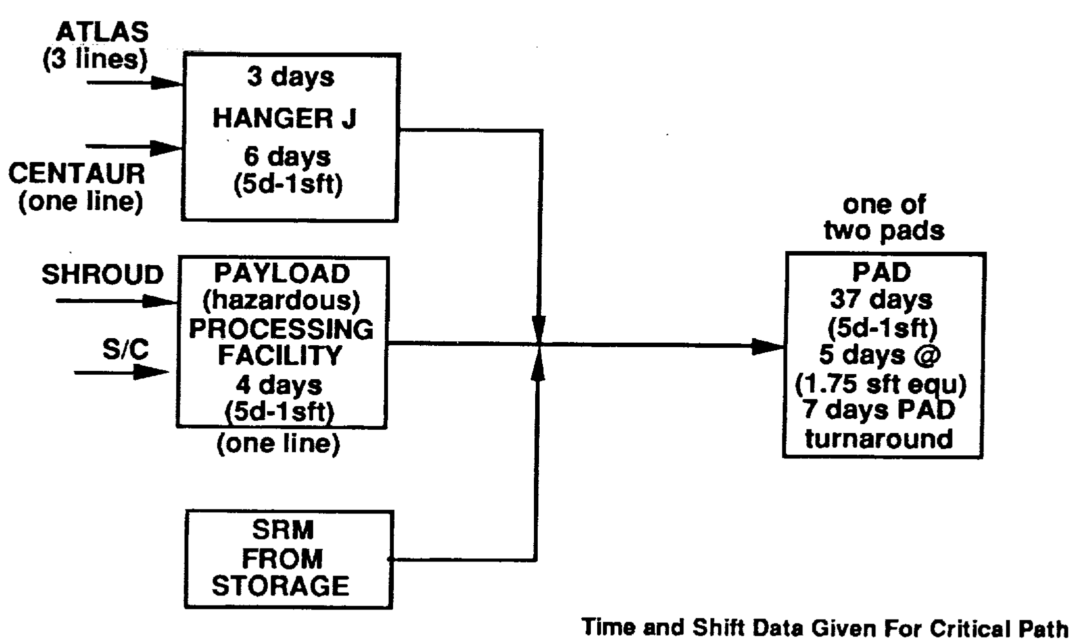

Figure B.1.3.1-2.– Atlas processing.

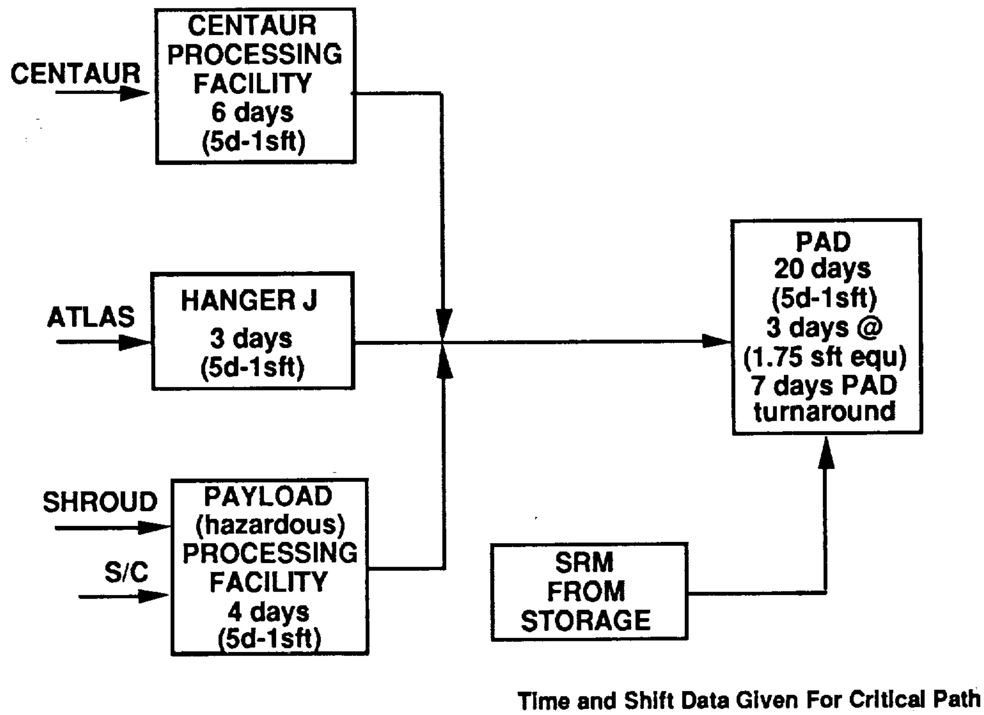

Figure B.1.3.1-3.– Enhanced Atlas processing.

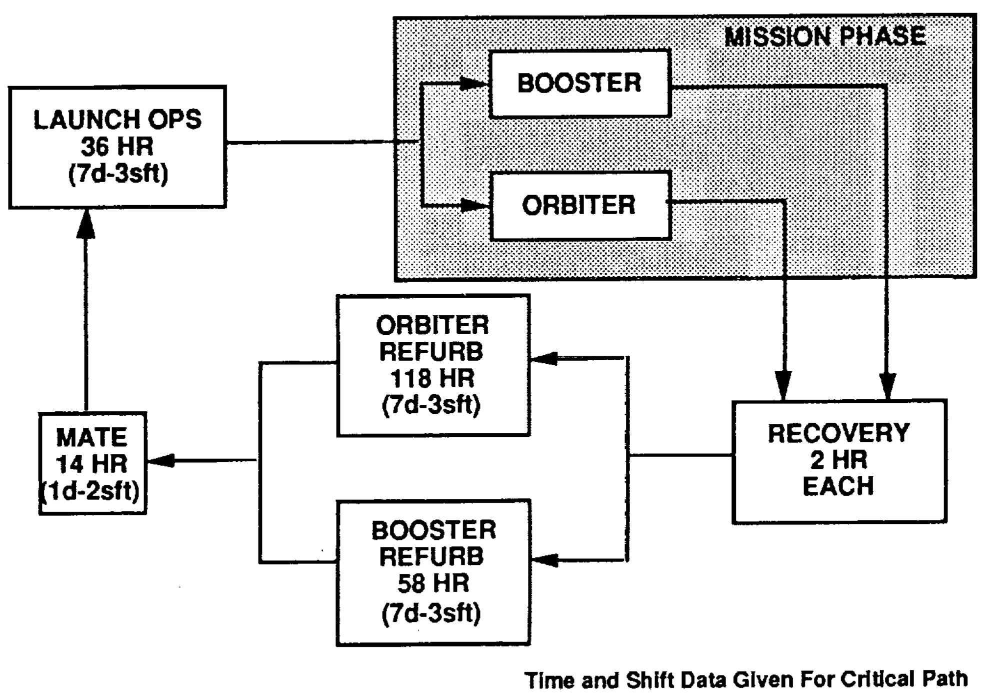

Figure B.1.3.1-4.– Beta II processing.

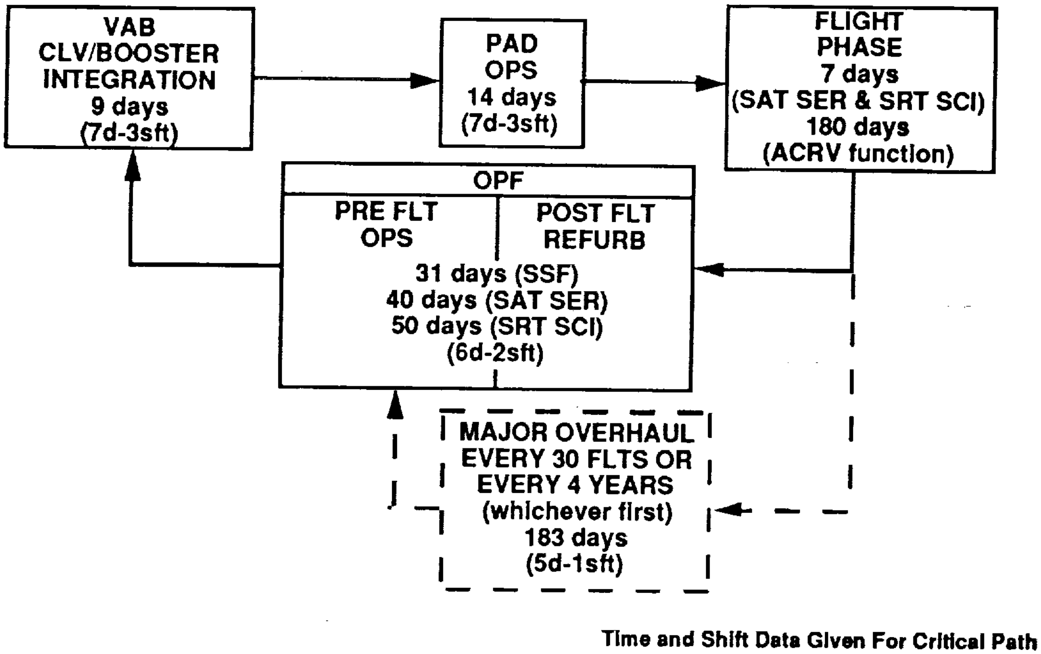

Figure B.1.3.1-5.– Crew and Logistics Vehicle (CLV) processing.

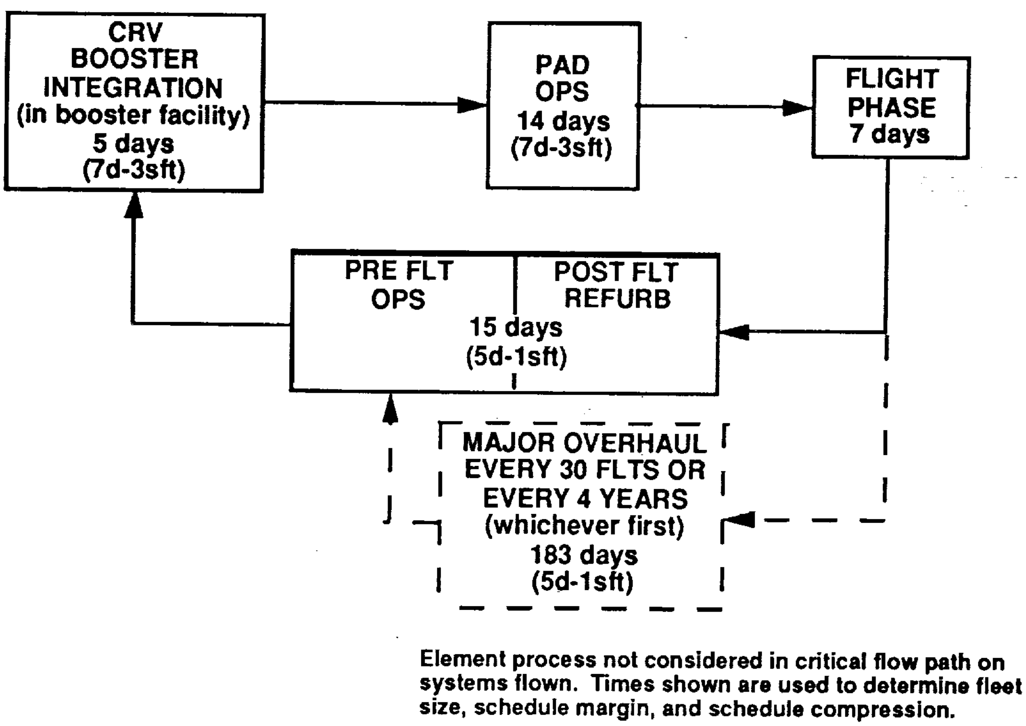

Figure B.1.3.1-6.– Cargo Return Vehicle (CRV) processing.

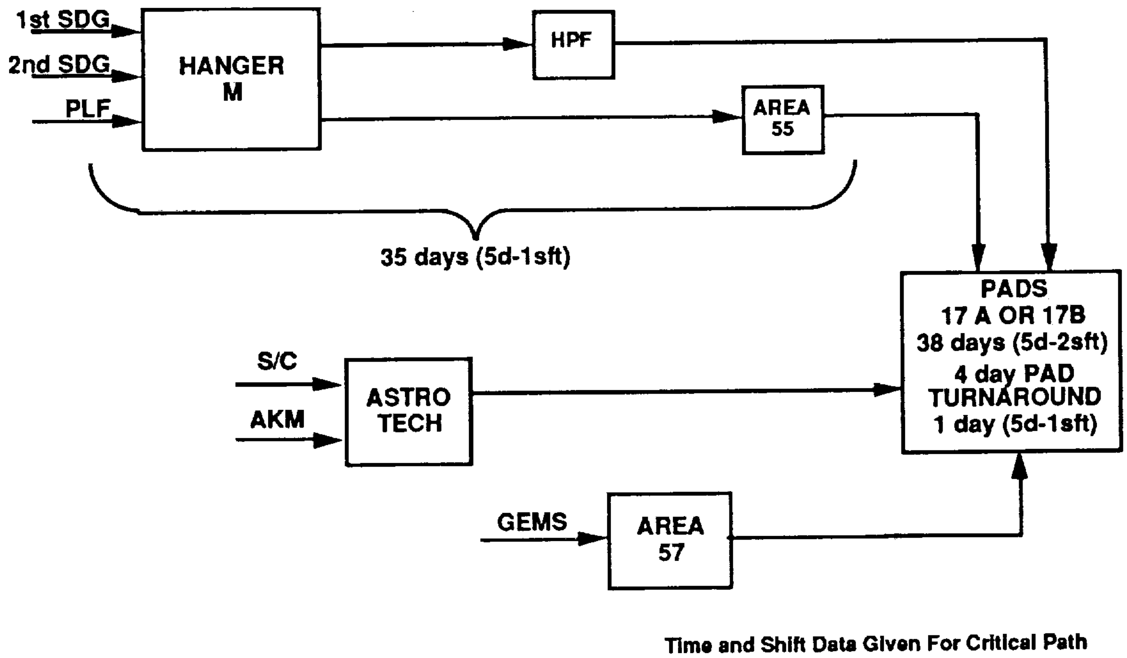

Figure B.1.3.1-7.– Delta processing.

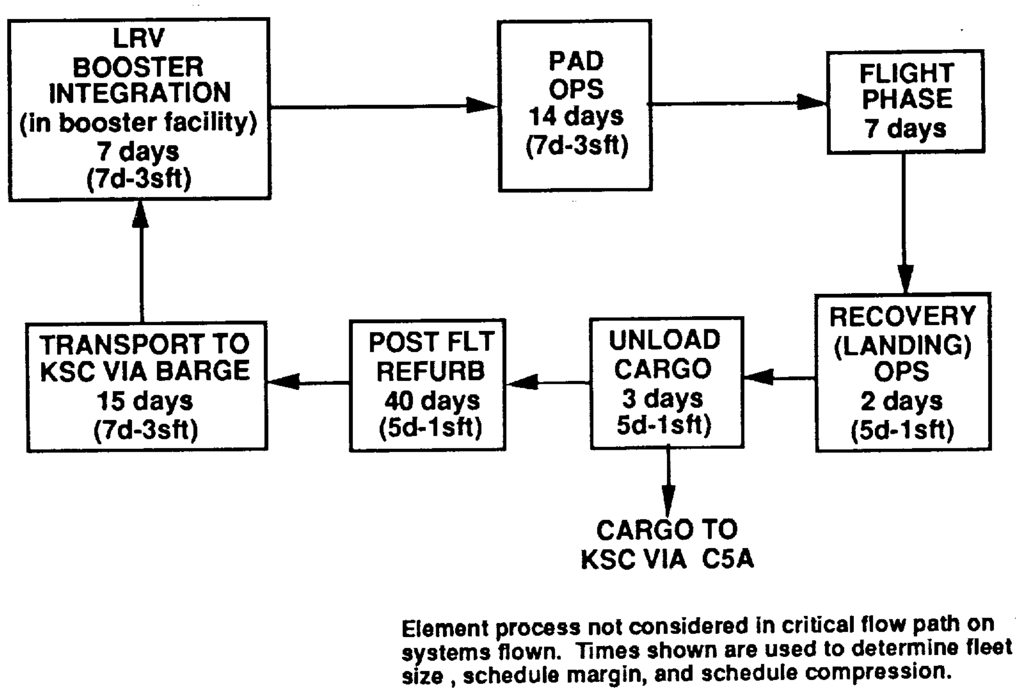

Figure B.1.3.1-8.– Logistic Return Vehicle (LRV) processing.

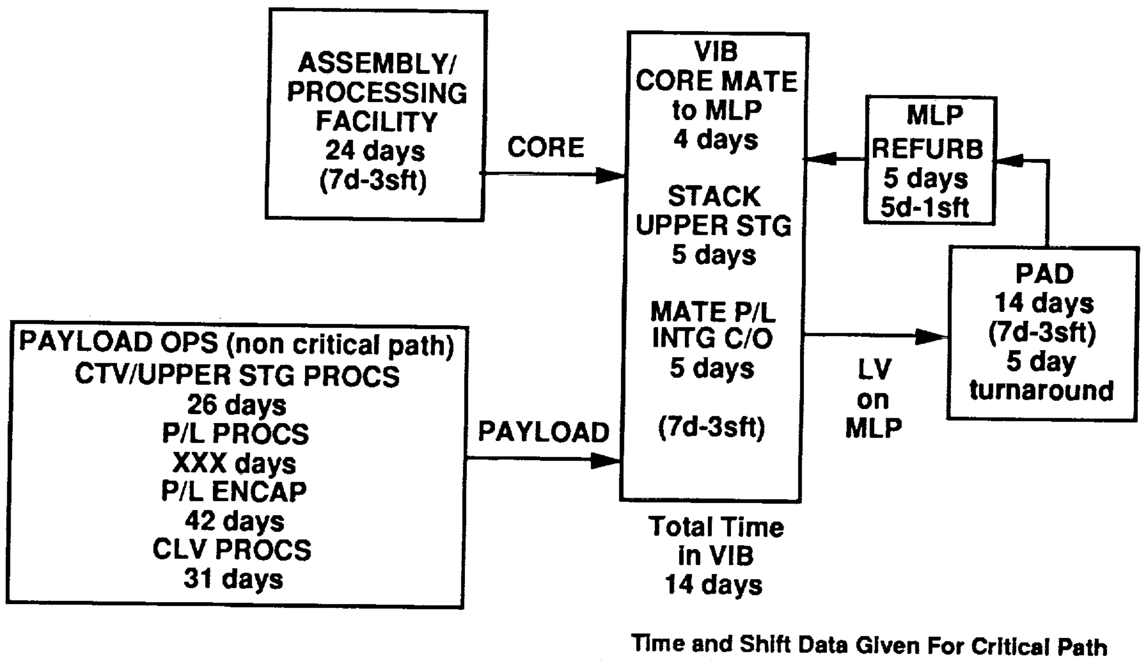

Figure B.1.3.1-9.– MLS-HL processing.

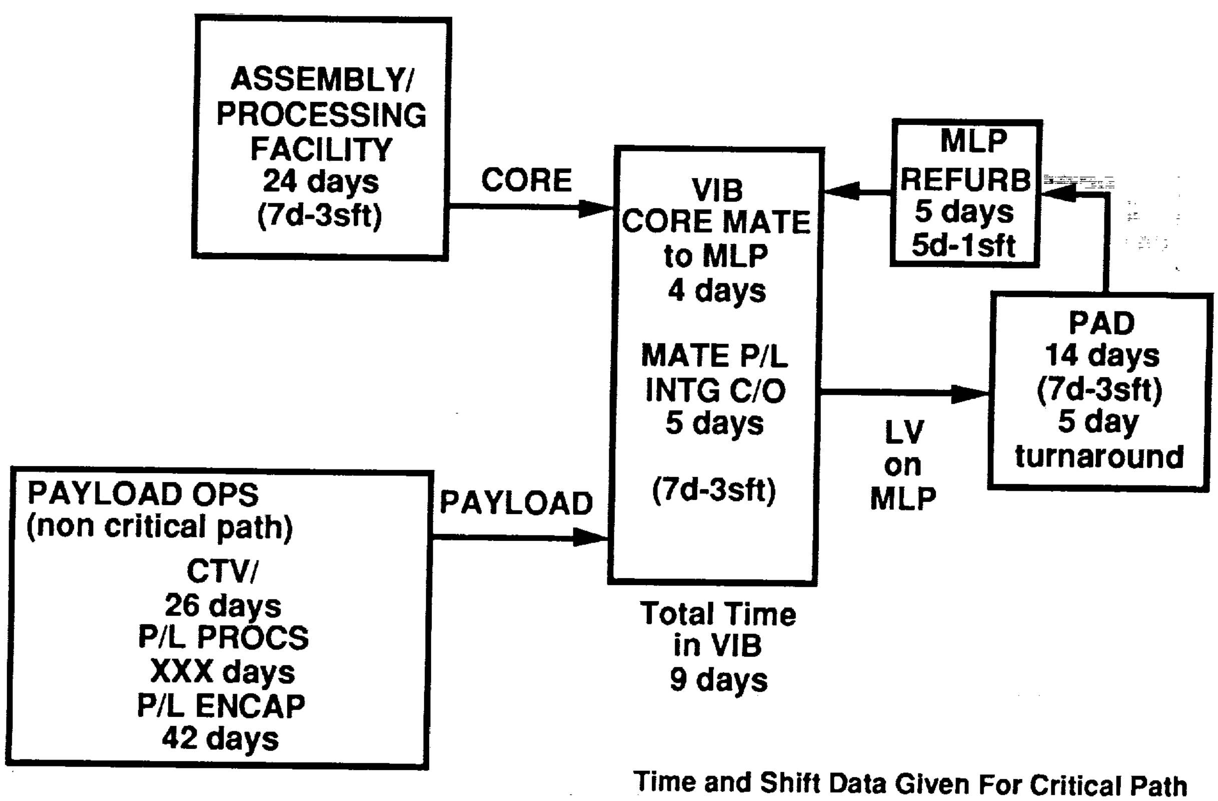

Figure B.1.3.1-10.– MLS-X processing.

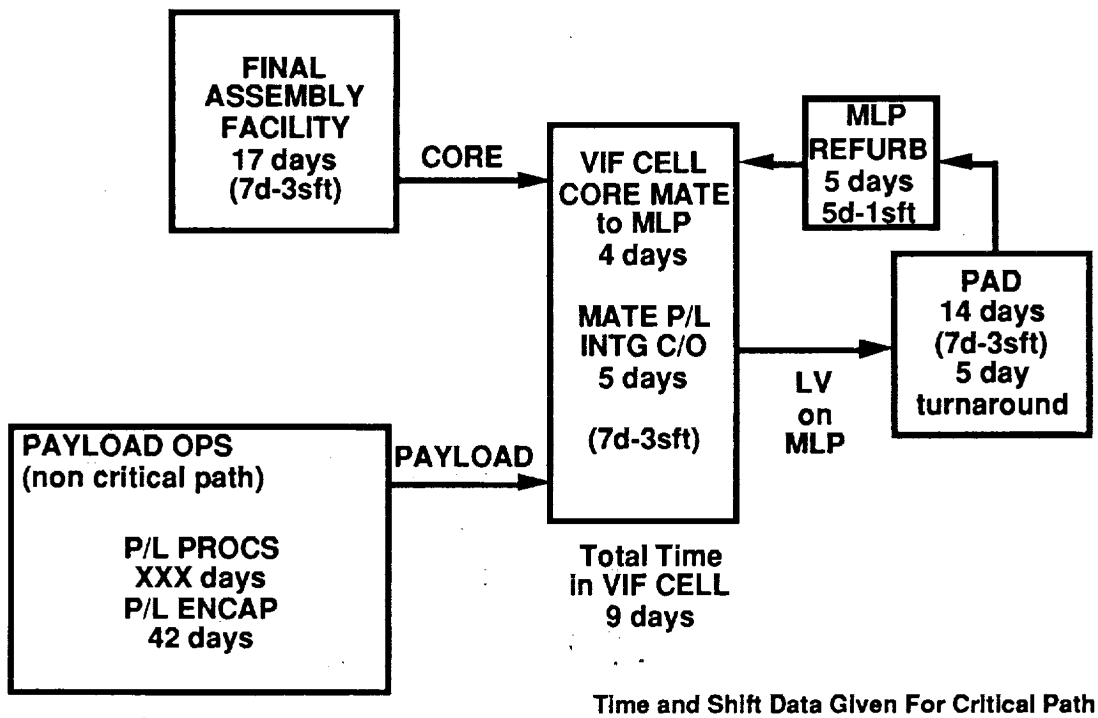

Figure B.1.3.1-11.– NLS-20 processing.

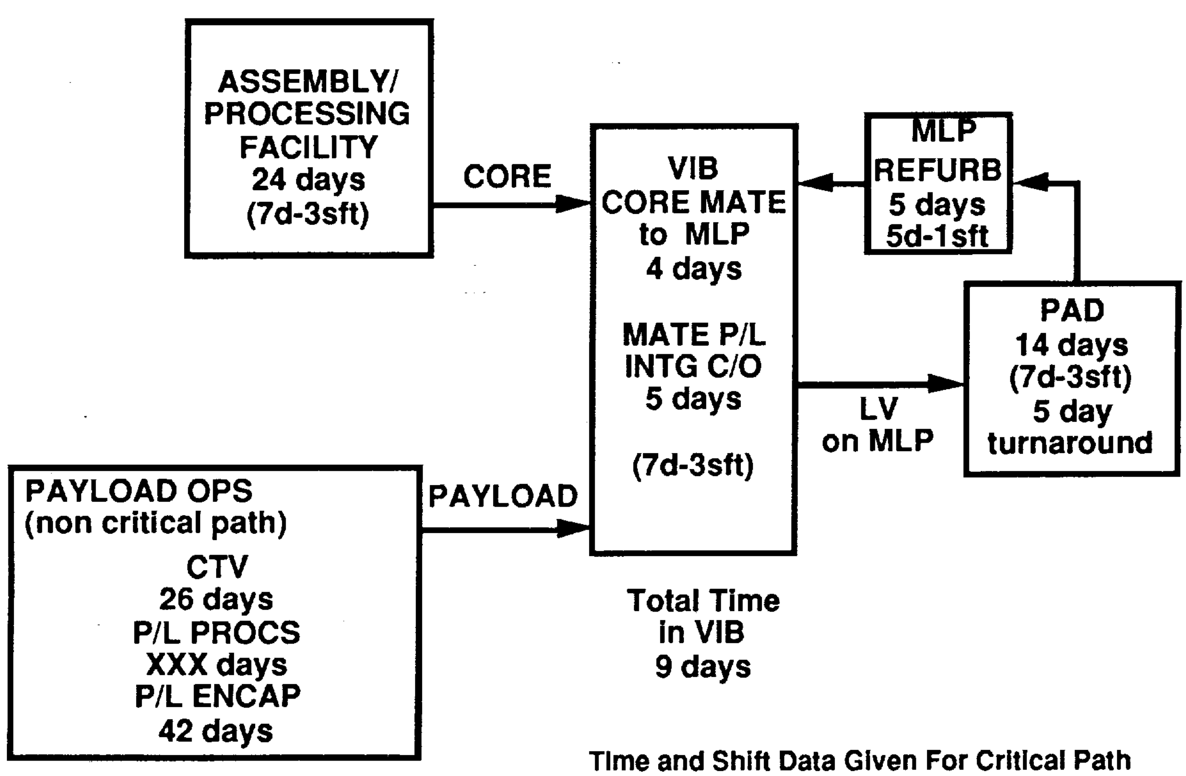

Figure B.1.3.1-12.– NLS-50 processing.

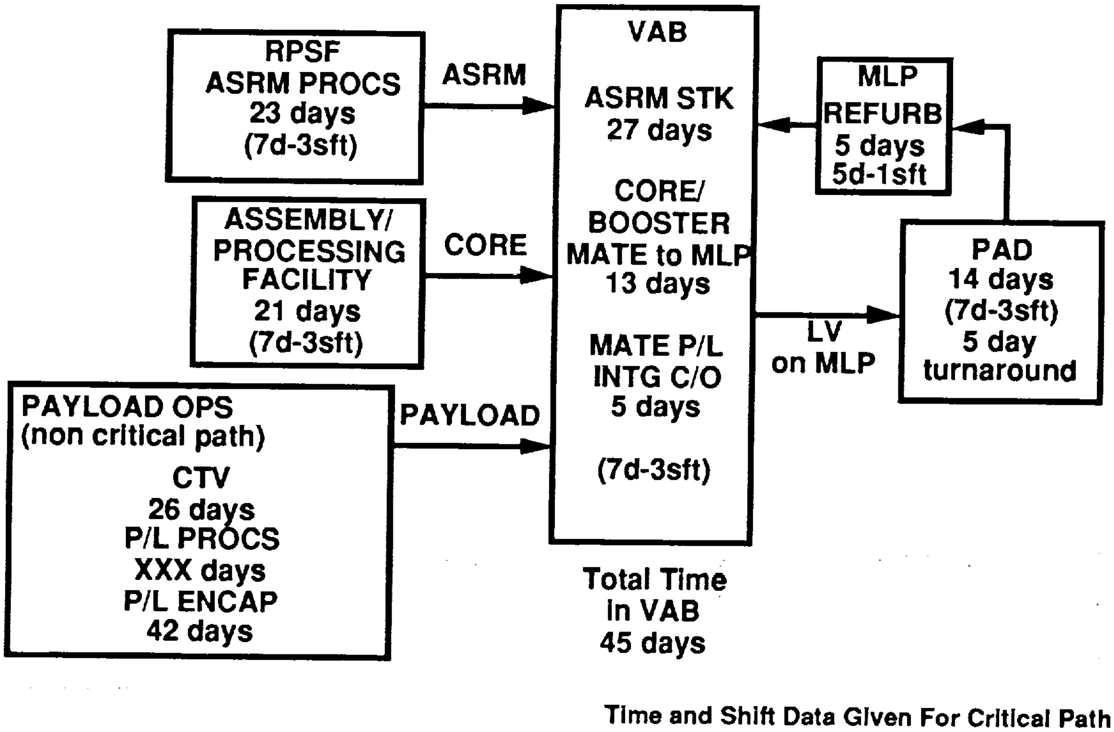

Figure B.1.3.1-13.– NLS-HL processing.

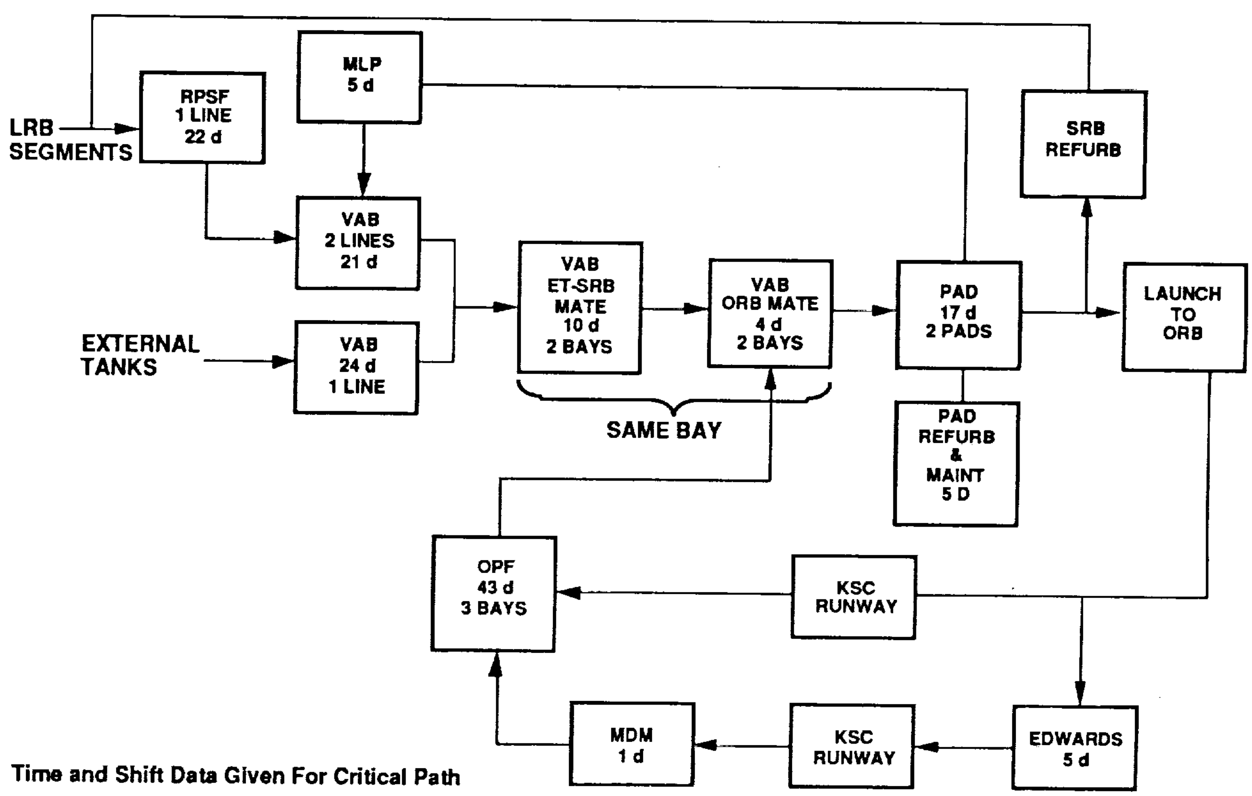

Figure B.1.3.1-14.– Reusable Cargo Vehicle (RCV) processing.

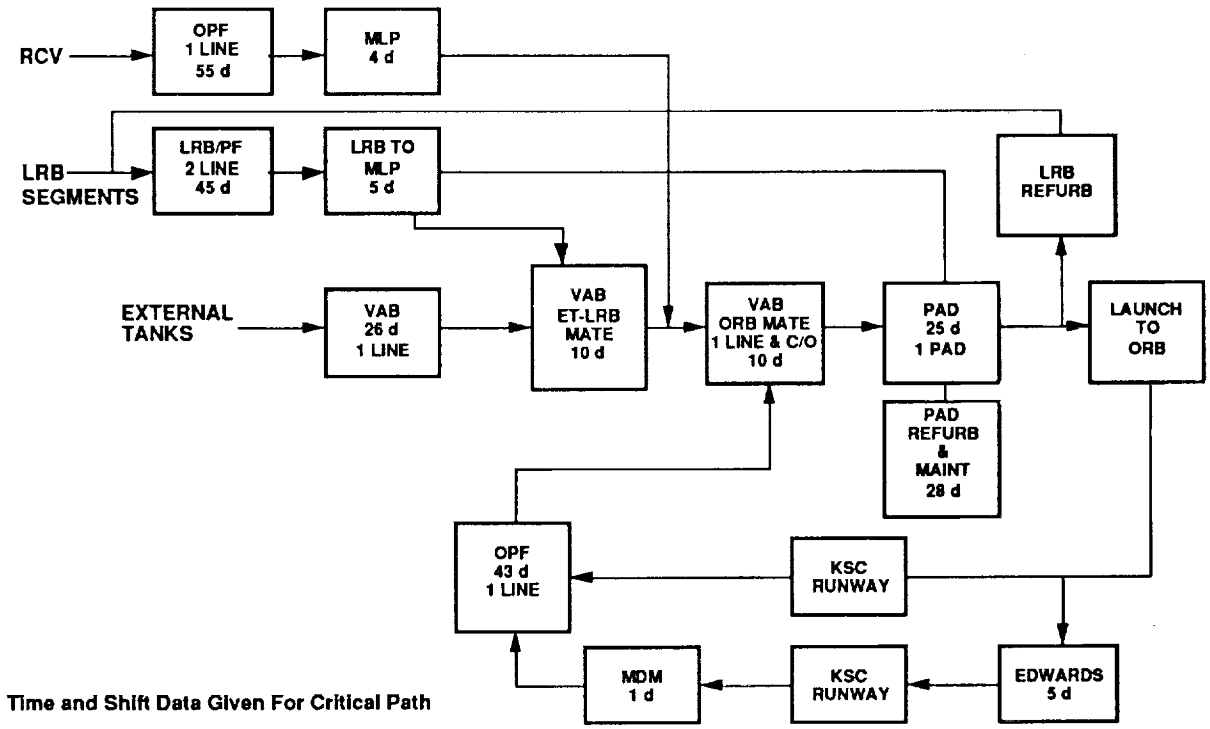

Figure B.1.3.1-15.– RCV/LRB processing.

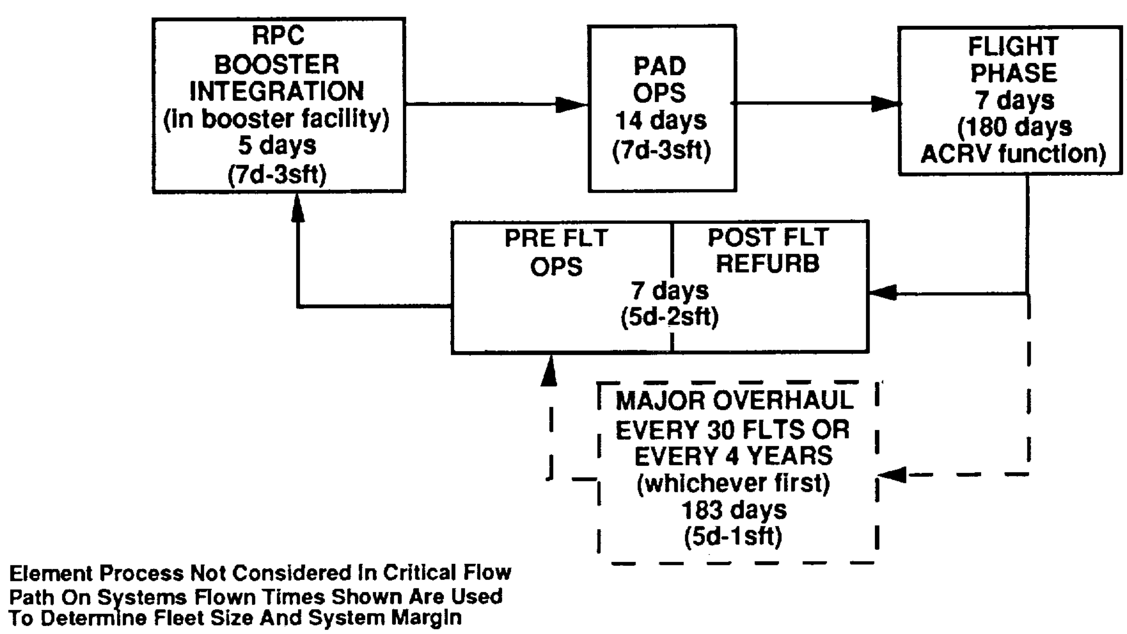

Figure B.1.3.1-16.– Reusable Personnel Carrier (RPC) processing.

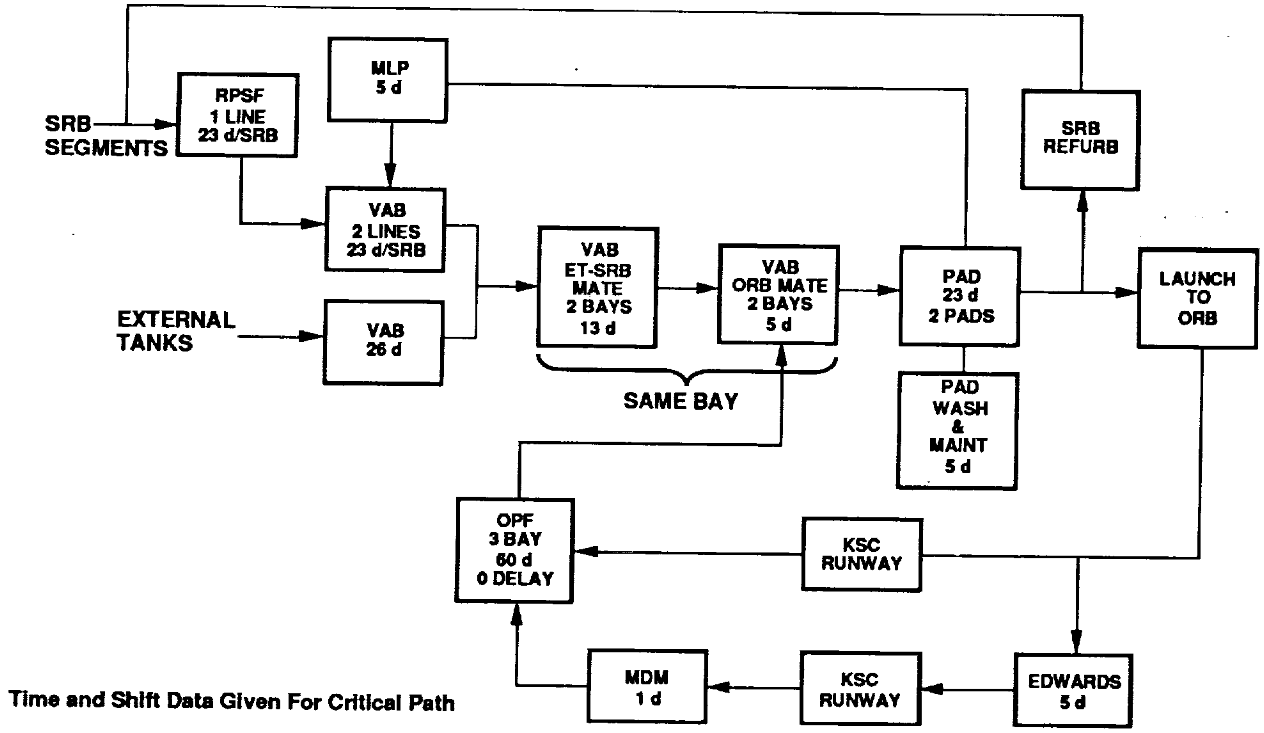

Figure B.1.3.1-17.– Shuttle processing.

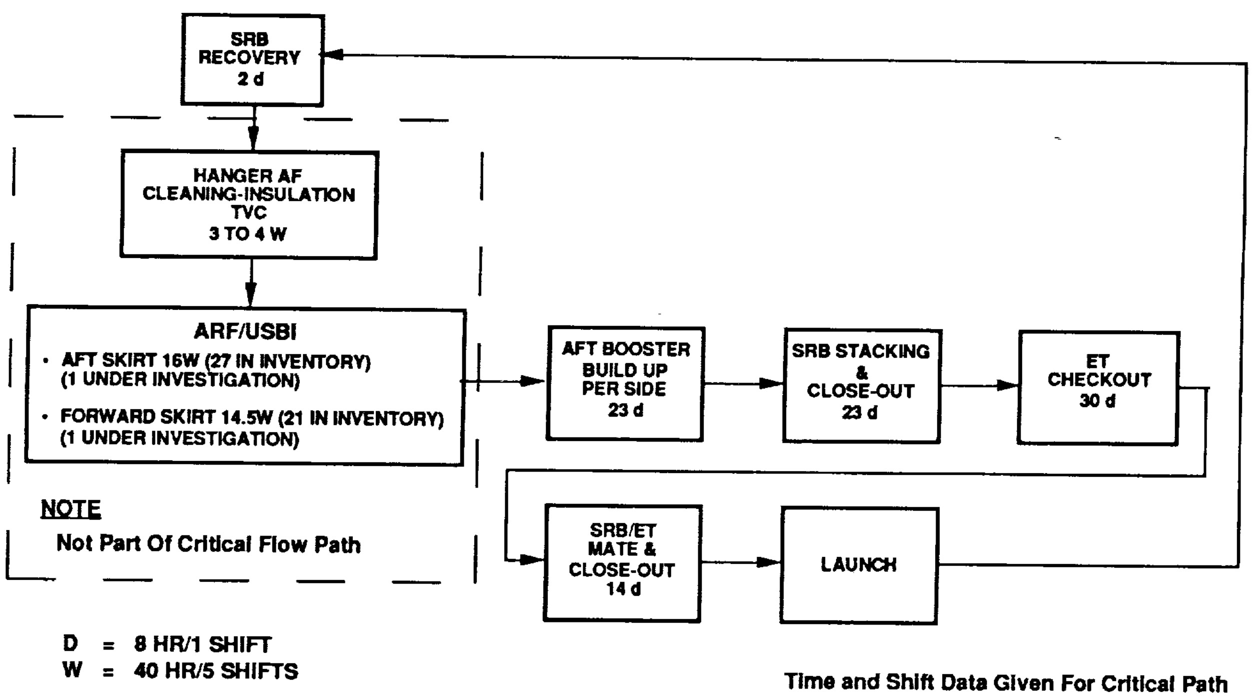

Figure B.1.3.1-18.– Shuttle Solid Rocket Booster (SRB) processing.

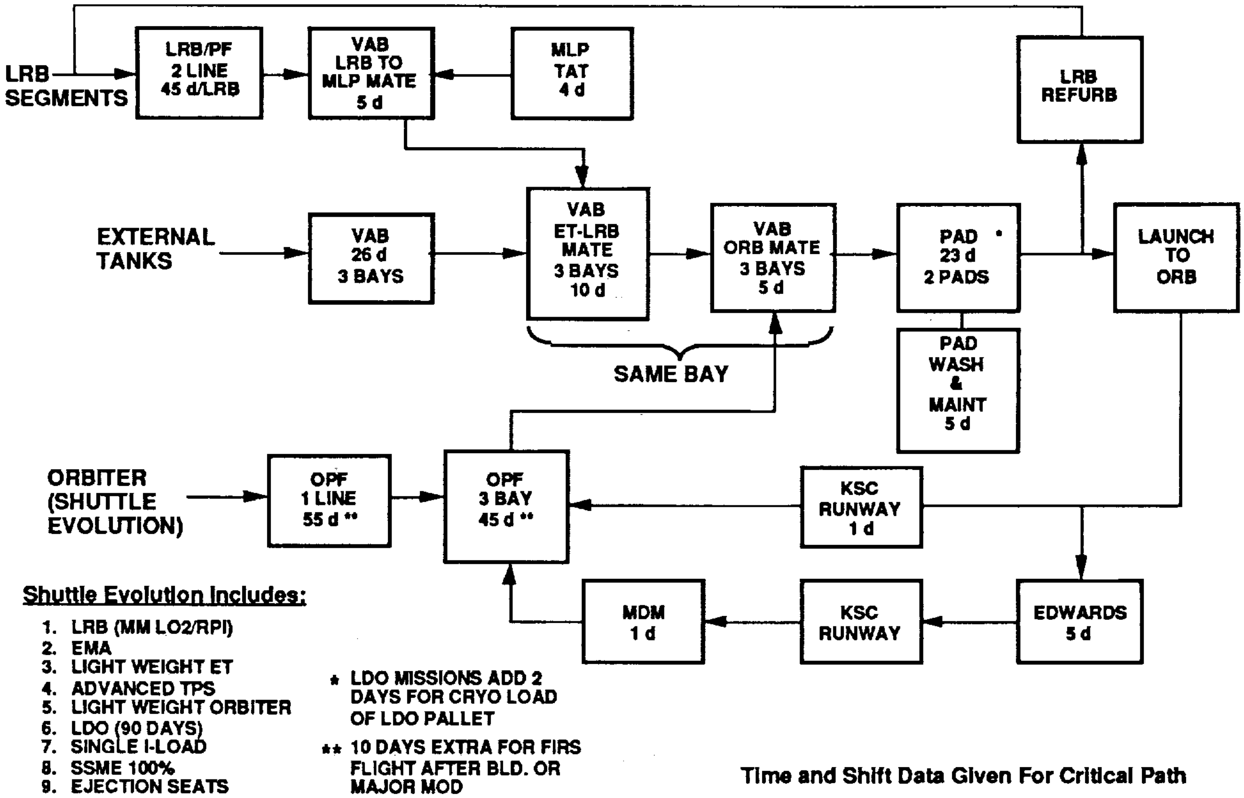

Figure B.1.3.1-19.– Shuttle evolution processing.

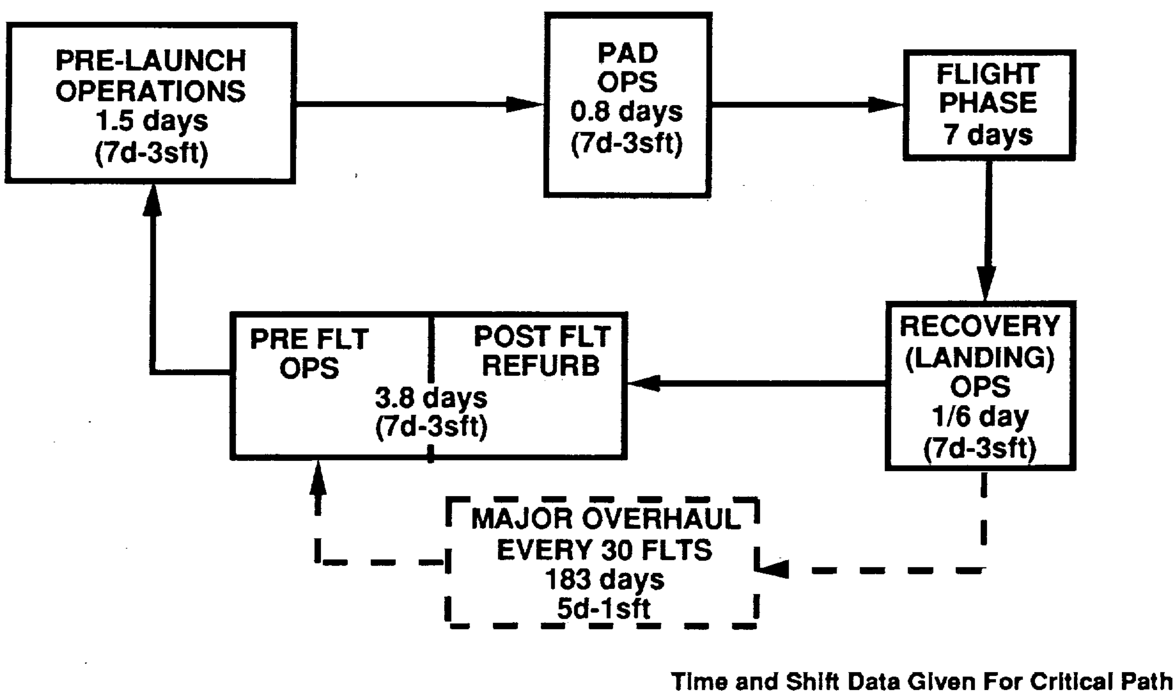

Figure B.1.3.1-20.– Single Stage to Orbit (SSTO) processing.

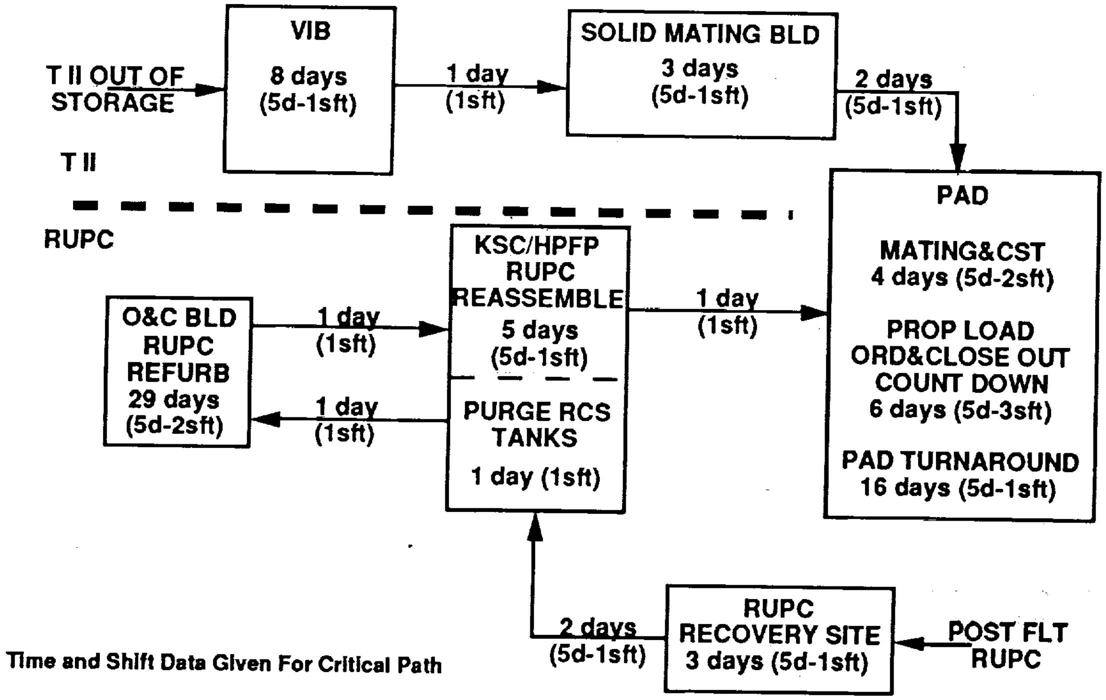

Figure B.1.3.1-21.– Titan II/RUPC processing (ETR).

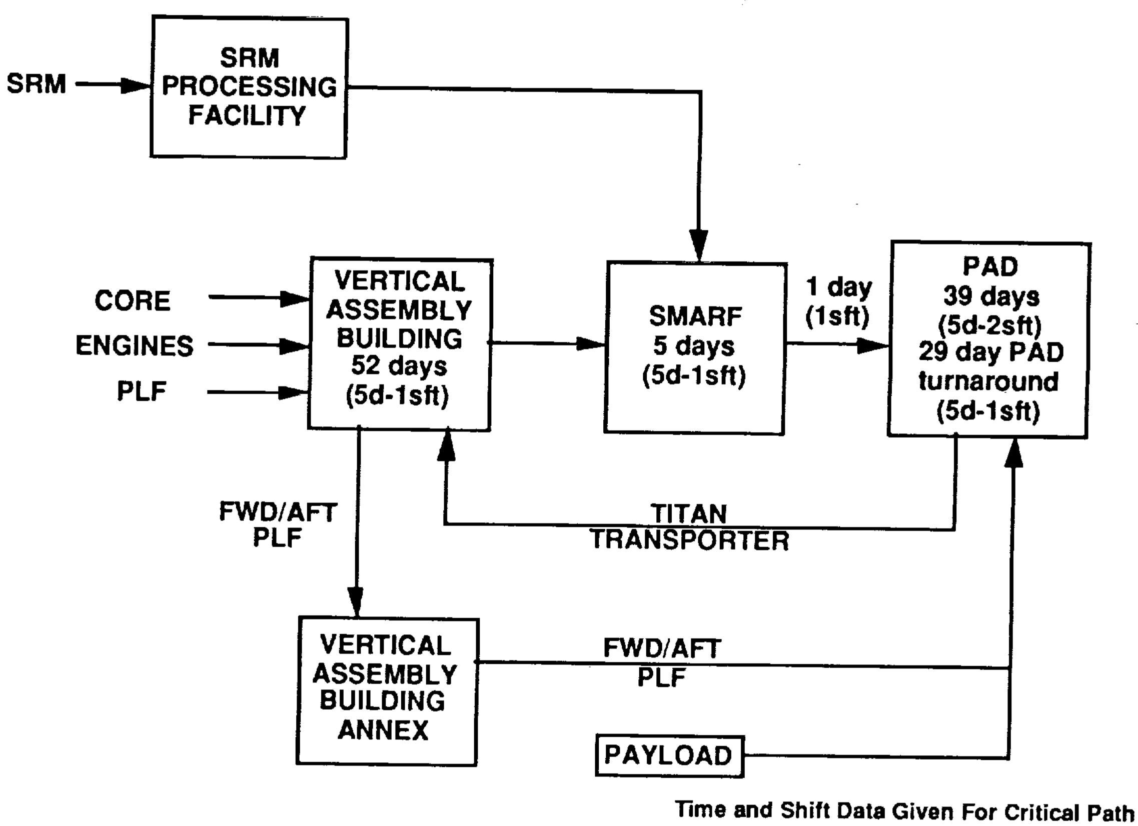

Figure B.1.3.1-22.– Titan IV NUS processing (ETR).

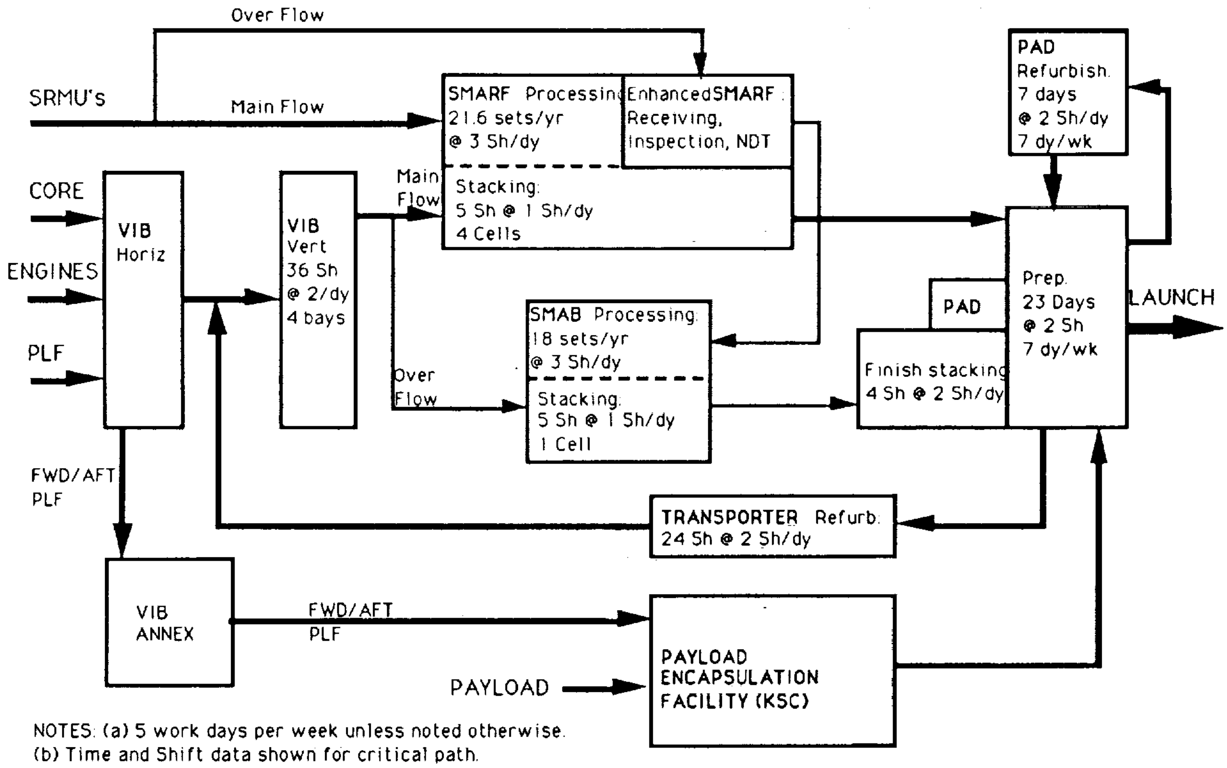

Figure B.1.3.1-23.– Titan IV NUS processing (ETR). (operations capabilities)

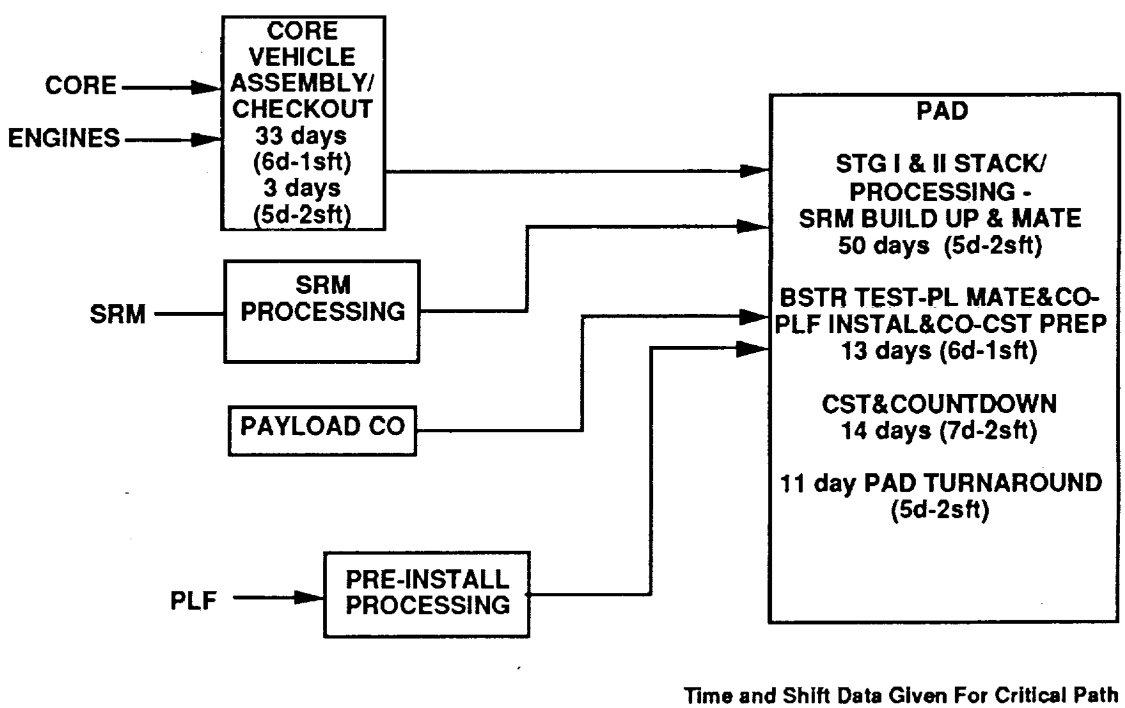

Figure B.1.3.1-24.– Titan IV NUS processing (WTR).

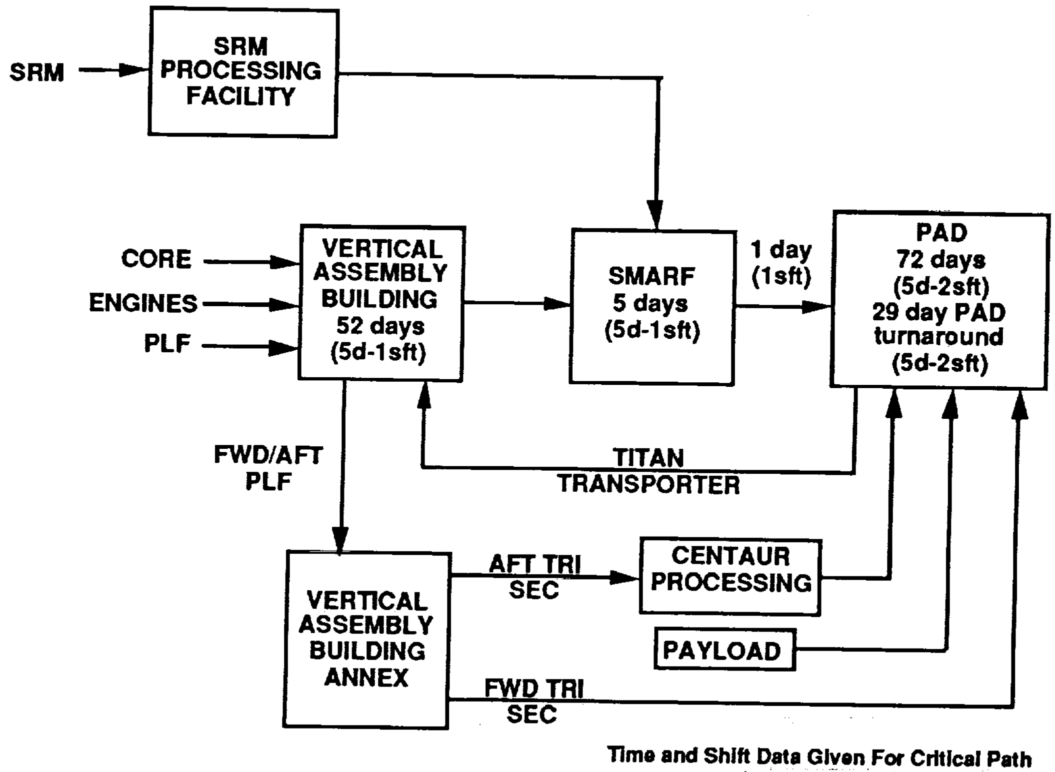

Figure B.1.3.1-25.– Titan IV/Centaur processing (ETR).

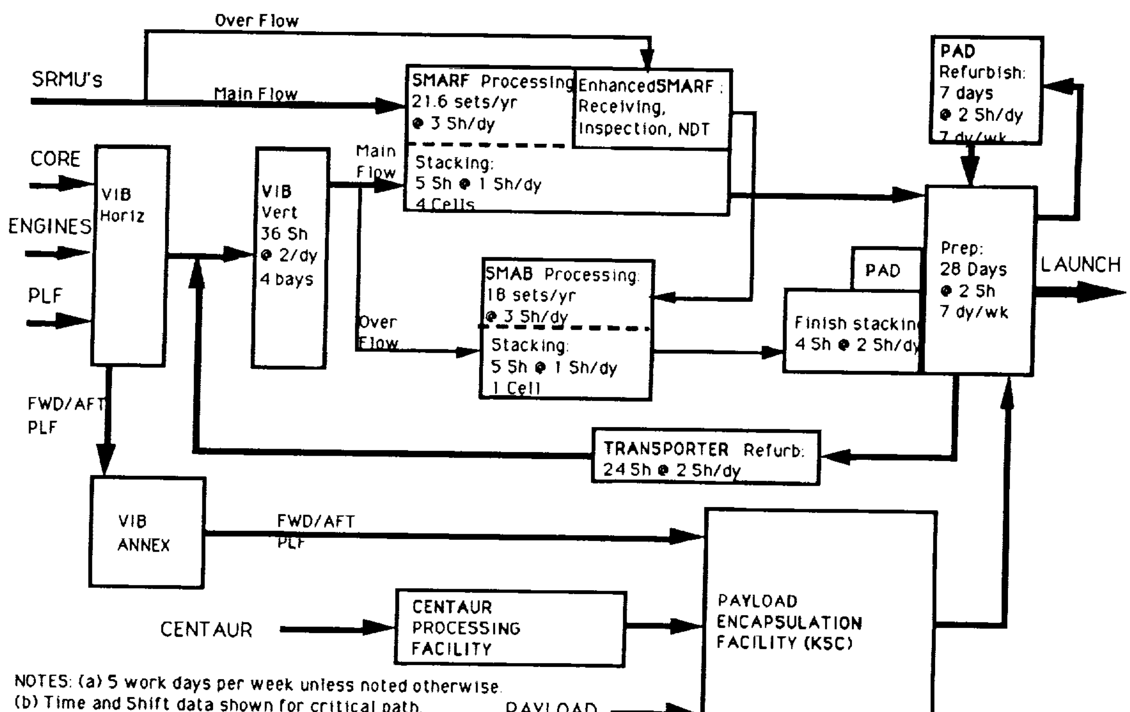

Figure B.1.3.1-26.– Titan IV/Centaur processing (ETR).
(operations capabilities)

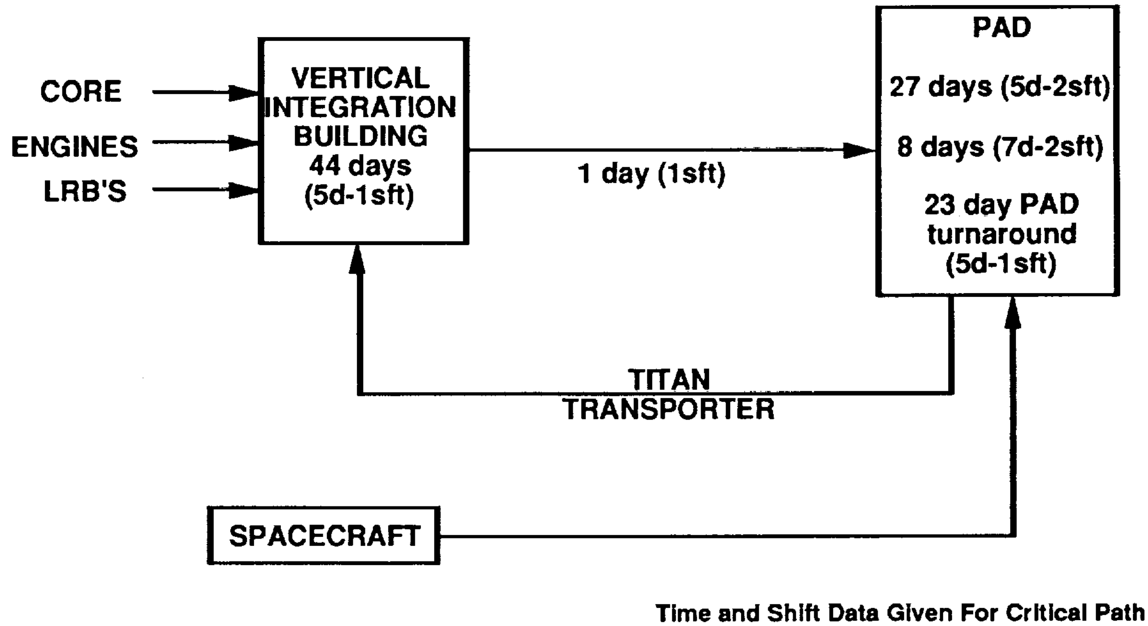

Figure B.1.3.1-27.– Titan IV (human-rated) with LRB'S processing (ETR).

B.1.3.2 Architecture Vehicle/Facility Summaries

Fleet sizes and facility requirements, based on the ground operations flow analysis, are summarized in Tables B.1.3.2-1 through B.1.3.2-18 for each of the architectures. Information for each of the "If" Scenarios is presented. Each table lists the initial fleet size and existing facilities for each system. If new vehicles and/or facilities are determined to be needed, the number and the year required are identified.

TABLE B.1.3.2-1.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 1

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96,00	1/96,00	1/96,00,07
MLPS	3				1/03	1/03	1/03
OPF	3						
VAB Stacking Cells	2						
Pads	2						
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						

TABLE B.1.3.2-2.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 2

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96
MLPS	3						
LRB Sets		3/00	3/00	3/00,1/05	3/00,1/05	3/00,1/04	3/00,1/04,08
OPF	3						
VAB Stacking Cells	2						
Pads	2						
RCV							
Unmanned Orbiters				1/00,03	1/00,03	1/00,03	1/00,03
LRB Sets				1/02,03	1/02,03,11	1/02,03,07	1/02,03,07
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						

TABLE B.1.3.2-3.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 3

		IF SCENARIO					
ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
CTV							
CTV's				2/00	2/00,03	2/00,03	2/00,03
CTV Processing Lines				1/00	1/00,01,07	1/00,01,07	1/00,01,07
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Vert Intg Bld Cells Shared	0						
SMAB Cells Shared	0						
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						
NLS - East							
Final Assy Fac-20		1/05	1/05	1/05	1/05	1/05	1/05
Core Assy/Prod-50/HL		1/00	1/00	1/00	1/00	1/00	1/00
Cargo Integ-20/50		1/00,10	1/00,10	1/00,03	1/00,03	1/00,03	1/00,03
Pyld Encaps-HL		1/00	1/00	1/00	1/00	1/00	1/00
NLS MLP-20/50		1/00	1/00	1/00	1/00	1/00	1/00
NLS MLP-HL		1/00	1/00	1/00	1/00	1/00	1/00
VIB Cells-20		1/05	1/05	1/05	1/05	1/05	1/05
VIB Cells-50		1/00	1/00	1/00	1/00	1/00	1/00
New VAB Cells Shuttle				1/03	1/03	1/03	1/03
CCFS Pads-20/50		1/00	1/00	1/00	1/00	1/00	1/00

TABLE B.1.3.2-3.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 3 (Concluded)

ELEMENT/SYSTEMS	EXIST	IF SCENARIO					
OPS SUPPORT FAC	FACS	A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
NLS - West							
Final Assy Fac-20		1/05	1/05	1/05	1/05	1/05	1/05
Core Assy/Prod-50/HL		1/00	1/00	1/00	1/00	1/00	1/00
Cargo Integ-20/50		1/00	1/00	1/00	1/00	1/00	1/00
Pyld Encaps-HL		1/01	1/01	1/01	1/01	1/01	1/01
NLS MLP-20/50		1/00	1/00	1/00	1/00	1/00	1/00
NLS MLP-HL		1/01	1/01	1/01	1/01	1/01	1/01
VIB Cells-20		1/05	1/05	1/05	1/05	1/05	1/05
VIB Cells-50		1/00	1/00	1/00	1/00	1/00	1/00
New VAB Cells WTR Shuttle		1/01	1/01	1/01	1/01	1/01	1/01
New WTR Pads-20/50		1/00	1/00	1/00	1/00	1/00	1/00
New WTR Pads-HL		1/01	1/01	1/01	1/01	1/01	1/01

TABLE B.1.3.2-4.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 4

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
RPC							
RPC'S				3/00	3/00	3/00	3/00
RPC Processing Lines				1/00	1/00	1/00	1/00
CRV							
CRV'S				3/00	3/00	3/00	3/00
CRV Processing Lines				1/00	1/00	1/00	1/00
CTV							
CTV's				2/00,1/03,07	2/00,03	2/00,03	2/00,03
CTV Processing Lines				1/00,02	1/00,01,07	1/00,01,07	1/00,01,07
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Vert Intg Bld Cells Shared	0						
SMAB Cells Shared	0						
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						
NLS - East							
Final Assy Fac-20		1/05	1/05	1/05	1/05	1/05	1/05
Core Assy/Prod-50/HL		1/00	1/00	1/00,03	1/00,02	1/00,02	1/00,02
Cargo Integ-20/50		1/00,10	1/00,10	1/00,01,06	1/00,01,06	1/00,01,05	1/00,01,05,18
Pyld Encaps-HL		1/00	1/00	1/00,03	1/00,03	1/00,03	1/00,03
NLS MLP-20/50		1/00	1/00	1/00,06	1/00,06	1/00,06	1/00,06
NLS MLP-HL		1/00	1/00	1/00,02	1/00,02	1/00,02	1/00,02
VIB Cells-20		1/05	1/05	1/05	1/05	1/05	1/05
VIB Cells-50		1/00	1/00	1/00	1/00	1/00	1/00
New VAB Cells Shuttle				1/03	1/03	1/03	1/03
CCFS Pads-20/50		1/00	1/00	1/00	1/00	1/00	1/00

TABLE B.1.3.2-4.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 4 (Concluded)

		IF SCENARIO					
ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST FACS	A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
NLS - WEST							
Final Assy Fac-20		1/05	1/05	1/05	1/05	1/05	1/05
Core Assy/Prod-50/HL		1/00	1/00	1/00	1/00	1/00	1/00
Cargo Integ-20/50		1/00	1/00	1/00	1/00	1/00	1/00
Pyld Encaps-HL		1/01	1/01	1/01	1/01	1/01	1/01
NLS MLP-20/50		1/00	1/00	1/00	1/00	1/00	1/00
NLS MLP-HL		1/01	1/01	1/01	1/01	1/01	1/01
VIB Cells-20		1/05	1/05	1/05	1/05	1/05	1/05
VIB Cells-50		1/00	1/00	1/00	1/00	1/00	1/00
New VAB Cells WTR Shuttle		1/01	1/01	1/01	1/01	1/01	1/01
New WTR Pads-20/50		1/00	1/00	1/00	1/00	1/00	1/00
New WTR Pads-HL		1/01	1/01	1/01	1/01	1/01	1/01

TABLE B.1.3.2-5.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 5

		IF SCENARIO					
ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
CLV							
CLV'S		3/00	3/00	3/00,1/03,05	3/00,1/03,05	3/00,1/03,05	3/00,1/03,05, 08
CLV Processing Lines		1/00	1/00,05	1/00,04	1/00,04	1/00,04	1/00,04,12
CRV							
CRV'S				3/00	3/00	3/00	3/00
CRV Processing Lines				1/00	1/00	1/00	1/00
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						
MLS - East							
Core Assy/Prod-X/HL		1/00	1/00	1/00,03	1/00,03	1/00,03	1/00,03,18
Cargo Integ-X/HL		1/00,03	1/00,02,05	1/00,01,02, 04	1/00,01,02, 04,06	1/00,01,02, 04,06	1/00,01,02, 04,06,18
MLS MLP-X/HL		2/00	2/00	2/00,1/05	2/00,1/05	2/00,1/05	2/00,1/05,18
VIB Cells-X/HL		1/00	1/00	1/00	1/00,18	1/00,12	1/00,06
CCFS Pads-X/HL		1/00	1/00	1/00,04	1/00,04	1/00,04	1/00,04
MLS - West							
Core Assy/Prod-X/HL		1/00	1/00	1/00	1/00	1/00	1/00
Cargo Integ-X/HL		1/00	1/00	1/00	1/00	1/00	1/00
MLS MLP-X/HL		2/00	2/00	2/00	2/00	2/00	2/00
VIB Cells-X/HL		1/00	1/00	1/00	1/00	1/00	1/00
Pads-X/HL		1/00	1/00	1/00	1/00	1/00	1/00

TABLE B.1.3.2-6.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 6

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
RPC							
RPC'S		3/00	3/00	3/00	3/00	3/00,05	3/00,05
RPC Processing Lines		1/00	1/00	1/00	1/00	1/00	1/00
CRV							
CRV'S		3/00	3/00	3/00	3/00	3/00	3/00
CRV Processing Lines		1/00	1/00	1/00	1/00	1/00	1/00
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						
MLS - East							
Core Assy/Prod-X/HL		1/00	1/00,05	1/00,02	1/00,01,12	1/00,01,06	1/00,01,06
Cargo Integ-X/HL		1/00,01,06	1/00,01,02,14	2/00,1/01,02 05	2/00,1/01,02, 03,12	2/00,1/01,02, 03,12	2/00,1/01,02, 03,08
MLS MLP-X/HL		2/00	2/00	2/00,1/03	2/00,1/02	2/00,1/02,14	2/00,1/02,12
VIB Cells-X/HL		1/00	1/00	1/00	1/00,12	1/00,05	1/00,05
CCFS Pads-X/HL		1/00	1/00,12	1/00,02	1/00,02	1/00,02	1/00,02,12
MLS - West							
Core Assy/Prod-X/HL		1/00	1/00	1/00	1/00	1/00	1/00
Cargo Integ-X/HL		1/00	1/00	1/00	1/00	1/00	1/00
MLS MLP-X/HL		2/00	2/00	2/00	2/00	2/00	2/00
VIB Cells-X/HL		1/00	1/00	1/00	1/00	1/00	1/00
Pads-X/HL		1/00	1/00	1/00	1/00	1/00	1/00

TABLE B.1.3.2-7.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 7

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
RPC							
RPC'S		3/00	3/00	3/00	3/00,1/04	3/00,1/04	3/00,1/04
RPC Processing Lines		1/00	1/00	1/00	1/00	1/00	1/00
LRV							
LRV's		3/00	3/00	3/00,1/04,05	3/00,1/04,05	3/00,1/04,05	3/00,1/04,05
LRV Processing Lines		1/00	1/00,02	1/00,02,04	1/00,02,04	1/00,02,04	1/00,02,04
LRV Transport Barges		1/00	1/00	1/00,05	1/00,05	1/00,05	1/00,05
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						
MLS - East							
Core Assy/Prod-X/HL		1/00	1/00,12	1/00,03	1/00,02,14	1/00,02,12	1/00,02,6
Cargo Integ-X/HL		1/00,03	1/00,01,03	1/00,02,04, 05	1/00,02,03, 05	1/00,02,03, 05,14	1/00,02,03, 05,08
MLS MLP-X/HL		2/00	2/00	2/00,1/04	2/00,1/03	2/00,1/03	2/00,1/03,12
VIB Cells-X/HL		1/00	1/00	1/00,14	1/00,05	1/00,05	1/00,05
CCFS Pads-X/HL		1/00	1/00	1/00,03	1/00,03	1/00,03	1/00,03,18
MLS - West							
Core Assy/Prod-X/HL		1/00	1/00	1/00	1/00	1/00	1/00
Cargo Integ-X/HL		1/00	1/00	1/00	1/00	1/00	1/00
MLS MLP-X/HL		2/00	2/00	2/00	2/00	2/00	2/00
VIB Cells-X/HL		1/00	1/00	1/00	1/00	1/00	1/00
Pads-X/HL		1/00	1/00	1/00	1/00	1/00	1/00

TABLE B.1.3.2-8.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 8

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96,00	1/96,00	1/96,00,07
MLPS	3				1/03	1/03	1/03
OPF	3						
VAB Stacking Cells	2						
Pads	2						
SSTO							
SSTO's		3/00	3/00	3/00	3/00	3/00	3/00
SSTO Processing Fac		1/00	1/00	1/00	1/00	1/00	1/00
Pads		1/00	1/00	1/00	1/00	1/00	1/00
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						

TABLE B.1.3.2-9.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 9

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
AMLS							
Orbiters		3/05	3/05	3/05	3/05	3/05,1/11	3/05,1/11
Boosters		3/05	3/05	3/05	3/05	3/05	3/05
Launch Pads		2/05	2/05	2/05	2/05	2/05	2/05
Booster Proc Cells		1/05	1/05,12	1/05,09	1/05,08	1/05,08	1/05,08
Orbiter Proc Cells		1/05,11	1/05,11	1/05,08	1/05,08	1/05,08	1/05,07,11
Mating Facilities		1/05	1/05	1/05	1/05	1/05	1/05
Transporters		2/05	2/05	2/05	2/05	2/05	2/05
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						

TABLE B.1.3.2-10.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 10

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96,06
MLPS	3						1/08
OPF	3						
VAB Stacking Cells	2						
Pads	2						
NDV							
Vehicles		3/10	3/10	3/10	3/10	3/10	3/10
Primary Operating Site		1/10	1/10	1/10	1/10	1/10	1/10
Processing Hangers		3/10	3/10	3/10	3/10	3/10	3/10
Cryo Facilities/Fuel Station		2/10	2/10	2/10	2/10	2/10	2/10
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						

TABLE B.1.3.2-11.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 11

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
RPC							
RPC'S				3/00	3/00	3/00	3/00,1/06,09
RPC Processing Lines				1/00	1/00	1/00	1/00
CRV							
CRV's				2/00,1/03,07	2/00,03	2/00,03	2/00,03
CRV Processing Lines				1/00,02	1/00,01,07	1/00,01,07	1/00,01,07
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						
NLS - East							
Core Assy/Prod-50/HL		1/00	1/00	1/00,06	1/00,06	1/00,03	1/00,03
Cargo Integ-20/50		1/00	1/00	1/00,02,06	1/00,02,06	2/00,1/02,06, 18	3/00,1/04,06, 18
Pyld Encaps-HL		1/00	1/00	1/00	1/00	1/00	1/00
NLS MLP-20/50		1/00	1/00	1/00	1/00	1/00,02	1/00,01,18
NLS MLP-HL		1/00	1/00	1/00	1/00	1/00	1/00
VIB Cells-50		1/00	1/00	1/00	1/00	1/00	1/00
CCFS Pads-20/50		1/00	1/00	1/00	1/00	1/00	1/00,04

TABLE B.1.3.2-11.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 11 (Concluded)

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST FACS	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
NLS - West							
Core Assy/Prod-50/HL		1/00	1/00	1/00	1/00	1/00	1/00
Cargo Integ-20/50		1/00	1/00	1/00	1/00	1/00	1/00
Pyld Encaps-HL		1/01	1/01	1/01	1/01	1/01	1/01
NLS MLP-20/50		1/00	1/00	1/00	1/00	1/00	1/00
NLS MLP-HL		1/01	1/01	1/01	1/01	1/01	1/01
VIB Cells-50		1/00	1/00	1/00	1/00	1/00	1/00
New VAB Cells WTR Shuttle		1/01	1/01	1/01	1/01	1/01	1/01
New WTR Pads-20/50		1/00	1/00	1/00	1/00	1/00	1/00
New WTR Pads-HL		1/01	1/01	1/01	1/01	1/01	1/01

TABLE B.1.3.2-12.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 12

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
RPC							
RPC'S				3/05	3/05	3/05,1/18	3/05,1/10,11
RPC Processing Lines				1/05	1/05	1/05	1/05
CTV							
CTV's				2/00,1/03,07	2/00,03	2/00,03	2/00,03
CTV Processing Lines				1/00,02	1/00,01,07	1/00,01,07	1/00,01,07
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						
NLS - East							
Core Assy/Prod-50/HL		1/00	1/00	1/00,06	1/00,06	1/00,06	1/00,06
Cargo Integ-20/50		1/00	1/00	1/00,04,06	1/00,04,06	1/00,04,06	1/00,04,06,08
Pyld Encaps-HL		1/00	1/00	1/00	1/00	1/00	1/00
NLS MLP-20/50		1/00	1/00	1/00	1/00	1/00	1/00
NLS MLP-HL		1/00	1/00	1/00	1/00	1/00	1/00
VIB Cells-50		1/00	1/00	1/00	1/00	1/00	1/00
CCFS Pads-20/50		1/00	1/00	1/00	1/00	1/00	1/00
NLS - West							
Core Assy/Prod-50/HL		1/00	1/00	1/00	1/00	1/00	1/00
Cargo Integ-20/50		1/00	1/00	1/00	1/00	1/00	1/00
Pyld Encaps-HL		1/01	1/01	1/01	1/01	1/01	1/01
NLS MLP-20/50		1/00	1/00	1/00	1/00	1/00	1/00
NLS MLP-HL		1/01	1/01	1/01	1/01	1/01	1/01
VIB Cells-50		1/00	1/00	1/00	1/00	1/00	1/00
New VAB Cells WTR Shuttle		1/01	1/01	1/01	1/01	1/01	1/01
New WTR Pads-20/50		1/00	1/00	1/00	1/00	1/00	1/00
New WTR Pads-HL		1/01	1/01	1/01	1/01	1/01	1/01

TABLE B.1.3.2-13.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 13

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
RPC							
RPC'S				3/00	3/00	3/00	3/00
RPC Processing Lines				1/00	1/00	1/00	1/00
CTV							
CTV's				2/00,1/03,07	2/00,03	2/00,03	2/00,03
CTV Processing Lines				1/00,02	1/00,01,07	1/00,01,07	1/00,01,07
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						
NLS - East							
Core Assy/Prod-50/HL		1/00	1/00	1/00,06	1/00,06	1/00,04	1/00,02
Cargo Integ-20/50		1/00	1/00	1/00,02,06	1/00,02,06	2/00,1/02,06	3/00,1/04,06
Pyld Encaps-HL		1/00	1/00	1/02	1/02	1/00	1/02
NLS MLP-20/50		1/00	1/00	1/00	1/00	1/00,06	1/00,06
NLS MLP-HL		1/00	1/00	1/00	1/00	1/00	1/00
VIB Cells-50		1/00	1/00	1/00	1/00	1/00	1/00
CCFS Pads-20/50		1/00	1/00	1/00	1/00	1/00	1/00
NLS - West							
Core Assy/Prod-50/HL		1/00	1/00	1/00	1/00	1/00	1/00
Cargo Integ-20/50		1/00	1/00	1/00	1/00	1/00	1/00
Pyld Encaps-HL		1/01	1/01	1/01	1/01	1/01	1/01
NLS MLP-20/50		1/00	1/00	1/00	1/00	1/00	1/00
NLS MLP-HL		1/01	1/01	1/01	1/01	1/01	1/01
VIB Cells-50		1/00	1/00	1/00	1/00	1/00	1/00
New VAB Cells WTR Shuttle		1/01	1/01	1/01	1/01	1/01	1/01
New WTR Pads-20/50		1/00	1/00	1/00	1/00	1/00	1/00
New WTR Pads-HL		1/01	1/01	1/01	1/01	1/01	1/01

TABLE B.1.3.2-14.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 14

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
RPC							
RPC'S				3/00	3/00	3/00	3/00
RPC Processing Lines				1/00	1/00	1/00	1/00
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						
MR Titan IV							
MR Titan IV Transporter			2/00	2/00	2/00	2/00	2/00,1/08
MR Titan IV Pads			1/00	1/00	1/00,02	1/00,02	1/00,02

TABLE B.1.3.2-15.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 16

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96,00	1/96,00	1/96,00,07
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
AMSC							
Boosters		3/05	3/05	3/05	3/05	3/05	3/05
Orbiters		3/05	3/05	3/05	3/05	3/05	3/05
Booster Refurb Fac		1/05	1/05	1/05	1/05	1/05	1/05
Orbiter Refurb Fac		1/05	1/05,07	1/05,06,12	1/05,06,12	1/05,06,12	1/05,06,12
Mating Fac		1/05	1/05	1/05	1/05	1/05	1/05
Tank Sets		3/05	3/05	3/05	3/05	3/05	3/05
LRV							
LRV's				3/05,1/08	3/05,1/08,10	3/05,1/08,10	3/05,1/08,10
LRV Processing Lines				1/05,06,08	1/05,06,08,10	1/05,06,08,10	1/05,06,08,10
LRV Transport Barges				1/05,08	1/05,08	1/05,08	1/05,08
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						

TABLE B.1.3.2-16.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 17

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96,00	1/96,00	1/96,00,07
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
RUPC							
RUPC'S		3/00	3/00	3/00,1/05	3/00,1/05	3/00,1/05	3/00,1/05
RUPC Reassembly Bldgs		1/00	1/00	1/00	1/00	1/00	1/00
RUPC O&C Bldgs		1/00	1/00,05	1/00,02	1/00,02	1/00,02	1/00,02
RUPC Recovery Sites		1/00	1/00	1/00	1/00	1/00	1/00
LRV							
LRV's			3/00	3/00,1/08	3/00,1/02,03, 04,05,18	3/00,1/02,03, 04,05,18	3/00,1/02,03, 04,05,18
LRV Processing Lines			1/00,05	1/00,01,03,04	1/00,01,03,04, 06	1/00,01,03,04, 06	1/00,01,03,04, 06
LRV Transport Barges			1/00	1/00,08	1/00,02,05	1/00,02,05	1/00,02,05
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1			1/05	1/05	1/04	1/03
Pads East-Unique	1			1/02	1/02	1/02	1/02
Pads West	1						

TABLE B.1.3.2-17.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 18

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
Beta II							
Boosters		3/05	3/05	3/05	3/05	3/05	3/05
Orbiters		3/05	3/05	3/05	3/05	3/05	3/05
Booster Refurb Fac		1/05	1/05	1/05	1/05	1/05	1/05
Orbiter Refurb Fac		1/05	1/05	1/05	1/05	1/05	1/05
Mating Fac		1/05	1/05	1/05	1/05	1/05	1/05
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4						
SMAB Cells	5						
Titan Transporter	4						
Pads East	2						
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan II/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						

TABLE B.1.3.2-18.– ARCHITECTURE VEHICLES/FACILITIES SUMMARY
Architecture 19

ELEMENT/SYSTEMS OPS SUPPORT FAC	EXIST	IF SCENARIO A ADD/YR	B ADD/YR	C ADD/YR	D ADD/YR	E-low ADD/YR	E-high ADD/YR
Shuttle							
Orbiters	4			1/96	1/96	1/96	1/96
MLPS	3						
OPF	3						
VAB Stacking Cells	2						
Pads	2						
ALV							
747's		2/00	2/00	2/00	2/00	2/00	2/00
RPCs		3/00	3/00	3/00	3/00	3/00	3/00
Horizontal Proc Facs		1/00,03	1/00,03	1/00,01,05	1/00,01,05	1/00,01,05	1/00,01,05
P/A Module Proc Facs		1/00	1/00	1/00	1/00	1/00,07	1/00,07
RPC Proc Facs		1/00	1/00	1/00	1/00	1/00	1/00
747 Maint & Mating Cells		1/00	1/00	1/00	1/00	1/00	1/00
P/A Mod Recovery Vessels		2/00	2/00	2/00	2/00	2/00	2/00
P/A Modules		3/00	3/00	3/00,1/03	3/00,1/03	3/00,1/03	3/00,1/03,07
LRV							
LRV's		3/00	3/00	3/00,1/02,03, 05	3/00,1/02,03, 2/04	3/00,1/02,03, 2/04	3/00,1/02,03, 2/04
Atlas IIAS							
Booster Processing	3						
Centaur Processing	1						
HPF Lines	1						
Launch Pads	2						
Delta II							
Booster Processing	3						
Launch Pads East	2						
Launch Pads West	1						
Titan III/IV							
Vert Intg Bld Cells	4			2/02,1/03	2/02,1/03,04 06	2/02,1/03,04 06	2/02,1/03,04 06
SMAB Cells	5						
Titan Transporter	4		1/02	2/01,02,1/03 05	2/01,02,1/03 2/04,1/05	2/01,02,1/03 2/04,1/05	2/01,02,1/03 2/04,1/05
Pads East	2		1/01	1/00,01,02,03, 05	1/00,01,02,03, 2/04,1/06	1/00,01,02,03, 2/04,1/06	1/00,01,02,03, 2/04,1/06
Pads West	1	1/99	1/99	1/99	1/99	1/99	1/99
Titan IV/IIS							
Titan Transporter-Unique	1						
Pads East-Unique	1						
Pads West	1						

B.1.4 ARCHITECTURE COST RISK DATA

Architecture Cost Risk is the risk incurred in acquiring systems in an architecture due to uncertainties in schedule, program definition, technology, and estimating approach. It is calculated on a relative basis, taking into account Technical Challenge, Program Immaturity, and the Number of New Systems. Please refer to Volume I, section 3.2.5.

All numbers were determined by the NIT using a consensus process.

