JSC-09095-75

Shuttle Systems Weight and Performance

(NASA-TM-85470) SHUTTLE SYSTEMS WEIGHT AND PERFORMANCE Monthly Status Report (NASA) 101 p

N84-70524

Unclas
00/16 44574

Monthly Status Report

OCTOBER 31,1983

DEC 1983
RECEIVED
NASA STI FACILITY
ACCESS DEPT.

NASA
National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

SHUTTLE SYSTEMS WEIGHT AND PERFORMANCE

MONTHLY STATUS REPORT

Jesse F. Goree, Manager
Technical Integration Office
Space Shuttle Program Office

for Jesse F. Goree Jr
Enoch M. Jones, Manager
Systems Integration
Space Shuttle Program Office

NATIONAL AERONATUCS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TEXAS

OCTOBER 31, 1983

TABLE OF CONTENTS

SECTION		PAGE
1.0	INTRODUCTION	1-1
2.0	SYSTEM WEIGHT AND PERFORMANCE - STS MISSIONS	2-1
	MISSION SUMMARY, LIFT CAPABILITY AND MANAGERS RESERVE	2-2
	PAYLOAD WEIGHT SUMMARY	2-5
	STS OPERATOR WEIGHT SUMMARY	2-6
	SHUTTLE SYSTEM MANAGERS RESERVE CHANGES	2-7
	PROJECTED MANAGERS RESERVE	2-11
	POTENTIAL CHANGES TO LIFT CAPABILITY	2-12
3.0	SYSTEM WEIGHT AND PERFORMANCE - BRM MISSIONS	3-1
	MISSION DESCRIPTIONS	3-2
	LEVEL II CONTROL WEIGHT CHANGES	3-3
	MISSION SUMMARY, LIFT CAPABILITY AND MANAGERS RESERVE	3-4
	SHUTTLE SYSTEM MANAGERS RESERVE CHANGES	3-6
	PROJECTED MANAGERS RESERVE	3-7
	SPACE SHUTTLE CAPABILITY EVOLUTION	3-8
	SPACE SHUTTLE DEPLOYMENT CAPABILITY	3-10
	TIME HISTORY INJECTED WEIGHT MARGIN	3-11
	CONTROL WEIGHT ARITHMETIC	3-14
	BASELINE CAPABILITY VARIATIONS	3-17
4.0	ORBITER WEIGHT SUMMARY	4-1
	ORBITER CURRENT INERT WEIGHT CHANGE SUMMARY	4-2
	ORBITER INERT WEIGHT COMPARISON - STATUS	4-3
	OV-102 OPERATIONAL REWORK	4-4
	ORBITER POTENTIAL INERT WEIGHT CHANGES	4-5
	ORBITER INERT WEIGHT HISTORIES	4-6
	ORBITER PROPELLANT AND NON-PROPULSIVE CONSUMABLES CHANGES	4-9
	ORBITER PROPELLANT AND NON-PROPULSIVE CONSUMABLES LOADING	4-10
5.0	PERSONNEL AND FLIGHT CREW EQUIPMENT	5-1
	CURRENT PERSONNEL AND FLIGHT CREW EQUIPMENT WEIGHT CHANGE SUMMARY	5-2
	PERSONNEL AND FLIGHT CREW EQUIPMENT MATRIX - OPERATIONAL MISSIONS	5-3
	FLIGHT CREW EQUIPMENT CHANGEOUT ITEMS - OPERATIONAL MISSIONS	5-4

SECTION		PAGE
6.0	SSME INERT WEIGHT	6-1
	SSMEX3 CURRENT INERT WEIGHT CHANGE SUMMARY	6-2
	SSMEX3 POTENTIAL INERT WEIGHT CHANGES	6-3
	SSMEX3 INERT WEIGHT HISTORY	6-4
7.0	EXTERNAL TANK INERT WEIGHT	7-1
	ET CURRENT INERT WEIGHT CHANGE SUMMARY	7-2
	ET POTENTIAL INERT WEIGHT CHANGES	7-3
	ET INERT WEIGHT HISTORY	7-4
8.0	SOLID ROCKET BOOSTER INERT WEIGHT & PROPELLANT SUMMARY	8-1
	SRBX2 CURRENT WEIGHT CHANGE SUMMARY	8-2
	SRBX2 POTENTIAL WEIGHT CHANGES	8-3
	SRBX2 WEIGHT HISTORY	8-4
	SRBX2 PROPELLANT SUMMARY	8-5
9.0	MPS PROPELLANT INVENTORIES	9-1
	STS-9	9-2
	STS-11	9-3
	STS-13	9-5
	STS-14	9-6
	STS-15 and Subsequent and Galileo	9-7
	BRM-1	9-8
	BRM-3A AND 4	9-9
10.0	PAYLOAD WEIGHT CHARGEABLE OPTIONS	10-1
	HARDWARE PAYLOAD WEIGHT CHARGEABLE OPTIONS	10-2
	CREW EQUIPMENT/LIFE SUPPORT P/L WEIGHT CHARGEABLE OPTIONS	10-4
	ELECTRICAL ENERGY P/L WEIGHT CHARGEABLE OPTIONS	10-7
	PROPULSION HARDWARE AND PROPELLANTS P/L WEIGHT CHARGEABLE OPTIONS	10-8
APPENDIX A	MASS PROPERTIES	A-1
	STS-9	A-2
	STS-11	A-4
	STS-13	A-6
	STS-14	A-8
	STS-16	A-10
	STS-17	A-12
	STS-19	A-14
	STS-20	A-16
	STS-21	A-18
	STS-22	A-20
	STS-23	A-22
	STS-24	A-24
	STS-25	A-26
	ORBITER DEFINITION - WEIGHT AND C.G.	A-28

1.0 INTRODUCTION

The purpose of this document is to present the status of Shuttle systems weight and performance to provide visibility into the Managers Reserve for the STS Missions as defined by JSC 07700 Volume III Revision A, "STS Flight Definition and Requirements Directive," and the Baseline Reference Missions (BRM). Control and status weights are reported monthly and are obtained from the responsible offices specified in JSC-07700, Volume X, Appendix 10.12. These weights along with ascent performance ground rules in Appendix 10.12 for BRM are used to status Managers Reserve. Mass properties can be found in JSC-08934, "Shuttle Operational Data Book, Volume II, Mission Mass Properties." Acronyms used for this document are based on JSC-07700, Volume I. Appendix A provides Mass Properties for the vehicle configurations as defined herein.

2.0 SYSTEM WEIGHT AND PERFORMANCE - STS MISSIONS

The status of Shuttle system total injected Managers Reserve and pending changes are summarized in this section for the STS Missions.

This section consists of the Mission Summary of Lift Capability and Managers Reserve (Table 2.1), Payload Weight Summary (Table 2.2), STS Operator Weight Summary (Table 2.3), and Managers Reserve Changes (Table 2.4). Projected changes that affect Lift Capability and Performance Margin (Table 2.8) are also shown.

TABLE 2.1 - MISSION SUMMARY, LIFT CAPABILITY, AND MANAGERS RESERVE

OCTOBER 31, 1983

DARS - 4090

MISSIONS	STS-009	STS-011	STS-013	STS-014	STS-015	STS-016	STS-017	STS-018
LAUNCH DATE	11/28/83	01/29/84	04/04/84	06/04/84	07/14/84	08/09/84	08/30/84	09/29/84
ORBITER	OV-102E	OV-099	OV-099	OV-103	OV-099	OV-103	OV-102E	OV-099
ET	LWT-004	LWT-003	LWT-005	LWT-006	LWT-007	LWT-008	LWT-009	LWT-010
CREW/DAYS	6M/9D	5M/8D	5M/6D	6M/7D		5M/7D	5M/10D	
SSME THROTTLE SETTING (%)	104/104	100/104	104/104	100/104		104/104	104/104	
SRM MOTOR	272-83	111-83	111-83	111-83	111-83	111-83	111-83	111-83
SRB'S	STD/DFI	MWC	MWC	LWC	LWC	LWC	LWC	LWC
ALTITUDE (NM)	135	165	250	173		160	190	
INCLINATION (DEG)	57.00	28.45	28.5	28.45		28.45	57.0	
P/L ASSIGNMENT	SL-1/LM + PALLET	PALAPA B2/PAM-D CINEMA 360,MFR WESTAR VI/PAM-D 2 MMU'S SPAS-1A/ UNQ	LDEF-1 DEPL., SMRM/ FSS/ 2 MMU'S MFR CINEMA 360	TELESAT-1/PAM-D LFC-1/ MPESS SYSCOM IV-1/UNQ OAST-1/ MPESS CIN 360	DOD	TELSTAR 3C/PAM-D SDS-D/ PAM-D, SYNCOM IV-2/UNQ SPARTAN -1/MPESS	OSTA-3/ PALLET, ERBS/UNQ LFC/ORG /MPESS SPARX-1/ UNQ	DOD
WEIGHT SUMMARY								
PROJECTED MANAGER'S RESERVE (2)	773	12227	2200	4891		5040	1779	
PROJECTED CHANGES (TABLE 2.8)	92	-1000	-2800	-1400		-1400	-1400	
CURRENT MANAGER'S RESERVE (3)	681	13227	5000	6291		6440	3179	
PAYLOAD	33131	29348	32665	36718		42415	19165	
LIFT CAPABILITY	33812	42575	37665	43009		48855	22344	
STS OPERATOR	133	5301	4936	5564		5454	5287	
ORBITER	155510	148365	148367	147159		147159	155510	
SSME X 3 INERT	20729	20674	20674	20772		20772	20729	
PERSONNEL	3175	3944	3694	4077		3694	3861	
NON-PROP. CONSUMABLES	6062	6017	6017	6017		6017	6928	
OMS PROPELLANT	16000	23600	25064	25064		25064	24000	
RCS PROPELLANT	7830	7416	7416	7416		7416	7830	
MPS PROPELLANT FB/FPR/RESIDUALS	13764	13716	13715	13716		13716	13716	
MPS PRESSURANTS	423	423	423	423		423	423	
ET	67865	67844	67494	67479		66957	66957	
SHUTTLE SYS AT MECO	325303	339875	335485	340696		345527	327585	
NON-PROPULSIVE WEIGHT LOSS (1)	442	442	442	442		442	442	
SRB X 2 INERT	379760	375382	373624	370972		370972	370972	
SRB X 2 PROPELLANT	2217649	2216964	2218068	2220172		2220172	2220172	
MPS PROPELLANT EXPENDED	1584739	1572241	1580469	1579447		1579298	1582559	
SHUTTLE SYSTEM AT SRB IGNITION	4507893	4504904	4508088	4511729		4516411	4501730	

1) SEE TABLE 2.1.2.

2) PROJECTED MANAGERS RESERVE IS SUM OF CURRENT MANAGERS RESERVE AND PROJECTED CHANGES.

(3) MANAGERS RESERVE FOR STS-14 AND SUBSEQUENT NOT BASED ON DATA SUBMITTALS.

TABLE 2.1 - MISSION SUMMARY, LIFT CAPABILITY, AND MANAGERS RESERVE OCTOBER 31, 1983
BARS - 4090

MISSIONS	STS-019	STS-020	STS-021	STS-022	STS-023	STS-024	STS-025
LAUNCH DATE	10/24/84	11/22/84	12/20/84	02/01/85	03/06/85	03/29/85	05/26
ORBITER	OV-103	OV-099	OV-103	OV-099	OV-103	OV-099	OV-104
ET	LWT-011	LWT-012	LWT-013	LWT-014	LWT-015	LWT-016	LWT-017
CREW/DAYS	6M/6D	7M/7D	5M/4D	5M/6D	5M/4D	6M/7D	5M/7D
SSME THROTTLE SETTING (%)	100/104	104/104	104/104	104/104	104/104	104/104	104/104
SRM MOTOR	111-83	111-83	111-83	111-83	111-83	111-83	111-83
SRB'S	LWC	LWC	MWC	LWC	MWC	MWC	MWC
ALTITUDE (NM)	160	190	153.5	250	153.5	202	160
INCLINATION (DEG)	28.45	57.0	28.45	28.45	28.45	50.0	28.45
P/L ASSIGNMENT	TELESAT H/PAM-D, GAS ABS, MSL-1/ MPESS P/L OF OPP'TY	SL-3/LM + MPESS	TDRS-B/ IUS-2, P/L OPP'TY	SYNCOM IV-3/UNO LDEF-1 RETR	TDRS-C/ IUS-2, MSL-2/ MPESS	S/L-2/ IG + 3 PALLETS	TELSTAR 3D/PAM-D MEXSAT-A /PAM-D, ARABSAT -A/PAM-D P/L OF OPP'TY
WEIGHT SUMMARY							
PROJECTED MANAGER'S RESERVE (2)	23682	4374	10617	16855	6293	6946	15079
PROJECTED CHANGES (TABLE 2.8)	-1400	-1400	-1400	-2800	-1400	-1400	-1400
CURRENT MANAGER'S RESERVE (3)	25082	5774	12017	19655	7693	8346	16479
PAYLOAD	25707	33162	45591	18515	49134	33433	33931
LIFT CAPABILITY	50789	38936	57608	38170	56827	41779	50410
STS OPERATOR	3217	243	2176	4839	3593	151	3829
ORBITER	147159	148360	147159	148360	147159	148360	147894
SSME X 3 INERT	20772	20791	20772	20791	20772	20791	20772
PERSONNEL	4077	3502	3694	3694	3694	3177	3694
NON-PROP. CONSUMABLES	6017	5151	6017	6017	6017	5151	6017
OMS PROPELLANT	19200	22900	19300	25064	19300	25064	24000
RCS PROPELLANT	7416	7416	7416	7416	7416	7416	7416
MPS PROPELLANT FB/FPR/RESIDUALS	13716	13716	13716	13716	13716	13716	13716
MPS PRESSURANTS	423	423	423	423	423	423	423
ET	67005	67005	67005	67005	67005	66947	66947
SHUTTLE SYS AT MECO	339791	328443	345286	335495	345922	332975	345118
NON-PROPULSIVE WEIGHT LOSS (1)	442	442	442	442	442	442	442
SRB X 2 INERT	370972	370972	373624	370972	373624	373624	373624
SRB X 2 PROPELLANT	2220172	2220172	2218068	2220172	2218068	2218068	2218068
MPS PROPELLANT EXPENDED	1560656	1579964	1373721	1566083	1578045	1577392	1569259
SHUTTLE SYSTEM AT SRB IGNITION	4492033	4499993	4311141	4493164	4516101	4502501	4506511

1) SEE TABLE 2.1.2.

2) PROJECTED MANAGERS RESERVE IS SUM OF CURRENT MANAGERS RESERVE AND PROJECTED CHANGES.

(3) MANAGERS RESERVE FOR STS-14 AND SUBSEQUENT NOT BASED ON DATA SUBMITTALS.

TABLE 2.1.1 - BASELINED ASCENT PERFORMANCE GROUNDRULES SUMMARY OCTOBER 31, 1983
BARS - 4090

MISSIONS	STS-009	STS-011	STS-013	STS-014	STS-015	STS-016	STS-017	STS-018
LAUNCH DATE	11/28/83	01/29/84	04/04/84	06/04/84	07/14/84	08/09/84	08/30/84	09/29/84
LAUNCH SITE	KSC	KSC	KSC	KSC	KSC	KSC	KSC	KSC
ORBITER	OV-102E	OV-099	OV-099	OV-103	OV-099	OV-103	OV-102E	OV-099
ET	LWT-004	LWT-003	LWT-005	LWT-006	LWT-007	LWT-008	LWT-009	LWT-010
EPS TANK SETS	5	4	4	4		4	5	
SOFTWARE RELEASE	OI 02-9	OI 02-11	OI 02-13	OI 03-14	OI 03-15	OI 04-16	OI 04-17	OI 04-18
CREW/DAYS	6M/9D	5M/8D	5M/6D	6M/7D		5M/7D	5M/10D	
SSME THROTTLE SETTING (%)	104/104	100/104	104/104	100/104		104/104	104/104	
SSME ISP (SEC)	452.5	452.5	452.5	452.5		452.5	452.5	
SRM MOTOR	272-83	111-83	111-83	111-83	111-83	111-83	111-83	111-83
SRM BURN RATE (IPS)-LH @ 60 DEGREES F	.365	.368	.368	.368		.368	.368	
SRM BURN RATE (IPS)-RH @ 60 DEGREES F	.365	.368	.368	.368		.368	.368	
SRB TEMPERATURE (LAUNCH DATE)	67	60	67	76		80	80	
ASCENT AEROCYNAMICS	IVBC-3	IVBC-3	IVBC-3	IVBC-3	IVBC-3	IVBC-3	IVBC-3	IVBC-3
TRAJECTORY SHAPING	NOMINAL	NOMINAL	NOMINAL	NOMINAL		NOMINAL	NOMINAL	
ALTITUDE (NM)	135	165	250	173		160	190	
INCLINATION (DEG)	57.00	28.45	28.5	28.45		28.45	57.0	
MECO TARGET (1)								
ALT (NM)	57	57	57	57	57	57	57	
VEL (FT/SEC)	25725	25670	26023	25670		25670	25725	
FPA (DEG)	.65	.65	1.13	.65		.65	.65	
DESIGN SEASON	TRANS	WINTER	WINTER	SUMMER		SUMMER	SUMMER	
Q-M DESIGN CONSTRAINT	(2) (4)	TPS/790	TPS/790	TPS/819		TPS/819	(2)	
MAX Q ON Q-M DESIGN CONSTRAINT	677	724	724	743		743	730	
MINIMUN Q-ALPHA	(3)	-2500	-2500	-2500		-2500	-2500	
DATA SUBMITALS	J712-7R1	J717-4	J719-A3	J720-1		J722-R2	J721-R1	
	10/12/83	08/23/83	10/05/83	08/23/83		08/23/83	08/23/83	
MPS INVENTORY REVISION	S090J	S110S	S110S	S09K4		S151Z	S151Z	

(1) STS-13 AND 22 ARE DIRECT INSERTION MISSIONS.

(2) PLACARD TO 790 MAX DUE TO OV-102 TILES LIMITATION
(3) -2800/-2500

(4) DESIGNED TO UNIQUE Q MACH TO MAXIMIZE LAUNCH PROBABLY

TABLE 2.1.1 - BASELINED ASCENT PERFORMANCE GROUNDRULES SUMMARY OCTOBER 31, 1983
BARS - 4090

MISSIONS	STS-019	STS-020	STS-021	STS-022	STS-023	STS-024	STS-025
LAUNCH DATE	10/24/84	11/22/84	12/20/84	02/01/85	03/06/85	03/29/85	05/26
LAUNCH SITE	KSC	KSC	KSC	KSC	KSC	KSC	KSC
ORBITER	OV-103	OV-099	OV-103	OV-099	OV-103	OV-099	OV-104
ET	LWT-011	LWT-012	LWT-013	LWT-014	LWT-015	LWT-016	LWT-017
EPS TANK SETS	4	4	4	4	4	4	4
SOFTWARE RELEASE	OI 04-19	OI 04-20	OI 04-21	OI 05-22	OI 05-23	OI 05-24	OI 05-23
CREW/DAYS	6M/6D	7M/7D	5M/4D	5M/6D	5M/4D	6M/7D	5M/7D
SSME THROTTLE SETTING (%)	100/104	104/104	104/104	104/104	104/104	104/104	104/104
SSME ISP (SEC)	452.5	452.5	452.5	452.5	452.5	452.5	452.5
SRM MOTOR	111-83	111-83	111-83	111-83	111-83	111-83	111-83
SRM BURN RATE (IPS)-LH @ 60 DEGREES F	.368	.368	.368	.368	.368	.368	.368
SRM BURN RATE (IPS)-RH @ 60 DEGREES F	.368	.368	.368	.368	.368	.368	.368
SRB TEMPERATURE (LAUNCH DATE)	74	68	62	61			
ASCENT AEROCYNAMICS	IVBC-3	IVBC-3	IVBC-3	IVBC-3	IVBC-3	IVBC-3	IVBC-3
TRAJECTORY SHAPING	NOMINAL	NOMINAL	NOMINAL	NOMINAL	NOMINAL	NOMINAL	NOMINAL
ALTITUDE (NM)	160	190	153.5	250	153.5	202	160
INCLINATION (DEG)	28.45	57.0	28.45	28.45	28.45	50.0	28.45
MECO TARGET (1)							
ALT (NM)	57	57	57	57	57	57	57
VEL (FT/SEC)	25670	25725	25670	26023	25670	25725	25670
FPA (DEG)	.65	.65	.65	1.13	.65	.65	.65
DESIGN SEASON	TRANS	WINTER	WINTER	WINTER	WINTER	WINTER	SUMMER
Q-M DESIGN CONSTRAINT	TPS/819	TPS/819	TPS/819	TPS/819	TPS/819	TPS/819	TPS/819
MAX Q ON Q-M DESIGN CONSTRAINT	739	729	734	734	734	729	739
MINIMUN Q-ALPHA	-2500	-2500	-2500	-2500	-2500	-2500	-2500
DATA SUBMITALS	J737-R1	J-742		J746			
	08/23/83	09/01/83		10/04/83			
MPS INVENTORY REVISION	S151Z	S151Z	S151Z	S151Z	S151Z	S151Z	S151Z

(1) STS-13 AND 22 ARE DIRECT INSERTION MISSIONS.