B.1.4.1 Technical Challenge/Program Immaturity Data

Table B.1.4.1 shows the Technical Challenge and Program Immaturity values derived by the NIT for all systems. The ranges that the NIT considered and the actual consensus values are listed for the three components of Technical Challenge; non-recurring, recurring, and operations, and for Program Immaturity. Program Immaturity values for various system combinations, such as CLV/MLS-HL and RPC/MLS-X, are also shown.

TABLE B.1.4.1.– ARCHITECTURE COST RISK TECHNICAL CHALLENGE AND PROGRAM IMMATURITY DATA

	Technical Challenge						Program Immaturity	
	Nonrecurring		Recur Production		Operations			
HTS Element/System	NIT Range	Value	NIT Range	Value	NIT Range	Value	NIT Range	Value
ACRV	2 to 4	3	1 to 4	2	2 to 5	3	4 to 7	5
ALV	4	4	4	4	4	4	8	8
AMLS	5 to 7	7	4 to 7	6	4 to 7	6	6 to 9	8
AMSC	3 to 7	6	3 to 7	4	5 to 9	6	6 to 9	7
Atlas	1	1	1	1	1	1	1	1
Atlas Evolution	2 to 3	2	1 to 2	1	1 to 2	1	2 to 4	3
Beta II	7 to 10	8	5 to 9	7	6 to 9	8	9 to 10	10
CLV	2 to 6	5	1 to 5	3	1 to 8	3	6 to 8	7
CRV	2 to 5	4	1 to 5	3	1 to 8	3	6 to 8	7
CTF	2 to 7	4	1 to 4	2	1 to 7	3	4 to 8	6
CTV	2 to 5	4	1 to 5	3	1 to 7	3	5 to 8	6
Delta	1	1	1	1	1	1	1	1
LRV	2 to 5	3	1 to 5	3	1 to 8	2	6 to 8	7
MLS	3 to 5	4	3 to 5	4	3 to 4	3	5 to 7	6
MLS-PA	4	4	4	4	4	4	7	7
NDV	10	10	10	10	7 to 10	9	10	10
NLS	3 to 6	4	3 to 5	4	3 to 4	3	4 to 7	6
RCV	2 to 4	3	1 to 3	2	2 to 3	3	3 to 4	4
RPC	2 to 5	5	1 to 5	3	3 to 7	3	4 to 7	6
RUPC	5 to 9	8	5 to 7	6	3 to 8	3	6 to 8	7
Shuttle	1	1	1	1	1	1	1	1
Shuttle Evolution	2 to 4	3	1 to 2	2	2 to 4	3	3 to 4	4
SSTO (Rocket)	5 to 10	9	4 to 10	6	8 to 9	9	7 to 10	8
Titan II	1	1	1	1	1	1	1	1
Titan II (HR)	2 to 4	3	1 to 2	2	1 to 2	2	2 to 4	3
Titan IV	1	1	1	1	1	1	1	1
Titan IV Evolution	2 to 4	3	1 to 4	2	1 to 2	2	3 to 4	4
Titan IV+ (HR)	2 to 5	3	1 to 2	2	2 to 4	3	3 to 6	5
System Combinations								
Atlas CTF	—	—	—	—	—	—	—	6
CLV/MLS-HL	—	—	—	—	—	—	—	7
Delta CTF	—	—	—	—	—	—	—	6
MLS-X/CRV	—	—	—	—	—	—	—	7
NLS-1/CTV	—	—	—	—	—	—	—	6
NLS-1/LRV	—	—	—	—	—	—	—	7
RPC/MLS-HL/LRV	—	—	—	—	—	—	—	7
RPC/MLS-X	—	—	—	—	—	—	—	6
RPC/HR Titan IV+	—	—	—	—	—	—	—	6
RPC/NLS-2	—	—	—	—	—	—	—	6
RUPC/Titan II	—	—	—	—	—	—	—	7
Titan CTF	—	—	—	—	—	—	—	6

B.1.4.2 New Systems Data

Table B.1.4.2 shows the new systems values derived by the NIT for families of related systems that occur in the same architecture. The range that the NIT considered and the actual consensus values, which are based on averaging, are listed. The number of new systems value for a single system may be judged to be less than one, based on how much of the hardware is common with existing systems or other new systems in the architecture.

TABLE B.1.4.2.– ARCHITECTURE COST RISK NEW SYSTEMS DATA

HTS System	# of New Systems	
	NIT Range	Ave Value
ACRV	0.8 to 1	0.971
ALV	—	1.500
AMLS	—	1.600
AMSC	1 to 1.2	1.029
Atlas Evolution	0.1 to 0.3	0.207
Atlas/Delta CTF	0.7 to 1	0.957
Beta II	1 to 2	1.500
CRV	1	1.000
CTV	1	1.000
LRV	1	1.000
MLS-X + RPC, MLS-HL	2.2 to 3	2.743
MLS-X, MLS-HL + CLV	2 to 3	2.600
NDV	—	1.000
NLS 1, 2	1.2 to 2	1.486
NLS 1, 2 + RPC	2.2 to 2.6	2.443
NLS 1, 2 + RPC, 3	3 to 3.5	3.329
NLS 1, 2, 3	2.2 to 3	2.414
Shuttle Evolution + RCV	0.5 to 1.1	0.929
SSTO	1	1.000
Titan CTF	0.9 to 1	0.986
Titan Evolution	0.1 to 0.8	0.486
Titan II (HR) + RUPC	1.2 to 1.5	1.400
Titan IV (HR) + RPC	1.2 to 1.7	1.429

B.1.5 ENVIRONMENT DATA

The Environment attribute is the degree to which a given architecture permanently alters the Earth's environment during the course of nominal operations. It is calculated based on relative impacts due to propulsive effluents. Please refer to Volume I, section 3.2.7.

Table B.1.5 summarizes environmental data for all launch vehicles. The table shows the weight and the weighted score of each of the nine exhaust products that have been judged by the NIT to have significant environmental impact for a single flight of each vehicle. The weighted score is the weight of the exhaust product multiplied by the environmental impact factor. The total of the weighted scores for a flight is also shown.

The environmental impact factors are:

CO	=	1.7
CO_2	=	1.5
H_2	=	0.1
H_2O	=	0.1
HCl	=	5.0
N_2	=	0.3
OH	=	0.5
H	=	0.3
Al_2O_3	=	3.0

TABLE B.1.5.– ENVIRONMENT DATA

Launch System	CO (1.7)		CO_2 (1.5)		H_2 (0.1)		H_2O (0.1)		HCl (5.0)		N_2 (0.3)		OH (0.5)		H (0.3)		Al_2O_3 (3.0)		Total
	Mass (klbs)	Wghted Score	Mass (klbs)	Wghted Score	Mass (klbs)	Wghted Score	Mass (klbs)	Wghted Score	Mass (klbs)	Wghted Score	Mass (klbs)	Wghted Score	Mass (klbs)	Wghted Score	Mass (klbs)	Wghted Score	Mass (klbs)	Wghted Score	Wghted Score
ALV	0.0	0.0	0.0	0.0	11.1	1.1	310.4	31.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32
AMLS	0.0	0.0	0.0	0.0	74.3	7.4	2079.6	208.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	215
AMSC	0.0	0.0	0.0	0.0	8.0	0.8	223.2	22.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23
Atlas E	81.5	138.6	67.7	101.6	4.8	0.5	101.1	10.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	251
Atlas I	100.1	170.2	83.1	124.7	5.9	0.6	124.1	12.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	308
Atlas II	112.8	191.8	93.8	140.7	6.6	0.7	140.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	347
Atlas IIAS	128.8	219.0	95.8	143.7	8.2	0.8	146.2	14.6	14.0	70.0	5.6	1.7	0.0	0.0	0.0	0.0	20.0	60.0	510
Beta II	0.0	0.0	377.5	566.3	11.0	1.1	481.9	48.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	616
Delta II	125.2	212.8	76.6	114.9	6.6	0.7	70.4	7.0	31.4	157.0	17.8	5.3	0.0	0.0	0.0	0.0	45.0	135.0	633
MLS-HL	0.0	0.0	0.0	0.0	58.2	5.8	1628.2	162.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	169
MLS-X	0.0	0.0	0.0	0.0	58.2	5.8	1628.2	162.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	169
NDV	0.0	0.0	0.0	0.0	193.2	19.3	5406.8	540.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	560
NLS-20	0.0	0.0	0.0	0.0	11.8	1.2	331.2	33.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34
NLS-50	0.0	0.0	0.0	0.0	58.2	5.8	1628.2	162.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	169
NLS-HL	542.6	922.4	48.2	72.3	108.8	10.9	1813.9	181.4	479.9	2399.5	197.8	59.3	4.8	2.4	2.4	0.7	851.3	2553.9	6203
Shuttle	574.6	976.8	84.2	126.3	102.8	10.3	1735.4	173.5	502.6	2513.0	208.8	62.6	0.8	0.4	0.8	0.2	720.0	2160.0	6023
Shuttle Evol/RCV	625.5	1063.4	518.8	778.2	90.6	9.1	2286.7	228.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2079
SSTO (Rocket)	0.0	0.0	0.0	0.0	32.8	3.3	918.5	91.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	95
Titan II	11.3	19.2	30.5	45.8	15.9	1.6	146.4	14.6	0.0	0.0	114.9	34.5	0.0	0.0	0.0	0.0	0.0	0.0	116
Titan II+GEMs (HR)	51.7	87.9	60.0	90.0	5.1	0.5	120.3	12.0	31.5	157.5	148.5	44.6	0.1	0.1	0.1	0.0	45.0	135.0	528
Titan III	220.7	375.2	92.0	138.0	20.7	2.1	200.2	20.0	229.2	1146.0	177.6	53.3	0.3	0.2	0.3	0.1	254.1	762.3	2497
Titan IV Evolution	342.7	582.6	174.2	261.3	32.6	3.3	370.6	37.1	267.5	1337.5	433.3	130.0	0.4	0.2	0.4	0.1	382.8	1148.4	3500
Titan IV+LRB (HR)	624.0	1060.8	217.2	325.8	8.4	0.8	421.2	42.1	0.0	0.0	537.0	161.1	0.0	0.0	0.0	0.0	0.0	0.0	1591
Titan IV+SRM	284.2	483.1	111.0	166.5	26.6	2.7	243.6	24.4	230.6	1153.0	276.8	83.0	0.3	0.2	0.3	0.1	330.0	990.0	2903
Titan IV+SRMUs	326.3	554.7	117.2	175.8	30.4	3.0	260.1	26.0	267.5	1337.5	292.4	87.7	0.4	0.2	0.4	0.1	382.8	1148.4	3334

B.1.6 FUNDING PROFILE DATA

Funding Profile is the sum of the system costs of an architecture, incurred over the time period of study interest (1992-2020), to deliver all missions flown from 1998 to 2020. It includes the total cost and the peak cost of the architecture. Annual costs are categorized into six cost phases: design, development, test, and evaluation (DDT&E), facilities, non-recurring production, pre-planned product improvement (P3I), operations, and recurring production. The cost of unreliability is also added to the cost of the architecture. Please refer to Volume I, section 3.2.2.

B.1.6.1 Work Breakdown Structure

Table B.1.6.1 shows the Work Breakdown Structure (WBS) agreed upon by the NIT to be used as a common basis for comparing costs.

In some cases, data did not exist on subsystem level. In other cases, too much data existed. Therefore, the WBS was only used as a guideline and was not strictly applied to all systems.

TABLE B.1.6.1.– HUMAN TRANSPORTATION SYSTEM STUDY WORK BREAKDOWN STRUCTURE

LEVEL:	0	I	II	III	IV	V
LABEL:	Architecture	System	Segment	Element	Subsystem	Subsystem Definitions (As Applicable - Items Listed = Examples Only)
	n.0 ARCHITECTURES 1 TO x					
		1.0 TRANSPORTATION SYSTEM - COMMON SYSTEMS				For elements common between systems in an architecture
			1.1 PROGRAM SEGMENT			
				1.1.1 Program Management & Support		
				1.1.2 Systems Engineering & Integration		
			1.2 VEHICLE SEGMENT			
				1.2.1 to 1.2.6 ELEMENTS (1 thru 6)		All stages, plus shrouds, crew modules. reusable cargo carriers
					1.2.1.1 IAT	Element integration, assembly, & test
					1.2.1.2 Structures	Tanks, Adapters, Skirts, Wings, Empennage, Fuselage
					1.2.1.3 Separation Sys	Separation systems, Ordnance, Disconnects
					1.2.1.4 Recovery & Landing Sys	Parachutes, Landing Gear
					1.2.1.5 Thermal Protection	Tiles, Blankets, MLI, Carbon/Carbon, SOFI
					1.2.1.6 Main Engine Prop	Liquid engines, Solid motors
					1.2.1.7 Auxiliary Propulsion	TVC, RCS, OMS
					1.2.1.8 Propulsion Feed Sys	Feed lines, Fill & drain, Propellant Utilization, Pressurization
					1.2.1.9 Power Gen & Distrib	Batteries, Fuel Cells, Cables & harnesses, Power Distrib Units
					1.2.1.10 Control System	Hydraulics, EMAs
					1.2.1.11 Avionics	GN&C, Comm & Track, Data Process, Instrumentation, Telemetry Range Safety, Active thermal control
					1.2.1.12 Envir Ctl & Life Supt	Atmosphere Ctl, Consumables & waste mgt, Airlock
					1.2.1.13 Tooling	Design, manufacture, and maintenance of production rate tooling
					1.2.1.14 Support Equipment	System-peculiar (or common for 1.0) ground support equipment (GSE)
					1.2.1.15 Spares & Repair Parts	Sum of all element subsystem spares
					1.2.1.16 Major Overhauls	Major overhaul of entire element, including all subsystems
			1.3 GROUND SEGMENT			
				1.3.1 FACILITIES & EQUIPMENT		
					1.3.1.1 Launch Pad	For all facilities: Non-Recurring = Architecture & Engineering
					1.3.1.2 Vertical Process Facil	(A&E), Construction of Facility (C of F), Site Activation (SA);
					1.3.1.3 Horizontal Proc Facil	Recurring = Facility maintenance
					1.3.1.4 Launch Ctl Cntr	"
					1.3.1.5 Mission Control Ctr	"
					1.3.1.6 Comm Network	"
					1.3.1.7 Test Facilities	"
					1.3.1.8 Manufacturing Facil	" Government Owned/Contractor Operated (GOCO) only
					1.3.1.n Other Facilities	Whatever other facilities apply to specific system
			1.4 TEST & OPERATIONS SEGMENT			
				1.4.1 SYSTEM TEST & EVALUATION		
					1.4.1.1 Development Tests	Subsystems - aerothermal, acoustic shock & vibration, fluids
					1.4.1.2 Operational Tests	Integrated system ground, flight

TABLE B.1.6.1.– HUMAN TRANSPORTATION SYSTEM STUDY WORK BREAKDOWN STRUCTURE (CONCLUDED)

LEVEL: / LABEL:	0 Architecture	I System	II Segment	III Element	IV Subsystem		V Subsystem Definitions (As Applicable - Items Listed = Examples Only)
				1.4.2 SYSTEM OPERATIONS & SUPPORT			
					1.4.2.1	Training	Start-up training program for personnel associated with operations, recurring crew and flight controller training
					1.4.2.2	Launch Operations	Vehicle launch processing, Cargo integration, Flight-to-flight refurbishment, Base ops support, Liquid propellants, Landing & recovery ops, Unscheduled maintenance
					1.4.2.3	Flight Operations	Flight planning & design, Real-time mission control, Analytical payload integration, Crew operations
			1.5 SOFTWARE SEGMENT				
				1.5.1 FLIGHT SOFTWARE			
					1.5.2.1	Operating System	For all software: Non-Recurring = System design, coding, test & debug, Independent Verification & Validation; Recurring = Software maintenance, Flight-to-flight reconfiguration
					1.5.2.2	Guidance, Nav, & Ctl	
					1.5.2.3	Subsystems Mgt	
					1.5.2.4	Comm/Telemetry	
					1.5.2.5	Other	
				1.5.2 GROUND SOFTWARE			
					1.5.3.1	GSE Operations	
					1.5.3.2	Pre Launch Ops	
					1.5.3.3	Launch Management	
					1.5.3.4	Post Launch Ops	
					1.5.3.5	Other	
	2.0 to n.0 TRANSPORTATION SYSTEM - INDIVIDUAL SYSTEMS						For each individual system in an architecture

B.1.6.2 Cost Data Input Sheets

Tables B.1.6.2-1 through B.1.6.2-29 contain the cost data input sheets for all systems used in the architectures. Each sheet represents all cost data associated with an individual system, including rate and learning curves and spread factors. This data, along with flight profiles, is input into the cost model spreadsheets to produce annual architecture costs. The sheet provides a standard format for the data.

TABLE B.1.6.2-1.– ACRV COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

ASSURED CREW RETURN VEHICLE (ACRV)

NON-RECURRING	TOTAL COST	SPREAD FACTORS - 8	- 7	- 6	- 5	- 4	- 3	- 2	- 1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$733	7%	11%	28%	25%	16%	8%	4%	1%				
N/R PROD													
P3I													
FACILITIES:													

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS - 5	- 4	- 3	- 2	- 1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
ACRV	1	$107	100%	100%					9%	30%	37%	24%	
LAUNCH OPS	1				$0	$8						100%	

CRITICAL ITEMS:

TABLE B.1.6.2-2.– ALV/RPC COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

AIR LAUNCHED VEHICLE (ALV) AND RPC

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC*	NUM FAC
DDT&E	$4,625			1%	20%	44%	18%	10%	7%	2000			
N/R PROD TLG	$300				20%	30%	50%						
P3I													
FACILITIES:													
Maint. Hanger	$40			5%	10%	70%	15%				3	82.7	1
RPC/Stage Proc.	$112			5%	7%	13%	70%	5%			**18	**13.8	1
ALV Processing	$48			10%	15%	50%	20%	5%			14	20.0	1
Launch Facilities	$201			10%	20%	25%	40%				1	248.0	1
Module Recovery	$120			10%	20%	55%	15%				3	165.3	2
Ops/Trng Fac.	$300			5%	30%	35%	20%	10%			N/A	N/A	1

**Note: RPC is 18 days, but U/S receiving is only 1 day.

* 248 workdays/yr

RECURRING	QTY/ VEHICLE	INIT COST:	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	0	COMMON-ALITY
PRODUCTION													
747 Carrier A/C	1	$311	95%	N/A	No					52%	43%	5%	
Upper Stg Veh.	1	41/53	90%	N/A	Yes				12%	30%	48%	10%	RL10
Stg I Expended	1	$36	85%	N/A	Yes					15%	85%		
Stg I P/A Mod.	1	$162	90%	N/A	No					10%	70%	20%	SSME
PLS-lite	1	$196	92%	N/A	No					10%	60%	30%	
PLS-L OMS/LES	1	$42	90%	N/A	Yes					15%	75%	10%	
PSE Set	N/A	$10.5	95%	N/A	No							N/A	
LAUNCH OPS		$21/23	90%	95%		$29							
FLIGHT OPS		$1/9	100%	N/A		$27							
SE&I		$4/5	100%	N/A		N/A							

CRITICAL ITEMS:

1. The 747-400FX is a modified new aircraft with the cargo launch center inside the airplane; Range safety & FAA interfaces are also required.
2. The upper stage has two configurations- $41M TFU for single engine cargp & $53M for 2 engine RPC flights (U/S engine-out capability.)
3. Stage I is composed of two cryo. stage elements - a disposable core and a reusable propulsion/avionics module with an SSME deriv. engine.
4. The PLS-lite carries 4 passengers; one passenger is a qualified Mini-RPC pilot.
5. The RPC OMS module is expended on each flight; RPC reuse hardware is good for 50 flights before disposal and launch ops. estimate includes refurb.
6. PSE is for 1 747 & Mini-RPC set, with expendables checkout capability; 3 sets are required at primary launch site.

TABLE B.1.6.2-3.– AMSC COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

ADVANCED MILITARY SPACECRAFT CAPABILITY (AMSC)

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$6,478				20%	25%	30%	20%	5%				
N/R PROD													
P3I													
FACILITIES:													

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Reusable Hdwe:													
Airframe	1	$669	90%	100%				25%	26%	30%	19%		
Main Engine	3	$21	90%	90%				25%	27%	30%	18%		
Expendable Hdwe:													
Drop Tank	2	$14	90%	90%				25%	25%	25%	25%		
Refurbishment	1				$1.4	$115.0						100%	
LAUNCH OPS	1				$0.5	$92.4						100%	
FLIGHT OPS	1				$0.1	$25.9						100%	
PROGRAM MGT	1				$0.0	$35.2						100%	

CRITICAL ITEMS:

Reusable Airframe useful life = 200 flights
Main Engine useful life = 50 flights
Drop Tank useful life = 1 flight (expendable)

TABLE B.1.6.2-4.– ATLAS IIAS COST DATA INPUT SHEET
(M 92$ - Including Program Wrap Factors)

ATLAS IIAS

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC*	NUM FAC
RDT&E	$0												
N/R PROD	$0												
P3I	$0												
FACILITIES:													
Pad - ETR	$381					25%	30%	30%	15%		42	6.0	2
SLC - WTR	$476					25%	30%	30%	15%		60	4.2	1
Production												14.0	1

* 250 workdays/yr

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Solids					$3	$0				60%	40%		
Booster					$27	$27			25%	55%	10%	10%	
Upper Stage					$33	$23			25%	55%	10%	10%	
Shroud					$2	$0				70%	30%		
LAUNCH OPS					$1	$26						100%	
FLIGHT OPS					$1	$24					10%	90%	
PROG MGT & SUP					$0	$5						100%	

CRITICAL ITEMS:

RECURRING CPF

Flts/Yr	2	4	6	8	10	12
CPF	$120	$93	$85	$80	$78	$76

TABLE B.1.6.2-5.– ATLAS IIAS EVOLUTION COST DATA INPUT SHEET
(M 92$ - Including Program Wrap Factors)

ATLAS IIAS EVOLUTION

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC*	NUM FAC
DDT&E	$100					15%	30%	30%	25%				
N/R PROD	$0												
P3I	$0												
FACILITIES:													
Centaur Proc Fac	$150					25%	30%	30%	15%				
												14.0	1

* 250 workdays/year

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Solids					$3	$0				60%	40%		
Booster					$27	$27			25%	55%	10%	10%	
Upper Stage					$29	$23			25%	55%	10%	10%	
Shroud					$2	$0				70%	30%		
LAUNCH OPS					$1	$11						100%	
FLIGHT OPS					$1	$24					10%	90%	
PROG MGT & SUP					$0	$5						100%	

RECURRING CPF

Flts/Yr	2	4	6	8	10	12
CPF	$108	$86	$78	$74	$72	$71

CRITICAL ITEMS:

ACTIVITY	INVEST	BENEFIT
EMAs/Valves	$20	reduces Booster On Stand (BOS) to 23 days, reduces launch ops manpower
Automated GSE	$7	reduces BOS to 23 days, reduces launch ops manpower
Centaur Processing Fac	$150	reduces Atlas/Centaur BOS to 23 days, reuces pre-launch Titan/Centaur processing & relieves other Titan facilities
Single Engine Centaur	$73	increases reliability, reduces unit cost $4M

TABLE B.1.6.2-6.– BETA II COST DATA INPUT SHEET (M 92$ - Not Including Program Wrap Factors)

BETA II

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$15,538	5%	15%	10%	20%	25%	13%	10%	2%	2005			
N/R PROD	$703	10%	55%	25%	8%	2%							
P3I													
FACILITIES:													
Total	$1,475												
EAFB Test Fac	$348	5%	35%	45%	15%							6.0	1
KSC Facilities	$375	2%	10%	50%	35%	3%						40.0	1
VAFB Facilities	$452	1%	5%	20%	38%	30%	6%					10.0	1
MOC/Trng Fac	$200	2%	20%	50%	25%	3%						50.0	1
Flt Training A/C	$100	1%	15%	39%		5%	40%						set of 2

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
BOOSTER	1	$2,940	95%	100%					15%	55%	25%	5%	
ORBITER	1	$703	92%	100%					12%	48%	35%	5%	SSME
SPARES	1	$692	92%	100%								100%	SSME
Booster #1 Mod	* 1	$735	100%	100%							90%	10%	
Orbiter #1 Mod	* 1	$176	100%	100%							80%	20%	
(see Notes 4 &5 below)													
LAUNCH OPS (2 SITES)					$7	$310						100%	
FLIGHT OPS (2 SITES)					$7	$120						100%	
PROGRAM MGT (2 SITES)					$0	$46						100%	

CRITICAL ITEMS:

1. NOTE*: The first two flight units, orbiter & booster #1, are included in the DDT&E cost estimate; the DDT&E prototype (TFU) units are modified in production after the first two fleet sets are delivered.
2. The booster nacelle and propulsion system development are the highest program risk iers.
3. Edwards test facilities are deactivated and equipment is moved to WSMR Spaceport after the second year of flight operations.
4. Maximum flight rate out of VAFB (West Launch Site) is 10 per year; military surge costs are excluded.
5. Cost per flight estimates are based on an average of 38 flights per year. Max flight rate capability is 50/year (without military surge).
6. Orbiter crew training requirments are an O&S flight ops cost driver.

TABLE B.1.6.2-7.– CLV COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

CREW & LOGISTICS VEHICLE (CLV)

NON-RECURRING	TOTAL COST	-8	-7	-6	SPREAD FACTORS -5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC*	NUM FAC
DDT&E	$7,053		7%	11%	28%	25%	16%	8%	5%				
N/R PROD	assumed included in DDT&E												
P3I													
FACILITIES:													
	assumed included in DDT&E												

* 250 workdays/yr

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Reusable Vehicle	1	$738	100%	100%					9%	30%	37%	24%	
LAUNCH OPS	1	$26	1	1									
FLIGHT OPS	included in launch ops											100%	
PROG MGT & SUP	included in launch ops												

CRITICAL ITEMS:

TABLE B.1.6.2-8.– CRV COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

CARGO RETURN VEHICLE (CRV)

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC*	NUM FAC
DDT&E	$1,661				15%	22%	28%	25%	10%	2000			
N/R PROD	$249						25%	45%	30%				
P3I	$0												
FACILITIES:													
Horiz Proc Fac	$10						30%	45%	25%		65	4.6	

* 300 workdays/yr

RECURRING	QTY/VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMONALITY
PRODUCTION**													
ELEMENT 1	1	$2	90%	75%								100%	
ELEMENT 2	1	$5	90%	90%						15%	75%	10%	
ELEMENT 3	1	$61	90%	90%						20%	75%	5%	
ELEMENT 4	1	$126	90%	100%					10%	35%	50%	5%	
Program Mgt	1	$51	95%	50%					5%	30%	45%	20%	
Overhauls	1	$39	95%	100%								100%	
Vehicle Spares	1	$1	90%	85%								100%	
LAUNCH OPS		$12	90%	63%								100%	
FLIGHT OPS		$9	90%	55%								100%	
PROGRAM MGT		$4	90%	63%								100%	

CRITICAL ITEMS:

Recovery: Parafoil recovery system for 80Klb landing weight
Avionics & Software: Autonomous/unmanned flight systems, automated ground checkout (Built In Test)
Booster availability: CRV requires 80Klb+ booster

Test Program:
Number prototypes = 4 equivalent units
Number flight tests = 3
Initial spares lay-in = .75 equivalent un

ELE 1: 1.2.1.9.1 (Batteries)
ELE 2: 1.2.1.4 (Parafoils)
ELE 3: 1.2.1...4,5,7 TPS & APS)
ELE 4: 1.2.1...2,8,9.2,10,11 (Re Veh)

TABLE B.1.6.2-9.– CTF COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

CARGO TRANSFER FUNCTION (CTF) - ATLAS IIAS & DELTA II

NON-RECURRING	TOTAL COST	SPREAD FACTORS - 8	- 7	- 6	- 5	- 4	- 3	- 2	- 1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$218					20%	40%	25%	15%	1997			
N/R PROD	$24						15%	45%	40%				
P3I													
FACILITIES:													

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS - 5	- 4	- 3	- 2	- 1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
IMA	1	$16	90%	90%							60%	40%	
Overhauls	1	$4	100%	80%								100%	
LAUNCH OPS		$1	100%	100%								100%	

CRITICAL ITEMS:

Delta II CTF assumed to be same as for Atlas IIAS

The Recurring costs shown here are ADDITIVE to an Atlas IIAS flight. The IMA fits on top of an Atlas/Centaur.

IMA design life is 10 missions, returned by Shuttle.

Estimates based on LeRC report, "Expendable Launch Vehicle Support for the SSF Program" (12/4/91)

TABLE B.1.6.2-9.– CTF COST DATA INPUT SHEET (CONTINUED)
(M 92$ - Not Including Program Wrap Factors)

CARGO TRANSFER FUNCTION (CTF) - MLS

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$602	1%	3%	1%	15%	25%	28%	15%	12%	2000			
N/R PROD	$30				12%	80%	8%						
P3I													
FACILITIES:													
Horiz Proc Fac	$23		6%	12%	82%						12	24.0	1
SSF Crew Train.	$1						100%				N/A	N/A	1
KSC Test & Other	$12		3%	97%							N/A	24.0	1

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR. CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Expendable Veh	1	$66	92%	100%						20%	78%	2%	
Prog MGMT	1	$7	100%	100%					5%	48%	40%	15%	
Tool Sustaining	1	$2	100%	100%						45%	50%	5%	
LAUNCH OPS	1	$9	90%	55%		$4						100%	
FLIGHT OPS	1	$6	90%	65%		$1						100%	
PROGRAM MGT	1	$7	90%	65%								100%	

CRITICAL ITEMS:

1. Software development & verif./val. effort impacts by SSF - WBS 1.5.1
2. Radar development for rendzvous & docking (OMV hardware maturity) - WBS 1.2.1.10
3. Adequate thermal protection of avionics - WBS 1.2.1.5
4. Operations software maintenance cost risk (parametric requirements impacts) - WBS 1.5.2
5. Inadequately defined payload characteristics & interface impacts

TABLE B.1.6.2-9.– CTF COST DATA INPUT SHEET (CONCLUDED)
(M 92$ - Not Including Program Wrap Factors)

CARGO TRANSFER FUNCTION (CTF) - TITAN IV

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$102					20%	40%	25%	15%				
N/R PROD	$12						15%	45%	40%				
P3I													
FACILITIES:													

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Expend Vehicle	1	$82	90%	80%							60%	40%	
LAUNCH OPS		$11	90%	80%								100%	
FLIGHT OPS		$4	90%	80%								100%	

CRITICAL ITEMS:

TABLE B.1.6.2-10.– CTV COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

CARGO TRANSFER VEHICLE (CTV)

NON-RECURRING	TOTAL COST	-8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
				SPREAD FACTORS									
DDT&E	$461					15%	25%	35%	25%	2000			
N/R PROD													
P3I													
FACILITIES:													
Horiz Proc Facil	$22						20%	40%	40%				

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	-5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
							SPREAD FACTORS						
PRODUCTION													
Reusable	1	$63	90%	100%					25%	40%	35%		
Expendable	1	$16	90%	100%						60%	40%		
Overhauls		$14	90%	85%								100%	
LAUNCH OPS	1	$25	90%	64%								100%	

CRITICAL ITEMS:

Reusable Hardware = Kickstage + Proximity Operations Module
Expendable Hardware = Strongback + Forward Propulsion Module

TABLE B.1.6.2-11.– DELTA II COST DATA INPUT SHEET
(M 92$ - Including Program Wrap Factors)

DELTA II

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC*	NUM FAC
RDT&E	$0												
N/R PROD	$0												
P3I	$0												
FACILITIES:													
Pad - ETR	$381					25%	30%	30%	15%		35	7.1	2
SLC - WTR	$476					25%	30%	30%	15%		42	6.0	1
Production												18.0	1

* 250 workdays/yr

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Solids					$4	$12				60%	40%		
Core					$16	$66			25%	55%	10%	10%	
Upper Stage					$6	$18			25%	55%	10%	10%	
Shroud					$1	$4				70%	30%		
LAUNCH OPS					$1	$20						100%	
FLIGHT OPS					$1	$15					10%	90%	
PROG MGT & SUP					$0	$5						100%	

CRITICAL ITEMS:

RECURRING CPF

Flts/Yr	2	4	6	8	10	12
CPF	$99	$64	$52	$47	$43	$41

TABLE B.1.6.2-12.– LRV COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

LOGISTICS RETURN VEHICLE (LRV)

NON-RECURRING	TOTAL COST	SPREAD FACTORS - 8	- 7	- 6	- 5	- 4	- 3	- 2	- 1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$580				15%	22%	28%	25%	10%				
N/R PROD	$193						25%	45%	30%				
P3I													
FACILITIES:													
Total	$56						30%	45%	25%				
Horiz Proc Fac	$29												
Other	$26												

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS - 5	- 4	- 3	- 2	- 1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
LRV	1	$130	90%	90%				10%	35%	50%	5%		
LAUNCH OPS	1	$8	90%	69%								100%	
FLIGHT OPS	1	$1	90%	68%								100%	
PROGRAM MGT	1	$2	96%	70%								100%	

CRITICAL ITEMS:

TABLE B.1.6.2-13.– MLS COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

MANNED LAUNCH SYSTEM (MLS)-X, HL CORE STAGE (1.5)

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC*	NUM FAC
DDT&E	$4,367	5%	8%	17%	12%	21%	15%	12%	10%	2000			
N/R PROD	$287		12%	32%	38%	18%							
P3I	$385				10%	24%	28%	28%	10%				
FACILITIES:	$1,562											(Max/Fac)	
Engine Mfg	$151	15%	80%	5%								(NLS qty)	1
Launch Pad/Proc	$612	1%	15%	50%	20%	8%	6%				14	21.0	varies
LCC	$153			2%	65%	28%	5%					24.0	1/site
CIF	$93		2%	60%	28%	5%	5%				7	42.0	varies
MLP	$144		2%	18%	70%	9%	1%				7		varies
Other	$409		3%	28%	50%	17%	2%						1/site

*300 workdays/yr

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Core (w/o eng)	1	$36	91%	90%				25%	20%	25%	20%	10%	NLS cores
Prop Sec Mech	1	$53	90%	87%					28%	32%	20%	20%	NLS cores
Prop Sec STME	6	$14	94%	94%						60%	40%		NLS prop
Prop Sec Elec	1	$68	92%	100%					28%	35%	32%	5%	85% NLS
Adapter	1	$3	85%	90%							90%	10%	
Shroud	1	$8	100%	100%								100%	Titan IV
LAUNCH OPS	1	$19	90%	55%		$80	(see note 7 below)				10%	90%	
FLIGHT OPS	1	$6	90%	65%		$12	(see note 7 below)					100%	
PROGRAM MGT	1	$9	90%	65%							5%	95%	

CRITICAL ITEMS:

1. All STME estimates are the MSFC NLS inputs with no changes for MLS.
2. Added new Emergency Detection System (EDS) avionics functions; software estimate is NLS est. plus 25% for new EDS function.
4. Facilities for higher launch rates may not be a straight multiplier of quantity (ie.-facility size may increase).
5. Assumes "clean sheet" design, with no NLS program preceding MLS.
6. Boeing cost model CER's & S1-C history used to develop estimate; MSFC NLS-50 estimate is slightly higher (?)...
7. Fixed cost per year in ops is for facilities and S/W maint. functions; fac maint/yr factor = 4%; software maint/yr factor = 6%.

TABLE B.1.6.2-14.– MLS (PARTIALLY REUSABLE) COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

MANNED LAUNCH SYSTEM (MLS) - PARTIALLY REUSABLE

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$2,333	5%	8%	17%	12%	21%	15%	12%	10%	2000			
N/R PROD	$164		12%	32%	38%	18%							
P3I													
FACILITIES:	$1749 (Total)												
Core Processing	$85	1%	15%	50%	20%	14%					7	35.4	1
VIF Proc. Cell	$136	1%	15%	50%	20%	8%	6%				14	17.7	2
Cargo INTG Fac.	$211		2%	60%	28%	5%	5%				35	7.1	1
MLP	$122		2%	18%	70%	9%	1%				29	8.6	2
Pad & Recovery	$415	2%	5%	18%	40%	30%	5%				5	49.6	1
P/A m. Proc. Cell	$14		3%	7%	15%	50%	20%	5%			20	12.4	5
LCC & Other Fac.	$452			5%	30%	35%	20%	10%			N/A	TBD	1

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Core Tank Mod.	1	$64	85%	100%						20%	60%	10%	
Common P/AMod.	3	$30	90%	100%					12%	32%	36%	20%	
Deriv. Cyro Eng.	6	$38	95%	100%						60%	40%		SSME
Core-Unique Av.	1	$14	90%	100%					5%	45%	35%	15%	
Shroud & Adapte	1	$8	90%	100%							90%	10%	
RPC EDS Kit	1	$8	90%	100%						12%	68%	20%	RPC elec.
LAUNCH OPS	1				$8	$58	(see note 7 below)				10%	90%	
FLIGHT OPS	1				$5	$10	(see note 7 below)					100%	
PROGRAM MGT	1				$3	$7					5%	95%	

CRITICAL ITEMS:

1. SSME derivative is a Phillips Lab design with $400M DDT&E estimated effort(92$); this estimate is included in the PRHL total.
2. Add emergency detection System (EDS) avionics functions to prod. unit costs for MANNED FLIGHTS ONLY(PLS w/ RPC or FRPC)
3. Facilities are based on ETR base estimates for CCAFB
4. Assumes "clean sheet" design, with no NLS program preceding PHRL
5. Boeing cost model CER's & S1-C history used to develop estimate.
6. Fixed cost per year in ops. is for facilities and S/W maint. functions; fac. maint./yr. factor=4%; software maint./yr. factor=6%.

TABLE B.1.6.2-15.– NDV COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

NASP DERIVED VEHICLE (NDV)

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$12,517		8%	16%	23%	20%	16%	10%	7%	2010			
N/R PROD													
P3I													
FACILITIES:													
)EVEL FACILITIES	$243		8%	16%	22%	20%	16%	10%	6%				
PROD FACILITIES	$120		8%	16%	22%	20%	16%	10%	6%				
OPS FACILITIES	$120		8%	16%	22%	20%	16%	10%	6%				

PER Dr. Toten the above increment of facilities will support a maximum fleet of 10 or 11 vehicles.

RECURRING	QTY/VEHICLE	)NIT COST:	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
PROTOFLIGHT #1		$1,120	100%	100%				15%	55%	25%	5%	2010	
PROTOFLIGHT #2		$1,030	100%	100%				15%	55%	25%	5%	2010	
FLIGHT UNIT #1		$2,191	100%	100%					38%	58%	14%	2012	
FLIGHT UNIT #2		$1,961	100%	100%					38%	58%	14%	2013	

PER Dr. Toten 4 flight articles are the minimum for 40 flights per year.

LAUNCH/FLIGHT OPS					$7	$186						100%	

CRITICAL ITEMS:

TABLE B.1.6.2-16.– NLS (20 K) COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

NATIONAL LAUNCH SYSTEM - 20K VEHICLE (NLS-20)

NON-RECURRING	TOTAL COST	SPREAD FACTORS - 8	- 7	- 6	- 5	- 4	- 3	- 2	- 1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$218				5%	22%	32%	27%	15%	2005			
N/R PROD													
P3I													
FACILITIES:													
	$355				10%	18%	28%	27%	17%				
Vert Proc Fac	$139												
Horiz Proc Fac	$154												
MLP	$62												

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS - 5	- 4	- 3	- 2	- 1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Core	1	$17	90%	87%					28%	32%	20%	20%	
STME	1	$14	94%	94%						60%	40%		NLS 50/100
Shroud	1	$1	90%	100%						70%	30%		
AUS	1	$22	90%	90%				25%	30%	35%	10%		NLS 50/100
LAUNCH OPS - ETR (WTR)					$0	$88 ($110)					10%	90%	NLS 50

CRITICAL ITEMS:

TABLE B.1.6.2-17.– NLS (50 K) COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

NATIONAL LAUNCH SYSTEM - 50K VEHICLE (NLS-50)

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$4,991	2%	6%	15%	20%	22%	15%	10%	10%	2000			
N/R PROD	$83			50%	39%	12%	0%	0%	0%	2000			
P3I	$385				10%	24%	28%	28%	10%	2006			
FACILITIES:													
	$1,516				8%	16%	28%	33%	15%				
Pad	$278												
Vert Proc Fac	$248												
Horiz Proc Fac	$57												
MLP	$144												
Other	$789												

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Core-Tank	1				$14	$0		25%	30%	30%	15%		STS/ NLS 100
Core-Other	1	$99	90%	87%					28%	32%	20%	20%	NLS 100
STME	4	$14	94%	94%						60%	40%		NLS 20/100
Shroud	1	$8	100%	100%						70%	30%		TIV
Adv Upper Stg	1	$22	90%	90%				25%	30%	35%	10%		NLS 20/100
LAUNCH OPS - ETR (WTR)					$0	$88 ($110)					10%	90%	NLS 20

CRITICAL ITEMS:

Development includes most NLS common elements (eg. STME, Core, Test Facilities, Tooling, Software, etc) and all CCAFS facilities, but not AUS (in NLS-100).
STS carries fixed Core-Tank (ET) cost per year

TABLE B.1.6.2-18.– NLS (HEAVY LIFT) COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

NATIONAL LAUNCH SYSTEM - HEAVY LIFT VEHICLE (NLS-HL)

NON-RECURRING	TOTAL COST	SPREAD FACTORS - 8	- 7	- 6	- 5	- 4	- 3	- 2	- 1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$120						30%	45%	25%	2000			
N/R PROD													
P3I													
FACILITIES:	$377				15%	46%	22%	9%	8%				
Pad-Mods	$70												
VPF-Mods	$4												
Cargo Proc Fac	$117												
MLP-Mods	$82												
Other	$104												

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS - 5	- 4	- 3	- 2	- 1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Core-Tank	1				$14	$0		25%	30%	30%	15%		STS/ NLS 50
Core-Other	1	$99	90%	87%					28%	32%	20%	20%	NLS 50
STME	4	$14	94%	94%						60%	40%		NLS 20/50
Shroud	1	$18	100%	100%						70%	30%		
Adv Upper Stg	1	$22	90%	90%				25%	30%	35%	10%		NLS 50/100
ASRM	* 1				$31	$0				1%	58%	41%	STS
LAUNCH OPS - ETR (WTR)					$0	$137 ($172)					10%	90%	

CRITICAL ITEMS:

Development includes new shroud, Advanced Upper Stage, KSC facilities and mods
* = cost per shipset (1 shipset = 2 ASRMs)
STS carries fixed ASRM and Core-Tank (ET) cost per year

TABLE B.1.6.2-19.– RCV COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

REUSABLE CARGO VEHICLE (RCV)

NON-RECURRING	TOTAL COST	SPREAD FACTORS - 8	- 7	- 6	- 5	- 4	- 3	- 2	- 1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$150 *		7%	11%	28%	25%	16%	8%	5%				
N/R PROD													
P3I													
FACILITIES:													

* DDT&E includes $150 M for STS to RCV redesign.

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS - 5	- 4	- 3	- 2	- 1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
*Reusable *													
RCV (New)		$2,500	100%	100%				25%	30%	30%	15%		
RCV (Refurbed)		$500	100%	100%				25%	30%	30%	15%		
SSME (New)		$96	90%	90%					25%	60%	15%		
Flight to Flight ET					$12	$352			23%	36%	40%	1%	
LRB (S/Set)		$109	90%	88%									
SSME (Refurb)					$3	$44			16%	26%	26%	32%	
Orbiter/CE					$10	$229						100%	
LAUNCH OPS					$5	$582						100%	
FLIGHT OPS					$7	$664				1%	7%	92%	
R&PM/SUPT					$0	$327						100%	

CRITICAL ITEMS:

TABLE B.1.6.2-20.– RPC COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

REUSABLE PERSONNEL CARRIER (RPCmin)

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$3,011			15%	28%	23%	23%	11%		CY 2000			
N/R PROD	$271			5%	5%	20%	50%	20%					
P3I													
FACILITIES:													
Total	$434												
Horiz Proc Fac	$42			5%	30%	50%	15%				18	16.8	1
MCC	$37			10%	50%	40%						24.0	1
Training	$262			5%	20%	50%	25%						1
Landing/Equip	$93			5%	30%	40%	25%					24.0	5
												(KSC + Alt Sites)	

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Biconic Vehicle	1	$235	92%	100%						10%	60%	30%	
Expend Hdwe	1	$58	90%	100%						20%	75%	5%	
Launch Esc Sys	1	$7	90%	100%						5%	75%	20%	RS-27 eng
Supt Equip Set	1	$13	95%	100%						10%	85%	5%	
Tool/STE Maint	1	$2	100%	100%						10%	50%	40%	
Veh/PSE Spares	1	$20	92%	100%						5%	65%	30%	
LAUNCH OPS	1	$134	90%	100%	$1	$68						100%	
FLIGHT OPS	1	$9	100%	100%	$1	$28						100%	
PROGRAM MGT	1	$3	100%	100%	$0	$29						100%	

CRITICAL ITEMS:

1. Avonics Imbedded Software & Adaptive Guidance - Reusable Biconic Vehicle WBS 14.2.1.11
2. Recovery & Landing Parafoil & Landing Gear Systems - Reusable Biconic Vehicle WBS 14.2.1.4
3. Flight Software Development & Verif/Val - Software WBS 14.5.1
4. New Launch Escape System (LES) Test & Verification - LES WBS 14.2.3
5. New Facilities Funding Stability & Timely Activation - Training Fac. WBS 14.3.8
6. New Facilities Funding Stability & Timely Activation - Alternate Sites Fac. WBS 14.3.9

Note: Funding spread is a U.S. Gov. fiscal year R&D appropirations estimate and includes termination liability allowances for the prime contractor.

TABLE B.1.6.2-21.– RUPC COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

REUSABLE ULTRA-LITE PERSONNEL CARRIER (RUPC)

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$1,425				15%	28%	23%	23%	11%				
N/R PROD	$145					25%	45%	30%					
P3I													
FACILITIES:													
	$3							70%	30%				

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
RUPC Reu Hdw	1	$58	90%	80%					10%	35%	50%	5%	
RUPC Exp Hdw	1	$30	94%	80%						15%	75%	10%	
LAUNCH OPS	1	$34	90%	80%								100%	
PROGRAM MGT	1	$15	90%	80%								100%	

CRITICAL ITEMS:

TABLE B.1.6.2-22.– SPACE SHUTTLE COST DATA INPUT SHEET
(M 92$ - Including Program Wrap Factors)

SHUTTLE

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC*	NUM FAC
RDT&E	$0												
N/R PROD	$0												
P3I	$1,000	100%	100%	100%	100%	100%	100%	100%	100%				
FACILITIES:													
Pad	$973					15%	40%	40%	5%		28	10.7	2
VAB-1 Hi Bay	$252					15%	40%	40%	5%		41	7.3	2
OPF - 1 Lo Bay	$268					25%	30%	30%	15%		60	5.0	3
LCC - 1 Fr Room	$54						40%	45%	15%				3
MLP	$116						35%	45%	20%		64	4.7	3
Production													

* 300 workdays/yr

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
* Reusable *													
Orbiter (New)		$1,637	100%	100%				25%	30%	30%	15%		
SSME (New)		$96	90%	90%					25%	60%	15%		
Flight to Flight *													
ET					$12	$352			23%	36%	40%	1%	
SRB (S/Set)					$23	$358				1%	58%	41%	
SSME (Refurb)					$5	$75			16%	26%	26%	32%	
Orbiter/CE					$10	$229						100%	
LAUNCH OPS					$5	$598						100%	
FLIGHT OPS					$7	$666				1%	7%	92%	
R & PM/SUPT					$0	$327						100%	

CRITICAL ITEMS:

RECURRING CPF (without reusable hardware production)

Flts/Yr	2	4	6	8	10	12
CPF	$1,366	$714	$497	$389	$324	$280

TABLE B.1.6.2-23.– SHUTTLE EVOLUTION COST DATA INPUT SHEET (M 92$ - Not Including Program Wrap Factors)

SHUTTLE EVOLUTION

NON-RECURRING	TOTAL COST	-8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC*	NUM FAC
				SPREAD FACTORS									
DDT&E	$3,000			5%	10%	25%	25%	25%	10%				
N/R PROD													
P3I	(P3I included in DDT&E above)												
FACILITIES:													
LRB	$1,140					28%	32%	32%	8%				

* 300 workdays/yr

RECURRING	QTY/VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	-5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMONALITY
							SPREAD FACTORS						
PRODUCTION													
"Reusable"													
Orbiter (New)		$1,756	100%	100%				25%	30%	30%	15%		
SSME (New)		$96	90%	90%					25%	60%	15%		
light to Flight "													
ET					$12	$352			23%	36%	40%	1%	
LRB (S/set)		$176	90%	88%						1%	58%	41%	
SSME (Refurb)					$3	$44			16%	26%	26%	32%	
Orbiter/CE)					$10	$229						100%	
LAUNCH OPS					$5	$582						100%	
FLIGHT OPS					$7	$664				1%	7%	92%	
R&PM/Supt					$0	$327						100%	

CRITICAL ITEMS:

RECURRING CPF (without reusable hardware production)

Flts/Yr	2	4	6	8	10	12
CPF	$1214	$655	$469	$372	$315	$276

TABLE B.1.6.2-24.– SHUTTLE EVOLUTION (CEM) COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

SHUTTLE EVOLUTION - CEM

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$10,034			5%	10%	25%	25%	25%	10%				
N/R PROD													
P3I	(P3I included in DDT&E above)												
FACILITIES:													
LRB	$1,140					28%	32%	32%	8%				

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Reusable													
Orbiter (New)		$2,500	100%	100%				25%	30%	30%	15%		
SSME (New)		$96	90%	90%					25%	60%	15%		
light to Flight *													
ET					$12	$352			23%	36%	40%	1%	
LRB (S/set)		$109	90%	88%						1%	58%	41%	
SSME (Refurb)					$3	$44			16%	26%	26%	32%	
Orbiter/CE)					$10	$229						100%	
LAUNCH OPS					$5	$582						100%	
FLIGHT OPS					$7	$664				1%	7%	92%	
R&PM/Supt					$0	$327						100%	

CRITICAL ITEMS:

TABLE B.1.6.2-25.– SSTO COST DATA INPUT SHEET
(M 92$ - Not Including Program Wrap Factors)

SINGLE STAGE TO ORBIT (SSTO)

** Vertical Takeoff/Horizontal Landing (VTHL) **

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC	NUM FAC
DDT&E	$2,705				15%	25%	28%	22%	10%	1997			
N/R PROD													
P3I													
FACILITIES:													
Total	$630					25%	30%	30%	15%		7	120.0	1 *

*(2 Pads & refurb & flight & launch ops sufficient for operations of 4 vehicles @ ETR)

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
Reusable Hdwe:													
Airframe	1	$579	100%	100%					15%	55%	25%	5%	
Plug Nozzle Eng	1	$74	90%	90%						10%	85%	5%	
Refurbishment	1				$1.4	$115.0						100%	
LAUNCH OPS	1				$0.5	$92.4						100%	
FLIGHT OPS	1				$0.1	$25.9						100%	
PROGRAM MGT	1				$0.0	$35.2						100%	

CRITICAL ITEMS:

Reusable Airframe useful life = 200 flights

Plug Nozzle Engine useful life = 100 flights

RECURRING CPF (without reusable hardware production)

Flts/Yr	5	10	20	30	40	80
CPF	$55.8	$28.9	$15.5	$11.0	$8.8	$5.4

** 80 flights per year is considered nominal.

TABLE B.1.6.2-26.– TITAN II COST DATA INPUT SHEET
(M 92$ - Including Program Wrap Factors)

TITAN II

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC*	NUM FAC
RDT&E	$0												
N/R PROD	$0												
P3I	$0												
FACILITIES:													
Pad - ETR	$300					25%	30%	30%	15%				
SLC - WTR						25%	30%	30%	15%		84	3.0	1
Production											(refurb)	3.0	1

* 250 workdays/yr

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
TII-VEH HDW		$31	100%	80%						22%	75%	3%	
LAUNCH OPS		$12	100%	80%								100%	
P/L INTEG		$4	100%	80%							75%	25%	

CRITICAL ITEMS:

RECURRING CPF

Flts/Yr	2	3	4
CPF	$38	$33	$30

TABLE B.1.6.2-27.– TITAN IV COST DATA INPUT SHEET
(M 92$ - Including Program Wrap Factors)

TITAN IV

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC*	NUM FAC
RDT&E	$0												
N/R PROD	$0												
P3I	$0												
FACILITIES:													
Pad - ETR	$477					15%	40%	40%	5%		60	4.2	2
SLC - WTR	$596					15%	40%	40%	5%		120	2.1	1
VIB - Hi Bay	$155						35%	40%	25%		30	8.3	2
SMAB	$144						20%	45%	35%		40	6.3	1
Production												12.0	1

* 250 workdays/yr

RECURRING	QTY/VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
TIV-VEH HDW		$252	100%	80%					25%	30%	30%	15%	
CENTAUR		$72	100%	80%						25%	60%	15%	
LAUNCH OPS		$61	100%	80%								100%	
NUS-P/L INTEG		$20	100%	80%						1%	58%	41%	
CENT-P/L INTEG		$31	100%	80%					16%	26%	26%	32%	
PROG MGT & SUP												100%	

CRITICAL ITEMS:

RECURRING CPF					
Flts/Yr	2	4	6	8	10
CPF-NUS	$266	$213	$187	$170	$159
CPF-Cent	$333	$266	$234	$213	$198

TABLE B.1.6.2-28.– TITAN IV EVOLUTION COST DATA INPUT SHEET
(M 92$ - Including Program Wrap Factors)

TITAN IV - EVOLUTION (WITH SRMU)

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/ FAC*	NUM FAC
RDT&E	$0												
N/R PROD	$0												
P3I	$403					25%	30%	30%	15%				
FACILITIES:													

* 250 workdays/yr

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
TIV-VEH HDW		$298	100%	80%					25%	30%	30%	15%	
CENTAUR		$72	100%	80%						25%	60%	15%	
LAUNCH OPS		$61	100%	80%								100%	
NUS-P/L INTEG		$20	100%	80%						1%	58%	41%	
CENT-P/L INTEG		$31	100%	80%					16%	26%	26%	32%	
PROG MGT & SUP												100%	

CRITICAL ITEMS:

RECURRING CPF

Flts/Yr	2	4	6	8	10
CPF-NUS	$303	$243	$213	$194	$181
CPF-Cent	$370	$296	$260	$237	$220

TABLE B.1.6.2-29.– TITAN IV (HUMAN-RATED) COST DATA INPUT SHEET
(M 92$ - Including Program Wrap Factors)

MAN-RATED TITAN IV (WITH LRBs)

NON-RECURRING	TOTAL COST	SPREAD FACTORS -8	-7	-6	-5	-4	-3	-2	-1	EARLIEST IOC	DWELL TIME	MAX FPY/FAC*	NUM FAC
DDT&E	$298					25%	30%	30%	15%				
N/R PROD	$0												
P3I	$518					25%	30%	30%	15%				
FACILITIES:													

***** Recurring cost inputs are Δ added to unmanned TIV/NUS *****

* 250 workdays/yr

RECURRING	QTY/ VEHICLE	UNIT COST: TFU	LC%	RC%	VAR CPF	FIXED CPY	SPREAD FACTORS -5	-4	-3	-2	-1	YEAR OF FLIGHT	COMMON-ALITY
PRODUCTION													
TIV Veh Hdw	1	$70	100%	80%					25%	30%	30%	15%	
LAUNCH OPS	1	$4	100%	80%								100%	
NUS-P/L INTEG	1	$8	100%	80%						1%	58%	41%	

CRITICAL ITEMS:

B.1.7 HUMAN SAFETY DATA

Human Safety is the measure of risk in terms of human loss caused by the elements and/or operations associated with a given architecture. The quantity measured is crew loss events. In order to measure this, a probability of crew loss, or probability of death, has been developed for each system based on the flight phases by a team of safety experts. Please refer to Volume I, section 3.2.3.

B.1.7.1 Human Safety Summary Data

Table B.1.7.1 lists the probability of crew loss for each system with human crews. This probability is multiplied by the number of flights in an architecture to produce the number of loss events for the system.

The Probability of Mission Success (PMS) values used to calculate the data shown includes the effects of pad hold-down and higher orbital maneuvering subsystem (OMS) engine reliability values. These PMS values were produced late in the study extension period due to further model refinements.

TABLE B.1.7.1.– HUMAN SAFETY PROBABILITY OF CREW LOSS SUMMARY

System	Probability of Loss	Flights Per Loss
ALV	0.00829	120.6
AMLS	0.00319	313.5
AMSC	0.00685	146.0
Beta II	0.00624	160.3
CLV/MLS-HL	0.00524	190.8
NDV	0.00922	108.5
RPC/HR Titan IV	0.00820	122.0
RPC/MLS-HL	0.00524	190.8
RPC/MLS-X	0.00375	266.7
RPC/NLS-50	0.00375	266.7
RUPC/Titan II	0.00764	130.9
Shuttle	0.01551	64.5
Shuttle Evolution	0.01716	58.3
SSTO	0.00412	242.7

B.1.7.2 System Flight Phase Safety Sheets

Tables B.1.7.2 through B.1.7.2-14 contain the flight phase safety sheets used to determine the probability of crew loss (Pd) for each flight phase of each system. The flight phases are determined from the system ascent success trees.

Each sheet shows the general type of failure, such as explosion or fire, possible causes of the failure, the probability of a failure being that type of failure, the probability that the crew would survive the failure, and the probability that the crew could successfully abort, given that they survived long enough. The Pd shown at the bottom of the table is the probability that the crew would be lost if a failure occurred during the flight phase.

TABLE B.1.7.2-1.– ALV HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: ALV
Flight Phase: Climb Out on 747

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Flight deck, middeck electrical short	1	0.95 **	0.98 *
Loss of Control	Vehicle inactive - unlikely event	0	0	0
Damaged Vehicle	Bird strike, hail	3	0.9 ***	0.98 *
Benign Failure	Failure of non-critical system	95	0.98 ***	0.99 *
Hazardous Environment	Leaks into crew compartment RCS fluids, loss of ECLSS	1	0.9 ***	0.98 *
		100		$P_D = 0.0337$

Notes:

* All aspect launch escape system (LES) is active
** Active fire detection/suppression system
*** Estimate of statistical average of a variety of hazard sources

TABLE B.1.7.2-1.– ALV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: ALV
Flight Phase: Separation from 747

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Pressurization system failure	1	0.8 ***	0.6 *
Fire	Propellant leak	2	0.95 **	0.98 *
Loss of Control	Actuator, APU failures, pilot error	15	0.8 ***	0.6 *
Damaged Vehicle	Recontact with 747	10	0.8 ***	0.6 *
Benign Failure	Failure of non-critical system	71	0.98 ****	0.99 *
Hazardous Environment	Leaks into crew compartment RCS fluids, loss of ECLSS	1	0.9 ****	0.98 *
		100		$P_D = 0.2357$

Notes:

No account is made for safety of 747 crew.

* All aspect launch escape system (LES) is active, number varies based on LES hardware's exposure to hazards and to the physical proximity to the 747

** Active fire detection/suppression system

*** Significant q would exacerbate failure modes

**** Estimate of statistical average of a variety of hazard sources

TABLE B.1.7.2-1.– ALV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: ALV
Flight Phase: 747 Return to Runway

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Flight deck, middeck electrical short	1	0.95 **	0.99 *
Loss of Control	Unlikely event	0	0	0
Damaged Vehicle	Bird strike, hail, plume damage from "orbiter"	3	0.9 ***	0.99 *
Benign Failure	Failure of non-critical system	96	0.98 ***	0.99 *
Hazardous Environment	Unlikely event	0	0	0
		100		$P_D = 0.0325$

Notes:

* Abort based on 747's inherent systems
** Active fire detection/suppression system
*** Estimate of statistical average of a variety of hazard sources

TABLE B.1.7.2-1.– ALV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: ALV
Flight Phase: SSME Ignition and Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, overpressure	10	0.5 *	0.9 *
Fire	Propellant leak, fuel cells	10	0.5 *	0.9 *
Loss of Control	Actuator, APU failures, pilot error	10	0.1 *	0.9 *
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	69	0.98 **	0.95 *
Hazardous Environment	Leaks into crew compartment RCS fluids, loss of ECLSS	1	0.98 **	0.9 *
		100		$P_D = 0.2498$

Notes:

* LES active

** Estimate of statistical average of a variety of hazard sources

TABLE B.1.7.2-1.– ALV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: ALV
Flight Phase: Wing Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - short time period	0	0	0
Fire	Not applicable - short time period	0	0	0
Loss of Control	Unclean separation	20	0.5 *	0.8 *
Damaged Vehicle	Recontact	10	0.5 *	0.8 *
Benign Failure	Failure of non-critical system	50	0.98 **	0.95 *
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.4145$

Notes:

* LES active

** Estimate of statistical average of a variety of hazard sources

TABLE B.1.7.2-1.– ALV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: ALV
Flight Phase: Staging (1/2)

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Valve malfunction, slam shut ignites LOX, LH2	10	0.5 *	0.9 *
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Separation hang-up	10	0.7 **	0.9 *
Damaged Vehicle	Recontact with tank	20	0.6 **	0.9 *
Benign Failure	Failure of non-critical system	60	0.99 **	0.9 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.2494$

Notes:

* LES active

** Estimate of statistical average of a variety of hazard sources

TABLE B.1.7.2-1.– ALV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: ALV
Flight Phase: Second Stage Ignition and Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, overpressure	10	0.5 *	0.9 *
Fire	Propellant leak, fuel cells	10	0.5 *	0.9 *
Loss of Control	Actuator, APU failures	10	0.1 *	0.9 *
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	69	0.98 **	0.95 *
Hazardous Environment	Leaks into crew compartment RCS fluids, loss of ECLSS	1	0.98 **	0.9 *
		100		$P_D = 0.2498$

Notes:

* LES active

** Estimate of statistical average of a variety of hazard sources

TABLE B.1.7.2-1.– ALV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: ALV
Flight Phase: Staging (2/payload)

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Valve malfunction, slam shut ignites LOX, LH2	10	0.5 *	0.9 *
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric separation	20	0.7 **	0.8 *
Damaged Vehicle	Recontact	20	0.6 **	0.9 *
Benign Failure	Failure of non-critical system	50	0.99 **	0.9 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.2895$

Notes:

* LES active

** Estimate of statistical average of a variety of hazard sources

TABLE B.1.7.2-1.– ALV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: ALV
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Flight deck, middeck electrical short	1	0.95 ***	0.98 *
Loss of Control	Actuator, APU failures, pilot error	10	0.8 ****	0.6 **
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	88	0.98 ****	0.99 *
Hazardous Environment	ECLSS failure, failure of pressure shell	1	0.9 ****	0.98 *
		100		$P_D = 0.0801$

Notes:

* Sufficient altitude to enable multiple landing opportunities

** Depending on attitude at failure, initiation of successful entry is uncertain

*** Active fire detection/suppression system

**** Estimate of statistical average of a variety of hazard sources

TABLE B.1.7.2-1.– ALV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: ALV
Flight Phase: OMS Circularization

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage, engine failure	2	0.7 *	0.2 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric burn	2	0.1 *	0.5 **
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical systems	95	0.98 *	0.98 ***
Hazardous Environment	Leaks, ECLSS failure	1	0.9 *	0.95 ***
		100		$P_D = 0.0753$

Notes:

* Estimate of statistical average of a variety of hazard sources

** LES active

*** Sufficient time should be available to initiate orderly return

TABLE B.1.7.2-2.– AMLS HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: AMLS
Flight Phase: Stage 1 and 2 Ignition

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Fuel leak	10	0.1 ***	0.5 ****
Fire	Fuel leak, hydraulics	10	0.9 *	0.9 **
Loss of Control	Actuator (flight controls or engine controls)	10	0.75 *	0.75 **
Damaged Vehicle	Collision (birdstrike, aircraft) contact with pad	5	0.8 *	0.92 **
Benign Failure	Failure of non-critical system, software, engine performance	64	0.99 *	0.98 **
Hazardous Environment	ECLSS failure	1	0.999 *	0.99 **
		100		$P_D = 0.1901$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** Several abort procedures are available in this flight phase, including return to launch site and ejection seats
- *** Crew is surrounded by propellants
- **** High degree of correlation when major explosion does occur

TABLE B.1.7.2-2.– AMLS HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: AMLS
Flight Phase: Staging

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Fuel leak, unstable combustion	1	0.1 ***	0.05 ****
Fire	Fuel leak, hydraulics	10	0.9 *	0.8 **
Loss of Control	Flight control malfunction, software	10	0.7 *	0.6 **
Damaged Vehicle	Recontact	10	0.8	0.6
Benign Failure	Failure of non-critical systems, software, engine performance	68	0.99 *	0.97 **
Hazardous Environment	ECLSS failure	1	0.99 *	0.98 **
		100		$P_D = 0.1752$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** Abort procures exist in this flight phase
- *** Crew is surrounded by propellants
- **** High degree of correlation in a high q environment when a major explosion does occur

TABLE B.1.7.2-2.– AMLS HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: AMLS
Flight Phase: Booster Return to Launch Site

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unlikely event	0	0	0
Fire	Propellant leak	3	0.9 *	0.6 **
Loss of Control	Actuator, APU failures	10	0.75 *	0.6 **
Damaged Vehicle	Seal leak, aerothermal loads, hail, birdstrike	5	0.85 *	0.98 **
Benign Failure	Failure of non-critical system	81	0.99 *	0.97 **
Hazardous Environment	Leak in pressure shell, ECLSS failure	1	0.99 *	0.98 **
		100		$P_D = 0.1096$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Dead stick landing

TABLE B.1.7.2-2.– AMLS HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: AMLS
Flight Phase: Stage 2 Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable burn, propellant leak	10	0.5 *	0.3 **
Fire	Propellant leak	10	0.5 *	0.3 **
Loss of Control	Actuator, APU failures	10	0.1 *	0.3 **
Damaged Vehicle	Unlikely event	0	0	0
Benign Failure	Failure of non-critical system	69	0.98 *	0.95 **
Hazardous Environment	Leak in pressure shell, ECLSS failure	1	0.98 *	0.9 **
		100		$P_D = 0.3158$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Intact abort requires vehicle is flyable to a runway, landing systems (APUs, power) are near main propulsion

TABLE B.1.7.2-2.– AMLS HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: AMLS
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage of on-orbit consumables or return fuel	4	0.7 *	0.3 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Not applicable - unlikely event	0	0	0
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Loss of non-critical system	95	0.98 *	0.97 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.95 **
		100		$P_D = 0.0800$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Intact abort requires vehicle is flyable to a runway, landing systems (APUs, power) are near main propulsion

TABLE B.1.7.2-2.– AMLS HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: AMLS
Flight Phase: Orbit Circularization (OMS Burn)

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage, engine failure	2	0.7 *	0.2 ***
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric burn	2	0.1 *	0.5 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	95	0.98 *	0.98 **
Hazardous Environment	Leaks, ECLSS failure	1	0.9 *	0.95 **
		100		$P_D = 0.0753$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** OMS/RCS will enable controlled reentry
- *** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-3.– AMSC HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: AMSC
Flight Phase: Climb Out on 747

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Flight deck, middeck electrical short	1	0.95 **	0.98 *
Loss of Control	Vehicle inactive - unlikely event	0	0	0
Damaged Vehicle	Bird strike, hail	3	0.9 ***	0.96 *
Benign Failure	Failure of non-critical system	95	0.98 ***	0.99 *
Hazardous Environment	Leaks into crew compartment RCS fluids, loss of ECLSS	1	0.9 ***	0.98 *
		100		$P_D = 0.0343$

Notes:

* All aspect launch escape system (LES) is active, number varies based on LES hardware's exposure to hazards

** Active fire detection/suppression system

*** Estimate of statistical average of a variety of hazard sources

TABLE B.1.7.2-3.– AMSC HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: AMSC
Flight Phase: Separation from 747

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Pressurization system failure	1	0.8 ***	0.6 *
Fire	Propellant leak	2	0.95 **	0.98 *
Loss of Control	Actuator, APU failures, pilot error	15	0.8 ***	0.6 *
Damaged Vehicle	Recontact with 747	10	0.8 ***	0.6 *
Benign Failure	Failure of non-critical system	71	0.98 ****	0.99 *
Hazardous Environment	Leaks into crew compartment RCS fluids, loss of ECLSS	1	0.9 ****	0.98 *
		100		$P_D = 0.1589$

Notes:

No account is made for safety of 747 crew.

* All aspect launch escape system (LES) is active, number varies based on LES hardware's exposure to hazards and to the physical proximity to the 747

** Active fire detection/suppression system

*** Significant q would exacerbate failure modes

**** Estimate of statistical average of a variety of hazard sources

TABLE B.1.7.2-3.– AMSC HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: AMSC
Flight Phase: Liquid Engine Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, overpressure	5	0.5 ***	0.3 ***
Fire	Propellant leak, fuel cells	5	0.5 ***	0.3 ***
Loss of Control	Actuator, APU failures, pilot error	10	0.1 ***	0.4 ***
Damaged Vehicle	Not applicable - unlikely event	10	0.5 ***	0.5 ***
Benign Failure	Failure of non-critical system	69	0.98 **	0.95 *
Hazardous Environment	Leaks into crew compartment RCS fluids, loss of ECLSS	1	0.98 **	0.9 *
		100		$P_D = 0.3048$

Notes:

* Assumes orbiter can separate and return to land

** Estimate of statistical average of a variety of hazard sources

*** Ejection seats not useful for most of this phase - entire vehicle must remain intact for an abort. With engines in the orbiter and propellant tanks that 'surround' the orbiter, isolation of failures is improbable.

TABLE B.1.7.2-3.– AMSC HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: AMSC
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Flight deck, middeck electrical short	1	0.95 ***	0.98 *
Loss of Control	Actuator, APU failures, pilot error	10	0.8 ****	0.6 **
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	88	0.98 ****	0.99 *
Hazardous Environment	ECLSS failure, failure of pressure shell	1	0.9 ****	0.98 *
		100		$P_D = 0.0801$

Notes:

- * Sufficient altitude to enable multiple landing opportunities
- ** Depending on attitude at failure, initiation of successful entry is uncertain
- *** Active fire detection/suppression system
- **** Estimate of statistical average of a variety of hazard sources

TABLE B.1.7.2-3.– AMSC HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: AMSC
Flight Phase: Drop Tank Release

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Valve malfunction, slam shut ignites LOX, LH2	10	0.001 *	0.001 *
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric separation	20	0.7 **	0.001 *
Damaged Vehicle	Recontact with tank	20	0.6 **	0.05 *
Benign Failure	Failure of non-critical system	50	0.99 **	0.9 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.5484$

Notes:

* At this altitude/attitude, abort procedures that require intact vehicle are very limited
** Estimate of statistical average of a variety of hazard sources

TABLE B.1.7.2-3.– AMSC HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: AMSC
Flight Phase: OMS Circularization

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage, engine failure	2	0.7 *	0.2 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric burn	2	0.1 *	0.01 **
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical systems	95	0.98 *	0.98 ***
Hazardous Environment	Leaks, ECLSS failure	1	0.9 *	0.95 ***
		100		$P_D = 0.0763$

Notes:

* Estimate of statistical average of a variety of hazard sources

** At this altitude/attitude, abort procedures that require intact vehicle are very limited

*** Sufficient time should be available to initiate orderly return

TABLE B.1.7.2-4.– BETA II HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: Beta II
Flight Phase: Takeoff/Turbojet Acceleration

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Fuel leak	1	0.1 ***	0.5 ****
Fire	Fuel leak, hydraulics	3	0.9 *	0.9 **
Loss of Control	Actuator (flight controls or engine controls), landing gear	10	0.75 *	0.75 **
Damaged Vehicle	Collision (birdstrike, aircraft)	5	0.85 *	0.92 **
Benign Failure	Failure of non-critical system, software, engine performance	80	0.99 *	0.98 **
Hazardous Environment	ECLSS failure	1	0.999 *	0.99 **
		100		$P_D = 0.0938$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** Several abort procedures are available in this flight phase, including return to launch site and ejection seats
- *** Crew is surrounded by propellants
- **** High degree of correlation when major explosion does occur

TABLE B.1.7.2-4.– BETA II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Beta II
Flight Phase: Turbojet/Ramjet Acceleration

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable burn, propellant leak	1	0.1 ***	0.05 ****
Fire	Propellant leak	3	0.9 *	0.8 **
Loss of Control	Actuator, APU failures	10	0.75 *	0.6 **
Damaged Vehicle	Seal leak, aerothermal loads	5	0.85 *	0.92 **
Benign Failure	Failure of non-critical system	80	0.99 *	0.97 **
Hazardous Environment	Leak in pressure shell, ECLSS failure	1	0.99 *	0.98 **
		100		$P_D = 0.1163$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** Several abort procedures are available in this flight phase
- *** Crew is surrounded by propellants
- **** High degree of correlation in a high q environment when major explosion does occur

TABLE B.1.7.2-4.– BETA II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Beta II
Flight Phase: Ramjet Acceleration

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Fuel leak, unstable combustion	1	0.08 ***	0.05 ****
Fire	Fuel leak, hydraulics	3	0.9 *	0.8 **
Loss of Control	Flight control malfunction, software	10	0.7 *	0.6 **
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical systems, software, engine performance	85	0.99 *	0.97 **
Hazardous Environment	ECLSS failure	1	0.99 *	0.98 **
		100		$P_D = 0.1104$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Abort procures exist in this flight phase

*** Crew is surrounded by propellants

**** High degree of correlation in a high q environment when major explosion does occur

TABLE B.1.7.2-4.– BETA II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Beta II
Flight Phase: Separation/Staging

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant leak	5	0.5 *	0.8 **
Fire	Propellant leak	3	0.8 *	0.9 **
Loss of Control	Shock interactions	10	0.6 *	0.75 **
Damaged Vehicle	Recontact between stages	82	0.1 ***	0.5 **
Benign Failure	Not applicable - short time period	0	0	0
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.8724$

Notes:

* Estimate of statistical average of a variety of hazard sources
** Depending on level of damage to vehicle(s), launch point is selected to permit runway landing downrange
*** Damage significant enough to abort the mission implies vehicles flying abilities (upon which abort is predicated) have been compromised

TABLE B.1.7.2-4.– BETA II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Beta II
Flight Phase: Orbiter Stage Ignition and Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable burn, propellant leak	3	0.5 *	0.3 **
Fire	Propellant leak	3	0.5 *	0.3 **
Loss of Control	Actuator, APU failures	10	0.1 *	0.3 **
Damaged Vehicle	Shock interaction with booster	10	0.5 *	0.5 **
Benign Failure	Failure of non-critical system	73	0.98 *	0.95 **
Hazardous Environment	Leak in pressure shell, ECLSS failure	1	0.98 *	0.9 **
		100		$P_D = 0.2746$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Intact abort requires vehicle is flyable to a runway, landing systems (APUs, power) are near main propulsion

TABLE B.1.7.2-4.– BETA II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Beta II
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage of on-orbit consumables or return fuel	4	0.7 *	0.3 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Not applicable - unlikely event	0	0	0
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Loss of non-critical system	95	0.98 *	0.97 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.95 **
		100		$P_D = 0.0800$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Intact abort requires vehicle is flyable to a runway, landing systems (APUs, power) are near main propulsion

TABLE B.1.7.2-4.– BETA II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: Beta II
Flight Phase: Orbit Circularization (OMS Burn)

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage, engine failure	2	0.7 *	0.2 ***
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric burn	2	0.1 *	0.01 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	95	0.98 *	0.98 **
Hazardous Environment	Leaks, ECLSS failure	1	0.9 *	0.95 **
		100		$P_D = 0.0763$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** OMS/RCS will enable controlled reentry
- *** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-5.– CLV/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: CLV/MLS-HL
Flight Phase: Ignition

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, propellant leak, overpressure	10	0.01 ***	0.001 ***
Fire	Propellant leak, hot gas leak	20	0.5 **	0.95 *
Loss of Control	Not applicable - vehicle is still held down	0	0	0
Damaged Vehicle	Not applicable - vehicle is still held down	0	0	0
Benign Failure	Failure of non-critical system	70	0.95 **	0.99 *
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.2466$

Notes:

* Launch escape system (LES) is active

** Estimate of statistical average of a variety of hazard sources

*** If failure was detected, it is assumed propulsion would be shut down; in cases where the failure is undetected, and the propellant tanks are full, large energy releases are possible

TABLE B.1.7.2-5.– CLV/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: CLV/MLS-HL
Flight Phase: First Boost Phase

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, propellant leak, overpressure	10	0.9 *	0.9 **
Fire	Propellant leak, hot gas leak	10	0.9 *	0.9 **
Loss of Control	Actuator, APU failures, GN&C	10	0.9 *	0.8 **
Damaged Vehicle	Contact with pad, bird strike, etc.	10	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	59	0.98 *	0.95 **
Hazardous Environment	Leaks into crew compartment RCS or TCS fluids	1	0.9 *	0.9 **
		100		$P_D = 0.1606$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active - numbers vary based on assessment of possibility of adverse attitude/altitude outside LES capability

TABLE B.1.7.2-5.– CLV/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: CLV/MLS-HL
Flight Phase: Propulsion Module Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Actuator, APU failures, unclean separation	10	0.8 *	0.7 **
Damaged Vehicle	Hangup on separation, contact with nozzles	20	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	70	0.98 *	0.99 ***
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.1689$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Launch escape system (LES) may be incapable of countering some forces/moments that result from certain high speed loss-of-control situations

*** Emergency detection system and LES are active

TABLE B.1.7.2-5.– CLV/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: CLV/MLS-HL
Flight Phase: Continued Burn After Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable burn, propellant leak, overpressure	5	0.9 *	0.9 **
Fire	Propellant leak	5	0.9 *	0.9 **
Loss of Control	Actuator, APU failures	10	0.9 *	0.8 **
Damaged Vehicle	Vibration, leaks or damage resultant from separation	10	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	69	0.98 *	0.95 **
Hazardous Environment	Leaks into crew compartment RCS or TCS fluids	1	0.9 *	0.9 **
		100		$P_D = 0.1485$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active - numbers vary based on assessment of possibility of adverse attitude/altitude outside LES capability

TABLE B.1.7.2-5.– CLV/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: CLV/MLS-HL
Flight Phase: Upper Stage Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable burn, propellant leak, overpressure	5	0.9 *	0.9 **
Fire	Propellant leak	5	0.9 *	0.9 **
Loss of Control	Actuator, TVC failure	10	0.3 ***	0.8 **
Damaged Vehicle	Residual damage from staging	10	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	69	0.98 *	0.95 **
Hazardous Environment	Leaks into crew compartment RCS fluids, loss of pressure	1	0.9 *	0.9 **
		100		$P_D = 0.1965$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active - numbers vary based on assessment of possibility of adverse attitude/altitude outside LES capability

*** Some failures would place CLV in unrecoverable orbit - reentry would violate control, TPS, etc. constraints

TABLE B.1.7.2-5.– CLV/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: CLV/MLS-HL
Flight Phase: Second Stage/CLV Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric separation	5	0.7 *	0.52 ***
Damaged Vehicle	Recontact between second stage and CLV	5	0.8 *	0.52 ***
Benign Failure	Failure of non-critical system	89	0.98 *	0.95 **
Hazardous Environment	Leaks into crew compartment RCS or TCS fluids	1	0.9 *	0.98 **
		100		$P_D = 0.1236$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** Emergency detection system and launch escape system (LES) are active as is CLV OMS/RCS
- *** LES and/or CLV OMS/RCS may be incapable of countering some forces/moments induced from separation

TABLE B.1.7.2-5.– CLV/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: CLV/MLS-HL
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Flight deck, middeck electrical short	1	0.95 *	0.98 **
Loss of Control	Actuator, APU failures, pilot error	1	0.8 *	0.8 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	95	0.98 *	0.99 **
Hazardous Environment	Leaks into crew compartment RCS fluids, ECLSS failure	3	0.9 *	0.98 **
		100		$P_D = 0.0361$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** OMS/RCS can position vehicle for safe return
- *** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-5.– CLV/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: CLV/MLS-HL
Flight Phase: Orbit Circularization (OMS Burn)

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, overpressure, propellant leak	5	0.8 *	0.6 ***
Fire	Flight deck, middeck electrical short	1	0.95 *	0.98 **
Loss of Control	Actuator, APU failures, pilot error	5	0.7 *	0.8 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	88	0.98 *	0.99 **
Hazardous Environment	Leaks into crew compartment RCS fluids, ECLSS failure	1	0.9 *	0.98 **
		100		$P_D = 0.0761$

Notes:

* Estimate of statistical average of a variety of hazard sources

** OMS/RCS can position vehicle for safe return

*** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-6.– NDV HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: NDV
Flight Phase: Initial Acceleration Mode

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant leak, engine/pump rupture	20	0.5 *	0.3 **
Fire	Minor leaks, APU, fuel cells	20	0.6 *	0.3 **
Loss of Control	GN&C failure, software, loss of hydraulic/electrical power	10	0.5 *	0.3 **
Damaged Vehicle	Aerodynamic, thermal, acoustic, bird strike, etc.	10	0.9 *	0.3 **
Benign Failure	Loss of non-critical systems	39	0.9 *	0.95 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.3 **
		100		$P_D = 0.5559$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Abort in all phases is possible, but is contingent upon an intact flying return - any non-benign failure jeopardizes systems required to land

TABLE B.1.7.2-6.– NDV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: NDV
Flight Phase: Ramjet Mode

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant leak, engine/pump rupture	20	0.5 *	0.3 **
Fire	Minor leaks, APU, fuel cells	20	0.6 *	0.3 **
Loss of Control	GN&C failure, software, loss of hydraulic/electrical power,	10	0.5 *	0.3 **
Damaged Vehicle	Aerodynamic, thermal, acoustic	10	0.8 *	0.3 **
Benign Failure	Loss of non-critical systems	39	0.9 *	0.95 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.3 **
		100		$P_D = 0.5589$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** Abort in all phases is possible, but is contingent upon an intact flying return - any non-benign failure jeopardizes systems required to land

TABLE B.1.7.2-6.– NDV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: NDV
Flight Phase: Scramjet Mode

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant leak, engine/pump rupture	20	0.5 *	0.3 **
Fire	Minor leaks, APU, fuel cells	20	0.6 *	0.3 **
Loss of Control	GN&C failure, software, loss of hydraulic/electrical power,	10	0.5 *	0.3 **
Damaged Vehicle	Aerodynamic, thermal, acoustic,	10	0.8 *	0.3 **
Benign Failure	Loss of non-critical systems	39	0.9 *	0.95 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.3 **
		100		$P_D = 0.5589$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Abort in all phases is possible, but is contingent upon an intact flying return - any non-benign failure jeopardizes systems required to land

TABLE B.1.7.2-6.– NDV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: NDV
Flight Phase: Orbit Insertion Mode

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant leak, engine/pump rupture	20	0.5 *	0.3 **
Fire	Minor leaks, APU, fuel cells	20	0.5 *	0.3 **
Loss of Control	GN&C failure, software, loss of hydraulic/electrical power	5	0.55 *	0.3 **
Damaged Vehicle	Aerodynamic, thermal, acoustic, bird strike, etc.	3	0.9 *	0.3 **
Benign Failure	Loss of non-critical systems	51	0.9 *	0.95 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.3 **
		100		$P_D = 0.4849$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Abort in all phases is possible, but is contingent upon an intact flying return - any non-benign failure jeopardizes systems required to land

TABLE B.1.7.2-6.– NDV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: NDV
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage of on-orbit consumables or return fuel	4	0.7 *	0.3 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Not applicable - unlikely event	0	0	0
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Loss of non-critical system	95	0.98 *	0.97 **
Hazardous Environment	Leak in pressure shell, ECLSS failure	1	0.9 *	0.95 **
		100		$P_D = 0.0800$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Abort in all phases is possible, but is contingent upon an intact flying return - any non-benign failure jeopardizes systems required to land

TABLE B.1.7.2-6.– NDV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: NDV
Flight Phase: Orbit Circularization (OMS Burn)

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage, engine failure	2	0.7 *	0.2 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric burn	2	0.1 *	0.01 **
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	95	0.98 *	0.98 **
Hazardous Environment	Leaks, ECLSS failure	1	0.9 *	0.95 **
		100		$P_D = 0.0763$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Abort in all phases is possible, but is contingent upon an intact flying return - any non-benign failure jeopardizes systems required to land

TABLE B.1.7.2-7.– RPC/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: RPC/MLS-HL
Flight Phase: Ignition

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, propellant leak, overpressure	10	0.01 ***	0.001 ***
Fire	Propellant leak, hot gas leak	20	0.5 **	0.95 *
Loss of Control	Not applicable - vehicle is still held down	0	0	0
Damaged Vehicle	Not applicable - vehicle is still held down	0	0	0
Benign Failure	Failure of non-critical system	70	0.95 **	0.99 *
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.2466$

Notes:

* Launch escape system (LES) is active

** Estimate of statistical average of a variety of hazard sources

*** If failure was detected, it is assumed propulsion would be shut down; in cases where the failure is undetected, and the propellant tanks are full, large energy releases are possible

TABLE B.1.7.2-7.– RPC/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/MLS-HL
Flight Phase: First Boost Phase

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, propellant leak, overpressure	10	0.9 *	0.9 **
Fire	Propellant leak, hot gas leak	10	0.9 *	0.9 **
Loss of Control	Actuator, APU failures, GN&C	10	0.9 *	0.8 **
Damaged Vehicle	Contact with pad, bird strike, etc.	10	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	59	0.98 *	0.95 **
Hazardous Environment	Leaks into crew compartment RCS or TCS fluids	1	0.9 *	0.9 **
		100		$P_D = 0.1606$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active - numbers vary based on assessment of possibility of adverse attitude/altitude outside LES capability

TABLE B.1.7.2-7.– RPC/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/MLS-HL
Flight Phase: Propulsion Module Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Actuator, APU failures, unclean separation	10	0.8 *	0.7 **
Damaged Vehicle	Hangup on separation, contact with nozzles	20	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	70	0.98 *	0.99 ***
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.1689$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Launch escape system (LES) may be incapable of countering some forces/moments that result from certain high speed loss-of-control situations

*** Emergency detection system and LES are active

TABLE B.1.7.2-7.– RPC/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/MLS-HL
Flight Phase: Continued Burn After Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable burn, propellant leak, overpressure	5	0.9 *	0.9 **
Fire	Propellant leak	5	0.9 *	0.9 **
Loss of Control	Actuator, APU failures	10	0.9 *	0.8 **
Damaged Vehicle	Vibration, leaks or damage resultant from separation	10	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	69	0.98 *	0.95 **
Hazardous Environment	Leaks into crew compartment RCS or TCS fluids	1	0.9 *	0.9 **
		100		$P_D = 0.1485$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active - numbers vary based on assessment of possibility of adverse attitude/altitude outside LES capability

TABLE B.1.7.2-7.– RPC/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/MLS-HL
Flight Phase: Upper Stage Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable burn, propellant leak, overpressure	5	0.9 *	0.9 **
Fire	Propellant leak	5	0.9 *	0.9 **
Loss of Control	Actuator, TVC failure	10	0.3 ***	0.8 **
Damaged Vehicle	Residual damage from staging	10	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	69	0.98 *	0.95 **
Hazardous Environment	Leaks into crew compartment RCS fluids, loss of pressure	1	0.9 *	0.9 **
		100		$P_D = 0.1965$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** Emergency detection system and launch escape system (LES) are active - numbers vary based on assessment of possibility of adverse attitude/altitude outside LES capability
- *** Some failures would place RPC in unrecoverable orbit - reentry would violate control , TPS, etc. constraints

TABLE B.1.7.2-7.– RPC/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/MLS-HL
Flight Phase: First/Second Stage Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric separation	5	0.7 *	0.52 ***
Damaged Vehicle	Recontact between RPC and tank	5	0.8 *	0.52 ***
Benign Failure	Failure of non-critical system	89	0.98 *	0.95 **
Hazardous Environment	Leaks into crew compartment RCS or TCS fluids	1	0.9 *	0.98 **
		100		$P_D = 0.1236$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** Emergency detection system and launch escape system (LES) are active
- *** LES and/or RPC OMS may be incapable of countering some forces/moments induced from separation

TABLE B.1.7.2-7.– RPC/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/MLS-HL
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Flight deck, middeck electrical short	1	0.95 *	0.98 **
Loss of Control	Actuator, APU failures, pilot error	1	0.8 *	0.8 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	95	0.98 *	0.99 **
Hazardous Environment	Leaks into crew compartment RCS fluids, ECLSS failure	3	0.9 *	0.98 **
		100		$P_D = 0.0361$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** OMS/RCS can position vehicle for safe return
- *** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-7.– RPC/MLS-HL HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: RPC/MLS-HL
Flight Phase: OMS Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, overpressure, propellant leak	5	0.8 *	0.6 ***
Fire	Flight deck, middeck electrical short	1	0.95 *	0.98 **
Loss of Control	Actuator, APU failures, pilot error	5	0.7 *	0.8 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	88	0.98 *	0.99 **
Hazardous Environment	Leaks into crew compartment RCS fluids, ECLSS failure	1	0.9 *	0.98 **
		100		$P_D = 0.0761$

Notes:

* Estimate of statistical average of a variety of hazard sources

** OMS/RCS can position vehicle for safe return

*** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-8.– RPC/MLS-X HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: RPC/MLS-X
Flight Phase: Ignition

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, propellant leak, overpressure	10	0.01 ***	0.001 ***
Fire	Propellant leak, hot gas leak	20	0.5 **	0.95 *
Loss of Control	Not applicable - vehicle is still held down	0	0	0
Damaged Vehicle	Not applicable - vehicle is still held down	0	0	0
Benign Failure	Failure of non-critical system	70	0.95 **	0.99 *
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.2466$

Notes:

* Launch escape system (LES) is active

** Estimate of statistical average of a variety of hazard sources

*** If failure was detected, it is assumed propulsion would be shut down; in cases where the failure is undetected, and the propellant tanks are full, large energy releases are possible

TABLE B.1.7.2-8.– RPC/MLS-X HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/MLS-X
Flight Phase: First Boost Phase

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, propellant leak, overpressure	10	0.9 *	0.9 **
Fire	Propellant leak, hot gas leak	10	0.9 *	0.9 **
Loss of Control	Actuator, APU failures, GN&C	10	0.9 *	0.8 **
Damaged Vehicle	Contact with pad, bird strike, etc.	10	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	59	0.98 *	0.95 **
Hazardous Environment	Leaks into crew compartment RCS or TCS fluids	1	0.9 *	0.9 **
		100		$P_D = 0.1606$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active - numbers vary based on assessment of possibility of adverse attitude/altitude outside LES capability

TABLE B.1.7.2-8.– RPC/MLS-X HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/MLS-X
Flight Phase: Propulsion Module Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Actuator, APU failures, unclean separation	10	0.8 *	0.7 **
Damaged Vehicle	Hangup on separation, contact with nozzles	20	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	70	0.98 *	0.99 ***
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.1689$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Launch escape system (LES) may be incapable of countering some forces/moments that result from certain high speed loss-of-control situations

*** Emergency detection system and LES are active

TABLE B.1.7.2-8.– RPC/MLS-X HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/MLS-X
Flight Phase: Continued Burn After Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable burn, propellant leak, overpressure	5	0.9 *	0.9 **
Fire	Propellant leak	5	0.9 *	0.9 **
Loss of Control	Actuator, APU failures	10	0.9 *	0.8 **
Damaged Vehicle	Vibration, leaks or damage resultant from separation	10	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	69	0.98 *	0.95 **
Hazardous Environment	Leaks into crew compartment RCS or TCS fluids	1	0.9 *	0.9 **
		100		$P_D = 0.1485$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active - numbers vary based on assessment of possibility of adverse attitude/altitude outside LES capability

TABLE B.1.7.2-8.– RPC/MLS-X HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/MLS-X
Flight Phase: Vehicle Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric separation	5	0.7 *	0.52 ***
Damaged Vehicle	Recontact between RPC and tank	5	0.8 *	0.52 ***
Benign Failure	Failure of non-critical system	89	0.98 *	0.95 **
Hazardous Environment	Leaks into crew compartment RCS or TCS fluids	1	0.9 *	0.98 **
		100		$P_D = 0.1236$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** Emergency detection system and launch escape system (LES) are active
- *** LES and/or RPC OMS may be incapable of countering some forces/moments induced from separation

TABLE B.1.7.2-8.– RPC/MLS-X HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/MLS-X
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Flight deck, middeck electrical short	1	0.95 *	0.98 **
Loss of Control	Actuator, APU failures, pilot error	1	0.8 *	0.8 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	95	0.98 *	0.99 **
Hazardous Environment	Leaks into crew compartment RCS fluids, ECLSS failure	3	0.9 *	0.98 **
		100		$P_D = 0.0361$

Notes:

* Estimate of statistical average of a variety of hazard sources

** OMS/RCS can position vehicle for safe return

*** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-8.– RPC/MLS-X HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: RPC/MLS-X
Flight Phase: OMS Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, overpressure, propellant leak	5	0.8 *	0.6 ***
Fire	Flight deck, middeck electrical short	1	0.95 *	0.98 **
Loss of Control	Actuator, APU failures, pilot error	5	0.7 *	0.8 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	88	0.98 *	0.99 **
Hazardous Environment	Leaks into crew compartment RCS fluids, ECLSS failure	1	0.9 *	0.98 **
		100		$P_D = 0.0761$

Notes:

* Estimate of statistical average of a variety of hazard sources

** OMS/RCS can position vehicle for safe return

*** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-9.– RPC/HR TITAN IV HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: RPC/HR Titan IV
Flight Phase: Stage 0 & 1 Ignition

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant supply system leak, unstable burn	5	0.8 *	0.95 **
Fire	Leak in tankage, hot gas leak	5	0.8 *	0.95 **
Loss of Control	Unlikely event - vehicle is held down	0	0	0
Damaged Vehicle	Unlikely event - vehicle is held down	0	0	0
Benign Failure	Software, controllers, actuators	90	0.9 *	0.95 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.1545$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active

TABLE B.1.7.2-9.– RPC/HR TITAN IV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/HR Titan IV
Flight Phase: Stage 0 & 1 Parallel Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leak in propellant system, unstable burn	12	0.9 *	0.9 **
Fire	Leak in propellant system, hot gas leak	12	0.9 *	0.9 **
Loss of Control	Asymmetric burn, failed actuator, failed guidance	10	0.9 *	0.9 **
Damaged Vehicle	Aerodynamic, thermal, acoustic loads, bird strike, hail	10	0.6 *	0.9 **
Benign Failure	Software, power, thermal control failures	55	0.98 *	0.95 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.9 **
		100		$P_D = 0.1505$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active

TABLE B.1.7.2-9.– RPC/HR TITAN IV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/HR Titan IV
Flight Phase: Stage 0 Jettison

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - short time period	0	0	0
Fire	Not applicable - short time period	0	0	0
Loss of Control	Asymmetric separation, flow field loads	20	0.7 *	0.8 **
Damaged Vehicle	Physical contact, plume impingement	30	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	50	0.9 *	0.97 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.3075$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active; some dynamic situations exceed LES capability

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TABLE B.1.7.2-9.– RPC/HR TITAN IV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/HR Titan IV
Flight Phase: Stage 1 (continued) Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leak in propellant system, turbopump failure	5	0.9 *	0.9 **
Fire	Leak in propellant system, hot gas leak	5	0.9 *	0.9 **
Loss of Control	Failed actuator, GN&C failure	10	0.9 *	0.9 **
Damaged Vehicle	Aerodynamic, thermal, acoustic loads	10	0.6 *	0.8 **
Benign Failure	Software, power, thermal control failures	69	0.98 *	0.95 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.9 **
		100		$P_D = 0.1395$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active; some dynamic situations exceed LES capability

TABLE B.1.7.2-9.– RPC/HR TITAN IV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/HR Titan IV
Flight Phase: Stage 1 Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - short time period	0	0	0
Fire	Ignition of residual Stage 1 propellants	1	0.9 *	0.9 **
Loss of Control	Incomplete staging	10	0.8 *	0.9 **
Damaged Vehicle	Physical recontact between stages	5	0.8 *	0.8 **
Benign Failure	Loss of non-critical system	84	0.9 *	0.97 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.1546$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active; some dynamic situations exceed LES capability

TABLE B.1.7.2-9.– RPC/HR TITAN IV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/HR Titan IV
Flight Phase: Stage 2 Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant leak, turbopump failure, engine rupture	5	0.8 *	0.9 **
Fire	Fuel leak	5	0.7 *	0.9 **
Loss of Control	GN&C failure, actuator failure	10	0.7 *	0.9 **
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Loss of non-critical system, loss of thrust	79	0.98 *	0.9 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.9 **
		100		$P_D = 0.1646$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active

TABLE B.1.7.2-9.– RPC/HR TITAN IV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/HR Titan IV
Flight Phase: Stage 2 Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - short time period	0	0	0
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Incomplete staging	5	0.7 *	0.7 ***
Damaged Vehicle	Physical recontact between stage 2 and RPC	5	0.8 *	0.5 ****
Benign Failure	Loss of non-critical system	89	0.9 *	0.95 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.98 **
		100		$P_D = 0.1857$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active

*** Depending on attitude, RPC may not be able to successfully reenter with attached second stage hardware attached

**** Exterior damage to RPC will preclude successful reentry in some cases

TABLE B.1.7.2-9.– RPC/HR TITAN IV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/HR Titan IV
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Flight deck, middeck electrical short	1	0.95 *	0.98 **
Loss of Control	Actuator, APU failures, pilot error	1	0.8 *	0.8 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	95	0.98 *	0.99 **
Hazardous Environment	Leaks into crew compartment RCS fluids, ECLSS failure	3	0.9 *	0.98 **
		100		$P_D = 0.0361$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** OMS/RCS can position vehicle for safe return
- *** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-9.– RPC/HR TITAN IV HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: RPC/HR Titan IV
Flight Phase: OMS Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, overpressure, propellant leak	5	0.8 *	0.6 ***
Fire	Flight deck, middeck electrical short	1	0.95 *	0.98 **
Loss of Control	Actuator, APU failures, pilot error	5	0.7 *	0.8 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	88	0.98 *	0.99 **
Hazardous Environment	Leaks into crew compartment RCS fluids, ECLSS failure	1	0.9 *	0.98 **
		100		$P_D = 0.0761$

Notes:

* Estimate of statistical average of a variety of hazard sources

** OMS/RCS can position vehicle for safe return

*** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-10.– RPC/NLS-50 HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: RPC/NLS-50
Flight Phase: Ignition

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, propellant leak, overpressure	10	0.01 ***	0.001 ***
Fire	Propellant leak, hot gas leak	20	0.5 **	0.95 *
Loss of Control	Not applicable - vehicle is still held down	0	0	0
Damaged Vehicle	Not applicable - vehicle is still held down	0	0	0
Benign Failure	Failure of non-critical system	70	0.95 **	0.99 *
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.2466$

Notes:

* Launch escape system (LES) is active

** Estimate of statistical average of a variety of hazard sources

*** If failure was detected, it is assumed propulsion would be shut down; in cases where the failure is undetected, and the propellant tanks are full, large energy releases are possible

TABLE B.1.7.2-10.– RPC/NLS-50 HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/NLS-50
Flight Phase: First Boost Phase

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, propellant leak, overpressure	10	0.9 *	0.9 **
Fire	Propellant leak, hot gas leak	10	0.9 *	0.9 **
Loss of Control	Actuator, APU failures, GN&C	10	0.9 *	0.8 **
Damaged Vehicle	Contact with pad, bird strike, etc.	10	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	59	0.98 *	0.95 **
Hazardous Environment	Leaks into crew compartment RCS or TCS fluids	1	0.9 *	0.9 **
		100		$P_D = 0.1606$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active - numbers vary based on assessment of possibility of adverse attitude/altitude outside LES capability

TABLE B.1.7.2-10.– RPC/NLS-50 HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/NLS-50
Flight Phase: Propulsion Module Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Actuator, APU failures, unclean separation	10	0.8 *	0.7 **
Damaged Vehicle	Hangup on separation, contact with nozzles	20	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	70	0.98 *	0.99 ***
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.1689$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** Launch escape system (LES) may be incapable of countering some forces/moments that result from certain high speed loss-of-control situations
- *** Emergency detection system and LES are active

TABLE B.1.7.2-10.– RPC/NLS-50 HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/NLS-50
Flight Phase: Continued Burn After Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable burn, propellant leak, overpressure	5	0.9 *	0.9 **
Fire	Propellant leak	5	0.9 *	0.9 **
Loss of Control	Actuator, APU failures	10	0.9 *	0.8 **
Damaged Vehicle	Vibration, leaks or damage resultant from separation	10	0.6 *	0.8 **
Benign Failure	Failure of non-critical system	69	0.98 *	0.95 **
Hazardous Environment	Leaks into crew compartment RCS or TCS fluids	1	0.9 *	0.9 **
		100		$P_D = 0.1485$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active - numbers vary based on assessment of possibility of adverse attitude/altitude outside LES capability

TABLE B.1.7.2-10.– RPC/NLS-50 HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/NLS-50
Flight Phase: Vehicle Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric separation	5	0.7 *	0.5 ***
Damaged Vehicle	Recontact between RPC and tank	5	0.8 *	0.5 ***
Benign Failure	Failure of non-critical system	89	0.98 *	0.99 **
Hazardous Environment	Leaks into crew compartment RCS or TCS fluids	1	0.9 *	0.98 **
		100		$P_D = 0.0902$

Notes:

* Estimate of statistical average of a variety of hazard sources
** Emergency detection system and launch escape system (LES) are active
*** LES and/or RPC OMS may be incapable of countering some forces/moments induced from separation

TABLE B.1.7.2-10.– RPC/NLS-50 HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RPC/NLS-50
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Flight deck, middeck electrical short	1	0.95 *	0.98 **
Loss of Control	Actuator, APU failures, pilot error	1	0.8 *	0.8 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	95	0.98 *	0.99 **
Hazardous Environment	Leaks into crew compartment RCS fluids, ECLSS failure	3	0.9 *	0.98 **
		100		$P_D = 0.0361$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** OMS/RCS can position vehicle for safe return
- *** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-10.– RPC/NLS-50 HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: RPC/NLS-50
Flight Phase: OMS Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, overpressure, propellant leak	5	0.8 *	0.6 ***
Fire	Flight deck, middeck electrical short	1	0.95 *	0.98 **
Loss of Control	Actuator, APU failures, pilot error	5	0.7 *	0.8 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	88	0.98 *	0.99 **
Hazardous Environment	Leaks into crew compartment RCS fluids, ECLSS failure	1	0.9 *	0.98 **
		100		$P_D = 0.0761$

Notes:

* Estimate of statistical average of a variety of hazard sources

** OMS/RCS can position vehicle for safe return

*** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-11.– RUPC/HR TITAN II HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: RUPC/HR Titan II
Flight Phase: Stage 1 Ignition

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant supply system leak, unstable burn	5	0.8 *	0.95 **
Fire	Leak in tankage, hot gas leak	5	0.8 *	0.95 **
Loss of Control	Unlikely event - vehicle is held down	0	0	0
Damaged Vehicle	Unlikely event - vehicle is held down	0	0	0
Benign Failure	Software, controllers, actuators	90	0.9 *	0.95 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.1545$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active

TABLE B.1.7.2-11.– RUPC/HR TITAN II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RUPC/HR Titan II
Flight Phase: Stage 0 and 1 Parallel Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leak in propellant system, unstable burn, case rupture	25	0.9 *	0.9 **
Fire	Leak in propellant system, hot gas leak	25	0.9 *	0.9 **
Loss of Control	Asymmetric burn, failed actuator, failed guidance	10	0.9 *	0.9 **
Damaged Vehicle	Aerodynamic, thermal, acoustic loads, bird strike, hail	10	0.6 *	0.9 **
Benign Failure	Software, power, thermal control failures	29	0.98 *	0.95 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.9 **
		100		$P_D = 0.1819$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active

TABLE B.1.7.2-11.– RUPC/HR TITAN II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RUPC/HR Titan II
Flight Phase: Stage 0 Jettison (10 Solids)

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Residual propellant, overpressure, hot gas on tanks	5	0.8 *	0.9 **
Fire	Hot gas impingement	5	0.9 *	0.97 **
Loss of Control	Asymmetric separation, flow field loads	40	0.7 *	0.8 **
Damaged Vehicle	Physical contact, plume impingement	5	0.8 *	0.8 **
Benign Failure	Failure of non-critical system	44	0.9 *	0.97 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.97 *	0.9 **
		100		$P_D = 0.2715$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active; some dynamic situations exceed LES capability

TABLE B.1.7.2-11.– RUPC/HR TITAN II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RUPC/HR Titan II
Flight Phase: Stage 1 (continued) Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leak in propellant system, turbopump failure	5	0.9 *	0.9 **
Fire	Leak in propellant system, hot gas leak	5	0.9 *	0.9 **
Loss of Control	Failed actuator, GN&C failure	10	0.9 *	0.9 **
Damaged Vehicle	Aerodynamic, thermal, acoustic loads	10	0.6 *	0.8 **
Benign Failure	Software, power, thermal control failures	69	0.98 *	0.95 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.9 **
		100		$P_D = 0.1395$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** Emergency detection system and launch escape system (LES) are active; some dynamic situations exceed LES capability

TABLE B.1.7.2-11.– RUPC/HR TITAN II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RUPC/HR Titan II
Flight Phase: Stage 1 Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - short time period	0	0	0
Fire	Ignition of residual Stage 1 propellants	1	0.9 *	0.9 **
Loss of Control	Incomplete staging	10	0.8 *	0.9 **
Damaged Vehicle	Physical recontact between stages	5	0.8 *	0.8 **
Benign Failure	Loss of non-critical system	84	0.9 *	0.97 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.1546$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active; some dynamic situations exceed LES capability

TABLE B.1.7.2-11.– RUPC/HR TITAN II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RUPC/HR Titan II
Flight Phase: Stage 2 Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant leak, turbopump failure, engine rupture	5	0.8 *	0.9 **
Fire	Fuel leak	5	0.7 *	0.9 **
Loss of Control	GN&C failure, actuator failure	10	0.7 *	0.9 **
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Loss of non-critical system, loss of thrust	79	0.98 *	0.9 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.9 **
		100		$P_D = 0.1646$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Emergency detection system and launch escape system (LES) are active

TABLE B.1.7.2-11.– RUPC/HR TITAN II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RUPC/HR Titan II
Flight Phase: Stage 2 Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - short time period	0	0	0
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Incomplete staging	5	0.7 *	0.7 ***
Damaged Vehicle	Physical recontact between stage 2 and RUPC	5	0.8 *	0.5 ****
Benign Failure	Loss of non-critical system	89	0.9 *	0.95 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.98 **
		100		$P_D = 0.1857$

Notes:

- * Estimate of statistical average of a variety of hazard sources
- ** Emergency detection system and launch escape system (LES) are active
- *** Depending on attitude, RUPC may not be able to successfully reenter with attached second stage hardware attached
- **** Exterior damage to RUPC will preclude successful reentry in some cases

TABLE B.1.7.2-11.– RUPC/HR TITAN II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: RUPC/HR Titan II
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - unlikely event	0	0	0
Fire	Flight deck, middeck electrical short	1	0.95 *	0.98 **
Loss of Control	Actuator, APU failures, pilot error	1	0.8 *	0.8 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	95	0.98 *	0.99 **
Hazardous Environment	Leaks into crew compartment RCS fluids, ECLSS failure	3	0.9 *	0.98 **
		100		$P_D = 0.0361$

Notes:

* * Estimate of statistical average of a variety of hazard sources
* ** OMS/RCS can position vehicle for safe return
* *** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-11.– RUPC/HR TITAN II HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: RUPC/HR Titan II
Flight Phase: OMS Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, overpressure, propellant leak	5	0.8 *	0.6 ***
Fire	Flight deck, middeck electrical short	1	0.95 *	0.98 **
Loss of Control	Actuator, APU failures, pilot error	5	0.7 *	0.8 ***
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	88	0.98 *	0.99 **
Hazardous Environment	Leaks into crew compartment RCS fluids, ECLSS failure	1	0.9 *	0.98 **
		100		$P_D = 0.0761$

Notes:

* Estimate of statistical average of a variety of hazard sources

** OMS/RCS can position vehicle for safe return

*** OMS/RCS may be incapable of countering some forces/moments

TABLE B.1.7.2-12.– SPACE SHUTTLE HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: Space Shuttle
Flight Phase: SSME Ignition

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, propellant leak	10	0.01 ***	0.001 ****
Fire	Propellant leak, APU	20	0.5 ***	0.95 **
Loss of Control	Not applicable - vehicle is still held down	0	0	0
Damaged Vehicle	Not applicable - vehicle is still held down	0	0	0
Benign Failure	Software, controller, actuators, APU	70	0.95 *	0.99 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.2466$

Notes:

* Estimate of statistical average of a variety of sources

** Abort procedure consists of engine shutdown and egress from the vehicle

*** Collocation of propulsion, power, APUs results in high degree of correlated failures

**** Crew is surrounded by full propellant tankage

TABLE B.1.7.2-12.– SPACE SHUTTLE HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Space Shuttle
Flight Phase: SRB Ignition

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leak in case, flaw in solid	10	0.001 ***	0.001 ****
Fire	Not applicable - see SSME ign.	0	0	0
Loss of Control	Asymmetric ignition, failed actuator	20	0.01 ***	0.001 ****
Damaged Vehicle	Hold-down release, contact with tower	10	0.01 ***	0.001 ****
Benign Failure	Software, controllers, actuators	60	0.9 *	0.9 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.5140$

Notes:

* Estimate of statistical average of a variety of sources

** Abort procedure consists of engine shutdown and egress from the vehicle

*** Collocation of propulsion, power, APUs results in high degree of correlated failures

**** Crew is surrounded by full propellant tankage, no realistic abort capability is available at this point

TABLE B.1.7.2-12.– SPACE SHUTTLE HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Space Shuttle
Flight Phase: SSME/SRB Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant leak, turbopump failure, flaw in solids, fuel cells	25	0.3 *	0.05 **
Fire	Propellant leak, APU, fuel cells	20	0.5 *	0.05 **
Loss of Control	Actuator (TVC) failure, winds, software/controller	20	0.05 *	0.05 **
Damaged Vehicle	Aero, thermal, acoustic loads,	10	0.5 *	0.1 **
Benign Failure	Software, power, thermal control, thrust loss	24	0.98 *	0.95 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.9 **
		100		$P_D = 0.7542$

Notes:

* Estimate of statistical average of a variety of sources

** Abort procedures include RTLS, TAL, AOA, but all are contingent on the ability of the orbiter to fly, collocation of flight critical subsystems near propulsion results in high correlation factor

TABLE B.1.7.2-12.– SPACE SHUTTLE HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Space Shuttle
Flight Phase: SRB Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - short time period	0	0	0
Fire	Not applicable - short time period	0	0	0
Loss of Control	Asymmetric separation, flow field loads	50	0.1 *	0.3 **
Damaged Vehicle	Physical contact with SRBs, plume impingement	50	0.4 *	0.5 **
Benign Failure	Not applicable - short time period	0	0	0
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.8850$

Notes:

* Estimate of statistical average of a variety of sources

** Abort procedures include intact abort - any damage to flight critical subsystems precludes successful abort

TABLE B.1.7.2-12.– SPACE SHUTTLE HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Space Shuttle
Flight Phase: SSME Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant leak, engine rupture	15	0.5 *	0.3 **
Fire	Minor leak, fuel cells	15	0.5 *	0.3 **
Loss of Control	Multiple APU failures, software, GN&C failure	10	0.1 *	0.3 **
Damaged Vehicle	Vibration, flight loads	10	0.8 *	0.5 **
Benign Failure	Loss of non-critical systems, SSME shut down	49	0.98 *	0.95 **
Hazardous Environment	Leak in pressure shell	1	0.9 *	0.9 **
		100		$P_D = 0.4477$

Notes:

* Estimate of statistical average of a variety of sources

** Abort procedures all include a flying reentry - any damage to the flight critical subsystems results in an inability to abort

TABLE B.1.7.2-12.– SPACE SHUTTLE HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Space Shuttle
Flight Phase: ET Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Valve malfunction, slam shut ignites LOX, LH2	10	0.001 *	0.001 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Separation failure	5	0.9 *	0.001 **
Damaged Vehicle	Collision with ET	10	0.8 *	0.1 **
Benign Failure	Loss of non-critical system	75	0.99 *	0.9 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.3237$

Notes:

* Estimate of statistical average of a variety of hazard sources; explosions likely to affect flight critical subsystems in aft fuselage

** Abort procedures all include a flying reentry - any damage to the flight critical subsystems results in an inability to abort

TABLE B.1.7.2-12.– SPACE SHUTTLE HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Space Shuttle
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage of on-orbit consumables	4	0.7 *	0.2 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Not applicable - unlikely event	0	0	0
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Loss of non-critical systems	95	0.98 *	0.95 **
Hazardous Environment	Leaks, ECLSS failure	1	0.9 *	0.95 **
		100		$P_D = 0.1014$

Notes:

- * Estimate of statistical average of a variety of sources
- ** Abort procedures all include a flying reentry - any damage to the flight critical subsystems results in an inability to abort

TABLE B.1.7.2-12.– SPACE SHUTTLE HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: Space Shuttle
Flight Phase: OMS Circularization

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage, engine failure	2	0.7 *	0.2 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric burn	2	0.1 *	0.01 **
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical systems	95	0.98 *	0.98 **
Hazardous Environment	Leaks, ECLSS failure	1	0.9 *	0.95 **
		100		$P_D = 0.0763$

Notes:

* Estimate of statistical average of a variety of sources

** Abort procedures all include a flying reentry - any damage to the flight critical subsystems results in an inability to abort

TABLE B.1.7.2-13.– SPACE SHUTTLE EVOLUTION HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: Space Shuttle Evolution
Flight Phase: SSME Ignition

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Unstable engine burn, propellant leak	10	0.01 ***	0.001 ****
Fire	Propellant leak, APU	20	0.5 ***	0.95 **
Loss of Control	Not applicable - vehicle is still held down	0	0	0
Damaged Vehicle	Not applicable - vehicle is still held down	0	0	0
Benign Failure	Software, controller, actuators, APU	70	0.95 *	0.99 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.2466$

Notes:

* Estimate of statistical average of a variety of sources
** Abort procedure consists of engine shutdown and egress from the vehicle
*** Collocation of propulsion, power, APUs results in high degree of correlated failures
**** Crew is surrounded by full propellant tankage

TABLE B.1.7.2-13.– SPACE SHUTTLE EVOLUTION HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Space Shuttle Evolution
Flight Phase: HRB Ignition

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leak in case, flaw in solid, propellant leak	2	0.5 *	0.6 ***
Fire	Propellant leak	5	0.8 *	0.9 **
Loss of Control	Asymmetric ignition, failed actuator	20	0.4 *	0.9 **
Damaged Vehicle	Hold-down release, contact with tower	10	0.7 *	0.8 **
Benign Failure	Software, controllers, actuators	63	0.9 *	0.94 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.2970$

Notes:

* Estimate of statistical average of a variety of sources

** Abort procedure consists of engine shutdown and egress from the vehicle

*** Crew is surrounded by full propellant tankage

TABLE B.1.7.2-13.– SPACE SHUTTLE EVOLUTION HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Space Shuttle Evolution
Flight Phase: SSME/HRB Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant leak, turbopump failure, flaw in solids, fuel cells	10	0.85 *	0.9 **
Fire	Propellant leak, APU, fuel cells	10	0.9 *	0.9 **
Loss of Control	Actuator (TVC) failure, winds, software/controller	10	0.9 *	0.8 **
Damaged Vehicle	Aero, thermal, acoustic loads, bird strike, etc.	10	0.55 *	0.8 **
Benign Failure	Software, power, thermal control, thrust loss	59	0.98 *	0.95 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.9 **
		100		$P_D = 0.1691$

Notes:

* Estimate of statistical average of a variety of sources

** Abort procedures include ejectable crew cab, some dynamic situations exceed capabilities

TABLE B.1.7.2-13.– SPACE SHUTTLE EVOLUTION HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Space Shuttle Evolution
Flight Phase: HRB Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Not applicable - short time period	0	0	0
Fire	Not applicable - short time period	0	0	0
Loss of Control	Asymmetric separation, flow field loads	50	0.5 *	0.3 **
Damaged Vehicle	Physical contact with HRBs, plume impingement	50	0.5 *	0.5 **
Benign Failure	Not applicable - short time period	0	0	0
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.8000$

Notes:

* Estimate of statistical average of a variety of sources

** Abort procedures include intact abort - any damage to flight critical subsystems precludes successful abort

TABLE B.1.7.2-13.– SPACE SHUTTLE EVOLUTION HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Space Shuttle Evolution
Flight Phase: SSME Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant leak, engine rupture	5	0.88 *	0.9 **
Fire	Minor leak, fuel cells	5	0.9 *	0.9 **
Loss of Control	Multiple APU failures, software, GN&C failure	10	0.9 *	0.8 **
Damaged Vehicle	Vibration, flight loads	10	0.6 *	0.8 **
Benign Failure	Loss of non-critical systems, SSME shut down	69	0.98 *	0.95 **
Hazardous Environment	Leak in pressure shell	1	0.9 *	0.9 **
		100		$P_D = 0.1494$

Notes:

* Estimate of statistical average of a variety of sources

** Abort procedures include a separable crew cab

TABLE B.1.7.2-13.– SPACE SHUTTLE EVOLUTION HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Space Shuttle Evolution
Flight Phase: ET Separation

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Valve malfunction, slam shut ignites LOX, LH2	10	0.001 *	0.001 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Separation failure	5	0.9 *	0.5 **
Damaged Vehicle	Collision with ET	10	0.8 *	0.2 **
Benign Failure	Loss of non-critical system	75	0.99 *	0.9 **
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.2932$

Notes:

* Estimate of statistical average of a variety of hazard sources; explosions likely to affect flight critical subsystems in aft fuselage

** Abort procedures include a separable crew cab

TABLE B.1.7.2-13.– SPACE SHUTTLE EVOLUTION HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: Space Shuttle Evolution
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage of on-orbit consumables	4	0.7 *	0.9 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Not applicable - unlikely event	0	0	0
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Loss of non-critical systems	95	0.98 *	0.95 **
Hazardous Environment	Leaks, ECLSS failure	1	0.9 *	0.95 **
		100		$P_D = 0.0818$

Notes:

* Estimate of statistical average of a variety of sources

** Abort procedures include a separable crew cab

TABLE B.1.7.2-13.– SPACE SHUTTLE EVOLUTION HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: Space Shuttle Evolution
Flight Phase: OMS Circularization

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage, engine failure	2	0.7 *	0.9 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric burn	2	0.1 *	0.9 **
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical systems	95	0.98 *	0.98 **
Hazardous Environment	Leaks, ECLSS failure	1	0.9 *	0.95 **
		100		$P_D = 0.0647$

Notes:

* Estimate of statistical average of a variety of sources

** Abort procedures include a separable crew cab

TABLE B.1.7.2-14.– SSTO HUMAN SAFETY FLIGHT PHASE DATA SHEETS

System: SSTO
Flight Phase: Engine Ignition

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant leak	10	0.01 ***	0.001 ***
Fire	Propellant leaks, APU	20	0.5 **	0.95 *
Loss of Control	Not applicable - short time period	0	0	0
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Software, controller, actuators, APUs, pumps, valves	70	0.95 **	0.99 *
Hazardous Environment	Not applicable - short time period	0	0	0
		100		$P_D = 0.2466$

Notes:

* Launch escape system (LES) is active

** Estimate of statistical average of a variety of hazard sources

*** If failure was detected, it is assumed propulsion would be shut down; in cases where the failure is undetected, and the propellant tanks are full, large energy releases are possible

TABLE B.1.7.2-14.– SSTO HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: SSTO
Flight Phase: Engine Burn

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Propellant leak, engine/pump rupture	20	0.5 *	0.3 **
Fire	Minor leaks, APU, fuel cells	20	0.5 *	0.3 **
Loss of Control	GN&C failure, software, loss of hydraulic/electrical power	5	0.5 *	0.3 **
Damaged Vehicle	Aerodynamic, thermal, acoustic, bird strike, etc.	5	0.9 *	0.3 **
Benign Failure	Loss of non-critical systems	49	0.9 *	0.95 **
Hazardous Environment	ECLSS failure, leak in pressure shell	1	0.9 *	0.3 **
		100		$P_D = 0.4974$

Notes:

* Estimate of statistical average of a variety of hazard sources, not that since many flight critical systems are collocated in the aft fuselage, correlation is a concern

** Abort in all phases is possible, but is contingent upon an intact flying return - any non-benign failure jeopardizes systems required to land

TABLE B.1.7.2-14.– SSTO HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONTINUED)

System: SSTO
Flight Phase: Coast

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage of on-orbit consumables or return fuel	4	0.7 *	0.3 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Not applicable - unlikely event	0	0	0
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Loss of non-critical system	95	0.98 *	0.97 **
Hazardous Environment	Leak in pressure shell, ECLSS failure	1	0.9 *	0.95 **
		100		$P_D = 0.0800$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Abort to orbit, once around, or some other landing is achievable except in the case where OMS/RCS propellant is involved in an explosion

TABLE B.1.7.2-14.– SSTO HUMAN SAFETY FLIGHT PHASE DATA SHEETS (CONCLUDED)

System: SSTO
Flight Phase: Orbit Circularization (OMS Burn)

Emergency	Probable Cause	% of Failures	$P_{Survivable}$	P_{Abort}
Explosion	Leakage, engine failure	2	0.7 *	0.2 **
Fire	Not applicable - unlikely event	0	0	0
Loss of Control	Asymmetric burn	2	0.1 *	0.01 **
Damaged Vehicle	Not applicable - unlikely event	0	0	0
Benign Failure	Failure of non-critical system	95	0.98 *	0.98 **
Hazardous Environment	Leaks, ECLSS failure	1	0.9 *	0.95 **
		100		$P_D = 0.0763$

Notes:

* Estimate of statistical average of a variety of hazard sources

** Abort to orbit, once around, or some other landing is achievable except in the case where OMS/RCS propellant is involved in an explosion

B.1.8 LAUNCH SCHEDULE CONFIDENCE

Launch Schedule Confidence is an indication of an architecture's ability to meet launch schedules. This has three parts: Schedule Compression, Schedule Margin, and Percentage of Flights with Delays.

Schedule Compression is a measure of a system's ability to make up schedule slips by compressing the ground processing flow time. This is done by extending shifts and adding work on weekends.

Schedule Margin is a measure of the system's ability to make up schedule slips by using excess ground processing capacity. There is excess ground processing capacity when the flight rate for a particular year is less than the ground operations are designed for, and personnel and facilities are not being used.

The Percentage of Flights with Delays is a measure of the likelihood of a system to have a launch delay based on unscheduled maintenance items occurring at critical times in the ground processing flow.

Please refer to Volume I, section 3.2.6.

B.1.8.1 Schedule Compression Data

Table B.1.8.1 summarizes the Schedule Compression data for systems used in the architectures. The nominal flow time and the compressed flow time, both in days, are listed for each system. The percentage that the flow time can be compressed is also listed. This data comes from the ground operations model.

TABLE B.1.8.1.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE COMPRESSION DATA

System	Nominal Flow Time (days)	Compressed Flow Time (days)	Percentage Completed
ALV	8	3	63%
AMLS	46	20	57%
AMSC - East	3	3	0%
AMSC - West	41	25	39%
Atlas	66	34	48%
Atlas Evolution	39	19	51%
Beta II Booster	5	5	0%
Beta II Orbiter	14	14	0%
CLV (Arch 5/If A)	62	47	24%
CLV (Arch 5/If B)	75	54	28%
CLV (Arch 5/If C)	133	114	14%
CLV (Arch 5/If D)	125	106	15%
CLV (Arch 5/If E-low)	120	102	15%
CLV (Arch 5/If E-high)	114	96	16%
CRV (MLS/HL)	47	36	23%
CRV (NLS-HL)	42	29	31%
CTV	146	79	46%
Delta	101	48	52%
LRV (MLS-HL)	106	73	31%
LRV (Titan)	77	48	38%
MLS-HL	52	52	0%
MLS-X	47	47	0%
NDV	3	1	67%
NLS-20	37	37	0%
NLS-50	47	47	0%
NLS-HL	77	77	0%

TABLE B.1.8.1.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE COMPRESSION DATA (CONCLUDED)

System	Nominal Flow Time (days)	Compressed Flow Time (days)	Percentage Completed
RCV	80	55	31%
RPC (ALV)	34	12	65%
RPC (Arch 11)	210	204	3%
RPC (Arch 6/If A)	35	33	6%
RPC (Arch 6/If B)	35	33	6%
RPC (Arch 6/If C)	107	106	1%
RPC (Arch 6/If D)	107	105	2%
RPC (Arch 6/If E-low)	100	99	1%
RPC (Arch 6/If E-high)	91	90	1%
RPC (Arch 7/If A)	35	33	6%
RPC (Arch 7/If B)	35	33	6%
RPC (Arch 7/If C)	107	106	1%
RPC (Arch 7/If D)	89	87	2%
RPC (Arch 7/If E-low)	85	84	1%
RPC (Arch 7/If E-high)	80	78	3%
RPC (NLS-50)	37	31	16%
RUPC	78	43	45%
Shuttle	128	85	34%
Shuttle Evolution	87	62	29%
SSTO	13	13	0%
Titan II	49	26	47%
Titan IV (HR)	138	62	55%
Titan IV - East	61	29	52%
Titan IV - West	160	92	43%
Titan IV/Centaur	66	38	42%

B.1.8.2 Schedule Margin Data

Table B.1.8.2 summarizes the system Schedule Margin data. The margin in days for each year of the study period is shown. The data is grouped by architectures. If a system varies across "If" Scenarios, or between low or high inclination launches, it is indicated next to the system's name. Margins of zero indicate that a system does not have any flights during that year. This data comes from the ground operations model.

TABLE B.1.8.2.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE MARGIN DATA

System/Element	Schedule Margin By Year (days)																												
	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Architecture 01																													
Atlas	462	395	529	328	462	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529
Delta - East	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309
Shuttle - If A	638	500	592	638	638	592	592	592	592	592	592	592	592	592	592	592	592	592	592	638	638	638	638	638	638	638	638	638	638
Shuttle - If B	362	270	270	316	408	408	546	500	546	546	500	500	546	454	546	546	546	546	546	546	546	546	546	546	546	546	546	546	546
Shuttle - If C	362	270	270	316	224	171	270	270	171	270	270	224	224	224	270	171	270	270	270	224	224	270	270	224	270	270	270	270	270
Shuttle - If D	362	270	270	316	224	171	270	270	17	224	94	40	132	178	178	86	178	224	178	132	178	224	178	178	178	224	178	178	178
Shuttle - If E-low	362	270	270	316	224	171	270	270	17	224	94	40	86	132	132	40	132	178	132	86	132	178	132	132	132	178	86	132	86
Shuttle - If E-high	362	270	270	316	224	171	270	270	17	224	94	40	86	132	86	221	253	253	253	150	253	253	253	221	253	285	221	253	221
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	326	326	326	287	326	326	326	326	287	326	326
Titan IV - East	625	590	555	555	590	590	450	555	520	520	485	555	520	555	485	555	520	555	485	555	520	555	485	555	520	555	485	555	520
Titan IV - West	68	167	167	266	167	68	167	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532
Architecture 02																													
Atlas/Atlas Evolution	462	395	529	328	462	529	529	529	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
Delta/Delta Evolution - East	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450
Delta/Delta Evolution - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309
RCV - If C	0	0	0	0	0	0	0	0	297	438	373	468	492	470	492	492	429	471	492	429	429	470	470	470	470	470	470	470	470
RCV - If D	0	0	0	0	0	0	0	0	297	438	373	468	471	429	471	431	429	471	471	379	429	429	429	429	429	429	429	429	429
RCV - If E-low	0	0	0	0	0	0	0	0	97	392	373	468	429	377	429	379	377	429	429	327	377	377	377	377	377	377	325	377	325
RCV - If E-high	0	0	0	0	0	0	0	0	97	392	373	468	429	377	377	327	273	273	325	171	273	221	273	221	273	273	221	273	221
Shuttle/Shuttle Ev - If A	638	500	592	638	638	592	592	592	637	637	637	637	637	637	637	637	637	637	637	668	668	668	668	668	668	668	668	668	668
Shuttle/Shuttle Ev - If B	362	270	270	316	408	408	546	500	637	637	606	606	637	575	637	606	606	606	637	606	606	606	606	606	606	606	606	606	606
Shuttle/Shuttle Ev - If C	320	228	228	274	182	136	228	228	276	438	387	510	513	479	513	513	429	481	513	429	429	479	479	479	479	479	479	479	479
Shuttle/Shuttle Ev - If D	362	270	270	316	224	171	270	270	297	438	373	417	393	362	393	369	362	393	393	338	362	362	362	362	362	362	362	362	362
Shuttle/Shuttle Ev - If E-low	362	270	270	316	224	171	270	270	97	392	373	468	429	377	429	379	377	429	429	327	377	377	377	377	377	377	325	377	325
Shuttle/Shuttle Ev - If E-high	362	270	270	316	224	171	270	270	97	392	373	468	429	377	377	327	273	273	325	171	273	221	273	221	273	273	221	273	221
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	326	326	326	287	326	326	326	326	287	326	326
Titan IV/Titan Evol - East	625	590	555	555	590	590	450	555	520	520	485	555	520	555	485	555	520	555	485	555	520	555	485	555	520	555	485	555	520
Titan IV/Titan Evol - West	68	167	167	266	167	68	167	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532

TABLE B.1.8.2.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE MARGIN DATA (CONTINUED)

System/Element	Schedule Margin By Year (days)																												
	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Architecture 03																													
Atlas	498	440	556	382	498	556	556	556	556	556	556	556	556	672	672	672	730	730	730	730	730	730	730	730	730	730	730	730	730
Delta - East	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309
NLS-20 - East - IF A/B	0	0	0	0	0	0	0	0	0	0	0	0	0	169	113	169	113	141	85	141	113	141	85	141	113	141	85	141	113
NLS-20 - East - IF C/D/E	0	0	0	0	0	0	0	0	0	0	0	0	0	57	1	29	1	29	99	137	118	137	99	137	118	137	99	137	118
NLS-20 - West	0	0	0	0	0	0	0	0	0	0	0	0	0	281	281	281	253	281	281	281	281	253	281	281	281	281	253	281	281
NLS-50 - East - If A/B	0	0	0	0	0	0	0	0	309	281	253	225	197	169	113	169	113	141	85	141	113	141	85	141	113	141	85	141	113
NLS-50 - East - If C	0	0	0	0	0	0	0	0	309	225	169	113	85	57	1	29	1	29	99	137	118	137	99	137	118	137	99	137	118
NLS-50 - East - If D/E	0	0	0	0	0	0	0	0	296	224	169	113	85	57	1	29	1	29	99	137	118	137	99	137	118	137	99	137	118
NLS-50 - West	0	0	0	0	0	0	0	0	337	320	337	296	309	281	281	281	253	281	281	281	281	253	281	281	281	281	253	281	281
NLS-HL	0	0	0	0	0	0	0	0	0	304	341	296	317	296	317	296	317	296	317	296	317	296	317	296	317	296	317	296	317
Shuttle - If A	638	500	592	638	638	592	592	592	574	565	556	542	523	542	504	542	523	542	504	573	554	573	535	573	554	573	535	573	554
Shuttle - If B	362	270	270	316	408	408	546	500	537	537	491	482	528	436	528	528	528	528	528	528	528	528	528	528	528	528	528	528	528
Shuttle - If C	362	270	270	316	224	171	270	270	215	261	307	206	298	206	252	206	252	298	252	252	252	298	252	252	298	298	252	252	298
Shuttle - If D	362	270	270	316	224	171	270	270	248	402	169	325	206	160	160	248	206	206	206	206	206	206	206	206	206	206	206	206	206
Shuttle - If E-low	362	270	270	316	224	171	270	270	248	402	169	325	160	94	94	171	160	160	160	160	160	160	160	160	160	160	94	160	94
Shuttle - If E-high	362	270	270	316	224	171	270	270	248	402	169	325	160	94	17	94	17	22	68	22	68	22	68	22	68	68	22	68	22
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - East	630	600	570	570	600	605	465	565	595	635	630	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - West	68	167	167	266	167	68	167	334	631	631	631	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE B.1.8.2.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE MARGIN DATA (CONTINUED)

System/Element	Schedule Margin By Year (days)																												
	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Architecture 04																													
Atlas	498	440	556	382	498	556	556	556	556	556	556	556	556	672	672	672	730	730	730	730	730	730	730	730	730	730	730	730	730
CRV - If C	0	0	0	0	0	0	0	0	224	110	20	71	71	29	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
CRV - If D	0	0	0	0	0	0	0	0	179	65	60	29	29	181	202	181	226	242	202	242	226	242	202	242	226	242	202	242	226
CRV - If E-low	0	0	0	0	0	0	0	0	179	65	60	29	29	181	178	181	202	161	178	161	202	161	178	161	202	207	154	207	161
CRV - If E-high	0	0	0	0	0	0	0	0	179	65	60	29	29	181	154	157	154	154	130	154	154	154	130	154	154	178	106	178	130
Delta - East	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309
NLS-20 - East - IF A/B	0	0	0	0	0	0	0	0	0	0	0	0	0	169	113	169	113	141	85	141	113	141	85	141	113	141	85	141	113
NLS-20 - East - IF C/D	0	0	0	0	0	0	0	0	0	0	0	0	0	80	42	61	42	61	23	61	42	61	23	61	42	61	23	61	42
NLS-20 - East - IF E-low	0	0	0	0	0	0	0	0	0	0	0	0	0	61	23	42	23	42	4	42	23	42	4	42	23	42	170	254	198
NLS-20 - East - IF E-high	0	0	0	0	0	0	0	0	0	0	0	0	0	61	4	23	170	170	142	170	170	170	142	170	170	198	114	198	142
NLS-20 - West	0	0	0	0	0	0	0	0	0	0	0	0	0	281	281	281	253	281	281	281	281	253	281	281	281	281	253	281	281
NLS-50 - East - If A/B	0	0	0	0	0	0	0	0	309	281	253	225	197	169	113	169	113	141	85	141	113	141	85	141	113	141	85	141	113
NLS-50 - East - If C	0	0	0	0	0	0	0	0	224	110	20	1	99	80	42	61	42	61	23	61	42	61	23	61	42	61	23	61	42
NLS-50 - East - If D	0	0	0	0	0	0	0	0	179	65	1	1	99	80	42	61	42	61	23	61	42	61	23	61	42	61	23	61	42
NLS-50 - East - If E-low	0	0	0	0	0	0	0	0	179	65	1	1	80	61	23	42	23	42	4	42	23	42	4	42	23	42	154	226	178
NLS-50 - East - If E-high	0	0	0	0	0	0	0	0	179	65	1	1	80	61	4	23	154	154	130	154	154	154	130	154	154	178	106	178	130
NLS-50 - West	0	0	0	0	0	0	0	0	337	320	337	296	309	281	281	281	253	281	281	281	281	253	281	281	281	281	253	281	281
NLS-HL	0	0	0	0	0	0	0	0	0	304	341	296	317	296	317	296	317	296	317	296	317	296	317	296	317	296	317	296	317
RPC - If C	0	0	0	0	0	0	0	0	75	110	20	1	99	80	42	61	42	61	23	61	42	61	23	61	42	61	23	61	42
RPC - If D	0	0	0	0	0	0	0	0	17	65	1	1	99	80	42	61	42	61	23	61	42	61	23	61	42	61	23	61	42
RPC - If E-low	0	0	0	0	0	0	0	0	17	65	1	1	80	61	23	42	23	42	4	42	23	42	4	42	23	42	154	226	178
RPC - If E-high	0	0	0	0	0	0	0	0	17	65	1	1	80	99	42	61	154	154	130	154	154	154	130	154	154	178	106	178	130
Shuttle - If A	638	500	592	638	638	592	592	592	574	565	556	542	523	542	504	542	523	542	504	573	554	573	535	573	554	573	535	573	554
Shuttle - If B	362	270	270	316	408	408	546	500	537	537	491	482	528	436	528	528	528	528	528	528	528	528	528	528	528	528	528	528	528
Shuttle - If C	362	270	270	316	224	171	270	270	325	556	633	710	787	710	864	787	787	710	864	787	787	787	787	787	787	787	787	787	787
Shuttle - If D/E	362	270	270	316	224	171	270	270	402	556	556	710	787	633	787	710	710	710	710	710	710	710	710	710	710	710	710	710	710
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - East - If A/B	630	600	570	570	600	605	465	565	595	635	630	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - East - IF C/D/E	660	600	570	570	600	605	465	565	530	600	595	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - West	68	167	167	266	167	68	167	334	631	631	631	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE B.1.8.2.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE MARGIN DATA (CONTINUED)

System/Element	Schedule Margin By Year (days)																												
	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Architecture 05																													
Atlas	462	395	529	328	462	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529
CLV - If A	0	0	0	0	0	0	0	0	133	75	17	149	125	149	92	149	125	149	92	173	149	173	125	173	149	173	125	173	149
CLV - If B	0	0	0	0	0	0	0	0	17	149	34	29	61	72	110	100	86	100	110	100	58	100	54	100	58	100	54	100	58
CLV - If C	0	0	0	0	0	0	0	0	173	53	51	23	34	10	10	58	79	142	100	100	37	100	16	100	37	100	16	100	37
CLV - If D	0	0	0	0	0	0	0	0	125	8	34	23	60	102	102	102	44	200	102	102	82	164	85	128	110	164	82	164	110
CLV - If E-low	0	0	0	0	0	0	0	0	125	8	34	23	160	102	102	102	44	128	102	102	46	128	82	92	82	92	46	92	110
CLV - If E-high	0	0	0	0	0	0	0	0	125	8	34	23	160	102	92	102	44	20	102	20	110	215	85	215	110	215	85	215	110
CRV - If C	0	0	0	0	0	0	0	0	173	53	51	44	34	10	10	58	79	142	100	100	37	100	16	100	37	100	16	100	37
CRV - If D/E	0	0	0	0	0	0	0	0	125	8	34	58	160	102	102	102	44	218	102	102	110	215	85	215	110	215	85	215	110
Delta - East	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309
MLS-HL/X - East - If A	0	0	0	0	0	0	0	0	133	75	17	173	149	173	125	173	149	173	125	197	173	197	149	197	173	197	149	197	173
MLS-HL/X - East - If B	0	0	0	0	0	0	0	0	133	17	173	125	34	53	53	77	53	77	53	77	29	77	5	77	29	77	5	77	29
MLS-HL/X - East - If C	0	0	0	0	0	0	0	0	17	125	29	8	5	67	63	53	67	95	91	81	39	95	63	81	67	95	49	95	53
MLS-HL/X - East - If D	0	0	0	0	0	0	0	0	17	125	29	8	5	39	21	25	25	39	35	39	-3	39	7	25	11	39	58	154	106
MLS-HL/X - East - If E-low	0	0	0	0	0	0	0	0	17	125	29	8	67	10	7	11	11	25	21	25	58	130	58	106	82	130	10	130	58
MLS-HL/X - East - If E-high	0	0	0	0	0	0	0	0	17	125	29	8	67	10	58	82	58	58	58	58	10	58	10	34	34	82	58	163	100
MLS-HL - West	0	0	0	0	0	0	0	0	0	249	307	191	249	191	249	191	249	191	249	191	249	191	249	191	249	191	249	191	249
MLS-X - East	0	0	0	0	0	0	0	0	307	249	307	191	249	191	249	191	249	191	249	191	249	191	249	191	249	191	249	191	249
Shuttle - If A	638	500	592	638	638	592	592	592	684	684	684	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If B	362	270	270	316	408	408	546	500	638	684	638	684	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If C	362	270	270	316	224	171	270	270	224	408	454	546	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If D/E	362	270	270	316	224	171	270	270	171	270	408	408	638	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	326	326	326	287	326	326	326	326	287	326	326
Titan IV - East	625	590	555	555	590	590	450	555	520	520	520	660	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - West	68	167	167	266	167	68	167	334	631	631	631	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE B.1.8.2.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE MARGIN DATA (CONTINUED)

System/Element	Schedule Margin By Year (days)																											
	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Architecture 06																													
Atlas	462	395	529	328	462	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529
CRV - If A	0	0	0	0	0	0	0	0	125	5	29	51	110	145	85	145	110	145	85	204	190	204	186	204	190	204	186	204	190
CRV - If B	0	0	0	0	0	0	0	0	149	5	45	66	98	10	94	66	52	66	94	66	6	66	2	66	6	66	2	66	6
CRV - If C	0	0	0	0	0	0	0	0	95	62	16	87	15	20	129	20	66	129	129	20	24	87	60	113	85	113	60	113	85
CRV - If D/E	0	0	0	0	0	0	0	0	25	6	85	20	24	37	71	50	50	71	71	50	19	50	15	50	19	50	15	50	19
Delta - East	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309
MLS-HL/X - East - If A	0	0	0	0	0	0	0	0	17	149	125	92	34	92	53	101	77	101	53	149	125	149	101	149	125	149	101	149	125
MLS-HL/X - East - If B	0	0	0	0	0	0	0	0	75	149	53	5	29	8	50	50	29	50	50	50	51	190	115	190	140	190	115	190	140
MLS-HL/X - East - If C	0	0	0	0	0	0	0	0	92	5	110	98	10	47	61	42	42	70	61	56	19	56	10	56	19	56	10	56	19
MLS-HL/X - East - If D	0	0	0	0	0	0	0	0	34	8	93	42	23	5	19	14	0	28	19	14	35	121	10	121	35	121	10	121	35
MLS-HL/X - East - If E-low	0	0	0	0	0	0	0	0	34	8	93	42	14	27	85	85	27	121	85	85	5	100	16	100	37	100	16	100	37
MLS-HL/X - East - If E-high	0	0	0	0	0	0	0	0	34	8	93	42	14	27	27	27	10	50	50	15	160	276	102	276	160	327	44	327	102
MLS-HL - West	0	0	0	0	0	0	0	0	0	249	307	191	249	191	249	191	249	191	249	191	249	191	249	191	249	191	249	191	249
MLS-X - East	0	0	0	0	0	0	0	0	307	249	307	191	249	191	249	191	249	191	249	191	249	191	249	191	249	191	249	191	249
RPC - If A	0	0	0	0	0	0	0	0	17	149	125	92	34	92	53	101	77	101	53	149	125	149	101	149	125	149	101	149	125
RPC - If B	0	0	0	0	0	0	0	0	75	149	53	5	29	8	50	50	29	50	50	50	51	190	115	190	140	190	115	190	140
RPC - If C	0	0	0	0	0	0	0	0	92	5	110	93	10	47	61	42	42	70	61	56	19	56	10	56	19	56	10	56	19
RPC - If D	0	0	0	0	0	0	0	0	34	8	93	42	23	5	19	14	0	28	19	14	35	93	10	93	35	93	10	93	35
RPC - If E-low	0	0	0	0	0	0	0	0	34	8	93	42	14	27	85	85	27	121	85	85	5	100	16	100	37	100	16	100	37
RPC - If E-high	0	0	0	0	0	0	0	0	34	8	93	42	14	27	27	27	10	50	50	15	160	255	102	255	160	263	44	263	102
Shuttle - If A	638	500	592	638	638	592	592	592	684	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If B	362	270	270	316	408	408	546	500	684	684	684	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If C	362	270	270	316	224	171	270	270	362	362	546	638	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If D/E	362	270	270	316	224	171	270	270	224	500	592	638	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	326	326	326	287	326	326	326	326	287	326	326
Titan IV - East	625	590	555	555	590	590	450	555	520	520	520	660	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - West	68	167	167	266	167	68	167	334	631	631	631	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE B.1.8.2.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE MARGIN DATA (CONTINUED)

System/Element	Schedule Margin By Year (days)																												
	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Architecture 07																													
Atlas	462	395	529	328	462	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529
CRV - If C	0	0	0	0	0	0	0	0	221	125	53	110	53	11	21	11	11	25	21	25	3	25	58	130	82	130	58	130	82
CRV - If D	0	0	0	0	0	0	0	0	197	77	29	67	155	34	34	58	34	58	34	58	10	58	30	125	55	125	30	125	55
CRV - If E-low	0	0	0	0	0	0	0	0	197	77	29	67	71	10	10	34	10	34	10	34	25	50	0	50	25	50	0	50	25
CRV - If E-high	0	0	0	0	0	0	0	0	197	77	29	67	71	10	40	50	0	65	10	5	29	50	16	50	29	50	29	50	29
Delta - East	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309
LRV	0	0	0	0	0	0	0	0	176	50	260	141	185	213	339	276	276	276	339	276	213	276	213	276	213	276	213	276	213
MLS-HL/X - East - If A	0	0	0	0	0	0	0	0	133	75	17	173	149	173	125	173	149	173	125	197	173	197	149	197	173	197	149	197	173
MLS-HL/X - East - If B	0	0	0	0	0	0	0	0	75	173	92	29	29	5	5	29	5	29	5	29	29	71	8	71	29	71	8	71	29
MLS-HL/X - East - If C	0	0	0	0	0	0	0	0	17	125	53	51	53	11	21	11	11	25	21	25	-3	25	58	130	82	130	58	130	82
MLS-HL/X - East - If D	0	0	0	0	0	0	0	0	197	34	29	67	263	34	34	58	34	58	34	58	10	58	27	125	55	125	27	125	55
MLS-HL/X - East - If E-low	0	0	0	0	0	0	0	0	197	34	29	67	254	10	10	34	10	34	10	34	25	95	0	95	25	95	0	95	25
MLS-HL/X - East - If E-high	0	0	0	0	0	0	0	0	197	34	29	67	254	10	27	65	0	65	10	5	37	58	16	58	37	79	160	321	218
MLS-HL - West	0	0	0	0	0	0	0	0	0	249	0	191	0	191	0	191	0	191	0	191	0	191	0	191	0	191	0	191	0
MLS-X - East	0	0	0	0	0	0	0	0	307	249	307	191	249	191	249	191	249	191	249	191	249	191	249	191	249	191	249	191	249
RPC - If A	0	0	0	0	0	0	0	0	239	239	221	173	149	173	125	173	149	173	125	197	173	197	149	197	173	197	149	197	173
RPC - If B	0	0	0	0	0	0	0	0	176	50	101	29	29	5	5	29	5	29	5	29	29	71	8	71	29	71	8	71	29
RPC - If C	0	0	0	0	0	0	0	0	176	50	53	93	53	11	21	11	11	25	21	25	3	25	35	93	35	93	35	93	35
RPC - If D	0	0	0	0	0	0	0	0	176	-50	29	67	185	34	34	58	34	58	34	58	10	58	30	125	55	125	30	125	55
RPC - If E-low	0	0	0	0	0	0	0	0	176	50	29	67	185	10	10	34	10	34	10	34	25	95	0	95	25	95	0	95	25
RPC - If E-high	0	0	0	0	0	0	0	0	176	50	29	67	185	10	40	65	0	65	10	5	37	58	16	58	37	79	147	216	147
Shuttle - If A	638	500	592	638	638	592	592	592	684	684	684	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If B	362	270	270	316	408	408	546	500	638	684	638	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If C	362	270	270	316	224	171	270	270	362	454	454	546	638	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If D/E	362	270	270	316	224	171	270	270	270	454	454	546	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	326	326	326	287	326	326	326	326	287	326	326
Titan IV - East	625	590	555	555	590	590	450	555	520	520	520	660	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - West	68	167	167	266	167	68	167	334	631	631	631	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE B.1.8.2.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE MARGIN DATA (CONTINUED)

System/Element	Schedule Margin By Year (days)																												
	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Architecture 08																													
Atlas	462	395	529	328	462	529	529	529	529	596	596	596	596	596	596	596	596	596	596	596	596	596	596	596	596	596	596	596	596
Delta - East	282	506	618	674	562	506	450	338	450	506	562	618	674	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	253	309	309	197	309	253	309	253	253	309	253	253	309	253	309
Shuttle - If A	638	500	592	638	638	592	592	592	592	684	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If B	362	270	270	316	408	408	546	500	592	638	684	638	684	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If C	362	270	270	316	224	171	270	270	362	500	500	592	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If D/E	362	270	270	316	224	171	270	270	270	454	454	500	638	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SSTO - If A	0	0	0	0	0	0	0	0	360	369	357	356	355	353	353	353	353	353	353	355	355	355	355	355	355	355	355	355	355
SSTO - If B	0	0	0	0	0	0	0	0	361	369	353	349	347	343	346	344	344	344	346	344	343	344	343	344	343	344	343	344	343
SSTO - If C	0	0	0	0	0	0	0	0	360	362	343	334	325	317	318	320	321	361	320	318	318	317	318	318	320	321	317	320	320
SSTO - If D	0	0	0	0	0	0	0	0	360	362	343	334	325	309	310	312	313	313	312	310	310	313	310	310	312	313	309	312	312
SSTO - If E-low	0	0	0	0	0	0	0	0	360	352	304	334	323	308	308	309	309	308	308	305	307	308	307	305	308	309	304	308	307
SSTO - If E-high	0	0	0	0	0	0	0	0	360	352	343	334	323	308	309	310	312	312	310	309	309	312	309	309	310	312	307	310	309
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	326	326	326	287	326	326	326	326	287	326	326
Titan IV - East - If A/B	625	600	570	570	600	605	465	565	530	535	495	565	530	565	495	565	530	565	495	565	530	565	495	565	530	565	495	565	530
Titan IV - East - IF C/D/E	625	600	570	570	600	605	465	565	470	415	375	445	410	445	375	415	410	445	375	445	410	445	375	445	410	445	375	445	410
Titan IV - West	68	167	167	266	167	68	167	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532
Architecture 10																													
Atlas - If A	462	529	529	328	462	529	529	529	610	610	610	610	610	610	610	610	610	610	650	650	650	690	0	0	0	0	0	0	0
Atlas - If B	462	529	529	328	462	529	529	529	610	610	610	610	610	610	610	610	610	610	610	610	610	690	0	0	0	0	0	0	0
Atlas - If C/D/E	462	529	529	328	462	529	529	529	570	530	570	610	610	610	610	610	610	610	610	610	610	690	0	0	0	0	0	0	0
Delta - East - If A	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	506	562	618	674	0	0	0	0	0	0	0
Delta - East - If B	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	394	562	674	0	0	0	0	0	0	0
Delta - East - If C	282	506	618	674	562	506	450	338	394	450	450	338	450	450	450	338	450	450	450	394	562	674	0	0	0	0	0	0	0
Delta - East - If D/E	282	506	618	674	562	506	450	338	450	394	450	338	450	450	450	338	450	450	450	394	562	618	0	0	0	0	0	0	0
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	253	309	309	197	309	309	0	309	0	0	0	309	0	0	0
NDV - If A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	728	727	728	726	726	725	726	726	726	725	726
NDV - If B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	729	728	726	725	724	724	724	724	724	723	724
NDV - If C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	728	726	724	722	720	720	720	721	720	719	720
NDV - If D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	728	725	723	720	717	717	717	718	717	717	718
NDV - If E-low	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	728	725	723	719	717	717	717	718	716	716	717
NDV - If E-high	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	727	724	722	718	716	715	716	717	715	715	716
Shuttle - If A	636	495	589	636	636	589	589	589	589	589	589	589	589	589	589	589	589	589	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If B	354	260	260	307	401	401	542	495	589	589	542	542	589	495	589	542	542	542	636	636	636	0	0	0	0	0	0	0	0
Shuttle - If C	354	260	260	307	213	159	260	260	260	354	260	307	354	260	307	307	307	307	448	448	542	636	0	0	0	0	0	0	0
Shuttle - If D	354	260	260	307	213	159	260	260	159	260	213	213	213	159	159	213	159	213	307	354	448	636	0	0	0	0	0	0	0
Shuttle - If E-low	354	260	260	307	213	159	260	260	159	260	213	213	159	81	81	159	81	159	307	354	448	636	0	0	0	0	0	0	0
Shuttle - If E-high	354	260	260	307	213	159	260	260	159	260	213	213	159	81	3	81	25	25	307	354	448	636	0	0	0	0	0	0	0
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	0	0	0	0	0	0	0	0	0	0	0
Titan IV - East	625	590	555	555	590	590	450	555	520	520	485	555	520	555	485	555	520	555	485	555	520	555	485	555	520	555	485	555	520
Titan IV - West	68	167	167	266	167	68	167	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532

TABLE B.1.8.2.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE MARGIN DATA (CONTINUED)

System/Element	Schedule Margin By Year (days)																												
	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Architecture 11																													
Atlas	462	395	529	328	462	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529
CTV - If C	0	0	0	0	0	0	0	0	75	17	22	57	29	53	5	29	29	53	5	53	29	53	5	53	29	53	5	53	29
CTV - If D	0	0	0	0	0	0	0	0	75	17	22	57	29	53	5	8	29	53	5	53	29	53	5	53	29	53	5	53	29
CTV - If E-low	0	0	0	0	0	0	0	0	75	17	22	57	5	29	141	44	155	169	141	169	155	169	141	169	155	169	109	169	141
CTV - If E-high	0	0	0	0	0	0	0	0	75	17	22	57	5	29	109	44	109	109	51	109	109	109	51	109	109	141	99	141	113
Delta - East	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309
NLS-50 - East - If A/B	0	0	0	0	0	0	0	0	309	281	253	225	197	225	169	225	197	225	169	225	197	225	169	225	197	225	169	225	197
NLS-50 - East - If C	0	0	0	0	0	0	0	0	225	197	113	57	29	53	5	29	29	53	5	53	29	53	5	53	29	53	5	53	29
NLS-50 - East - If D	0	0	0	0	0	0	0	0	224	197	141	57	29	53	5	8	29	53	5	53	29	53	5	53	29	53	5	53	29
NLS-50 - East - If E-low	0	0	0	0	0	0	0	0	224	197	141	57	5	29	61	80	80	99	61	99	80	99	61	99	80	99	42	99	61
NLS-50 - East - If E-high	0	0	0	0	0	0	0	0	224	197	141	57	5	29	42	61	42	42	23	42	42	42	23	42	42	61	4	61	23
NLS-50 - West	0	0	0	0	0	0	0	0	337	320	337	296	309	296	309	296	309	296	309	296	309	296	309	296	309	296	309	296	309
NLS-HL - East - If D	0	0	0	0	0	0	0	0	224	200	0	80	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0
NLS-HL - East - If E	0	0	0	0	0	0	0	0	224	200	0	80	0	0	0	304	0	0	0	0	0	0	0	0	0	0	0	0	0
NLS-HL - West	0	0	0	0	0	0	0	0	0	304	341	296	317	296	317	296	317	296	317	296	317	296	317	296	317	296	317	296	317
RPC - If C	0	0	0	0	0	0	0	0	75	17	113	57	29	53	5	29	29	53	5	53	29	53	5	53	29	53	5	53	29
RPC - If D	0	0	0	0	0	0	0	0	75	17	48	57	29	53	5	8	29	53	5	53	29	53	5	53	29	53	5	53	29
RPC - If E-low	0	0	0	0	0	0	0	0	75	17	48	57	5	29	61	80	80	99	61	99	80	99	61	99	80	99	42	99	61
RPC - If E-high	0	0	0	0	0	0	0	0	75	17	48	57	5	29	42	61	7	42	23	42	42	42	23	42	42	61	4	61	23
Shuttle - If A	638	500	592	638	638	592	592	592	574	565	556	542	523	542	504	542	523	542	504	573	554	573	535	573	554	573	535	573	554
Shuttle - If B	362	270	270	316	408	408	546	500	537	537	491	482	528	436	528	528	528	528	528	528	528	528	528	528	528	528	528	528	528
Shuttle - If C	362	270	270	316	224	171	270	270	215	261	307	252	298	206	252	206	252	298	298	298	298	298	298	298	298	298	298	298	298
Shuttle - If D/E	362	270	270	316	224	171	270	270	248	402	261	325	252	252	252	325	206	206	252	206	206	206	206	206	206	206	206	206	206
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	326	326	326	287	326	326	326	326	287	326	326
Titan IV - East - If A/B	630	600	570	570	600	605	465	565	595	635	630	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - East - IF C/D/E	630	600	570	570	600	605	465	565	530	535	560	665	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - West	68	167	167	266	167	68	167	334	631	631	631	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE B.1.8.2.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE MARGIN DATA (CONTINUED)

System/Element	Schedule Margin By Year (days)																												
	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Architecture 12																													
Atlas	462	395	529	328	462	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529
CTV - If C	0	0	0	0	0	0	0	0	249	181	17	151	85	1	5	29	29	53	5	53	29	53	5	53	29	53	5	53	29
CTV - If D	0	0	0	0	0	0	0	0	181	22	17	169	85	1	5	8	29	53	5	53	29	53	5	53	29	53	5	53	29
CTV - If E-low	0	0	0	0	0	0	0	0	181	22	17	169	85	1	141	44	155	169	141	169	155	169	141	169	155	169	109	169	141
CTV - If E-high	0	0	0	0	0	0	0	0	181	22	17	169	85	1	141	44	109	109	51	109	109	109	51	109	109	141	99	141	113
Delta - East	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309
NLS-50 - East - If A/B	0	0	0	0	0	0	0	0	309	281	253	225	197	225	169	225	197	225	169	225	197	225	169	225	197	225	169	225	197
NLS-50 - East - If C	0	0	0	0	0	0	0	0	309	281	197	169	85	1	5	29	29	53	5	53	29	53	5	53	29	53	5	53	29
NLS-50 - East - If D	0	0	0	0	0	0	0	0	296	272	197	169	85	1	5	8	29	53	5	53	29	53	5	53	29	53	5	53	29
NLS-50 - East - If E-low	0	0	0	0	0	0	0	0	296	272	197	169	85	1	61	80	80	99	61	99	80	99	61	99	80	99	42	99	61
NLS-50 - East - If E-high	0	0	0	0	0	0	0	0	296	272	197	169	85	1	61	61	42	42	23	42	42	42	23	42	42	61	4	61	23
NLS-50 - West	0	0	0	0	0	0	0	0	337	320	337	296	309	296	309	296	309	296	309	296	309	296	309	296	309	296	309	296	309
NLS-HL - East - If D	0	0	0	0	0	0	0	0	296	272	0	176	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0
NLS-HL - East - If E	0	0	0	0	0	0	0	0	296	272	0	176	0	0	0	304	0	0	0	0	0	0	0	0	0	0	0	0	0
NLS-HL - West	0	0	0	0	0	0	0	0	0	304	341	296	317	296	317	296	317	296	317	296	317	296	317	296	317	296	317	296	317
RPC - If C	0	0	0	0	0	0	0	0	249	191	17	169	85	1	5	29	29	53	5	53	29	53	5	53	29	53	5	53	29
RPC - If D	0	0	0	0	0	0	0	0	249	191	17	169	85	1	5	8	29	53	5	53	29	53	5	53	29	53	5	53	29
RPC - If E-low	0	0	0	0	0	0	0	0	249	191	17	169	85	1	61	80	80	99	48	48	48	48	48	48	48	48	42	99	61
RPC - If E-high	0	0	0	0	0	0	0	0	249	191	17	169	85	1	61	61	42	42	7	42	42	42	23	42	42	61	4	61	23
Shuttle - If A	638	500	592	638	638	592	592	592	574	565	556	542	523	542	504	542	523	542	504	573	554	573	535	573	554	573	535	573	554
Shuttle - If B	362	270	270	316	408	408	546	500	546	546	500	500	546	454	546	546	546	546	546	546	546	546	546	546	546	546	546	546	546
Shuttle - If C	362	270	270	316	224	171	270	270	169	261	307	206	298	206	252	206	252	298	298	252	298	298	298	298	298	298	298	298	298
Shuttle - If D	362	270	270	316	224	171	270	270	248	402	215	325	206	160	206	248	206	252	206	206	206	206	206	206	206	206	206	206	206
Shuttle - If E-low	362	270	270	316	224	171	270	270	248	402	215	325	160	94	206	248	206	252	206	206	206	206	206	206	206	206	206	206	206
Shuttle - If E-high	362	270	270	316	224	171	270	270	248	402	215	325	160	94	160	248	206	252	206	206	206	206	206	206	206	206	206	206	206
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	326	326	326	287	326	326	326	326	287	326	326
Titan IV - East - If A/B	630	600	570	570	600	605	465	565	595	635	630	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - East - IF C	630	600	570	570	600	605	465	565	565	570	595	665	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - East - IF D/E	630	600	570	570	600	605	465	565	565	570	600	665	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - West	68	167	167	266	167	68	167	334	631	631	631	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE B.1.8.2.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE MARGIN DATA (CONTINUED)

System/Element	Schedule Margin By Year (days)																											
	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Architecture 13																													
Atlas	462	395	529	328	462	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529
CTV - If C	0	0	0	0	0	0	0	0	75	17	22	57	29	53	5	29	29	53	5	53	29	53	5	53	29	53	5	53	29
CTV - If D	0	0	0	0	0	0	0	0	75	17	22	57	29	53	5	8	29	53	5	53	29	53	5	53	29	53	5	53	29
CTV - If E-low	0	0	0	0	0	0	0	0	75	17	22	57	5	29	141	44	155	169	141	169	155	169	141	169	155	169	109	169	141
CTV - If E-high	0	0	0	0	0	0	0	0	75	17	22	57	5	29	109	44	109	109	51	109	109	109	51	109	109	141	99	141	113
Delta - East	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309
NLS-50 - East - If A/B	0	0	0	0	0	0	0	0	309	281	253	225	197	225	169	225	197	225	169	225	197	225	169	225	197	225	169	225	197
NLS-50 - East - If C	0	0	0	0	0	0	0	0	225	197	113	57	29	53	5	29	29	53	5	53	29	53	5	53	29	53	5	53	29
NLS-50 - East - If D	0	0	0	0	0	0	0	0	224	197	113	57	29	53	5	8	29	53	5	53	29	53	5	53	29	53	5	53	29
NLS-50 - East - If E-low	0	0	0	0	0	0	0	0	224	197	113	57	5	29	61	80	80	99	61	99	80	99	61	99	80	99	42	99	61
NLS-50 - East - If E-high	0	0	0	0	0	0	0	0	224	197	113	57	5	29	42	61	42	42	23	42	42	42	23	42	42	61	4	61	23
NLS-50 - West	0	0	0	0	0	0	0	0	337	320	337	296	309	296	309	296	309	296	309	296	309	296	309	296	309	296	309	296	309
NLS-HL - East - If D	0	0	0	0	0	0	0	0	224	200	0	80	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0
NLS-HL - East - If E	0	0	0	0	0	0	0	0	224	200	0	80	0	0	0	304	0	0	0	0	0	0	0	0	0	0	0	0	0
NLS-HL - West	0	0	0	0	0	0	0	0	0	304	341	296	317	296	317	296	317	296	317	296	317	296	317	296	317	296	317	296	317
RPC - If C	0	0	0	0	0	0	0	0	75	17	113	57	29	53	5	29	29	53	5	53	29	53	5	53	29	53	5	53	29
RPC - If D	0	0	0	0	0	0	0	0	75	17	113	57	29	53	5	8	29	53	5	53	29	53	5	53	29	53	5	53	29
RPC - If E-low	0	0	0	0	0	0	0	0	75	17	113	57	5	29	61	80	80	99	61	99	80	99	61	99	80	99	42	99	61
RPC - If E-high	0	0	0	0	0	0	0	0	75	17	113	57	5	29	42	61	42	42	23	42	42	42	23	42	42	61	4	61	23
Shuttle - If A	638	500	592	638	638	592	592	592	574	565	556	542	523	542	504	542	523	542	504	573	554	573	535	573	554	573	535	573	554
Shuttle - If B	362	270	270	316	408	408	546	500	537	537	491	482	528	436	528	528	528	528	528	528	528	528	528	528	528	528	528	528	528
Shuttle - If C	362	270	270	316	224	171	270	270	215	261	261	252	298	206	252	206	252	252	252	252	252	298	298	252	298	298	298	252	298
Shuttle - If D/E	362	270	270	316	224	171	270	270	248	402	261	325	206	160	206	248	206	206	252	206	206	206	206	206	206	206	206	206	206
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	326	326	326	287	326	326	326	326	287	326	326
Titan IV - East - If A/B	630	600	570	570	600	605	465	565	595	635	630	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - East - IF C	630	600	570	570	600	605	465	565	530	535	560	665	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - East - IF D/E	630	600	570	570	600	605	465	565	530	535	530	665	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - West	68	167	167	266	167	68	167	334	631	631	631	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE B.1.8.2.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE MARGIN DATA (CONTINUED)

	Schedule Margin By Year (days)																												
System/Element	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Architecture 14																													
Atlas	462	395	529	328	462	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529
Delta - East	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309
HR Titan IV+ - If C	0	0	0	0	0	0	0	0	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
HR Titan IV+ - If D	0	0	0	0	0	0	0	0	53	53	170	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282
HR Titan IV+ - If E-low	0	0	0	0	0	0	0	0	53	53	170	282	170	170	170	170	170	170	170	170	170	170	170	170	170	170	58	170	58
HR Titan IV+ - If E-high	0	0	0	0	0	0	0	0	53	53	170	282	170	170	58	58	184	106	184	106	184	106	184	106	184	184	106	184	106
RPC - If C	0	0	0	0	0	0	0	0	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
RPC - If D	0	0	0	0	0	0	0	0	53	53	170	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282
RPC - If E-low	0	0	0	0	0	0	0	0	53	53	170	282	170	170	170	170	170	170	170	170	170	170	170	170	170	170	58	170	58
RPC - If E-high	0	0	0	0	0	0	0	0	53	53	170	282	170	170	58	58	184	106	184	106	184	106	184	106	184	184	106	184	106
Shuttle - If A	638	500	592	638	638	592	592	592	592	592	592	592	592	592	592	592	592	592	592	638	638	638	638	638	638	638	638	638	638
Shuttle - If B	362	270	270	316	408	408	546	500	592	546	500	546	592	454	546	500	500	500	546	546	546	546	546	546	546	546	546	546	546
Shuttle - If C	362	270	270	316	224	171	270	270	270	316	224	270	362	224	270	270	270	362	316	270	316	316	316	270	316	316	270	270	316
Shuttle - If D/E	362	270	270	316	224	171	270	270	171	224	171	94	224	94	270	270	171	270	224	224	224	224	224	224	224	224	224	224	224
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	326	326	326	287	326	326	326	326	287	326	326
Titan IV - East - If A/B	625	600	570	570	600	605	465	565	530	535	495	565	530	565	495	565	530	565	495	565	530	565	495	565	530	565	495	565	530
Titan IV - East - If C/D/E-low	625	600	570	570	600	605	465	565	500	475	405	445	410	445	375	445	410	445	375	445	410	445	375	445	410	445	375	445	410
Titan IV - East - If E-high	625	600	570	570	600	605	465	565	500	475	405	445	410	445	375	385	410	445	375	445	410	445	375	445	410	445	375	445	410
Titan IV - West	68	167	167	266	167	68	167	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532
Architecture 16																													
AMSC - If A	0	0	0	0	0	0	0	0	0	0	0	0	0	369	353	353	353	353	353	369	369	369	369	369	369	369	369	369	369
AMSC - If B	0	0	0	0	0	0	0	0	0	0	0	0	0	350	338	326	314	311	311	305	273	305	273	305	273	305	273	305	273
AMSC - If C	0	0	0	0	0	0	0	0	0	0	0	0	0	344	326	308	233	233	233	293	290	293	290	293	290	293	290	293	290
AMSC - If D	0	0	0	0	0	0	0	0	0	0	0	0	0	344	326	308	233	233	233	293	290	293	290	293	290	293	290	293	290
AMSC - If E-low	0	0	0	0	0	0	0	0	0	0	0	0	0	344	323	305	194	194	194	290	287	290	287	290	287	290	284	290	284
AMSC - If E-high	0	0	0	0	0	0	0	0	0	0	0	0	0	358	351	344	340	339	340	337	337	337	337	337	337	338	336	338	336
Atlas	462	395	529	328	462	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529
Delta - East	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309
LRV - If C	0	0	0	0	0	0	0	0	0	0	0	0	0	197	155	65	284	200	116	116	200	284	200	116	284	284	116	200	284
LRV - If D/E	0	0	0	0	0	0	0	0	0	0	0	0	0	197	155	65	284	116	56	70	100	130	88	70	130	130	56	100	130
Shuttle - If A	638	500	592	638	638	592	592	592	592	592	592	592	592	638	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If B	362	270	270	316	408	408	546	500	592	592	546	546	592	546	638	592	638	684	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If C	362	270	270	316	224	171	270	270	270	316	270	316	362	362	500	592	638	684	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If D/E	362	270	270	316	224	171	270	270	171	316	224	224	224	224	362	500	592	638	0	0	0	0	0	0	0	0	0	0	0
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	326	326	326	287	326	326	326	326	287	326	326
Titan IV - East - If A/B	625	600	570	570	600	605	465	565	530	535	495	565	530	565	495	565	530	565	495	565	530	565	495	565	530	565	495	565	530
Titan IV - East - If C	625	600	570	570	600	605	465	565	500	475	405	445	410	355	165	115	349	354	248	322	317	386	280	322	349	386	248	354	349
Titan IV - East - If D/E	625	600	570	570	600	605	465	565	500	475	405	445	410	355	165	115	349	322	56	130	125	194	88	130	157	194	56	162	157
Titan IV - West	68	167	167	266	167	68	167	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532

TABLE B.1.8.2.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE MARGIN DATA (CONTINUED)

System/Element	Schedule Margin By Year (days)																												
	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Architecture 17																													
Atlas	462	395	529	328	462	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529	529
Delta - East	282	506	618	674	562	506	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450	450	450	338	450
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309	253	309	309	309
LRV - If A	0	0	0	0	0	0	0	0	253	253	253	253	253	253	253	253	253	253	253	253	253	253	253	253	253	253	253	253	253
LRV - If B	0	0	0	0	0	0	0	0	253	197	141	85	29	155	185	155	185	155	185	155	125	155	125	155	125	155	125	155	125
LRV - If C	0	0	0	0	0	0	0	0	85	95	2	143	93	98	40	70	130	100	70	40	40	100	40	40	70	100	10	70	70
LRV - If D/E	0	0	0	0	0	0	0	0	85	95	2	143	61	60	165	271	266	303	197	203	203	315	203	203	285	315	197	285	285
RUPC - If A	0	0	0	0	0	0	0	0	248	209	209	209	209	209	209	209	209	209	209	287	287	287	287	287	287	287	287	287	287
RUPC - If B	0	0	0	0	0	0	0	0	248	170	92	92	53	25	93	59	59	59	93	127	93	127	93	127	93	127	93	127	93
RUPC - If C/D	0	0	0	0	0	0	0	0	92	14	237	237	159	184	262	223	223	223	262	277	262	277	262	277	262	277	262	277	262
RUPC - If E-low	0	0	0	0	0	0	0	0	92	14	237	237	81	145	220	184	152	184	220	220	220	220	220	220	220	254	184	254	184
RUPC - If E-high	0	0	0	0	0	0	0	0	92	14	237	81	145	184	145	106	67	145	145	145	145	145	145	145	145	184	106	184	106
Shuttle - If A	638	500	592	638	638	592	592	592	684	684	684	684	684	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If B	362	270	270	316	408	408	546	500	638	684	684	638	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If C	362	270	270	316	224	171	270	270	316	454	500	546	684	684	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If D/E	362	270	270	316	224	171	270	270	224	454	454	500	592	684	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan II - East - If A	0	0	0	0	0	0	0	0	263	229	229	229	229	229	229	229	229	229	229	297	297	297	297	297	297	297	297	297	297
Titan II - East - If B	0	0	0	0	0	0	0	0	263	195	127	127	93	25	93	59	59	59	93	127	93	127	93	127	93	127	93	127	93
Titan II - East - If C/D	0	0	0	0	0	0	0	0	127	59	356	336	322	254	322	288	288	288	322	356	322	356	322	356	322	356	322	356	322
Titan II - East - If E-low	0	0	0	0	0	0	0	0	127	59	356	336	288	220	288	254	254	254	288	322	288	322	288	322	288	322	254	322	254
Titan II - East - If E-high	0	0	0	0	0	0	0	0	127	59	356	288	220	254	220	186	152	220	220	220	220	220	220	220	220	254	186	254	186
Titan II - West	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	326	326	326	287	326	326	326	326	287	326	326
Titan IV - East - If A	625	600	570	570	600	605	465	565	440	415	375	445	410	445	375	445	410	445	375	505	470	505	435	505	470	505	435	505	470
Titan IV - East - If B	625	600	570	570	600	605	465	565	440	385	285	355	290	265	255	295	260	295	255	365	290	365	255	365	290	365	255	365	290
Titan IV - East - If C	625	600	570	570	600	605	465	565	350	205	11	290	93	98	325	431	426	463	367	463	426	527	389	463	458	527	421	495	458
Titan IV - East - If D/E	625	600	570	570	600	605	465	565	350	205	11	290	61	303	165	271	266	303	197	303	266	367	229	303	298	367	197	335	298
Titan IV - West	68	167	167	266	167	68	167	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532

TABLE B.1.8.2.– LAUNCH SCHEDULE CONFIDENCE SCHEDULE MARGIN DATA (CONCLUDED)

System/Element	Schedule Margin By Year (days)																												
	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Architecture 18																													
Atlas	462	395	529	328	462	529	529	529	529	529	529	529	529	596	596	596	596	596	596	596	596	596	596	596	596	596	596	596	596
Beta II - If A	0	0	0	0	0	0	0	0	0	0	0	0	0	365	363	361	348	346	343	346	346	346	346	346	346	346	346	346	346
Beta II - If B	0	0	0	0	0	0	0	0	0	0	0	0	0	365	346	341	338	336	336	334	331	334	331	334	331	334	331	334	331
Beta II - If C	0	0	0	0	0	0	0	0	0	0	0	0	0	365	341	324	314	305	297	295	297	300	295	297	297	300	295	297	297
Beta II - If D	0	0	0	0	0	0	0	0	0	0	0	0	0	365	338	319	300	278	271	266	271	271	268	268	271	273	266	271	268
Beta II - If E-low	0	0	0	0	0	0	0	0	0	0	0	0	0	365	338	319	300	278	271	266	271	271	268	268	271	273	266	271	268
Beta II - If E-high	0	0	0	0	0	0	0	0	0	0	0	0	0	365	338	322	305	285	276	273	276	278	273	276	276	278	271	276	273
Delta - East	282	506	618	674	562	506	450	338	450	450	450	338	450	506	506	450	618	674	0	618	0	0	0	618	0	0	0	618	0
Delta - West	0	309	197	309	253	253	309	309	309	253	309	309	309	253	253	309	309	197	309	253	309	253	253	309	253	253	309	253	309
Shuttle - If A	638	500	592	638	638	592	592	592	592	592	592	592	592	684	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If B	362	270	270	316	408	408	546	500	592	592	546	546	592	592	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If C	362	270	270	316	224	171	270	270	270	316	270	316	362	362	546	592	684	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If D	362	270	270	316	224	171	270	270	171	316	224	270	224	224	408	500	546	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If E	362	270	270	316	224	171	270	270	171	316	224	270	171	171	362	500	546	0	0	0	0	0	0	0	0	0	0	0	0
Titan II	0	287	248	326	287	248	287	287	326	287	287	326	287	326	326	326	287	326	326	326	326	287	326	326	326	326	287	326	326
Titan IV - East - If A/B	625	600	570	570	600	605	465	565	530	535	495	565	530	565	495	565	530	565	495	565	530	565	495	565	530	565	495	565	530
Titan IV - East - If C/D/E	625	600	570	570	600	605	465	565	500	475	405	445	410	445	375	415	410	445	375	445	410	445	375	445	410	445	375	445	410
Titan IV - West	68	167	167	266	167	68	167	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532	334	532
Architecture 19																													
ALV	0	0	0	0	0	0	0	0	240	90	115	205	225	195	205	175	205	175	215	175	225	185	215	185	215	195	215	175	225
Atlas - If A/B/C	462	529	529	328	462	529	529	529	650	650	650	650	650	690	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atlas - If D/E	395	462	529	328	462	462	529	529	650	650	650	650	650	690	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Delta - East	282	506	618	674	562	506	450	338	506	562	618	674	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Delta - West	0	309	197	309	253	253	309	309	309	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RPC/ALV - If A	0	0	0	0	0	0	0	0	240	90	115	205	225	195	205	175	205	175	215	175	225	185	215	185	215	195	215	175	225
RPC/ALV - If B	0	0	0	0	0	0	0	0	215	15	15	165	195	145	175	135	165	135	185	125	175	135	165	135	165	145	165	125	175
RPC/ALV - If C/D	0	0	0	0	0	0	0	0	165	205	185	5	55	65	95	5	65	55	105	25	75	55	85	45	75	65	85	35	85
RPC/ALV - If E-low	0	0	0	0	0	0	0	0	165	205	185	5	30	55	85	31	149	149	167	109	149	149	149	149	149	149	131	147	131
RPC/ALV - If E-high	0	0	0	0	0	0	0	0	165	205	185	5	30	55	75	131	113	95	131	95	113	95	113	95	113	113	95	113	95
Shuttle - If A	636	495	589	636	636	589	589	589	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If B	354	260	260	307	401	401	542	495	683	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If C	354	260	260	307	213	159	260	260	307	495	542	589	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle - If D/E	354	260	260	307	213	159	260	260	307	448	542	495	683	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan II	0	289	251	327	289	251	289	289	327	289	327	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Titan IV - East	625	590	555	555	590	590	450	555	520	520	485	555	520	555	485	555	520	555	485	555	520	555	485	555	520	555	485	555	520
Titan IV - West	68	167	167	266	167	68	167	334	532	631	631	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

B.1.8.3 Delay Data

Table B.1.8.3 summarizes data for the Percentage of Flights Delayed due to Unscheduled Maintenance Actions (UMA's). The percentage delay is listed for each system. This data comes from a model based on UMA histories of space and airline systems.

TABLE B.1.8.3.– LAUNCH SCHEDULE CONFIDENCE LAUNCH DELAY DATA

System	% of Flights Delayed
ACRV (180 day)	0.04%
AMLS Booster	5.04%
AMLS Orbiter	22.59%
AMSC	9.85%
Atlas	5.37%
Beta Booster	8.61%
Beta II Booster	5.94%
Beta II Orbiter	8.90%
Beta Orbiter	9.81%
Boeing 747	5.40%
CLV	11.36%
CRV	15.95%
Delta	7.59%
LRV	5.61%
MLS	3.22%
NASP	10.44%
NLS	3.22%
RPC (180 day)	7.08%
RPC (7 day)	6.32%
RUPC	5.88%
Shuttle	24.55%
Shuttle Evolution	24.02%
SSTO	9.69%
Titan II	3.22%
Titan II (RUPC)	3.22%
Titan III	3.22%
Titan IV	3.22%
Titan IV (HR)	3.22%

B.1.9 PMS DATA

Probability of Mission Success is an indication of the likelihood of successfully doing the jobs in the mission model. The PMS for each system is determined by first describing the phases of flight for each system and then constructing a system success tree. Next, equations that determine the probability at each flight phase are defined. The input values for each variable in the equations are determined then based on historical data. This method produces consistent results for both new and existing systems. Please refer to Volume I, section 3.2.4.

Using the methodology developed by the NIT, the PMS is meant to be a relative, not absolute, measure. The numbers are to be compared only against one another. They do not represent the absolute PMS of the different systems.

During the course of the study, several sets of PMS values were produced as the PMS model matured. Later sets of data included the effects of pad hold-down and of higher OMS engine reliability modeling, which increased the PMS values for many of the systems.

B.1.9.1 PMS Summary Data

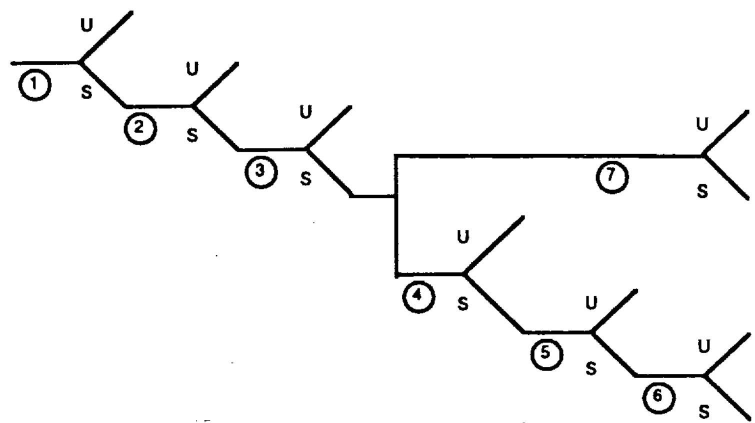
Table B.1.9.1 shows the PMS values for each system. It includes the original study numbers for pad hold-down and higher OMS engine reliability values.

TABLE B.1.9.1.– ARCHITECTURE COST RISK NEW SYSTEMS DATA

Vehicle	Original Study Results	With Hold Down	With OMS & Hold Down
AMSC	0.9577		0.9770
Atlas Evolution	0.9369		
Atlas IIAS	0.9326		
Beta II	0.9652		
CLV/MLS-HL	0.9543	0.9617	0.9617
Delta	0.9319		
MLS-HL	0.9691	0.9767	
MLS-HL/CTV	0.9499	0.9573	0.9595
MLS-X	0.9842	0.9919	
MLS-X/CTV	0.9455	0.9528	0.9572
NLS-20	0.9435	0.9519	0.9519
NLS-50	0.9842	0.9919	
NLS-50/AUS	0.9455	0.9528	
NLS-50/CTV	0.9455	0.9528	0.9572
NLS-HL/CRV	0.9309	0.9381	0.9762
NLS-HL/CTV	0.9308	0.9380	0.9423
RCV	0.9290	0.9394	0.9584
RPC/HR Titan IV	0.9189	0.9426	0.9426
RPC/LRV/MLS-HL	0.9543	0.9617	0.9617
RPC/MLS-X	0.9544	0.9618	0.9618
RPC/NLS-50	0.9544	0.9618	0.9618
RUPC/Titan II	0.9323	0.9417	0.9562
Shuttle	0.9431	0.9537	0.9730
Shuttle Evolution	0.9290	0.9394	0.9584
SSTO	0.9691	0.9768	0.9768
Titan Evolution	0.9519		
Titan Evolution/Centaur	0.9186		
Titan II	0.9626		
Titan III	0.9474		
Titan IV	0.9474		
Titan IV/Centaur	0.9100		
Titan IV/CTF/LRV	0.9242		0.9307

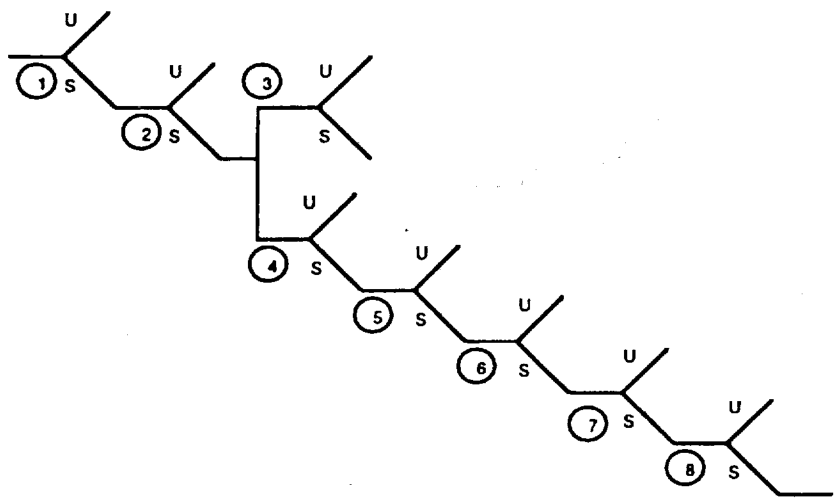
B.1.9.2 System Success Trees

Figures B.1.9.2-1 through B.1.9.2-32 show the success trees for each system. Each figure includes the tree diagram for a system showing the different flight phases, a description of each branch of the tree, and comments concerning the phase. Since it was determined that the impacts on PMS of on-orbit operations and descent were minimal, most of the trees shown are only for ascent. A generic on-orbit tree has been included at the end.



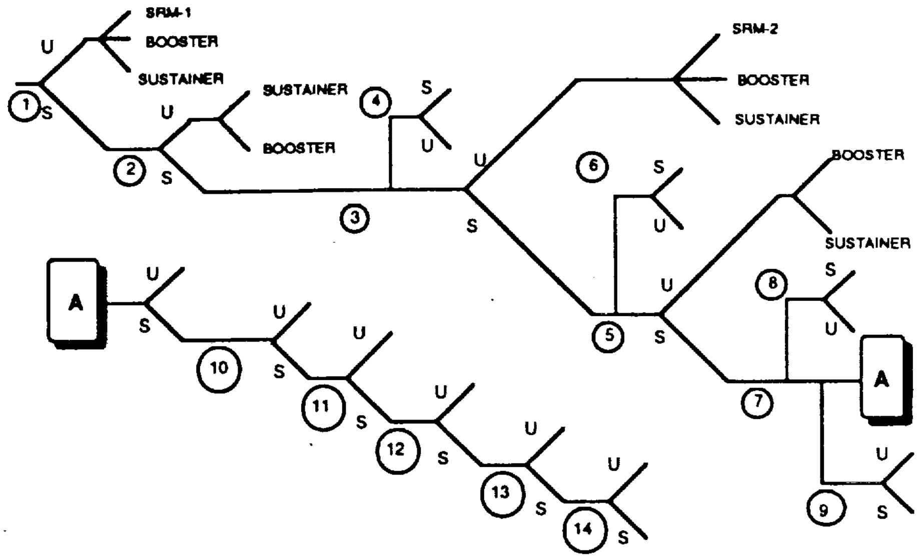
PHASE	DESCRIPTION	COMMENTS
1	STAGE 1 AND 2 IGNITION	LIQUID ENGINES - PARALLEL BURN
2	STAGE 1 AND 2 BURN	ENGINE OUT IN EACH VEHICLE FROM LIFT OFF
3	STAGING	VEHICLE SEPARATION
4	STAGE 2 BURN PHASE	
5	COAST TO LAUNCH APOGEE	
6	ORBIT CIRCULARIZATION	TWO OMS ENGINES, ONE CAN DO JOB
7	BOOSTER RETURN TO LAUNCH SITE	DEAD STICK RETURN

Figure B.1.9.2-1.– AMLS ascent success tree.