(2) PLACARD TO 790 MAX DUE TO OV-102 TILES LIMITATION
(3) -2800/-2500

(4) DESIGNED TO UNIQUE Q MACH TO MAXIMIZE LAUNCH PROBABLY

TABLE 2.1.2 - NON-PROPULSIVE WEIGHT LOSS TO MECO
BARS - 4090

OCTOBER 31, 1983

MISSIONS	STS-009	STS-011	STS-013	STS-014	STS-015	STS-016	STS-017	STS-018
ET TPS ABLATION	45	45	45	45	45	45	45	45
APU CONSUMABLES EXPENDED TO MECO	60	60	60	60	60	60	60	60
SSME HELIUM PRUGE	62	62	62	62	62	62	62	62
ICE LOSSES TO MECO (1)	270	270	270	270	270	270	270	270
ET DEBRIS	5	5	5	5	5	5	5	5
NON-PROPULSIVE WEIGHT LOSS	442	442	442	442	442	442	442	442

MISSIONS	STS-019	STS-020	STS-021	STS-022	STS-023	STS-024	STS-025
ET TPS ABLATION	45	45	45	45	45	45	45
APU CONSUMABLES EXPENDED TO MECO	60	60	60	60	60	60	60
SSME HELIUM PRUGE	62	62	62	62	62	62	62
ICE LOSSES TO MECO (1)	270	270	270	270	270	270	270
ET DEBRIS	5	5	5	5	5	5	5
NON-PROPULSIVE WEIGHT LOSS	442	442	442	442	442	442	442

(1) SEE TABLE 7.1 FOR ADDITIONAL ICE ON ET AT SRB IGNITION

TABLE 2.2 - PAYLOAD WEIGHT SUMMARY
BARS - 4090

OCTOBER 31, 1983

	MISSIONS ORBITER	STS-009 OV-102E	STS-011 OV-099	STS-013 OV-099	STS-014 OV-103	STS-015 OV-099	STS-016 OV-103	STS-017 OV-102E	STS-018 OV-099
MV0073A	P/L ATTACH HDW	1497							
MV0073A	RETENTION FTG. ALLOWANCE	-675							
MV0548A	CCTV CAMERA	72							
MV0704A	PALLET UTILITY KIT								
MV0711A	X603 INTFC HARNESS	85							
MV0713A	1307 B/H P/L WIRING	36							
MV0719A	AFT FLT DECK HARNESS	5							
MV0725A	SIP SMCH	2							
	P/L UMBILICAL	10							
	PAYLOAD RECORDER								
MV0643A	MMU (2)		1200	1200					
MV0720A	P/L RECORDER CABLE								
MV0722A	STD SWITCH PANEL	20							
MV0519A	A/L ADAPTER	691							
MV0520A	ATCS RAD. PANELS	355							
MV0525A	EPS TANK SET 4 HDW	699							
	WEIGHT GROWTH ALLOWANCE								
MV0525A	EPS TANK SET 4 CRYO	870							
MV0610A	MID DECK SEAT/SEATS(6&7)	92							
MV0702A	P/L TIME BUFFER	3							
MV0710A	S/L UTILITY KIT	75							
MV0712A	SMCH	423							
MV0718A	IUS UTILITY KIT								
MV0727A	S/L FLUID KIT	48							
MV0728A	S/L ELECT. KIT	261							
MV0730A	S/L MODULE KIT	159							
	TDRS + IUS-2 STAGE								
	IUS AFD EQUIPMENT								
	MSL-1, -2 PAYLOAD/CARRIER								
	SPARX							1600	
	OAST-1 PAYLOAD/CARRIER				2953				
	SBS						9630		
	TELSTAR						9928		
	OASIS								
	SYNCOM IV 1,2				17049		17260		
	SPAS-01		3192						
	OSTA-2								
	PALAPA B1,B2 + PAM-D		9964						
	TELESAT I,H/PAM-D				9796				
	ERBS							5600	
	OSTA-3							4500	
	SL-1/2 PAYLOAD/CARRIER	27983							
	WESTAR		9725						
	PERSONNEL	450							
	MEXSAT								
	LFC-1 + CARRIER, LFC/ORS				3491			5072	
	ACES		246						
	IEF		69				69		
	ARC							215	
	ADSF						304		
	MFR		104	104					
	LDEF			21615					
	SMM REPAIR PAYLOAD			6913					
	ARABSAT								
	RME		4	4	4		4	4	
	SPARTAN						3371		
	I MAX CAMERA			325	325			325	
	CINEMA 360		546	472	472				
	— PRIMARY PAYLOAD SUBTOTAL —	33131	25050	32635	34090		40566	17316	
MV0514A	CONTAINER SUPT ASSY		73						
MV0736A	MLR EXPERIMENT		170						
	RENDEZVOUS RADAR BALLON		515						
	CFES EXPERIMENT				779				
	GET AWAY SPECIAL		3100		1796		1796	1796	
	STUDENT EXPERIMENTS		50	50	50		50	50	
	GAS CONTROLLER		3		3		3	3	
	SESA BAY 2		387						
	ANCILLARY PAYLOAD SUBTOTAL		4298	50	2628		1849	1849	
	TOTAL PAYLOAD	33131	29348	32685	36718		42415	19165	

TABLE 2.2 - PAYLOAD WEIGHT SUMMARY
BARS - 4090

OCTOBER 31, 1983

	MISSIONS ORBITER	STS-019 OV-103	STS-020 OV-099	STS-021 OV-103	STS-022 OV-099	STS-023 OV-103	STS-024 OV-099	STS-025 OV-104
MV0073A	P/L ATTACH HDW		1890				2524	
MV0073A	RETENTION FTG. ALLOWANCE		-675				-675	
MV0548A	CCTV CAMERA		73				73	
MV0704A	PALLET UTILITY KIT							
MV0711A	X603 INTFC HARNESS		86				86	
MV0713A	1307 B/H P/L WIRING		36				36	
MV0719A	AFT FLT DECK HARNESS		5				5	
MV0725A	SIP SMCH		31				31	
	P/L UMBILICAL		10				10	
	PAYLOAD RECORDER			60		60		
MV0643A	MMU (2)							
MV0720A	P/L RECORDER CABLE			1		1		
MV0722A	STD SWITCH PANEL		20				20	
MV0519A	A/L ADAPTER		691				691	
MV0520A	ATCS RAD. PANELS		355				355	
MV0525A	EPS TANK SET 4 HDW		692				692	
	WEIGHT GROWTH ALLOWANCE		4569					
MV0525A	EPS TANK SET 4 CRYO		866				866	
MV0610A	MID DECK SEAT/SEATS(6&7)		184				184	
MV0702A	P/L TIME BUFFER		3				3	
MV0710A	S/L UTILITY KIT		45				45	
MV0712A	SMCH		577				577	
MV0718A	IUS UTILITY KIT			64		64		
MV0727A	S/L FLUID KIT		48				48	
MV0728A	S/L ELECT. KIT		261				261	
MV0730A	S/L MODULE KIT		159				159	
	TDRS + IUS-2 STAGE			43149		43149		
	IUS AFD EQUIPMENT			161		161		
	MSL-1, -2 PAYLOAD/CARRIER	5143				3850		
	SPARX							
	OAST-1 PAYLOAD/CARRIER							
	SBS							
	TELSTAR							9928
	OASIS			307				
	SYNCOM IV 1,2				17260			
	SPAS-01							
	OSTA-2							
	PALAPA B1,B2 + PAM-D							
	TELESAT I,H/PAM-D	9936						
	ERBS							
	OSTA-3							
	SL-1/2 PAYLOAD/CARRIER		22336				26542	
	WESTAR							
	PERSONNEL		900				900	
	MEXSAT							10200
	LFC-1 + CARRIER, LFC/ORS							
	ACES							
	IEF							
	ARC							
	ADSF				304			
	MFR							
	LDEF							
	SMM REPAIR PAYLOAD							
	ARABSAT							10158
	RME	4						
	SPARTAN							
	I MAX CAMERA							
	CINEMA 360							
	--- PRIMARY PAYLOAD SUBTOTAL ---	15083	33162	43742	17564	47285	33433	30286
MV0514A	CONTAINER SUPT ASSY							
MV0736A	MLR EXPERIMENT							
	RENDEZVOUS RADAR BALLON							
	CFES EXPERIMENT	779						
	GET AWAY SPECIAL	9792		1796	898	1796		3592
	STUDENT EXPERIMENTS	50		50	50	50		50
	GAS CONTROLLER	3		3	3	3		3
	SESA BAY 2							
	ANCILLARY PAYLOAD SUBTOTAL	10624		1849	951	1849		3645
	TOTAL PAYLOAD	25707	33162	45591	18515	49134	33433	33931

TABLE 2.3 STS OPERATOR WEIGHT SUMMARY
BARS - 4090

OCTOBER 31, 1983

	MISSIONS ORBITER	STS-009 OV-102E	STS-011 OV-099	STS-013 OV-099	STS-014 OV-103	STS-015 OV-099	STS-016 OV-103	STS-017 OV-102E	STS-018 OV-099
	DELETE P/L RECORDER-CHARGED TO P/L	INC	INC	INC	INC		INC	INC	
	AIRLOCK B HATCH-CHARGED TO P/L	-115	INC	INC	INC		INC	INC	
	SPARE MCIU (RMS)	N/A	18	18	18		18	18	
	ET SEP CAMERA DOORS	12	N/A	N/A	N/A		N/A	N/A	
	REDUCE ARM RESTS	5	N/A	N/A	N/A		N/A	N/A	
MV0073A	ORBITER P/L FITTING ALLOWANCE	INC	INC	INC	INC		INC	INC	
MV0082A	RMS	-1304	INC	INC	INC		INC	INC	
MV0544A	EPS TANK SET 3	INC	INC	INC	INC		INC	INC	
MV0610A	MISSION SPEC. SEAT - POS 3	INC	INC	INC	INC		INC	INC	
MV0610A	PAYLOAD SPEC. SEAT - POS 4	INC	INC	INC	INC		INC	INC	
MV0645A	GALLEY	INC	INC	INC	-164		INC	INC	
	H20 DISPENSING SYSTEM	N/A	N/A	N/A	26		N/A	N/A	
	RENDEZVOUS RADAR	INC	INC	INC	INC		INC	INC	
MV0627A	REDUCE LIOH RACKS	N/A	N/A	N/A	N/A		N/A	N/A	
MV0532A	REDUCE P/L BAY LINER	-7	N/A	N/A	N/A		N/A	N/A	
	REMOVE EJECTION SEAT BALLAST	-50	N/A	N/A	N/A		N/A	-50	
	REMOVE STABILIZER LINKS	-32	N/A	N/A	N/A		N/A	N/A	
	REMOVE PARACHUTES	-28	N/A	N/A	N/A		N/A	-28	
	REMOVE SURVIVAL KITS	-56	N/A	N/A	N/A		N/A	-56	
	--- MANIFEST SUBTOTAL ---	-1575	18	18	-120		18	-116	
MV0073A	P/L ATTACH HARDWARE	PC	2308	1995	2935		3115	2587	
MV0073A	RETENTION FITTING ALLOWANCE	PC	-675	-675	-675		-675	-675	
MV0082A	RMS ELBOW CAMERA		31	31	31		31	31	
	SPARE KU BAND ELECTRONICS	96							
MV0702A	P/L TIMING BUFFER	PC	3	3	3		3	3	
MV0545A	COMSEC	40	40	40	40		40	40	
MV0408A	MADS 2		713	713	261		261		
MV0412A	S-BAND FM		22	22	22		22	22	
MV0520A	ATCS RAD PANELS	PC	355	355	355		355	355	
MV0525A	EPS TANK SET 4 HDW	PC	692	692	693		693	699	
MV0548A	CCTV CAMERA-2	PC	73	73	73		73	72	
MV0550A	AFT STA CONTAINERS	48	48	48	48		48	48	
MV0564A	PDRS SYS TEST-VTR	65	66	66	330		66	65	
MV0566A	EPS TANK SET 5 HDW	635						635	
MV0570A	ACIP	131	131	131	131			131	
MV0575A	TILE GAP HTG	7							
MV0578A	DAC HARNESS	6							
	CBSA		196	196					
	BEAM		167	57					
MV0581A	OEX RECORDER	15							
MV0589A	IUS COLOUMB DAMPER								
MV0610A	MID-DECK SEAT 1-POS 7	92	92	92	92		92	92	
MV0610A	MID-DECK SEAT 2-POS 6				92				
MV0728A	SIP SMCH		13						
MV0704A	PALLET UTILITY KIT								
MV0711A	X603 INTFC HARNESS	PC	86	86	85		86	85	
MV0712A	SMCH	PC	650	856	856		856	856	
MV0713A	1307 B/H P/L CABLE	PC	44	44	44		44	44	
MV0719A	AFT FLT DECK HARNESS	PC	23	15	18		15	5	
MV0720A	P/L RECORDER CABLE		1	1	1		1	1	
MV0722A	STD SWITCH PANEL	PC	40	40	40		40	40	
MV0725A	SIP SMCH	PC	98		28		89		
MV0766A	LONGERON CABLE SUPPORT		11	11	11		11		
	PERSONNEL	450							
	BALLAST PROVISIONS	22						22	
	AUXILIARY O2 HARDWARE	75						75	
	ONBOARD H2 DETECTION	26	26	26	26		26	26	
MV0757A	SPAS AFD & P/L WIRING		29						
MV0568A	PSA				124		124	124	
MV0633A	PSA LINER				20		20	20	
	--- OPERATOR SUBTOTAL ---	1708	5283	4918	5684		5436	5403	
	TOTAL STS OPERATOR -------	133	5301	4936	5564		5454	5287	

TABLE 2.3 STS OPERATOR WEIGHT SUMMARY OCTOBER 31, 1983
BARS - 4090

	MISSIONS ORBITER	STS-019 OV-103	STS-020 OV-099	STS-021 OV-103	STS-022 OV-099	STS-023 OV-103	STS-024 OV-099	STS-025 OV-104
	DELETE P/L RECORDER-CHARGED TO P/L	INC	INC	-60	INC	-60	INC	INC
	AIRLOCK D HATCH-CHARGED TO P/L	INC	-115	INC	INC	INC	-115	
	SPARE MSIU (RMS)	N/A	N/A	N/A	18	N/A	N/A	N/A
	ET SEP CAMERA DOORS	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	REDUCE ARM RESTS	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MV0073A	ORBITER P/L FITTING ALLOWANCE	INC	INC		INC	INC	INC	INC
MV0082A	RMS	-935	-935	-935	INC	-935	-935	-935
MV0544A	EPS TANK SET 3	INC	INC	INC	INC	INC	INC	INC
MV0610A	MISSION SPEC. SEAT - POS 3	INC	INC	INC	INC	INC	INC	INC
MV0610A	PAYLOAD SPEC. SEAT - POS 4	INC	INC	INC	INC	INC	INC	INC
MV0645A	GALLEY	-164	INC	INC	INC	INC	INC	INC
	H2O DISPENSING SYSTEM	26	N/A	N/A	N/A	N/A	N/A	N/A
	RENDEZVOUS RADAR	INC	INC	INC	INC	INC	INC	INC
MV0627A	REDUCE LIGH RACKS	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MV0532A	REDUCE P/L BAY LINER	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	REMOVE EJECTION SEAT BALLAST	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	REMOVE STABILIZER LINKS	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	REMOVE PARACHUTES	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	REMOVE SURVIVAL KITS	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	--- MANIFEST SUBTOTAL ---	-1073	-1050	-995	18	-995	-1050	-935
MV0073A	P/L ATTACH HARDWARE	1995	PC	878	2003	2288	PC	2561
MV0073A	RETENTION FITTING ALLOWANCE	-675	PC	-675	-675	-675	PC	-675
MV0082A	RMS ELBOW CAMERA				31			
	SPARE KU BAND ELECTRONICS							
MV0702A	P/L TIMING BUFFER	3	PC	3	3	3	PC	3
MV0545A	COMSEC	40	40	40	40	40	40	40
MV0408A	MADS 2	261	713	261	713	261	713	261
MV0412A	S-BAND FM	22	22	22	22	22	22	22
MV0520A	ATCS RAD PANELS	355	PC	355	355	355	PC	355
MV0525A	EPS TANK SET 4 HDW	693	PC	693	692	693		693
MV0548A	CCTV CAMERA-2	73	PC	73	73	73		73
MV0550A	AFT STA CONTAINERS	48	48	48	48	48	48	48
MV0564A	PDRS SYS TEST-VTR	66	66	66	66	66	66	66
MV0566A	EPS TANK SET 5 HDW							
MV0570A	ACIP		131		131		131	
MV0575A	TILE GAP HTG							
MV0578A	DAC HARNESS							
	CBSA							
	BEAM							
MV0581A	OEX RECORDER							
MV0589A	IUS COLOUMB DAMPER			68		68		
MV0610A	MID-DECK SEAT 1-POS 7	92		92	92	92		92
MV0610A	MID-DECK SEAT 2-POS 6	92	92					
MV0728A	SIP SMCH							
MV0704A	PALLET UTILITY KIT					25		
MV0711A	X603 INTFC HARNESS	86	PC	86	86	86	PC	86
MV0712A	SMCH	856	PC	856	856	856	PC	856
MV0713A	1307 B/H P/L CABLE	44	PC	44	44	44	PC	44
MV0719A	AFT FLT DECK HARNESS	18	PC	40	19	18		18
MV0720A	P/L RECORDER CABLE				1			
MV0722A	STD SWITCH PANEL	40	PC	40	40	40	PC	40
MV0725A	SIP SMCH		PC			4		
MV0766A	LONGERON CABLE SUPPORT	11	11	11	11	11	11	11
	PERSONNEL							
	BALLAST PROVISIONS							
	AUXILIARY O2 HARDWARE							
	ONBOARD H2 DETECTION	26	26	26	26	26	26	26
MV0757A	SPAS AFD & P/L WIRING							
MV0568A	PSA	124	124	124	124	124	124	124
MV0633A	PSA LINER	20	20	20	20	20	20	20
	--- OPERATOR SUBTOTAL ---	4290	1293	3171	4821	4588	1201	4764
	TOTAL STS OPERATOR -------	3217	243	2176	4839	3593	151	3829

TABLE 2.4 - SHUTTLE SYSTEM MANAGERS RESERVE CHANGES - STATUS OCTOBER 31, 1983
BARS - 4090

	MISSIONS ORBITER ET	STS-009 OV-102E LWT-004	STS-011 OV-099 LWT-003	STS-013 OV-099 LWT-005	STS-014 OV-103 LWT-006	STS-015 OV-099 LWT-007	STS-016 OV-103 LWT-008	STS-017 OV-102E LWT-009	STS-018 OV-099 LWT-010
PREVIOUS	CURRENT MANAGERS RESERVE--NOM(08-24-83)	1686	14112	6502	8470		5493	18963	
	PAYLOAD (TABLE 2.6)	320	-177	-52	-1576		647	-1929	
	STS OPERATOR (TABLE 2.7)	-5	-51	-180	34		315	-1483	
	ORBITER (TABLE 4.1)	385	-9	-11	1190		1190	-8667	
	SSME X 3 (TABLE 6.1)	0	0	0	-98		-98	-74	
	PERSONNEL (TABLE 5.1)	-64	-314	-119	-810		-427	-594	
	NON-PROP CONSUMABLES (TABLE 4.7)	21	0	0	0		0	-911	
	OMS (TABLE 4.7)	0	0	0	-764		-864	-2000	
	RCS (TABLE 4.7)	0	0	0	0		0	-414	
	MPS PROPELLANT FB/FPR/RESIDUALS(TABLE 9)	-49	0	0	0		0	0	
	ET (TABLE 7.1)	-233	0	0	-459		63	63	
	ELEMENT WEIGHT CHANGES	375	-551	-362	-2433		826	-16009	
	PERFORMANCE CHANGES (TABLE 2.5)	-1380	-334	-1140	304		121	225	
	CURRENT MANAGERS RESERVE--NOMINAL	681	13227	5000	6291		6440	3179	

TABLE 2.4 - SHUTTLE SYSTEM MANAGERS RESERVE CHANGES - STATUS OCTOBER 31, 1983
BARS - 4090

	MISSIONS ORBITER ET	STS-019 OV-103 LWT-011	STS-020 OV-099 LWT-012	STS-021 OV-103 LWT-013	STS-022 OV-099 LWT-014	STS-023 OV-103 LWT-015	STS-024 OV-099 LWT-016	STS-025 OV-104 LWT-017
PREVIOUS	CURRENT MANAGERS RESERVE--NOM(08-24-83)	30858	5400		20197			
	PAYLOAD (TABLE 2.6)	-698	-2097		-304			
	STS OPERATOR (TABLE 2.7)	-138	973		-171			
	ORBITER (TABLE 4.1)	-316	-11		-11			
	SSME X 3 (TABLE 6.1)	-117	-117		-117			
	PERSONNEL (TABLE 5.1)	-810	364		-427			
	NON-PROP CONSUMABLES (TABLE 4.7)	0	866		0			
	OMS (TABLE 4.7)	0	0		0			
	RCS (TABLE 4.7)	0	0		0			
	MPS PROPELLANT FB/FPR/RESIDUALS(TABLE 9)	0	0		0			
	ET (TABLE 7.1)	1	1		1			
	ELEMENT WEIGHT CHANGES	-2078	-21		-1029			
	PERFORMANCE CHANGES (TABLE 2.5)	-3698	395		487			
	CURRENT MANAGERS RESERVE--NOMINAL	25082	5774		19655			

TABLE 2.5 - BRIEF DESCRIPTION OF PERFORMANCE CHANGES - STATUS OCTOBER 31, 1983
BARS - 4090

MISSIONS	STS-009	STS-011	STS-013	STS-014	STS-015	STS-016	STS-017	STS-018
SIM UPDATE	-162	-373	-53	30		24	-336	
SSME TAGS	-330							
I LOAD UPDATE OPTION (B)	-457							
INERT WEIGHT IMPACT	-26	39	25	120		-57	1120	
DEC ENVIRONMENT	-355							
TPS/790 Q-MACH CONSTRAINT			-1000				-1000	
REDUCE SSME THROTTLE SETTING (104-100)								
SRB X 2 (1) (TABLE 8.1)	0	0	-112	154		154	441	
PERFORMANCE CHANGES	-1380	-334	-1140	304		121	225	

MISSIONS	STS-019	STS-020	STS-021	STS-022	STS-023	STS-024	STS-025
SIM UPDATE	16	-47		-26			
SSME TAGS							
I LOAD UPDATE OPTION (B)							
INERT WEIGHT IMPACT	145	1		72			
DEC ENVIRONMENT							
TPS/790 Q-MACH CONSTRAINT							
REDUCE SSME THROTTLE SETTING (104-100)	-4300						
SRB X 2 (1) (TABLE 8.1)	441	441		441			
PERFORMANCE CHANGES	-3698	395		487			

(1) EQUIVALENT MARGIN = WT/10

TABLE 2.6 - PAYLOAD WEIGHT CHANGES - STATUS
BARS - 4090

OCTOBER 31, 1983

	MISSIONS	STS-009	STS-011	STS-013	STS-014	STS-015	STS-016	STS-017	STS-018
	P/L STATUS (08-24-83)	33451	29171	32633	35142		43062	17236	
	ADD MLR		170						
	ADD ACROSS THE BAY STRUCTURE(GASES)								
MV0073A	UPDATE ATTACH HARDWARE	-159							
MV0548A	UPDATE CCTV	39							
MV0713A	UPDATE 1307 B/H P/L WIRING	-61							
MV0525A	UPDATE EPS TANK SET 4	-17							
MV0710A	UPDATE S/L UTILITY KIT	12							
	ADD SPARX							1600	
	UPDATE S/L FOR ACTUAL WEIGHT	-133							
	ADD ADSF						304		
	ADD RME							4	
	UPDATE/ADD I MAX CAMERA			9	325			325	
MV0514A	ADD CONT SUPT ASSY		73						
	UPDATE/ADD CINEMA 360		-50	-44	472				
	LDEF UPDATE			87					
	TELSTAR UPDATE						-172		
	TELSAT UPDATE								
	MSL UPDATE								
	DELETE ARABSAT								
	ADD GASES		-16						
	DELETE/ADD CFES				779		-779		
MV0719A	UPDATE								
MV0519A	UPDATE TUNNEL								
MV0710A	UPDATE								
MV0730A	UPDATE								
	ADD OASIS								
MV0525A	ADD TANK SET 4								
	CRYO UPDATE	4							
	P/L CHANGES	-320	177	52	1576		-647	1929	
	P/L STATUS	33131	29348	32685	36718		42415	19165	

TABLE 2.6 - PAYLOAD WEIGHT CHANGES - STATUS OCTOBER 31, 1983

BARS - 4090

	MISSIONS	STS-019	STS-020	STS-021	STS-022	STS-023	STS-024	STS-025
	P/L STATUS (08-24-83)	25009	31065		18211			
	ADD MLR							
	ADD ACROSS THE BAY STRUCTURE(GASES)	6100						
MV0073A	UPDATE ATTACH HARDWARE		579					
MV0548A	UPDATE CCTV		40					
MV0713A	UPDATE 1307 B/H P/L WIRING		-61					
MV0525A	UPDATE EPS TANK SET 4							
MV0710A	UPDATE S/L UTILITY KIT							
	ADD SPARX							
	UPDATE S/L FOR ACTUAL WEIGHT							
	ADD ADSF				304			
	ADD RME	4						
	UPDATE/ADD I MAX CAMERA							
MV0514A	ADD CONT SUPT ASSY							
	UPDATE/ADD CINEMA 360							
	LDEF UPDATE							
	TELSTAR UPDATE							
	TELSAT UPDATE	-114						
	MSL UPDATE	1293						
	DELETE ARABSAT	-10158						
	ADD GASES	2794						
	DELETE/ADD CFES	779						
MV0719A	UPDATE		-11					
MV0519A	UPDATE TUNNEL		-25					
MV0710A	UPDATE		15					
MV0730A	UPDATE		2					
	ADD OASIS							
MV0525A	ADD TANK SET 4		1558					
	CRYO UPDATE							
	P/L CHANGES	698	2097		304			
	P/L STATUS	25707	33162	45591	18515	49134	33433	33931

TABLE 2.7 - STS OPERATOR WEIGHT CHANGES
BARS - 4090

OCTOBER 31, 1983

	MISSIONS	STS-009	STS-011	STS-013	STS-014	STS-015	STS-016	STS-017	STS-018
	STS OPERATOR STATUS (08-24-83)	128	5250	4756	5598		5769	3804	
	UPDATE STABLIZER LINK DELETION	5							
MV0610A	REDUCE ARM RESTS	20	20	20	20		20	20	
MV0566A	UPDATE/ADD TANK SET 5	-14						635	
MV0570A	UPDATE ACIP	-51	-52	-52	-52		-183	131	
MV0408A	DELETE MADS 2				-712				
MV0545A	ADD COMSEC(XFER FROM ORBITER	40	40	40	40		40	40	
MV0082A	RMS UPDATE	6							
	P/L BAY LINER	-7							
MV0578A	DAC WIRING	6							
MV0072A	ATTACH HDW UPDATE		10	20	30		-14	581	
MV0082A	RMS ELBOW CAMERA		31	31	31		31	31	
MV0408A	MADS/MINI MADS		1	1	261		-451		
MV0514A	CONT SUPT ASSY		-53						
MV0728A	SIP SMCH UPDATE		13						
MV0712A	SMCH UPDATE		-206						
MV0719A	AFT FLT DECK HARNESS		8		-1			-14	
MV0725A	SIP SMCH UPDATE		9		28				
MV0766A	LONGERON CABLE SUPT		11	11	11		11		
	DELETE/ADD GALLEY				-138		138		
MV0525A	TANK SET 4 UPDATE/DELETION				1		1	7	
	ADD 4 VTR'S/UPDATE				264			-1	
MV0711A	UPDATE 603 HARNESS				-1			-1	
MV0610A	ADD SEATS				184		92	92	
MV0412A	ADD S-BAND FM								
	DELETE EJECT SEAT BALLAST							-50	
	DELETE PARACHUTES							-28	
	DELETE SURVIVAL KITS							-56	
MV0548A	UPDATE CCTV							-1	
	ADD BALLAST PROV							22	
	ADD EMERG O2 TANKS							75	
	DELETE PSA AND CONTAINER		-144	-144					
	ADD CBSA AND BEAM		363	253					
	DELETE PERSONNEL (XFER TO PERSONNEL								
	STS OPERATOR CHANGES	5	51	180	-34		-315	1483	
	STS OPERATOR STATUS	133	5301	4936	5564		5454	5287	

TABLE 2.7 - STS OPERATOR WEIGHT CHANGES
BARS - 4090

OCTOBER 31, 1983

	MISSIONS	STS-019	STS-020	STS-021	STS-022	STS-023	STS-024	STS-025
	STS OPERATOR STATUS (08-24-83)	3079	1216		4668			
	UPDATE STABLIZER LINK DELETION							
MV0610A	REDUCE ARM RESTS	20	20		20			
MV0566A	UPDATE/ADD TANK SET 5							
MV0570A	UPDATE ACIP		-52		-52			
MV0408A	DELETE MADS 2							
MV0545A	ADD COMSEC(XFER FROM ORBITER	40	40		40			
MV0082A	RMS UPDATE							
	P/L BAY LINER							
MV0578A	DAC WIRING							
MV0072A	ATTACH HDW UPDATE	-241			28			
MV0082A	RMS ELBOW CAMERA				31			
MV0408A	MADS/MINI MADS	261	1		1			
MV0514A	CONT SUPT ASSY							
MV0728A	SIP SMCH UPDATE							
MV0712A	SMCH UPDATE							
MV0719A	AFT FLT DECK HARNESS							
MV0725A	SIP SMCH UPDATE							
MV0766A	LONGERON CABLE SUPT	11	11		11			
	DELETE/ADD GALLEY	-138						
MV0525A	TANK SET 4 UPDATE/DELETION	1	-692					
	ADD 4 VTR'S/UPDATE							
MV0711A	UPDATE 603 HARNESS							
MV0610A	ADD SEATS	184			92			
MV0412A	ADD S-BAND FM		22					
	DELETE EJECT SEAT BALLAST							
	DELETE PARACHUTES							
	DELETE SURVIVAL KITS							
MV0543A	UPDATE CCTV							
	ADD BALLAST PROV							
	ADD EMERG O2 TANKS							
	DELETE PSA AND CONTAINER							
	ADD CBSA AND BEAM							
	DELETE PERSONNEL (XFER TO PERSONNEL		-323					
	STS OPERATOR CHANGES	138	-973		171			
	STS OPERATOR STATUS	3217	243	2176	4839	3593	151	3829

TABLE 2.8 - PROJECTED WEIGHT MARGINS - STS-009 THROUGH STS-025 OCTOBER 31, 1983
BARS - 4090

MISSIONS	STS-009	STS-011	STS-013	STS-014	STS-015	STS-016	STS-017	STS-018
CURRENT MANAGER'S RESERVE	681	13227	5000	6291		6440	3179	
SIM UPDATE (2)	92							
ADOPT STANDARD I LOADS			-400	-400	-400	-400	-400	
LAUNCH WINDOW RESERVE			-1400					
ORBITER WING CONSTRAINT(1)		-1000	-1000	-1000		-1000	-1000	
Q ALPHA = -2900 (1)		TBD	TBD				TBD	
Q ALPHA = -4100 (1)				TBD		TBD		
PROJECTED MANAGERS RESERVE CHANGES	92	-1000	-2800	-1400		-1400	-1400	
PROJECTED MANAGERS RESERVE	773	12227	2200	4891		5040	1779	

MISSIONS	STS-019	STS-020	STS-021	STS-022	STS-023	STS-024	STS-025
CURRENT MANAGER'S RESERVE	25082	5774	12017	19655	7693	8346	16479
ADOPT STANDARD I LOADS	-400	-400	-400	-400	-400	-400	-400
LAUNCH WINDOW RESERVE				-1400			
ORBITER WING CONSTRAINT(1)	-1000	-1000	-1000	-1000	-1000	-1000	-1000
Q ALPHA = -2900 (1)		TBD		TBD		TBD	
Q ALPHA = -4100 (1)	TBD		TBD		TBD		TBD
PROJECTED MANAGERS RESERVE CHANGES	-1400	-1400	-1400	-2800	-1400	-1400	-1400
PROJECTED MANAGERS RESERVE	23682	4374	10617	16855	6293	6946	15079

(1) OV-103 WING DESIGN HAS BEEN CHANGED.THE 1000LB POTENTIAL SHALL BE CARRIED UNTIL COMBINED EFFECT OF DESIGN CHANGE & Q ALPHA CHANGE IS KNOWN

(2) PERFORMACE RESULTS FROM SODS J-712 ADD 8

TABLE 2.9 - BRIEF DESCRIPTION OF PROJECTED CHANGES TO MANAGERS RESERVE STS-8 THROUGH 22

ORBITER INERT WEIGHT	VEHICLE DEPENDENT
A LIST OF ORBITER INERT WEIGHT POTENTIAL CHANGES IS GIVEN IN TABLE 4.4.	
STANDARD I-LOAD	-400
THE I-LOAD DESIGN FOR OFT IS CONFIGURED FOR THE EXPECTED MONTH OF LAUNCH. IF THE I-LOAD WAS CONFIGURED BASED ON SEASONAL CHARACTERISTICS, A PENALTY OF 400 LBS COULD OCCUR FOR THE NOMINAL LAUNCH.	
LAUNCH WINDOW RESERVE	0 to -1400
DUE TO THE UNCERTAINTY OF KNOWING WHERE THE TARGET SATELLITE MAY BE IN ITS ORBIT A PHASING PROBLEM MAY OCCUR DURING THE RENDEZVOUS AND DOCKING MANEUVER. THE RESULTING PENTALTY MAY BE 0 TO -1400 LBS.	
ORBITER WING CONSTRAINT	-1000
THE PRESENT ORBITER WING PLACARD RESULTS IN A PENALTY OF UP TO 1000 LBS.	
Q ALPHA = -2900	TBD
PROPOSED OV-099 Q ALPHA CONSTRAINT CHANGE.	
Q ALPHA = -8100	TBD
PROPOSED OV-103 AND OV-104 Q ALPHA CONSTRAINT CHANGE.	

3.0 SYSTEM WEIGHT AND PERFORMANCE - BRM MISSIONS

The status of Shuttle system Managers Reserve, control weights, and pending changes are summarized in this section for the BRM missions, and the Galileo Mission.

This section consists of BRM Mission Descriptions (Table 3.1), Level II Control Weight Changes (Table 3.2), Mission Summary of Lift Capability and Managers Reserve (Table 3.3), Managers Reserve Changes (Tables 3.5 and 3.6), and Projected Weight Margins (Table 3.6). Space Shuttle capability evolutions for BRM-1Y and BRM-4Y are shown in Figures 3.1.1 and 3.1.2. The variation of payload capability with orbit inclination based on groundrules defined by BRM-1Y for ETR launches, and BRM-4Y for WTR launches are shown in Figure 3.2.

TABLE 3.1 - BRM MISSION DESCRIPTIONS

Mission 1. Mission 1 is a payload delivery mission to a 150 n. mi. circular orbit. The mission will be launched due east and requires a payload capability of 65,000-lb. The purpose of this mission is either the placement in orbit of a 65,000-lb satellite or the placement in orbit of a 65,000-lb satellite and retrieval from orbit of a 32,000-lb satellite. The Orbiter-vehicle on-orbit translational delta V requirements in excess of a 50 X 100 n. mi. reference orbit are 650 ft/sec from the orbital maneuvering subsystem (OMS) and 100 ft/sec from the RCS. The injected margin is based on an SRB mean bulk temperature at 60°F, nominal shaping (1) and a first stage maximum dynamic pressure of 680 psf. Other ground rules are described in JSC-07700, Space Shuttle Flight and Ground System Specification, Volume X, Appendix 10.12.

Mission 3A. Mission 3A is a payload delivery mission to an orbit at 104° inclination and return to the launch site. The boost phase shall result in an insertion into an orbit with a minimum apogee of 100 n. mi., as measured above the earth's equatorial radius. The Orbiter-vehicle on-orbit translation delta V requirements in excess of a 50 X 100 n. mi. reference orbit are 250 ft/sec from the OMS and 100 ft/sec from the RCS. The ascent payload requirement is 32,000 lb. For mission performance and consumables analyses, a return payload of 2500 lb will be assumed (the 2500 lb is included in the 32,000 lb ascent payload weight). The injected margin is based on an SRB mean bulk temperature of 52°F, a filament wound case SRB and a first stage maximum dynamic pressure of 650 psf. Other ground rules are described in JSC-07700, Space Shuttle Flight and Ground System Specification, Volume X, Appendix 10.12.

Mission 4. Mission 4 is a payload delivery and retrieval mission of a modular spacecraft weighing 32,000 lb at lift-off. The mission will deploy a spacecraft weighing 29,000 pounds in a 150 n. mi. circular orbit at 98 degrees inclination within two revolutions after lift-off. A passively cooperative, stabilized spacecraft, weighing 22,500 pounds, will be retrieved from a 150 n. mi. circular orbit and returned to VAFB. The mission length, including contingencies, will be 7 days. For mission performance and consumables analyses, a cradle weight of 2,500 lb will be assumed to be included in the ascent payload weight, but must be added to the retrieved payload weight. The RCS will be loaded full and the minimum on-orbit translation, delta-velocity from the OMS, including post-MECO insertion burn, is a total of 1050.5 ft/sec. The total injected margin is based on a first stage maximum dynamic pressure of 650 psf, a filament wound case SRB and includes 1730 lb for the SRB mean bulk temperature of 52°F. Standard provisions shall be included for personnel and stowed equipment. Contingency EVA capability shall be provided.

Mission 1Y, 4Y. The new BRM-1Y and BRM-4Y missions are assumed to have the same payload requirements as BRM-1 and BRM-4, respectively. The new missions are planned for one day with two crewmen. It is assumed that the non-propulsive consumables, personnel and RCS propellants are loaded in accordance with BRM-3A. The OMS propellants are based on delta-velocity required for orbit insertion, circularization and deorbit. For BRM-1Y, the delta-velocity requirement is 690 ft/sec and for BRM-4Y, the delta-velocity is 1000 ft/sec. The difference is attributable to MECO velocity reduction at WTR for ET disposal.

Galileo. The Galileo mission is an Orbiter delivery of the CENTAUR CARGO ELEMENT to 130 N.Mi circular orbit at 28.5 degrees inclination. The payload for this mission is 65,000 lbs. of which 62,100 lbs. is the control weight of LERC provided Centaur element and 2900 lbs. is the control weight for JSC provided equipment. The purpose of the mission is to launch a Centaur/spacecraft from the Orbiter into a planetary trajectory.

(1) S15243 Trans-Atlantic Abort Landing (TAL) intact abort mode.

TABLE 3.2 - LEVEL II CONTROL WEIGHT CHANGES

	Level II Change Request	Control Weight, lb								
		Orbiter			SSMEX3	ET	SRBX2			
		OV-103	OV-099	OV-102 OPER		Light (LWT-7)	Heavy 86-80	Light 86-80	Light HPM	Heavy HPM
August 1983 Control Weight, lb		142503	144764	145569	21015	69927	372522	365822	369000	375600
October 1983 Control Weight, lb		142503	144764	145569	21015	69927	372522	365822	369000	375600

BRIEF DESCRIPTION FOR LEVEL II CONTROL WEIGHT CHANGES

NONE THIS REPORT

TABLE 3.3 - MISSION SUMMARY, LIFT CAPABILITY, AND MANAGERS RESERVE
BARS - 4090

OCTOBER 31, 1983

MISSION (1)	BRM-1	BRM-1Y	BRM-3A	PRM-4	PRM-4Y	GALILEO	GALILEO
LAUNCH DATE	WINTER	WINTER	WINTER	WINTER	WINTER	MAY 1986	ALT PROJ
ORBITER	OV-103	OV-103	OV-103	OV-103	OV-103	OV-104	
EXTERNAL TANK	LWT-7	LWT-7	LWT-7	LWT-7	LWT-7	LWT-7	
CREW/DAYS	4M/7D	2M/1D	2M/1D	4M/7D	2M/1D	4M/2D	
SSME	OPER	OPER	OPER	OPER	OPER	OPER	
SSME THROTTLE SETTINGS (%)	109/109	109/109	109/109	109/109	109/109	109/109	104/104
SRB	MWC/HPM	MWC/HPM	FWC/HPM	FWC/HPM	FWC/HPM	MWC/HPM	FWC/HPM
ALTITUDE (N.M.)	150	150	100	150	150	130	
INCLINATION (DEG)	28.45	28.45	104	98	98	28.45	
WEIGHT SUMMARY							
PROJECTED MANAGERS RESERVE	1320	4757	4257	-1195	3032	4607	3977
PROJECTED CHANGES (TABLE 3.6)	-3703	-3703	853	853	853	-3703	-4333
CURRENT MANAGER'S RESERVE (3)	5023	8460	3404	-2048	2179	8310	8310
PAYLOAD	65000	65000	32000	32000	32000	65000	65000
LIFT CAPABILITY (2)	70023	73460	35404	29952	34179	73310	73310
STS OPERATOR		-519	-519		-519	-995	-995
ORBITER INERT	147159	147159	147159	147159	147159	147894	147894
SSME X 3 INERT	20772	20772	20772	20772	20772	20772	20772
PERSONNEL	3575	2364	2364	3575	2364	3238	3238
NON-PROP. CONSUMABLES	4749	3942	3942	4749	3942	4411	4411
OMS PROPELLANT	19700	18800	15095	23064	23362	18200	18200
RCS PROPELLANT	7416	7416	7416	7416	7416	6480	6480
MPS PROPELLANT UNEXPENDED	13554	13554	14502	14502	14502	13716	13716
MPS PRESSURANTS	423	423	423	423	423	423	423
ET INERT	66957	66957	66957	66957	66957	66957	66957
SHUTTLE SYSTEM AT MECO	354328	354328	313515	320369	320557	354406	354406
. NON-PROPULSIVE WEIGHT LOSS (4)	442	442	442	442	442	442	442
SRB X 2 INERT	373624	373624	319184	319184	319184	373624	373624
SRB X 2 PROPELLANT	2218068	2218068	2214472	2214472	2214472	2218068	2218068
MPS PROPELLANT EXPENDED	1575792	1572395	1576503	1581955	1577728	1577428	1577428
SHUTTLE SYSTEM AT SRB IGNITION	4522254	4518857	4424116	4436622	4432383	4523968	4523968

(1) FOR BRIEF DESCRIPTION SEE TABLE 3.1

(2) P/L LIMITED TO 65000 LBS FOR LANDING WT AND BRM-1 &1Y SHAPED NOMINAL.

(3) EXPENDED PROPELLANT EXCEEDS USABLE IMPULSE FOR NEGATIVE MANAGERS RESERVE
. SEE TABLE 9.

(4) SEE TABLE 2.1.2

TABLE 3.3.1 - BASELINED ASCENT PERFORMANCE GROUNDRULES SUMMARY
BARS - 4090

OCTOBER 31, 1983

MISSIONS	BRM-1	BRM-1Y	BRM-3A	PRM-4	PRM-4Y	GALILEO
LAUNCH DATE	WINTER	WINTER	WINTER	WINTER	WINTER	MAY 1986
LAUNCH SITE	ETR	ETR	WTR	WTR	WTR	ETR
ORBITER	OV-103	OV-103	OV-103	OV-103	OV-103	OV-104
EXTERNAL TANK	LWT-7	LWT-7	LWT-7	LWT-7	LWT-7	LWT-7
EPS TANK SETS	3	3	3	3	3	3
SOFTWARE RELEASE						
CREW/DAYS	4M/7D	2M/1D	2M/1D	4M/7D	2M/1D	4M/2D
SSME THROTTLE SETTINGS (%)	109/109	109/109	109/109	109/109	109/109	109/109
SSME ISP	SPEC NOM	SPEC NOM	SPEC NOM	SPEC NOM	SPEC NOM	SPEC NOM
SRB	MWC/HPM	MWC/HPM	FWC/HPM	FWC/HPM	FWC/HPM	MWC/HPM
ASCENT AERODYNAMICS	IVBC-3	IVDC-3	IVBC-3	IVBC-3	IVBC-3	IVBC-3
TRAJECTORY SHAPING	NOMINAL	NOMINAL	ABORT	ABORT	ABORT	NOMINAL
ALTITUDE (N.M.)	150	150	100	150	150	130
INCLINATION (DEG)	28.45	28.45	104	98	98	28.45
DESIGN SEASON	WINTER	WINTER	WINTER	WINTER	WINTER	TRANS
Q-M DESIGN CONSTRAINT	TPS/819	TPS/819	TPS/819	TPS/819	TPS/819	TPS/819
MAX Q	720	720	650	650	650	741
LOAD RELIEF Q-ALPHA	-2000	-2000	-1500	-1500	-1500	-2500
ENTRY TARGET LINE	STEEP	STEEP	SHALLOW	SHALLOW	SHALLOW	STEEP

TABLE 3.3.2 JSC-PROVIDED INTEGRATION HARDWARE FOR GALILEO
BARS - 4090

DESCRIPTION	
FLUID SYSTEMS MISSION KIT ORBITER	268
ORBITER BRIDGE/KEEL FITTINGS INCLUDING WEIGHT ALLOCATION	823
PAYLOAD RECORDER	60
CABLES	900
- SMCH CABLE (INCLUDES AFT BULKHEAD WIRING AND WIRE TRAYS)	
- UNIQUE CABLES	
AFT FLIGHT DECK WIRING & EQUIPMENT	25
ONE STANDARD SWITCH PANEL	21
PAYLOAD TIMING BUFFER	3
ATCS RADIATOR PANELS 7 & 8	355
VIDEO/PHOTOGRAPHIC EQUIPMENT	140
MISCELLANEOUS ORBITER CLOSEOUT HARDWARE	55
RTG COOLING	450
TOTAL (1)	3100

(1) OF THE 3100, PAYLOAD CHARGEABLE IS LIMITED TO 2900.