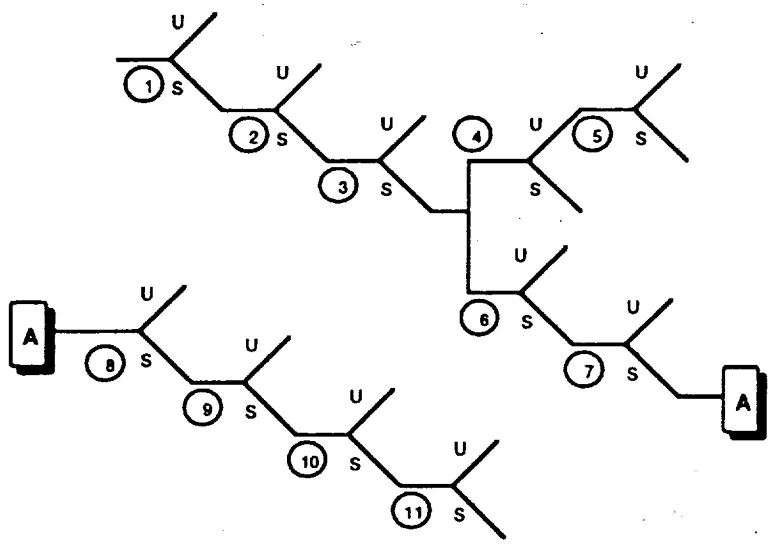
PHASE	DESCRIPTION	COMMENTS
1	747 CLIMB OUT	4 TURBOFANS
2	AMSC ORBITER SEPARATION	
3	747 RETURN TO AIR STRIP	4 TURBOFANS
4	SSME IGNITION AND BURN	3 SSME'S; NO ENGINE OUT
5	COAST	
6	PROPELLANT TANK SEPARATION	
7	COAST	
8	ORBIT CIRCULARIZATION	2-ENGINE OMS; NO ENGINE OUT

Figure B.1.9.2-2.– AMSC ascent success tree.



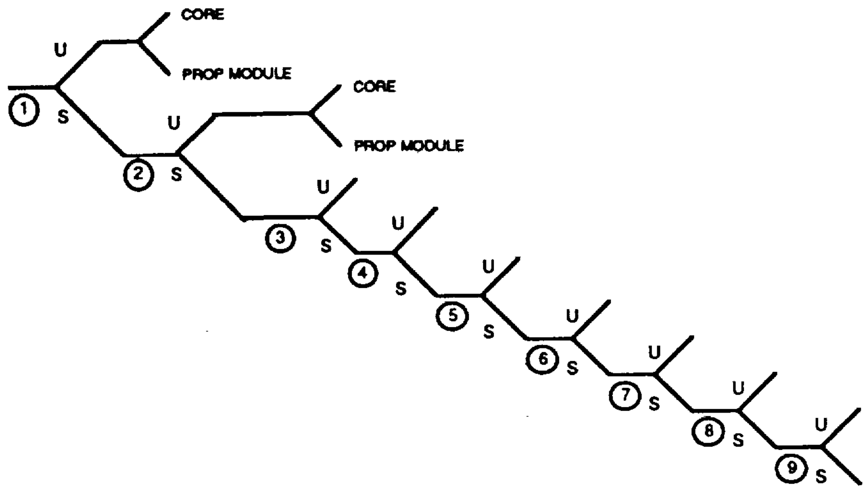
PHASE	DESCRIPTION	COMMENTS
1	INITIAL BOOST PHASE	FIRST PAIR OF SOLIDS, BOOSTER & SUSTAINER; INCLUDES IGNITION AND BURN OF ALL
2	SECOND BOOST PHASE	BOOSTER & SUSTAINER ONLY
3	THIRD BOOST PHASE	SECOND PAIR OF SOLIDS IGNITION & BURN, BOOSTER & SUSTAINER CONTINUED OPERATION
4	FIRST SOLID SET JETTISON	BOOSTER AND SUSTAINER BURNING
5	FOURTH BOOST PHASE	BOOSTER AND SUSTAINER CONTINUED OPERATION
6	SECOND SOLID SET JETTISON	
7	FIFTH BOOST PHASE	CONTINUED OPERATION OF SUSTAINER
8	BOOSTER ENGINE SEPARATION	
9	SHROUD JETTISON	
10	VEHICLE SEPARATION	TANK-UPPER STAGE SEPARATION; INCLUDES SUSTAINER SHUTDOWN
11	UPPER STAGE FIRST BURN	INCLUDES IGNITION, OPERATION AND SHUTDOWN
12	COAST	PERIGEE TO APOGEE TRANSIT TIME
13	UPPER STAGE SECOND BURN	INCLUDES IGNITION, OPERATION AND SHUTDOWN
14	PAYLOAD SEPARATION	UPPER STAGE-PAYLOAD SEPARATION

Figure B.1.9.2-3.– Atlas IIAS ascent success tree.



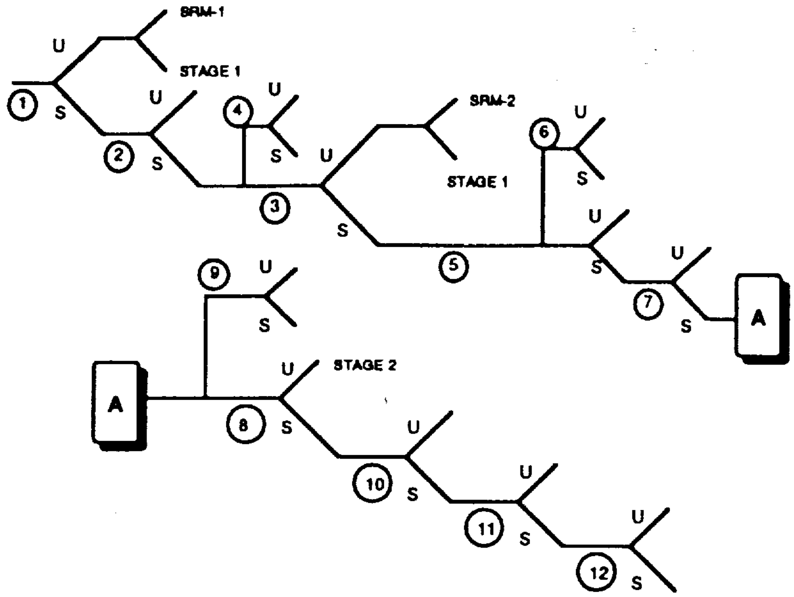
PHASE	DESCRIPTION	COMMENTS
1	CARRIER AIRCRAFT TAKEOFF	10 HSCT TURBOFANS
2	CARRIER AIRCRAFT CLIMBOUT	10 HSCT TURBOFANS IN PARALLEL WITH 10 RAMJETS OFF COMMON INLET
3	FINAL CARRIER AIRCRAFT ASCENT	10 RAMJETS
4	CARRIER AIRCRAFT POWERED RETURN	10 RAMJETS
5	CARRIER AIRCRAFT GLIDE RETURN	
6	ORBITER SEPARATION	
7	SSME IGNITION AND BURN	1 SSME
8	COAST	
9	ORBIT CIRCULARIZATION	2-ENGINE OMS; ENGINE OUT

Figure B.1.9.2-4.– Beta II ascent success tree.



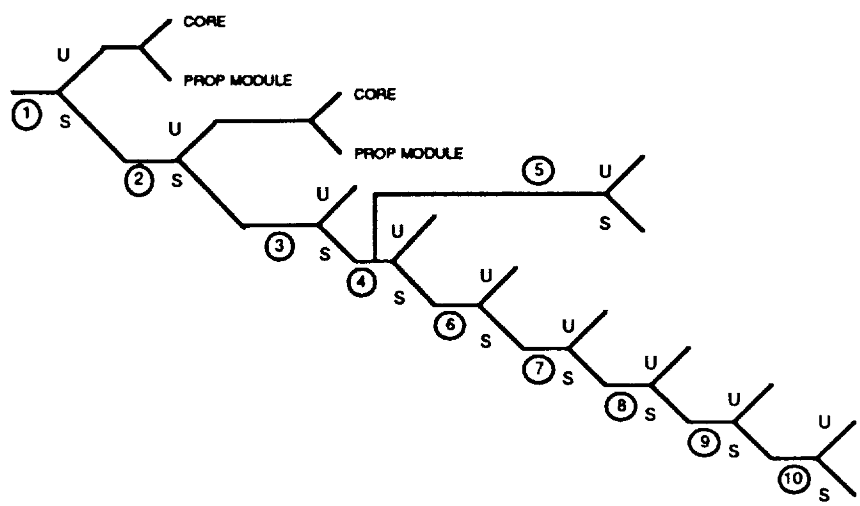
PHASE	DESCRIPTION	COMMENTS
1	ENGINE IGNITION	CORE AND BOOSTER ENGINES; IGNITION AND THRUST BUILDUP
2	FIRST BOOST PHASE	CORE (2) AND PROPULSION MODULE (4) ENGINE OPERATION
3	PROPULSION MODULE SEP	
4	SECOND BOOST PHASE	CORE ENGINES CONTINUED OPERATION
5	STAGE SEPARATION	
6	UPPER STAGE BURN	IGNITION, BURN AND SHUTDOWN
7	VEHICLE SEPARATION	CLV-CORE TANK SEPARATION
8	COAST	PERIGEE TO APOGEE TRANSIT TIME
9	CLV ORBIT CIRCULARIZATION	INCLUDES IGNITION, OPERATION AND SHUTDOWN

Figure B.1.9.2-5.– CLV/MLS-HL ascent success tree.



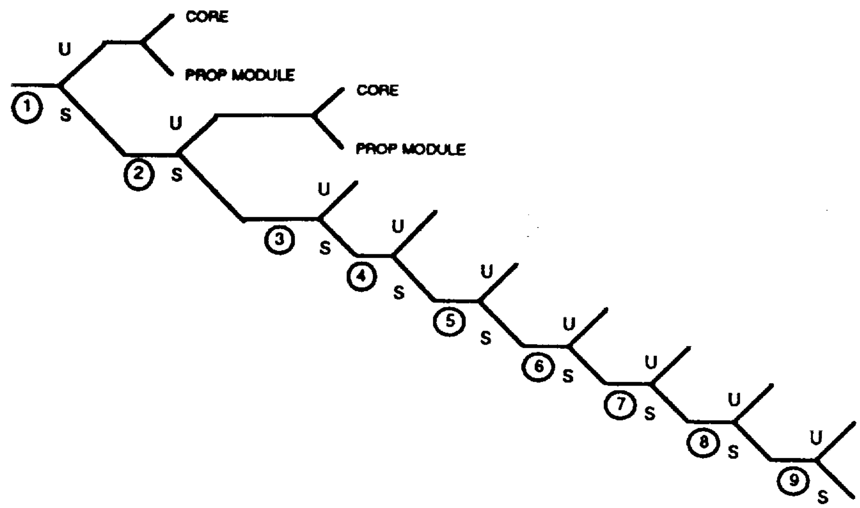
PHASE	DESCRIPTION	COMMENTS
1	INITIAL BOOST PHASE	TWO THIRDS OF SOLIDS AND FIRST STAGE; INCLUDES IGNITION AND BURN OF ALL
2	SECOND BOOST PHASE	FIRST STAGE LIQUIDS ONLY
3	THIRD BOOST PHASE	FIRST STAGE LIQUIDS AND LAST THIRD OF SOLIDS
4	FIRST SOLID SET JETTISON	
5	FOURTH BOOST PHASE	FIRST STAGE LIQUIDS ONLY
6	SECOND SOLID SET JETTISON	
7	FIRST STAGE SEPARATION	
8	SECOND STAGE OPERATION	INCLUDES IGNITION AND BURN TIME
9	SHROUD JETTISON	
10	VEHICLE SEPARATION	TANK-UPPER STAGE SEPARATION; INCLUDES SUSTAINER SHUTDOWN
11	UPPER STAGE	INCLUDES IGNITION, OPERATION AND SHUTDOWN
12	PAYLOAD SEPARATION	UPPER STAGE-PAYLOAD SEPARATION

Figure B.1.9.2-6.– Delta II ascent success tree.



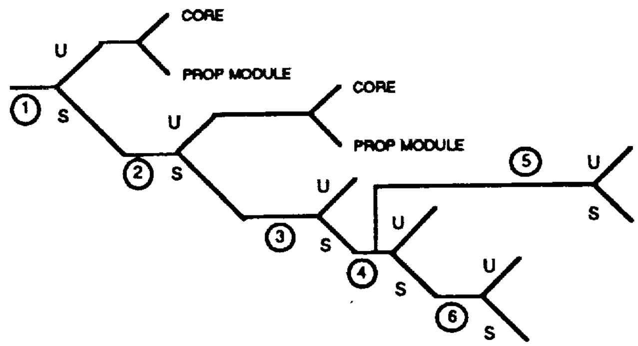
PHASE	DESCRIPTION	COMMENTS
1	ENGINE IGNITION	CORE AND BOOSTER ENGINES; IGNITION AND THRUST BUILDUP
2	FIRST BOOST PHASE	CORE (2) AND PROPULSION MODULE (4) ENGINE OPERATION
3	PROPULSION MODULE SEP	
4	SECOND BOOST PHASE	CORE ENGINES CONTINUED OPERATION
5	STAGE SEPARATION	
6	UPPER STAGE FIRST BURN	IGNITION, BURN AND SHUTDOWN
8	COAST	PERIGEE TO APOGEE TRANSIT TIME
9	UPPER STAGE SECOND BURN	IGNITION, OPERATION AND SHUTDOWN
7	PAYLOAD SEPARATION	

Figure B.1.9.2-7.– MLS-HL ascent success tree.



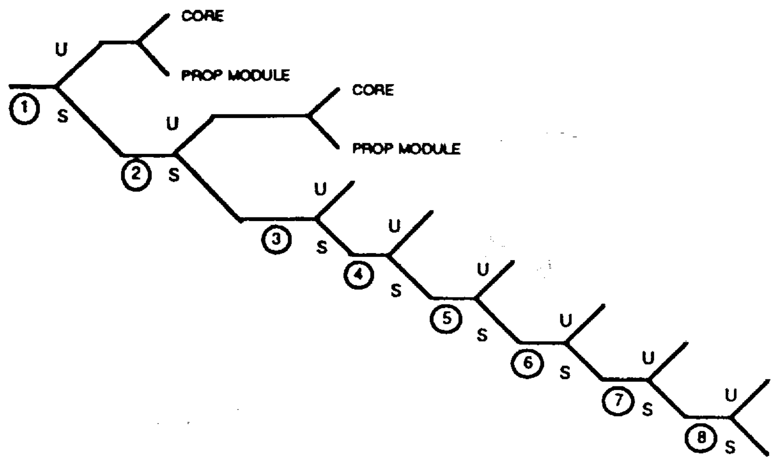
PHASE	DESCRIPTION	COMMENTS
1	ENGINE IGNITION	CORE AND BOOSTER ENGINES; IGNITION AND THRUST BUILDUP
2	FIRST BOOST PHASE	CORE (2) AND PROPULSION MODULE (4) ENGINE OPERATION
3	PROPULSION MODULE SEP	
4	SECOND BOOST PHASE	CORE ENGINES CONTINUED OPERATION
5	STAGE SEPARATION	
6	UPPER STAGE BURN	IGNITION, BURN AND SHUTDOWN
7	VEHICLE/CRV SEPARATION	CRV-CORE TANK SEPARATION
8	COAST	PERIGEE TO APOGEE TRANSIT TIME
9	CRV ORBIT CIRCULARIZATION	IGNITION, OPERATION AND SHUTDOWN

Figure B.1.9.2-8.– MLS-HL/CRV ascent success tree.



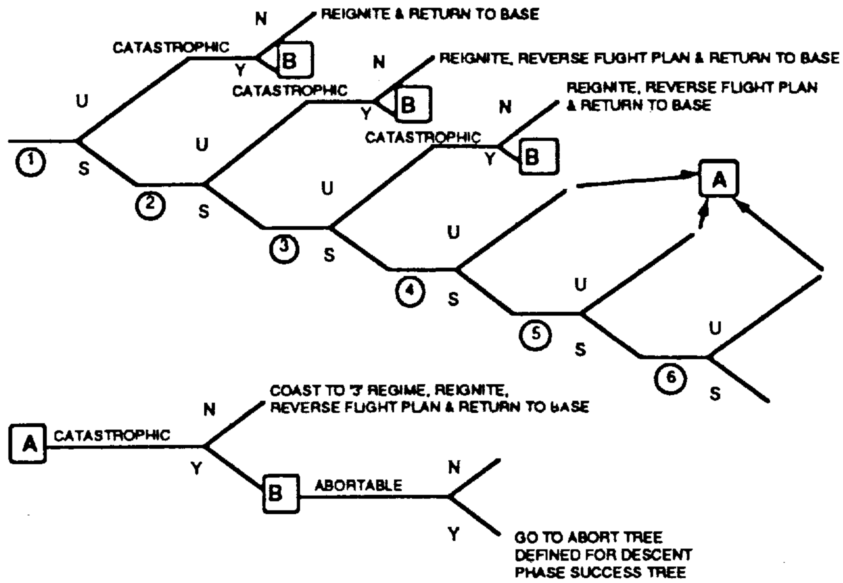
PHASE	DESCRIPTION	COMMENTS
1	ENGINE IGNITION	CORE AND BOOSTER ENGINES; IGNITION AND THRUST BUILDUP
2	FIRST BOOST PHASE	CORE (2) AND PROPULSION MODULE (4) ENGINE OPERATION
3	PROPULSION MODULE SEP	
4	SECOND BOOST PHASE	CORE ENGINES CONTINUED OPERATION
5	SHROUD JETTISON	PARALLEL WITH CORE ENGINE OPERATION
6	PAYLOAD SEPARATION	

Figure B.1.9.2-9.– MLS-X ascent success tree.



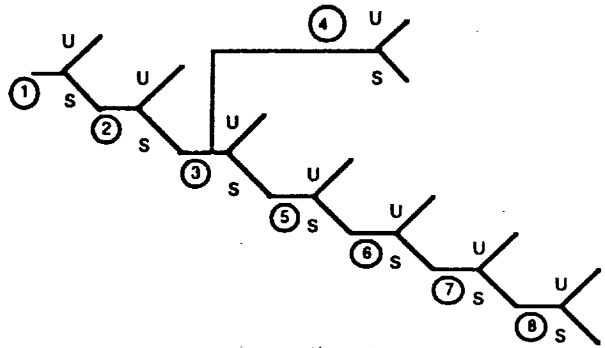
PHASE	DESCRIPTION	COMMENTS
1	ENGINE IGNITION	CORE AND BOOSTER ENGINES; IGNITION AND THRUST BUILDUP
2	FIRST BOOST PHASE	CORE (2) AND PROPULSION MODULE (4) ENGINE OPERATION
3	PROPULSION MODULE SEP	
4	SECOND BOOST PHASE	CORE ENGINES CONTINUED OPERATION
5	VEHICLE/CTF SEPARATION	CTF-CORE TANK SEPARATION
6	CTF FIRST BURN	
7	COAST	PERIGEE TO APOGEE TRANSIT TIME
8	CTF ORBIT CIRCULARIZATION	INCLUDES IGNITION, OPERATION AND SHUTDOWN

Figure B.1.9.2-10.– MLS-X/CTF ascent success tree.



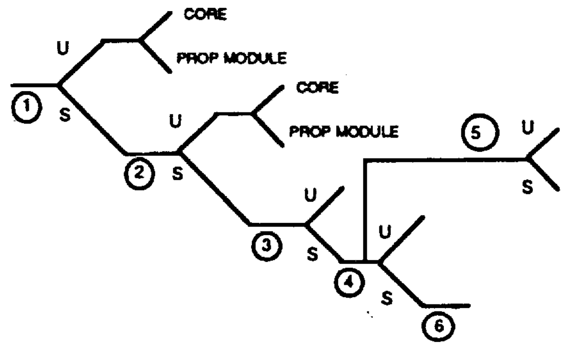
PHASE	DESCRIPTION	COMMENTS
1	INITIAL ACCELERATION MODE	FROM STANDSTILL TO MACH 3
2	RAMJET MODE	INCLUDES TRANSITION FROM INITIAL TO RAMJET MODE
3	SCRAMJET MODE	INCLUDES TRANSITION FROM RAMJET TO SCRAMJET MODE
4	ORBIT INSERTION BURN	INCLUDES SCRAMJET SHUTDOWN, ROCKET IGNITION, BURN & SHUTDOWN
5	COAST	
6	ORBIT CIRCULARIZATION	INCLUDES IGNITION, BURN, AND SHUTDOWN

Figure B.1.9.2-11.– NDV ascent success tree.



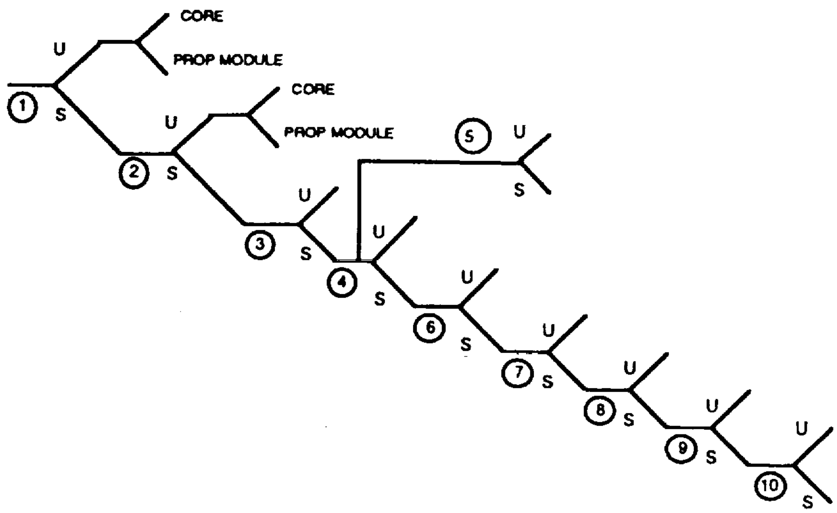
PHASE	DESCRIPTION	COMMENTS
1	IGNITION	INCLUDES THRUST BUILDUP
2	FIRST BOOST PHASE	PROPULSION MODULE (4) ENGINE OPERATION
3	VEHICLE SEPARATION	CTV-CORE TANK SEPARATION; INCLUDES ENGINE SHUTDOWN
4	SHROUD JETTISON	
5	UPPER STAGE FIRST BURN	INCLUDES IGNITION, OPERATION AND SHUTDOWN
6	COAST	PERIGEE TO APOGEE TRANSIT TIME
7	UPPER STAGE SECOND BURN	INCLUDES IGNITION, OPERATION AND SHUTDOWN
8	PAYLOAD SEPARATION	UPPER STAGE-PAYLOAD SEPARATION

Figure B.1.9.2-12.– NLS-20 ascent success tree.



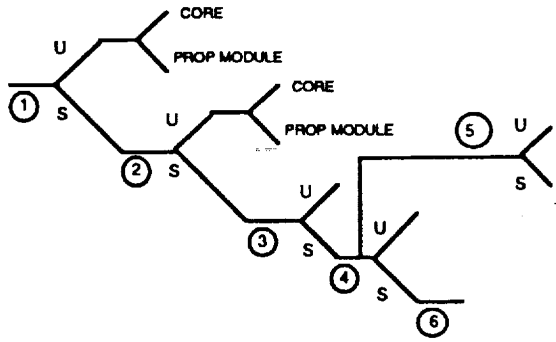
PHASE	DESCRIPTION	COMMENTS
1	ENGINE IGNITION	CORE & BOOSTER IGNITION AND THRUST BUILD UP
2	FIRST BOOST PHASE	CORE (2) AND PROPULSION MODULE (4) ENGINE OPERATION
3	PROPULSION MODULE SEP	
4	SECOND BOOST PHASE	CORE ENGINES CONTINUED OPERATION
5	SHROUD JETTISON	
6	PAYLOAD SEPARATION	

Figure B.1.9.2-13.– NLS-50 ascent success tree.



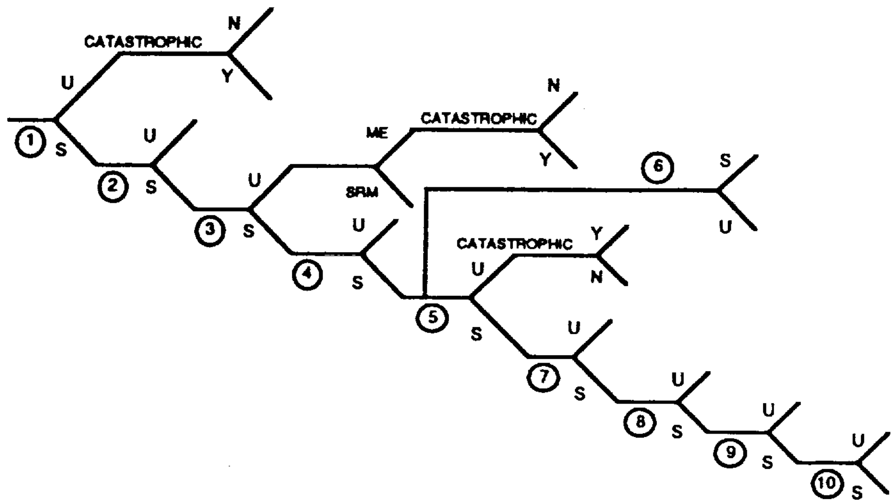
PHASE	DESCRIPTION	COMMENTS
1	ENGINE IGNITION	CORE & BOOSTER IGNITION AND THRUST BUILD UP
2	FIRST BOOST PHASE	CORE (2) AND PROPULSION MODULE (4) ENGINE OPERATION
3	PROPULSION MODULE SEP	
4	SECOND BOOST PHASE	CORE ENGINES CONTINUED OPERATION
5	SHROUD JETTISON	
6	VEHICLE SEPARATION	INCLUDES CORE ENGINE SHUTDOWN
7	UPPER STAGE FIRST BURN	
8	COAST	PERIGEE TO APOGEE TRANSIT TIME
9	UPPER STAGE SECOND BURN	INCLUDES IGNITION, OPERATION AND SHUTDOWN
10	PAYLOAD SEPARATION	

Figure B.1.9.2-14.– NLS-50/AUS ascent success tree.



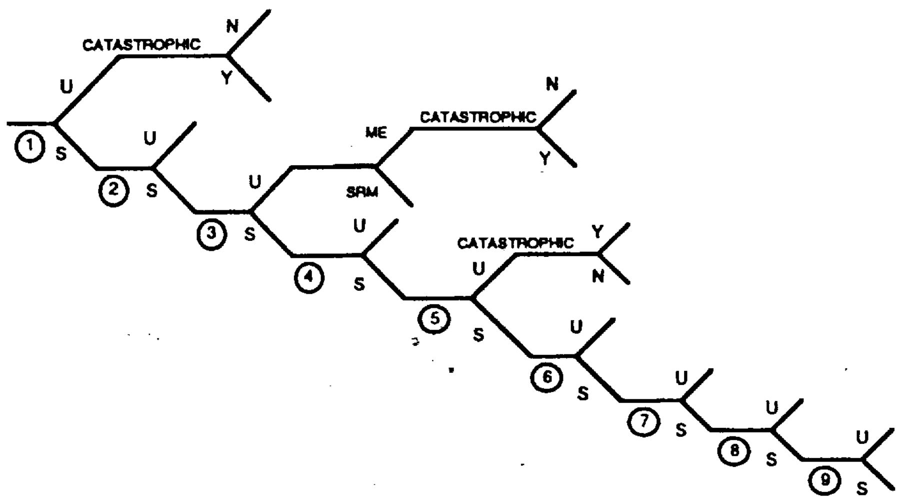
PHASE	DESCRIPTION	COMMENTS
1	ENGINE IGNITION	CORE & BOOSTER IGNITION AND THRUST BUILD UP
2	FIRST BOOST PHASE	CORE (2) AND PROPULSION MODULE (4) ENGINE OPERATION
3	PROPULSION MODULE SEP	
4	SECOND BOOST PHASE	CORE ENGINES CONTINUED OPERATION
5	SHROUD JETTISON	
6	VEHICLE/CTV SEPARATION	
7	CTV FIRST BURN	
8	COAST	
9	CTV SECOND BURN	ORBIT CIRCULARIZATION

Figure B.1.9.2-15.– NLS-50/CTV ascent success tree.



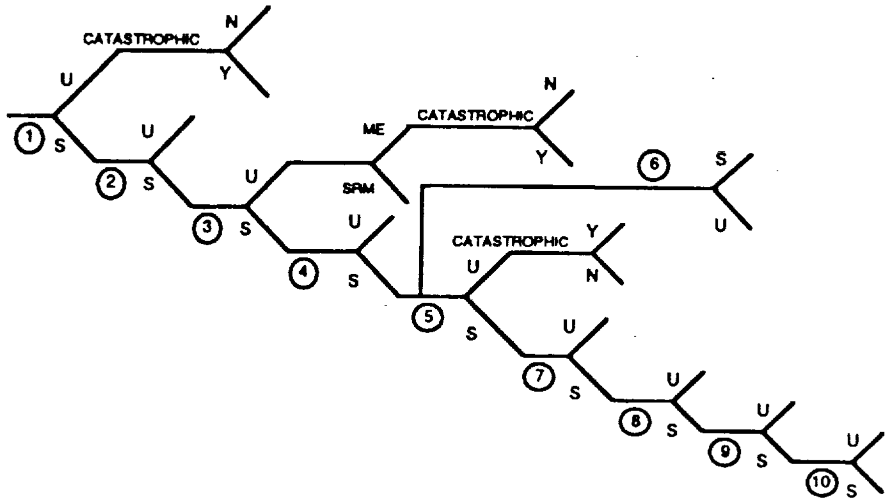
PHASE	DESCRIPTION	COMMENTS
1	LIQUID ENGINE IGNITION	IGNITION AND THRUST BUILDUP - 2 ENG
2	SRM IGNITION	IGNITION AND LIFTOFF
3	ME/SRM BURN TIME	PARALLEL BURN TIME TO SRB TAILOFF
4	SRM SEPARATION	
5	ME BURN TIME	THROUGH MECO
6	SHROUD JETTISON	POST SRM SEPARATION
7	CORE TANK SEPARATION	
8	UPPER STAGE FIRST BURN	
9	COAST	
10	ORBIT CIRCULARIZATION	INCLUDES IGNITION, BURN & CUTOFF

Figure B.1.9.2-16.– NLS-HL ascent success tree.



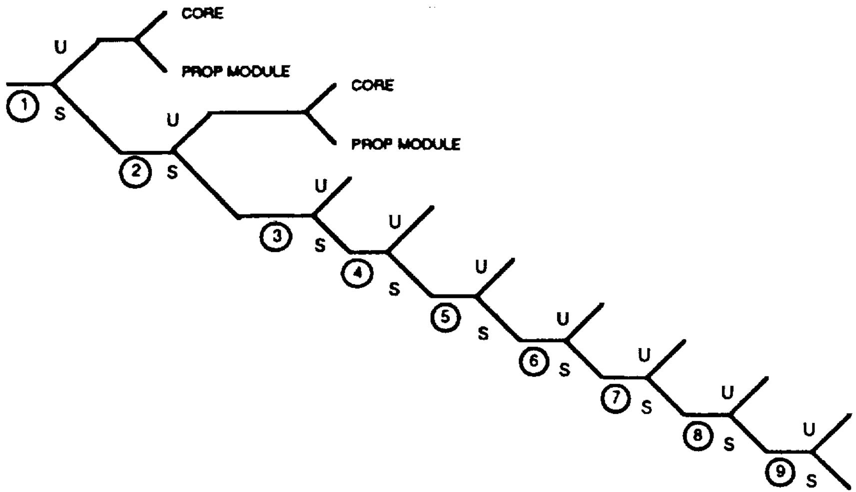
PHASE	DESCRIPTION	COMMENTS
1	LIQUID ENGINE IGNITION	IGNITION AND THRUST BUILDUP - 2 ENG
2	SRM IGNITION	IGNITION AND LIFTOFF
3	ME/SRM BURN TIME	PARALLEL BURN TIME TO SRB TAILOFF
4	SRM SEPARATION	
5	ME BURN TIME	THROUGH MECO
6	CORE TANK SEPARATION	
7	CRV FIRST BURN	
8	COAST	
9	ORBIT CIRCULARIZATION	INCLUDES IGNITION, BURN & CUTOFF

Figure B.1.9.2-17.– NLS-HL/CRV ascent success tree.



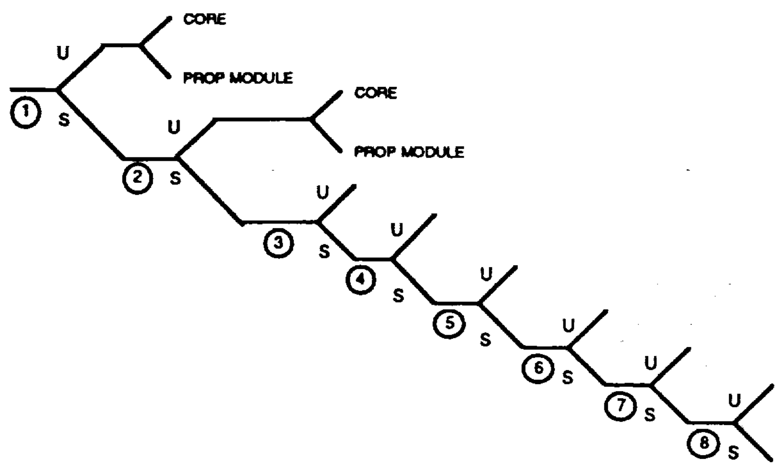
PHASE	DESCRIPTION	COMMENTS
1	LIQUID ENGINE IGNITION	IGNITION AND THRUST BUILDUP - 2 ENG
2	SRM IGNITION	IGNITION AND LIFTOFF
3	ME/SRM BURN TIME	PARALLEL BURN TIME TO SRB TAILOFF
4	SRM SEPARATION	
5	ME BURN TIME	THROUGH MECO
6	SHROUD JETTISON	POST SRM SEPARATION
7	CORE TANK SEPARATION	
8	CTV FIRST BURN	
9	COAST	
10	ORBIT CIRCULARIZATION	INCLUDES IGNITION, BURN & CUTOFF

Figure B.1.9.2-18.– NLS-HL/CTV ascent success tree.



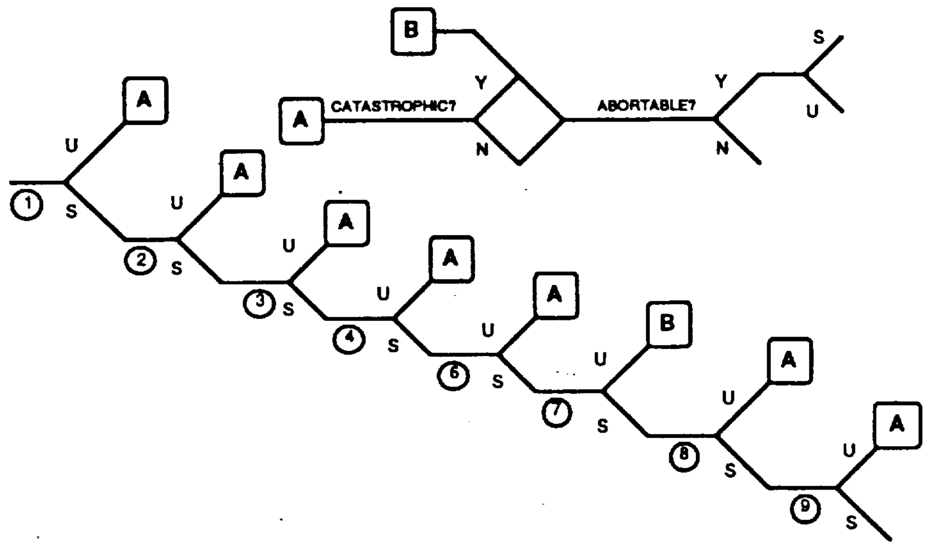
PHASE	DESCRIPTION	COMMENTS
1	ENGINE IGNITION	CORE AND BOOSTER ENGINES; IGNITION AND THRUST BUILDUP
2	FIRST BOOST PHASE	CORE (2) AND PROPULSION MODULE (4) ENGINE OPERATION
3	PROPULSION MODULE SEP	
4	SECOND BOOST PHASE	CORE ENGINES CONTINUED OPERATION
5	STAGE SEPARATION	
6	UPPER STAGE BURN	IGNITION, BURN AND SHUTDOWN
7	VEHICLE/RPC SEPARATION	RPC-CORE TANK SEPARATION
8	COAST	PERIGEE TO APOGEE TRANSIT TIME
9	RPC ORBIT CIRCULARIZATION	INCLUDES IGNITION, OPERATION AND SHUTDOWN

Figure B.1.9.2-19.– RPC/LRV/MLS-HL ascent success tree.



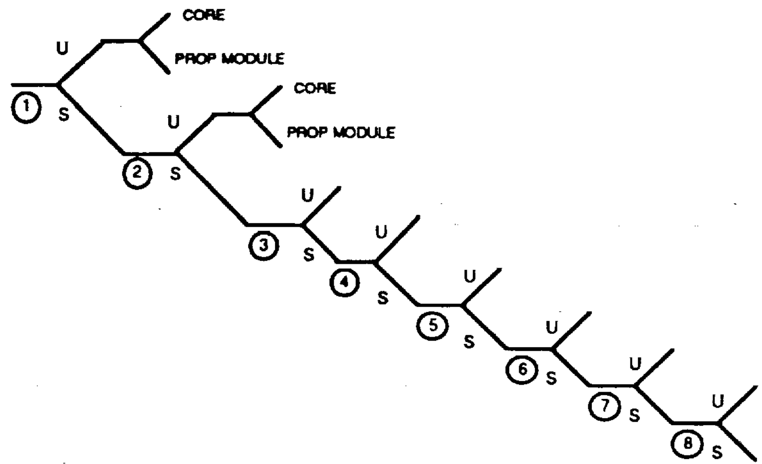
PHASE	DESCRIPTION	COMMENTS
1	ENGINE IGNITION	CORE AND BOOSTER ENGINES; IGNITION AND THRUST BUILDUP
2	FIRST BOOST PHASE	CORE (2) AND PROPULSION MODULE (4) ENGINE OPERATION
3	PROPULSION MODULE SEP	
4	SECOND BOOST PHASE	CORE ENGINES CONTINUED OPERATION
5	VEHICLE/RPC SEPARATION	RPC-CORE TANK SEPARATION
6	RPC FIRST BURN	
7	COAST	PERIGEE TO APOGEE TRANSIT TIME
8	RPC ORBIT CIRCULARIZATION	INCLUDES IGNITION, OPERATION AND SHUTDOWN

Figure B.1.9.2-20.– RPC/MLS-X ascent success tree.



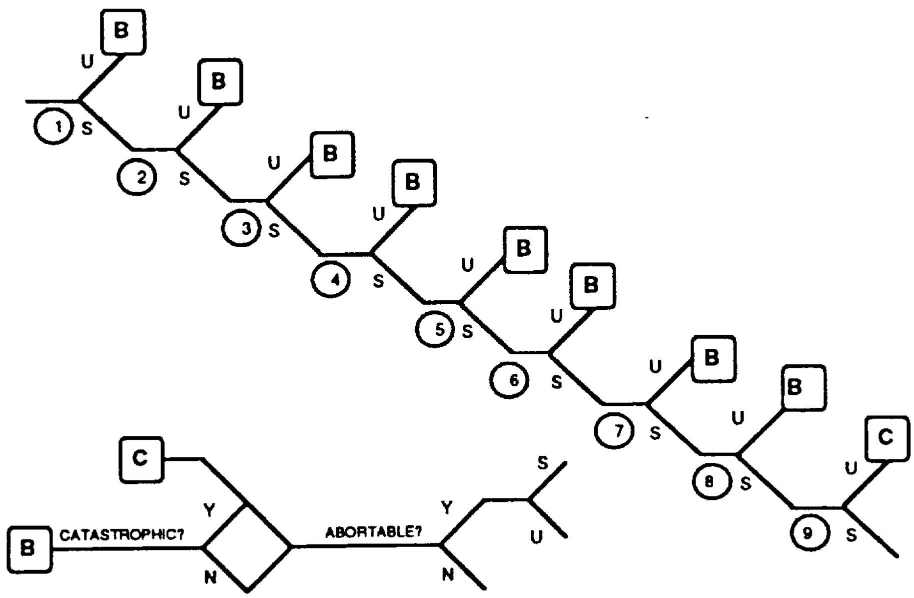
PHASE	DESCRIPTION	COMMENTS
1	STAGE 0 AND CORE IGNITION	LIQUID BOOSTER AND CORE IGNITION AND THRUST BUILD UP; 6 ENGINES PER BOOSTER
2	STAGE 0 AND CORE BOOST PHASE	2 ENGINES PER BOOSTER; INCLUDES BOOSTER ENGINE CUT OFF; NO ENGINE OUT
3	LRB SEPARATION	JETTISON OF LRB TANKS
4	STAGE 1 BURN PHASE	CORE BURN
5	STAGING	INCLUDES SHUTDOWN, SEP, & IGNITION
6	STAGE 2 BURN PHASE	SINGLE ENGINE; IGNITION AND BURN
7	RPC SEPARATION	
8	COAST	
9	ORBIT CIRCULARIZATION	RPC 2-ENGINE OMS; NO ENGINE OUT

Figure B.1.9.2-21.– RPC/MR TITAN IV+ ascent success tree.



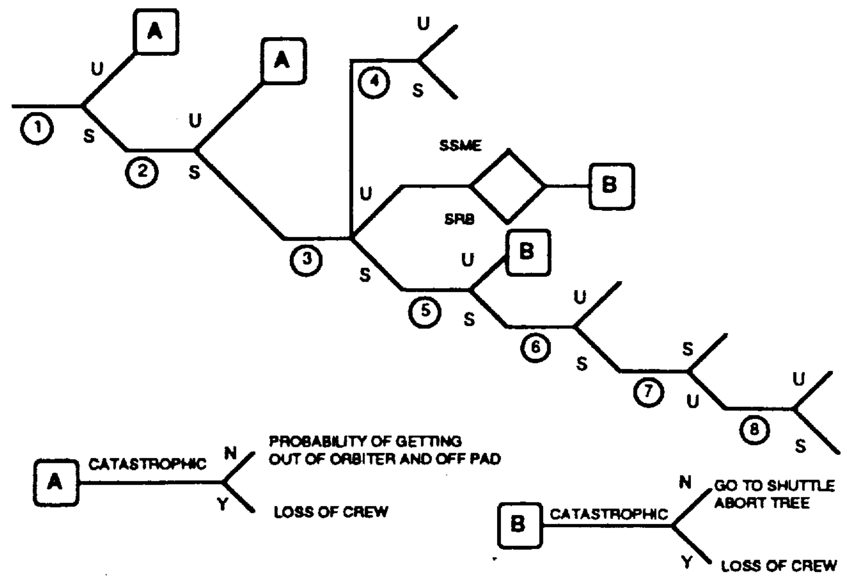
PHASE	DESCRIPTION	COMMENTS
1	ENGINE IGNITION	CORE & BOOSTER IGNITION AND THRUST BUILD UP
2	FIRST BOOST PHASE	CORE (2) AND PROPULSION MODULE (4) ENGINE OPERATION
3	PROPULSION MODULE SEP	
4	SECOND BOOST PHASE	CORE ENGINES CONTINUED OPERATION
5	VEHICLE SEPARATION	PLS-CORE TANK SEPARATION; INCLUDES CORE ENGINE SHUTDOWN
6	RPC FIRST BURN	INCLUDES IGNITION, OPERATION AND SHUTDOWN
7	COAST	PERIGEE TO APOGEE TRANSIT TIME
8	RPC CIRCULARIZATION BURN	INCLUDES IGNITION, OPERATION AND SHUTDOWN

Figure B.1.9.2-22.– RPC/NLS-50 ascent success tree.



PHASE	DESCRIPTION	COMMENTS
1	FIRST BOOST PHASE	2 LIQUID ENGINE CORE IGNITION AND THRUST BUILD UP
2	SECOND BOOST PHASE	TEN SOLIDS IGNITION AND BURN WITH LIQUID CORE. SOLIDS ARE BURNED IN A STAGGERED MODE WITH SIGNIFICANT OVERLAP; FIRST 4, THEN 2, THEN 2, THEN 2.
3	SOLID MOTOR CASE JETTISON	JETTISON ALL SOLID CASES
4	THIRD BOOST PHASE	2 LIQUID ENG
5	STAGE SEPARATION	DROP OFF FIRST STAGE
6	SECOND STAGE BURN	SINGLE ENGINE OPERATION
7	RUPC SEPARATION	
8	COAST	
9	ORBIT CIRCULARIZATION	RUPC 2-ENGINE OMS

Figure B.1.9.2-23.– RUPC/TITAN II + GEMs ascent success tree.



PHASE	DESCRIPTION	COMMENTS
1	SSME IGNITION	IGNITION AND THRUST BUILDUP
2	SRB IGNITION	IGNITION AND LIFTOFF
3	SSME/SRB BURN TIME	PARALLEL BURN TIME TO SRB TAILOFF
4	SRB SEPARATION	
5	SSME BURN TIME	THROUGH MECO
6	ET JETTISON	
7	COAST	
8	OMS CIRCULARIZATION	INCLUDES IGNITION, BURN & CUTOFF. IF UNSUCCESSFUL, AND NON-CATASTROPHIC, GO TO DESCENT PHASE. NO ENGINE OUT FOR ORBIT INSERTION

Figure B.1.9.2-24.– Shuttle ascent success tree.

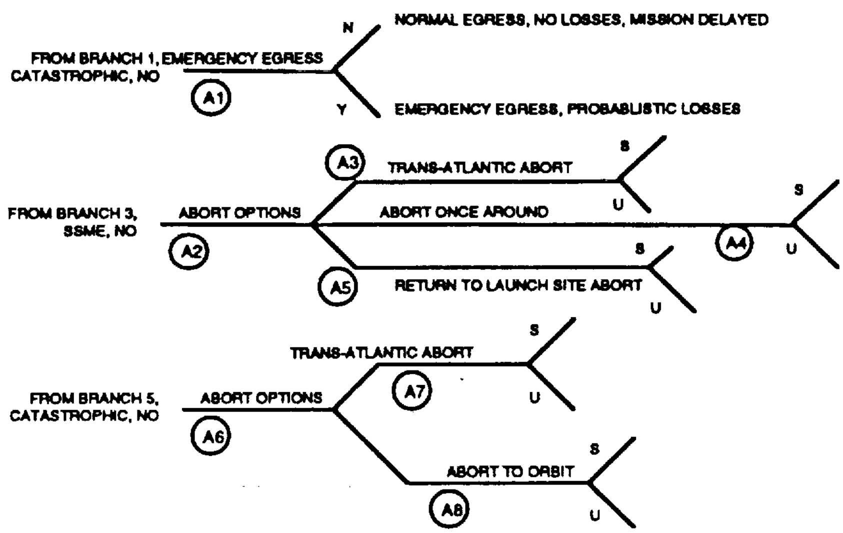


Figure B.1.9.2-25.– Shuttle abort success tree.

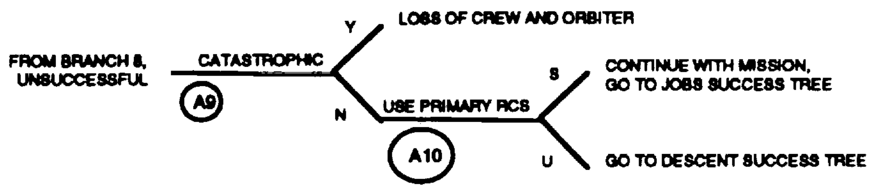
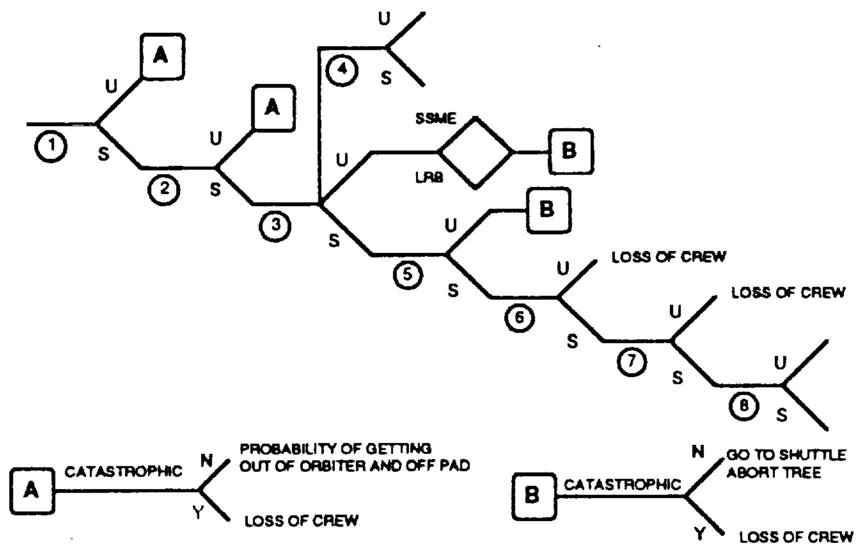
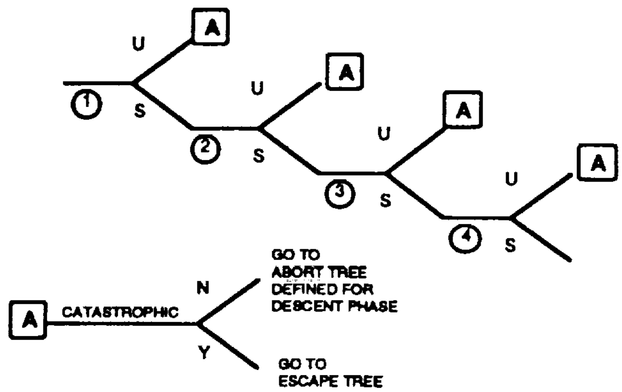


Figure B.1.9.2-25.– Shuttle abort success tree (Concluded).



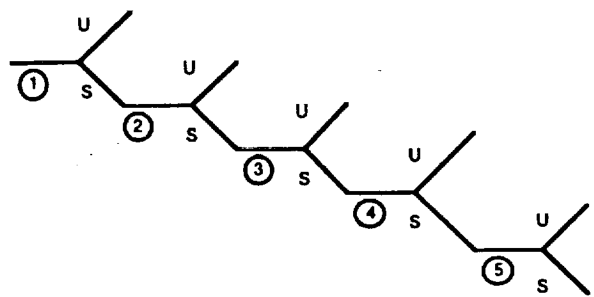
PHASE	DESCRIPTION	COMMENTS
1	SSME IGNITION	IGNITION AND THRUST BUILDUP
2	LRB IGNITION	IGNITION AND THRUST BUILD UP WITH LIFTOFF; 4 ENGINES PER BOOSTER WITH ENGINE OUT; SSME'S OPERATING
3	FIRST BOOST PHASE	SSME AND STME PARALLEL BURN THROUGH BOOSTER ENGINE CUT OFF
4	LRB SEPARATION	
5	SECOND BOOST PHASE	THREE SSME OPERATION THROUGH SHUT DOWN ; ABORT OPTIONS SAME AS SHUTTLE
6	ET JETTISON	
7	COAST	
8	OMS CIRCULARIZATION	INCLUDES IGNITION, BURN & CUTOFF. IF UNSUCCESSFUL, AND NON-CATASTROPHIC, GO TO DESCENT PHASE. NO ENGINE OUT FOR ORBIT INSERTION.

Figure B.1.9.2-26.– Shuttle evolution and RCV ascent success tree.



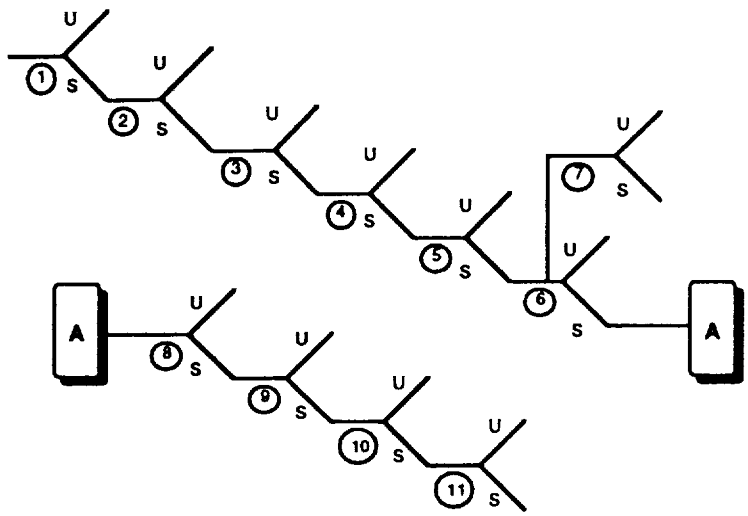
PHASE	DESCRIPTION	COMMENTS
1	ENGINE IGNITION	INCLUDES LIFTOFF
2	ENGINE BURN	INCLUDES ENGINE CUTOFF
3	COAST PHASE	ACS RELIABILITY
4	ORBIT CIRCULARIZATION	INCLUDES IGNITION, BURN & CUTOFF

Figure B.1.9.2-27.– SSTO ascent success tree.



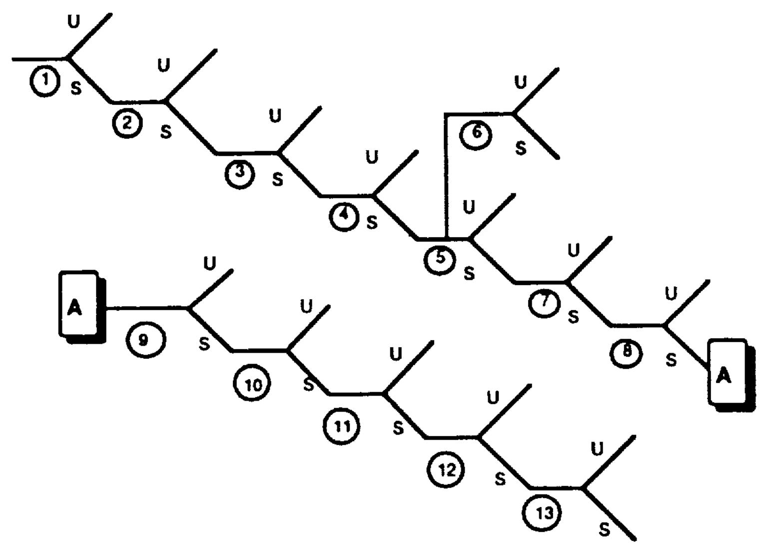
PHASE	DESCRIPTION	COMMENTS
1	STAGE 1 IGNITION	LIQUID ENGINES - CORE VEHICLE
2	STAGE 1 BURN	
3	STAGING	INCLUDES SHUTDOWN, SEP, & IGNITION
4	STAGE 2 BURN PHASE	
5	PAYLOAD SEPARATION	

Figure B.1.9.2-28.– Titan II ascent success tree.



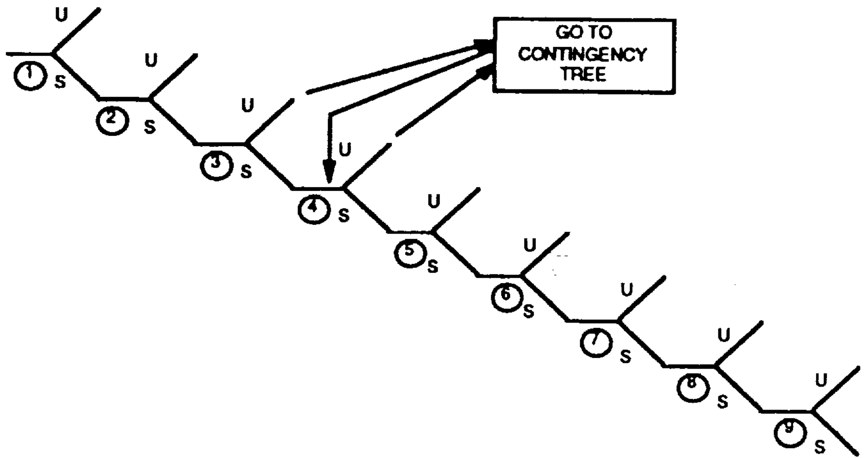
PHASE	DESCRIPTION	COMMENTS
1	STAGE 0 IGNITION	SOLID STRAP-ON BOOSTERS
2	STAGE 0 BURN	
3	STAGE 1 IGNITION	LIQUID ENGINES - CORE VEHICLE
4	JETTISON OF SOLIDS	
5	FIRST STAGE BURN	
6	STAGING	INCLUDES SHUTDOWN, SEP, & IGNITION
7	STAGE 2 BURN PHASE	
8	SHROUD SEPARATION	PARALLEL TO 6
9	UPPER STAGE FIRST BURN	
10	COAST	
11	UPPER STAGE SECOND BURN	
12	PAYLOAD SEPARATION	

Figure B.1.9.2-29.– Titan III ascent success tree.



PHASE	DESCRIPTION	COMMENTS
1	STAGE 0 IGNITION	SOLID STRAP-ON BOOSTERS
2	STAGE 0 BURN	
3	STAGE 1 IGNITION	LIQUID ENGINES - CORE VEHICLE
4	JETTISON OF SOLIDS	
5	STAGE 1 BURN PHASE	
6	SHROUD JETTISON	
7	STAGING	
8	STAGE 2 BURN PHASE	
9	2ND STAGE SEPARATION	
10	UPPER STAGE FIRST BURN	INCLUDES IGNITION, OPERATION AND SHUTDOWN
11	UPPER STAGE COAST	
12	UPPER STAGE 2ND BURN	INCLUDES IGNITION, OPERATION AND SHUTDOWN
13	PAYLOAD SEPARATION	

Figure B.1.9.2-30.–Titan IV ascent success tree.

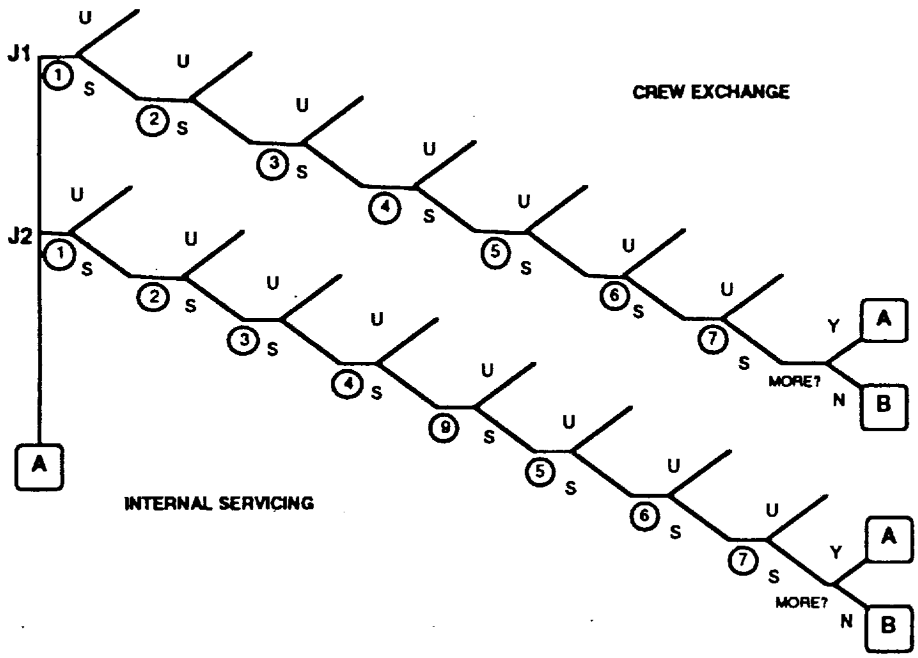


PHASE	DESCRIPTION	COMMENTS
1	SEPARATE FROM SSF	MECHANICAL/PYRO RELIABILITY
2	DEPARTURE PROXIMITY OPERATIONS	ACS RELIABILITY
3	DEORBIT ENGINE IGNITION	DEORBIT ENGINE RELIABILITY
4	DEORBIT ENGINE BURN	DEORBIT ENGINE RELIABILITY
5	ENTRY INTERFACE ALIGNMENT	ACS RELIABILITY
6	ENTRY	TPS AND ACS RELIABILITY
7	TERMINAL AREA ENERGY MANAGEMENT	AERO SURFACES AND CONTROL LOOP
8	POWERED FLIGHT	AIR-BREATHING ENGINES
9	LANDING	RETRO ROCKETS, STRUTS, LANDING GEAR, AIR BAGS, ETC

NOTES: CONTINGENCY SUBROUTINE USES LARGEST RCS ENGINE FOR DEORBIT BURN

CONSIDERATION NEEDS TO BE GIVEN TO ECLSS, AVIONICS, POWER, AND HYDRAULICS, IF ANY, DURING THE ENTIRE DESCENT PROFILE.

Figure B.1.9.2-31.– ACRV descent success tree.



PHASE	DESCRIPTION	COMMENTS
1	ORBIT CHANGE	FROM INSERTION TO TARGET ORBIT
2	RENDEZVOUS	ARRIVAL PROXIMITY OPERATIONS
3	ESTABLISH HARD INTERFACE	MECHANICAL CONNECTION
4	ESTABLISH PRESSURIZED INTERFACE	PERSONNEL TRANSFER PATH
5	RELEASE PRESSURIZED INTERFACE	DISCONNECT TUNNEL
6	RELEASE HARD INTERFACE	RELEASE MECHANICAL HOLD-DOWNS
7	DEPARTURE	DEPARTURE PROXIMITY OPERATIONS
8	ORBIT CHANGE	POSITION FOR NEXT OPERATION
9	PERFORM ACTIVITY	EXPERIMENT, SERVICE FUNCTION
10	EVA	
11	UNLOAD PAYLOAD	INCLUDES ALL FUNCTIONS
12	LOAD PAYLOAD	INCLUDES ALL FUNCTIONS

NOTE: IF JOB IS UNSUCCESSFUL, JOB IS LOST. IF MORE JOBS, THEY ARE ATTEMPTED. IF NOT, SYSTEM GOES TO DESCENT PHASE, IF APPLICABLE. PERSONNEL LOST DURING THIS PHASE IS NOT A HIGH PROBABILITY AND HAS BEEN DISCOUNTED. ALSO, ALL SYSTEMS SHOULD EXHIBIT SAME PROBABILITY, SO IT IS NOT A DISCRIMINATOR.

Figure B.1.9.2-32.– On-orbit success tree.

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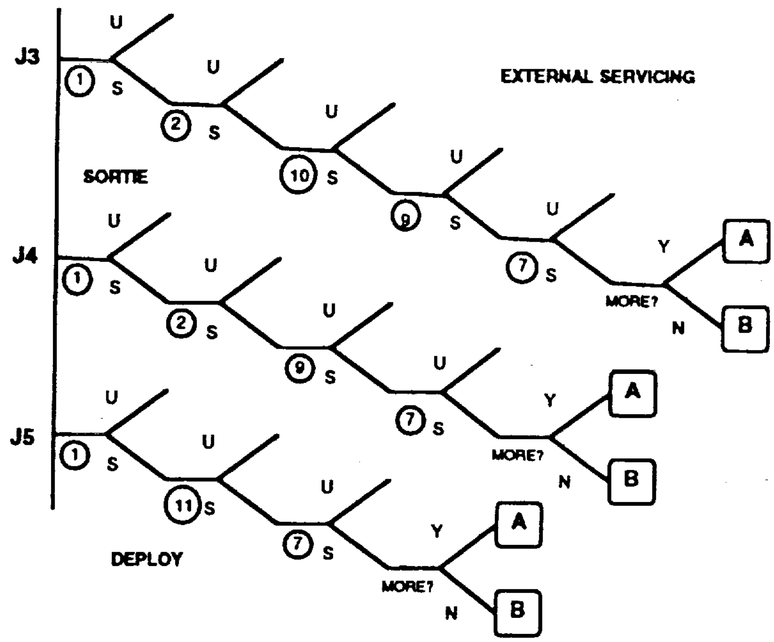
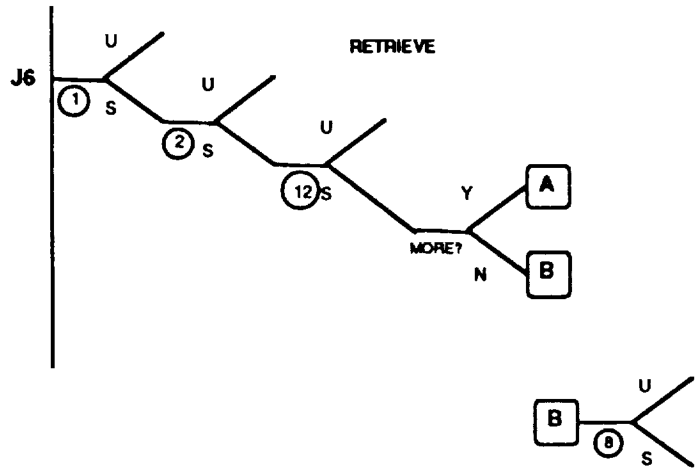


PHASE	DESCRIPTION	COMMENTS
1	ORBIT CHANGE	FROM INSERTION TO TARGET ORBIT
2	RENDEZVOUS	ARRIVAL PROXIMITY OPERATIONS
3	ESTABLISH HARD INTERFACE	MECHANICAL CONNECTION
4	ESTABLISH PRESSURIZED INTERFACE	PERSONNEL TRANSFER PATH
5	RELEASE PRESSURIZED INTERFACE	DISCONNECT TUNNEL
6	RELEASE HARD INTERFACE	RELEASE MECHANICAL HOLD-DOWNS
7	DEPARTURE	DEPARTURE PROXIMITY OPERATIONS
8	ORBIT CHANGE	POSITION FOR NEXT OPERATION
9	PERFORM ACTIVITY	EXPERIMENT, SERVICE FUNCTION
10	EVA	
11	UNLOAD PAYLOAD	INCLUDES ALL FUNCTIONS
12	LOAD PAYLOAD	INCLUDES ALL FUNCTIONS

NOTE: IF JOB IS UNSUCCESSFUL, JOB IS LOST. IF MORE JOBS, THEY ARE ATTEMPTED. IF NOT, SYSTEM GOES TO DESCENT PHASE, IF APPLICABLE. PERSONNEL LOST DURING THIS PHASE IS NOT A HIGH PROBABILITY AND HAS BEEN DISCOUNTED. ALSO, ALL SYSTEMS SHOULD EXHIBIT SAME PROBABILITY, SO IT IS NOT A DISCRIMINATOR.

Figure B.1.9.2-32.– On orbit success tree (Continued).



PHASE	DESCRIPTION	COMMENTS
1	ORBIT CHANGE	FROM INSERTION TO TARGET ORBIT
2	RENDEZVOUS	ARRIVAL PROXIMITY OPERATIONS
3	ESTABLISH HARD INTERFACE	MECHANICAL CONNECTION
4	ESTABLISH PRESSURIZED INTERFACE	PERSONNEL TRANSFER PATH
5	RELEASE PRESSURIZED INTERFACE	DISCONNECT TUNNEL
6	RELEASE HARD INTERFACE	RELEASE MECHANICAL HOLD-DOWNS
7	DEPARTURE	DEPARTURE PROXIMITY OPERATIONS
8	ORBIT CHANGE	POSITION FOR NEXT OPERATION
9	PERFORM ACTIVITY	EXPERIMENT, SERVICE FUNCTION
10	EVA	
11	UNLOAD PAYLOAD	INCLUDES ALL FUNCTIONS
12	LOAD PAYLOAD	INCLUDES ALL FUNCTIONS

NOTE: IF JOB IS UNSUCCESSFUL, JOB IS LOST. IF MORE JOBS, THEY ARE ATTEMPTED. IF NOT, SYSTEM GOES TO DESCENT PHASE, IF APPLICABLE. PERSONNEL LOST DURING THIS PHASE IS NOT A HIGH PROBABILITY AND HAS BEEN DISCOUNTED. ALSO, ALL SYSTEMS SHOULD EXHIBIT SAME PROBABILITY, SO IT IS NOT A DISCRIMINATOR.

Figure B.1.9.2-32.– On orbit success tree (Concluded).

B.1.9.3 PMS Flight Phase Equations

Tables B.1.9.3-1 through B.1.9.3-2 show the equations used to generate the PMS values for each flight phase of each system. The flight phases correspond to the success trees shown. Table B.1.9.3-1 defines the equation constants and shows the values used. These are based on historical values.

TABLE B.1.9.3-1.– PMS FLIGHT PHASE EQUATIONS DEFINITION OF CONSTANTS

Constant	Value	Description
AR	0.9999	Reliability of avionics/electronics of total launch system
RL	0.9977	Reliability of liquid engines
RMS	0.99835	Reliability of monolithic solid engines
RRAM	0.9999	Reliability of ramjet engines
RS1	0.9847	Reliability of stage 1 propulsion hardware
RS2	0.9847	Reliability of stage 2 propulsion hardware
RSA	0.9999	Reliability of booster stage avionics/electronics
RSS	0.99213	Reliability of segmented solid engines
RSU	0.9847	Reliability of upper stage
RTF	0.9999	Reliability of turbofan engines

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS

System	Phase	Equations
ALV	1	$RTF^4 * AR^{(1/9)} * RSA$
	2	$AR^{(1/9)} * 0.9999$
	3	$RS1 * AR^{(1/9)} * RL$
	4	$AR^{(1/9)} * 0.99999$
	5	$AR^{(1/9)} * 0.99999$
	6	$AR^{(1/9)} * RL^2 * RS2$
	7	$AR^{(1/9)} * 0.99999$
	8	$AR^{(1/9)} * 0.99999$
	9	$RSU * AR^{(1/9)} * (RL^3 + 3 * RL^2 * (1-RL) + 3 * RL * (1-RL)^2)$
AMLS	1	$AR^{(1/6)} * (RS1^{(1/3)} * (RL^{13} + 13 * (1-RL) * RL^{12} + 78 * (1-RL)^2 * RL^{11})^{(1/3)} * RS1^{(1/2)})^{(1/2)}$
	2	$AR^{(1/6)} * (RS1^{(1/3)} * (RL^{13} + 13 * (1-RL) * RL^{12} + 78 * (1-RL)^2 * RL^{11})^{(1/3)} * RS1^{(1/2)})^{(1/2)}$
	3	$AR^{(1/6)} * 0.9999$
	4	$AR^{(1/6)} * (RS1^{(1/3)} * (RL^8 + 8 * (1-RL) * RL^7 + 28 * (1-RL)^2 * RL^6)^{(1/3)})^{(1/2)}$
	5	$AR^{(1/6)} * 0.9999$
	6	$AR^{(1/6)} * ((RSU^2 + 2 * RSU * (1-RSU))^2 + 2 * (RSU^2 + 2 * RSU * (1-RSU)) * (1-(RSU^2 + 2 * RSU * (1-RSU))))$ $* (RL^3 + 3 * RL^2 * (1-RL) + 3 * RL * (1-RL)^2)$
AMSC	1	$RTF^4 * AR^{(1/7)} * RSA$
	2	$AR^{(1/7)} * 0.9999$
	3	$RS1 * AR^{(1/7)} * RL^3$
	4	$AR^{(1/7)} * 0.99999$
	5	$AR^{(1/7)} * 0.9999$
	6	$AR^{(1/7)} * 0.99999$
	7	$AR^{(1/7)} * ((RL^3 + 3 * RL^2 * (1-RL) + RL * (1-RL)^2) * RSU + (1-(RL^3 + 3 * RL^2 * (1-RL) + RL * (1-RL)^2) * RSU) * RL^4)$

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS (CONTINUED)

System	Phase	Equations
Atlas IIAS	1	$RS1^{(1/5)} * AR^{(1/14)} * (RL^2)^{(1/4)} * RL^{(1/5)} * RMS^2$
	2	$RS1^{(1/5)} * AR^{(1/14)} * (RL^2)^{(1/4)} * RL^{(1/5)}$
	3	$RS1^{(1/5)} * AR^{(1/14)} * (RL^2)^{(1/4)} * RL^{(1/5)} * RMS^2$
	4	$AR^{(1/14)} * 0.9999$
	5	$RS1^{(1/5)} * AR^{(1/14)} * (RL^2)^{(1/4)} * RL^{(1/5)}$
	6	$AR^{(1/14)} * 0.9999$
	7	$RS1^{(1/5)} * AR^{(1/14)} * RL^{(1/5)}$
	8	$AR^{(1/14)} * 0.9999$
	9	$AR^{(1/14)} * 0.9999$
	10	$AR^{(1/14)} * 0.9999$
	11	$RSU * AR^{(1/14)} * RL^2$
	12	$AR^{(1/14)} * 0.9999$
	13	$RSU * AR^{(1/14)} * RL^2$
	14	$AR^{(1/14)} * 0.9999$
Atlas Evolution	1	$RS1^{(1/5)} * AR^{(1/14)} * (RL^2)^{(1/4)} * RL^{(1/5)} * RMS^2$
	2	$RS1^{(1/5)} * AR^{(1/14)} * (RL^2)^{(1/4)} * RL^{(1/5)}$
	3	$RS1^{(1/5)} * AR^{(1/14)} * (RL^2)^{(1/4)} * RL^{(1/5)} * RMS^2$
	4	$AR^{(1/14)} * 0.9999$
	5	$RS1^{(1/5)} * AR^{(1/14)} * (RL^2)^{(1/4)} * RL^{(1/5)}$
	6	$AR^{(1/14)} * 0.9999$
	7	$RS1^{(1/5)} * AR^{(1/14)} * RL^{(1/5)}$
	8	$AR^{(1/14)} * 0.9999$
	9	$AR^{(1/14)} * 0.9999$
	10	$AR^{(1/14)} * 0.9999$
	11	$RSU * AR^{(1/14)} * RL$
	12	$AR^{(1/14)} * 0.9999$
	13	$RSU * AR^{(1/14)} * RL$
	14	$AR^{(1/14)} * 0.9999$

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS (CONTINUED)

System	Phase	Equations
Beta II	1	$(RTF^{10})^{(1/2)} * AR^{(1/7)} * RSA^{(1/3)}$
	2	$(RTF^{10})^{(1/2)} * AR^{(1/7)} * RSA^{(1/3)} * (RRAM^{10})^{(1/2)}$
	3	$(RRAM^{10})^{(1/2)} * AR^{(1/7)} * RSA^{(1/3)}$
	4	$AR^{(1/7)} * 0.9999$
	5	$RS1 * AR^{(1/7)} * RL$
	6	$AR^{(1/7)} * 0.99999$
	7	$AR^{(1/7)} * ((RL^2 + 2 * RL * (1 - RL)) + (1 - (RL^2 + 2 * RL^2 * (1 - RL))) * RL^4 * RSU)$
CLV/MLS-HL	1	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	2	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	3	$AR^{(1/9)} * 0.9999$
	4	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^2 + 2 * (1 - RL) * RL))^{(1/2)}$
	5	$AR^{(1/9)} * 0.9999$
	6	$RSU * AR^{(1/9)} * (RL^3 + 3 * (1 - RL) * RL^2)$
	7	$AR^{(1/9)} * 0.9999$
	8	$AR^{(1/9)} * 0.99999$
	9	$RSU * AR^{(1/9)} * (RL^3 + 3 * RL^2 * (1 - RL) + 3 * RL * (1 - RL)^2)$
Delta	1	$RS1^{(1/3)} * AR^{(1/13)} * RL^{(1/3)} * RMS^6$
	2	$RS1^{(1/3)} * AR^{(1/13)} * RL^{(1/3)} * RMS^3$
	3	$AR^{(1/13)} * 0.9999$
	4	$RS1^{(1/3)} * AR^{(1/13)} * RL^{(1/3)}$
	5	$AR^{(1/13)} * 0.9999$
	6	$AR^{(1/13)} * 0.9999$
	7	$RS2 * AR^{(1/13)} * RL$
	8	$AR^{(1/13)} * 0.9999$
	9	$AR^{(1/13)} * 0.9999$
	10	$RS2 * AR^{(1/13)} * RL$
	11	$AR^{(1/13)} * 0.9999$
	12	$AR^{(1/13)} * RMS$
	13	$AR^{(1/13)} * 0.9999$

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS (CONTINUED)

System	Phase	Equations
MLS-HL	1	$AR^{(1/7)} * (RS1^{(1/3)} * (RL^6 + 6 * (1-RL) * RL^5)^{(1/2)})^{(1/2)}$
	2	$AR^{(1/7)} * (RS1^{(1/3)} * (RL^6 + 6 * (1-RL) * RL^5)^{(1/2)})^{(1/2)}$
	3	$AR^{(1/7)} * 0.9999$
	4	$AR^{(1/7)} * (RS1^{(1/3)} * (RL^2 + 2 * (1-RL) * RL))^{(1/2)}$
	5	$AR^{(1/7)} * 0.9999$
	6	$RS2 * AR^{(1/7)} * (RL^3 + 3 * (1-RL) * RL^2)$
	7	$AR^{(1/7)} * 0.9999$
MLS-HL/CTV	1	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^6 + 6 * (1-RL) * RL^5)^{(1/2)})^{(1/2)}$
	2	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^6 + 6 * (1-RL) * RL^5)^{(1/2)})^{(1/2)}$
	3	$AR^{(1/9)} * 0.9999$
	4	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^2 + 2 * (1-RL) * RL))^{(1/2)}$
	5	$AR^{(1/9)} * 0.9999$
	6	$RSU * AR^{(1/9)} * (RL^3 + 3 * (1-RL) * RL^2)$
	7	$AR^{(1/9)} * 0.9999$
	8	$AR^{(1/9)} * 0.99999$
	9	$RSU * AR^{(1/9)} * RL$
MLS-X	1	$AR^{(1/6)} * (RS1^{(1/2)} * (RL^5 + 5 * (1-RL) * RL^4)^{(1/2)})^{(1/2)}$
	2	$AR^{(1/6)} * (RS1^{(1/3)} * (RL^6 + 6 * (1-RL) * RL^5)^{(1/2)})^{(1/2)}$
	3	$AR^{(1/6)} * 0.9999$
	4	$AR^{(1/6)} * (RS1^{(1/3)} * (RL^2 + 2 * (1-RL) * RL))^{(1/2)}$
	5	$AR^{(1/6)} * 0.9999$
	6	$AR^{(1/6)} * 0.9999$

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS (CONTINUED)

System	Phase	Equations
MLS-X/CTV	1	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	2	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	3	$AR^{(1/9)} * 0.9999$
	4	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^2 + (2 * RL * (1 - RL))))^{(1/2)}$
	5	$AR^{(1/9)} * 0.9999$
	6	$AR^{(1/9)} * 0.9999$
	7	$RSU * AR^{(1/9)} * RL$
	8	$AR^{(1/9)} * 0.9999$
	9	$RSU * AR^{(1/9)} * RL$
NLS-20	1	$AR^{(1/8)} * (RS1^{(1/2)} * RL^{(1/2)})^{(1/2)}$
	2	$AR^{(1/8)} * (RS1^{(1/2)} * RL^{(1/2)})^{(1/2)}$
	3	$AR^{(1/8)} * 0.9999$
	4	$AR^{(1/8)} * 0.9999$
	5	$RSU * AR^{(1/8)} * RL^2$
	6	$AR^{(1/8)} * 0.99999$
	7	$RSU * AR^{(1/8)} * RL^2$
	8	$AR^{(1/8)} * 0.9999$
NLS-50	1	$AR^{(1/6)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	2	$AR^{(1/6)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	3	$AR^{(1/6)} * 0.9999$
	4	$AR^{(1/6)} * (RS1^{(1/3)} * (RL^2 + 2 * RL * (1 - RL)))^{(1/2)}$
	5	$AR^{(1/6)} * 0.9999$
	6	$AR^{(1/6)} * 0.9999$

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS (CONTINUED)

System	Phase	Equations
NLS-50/AUS	1	$AR^{(1/10)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	2	$AR^{(1/10)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	3	$AR^{(1/10)} * 0.9999$
	4	$AR^{(1/10)} * (RS1^{(1/3)} * (RL^2 + 2 * RL * (1 - RL)))^{(1/2)}$
	5	$AR^{(1/10)} * 0.9999$
	6	$AR^{(1/10)} * 0.9999$
	7	$RSU * AR^{(1/10)} * RL^2$
	8	$AR^{(1/10)} * 0.99999$
	9	$RSU * AR^{(1/10)} * RL^2$
	10	$AR^{(1/10)} * 0.9999$
NLS-50/CTV	1	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	2	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	3	$AR^{(1/9)} * 0.9999$
	4	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^2 + 2 * RL * (1 - RL)))^{(1/2)}$
	5	$AR^{(1/9)} * 0.9999$
	6	$AR^{(1/9)} * 0.9999$
	7	$RSU * AR^{(1/9)} * RL$
	8	$AR^{(1/9)} * 0.9999$
	9	$RSU * AR^{(1/9)} * RL$

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS (CONTINUED)

System	Phase	Equations
NLS-HL	1	$AR^{(1/10)} * (RS1^{(1/4)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)})^{(1/2)}$
	2	$AR^{(1/10)} * (RS1^{(1/4)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)})^{(1/2)} * (RSS^2)^{(1/2)}$
	3	$AR^{(1/10)} * (RS1^{(1/4)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)})^{(1/2)} * (RSS^2)^{(1/2)}$
	4	$AR^{(1/10)} * 0.9999$
	5	$AR^{(1/10)} * (RS1^{(1/4)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)})^{(1/2)}$
	6	$AR^{(1/10)} * 0.9999$
	7	$AR^{(1/10)} * 0.9999$
	8	$RSU * AR^{(1/10)} * RL^2$
	9	$AR^{(1/10)} * 0.99999$
	10	$RSU * AR^{(1/10)} * RL^2$
NLS-HL/CRV	1	$AR^{(1/9)} * (RS1^{(1/4)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)})^{(1/2)}$
	2	$AR^{(1/9)} * (RS1^{(1/4)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)})^{(1/2)} * (RSS^2)^{(1/2)}$
	3	$AR^{(1/9)} * (RS1^{(1/4)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)})^{(1/2)} * (RSS^2)^{(1/2)}$
	4	$AR^{(1/9)} * 0.9999$
	5	$AR^{(1/9)} * (RS1^{(1/4)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)})^{(1/2)}$
	6	$AR^{(1/9)} * 0.9999$
	7	$AR^{(1/9)} * ((RL^6 + 6 * RL^5 * (1 - RL) + 15 * RL^4 * (1 - RL)^2 + 18 * RL^3 * (1 - RL)^3 + 3 * RL^2 * (1 - RL)^4) * RSU + (1 - (RL^6 + 6 * RL^5 * (1 - RL) + 15 * RL^4 * (1 - RL)^2 + 18 * RL^3 * (1 - RL)^3 + 3 * RL^2 * (1 - RL)^4) * RSU) * RL^4)$
	8	$AR^{(1/9)} * 0.99999$
	9	$AR^{(1/9)} * ((RL^6 + 6 * RL^5 * (1 - RL) + 15 * RL^4 * (1 - RL)^2 + 18 * RL^3 * (1 - RL)^3 + 3 * RL^2 * (1 - RL)^4) * RSU + (1 - (RL^6 + 6 * RL^5 * (1 - RL) + 15 * RL^4 * (1 - RL)^2 + 18 * RL^3 * (1 - RL)^3 + 3 * RL^2 * (1 - RL)^4) * RSU) * RL^4)$

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS (CONTINUED)

System	Phase	Equations
NLS-HL/CTV	1	$AR^{(1/10)} * (RS1^{(1/4)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)})^{(1/2)}$
	2	$AR^{(1/10)} * (RS1^{(1/4)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)})^{(1/2)} * (RSS^2)^{(1/2)}$
	3	$AR^{(1/10)} * (RS1^{(1/4)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)})^{(1/2)} * (RSS^2)^{(1/2)}$
	4	$AR^{(1/10)} * 0.9999$
	5	$AR^{(1/10)} * (RS1^{(1/4)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)})^{(1/2)}$
	6	$AR^{(1/10)} * 0.9999$
	7	$AR^{(1/10)} * 0.9999$
	8	$RSU * AR^{(1/10)} * RL$
	9	$AR^{(1/10)} * 0.99999$
	10	$RSU * AR^{(1/10)} * RL$
RCV	1	$AR^{(1/8)} * (RS1^{(1/4)} * (RL^3)^{(1/4)})^{(1/2)}$
	2	$AR^{(1/8)} * ((RS1^{(1/4)} * (RL^3)^{(1/4)})^{(1/2)} * ((RL^4 + 4 * (1 - RL) * RL^3)^2)^{(1/2)} * (RS1^2)^{(1/2)}$
	3	$AR^{(1/8)} * ((RS1^{(1/4)} * (RL^3)^{(1/4)})^{(1/2)} * ((RL^4 + 4 * (1 - RL) * RL^3)^2)^{(1/2)} * (RS1^2)^{(1/2)}$
	4	$AR^{(1/8)} * 0.9999$
	5	$AR^{(1/8)} * (RS1^{(1/4)} * (RL^3)^{(1/4)})^{(1/2)}$
	6	$AR^{(1/8)} * 0.9999$
	7	$AR^{(1/8)} * 0.9999$
	8	$AR^{(1/8)} * ((RSU^2 + 2 * RSU * (1 - RSU))^2 + 2 * (RSU^2 + 2 * RSU * (1 - RSU)) * (1 - (RSU^2 + 2 * RSU * (1 - RSU)))) * (RL^3 + 3 * RL^2 * (1 - RL) + 3 * RL * (1 - RL)^2)$
RPC/MLS-HL	1	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	2	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	3	$AR^{(1/9)} * 0.9999$
	4	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^2 + 2 * (1 - RL) * RL))^{(1/2)}$
	5	$AR^{(1/9)} * 0.9999$
	6	$RSU * AR^{(1/9)} * (RL^3 + 3 * (1 - RL) * RL^2)$
	7	$AR^{(1/9)} * 0.9999$
	8	$AR^{(1/9)} * 0.99999$
	9	$RSU * AR^{(1/9)} * (RL^3 + 3 * RL^2 * (1 - RL) + 3 * RL * (1 - RL)^2)$

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS (CONTINUED)

System	Phase	Equations
RPC/ MLS-HL	1	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	2	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	3	$AR^{(1/9)} * 0.9999$
	4	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^2 + 2 * (1 - RL) * RL))^{(1/2)}$
	5	$AR^{(1/9)} * 0.9999$
	6	$RSU * AR^{(1/9)} * (RL^3 + 3 * (1 - RL) * RL^2)$
	7	$AR^{(1/9)} * 0.9999$
	8	$AR^{(1/9)} * 0.99999$
	9	$RSU * AR^{(1/9)} * (RL^3 + 3 * RL^2 * (1 - RL) + 3 * RL * (1 - RL)^2)$
RPC/ MLS-X	1	$AR^{(1/8)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	2	$AR^{(1/8)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	3	$AR^{(1/8)} * 0.9999$
	4	$AR^{(1/8)} * (RS1^{(1/3)} * (RL^2 + 2 * (1 - RL) * RL))^{(1/2)}$
	5	$AR^{(1/8)} * 0.9999$
	6	$RSU * AR^{(1/8)} * (RL^3 + 3 * RL^2 * (1 - RL) + 3 * RL * (1 - RL)^2)$
	7	$AR^{(1/8)} * 0.99999$
	8	$RSU * AR^{(1/8)} * (RL^3 + 3 * RL^2 * (1 - RL) + 3 * RL * (1 - RL)^2)$
RPC/ NLS-50	1	$AR^{(1/8)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	2	$AR^{(1/8)} * (RS1^{(1/3)} * (RL^6 + 6 * (1 - RL) * RL^5)^{(1/2)})^{(1/2)}$
	3	$AR^{(1/8)} * 0.9999$
	4	$AR^{(1/8)} * (RS1^{(1/3)} * (RL^2 + 2 * (1 - RL) * RL))^{(1/2)}$
	5	$AR^{(1/8)} * 0.9999$
	6	$RSU * AR^{(1/8)} * (RL^3 + 3 * RL^2 * (1 - RL) + 3 * RL * (1 - RL)^2)$
	7	$AR^{(1/8)} * 0.99999$
	8	$RSU * AR^{(1/8)} * (RL^3 + 3 * RL^2 * (1 - RL) + 3 * RL * (1 - RL)^2)$

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS (CONTINUED)

System	Phase	Equations
RUPC/ Titan II	1	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^2)^{(1/3)})^{(1/2)}$
	2	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^2)^{(1/3)})^{(1/2)} * RMS^{10}$
	3	$AR^{(1/9)} * 0.9999$
	4	$AR^{(1/9)} * (RS1^{(1/3)} * (RL^2)^{(1/3)})^{(1/2)}$
	5	$AR^{(1/9)} * 0.9999$
	6	$RS2 * AR^{(1/9)} * RL$
	7	$AR^{(1/9)} * 0.9999$
	8	$AR^{(1/9)} * 0.99999$
	9	$AR^{(1/9)} * ((RL^4 + 4 * RL^3 * (1 - RL) + 2 * RL^2 * (1 - RL)^2) * RSU + (1 - (RL^4 + 4 * RL^3 * (1 - RL) + 2 * RL^2 * (1 - RL)^2) * RSU) * RL^4)$
Shuttle	1	$AR^{(1/8)} * (RS1^{(1/4)} * (RL^3)^{(1/4)})^{(1/2)}$
	2	$AR^{(1/8)} * (RS1^{(1/4)} * (RL^3)^{(1/4)})^{(1/2)} * (RSS^2)^{(1/2)}$
	3	$AR^{(1/8)} * (RS1^{(1/4)} * (RL^3)^{(1/4)})^{(1/2)} * (RSS^2)^{(1/2)}$
	4	$AR^{(1/8)} * 0.9999$
	5	$AR^{(1/8)} * (RS1^{(1/4)} * (RL^3)^{(1/4)})^{(1/2)}$
	6	$AR^{(1/8)} * 0.9999$
	7	$AR^{(1/8)} * 0.9999$
	8	$AR^{(1/8)} * ((RSU^2 + 2 * RSU * (1 - RSU))^2 + 2 * (RSU^2 + 2 * RSU * (1 - RSU)) * (1 - (RSU^2 + 2 * RSU * (1 - RSU)))) * (RL^3 + 3 * RL^2 * (1 - RL) + 3 * RL * (1 - RL)^2)$
Shuttle Evolution	1	$AR^{(1/8)} * (RS1^{(1/4)} * (RL^3)^{(1/4)})^{(1/2)}$
	2	$AR^{(1/8)} * (RS1^{(1/4)} * (RL^3)^{(1/4)})^{(1/2)} * ((RL^4 + 4 * (1 - RL) * RL^3)^2)^{(1/2)} * (RS1^2)^{(1/2)}$
	3	$AR^{(1/8)} * (RS1^{(1/4)} * (RL^3)^{(1/4)})^{(1/2)} * ((RL^4 + 4 * (1 - RL) * RL^3)^2)^{(1/2)} * (RS1^2)^{(1/2)}$
	4	$AR^{(1/8)} * 0.9999$
	5	$AR^{(1/8)} * (RS1^{(1/4)} * (RL^3)^{(1/4)})^{(1/2)}$
	6	$AR^{(1/8)} * 0.9999$
	7	$AR^{(1/8)} * 0.9999$
	8	$AR^{(1/8)} * ((RSU^2 + 2 * RSU * (1 - RSU))^2 + 2 * (RSU^2 + 2 * RSU * (1 - RSU)) * (1 - (RSU^2 + 2 * RSU * (1 - RSU)))) * (RL^3 + 3 * RL^2 * (1 - RL) + 3 * RL * (1 - RL)^2)$

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS (CONTINUED)

System	Phase	Equations
SSTO	1	$AR^{(1/4)} * (RS1^{(1/2)} * (RL^{12} + 12 * (1 - RL) * RL^{11})^{(1/2)})^{(1/2)}$
	2	$AR^{(1/4)} * (RS1^{(1/2)} * (RL^{12} + 12 * (1 - RL) * RL^{11})^{(1/2)})^{(1/2)}$
	3	$AR^{(1/4)} * 0.9999$
	4	$RSU * AR^{(1/4)}$
Titan II	1	$RS1^{(1/2)} * AR^{(1/6)} * (RL^2)^{(1/2)}$
	2	$RS1^{(1/2)} * AR^{(1/6)} * (RL^2)^{(1/2)}$
	3	$AR^{(1/6)} * 0.9999$
	4	$RS2 * AR^{(1/6)} * RL$
	5	$AR^{(1/6)} * 0.9999$
	6	$AR^{(1/6)} * 0.9999$
Titan III	1	$AR^{(1/11)} * (RSS^2)^{(1/2)}$
	2	$AR^{(1/11)} * (RSS^2)^{(1/2)}$
	3	$RS1^{(1/2)} * AR^{(1/11)} * (RL^2)^{(1/2)}$
	4	$AR^{(1/11)} * 0.9999$
	5	$RS1^{(1/2)} * AR^{(1/11)} * (RL^2)^{(1/2)}$
	6	$AR^{(1/11)} * 0.9999$
	7	$RS2 * AR^{(1/11)} * RL$
	8	$AR^{(1/11)} * 0.9999$
	9	$AR^{(1/11)} * 0.9999$
	10	$AR^{(1/11)} * 0.9999$

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS (CONTINUED)

System	Phase	Equations
Titan IV	1	$AR^{(1/11)} * (RSS^2)^{(1/2)}$
	2	$AR^{(1/11)} * (RSS^2)^{(1/2)}$
	3	$RS1^{(1/2)} * AR^{(1/11)} * (RL^2)^{(1/2)}$
	4	$AR^{(1/11)} * 0.9999$
	5	$RS1^{(1/2)} * AR^{(1/11)} * (RL^2)^{(1/2)}$
	6	$AR^{(1/11)} * 0.9999$
	7	$RS2 * AR^{(1/11)} * RL$
	8	$AR^{(1/11)} * 0.9999$
	9	$AR^{(1/11)} * 0.9999$
	10	$AR^{(1/11)} * 0.9999$
Titan IV/ Centaur	1	$AR^{(1/13)} * (RSS^2)^{(1/2)}$
	2	$AR^{(1/13)} * (RSS^2)^{(1/2)}$
	3	$RS1^{(1/2)} * AR^{(1/13)} * (RL^2)^{(1/2)}$
	4	$AR^{(1/13)} * 0.9999$
	5	$RS1^{(1/2)} * AR^{(1/13)} * (RL^2)^{(1/2)}$
	6	$AR^{(1/13)} * 0.9999$
	7	$RS2 * AR^{(1/13)} * RL$
	8	$AR^{(1/13)} * 0.9999$
	9	$AR^{(1/13)} * 0.9999$
	10	$RSU * AR^{(1/13)} * RL^2$
	11	$AR^{(1/13)} * 0.9999$
	12	$RSU * AR^{(1/13)} * RL^2$
	13	$AR^{(1/13)} * 0.9999$

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS (CONTINUED)

System	Phase	Equations
Titan IV/CTF	1	$AR^{(1/11)} * (RSS^2)^{(1/2)}$
	2	$AR^{(1/11)} * (RSS^2)^{(1/2)}$
	3	$RS1^{(1/2)} * AR^{(1/11)} * (RL^2)^{(1/2)}$
	4	$AR^{(1/11)} * 0.9999$
	5	$RS1^{(1/2)} * AR^{(1/11)} * (RL^2)^{(1/2)}$
	6	$AR^{(1/11)} * 0.9999$
	7	$RS2 * AR^{(1/11)} * RL$
	8	$AR^{(1/11)} * 0.9999$
	9	$AR^{(1/11)} * 0.9999$
	10	$AR^{(1/11)} * 0.9999$
	11	$AR^{(1/11)} * RSU * RL$
Titan IV/LRV	1	$AR^{(1/11)} * (RSS^2)^{(1/2)}$
	2	$AR^{(1/11)} * (RSS^2)^{(1/2)}$
	3	$RS1^{(1/2)} * AR^{(1/11)} * (RL^2)^{(1/2)}$
	4	$AR^{(1/11)} * 0.9999$
	5	$RS1^{(1/2)} * AR^{(1/11)} * (RL^2)^{(1/2)}$
	6	$AR^{(1/11)} * 0.9999$
	7	$RS2 * AR^{(1/11)} * RL$
	8	$AR^{(1/11)} * 0.9999$
	9	$AR^{(1/11)} * 0.9999$
	10	$AR^{(1/11)} * 0.9999$
	11	$AR^{(1/11)} * (RL^4 + 4 * RL^3 * (1 - RL) + 2 * RL^2 * (1 - RL)^2) * RSU$

TABLE B.1.9.3-2.– PMS FLIGHT PHASE EQUATIONS (CONCLUDED)

System	Phase	Equations
Titan Evolution	1	$RS1^{(1/4)} * AR^{(1/9)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)}$
	2	$RS1^{(1/4)} * AR^{(1/9)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)} * (RSS^2)^{(1/2)}$
	3	$RS1^{(1/4)} * AR^{(1/9)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)} * (RSS^2)^{(1/2)}$
	4	$AR^{(1/9)} * 0.9999$
	5	$RS1^{(1/4)} * AR^{(1/9)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)}$
	6	$AR^{(1/9)} * 0.9999$
	7	$RS2 * AR^{(1/9)} * RL$
	8	$AR^{(1/9)} * 0.99999$
	9	$AR^{(1/9)} * 0.99999$
Titan Evolution/ Centaur	1	$RS1^{(1/4)} * AR^{(1/13)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)}$
	2	$RS1^{(1/4)} * AR^{(1/13)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)} * (RSS^2)^{(1/2)}$
	3	$RS1^{(1/4)} * AR^{(1/13)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)} * (RSS^2)^{(1/2)}$
	4	$AR^{(1/13)} * 0.9999$
	5	$RS1^{(1/4)} * AR^{(1/13)} * (RL^4 + 4 * RL^3 * (1 - RL))^{(1/4)}$
	6	$AR^{(1/13)} * 0.9999$
	7	$RS2 * AR^{(1/13)} * RL$
	8	$AR^{(1/13)} * 0.99999$
	9	$AR^{(1/13)} * 0.99999$
	10	$RSU * AR^{(1/13)} * RL$
	11	$AR^{(1/13)} * 0.9999$
	12	$RSU * AR^{(1/13)} * RL$
	13	$AR^{(1/13)} * 0.9999$

B.1.10 GROUND OPERABILITY ALTERNATE ATTRIBUTE

During the course of the study, an attempt was made to develop a more comprehensive attribute model to describe operability of transportation systems. This was intended to either supplement or replace the Launch Schedule Confidence attribute. Unfortunately, this work was developed too late to be used for the study evaluations. It may be of use for future work and the data has been included here. This model has been developed for KSC by Lockheed (LSOC).