TABLE 3.4 - SHUTTLE SYSTEM MANAGERS RESERVE CHANGES - STATUS
BARS - 4090

OCTOBER 31, 1983

MISSIONS ORBITER EXTERNAL TANK SRB	BRM-1 OV-103 LWT-7 MWC/HPM	BRM-1Y OV-103 LWT-7 MWC/HPM	BRM-3A OV-103 LWT-7 FWC/HPM	PRM-4 OV-103 LWT-7 FWC/HPM	PRM-4Y OV-103 LWT-7 FWC/HPM	GALILEO OV-104 LWT-7 MWC/HPM
PREV CURRENT MANAGERS RESERVE(09-24-83)	5287	8654	4266	-1116	3041	8954
PAYLOAD	0	0	0	0	0	0
STS OPERATOR						
ORBITER	-316	-316	-316	-316	-316	-1051
SSME X 3	-117	-117	-117	-117	-117	-117
PERSONNEL	-70			-70		-92
NON-PROP CONSUMABLES						
OMS						
MPS PROPELLANT FB/FPR/RESIDUALS(TABLE 9)						
ET	63	63	63	63	63	63
ELEMENT WEIGHT CHANGES	-440	-370	-370	-440	-370	-1197
PERFORMANCE CHANGES	176	176	-492	-492	-492	553
CURRENT MANAGERS RESERVE	5023	8460	3404	-2048	2179	8310

TABLE 3.5 - BRIEF DESCRIPTION OF PERFORMANCE CHANGES-STATUS
BARS - 4090

MISSIONS	BRM-1	BRM-1Y	BRM-3A	PRM-4	PRM-4Y	GALILEO
SIM UPDATE-JSC/ET4 (FWC)			400	400	400	
SIM UPDATE						377
SIM UPDATE(Q,Q-ALPHA,SHALLOW ENTRY,NO ABORT OVERLAP)			280	280	280	
SRB X 2 (1)	176	176	-1172	-1172	-1172	176
SSPO RPTED PERFORMANCE CHANGES	176	176	-492	-492	-492	553

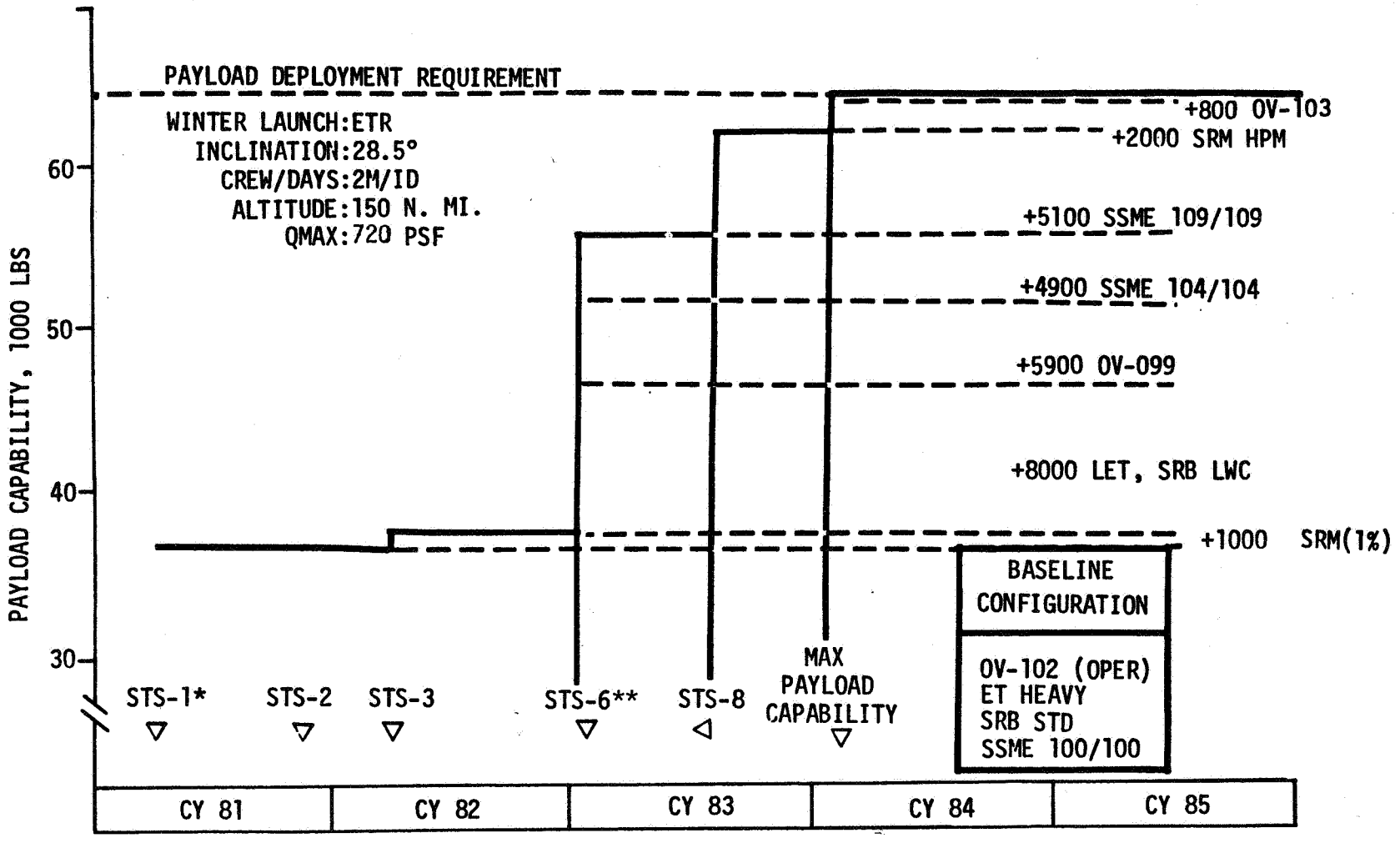
TABLE 3.6 - PROJECTED WEIGHT MARGINS - BRM'S & PRM'S
BARS - 4090

OCTOBER 31, 1983

	MISSIONS	BRM-1	BRM-1Y	BRM-3A	PRM-4	PRM-4Y	GALILEO	GAL ALT
	CURRENT MANAGERS RESERVE	5023	8460	3404	-2048	2179	8310	8310
	PERFORMANCE ENHANCEMENTS FOR CY86 COMMITMENTS.			1385	1385	1365		
	PERFORMANCE ENHANCEMENTS FOR CY88 COMMITMENTS.			1113	1113	1113		
	SSME ISP 2.7 SEC LOW	-3100	-3100	-3100	-3100	-3100	-3100	-3100
	Q ALPHA = -3500 (WING LOAD)	-800	-800	-800	-800	-800	-800	-800
(1)	SHAPE NOMINAL			1800	1800	1800		
	REDUCE SSME THROTTLE SETTING(109 TO 104)							-5100
	FILAMENT WOUND CASE (FWC)							4600
	FWC HARDWARE UPDATE			-130	-130	-130		-130
	MPS INVENTORY PERFORMANCE CHANGES FOR INCORPORATING SHAPE NOMIMAL, TARGET MR 5 MIN DRAINBACK, AND ORBITER ECO TIMER			585	585	585		
	MPS INVENTORY PERFORMANCE CHANGES FOR INCORPORATING TARGET MR, 5 MIN DRAINBACK, AND ORBITER ECO TIMER	197	197				197	197
	PROJECTED CHANGES	-3703	-3703	853	853	853	-3703	-4333
	PROJECTED MANAGERS RESERVE	1320	4757	4257	-1195	3032	4607	3977

(1) JSC/ET4 SIM/SHAPE NOM,OPS GROUNDRULES,Q=690PSF,Q ALPHA=-3400PSF.

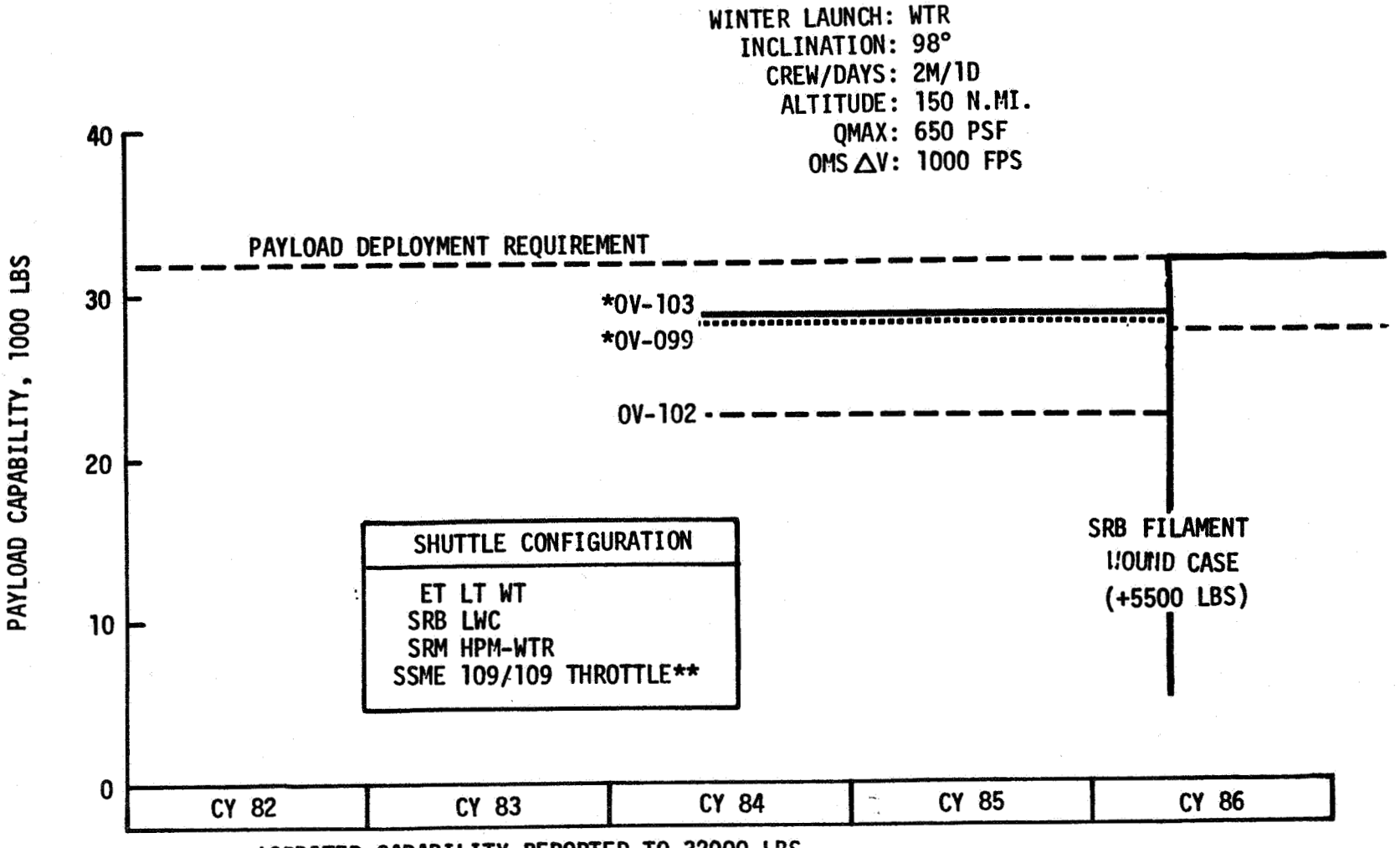
FIGURE 3.1.1 - SPACE SHUTTLE CAPABILITY EVOLUTION - REFERENCE MISSION - 1Y



*STS-1 THROUGH STS-5 CONFIGURED FOR DDT&E AND CONSTRAINED TO 100% SSME THROTTLE.

**STS-6 AND SUBSEQUENT CONFIGURATION PRESENTLY PLACARDED AT 104% SSME MAX THROTTLE FOR INCREASED ENGINE LIFE.

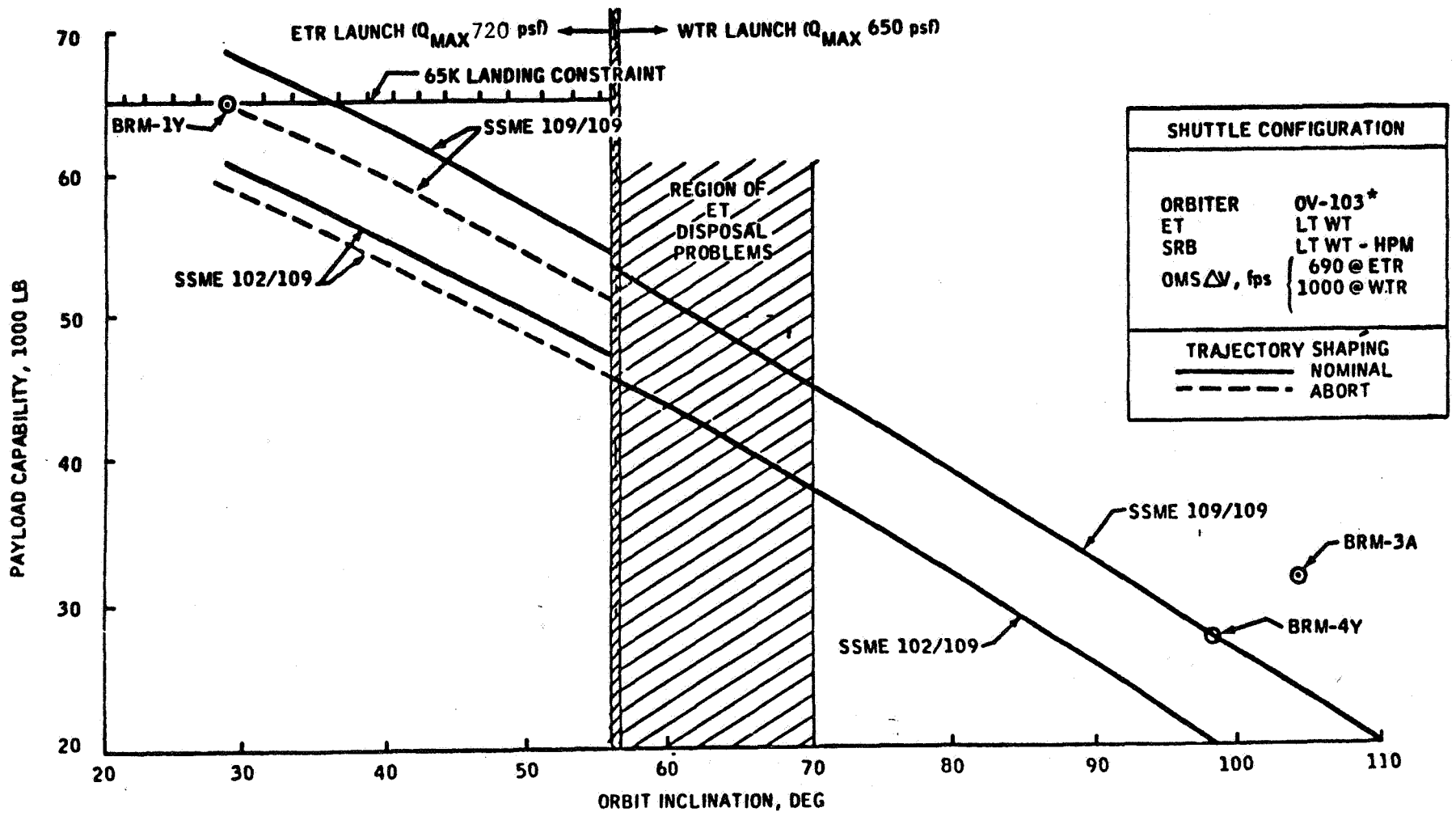
FIGURE 3.1.2- SPACE SHUTTLE CAPABILITY EVOLUTION - REFERENCE MISSION - 4Y



*ORBITER CAPABILITY REPORTED TO 32000 LBS
**CAPABILITY REDUCED BY 6800 LBS FOR 102/109 THROTTLE

FIGURE 3.2 - SPACE SHUTTLE PAYLOAD DEPLOYMENT CAPABILITY VS INCLINATION
(CREW/DAYS 2M/1D, ORBIT ALTITUDE 150 N. MI.)

UNDER REVIEW



* BASED ON PROJECTED WEIGHT JSC-09095-71 (APRIL 1983)

FIGURE 3.3.1 TIME HISTORY INJECTED WEIGHT MARGIN & MANAGERS' RESERVE BRM-1

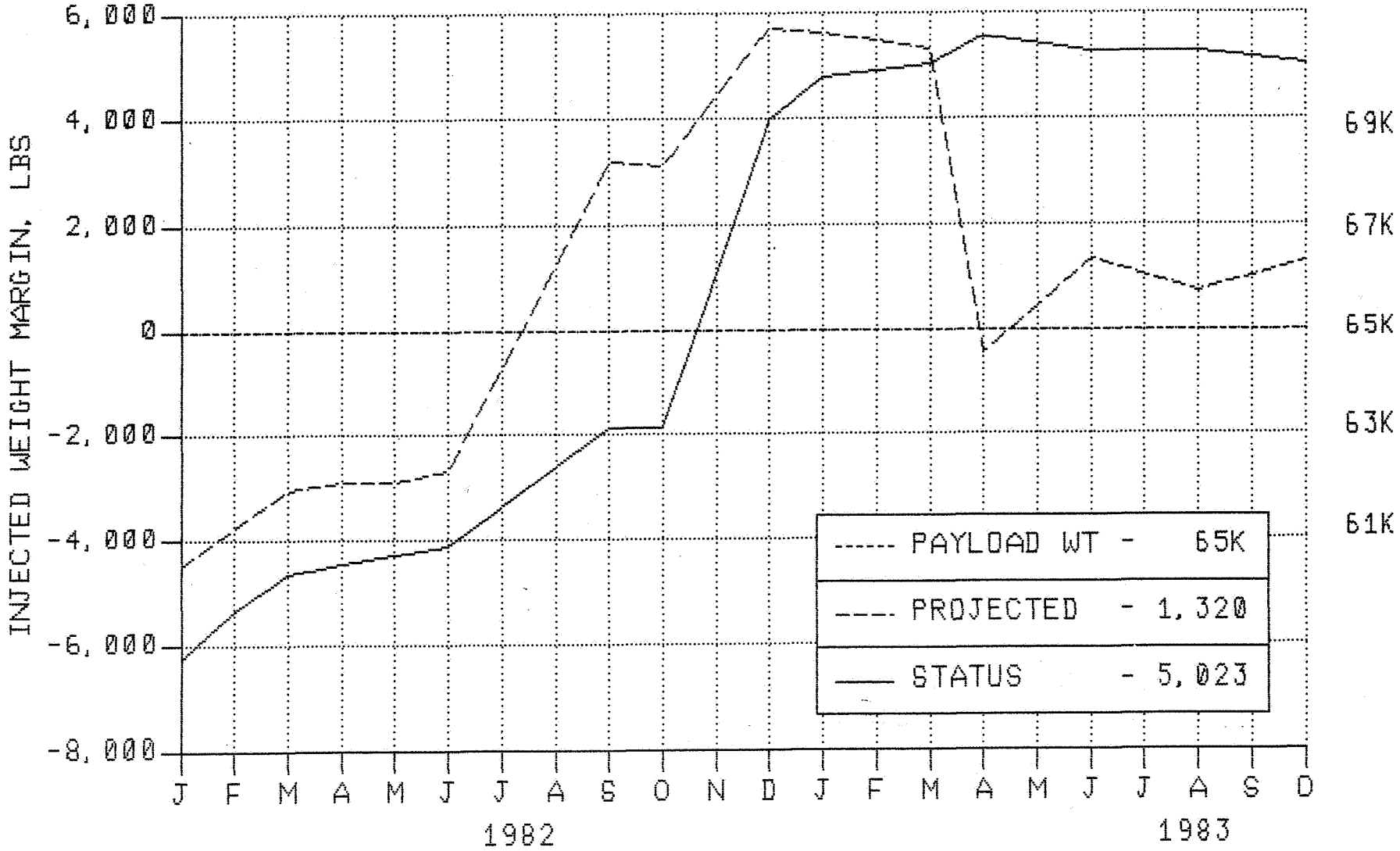


FIGURE 3.3.2 TIME HISTORY INJECTED WEIGHT MARGIN & MANAGERS'S RESERVE BRM-3A

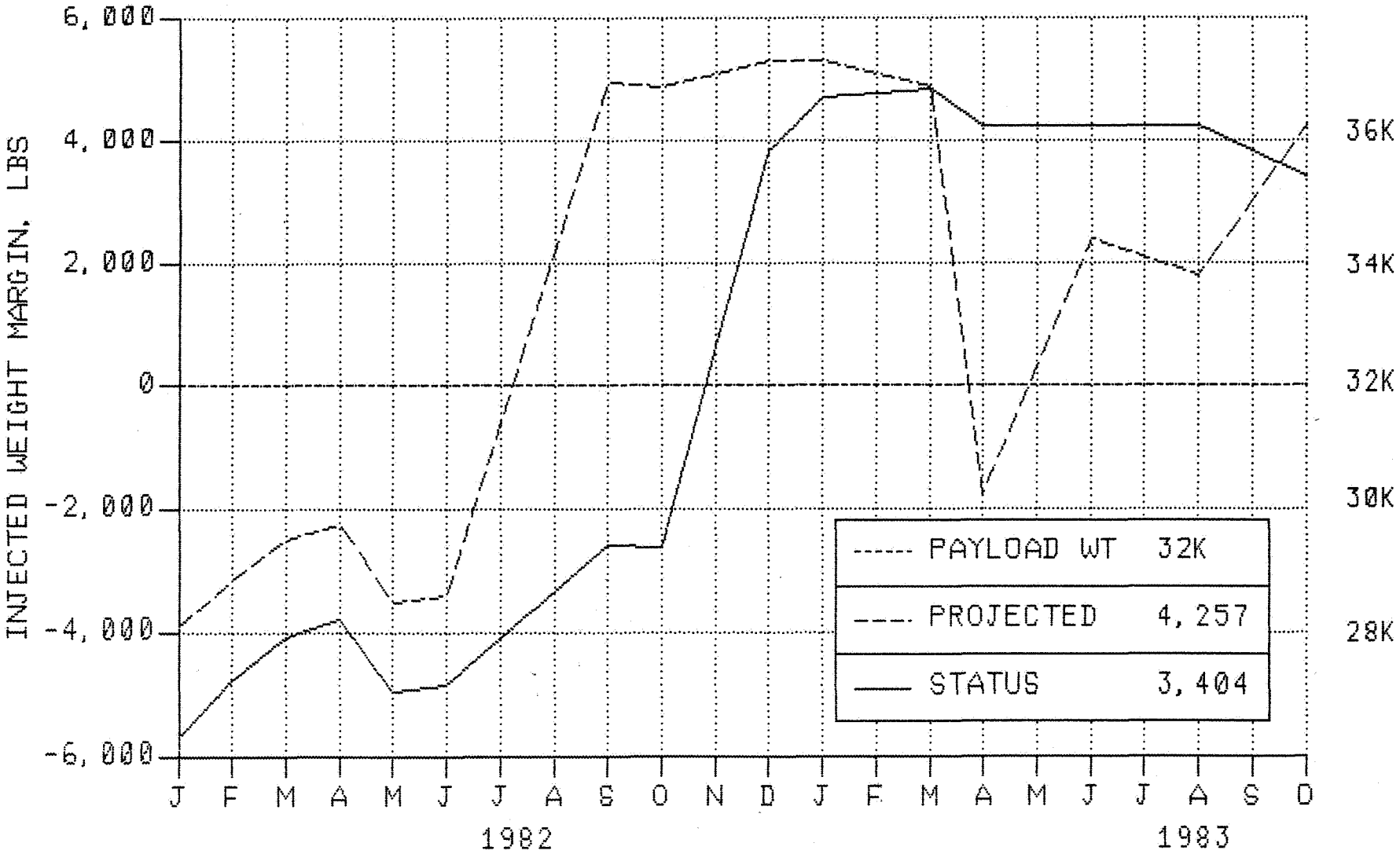


FIGURE 3.3.3 TIME HISTORY INJECTED WEIGHT MARGIN & MANAGERS'S RESERVE BRM-4

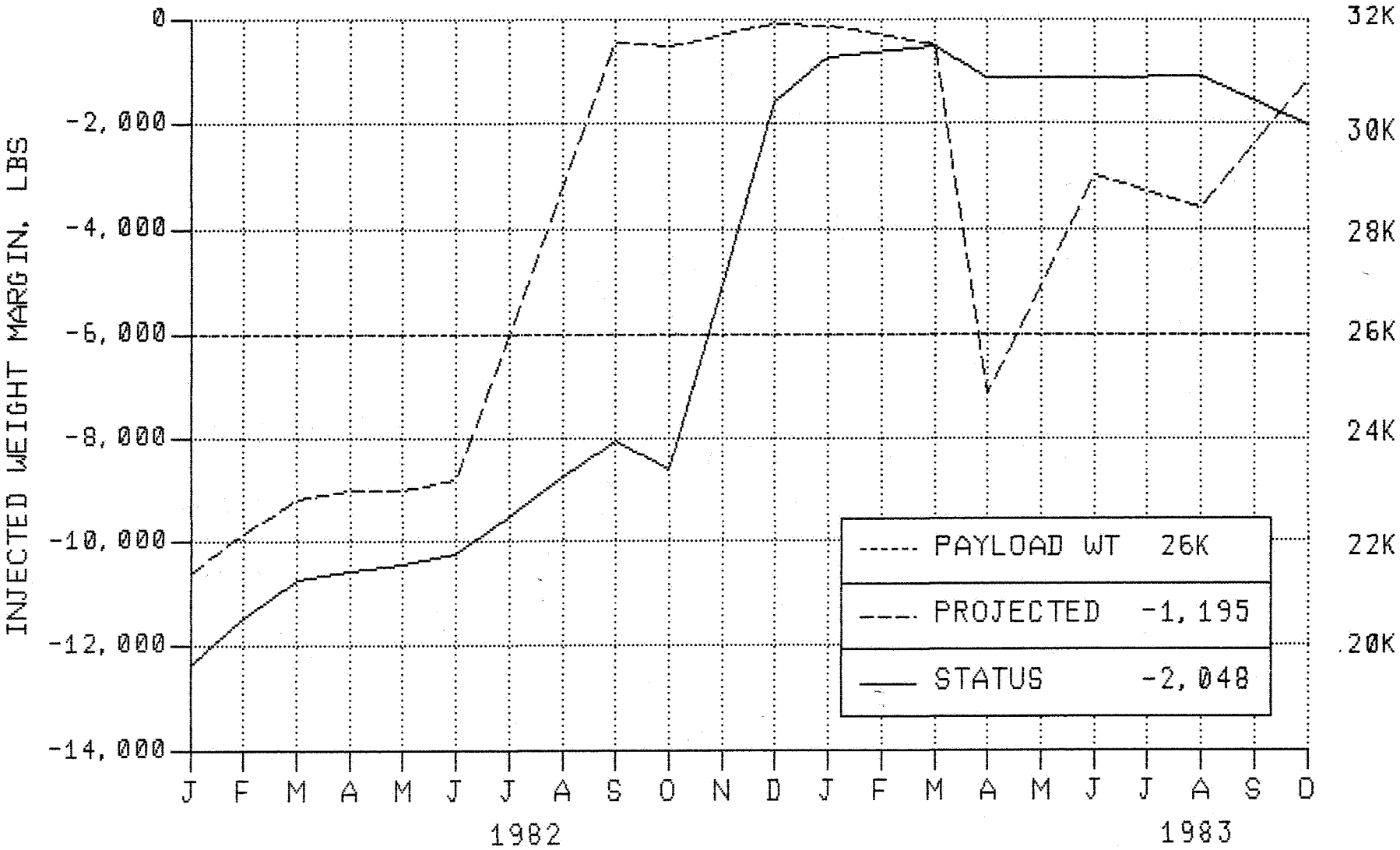


TABLE 3.8.1 - ORBITER/SSME CONTROL WEIGHT ARITHMETIC

September 1974	
Orbiter Inert Control Weight, lb	132139
Orbiter Closed Loop Fluids, lb	-1369
Orbiter Dry, lb	130770
Personnel Allocation From Orbiter, lb	+225
SSMEX3, lb	+19017
Total Dry, lb	150012*

*SSME3 Control Weight Increased 12 lb Per PRCBD S00780: 6-18-74

August 1983 - October 1983	Mission 1	Mission 3A
Orbiter Inert Control Weight, lb	142503	142059
Changes		
None this report		
New Orbiter Inert Control, lb	142503	142059
Closed Loop Fluids, lb	-1600	-1600
Orbiter Dry, lb	140903	140459
Personnel Allocation From Orbiter, lb	+277	+277
SSMEX3, lb	+21015	+21015
Total Dry, lb	162195	161751
Transferred From Level II - Management Reserve, lb	-12195	-11751
Orbiter Dry Weight, lb	150000	150000

TABLE 3.8.2 - ET CONTROL WEIGHT ARITHMETIC

September 1974

ET Inert Control - Level III	70910
ET Inert - CFE	(70387)
ET/Orbiter Umbilical Hdw-GFE	(523)
Separation - GFE	380
SRB Supports - GFE	(375)
Orbiter Ftg - GFE	(5)
ET Inert Control - Level II	71290
Residuals - Nominal	3710
ET at MECO	75000

August 1983 - October 1983

	LWT
ET Inert - CFE	68644
Changes	
None this Report	
New ET Inert CFE	68644
ET/Orb Unbilical - GFE	+474
ET Inert Control Level III	69118
Separation - GFE	809
SRB Supports - GFE	(750)
ORB Ftgs - GFE (EO-1. 2. & 3)	(59)
New ET Inert Control Level II	69927
Residuals - AOA	8231
- Non Prop Gas	423
Total at MECO	78581
Transferred from Level II Mgmt. Reserve	-3581
ET at MECO	75000

TABLE 3.8.3 - SRB CONTROL WEIGHT ARITHMETIC

SRM PDR November 1974		August 1983 - October 1983	Hvy. Wt.	Lt. Wt.	Lt.- HPM	Hvy. Wt.- HPM
SRBX2 Inert Control	361020	SRBX2 Inert Control	372522	365822	369000	375600
		Changes				
		None this Report				
		New SRBX2 Inert	372522	365822	369000	375600
		Transferred from Level II Mgmt Reservt -	-11502	-4802	-7980	-14580
		SRBX2 Inert	361020	361020	361020	361020

TABLE 3.11 - BASELINE CAPABILITY VARIATIONS LISTS - BRM's & PRM's

TITLE	MARGIN IMPACT (LBS)	ACTIONEE
WTR Motor at ETR	+2000	MSFC-SRB
$2\sigma/1\sigma$ FPR at Mode Boundary	+1722	JSC-SSPO
Filament Wound Case-ETR	+4600	Level I
Decrease SSME Pwr Level	-5100	

WTR MOTOR AT ETR +2000

The WTR Motor defined as 86-80 or HPM can be used at ETR December through March. This results in a payload improvement of approximately 2000 lbs. The use of this motor is dependent upon a 14-month lead time for production.

$2\sigma/1\sigma$ FPR AT MODE BOUNDARY +1722

If the current 2σ used for operational AOA (BRM-1) is decreased to 1σ, the corresponding gain in performance is 1722 lbs.

SRB FILAMENT WOUND CASE +4600

Filament wound (Composite) SRM Case

Decrease SSME Throttle Setting (109 to 104) -5100

If the SSME throttle setting is reduced from 109% to 104% the performance loss is 5100 lbs.

4.0 ORBITER WEIGHT SUMMARY

This section provides the inert weight status along with pending changes, a comparison of STS-9 to the Operational OV-102, OV-102 operational rework and a time history of Orbiter inert weight. The inert weight data was taken from SD72-SH-0120-130, "Space Shuttle Mass Properties Status," dated October 2, 1983. The non-propulsive consumables are based on the control weights specified in JSC-07700, Volume X, Appendix 10.12. mission requirements.

TABLE 4.1 - ORBITER INERT WEIGHT CHANGES- STATUS OCTOBER 31, 1983
BARS - 4090

	MISSIONS ORBITER	STS-009 OV-102E	STS-011 OV-099	STS-013 OV-099	STS-014 OV-103	STS-015 OV-099	STS-016 OV-103	STS-017 OV-102E	STS-018 OV-099
	PREV RI-SPACE INERT STATUS (08-02-83)	155815	148276	148276	148269		148269	146763	
9/9-1	XFER COMSEC BOXES TO STS OPERATOR	-40	-40	-40	-40		-40	-40	
82/10-2	DELETE ARM RESTS	-20	-20	-20	-20		-20	-20	
83/2-2	THUMBWHEEL SWITCH REPLACEMENT		-10	-10	-10		-10	-10	
83/8-1	PRSD TANK SET UPDATE	-21							
83/8-4	PERM INSTALL STANDOFFS IN P/L BAY	3	3	3	3		3	3	
83/9-5	ACTUAL WT DEVIATION	-107			-735		-735		
9/8-3	CCTV P/L BAY	39							
81/7-2	UPDATE DFI SCAR	-221							
83/9-1	REDUNDANT LO2 FEEDLINE TEMP MEA			2	2		2	2	
83/9-2	HYD FTG MTL SUB		14	14	14		14	14	
83/9-3	XFER TANK SET 4 SUPTS TO OPERATOR							-13	
83/9-4	LWR MID FUS SUPT STRAPS	3							
83/9-6	MMU PROVISIONS		39	39	39		39	39	
83/9-7	P/L STOWAGE ASSEM (PSA) MOD KIT		23	23	23		23	23	
83/9-8	P/L WIRE HARNESS ACCOM REV	-21							
	CHANGE ORBITER EFFECTIVITY (099 TO 103)				-1521		-1521		
	CHANGE ORBITER EFFECTIVITY (099 TO 102)							8669	
82/9-2	AFRSI IMPLEMENTATION				715		715		
83/8-3	LESS-ADDITIONAL MOMENT TILES				330		330		
	STRUCTURAL PROV FOR MMU NO 2				10		10		
	RI NEW CHANGES	-385	9	11	-1190		-1190	8667	
	RI-SPACE DIV INERT STATUS (10-02-83)	155430	148285	148287	147079	148280	147079	155430	
	CHANGES NOT INCORPORATED								
	BOUYANCY	80	80	80	80	80	80	80	
	ORBITER INERT CHANGES	-385	9	11	-1190	0	-1190	8667	
	ORBITER INERT STATUS	155510	148365	148367	147159	148360	147159	155510	

TABLE 4.1 - ORBITER INERT WEIGHT CHANGES- STATUS OCTOBER 31, 1983
BARS - 4090

	MISSIONS ORBITER	STS-019 OV-103	STS-020 OV-099	STS-021 OV-103	STS-022 OV-099	STS-023 OV-103	STS-024 OV-099	STS-025 OV-104
	PREV RI-SPACE INERT STATUS (08-02-83)	146763	148269		148269			
9/9-1	XFER COMSEC BOXES TO STS OPERATOR	-40	-40		-40			
82/10-2	DELETE ARM RESTS	-20	-20		-20			
83/2-2	THUMBWHEEL SWITCH REPLACEMENT	-10	-10		-10			
83/8-1	PRSD TANK SET UPDATE							
83/8-4	PERM INSTALL STANDOFFS IN P/L BAY	3	3		3			
83/9-5	ACTUAL WT DEVIATION	-735						
9/8-3	CCTV P/L BAY							
81/7-2	UPDATE DFI SCAR							
83/9-1	REDUNDANT LO2 FEEDLINE TEMP MEA	2	2		2			
83/9-2	HYD FTG MTL SUB	14	14		14			
83/9-3	XFER TANK SET 4 SUPTS TO OPERATOR	-13						
83/9-4	LWR MID FUS SUPT STRAPS							
83/9-6	MMU PROVISIONS	39	39		39			
83/9-7	P/L STOWAGE ASSEM (PSA) MOD KIT	23	23		23			
83/9-8	P/L WIRE HARNESS ACCOM REV							
	CHANGE ORBITER EFFECTIVITY (099 TO 103)							
	CHANGE ORBITER EFFECTIVITY (099 TO 102)							
82/9-2	AFRSI IMPLEMENTATION	715						
83/8-3	LESS-ADDITIONAL MOMENT TILES	330						
	STRUCTURAL PROV FOR MMU NO 2	10						
	RI NEW CHANGES	316	11		11			
	RI-SPACE DIV INERT STATUS (10-02-83)	147079	148280	147079	148280	147079	148280	147814
	CHANGES NOT INCORPORATED							
	BOUYANCY	80	80	80	80	80	80	80
	ORBITER INERT CHANGES	316	11		11			
	ORBITER INERT STATUS	147159	148360	147159	148360	147159	148360	147894

TABLE 4.2 ORBITER INERT WEIGHT COMPARISON--STATUS--(OV-102, 099, 103, 104) OCTOBER 31, 1983
BARS - 4090

MISSIONS ORBITER	STS-9&17 OV-102E	OPER OV-102	STS-011 OV-099	STS-013 OV-099	OPER OV-099
STATUS	155430	155430	148285	148285	148285
DFI SCAR - REMOVED		-2820			
DFI SCAR - RETAINED		2102			
VERTICAL LCD INDICATOR		-2			
DELETE COMM B SCAR		-43			
MPS PREVALVE SLAM PREVENTION		32			
ELBOW CAMERA KIT+RMS DFI		-42			
NEW MEASUREMENT TO ORBITER OI		91			
REMOVE ALT EMU LCG H2O LINE		-15			
PGHM ATTACH POINTS		2			
CABIN+AVIONICS FAN DELTA P XDUCER		3			
WATER PUMP PKG-DELTA P XDUCER		2			
REVISE CREW STA CAMERA MTS		2			
REDESIGN P/L PATCH PANEL		6			
REDESIGN LDG ISO+MPS SHUT VALVE		-22			
INCREASE STR STAB TUBE P/L		2			
ADD OFI FOR INCREMENT APU		1			
KSC REWORK		-1126			
ADD OVERHEAD FLOODLITES		4			
RELOCATE OVER FLOODLITES		4			
CHANGE CLAMPS FOR PVD DUCTS		-8			
HYD SYSTEM DRAIN PORTS+GAS WIRING		9			
P/L SINGLE LATCH CONTROL		6			
MID FUSELAGE MOD-THERMAL STRESS		-75			
ESCAPE APRON		2			
ADD KU BAND ANTENNA ROTATION		2			
GLOBAL POSITIONING SYSTEM		47			
ADD GPS 3 & 4 STRING PROV		9			
REMOVE DECOMP CONVER + IMU MUFF		-21			
HEADS UP DISPLAY		191			
5.4 LOADS ASSESSMENT		526			
INCREASE WING TRUSS TUBES		8			
TPS DESIGN PRODUCIBILITY		11			
TVC SERVO ACTUATOR LIGHT WEIGHT		-59			
FRCS TANK SWIRL DIFFUSER		8			
OPER OVERHEAD FUSELAGE HATCH		99			
ANTI-SLAM FILL + DRAIN VALVE		-4			
ORBITER SIDE HATCH PHOTO WINDOW		4			
RMS MEASUREMENT TO OI		7			
DELETE ASC/DESC MTNG FOR R7 SSP		-10			
REDUNDANT LO2 FEEDLINE TEMP MEA		2		2	2
EMU IN COMPT WITH A/L PWR SUPPLY		-4			
HYD FTG MTL SUB		14			
ORB PROVISIONS FOR MMU		39			
INCR III MCA OPTIMIZATION		5			5
. P/L STOWAGE ASSEM (PSA) MOD KIT		23			
DELETE AFRSI TEST PROGRAM					-12
STABLIZER LINKS SUPT INSTALL LONGERON BRIDGE STAB LINKS		60			
OMS POD MADS INSTRUMENTATION		-139			
. KU BAND ANTENA MOTOR PROBLEM		1			
. THUMBWHEEL SWITCH REPLACEMENT		-10			
BOUYANCY	80	80	80	80	80
--- ORBITER INERT WEIGHT ---	155510	154434	148365	148367	148360

TABLE 4.2 ORBITER INERT WEIGHT COMPARISON--STATUS--(OV-102, 099, 103, 104) OCTOBER 31, 1983
BARS - 4090

	MISSIONS ORBITER	STS-014 OV-103	OPER OV-103	STS-025 OV-104
	STATUS	147079	147079	147079
	DFI SCAR - REMOVED			
	DFI SCAR - RETAINED			
	VERTICAL LCD INDICATOR			
	DELETE COMM B SCAR			
	MPS PREVALVE SLAM PREVENTION			
	ELBOW CAMERA KIT+RMS DFI			
	NEW MEASUREMENT TO ORBITER OI			
	REMOVE ALT EMU LCG H2O LINE			
	PGHM ATTACH POINTS			
	CABIN+AVIONICS FAN DELTA P XDUCER			
	WATER PUMP PKG-DELTA P XDUCER			
	REVISE CREW STA CAMERA MTS			
	REDESIGN P/L PATCH PANEL			
	REDESIGN LDG ISO+MPS SHUT VALVE			
	INCREASE STR STAB TUBE P/L			
	ADD OFI FOR INCREMENT APU			
	KSC REWORK			
	ADD OVERHEAD FLOODLITES			
	RELOCATE OVER FLOODLITES			
	CHANGE CLAMPS FOR PVD DUCTS			
	HYD SYSTEM DRAIN PORTS+GAS WIRING			
	P/L SINGLE LATCH CONTROL			
	MID FUSELAGE MOD-THERMAL STRESS			
	ESCAPE APRON			
	ADD KU BAND ANTENNA ROTATION			
	GLOBAL POSITIONING SYSTEM			
	ADD GPS 3 & 4 STRING PROV			
	REMOVE DECOMP CONVER + IMU MUFF			
	HEADS UP DISPLAY			
	5.4 LOADS ASSESSMENT			
	INCREASE WING TRUSS TUBES			
	TPS DESIGN PRODUCIBILITY			
	TVC SERVO ACTUATOR LIGHT WEIGHT			
	FRCS TANK SWIRL DIFFUSER			
	OPER OVERHEAD FUSELAGE HATCH			
	ANTI-SLAM FILL + DRAIN VALVE			
	ORBITER SIDE HATCH PHOTO WINDOW			
	RMS MEASUREMENT TO OI			
	DELETE ASC/DESC MTNG FOR R7 SSP			
	REDUNDANT LO2 FEEDLINE TEMP MEA			
	EMU IN COMPT WITH A/L PWR SUPPLY			
	HYD FTG MTL SUB			
	ORB PROVISIONS FOR MMU			
	INCR III MCA OPTIMIZATION			
.	P/L STOWAGE ASSEM (PSA) MOD KIT			
	DELETE AFRSI TEST PROGRAM			
	STABLIZER LINKS SUPT INSTALL LONGERON BRIDGE STAB LINKS			
	OMS POD MADS INSTRUMENTATION			
.	KU BAND ANTENA MOTOR PROBLEM			
.	THUMBWHEEL SWITCH REPLACEMENT			
	BOUYANCY	80	80	80
	--- ORBITER INERT WEIGHT ---	147159	147159	147159

TABLE 4.3 - OV-102 OPERATIONAL REWORK

Remove Ejection Seats and Rail	-664
Add Operational Seats	318
Add Emergency Egress Provision Through Right-hand Observation Window	88
Remove Emergency Escape Hatch and Provision	(-929)
Redesign CM/FF Escape Panel and Provision	-214
Ejection Panel Support Structure, Baffles & TCS	- 52
Seat Rail Support Beam and Fitting	- 52
Support Struts to Mid-Deck Floor	- 44
Seat Torque Box	-182
Pyrotechnic System	-385
Remove Escape Suit Ventilation System Kit	- 14
Ejection Seat Removal Mod	-1201
Add Multiple Attached Payloads	5
Remove C-Band Antenna Switch (OFT Only)	- 5
Add Keel Mounted TV	57
Add C-Band Antenna for Operational	3
Change OFT Egress to Operational Egress	8
Single Zeroize Switch	1
FCP & Power Contractor Redundant Control Power	2
EMU Incompat With Airlock Power Supply/Battery Charger	4
ORBITER INERT TOTAL	-1126

TABLE 4.4 - ORBITER POTENTIAL INERT WEIGHT CHANGES

SEQ. NO. (MCR NO)	ITEM	STS-9/OV102E WEIGHT, LB	OV-102 OPER WEIGHT, LB	STS-8/OV-099 WEIGHT, LB	OV-099 OPER WEIGHT, LB	OV-103 WEIGHT, LB	OV-104 WEIGHT, LB
		0	0	0	0	0	0
	Weight Reduction Candidates	0	-1212(1)	0	0	0	0
	STATUS WEIGHT	155510	154434	148365	148360	147159	147894
	Projected Inert Changes	0	0	0	0	0	0
	PROJECTED WEIGHT	155510	154434	148365	148360	147159	147894

(1) CANCELLED - Hold for Future Consideration.