The model is composed of ten complexity factors. These are assessed on either the architecture, system, or element level:

<u>Architecture Level</u>

(1) Number of Flights - total number of flights in the architecture.

(2) System Commonality - ratio of common types flight elements to total types of flight elements.

<u>System Level</u>

(3) Number of Elements - total number of significant flight elements in a launch system.

(4) Crew Rating - rating that distinguishes between launch systems with or without crews.

(5) Processing Concept - rating that distinguishes between the launch site processing concepts such as Integrate on Pad (IOP), Integrate/Transfer/Launch (ITL) and mixed (ITL/IOP).

(6) Number of Fluids - number of fluids for a launch system.

(7) Reliability - predicted level of unscheduled system maintenance (different from PMS).

<u>Element Level</u>

(8) Expendable/Recoverable Hardware - rating that distinguishes between recoverable/refurbishable and expendable flight hardware.

(9) Propellant Type - rating of the type of propellant used by a flight element.

(10) Number of Significant Components - total number of significant components in a flight element.

Each of these factors has a utility curve and a weighting associated with it used to normalize the data so that it can be combined into a single Figure of Merit (FOM) for the architecture. A higher FOM is considered to be better. The utility curves and weighting factors were determined by a team of launch site engineers with operations experience in ground processing through the application of engineering judgment. The weighting factors are as follows:

Number of Flights	14.1%
Number of Significant Components	13.3%
Crew Rating	12.5%
Number of Elements	11.7%
System Commonality	10.8%
Number of Fluids	10.0%
Expendable/Recoverable Hardware	9.2%
Propellant Type	7.5%
Processing Concept	6.7%
Reliability	4.2%

Because the model was developed later in the study, neither the data nor the model itself, including the utility curves and the weightings, has been thoroughly reviewed by the NIT.

B.1.10.1 System Ground Operability Data

Table B.1.10.1 includes data concerning system and element level assessments of each launch system. The system level data includes:

- System FOM - a composite figure of merit for the system and element level data.
- Elements - the number of significant elements in the system and the utility value associated with it. A smaller number of elements is considered better.
- Crew Rating - 1.0 for standard missions not requiring a crew, 0.5 for high value missions not requiring a crew, 0.1 for missions requiring a crew.
- Processing Concept Rating - 1.0 for ITL, 0.5 for ITL/IOP, 0.1 for IOP.
- Fluids - the number of fluids in the system and the utility value associated with it. A smaller number of fluids is considered better.
- Reliability - the predicted level of unscheduled system maintenance and the utility value associated with it. A higher reliability is considered better.

The element level data is assessed on each significant flight element in the system. A system level value is calculated by normalizing the element values with a utility curve and then averaging. The element level data includes:

- Expendable/Recoverable Rating - 1.0 for expendable, 0.5 for reusable.
- Propellant Type Rating - 0 for no propellant, 1 for solid, 2 for hyper mono, 3 for solid/storable, 4 for hyper biprop, 5 for solid cryo, 6 for storable cryo, 7 for cryo-cryo, 8 for others. A lower rating is considered better.
- Significant Components - the number of significant components of the element. A smaller number of components is considered better.

TABLE B.1.10.1.– SYSTEMS GROUND OPERABILITY DATA SUMMARY

System	System FOM	System Level: Elements #	Elements Value	Crew Rating	Proc Cncpt	Fluids #	Fluids Value	Reliability Rel	Reliability Value	Element Level: Elem Num	Expend/Recover Rating	Expend/Recover Value	Propellant Type Type	Propellant Type Value	Sig Components #	Sig Components Value
AMSC	0.6983	6	0.6786	0.1	1.0	8	0.5200	0.9015	0.3773	1	0.5	0.8333	8	0.4188	7	0.8607
										2	1.0		7		1	
										3	1.0		7		1	
										4	0.5		7		8	
										5	1.0		1		1	
										6	1.0		1		1	
Atlas E	0.7908	4	0.8071	1.0	0.1	8	0.5200	0.9460	0.4440	1	1.0	1.0000	6	0.4375	2	0.9036
										2	1.0		6		4	
										3	1.0		8		2	
										4	1.0		0		2	
Atlas I	0.7925	4	0.8071	1.0	0.1	7	0.5800	0.9460	0.4440	1	1.0	1.0000	6	0.4375	2	0.8714
										2	1.0		6		4	
										3	1.0		8		4	
										4	1.0		0		2	
Atlas IIAS	0.7889	8	0.5500	1.0	0.1	7	0.5800	0.9463	0.4445	1	1.0	1.0000	1	0.6625	1	0.9438
										2	1.0		1		1	
										3	1.0		1		1	
										4	1.0		1		1	
										5	1.0		6		2	
										6	1.0		6		3	
										7	1.0		8		4	
										8	1.0		0		2	
Atlas IIAS/CTF	0.7585	9	0.4857	1.0	0.1	9	0.4600	0.9463	0.4445	1	1.0	0.9444	6	0.6000	2	0.9357
										2	1.0		6		3	
										3	1.0		1		1	
										4	1.0		1		1	
										5	1.0		1		1	
										6	1.0		1		1	
										7	1.0		8		4	
										8	0.5		8		3	
										9	1.0		0		2	

TABLE B.1.10.1.– SYSTEMS GROUND OPERABILITY DATA SUMMARY (CONTINUED)

System	System FOM	System Level: Elements #	Elements Value	Crew Rating	Proc Cncpt	Fluids #	Fluids Value	Reliability Rel	Reliability Value	Element Level: Elem Num	Expend/Recover Rating	Expend/Recover Value	Propellant Type Type	Propellant Type Value	Sig Components #	Sig Components Value
Atlas Evolution	0.7900	8	0.5500	1.0	0.1	7	0.5800	0.9463	0.4445	1	1.0	1.0000	1	0.6625	1	0.9518
										2	1.0		1		1	
										3	1.0		1		1	
										4	1.0		1		1	
										5	1.0		6		2	
										6	1.0		6		3	
										7	1.0		8		3	
										8	1.0		0		2	
Beta II	0.6244	2	0.9357	0.1	1.0	8	0.5200	0.9110	0.3915	1	0.5	0.5000	6	0.2688	14	0.3893
										2	0.5		7		7	
CLV/MLS-HL	0.6811	4	0.8071	0.1	1.0	10	0.4000	0.9678	0.6458	1	1.0	0.8750	7	0.1281	4	0.7589
										2	1.0		8		4	
										3	1.0		8		5	
										4	0.5		8		6	
Delta II	0.7678	13	0.2286	1.0	0.1	7	0.5800	0.9241	0.4112	1	1.0	1.0000	1	0.8269	1	0.9852
										2	1.0		1		1	
										3	1.0		1		1	
										4	1.0		1		1	
										5	1.0		1		1	
										6	1.0		1		1	
										7	1.0		1		1	
										8	1.0		1		1	
										9	1.0		1		1	
										10	1.0		6		2	
										11	1.0		4		2	
										12	1.0		1		1	
										13	1.0		0		2	

TABLE B.1.10.1.– SYSTEMS GROUND OPERABILITY DATA SUMMARY (CONTINUED)

System	System FOM	System Level: Elements #	Elements Value	Crew Rating	Proc Cncpt	Fluids #	Fluids Value	Reliability Rel	Reliability Value	Element Level: Elem Num	Expend/Recover Rating	Expend/Recover Value	Propellant Type Type	Propellant Type Value	Sig Components #	Sig Components Value
Delta II/CTF	0.7400	14	0.1643	1.0	0.1	9	0.4600	0.9241	0.4112	1	1.0	0.9643	1	0.7750	1	0.9770
										2	1.0		1		1	
										3	1.0		1		1	
										4	1.0		1		1	
										5	1.0		1		1	
										6	1.0		1		1	
										7	1.0		1		1	
										8	1.0		1		1	
										9	1.0		1		1	
										10	1.0		6		2	
										11	1.0		4		2	
										12	1.0		1		1	
										13	0.5		8		3	
										14	1.0		0		2	
MLS-HL	0.7860	4	0.8071	0.5	1.0	7	0.5800	0.9678	0.6458	1	1.0	1.0000	7	0.3531	4	0.8232
										2	1.0		8		4	
										3	1.0		8		5	
										4	1.0		0		2	
MLS-HL/CRV	0.7407	4	0.8071	0.5	1.0	8	0.5200	0.8405	0.2858	1	1.0	0.8750	7	0.2406	4	0.7911
										2	1.0		8		4	
										3	1.0		8		5	
										4	0.5		4		4	
MLS-X	0.8719	3	0.8714	1.0	1.0	6	0.6400	0.9678	0.6458	1	1.0	1.0000	7	0.4375	4	0.8500
										2	1.0		8		4	
										3	1.0		0		2	
NLS-20	0.8836	3	0.8714	1.0	1.0	5	0.7000	0.9678	0.6458	1	1.0	1.0000	8	0.4375	4	0.8929
										2	1.0		7		2	
										3	1.0		0		2	

TABLE B.1.10.1.– SYSTEMS GROUND OPERABILITY DATA SUMMARY
(CONTINUED)

		System Level								Element Level						
		Elements		Crew	Proc	Fluids		Reliability		Elem	Expend/Recover		Propellant Type		Sig Components	
System	System FOM	#	Value	Rating	Cncpt	#	Value	Rel	Value	Num	Rating	Value	Type	Value	#	Value
NLS-50	0.8719	3	0.8714	1.0	1.0	6	0.6400	0.9678	0.6458	1	1.0	1.0000	7	0.4375	4	0.8500
										2	1.0		8		4	
										3	1.0		0		2	
NLS-50/AUS	0.8609	4	0.8071	1.0	1.0	6	0.6400	0.9678	0.6458	1	1.0	1.0000	7	0.3813	4	0.8554
										2	1.0		8		4	
										3	1.0		7		3	
										4	1.0		0		2	
NLS-50/CTV	0.8672	4	0.8071	1.0	1.0	6	0.6400	0.9678	0.6458	1	1.0	1.0000	7	0.4656	4	0.8554
										2	1.0		8		4	
										3	1.0		4		3	
										4	1.0		0		2	
NLS-HL	0.7696	4	0.8071	0.5	1.0	8	0.5200	0.9678	0.6458	1	0.5	0.7500	3	0.6344	6	0.7589
										2	0.5		3		6	
										3	1.0		7		5	
										4	1.0		0		2	
NLS-HL/CRV	0.7182	4	0.8071	0.5	1.0	10	0.4000	0.8405	0.2858	1	0.5	0.6250	3	0.5219	6	0.7268
										2	0.5		3		6	
										3	1.0		7		5	
										4	0.5		4		4	
NLS-HL/CTV	0.7684	5	0.7429	0.5	1.0	8	0.5200	0.9678	0.6458	1	0.5	0.8000	3	0.6175	6	0.7814
										2	0.5		3		6	
										3	1.0		7		5	
										4	1.0		4		3	
										5	1.0		0		2	
RCV	0.6752	4	0.8071	0.5	0.5	10	0.4000	0.7545	0.1568	1	0.5	0.6250	3	0.4094	5	0.7589
										2	0.5		3		5	
										3	1.0		7		1	
										4	0.5		8		8	

TABLE B.1.10.1.– SYSTEMS GROUND OPERABILITY DATA SUMMARY (CONTINUED)

System	System FOM	System Level: Elements #	Elements Value	Crew Rating	Proc Cncpt	Fluids #	Fluids Value	Reliability Rel	Reliability Value	Element Level: Elem Num	Expend/Recover Rating	Expend/Recover Value	Propellant Type Type	Propellant Type Value	Sig Components #	Sig Components Value
RPC/HR Titan IV	0.6547	5	0.7429	0.1	0.5	13	0.2200	0.9292	0.4188	1	1.0	0.9000	3	0.5050	3	0.8457
										2	1.0		3		3	
										3	1.0		4		3	
										4	1.0		4		2	
										5	0.5		8		6	
RPC/MLS-HL/LRV	0.6511	5	0.7429	0.1	1.0	12	0.2800	0.9292	0.4188	1	1.0	0.8000	7	0.2125	4	0.7557
										2	1.0		8		4	
										3	1.0		8		5	
										4	0.5		4		5	
										5	0.5		8		6	
RPC/MLS-X	0.6707	3	0.8714	0.1	1.0	11	0.3400	0.9292	0.4188	1	1.0	0.8333	7	0.1375	4	0.7643
										2	1.0		8		4	
										3	0.5		8		6	
RPC/NLS-50	0.6707	3	0.8714	0.1	1.0	11	0.3400	0.9292	0.4188	1	1.0	0.8333	7	0.1375	4	0.7643
										2	1.0		8		4	
										3	0.5		8		6	
RUPC/Titan II	0.6920	13	0.2286	0.1	0.5	6	0.6400	0.9678	0.6458	1	1.0	1.0000	1	0.7750	1	0.9703
										2	1.0		1		1	
										3	1.0		1		1	
										4	1.0		1		1	
										5	1.0		1		1	
										6	1.0		1		1	
										7	1.0		1		1	
										8	1.0		1		1	
										9	1.0		1		1	
										10	1.0		1		1	
										11	1.0		4		3	
										12	1.0		4		2	
										13	1.0		8		4	

TABLE B.1.10.1.– SYSTEMS GROUND OPERABILITY DATA SUMMARY
(CONTINUED)

System	System FOM	System Level								Element Level						
		Elements		Crew Rating	Proc Cncpt	Fluids		Reliability		Elem Num	Expend/Recover		Propellant Type		Sig Components	
		#	Value			#	Value	Rel	Value		Rating	Value	Type	Value	#	Value
Shuttle	0.6149	4	0.8071	0.1	0.5	11	0.3400	0.7545	0.1568	1 2 3 4	0.5 0.5 1.0 0.5	0.6250	3 3 7 8	0.4094	6 6 1 8	0.7268
Shuttle Evolution	0.6295	4	0.8071	0.1	0.5	9	0.4600	0.7598	0.1647	1 2 3 4	0.5 0.5 1.0 0.5	0.6250	5 5 7 8	0.2969	3 3 1 9	0.8071
SSTO	0.5947	1	1.0000	0.1	1.0	7	0.5800	0.9031	0.3797	1	0.5	0.5000	7	0.2125	18	0.1000
Titan II	0.8459	3	0.8714	1.0	0.1	5	0.7000	0.9678	0.6458	1 2 3	1.0 1.0 1.0	1.0000	4 4 0	0.7000	3 2 2	0.9143
Titan III	0.8423	5	0.7429	1.0	0.5	5	0.7000	0.9678	0.6458	1 2 3 4 5	1.0 1.0 1.0 1.0 1.0	1.0000	3 3 4 4 0	0.6850	6.5 6.5 3 2 2	0.8071
Titan IV	0.8371	5	0.7429	1.0	0.5	5	0.7000	0.9678	0.6458	1 2 3 4 5	1.0 1.0 1.0 1.0 1.0	1.0000	3 3 4 4 0	0.6850	8 8 3 2 2	0.7686
Titan IV/Centaur	0.7427	6	0.6786	0.5	0.5	8	0.5200	0.9678	0.6458	1 2 3 4 5 6	1.0 1.0 1.0 1.0 1.0 1.0	1.0000	3 3 4 4 8 0	0.5875	8 8 3 2 4 2	0.7750

TABLE B.1.10.1.– SYSTEMS GROUND OPERABILITY DATA SUMMARY
(CONCLUDED)

System	System FOM	System Level: Elements #	Elements Value	Crew Rating	Proc Cncpt	Fluids #	Fluids Value	Reliability Rel	Reliability Value	Element Level: Elem Num	Expend/Recover Rating	Expend/Recover Value	Propellant Type Type	Propellant Type Value	Sig Components #	Sig Components Value
Titan IV/CTF	0.7326	7	0.6143	0.5	0.5	9	0.4600	0.9678	0.6458	1	1.0	0.9286	3	0.5179	3	0.8898
										2	1.0		3		3	
										3	1.0		4		3	
										4	1.0		4		2	
										5	1.0		8		3	
										6	0.5		8		3	
										7	1.0		0		2	
Titan IV/CTF/LRV	0.7042	7	0.6143	0.5	0.5	10	0.4000	0.9439	0.4409	1	1.0	0.8571	3	0.4536	3	0.8714
										2	1.0		3		3	
										3	1.0		4		3	
										4	1.0		4		2	
										5	1.0		8		3	
										6	0.5		8		3	
										7	0.5		4		4	
Titan Evolution	0.7583	6	0.6786	0.5	0.5	8	0.5200	0.9678	0.6458	1	1.0	1.0000	3	0.5875	3	0.8929
										2	1.0		3		3	
										3	1.0		4		3	
										4	1.0		4		2	
										5	1.0		8		3	
										6	1.0		0		2	
Titan Evol/Centaur	0.7583	6	0.6786	0.5	0.5	8	0.5200	0.9678	0.6458	1	1.0	1.0000	3	0.5875	3	0.8929
										2	1.0		3		3	
										3	1.0		4		3	
										4	1.0		4		2	
										5	1.0		8		3	
										6	1.0		0		2	

B.1.10.2 Architecture Ground Operability Data

Tables B.1.10.2-1 through B.1.10.2-6 include data for each of the architectures by "If" Scenario. The data includes:

- Architecture FOM - the figure of merit, or score, for the architecture.
- Flights - the total number of flights in the architecture and the utility value associated with it. A smaller number of flights is considered better.
- System Commonality - the system commonality ratio and the utility value associated with it. Higher ratios are considered better.

A list of each system in the architecture is also included. It shows the number of flights of the system, the system's figure of merit, and the contribution of the system's figure of merit to the total architecture figure of merit. The contribution is based on the number of flights and the weighting factors.

TABLE B.1.10.2-1.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO A

Arch	Arch FOM	Architecture Level: Flights #	Architecture Level: Flights Value	Architecture Level: Sys Commonality Ratio	Architecture Level: Sys Commonality Value	System/Element Level: System	System/Element Level: Flights	FOM: System	FOM: Rel Val
1A	0.6730	645	0.8695	0.649	0.2767	Atlas E	2	0.7908	0.0017
						Atlas I	4	0.7925	0.0034
						Atlas IIAS	88	0.7889	0.0737
						Delta II	192	0.7678	0.1544
						Shuttle	76	0.6149	0.0431
						Titan II	42	0.8459	0.0389
						Titan III	1	0.8423	0.0009
						Titan IV	142	0.8371	0.1295
						Titan IV/Centaur	98	0.7427	0.0750
2A	0.7219	645	0.8695	1.133	0.8144	Atlas E	2	0.7908	0.0017
						Atlas I	4	0.7925	0.0034
						Atlas IIAS	30	0.7889	0.0251
						Atlas Evolution	58	0.7900	0.0486
						Delta II	192	0.7678	0.1544
						Shuttle	26	0.6149	0.0147
						Shuttle Evolution	50	0.6295	0.0295
						Titan II	42	0.8459	0.0389
						Titan III	1	0.8423	0.0009
						Titan IV	42	0.8371	0.0383
						Titan IV/Centaur	24	0.7427	0.0184
						Titan Evolution	100	0.7583	0.0790
						Titan Evol/Centaur	74	0.7583	0.0584
3A	0.6748	635	0.8785	0.457	0.0633	Atlas E	2	0.7908	0.0017
						Atlas I	4	0.7925	0.0034
						Atlas IIAS	43	0.7889	0.0366
						Delta II	192	0.7678	0.1569
						NLS-20	64	0.8836	0.0640
						NLS-50	78	0.8719	0.0765
						NLS-50/AUS	73	0.8609	0.0703
						NLS-HL	10	0.7696	0.0082
						Shuttle	76	0.6149	0.0438
						Titan II	23	0.8459	0.0216
						Titan III	1	0.8423	0.0009
						Titan IV	44	0.8371	0.0408
						Titan IV/Centaur	25	0.7427	0.0194
4A	0.6748	635	0.8785	0.457	0.0633	Atlas E	2	0.7908	0.0017
						Atlas I	4	0.7925	0.0034
						Atlas IIAS	43	0.7889	0.0366
						Delta II	192	0.7678	0.1569
						NLS-20	64	0.8836	0.0640
						NLS-50	78	0.8719	0.0765
						NLS-50/AUS	73	0.8609	0.0703
						NLS-HL	10	0.7696	0.0082
						Shuttle	76	0.6149	0.0438
						Titan II	23	0.8459	0.0216
						Titan III	1	0.8423	0.0009
						Titan IV	44	0.8371	0.0408
						Titan IV/Centaur	25	0.7427	0.0194

TABLE B.1.10.2-1.–ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO A (CONTINUED)

Arch	Arch FOM	Architecture Level				System/Element Level			
		Flights		Sys Commonality		System	Flights	FOM	
		#	Value	Ratio	Value			System	Rel Val
5A	0.6901	635	0.8785	0.667	0.2967	Atlas E	2	0.7908	0.0017
						Atlas I	4	0.7925	0.0034
						Atlas IIAS	88	0.7889	0.0748
						CLV/MLS-HL	50	0.6811	0.0340
						Delta II	192	0.7678	0.1569
						MLS-HL	75	0.7860	0.0634
						MLS-X	86	0.8719	0.0844
						Shuttle	26	0.6149	0.0150
						Titan II	42	0.8459	0.0395
						Titan III	1	0.8423	0.0009
						Titan IV	44	0.8371	0.0408
						Titan IV/Centaur	25	0.7427	0.0194
6A	0.6868	687	0.8317	0.726	0.3622	Atlas E	2	0.7908	0.0016
						Atlas I	4	0.7925	0.0032
						Atlas IIAS	88	0.7889	0.0692
						Delta II	192	0.7678	0.1450
						MLS-HL	75	0.7860	0.0586
						MLS-HL/CRV	52	0.7407	0.0372
						MLS-X	86	0.8719	0.0780
						RPC/MLS-X	52	0.6707	0.0319
						Shuttle	24	0.6149	0.0128
						Titan II	42	0.8459	0.0365
						Titan III	1	0.8423	0.0009
						Titan IV	44	0.8371	0.0377
						Titan IV/Centaur	25	0.7427	0.0180
7A	0.6837	635	0.8785	0.633	0.2589	Atlas E	2	0.7908	0.0017
						Atlas I	4	0.7925	0.0034
						Atlas IIAS	88	0.7889	0.0748
						Delta II	192	0.7678	0.1569
						MLS-HL	75	0.7860	0.0634
						MLS-X	86	0.8719	0.0844
						RPC/MLS-HL/LRV	50	0.6511	0.0317
						Shuttle	26	0.6149	0.0150
						Titan II	42	0.8459	0.0395
						Titan III	1	0.8423	0.0009
						Titan IV	44	0.8371	0.0408
						Titan IV/Centaur	25	0.7427	0.0194
8A	0.6281	645	0.8695	0.632	0.2578	Atlas E	2	0.7908	0.0017
						Atlas I	4	0.7925	0.0034
						Atlas IIAS	67	0.7889	0.0561
						Delta II	101	0.7678	0.0812
						Shuttle	24	0.6149	0.0136
						SSTO	191	0.5947	0.1024
						Titan II	15	0.8459	0.0139
						Titan III	1	0.8423	0.0009
						Titan IV	142	0.8371	0.1295
						Titan IV/Centaur	98	0.7427	0.0750

TABLE B.1.10.2-1.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO A (CONTINUED)

		Architecture Level				System/Element Level			
	Arch	Flights		Sys Commonality				FOM	
Arch	FOM	#	Value	Ratio	Value	System	Flights	System	Rel Val
11A	0.6707	635	0.8785	0.488	0.0978	Atlas E	2	0.7908	0.0017
						Atlas I	4	0.7925	0.0034
						Atlas IIAS	88	0.7889	0.0748
						Delta II	192	0.7678	0.1569
						NLS-50	78	0.8719	0.0765
						NLS-50/AUS	73	0.8609	0.0703
						NLS-HL	10	0.7696	0.0082
						Shuttle	76	0.6149	0.0438
						Titan II	42	0.8459	0.0395
						Titan III	1	0.8423	0.0009
						Titan IV	44	0.8371	0.0408
						Titan IV/Centaur	25	0.7427	0.0194
12A	0.6707	635	0.8785	0.488	0.0978	Atlas E	2	0.7908	0.0017
						Atlas I	4	0.7925	0.0034
						Atlas IIAS	88	0.7889	0.0748
						Delta II	192	0.7678	0.1569
						NLS-50	78	0.8719	0.0765
						NLS-50/AUS	73	0.8609	0.0703
						NLS-HL	10	0.7696	0.0082
						Shuttle	76	0.6149	0.0438
						Titan II	42	0.8459	0.0395
						Titan III	1	0.8423	0.0009
						Titan IV	44	0.8371	0.0408
						Titan IV/Centaur	25	0.7427	0.0194
13A	0.6707	635	0.8785	0.488	0.0978	Atlas E	2	0.7908	0.0017
						Atlas I	4	0.7925	0.0034
						Atlas IIAS	88	0.7889	0.0748
						Delta II	192	0.7678	0.1569
						NLS-50	78	0.8719	0.0765
						NLS-50/AUS	73	0.8609	0.0703
						NLS-HL	10	0.7696	0.0082
						Shuttle	76	0.6149	0.0438
						Titan II	42	0.8459	0.0395
						Titan III	1	0.8423	0.0009
						Titan IV	44	0.8371	0.0408
						Titan IV/Centaur	25	0.7427	0.0194
14A	0.6730	645	0.8695	0.649	0.2767	Atlas E	2	0.7908	0.0017
						Atlas I	4	0.7925	0.0034
						Atlas IIAS	88	0.7889	0.0737
						Delta II	192	0.7678	0.1544
						Shuttle	76	0.6149	0.0431
						Titan II	42	0.8459	0.0389
						Titan III	1	0.8423	0.0009
						Titan IV	142	0.8371	0.1295
						Titan IV/Centaur	98	0.7427	0.0750

TABLE B.1.10.2-1.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO A (CONCLUDED)

		Architecture Level				System/Element Level			
	Arch	Flights		Sys Commonality				FOM	
Arch	FOM	#	Value	Ratio	Value	System	Flights	System	Rel Val
16A	0.6685	651	0.8641	0.585	0.2056	AMSC	42	0.6983	0.0290
						Atlas E	2	0.7908	0.0017
						Atlas I	4	0.7925	0.0033
						Atlas IIAS	88	0.7889	0.0730
						Delta II	192	0.7678	0.1530
						Shuttle	40	0.6149	0.0225
						Titan II	42	0.8459	0.0385
						Titan III	1	0.8423	0.0009
						Titan IV	142	0.8371	0.1283
						Titan IV/Centaur	98	0.7427	0.0743
17A	0.7288	723	0.7993	1.208	0.8978	Atlas E	2	0.7908	0.0015
						Atlas I	4	0.7925	0.0030
						Atlas IIAS	88	0.7889	0.0657
						Delta II	192	0.7678	0.1378
						RUPC/Titan II	63	0.6920	0.0386
						Shuttle	28	0.6149	0.0142
						Titan II	42	0.8459	0.0347
						Titan III	1	0.8423	0.0008
						Titan IV	142	0.8371	0.1155
						Titan IV/Centaur	98	0.7427	0.0669
						Titan IV/CTF	21	0.7326	0.0140
						Titan IV/CTF/LRV	42	0.7042	0.0264
18A	0.6442	645	0.8695	0.615	0.2389	Atlas E	2	0.7908	0.0017
						Atlas I	4	0.7925	0.0034
						Atlas IIAS	72	0.7889	0.0603
						Beta II	138	0.6244	0.0803
						Delta II	126	0.7678	0.1013
						Shuttle	39	0.6149	0.0221
						Titan II	23	0.8459	0.0213
						Titan III	1	0.8423	0.0009
						Titan IV	142	0.8371	0.1295
						Titan IV/Centaur	98	0.7427	0.0750

TABLE B.1.10.2-2.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO B

Arch	Arch FOM	Architecture Level: Flights #	Flights Value	Sys Commonality Ratio	Sys Commonality Value	System/Element Level: System	Flights	FOM System	FOM Rel Val
1B	0.6483	717	0.8047	0.649	0.2767	Atlas E	2	0.7908	0.0015
						Atlas I	4	0.7925	0.0030
						Atlas IIAS	88	0.7889	0.0663
						Delta II	192	0.7678	0.1389
						Shuttle	148	0.6149	0.0755
						Titan II	42	0.8459	0.0350
						Titan III	1	0.8423	0.0008
						Titan IV	142	0.8371	0.1165
						Titan IV/Centaur	98	0.7427	0.0675
2B	0.7012	709	0.8119	1.133	0.8144	Atlas E	2	0.7908	0.0015
						Atlas I	4	0.7925	0.0031
						Atlas IIAS	30	0.7889	0.0228
						Atlas Evolution	58	0.7900	0.0443
						Delta II	192	0.7678	0.1405
						Shuttle	63	0.6149	0.0325
						Shuttle Evolution	77	0.6295	0.0413
						Titan II	42	0.8459	0.0354
						Titan III	1	0.8423	0.0008
						Titan IV	42	0.8371	0.0348
						Titan IV/Centaur	24	0.7427	0.0167
						Titan Evolution	100	0.7583	0.0718
						Titan Evol/Centaur	74	0.7583	0.0532
3B	0.6475	707	0.8137	0.457	0.0633	Atlas E	2	0.7908	0.0015
						Atlas I	4	0.7925	0.0031
						Atlas IIAS	43	0.7889	0.0328
						Delta II	192	0.7678	0.1409
						NLS-20	64	0.8836	0.0575
						NLS-50	78	0.8719	0.0687
						NLS-50/AUS	73	0.8609	0.0632
						NLS-HL	10	0.7696	0.0074
						Shuttle	148	0.6149	0.0766
						Titan II	23	0.8459	0.0194
						Titan III	1	0.8423	0.0008
						Titan IV	44	0.8371	0.0366
						Titan IV/Centaur	25	0.7427	0.0175
4B	0.6475	707	0.8137	0.457	0.0633	Atlas E	2	0.7908	0.0015
						Atlas I	4	0.7925	0.0031
						Atlas IIAS	43	0.7889	0.0328
						Delta II	192	0.7678	0.1409
						NLS-20	64	0.8836	0.0575
						NLS-50	78	0.8719	0.0687
						NLS-50/AUS	73	0.8609	0.0632
						NLS-HL	10	0.7696	0.0074
						Shuttle	148	0.6149	0.0766
						Titan II	23	0.8459	0.0194
						Titan III	1	0.8423	0.0008
						Titan IV	44	0.8371	0.0366
						Titan IV/Centaur	25	0.7427	0.0175

TABLE B.1.10.2-2.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO B (CONTINUED)

Arch	Arch FOM	Architecture Level: Flights #	Architecture Level: Flights Value	Architecture Level: Sys Commonality Ratio	Architecture Level: Sys Commonality Value	System/Element Level: System	Flights	FOM System	FOM Rel Val
5B	0.6537	761	0.7651	0.667	0.2967	Atlas E	2	0.7908	0.0014
						Atlas I	4	0.7925	0.0029
						Atlas IIAS	88	0.7889	0.0624
						CLV/MLS-HL	136	0.6811	0.0772
						Delta II	192	0.7678	0.1309
						MLS-HL	75	0.7860	0.0529
						MLS-X	86	0.8719	0.0704
						Shuttle	66	0.6149	0.0317
						Titan II	42	0.8459	0.0329
						Titan III	1	0.8423	0.0008
						Titan IV	44	0.8371	0.0340
						Titan IV/Centaur	25	0.7427	0.0162
6B	0.6525	826	0.7066	0.726	0.3622	Atlas E	2	0.7908	0.0013
						Atlas I	4	0.7925	0.0026
						Atlas IIAS	88	0.7889	0.0575
						Delta II	192	0.7678	0.1206
						MLS-HL	75	0.7860	0.0488
						MLS-HL/CRV	102	0.7407	0.0607
						MLS-X	86	0.8719	0.0649
						RPC/MLS-X	102	0.6707	0.0521
						Shuttle	63	0.6149	0.0279
						Titan II	42	0.8459	0.0303
						Titan III	1	0.8423	0.0007
						Titan IV	44	0.8371	0.0313
						Titan IV/Centaur	25	0.7427	0.0149
7B	0.6332	804	0.7264	0.633	0.2589	Atlas E	2	0.7908	0.0013
						Atlas I	4	0.7925	0.0027
						Atlas IIAS	88	0.7889	0.0591
						Delta II	192	0.7678	0.1239
						MLS-HL	75	0.7860	0.0501
						MLS-X	86	0.8719	0.0666
						RPC/MLS-HL/LRV	180	0.6511	0.0900
						Shuttle	65	0.6149	0.0296
						Titan II	42	0.8459	0.0312
						Titan III	1	0.8423	0.0007
						Titan IV	44	0.8371	0.0322
						Titan IV/Centaur	25	0.7427	0.0153
8B	0.5770	833	0.7003	0.632	0.2578	Atlas E	2	0.7908	0.0013
						Atlas I	4	0.7925	0.0026
						Atlas IIAS	70	0.7889	0.0454
						Delta II	105	0.7678	0.0654
						Shuttle	66	0.6149	0.0290
						SSTO	330	0.5947	0.1369
						Titan II	15	0.8459	0.0107
						Titan III	1	0.8423	0.0007
						Titan IV	142	0.8371	0.1003
						Titan IV/Centaur	98	0.7427	0.0581

TABLE B.1.10.2-2.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO B (CONTINUED)

		Architecture Level				System/Element Level			
	Arch	Flights		Sys Commonality				FOM	
Arch	FOM	#	Value	Ratio	Value	System	Flights	System	Rel Val
11B	0.6442	707	0.8137	0.488	0.0978	Atlas E	2	0.7908	0.0015
						Atlas I	4	0.7925	0.0031
						Atlas IIAS	88	0.7889	0.0672
						Delta II	192	0.7678	0.1409
						NLS-50	78	0.8719	0.0687
						NLS-50/AUS	73	0.8609	0.0632
						NLS-HL	10	0.7696	0.0074
						Shuttle	148	0.6149	0.0766
						Titan II	42	0.8459	0.0355
						Titan III	1	0.8423	0.0008
						Titan IV	44	0.8371	0.0366
						Titan IV/Centaur	25	0.7427	0.0175
12B	0.6442	707	0.8137	0.488	0.0978	Atlas E	2	0.7908	0.0015
						Atlas I	4	0.7925	0.0031
						Atlas IIAS	88	0.7889	0.0672
						Delta II	192	0.7678	0.1409
						NLS-50	78	0.8719	0.0687
						NLS-50/AUS	73	0.8609	0.0632
						NLS-HL	10	0.7696	0.0074
						Shuttle	148	0.6149	0.0766
						Titan II	42	0.8459	0.0355
						Titan III	1	0.8423	0.0008
						Titan IV	44	0.8371	0.0366
						Titan IV/Centaur	25	0.7427	0.0175
13B	0.6442	707	0.8137	0.488	0.0978	Atlas E	2	0.7908	0.0015
						Atlas I	4	0.7925	0.0031
						Atlas IIAS	88	0.7889	0.0672
						Delta II	192	0.7678	0.1409
						NLS-50	78	0.8719	0.0687
						NLS-50/AUS	73	0.8609	0.0632
						NLS-HL	10	0.7696	0.0074
						Shuttle	148	0.6149	0.0766
						Titan II	42	0.8459	0.0355
						Titan III	1	0.8423	0.0008
						Titan IV	44	0.8371	0.0366
						Titan IV/Centaur	25	0.7427	0.0175
14B	0.6483	717	0.8047	0.649	0.2767	Atlas E	2	0.7908	0.0015
						Atlas I	4	0.7925	0.0030
						Atlas IIAS	88	0.7889	0.0663
						Delta II	192	0.7678	0.1389
						Shuttle	148	0.6149	0.0755
						Titan II	42	0.8459	0.0350
						Titan III	1	0.8423	0.0008
						Titan IV	142	0.8371	0.1165
						Titan IV/Centaur	98	0.7427	0.0675

TABLE B.1.10.2-2.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO B (CONCLUDED)

Arch	Arch FOM	Architecture Level				System/Element Level			
		Flights		Sys Commonality				FOM	
		#	Value	Ratio	Value	System	Flights	System	Rel Val
16B	0.6038	943	0.6013	0.585	0.2056	AMSC	285	0.6983	0.1358
						Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0023
						Atlas IIAS	88	0.7889	0.0504
						Delta II	192	0.7678	0.1056
						Shuttle	89	0.6149	0.0345
						Titan II	42	0.8459	0.0266
						Titan III	1	0.8423	0.0006
						Titan IV	142	0.8371	0.0886
						Titan IV/Centaur	98	0.7427	0.0513
17B	0.6799	951	0.5941	1.208	0.8978	Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0023
						Atlas IIAS	88	0.7889	0.0500
						Delta II	192	0.7678	0.1047
						RUPC/Titan II	158	0.6920	0.0736
						Shuttle	66	0.6149	0.0254
						Titan II	42	0.8459	0.0264
						Titan III	1	0.8423	0.0006
						Titan IV	142	0.8371	0.0878
						Titan IV/Centaur	98	0.7427	0.0509
						Titan IV/CTF	24	0.7326	0.0122
						Titan IV/CTF/LRV	134	0.7042	0.0641
18B	0.6121	757	0.7687	0.615	0.2389	Atlas E	2	0.7908	0.0014
						Atlas I	4	0.7925	0.0029
						Atlas IIAS	73	0.7889	0.0521
						Beta II	211	0.6244	0.1046
						Delta II	127	0.7678	0.0870
						Shuttle	76	0.6149	0.0367
						Titan II	23	0.8459	0.0181
						Titan III	1	0.8423	0.0008
						Titan IV	142	0.8371	0.1103
						Titan IV/Centaur	98	0.7427	0.0639

TABLE B.1.10.2-3.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO C

Arch	Arch FOM	Architecture Level: Flights #	Architecture Level: Flights Value	Architecture Level: Sys Commonality Ratio	Architecture Level: Sys Commonality Value	System/Element Level: System	System/Element Level: Flights	FOM: System	FOM: Rel Val
1C	0.6047	869	0.6679	0.649	0.2767	Atlas E	2	0.7908	0.0012
						Atlas I	4	0.7925	0.0025
						Atlas IIAS	88	0.7889	0.0547
						Delta II	192	0.7678	0.1146
						Shuttle	300	0.6149	0.1263
						Titan II	42	0.8459	0.0288
						Titan III	1	0.8423	0.0007
						Titan IV	142	0.8371	0.0961
						Titan IV/Centaur	98	0.7427	0.0557
2C	0.6538	896	0.6436	1.111	0.7900	Atlas E	2	0.7908	0.0012
						Atlas I	4	0.7925	0.0024
						Atlas IIAS	30	0.7889	0.0181
						Atlas Evolution	58	0.7900	0.0350
						Delta II	192	0.7678	0.1112
						RCV	83	0.6752	0.0395
						Shuttle	97	0.6149	0.0396
						Shuttle Evolution	147	0.6295	0.0624
						Titan II	42	0.8459	0.0280
						Titan III	1	0.8423	0.0007
						Titan IV	42	0.8371	0.0276
						Titan IV/Centaur	24	0.7427	0.0132
						Titan Evolution	100	0.7583	0.0568
						Titan Evol/Centaur	74	0.7583	0.0421
3C	0.6111	925	0.6175	0.52	0.1333	Atlas E	2	0.7908	0.0012
						Atlas I	4	0.7925	0.0024
						Atlas IIAS	43	0.7889	0.0251
						Delta II	192	0.7678	0.1077
						NLS-20	64	0.8836	0.0439
						NLS-50	78	0.8719	0.0525
						NLS-50/AUS	72	0.8609	0.0476
						NLS-50/CTV	79	0.8672	0.0528
						NLS-HL	10	0.7696	0.0056
						Shuttle	287	0.6149	0.1135
						Titan II	23	0.8459	0.0148
						Titan III	1	0.8423	0.0006
						Titan IV	44	0.8371	0.0280
						Titan IV/Centaur	26	0.7427	0.0139
4C	0.6233	1034	0.5194	0.714	0.3489	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0021
						Atlas IIAS	43	0.7889	0.0225
						Delta II	192	0.7678	0.0963
						NLS-20	64	0.8836	0.0393
						NLS-50	77	0.8719	0.0464
						NLS-50/AUS	70	0.8609	0.0414
						NLS-50/CTV	79	0.8672	0.0472
						NLS-HL	10	0.7696	0.0050
						NLS-HL/CRV	136	0.7182	0.0617
						RPC/NLS-50	84	0.6707	0.0343
						Shuttle	176	0.6149	0.0623
						Titan II	23	0.8459	0.0133
						Titan III	1	0.8423	0.0006
						Titan IV	45	0.8371	0.0256
						Titan IV/Centaur	28	0.7427	0.0134

TABLE B.1.10.2-3.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO C (CONTINUED)

Arch	Arch FOM	Architecture Level				System/Element Level			
		Flights		Sys Commonality				FOM	
		#	Value	Ratio	Value	System	Flights	System	Rel Val
5C	0.6218	972	0.5752	0.75	0.3889	Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0022
						Atlas IIAS	88	0.7889	0.0489
						CLV/MLS-HL	216	0.6811	0.0960
						Delta II	192	0.7678	0.1025
						MLS-HL	75	0.7860	0.0414
						MLS-HL/CRV	89	0.7407	0.0450
						MLS-X	86	0.8719	0.0551
						Shuttle	108	0.6149	0.0407
						Titan II	42	0.8459	0.0258
						Titan III	1	0.8423	0.0006
						Titan IV	44	0.8371	0.0266
						Titan IV/Centaur	25	0.7427	0.0127
6C	0.6055	1077	0.4807	0.726	0.3622	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0020
						Atlas IIAS	88	0.7889	0.0441
						Delta II	192	0.7678	0.0925
						MLS-HL	75	0.7860	0.0374
						MLS-HL/CRV	230	0.7407	0.1050
						MLS-X	86	0.8719	0.0497
						RPC/MLS-X	186	0.6707	0.0728
						Shuttle	102	0.6149	0.0347
						Titan II	42	0.8459	0.0233
						Titan III	1	0.8423	0.0006
						Titan IV	44	0.8371	0.0240
						Titan IV/Centaur	25	0.7427	0.0115
7C	0.6023	1040	0.5140	0.736	0.3733	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0021
						Atlas IIAS	88	0.7889	0.0457
						Delta II	192	0.7678	0.0958
						MLS-HL	75	0.7860	0.0387
						MLS-HL/CRV	127	0.7407	0.0600
						MLS-X	86	0.8719	0.0515
						RPC/MLS-HL/LRV	248	0.6511	0.0959
						Shuttle	106	0.6149	0.0373
						Titan II	42	0.8459	0.0241
						Titan III	1	0.8423	0.0006
						Titan IV	44	0.8371	0.0249
						Titan IV/Centaur	25	0.7427	0.0119
8C	0.5266	1301	0.2791	0.94	0.6000	Atlas E	2	0.7908	0.0008
						Atlas I	4	0.7925	0.0017
						Atlas IIAS	71	0.7889	0.0295
						Atlas IIAS/CTF	4	0.7585	0.0016
						Delta II	106	0.7678	0.0423
						Shuttle	101	0.6149	0.0284
						SSTO	678	0.5947	0.1801
						Titan II	15	0.8459	0.0069
						Titan III	1	0.8423	0.0005
						Titan IV	142	0.8371	0.0642
						Titan IV/Centaur	98	0.7427	0.0372
						Titan IV/CTF	79	0.7326	0.0294

TABLE B.1.10.2-3.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY IF SCENARIO C (CONTINUED)

		Architecture Level				System/Element Level			
	Arch	Flights		Sys Commonality				FOM	
Arch	FOM	#	Value	Ratio	Value	System	Flights	System	Rel Val
11C	0.6064	1001	0.5491	0.66	0.2889	Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0022
						Atlas IIAS	88	0.7889	0.0475
						Delta II	192	0.7678	0.0995
						NLS-50	75	0.8719	0.0467
						NLS-50/AUS	67	0.8609	0.0410
						NLS-50/CTV	79	0.8672	0.0488
						NLS-HL	10	0.7696	0.0052
						RPC/NLS-50	84	0.6707	0.0354
						Shuttle	279	0.6149	0.1020
						Titan II	42	0.8459	0.0250
						Titan III	1	0.8423	0.0006
						Titan IV	47	0.8371	0.0276
						Titan IV/Centaur	31	0.7427	0.0153
12C	0.6100	984	0.5644	0.66	0.2889	Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0022
						Atlas IIAS	88	0.7889	0.0483
						Delta II	192	0.7678	0.1012
						NLS-50	75	0.8719	0.0475
						NLS-50/AUS	70	0.8609	0.0435
						NLS-50/CTV	79	0.8672	0.0496
						NLS-HL	10	0.7696	0.0053
						RPC/NLS-50	64	0.6707	0.0274
						Shuttle	282	0.6149	0.1049
						Titan II	42	0.8459	0.0255
						Titan III	1	0.8423	0.0006
						Titan IV	47	0.8371	0.0281
						Titan IV/Centaur	28	0.7427	0.0140
13C	0.6046	1008	0.5428	0.66	0.2889	Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0022
						Atlas IIAS	88	0.7889	0.0471
						Delta II	192	0.7678	0.0988
						NLS-50	75	0.8719	0.0463
						NLS-50/AUS	67	0.8609	0.0407
						NLS-50/CTV	79	0.8672	0.0485
						NLS-HL	10	0.7696	0.0052
						RPC/NLS-50	84	0.6707	0.0351
						Shuttle	286	0.6149	0.1038
						Titan II	42	0.8459	0.0249
						Titan III	1	0.8423	0.0006
						Titan IV	47	0.8371	0.0274
						Titan IV/Centaur	31	0.7427	0.0152
14C	0.6174	1011	0.5401	0.936	0.5956	Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0022
						Atlas IIAS	88	0.7889	0.0470
						Delta II	192	0.7678	0.0985
						RPC/HR Titan IV	84	0.6547	0.0337
						Shuttle	280	0.6149	0.1013
						Titan II	42	0.8459	0.0248
						Titan III	1	0.8423	0.0006
						Titan IV	142	0.8371	0.0826
						Titan IV/Centaur	98	0.7427	0.0479
						Titan IV/CTF	78	0.7326	0.0373

TABLE B.1.10.2-3.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO C (CONCLUDED)

Arch	Arch FOM	Architecture Level: Flights #	Flights Value	Sys Commonality Ratio	Sys Commonality Value	System/Element Level: System	Flights	FOM System	FOM Rel Val
16C	0.5725	1357	0.2287	0.887	0.5411	AMSC	350	0.6983	0.1159
						Atlas E	2	0.7908	0.0008
						Atlas I	4	0.7925	0.0016
						Atlas IIAS	88	0.7889	0.0350
						Delta II	192	0.7678	0.0734
						Shuttle	145	0.6149	0.0391
						Titan II	42	0.8459	0.0185
						Titan III	1	0.8423	0.0004
						Titan IV	142	0.8371	0.0615
						Titan IV/Centaur	98	0.7427	0.0357
						Titan IV/CTF	79	0.7326	0.0282
						Titan IV/CTF/LRV	214	0.7042	0.0718
17C	0.6030	1427	0.1657	1.208	0.8978	Atlas E	2	0.7908	0.0008
						Atlas I	4	0.7925	0.0015
						Atlas IIAS	88	0.7889	0.0333
						Delta II	192	0.7678	0.0698
						RUPC/Titan II	242	0.6920	0.0751
						Shuttle	106	0.6149	0.0272
						Titan II	42	0.8459	0.0176
						Titan III	1	0.8423	0.0004
						Titan IV	142	0.8371	0.0585
						Titan IV/Centaur	98	0.7427	0.0339
						Titan IV/CTF	94	0.7326	0.0319
						Titan IV/CTF/LRV	416	0.7042	0.1327
18C	0.5664	1108	0.4528	0.807	0.4522	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0020
						Atlas IIAS	75	0.7889	0.0365
						Atlas IIAS/CTF	4	0.7585	0.0018
						Beta II	408	0.6244	0.1382
						Delta II	129	0.7678	0.0604
						Delta II/CTF	1	0.7400	0.0004
						Shuttle	142	0.6149	0.0469
						Titan II	23	0.8459	0.0124
						Titan III	1	0.8423	0.0005
						Titan IV	142	0.8371	0.0754
						Titan IV/Centaur	98	0.7427	0.0437
						Titan IV/CTF	79	0.7326	0.0345

TABLE B.1.10.2-4.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO D

Arch	Arch FOM	Architecture Level: Flights #	Architecture Level: Flights Value	Architecture Level: Sys Commonality Ratio	Architecture Level: Sys Commonality Value	System/Element Level: System	Flights	FOM: System	FOM: Rel Val
1D	0.5951	907	0.6337	0.649	0.2767	Atlas E	2	0.7908	0.0012
						Atlas I	4	0.7925	0.0024
						Atlas IIAS	88	0.7889	0.0524
						Delta II	192	0.7678	0.1098
						Shuttle	338	0.6149	0.1363
						Titan II	42	0.8459	0.0276
						Titan III	1	0.8423	0.0007
						Titan IV	142	0.8371	0.0921
						Titan IV/Centaur	98	0.7427	0.0533
2D	0.6502	914	0.6274	1.111	0.7900	Atlas E	2	0.7908	0.0012
						Atlas I	4	0.7925	0.0024
						Atlas IIAS	30	0.7889	0.0177
						Atlas Evolution	58	0.7900	0.0343
						Delta II	192	0.7678	0.1090
						RCV	97	0.6752	0.0452
						Shuttle	101	0.6149	0.0404
						Shuttle Evolution	147	0.6295	0.0612
						Titan II	42	0.8459	0.0274
						Titan III	1	0.8423	0.0006
						Titan IV	42	0.8371	0.0270
						Titan IV/Centaur	24	0.7427	0.0130
						Titan Evolution	100	0.7583	0.0557
						Titan Evol/Centaur	74	0.7583	0.0412
3D	0.6149	953	0.5923	0.611	0.2344	Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0023
						Atlas IIAS	43	0.7889	0.0244
						Delta II	192	0.7678	0.1045
						NLS-20	64	0.8836	0.0426
						NLS-50	78	0.8719	0.0510
						NLS-50/AUS	72	0.8609	0.0462
						NLS-50/CTV	79	0.8672	0.0513
						NLS-HL	10	0.7696	0.0055
						NLS-HL/CTV	4	0.7684	0.0022
						Shuttle	311	0.6149	0.1194
						Titan II	23	0.8459	0.0144
						Titan III	1	0.8423	0.0006
						Titan IV	44	0.8371	0.0272
						Titan IV/Centaur	26	0.7427	0.0135
4D	0.6298	1072	0.4852	0.833	0.4811	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0020
						Atlas IIAS	43	0.7889	0.0217
						Delta II	192	0.7678	0.0929
						NLS-20	64	0.8836	0.0379
						NLS-50	78	0.8719	0.0453
						NLS-50/AUS	70	0.8609	0.0400
						NLS-50/CTV	79	0.8672	0.0456
						NLS-HL	10	0.7696	0.0049
						NLS-HL/CRV	153	0.7182	0.0670
						NLS-HL/CTV	4	0.7684	0.0019
						RPC/NLS-50	85	0.6707	0.0334
						Shuttle	192	0.6149	0.0655
						Titan II	23	0.8459	0.0128
						Titan III	1	0.8423	0.0006
						Titan IV	44	0.8371	0.0241
						Titan IV/Centaur	28	0.7427	0.0129

TABLE B.1.10.2-4.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO D (CONTINUED)

Arch	Arch FOM	Architecture Level: Flights #	Architecture Level: Flights Value	Architecture Level: Sys Commonality Ratio	Architecture Level: Sys Commonality Value	System/Element Level: System	System/Element Level: Flights	FOM: System	FOM: Rel Val
5D	0.6102	1037	0.5167	0.75	0.3889	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0021
						Atlas IIAS	88	0.7889	0.0458
						CLV/MLS-HL	246	0.6811	0.1025
						Delta II	192	0.7678	0.0960
						MLS-HL	75	0.7860	0.0388
						MLS-HL/CRV	114	0.7407	0.0541
						MLS-X	86	0.8719	0.0517
						Shuttle	118	0.6149	0.0416
						Titan II	42	0.8459	0.0242
						Titan III	1	0.8423	0.0006
						Titan IV	44	0.8371	0.0250
						Titan IV/Centaur	25	0.7427	0.0119
6D	0.5975	1137	0.4267	0.726	0.3622	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0019
						Atlas IIAS	88	0.7889	0.0418
						Delta II	192	0.7678	0.0876
						MLS-HL	75	0.7860	0.0354
						MLS-HL/CRV	290	0.7407	0.1254
						MLS-X	86	0.8719	0.0471
						RPC/MLS-X	187	0.6707	0.0694
						Shuttle	101	0.6149	0.0325
						Titan II	42	0.8459	0.0220
						Titan III	1	0.8423	0.0005
						Titan IV	44	0.8371	0.0228
						Titan IV/Centaur	25	0.7427	0.0109
7D	0.5945	1102	0.4582	0.736	0.3733	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0020
						Atlas IIAS	88	0.7889	0.0431
						Delta II	192	0.7678	0.0904
						MLS-HL	75	0.7860	0.0365
						MLS-HL/CRV	189	0.7407	0.0843
						MLS-X	86	0.8719	0.0486
						RPC/MLS-HL/LRV	248	0.6511	0.0905
						Shuttle	106	0.6149	0.0352
						Titan II	42	0.8459	0.0227
						Titan III	1	0.8423	0.0005
						Titan IV	44	0.8371	0.0235
						Titan IV/Centaur	25	0.7427	0.0112
8D	0.5078	1405	0.1855	0.94	0.6000	Atlas E	2	0.7908	0.0008
						Atlas I	4	0.7925	0.0015
						Atlas IIAS	71	0.7889	0.0273
						Atlas IIAS/CTF	4	0.7585	0.0015
						Delta II	106	0.7678	0.0391
						Shuttle	109	0.6149	0.0284
						SSTO	774	0.5947	0.1904
						Titan II	15	0.8459	0.0064
						Titan III	1	0.8423	0.0004
						Titan IV	142	0.8371	0.0594
						Titan IV/Centaur	98	0.7427	0.0344
						Titan IV/CTF	79	0.7326	0.0272

TABLE B.1.10.2-4.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO D (CONTINUED)

		Architecture Level				System/Element Level			
	Arch	Flights		Sys Commonality				FOM	
Arch	FOM	#	Value	Ratio	Value	System	Flights	System	Rel Val
11D	0.6117	1028	0.5248	0.759	0.3989	Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0021
						Atlas IIAS	88	0.7889	0.0462
						Delta II	192	0.7678	0.0969
						NLS-50	74	0.8719	0.0448
						NLS-50/AUS	66	0.8609	0.0393
						NLS-50/CTV	79	0.8672	0.0475
						NLS-HL	10	0.7696	0.0051
						NLS-HL/CTV	4	0.7684	0.0020
						RPC/NLS-50	85	0.6707	0.0349
						Shuttle	302	0.6149	0.1075
						Titan II	42	0.8459	0.0244
						Titan III	1	0.8423	0.0006
						Titan IV	48	0.8371	0.0275
						Titan IV/Centaur	31	0.7427	0.0149
12D	0.6149	1014	0.5374	0.759	0.3989	Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0021
						Atlas IIAS	88	0.7889	0.0469
						Delta II	192	0.7678	0.0982
						NLS-50	74	0.8719	0.0455
						NLS-50/AUS	71	0.8609	0.0428
						NLS-50/CTV	79	0.8672	0.0482
						NLS-HL	10	0.7696	0.0051
						NLS-HL/CTV	4	0.7684	0.0020
						RPC/NLS-50	64	0.6707	0.0266
						Shuttle	308	0.6149	0.1111
						Titan II	42	0.8459	0.0247
						Titan III	1	0.8423	0.0006
						Titan IV	48	0.8371	0.0278
						Titan IV/Centaur	27	0.7427	0.0131
13D	0.6105	1034	0.5194	0.759	0.3989	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0021
						Atlas IIAS	88	0.7889	0.0460
						Delta II	192	0.7678	0.0963
						NLS-50	74	0.8719	0.0446
						NLS-50/AUS	67	0.8609	0.0397
						NLS-50/CTV	79	0.8672	0.0472
						NLS-HL	10	0.7696	0.0050
						NLS-HL/CTV	4	0.7684	0.0020
						RPC/NLS-50	85	0.6707	0.0347
						Shuttle	307	0.6149	0.1086
						Titan II	42	0.8459	0.0242
						Titan III	1	0.8423	0.0006
						Titan IV	48	0.8371	0.0273
						Titan IV/Centaur	31	0.7427	0.0148

TABLE B.1.10.2-4.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO D (CONCLUDED)

		Architecture Level				System/Element Level			
	Arch	Flights		Sys Commonality				FOM	
Arch	FOM	#	Value	Ratio	Value	System	Flights	System	Rel Val
14D	0.6093	1046	0.5086	0.936	0.5956	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0021
						Atlas IIAS	88	0.7889	0.0454
						Delta II	192	0.7678	0.0952
						RPC/HR Titan IV	85	0.6547	0.0330
						Shuttle	314	0.6149	0.1098
						Titan II	42	0.8459	0.0240
						Titan III	1	0.8423	0.0006
						Titan IV	142	0.8371	0.0798
						Titan IV/Centaur	98	0.7427	0.0463
						Titan IV/CTF	78	0.7326	0.0361
16D	0.5537	1439	0.1549	0.837	0.4856	AMSC	350	0.6983	0.1093
						Atlas E	2	0.7908	0.0008
						Atlas I	4	0.7925	0.0015
						Atlas IIAS	88	0.7889	0.0330
						Delta II	192	0.7678	0.0692
						Shuttle	160	0.6149	0.0407
						Titan II	42	0.8459	0.0174
						Titan III	1	0.8423	0.0004
						Titan IV	142	0.8371	0.0580
						Titan IV/Centaur	98	0.7427	0.0336
						Titan IV/CTF	79	0.7326	0.0265
						Titan IV/CTF/LRV	281	0.7042	0.0889
17D	0.5918	1514	0.1000	1.208	0.8978	Atlas E	2	0.7908	0.0007
						Atlas I	4	0.7925	0.0014
						Atlas IIAS	88	0.7889	0.0314
						Delta II	192	0.7678	0.0658
						RUPC/Titan II	242	0.6920	0.0708
						Shuttle	112	0.6149	0.0271
						Titan II	42	0.8459	0.0166
						Titan III	1	0.8423	0.0004
						Titan IV	142	0.8371	0.0552
						Titan IV/Centaur	98	0.7427	0.0320
						Titan IV/CTF	94	0.7326	0.0300
						Titan IV/CTF/LRV	497	0.7042	0.1494
18D	0.5462	1215	0.3565	0.807	0.4522	Atlas E	2	0.7908	0.0009
						Atlas I	4	0.7925	0.0018
						Atlas IIAS	76	0.7889	0.0338
						Atlas IIAS/CTF	4	0.7585	0.0017
						Beta II	503	0.6244	0.1554
						Delta II	131	0.7678	0.0559
						Delta II/CTF	1	0.7400	0.0004
						Shuttle	151	0.6149	0.0455
						Titan II	23	0.8459	0.0113
						Titan III	1	0.8423	0.0005
						Titan IV	142	0.8371	0.0687
						Titan IV/Centaur	98	0.7427	0.0398
						Titan IV/CTF	79	0.7326	0.0314

TABLE B.1.10.2-5.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO E-LOW

Arch	Arch FOM	Architecture Level: Flights #	Architecture Level: Flights Value	Architecture Level: Sys Commonality Ratio	Architecture Level: Sys Commonality Value	System/Element Level: System	Flights	FOM System	FOM Rel Val
1El	0.5904	926	0.6166	0.649	0.2767	Atlas E	2	0.7908	0.0012
						Atlas I	4	0.7925	0.0023
						Atlas IIAS	88	0.7889	0.0513
						Delta II	192	0.7678	0.1076
						Shuttle	357	0.6149	0.1411
						Titan II	42	0.8459	0.0271
						Titan III	1	0.8423	0.0006
						Titan IV	142	0.8371	0.0902
						Titan IV/Centaur	98	0.7427	0.0522
2El	0.6459	933	0.6103	1.111	0.7900	Atlas E	2	0.7908	0.0012
						Atlas I	4	0.7925	0.0023
						Atlas IIAS	30	0.7889	0.0174
						Atlas Evolution	58	0.7900	0.0336
						Delta II	192	0.7678	0.1068
						RCV	97	0.6752	0.0443
						Shuttle	101	0.6149	0.0396
						Shuttle Evolution	166	0.6295	0.0677
						Titan II	42	0.8459	0.0269
						Titan III	1	0.8423	0.0006
						Titan IV	42	0.8371	0.0265
						Titan IV/Centaur	24	0.7427	0.0127
						Titan Evolution	100	0.7583	0.0546
						Titan Evol/Centaur	74	0.7583	0.0404
3El	0.6098	972	0.5752	0.611	0.2344	Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0022
						Atlas IIAS	43	0.7889	0.0239
						Delta II	192	0.7678	0.1025
						NLS-20	64	0.8836	0.0418
						NLS-50	78	0.8719	0.0500
						NLS-50/AUS	72	0.8609	0.0453
						NLS-50/CTV	79	0.8672	0.0502
						NLS-HL	10	0.7696	0.0054
						NLS-HL/CTV	4	0.7684	0.0021
						Shuttle	330	0.6149	0.1242
						Titan II	23	0.8459	0.0141
						Titan III	1	0.8423	0.0006
						Titan IV	44	0.8371	0.0266
						Titan IV/Centaur	26	0.7427	0.0132
4El	0.6259	1091	0.4681	0.833	0.4811	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0020
						Atlas IIAS	43	0.7889	0.0213
						Delta II	192	0.7678	0.0913
						NLS-20	64	0.8836	0.0372
						NLS-50	78	0.8719	0.0445
						NLS-50/AUS	70	0.8609	0.0393
						NLS-50/CTV	79	0.8672	0.0448
						NLS-HL	10	0.7696	0.0048
						NLS-HL/CRV	153	0.7182	0.0658
						NLS-HL/CTV	4	0.7684	0.0019
						RPC/NLS-50	104	0.6707	0.0402
						Shuttle	192	0.6149	0.0644
						Titan II	23	0.8459	0.0126
						Titan III	1	0.8423	0.0005
						Titan IV	44	0.8371	0.0237
						Titan IV/Centaur	28	0.7427	0.0127

TABLE B.1.10.2-5.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO E-LOW (CONTINUED)

		Architecture Level				System/Element Level			
	Arch	Flights		Sys Commonality				FOM	
Arch	FOM	#	Value	Ratio	Value	System	Flights	System	Rel Val
5El	0.6066	1056	0.4996	0.75	0.3889	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0021
						Atlas IIAS	88	0.7889	0.0450
						CLV/MLS-HL	265	0.6811	0.1084
						Delta II	192	0.7678	0.0943
						MLS-HL	75	0.7860	0.0381
						MLS-HL/CRV	114	0.7407	0.0531
						MLS-X	86	0.8719	0.0507
						Shuttle	118	0.6149	0.0409
						Titan II	42	0.8459	0.0237
						Titan III	1	0.8423	0.0006
						Titan IV	44	0.8371	0.0245
						Titan IV/Centaur	25	0.7427	0.0117
6El	0.5939	1156	0.4096	0.726	0.3622	Atlas E	2	0.7908	0.0009
						Atlas I	4	0.7925	0.0019
						Atlas IIAS	88	0.7889	0.0411
						Delta II	192	0.7678	0.0862
						MLS-HL	75	0.7860	0.0348
						MLS-HL/CRV	290	0.7407	0.1233
						MLS-X	86	0.8719	0.0463
						RPC/MLS-X	206	0.6707	0.0751
						Shuttle	101	0.6149	0.0320
						Titan II	42	0.8459	0.0217
						Titan III	1	0.8423	0.0005
						Titan IV	44	0.8371	0.0224
						Titan IV/Centaur	25	0.7427	0.0107
7El	0.6055	1121	0.4411	0.857	0.5078	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0019
						Atlas IIAS	88	0.7889	0.0424
						Delta II	192	0.7678	0.0889
						MLS-HL	75	0.7860	0.0359
						MLS-HL/CRV	189	0.7407	0.0829
						MLS-X	86	0.8719	0.0478
						RPC/MLS-HL/LRV	248	0.6511	0.0889
						RPC/MLS-X	19	0.6707	0.0071
						Shuttle	106	0.6149	0.0346
						Titan II	42	0.8459	0.0224
						Titan III	1	0.8423	0.0005
						Titan IV	44	0.8371	0.0231
						Titan IV/Centaur	25	0.7427	0.0110
8El	0.5045	1424	0.1684	0.94	0.6000	Atlas E	2	0.7908	0.0008
						Atlas I	4	0.7925	0.0015
						Atlas IIAS	71	0.7889	0.0269
						Atlas IIAS/CTF	4	0.7585	0.0014
						Delta II	106	0.7678	0.0386
						Shuttle	109	0.6149	0.0280
						SSTO	793	0.5947	0.1925
						Titan II	15	0.8459	0.0063
						Titan III	1	0.8423	0.0004
						Titan IV	142	0.8371	0.0586
						Titan IV/Centaur	98	0.7427	0.0340
						Titan IV/CTF	79	0.7326	0.0268

TABLE B.1.10.2-5.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO E-LOW (CONTINUED)

Arch	Arch FOM	Architecture Level: Flights #	Architecture Level: Flights Value	Architecture Level: Sys Commonality Ratio	Architecture Level: Sys Commonality Value	System/Element Level: System	System/Element Level: Flights	System/Element Level: FOM System	System/Element Level: FOM Rel Val
11E1	0.6080	1047	0.5077	0.759	0.3989	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0021
						Atlas IIAS	88	0.7889	0.0454
						Delta II	192	0.7678	0.0951
						NLS-50	74	0.8719	0.0440
						NLS-50/AUS	66	0.8609	0.0386
						NLS-50/CTV	79	0.8672	0.0466
						NLS-HL	10	0.7696	0.0050
						NLS-HL/CTV	4	0.7684	0.0020
						RPC/NLS-50	104	0.6707	0.0419
						Shuttle	302	0.6149	0.1055
						Titan II	42	0.8459	0.0239
						Titan III	1	0.8423	0.0006
						Titan IV	48	0.8371	0.0270
						Titan IV/Centaur	31	0.7427	0.0146
12E1	0.6110	1033	0.5203	0.759	0.3989	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0021
						Atlas IIAS	88	0.7889	0.0460
						Delta II	192	0.7678	0.0964
						NLS-50	74	0.8719	0.0446
						NLS-50/AUS	71	0.8609	0.0421
						NLS-50/CTV	79	0.8672	0.0473
						NLS-HL	10	0.7696	0.0050
						NLS-HL/CTV	4	0.7684	0.0020
						RPC/NLS-50	81	0.6707	0.0331
						Shuttle	310	0.6149	0.1098
						Titan II	42	0.8459	0.0243
						Titan III	1	0.8423	0.0006
						Titan IV	48	0.8371	0.0273
						Titan IV/Centaur	27	0.7427	0.0129
13E1	0.6068	1053	0.5023	0.759	0.3989	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0021
						Atlas IIAS	88	0.7889	0.0451
						Delta II	192	0.7678	0.0946
						NLS-50	74	0.8719	0.0438
						NLS-50/AUS	67	0.8609	0.0389
						NLS-50/CTV	79	0.8672	0.0464
						NLS-HL	10	0.7696	0.0049
						NLS-HL/CTV	4	0.7684	0.0020
						RPC/NLS-50	104	0.6707	0.0416
						Shuttle	307	0.6149	0.1067
						Titan II	42	0.8459	0.0238
						Titan III	1	0.8423	0.0006
						Titan IV	48	0.8371	0.0268
						Titan IV/Centaur	31	0.7427	0.0145

TABLE B.1.10.2-5.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY IF SCENARIO E-LOW (CONCLUDED)

Arch	Arch FOM	Architecture Level: Flights #	Flights Value	Sys Commonality Ratio	Sys Commonality Value	System/Element Level: System	Flights	FOM System	FOM Rel Val
14EI	0.6057	1065	0.4915	0.936	0.5956	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0020
						Atlas IIAS	88	0.7889	0.0446
						Delta II	192	0.7678	0.0935
						RPC/HR Titan IV	104	0.6547	0.0396
						Shuttle	314	0.6149	0.1079
						Titan II	42	0.8459	0.0235
						Titan III	1	0.8423	0.0006
						Titan IV	142	0.8371	0.0784
						Titan IV/Centaur	98	0.7427	0.0454
						Titan IV/CTF	78	0.7326	0.0354
16EI	0.5507	1458	0.1378	0.837	0.4856	AMSC	367	0.6983	0.1131
						Atlas E	2	0.7908	0.0007
						Atlas I	4	0.7925	0.0015
						Atlas IIAS	88	0.7889	0.0326
						Delta II	192	0.7678	0.0683
						Shuttle	162	0.6149	0.0407
						Titan II	42	0.8459	0.0172
						Titan III	1	0.8423	0.0004
						Titan IV	142	0.8371	0.0573
						Titan IV/Centaur	98	0.7427	0.0332
						Titan IV/CTF	79	0.7326	0.0262
						Titan IV/CTF/LRV	281	0.7042	0.0877
17EI	0.5913	1533	0.1000	1.208	0.8978	Atlas E	2	0.7908	0.0007
						Atlas I	4	0.7925	0.0014
						Atlas IIAS	88	0.7889	0.0310
						Delta II	192	0.7678	0.0650
						RUPC/Titan II	261	0.6920	0.0754
						Shuttle	112	0.6149	0.0267
						Titan II	42	0.8459	0.0164
						Titan III	1	0.8423	0.0004
						Titan IV	142	0.8371	0.0545
						Titan IV/Centaur	98	0.7427	0.0316
						Titan IV/CTF	94	0.7326	0.0297
						Titan IV/CTF/LRV	497	0.7042	0.1476
18EI	0.5427	1234	0.3394	0.807	0.4522	Atlas E	2	0.7908	0.0009
						Atlas I	4	0.7925	0.0018
						Atlas IIAS	76	0.7889	0.0333
						Atlas IIAS/CTF	4	0.7585	0.0017
						Beta II	520	0.6244	0.1582
						Delta II	131	0.7678	0.0551
						Delta II/CTF	1	0.7400	0.0004
						Shuttle	153	0.6149	0.0454
						Titan II	23	0.8459	0.0111
						Titan III	1	0.8423	0.0005
						Titan IV	142	0.8371	0.0677
						Titan IV/Centaur	98	0.7427	0.0392
						Titan IV/CTF	79	0.7326	0.0310

TABLE B.1.10.2-6.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO E-HIGH

Arch	Arch FOM	Architecture Level				System/Element Level			
		Flights		Sys Commonality				FOM	
		#	Value	Ratio	Value	System	Flights	System	Rel Val
1Eh	0.5828	958	0.5878	0.649	0.2767	Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0023
						Atlas IIAS	88	0.7889	0.0496
						Delta II	192	0.7678	0.1040
						Shuttle	389	0.6149	0.1486
						Titan II	42	0.8459	0.0262
						Titan III	1	0.8423	0.0006
						Titan IV	142	0.8371	0.0872
						Titan IV/Centaur	98	0.7427	0.0505
2Eh	0.6387	965	0.5815	1.111	0.7900	Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0023
						Atlas IIAS	30	0.7889	0.0168
						Atlas Evolution	58	0.7900	0.0325
						Delta II	192	0.7678	0.1032
						RCV	97	0.6752	0.0428
						Shuttle	101	0.6149	0.0383
						Shuttle Evolution	198	0.6295	0.0781
						Titan II	42	0.8459	0.0260
						Titan III	1	0.8423	0.0006
						Titan IV	42	0.8371	0.0256
						Titan IV/Centaur	24	0.7427	0.0123
						Titan Evolution	100	0.7583	0.0528
						Titan Evol/Centaur	74	0.7583	0.0391
3Eh	0.6013	1004	0.5464	0.611	0.2344	Atlas E	2	0.7908	0.0011
						Atlas I	4	0.7925	0.0022
						Atlas IIAS	43	0.7889	0.0231
						Delta II	192	0.7678	0.0992
						NLS-20	64	0.8836	0.0405
						NLS-50	78	0.8719	0.0484
						NLS-50/AUS	72	0.8609	0.0439
						NLS-50/CTV	79	0.8672	0.0486
						NLS-HL	10	0.7696	0.0052
						NLS-HL/CTV	4	0.7684	0.0021
						Shuttle	362	0.6149	0.1319
						Titan II	23	0.8459	0.0137
						Titan III	1	0.8423	0.0006
						Titan IV	44	0.8371	0.0258
						Titan IV/Centaur	26	0.7427	0.0128
4Eh	0.6194	1123	0.4393	0.833	0.4811	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0019
						Atlas IIAS	43	0.7889	0.0207
						Delta II	192	0.7678	0.0887
						NLS-20	64	0.8836	0.0362
						NLS-50	78	0.8719	0.0433
						NLS-50/AUS	70	0.8609	0.0381
						NLS-50/CTV	79	0.8672	0.0435
						NLS-HL	10	0.7696	0.0046
						NLS-HL/CRV	153	0.7182	0.0639
						NLS-HL/CTV	4	0.7684	0.0018
						RPC/NLS-50	136	0.6707	0.0511
						Shuttle	192	0.6149	0.0626
						Titan II	23	0.8459	0.0122
						Titan III	1	0.8423	0.0005
						Titan IV	44	0.8371	0.0230
						Titan IV/Centaur	28	0.7427	0.0123

TABLE B.1.10.2-6.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO E-HIGH (CONTINUED)

Arch	Arch FOM	Architecture Level: Flights #	Flights Value	Sys Commonality Ratio	Sys Commonality Value	System/Element Level: System	Flights	FOM System	FOM Rel Val
5Eh	0.6007	1088	0.4708	0.75	0.3889	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0020
						Atlas IIAS	88	0.7889	0.0437
						CLV/MLS-HL	297	0.6811	0.1180
						Delta II	192	0.7678	0.0915
						MLS-HL	75	0.7860	0.0370
						MLS-HL/CRV	114	0.7407	0.0515
						MLS-X	86	0.8719	0.0492
						Shuttle	118	0.6149	0.0397
						Titan II	42	0.8459	0.0230
						Titan III	1	0.8423	0.0005
						Titan IV	44	0.8371	0.0238
						Titan IV/Centaur	25	0.7427	0.0113
6Eh	0.5878	1188	0.3808	0.726	0.3622	Atlas E	2	0.7908	0.0009
						Atlas I	4	0.7925	0.0018
						Atlas IIAS	88	0.7889	0.0400
						Delta II	192	0.7678	0.0838
						MLS-HL	75	0.7860	0.0339
						MLS-HL/CRV	290	0.7407	0.1200
						MLS-X	86	0.8719	0.0451
						RPC/MLS-X	238	0.6707	0.0845
						Shuttle	101	0.6149	0.0311
						Titan II	42	0.8459	0.0211
						Titan III	1	0.8423	0.0005
						Titan IV	44	0.8371	0.0218
						Titan IV/Centaur	25	0.7427	0.0104
7Eh	0.5996	1153	0.4123	0.857	0.5078	Atlas E	2	0.7908	0.0009
						Atlas I	4	0.7925	0.0019
						Atlas IIAS	88	0.7889	0.0412
						Delta II	192	0.7678	0.0864
						MLS-HL	75	0.7860	0.0349
						MLS-HL/CRV	189	0.7407	0.0806
						MLS-X	86	0.8719	0.0465
						RPC/MLS-HL/LRV	248	0.6511	0.0865
						RPC/MLS-X	51	0.6707	0.0187
						Shuttle	106	0.6149	0.0336
						Titan II	42	0.8459	0.0217
						Titan III	1	0.8423	0.0005
						Titan IV	44	0.8371	0.0224
						Titan IV/Centaur	25	0.7427	0.0107
8Eh	0.4989	1456	0.1396	0.94	0.6000	Atlas E	2	0.7908	0.0007
						Atlas I	4	0.7925	0.0015
						Atlas IIAS	71	0.7889	0.0263
						Atlas IIAS/CTF	4	0.7585	0.0014
						Delta II	106	0.7678	0.0378
						Shuttle	109	0.6149	0.0274
						SSTO	825	0.5947	0.1959
						Titan II	15	0.8459	0.0061
						Titan III	1	0.8423	0.0004
						Titan IV	142	0.8371	0.0574
						Titan IV/Centaur	98	0.7427	0.0332
						Titan IV/CTF	79	0.7326	0.0262

TABLE B.1.10.2-6.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO E-HIGH (CONTINUED)

		Architecture Level				System/Element Level			
	Arch	Flights		Sys Commonality				FOM	
Arch	FOM	#	Value	Ratio	Value	System	Flights	System	Rel Val
11Eh	0.6018	1079	0.4789	0.759	0.3989	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0020
						Atlas IIAS	88	0.7889	0.0440
						Delta II	192	0.7678	0.0923
						NLS-50	74	0.8719	0.0427
						NLS-50/AUS	66	0.8609	0.0374
						NLS-50/CTV	79	0.8672	0.0453
						NLS-HL	10	0.7696	0.0048
						NLS-HL/CTV	4	0.7684	0.0019
						RPC/NLS-50	136	0.6707	0.0531
						Shuttle	302	0.6149	0.1024
						Titan II	42	0.8459	0.0232
						Titan III	1	0.8423	0.0005
						Titan IV	48	0.8371	0.0262
						Titan IV/Centaur	31	0.7427	0.0142
12Eh	0.6047	1065	0.4915	0.759	0.3989	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0020
						Atlas IIAS	88	0.7889	0.0446
						Delta II	192	0.7678	0.0935
						NLS-50	74	0.8719	0.0433
						NLS-50/AUS	71	0.8609	0.0408
						NLS-50/CTV	79	0.8672	0.0459
						NLS-HL	10	0.7696	0.0049
						NLS-HL/CTV	4	0.7684	0.0020
						RPC/NLS-50	112	0.6707	0.0443
						Shuttle	311	0.6149	0.1068
						Titan II	42	0.8459	0.0235
						Titan III	1	0.8423	0.0006
						Titan IV	48	0.8371	0.0265
						Titan IV/Centaur	27	0.7427	0.0125
13Eh	0.6006	1085	0.4735	0.759	0.3989	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0020
						Atlas IIAS	88	0.7889	0.0438
						Delta II	192	0.7678	0.0918
						NLS-50	74	0.8719	0.0425
						NLS-50/AUS	67	0.8609	0.0378
						NLS-50/CTV	79	0.8672	0.0450
						NLS-HL	10	0.7696	0.0048
						NLS-HL/CTV	4	0.7684	0.0019
						RPC/NLS-50	136	0.6707	0.0529
						Shuttle	307	0.6149	0.1035
						Titan II	42	0.8459	0.0231
						Titan III	1	0.8423	0.0005
						Titan IV	48	0.8371	0.0260
						Titan IV/Centaur	31	0.7427	0.0141

TABLE B.1.10.2-6.– ARCHITECTURE GROUND OPERABILITY DATA SUMMARY FOR IF SCENARIO E-HIGH (CONCLUDED)

Arch	Arch FOM	Architecture Level				System/Element Level			
		Flights		Sys Commonality				FOM	
		#	Value	Ratio	Value	System	Flights	System	Rel Val
14Eh	0.5997	1097	0.4627	0.936	0.5956	Atlas E	2	0.7908	0.0010
						Atlas I	4	0.7925	0.0020
						Atlas IIAS	88	0.7889	0.0433
						Delta II	192	0.7678	0.0908
						RPC/HR Titan IV	136	0.6547	0.0503
						Shuttle	314	0.6149	0.1047
						Titan II	42	0.8459	0.0229
						Titan III	1	0.8423	0.0005
						Titan IV	142	0.8371	0.0761
						Titan IV/Centaur	98	0.7427	0.0441
						Titan IV/CTF	78	0.7326	0.0344
16Eh	0.5460	1490	0.1090	0.837	0.4856	AMSC	398	0.6983	0.1200
						Atlas E	2	0.7908	0.0007
						Atlas I	4	0.7925	0.0015
						Atlas IIAS	88	0.7889	0.0319
						Delta II	192	0.7678	0.0668
						Shuttle	163	0.6149	0.0400
						Titan II	42	0.8459	0.0168
						Titan III	1	0.8423	0.0004
						Titan IV	142	0.8371	0.0561
						Titan IV/Centaur	98	0.7427	0.0325
						Titan IV/CTF	79	0.7326	0.0256
						Titan IV/CTF/LRV	281	0.7042	0.0858
17Eh	0.5905	1565	0.1000	1.208	0.8978	Atlas E	2	0.7908	0.0007
						Atlas I	4	0.7925	0.0014
						Atlas IIAS	88	0.7889	0.0304
						Delta II	192	0.7678	0.0636
						RUPC/Titan II	293	0.6920	0.0829
						Shuttle	112	0.6149	0.0262
						Titan II	42	0.8459	0.0160
						Titan III	1	0.8423	0.0004
						Titan IV	142	0.8371	0.0534
						Titan IV/Centaur	98	0.7427	0.0309
						Titan IV/CTF	94	0.7326	0.0290
						Titan IV/CTF/LRV	497	0.7042	0.1445
18Eh	0.5368	1266	0.3106	0.807	0.4522	Atlas E	2	0.7908	0.0009
						Atlas I	4	0.7925	0.0017
						Atlas IIAS	76	0.7889	0.0324
						Atlas IIAS/CTF	4	0.7585	0.0016
						Beta II	551	0.6244	0.1634
						Delta II	131	0.7678	0.0537
						Delta II/CTF	1	0.7400	0.0004
						Shuttle	154	0.6149	0.0445
						Titan II	23	0.8459	0.0108
						Titan III	1	0.8423	0.0005
						Titan IV	142	0.8371	0.0660
						Titan IV/Centaur	98	0.7427	0.0382
						Titan IV/CTF	79	0.7326	0.0302

APPENDIX C

ARCHITECTURE SUMMARY DATA

The following section contains data relating to the architectures used in the Human Transportation System study. This data is considered output data that has been produced from the study's analysis process.

Two sets of data are addressed here. The first set, or the baseline set, was the data for which most of the analysis of the results was done. The updated set was produced late in the study. It has corrections for various errors, most of which were minor, and utilizes updated PMS numbers that account for launch pad hold down and better OMS values. Also, the updated set includes Architectures 10 (NDV) and 19 (ALV). Because the analysis was done late in the study, data from Architectures 10 and 19 has not undergone the same level of scrutiny as the rest of the data.

C.1.1 ARCHITECTURE ATTRIBUTE VALUES

The following subsections contain tables summarizing architecture data for both the baseline and updated data sets. The data is grouped by "If" Scenarios. Each table lists flight and attribute values on the architecture level that has been *rolled up* from system level data. The data listed includes

- Flights.– The number of flights with a crew, with no crew, and a combination of both types are shown. These cover all flights of every system in the architecture including low and high inclination, and DOD flights.
- Architecture Cost Risk (ACR).– The ACR data includes values for technical challenge, program immaturity, and the number of new systems. Lower numbers are better. Also included is an overall ACR value that is a combination of these (see below). Higher values are better.
- Environment.– The total environmental impact is shown. This is a composite of the pounds of effluents and the environmental impact factors. Lower numbers are better.
- Funding Profile (FP).– The FP data includes values for total cost and peak year costs. These are in millions of 1992 dollars. Also included is an overall FP value that is a combination of these (see below).
- Human Safety (HS).– The number of crew loss events incurred over the time period studied is shown.

- Launch Schedule Confidence (LSC).– The LSC data includes values for schedule compression, schedule margin, and the percentage of flights delayed. Higher compression and margin numbers are better. Lower delay numbers are better. Also included is an overall LSC value that is a combination of these (see below). Higher values are better.

- Probability of Mission Success (PMS).– The flight rate-weighted, composite PMS is shown.

The ACR, FP, and LSC attributes are composed of several components, or subattributes. In each case, an attribute value is shown which represents a combination of these components. These are combined by assigning a linear number between zero and one to each value within the "If" Scenario. A one corresponds to the best value and a zero corresponds to the worst value. These values are combined using the percentages shown in Table C.1.1, below.

TABLE C.1.1.– SUB-ATTRIBUTE WEIGHTINGS

ACR	Technical Challenge	45%
	Program Immaturity	30%
	New Systems	25%
FP	Total Cost	50%
	Peak Year Cost	50%
LSC	Schedule Compression	33%
	Schedule Margin	33%
	Delay	33%

C.1.1.1 Architecture Attribute Values (Baseline)

Tables C.1.1.1-1 through C.1.1.1-6 contain the architecture attribute values derived from the baseline set of data.