FIGURE 4.1 ORBITER -102 INERT WEIGHT HISTORY - OPERATIONAL

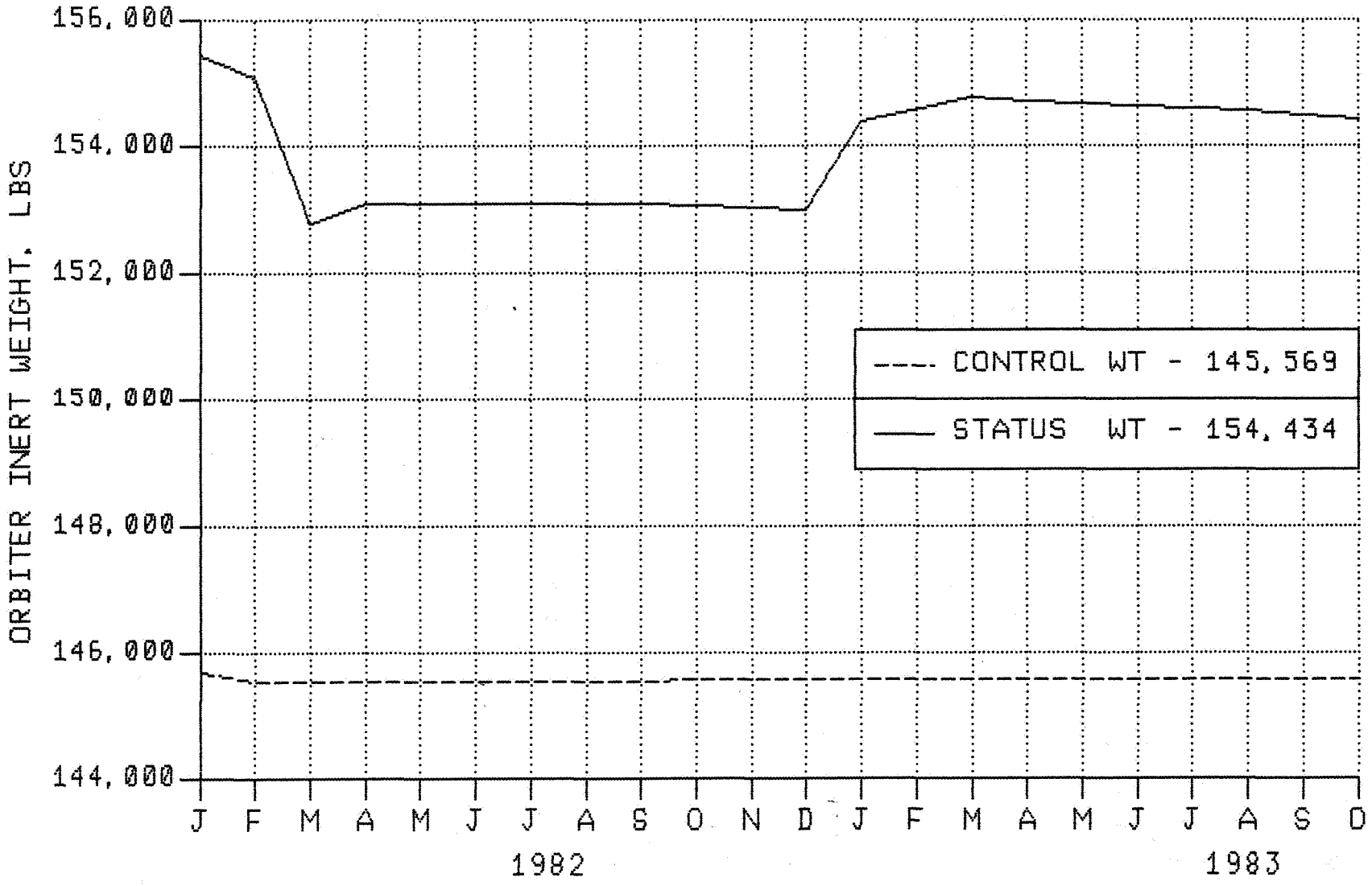


FIGURE 4.2 ORBITER -099 INERT WEIGHT HISTORY

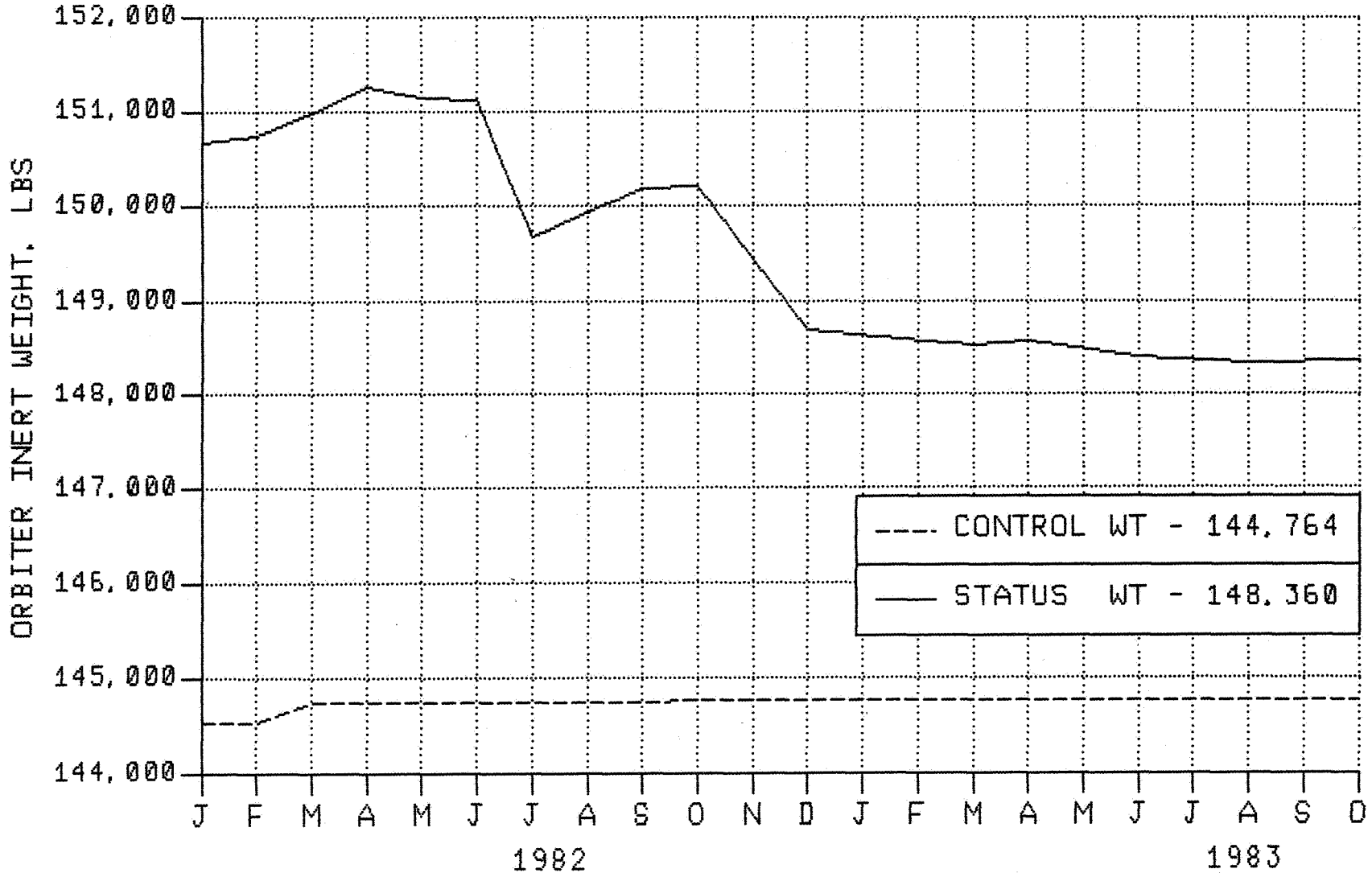


FIGURE 4.3 ORBITER -103 INERT WEIGHT HISTORY

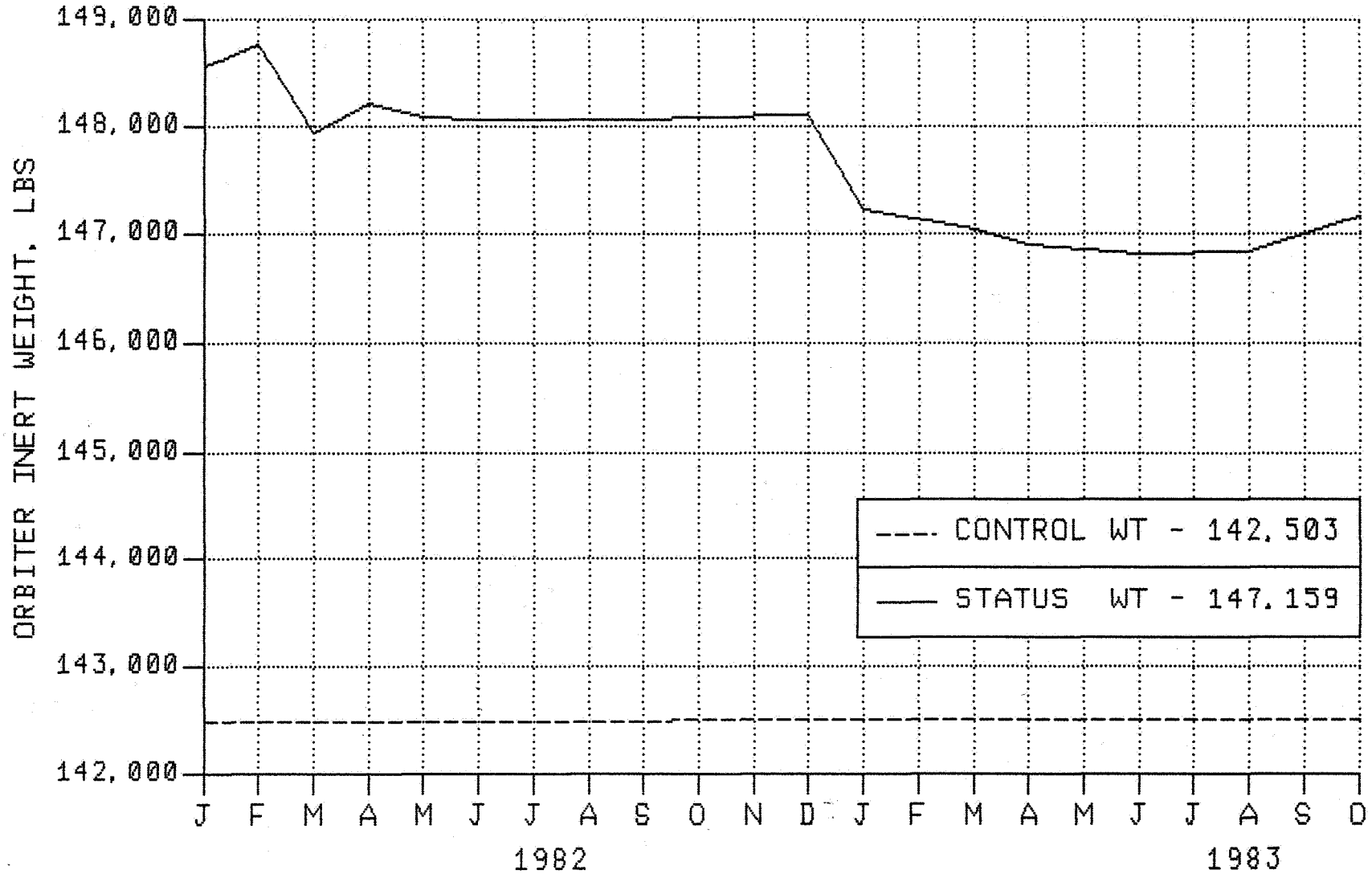


TABLE 4.6 - ORBITER PROPELLANT AND NON-PROPULSIVE CONSUMABLES
BARS - 4090

OCTOBER 31, 1983

MISSIONS	STS-009	STS-011	STS-013	STS-014	STS-015	STS-016	STS-017	STS-018
PREV RPTED NON-PROP CONSUMABLES	6205	6139	6139	6139		6139	6139	
ADD TK SET 5 CRYO							866	
DELETE EPS TANK SET 4 CRYOS								
UPDATE/ADD EMERG O2	-21						45	
NON-PROPULSIVE CHANGES	-21						911	
NON-PROPULSIVE CONSUMABLES AT SRB IGN	6184	6139	6139	6139		6139	7050	
NON-PROP CONSUMABLES								
APU CONSUMABLES EXPENDED	-60	-60	-60	-60		-60	-60	
SSME HELIUM PURGE	-62	-62	-62	-62		-62	-62	
NON-PROPULSIVE CONSUMABLES AT MECO	6062	6017	6017	6017		6017	6928	
PREV RPTED OMS PROPELLANT	16000	23600	25064	24300		24200	22000	
OMS PROPELLANT CHANGES				764		864	2000	
OMS PROPELLANT	16000	23600	25064	25064		25064	24000	
PREV RPTED RCS PROPELLANT	7830	7416	7416	7416		7416	7416	
RCS PROPELLANT CHANGES							414	
RCS PROPELLANT	7830	7416	7416	7416		7416	7830	

TABLE 4.6 - ORBITER PROPELLANT AND NON-PROPULSIVE CONSUMABLES OCTOBER 31, 1983
BARS - 4090

MISSIONS	STS-019	STS-020	STS-021	STS-022	STS-023	STS-024	STS-025
PREV RPTED NON-PROP CONSUMABLES	6139	6139		6139			
ADD TK SET 5 CRYO							
DELETE EPS TANK SET 4 CRYOS		-866					
UPDATE/ADD EMERG O2							
NON-PROPULSIVE CHANGES		-866					
NON-PROPULSIVE CONSUMABLES AT SRB IGN	6139	5273	6139	6139	6139	5273	6139
NON-PROP CONSUMABLES							
APU CONSUMABLES EXPENDED	-60	-60	-60	-60	-60	-60	-60
SSME HELIUM PURGE	-62	-62	-62	-62	-62	-62	-62
NON-PROPULSIVE CONSUMABLES AT MECO	6017	5151	6017	6017	6017	5151	6017
PREV RPTED OMS PROPELLANT	19200	22900		25064			
OMS PROPELLANT CHANGES							
OMS PROPELLANT	19200	22900	19300	25064	19300	25064	24000
PREV RPTED RCS PROPELLANT	7416	7416		7416			
RCS PROPELLANT CHANGES							
RCS PROPELLANT	7416	7416	7416	7416	7416	7416	7416

TABLE 4.7 - ORBITER PROPELLANT AND NON-PROPULSIVE CONSUMABLES FLUID LOADINGS SUMMARY AT SRB IGNITION

STS-11 Mission	STS-9	STS-11	STS-13	STS-14	STS-16	STS-17	STS-19	STS-20	STS-21
Vehicle	OV-102E	OV-099	OV-099	OV-103	OV-103	OV-102E	OV-103	OV-099	OV-103
Propellant-Main Ascent Total	SEE SECTION 9								
Propellant - OMS Load	16000	23600	25064	25064	25064	24000	19200	22900	19300
Residuals	891	799	799	799	799	799	799	799	799
Ballast (R Pod/L Pod)	0/0	0/200	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Propellant - RCS Fwd	2446	2446	2446	2446	2446	2446	2446	2446	2446
Residuals	392	282	282	282	282	392	282	282	282
RCS Dump (X CG)	Yes(1)	Yes(1)	Yes(1)	Yes(1)	Yes(1)	Yes(1)	Yes(1)	Yes(1)	Yes(1)
Propellant - RCS Aft	5384	4970	4970	4970	4970	5384	4970	4970	4970
Residuals	748	378	378	378	378	748	378	378	378
Entry Allowance	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Non-Propulsive Consumables	6184	6139	6139	6139	6139	7050	6139	5273	6139
N_2 Gaseous-Launch Load	262	262	262	262	262	262	262	262	262
Water-Potable Launch Load	476	476	476	476	476	476	476	476	476
Water-Waste Load	7	7	7	7	7	7	7	7	7
NH_3-Launch Load	98	98	98	98	98	98	98	98	98
O_2 Cryogenic-Load (Tank sets)	3100(4)*	3100(4)	3100(4)	3100(4)	3100(4)	3875(5)	3100(4)	2325(3)**	3100(4)
H_2 Cryogenic-Load (Tank sets)	364(4)*	364(4)	364(4)	364(4)	364(4)	455(5)	364(4)	273(3)**	364(4)
APU N_2H_4-Load	930	930	930	930	930	930	930	930	930
Hydraulic Water-Launch Load	355	355	355	355	355	355	355	355	355
APU H_2O-Gas Gen. Cool	6	6	6	6	6	6	6	6	6
APU H_2O-Fuel Pump Cool	42	42	42	42	42	42	42	42	42
Auxiliary O_2	45	0	0	0	0	45	0	0	0
Cabin Air	185	185	185	185	185	185	185	185	185
MPS Pressurants	43	43	43	43	43	43	43	43	43
OMS Pressurants	87	87	87	87	87	87	87	87	87
RCS Pressurants	24	24	24	24	24	24	24	24	24
Water Pressurants	1	1	1	1	1	1	1	1	1
NH_3 Pressurants	0	0	0	0	0	0	0	0	0
APU Pressurants	6	6	6	6	6	6	6	6	6
SSME Shutdown & Seal Purge (He)	151	151	151	151	151	151	151	151	151
ECLSS Pressurant (GN_2)	2	2	2	2	2	2	2	2	2

(*) TANK SET 1, 2, 3 AND 5 CRYO'S ARE INCLUDED. TANK SET 4 CRYO'S ARE CHARGED TO P/L.
(**) TANK SET 4 CRYO'S ARE CHARGED TO P/L.
(1) AS REQUIRED FOR X CG CONTROL

TABLE 4.7 - ORBITER PROPELLANT AND NON-PROPULSIVE CONSUMABLES FLUID LOADINGS SUMMARY AT SRB IGNITION (CONTINUED)

Mission	STS-22	STS-23	STS-24	STS-25	1 Due East	3A Deploy	4 Perform Cap. Asses	Galileo
Vehicle	OV-102	OV-103	OV-099	OV-099	OV-103	OV-103	OV-103	OV-104
Propellant-Main Ascent Total	SEE SECTION 9							
Propellant - OMS Load	25064	19300	25064	24000	19700	15095	25064	18200
Residuals	891	799	799	799	799	799	799	799
Ballast (R POD/L POD)	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Propellant - RCS Fwd Load	2446	2446	2446	2446	2446	2446	2446	1510
Residuals	282	282	282	282	282	282	282	282
RCS Dump (X CG)	Yes(1)	Yes(1)	Yes(1)	Yes(1)	Yes(1)	Yes(1)	Yes(1)	Yes(1)
Propellant - RCS Aft	4970	4970	4970	4970	4970	4970	4970	4970
Residuals	378	378	378	378	378	378	378	378
Entry Allowance	TBD	2200	TBD	TBD	TBD	TBD	TBD	TBD
Non-Propulsive Consumables	6139	6139	5273	6139	4749	3942	4749	4411
N_2 Gaseous-Launch Load	262	262	262	262	212	212	212	262
Water-Potable Launch Load	476	476	476	476	185.0	185.0	185.0	476
Water-Waste Load	7	7	7	7	11.0	11.0	11.0	7
NH_3-Launch Load	98	98	98	98	97.6	97.6	97.6	98
O_2 Cryogenic-Load (Tank sets)	3100(4)	3100(4)	2325(3)**	3100(4)	2334.0(3)	1552.5(2)	2334.0(3)	1554(2)
H_2 Cryogenic-Load (Tank sets)	364(4)	364(4)	273(3)**	364(4)	274.3(3)	182.8(2)	274.3(3)	182(2)
APU N_2H_4-Load	930	930	930	930	702.0	702.0	702.0	930
Hydraulic Water-Launch Load	355	355	355	355	353.0	353.0	353.0	355
APU H_2O-Gas Gen. Cool	6	6	6	6	6.0	6.0	6.0	6
APU H_2O-Fuel Pump Cool	42	42	42	42	42.0	42.0	42.0	42
(2)Auxiliary O_2	66	0	0	0	0.0	66.0	0.0	0
Cabin Air	185	185	185	185	190.0	190.0	190.0	185
MPS Pressurants	43	43	43	43	44.0	44.0	44.0	43
OMS Pressurants	87	87	87	87	113.0	113.0	113.0	87
RCS Pressurants	24	24	24	24	28.0	28.0	28.0	24
Water Pressurants	1	1	1	1	1.0	1.0	1.0	1
NH_3 Pressurants	0	0	0	0	0.1	0.1	0.1	0
APU Pressurants	6	6	6	6	3.0	3.0	3.0	6
SSME Shutdown & Seal Purge (He)	151	151	151	151	152.0	152.0	152.0	151
ECLSS Pressurant (GN_2)	2	2	2	2	1.0	1.0	1.0	2

(**)TANK SET 4 CRYO'S ARE CHARGED TO PAYLOAD.
(1) AS REQUIRED FOR X CG CONTROL.