TABLE C.1.1.1-1.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO A (MINIMUM LEVEL OF ACTIVITY) - HTS BASELINE DATA

Arch	Major Elements	Flights			Architecture Cost Risk			
		Crew	No Crew	Total	Tch Chal	Prog Im	New Sys	Value
1A	Reference (Shuttle, DAT, ACRV)	76	569	645	145.1	1.000	0.00	1.000
2A	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	76	569	645	318.5	2.412	1.63	0.841
3A	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	76	559	635	355.8	5.217	2.41	0.743
4A	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	76	559	635	355.8	5.217	2.41	0.743
5A	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	76	559	635	550.2	5.631	2.60	0.691
6A	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	76	611	687	537.6	6.241	3.74	0.609
7A	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	76	559	635	472.8	5.631	3.74	0.605
8A	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	76	569	645	1,353.4	11.335	1.00	0.581
11A	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	76	559	635	335.1	4.017	1.49	0.826
12A	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	76	559	635	335.1	4.017	1.49	0.826
13A	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	76	559	635	335.1	4.017	1.49	0.826
14A	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	76	569	645	145.1	1.000	0.00	1.000
16A	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	82	569	651	432.4	2.323	1.03	0.864
17A	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	91	605	696	340.9	4.452	3.39	0.691
18A	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	177	468	645	2,781.3	22.181	1.50	0.150

TABLE C.1.1.1-1.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO A (MINIMUM LEVEL OF ACTIVITY) - HTS BASELINE DATA (CONCLUDED)

Arch	Environment	Funding Profile			Human Safety	Launch Schedule Confidence				PMS
		Tot (mil)	Pk Yr (mil)	Value		Sch Comp	Sch Mar	Delay	Value	
1A	1,433,252	$151,440	$6,388	0.630	1.7	0.456	5.613	7.30	0.561	0.9354
2A	1,265,102	$171,494	$9,480	0.264	1.5	0.446	6.378	7.30	0.572	0.9364
3A	927,776	$168,979	$11,075	0.159	1.7	0.299	4.685	7.30	0.216	0.9438
4A	927,776	$168,979	$11,075	0.159	1.7	0.299	4.685	7.30	0.216	0.9438
5A	597,649	$142,288	$10,879	0.347	1.0	0.336	4.663	6.60	0.381	0.9480
6A	594,706	$149,204	$12,940	0.145	0.8	0.314	4.659	7.20	0.257	0.9485
7A	597,649	$138,375	$12,197	0.271	1.0	0.321	4.626	6.70	0.336	0.9480
8A	1,066,800	$94,248	$7,947	0.881	0.9	0.326	12.185	6.90	0.622	0.9442
11A	950,718	$168,693	$11,075	0.161	1.7	0.343	5.267	7.40	0.312	0.9436
12A	950,718	$168,693	$11,075	0.161	1.7	0.343	5.267	7.40	0.312	0.9436
13A	950,718	$168,693	$11,075	0.161	1.7	0.343	5.267	7.40	0.312	0.9436
14A	1,433,252	$151,440	$6,388	0.630	1.7	0.456	5.630	7.30	0.561	0.9354
16A	1,217,385	$117,670	$9,326	0.625	1.3	0.434	12.971	6.90	0.865	0.9364
17A	1,384,266	$115,921	$7,233	0.795	1.2	0.469	5.080	6.40	0.685	0.9325
18A	1,243,214	$164,759	$12,786	0.056	2.4	0.362	9.881	8.90	0.334	0.9410

TABLE C.1.1.1-2.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO B (CURRENT MISSIONS WITHOUT SSF) - HTS BASELINE DATA

Arch	Major Elements	Flights			Architecture Cost Risk			
		Crew	No Crew	Total	Tch Chal	Prog Im	New Sys	Value
1B	Reference (Shuttle, DAT, ACRV)	148	569	717	148.0	1.000	0.00	1.000
2B	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	140	569	709	323.9	2.422	1.63	0.846
3B	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	148	559	707	358.7	4.787	2.41	0.763
4B	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	148	559	707	358.7	4.787	2.41	0.763
5B	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	202	559	761	634.4	7.181	2.60	0.678
6B	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	165	661	826	638.8	7.320	3.74	0.599
7B	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	245	559	804	623.7	7.973	3.74	0.594
8B	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	257	576	833	1,374.2	14.826	1.00	0.578
11B	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	148	559	707	338.0	3.710	1.49	0.839
12B	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	148	559	707	338.0	3.710	1.49	0.839
13B	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	148	559	707	338.0	3.710	1.49	0.839
14B	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	148	569	717	148.0	1.000	0.00	1.000
16B	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	374	569	943	458.3	7.196	1.03	0.812
17B	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	224	700	924	386.2	7.787	3.39	0.660
18B	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	287	470	757	2,840.3	28.594	1.50	0.150

TABLE C.1.1.1-2.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO B (CURRENT MISSIONS WITHOUT SSF) - HTS BASELINE DATA (CONCLUDED)

Arch	Environment	Funding Profile			Human Safety	Launch Schedule Confidence				PMS
		Tot (mil)	Pk Yr (mil)	Value		Sch Comp	Sch Mar	Delay	Value	
1B	1,866,922	$156,459	$6,649	0.653	3.3	0.444	5.298	9.10	0.498	0.9362
2B	1,544,102	$174,990	$9,620	0.300	2.8	0.435	6.126	8.80	0.526	0.9365
3B	1,361,446	$174,000	$11,192	0.184	3.3	0.303	4.481	9.00	0.246	0.9437
4B	1,361,446	$174,000	$11,192	0.184	3.3	0.303	4.481	9.00	0.246	0.9437
5B	853,083	$165,145	$11,023	0.256	2.5	0.328	3.977	8.50	0.343	0.9484
6B	846,479	$179,660	$13,076	0.000	1.9	0.294	3.716	8.90	0.233	0.9489
7B	854,476	$179,510	$12,515	0.045	2.8	0.279	3.748	9.10	0.183	0.9488
8B	1,337,062	$104,010	$8,193	0.879	2.8	0.273	13.977	8.20	0.390	0.9482
11B	1,384,388	$173,714	$11,192	0.186	3.3	0.342	5.004	9.20	0.300	0.9435
12B	1,384,388	$173,714	$11,192	0.186	3.3	0.342	5.020	9.20	0.300	0.9435
13B	1,384,388	$173,714	$11,192	0.186	3.3	0.342	5.004	9.20	0.300	0.9435
14B	1,866,922	$156,461	$6,638	0.654	3.3	0.444	5.312	9.10	0.498	0.9362
16B	1,518,137	$133,564	$9,402	0.590	4.4	0.317	33.740	10.00	0.482	0.9423
17B	1,979,947	$137,715	$7,952	0.675	2.9	0.458	3.937	7.70	0.669	0.9321
18B	1,512,155	$170,378	$12,812	0.082	3.9	0.326	10.674	10.60	0.173	0.9434

TABLE C.1.1.1-3.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO C (CURRENT MISSION PLUS SSF PMC) - HTS BASELINE DATA

Arch	Major Elements	Flights			Architecture Cost Risk			
		Crew	No Crew	Total	Tch Chal	Prog Im	New Sys	Value
1C	Reference (Shuttle, DAT, ACRV)	300	569	869	168.7	1.000	0.97	1.000
2C	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	244	652	896	370.8	2.740	2.60	0.878
3C	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	287	638	925	435.0	4.898	4.38	0.768
4C	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	260	771	1,031	753.9	8.102	6.30	0.603
5C	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	324	648	972	835.8	9.404	3.60	0.707
6C	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	288	789	1,077	830.4	9.212	3.74	0.702
7C	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	354	686	1,040	859.0	10.234	4.74	0.643
8C	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	374	927	1,301	1,448.1	19.947	3.92	0.513
11C	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	363	638	1,001	578.0	4.745	3.44	0.791
12C	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	346	638	984	555.3	4.604	4.41	0.751
13C	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	370	638	1,008	587.1	4.719	4.41	0.744
14C	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	364	647	1,011	340.1	2.907	3.39	0.845
16C	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	495	862	1,357	549.0	10.213	3.99	0.726
17C	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	348	1,052	1,400	478.3	11.434	4.36	0.710
18C	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	550	558	1,108	3,088.9	38.357	4.42	0.088

TABLE C.1.1.1-3.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO C (CURRENT MISSION PLUS SSF PMC) - HTS BASELINE DATA (CONCLUDED)

Arch	Environment	Funding Profile			Human Safety	Launch Schedule Confidence				PMS
		Tot (mil)	Pk Yr (mil)	Value		Sch Comp	Sch Mar	Delay	Value	
1C	2,782,450	$177,404	$7,303	0.835	6.7	0.425	4.429	11.80	0.355	0.9374
2C	2,067,017	$209,653	$11,485	0.478	4.8	0.408	5.684	12.00	0.331	0.9354
3C	2,215,156	$208,111	$12,115	0.446	6.4	0.321	3.440	10.90	0.268	0.9437
4C	2,413,326	$271,433	$15,918	0.000	4.3	0.317	3.313	10.40	0.302	0.9429
5C	1,134,554	$221,241	$12,884	0.355	3.9	0.288	3.208	10.60	0.243	0.9492
6C	1,117,133	$234,206	$14,393	0.221	3.3	0.262	3.143	10.70	0.196	0.9498
7C	1,134,315	$249,083	$14,146	0.183	4.2	0.250	3.188	11.40	0.121	0.9496
8C	1,847,511	$130,959	$8,959	0.904	4.2	0.218	15.527	8.70	0.468	0.9521
11C	2,229,404	$239,061	$14,315	0.208	6.6	0.329	3.282	10.70	0.294	0.9442
12C	2,234,602	$234,397	$12,125	0.352	6.6	0.342	3.388	10.80	0.306	0.9441
13C	2,271,571	$244,613	$14,429	0.182	6.8	0.340	3.323	10.80	0.302	0.9442
14C	3,055,613	$233,987	$9,842	0.486	7.2	0.413	4.423	10.70	0.430	0.9347
16C	2,833,665	$196,869	$11,072	0.547	6.1	0.332	27.718	10.30	0.663	0.9391
17C	3,438,581	$204,202	$10,818	0.536	4.6	0.451	3.443	8.30	0.671	0.9304
18C	2,299,257	$216,203	$14,034	0.306	7.5	0.284	11.226	12.30	0.204	0.9458

TABLE C.1.1.1-4.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO D (CURRENT MISSION PLUS EXPANDED SSF) - HTS BASELINE DATA

Arch	Major Elements	Flights			Architecture Cost Risk			
		Crew	No Crew	Total	Tch Chal	Prog Im	New Sys	Value
1D	Reference (Shuttle, DAT, ACRV)	338	569	907	173.4	1.000	0.97	1.000
2D	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	248	666	914	373.2	2.761	2.60	0.882
3D	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	311	642	953	446.1	4.833	4.38	0.772
4D	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	277	791	1,068	773.2	8.238	6.30	0.610
5D	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	364	673	1,037	891.5	9.964	3.60	0.707
6D	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	288	849	1,137	884.8	9.871	3.74	0.702
7D	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	354	748	1,102	909.1	10.868	4.74	0.644
8D	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	382	1,023	1,405	1,472.1	20.929	3.92	0.527
11D	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	387	641	1,028	588.9	4.681	3.44	0.797
12D	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	372	642	1,014	566.8	4.544	4.41	0.755
13D	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	392	642	1,034	598.6	4.671	4.41	0.750
14D	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	399	647	1,046	343.1	2.854	3.39	0.848
16D	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	510	929	1,439	560.4	10.643	3.99	0.732
17D	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	354	1,133	1,487	491.5	11.940	4.36	0.716
18D	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	654	561	1,215	3,228.3	42.808	4.42	0.088

TABLE C.1.1.1-4.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO D (CURRENT MISSION PLUS EXPANDED SSF) - HTS BASELINE DATA (CONCLUDED)

Arch	Environment	Funding Profile			Human	Launch Schedule Confidence				PMS
		Tot (mil)	Pk Yr (mil)	Value	Safety	Sch Comp	Sch Mar	Delay	Value	
1D	3,011,335	$183,876	$7,583	0.834	7.6	0.422	4.124	12.30	0.360	0.9376
2D	2,120,227	$212,741	$11,618	0.493	4.9	0.406	5.381	12.30	0.356	0.9354
3D	2,384,532	$212,372	$12,575	0.437	7.0	0.322	3.312	11.20	0.294	0.9437
4D	2,636,791	$276,905	$16,057	0.000	4.7	0.319	3.627	10.70	0.331	0.9427
5D	1,204,063	$237,832	$12,901	0.326	4.3	0.285	3.363	11.10	0.251	0.9494
6D	1,121,400	$248,089	$14,611	0.189	3.3	0.262	2.837	11.10	0.212	0.9500
7D	1,144,771	$259,900	$14,369	0.161	4.2	0.252	3.593	11.80	0.158	0.9498
8D	1,904,825	$137,588	$9,107	0.910	4.3	0.204	15.699	8.90	0.481	0.9532
11D	2,395,912	$245,043	$14,766	0.191	7.2	0.330	3.180	11.00	0.317	0.9441
12D	2,416,023	$240,552	$12,581	0.336	7.2	0.342	3.260	11.10	0.327	0.9440
13D	2,426,198	$248,850	$14,880	0.170	7.3	0.340	3.225	11.10	0.324	0.9441
14D	3,261,992	$238,531	$10,006	0.495	7.9	0.410	4.648	11.10	0.440	0.9350
16D	3,147,357	$209,002	$11,190	0.531	6.5	0.337	25.991	10.30	0.707	0.9385
17D	3,744,732	$214,216	$11,259	0.508	4.7	0.449	3.816	8.40	0.681	0.9301
18D	2,413,720	$227,835	$15,020	0.237	8.7	0.263	11.172	12.90	0.200	0.9473

TABLE C.1.1.1-5.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO E-LOW (CURRENT MISSION PLUS EXPANDED SSF AND LOW-LEVEL SEI) - HTS BASELINE DATA

Arch	Major Elements	Flights			Architecture Cost Risk			
		Crew	No Crew	Total	Tch Chal	Prog Im	New Sys	Value
1El	Reference (Shuttle, DAT, ACRV)	357	569	926	174.7	1.000	0.97	1.000
2El	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	267	666	933	376.2	2.798	2.60	0.882
3El	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	330	642	972	447.5	4.759	4.38	0.776
4El	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	296	791	1,087	788.7	8.319	6.30	0.613
5El	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	383	673	1,056	907.3	10.172	3.60	0.710
6El	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	307	849	1,156	903.1	9.921	3.74	0.705
7El	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	373	748	1,121	925.3	10.902	4.74	0.648
8El	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	401	1,023	1,424	1,473.7	21.129	3.92	0.539
11El	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	406	641	1,047	603.2	4.830	3.44	0.797
12El	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	391	642	1,033	580.9	4.675	4.41	0.756
13El	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	411	642	1,053	613.0	4.820	4.41	0.750
14El	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	418	647	1,065	350.6	3.034	3.39	0.848
16El	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	529	929	1,458	561.5	10.756	3.99	0.737
17El	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	373	1,133	1,506	495.1	12.061	4.36	0.720
18El	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	673	561	1,234	3,241.6	43.528	4.42	0.111

TABLE C.1.1.1-5.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO E-LOW (CURRENT MISSION PLUS EXPANDED SSF AND LOW-LEVEL SEI) - HTS BASELINE DATA (CONCLUDED)

Arch	Environment	Funding Profile			Human Safety	Launch Schedule Confidence				PMS
		Tot (mil)	Pk Yr (mil)	Value		Sch Comp	Sch Mar	Delay	Value	
1EI	3,125,773	$185,281	$7,583	0.841	8.0	0.420	3.969	12.60	0.350	0.9378
2EI	2,159,732	$214,445	$11,618	0.506	5.3	0.404	5.374	12.50	0.351	0.9353
3EI	2,498,969	$215,514	$12,575	0.446	7.4	0.323	3.180	11.40	0.296	0.9437
4EI	2,639,994	$281,176	$16,055	0.021	4.8	0.316	3.641	10.70	0.341	0.9429
5EI	1,207,266	$241,749	$12,901	0.339	4.5	0.287	3.300	11.20	0.264	0.9495
6EI	1,124,605	$252,981	$14,611	0.200	3.4	0.256	2.793	11.10	0.224	0.9501
7EI	1,147,976	$264,130	$14,369	0.020	4.3	0.246	3.511	11.80	0.170	0.9499
8EI	1,906,633	$137,650	$9,107	0.910	4.5	0.201	15.786	8.90	0.447	0.9535
11EI	2,399,115	$249,029	$14,766	0.204	7.3	0.324	3.169	11.00	0.325	0.9443
12EI	2,430,932	$244,660	$12,581	0.348	7.3	0.339	3.295	11.10	0.340	0.9442
13EI	2,429,401	$252,837	$14,880	0.185	7.4	0.337	3.300	11.10	0.337	0.9443
14EI	3,292,215	$243,210	$10,006	0.505	8.1	0.406	4.420	11.10	0.441	0.9347
16EI	3,159,797	$209,975	$11,199	0.545	6.7	0.333	25.906	10.40	0.629	0.9387
17EI	3,754,761	$215,336	$11,296	0.522	4.9	0.449	3.713	8.40	0.677	0.9302
18EI	2,436,229	$228,370	$15,052	0.256	8.9	0.259	11.266	13.00	0.190	0.9475

TABLE C.1.1.1-6.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO E-HIGH (CURRENT MISSION PLUS EXPANDED SSF AND HIGH-LEVEL SEI) - HTS BASELINE DATA

Arch	Major Elements	Flights			Architecture Cost Risk			
		Crew	No Crew	Total	Tch Chal	Prog Im	New Sys	Value
1Eh	Reference (Shuttle, DAT, ACRV)	389	569	958	179.6	1.000	0.97	0.999
2Eh	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	299	666	965	381.1	2.858	2.60	0.882
3Eh	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	362	642	1,004	451.6	4.639	4.38	0.776
4Eh	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	328	791	1,119	810.9	8.450	6.30	0.609
5Eh	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	415	673	1,088	935.7	10.505	3.60	0.703
6Eh	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	339	849	1,188	929.9	10.001	3.74	0.701
7Eh	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	405	748	1,153	955.4	10.958	4.74	0.644
8Eh	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	433	1,023	1,456	1,476.4	21.453	3.92	0.537
11Eh	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	438	641	1,079	628.7	5.070	3.44	0.792
12Eh	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	423	642	1,065	605.3	4.911	4.41	0.751
13Eh	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	443	642	1,085	636.8	5.058	4.41	0.745
14Eh	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	450	647	1,097	364.0	3.321	3.39	0.844
16Eh	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	561	929	1,490	563.0	10.973	3.99	0.735
17Eh	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	405	1,133	1,538	502.0	12.257	4.36	0.717
18Eh	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	705	561	1,266	3,334.3	44.877	4.42	0.088

TABLE C.1.1.1-6.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO E-HIGH (CURRENT MISSION PLUS EXPANDED SSF AND HIGH-LEVEL SEI) - HTS BASELINE DATA (CONCLUDED)

Arch	Environment	Funding Profile			Human	Launch Schedule Confidence				PMS
		Tot (mil)	Pk Yr (mil)	Value	Safety	Sch Comp	Sch Mar	Delay	Value	
1Eh	3,318,514	$192,109	$8,153	0.785	8.7	0.417	4.064	13.00	0.319	0.9379
2Eh	2,226,268	$219,147	$11,618	0.490	5.8	0.400	5.117	12.90	0.316	0.9350
3Eh	2,691,712	$219,794	$12,575	0.431	8.1	0.323	2.943	11.90	0.259	0.9436
4Eh	2,645,392	$287,407	$16,055	0.000	5.0	0.312	3.911	10.70	0.338	0.9432
5Eh	1,212,664	$248,639	$12,901	0.484	4.7	0.279	3.267	11.30	0.246	0.9497
6Eh	1,130,001	$260,351	$14,611	0.176	3.5	0.250	2.748	11.10	0.216	0.9502
7Eh	1,153,372	$272,028	$14,369	0.151	4.5	0.243	3.295	11.70	0.171	0.9500
8Eh	1,909,677	$137,754	$9,107	0.910	4.7	0.197	15.914	8.90	0.443	0.9538
11Eh	2,404,513	$256,261	$14,766	0.180	7.5	0.315	3.041	11.00	0.312	0.9446
12Eh	2,442,189	$251,494	$12,581	0.325	7.6	0.334	3.156	11.10	0.332	0.9445
13Eh	2,434,799	$259,465	$14,880	0.163	7.6	0.332	3.132	11.00	0.336	0.9446
14Eh	3,343,116	$251,638	$10,169	0.467	8.4	0.399	4.364	11.10	0.431	0.9342
16Eh	3,166,539	$210,362	$11,199	0.544	6.9	0.326	33.053	10.50	0.692	0.9391
17Eh	3,771,642	$217,250	$11,296	0.515	5.2	0.449	3.551	8.40	0.675	0.9302
18Eh	2,461,331	$231,806	$15,588	0.213	9.2	0.253	11.632	13.20	0.172	0.9479

C.1.1.2 Architecture Attribute Values (Updated)

The following tables, Table C.1.1.2-1 through Table C.1.1.2-6, contain the architecture attribute values from the updated set of data. The updated set was produced late in the study. It has corrections for various errors, most of which were minor, and utilizes updated PMS numbers that account for launch pad hold down and better OMS values. Also, the updated set includes Architectures 10 (NDV) and 19 (ALV).

TABLE C.1.1.2-1.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO A (MINIMUM LEVEL OF ACTIVITY) - HTS UPDATED DATA

Arch	Major Elements	Flights			Architecture Cost Risk			
		Crew	No Crew	Total	Tch Chal	Prog Im	New Sys	Value
1A	Reference (Shuttle, DAT, ACRV)	76	569	645	145.1	1.000	0.00	1.000
2A	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	76	569	645	318.5	2.412	1.63	0.853
3A	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	76	559	635	355.8	5.217	2.41	0.758
4A	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	76	559	635	355.8	5.217	2.41	0.758
5A	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	76	559	635	550.2	5.631	2.60	0.720
6A	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	76	611	687	537.6	6.241	3.74	0.636
7A	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	76	559	635	472.8	5.631	3.74	0.651
8A	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	76	569	645	1,353.4	11.335	1.00	0.665
10A	Advanced Technology - NDV (Shuttle, DAT, ACRV, NDV, CTF)	168	466	634	4,605.5	18.957	1.00	0.229
11A	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	76	559	635	335.1	4.017	1.49	0.839
12A	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	76	559	635	335.1	4.017	1.49	0.839
13A	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	76	559	635	335.1	4.017	1.49	0.839
14A	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	76	569	645	145.1	1.000	0.00	1.000
16A	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	82	569	651	432.4	2.323	1.03	0.884
17A	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	91	605	696	340.9	4.452	3.39	0.705
18A	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	177	468	645	2,781.3	22.181	1.50	0.334
19A	New Concept - Air Launch (ALV) (Shuttle, DAT, ACRV, ALV, CTF, LRV)	76	622	698	316.4	18.657	2.50	0.566

TABLE C.1.1.2-1.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO A (MINIMUM LEVEL OF ACTIVITY) - HTS UPDATED DATA (CONCLUDED)

Arch	Environment	Funding Profile			Human	Launch Schedule Confidence				PMS
		Tot (mil)	Pk Yr (mil)	Value	Safety	Sch Comp	Sch Mar	Delay	Value	
1A	1,433,252	$149,681	$6,388	0.632	1.2	0.456	5.613	7.30	0.490	0.9389
2A	1,265,102	$169,717	$9,480	0.264	1.3	0.446	6.378	7.30	0.479	0.9399
3A	927,776	$167,142	$11,075	0.160	1.2	0.299	4.685	7.30	0.214	0.9501
4A	927,776	$167,252	$11,075	0.159	1.2	0.299	4.685	7.30	0.214	0.9501
5A	597,649	$142,033	$10,879	0.340	0.7	0.336	4.663	6.60	0.371	0.9515
6A	594,706	$148,725	$12,940	0.138	0.6	0.314	4.659	7.20	0.253	0.9523
7A	597,649	$137,902	$12,197	0.266	0.7	0.321	4.626	6.70	0.331	0.9515
8A	1,066,800	$93,604	$7,947	0.881	0.6	0.326	12.185	6.90	0.370	0.9476
10A	1,303,863	$141,355	$10,522	0.371	1.9	0.493	48.651	7.40	0.867	0.9432
11A	950,718	$166,966	$11,075	0.161	1.2	0.343	5.267	7.40	0.281	0.9491
12A	950,718	$166,966	$11,075	0.161	1.2	0.343	5.267	7.40	0.281	0.9491
13A	950,718	$166,966	$11,075	0.161	1.2	0.343	5.267	7.40	0.281	0.9491
14A	1,433,252	$149,790	$6,388	0.631	1.2	0.456	5.630	7.30	0.491	0.9389
16A	1,217,385	$117,768	$9,326	0.618	0.9	0.434	12.971	6.90	0.562	0.9395
17A	1,384,266	$115,537	$7,233	0.792	0.9	0.469	5.080	6.40	0.629	0.9365
18A	1,243,214	$164,834	$12,786	0.044	1.5	0.362	9.881	8.90	0.148	0.9428
19A	992,475	$120,838	$7,654	0.725	0.8	0.428	13.160	7.80	0.433	0.9403

TABLE C.1.1.2-2.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO B (CURRENT MISSIONS WITHOUT SSF) - HTS UPDATED DATA

Arch	Major Elements	Flights			Architecture Cost Risk			
		Crew	No Crew	Total	Tch Chal	Prog Im	New Sys	Value
1B	Reference (Shuttle, DAT, ACRV)	148	569	717	148.0	1.000	0.00	1.000
2B	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	140	569	709	323.9	2.422	1.63	0.858
3B	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	148	559	707	358.7	4.787	2.41	0.776
4B	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	148	559	707	358.7	4.787	2.41	0.776
5B	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	202	559	761	634.4	7.181	2.60	0.710
6B	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	165	661	826	638.8	7.320	3.74	0.632
7B	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	245	559	804	623.7	7.973	3.74	0.626
8B	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	257	576	833	1,374.2	14.826	1.00	0.659
10B	Advanced Technology - NDV (Shuttle, DAT, ACRV, NDV, CTF)	262	474	736	4,643.1	22.387	1.00	0.250
11B	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	148	559	707	338.0	3.710	1.49	0.852
12B	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	148	559	707	338.0	3.710	1.49	0.852
13B	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	148	559	707	338.0	3.710	1.49	0.852
14B	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	148	569	717	148.0	1.000	0.00	1.000
16B	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	374	569	943	458.3	7.196	1.03	0.832
17B	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	224	700	924	386.2	7.787	3.39	0.676
18B	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	291	470	761	2,840.3	28.449	1.50	0.330
19B	New Concept - Air Launch (ALV) (Shuttle, DAT, ACRV, ALV, CTF, LRV)	202	710	912	396.6	19.859	2.50	0.602

TABLE C.1.1.2-2.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO B (CURRENT MISSIONS WITHOUT SSF) - HTS UPDATED DATA (CONCLUDED)

Arch	Environment	Funding Profile			Human Safety	Launch Schedule Confidence				PMS
		Tot (mil)	Pk Yr (mil)	Value		Sch Comp	Sch Mar	Delay	Value	
1B	1,866,922	$154,231	$6,649	0.663	2.3	0.444	5.298	9.10	0.447	0.9424
2B	1,544,102	$174,710	$9,620	0.298	2.3	0.435	6.126	8.80	0.472	0.9423
3B	1,361,446	$171,694	$11,192	0.196	2.3	0.303	4.481	9.00	0.239	0.9524
4B	1,361,446	$171,915	$11,192	0.194	2.3	0.303	4.481	9.00	0.239	0.9524
5B	853,083	$164,774	$11,023	0.254	1.7	0.328	3.977	8.50	0.329	0.9538
6B	846,479	$179,088	$13,076	0.000	1.4	0.294	3.716	8.90	0.232	0.9544
7B	854,476	$178,861	$12,515	0.045	1.9	0.279	3.748	9.10	0.187	0.9542
8B	1,337,062	$103,362	$8,193	0.879	1.8	0.273	13.977	8.20	0.343	0.9536
10B	1,634,355	$151,119	$10,591	0.378	3.1	0.493	56.459	8.80	0.878	0.9465
11B	1,384,388	$171,629	$11,192	0.196	2.3	0.342	5.004	9.20	0.279	0.9515
12B	1,384,388	$171,629	$11,192	0.196	2.3	0.342	5.020	9.20	0.280	0.9515
13B	1,384,388	$171,629	$11,192	0.196	2.3	0.342	5.004	9.20	0.279	0.9515
14B	1,866,922	$154,452	$6,638	0.663	2.3	0.444	5.312	9.10	0.447	0.9424
16B	1,518,137	$133,002	$9,402	0.590	3.4	0.317	33.740	10.00	0.334	0.9509
17B	1,979,947	$137,063	$7,952	0.676	2.2	0.458	3.937	7.70	0.615	0.9394
18B	1,536,244	$170,394	$12,812	0.078	2.5	0.326	10.635	10.70	0.124	0.9465
19B	1,517,538	$153,122	$9,279	0.467	2.1	0.432	11.173	9.30	0.444	0.9418

TABLE C.1.1.2-3.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO C (CURRENT MISSION PLUS SSF PMC) - HTS UPDATED DATA

Arch	Major Elements	Flights			Architecture Cost Risk			
		Crew	No Crew	Total	Tch Chal	Prog Im	New Sys	Value
1C	Reference (Shuttle, DAT, ACRV)	300	569	869	168.7	1.000	0.97	1.000
2C	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	244	652	896	370.8	2.740	2.60	0.890
3C	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	287	638	925	435.0	4.898	4.38	0.783
4C	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	260	774	1,034	753.9	8.116	6.30	0.635
5C	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	324	648	972	835.8	9.404	3.60	0.744
6C	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	288	789	1,077	830.4	9.212	3.74	0.739
7C	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	354	686	1,040	859.0	10.234	4.74	0.681
8C	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	374	927	1,301	1,448.1	19.947	3.92	0.584
10C	Advanced Technology - NDV (Shuttle, DAT, ACRV, NDV, CTF)	442	558	1,000	4,748.8	27.047	3.92	0.203
11C	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	363	638	1,001	578.0	4.745	3.44	0.814
12C	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	346	638	984	555.3	4.604	4.41	0.772
13C	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	370	638	1,008	587.1	4.719	4.41	0.768
14C	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	364	647	1,011	340.1	2.907	3.39	0.855
16C	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	495	862	1,357	549.0	10.213	3.99	0.747
17C	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	348	1,052	1,400	478.3	11.434	4.36	0.727
18C	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	550	558	1,108	3,088.9	38.357	4.42	0.251
19C	New Concept - Air Launch (ALV) (Shuttle, DAT, ACRV, ALV, CTF, LRV)	315	1,093	1,408	499.7	21.593	3.47	0.685

TABLE C.1.1.2-3.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO C (CURRENT MISSION PLUS SSF PMC) - HTS UPDATED DATA (CONCLUDED)

Arch	Environment	Funding Profile			Human Safety	Launch Schedule Confidence				PMS
		Tot (mil)	Pk Yr (mil)	Value		Sch Comp	Sch Mar	Delay	Value	
1C	2,782,450	$173,035	$7,303	0.842	4.7	0.425	4.429	11.80	0.295	0.9477
2C	2,067,017	$207,086	$11,485	0.476	4.0	0.408	5.684	12.00	0.265	0.9462
3C	2,215,156	$203,410	$12,115	0.453	4.5	0.321	3.440	10.90	0.241	0.9559
4C	2,413,831	$267,159	$15,918	0.000	3.0	0.316	3.307	10.40	0.276	0.9571
5C	1,134,554	$218,926	$12,884	0.352	2.8	0.288	3.208	10.60	0.225	0.9560
6C	1,117,133	$233,383	$14,393	0.212	2.3	0.262	3.143	10.70	0.186	0.9565
7C	1,134,315	$246,523	$14,146	0.178	2.9	0.250	3.188	11.40	0.113	0.9564
8C	1,847,511	$129,645	$8,959	0.904	2.7	0.218	15.527	8.70	0.367	0.9589
10C	2,471,009	$186,768	$11,629	0.542	5.2	0.498	64.607	9.80	0.875	0.9493
11C	2,229,404	$236,669	$14,315	0.204	4.6	0.329	3.282	10.70	0.266	0.9552
12C	2,234,602	$231,935	$12,125	0.348	4.6	0.342	3.388	10.80	0.274	0.9553
13C	2,271,571	$240,521	$14,429	0.184	4.7	0.340	3.323	10.80	0.271	0.9554
14C	3,055,613	$231,146	$9,842	0.484	5.0	0.413	4.423	10.70	0.372	0.9455
16C	2,833,665	$196,585	$11,072	0.538	4.6	0.332	27.718	10.30	0.436	0.9487
17C	3,438,581	$201,570	$10,818	0.535	3.4	0.451	3.443	8.30	0.612	0.9392
18C	2,299,257	$216,062	$14,034	0.296	4.7	0.284	11.226	12.30	0.123	0.9501
19C	2,717,314	$216,022	$11,884	0.420	3.4	0.429	9.290	9.90	0.485	0.9413

TABLE C.1.1.2-4.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO D (CURRENT MISSION PLUS EXPANDED SSF) - HTS UPDATED DATA

Arch	Major Elements	Flights			Architecture Cost Risk			
		Crew	No Crew	Total	Tch Chal	Prog Im	New Sys	Value
1D	Reference (Shuttle, DAT, ACRV)	338	569	907	173.4	1.000	0.97	1.000
2D	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	248	666	914	373.2	2.761	2.60	0.892
3D	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	311	642	953	446.1	4.833	4.38	0.786
4D	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	277	795	1,072	773.2	8.255	6.30	0.639
5D	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	364	673	1,037	891.5	9.964	3.60	0.742
6D	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	288	849	1,137	884.8	9.871	3.74	0.737
7D	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	354	748	1,102	909.1	10.868	4.74	0.680
8D	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	382	1,023	1,405	1,472.1	20.929	3.92	0.591
10D	Advanced Technology - NDV (Shuttle, DAT, ACRV, NDV, CTF)	539	559	1,098	4,795.0	30.842	3.92	0.196
11D	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	387	641	1,028	588.9	4.681	3.44	0.817
12D	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	372	642	1,014	566.8	4.544	4.41	0.775
13D	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	392	642	1,034	598.6	4.671	4.41	0.771
14D	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	399	647	1,046	343.1	2.854	3.39	0.856
16D	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	510	929	1,439	560.4	10.643	3.99	0.751
17D	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	354	1,133	1,487	491.5	11.940	4.36	0.731
18D	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	663	561	1,224	3,228.3	42.500	4.42	0.241
19D	New Concept - Air Launch (ALV) (Shuttle, DAT, ACRV, ALV, CTF, LRV)	319	1,197	1,516	520.4	21.492	3.47	0.701

TABLE C.1.1.2-4.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO D (CURRENT MISSION PLUS EXPANDED SSF) - HTS UPDATED DATA (CONCLUDED)

Arch	Environment	Funding Profile			Human	Launch Schedule Confidence				PMS
		Tot (mil)	Pk Yr (mil)	Value	Safety	Sch Comp	Sch Mar	Delay	Value	
1D	3,011,335	$179,347	$7,583	0.840	5.2	0.422	4.124	12.30	0.298	0.9488
2D	2,120,227	$208,641	$11,618	0.497	4.1	0.406	5.381	12.30	0.286	0.9465
3D	2,384,532	$207,548	$12,575	0.445	4.8	0.322	3.312	11.20	0.263	0.9563
4D	2,637,465	$274,235	$16,057	0.000	3.3	0.318	3.614	10.70	0.297	0.9576
5D	1,204,063	$235,438	$12,901	0.325	3.1	0.285	3.363	11.10	0.230	0.9565
6D	1,121,400	$247,005	$14,611	0.183	2.3	0.262	2.837	11.10	0.202	0.9568
7D	1,144,771	$257,270	$14,369	0.161	2.9	0.252	3.593	11.80	0.144	0.9567
8D	1,904,825	$134,657	$9,107	0.910	2.8	0.204	15.699	8.90	0.358	0.9602
10D	2,684,402	$191,445	$11,712	0.553	6.4	0.505	73.453	10.20	0.870	0.9510
11D	2,395,912	$240,904	$14,766	0.196	5.0	0.330	3.180	11.00	0.286	0.9555
12D	2,416,023	$236,282	$12,581	0.341	5.0	0.342	3.260	11.10	0.292	0.9557
13D	2,426,198	$244,651	$14,880	0.176	5.1	0.340	3.225	11.10	0.290	0.9556
14D	3,261,992	$233,889	$10,006	0.502	5.6	0.410	4.648	11.10	0.374	0.9464
16D	3,147,357	$206,752	$11,190	0.529	4.9	0.337	25.991	10.30	0.452	0.9481
17D	3,744,732	$211,549	$11,259	0.508	3.5	0.449	3.816	8.40	0.609	0.9389
18D	2,467,924	$225,976	$15,020	0.234	5.6	0.263	11.100	13.00	0.104	0.9516
19D	3,079,607	$233,843	$12,313	0.366	3.4	0.429	8.401	9.80	0.508	0.9407

TABLE C.1.1.2-5.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO E-LOW (CURRENT MISSION PLUS EXPANDED SSF AND LOW-LEVEL SEI) - HTS UPDATED DATA

Arch	Major Elements	Flights			Architecture Cost Risk			
		Crew	No Crew	Total	Tch Chal	Prog Im	New Sys	Value
1El	Reference (Shuttle, DAT, ACRV)	357	569	926	174.7	1.000	0.97	1.000
2El	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	267	666	933	376.2	2.798	2.60	0.892
3El	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	330	642	972	447.5	4.759	4.38	0.788
4El	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	296	795	1,091	788.7	8.336	6.30	0.640
5El	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	383	673	1,056	907.3	10.172	3.60	0.742
6El	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	307	849	1,156	903.1	9.921	3.74	0.738
7El	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	373	748	1,121	925.3	10.902	4.74	0.682
8El	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	401	1,023	1,424	1,473.7	21.129	3.92	0.597
10El	Advanced Technology - NDV (Shuttle, DAT, ACRV, NDV, CTF)	558	559	1,117	4,803.8	31.487	3.92	0.204
11El	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	406	641	1,047	603.2	4.830	3.44	0.816
12El	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	391	642	1,033	580.9	4.675	4.41	0.774
13El	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	411	642	1,053	613.0	4.820	4.41	0.770
14El	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	418	647	1,065	350.6	3.034	3.39	0.855
16El	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	529	929	1,458	561.5	10.756	3.99	0.754
17El	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	373	1,133	1,506	495.1	12.061	4.36	0.734
18El	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	682	561	1,243	3,241.6	43.220	4.42	0.251
19El	New Concept - Air Launch (ALV) (Shuttle, DAT, ACRV, ALV, CTF, LRV)	338	1,197	1,535	533.3	21.670	3.47	0.706

TABLE C.1.1.2-5.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO E-LOW (CURRENT MISSION PLUS EXPANDED SSF AND LOW-LEVEL SEI) - HTS UPDATED DATA (CONCLUDED)

Arch	Environment	Funding Profile			Human	Launch Schedule Confidence				PMS
		Tot (mil)	Pk Yr (mil)	Value	Safety	Sch Comp	Sch Mar	Delay	Value	
1EI	3,125,773	$180,764	$7,583	0.847	5.5	0.420	3.969	12.60	0.286	0.9493
2EI	2,159,732	$210,261	$11,618	0.510	4.4	0.404	5.374	12.50	0.282	0.9468
3EI	2,498,969	$210,595	$12,575	0.453	5.1	0.323	3.180	11.40	0.262	0.9566
4EI	2,640,668	$278,439	$16,055	0.021	3.4	0.315	3.629	10.70	0.304	0.9577
5EI	1,207,266	$239,357	$12,901	0.337	3.2	0.287	3.300	11.20	0.238	0.9566
6EI	1,124,605	$251,828	$14,611	0.195	2.4	0.256	2.793	11.10	0.210	0.9569
7EI	1,147,976	$261,503	$14,369	0.177	3.0	0.246	3.511	11.80	0.153	0.9567
8EI	1,906,633	$134,719	$9,107	0.910	2.9	0.201	15.786	8.90	0.361	0.9604
10EI	2,727,819	$194,054	$11,712	0.559	6.6	0.506	74.924	10.30	0.853	0.9513
11EI	2,399,115	$244,820	$14,766	0.209	5.1	0.324	3.169	11.00	0.291	0.9557
12EI	2,430,932	$240,399	$12,581	0.353	5.1	0.339	3.295	11.10	0.301	0.9558
13EI	2,429,401	$248,568	$14,880	0.190	5.2	0.337	3.300	11.10	0.298	0.9557
14EI	3,292,215	$238,358	$10,006	0.512	5.8	0.406	4.420	11.10	0.377	0.9463
16EI	3,159,797	$207,093	$11,199	0.545	5.0	0.333	25.906	10.40	0.443	0.9485
17EI	3,754,761	$212,679	$11,296	0.521	3.7	0.449	3.713	8.40	0.608	0.9391
18EI	2,490,434	$226,489	$15,052	0.253	5.7	0.260	11.194	13.10	0.112	0.9518
19EI	3,080,217	$237,080	$12,199	0.386	3.5	0.430	8.520	9.90	0.505	0.9408

TABLE C.1.1.2-6.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO E-HIGH (CURRENT MISSION PLUS EXPANDED SSF AND HIGH-LEVEL SEI) - HTS UPDATED DATA

Arch	Major Elements	Flights			Architecture Cost Risk			
		Crew	No Crew	Total	Tch Chal	Prog Im	New Sys	Value
1Eh	Reference (Shuttle, DAT, ACRV)	389	569	958	179.6	1.000	0.97	1.000
2Eh	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	299	666	965	381.1	2.858	2.60	0.891
3Eh	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	362	642	1,004	451.6	4.639	4.38	0.788
4Eh	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	328	795	1,123	810.9	8.466	6.30	0.637
5Eh	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	415	673	1,088	935.7	10.505	3.60	0.738
6Eh	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	339	849	1,188	929.9	10.001	3.74	0.735
7Eh	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	405	748	1,153	955.4	10.958	4.74	0.679
8Eh	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	433	1,023	1,456	1,476.4	21.453	3.92	0.595
10Eh	Advanced Technology - NDV (Shuttle, DAT, ACRV, NDV, CTF)	590	559	1,149	4,821.1	32.792	3.92	0.193
11Eh	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	438	641	1,079	628.7	5.070	3.44	0.812
12Eh	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	423	642	1,065	605.3	4.911	4.41	0.770
13Eh	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	443	642	1,085	636.8	5.058	4.41	0.766
14Eh	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	450	647	1,097	364.0	3.321	3.39	0.852
16Eh	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	561	929	1,490	563.0	10.973	3.99	0.752
17Eh	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	405	1,133	1,538	502.0	12.257	4.36	0.732
18Eh	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	714	561	1,275	3,334.3	44.568	4.42	0.232
19Eh	New Concept - Air Launch (ALV) (Shuttle, DAT, ACRV, ALV, CTF, LRV)	370	1,197	1,567	543.3	21.961	3.47	0.703

TABLE C.1.1.2-6.– ARCHITECTURE ATTRIBUTE VALUES FOR IF SCENARIO E-HIGH (CURRENT MISSION PLUS EXPANDED SSF AND HIGH-LEVEL SEI) - HTS UPDATED DATA (CONCLUDED)

Arch	Environment	Funding Profile			Human Safety	Launch Schedule Confidence				PMS
		Tot (mil)	Pk Yr (mil)	Value		Sch Comp	Sch Mar	Delay	Value	
1Eh	3,318,514	$187,368	$8,153	0.791	6.0	0.417	4.064	13.00	0.256	0.9501
2Eh	2,226,268	$214,914	$11,618	0.495	5.0	0.400	5.117	12.90	0.249	0.9472
3Eh	2,691,712	$214,821	$12,575	0.439	5.6	0.323	2.943	11.90	0.226	0.9571
4Eh	2,646,066	$284,676	$16,055	0.000	3.5	0.311	3.898	10.60	0.308	0.9578
5Eh	1,212,664	$246,271	$12,901	0.314	3.4	0.279	3.267	11.30	0.222	0.9567
6Eh	1,130,001	$259,200	$14,611	0.170	2.5	0.250	2.748	11.10	0.203	0.9570
7Eh	1,153,372	$269,413	$14,369	0.151	3.1	0.243	3.295	11.70	0.156	0.9569
8Eh	1,909,677	$134,823	$9,107	0.910	3.0	0.197	15.914	8.90	0.357	0.9607
10Eh	2,783,987	$195,349	$11,712	0.555	6.9	0.508	77.912	10.40	0.861	0.9518
11Eh	2,404,513	$251,997	$14,766	0.185	5.2	0.315	3.041	11.00	0.280	0.9558
12Eh	2,442,189	$247,166	$12,581	0.330	5.2	0.334	3.156	11.10	0.295	0.9560
13Eh	2,434,799	$255,132	$14,880	0.168	5.3	0.332	3.132	11.00	0.299	0.9559
14Eh	3,343,116	$246,790	$10,169	0.474	6.0	0.399	4.364	11.10	0.370	0.9462
16Eh	3,166,539	$207,482	$11,199	0.544	5.2	0.326	33.053	10.50	0.460	0.9491
17Eh	3,771,642	$214,561	$11,296	0.515	3.9	0.449	3.551	8.40	0.607	0.9394
18Eh	2,515,543	$229,974	$15,588	0.210	5.9	0.254	11.559	13.20	0.100	0.9521
19Eh	3,081,246	$239,498	$12,317	0.371	3.8	0.431	8.320	10.00	0.498	0.9411

C.1.2 ARCHITECTURE SCORES

The following subsections contain tables summarizing architecture scores for both the baseline and updated data sets. The data is shown for each "If" Scenario.

The architecture score varies between 0 and 100, with 100 being the best. It is determined by combining attribute utility scores using the weightings determined by the NIT through a consensus process. Percentages are shown in Table C.1.2.

TABLE C.1.2.- ARCHITECTURE ATTRIBUTE SCORE WEIGHTINGS

Human Safety	29%
Funding Profile	27%
Probability of Mission Success	19%
Architecture Cost Risk	13%
Launch Schedule Confidence	8%
Environment	4%

C.1.2.1 Architecture Scores (Baseline)

Table C.1.2.1 contains the architecture scores from the baseline set of data.

TABLE C.1.2.1.– ARCHITECTURE SCORES - HTS BASELINE DATA

Arch	Major Elements	Architecture Scores					
		If A	If B	If C	If D	If E-low	If E-high
1	Reference (Shuttle, DAT, ACRV)	52.2	56.1	54.0	53.8	53.8	48.0
2	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	43.5	50.6	54.1	56.1	55.1	51.2
3	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	41.0	44.3	46.4	47.2	46.7	41.9
4	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	41.0	44.3	44.7	43.5	44.6	43.2
5	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	67.6	63.1	66.6	63.3	63.3	66.2
6	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	62.4	59.9	66.4	64.5	64.5	63.2
7	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	63.6	49.9	57.0	57.1	52.4	55.8
8	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	81.4	76.2	82.6	83.4	82.7	81.9
11	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	43.1	46.0	39.1	39.8	41.4	39.7
12	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	43.1	46.0	43.0	43.5	45.2	43.1
13	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	43.1	46.0	36.2	37.8	39.8	38.3
14	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	52.2	56.1	36.4	38.6	39.8	36.5
16	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	63.1	46.3	51.6	52.6	52.7	52.9
17	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	60.3	53.9	52.9	53.2	53.8	52.0
18	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	12.5	22.8	25.8	23.8	25.6	22.6

C.1.2.2 Architecture Scores (Updated)

Table C.1.2.2 contains the architecture scores from the updated set of data. The updated set was produced late in the study. It has corrections for various errors, most of which were minor, and utilizes updated PMS numbers that account for launch pad hold down and better OMS values. Also, the updated set includes Architectures 10 (NDV) and 19 (ALV).

TABLE C.1.2.2.– ARCHITECTURE SCORES - HTS UPDATED DATA

Arch	Major Elements	Architecture Scores					
		If A	If B	If C	If D	If E-low	If E-high
1	Reference (Shuttle, DAT, ACRV)	54.3	57.0	54.3	58.3	59.1	54.3
2	Evolution of Current Systems (Shuttle, DAT, ACRV, Shuttle Evolution)	39.6	44.6	48.1	53.5	53.6	49.1
3	Alternate Access - Cargo Only (Shuttle, DAT, ACRV, NLS, CTV)	47.8	51.0	49.5	53.3	53.6	49.7
4	Alternate Access - Crew & Cargo (Shuttle, DAT, ACRV, PLS, NLS, CTV, CRV)	47.7	51.0	49.8	49.5	50.6	49.5
5	Separation of People & Cargo/Human Booster (Shuttle, DAT, CLV, MLS, CRV)	69.2	64.9	64.7	62.6	63.3	61.4
6	Separation of People & Cargo/Human Booster (Shuttle, DAT, PLS, MLS, CRV)	63.1	59.7	65.5	64.1	64.5	63.0
7	Separation of People & Cargo (Shuttle, DAT, PLS, MLS, CRV, LRV)	65.1	53.2	56.7	57.7	58.4	57.1
8	Advanced Technology (Shuttle, DAT, ACRV, SSTO, CTF)	80.9	79.9	82.6	83.4	83.5	83.1
10	Advanced Technology - NDV (Shuttle, DAT, ACRV, NDV, CTF)	27.3	34.2	35.6	36.8	38.9	37.2
11	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	48.6	51.4	41.2	44.5	46.5	45.2
12	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	48.6	51.5	45.0	48.4	50.3	49.0
13	ACRV Commonality (Shuttle, DAT, ACRV, PLS, NLS, CTV)	48.6	51.4	39.0	42.5	44.6	43.4
14	Human Booster (Shuttle, DAT, ACRV, PLS, HR Titan, CTF)	54.2	57.0	36.5	41.5	42.9	40.2
16	New Concept - Air Launch (Shuttle, DAT, ACRV, AMSC, CTF, LRV)	61.1	46.6	44.6	48.0	50.2	49.6
17	New Concept - Titan Evolution (Shuttle, DAT, ACRV, RUPC, CTF, LRV)	60.0	50.8	47.7	49.5	50.1	48.9
18	New Concept - Beta II (Shuttle, DAT, ACRV, Beta II, CTF)	19.2	27.5	27.2	26.5	29.3	26.5
19	New Concept - Air Launch (ALV) (Shuttle, DAT, ACRV, ALV, CTF, LRV)	62.1	47.3	45.6	47.1	48.4	46.2

C.1.3 ARCHITECTURE COST SUMMARIES

Table C.1.3 shows a comprehensive summary of architecture cost data. Costs for each system in each architecture are listed. Costs for each cost phase are shown along with unreliability costs and various totals. Also shown are the recurring costs per flight.

The nonrecurring cost phases are design, development, test, and evaluation (DDT&E), facilities, nonrecurring production, and preplanned product improvement (P3I). The recurring cost phases include operations and recurring production.

All costs are in millions of 1992 dollars and include wraps. They include all costs incurred from 1992 to 2020 for flights from 1998 to 2020. They come from the updated data set which includes revised PMS values.

TABLE C.1.3.– ARCHITECTURE COST SUMMARY

Arch	#	System/ Family	Cost (Millions of 92 Dollars): Nonrecurring: DDT&E	Facs	NR Prod	P3I	NR Total	Recurring: Ops	Rec Prod	Rec Total	NR+Rec Total	Unrel	Total	Recurring Cost/Flt: Flights After 97	CPF
1	A	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	0	0	23,000	23,000	37,301	26,272	63,573	86,573	1,761	88,334	59	1,077.5
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	0	595	0	23,000	23,595	52,753	68,831	121,584	145,179	4,502	149,681	523	232.5
	B	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	0	0	23,000	23,000	37,757	28,668	66,425	89,425	3,459	92,884	97	684.8
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	0	595	0	23,000	23,595	53,209	71,227	124,436	148,031	6,200	154,231	561	221.8
	C	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	0	0	23,000	23,000	39,473	38,947	78,420	101,420	6,981	108,401	240	326.8
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	1,321	595	0	24,402	26,317	55,173	81,823	136,996	163,313	9,722	173,035	704	194.8
	D	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	116	0	23,000	23,116	40,067	42,850	82,917	106,033	8,680	114,713	278	298.3
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	1,321	711	0	24,402	26,433	55,767	85,726	141,493	167,926	11,421	179,347	742	190.7
	E-low	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	116	0	23,000	23,116	40,295	43,977	84,272	107,388	8,742	116,130	297	283.7
		Titan II	0	0	0	0	0	470	865	1,335	1,335	56	1,393	31	43.1
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	1,321	711	0	24,402	26,433	55,995	86,853	142,848	169,281	11,483	180,764	761	187.7
	E-high	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	636	0	23,000	23,636	41,171	47,549	88,720	112,356	10,378	122,734	329	269.7
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	1,321	1,231	0	24,402	26,953	56,871	90,425	147,296	174,249	13,119	187,368	793	185.7
2	A	Atlas	0	0	0	0	0	352	1,015	1,367	1,367	67	1,434	11	124.3
		Atlas Evol	100	151	0	0	251	1,166	4,589	5,755	6,006	252	6,258	58	99.2
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	0	0	2,000	2,000	8,063	5,519	13,582	15,582	1,699	17,281	9	1,509.1
		Shuttle Evol	3,000	1,140	0	24,150	28,290	35,312	19,181	54,493	82,783	2,267	85,050	50	1,089.9
		Titan Evol	0	0	0	403	403	9,291	29,698	38,989	39,392	2,243	41,635	174	224.1
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,851	4,692	6,543	7,138	513	7,651	29	225.6
		Total	3,100	1,886	0	26,553	31,539	58,552	72,208	130,760	162,299	7,418	169,717	523	250.0

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

Arch	If	System/ Family	Cost (Millions of 92 Dollars) Nonrecurring DDT&E	Face	NR Prod	P3I	NR Total	Recurring Ops	Rec Prod	Rec Total	NR+Rec Total	Unrel	Total	Recurring Cost/Flt Flights After 97	CPF
2	B	Atlas	0	0	0	0	0	352	1,015	1,367	1,367	67	1,434	11	124.3
		Atlas Evol	100	151	0	0	251	1,166	4,589	5,755	6,006	252	6,258	58	99.2
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	0	0	2,000	2,000	8,099	5,669	13,768	15,768	1,699	17,467	12	1,147.3
		Shuttle Evol	3,000	1,140	0	24,150	28,290	35,633	21,716	57,349	85,639	4,218	89,857	77	744.8
		Titan Evol	0	0	0	403	403	9,291	29,698	38,989	39,392	2,243	41,635	174	224.1
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,851	4,692	6,543	7,138	513	7,651	29	225.6
		Total	3,100	1,886	0	26,553	31,539	58,909	74,893	133,802	165,341	9,369	174,710	553	242.0
	C	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	352	1,015	1,367	1,367	67	1,434	11	124.3
		Atlas Evol	100	151	0	0	251	1,166	4,589	5,755	6,006	252	6,258	58	99.2
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	0	0	2,000	2,000	9,991	9,570	19,561	21,561	1,699	23,260	37	528.7
		Shut Evol/RCV	3,152	1,140	0	24,318	28,610	37,469	37,190	74,659	103,269	9,884	113,153	230	324.6
		Titan Evol	0	0	0	403	403	9,291	29,698	38,989	39,392	2,243	41,635	174	224.1
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,851	4,692	6,543	7,138	513	7,651	29	225.6
		Total	4,573	1,886	0	28,123	34,581	62,885	94,585	157,470	192,051	15,035	207,086	731	215.4
	D	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	352	1,015	1,367	1,367	67	1,434	11	124.3
		Atlas Evol	100	151	0	0	251	1,166	4,589	5,755	6,006	252	6,258	58	99.2
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	0	0	2,000	2,000	10,038	9,770	19,808	21,808	1,761	23,569	41	483.1
		Shut Evol/RCV	3,152	1,140	0	24,318	28,610	37,637	38,186	75,823	104,433	9,966	114,399	244	310.8
		Titan Evol	0	0	0	403	403	9,291	29,698	38,989	39,392	2,243	41,635	174	224.1
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,851	4,692	6,543	7,138	513	7,651	29	225.6
		Total	4,573	1,886	0	28,123	34,581	63,100	95,781	158,881	193,462	15,179	208,641	749	212.1
	E-low	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	352	1,015	1,367	1,367	67	1,434	11	124.3
		Atlas Evol	100	151	0	0	251	1,166	4,589	5,755	6,006	252	6,258	58	99.2
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	0	0	2,000	2,000	10,038	9,770	19,808	21,808	1,761	23,569	41	483.1
		Shut Evol/RCV	3,152	1,140	0	24,318	28,610	37,865	39,595	77,460	106,070	9,949	116,019	263	294.5
		Titan Evol	0	0	0	403	403	9,291	29,698	38,989	39,392	2,243	41,635	174	224.1
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,851	4,692	6,543	7,138	513	7,651	29	225.6
		Total	4,573	1,886	0	28,123	34,581	63,328	97,190	160,518	195,099	15,162	210,261	768	209.0
	E-high	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	352	1,015	1,367	1,367	67	1,434	11	124.3
		Atlas Evol	100	151	0	0	251	1,166	4,589	5,755	6,006	252	6,258	58	99.2
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	0	0	2,000	2,000	10,038	9,770	19,808	21,808	1,761	23,569	41	483.1
		Shut Evol/RCV	3,152	1,140	0	24,318	28,610	38,247	41,843	80,090	108,700	11,972	120,672	295	271.5
		Titan Evol	0	0	0	403	403	9,291	29,698	38,989	39,392	2,243	41,635	174	224.1
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,851	4,692	6,543	7,138	513	7,651	29	225.6
		Total	4,573	1,886	0	28,123	34,581	63,710	99,438	163,148	197,729	17,185	214,914	800	203.9

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

Arch	#	System/ Family	Cost (Millions of 92 Dollars): Nonrecurring: DDT&E	Facs	NR Prod	P3I	NR Total	Recurring: Ops	Rec Prod	Rec Total	NR+Rec Total	Unrel	Total	Recurring Cost/Flt: Flights After 97	CPF
3	A	Atlas	0	0	0	0	0	598	2,059	2,657	2,657	134	2,791	24	110.7
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-20	395	2,410	0	0	2,805	1,973	4,343	6,316	9,121	146	9,267	64	98.7
		NLS-50	9,004	3,967	152	696	13,819	4,431	22,207	26,637	40,456	384	40,840	151	176.4
		NLS-HL	216	3,494	0	0	3,711	2,633	1,874	4,508	8,218	59	8,277	10	450.8
		Shuttle	0	0	0	23,000	23,000	37,301	26,272	63,573	86,573	1,761	88,334	59	1,077.5
		Titan II	0	0	0	0	0	168	311	479	479	29	508	12	39.9
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	9,615	10,466	152	23,696	43,930	51,129	68,776	119,905	163,834	3,308	167,142	513	233.7
	B	Atlas	0	0	0	0	0	598	2,059	2,657	2,657	134	2,791	24	110.7
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-20	395	2,410	0	0	2,805	1,973	4,343	6,316	9,121	146	9,267	64	98.7
		NLS-50	9,004	3,967	152	696	13,819	4,431	22,207	26,637	40,456	384	40,840	151	176.4
		NLS-HL	216	3,494	0	0	3,711	2,633	1,874	4,508	8,218	59	8,277	10	450.8
		Shuttle	0	0	0	23,000	23,000	37,757	28,670	66,427	89,427	3,459	92,886	97	684.8
		Titan II	0	0	0	0	0	168	311	479	479	29	508	12	39.9
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	9,615	10,466	152	23,696	43,930	51,585	71,174	122,759	166,688	5,006	171,694	551	222.8
	C	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	598	2,059	2,657	2,657	134	2,791	24	110.7
		CTV	830	119	0	871	1,820	1,402	1,529	2,930	4,751	49	4,800	79	37.1
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-20	395	2,286	0	0	2,681	1,714	4,310	6,024	8,705	145	8,850	64	94.1
		NLS-50	9,004	4,387	152	696	14,239	4,691	30,721	35,412	49,651	575	50,226	229	154.6
		NLS-HL	216	3,494	0	0	3,711	2,633	1,777	4,411	8,121	55	8,176	10	441.1
		Shuttle	0	0	0	23,000	23,000	39,318	38,173	77,491	100,491	6,981	107,472	227	341.4
		Titan II	0	0	0	0	0	168	311	479	479	29	508	12	39.9
		Titan IV	0	595	0	0	595	2,018	5,196	7,214	7,809	476	8,285	33	218.6
		Total	11,766	10,881	152	25,969	48,768	54,837	91,042	145,879	194,647	8,763	203,410	760	191.9
	D	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	598	2,059	2,657	2,657	134	2,791	24	110.7
		CTV	830	119	0	871	1,820	1,425	1,559	2,985	4,805	48	4,853	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-20	395	2,282	0	0	2,677	1,714	4,307	6,021	8,699	145	8,844	64	94.1
		NLS-50	9,004	4,371	152	696	14,223	4,691	30,643	35,334	49,556	573	50,129	229	154.3
		NLS-HL	216	4,402	0	0	4,618	3,477	2,469	5,946	10,564	55	10,619	14	424.7
		Shuttle	0	0	0	23,000	23,000	39,606	39,630	79,236	102,236	6,981	109,217	251	315.7
		Titan II	0	0	0	0	0	168	311	479	479	29	508	12	39.9
		Titan IV	0	595	0	0	595	2,018	5,196	7,214	7,809	476	8,285	33	218.6
		Total	11,766	11,769	152	25,969	49,655	55,992	93,140	149,133	198,788	8,760	207,548	788	189.3
	E-low	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	598	2,059	2,657	2,657	134	2,791	24	110.7
		CTV	830	119	0	871	1,820	1,425	1,559	2,985	4,805	48	4,853	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-20	395	2,282	0	0	2,677	1,714	4,307	6,021	8,699	145	8,844	64	94.1
		NLS-50	9,004	4,371	152	696	14,223	4,691	30,643	35,334	49,556	573	50,129	229	154.3
		NLS-HL	216	4,402	0	0	4,618	3,477	2,469	5,946	10,564	55	10,619	14	424.7
		Shuttle	0	0	0	23,000	23,000	39,832	40,752	80,584	103,584	8,680	112,264	270	298.5
		Titan II	0	0	0	0	0	168	311	479	479	29	508	12	39.9
		Titan IV	0	595	0	0	595	2,018	5,196	7,214	7,809	476	8,285	33	218.6
		Total	11,766	11,769	152	25,969	49,655	56,218	94,262	150,481	200,136	10,459	210,595	807	186.5

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

Arch	If	System/ Family	Cost (Millions of 92 Dollars) Nonrecurring DDT&E	Face	NR Prod	P3I	NR Total	Recurring Ops	Rec Prod	Rec Total	NR+Rec Total	Unrel	Total	Recurring Cost/Flt Flights After 97	CPF
3	E-high	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	598	2,059	2,657	2,657	134	2,791	24	110.7
		CTV	830	119	0	871	1,820	1,425	1,559	2,985	4,805	48	4,853	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-20	395	2,282	0	0	2,677	1,714	4,307	6,021	8,699	145	8,844	64	94.1
		NLS-50	9,004	4,371	152	696	14,223	4,691	30,643	35,334	49,556	573	50,129	229	154.3
		NLS-HL	216	4,402	0	0	4,618	3,477	2,469	5,946	10,564	55	10,619	14	424.7
		Shuttle	0	116	0	23,000	23,116	40,308	44,324	84,632	107,748	8,742	116,490	302	280.2
		Titan II	0	0	0	0	0	168	311	479	479	29	508	12	39.9
		Titan IV	0	595	0	0	595	2,018	5,196	7,214	7,809	476	8,285	33	218.6
		Total	11,766	11,885	152	25,969	49,771	56,694	97,834	154,529	204,300	10,521	214,821	839	184.2
4	A	Atlas	0	0	0	0	0	598	2,059	2,657	2,657	134	2,791	24	110.7
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-20	395	2,410	0	0	2,805	1,973	4,343	6,316	9,121	146	9,267	64	98.7
		NLS-50	9,004	3,967	152	696	13,819	4,431	22,207	26,637	40,456	384	40,840	151	176.4
		NLS-HL	216	3,494	0	0	3,711	2,633	1,874	4,508	8,218	59	8,277	10	450.8
		Shuttle	0	0	0	23,000	23,000	37,301	26,272	63,573	86,573	1,871	88,444	59	1,077.5
		Titan II	0	0	0	0	0	168	311	479	479	29	508	12	39.9
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	9,615	10,466	152	23,696	43,930	51,129	68,776	119,905	163,834	3,418	167,252	513	233.7
	B	Atlas	0	0	0	0	0	598	2,059	2,657	2,657	134	2,791	24	110.7
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-20	395	2,410	0	0	2,805	1,973	4,343	6,316	9,121	146	9,267	64	98.7
		NLS-50	9,004	3,967	152	696	13,819	4,431	22,207	26,637	40,456	384	40,840	151	176.4
		NLS-HL	216	3,494	0	0	3,711	2,633	1,874	4,508	8,218	59	8,277	10	450.8
		Shuttle	0	0	0	23,000	23,000	37,757	28,670	66,427	89,427	3,680	93,107	97	684.8
		Titan II	0	0	0	0	0	168	311	479	479	29	508	12	39.9
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	9,615	10,466	152	23,696	43,930	51,585	71,174	122,759	166,688	5,227	171,915	551	222.8
	C	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	598	2,059	2,657	2,657	134	2,791	24	110.7
		CRV	2,995	20	449	3,144	6,608	728	7,871	8,599	15,207	319	9,015	136	63.2
		CTV	830	79	0	871	1,781	1,402	1,527	2,929	4,709	143	8,513	79	37.1
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	714	56,488	161	54.0
		NLS-20	395	2,131	0	0	2,526	1,585	4,260	5,844	8,370	256	4,965	64	91.3
		NLS-50	9,004	4,279	152	696	14,131	4,819	36,824	41,643	55,774	319	34,012	310	134.3
		NLS-HL	216	4,956	0	0	5,172	7,064	21,457	28,521	33,693	120	15,327	146	195.3
		FFC	5,434	785	491	5,720	12,430	6,633	7,718	14,351	26,780	502	27,282	84	170.8
		Shuttle	0	0	0	23,000	23,000	37,984	31,501	69,485	92,485	3,742	96,227	116	599.0
		Titan II	0	0	0	0	0	168	311	479	479	29	508	12	39.9
		Titan IV	0	595	0	0	595	2,141	5,576	7,717	8,312	431	8,743	36	214.4
		Total	20,195	12,845	1,092	34,833	68,965	65,417	126,070	191,486	260,449	6,709	267,159	869	220.4

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

Arch	If	System/ Family	Cost (Millions of 92 Dollars)											Recurring Cost/Flt	
			Nonrecurring					Recurring			NR+Rec			Flights	
			DDT&E	Facs	NR Prod	P3I	NR Total	Ops	Rec Prod	Rec Total	Total	Unrel	Total	After 97	CPF
4	D	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	598	2,059	2,657	2,657	134	2,791	24	110.7
		CRV	2,995	20	449	3,144	6,608	743	8,618	9,361	15,969	118	16,087	153	61.2
		CTV	830	119	0	871	1,820	1,425	1,562	2,988	4,808	255	5,063	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-20	395	2,150	0	0	2,545	1,554	4,252	5,806	8,351	143	8,494	64	90.7
		NLS-50	9,004	4,398	152	696	14,250	4,851	36,761	41,612	55,862	709	56,571	312	133.4
		NLS-HL	216	5,197	0	0	5,414	7,064	24,431	31,495	36,908	396	37,304	167	188.6
		PFC	5,434	785	491	5,720	12,430	6,661	7,790	14,451	26,881	501	27,382	85	170.0
		Shuttle	0	0	0	23,000	23,000	38,178	32,468	70,646	93,646	5,489	99,135	132	535.2
		Titan II	0	0	0	0	0	168	311	479	479	29	508	12	39.9
		Titan IV	0	595	0	0	595	2,102	5,469	7,571	8,166	431	8,597	35	216.3
		Total	20,195	13,264	1,092	34,833	69,384	65,639	130,687	196,327	265,710	8,524	274,235	907	216.5
	E-low	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	598	2,059	2,657	2,657	134	2,791	24	110.7
		CRV	2,995	20	449	3,144	6,608	743	8,618	9,361	15,969	118	16,087	153	61.2
		CTV	830	119	0	871	1,820	1,425	1,562	2,988	4,808	255	5,063	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-20	395	2,204	0	0	2,600	1,552	4,253	5,806	8,405	143	8,548	64	90.7
		NLS-50	9,004	4,862	152	696	14,713	4,851	38,660	43,511	58,225	768	58,993	331	131.5
		NLS-HL	216	5,183	0	0	5,399	7,064	24,304	31,368	36,768	395	37,163	167	187.8
		PFC	5,434	785	491	5,720	12,430	7,251	9,075	16,326	28,756	497	29,253	104	157.0
		Shuttle	0	0	0	23,000	23,000	38,178	32,468	70,646	93,646	5,489	99,135	132	535.2
		Titan II	0	0	0	0	0	168	311	479	479	29	508	12	39.9
		Titan IV	0	595	0	0	595	2,102	5,469	7,571	8,166	431	8,597	35	216.3
		Total	20,195	13,768	1,092	34,833	69,887	66,227	133,745	199,974	269,862	8,578	278,439	926	216.0
	E-high	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	598	2,059	2,657	2,657	134	2,791	24	110.7
		CRV	2,995	20	449	3,144	6,608	743	8,618	9,361	15,969	118	16,087	153	61.2
		CTV	830	119	0	871	1,820	1,425	1,562	2,988	4,808	255	5,063	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-20	395	2,177	0	0	2,57[illegible]	1,520	4,246	5,766	8,338	143	8,481	64	90.1
		NLS-50	9,004	4,916	152	696	14,768	4,883	41,817	46,701	61,468	824	62,292	363	128.7
		NLS-HL	216	5,159	0	0	5,376	7,064	24,118	31,182	36,558	392	36,950	167	186.7
		PFC	5,434	785	491	5,720	12,430	8,228	11,180	19,408	31,838	632	32,470	136	142.7
		Shuttle	0	0	0	23,000	23,000	38,178	32,468	70,646	93,646	5,489	99,135	132	535.2
		Titan II	0	0	0	0	0	168	311	479	479	29	508	12	39.9
		Titan IV	0	595	0	0	595	2,102	5,469	7,571	8,166	431	8,597	35	216.3
		Total	20,195	13,771	1,092	34,833	69,892	67,204	138,814	206,020	275,910	8,766	284,676	958	215.1
5	A	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CLV	12,724	0	0	13,373	26,097	1,916	3,263	5,180	31,276	79[illegible]	32,066	50	103.6
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		MLS	8,849	6,217	684	696	16,445	9,476	42,253	51,729	68,174	621	68,795	211	245.2
		Shuttle	0	0	0	0	0	8,063	5,519	13,582	13,582	1,699	15,281	9	1,509.1
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	21,573	6,812	684	14,069	43,137	25,353	69,245	94,599	137,735	4,298	142,033	513	184.4

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

Arch	If	System/ Family	Cost (Millions of 92 Dollars) Nonrecurring DDT&E	Facs	NR Prod	P3I	NR Total	Recurring Ops	Rec Prod	Rec Total	NR+Rec Total	Unrel	Total	Recurring Cost/Flt Flights After 97	CPF
5	B	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CLV	12,724	0	0	13,373	26,097	5,212	3,263	8,476	34,572	894	35,466	136	62.3
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		MLS	8,849	6,514	684	696	16,743	10,330	57,116	67,446	84,189	969	85,158	297	227.1
		Shuttle	0	0	0	0	0	9,726	6,834	16,560	16,560	1,699	18,259	15	1,104.0
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	21,573	7,109	684	14,069	43,435	31,166	85,423	116,590	160,024	4,750	164,774	605	192.7
	C	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CLV	12,724	0	0	13,373	26,097	8,278	5,439	13,717	39,814	1,710	41,524	216	63.5
		CRV	2,995	20	449	3,144	6,608	682	5,920	6,602	13,210	624	13,834	89	74.2
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		MLS	8,849	7,469	684	696	17,697	11,957	84,312	96,268	113,966	1,708	115,674	466	206.6
		Shuttle	0	0	0	0	0	10,121	10,121	20,242	20,242	1,761	22,003	48	421.7
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	24,568	8,084	1,133	17,213	50,997	36,936	124,002	160,937	211,935	6,991	218,926	807	199.4
	D	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CLV	12,724	0	0	13,373	26,097	9,428	6,527	15,955	42,051	1,736	43,787	246	64.9
		CRV	2,995	20	449	3,144	6,608	712	6,963	7,675	14,283	776	15,059	114	67.3
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		MLS	8,849	8,084	684	696	18,312	12,489	92,765	105,254	123,567	1,905	125,472	521	202.0
		Shuttle	0	0	0	0	0	11,833	11,635	23,468	23,468	1,761	25,229	58	404.6
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	24,568	8,699	1,133	17,213	51,612	40,360	136,100	176,460	228,072	7,366	235,438	872	202.4
	E-low	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CLV	12,724	0	0	13,373	26,097	10,156	6,527	16,683	42,779	1,762	44,541	265	63.0
		CRV	2,995	20	449	3,144	6,608	712	6,963	7,675	14,283	776	15,059	114	67.3
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		MLS	8,849	8,084	684	696	18,312	12,674	95,642	108,316	126,628	2,008	128,636	540	200.6
		Shuttle	0	0	0	0	0	11,833	11,635	23,468	23,468	1,761	25,229	58	404.6
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	24,568	8,699	1,133	17,213	51,612	41,273	138,977	180,250	231,861	7,495	239,357	891	202.3
	E-high	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CLV	12,724	0	0	13,373	26,097	11,382	6,527	17,909	44,006	1,788	45,794	297	60.3
		CRV	2,995	20	449	3,144	6,608	712	6,963	7,675	14,283	776	15,059	114	67.3
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		MLS	8,849	8,520	684	696	18,749	12,982	100,462	113,444	132,193	2,105	134,298	572	198.3
		Shuttle	0	0	0	0	0	11,833	11,635	23,468	23,468	1,761	25,229	58	404.6
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	24,568	9,135	1,133	17,213	52,049	42,807	143,797	186,604	238,653	7,618	246,271	923	202.2

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

			Cost (Millions of 92 Dollars)											Recurring Cost/Flt	
			Nonrecurring					Recurring			NR+Rec			Flights	
Arch	If	System/ Family	DDT&E	Facs	NR Prod	P3I	NR Total	Ops	Rec Prod	Rec Total	Total	Unrel	Total	After 97	CPF
6	A	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CRV	2,995	20	449	3,144	6,608	625	4,332	4,957	11,565	301	11,866	52	95.3
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		MLS	8,849	6,514	684	696	16,743	9,519	49,797	59,316	76,059	788	76,847	265	223.8
		FFC	5,434	785	491	5,720	12,430	5,623	5,746	11,369	23,799	374	24,173	52	218.6
		Shuttle	0	0	0	0	0	4,857	3,392	8,249	8,249	1,699	9,948	7	1,178.4
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	17,278	7,914	1,624	9,560	36,376	26,522	81,477	107,999	144,375	4,350	148,725	565	191.1
	B	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CRV	2,995	20	449	3,144	6,608	697	6,456	7,153	13,761	596	14,357	102	70.1
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		MLS	8,849	7,340	684	696	17,569	10,042	64,819	74,861	92,430	1,195	93,625	365	205.1
		FFC	5,434	785	491	5,720	12,430	7,183	9,612	16,795	29,224	523	29,747	102	164.7
		Shuttle	0	0	0	0	0	8,099	5,669	13,768	13,768	1,699	15,467	12	1,147.3
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	17,278	8,740	1,624	9,560	37,202	31,919	104,766	136,685	173,886	5,201	179,088	670	204.0
	C	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CRV	2,995	40	449	3,144	6,628	784	11,779	12,563	19,191	1,319	20,510	230	54.6
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		MLS	8,849	7,635	684	696	17,863	11,296	95,338	106,634	124,497	1,923	126,420	577	184.8
		FFC	5,434	785	491	5,720	12,430	9,739	15,966	25,705	38,135	794	38,929	186	138.2
		Shuttle	0	0	0	0	0	10,051	9,821	19,872	19,872	1,761	21,633	42	473.1
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	17,278	9,055	1,624	9,560	37,516	37,768	151,114	188,882	226,398	6,985	233,383	912	207.1
	D	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CRV	2,995	40	449	3,144	6,628	808	14,233	15,041	21,669	1,750	23,419	290	51.9
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		MLS	8,849	8,394	684	696	18,623	11,870	104,491	116,361	134,984	2,111	137,095	638	182.4
		FFC	5,434	785	491	5,720	12,430	9,771	16,036	25,807	38,236	793	39,029	187	136.0
		Shuttle	0	0	0	0	0	10,039	9,772	19,811	19,811	1,761	21,572	41	483.2
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	17,278	9,814	1,624	9,560	38,276	38,386	162,742	201,128	239,403	7,603	247,005	972	206.9
	E-low	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CRV	2,995	40	449	3,144	6,628	808	14,233	15,041	21,669	1,750	23,419	290	51.9
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		MLS	8,849	9,038	684	696	19,267	11,878	106,705	118,583	137,850	2,186	140,036	657	180.5
		FFC	5,434	785	491	5,720	12,430	10,337	17,355	27,692	40,122	789	40,911	206	134.4
		Shuttle	0	0	0	0	0	10,039	9,772	19,811	19,811	1,761	21,572	41	483.2
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	17,278	10,458	1,624	9,560	38,920	38,960	166,275	205,235	244,155	7,674	251,828	991	207.1

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

Arch	If	System/ Family	Cost (Millions of 92 Dollars) Nonrecurring DDT&E	Facs	NR Prod	P3I	NR Total	Recurring Ops	Rec Prod	Rec Total	NR+Rec Total	Unrel	Total	Recurring Cost/Flt Flights After 97	CPF
6	E-high	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CRV	2,995	40	449	3,144	6,628	808	14,233	15,041	21,669	1,750	23,419	290	51.9
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		MLS	8,849	9,038	684	696	19,267	11,884	110,416	122,301	141,567	2,256	143,823	669	177.5
		FFC	5,434	785	491	5,720	12,430	11,292	19,846	31,138	43,568	927	44,495	238	130.8
		Shuttle	0	0	0	0	0	10,039	9,772	19,811	19,811	1,761	21,572	41	483.2
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	17,278	10,458	1,624	9,560	38,920	39,921	172,477	212,399	251,318	7,882	259,200	1,023	207.6
7	A	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	101	348	1,099	2,594	343	766	1,110	3,704	152	3,856	50	22.2
		MLS	8,849	6,345	684	696	16,573	9,476	42,253	51,729	68,302	621	68,923	211	245.2
		FFC	5,434	785	491	5,720	12,430	5,557	5,581	11,138	23,567	381	23,948	50	222.8
		Shuttle	0	0	0	0	0	8,063	5,519	13,582	13,582	1,699	15,281	9	1,509.1
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	15,329	7,826	1,521	7,515	32,190	29,340	72,331	101,671	133,861	4,041	137,902	513	198.2
	B	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	202	348	1,099	2,695	544	2,102	2,646	5,341	525	5,866	180	14.7
		MLS	8,849	6,655	684	696	16,884	10,754	64,418	75,172	92,056	1,189	93,245	341	220.4
		FFC	5,434	785	491	5,720	12,430	9,559	15,549	25,108	37,538	730	38,268	180	139.5
		Shuttle	0	0	0	0	0	8,124	5,770	13,894	13,894	1,699	15,593	14	992.4
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	15,329	8,237	1,521	7,515	32,602	34,879	106,049	140,928	173,530	5,331	178,861	648	217.5
	C	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CRV	2,995	20	449	3,144	6,608	725	7,501	8,226	14,834	765	15,599	127	64.8
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	303	348	1,099	2,796	604	2,731	3,336	6,132	748	6,880	248	13.5
		MLS	8,849	8,082	684	696	18,311	12,634	95,032	107,666	125,977	2,007	127,984	536	200.9
		FFC	5,434	785	491	5,720	12,430	11,586	20,524	32,110	44,539	1,148	45,687	248	129.5
		Shuttle	0	0	0	0	0	11,690	11,034	22,724	22,724	1,761	24,485	46	494.0
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	18,324	9,785	1,970	10,659	40,738	43,138	155,029	198,168	238,906	7,617	246,523	875	226.5
	D	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CRV	2,995	20	449	3,144	6,608	762	10,112	10,874	17,482	1,214	18,696	189	57.5
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	303	348	1,099	2,796	604	2,731	3,336	6,132	748	6,880	248	13.5
		MLS	8,849	8,226	684	696	18,455	13,226	104,367	117,593	136,048	2,193	138,241	598	196.6
		FFC	5,434	785	491	5,720	12,430	11,586	20,524	32,110	44,539	1,148	45,687	248	129.5
		Shuttle	0	0	0	0	0	10,098	10,020	20,118	20,118	1,761	21,879	46	437.3
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	18,324	9,929	1,970	10,659	40,882	42,175	165,961	208,137	249,019	8,252	257,270	937	222.1

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

Arch	It	System/ Family	Cost (Millions of 92 Dollars) Nonrecurring DDT&E	Facs	NR Prod	P3I	NR Total	Recurring Ops	Rec Prod	Rec Total	NR+Rec Total	Unrel	Total	Recurring Cost/Flt Flights After 97	CPF
7	E-low	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CRV	2,995	20	449	3,144	6,608	762	10,112	10,874	17,482	1,214	18,696	189	57.5
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	303	348	1,099	2,796	604	2,731	3,336	6,132	748	6,880	248	13.5
		MLS	8,849	8,394	684	696	18,623	13,229	106,602	119,830	138,453	2,186	140,639	617	194.2
		FFC	5,434	785	491	5,720	12,430	12,149	21,803	33,952	46,382	1,144	47,526	267	127.2
		Shuttle	0	0	0	0	0	10,098	10,020	20,118	20,118	1,761	21,879	46	437.3
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	18,324	10,097	1,970	10,659	41,050	42,737	169,476	212,212	253,262	8,241	261,503	956	222.0
	E-high	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CRV	2,995	20	449	3,144	6,608	762	10,112	10,874	17,482	1,214	18,696	189	57.5
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	303	348	1,099	2,796	604	2,731	3,336	6,132	748	6,880	248	13.5
		MLS	8,849	9,042	684	696	19,270	13,241	110,344	123,585	142,855	2,257	145,112	649	190.4
		FFC	5,434	861	491	5,720	12,505	13,088	24,222	37,310	49,815	1,140	50,955	299	124.8
		Shuttle	0	0	0	0	0	10,098	10,020	20,118	20,118	1,761	21,879	46	437.3
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	18,324	10,821	1,970	10,659	41,773	43,694	175,638	219,332	261,105	8,308	269,413	988	222.0
8	A	Atlas	0	0	0	0	0	1,361	4,270	5,631	5,631	268	5,899	48	117.3
		Delta	0	0	0	0	0	1,865	4,191	6,056	6,056	145	6,201	70	86.5
		Shuttle	0	0	0	0	0	4,857	3,392	8,249	8,249	1,699	9,948	7	1,178.4
		SSTO	4,880	1,137	0	5,114	11,131	8,901	7,106	16,007	27,137	653	27,790	191	83.8
		Titan II	0	0	0	0	0	53	99	152	152	48	200	4	38.0
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	4,880	1,732	0	5,114	11,726	28,569	48,468	77,037	88,762	4,842	93,604	523	147.3
	B	Atlas	0	0	0	0	0	1,367	4,465	5,832	5,832	268	6,100	51	114.4
		Delta	0	0	0	0	0	1,873	4,301	6,174	6,174	174	6,348	74	83.4
		Shuttle	0	0	0	0	0	9,726	6,834	16,560	16,560	1,699	18,259	15	1,104.0
		SSTO	4,880	1,137	0	5,114	11,131	9,040	7,417	16,456	27,587	1,302	28,889	330	49.9
		Titan II	0	0	0	0	0	53	99	152	152	48	200	4	38.0
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	4,880	1,732	0	5,114	11,726	33,591	52,526	86,116	97,842	5,520	103,362	677	127.2
	C	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,377	4,790	6,167	6,167	268	6,435	56	110.1
		CTF	577	0	63	397	1,037	1,108	5,897	7,006	8,043	236	8,279	83	84.4
		Delta	0	0	0	0	0	1,875	4,327	6,202	6,202	174	6,376	75	82.7
		Shuttle	0	0	0	0	0	10,038	9,771	19,809	19,809	1,761	21,570	41	483.1
		SSTO	4,880	1,137	0	5,114	11,131	9,397	8,472	17,869	28,999	1,961	30,960	678	26.4
		Titan II	0	0	0	0	0	53	99	152	152	48	200	4	38.0
		Titan IV	0	595	0	0	595	13,821	35,709	49,530	50,125	2,413	52,538	282	175.6
		Total	6,778	1,732	63	6,913	15,485	37,917	69,382	107,300	122,784	6,861	129,645	1,136	94.5

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

Arch	If	System/ Family	Cost (Millions of 92 Dollars) Nonrecurring DDT&E	Facs	NR Prod	P3I	NR Total	Recurring Ops	Rec Prod	Rec Total	NR+Rec Total	Unrel	Total	Recurring Cost/Flt Flights After 97	CPF
8	D	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,377	4,790	6,167	6,167	268	6,435	56	110.1
		CTF	577	0	63	397	1,037	1,108	5,897	7,006	8,043	236	8,279	83	84.4
		Delta	0	0	0	0	0	1,875	4,327	6,202	6,202	174	6,376	75	82.7
		Shuttle	0	0	0	0	0	11,726	11,185	22,911	22,911	1,761	24,672	49	467.6
		SSTO	4,880	1,137	0	5,114	11,131	9,496	9,636	19,131	30,262	2,608	32,870	774	24.7
		Titan II	0	0	0	0	0	53	99	152	152	48	200	4	38.0
		Titan IV	0	595	0	0	595	13,821	35,709	49,530	50,125	2,413	52,538	282	175.6
		Total	6,778	1,732	63	6,913	15,485	39,704	71,960	111,664	127,149	7,508	134,657	1,240	90.1
	E-low	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,377	4,790	6,167	6,167	268	6,435	56	110.1
		CTF	577	0	63	397	1,037	1,108	5,897	7,006	8,043	236	8,279	83	84.4
		Delta	0	0	0	0	0	1,875	4,327	6,202	6,202	174	6,376	75	82.7
		Shuttle	0	0	0	0	0	11,726	11,185	22,911	22,911	1,761	24,672	49	467.6
		SSTO	4,880	1,137	0	5,114	11,131	9,514	9,677	19,191	30,322	2,610	32,932	793	24.2
		Titan II	0	0	0	0	0	53	99	152	152	48	200	4	38.0
		Titan IV	0	595	0	0	595	13,821	35,709	49,530	50,125	2,413	52,538	282	175.6
		Total	6,778	1,732	63	6,913	15,485	39,722	72,001	111,724	127,209	7,510	134,719	1,259	88.7
	E-high	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,377	4,790	6,167	6,167	268	6,435	56	110.1
		CTF	577	0	63	397	1,037	1,108	5,897	7,006	8,043	236	8,279	83	84.4
		Delta	0	0	0	0	0	1,875	4,327	6,202	6,202	174	6,376	75	82.7
		Shuttle	0	0	0	0	0	11,726	11,185	22,911	22,911	1,761	24,672	49	467.6
		SSTO	4,880	1,137	0	5,114	11,131	9,543	9,750	19,293	30,424	2,612	33,036	825	23.4
		Titan II	0	0	0	0	0	53	99	152	152	48	200	4	38.0
		Titan IV	0	595	0	0	595	13,821	35,709	49,530	50,125	2,413	52,538	282	175.6
		Total	6,778	1,732	63	6,913	15,485	39,751	72,074	111,826	127,311	7,512	134,823	1,291	86.6
10	A	Atlas	0	0	0	0	0	966	3,595	4,561	4,561	201	4,762	43	106.1
		Delta	0	0	0	0	0	1,433	4,322	5,755	5,755	203	5,958	97	59.3
		NDV	22,581	873	0	12,422	35,876	4,391	6,688	11,079	46,955	4,021	50,976	115	96.3
		Shuttle	0	0	0	0	0	19,524	13,968	33,492	33,492	1,823	35,315	36	930.3
		Titan II	0	0	0	0	0	263	486	749	749	29	778	18	41.6
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	22,581	1,468	0	12,422	36,471	38,109	58,469	96,578	133,049	8,306	141,355	512	188.6
	B	Atlas	0	0	0	0	0	972	3,789	4,761	4,761	268	5,029	46	103.5
		Delta	0	0	0	0	0	1,443	4,456	5,899	5,899	203	6,102	102	57.8
		NDV	22,581	873	0	12,422	35,876	4,865	6,688	11,553	47,429	4,021	51,450	159	72.7
		Shuttle	0	0	0	0	0	24,491	17,809	42,300	42,300	1,894	44,194	52	813.5
		Titan II	0	0	0	0	0	263	486	749	749	29	778	18	41.6
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	22,581	1,468	0	12,422	36,471	43,566	62,638	106,204	142,675	8,444	151,119	580	183.1
	C	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	980	4,049	5,029	5,029	268	5,297	50	100.6
		CTF	577	0	0	379	956	1,110	5,902	7,012	7,968	236	8,204	84	83.5
		Delta	0	0	0	0	0	1,445	4,482	5,927	5,927	232	6,159	103	57.5
		NDV	22,581	873	0	12,422	35,876	5,878	6,688	12,566	48,443	6,032	54,475	253	49.7
		Shuttle	0	0	0	0	0	27,004	25,240	52,244	52,244	3,787	56,031	129	405.0
		Titan II	0	0	0	0	0	263	486	749	749	29	778	18	41.6
		Titan IV	0	595	0	0	595	13,821	35,709	49,530	50,125	2,413	52,538	282	175.6
		Total	24,479	1,468	0	14,203	40,149	50,749	82,873	133,622	173,772	12,997	186,768	835	160.0

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

Arch	If	System/ Family	Cost (Millions of 92 Dollars) Nonrecurring DDT&E	Facs	NR Prod	P3I	NR Total	Recurring Ops	Rec Prod	Rec Total	NR+Rec Total	Unrel	Total	Recurring Cost/Flt Flights After 97	CPF
10	D	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	980	4,050	5,030	5,030	268	5,298	50	100.6
		CTF	577	0	0	379	956	1,108	5,895	7,003	7,959	236	8,195	83	84.4
		Delta	0	0	0	0	0	1,447	4,510	5,957	5,957	232	6,189	104	57.3
		NDV	22,581	873	0	12,422	35,876	6,611	6,688	13,299	49,176	6,032	55,208	321	41.4
		Shuttle	0	0	0	0	0	27,353	26,981	54,334	54,334	5,619	59,953	158	343.9
		Titan II	0	0	0	0	0	263	486	749	749	29	778	18	41.6
		Titan IV	0	595	0	0	595	13,821	35,709	49,530	50,125	2,413	52,538	282	175.6
		Total	24,479	1,468	0	14,203	40,149	51,831	84,636	136,467	176,617	14,829	191,445	933	146.3
	E-low	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	980	4,050	5,030	5,030	268	5,298	50	100.6
		CTF	577	0	0	379	956	1,108	5,895	7,003	7,959	236	8,195	83	84.4
		Delta	0	0	0	0	0	1,447	4,510	5,957	5,957	232	6,189	104	57.3
		NDV	22,581	873	0	12,422	35,876	6,751	6,688	13,440	49,316	8,042	57,358	334	40.2
		Shuttle	0	0	0	0	0	27,425	27,367	54,792	54,792	5,619	60,411	164	334.1
		Titan II	0	0	0	0	0	263	486	749	749	29	778	18	41.6
		Titan IV	0	595	0	0	595	13,821	35,709	49,530	50,125	2,413	52,538	282	175.6
		Total	24,479	1,468	0	14,203	40,149	52,043	85,022	137,066	177,215	16,839	194,054	952	144.0
	E-high	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	980	4,050	5,030	5,030	268	5,298	50	100.6
		CTF	577	0	0	379	956	1,108	5,895	7,003	7,959	236	8,195	83	84.4
		Delta	0	0	0	0	0	1,447	4,510	5,957	5,957	232	6,189	104	57.3
		NDV	22,581	873	0	12,422	35,876	7,021	6,688	13,709	49,585	8,042	57,627	359	38.2
		Shuttle	0	368	0	0	368	27,656	27,794	55,450	55,818	5,619	61,437	171	324.3
		Titan II	0	0	0	0	0	263	486	749	749	29	778	18	41.6
		Titan IV	0	595	0	0	595	13,821	35,709	49,530	50,125	2,413	52,538	282	175.6
		Total	24,479	1,836	0	14,203	40,517	52,544	85,449	137,993	178,510	16,839	195,349	984	140.2
11	A	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,122	152	696	14,973	6,403	22,519	28,923	43,896	386	44,282	151	191.5
		NLS-HL	216	3,563	0	0	3,779	2,633	1,877	4,511	8,290	59	8,349	10	451.1
		Shuttle	0	0	0	23,000	23,000	37,301	26,272	63,573	86,573	1,871	88,444	59	1,077.5
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	9,220	9,280	152	23,696	42,347	52,235	68,878	121,115	163,462	3,504	166,966	513	236.1
	B	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,122	152	696	14,973	6,403	22,519	28,923	43,896	386	44,282	151	191.5
		NLS-HL	216	3,563	0	0	3,779	2,633	1,877	4,511	8,290	59	8,349	10	451.1
		Shuttle	0	0	0	23,000	23,000	37,757	28,670	66,427	89,427	3,680	93,107	97	684.8
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	9,220	9,280	152	23,696	42,347	52,691	71,276	123,969	166,316	5,313	171,629	551	225.0

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

Arch	If	System/ Family	Cost (Millions of 92 Dollars)											Recurring Cost/Flt	
			Nonrecurring					Recurring			NR+Rec			Flights	
			DDT&E	Facs	NR Prod	P3I	NR Total	Ops	Rec Prod	Rec Total	Total	Unrel	Total	After 97	CPF
11	C	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTV	830	119	0	871	1,820	1,402	1,527	2,929	4,749	256	5,005	79	37.1
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,412	152	696	15,264	6,403	38,782	45,185	60,449	756	61,205	305	148.1
		NLS-HL	216	3,563	0	0	3,779	2,633	1,714	4,347	8,127	52	8,179	10	434.7
		FFC	5,434	785	491	5,720	12,430	6,633	7,718	14,351	26,780	502	27,282	84	170.8
		Shuttle	0	0	0	23,000	23,000	39,220	37,675	76,895	99,895	7,359	107,254	219	351.1
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	2,405	6,411	8,816	9,411	552	9,963	41	215.0
		Total	15,484	10,474	643	30,287	56,888	62,616	106,976	169,592	226,480	10,189	236,669	836	202.9
	D	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTV	830	119	0	871	1,820	1,425	1,562	2,988	4,808	255	5,063	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,412	152	696	15,264	6,403	38,583	44,986	60,250	755	61,005	304	148.0
		NLS-HL	216	4,452	0	0	4,669	3,477	2,385	5,863	10,532	52	10,584	14	418.8
		FFC	5,434	785	491	5,720	12,430	6,661	7,790	14,451	26,881	501	27,382	85	170.0
		Shuttle	0	0	0	23,000	23,000	39,499	39,079	78,573	101,578	7,421	108,999	242	324.7
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	2,439	6,505	8,944	9,539	552	10,091	42	213.0
		Total	15,484	11,363	643	30,287	57,778	63,824	109,053	172,879	230,657	10,248	240,904	863	200.3
	E-low	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTV	830	119	0	871	1,820	1,425	1,562	2,988	4,808	255	5,063	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,515	152	696	15,366	6,403	40,479	46,882	62,249	816	63,065	323	145.1
		NLS-HL	216	4,452	0	0	4,669	3,477	2,372	5,849	10,518	51	10,569	14	417.8
		FFC	5,434	785	491	5,720	12,430	7,251	9,075	16,326	28,756	497	29,253	104	157.0
		Shuttle	0	0	0	23,000	23,000	39,499	39,079	78,578	101,578	7,421	108,999	242	324.7
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	2,439	6,505	8,944	9,539	552	10,091	42	213.0
		Total	15,484	11,466	643	30,287	57,880	64,414	112,221	176,636	234,517	10,304	244,820	882	200.3
	E-high	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTV	830	119	0	871	1,820	1,425	1,562	2,988	4,808	255	5,063	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,683	152	696	15,534	6,403	43,633	50,036	65,570	872	66,442	355	140.9
		NLS-HL	216	4,452	0	0	4,669	3,477	2,341	5,818	10,487	51	10,538	14	415.6
		FFC	5,434	785	491	5,720	12,430	8,228	11,793	20,021	32,451	632	33,083	136	147.2
		Shuttle	0	0	0	23,000	23,000	39,499	39,079	78,578	101,578	7,421	108,999	242	324.7
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	2,439	6,505	8,944	9,539	552	10,091	42	213.0
		Total	15,484	11,634	643	30,287	58,048	65,391	118,062	183,454	241,502	10,495	251,997	914	200.7
12	A	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,122	152	696	14,973	6,403	22,519	[illegible],923	43,896	386	44,282	151	191.5
		NLS-HL	216	3,563	0	0	3,779	2,633	1,877	4,511	8,290	59	8,349	10	451.1
		Shuttle	0	0	0	23,000	23,000	37,301	26,272	63,573	86,573	1,871	88,444	59	1,077.5
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	9,220	9,280	152	23,696	42,347	52,235	68,878	121,115	163,462	3,504	166,966	513	236.1

Note: Includes wraps

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TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

			Cost (Millions of 92 Dollars)											Recurring Cost/Flt	
		System/	Nonrecurring					Recurring			NR+Rec			Flights	
Arch	#	Family	DDT&E	Facs	NR Prod	P3I	NR Total	Ops	Rec Prod	Rec Total	Total	Unrel	Total	After 97	CPF
12	B	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,122	152	696	14,973	6,403	22,519	28,923	43,896	386	44,282	151	191.5
		NLS-HL	216	3,563	0	0	3,779	2,633	1,877	4,511	8,290	59	8,349	10	451.1
		Shuttle	0	0	0	23,000	23,000	37,757	28,670	66,427	89,427	3,680	93,107	97	684.8
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	9,220	9,280	152	23,696	42,347	52,691	71,276	123,969	166,316	5,313	171,629	551	225.0
	C	ACRV	1,321	0	0	0	1,321	71	317	388	1,708	0	1,708	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTV	830	79	0	871	1,781	1,402	1,527	2,929	4,709	256	4,965	79	37.1
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,412	152	696	15,264	6,403	37,063	43,467	58,730	694	59,424	288	150.9
		NLS-HL	216	3,563	0	0	3,779	2,633	1,728	4,361	8,141	53	8,194	10	436.1
		FFC	5,434	785	491	4,358	11,068	5,084	6,312	11,395	22,463	444	22,907	64	178.0
		Shuttle	0	0	0	23,000	23,000	39,256	37,855	77,111	100,111	7,359	107,470	222	347.3
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	2,287	6,023	8,310	8,905	581	9,486	38	218.7
		Total	16,805	10,434	643	28,925	56,808	61,056	103,974	165,030	221,836	10,099	231,935	819	201.5
	D	ACRV	1,321	0	0	0	1,321	71	317	388	1,708	0	1,708	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTV	830	119	0	871	1,820	1,425	1,562	2,988	4,808	255	5,063	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,412	152	696	15,264	6,403	37,015	43,419	58,682	692	59,374	288	150.8
		NLS-HL	216	4,452	0	0	4,669	3,477	2,402	5,880	10,548	52	10,600	14	420.0
		FFC	5,434	785	491	4,358	11,068	5,084	6,312	11,395	22,463	444	22,907	64	178.0
		Shuttle	0	0	0	23,000	23,000	39,570	39,412	78,982	101,982	7,421	109,403	248	318.5
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	2,281	5,988	8,269	8,864	581	9,445	38	217.6
		Total	16,805	11,363	643	28,925	57,737	62,231	106,157	168,390	226,124	10,157	236,282	849	198.3
	E-low	ACRV	1,321	0	0	0	1,321	71	317	388	1,708	0	1,708	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTV	830	119	0	871	1,820	1,425	1,562	2,988	4,808	255	5,063	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,304	5,515	152	696	15,366	6,403	38,723	45,127	60,493	755	61,248	305	148.0
		NLS-HL	216	4,452	0	0	4,669	3,477	2,384	5,861	10,530	52	10,582	14	418.6
		FFC	5,434	785	491	4,358	11,068	5,612	7,820	13,431	24,499	516	25,015	81	165.8
		Shuttle	0	0	0	23,000	23,000	39,594	39,542	79,136	102,136	7,421	109,557	250	316.5
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	2,281	5,988	8,269	8,864	581	9,445	38	217.6
		Total	16,805	11,468	643	28,925	57,839	62,783	109,485	172,269	230,107	10,292	240,399	868	198.5

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

Arch	#	System/ Family	Cost (Millions of 92 Dollars) Nonrecurring DDT&E	Facs	NR Prod	P3I	NR Total	Recurring Ops	Rec Prod	Rec Total	NR+Rec Total	Unrel	Total	Recurring Cost/Flt Flights After 97	CPF
12	E-high	ACRV	1,321	0	0	0	1,321	71	317	388	1,708	0	1,708	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTV	830	119	0	871	1,820	1,425	1,562	2,988	4,808	255	5,063	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,683	152	696	15,534	6,403	41,794	48,197	63,732	813	64,545	336	143.4
		NLS-HL	216	4,452	0	0	4,669	3,477	2,359	5,837	10,505	51	10,556	14	416.9
		FFC	5,434	785	491	4,358	11,068	6,574	10,227	16,801	27,868	582	28,450	112	150.0
		Shuttle	0	0	0	23,000	23,000	39,605	39,592	79,197	102,197	7,421	109,618	251	315.5
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	2,281	5,988	8,269	8,864	581	9,445	38	217.6
		Total	16,805	11,634	643	28,925	58,007	63,756	114,988	178,746	236,751	10,415	247,166	900	198.6
13	A	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,122	152	696	14,973	6,403	22,519	28,923	43,896	386	44,282	151	191.5
		NLS-HL	216	3,563	0	0	3,779	2,633	1,877	4,511	8,290	59	8,349	10	451.1
		Shuttle	0	0	0	23,000	23,000	37,301	26,272	63,573	86,573	1,871	88,444	59	1,077.5
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	9,220	9,280	152	23,696	42,347	52,235	68,878	121,115	163,462	3,504	166,966	513	236.1
	B	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,122	152	696	14,973	6,403	22,519	28,923	43,896	386	44,282	151	191.5
		NLS-HL	216	3,563	0	0	3,779	2,633	1,877	4,511	8,290	59	8,349	10	451.1
		Shuttle	0	0	0	23,000	23,000	37,757	28,670	66,427	89,427	3,680	93,107	97	684.8
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	1,978	5,061	7,039	7,634	476	8,110	32	220.0
		Total	9,220	9,280	152	23,696	42,347	52,691	71,278	123,969	166,316	5,313	171,629	551	225.0
	C	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTV	830	79	0	871	1,781	1,402	1,527	2,929	4,709	256	4,965	79	37.1
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,412	152	696	15,264	6,403	38,782	45,185	60,449	756	61,205	305	148.1
		NLS-HL	216	3,563	0	0	3,779	2,633	1,714	4,347	8,127	52	8,179	10	434.7
		FFC	5,434	785	491	5,720	12,430	6,633	7,718	14,351	26,780	502	27,282	84	170.8
		Shuttle	0	0	0	23,000	23,000	39,302	38,136	77,438	100,438	7,421	107,859	226	342.6
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	2,405	6,411	8,816	9,411	552	9,963	41	215.0
		Total	16,805	10,434	643	31,689	59,571	62,946	107,754	170,700	230,270	10,251	240,521	843	202.5
	D	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTV	830	119	0	871	1,820	1,425	1,562	2,988	4,808	255	5,063	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,412	152	696	15,264	6,403	38,703	45,107	60,370	755	61,125	305	147.9
		NLS-HL	216	4,452	0	0	4,669	3,477	2,387	5,864	10,533	52	10,585	14	418.9
		FFC	5,434	785	491	5,720	12,430	6,661	7,790	14,451	26,881	501	27,382	85	170.0
		Shuttle	0	0	0	23,000	23,000	39,558	39,358	78,916	101,916	7,421	109,337	247	319.5
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	2,439	6,505	8,944	9,539	552	10,091	42	213.0
		Total	16,805	11,363	643	31,689	60,500	64,131	109,771	173,904	234,403	10,248	244,651	869	200.1

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

			Cost (Millions of 92 Dollars)											Recurring Cost/Flt	
			Nonrecurring					Recurring			NR+Rec			Flights	
Arch	If	System/ Family	DDT&E	Facs	NR Prod	P3I	NR Total	Ops	Rec Prod	Rec Total	Total	Unrel	Total	After 97	CPF
13	E-low	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTV	830	119	0	871	1,820	1,425	1,562	2,988	4,808	255	5,063	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,515	152	696	15,366	6,403	40,602	47,005	62,372	816	63,188	324	145.1
		NLS-HL	216	4,452	0	0	4,669	3,477	2,372	5,849	10,518	51	10,569	14	417.8
		FFC	5,434	785	491	5,720	12,430	7,251	9,075	16,326	28,756	497	29,253	104	157.0
		Shuttle	0	0	0	23,000	23,000	39,558	39,358	78,916	101,916	7,421	109,337	247	319.5
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	2,439	6,505	8,944	9,539	552	10,091	42	213.0
		Total	16,805	11,466	643	31,689	60,602	64,721	112,940	177,662	238,265	10,304	248,568	888	200.1
	E-high	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTV	830	119	0	871	1,820	1,425	1,562	2,988	4,808	255	5,063	83	36.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		NLS-50	9,004	5,683	152	696	15,534	6,403	43,756	50,159	65,694	872	66,566	356	140.9
		NLS-HL	216	4,452	0	0	4,669	3,477	2,341	5,818	10,487	51	10,538	14	415.6
		FFC	5,434	785	491	5,720	12,430	8,228	11,180	19,408	31,838	632	32,470	136	142.7
		Shuttle	0	0	0	23,000	23,000	39,558	39,358	78,916	101,916	7,421	109,337	247	319.5
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	2,439	6,505	8,944	9,539	552	10,091	42	213.0
		Total	16,805	11,634	643	31,689	60,770	65,698	118,168	183,867	244,636	10,495	255,132	920	199.9
14	A	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	0	0	23,000	23,000	37,301	26,272	63,573	86,573	1,870	88,443	59	1,077.5
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	0	595	0	23,000	23,595	52,753	68,831	121,584	145,179	4,611	149,790	523	232.5
	B	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	0	0	23,000	23,000	37,757	28,670	66,427	89,427	3,678	93,105	97	684.8
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	0	595	0	23,000	23,595	53,209	71,229	124,438	148,033	6,419	154,452	561	221.8
	C	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	1,097	5,816	6,913	7,119	217	7,336	78	88.6
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		FFC	5,434	785	491	5,720	12,430	6,633	7,718	14,351	26,780	575	27,355	84	170.8
		Shuttle	0	0	0	23,000	23,000	39,232	37,723	76,955	99,955	7,355	107,310	220	349.8
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	298	1,073	0	518	1,889	17,230	45,484	62,714	64,603	3,474	68,077	365	171.8
		Total	7,237	1,858	513	30,640	40,247	68,360	110,207	178,567	218,813	12,333	231,146	846	211.1

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

			Cost (Millions of 92 Dollars)											Recurring Cost/Flt	
		System/	Nonrecurring					Recurring			NR+Rec			Flights	
Arch	If	Family	DDT&E	Facs	NR Prod	P3I	NR Total	Ops	Rec Prod	Rec Total	Total	Unrel	Total	After 97	CPF
14	D	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	1,097	5,816	6,913	7,119	217	7,336	78	88.6
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		FFC	5,434	785	491	5,720	12,430	6,661	7,790	14,451	26,881	574	27,455	85	170.0
		Shuttle	0	0	0	23,000	23,000	39,642	39,768	79,410	102,410	7,417	109,827	254	312.6
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	298	1,073	0	518	1,889	17,259	45,582	62,841	64,730	3,474	68,204	366	171.7
		Total	7,237	1,858	513	30,640	40,247	68,827	112,422	181,249	221,496	12,394	233,889	881	205.7
	E-low	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	1,097	5,816	6,913	7,119	217	7,336	78	88.6
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		FFC	5,434	785	491	5,720	12,430	7,251	9,075	16,326	28,756	640	29,396	104	157.0
		Shuttle	0	0	0	23,000	23,000	39,642	39,768	79,410	102,410	7,417	109,827	254	312.6
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	298	1,073	0	518	1,889	17,801	47,428	65,229	67,118	3,614	70,732	385	169.4
		Total	7,237	1,858	513	30,640	40,247	69,959	115,553	185,512	225,759	12,600	238,358	900	206.1
	E-high	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	1,097	5,816	6,913	7,119	217	7,336	78	88.6
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		FFC	5,434	785	491	5,720	12,430	8,228	11,180	19,408	31,838	983	32,821	136	142.7
		Shuttle	0	0	0	23,000	23,000	39,642	39,768	79,410	102,410	7,417	109,827	254	312.6
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	298	1,551	0	518	2,367	19,088	50,390	69,478	71,845	3,894	75,739	417	166.6
		Total	7,237	2,336	513	30,640	40,725	72,223	120,620	192,843	233,568	13,223	246,790	932	206.9
16	A	AMSC	11,688	0	0	9,352	21,040	3,795	6,781	10,575	31,615	727	32,342	42	251.8
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	0	0	0	0	13,005	9,263	22,268	22,268	1,811	24,079	23	968.2
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	11,688	595	0	9,352	21,635	32,252	58,603	90,854	112,489	5,279	117,768	529	171.7
	B	AMSC	11,688	0	0	9,352	21,040	3,853	9,810	13,663	34,703	1,465	36,168	285	47.9
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		Shuttle	0	0	0	0	0	19,548	14,066	33,614	33,614	1,873	35,487	38	884.6
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	11,688	595	0	9,352	21,635	38,853	66,435	105,288	126,923	6,079	133,002	787	133.8
	C	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		AMSC	11,688	0	0	9,352	21,040	3,861	11,347	15,208	36,248	2,194	38,442	350	43.5
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	2,172	11,542	13,713	13,919	642	14,561	293	46.8
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	303	348	837	2,535	752	2,351	3,102	5,637	1,454	7,091	214	14.5
		Shuttle	0	0	0	0	0	20,111	18,053	38,164	38,164	3,683	41,847	85	449.0
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	1,073	0	0	1,073	19,054	49,799	68,853	69,926	3,648	73,574	496	138.8
		Total	14,239	1,376	370	11,591	27,575	50,121	106,556	156,677	184,252	12,333	196,585	1,192	131.4

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

Arch	If	System/ Family	Cost (Millions of 92 Dollars)											Recurring Cost/Flt	
			Nonrecurring					Recurring			NR+Rec			Flights	
			DDT&E	Facs	NR Prod	P3I	NR Total	Ops	Rec Prod	Rec Total	Total	Unrel	Total	After 97	CPF
16	D	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		AMSC	11,688	0	0	9,352	21,040	3,861	11,347	15,208	36,248	2,194	38,442	350	43.5
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	2,409	12,803	15,212	15,418	740	16,158	360	42.3
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	404	348	837	2,636	864	2,961	3,825	6,460	1,937	8,397	281	13.6
		Shuttle	0	0	0	0	0	20,292	19,340	39,632	39,632	3,683	43,315	100	396.3
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	1,228	0	0	1,228	20,438	53,607	74,045	75,273	4,097	79,370	563	131.5
		Total	14,239	1,632	370	11,591	27,831	52,033	113,526	165,559	193,383	13,363	206,752	1,274	130.0
	E-low	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		AMSC	11,688	0	0	9,352	21,040	3,867	11,521	15,388	36,428	2,194	38,622	367	41.9
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	2,409	12,803	15,212	15,418	740	16,158	360	42.3
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	404	348	837	2,636	864	2,961	3,825	6,460	1,937	8,397	281	13.6
		Shuttle	0	0	0	0	0	20,317	19,476	39,793	39,793	3,683	43,476	102	390.1
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	1,228	0	0	1,228	20,438	53,607	74,045	75,273	4,097	79,370	563	131.5
		Total	14,239	1,632	370	11,591	27,831	52,064	113,836	165,900	193,730	13,363	207,093	1,293	128.3
	E-high	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		AMSC	11,688	0	0	9,352	21,040	3,879	11,835	15,714	36,754	2,196	38,950	398	39.5
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	2,409	12,803	15,212	15,418	740	16,158	360	42.3
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	404	348	837	2,636	864	2,961	3,825	6,460	1,937	8,397	281	13.6
		Shuttle	0	0	0	0	0	20,328	19,525	39,853	39,853	3,683	43,536	103	386.9
		Titan II	0	0	0	0	0	470	865	1,335	1,335	58	1,393	31	43.1
		Titan IV	0	1,228	0	0	1,228	20,438	53,607	74,045	75,273	4,097	79,370	563	131.5
		Total	14,239	1,632	370	11,591	27,831	52,087	114,199	166,286	194,117	13,365	207,482	1,325	125.5
17	A	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	960	5,085	6,045	6,251	178	6,429	63	96.0
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	101	348	1,099	2,594	448	616	1,064	3,658	199	3,857	42	25.3
		RLPC	2,573	5	262	2,690	5,529	1,950	1,890	3,840	9,369	85	9,454	63	61.0
		Shuttle	0	0	0	0	0	11,269	7,647	18,916	18,916	1,699	20,615	11	1,719.6
		Titan II	0	300	0	518	818	2,414	4,513	6,927	7,745	218	7,963	67	103.4
		Titan IV	0	595	0	0	595	13,378	34,472	47,850	48,445	2,386	50,831	266	179.9
		Total	3,803	1,001	632	4,307	9,742	33,869	66,507	100,376	110,118	5,419	115,537	574	174.9
	B	Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	1,596	8,465	10,062	10,267	289	10,556	158	63.7
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	202	348	1,099	2,695	705	1,608	2,313	5,008	655	5,663	134	17.3
		RLPC	2,573	11	262	2,690	5,535	3,246	3,403	6,649	12,184	154	12,338	158	42.1
		Shuttle	0	0	0	0	0	9,726	6,834	16,560	16,560	1,699	18,259	15	1,104.0
		Titan II	0	300	0	518	818	4,127	7,715	11,842	12,660	363	13,023	162	73.1
		Titan IV	0	595	0	0	595	15,809	41,416	57,225	57,820	3,016	60,836	361	158.5
		Total	3,803	1,108	632	4,307	9,849	38,659	81,725	120,384	130,233	6,830	137,063	768	156.8

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

			Cost (Millions of 92 Dollars)											Recurring Cost/Flt	
			Nonrecurring					Recurring			NR+Rec			Flights	
Arch	#	System/ Family	DDT&E	Facs	NR Prod	P3I	NR Total	Ops	Rec Prod	Rec Total	Total	Unrel	Total	After 97	CPF
17	C	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	2,966	15,744	18,709	18,915	543	19,458	510	36.7
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	404	348	1,099	2,897	1,163	4,121	5,284	8,182	1,881	10,063	416	12.7
		RLPC	2,573	11	262	2,690	5,535	4,068	4,479	8,548	14,082	188	14,270	242	35.3
		Shuttle	0	0	0	0	0	13,278	12,048	25,326	25,326	1,761	27,087	46	550.6
		Titan II	0	600	0	518	1,118	5,366	10,037	15,403	16,521	481	17,002	246	62.6
		Titan IV	0	1,705	0	0	1,705	24,258	62,816	87,074	88,779	5,236	94,015	713	122.1
		Total	5,124	2,720	632	5,709	14,183	54,797	121,846	176,644	190,826	10,744	201,570	1,235	143.0
	D	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	3,202	17,010	20,211	20,417	577	20,994	591	34.2
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	505	348	1,099	2,998	1,299	4,745	6,043	9,042	2,268	11,310	497	12.2
		RLPC	2,573	11	262	2,690	5,535	4,068	4,479	8,548	14,082	188	14,270	242	35.3
		Shuttle	0	0	0	0	0	13,351	12,348	25,699	25,699	1,761	27,460	52	494.2
		Titan II	0	600	0	518	1,118	5,366	10,037	15,403	16,521	481	17,002	246	62.6
		Titan IV	0	2,003	0	0	2,003	26,011	67,103	93,114	95,117	5,721	100,838	794	117.3
		Total	5,124	3,119	632	5,709	14,582	56,994	128,323	185,318	199,899	11,650	211,549	1,322	140.2
	E-low	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	3,202	17,010	20,211	20,417	577	20,994	591	34.2
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	505	348	1,099	2,998	1,299	4,745	6,043	9,042	2,268	11,310	497	12.2
		RLPC	2,573	11	262	2,690	5,535	4,239	4,670	8,909	14,444	196	14,640	261	34.1
		Shuttle	0	0	0	0	0	13,351	12,348	25,699	25,699	1,761	27,460	52	494.2
		Titan II	0	600	0	518	1,118	5,624	10,513	16,137	17,255	508	17,763	265	60.9
		Titan IV	0	2,003	0	0	2,003	26,011	67,103	93,114	95,117	5,721	100,838	794	117.3
		Total	5,124	3,119	632	5,709	14,582	57,423	128,990	186,413	200,994	11,685	212,679	1,341	139.0
	E-high	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287	0	—
		Atlas	0	0	0	0	0	1,403	5,635	7,038	7,038	335	7,373	69	102.0
		CTF	184	0	22	0	206	3,202	17,010	20,211	20,417	577	20,994	591	34.2
		Delta	0	0	0	0	0	2,047	6,649	8,696	8,696	319	9,015	161	54.0
		LRV	1,046	505	348	1,099	2,998	1,299	4,745	6,043	9,042	2,268	11,310	497	12.2
		RLPC	2,573	11	262	2,690	5,535	4,512	5,054	9,566	15,101	224	15,325	293	32.6
		Shuttle	0	0	0	0	0	13,351	12,348	25,699	25,699	1,761	27,460	52	494.2
		Titan II	0	600	0	518	1,118	6,034	11,283	17,317	18,435	524	18,959	297	58.3
		Titan IV	0	2,003	0	0	2,003	26,011	67,103	93,114	95,117	5,721	100,838	794	117.3
		Total	5,124	3,119	632	5,709	14,582	58,106	130,144	188,250	202,832	11,729	214,561	1,373	137.1
18	A	Atlas IIAS	0	0	0	0	0	1,371	4,595	5,966	5,966	268	6,234	53	112.6
		Beta II	28,034	1,847	1,268	22,427	53,577	14,704	11,767	26,471	80,048	3,423	83,471	138	191.8
		Delta	0	0	0	0	0	1,915	4,866	6,781	6,781	203	6,984	95	71.4
		Shuttle	0	0	0	0	0	12,992	9,212	22,204	22,204	1,867	24,071	22	1,009.3
		Titan II	0	0	0	0	0	168	311	479	479	29	508	12	39.9
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566	203	201.7
		Total	28,034	2,442	1,268	22,427	54,172	42,682	60,161	102,843	157,015	7,819	164,834	523	196.6

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

Arch	If	System/ Family	Cost (Millions of 92 Dollars)												Recurring Cost/Flt	
			Nonrecurring					Recurring			NR+Rec				Flights	
			DOT&E	Facs	NR Prod	P3I	NR Total	Ops	Rec Prod	Rec Total	Total	Unrel	Total		After 97	CPF
18	B	Atlas IIAS	0	0	0	0	0	1,373	4,660	6,033	6,033	268	6,301		54	111.7
		Beta II	28,034	1,847	1,268	22,427	53,577	16,278	11,855	28,133	81,710	6,790	88,500		211	133.3
		Delta	0	0	0	0	0	1,917	4,894	6,811	6,811	203	7,014		96	70.9
		Shuttle	0	0	0	0	0	13,076	9,562	22,538	22,638	1,867	24,505		29	780.6
		Titan II	0	0	0	0	0	168	311	479	479	29	508		12	39.9
		Titan IV	0	595	0	0	595	11,532	29,410	40,942	41,537	2,029	43,566		203	201.7
		Total	28,034	2,442	1,268	22,427	54,172	44,344	60,692	105,036	159,208	11,186	170,394		605	173.6
	C	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287		0	—
		Atlas	0	0	0	0	0	1,385	5,050	6,435	6,435	335	6,770		60	107.3
		Beta II	28,034	1,847	1,268	22,427	53,577	20,525	14,148	34,673	88,250	10,227	98,477		408	85.0
		CTF	577	0	63	0	640	1,110	5,903	7,013	7,654	236	7,890		84	83.5
		Delta	0	0	0	0	0	1,923	4,975	6,898	6,898	203	7,101		99	69.7
		Shuttle	0	0	0	0	0	18,484	17,211	35,695	35,695	3,796	39,491		82	435.3
		Titan II	0	0	0	0	0	168	311	479	479	29	508		12	39.9
		Titan IV	0	595	0	0	595	13,821	35,709	49,530	50,125	2,413	52,538		282	175.6
		Total	29,932	2,442	1,331	23,829	57,534	57,664	83,624	141,288	198,823	17,239	216,062		943	149.8
	D	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287		0	—
		Atlas	0	0	0	0	0	1,387	5,115	6,502	6,502	335	6,837		61	106.6
		Beta II	28,034	1,847	1,268	22,427	53,577	22,573	17,149	39,723	93,300	13,637	106,937		503	79.0
		CTF	577	0	63	0	640	1,110	5,903	7,013	7,654	236	7,890		84	83.5
		Delta	0	0	0	0	0	1,927	5,027	6,954	6,954	203	7,157		101	68.9
		Shuttle	0	0	0	0	0	18,702	18,325	37,027	37,027	3,796	40,823		100	370.3
		Titan II	0	0	0	0	0	168	311	479	479	29	508		12	39.9
		Titan IV	0	595	0	0	595	13,821	35,709	49,530	50,125	2,413	52,538		282	175.6
		Total	29,932	2,442	1,331	23,829	57,534	59,936	87,856	147,793	205,327	20,649	225,976		1,059	139.6
	E-low	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287		0	—
		Atlas	0	0	0	0	0	1,387	5,115	6,502	6,502	335	6,837		61	106.6
		Beta II	28,034	1,847	1,268	22,427	53,577	22,940	17,149	40,089	93,666	13,623	107,289		520	77.1
		CTF	577	0	63	0	640	1,110	5,903	7,013	7,654	236	7,890		84	83.5
		Delta	0	0	0	0	0	1,927	5,027	6,954	6,954	203	7,157		101	68.9
		Shuttle	0	0	0	0	0	18,725	18,462	37,187	37,187	3,796	40,983		102	364.6
		Titan II	0	0	0	0	0	168	311	479	479	29	508		12	39.9
		Titan IV	0	595	0	0	595	13,821	35,709	49,530	50,125	2,413	52,538		282	175.6
		Total	29,932	2,442	1,331	23,829	57,534	60,326	87,993	148,319	205,854	20,635	226,489		1,078	137.6
	E-high	ACRV	1,321	0	0	1,402	2,722	248	317	565	3,287	0	3,287		0	—
		Atlas	0	0	0	0	0	1,387	5,115	6,502	6,502	335	6,837		61	106.6
		Beta II	28,034	2,527	1,268	22,427	54,257	23,608	19,210	42,818	97,075	13,637	110,712		551	77.7
		CTF	577	0	63	0	640	1,110	5,903	7,013	7,654	236	7,890		84	83.5
		Delta	0	0	0	0	0	1,927	5,027	6,954	6,954	203	7,157		101	68.9
		Shuttle	0	0	0	0	0	18,737	18,512	37,249	37,249	3,796	41,045		103	361.6
		Titan II	0	0	0	0	0	168	311	479	479	29	508		12	39.9
		Titan IV	0	595	0	0	595	13,821	35,709	49,530	50,125	2,413	52,538		282	175.6
		Total	29,932	3,122	1,331	23,829	58,214	61,006	90,104	151,110	209,325	20,649	229,974		1,110	136.1

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONTINUED)

			Cost (Millions of 92 Dollars)											Recurring Cost/Flt	
			Nonrecurring					Recurring			NR+Rec			Flights	
Arch	#	System/ Family	DDT&E	Facs	NR Prod	P3I	NR Total	Ops	Rec Prod	Rec Total	Total	Unrel	Total	After 97	CPF
19	A	ALV/RPC	6,888	2,147	541	7,580	17,156	11,256	21,629	32,885	50,041	1,845	51,886	322	102.1
		Atlas	0	0	0	0	0	474	1,505	1,979	1,979	134	2,113	17	116.4
		CTF	184	505	22	0	711	879	4,676	5,554	6,265	161	6,426	53	104.8
		Delta	0	0	0	0	0	395	1,276	1,671	1,671	58	1,729	25	66.8
		LRV	1,046	505	348	1,099	2,998	348	5,088	5,436	8,434	277	8,711	53	102.6
		Shuttle	0	0	0	0	0	3,254	2,329	5,583	5,583	1,699	7,282	6	930.5
		Titan II	0	0	0	0	0	114	212	326	326	29	355	8	40.8
		Titan IV	0	1,218	0	0	1,218	10,425	28,937	39,362	40,580	1,756	42,336	198	198.8
		Total	8,118	4,375	911	8,679	22,083	27,144	65,652	92,796	114,879	5,959	120,838	576	161.1
	B	ALV/RPC	6,888	2,147	541	7,580	17,156	14,296	31,351	45,647	62,803	2,566	65,369	410	111.3
		Atlas	0	0	0	0	0	474	1,505	1,979	1,979	134	2,113	17	116.4
		CTF	184	505	22	0	711	1,502	7,974	9,476	10,187	293	10,480	141	67.2
		Delta	0	0	0	0	0	395	1,276	1,671	1,671	58	1,729	25	66.8
		LRV	1,046	505	348	1,099	2,998	495	5,088	5,584	8,582	688	9,270	141	39.6
		Shuttle	0	0	0	0	0	4,893	3,541	8,434	8,434	1,699	10,133	10	843.4
		Titan II	0	0	0	0	0	114	212	326	326	29	355	8	40.8
		Titan IV	0	1,638	0	0	1,838	13,590	36,018	49,608	51,446	2,227	53,673	286	173.5
		Total	8,118	4,995	911	8,679	22,703	35,759	86,966	122,725	145,428	7,694	153,122	756	162.3
	C	ACRV	1,321	0	0	1,468	2,789	248	317	565	3,354	0	3,354	0	—
		ALV/RPC	6,888	2,233	541	7,580	17,243	16,292	37,628	53,920	71,163	2,611	73,774	580	93.0
		Atlas	0	0	0	0	0	474	1,505	1,979	1,979	134	2,113	17	116.4
		CTF	184	505	22	0	711	2,700	14,348	17,048	17,759	501	18,260	524	32.5
		Delta	0	0	0	0	0	395	1,276	1,671	1,671	58	1,729	25	66.8
		LRV	1,046	505	348	1,099	2,998	730	5,088	5,818	8,816	2,045	10,861	427	13.6
		Shuttle	0	0	0	0	0	10,038	8,135	18,173	18,173	1,761	19,934	41	443.2
		Titan II	0	0	0	0	0	114	212	326	326	29	355	8	40.8
		Titan IV	0	4,344	0	0	4,344	22,871	54,840	77,711	82,055	3,588	85,643	572	135.9
		Total	9,439	7,587	911	10,147	28,085	53,862	123,349	177,211	205,295	10,727	216,022	1,243	142.6
	D	ACRV	1,321	0	0	1,468	2,789	248	317	565	3,354	0	3,354	0	—
		ALV/RPC	6,888	2,233	541	7,580	17,243	16,292	38,640	54,932	72,174	2,611	74,785	580	94.7
		Atlas	0	0	0	0	0	474	1,505	1,979	1,979	134	2,113	17	116.4
		CTF	184	505	22	0	711	3,019	16,036	19,054	19,765	557	20,322	625	30.5
		Delta	0	0	0	0	0	395	1,276	1,671	1,671	58	1,729	25	66.8
		LRV	1,046	505	348	1,099	2,998	786	5,088	5,874	8,872	2,520	11,392	528	11.1
		Shuttle	0	0	0	0	0	11,676	10,984	22,660	22,660	1,761	24,421	45	503.6
		Titan II	0	0	0	0	0	114	212	326	326	29	355	8	40.8
		Titan IV	0	5,122	0	0	5,122	25,603	60,574	86,177	91,299	4,073	95,372	673	128.0
		Total	9,439	8,365	911	10,147	28,863	58,606	134,632	193,238	222,100	11,743	233,843	1,348	143.4
	E-low	ACRV	1,321	0	0	1,468	2,789	248	317	565	3,354	0	3,354	0	—
		ALV/RPC	6,888	2,233	541	7,580	17,243	17,320	40,382	57,702	74,945	3,077	78,022	599	96.3
		Atlas	0	0	0	0	0	474	1,505	1,979	1,979	134	2,113	17	116.4
		CTF	184	505	22	0	711	3,019	16,036	19,054	19,765	557	20,322	625	30.5
		Delta	0	0	0	0	0	395	1,276	1,671	1,671	58	1,729	25	66.8
		LRV	1,046	505	348	1,099	2,998	786	5,088	5,874	8,872	2,520	11,392	528	11.1
		Shuttle	0	0	0	0	0	11,676	10,984	22,660	22,660	1,761	24,421	45	503.6
		Titan II	0	0	0	0	0	114	212	326	326	29	355	8	40.8
		Titan IV	0	5,122	0	0	5,122	25,603	60,574	86,177	91,299	4,073	95,372	673	128.0
		Total	9,439	8,365	911	10,147	28,863	59,634	136,374	196,008	224,871	12,209	237,080	1,367	143.4

Note: Includes wraps

TABLE C.1.3.– ARCHITECTURE COST SUMMARY (CONCLUDED)

Arch	If	System/ Family	Cost (Millions of 92 Dollars)											Recurring Cost/Flt	
			Nonrecurring					Recurring			NR+Rec			Flights	
			DDT&E	Facs	NR Prod	P3I	NR Total	Ops	Rec Prod	Rec Total	Total	Unrel	Total	After 97	CPF
19	E-high	ACRV	1,321	0	0	1,468	2,789	248	317	565	3,354	0	3,354	0	—
		ALV/RPC	6,888	2,233	541	7,580	17,243	17,672	42,222	59,894	77,136	3,304	80,440	631	94.9
		Atlas	0	0	0	0	0	474	1,505	1,979	1,979	134	2,113	17	116.4
		CTF	184	505	22	0	711	3,019	16,036	19,054	19,765	557	20,322	625	30.5
		Delta	0	0	0	0	0	395	1,276	1,671	1,671	58	1,729	25	66.8
		LRV	1,046	505	348	1,099	2,998	786	5,088	5,874	8,872	2,520	11,392	528	11.1
		Shuttle	0	0	0	0	0	11,676	10,984	22,660	22,660	1,761	24,421	45	503.6
		Titan II	0	0	0	0	0	114	212	326	326	29	355	8	40.8
		Titan IV	0	5,122	0	0	5,122	25,603	60,574	86,177	91,299	4,073	95,372	673	128.0
		Total	9,439	8,365	911	10,147	28,863	59,986	138,214	198,200	227,062	12,436	239,498	1,399	141.7

APPENDIX D
COMPUTATIONAL TOOLS AND MODELS

This appendix describes the various computational tools and models used in the Human Transportation System (HTS) analysis process.

D.1.1 ARCHITECTURE EVALUATION TOOL (AET)

To evaluate architectures, a large amount of system attribute measurements was compiled. To facilitate calculating architecture attribute values and scores from system data, the AET was developed for the HTS Study.

The AET was developed using 4th Dimension database software on a Macintosh computer. It contains about 400 procedures and about 100 screen layouts. The database structure requires approximately 1.5 MB of disk space. A data file with a complete set of data occupies 7 to 10 MB of disk space.

In choosing the type of software to use, three options were considered: spreadsheets, database managers, and a programming language. It was decided that using spreadsheets would be inefficient for the large amounts of data involved. Furthermore, with a spreadsheet, it would be difficult to assure that any computational change would be applied consistently for all systems and/or architectures. Developing with a programming language would assure maximum versatility. However, the development time and effort required would be enormous. By choosing a database program, the amount of development time could be drastically reduced since the database functions and many of the input/output functions were already in place. The 4th Dimension program was chosen because it is the most sophisticated of the Macintosh database programs and allows the greatest versatility. The program can also be compiled, which greatly increases speed when executing the large amount of code required for attribute computations.

The AET development process was simultaneous with much of the attribute definition process. It forced attribute integrators to define the actual calculation methodology for each attribute. Frequently, attribute integrators had failed to look at the effects of time on attribute values or had not sufficiently defined the architecture roll up technique of system attribute values. The AET development process precluded some of these problems, as well as other inconsistencies and inaccuracies in definition and measurement. The AET is able to calculate attribute scores in a consistent and rapid manner. It also provides a depository for system and architecture data.

The AET provides the capability to perform sensitivity analysis rapidly. Sensitivities can be performed by changing the systems in an architecture, changing utility curves, or changing attribute or subattribute weighting factors. Attribute input data can also be modified.

The AET is divided into two sections: Systems and Architectures. The Systems section handles data on the launch system level. This is where most of the data is entered. This section of the AET contains processors for each of the attributes except Alternate Access and for profiles. Since the Alternate Access attribute is a function of which systems are grouped into an architecture, it can be defined only on the architecture level. The profiles processor handles data related to flight rate, new vehicles, and fleet size.

A system level entry corresponds to a particular launch system. Each system entry has a unique set of profile and attribute input data. If any piece of data varies from architecture to architecture, a new system entry must be created. For example, Shuttle flight rates are different in almost every architecture, so a separate Shuttle entry must be made for each. Since Titan III is the same across all architectures, a single entry can be used.

Each processor displays screens for data input and shows the results of system level calculations. Data is typically presented in a spreadsheet-like format. As with a spreadsheet, calculations relevant to a particular piece of data are made instantaneously when that data point is entered. When either data input is required or data output is shown on a year by year basis, a graphing capability is available. Each processor can generate its own printout, which has been designed to look like the input screens to simplify data entry checking.

The Architectures section handles the roll up of data from different combinations of systems into architecture values and scores. The user can select the proper systems for the particular architecture from a list of all the defined systems. The user can go directly from the architecture level to one of the selected systems in the Systems section in order to enter or modify data.

Attribute data entry in the architectures section is performed in only the Alternate Access processor. The other attribute processors serve to roll up system data in the appropriate manner. Most attribute processors provide a list of the systems and the relevant system data, rolled up values, and an attribute score. One or more printouts are available for each attribute. For attributes involving year by year data, graphing capability is available.

The summary processor provides the architecture's overall score. It can also substitute different utility curves and subattribute weightings for one or more attributes, or different attribute weightings. These features may be used for sensitivity analysis.

Both on the architecture level and the system level, the user can search and sort. Reports and graphs of groups of architectures may also be generated for comparisons. All data can be exported into text files, which can be easily read by spreadsheets, word processors, or other programs. The user can also perform automatic recalculation of any or all processors for a selected group of systems or architectures.

Attributes that were defined early in the study but not evaluated (Alternate Access, Mission Growth Potential, Dependability, Resiliency, and Availability) remain modeled within the AET. Their processors are fully functional. The baseline weighting factors for these attributes have been set to zero so that these scores do not effect the final architecture score.

A user's guide to the AET has been provided as Appendix E.

D.1.2 TRANSPORTATION SYSTEMS INTEGRATION TOOL (TRANSIT)

The main mission capture and payload manifesting program used for the HTS Study was the Transportation Systems Integration Tool (TRANSIT). TRANSIT was developed at GDSS with major funding from JSC. It uses SmallTalk, a multi-platform programming environment, and can run on several different platforms.

TRANSIT performs end-to-end mission model analysis, including system performance calculation, mission capture and payload manifesting, simulation of system operability, reliability evaluation, and cost calculation. For the study, only the mission capture and payload manifesting features were used.

The following definitions are provided for clarity:

- *Mission.* A mission is an end objective usually having one or more payload or payload events. A mission bears the name of a payload.

- *Payload.* A payload, or payload event, signifies a specific occurrence of the mission in a particular year. Associated with the payload is its mass, dimensions, constraints, and year of occurrence. Payloads, not missions, are manifested onto a vehicle.

- *Flight.* A flight describes a launch system performing a certain objective, such as delivering its cargo to some destination in space. The cargo may consist of a single payload or multiple manifested payloads.

Mission capture is the matching up of a certain mission or group of missions to the launch system while satisfying all mission and vehicle constraints including performance. Mission constraints include final destinations, payload mass and dimensions, and other operational considerations, such as the requirement to fly similar payloads separately or to provide for crew receipt at the destination. Vehicle constraints include launch site, initial operational capability (IOC), other availability limitations, cargo volume, performance to the destination orbit, etc.

Payload manifesting, on the other hand, is selecting payloads to fly on the same flight of the launch system that has been chosen for the mission. Once the missions and systems match-up has been determined, TRANSIT begins to manifest payloads together on the launch vehicles. Only top level considerations such as mass, dimensions (both payload and vehicle cargo bay/fairing) and top level constraints are used here.

TRANSIT requires two sets of input: the mission input and the launch system input. The standard TRANSIT mission input format uses many information fields of the mission model. During the study, the mission model was imported directly into TRANSIT for mission capture analysis.

Table D.1.2-1 lists all the mission input parameters. Also included in the table is the explanation of how the data fields are used by TRANSIT. Not all parameters were used in the HTS Study.

TABLE D.1.2-1.– TRANSIT MISSION INPUT PARAMETERS

MISSION INPUT PARAMETERS	TRANSIT USE
Mission ID & Name	Priority, Manifesting Assumptions
Users/Customers (Agency, Country, ...)	Priority, Manifesting Assumptions
Payload Characteristics (Mass, Dimension,...)	Manifesting
Mission/Payload Type (Mann., Unman., Serv., Del., Ret., ...)	Manifesting, Mission/Vehicle Matchup
Orbit (Altitudes, Incl.), ΔV Or C3	Vehicle Performance Calculation
Launch Schedule (Annual Payload Schedule)	Manifesting, Mission/Vehicle Matchup
Manifesting Constraints (Like And Unlike Payloads)	Manifesting, Mission/Vehicle Matchup
Other Constraints (Launch Site, Priority,...)	Manifesting, Mission/Vehicle Matchup
Launch Reschedule	Allows Remanifesting
Payload Replacement	Allows Remanifesting
Payload Replacement Time	Remanifesting
Cost Per Payload Pound	Part Of Unreliability Cost Calculation
Payload Accommodations (Cargo Bay, Mounted In-line In Fairing, Middeck Lockers, G.A.S.,...)	Manifesting
Manifesting Priority	Manifesting
Comanifesting Limits	Manifesting

A complete TRANSIT run requires a multitude of information. The HTS Study, however, used only a few system features. Table D.1.2-2 describes the system input parameters.

TABLE D.1.2-2.– TRANSIT SYSTEM INPUT PARAMETERS

SYSTEM INPUT PARAMETERS	TRANSIT USE
Launch Vehicle ID & Name	Priority, Manifesting Assumptions
Available Date (Begin, End)	Manifesting
Performance To Orbits (Or Other Destinations)	Calculate Perf. Curve, Perf. To Other Orbits
Usable Payload Size	Manifesting
Vehicle Type (Mann., Unman., Serv., Del., Ret., ...)	Mission/Vehicle Matchup, Manifesting
Component Definition (Booster, Propulsion System, Avionics, Fairing,...)	Fleet Size Calculation
Reusability/Expendability	Fleet Size Calculation, Manifesting
Reliability Characteristics	Loss Analysis, Fleet Size Calculation
Launch Site Availability	Mission/Vehicle Matchup, Manifesting
Facilities Needs (Integration, Checkout, Pad,...)	Mission/Vehicle Matchup, Manifesting
Launch Per Year (Fac. Capabilities)	Manifesting, System Ramp-up
Other Constraints (Launch Incl., Azimuth,...)	Perf. Calculation, Manifesting
Stage Physical Dimensions (Stowed & Deployed)	Earth-to-orbit Manifesting
Isp, Inert & Usable Propellant Mass	Stage Performance Calculation
Additional Hardware (Aerobrake, Adapter,...)	Earth-to-Orbit Manifesting, Perf. Calculation
Accommodations/Facilities (Ground, Space,...)	Mission/Stage Matchup, Manifesting
Vehicle Type (Mann., Unman., Serv., Del., Ret., ...)	Mission/Stage Matchup, Manifesting
Launch Per Year	Mission/Stage Matchup, Manifesting
Reliability Characteristics	Loss Analysis, Fleet Size Calculation, Failure Rate, Backlog
System Cost (Vehicle, Fac., Ops, Nonrec., Rec.)	System & Architecture Cost Calculation

TRANSIT applies a mission capture algorithm to all architectures; for each mission, each vehicle system, and each year in the model. At the completion of the run, the outputs are tabulated. They include mission-to-vehicle capture, listing of payloads on the same flight, manifesting efficiency, summary of flight results for each launch site and launch systems. The HTS Study required two types of output from TRANSIT: (1) the flight rates for all vehicle systems and (2) the system manifesting efficiency defined as actual mission payload divided by total vehicle performance for that mission. Other available output reports include listings on the mission models, manifested payloads, and system performance.

For the HTS Study, data for manifests produced by TRANSIT was transferred into a standard spreadsheet format. The data in this format was then used by the cost models, the ground operations model, and the AET.

D.1.3 GROUND OPERATIONS ASSESSMENT MODEL

In order to accomplish the numerical analysis required for the ground operation assessment, a spreadsheet-based model has been developed by Rockwell. This model evaluates the quantity of ground facilities and reusable elements necessary to support the required flight rate based on the ground operations flow diagrams shown in Appendix B, section B.1.3. It also produces schedule compression and margin data. The model uses Microsoft Excel on either a Macintosh- or a Windows-based system.

Two different versions of the model were developed during the course of the study. Originally, a spreadsheet that captures all operations-related data for each system within an architecture was defined. Figure D.1.3-1 shows the layout of information within a typical architecture spreadsheet.

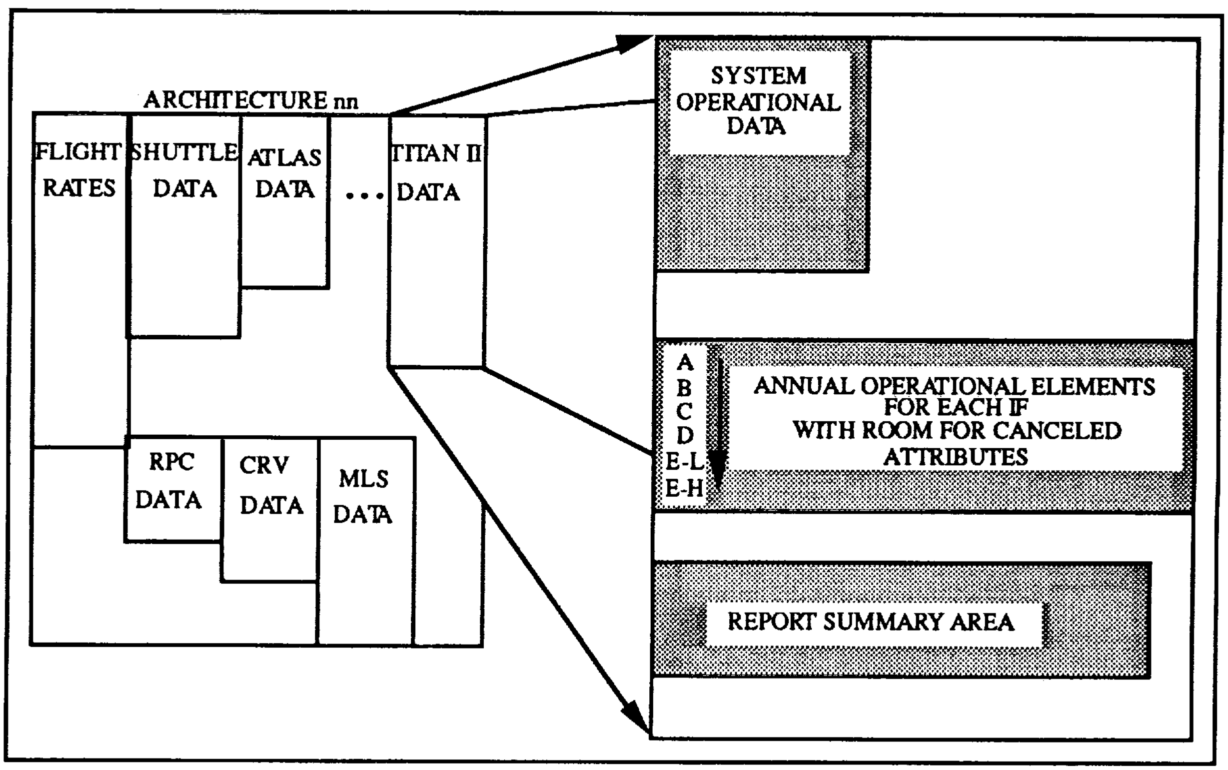

Figure D.1.3-1.– Original architecture spreadsheet layout for ground operations assessment model.

Most of the operations data in the study was produced using this version of the model. However, this limited approach proved to be unwieldy because of the size of the spreadsheets (most were larger than three megabytes), and the need to replicate each systems equation set for each architecture, meaning that changes had to be reproduced in each architecture spreadsheet.

During the study extension period, the model was revised to make it easier to use. It was converted from an architecture-based spreadsheet approach to a system-based approach, with a unique spreadsheet for entering architecture specific flight rates. Also, a macro was developed in order to make changing to system equations easier. Figure D.1.3-2 illustrates the different spreadsheet files involved.

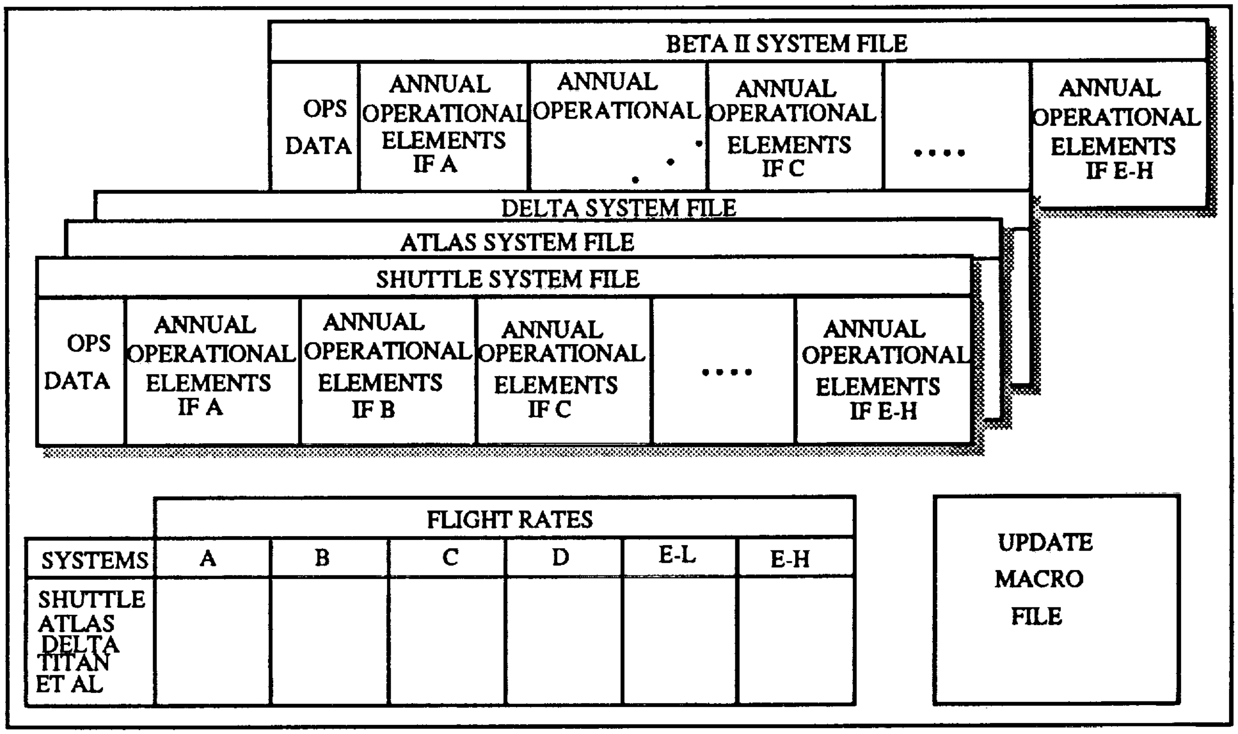

Figure D.1.3-2.– Spreadsheets for improved ground operations assessment model.

Architectures are defined by entering system specific flight rates into the system flight rate spreadsheet and naming the file to reflect the architecture under evaluation. This file is placed in a unique folder or directory along with the update macro. System spreadsheets for each system or shared system in the architecture are also moved into the architecture folder. The systems spreadsheets contain electronic links to the system flight rate spreadsheet.

When each system file is opened, the spreadsheet links are updated and the update macro is activated. This process recalculates the operations requirements and schedule margins based on the new flight rates for that system. The print command is used to print out information for all "If" Scenarios for this system. This process is repeated for every active system within the architecture. To maintain the data without printing it, the output can be copied to a separate spreadsheet, compiling results for all systems and saving or printing the information.

After the architecture assessment is complete, system spreadsheets are moved back to their home folder to await the next architecture to be evaluated. System changes need only be made once in this new process. The update macro handles all the copying requirements across the "If" Scenarios.

This revised model significantly reduces the time needed to create and evaluate new architectures. Under the original method, up to 40 hours was required to add a system to an existing architecture file, create new equations for its elements, link it to any systems sharing elements, and copy these equations from one "If" Scenario to another. The new approach requires less than 8 hours.

D.1.4 COST MODEL

The architecture cost model used to generate the architecture level cost estimates was a series of electronically linked, Microsoft Excel spreadsheets, each calculating some portion of total architecture costs. A separate model of linked spreadsheets was developed for each architecture, with the spreadsheets tailored to reflect the specific systems included in each unique architecture. Figure D.1.4-1 illustrates the general input-process-output connection within the cost model.

The results of the architecture cost analyses are provided in the form of a total architecture cost spreadsheet, which contains a total architecture cost summary and cost by year, for each system, and by each life cycle phase. These were passed to the AET, where top-level wrap factors for government support, contractor fee, and contingency were applied, and the total costs and peak year costs calculated. Figure D.1.4-2 illustrates the different data contained in the spreadsheets.

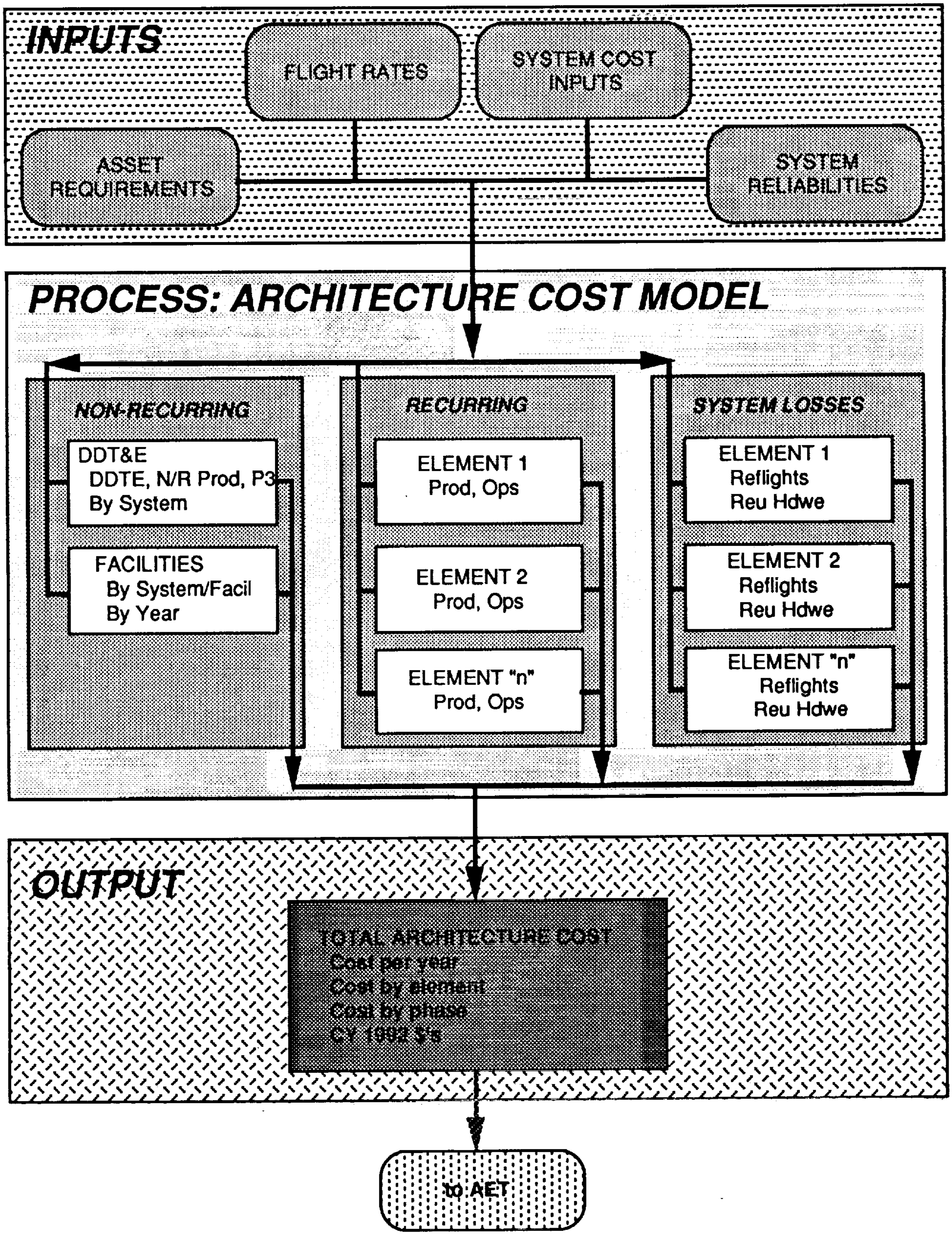

Figure D.1.4-1.– Architecture cost modeling process.

Architecture/If Scenario Identification

SCENARIO: ARCH 1C

Wrapped, Escalated, Discounted TAC

** TOTAL ARCHITECTURE COST SUMMARY **

TRANS	NON-RECURRING					RECURRING			TAC	TY/DISC		ARCH
SYSTEM	DDTE	PROD	P3I	FACIL	SUBTOT	PROD	OPS	SUBTOT	SUBTOT	TAC	UNRELI	TOTAL
STS	0	0	23,000	0	23,000	38,947	39,473	78,420	101,420	50,757	11,351	62,108
DELTA II	0	0	0	0	0	6,647	2,047	8,694	8,694	4,478	319	4,797
ATLAS IIAS	0	0	0	0	0	5,635	1,403	7,038	7,038	3,655	335	3,990
TITAN IV	0	0	0	596	596	29,407	11,533	40,940	41,536	21,477	2,262	23,740
TITAN II	0	0	0	0	0	867	465	1,332	1,332	690	58	747
ACRV	733	0	770	0	1,50[illegible]	214	168	382	1,884	2,248	0	2,248
TOTAL	733	0	23,770	596	25,098	81,717	55,089	136,806	161,905	83,305	14,325	97,630

PEAK YR FUNDING: 5,275

YEAR: 1998

Wrapped, Escalated, Discounted PYF

	NUM FLTS	RECUR TOTAL	RECUR CPF
STS	240	78,420	327
DELTA II	161	8,694	54
ATLAS IIAS	69	7,038	102
TITAN IV	203	40,940	202
TITAN II	31	1,332	43
ACRV	N/A	382	N/A

UNWRAPPED, CONSTANT 92$, UNDISCOUNTED VALUES PASSED TO THE AET

** FUNDING PROFILE **

ELEMENT	PHASE	1992	1993	1994	1995	1996	1997		2020	TOTAL
STS	DDT&E									0
	N/R PROD									0
	P3I	0	0	0	0	0	0		1,000	23,000
	FACIL	0	0	0	0	0	0		0	0
NON-RECUR	SUBTOTAL	0	0	0	0	0	0		1,000	23,000
	PROD	0	409	49[illegible]	620	582	906		615	38,947
	OPS	0	0	0	0	7	59		1,652	39,473
RECURRING	SUBTOTAL	0	409	491	620	[illegible]	965		2,267	78,420
	TOTAL	0	409	491	[illegible]	[illegible]	965		3,267	101,420
ACRV	DDT&E	51	81	205	183	117	59		0	733
TOTAL	DDT&E	51	81	205	183	117	59		0	733
	N/R PROD	0	0	0	0	0	0		0	0
	P3I	0	0	0	0	0	0		1,037	23,770
	FACIL	0	0	0	89	238	238		0	596
NON-RECUR	SUBTOTAL	51	81	205	273	356	297		1,037	25,098
	PROD	0	409	491	1,031	1,692	2,577		843	81,717
	OPS	0	0	0	15	42	159		2,205	55,089
RECURRING	SUBTOTAL	0	409	491	1,046	1,735	2,736		3,048	136,806
	TOTAL	51	490	696	1,318	2,090	3,033		4,084	161,905

Figure D.1.4-2.– Architecture cost data spreadsheet roadmap.

D.1.5 OTHER TOOLS/MODELS

During the course of the study, several other computer related tools/models were used.

- CNDB. A Macintosh version of the FY90 CNDB was developed just before the beginning of the study to provide a mechanism to develop the mission model. At the time, the CNDB existed only as a DOS application. The Macintosh version of the CNDB for the study is called the HTS DB and utilizes 4th Dimension.

- UMA Database. A database of UMA's developed by Rockwell was used to provide flight delay data for the Launch Schedule Confidence attribute.

- Ranger Model. The Ranger Model, developed by Boeing, was originally used for Architecture Cost Risk analysis. It was based on past experience in spacecraft development. It was replaced by a simpler, qualitative approach because of problems in data acquisition.

Other less complex spreadsheets were developed to support data acquisition and analysis. Several historical databases were also used.

APPENDIX E

The following is a complete copy of the Architecture Evaluation Tool (AET) User's Guide. This guide is included for reference for use of the AET. It was completed shortly after the conclusion of the study and covers version 1.3 of the AET.

Human Transportation System Study
Architecture Evaluation Tool
(AET)

User's Guide

Version 1.3
February 1993

CONTENTS

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Architecture Evaluation Tool User's Guide

Introduction

The purpose of this manual is to provide a basic user's guide to the Human Transportation System (HTS) Study Architecture Evaluation Tool (AET). It is not intended to be a comprehensive user's manual or to document every feature. Only the basic operation of the tool is discussed. Many functions are only briefly described, some not at all.

Much of the terminology in this guide, especially when it relates to attributes, is based on the study. Some familiarity with systems, architectures, and especially attributes used in the study is assumed. To find out more about attributes, attribute models, and attribute data, please see the study's final report.

A listing of the baseline If Scenarios and architectures is provided at the end of this document for reference purposes.

What the AET Can Do

The AET can calculate architecture level attribute values and scores from system level attribute data. These values and scores can be used to compare transportation system architectures.

The AET is capable of producing a variety of preformatted reports and graphs. It can also export data that can be opened in spreadsheets, word processors, or other applications.

Since much of the data required by the AET is generated using spreadsheets and other electronic tools, the AET has a data import capability. Data for new systems does not need to be manually inputted.

Within the AET, architectures are scored based on applying attribute values against utility curves and combining the scores of different attributes using attribute weightings. These can be "re-scored" with alternate utility curves and weightings for sensitivity analysis to show the effects and their implications on transportation alternatives.

The AET also provides a database for system and architecture data. Any data can be viewed relatively quickly. Analysis aids, such as graphs, are sometimes provided in the AET.

What the AET Cannot Do

The major limitation in the current version of the AET is that it does not contain either a cost or an operations model capable of producing data based on flight rate changes. If a system's flight rate is changed, its costs and operations data must also be changed accordingly. For the HTS study, cost and operations data were produced in a series of complex spreadsheet models. The data was then electronically imported into the AET.

The AET does not change automatically change safety or unreliability costs when the reliability (Probability of Mission Success) values are changed.

Whether or not future versions of the AET contain the links between flight rate and costs/operations data and the links between reliability, safety, and unreliability costs has not been determined. However, this capability would be a powerful addition to the tool when comparing different options to one another

The current version of the AET does not have a "free form" reporting capability to create custom reports. If this capability is required, the data should be exported and the reports created using another software program.

General Description

The AET is an implementation of a 4th Dimension (4D) database. The current version, 1.3, runs on 4D or 4D Runtime version 2.2.3. Use of slightly earlier versions of 4D, such as version 2.2 or 2.2.1, is acceptable. The compiled structure file requires approximately 1.4 MB of hard disk space. The data file requires a minimum of 6 to 8 MB. More disk space may be required if data is added. The AET requires a 68020-based or later Macintosh. Since the AET displays make use of some color, a color monitor is recommended but not required.

The AET is divided into the system level data section and the architecture level data section. Most of the data input is done in the systems section. Most of the output is shown in the architectures section.

Data calculation is performed using a series of data processors. Each section of the tool contains processors for each attribute and for other necessary functions.

Attributes

The AET contains processors for the 11 attributes developed by the HTS NASA-industry study team. These attributes are Alternate Access, Architecture Cost Risk, Availability, Dependability, Environment, Funding Profile, Human Safety, Launch Schedule Confidence, Mission Growth Potential, Probability of Mission Success, and Resiliency. In each case, an architecture attribute value is calculated based on algorithms using system and architecture data then applied against a utility curve to produce an attribute score.

Several of the attribute are composed of sub-attributes. In these cases, the architecture value is calculated by first calculating architecture sub-attribute values, applying each sub-attribute value against a utility curve to produce a sub-attribute score, and then combining the sub-attribute scores using sub-attribute weighting factors. As with other attributes, the architecture value is then applied against a utility curve to produce an attribute score.

The architecture score is determined by combining attribute scores using attribute weighting factors. The attribute weightings that were baselined are as follows:

Human Safety	29%
Funding Profile	27%
Probability of Mission Success	19%
Architecture Cost Risk	13%
Launch Schedule Confidence	8%
Environment	4%

These weightings, as well as sub-attribute weightings, were determined by the HTS NASA-industry study team using a consensus process.

During the course of the HTS study, five of the eleven attributes were deferred by consensus of the HTS NASA-industry team due to problems in definition and allocation of resources. However, support for these processors has continued throughout the AET development. These are fully functional and data can be entered in and calculated, although they have not been completely tested. Further, because the study team did not gather a complete set of data or achieve a complete understanding about the nature of the measurements, the models which the processors are based on may not be as mature as the other attributes.

The five attributes that were deferred are: Alternate Access, Availability, Dependability, Mission Growth Potential, and Resiliency. Some printed reports may not include data from these.

The current version of the AET has no provision to alter the baseline attribute or sub-attribute weightings. These are coded into the database structure. All baseline data scores are based on these. There are provisions for specifying different weightings for non-baseline (or sensitivity) analysis.

Utility Curves

Utility curves are used by the AET to convert a value into a non-dimensional value between 0 and 1. This is necessary to combine values of different units. The utility curves are shaped such that the better values get the higher scores (1 is best, 0 is worst).

For some attributes or sub-attributes, such as Probability of Mission Success, the higher the value the better. For others, such as Funding Profile, the lower the value better.

For most attributes and sub-attributes, it was decided by the study team to use a simple, linear curve. A 1 is assigned to the best value for all architectures being compared in an If Scenario and a 0 is assigned to the worst. Each attribute or sub-attribute has a different curve for each If Scenario. Care must be taken when comparing architecture scores across different If Scenarios because they are based on different curves.

The AET has provisions for changing any utility curve. It does not do this automatically. When an architecture attribute or sub-attribute value is calculated to be greater or less than the end points of the curve, a value of 1 or 0 is assigned. It is left up to the user to change the utility curves. If a curve is changed, the utility values for all architectures affected by the change must be re-calculated.

The method in which a baseline utility curve is defined and modified is discussed later.

Architecture/System Names

The names of each system or architecture entry have been chosen to try to convey some information about the entry. The only restriction on the name imposed by the database is that it be unique and can not be longer than 80 characters.

The system names include the common names or acronyms of the major elements in the system and sometimes end with a reference to a specific architecture or group of architectures that the system is associated with. For example, "ACRV - 12" and "ACRV - 19" are specific for Architectures 12 and 19. All other architectures that have an ACRV in them use the "ACRV" entry. "AMSC - 16 C" represents the AMSC in Architecture 16/If C.

If there is a human element in the system, the system name always lists it first.

The architecture names include the architecture number and If Scenario letter followed by a general theme for the architecture. For example, "02 C - Shuttle Evolution Option" represents Architecture 2/If C, which is focused on evolution of the Shuttle and ELV systems.

General Notes for AET Use

The AET does not, in general, use menus. Instead, user options are mostly presented as buttons on the screen. If, after clicking a button, more chooses can be made, a window is displayed with several more buttons and/or check boxes.

The AET makes use of several color "cues". Numbers that are input by the user are a medium blue color. These are also usually contained in a box or in some sort of table form. Numbers that are generated by the AET are green. Items on the screen that can be "clicked on", such as buttons or check boxes, are generally red, except for items in listings. Items that are fixed on the screen are generally dark blue or black.

The current version of AET does not have a "view only" mode. All modifiable data may be modified by anybody in the database. This may be incorporated into future versions.

Most data entry windows contain a "Cancel" button which will cancel any changes made to data. In the few cases where a "Cancel" button is not available, usually in intermediate windows in a series of windows that are required when executing a particular process, it may appear in the next window that is displayed. Changes to data (or anything else in a window) are usually accepted by using an "Enter" or "OK" button.

Because of the size of the database and the extensive calculations that are sometimes required, use of one of the faster Macintosh models is highly recommended. Other ways to increase performance include using a higher speed disk drive and turning off other applications or utilities that are running in the background. For machines with more than 8 MB of RAM, use of a RAM disk (an application that allows for simulating a hard disk in memory) greatly improves performance. Using the AET over a network is not recommended.

Many of the attributes require data on an annual basis, When this occurs, both the data to be inputted and any related data that is calculated on displayed are contained in tabular form where each row represents a specific year and each column is a type of data. Typically, the tool has the ability to graph this data. Some of the architecture annual data is automatically graphed in printed reports.

Starting the AET

In addition to 4D or 4D Runtime, two files are required in order to utilize the AET. One is the structure file, which contains the procedures and layouts for the database. This has been named "AET 1.3.comp" in the version 1.3 release. the other is the data file, which contains the actual data. This has been named "AET 1.3.comp.data". Either of these two may be renamed. A third file, a "flags" file, is created by 4D when using 4D in multi-user mode. This file is small and can be deleted when nobody is using the database, if desired.

To begin running the AET, double-click the structure file. The password window in Figure E-1 appears. Click on "User (no password)" and then the "OK" button. If either file has been renamed or moved into a different folder, a standard Macintosh window mat appear asking to identify where the data file is. If 4D is in multi-user mode, an informational window may appear. Click "OK". After a few seconds the main window (known as the splash screen) appears. There will be a few second delay until commands are accepted.

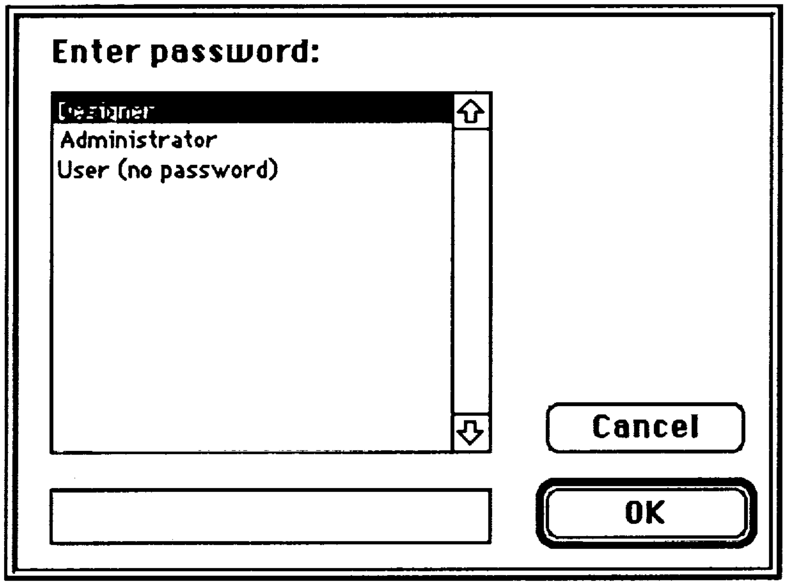


Figure E-1.– Password window.

Main Window

From the main window, the user may either enter the systems or architectures section of the database. These are selected under the "Data" menu in the menu bar at the top of the screen.

The "Data" menu is shown is Figure E-2. To enter the Systems or Architectures section, select the appropriate menu item. The user may also review/change the baseline utility curves and sub-attribute weighting values or import data from this menu.

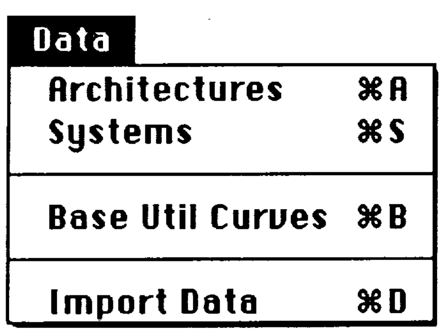


Figure E-2.– Data menu.

The user must return to the main window in order to switch to a different section of the database or to leave 4D. The choices are deactivated in other windows.

To leave the AET, select "Quit 4D" under the "File" menu. The "File" menu also contains a couple of informational selections.

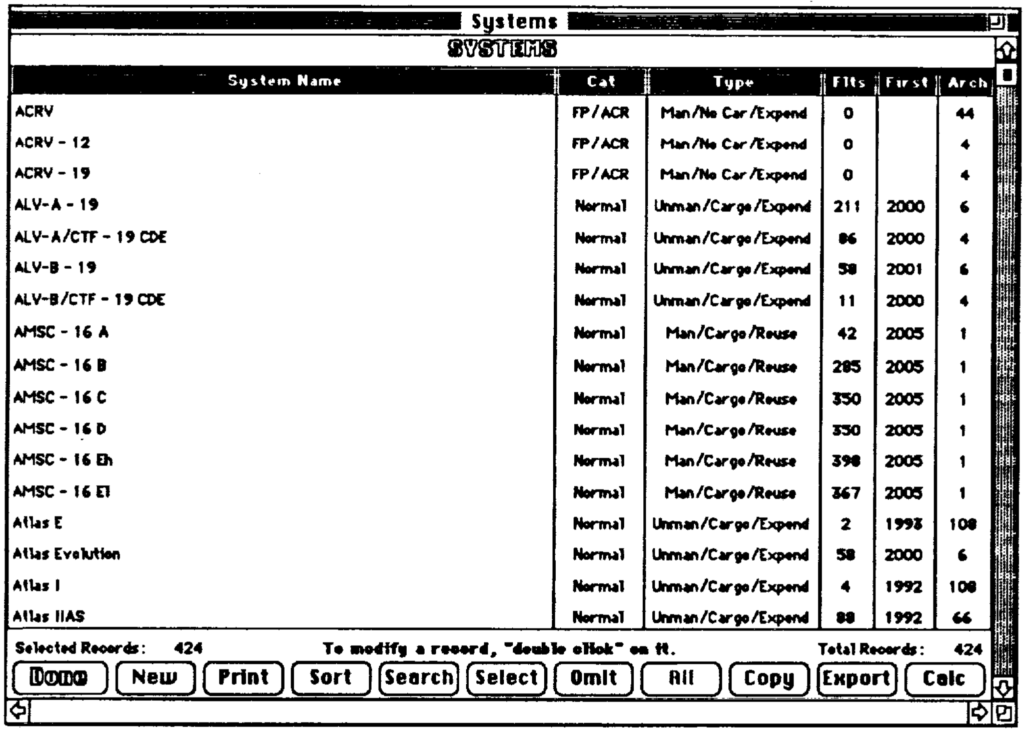
Listing Windows

When selecting "Architectures" or "Systems" from the "Data" menu, a listing window appears. This window initially lists all architecture or system entries currently in the database. Figure E-3 shows the system listing window and Figure E-4 shows the architecture listing window.

The listing window lists some of the data associated with each architecture or system entry (also called record). The series of buttons across the bottom of the window perform various operations on the records. Double-clicking on a record will show the data window for a particular architecture or system.

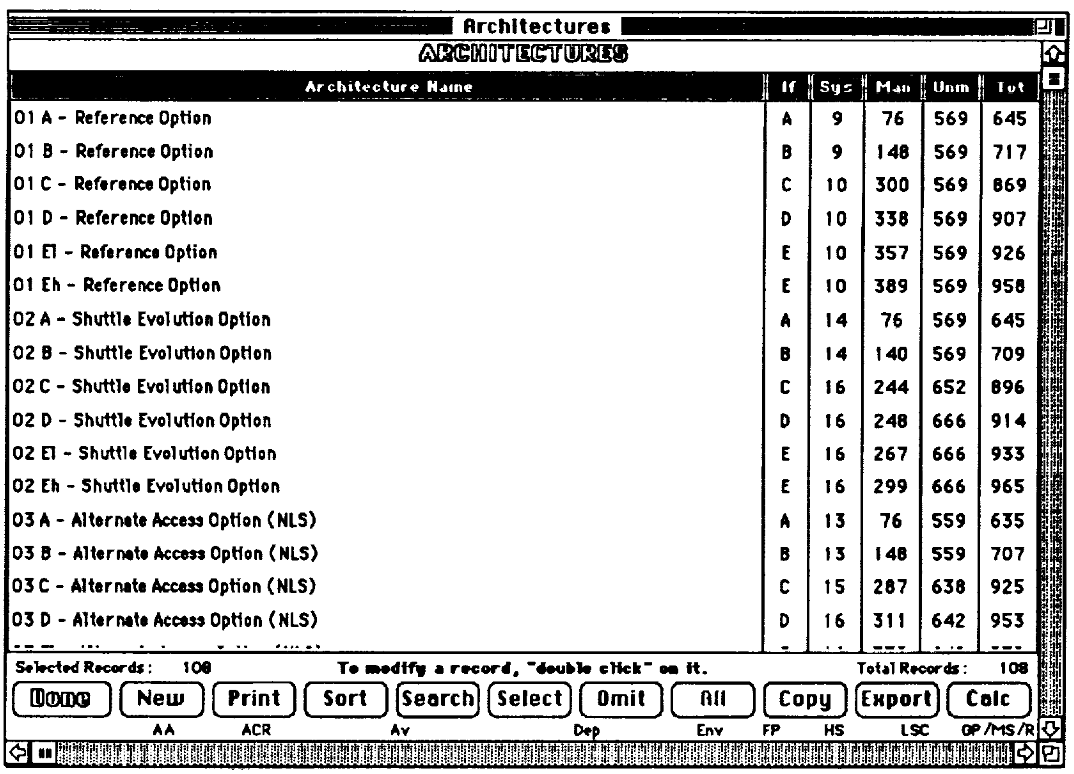
The listing window lists all the records in the current selection of records. Initially, this is all systems or architectures in the database. The number of records in the current selection is indicated in the lower left of the window. The total number of records is indicated in the lower right. Several of the buttons perform operations on every record in the current selection. Several buttons are used to determine what the current selection is. A button is dimmed when its functions cannot be used. The button functions are as follows:

- "Done" button: returns to the main window.



System Name	Cat	Type	Flts	First	Arch
ACRV	FP/ACR	Man/No Car/Expend	0		44
ACRV - 12	FP/ACR	Man/No Car/Expend	0		4
ACRV - 19	FP/ACR	Man/No Car/Expend	0		4
ALV-A - 19	Normal	Unman/Cargo/Expend	211	2000	6
ALV-A/CTF - 19 CDE	Normal	Unman/Cargo/Expend	86	2000	4
ALV-B - 19	Normal	Unman/Cargo/Expend	58	2001	6
ALV-B/CTF - 19 CDE	Normal	Unman/Cargo/Expend	11	2000	4
AMSC - 16 A	Normal	Man/Cargo/Reuse	42	2005	1
AMSC - 16 B	Normal	Man/Cargo/Reuse	285	2005	1
AMSC - 16 C	Normal	Man/Cargo/Reuse	350	2005	1
AMSC - 16 D	Normal	Man/Cargo/Reuse	350	2005	1
AMSC - 16 Eh	Normal	Man/Cargo/Reuse	398	2005	1
AMSC - 16 El	Normal	Man/Cargo/Reuse	367	2005	1
Atlas E	Normal	Unman/Cargo/Expend	2	1993	108
Atlas Evolution	Normal	Unman/Cargo/Expend	58	2000	6
Atlas I	Normal	Unman/Cargo/Expend	4	1992	108
Atlas IIAS	Normal	Unman/Cargo/Expend	88	1992	66

Figure E-3.– System listing window.



Architecture Name	If	Sys	Man	Unm	Tot
01 A - Reference Option	A	9	76	569	645
01 B - Reference Option	B	9	148	569	717
01 C - Reference Option	C	10	300	569	869
01 D - Reference Option	D	10	338	569	907
01 El - Reference Option	E	10	357	569	926
01 Eh - Reference Option	E	10	389	569	958
02 A - Shuttle Evolution Option	A	14	76	569	645
02 B - Shuttle Evolution Option	B	14	140	569	709
02 C - Shuttle Evolution Option	C	16	244	652	896
02 D - Shuttle Evolution Option	D	16	248	666	914
02 El - Shuttle Evolution Option	E	16	267	666	933
02 Eh - Shuttle Evolution Option	E	16	299	666	965
03 A - Alternate Access Option (NLS)	A	13	76	559	635
03 B - Alternate Access Option (NLS)	B	13	148	559	707
03 C - Alternate Access Option (NLS)	C	15	287	638	925
03 D - Alternate Access Option (NLS)	D	16	311	642	953

Figure E-4.– Architecture listing window.

- "New" button: creates a new record. A system or architecture data window is displayed.

- "Print" button: prints data concerning the current selection of records. In systems, this prints a listing of the records. In architectures, several options are presented including printing architecture attribute utility scores, various graphs relating to attribute scores, individual attribute reports (one page per record), and architecture attribute values.

- "Sort" button: sorts the records in the current selection of records according to various selectable data fields.

- "Search" button: searches for records that meet the user-definable search criteria and makes a new selection of records. This can either search all records in the database, search only within the current selection, or search outside the current selection and add the results. The new selection may need to be re-sorted.

- "Select" button: makes all records that are highlighted into the current selection of records. A single record may be highlighted by clicking once on it. A group of consecutive records may be highlighted by selecting the first record, then holding down the shift key while selecting the last record to be highlighted. Non-consecutive records can be highlighted by holding down the command key while clicking on a record. The new selection may need to be re-sorted.

- "Omit" button: removes highlighted records from the current selection of records. Records are highlighted as described above. The new selection may need to be re-sorted.

- "All" button: makes all records into the current selection.

- "Copy" button: makes a copy of a record. Several windows are displayed to lead the user though this process.

- "Export" button: exports data into an ASCII file on disk that can be read by spreadsheets, word processors, etc. Data concerning all records in the current selection is exported. The data fields are tab delimited (ASCII 9) and the record fields are carriage return delimited (ASCII 13). A standard Macintosh window is displayed to name the exported data file and locate it on disk. For systems, a choice is given of which attribute or combination of attribute data will be exported. The export format for each attribute is preset. For architectures, five options are given:

    (1) Architecture Information - definition data for each architecture including which systems it contains.

(2) Architecture Data - attribute value and scoring data. The user is given a choice of which data fields to export and the order. This is the most common export.

(3) Utility Curves and Weightings - the points defining each utility curve and the sub-attribute weighting ratios.

(4) Funding Profile Data - cost data in one of two formats. One summarizes the costs by system and the other summarizes by year. Both are shown by the six cost phases (DDT&E, Facilities, Non-recurring Production, Preplanned Product Improvement, Operations, and Recurring Production).

(5) Non-baseline Utility Data - non-baseline (sensitivity) utility scores.

- "Calc" button: performs the calculations on each record in the current selection that each attribute processor would perform if used separately. This is very useful in handling data that has been imported. The choice is given for which attribute to calculate. The Calculate All performs all calculations. (Note: Calculate All does not perform calculations for the five attributes not currently active: Alternate Access, Availability, Dependability, Mission Growth Potential, and Resiliency.) For systems, there is also a profiles choice which calculates flight profiles. This should be executed first before other attributes are calculated. For architectures, checking the "Calculate Utility Values Only" box will only execute the utility scoring portion of the calculations, greatly decreasing the amount of time required. This is useful when a baseline utility curve is modified. Also, the "Change Utility Curves/Weightings" button can be used to change the non-baseline (sensitivity) utility curves or weighting for all architectures in the current selection.

The architecture listings window contains all the attribute data values and scores. These values are seen by scrolling to the right. Aids to assist in viewing data for each attribute are located across the bottom of the window just above the horizontal scroll bar. These show the approximate position the scrolling "box" must be to center the attribute data in the window. For example, to see Funding Profile data, move the box directly under the "FP".

Individual Record Data Windows

When double-clicking on an entry line for a particular architecture or system record, the data window for that record is displayed. All information concerning that system or architecture is viewed or accessed from the data window and can be modified. It provides access to each attribute processor.

In either the systems or architectures data window, there are a series of four buttons in the lower right of the window. The "Enter" button saves all changes made since entering into the record into the database, leaves the data window, and returns to the listing window. The "Cancel" button returns to the listing window without saving any changes made since entering the record, including any calculations and modifications made relating to the attribute or other types of data. The "Delete" button permanently deletes the record and any relations it has to any other record. The "Print" button prints reports concerning the particular system or architecture.

The buttons in the box in the upper right are used for moving to different records within the current selection. The number of records in the current selection and the number of the particular record being viewed relative to the selection is displayed. Four buttons, "Next", "Prev", "First", and "Last", may be used to change to a different record in the selection. As with using the "Enter" button, all modification made to the database since entering the database are saved.

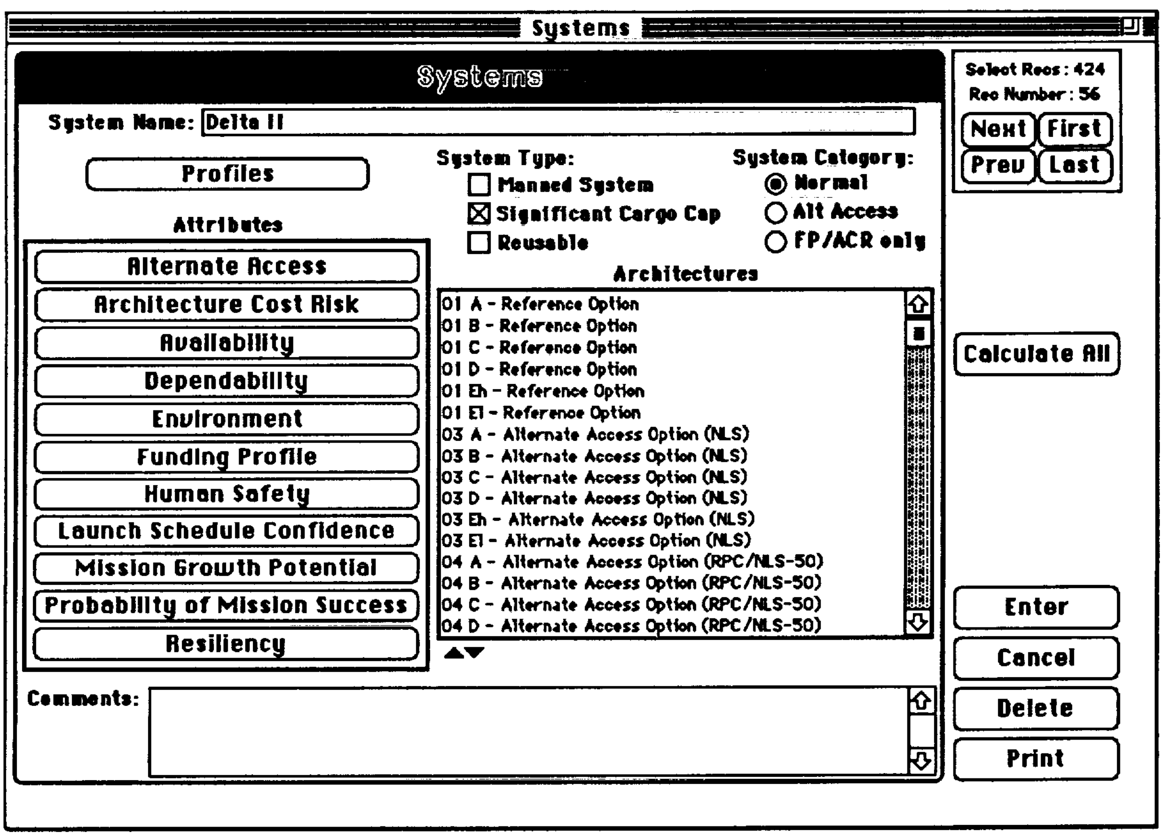


Figure E-5.– System data window.

System Data Window

The system data window allows viewing and modification of system level data. Figure E-5 shows an example of the window for an individual system record. The system's name, type, and category are displayed or modified in this window. An unlimited number of comments relating to the system can be entered at the bottom.

The systems type tells if the system has a crew, if it carries a significant amount of cargo, and if it is reusable. Any combination of these boxes can be checked.

The system category tells whether the system is used in an architecture just to provide alternate access (has no planned flights, is not used in any attribute calculations except Alternate Access, Architecture Cost Risk, and Funding Profile, example: a foreign system launching NASA payloads only when a NASA system is not operational), used only for Funding Profile and Architecture Cost Risk calculations (has no planned flight rate, example: ACRV), or is treated normally (used in all attribute calculations).

The "Architectures" box lists all the architectures containing this system. The two arrows at the bottom of the box are used to resort this list. (Note: the user links a system to an architecture in the architecture data window.)

The "Profiles" button is used to view/modify flight profile data. Figure E-6 shows the profiles window.

System: Delta II

Flight Profile

Total ETR Flights: 149 First Flight: 1992
Total VTR Flights: 43 Last Flight: 2020
Total Flights: 192 Total New Vehicles: 192
Max Number of Flights: 9

Auto Fleet Size Entry

	ETR Flights	VTR Flights	Flight Rate	• New Veh	Fleet Size
1992	8	0	8	8	0
1993	4	1	5	5	0
1994	2	3	5	5	0
1995	1	1	2	2	0
1996	3	2	5	5	0
1997	4	2	6	6	0
1998	5	1	6	6	0
1999	7	1	8	8	0
2000	5	1	6	6	0
2001	5	2	7	7	0
2002	5	1	6	6	0
2003	7	1	8	8	0
2004	5	1	6	6	0
2005	5	2	7	7	0
2006	5	2	7	7	0

	ETR Flights	VTR Flights	Flight Rate	• New Veh	Fleet Size
2007	7	1	8	8	0
2008	5	1	6	6	0
2009	5	3	8	8	0
2010	5	1	6	6	0
2011	7	2	9	9	0
2012	5	1	6	6	0
2013	5	2	7	7	0
2014	5	2	7	7	0
2015	7	1	8	8	0
2016	5	2	7	7	0
2017	5	2	7	7	0
2018	5	1	6	6	0
2019	7	2	9	9	0
2020	5	1	6	6	0

Print Graph Cancel OK

Figure E-6.– Profiles window.

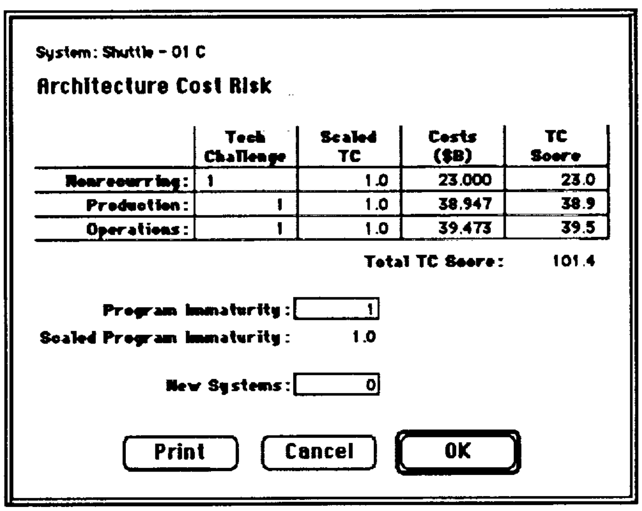
Flights are divided into low inclination (ETR) and high inclination (WTR) flights and shown for each year. Totals are generated automatically. Current vehicle and new vehicle profile data is also contained in this window (This data is not needed for any of the six current attributes.). This data may be printed or graphed.

Attribute data for the system is viewed/modified using one of the 11 buttons in the attributes box. Clicking on any of these in the system data window enters the attribute processor for that particular attribute and the system attribute screen is displayed. Some of these buttons may not be active based on the system type. Although there is an Alternate Access button, this data is architecture dependent and entered at the architecture level.

The following describes the systems processors for each of the six current attributes.

(1) System Architecture Cost Risk Processor

The system ACR processor window is shown in Figure E-7.