5.0 PERSONNEL AND FLIGHT CREW EQUIPMENT

This section presents the weight status and definition of Personnel Elements for BRM and STS Missions. A matrix of crew size versus mission duration for operational missions along with crew equipment changeout items necessary when manifesting is also presented.

TABLE 5.1 - CURRENT PERSONNEL AND FCE EQUIP WEIGHT CHANGE SUMMARY - STATUS OCTOBER 31, 1983
BARS - 4090

MISSIONS CREW/DAYS	STS-009 6M/9D	STS-011 5M/8D	STS-013 5M/6D	STS-014 6M/7D	STS-015	STS-016 5M/7D	STS-017 5M/10D	STS-018
PERSONNEL (08-24-83)	3111	3630	3575	3267		3267	3267	
ADD SPARE EMU		160						
SPARE EMU FLIGHT COVER		5						
CONTAMINANT CONTROL CART (4 EXTRA)		25						
MMU SHUTTLE RANGEFINDER		3						
CAMERA EQUIPMENT		4						
STOWAGE CONTAINERS-VOLUMES E,G&H		14						
MMU-THRUSTER LIGHT EXTENDER		4						
MMU-BATTERY XFER BAG		3						
MMU-BATTERY		10						
MMU-BATTERY CHARGING CABLE		2						
ICOS & BRACKET		7						
ET TPS CAMERA		15						
PAM-D TOOL CADDY		2						
SURS WRENCH		2						
AIRLOCK STOWAGE PALLET		10						
COMPARTMENT A & B		72						
5 ADDITIONAL LOCKERS		81						
DELETE SUPPLEMENTAL STOWAGE PROVISIONS		-100						
ACTUAL CREW WEIGHTS	-46							
ADD TLELPRINTER	80							
ADDITIONL CREW/DAYS				702		308	594	
MISC CHANGES	30	-5	119	108		119		
PERSONNEL AND GFE CHANGES	64	314	119	810		427	594	
PERSONNEL AND GFE (1)	3175	3944	3694	4077		3694	3861	

(1) REFLECTS ADDITIONAL EQUIPMENT FOR 7 DAYS.

TABLE 5.1 - CURRENT PERSONNEL AND FCE EQUIP WEIGHT CHANGE SUMMARY - STATUS OCTOBER 31, 1983
BARS - 4090

MISSIONS CREW/DAYS	STS-019 6M/6D	STS-020 7M/7D	STS-021 5M/4D	STS-022 5M/6D	STS-023 5M/4D	STS-024 6M/7D	STS-025 5M/7D
PERSONNEL (08-24-83)	3267	3866		3267			
ADD SPARE EMU							
SPARE EMU FLIGHT COVER							
CONTAMINANT CONTROL CART (4 EXTRA)							
MMU SHUTTLE RANGEFINDER							
CAMERA EQUIPMENT							
STOWAGE CONTAINERS-VOLUMES E,G&H							
MMU-THRUSTER LIGHT EXTENDER							
MMU-BATTERY XFER BAG							
MMU-BATTERY							
MMU-BATTERY CHARGING CABLE							
ICOS & BRACKET							
ET TPS CAMERA							
PAM-D TOOL CADDY							
SURS WRENCH							
AIRLOCK STOWAGE PALLET							
COMPARTMENT A & B							
5 ADDITIONAL LOCKERS							
DELETE SUPPLEMENTAL STOWAGE PROVISIONS							
ACTUAL CREW WEIGHTS							
ADD TLELPRINTER							
ADDITIONL CREW/DAYS	702			308			
MISC CHANGES	108	-364		119			
PERSONNEL AND GFE CHANGES	810	-364		427			
PERSONNEL AND GFE (1)	4077	3502	3694	3694	3694	3177	3694

(1) REFLECTS ADDITIONAL EQUIPMENT FOR 7 DAYS.

TABLE 5.2 - PERSONNEL AND FLIGHT CREW EQUIPMENT MATRIX - OPERATIONAL MISSIONS (1)(2)(3)

CONTROL WEIGHTS

Crewmembers \ Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	20	30
2	2709	2732	2867		2925		2996									
3		3038	3150		3229		3372									
4		3318	3407	3545 (4)	3588	3658 (4)	3700									
5																
6							4626									
7																

STATUS WEIGHTS

Crewmembers \ Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	20	30
2	2462	2471	2567		2611											
3					2915		3033									
4		2985	3082	3189	3225	3286	3322									
5					3521		3694									
6							4077		4168 (5)							
7																

(1) This matrix should not be used for "Y" or BRM-3A 2 Crewmember/1 Day Missions.
(2) Based on JSC-17858, Standard Flight Crew Equipment for STS Operations.
(3) Weight include 2 day contingency.
(4) Not approved, under review.
(5) Total weight does not reflect any allocation to payload or operator. Portion of weight may be charged to payload or operator as STS-9.

TABLE 5.3.- FLIGHT CREW EQUIPMENT CHANGEOUT ITEMS - OPERATIONAL MISSIONS

Deletions		Additions		
Item	Wt/Item, lb	Item	Requirements	Wt/Item,lb
1. Galley (1)	164.0	Food tray	1/crewmember	2.0
		Food accessories	1/set/mission	3.8
		Food Warmer	1/mission	14.4
		Wet wipe disp. assy.	2/14 mandays	.4
		Water dispensing sys.	1/mission	23.0 (2)
		Locker volume	1+1 locker/14 mandays	16.1
2. Sleep Stations (1)	128.0	Sleeping bags	1/crewmember	3.8
		Locker volume	1/6 locker/crewmember	2.7
3. Hygiene Stowage Container (1)	15.0	No changeouts required		
4. Passenger Seats (1) (3)	92.0	No changeouts required		

Notes:
1 - Weights for these items are preliminary planning weights only.
2 - Charged to Orbiter dry weight.
3 - For nominal missions, 4 seats charged to Orbiter dry weight.

6.0 SSME INERT WEIGHT

This section contains the inert weight status pending changes, and a time history for the SSME. Propellant data can be found in Section 9.0. The inert weight data was taken from SSME-83-2069 IL 3126-8047 "SSME Mass Properties Report (83-9)", 29 September, 1983.

TABLE 6.1 - SSME X 3 WEIGHT CHANGE SUMMARY - STATUS
BARS - 4090

OCTOBER 31, 1983

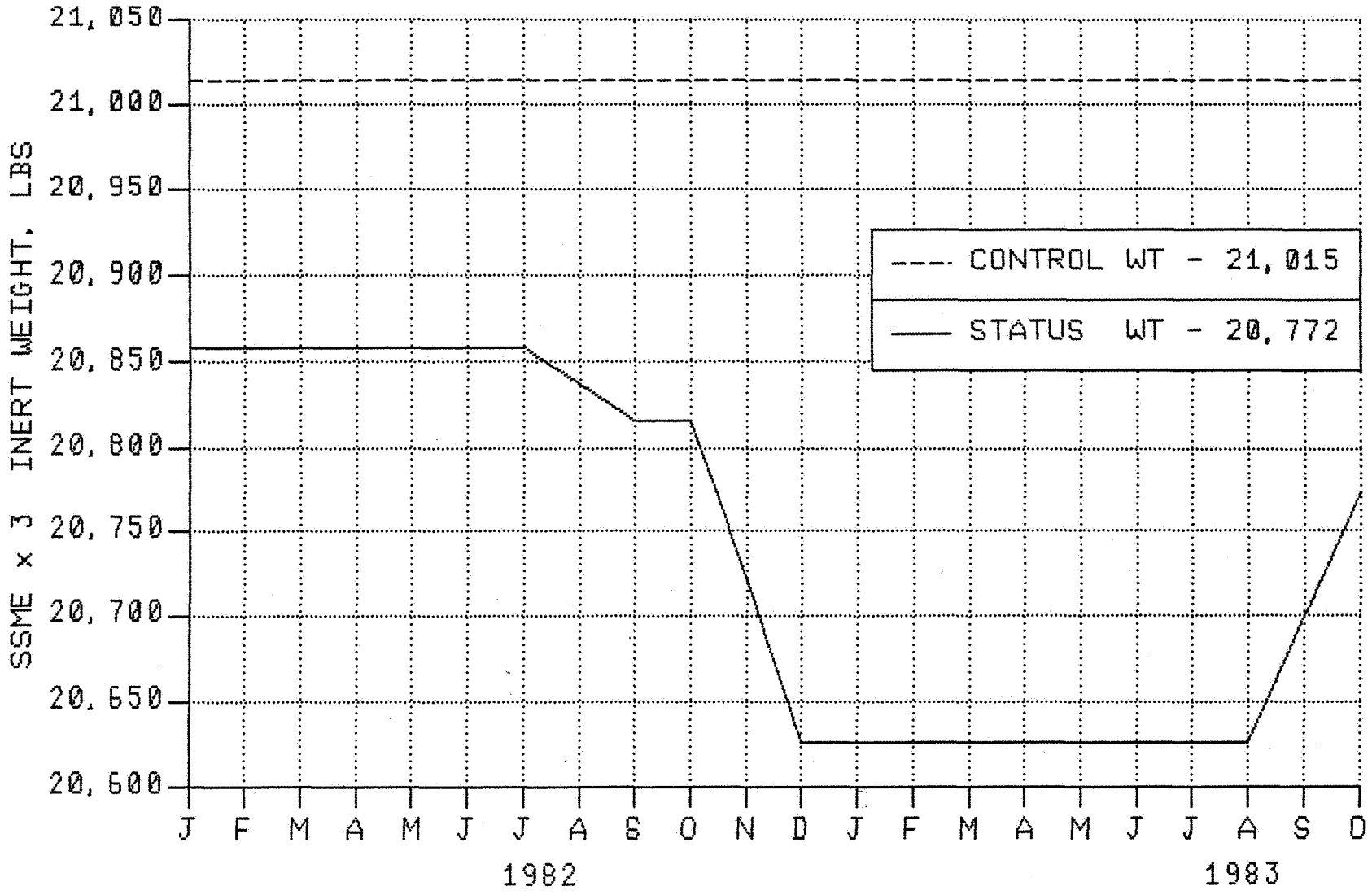
MISSIONS SSME'S	STS-009 2011 2018 2019	STS-011 2017 2012 2015	STS-013 2017 2012 2015	STS-014 2020 2021 2022	STS-015 2017 2012 2015	STS-016 2020 2021 2022	STS-017 2011 2018 2019	STS-018
PREV RI-ROCKETDYNE STATUS (07-28-83)	20729	20674	20674	20674		20674	20655	
CHANGE SSME EFFECTIVITY				-19		-19	74	
ADD FASCOS				117		117		
RI-ROCKETDYNE CHANGES				98		98	74	
RI-ROCKETDYNE INERT (09-29-83)	20729	20674	20674	20772		20772	20729	
CHANGES NOT INCORPORATED.								
SSME X 3 CHANGES				98		98	74	
SSME X 3 STATUS	20729	20674	20674	20772		20772	20729	

MISSIONS SSME'S	STS-019 2020 2121 2022	STS-020 2017 2012 2015	STS-021 2020 2121 2022	STS-022 2017 2012 2015	STS-023 2020 2021 2022	STS-024 2017 2012 2015	STS-025
PREV RI-ROCKETDYNE STATUS (07-28-83)	20655	20674		20674			
CHANGE SSME EFFECTIVITY							
ADD FASCOS	117	117		117			
RI-ROCKETDYNE CHANGES	117	117		117			
RI-ROCKETDYNE INERT (09-29-83)	20772	20791		20791			
CHANGES NOT INCORPORATED.							
SSME X 3 CHANGES	117	117		117			
SSME X 3 STATUS	20772	20791	20772	20791	20772	20791	20772

TABLE 6.2 - SSMEX3 PROJECTED INERT WEIGHT CHANGES FOR STS MISSIONS

ECP	ITEM	WEIGHT CHANGE, LB

FIGURE 6.1 SSME x 3 INERT WEIGHT HISTORY



7.0 EXTERNAL TANK INERT WEIGHT

This section provides the inert weight status, pending changes and a time history for the External Tank. Propellant data can be found in Section 9.0. Operational ET vehicles are designated LWT and subsequent. DFI vehicles are designated ET-1 through 6. The inert weight data was taken from the quarterly report, MMC-ET-SE02-82, "Mass Properties Status Report," dated September 15, 1983.

TABLE 7.1 - ET INERT WEIGHT CHANGES - STATUS
BARS - 4090

OCTOBER 31, 1983

MISSIONS ET	STS-009 LWT-004	STS-011 LWT-003	STS-013 LWT-005	STS-014 LWT-006	STS-015 LWT-007	STS-016 LWT-008	STS-017 LWT-009	STS-018 LWT-010
PREC MMC INERT STATUS LEV III	66526	66809	66459	65985		65985	65985	
REALIGN ET EFFECTIVITY				541				
MISC UPDATES				-82		-63	-63	
ACTUAL WEIGHING RESULTS	233							
MMC CHANGES	233			459		-63	-63	
MMC STATUS LEVEL III	66759	66809	66459	66444		65922	65922	
CHANGES NOT INCORPORATED								
BOUYANCY	155	155	155	155		155	155	
SEPARATION	883	883	883	883		883	883	
CHANGES	233	0	0	459		-63	-63	
ET INERT AT SRB IGN	67797	67847	67497	67482		66960	66960	
ET ICE/ABLATION								
ET TPS ABLATION	-45	-45	-45	-45		-45	-45	
ET DEBRIS	-5	-5	-5	-5		-5	-5	
ICE/FROST/ETC. AT MECO	118	47	47	47		47	47	
ET INERT + ICE AT MECO	67865	67844	67494	67479		66957	66957	

(*) REFLECTS ACTUAL WEIGHT

TABLE 7.1 - ET INERT WEIGHT CHANGES - STATUS
BARS - 4090

OCTOBER 31, 1983

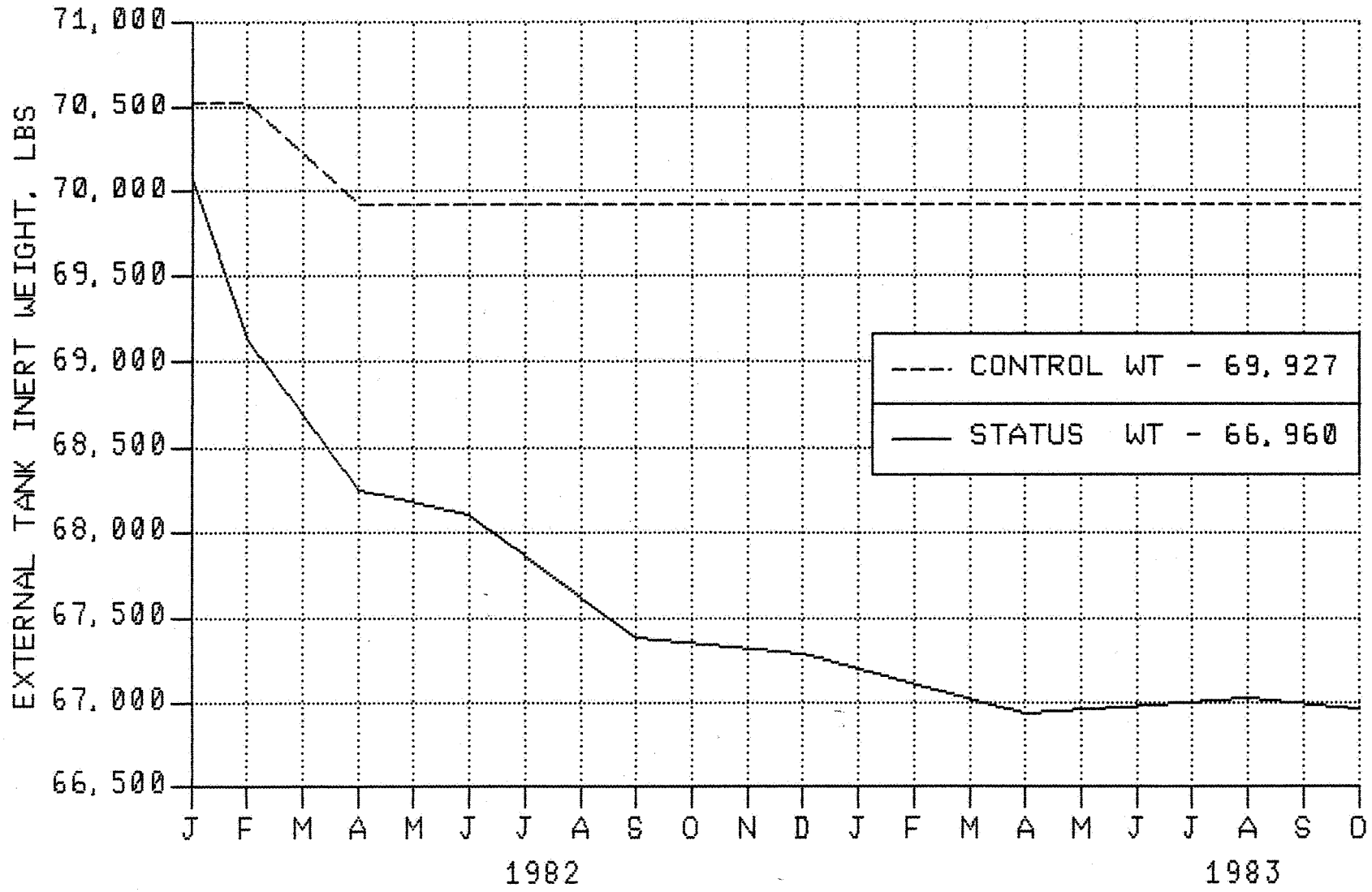
MISSIONS ET	STS-019 LWT-011	STS-020 LWT-012	STS-021 LWT-013	STS-022 LWT-014	STS-023 LWT-015	STS-024 LWT-016	STS-025 LWT-017
PREC MMC INERT STATUS LEV III	65971	65971		65971			
REALIGN ET EFFECTIVITY							
MISC UPDATES	-1	-1		-1			
ACTUAL WEIGHING RESULTS							
MMC CHANGES	-1	-1		-1			
MMC STATUS LEVEL III	65970	65970	65970	65970	65970	65912	65912
CHANGES NOT INCORPORATED							
BOUYANCY	155	155	155	155	155	155	155
SEPARATION	883	883	883	883	883	883	883
CHANGES	-1	-1		-1			
ET INERT AT SRB IGN	67008	67008	67008	67008	67008	66950	66950
ET ICE/ABLATION							
ET TPS ABLATION	-45	-45	-45	-45	-45	-45	-45
ET DEBRIS	-5	-5	-5	-5	-5	-5	-5
ICE/FROST/ETC. AT MECO	47	47	47	47	47	47	47
ET INERT + ICE AT MECO	67005	67005	67005	67005	67005	66947	66947

(*) REFLECTS ACTUAL WEIGHT

TABLE 7.2 - ET PROJECTED INERT WEIGHT CHANGES FOR STS MISSIONS

REF	ITEM	LWT-4	LWT-7	LWT-11	LWT-16	LWT-23
	TOTALS	0	0	0	0	0

FIGURE 7.1 EXTERNAL TANK (7 & SUBS) INERT WEIGHT HISTORY



8.0 SOLID ROCKET BOOSTER INERT WEIGHT AND PROPELLANT SUMMARY

This section provides the inert weight status, pending changes, a time history, and a propellant summary for the SRB. The inert weight data was taken from "Solid Rocket Booster Mass Properties Status Report" Number 66, September 23, 1983.

TABLE 8.1 - SRB INERT WEIGHT CHANGES - STATUS
BARS - 4090

OCTOBER 31, 1983

MISSIONS SRB'S	STS-009 09R/09L	STS-011 11R/IIL	STS-013 13R/13L	STS-014 14R/14L	STS-015 15R/15L	STS-016 A37/A38	STS-017 17R/16L	STS-018 18R/18L
PREVIOUS SRB INERT	379760	375382	372508	372508		372508	375382	
MISC UPDATES			1116	-1536		-1536	-4410	
SRB INERT CHANGES (1)			1116	-1536		-1536	-4410	
SRB INERT STATUS	379760	375382	373624	370972	370792	370972	370972	

MISSIONS SRB'S	STS-019 19R/19L	STS-020 20R/20L	STS-021 21R/21L	STS-022 22R/22L	STS-023 23R/23L	STS-024 24R/24L	STS-025 25R/25L
PREVIOUS SRB INERT	375382	375382		375382			
MISC UPDATES	-4410	-4410		-4410			
SRB INERT CHANGES (1)	-4410	-4410		-4410			
SRB INERT STATUS	370972	370972	373624	370972	373624	373624	373624

(1) DIVIDED BY 10 - VALUES SHOWN IN TABLE 2.4 AND TABLE 2.5.