System: Shuttle - 01 C

Architecture Cost Risk

	Tech Challenge	Scaled TC	Costs ($B)	TC Score
Nonrecurring:	1	1.0	23.000	23.0
Production:	1	1.0	38.947	38.9
Operations:	1	1.0	39.473	39.5

Total TC Score: 101.4

Program Immaturity: 1

Scaled Program Immaturity: 1.0

New Systems: 0

Print Cancel OK

Figure E-7.– System architecture cost risk processor window.

The three Technical Challenge (TC) numbers are entered in the first column of the TC table. The other three columns are updated automatically. The TC is scaled by a formula developed by the NASA-industry team, 1.6681^(TC-1). The cost column is automatically calculated from the cost data. The cost raw data must be present in the database for this column, but the Funding Profile attribute processor does not need to have performed its calculations. The TC score column is the scaled TC column multiplied by the costs column. The total TC score is the sum of the TC score column. This is the TC sub-attribute value for the system.

The Program Immaturity (PI) value is entered into the PI box. As with the TC values, it is scaled by the formula 1.6681^(PI-1). The scaled PI is the PI sub-attribute value for the system.

The number of New Systems (NS) sub-attribute value is entered directly.

All the ACR input numbers for the HTS study were determined by a consensus process.
A printout of the window is produced using the "Print" button.

(2) System Environment Processor

The system Environment processor window is shown in Figure E-8.

System: Shuttle - 01 C

Environment

Number of Flights: 300

Exhaust Product	Impact Factor	Wt/Flt (klbs)	Tot Wt (klbs)	Score
CO	1.7	574.6	172380	293046
CO2	1.5	84.2	25260	37890
H2	0.1	102.8	30840	3084
H2O	0.1	1735.4	520620	52062
HCl	5.0	502.6	150780	753900
N2	0.3	208.8	62640	18792
OH	0.5	0.8	240	120
H	0.3	0.8	240	72
Al2O3	3.0	720	216000	648000

Vehicle Score: 6023
System Score: 1806966

	Flight Profile	Env Score
1992	8	48184
1993	10	60230
1994	10	60230
1995	9	54207
1996	11	66253
1997	12	72276
1998	10	60230
1999	10	60230
2000	12	72276
2001	10	60230
2002	10	60230
2003	11	66253
2004	11	66253
2005	11	66253
2006	10	60230

	Flight Profile	Env Score
2007	12	72276
2008	10	60230
2009	10	60230
2010	10	60230
2011	11	66253
2012	11	66253
2013	10	60230
2014	10	60230
2015	11	66253
2016	10	60230
2017	10	60230
2018	10	60230
2019	10	60230
2020	10	60230

Print Graph Cancel OK

Figure E-8.– System environment processor window.

The weight of the exhaust product for each flight of the system is entered in the second column of the left-hand table. The rest of the data in the window is calculated automatically. The impact factors have been pre-determined and can not be changed. The total weight column is the weight per flight column multiplied by the number of flights. The score column is the total weight column multiplied by the impact factor. The system attribute value is the sum of the score column. The score for a single flight is also shown ("Vehicle Score").

The two table on the left shown the annual environmental impact. This may be graphed by using the "Graph" button.

A printout of the window is produced using the "Print" button.

(3) System Funding Profile Processor

The system Funding Profile processor window is shown in Figure E-9.

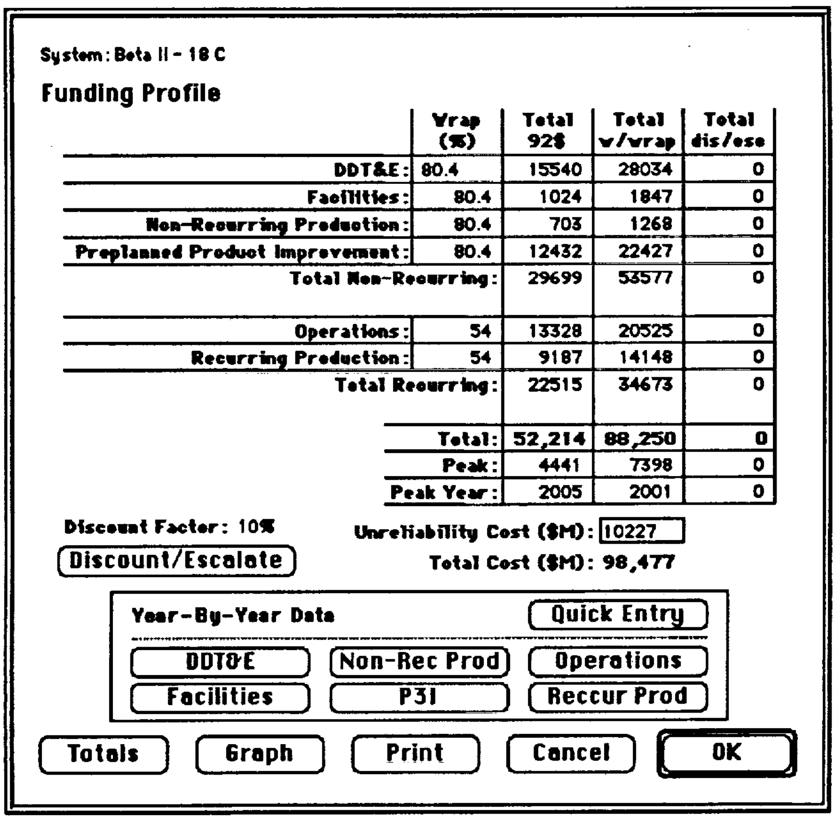


Figure E-9.– System funding profile processor window.

In this window, the wraps and the unreliability cost, which comes from the cost model, may be entered. The annual costs for each cost phase (DDT&E, Facilities, Non-Recurring Production, Preplanned Product Improvement, Operations, and Recurring Production) are entered using the buttons in the "Year-By-Year Data" box. Except for discounted/escalated values, the totals are calculated automatically. Subtotals for non-recurring and recurring costs are shown.

All costs are in millions of 1992 dollars.

Note: In the current version of the AET, the system cost processor is not connected with the flight profile data. Costs are entered from cost models outside the AET. If the flight rate data is changed, the costs should be remodeled and reentered. The operations model also needs to be revised to find facilities and new vehicle costs.

Annual costs may be entered in this processor in two ways. The quickest method is to use the "Quick Entry" button. The Quick Entry window is shown in Figure E-10. No calculation is done until the "OK" button is clicked. All cost data, including wraps and unreliability cost, can be entered here.

A second method of entering annual costs is to use one of the six cost phase buttons. Each deals with data concerning one cost phase. Costs are re-wrapped and re-totaled with each entry. Because of this, there is a second or two delay after each number is entered.

Quick Data Entry

	Wrap (%)
DDT&E:	80.4
Facilities:	80.4
Non-Recurring Production:	80.4

	Wrap (%)
Preplanned Product Improvement:	80.4
Operations:	54
Recurring Production:	54

92 Dollars (millions)

	DDT&E	Facs	NRec Prod	P3I	Ops	Rec Prod
1992	0	0	0	0	0	0
1993	0	0	0	0	0	0
1994	0	0	0	0	0	0
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	777	0	70	0	0	0
1998	2331	0	387	0	0	0
1999	1554	0	176	0	0	0
2000	3108	0	56	0	0	0
2001	3885	202	14	0	0	0
2002	2020	336	0	0	0	504
2003	1554	298	0	0	0	2093
2004	311	188	0	0	0	2228
2005	0	0	0	777	546	3118
2006	0	0	0	777	630	1077

	DDT&E	Facs	NRec Prod	P3I	Ops	Rec Prod
2007	0	0	0	777	728	167
2008	0	0	0	777	840	0
2009	0	0	0	777	840	0
2010	0	0	0	777	882	0
2011	0	0	0	777	896	0
2012	0	0	0	777	882	0
2013	0	0	0	777	882	0
2014	0	0	0	777	896	0
2015	0	0	0	777	882	0
2016	0	0	0	777	882	0
2017	0	0	0	777	868	0
2018	0	0	0	777	910	0
2019	0	0	0	777	882	0
2020	0	0	0	777	882	0

Unreliability Cost: 10227

Print Cancel OK

Figure E-10.– System funding profile processor quick entry window.

Wraps are entered in as percentages. For example, if a wrap is entered as 50, a cost of $100 will wrap to $150. A wrap is entered for each of the six cost phases.

In general, the four non-recurring wraps (DDT&E, Facilities, Non-Recurring Production, and Preplanned Product Improvement) are the same and the two recurring wraps (Operations, and Recurring Production) are the same.

The "Totals" button can be used to view annual totals for different combinations of cost phases. The "Graph" button can be used to generate various annual cost graphs. The "Print" button can be used to print either the window or a annual data report.

Discounting and escalation are executed when the "Discount/Escalate" button is clicked. The values appear in the last column of the table in the system Funding Profile processor window. This button must be executed before these values will appear in the graphing and totals windows. The discount rate is 10%. The escalation rates come from the standard NASA escalation rate tables. In the current version of the AET, these can not be changed.

(4) System Human Safety Processor

The system Human Safety processor has one input value - the probability of loss per flight. This value is multiplied by the number of flights to produce the number of loss events for the system. The system Human Safety processor window also shows the flights per loss event and the losses per 1000 flights. Average and maximum crew sizes can be entered to show crew losses, but these are not required for attribute value calculations.

(5) System Launch Schedule Confidence Processor

The system Launch Schedule Confidence (LSC) processor window is shown in Figure E-11.

System: Shuttle - 01 C

Launch Schedule Confidence

ETR Nominal Proc Time: 128 | ETR Schedule Comp (/flt): 0.335 | Total Flights: 300

ETR Compressed Proc Time: 85 | VTR Schedule Comp (/flt): 0 | Flight Delays (%): 24.5

VTR Nominal Proc Time: 0 | Schedule Comp (/flt): 0.335 | Delay Value: 73.6

VTR Compressed Proc Time: 0 | Schedule Comp Value: 100.7 | Margin Value: 586.2

	ETR Mar	VTR Mar	ETR Flts	VTR Flts	Comp	Mar	Delay
1992	362	0	8	0	2.6	22.6	1.9
1993	270	0	10	0	3.3	21	2.4
1994	270	0	10	0	3.3	21	2.4
1995	316	0	9	0	3	22.2	2.2
1996	224	0	11	0	3.6	19.2	2.7
1997	171	0	12	0	4	16	2.9
1998	270	0	10	0	3.3	21	2.4
1999	270	0	10	0	3.3	21	2.4
2000	171	0	12	0	4	16	2.9
2001	270	0	10	0	3.3	21	2.4
2002	270	0	10	0	3.3	21	2.4
2003	224	0	11	0	3.6	19.2	2.7
2004	224	0	11	0	3.6	19.2	2.7
2005	224	0	11	0	3.6	19.2	2.7
2006	270	0	10	0	3.3	21	2.4

	ETR Mar	VTR Mar	ETR Flts	VTR Flts	Comp	Mar	Delay
2007	171	0	12	0	4	16	2.9
2008	270	0	10	0	3.3	21	2.4
2009	270	0	10	0	3.3	21	2.4
2010	270	0	10	0	3.3	21	2.4
2011	224	0	11	0	3.6	19.2	2.7
2012	224	0	11	0	3.6	19.2	2.7
2013	270	0	10	0	3.3	21	2.4
2014	270	0	10	0	3.3	21	2.4
2015	224	0	11	0	3.6	19.2	2.7
2016	270	0	10	0	3.3	21	2.4
2017	270	0	10	0	3.3	21	2.4
2018	270	0	10	0	3.3	21	2.4
2019	270	0	10	0	3.3	21	2.4
2020	270	0	10	0	3.3	21	2.4

Resiliency | Print | Graph | Cancel | OK

Figure E-11.– System launch schedule confidence window.

For Schedule Compression (SC), nominal and compressed flow times are entered for low (ETR) and high (WTR) inclination launches. The units are days. ETR and WTR SC numbers are calculated by dividing the differences between the nominal and compressed flow times by the nominal flow times. The SC value per flight is the flight weighted average between the ETR and WTR SC values. The SC sub-attribute value for the system is the SC value per flight multiplied by the number of flights.

Schedule Margin (SM) data is entered on a annual basis for ETR and WTR in the first two columns of the table. The units are days. The SM value is calculated for each year by dividing the ETR and WTR margins by the ETR and WTR nominal flow times and multiplying by the number of ETR and WTR flights. The annual ETR and WTR numbers are added together and shown in the margin column. The SM sub-attribute value for the system is the sum of the margin column.

Delay data is entered into the flight delays box as a percentage. The Delay sub-attribute value for the system is the flight delays multiplied by the number of flights.

The table in the processor window also show annual compression and delay values.

The "Resiliency" button can use LSC data to automatically create Resiliency data. Great care must be taken when using this because the relationship between the two attributes is not always straight forward. The "Print" button will produce a printout of the window. The "Graph" button will graph the annual data.

Note: In the current version of the AET, the system LSC processor is not connected with the flight profile data. Data is entered from operations models outside the AET. If the flight rate data is changed, this data should be remodeled and reentered.

6) System Probability of Mission Success Processor

The system Probability of Mission Success (PMS) processor has one input value - the probability of mission success. This is the system attribute value. The system PMS processor window also shows the number of mission failures, the flights per mission failure, and the mission failures per 1000 flights.

The other five attribute processor are fully functional, but have not be completely tested. Also, the models on which these processors are based have not been as rigorously developed. These attributes were deferred during the HTS study.

The "Calculate All" button performs all calculations for the flight profiles and the attributes above.

Architecture Data Window

The architecture data window allows viewing and modification of architecture level data. Figure E-12 shows an example of the window for an individual architecture record.

The architecture's name and If Scenario are displayed/modified in this window. The If Scenario is chosen by clicking on the appropriate button. Comments relating to the system can be entered at the bottom.

The "Systems" box displays all systems linked to the architecture. The two arrows in the lower left of the box can be used to resort the list of systems. The number in the lower right shows the number of systems linked to the architecture. The category, type, number of flights, and a timeline are displayed for each system. A legend is shown below the box.

The system category in the system list is represented by a single letter: "N" for normal systems, "A" for alternate access systems only, and "C" for systems only used in Funding Profile and Architecture Cost Risk, such as the ACRV.

The system type in the system list is represented by three letters. The first letter is either "M" for manned systems or "U" for unmanned systems. The second is either "C" for system having cargo capability or "N" for systems having no cargo capability. The third is either "R" for reusable systems or "E" for expendable systems.

The timeline has one column for each year from 1992 to 2000. The columns for years that have at least one flight of the system have a "o". If there are no flights, the column has a "-".

A system is added to the architecture by using the "Add" button. The "Add" button displays a window with a list of all systems defined in the database. The system to be added is chosen from this list. It must be defined in the systems section before it can be added.

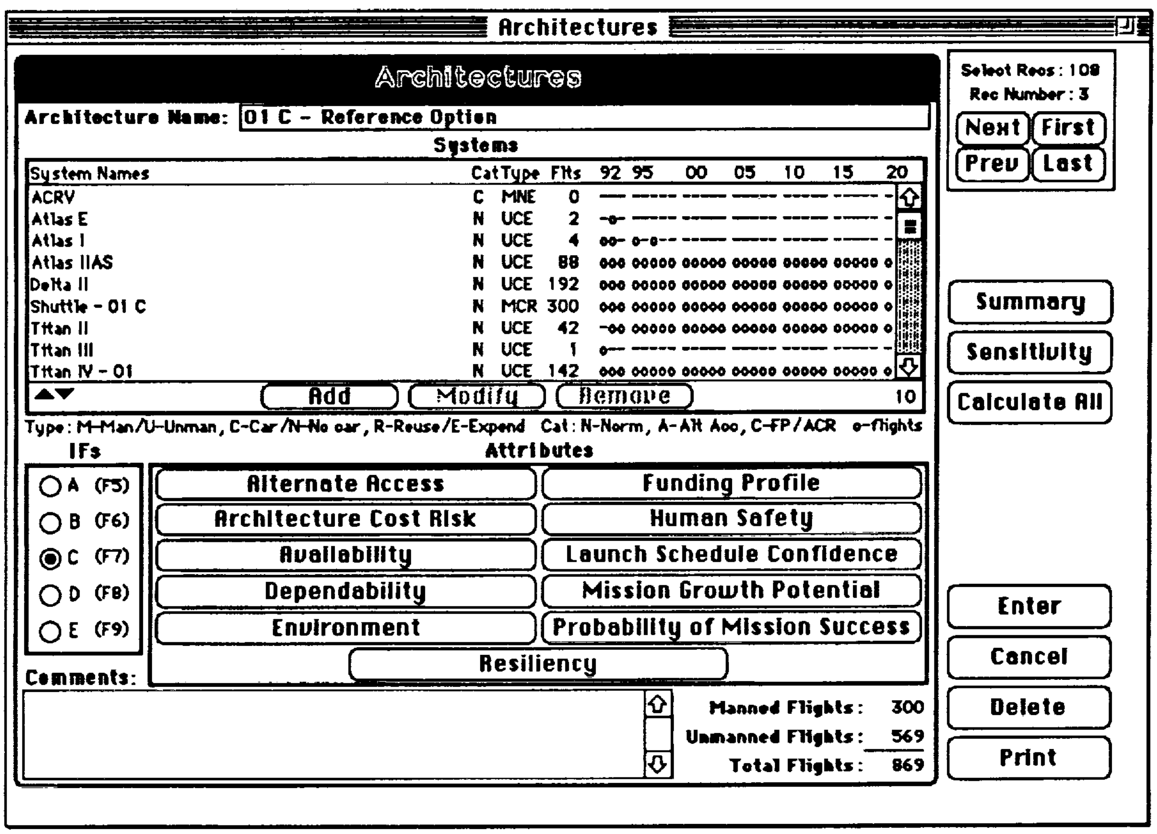


Figure E-12.– Architecture data window.

Data concerning a system can be viewed or changed by highlighting (clicking on) the system in the list and clicking the "Modify" button. The system data window for the system is displayed. It has full functionality and is used as described previously.

A system is removed from the architecture by highlighting it and clicking the "Remove" button.

The following describes the architecture processors for each of the six current attributes.

(1) Architecture Architecture Cost Risk Processor

The architecture ACR processor window is shown in Figure E-13.

The window contains a list of all systems in the architecture. The list contains relevant ACR data for each system. Various architecture ACR values and scores are also displayed.

The Technical Challenge (TC) sub-attribute value for each system is listed in the "TC Value" column. The architecture TC sub-attribute value (shown as "Total TC") is the sum of this column.

The Program Immaturity (PI) sub-attribute value for each system is listed in the "Scale PI" column. The number of flights of the system divided by the total number of flights in the architecture is shown in the "%" column. The "Scale PI" column is multiplied by the "%" column to produce the "PI Value" column.

Architecture: 01 C - Reference Option

Architecture Cost Risk

System Name	TC Value	Scale PI	Flts	%	PI Value	New Sys
ACRV	8.8	7.7	0	0	0	0.97
Atlas E	0	1	2	0.002	0.002	0
Atlas I	0	1	4	0.005	0.005	0
Atlas IIAS	7	1	88	0.101	0.101	0
Delta II	8.6	1	192	0.221	0.221	0
Shuttle - 01 C	101.4	1	300	0.345	0.345	0
Titan II	1.4	1	42	0.048	0.048	0
Titan III	0	1	1	0.001	0.001	0

Total Flights: 869
Total TC 168.7
TC Score: 1
Total PI Value: 1
PI Score: 1
Total New Systems: 0.97
New System Score: 1
Architecture Cost Risk: 1
Architecture Cost Risk Score: 1

Print | Utility | Cancel | OK

Figure E-13.– Architecture architecture cost risk processor window.

The architecture PI sub-attribute value (shown as Total PI Value") is the sum of the "PI Value" column.

The New Systems (NS) sub-attribute value for each system is listed in the "New Sys" column. The architecture NS sub-attribute value (shown as "Total New Systems") is the sum of this column.

Each of the three sub-attribute values is applied against utility curves to produce the architecture sub-attribute scores. These scores are combined using the sub-attribute weightings into the architecture ACR attribute value. The baseline sub-attribute weightings are: TC = 45%, PI = 30%, and NS = 25% (9:6:5 ratio). The architecture ACR attribute value is applied against a utility curve to produce the ACR attribute score.

The "Print" button at the bottom of the window can be used to produce the architecture ACR report. The "Utility" button can be used to see any one of the four utility curves.

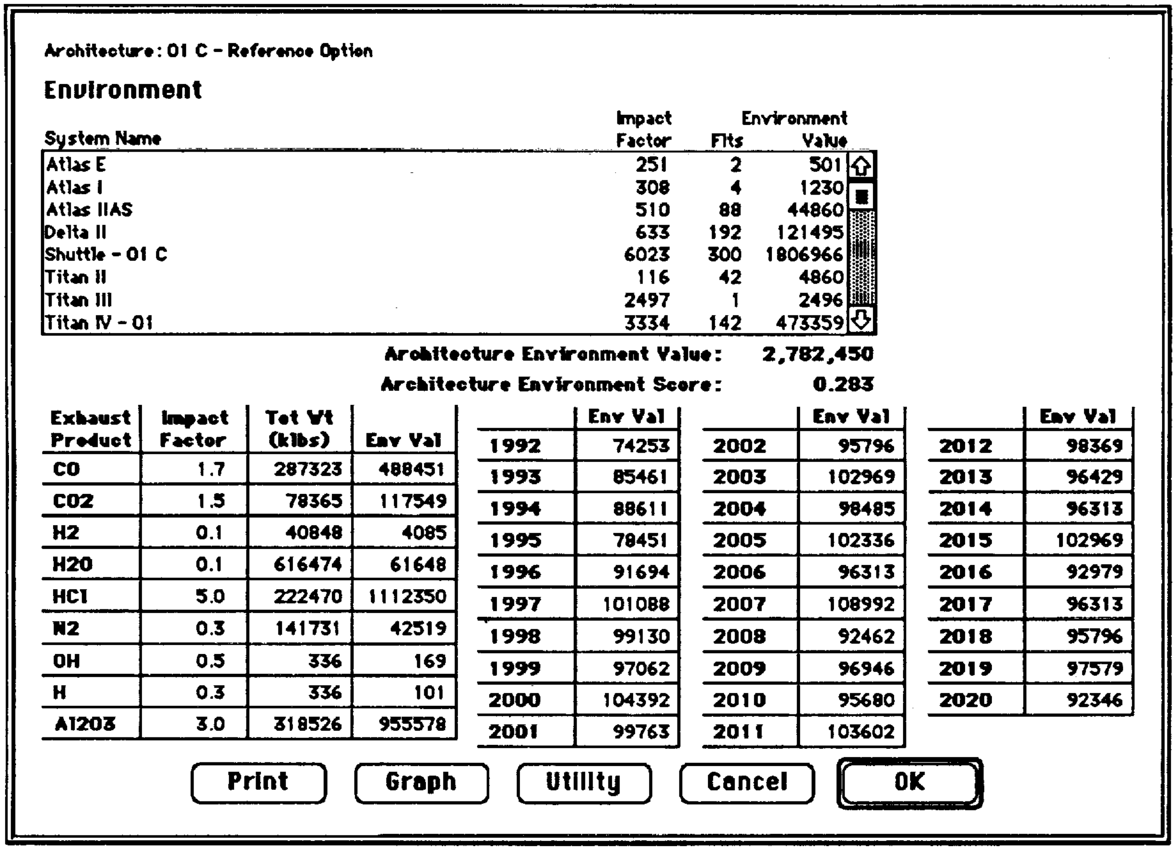
(2) Architecture Environment Processor

The architecture Environment processor window is shown in Figure E-14.

The window contains a list of all systems in the architecture. The list contains relevant Environment data for each system. The architecture Environment value and score are displayed. Annual Environment data is also shown.

The system list shows the impact factors of each flight, the number of flights, and the system Environment values. (Note: the impact factors and number of flights are shown for informational proposes only. The system Environment values are calculated in the system Environment processor.) The architecture Environment attribute value is the sum of the "Environment Value" column. This value is applied against a utility curve to produce the architecture Environment attribute score.

The "Print" button at the bottom of the window can be used to produce the architecture Environment report. The "Graph" button can be used to produce a graph of the annual data. The "Utility" button can be used to see the utility curve.



Architecture: 01 C - Reference Option

Environment

System Name	Impact Factor	Flts	Environment Value
Atlas E	251	2	501
Atlas I	308	4	1230
Atlas IIAS	510	88	44860
Delta II	633	192	121495
Shuttle - 01 C	6023	300	1806966
Titan II	116	42	4860
Titan III	2497	1	2496
Titan IV - 01	3334	142	473359

Architecture Environment Value: 2,782,450

Architecture Environment Score: 0.283

Exhaust Product	Impact Factor	Tot Wt (klbs)	Env Val
CO	1.7	287323	488451
CO2	1.5	78365	117549
H2	0.1	40848	4085
H2O	0.1	616474	61648
HCl	5.0	222470	1112350
N2	0.3	141731	42519
OH	0.5	336	169
H	0.3	336	101
Al2O3	3.0	318526	955578

	Env Val		Env Val		Env Val
1992	74253	2002	95796	2012	98369
1993	85461	2003	102969	2013	96429
1994	88611	2004	98485	2014	96313
1995	78451	2005	102336	2015	102969
1996	91694	2006	96313	2016	92979
1997	101088	2007	108992	2017	96313
1998	99130	2008	92462	2018	95796
1999	97062	2009	96946	2019	97579
2000	104392	2010	95680	2020	92346
2001	99763	2011	103602		

Figure E-14.– Architecture environment processor window.

(3) Architecture Funding Profile Processor

The architecture FP processor window is shown in Figure E-15.

The window contains a list of all systems in the architecture. The list contains costs for each cost phase (DDT&E, Facilities, Non-Recurring Production, Preplanned Product Improvement, Operations, and Recurring Production), unreliability costs, and totals for each system. The window also shows the various cost totals and peak cost data.

All costs shown, unless otherwise specified, contain wraps, are in millions of constant 1992 dollars.

Architecture: 01 C - Reference Option

Funding Profile

System Name	DDTE	Fac	NR Prod	P3I	Ops	R Prod	Unrel	Total
ACRV	1321	0	0	1402	248	317	0	3287
Atlas E	0	0	0	0	0	0	0	0
Atlas I	0	0	0	0	0	0	0	0
Atlas IIAS	0	0	0	0	1403	5635	335	7373
Delta II	0	0	0	0	2047	6649	319	9015
Shuttle - 01 C	0	0	0	23000	39473	38947	6981	108401
Titan II	0	0	0	0	470	865	58	1393
Titan III	0	0	0	0	0	0	0	0

Total DDT&E ($M):	1,321	Total Unreliability ($M):	9,722
Total Facilities ($M):	595	Total Cost ($M):	173,035
Total NR Production ($M):	0	Total Cost Score:	0.684
Total P3I ($M):	24,402	Peak Year Cost ($M):	7,303
Total Non-Recurring ($M):	26,317	Peak Year:	2003
		Peak Year Score:	1
Total Operations ($M):	55,173	Funding Profile:	0.842
Total R Production ($M):	81,823	Funding Profile Score:	0.931
Total Recurring ($M):	136,996		
Total NR+R ($M):	163,313		

Discount/Escalate

Totals | Print | Graph | Utility | Cancel | OK

Figure E-15.– Architecture funding profile processor window.

The Total Cost sub-attribute value is the total of all costs, including unreliability, for all systems in the architecture. The Peak Year Cost sub-attribute value is the highest value of the total annual costs. (Note: Peak year cost does not include unreliability costs. No attempt is made to spread unreliability costs over time.) The year in which the peak occurs is also displayed.

Both the Total Cost and the Peak Year Cost sub-attribute values are applied against utility curves to produce the architecture sub-attribute scores. These scores are combined using the sub-attribute weightings into the architecture FP attribute value. The baseline sub-attribute weightings are: Total Cost = 50% and Peak Year Cost = 50% (1:1 ratio). The architecture FP attribute value is applied against a utility curve to produce the FP attribute score.

As in the system Funding Profile processor, the "Totals" button at the bottom of the window can be used to view annual totals for different combinations of cost phases. The "Print" button can be used to print any one of three types of reports. The "Graph" button can be used to generate either various annual cost graphs or a pie graph of the cost phase costs. The "Utility" button can be used to see any one of the three utility curves.

Discounting and escalation are executed when the "Discount/Escalate" button is clicked. This must be executed before these values will appear in the graphing and totals windows. The discount rate is 10%. The escalation rates come from the standard NASA escalation rate tables. These can not be changed.

(4) Architecture Human Safety Processor

The architecture HS processor window is shown in Figure E-16.

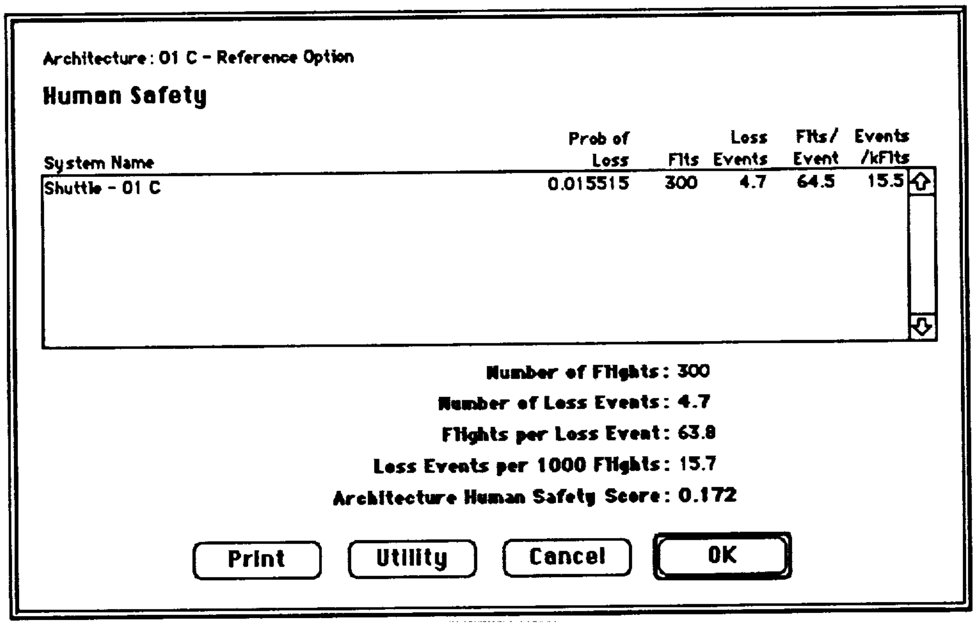


Figure E-16.– Architecture human safety processor window.

The window contains a list of all human systems. The list contains safety-related information about each system. The number of loss events is the sum of the "Loss Events" column. This is the architecture Human Safety attribute value. This value is applied against a utility curve to produce the architecture Human Safety attribute score.

The flights per loss event and the loss events per 1000 flights are also displayed.

The "Print" button at the bottom of the window can be used to produce the architecture Human Safety report. The "Utility" button can be used to see the utility curve.

(5) Architecture Launch Schedule Confidence Processor

The architecture LSC processor window is shown in Figure E-17.

The window contains a list of all systems in the architecture. The list contains relevant LSC data for each system. Architecture LSC values and scores are also displayed.

The Schedule Compression (SC) sub-attribute value for each system is listed in the "Comp Value" column. The sum of this column is shown as "Total Compression Values". This is divided by the totals flights to produce the architecture SC sub-attribute value (shown as "Schedule Compression").

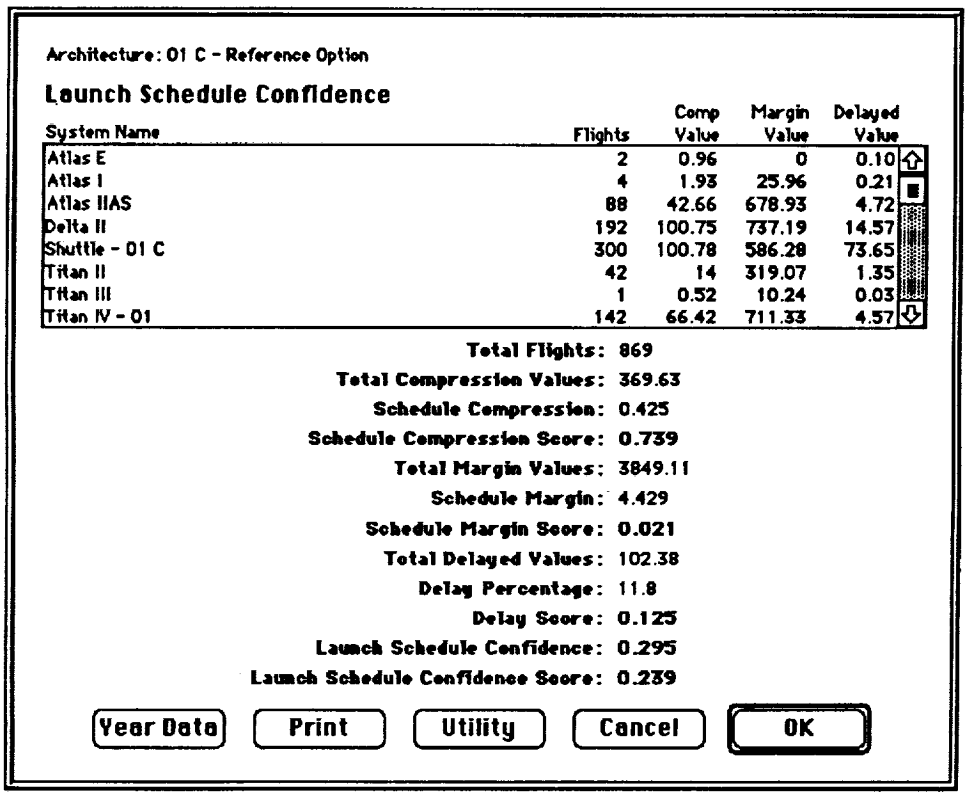


Figure E-17.– Architecture launch schedule confidence processor window.

The Schedule Margin (SM) sub-attribute value for each system is listed in the "Margin Value" column. The sum of this column is shown as "Total Margin Values". This is divided by the totals flights to produce the architecture SM sub-attribute value (shown as "Schedule Margin").

The delayed flight percentage sub-attribute value for each system is listed in the "Delayed Value" column. The sum of this column is shown as "Total

Delayed Values". This is divided by the totals flights to produce the architecture delay sub-attribute value (shown as "Delay Percentage").

Each of the three sub-attribute values is applied against utility curves to produce the architecture sub-attribute scores. These scores are combined using the sub-attribute weightings into the architecture LSC attribute value. The baseline sub-attribute weightings are: SC = 33.3%, SM = 33.3%, and Delay = 33% (1:1:1 ratio). The architecture LSC value is applied against a utility curve to produce the LSC attribute score.

The "Year Data" button at the bottom of the window can be used to view year values for all the sub-attributes. The "Print" button can be used to produce the architecture LSC report. The "Utility" button can be used to see any one of the four utility curves.

(6) Architecture Probability of Mission Success Processor

The architecture PMS processor window is shown in Figure E-18.

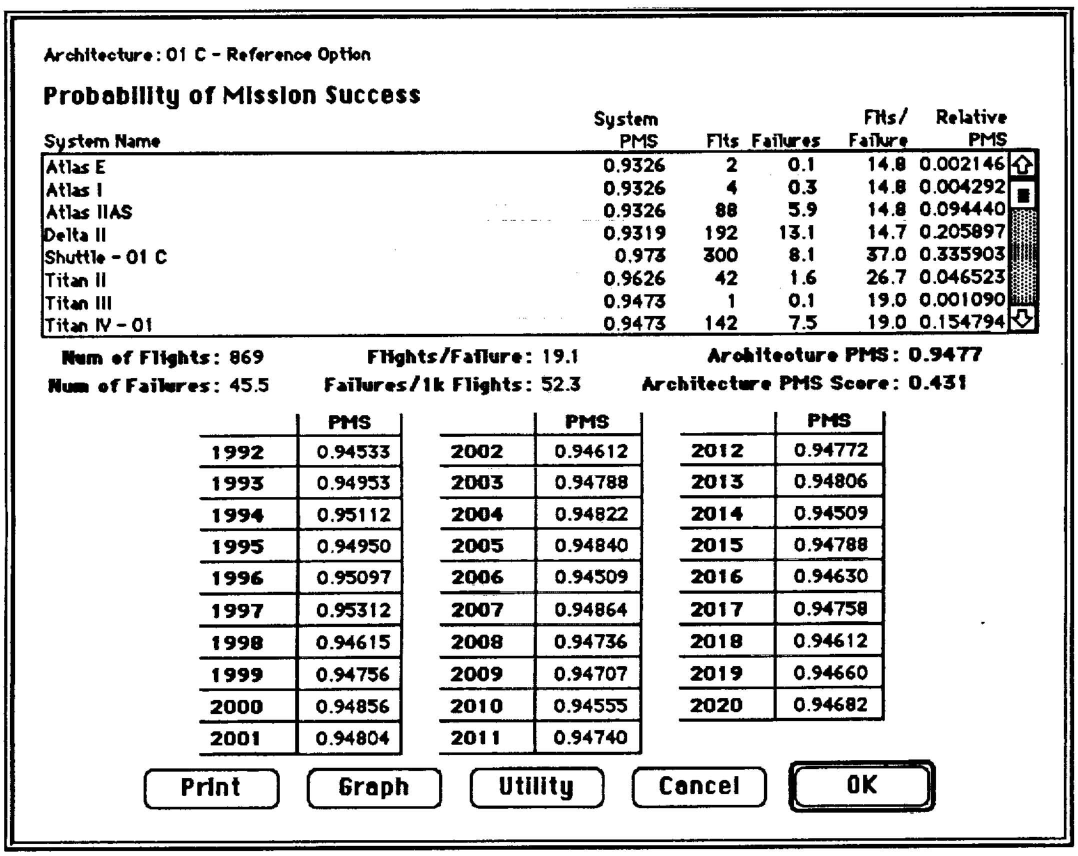


Figure E-18.– Architecture probability of mission success processor window.

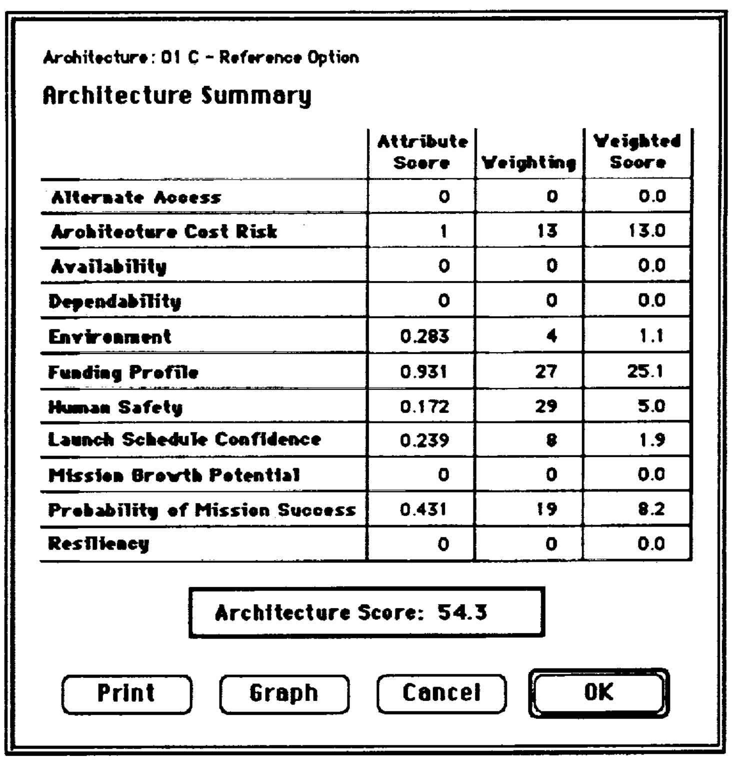
The window contains a list of all systems in the architecture. The list contains information about each system. The "Relative PMS" column represents the system PMS multiplied by the number of flights of that system and divided by the total number of flights in the architecture. The sum of this column is the architecture PMS attribute value. This value is applied against a utility curve to produce the architecture PMS attribute score.

The number of failures, the flights per failure, the failures per 1000 flights, and the annual PMS values are also displayed.

The "Print" button at the bottom of the window can be used to produce the architecture PMS report. The "Graph" button can be used to produce a graph of the annual PMS. The "Utility" button can be used to see the utility curve.

The other five attribute processor are fully functional, but have not be completely tested. Also, the models on which these processors are based have not been as rigorously developed. These attributes were deferred during the HTS study.

The "Summary" button is used to determine the overall architecture score. Figure E-19 shows the summary processor window.



Architecture: 01 C - Reference Option

Architecture Summary

	Attribute Score	Weighting	Weighted Score
Alternate Access	0	0	0.0
Architecture Cost Risk	1	13	13.0
Availability	0	0	0.0
Dependability	0	0	0.0
Environment	0.283	4	1.1
Funding Profile	0.931	27	25.1
Human Safety	0.172	29	5.0
Launch Schedule Confidence	0.239	8	1.9
Mission Growth Potential	0	0	0.0
Probability of Mission Success	0.431	19	8.2
Resiliency	0	0	0.0

Architecture Score: 54.3

Print Graph Cancel OK

Figure E-19.– Architecture summary processor window.

Each attribute score and baseline weighting is shown in the window. The weighted score is the attribute score multiplied by the weighting. The architecture score is the sum of the weighted scores. It will range between 0 and 100.

The architecture summary processor "Print" button can be used to print one of two summary reports. The "Graph" button can be used to generate a pie chart showing the attribute scores.

The "Calculate All" button performs all calculations for the attribute processors listed above and the summary processor.

The "Sensitivity" button is used to apply non-baselined utility curves, attribute weightings, and sub-attribute weightings. Figure E-20 shows the architecture sensitivity processor window.

Only one set of non-baselined data is allowed for each architecture.

The architecture sensitivity processor window table lists the attribute score, weighting, and the weighted score of each attribute. Each attribute weighting can be changed. The "Weighted Score" column will only be updated if the sum of the "Weightings" column equals 100. Otherwise zeros appear for the weighted scores and the architecture score. Any set of the 11 attribute weightings can be saved using the "Save" button. The "Recall" button will recall any one of previously saved sets of weightings. The "Baseline" button will recall the baseline set of weightings.

Different symbols are used to denote non-baselined numbers. A "•" beside a number in the "Attribute Score" column indicates that a non-baselined utility curve is used in determining the score. A "*" beside a number in the "Attribute Score" column indicates that non-baseline sub-attribute weightings are used in determining the score

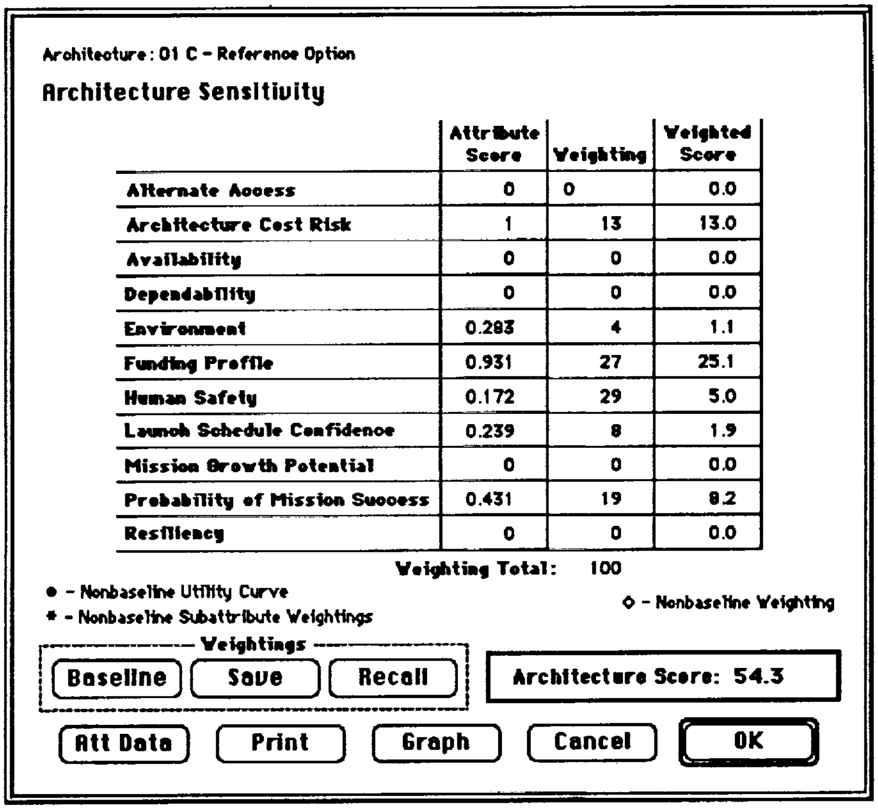


Figure E-20.– Architecture sensitivity processor window.

(for attributes with sub-attributes). A "◊" beside a number in the "Weighting" column indicates that a non-baselined attribute weighting is used. These symbols appear immediately to the right of the appropriate number.

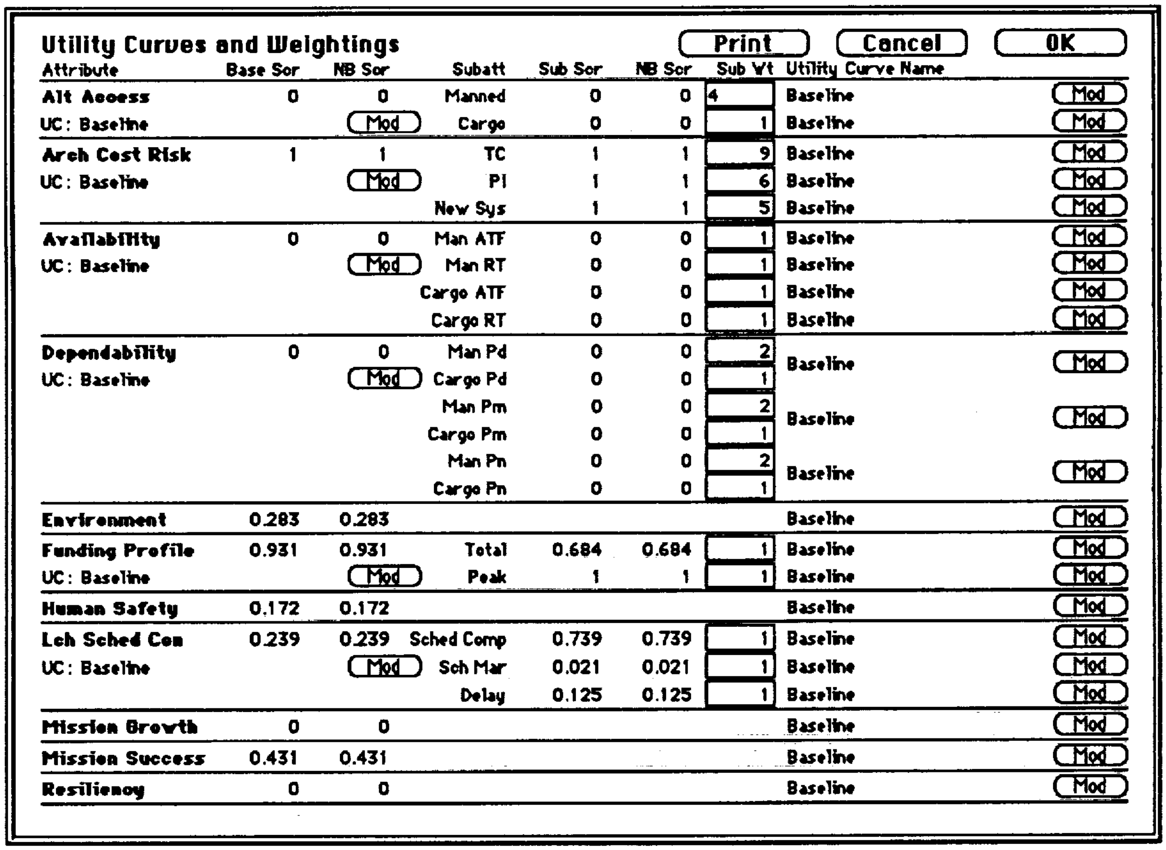
The "Print" and "Graph" buttons work the same as in the summary processor.

The "Att Data" button is used to view and change non-baselined utility curves and sub-attribute weightings. Figure E-21 shows the architecture sensitivity processor utility curve and weightings window.

The name of each utility curve is shown. "Baseline" is the name given when the baseline curve for an attribute or sub-attribute is being used. The various "Mod" buttons beside the utility curve names are used to create, name, change, delete and/or select utility curves. The curves can be defined as a series of points. A linear relation is assumed between two points. An unlimited number can be defined.

Sub-attribute weightings can be entered into the appropriate boxes. These weightings are in terms of integer ratios.

Both the baseline and non-baselined sub-attribute and attribute scores are shown throughout the screen. Non-baseline scores are updated every time a utility curve or sub-attribute weighting is changed.



Utility Curves and Weightings Print Cancel OK

Attribute	Base Scr	NB Scr	Subatt	Sub Scr	NB Scr	Sub Wt	Utility Curve Name	
Alt Access	0	0	Manned	0	0	4	Baseline	Mod
UC: Baseline		Mod	Cargo	0	0	1	Baseline	Mod
Arch Cost Risk	1	1	TC	1	1	9	Baseline	Mod
UC: Baseline		Mod	PI	1	1	6	Baseline	Mod
			New Sys	1	1	5	Baseline	Mod
Availability	0	0	Man ATF	0	0	1	Baseline	Mod
UC: Baseline		Mod	Man RT	0	0	1	Baseline	Mod
			Cargo ATF	0	0	1	Baseline	Mod
			Cargo RT	0	0	1	Baseline	Mod
Dependability	0	0	Man Pd	0	0	2	Baseline	Mod
UC: Baseline		Mod	Cargo Pd	0	0	1		
			Man Pm	0	0	2	Baseline	Mod
			Cargo Pm	0	0	1		
			Man Pn	0	0	2	Baseline	Mod
			Cargo Pn	0	0	1		
Environment	0.283	0.283					Baseline	Mod
Funding Profile	0.931	0.931	Total	0.684	0.684	1	Baseline	Mod
UC: Baseline		Mod	Peak	1	1	1	Baseline	Mod
Human Safety	0.172	0.172					Baseline	Mod
Lch Sched Con	0.239	0.239	Sched Comp	0.739	0.739	1	Baseline	Mod
UC: Baseline		Mod	Sch Mar	0.021	0.021	1	Baseline	Mod
			Delay	0.125	0.125	1	Baseline	Mod
Mission Growth	0	0					Baseline	Mod
Mission Success	0.431	0.431					Baseline	Mod
Resiliency	0	0					Baseline	Mod

Figure E-21.– Architecture sensitivity processor utility curve and weightings wndow.

Modifying Baseline Utility Curves and Sub-Attribute Weightings

Choosing "Base Util Curves" from the main menu will allow the user to modify all baselined attribute and sub-attribute utility curves. The baseline utility curve window is shown in Figure E-22. This window is used to choose the curve to view or change by clicking the "Modify" button next to the attribute or sub-attribute name.

The "Export" button can be used to export, or save, a special file containing all the curves to disk. The "Import" button can be used to read one of these exported files. These buttons can be used to transfer a set of curves from one database file to another or to save a set of curves to be used later. The file that is exported is in a special format unique to the AET and 4D and can not be read by other applications.

If a new database file is created, it is recommended that a set of curves (even "dummy" curves) be imported into it. Otherwise, errors may appear in certain circumstances. These curves can be modified as necessary.

When any of the "Modify" buttons are used, another window is displayed giving a choice of If Scenarios. (Note: The AET does not distinguish between IF E-high and If E-low. These use the same curve.) This window also contains an "Auto" button. Using the "Auto" button will automatically define the curves for each If Scenario. Each curve will be linear will the best architecture value getting a 1 and the worst getting a 0.

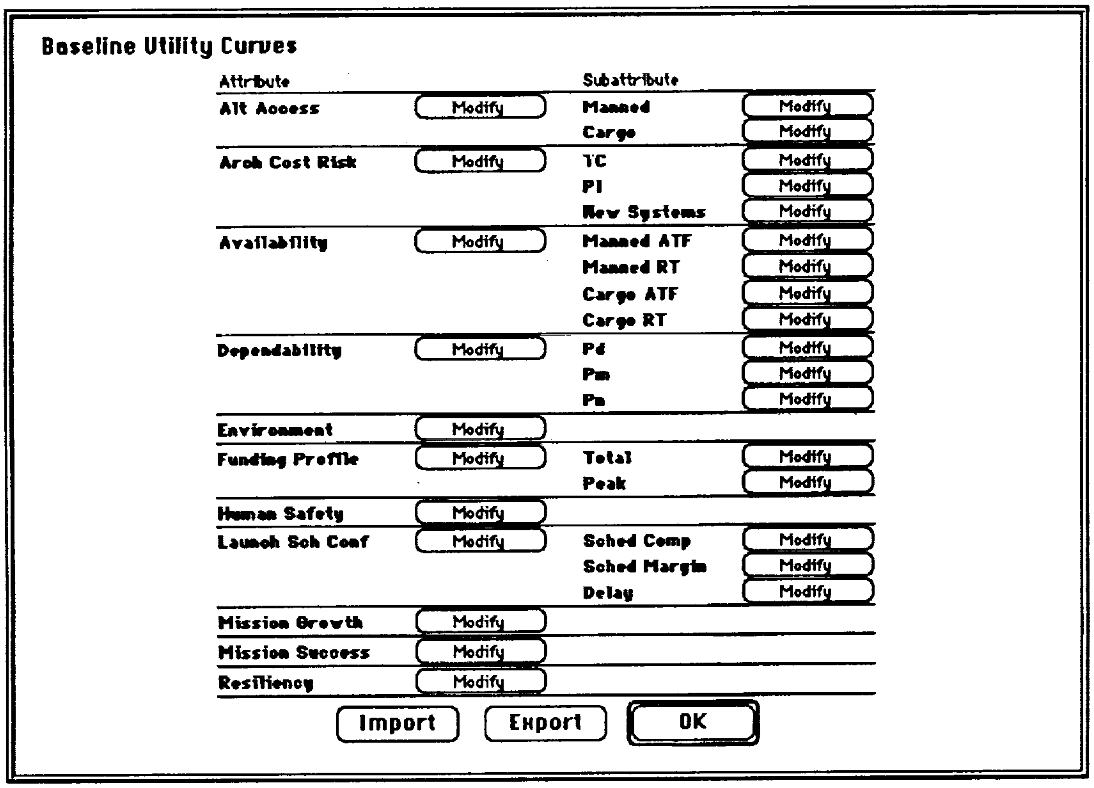


Figure E-22.– Baseline utility curve window.

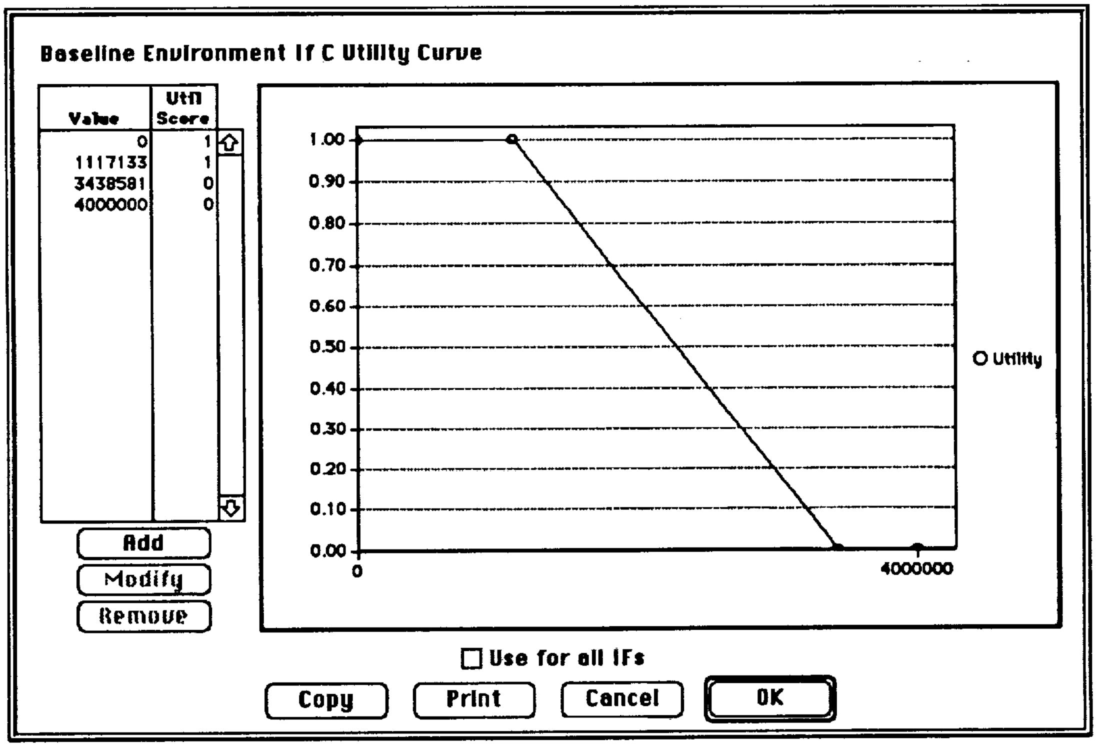


Figure E-23.– Modify utility curve window.

Figure E-23 shows the Modify Utility Curve window, which is displayed after the If Scenario is selected.

In the AET, utility curves are defined as a series of points. A linear relation is assumed between two points. An unlimited number of points can be defined. Values that fall before the first point or after the last point receive the same score as the first or last points, respectively. The points are shown in the table on the left side of the screen.

The "Add" button is used to add a new point. A point is changed by highlighting it in the table and then clicking the "Modify" button. Either one of these buttons will display the data point window. The coordinates for the point can be entered in the data point window. It also has two buttons to find the minimum or maximum values of all architectures in the If Scenario.

A point is deleted by highlighting it in the table and then clicking the "Remove" button. Any changes to the table are automatically updated in the graph.

Clicking the "Use for all IFs" check box will copy the curve to the other four If Scenarios (for comparing architectures across If Scenarios). The "Copy" button will copy the graph to the clipboard. The "Print" button will printout the graph.

Clicking the "OK" button will save any changes made to the curve. The architectures scores are not automatically recalculated. This can be done using the "Calc" button from the architecture listing window, clicking the "Calculate Utility Values Only" check box, and choosing the appropriate attribute.

Importing Data

Choosing "Import Data" from the main menu will allow the user to import data. The import data window is shown in Figure E-24. This window is used to choose the type of data to import.

The file to import data from must be a text (ASCII) file. Most programs are capable of producing this type of file using a "Save As..." command under the "File" menu. Some type of option to save as text is usually given. Some database-type programs may have the option to export data into a text file.

The two "Current Data" options at the bottom of the window tell the processor what to do with the current data in the database. The "Add to current data" will add all imported data to the current data. The current data will be unaffected. The "Replace all current data" will delete data for all architectures or systems relating to the type of data to import and replace it. For example, using this when importing architecture names will delete all architecture names in the database. Only the names being imported will appear in the database. Because data is deleted, this option is should be used with care.

One method of using this feature is to export all data for a particular category, change or add new data, and re-import it, replacing the old data. This is sometimes the easiest method of changing large amounts of data.

When the "Import" button is clicked, a window is displayed for specifying exactly which data will be imported and its order. An example window is shown for Architecture Cost Risk in Figure E-25.

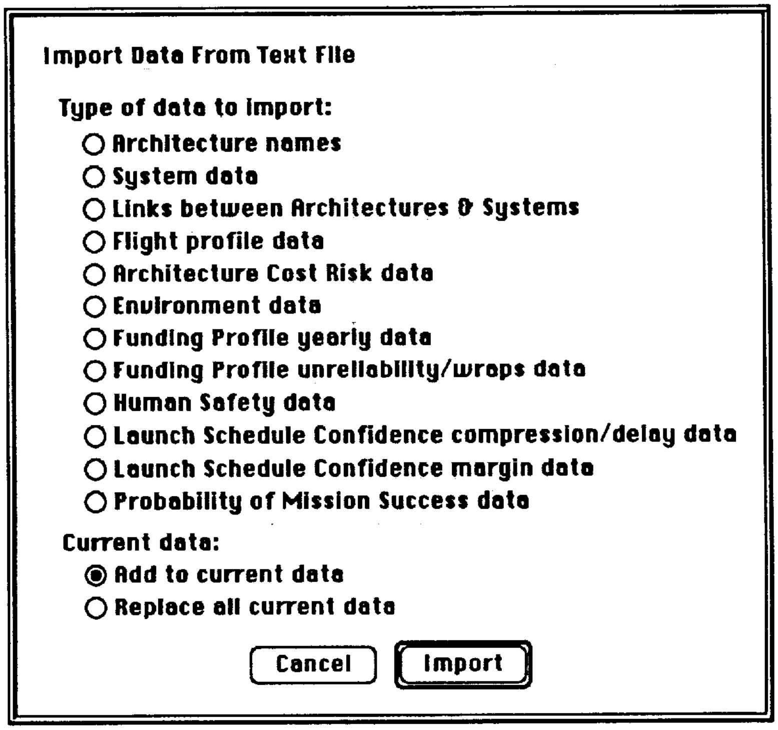


Figure E-24.– Import data window.

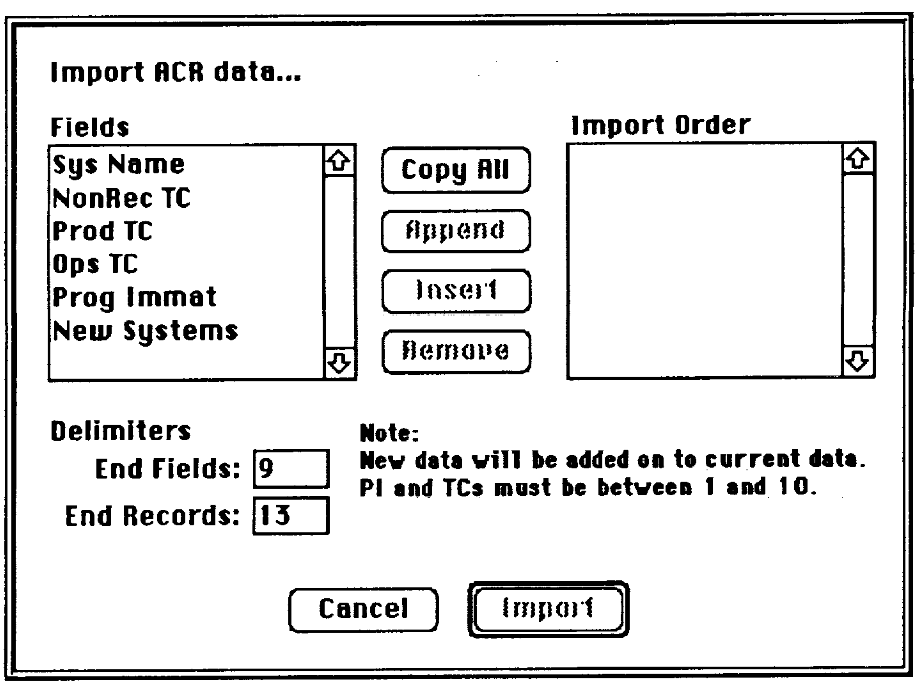


Figure E-25.– Import data fields window.

The left-hand box ("Fields") contains a list of data fields relating to the type of data to be imported. The right-hand box ("Import Order") is the list of fields that is actually being imported and their import order. The order must match the order of the data in the file to be imported. The four buttons between the "Fields" and the "Import Order" boxes are used to build the "Import Order" list. Three of these buttons are only active when fields in the "Fields" and/or "Import Order" lists are highlighted. Fields are highlighted by clicking on them.

The "Copy All" button clears the "Import Order" list and moves all fields from the "Fields" list to the "Import Order" list in the order that they appear in the "Fields" list. The "Append" button moves the field highlighted in the "Fields" list to the bottom of the "Import Order" list. The "Insert" button inserts the field highlighted in the "Fields" list immediately before the field highlighted in the "Import Order" list. The "Remove" button removes the field highlighted in the "Import Order" list.

The system or architecture name must always be included in the imported data. Otherwise, the database has no way of determining which system or architecture that the data goes with.

The two "Delimiters" boxes are the ASCII numbers for the characters that separate the fields and records. Typically, especially with spreadsheets that are saved as text, a tab character (ASCII 9) is placed between fields (spreadsheet columns) and a carriage return (ASCII 13) is placed between records (at the end of spreadsheet rows). Therefore. these are the window's defaults.

The window has a "Note" area to give certain requirements or comments concerning the data.

When the "Import" button is clicked, another standard Macintosh window appears asking for the disk location of the file to be imported.

Overall Evaluation Process

The following steps are used to evaluate an architecture:

(1) The systems are defined and all data entered in. The data can be entered manually or by importing.

(2) The system flight profile processor is run.

(3) The system attribute processors are run.

Note: Steps 2 and 3 can be done using the "Calc" button in the system listing window.

(4) The architectures are defined and system linked to them. This can be done manually or by importing data.

(5) The architecture attribute processors are run for attributes with sub-attributes.

(6) The sub-attribute utility curves are defined.

(7) All architecture attribute processors are run.

(8) The attribute utility curves are defined.

(9) All architecture attribute processors are run in "utility curve only" mode.

(10) The summary processor in run.

Note: Steps 5, 7, 9, and 10 can be done using the "Calc" button in the architecture listing window.

(11) Any reports or graphs that are required are printed out or any data exported.

Future Plans

At this time, there are no definite plans to add capabilities to the AET. However, there are several potential changes that have been identified for implementation if they become necessary. Any input from users on potential changes will be taken into account.

The largest potential change is the addition of cost and/or operations models. This would give the ability to analyze changes in flight rate or other cost or operations related data. Making this change would take solid several months of development time. It is unknown whether the size or speed of the resulting database would create problems.

Other potential capabilities or enhancements that could be added include addition of new attribute models, especially a new ground operations attribute developed during the study extension period, revision of the current attributes, and addition of a on-line help system. Also, now that a lot more understanding about the data and analysis requirements exists, the database can be restructured and the amount redundant data can be reduced.

Other simpler changes, such as minor changes to the user interface, can be made. This includes addition of a "view only" mode where the user can not change any data while in the database.

List of If Scenarios

The If Scenarios baselined by the HTS NASA-industry study team are composed of several mission types as follows:

TABLE. A-1.– MISSION TYPE

If	Mission Type
A	Support Assets (operational infrastructure payloads such as TDRS) Base (core science and technology, small payloads) ISF (Industrial Space Facility) DOD (DOD missions, capability model only)
B	All If A Missions Sortie Science (large return mass requirement such as Spacelab) Satellite Servicing
C	All If B Missions SSF PMC
D	All If C Missions SSF Expansion
E	All If D Missions SEI (manned missions only)

List of Architectures

The following 18 architectures were baselined by the HTS NASA-industry study team:

TABLE A-2.– ARCHITECTURES

Arch	Emphasis	Systems
1	Reference	Shuttle, Delta, Atlas, Titan, ACRV
2	Evolution of Current Systems	Shuttle, Delta, Atlas, Titan, ACRV, Shuttle Evolution, RCV, ELV Evolution
3	Alternate Access - Cargo Only	Shuttle, Delta, Atlas, Titan, ACRV, NLS, CTV
4	Alternate Access - Crew & Cargo	Shuttle, Delta, Atlas, Titan, ACRV, PLS, NLS, CRV, CTV
5	Separation of People & Cargo/Right Human Booster	Shuttle, Delta, Atlas, Titan, CLV, MLS, CRV
6	Separation of People & Cargo/Right Human Booster	Shuttle, Delta, Atlas, Titan, PLS, MLS, CRV
7	Separation of People & Cargo	Shuttle, Delta, Atlas, Titan, PLS, MLS, CRV, LRV
8	Advanced Technology	Shuttle, Delta, Atlas, Titan, ACRV, SSTO, CTF
9	Advanced Technology	Shuttle, Delta, Atlas, Titan, ACRV, AMLS, CTF
10	Advanced Technology	Shuttle, Delta, Atlas, Titan, ACRV, NDV, CTF
11	ACRV Commonalty	Shuttle, Delta, Atlas, Titan, PLS, NLS, CTV
12	ACRV Commonalty	Shuttle, Delta, Atlas, Titan, ACRV, PLS, NLS, CTV
13	ACRV Commonalty/Right Human Booster	Shuttle, Delta, Atlas, Titan, ACRV, PLS, NLS, CTV
14	Right Human Booster	Shuttle, Delta, Atlas, Titan, ACRV, PLS, MR Titan IV, CTF
15	Alternate Access - Foreign Systems	Shuttle, Delta, Atlas, Titan, ACRV, Hermes, Ariane, CTV, LRV
16	New Concept	Shuttle, Delta, Atlas, Titan, ACRV, AMSC, CTF, LRV
17	New Concept	Shuttle, Delta, Atlas, Titan, ACRV, RUPC, MR Titan II, CTF, LRV
18	New Concept	Shuttle, Delta, Atlas, Titan, ACRV, Beta II, CTF

APPENDIX F

IMPACT OF NEW BUSINESS APPROACHES

F.1.1 BACKGROUND

The final principal task of the Human Transportation System Study was to try to understand the impact of "New Ways of Doing Business" on the way NASA builds and flies missions. To better understand this impact, a survey was conducted among senior managers within the U. S. Government and participating companies (see Appendix G). The goal of the survey was to identify items that could improve industry's way of doing business with the U. S. Government. Over one hundred suggestions were received. The categorized responses of the survey are depicted in Figure F.1.1. The summary of the responses are presented, by category, in the following sections. Most responses identify what is wrong with the current way of doing business, rather than suggesting improvements to the system. However, where suggested improvements or solutions to specific problems were identified, they were included in the summation. Although the NASA Industry Team did not necessarily agree with all of the responses received, all of the responses are reflected in the text below.

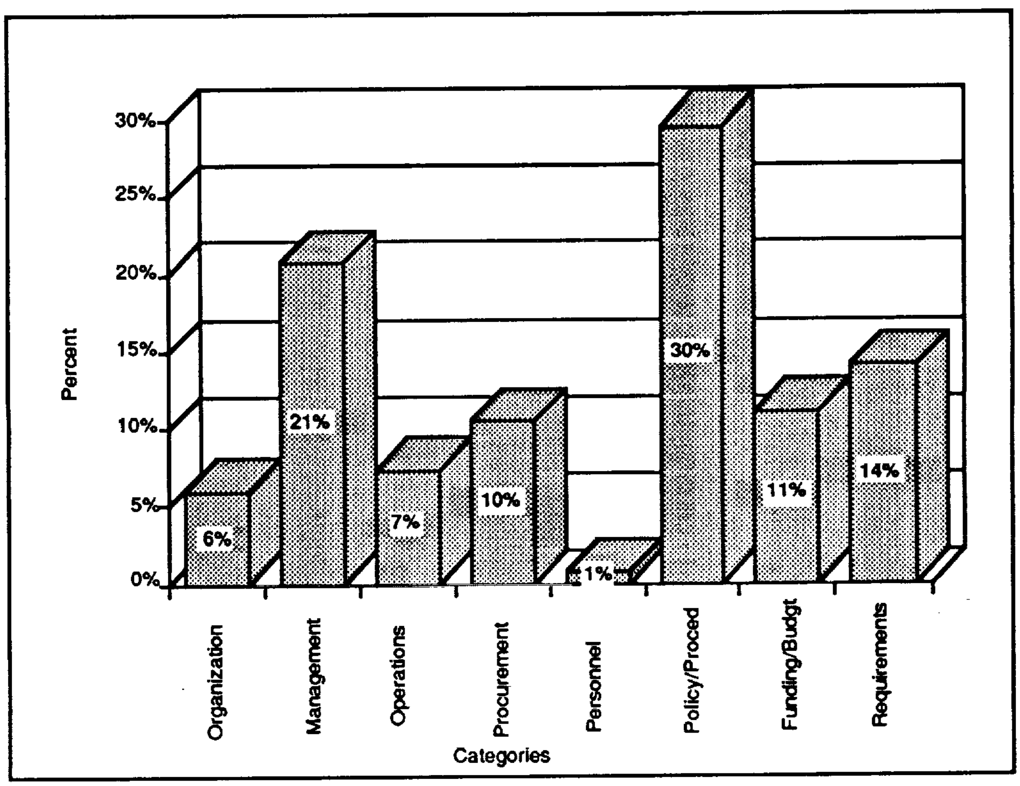


Figure F.1.1.– Percent of categorized survey responses on better ways of doing business with the government.

F.2.1 SURVEY RESULTS

F.2.1.1 Budget

Program funding constraints can cause several things to happen. For example, test hardware may be forced to be deleted and designs may be changed, resulting in much higher operational costs. Emphasis on low cost is perceived to be at the expense of on-time schedules and technology advancement. Cost and budget estimates have a significant influence on program stability and outcome. The lack of multiyear funding inhibits planning for orderly and efficient development of operational capability. Annualized funding is so variable that contractors *expect* to *cost share* in order to get around the uncertainties of the U. S. Government. Programs become longer and longer due to such constraints, which makes them more costly overall. The detailed involvement of Congress in the budgeting process (e.g., redesigning Space Station Freedom (SSF)), and the resultant contractor response to reduced budget levels cause early program inefficiencies. Political constraints affect the budget of NASA acquisitions and cause many restructuring problems.

Timely funding of fiscal year options is hindered because of tendencies within the appropriation and authorization processes to transfer NASA-budgeted funds to other agencies. This often results in work stoppages, delays of scheduled launches, and increased overall costs.

There is enormous pressure at the onset of a program to assume high levels of cost risk without adequate reserves to cover contingencies or growth. One recommendation is to delay the start of a program until cost estimates and budget availability match. Program budgeting should recognize program dynamics from the outset and reflect "looking back" costs. Reserves should be budgeted after the originally predicted peak cost point.

F.2.1.2 Management

New management practices must be introduced. To reduce costs and meet tighter end-item delivery schedules, oversight and review of projects must be sharply reduced, and authority must be delegated to those closest to the problems to allow them to effect the solutions. There is a need to streamline and reduce the number of customer reviews and meetings. Top management time is consumed by lack of delegation and excessively broad program reviews which do not concentrate on key issues. Meetings for information only that do not address any specific problems should be minimized. When meetings *are* held, the decision makers should maintain open lines of communication, and maximize productive time. To save costs, telecommunications should be used to reduce travel and facilitate participation by those closest to the technical problems.

Management needs to assign clear responsibility, goals, and commensurate authority to each job assignment so that the responsible person(s) can see that the job gets done. Clear goals will focus the efforts to adhere to schedule and avoid lost time. U. S. Government management needs to specify the deliverables of the program, rather than how to achieve those deliverables. Mission objectives should be defined and the technical solutions should evolve as technical problems arise. This allows people the creative flexibility in their approach to problems which leads to the most cost-effective solutions.

The lines of communication should be open between government and the contractor. Contractors should be treated as team members in open discussions. If continuity can be maintained within the program team (NASA and contractor), the following will happen: the team will be well-informed; time will be saved on training new team members; increased cooperation and enthusiasm for the program will be generated; and team members will have recognition for their individual efforts. A sense of trust among government, industry, and team members must be established to allow the members to push ahead decisively and to reduce barriers. Each member must be able to rely on support from the others. The high degree of interaction between NASA and its contractors, while technically productive, also tends to place upward pressure on the cost outcomes.

NASA management should select contractors for the role of design development. Then, the contractor should have more up-front responsibility, using clearly defined requirements and goals set by management, to perform its assigned role. Program direction should emphasize project accomplishment, rather than reporting, documentation, justification, etc. Continuing procurements to the point where the Request for Proposal is expected any day, and then aborting them, is a practice to be avoided. This will reduce the waste of contractor resources, which ultimately are paid for by the U. S. Government. A level of risk should be established that will enable the Government to project what funding will be available to award any intended procurement.

F.2.1.3 Operations

There are outdated design and integration processes used today that concurrent design, systems engineering, and integrated product development teams should improve. Establishment of concurrent engineering teams to evaluate candidate designs and system architectures should reduce the complexity of interfaces during the design phase. These teams need to be established early in the program. A "skunk works" activity may be one way to effectively formulate the concepts and system definitions on which the overall program development effort relies: production (logical manufacturing processes), operations (reduced manpower and documentation), specialty engineering (safety, quality, reliability, maintainability, etc.), and design.

Having a "Design-for-Operations" philosophy in the front end of a program can reduce overall acquisition and support costs. This is substantiated by quantitative modeling techniques and by experience. The F-117A has shown a reduction of over 25 percent in operations costs based on this concept. The F-117A program has also used common hardware and saved over $60 M in DDT&E costs for avionics systems.

The Japanese approach to reliable product development is to engineer, in the product definition phase, both the design and the manufacturing process to provide a stable production approach and a product that is highly reliable. This *concurrent engineering* process produces a basic product design that will accommodate the normal statistical variance that can be expected from the manufacturing process. If the design and manufacturing process are properly developed together, a quality product can be built and statistical process control utilized, rather than relying on inspection only.

If design, fabrication, and operational processes for space hardware are put together using the following suggestion (e.g., launch vehicle), the results could be a system with lower costs and greater reliability than any existing element of space hardware. The development team must establish an approach for the concurrent engineering of the element that will assure, to the maximum extent possible, a producible and reliable design. Before the hardware design of the element is initiated, an extensive analysis should be conducted of the functional operation of the total system to determine the design limits that must be placed upon all the critical subsystems and components to assure acceptable system functionality.

This effort first requires a functional flow analysis of all the subsystems that make up the total system. This analysis should flow the operational requirements down to the major component or Line Replaceable Unit (LRU) level. Next, a consistent computerized systems simulation model should be developed and utilized that will apply Taguchi's techniques while establishing acceptable operational limits on the subsystems down to the same LRU level.

When these limits are known and an assessment of the operational environment has been made, concurrent engineering design studies for the LRU's can begin. These studies must include considerations for all elements of the launch system's life cycle. The product and process designs must result in LRU's that can be built and operated reliably within the specification limits, with inspection only to assure there is no human error in assembly. The Mean Time Between Failure of the LRU's must be high, so that operational testing is not required to assure the system's reliability.

A suggestion to minimize long-term operating costs considered the impact and influence of logistics requirements on system design early in the design phase of a program. The "blind spot" associated with inadequate front end analysis of logistics requirements resulted in an incomplete concurrent engineering process. As a result, the major systems managers for the Department of Defense demanded logistics assessments as a part of the concurrent engineering process, knowing the impact on long-term operating costs. One obstacle encountered in implementing this suggestion was that funding constraints continued to reduce or cancel the logistics engineering analysis tasks.

It would greatly improve the implementation of the NASA management information data system if computer hardware and software used at NASA Centers was compatible. A standard of hardware and software requirements could be imposed so that NASA computer systems would be compatible.

F.2.1.4 Organization

An understanding of the division of authority between NASA Centers is often not clear. Multiple Center roles and responsibilities need to be complementary, rather than overlapping. Standardization of business practices between Centers would greatly improve the efficiency of doing business. Paperwork is sometimes required *by* one Center *for* another Center that, in turn, actually demands something different. Within an organization, establish separate work centers focusing on one function or product, with all supporting elements under the direction of the work center. There may be obstacles to overcome when co-locating some of the functional elements in the work centers due to the perception of where their traditional place is in the organization.

Another area for improvement is when Level II wants all changes coordinated for feasibility of concept approval before a Level II Program Change Identification Number (PCIN) is processed. The Level III project participants do not appear to want to listen to improvements or changes that are not within their current funding structure. Time is costly. To reduce the time, one suggestion might be for Level III to consider sponsoring the change if they become involved. It would also allow an independent evaluation of the element data. Another suggestion would be to use the major prime contractor as the integrating contractor. Contract design through launch with no second or third parties involved (e.g., Shuttle Processing Contractor).

F.2.1.5 Procurement

The procurement processes are fundamental to program successes. A procurement approach is needed that: (1) is applicable even with international partners, (2) can get work going within a few months, (3) expends only a small percentage of the resources on the effort of the procurement process itself, and (4) has a way to continue to utilize the capability that has been built-up during a competition. The process needs to find the best combination of capability, motivation, and low cost, while leaving the losing competitors with other options.

The procurement system needs to be simplified and kept honest. One suggestion was to establish a type of referee system where all procurement decisions are made by people who are precluded from subsequent involvement with the companies involved. The policy should be made simpler by excluding contractor involvement in the development of statements of work. This includes support contractors; competitive procurements should be fair to all.

The procurement "boilerplate" needs to be streamlined; a large amount of effort is spent answering irrelevant specifications. Reduction in reporting requirements would both simplify and limit costs within the program. The U. S. Government could take advantage of the contractors' reporting systems to reduce or eliminate specific government reports. The cost of complicated procurement regulations unnecessarily raises the costs of launch services. Standardizing the planning system to reduce acquisition complexity may help keep the costs down. The current acquisition process forces submittal of unrealistic cost schedules. Suggested solutions to improve the acquisition processes are to: (1) develop new cost estimation methodologies, (2) establish requirements early and conservatively, then avoid changes; (3) utilize multiyear authorizations and appropriations, (4) allow more flexible and realistic contract type selection, and (5) promote Total Quality Management at all levels.

The NASA Research Announcement (NRA) is a good approach for small studies and a step in the right direction for larger contracts. The use of the NRA has resulted in less than a 30-day turnaround between proposal receipt and award from the contractor, and streamlined the process of getting the contractor on board earlier. Level-of-effort contracts are recommended for increased flexibility. In all contracts, there needs to be an easier change mechanism, because the current mechanism takes too long and involves too many people.

Development of *new* systems should not be competitively priced. In fixed-priced developments, the contractor is forced to throw out things that can be significant (e.g., testing).

The imposition of a Performance Measurement System (PMS) on a one-of-a-kind type of DDT&E program (e.g., SSF) is not wise. PMS does well with a production program and products that are well defined.

Incentives for the contractors to meet or exceed the program objectives would help keep costs low. For example, Rockwell International earned 20 percent of every dollar it saved NASA on building the Endeavor. Incentives could include grants to develop new technology for systems specifically directed toward cost savings, rather than increasing performance; cash incentives to firms that reduce the manufacturing costs of specific items procured by the U. S. Government; and encouraging industrial teaming arrangements in focused technology areas such as the National Aerospace Plane Materials Consortium. In addition, the U.S. Government could stimulate the private sector's innovative creativity by issuing a request for proposal for space transportation *services*, and requesting that industry bid on the end product (e.g., four seats to and from SSF every 90 days). Such an approach assumes minimum government oversight over the design and manufacturing processes. It would also require the aerospace community to assume much greater financial risk than it has taken on in the past. To offset that risk, it is likely that the U. S. Government would have to agree to a minimum purchase that would allow the companies involved to earn a profit on their investments.

Financial incentives passed through to the individuals in a program would increase their enthusiasm and motivation for working on the program. The individuals, made personally responsible for the quality of their own efforts, would be less tolerant of poor performers, who would otherwise dilute the financial incentives.

F.2.1.6 Personnel

The only suggestion received that explicitly regarded personnel was to greatly reduce the number of people supporting development programs when the development is completed. This is an ingredient of a successful low-cost, high technology program, but should be coupled with a plan to retain or otherwise utilize the people within the company so that their expertise is available "on-call" as required.

F.2.1.7 Policy and Procedures

Lack of programmatic stability results in the waste of replanning resources and in credibility loss for current schedules (caused by funding constraints, new requirements, etc.). The program planning process, in particular the cost and budget estimation processes, has a significant influence on the program's stability, and hence its outcome. The essential problem is that there is currently no process which formally connects policy and the budget. At the top level, there is a space program policy. The top level requirements of this policy would tell NASA what it has to do. On the other side, there is the budget, which reflects the monetary constraints on the job NASA has to do, as defined by the policy and top level requirements. The solution is to develop and implement a process which links the budgets and the requirements. The link is especially important very early in the life of a program, but is required throughout.

NASA should start by identifing and prioritizing what it wants to accomplish; what the *mission need* is; and what it would cost. Just as the generation activity of technical requirements is recognized as being iterative, with the product improving with the number of iterations, the policy and requirements versus budget process should also be iterated until the desired quality of product and agreements are achieved.

The risk of not doing this is a vicious cycle of undesirable consequences between the Congress and NASA: (1) people in control of the budgets don't trust us; (2) those who don't trust us tend to micro-manage us; (3) as they get into micro management, they squeeze the resources or add their technical requirements to replace those we didn't have or didn't clearly enunciate; (4) as we get squeezed, we tend to take what we can get, since we find it difficult to stand fast to requirements which weren't clearly enunciated or which had poorly defined mission needs; (5) taking what we can get, instead of what we should have written down, further damages our credibility.

NASA needs to prove to the administration and to Congress that it can run multi-year programs in a cost-effective manner, particularly such programs as the Space Shuttle, which presently operate at levels of more than four billion dollars per year. Once NASA has reduced these costs and demonstrated this management capability, and before new programs are inaugurated, top level needs must be understood, and backers with funding support must be secured. Otherwise, these programs will be prey to multiple analyses and external micromanagement.

While concept definition may be entertaining for the participants, usually not enough focus is given to accurate program planning and costing. Structured, recognizable, processes should be established which are consistent across the NASA and engineering contractor community.

Any program development can be accomplished in 3 to 4 years, once uncertainties are resolved. The government should allow for more flexible contractual arrangements, (i.e., less rigorous procedures and documentation).

Contractors complain that the costs of continuing excessive government oversight and complicated procurement regulations unnecessarily raise the costs of launch services and/or programs. Purchasing launch services competitively from private firms, rather than managing launches from within NASA or the armed services, might save money. The intent of purchasing launch services is to remove the U. S. Government as much as possible from setting detailed engineering specifications for the launch system and to reduce the burden of excessive oversight by government managers. NASA could adopt the way the Federal Aviation Agency (FAA) does business; they set the "air worthiness standards" and then let the industry design, develop, and qualify products to meet those standards while filling a need.

In streamlining the policy and procedure processes, a commitment to total quality management needs to be made. Some of the suggestions for the policy to incorporate are: (1) use statistical design and manufacturing process development to produce parts within the specification limits and to establish expected failure rates and modes; (2) have a "Design for Operations" philosophy in the front end of a program that would reduce overall acquisition and support costs; (3) minimize the levels of approval required for simple changes; (4) minimize formal contract deliverables; (5) decrease the time of the evaluation and definition cycles for change orders; (6) confine review item discrepancies (RID's) at preliminary and critical design reviews to design topics, not requirements, and avoid changes between reviews; (7) automate the flight and mission planning systems and standardize vehicle loads to specific weights and centers-of-mass, thus saving large amounts of manpower-intensive planning; (8) establish documentation structures which accommodate the total program requirements definition.

Perceptions are that NASA holds too much work in-house. By doing the conceptual and preliminary design work, NASA competes with the contractors for business. In this process, they change system requirements, the program objectives become cloudy, and the program frequently loses support. If the NASA Center's mission is to be the design center, then it should perform the design function and contract only for manufacturing, assembly, and testing where there is no in-house capability to accomplish these functions. The alternative is for NASA to hand the contractor a set of requirements, and then allow the contractor to design and provide a system that satisfies those requirements.

Low cost innovation can be encouraged by providing contractors with an incentive and giving them the autonomy to implement changes without a lot of red tape. By providing incentives to change, a culture of constant improvement can be created. The U. S. Government should consider transferring technology to those who develop the product and provide more of the technology work effort and should also ensure that the technology is proven prior to the end of the program.

As contractor manpower reductions take place as a result of new ways of doing business, it is imperative that the U. S. Government reduce personnel proportionally. This would maximize the savings that result from such changes, and also guarantee that contractor efforts are matched and appreciated by the Government in pursuing space goals. Positive accomplishments should be the primary determinants of new business and continued employment.

The U. S. Government should consider entering into longer-term commitments with suppliers to purchase larger lot sizes. This could reduce the component unit cost substantially, which would directly benefit the competitive position and increase sales and profitability for the supplier. It would require some risk on either the prime contractor or the government. The Government would have to commit future budget funds which would reduce their budget flexibility. The contractor would have to take title to unsold goods with the expectation of adding value and reselling at a profit.

F.2.1.8 Requirements

NASA programs need to have a multitiered requirement system. Starting with an objective from the President or upper management, each tier needs to formulate appropriate requirements, working down to the smallest elements of the program.

For example, a broad-brush objective may be a permanent base on the Moon, a goal set by upper management. This implies requirements for a transportation system, habitat, and other support elements. In turn, these elements must be defined for the number of people they transport or support on the surface, resulting in further requirements for lower tiers. Such a functional decomposition has long been employed by military programs, and could be adopted more widely and consistently by NASA. With the broad top-level requirements determined, early configuration control could be employed to make sure that concepts for program elements address upper level requirements and that specifications are precise.

In the case of SSF, requirements were set in Phase A studies, but they were set too broadly, or else disregarded to such a great degree that Phase A contributed little substance to subsequent development of the project. When requirements for micro-g laboratory operations were imposed on the program, it was after the Phase A studies were complete, and without the needed configuration control. On the other hand, in the case of Apollo, the successful system engineering procedure was performed *intuitively* rather than formally.

Since requirements are both the first products in any potential program and are very important to the life of that program, NASA should spend more quality effort on this product. Ways to accomplish this include certifying requirement writers before they are allowed to begin and requirements "stamping" for certification, much like the Safety, Reliability, and Quality Assurance stamps of approval, to ensure they are true requirements and not "desirements." A center-wide, if not agency-wide, requirements tracking and control tool, and perhaps even a requirements organization, could insure requirements uniformity within and across programs.

To summarize, the NASA should define what it wants in a mission statement and establish the resultant requirements set. Let the contractor formulate the concepts and designs that meet the requirements, while providing required technology support. Then, the U. S. Government should *review* the concepts and designs (validating them against the requirements), advise, approve, and allow the contractor to implement the program. Once established, requirements should be changed only when absolutely necessary. All parties must stay focused on the mission statement, instead of trying to meet excessive, sometimes conflicting, requirements.

APPENDIX G

"THE IMPACT OF NEW BUSINESS APPROACHES"
TASK #4 OF THE
HUMAN TRANSPORTATION SYSTEM STUDY

The HTS Study contract is being conducted by the New Initiatives Office of the NASA Johnson Space Center with the six industry participants indicated above. We are looking for a list of key impediments or new ways of doing business that you have encountered or are currently encountering in your experiences with government contracts. Your input(s) will be combined with similar comments from other programs and functional areas across several contractors to focus efforts on how to improve our collective programmatic efficiency. A final NASA-Industry Team report, embodying the results of this survey, will be prepared, presented at appropriate levels within the NASA, and placed in the public domain.

Areas of interest include, but are not limited to, Organization, Management, Operations, Procurement, Personnel, Policy/Procedures, and Funding/Budgetary topics. Specific examples are useful for improving the readability of the report, but we are looking for broadly applicable material. Negative examples are acceptable, but the emphasis is on how to do more with what we have in the context of NASA-related business. Anonymity of organizations will be maintained in the final report(s) if such a desire is indicated above, but any information supplied will be available at the working level to all HTS Study contractors and participating government elements. Additional pages may be added to this questionnaire at your discretion.

1. Please identify the top three to five things that would (have) result(ed) in the greatest improvements in your way of doing business with the Government.

2. Your Company/Organization:
3. Program/Project/Functional Area:
4. Point(s) of Contact for further info: Tel: ( )
5a. Is it O.K. to identify your Company? Yes/No 5b. - - your Program? Yes/No

6. Were you able to actually implement the above improvement(s)? What obstacles were encountered? How were these overcome?

7. What risks are involved in the foregoing? Do you have any suggestions for mitigation?

8. Can you quantify the savings/level of improvement?

9. Approximately how large (dollars, man-months, or peak number of personnel) is/was your area of responsibility?

10. Was this a prime contract or a subcontracted effort? Were you teamed with any other aerospace contractor?

11. How would you assess the PLANNED schedule duration vs. the magnitude of the task and the length of time ACTUALLY required?

12. Can you compare or contrast your way of doing business with the Government with practices in the U.S. commercial or international sectors?

****

INTERVIEW/DISCUSSION POINTS

* What gives you the most "heartburn" in dealing with NASA?

* Are documentation requirements:
  Excessive?
  Conflicting?
  Duplicative?
  Restricting innovation?

* What can you say about procurement policies/regulations?

* How is the interface with your customer(s)?

* Is your test program:
  About right?

Duplicative as hardware progresses towards launch?
Still addressing obsolete requirements?
A great burden to your program?

* Are there any personnel/human resources policies/practices that are causing you difficulties?

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This report summarizes work completed under the Human Transportation System Study. This study was conducted by the New Initiatives Office at JSC with the technical support of Boeing, General Dynamics, Lockheed, McDonnell-Douglas, Martin Marietta, and Rockwell. The study was designed to generate information on determining the appropriate path to follow for new system development to meet the Nation's space transportation needs. The study evaluates 18 transportation architecture options using a parametric set of mission requirements. These options include use of current systems (e.g., Shuttle, Titan, etc.) as well as proposed systems (e.g., PLS, Single-Stage-to-Orbit, etc.) to assess the impact of various considerations, such as the cost of alternate access, or the benefit of separating people and cargo. The architecture options are compared to each other with six measurable evaluation criteria or attributes. They are: funding profile, human safety, probability of mission success, architecture cost risk, launch schedule confidence, and environmental impact. Values for these attributes are presented for the architecture options, with pertinent conclusions and recommendations.

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