TABLE 8.2 - SRBX1 PROJECTED WEIGHT CHANGES FOR STS MISSIONS

PCIN	CODE	ITEM	LWC	MWC
		TOTAL POTENTIAL CHANGES		

FIGURE 8.1 SRB x 2 (A51 & A52) INERT WEIGHT HISTORY

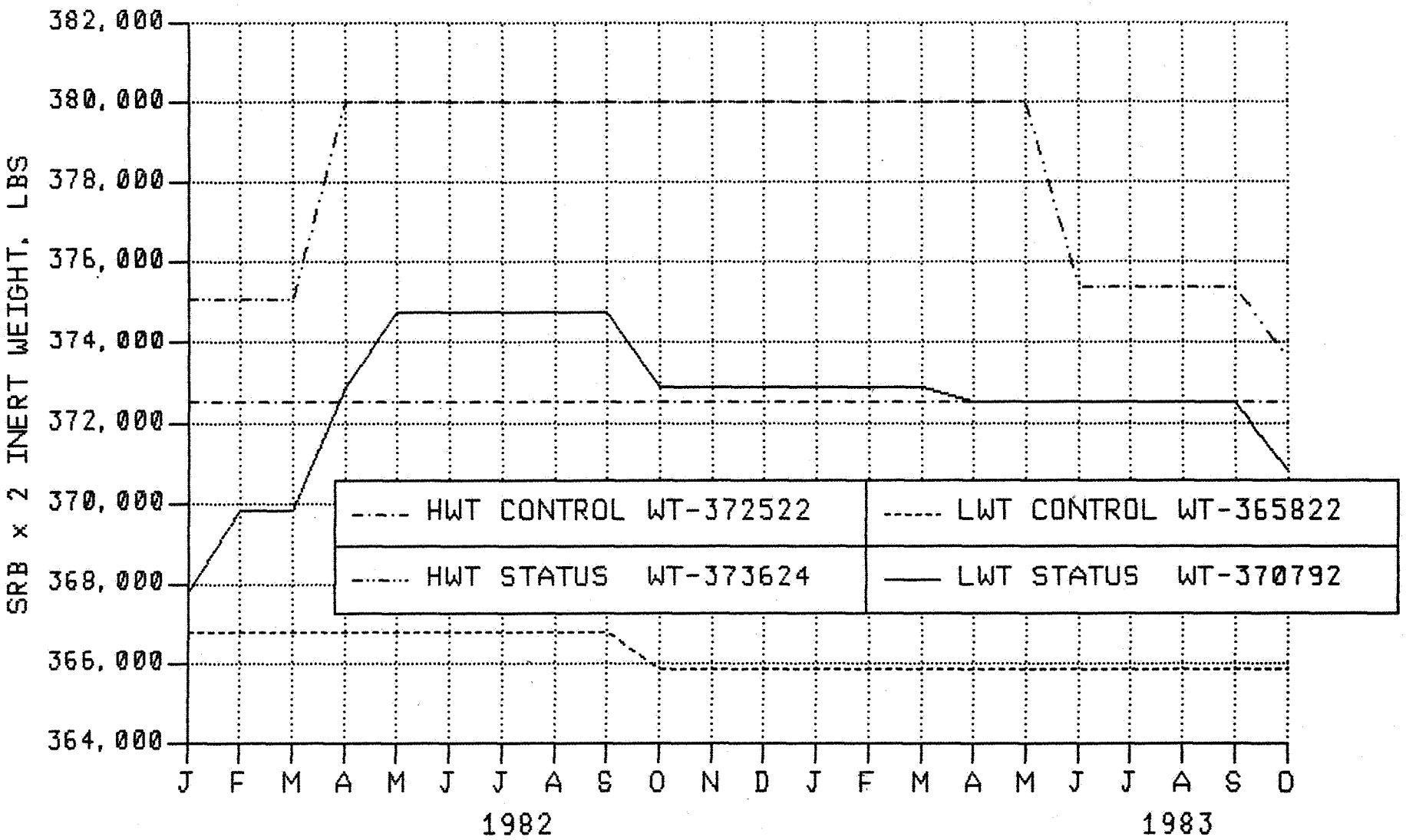


TABLE 8.3 - SRB PROPELLANT WEIGHT CHANGES - STATUS
BARS - 4090

OCTOBER 31, 1983

MISSIONS SRB'S	STS-009 09R/09L	STS-011 11R/IIL	STS-013 13R/13L	STS-014 14R/14L	STS-015 15R/15L	STS-016 A37/A38	STS-017 17R/16L	STS-018 18R/18L
PREVIOUS SRB PROPELLANT	2217649	2216964	2217504	2217504		2217504	2216964	
PROPELLANT UPDATE			564	2668		2668	3208	
SRB PROPELLANT CHANGES			564	2668		2668	3208	
SRB PROPELLANT STATUS	2217649	2216964	2218068	2220172	2220172	2220172	2220172	

MISSIONS SRB'S	STS-019 19R/19L	STS-020 20R/20L	STS-021 21R/21L	STS-022 22R/22L	STS-023 23R/23L	STS-024 24R/24L	STS-025 25R/25L
PREVIOUS SRB PROPELLANT	2216964	2216964		2216964			
PROPELLANT UPDATE	3208	3208		3208			
SRB PROPELLANT CHANGES	3208	3208		3208			
SRB PROPELLANT STATUS	2220172	2220172	2218068	2220172	2218068	2218068	2218068

9.0 MPS PROPELLANT INVENTORIES

The Main Propulsion System (MPS) propellant inventories for STS and BRM Missions are summarized in Table 9. This accounts for propellants on the vehicle, Orbiter, SSME and ET.

TABLE 9.1

10/03/33 15.17.08

MPS PROPELLANT INVENTORY STS 9 REV J

NOM T = T1 + 0.00

FUEL BIAS = 1084. THROTTLE SETTING NOM/ABT = 104/104 MR = 6.0230
TOTAL FPR = 5404. ULLAGE O2 = 1.82 SIGMA = 3. OBMR = 6.0411
DELTA FPR = 0. ULLAGE H2 = 1.63

	LH2	LO2	TOTAL
LOADED	231477.	1384678.	1616155.
ORB LINES	249.	3304.	3553.
SSME X 3	58.	1325.	1383.
ET(HXT=1046.3 HUP= .3 LXT=420.0 LUP= .4)	231170.	1380049.	1611219.
LOSS PRIOR TO ENG START CMD DBT 5M: 0S	104.	5700.	5804.
BOILOFF,BLEED,SEAL LEAK,POGO FLUSH	104.	5700.	5804.
LOAD AT ENGINE START COMMAND	231373.	1378978.	1610351.
ORB LINES	249.	3304.	3553.
SSME X 3	58.	1325.	1383.
ET	231066.	1374349.	1605415.
TRANSFERED FROM ET	58.	172.	230.
LOSS FOR THR BUILDUP AND SRB IGN DELAY	1733.	9434.	11167.
LOAD AT SRB IGNITION COMMAND	229640.	1369544.	1599184.
ORB LINES	249.	3304.	3553.
SSME X 3	116.	1497.	1613.
ET	229275.	1364743.	1594018.
**********			
UNUSABLE	2223.	4823.	7046.
ORB LINES(LOX ECO T=3.393,NPSP= 7.2)	249.	575.	824.
SSME X 3	58.	1325.	1383.
ET WET WALLS,BELLOWS	0.	175.	175.
ET : LOX LINES ; LH2 LINES AND TANK	780.	0.	780.
FLIGHT PRESS	1136.	2748.	3884.
USABLE RESERVES	1852.	4636.	6488.
ORB LINES (FPR)	0.	2729.	2729.
SSME X 3	0.	0.	0.
ET (FPR)	767.	1907.	2674.
BIAS	1084.	0.	1084.
USABLE IMPULSE	225565.	1360084.	1585649.
USED AT OBMR	224898.	1358543.	1583541.
SHUTDOWN CONSUMPTION	609.	1269.	1878.
0 SSME FROM NOM PCT THROTTLE SETTING	0.	0.	0.
3 SSME FROM 65 PCT THROTTLE SETTING	609.	1269.	1878.
VENTED AFTER SSME VALVE CLOSURE	58.	172.	230.

TABLE 9.2

03/05/33 14.34.22

MPS PROPELLANT INVENTORY STS 11 REV S

NOM T = T1 + 0.00

FUEL BIAS = 1201. THROTTLE SETTING NOM/ABT = 100/104 MR = 5.0261
TOTAL FPR = 5233. ULLAGE O2 = 1.32 SIGMA = 3. OBMR = 5.0443
DELTA FPR = 0. ULLAGE H2 = 1.63

	LH2	LO2	TOTAL
LOADED	231477.	1384673.	1616155.
ORB LINES	249.	3304.	3553.
SSME X 3	58.	1325.	1383.
ET(HXT=1046.3 HUP= .3 LXT=420.0 LUP= .4)	231170.	1380049.	1611219.
LOSS PRIOR TO ENG START CMD DBT 5M: 0S	104.	5700.	5804.
BOILOFF,BLEED,SEAL LEAK,POGO FLUSH	104.	5700.	5804.
LOAD AT ENGINE START COMMAND	231373.	1373973.	1610351.
ORB LINES	249.	3304.	3553.
SSME X 3	58.	1325.	1383.
ET	231066.	1374349.	1605415.
• TRANSFERED FROM ET	58.	172.	230.
LOSS FOR THR BUILDUP AND SRB IGN DELAY	1733.	9434.	11167.
LOAD AT SRB IGNITION COMMAND	229640.	1369544.	1599184.
ORB LINES	249.	3304.	3553.
SSME X 3	116.	1497.	1613.
ET	229275.	1364743.	1594018.
**********			
UNUSABLE	2223.	4823.	7046.
ORB LINES(LOX ECO T=3.393,NPSP= 7.2)	249.	575.	824.
SSME X 3	58.	1325.	1383.
ET WET WALLS,BELLOWS	0.	175.	175.
ET : LOX LINES ; LH2 LINES AND TANK	730.	0.	730.
FLIGHT PRESS	1136.	2748.	3884.
USABLE RESERVES	1945.	4495.	6440.
ORB LINES (FPR)	0.	2729.	2729.
SSME X 3	0.	0.	0.
ET (FPR)	744.	1766.	2510.
BIAS	1201.	0.	1201.
USABLE IMPULSE	225473.	1360226.	1585699.
USED AT OBMR	224806.	1358735.	1583591.
SHUTDOWN CONSUMPTION	609.	1269.	1873.
0 SSME FROM NOM PCT THROTTLE SETTING	0.	0.	0.
3 SSME FROM 65 PCT THROTTLE SETTING	609.	1269.	1873.
VENTED AFTER SSME VALVE CLOSURE	58.	172.	230.

TABLE 9.3

03/03/83 03.17.25

MPS PROPELLANT INVENTORY STS-13 REV K4

NOM T = T1 + 0.00

FUEL BIAS = 1200. THROTTLE SETTING NOM/ABT = 104/104 MR = 6.0261
TOTAL FPR = 5239. ULLAGE O2 = 1.82 SIGMA = 3. OBMR = 6.0442
DELTA FPR = 0. ULLAGE H2 = 1.63

	LH2	LO2	TOTAL
LOADED	231477.	1384678.	1616155.
ORB LINES	249.	3304.	3553.
SSME X 3	53.	1325.	1383.
ET(HXT=1046.3 HUP= .3 LXT=420.0 LUP= .4)	231170.	1380049.	1611219.
LOSS PRIOR TO ENG START CMD DBT 5M: 0S	104.	5700.	5804.
BOILOFF,BLEED,SEAL LEAK,POGO FLUSH	104.	5700.	5804.
LOAD AT ENGINE START COMMAND	231373.	1373978.	1610351.
ORB LINES	249.	3304.	3553.
SSME X 3	58.	1325.	1383.
ET	231066.	1374349.	1605415.
TRANSFERED FROM ET	58.	172.	230.
LOSS FOR THR BUILDUP AND SRB IGN DELAY	1733.	9434.	11167.
LOAD AT SRB IGNITION COMMAND	229640.	1369544.	1599184.
ORB LINES	249.	3304.	3553.
SSME X 3	116.	1497.	1613.
ET	229275.	1364743.	1594018.

****

UNUSABLE	2223.	4823.	7046.
ORB LINES(LOX ECO T=3.393,NPSP= 7.2)	249.	575.	824.
SSME X 3	53.	1325.	1383.
ET WET WALLS,BELLOWS	0.	175.	175.
ET : LOX LINES ; LH2 LINES AND TANK	780.	0.	780.
FLIGHT PRESS	1136.	2748.	3884.
USABLE RESERVES	1944.	4495.	6439.
ORB LINES (FPR)	0.	2729.	2729.
SSME X 3	0.	0.	0.
ET (FPR)	744.	1766.	2510.
BIAS	1200.	0.	1200.
USABLE IMPULSE	225474.	1360225.	1585699.
USED AT OBMR	224307.	1358734.	1583591.
SHUTDOWN CONSUMPTION	609.	1269.	1878.
0 SSME FROM NOM PCT THROTTLE SETTING	0.	0.	0.
3 SSME FROM 65 PCT THROTTLE SETTING	609.	1269.	1878.
VENTED AFTER SSME VALVE CLOSURE	58.	172.	230.

TABLE 9.4

08/12/83 15.06.57

MPS PROPELLANT INVENTORY STS 14 REV Y

NOM T = T1 + 0.00

FUEL BIAS = 1201. THROTTLE SETTING NOM/ABT = 100/104 MR = 6.0272
TOTAL FPR = 5238. ULLAGE O2 = 1.82 SIGMA = 3. OBMR = 6.0454
DELTA FPR = 0. ULLAGE H2 = 1.63

	LH2	LO2	TOTAL
LOADED	231480.	1384945.	1616425.
ORB LINES	249.	3304.	3553.
SSME X 3	58.	1325.	1383.
ET(HXT=1046.3 HUP= .3 LXT=420.0 LUP= .4)	231173.	1380316.	1611489.
LOSS PRIOR TO ENG START CMD DBT 5M: 0S	104.	5700.	5804.
BOILOFF,BLEED,SEAL LEAK,POGO FLUSH	104.	5700.	5804.
LOAD AT ENGINE START COMMAND	231376.	1379245.	1610621.
ORB LINES	249.	3304.	3553.
SSME X 3	58.	1325.	1383.
ET	231069.	1374616.	1605685.
TRANSFERED FROM ET	58.	172.	230.
LOSS FOR THR BUILDUP AND SRB IGN DELAY	1733.	9434.	11167.
LOAD AT SRB IGNITION COMMAND	229643.	1369311.	1599454.
ORB LINES	249.	3304.	3553.
SSME X 3	116.	1497.	1613.
ET	229278.	1365010.	1594288.

****

UNUSABLE	2223.	4823.	7046.
ORB LINES(LOX ECO T=3.393,NPSP= 7.2)	249.	575.	824.
SSME X 3	58.	1325.	1383.
ET WET WALLS,BELLOWS	0.	175.	175.
ET : LOX LINES ; LH2 LINES AND TANK	780.	0.	780.
FLIGHT PRESS	1136.	2748.	3884.
USABLE RESERVES	1945.	4495.	6440.
ORB LINES (FPR)	0.	2729.	2729.
SSME X 3	0.	0.	0.
ET (FPR)	743.	1766.	2509.
BIAS	1201.	0.	1201.
USABLE IMPULSE	225476.	1360493.	1585969.
USED AT OBMR	224809.	1359052.	1583861.
SHUTDOWN CONSUMPTION	609.	1269.	1878.
0 SSME FROM NOM PCT THROTTLE SETTING	0.	0.	0.
3 SSME FROM 65 PCT THROTTLE SETTING	609.	1269.	1878.
VENTED AFTER SSME VALVE CLOSURE	58.	172.	230.

TABLE 9.5

03/12/83 15.24.35

MPS PROPELLANT INVENTORY REV Z STS-15 & SUBSEQUENT + GALILEO

NOM T = T1 + 0.00

FUEL BIAS = 1201. THROTTLE SETTING NOM/ABT = 104/104 MR = 6.0272
TOTAL FPR = 5238. ULLAGE O2 = 1.82 SIGMA = 3. OBMR = 6.0454
DELTA FPR = 0. ULLAGE H2 = 1.63

	LH2	LO2	TOTAL
LOADED	231480.	1384945.	1616425.
ORB LINES	249.	3304.	3553.
SSME X 3	58.	1325.	1383.
ET(HXT=1046.3 HUP= .3 LXT=420.0 LUP= .4)	231173.	1380316.	1611489.
LOSS PRIOR TO ENG START CMD DBT 5M: 0S	104.	5700.	5804.
BOILOFF,BLEED,SEAL LEAK,POGO FLUSH	104.	5700.	5804.
LOAD AT ENGINE START COMMAND	231376.	1379245.	1610621.
ORB LINES	249.	3304.	3553.
SSME X 3	58.	1325.	1383.
ET	231069.	1374616.	1605685.
TRANSFERED FROM ET	58.	172.	230.
LOSS FOR THR BUILDUP AND SRB IGN DELAY	1733.	9434.	11167.
LOAD AT SRB IGNITION COMMAND	229643.	1369311.	1599454.
ORB LINES	249.	3304.	3553.
SSME X 3	116.	1497.	1613.
ET	229278.	1365010.	1594288.
**********			
UNUSABLE	2223.	4823.	7046.
ORB LINES(LOX ECO T=3.393,NPSP= 7.2)	249.	575.	824.
SSME X 3	58.	1325.	1383.
ET WET WALLS,BELLOWS	0.	175.	175.
ET : LOX LINES ; LH2 LINES AND TANK	780.	0.	780.
FLIGHT PRESS	1136.	2748.	3884.
USABLE RESERVES	1945.	4495.	6440.
ORB LINES (FPR)	0.	2729.	2729.
SSME X 3	0.	0.	0.
ET (FPR)	743.	1766.	2509.
BIAS	1201.	0.	1201.
USABLE IMPULSE	225476.	1360493.	1585969.
USED AT OBMR	224809.	1359052.	1583861.
SHUTDOWN CONSUMPTION	609.	1269.	1878.
0 SSME FROM NOM PCT THROTTLE SETTING	0.	0.	0.
3 SSME FROM 65 PCT THROTTLE SETTING	609.	1269.	1878.
VENTED AFTER SSME VALVE CLOSURE	58.	172.	230.

TABLE 9.6

12/08/82 08.47.27

MPS PROPELLANT INVENTORY BRM 1 REV S1

NOM T * T1 + 0.00

FUEL BIAS * 1016. MTS NOM/ABT * 109/109 MR * 6.0000
TOTAL FPR * 5397. ULLAGE O2 * 2.25 SIGMA * 3. OBMR * 6.0180
DELTA FPR * -300. ULLAGE H2 * 1.63

	LH2	LO2	TOTAL
LOADED	231480.	1384200.	1615680.
ORB LINES	249.	3304.	3553.
SSME X 3	58.	1325.	1383.
ET(HXT*1046.3 HUP* .3 LXT*420.0 LUP* .1)	231173.	1379571.	1610744.
LOSS PRIOR TO ENG START CMD DBT 8M:54S	104.	10000.	10104.
BOILOFF,BLEED,SEAL LEAK,POGO FLUSH	104.	10000.	10104.
LOAD AT ENGINE START COMMAND	231376.	1374200.	1605576.
ORB LINES	249.	3304.	3553.
SSME X 3	58.	1325.	1383.
ET	231069.	1369571.	1600640.
TRANSFERED FROM ET	58.	172.	230.
USED FOR THR BUILDUP AND SRB IGN DELAY	1733.	9434.	11167.
LOAD AT SRB IGNITION COMMAND	229643.	1364766.	1594409.
ORB LINES	249.	3304.	3553.
SSME X 3	116.	1497.	1613.
ET	229278.	1359965.	1589243.
UNUSABLE	2113.	4798.	6911.
ORB LINES(LOX ECO T*3.398,NPSP* 7.2)	249.	550.	799.
SSME X 3	58.	1325.	1383.
ET WET WALLS,BELLOWS	0.	175.	175.
ET : LOX LINES ; LH2 LINES AND TANK	670.	0.	670.
FLIGHT PRESS	1136.	2748.	3884.
USABLE RESERVES	1785.	4628.	6413.
ORB LINES (FPR)	0.	2754.	2754.
SSME X 3	0.	0.	0.
ET (FPR)	769.	1874.	2643.
BIAS	1016.	0.	1016.
USABLE IMPULSE	225745.	1355340.	1581085.
USED AT OBMR	224970.	1353875.	1578845.
SHUTDOWN CONSUMPTION	717.	1293.	2010.
0 SSME FROM NOM MTS PERCENT	0.	0.	0.
3 SSME FROM 65 MTS PERCENT	717.	1293.	2010.
VENTED AFTER SSME VALVE CLOSURE	58.	172.	230.

TABLE 9.7

12/03/32 09.41.03

MPS PROPELLANT INVENTORY BRM 3A,4 REV S1

AOA T = T1 + 0.00

FUEL BIAS = 1317. MTS NOM/ABT = 109/109 MR = 6.0000
TOTAL FPR = 3264. ULLAGE O2 = 2.25 SIGMA = 2. OBMR = 6.0181
DELTA FPR = -213. ULLAGE H2 = 1.63

	LH2	LO2	TOTAL
LOADED	231480.	1384200.	1615680.
ORB LINES	249.	3304.	3553.
SSME X 3	58.	1325.	1383.
ET(HXT=1046.3 HUP= .3 LXT=420.0 LUP= .1)	231173.	1379571.	1610744.
LOSS PRIOR TO ENG START CMD DBT 8M:54S	104.	10000.	10104.
BOILOFF,BLEED,SEAL LEAK,POGO FLUSH	104.	10000.	10104.
LOAD AT ENGINE START COMMAND	231376.	1374200.	1605576.
ORB LINES	249.	3304.	3553.
SSME X 3	58.	1325.	1383.
ET	231069.	1369571.	1600640.
TRANSFERED FROM ET	58.	172.	230.
USED FOR THR BUILDUP AND SRB IGN DELAY	1733.	9434.	11167.
LOAD AT SRB IGNITION COMMAND	229643.	1364766.	1594409.
ORB LINES	249.	3304.	3553.
SSME X 3	116.	1497.	1613.
ET	229278.	1359965.	1589243.

****

UNUSABLE	2158.	7533.	9691.
ORB LINES(LOX ECO T=1.438,NPSP=24.1)	249.	3285.	3534.
SSME X 3	58.	1325.	1383.
ET WET WALLS,BELLOWS	0.	175.	175.
ET : LOX LINES ; LH2 LINES AND TANK	715.	0.	715.
FLIGHT PRESS	1136.	2748.	3884.
USABLE RESERVES	1782.	2799.	4581.
ORB LINES (FPR)	0.	19.	19.
SSME X 3	0.	0.	0.
ET (FPR)	465.	2780.	3245.
BIAS	1317.	0.	1317.
USABLE IMPULSE	225703.	1354434.	1580137.
USED AT OBMR	224649.	1351955.	1576604.
SHUTDOWN CONSUMPTION	996.	2307.	3303.
1 SSME FROM NOM MTS PERCENT	332.	769.	1101.
2 SSME FROM ABT MTS PERCENT	664.	1538.	2202.
VENTED AFTER SSME VALVE CLOSURE	58.	172.	230.

10.0 PAYLOAD WEIGHT CHARGEABLE OPTIONS

This section offers a list of items that would be charged to the payload if it is required and would be considered as part of the total payload allocation.

TABLE 10.1 - HARDWARE PAYLOAD WEIGHT CHARGEABLE OPTIONS

ITEM	JSC 07700 Vol X Reference	Control Weight			Center of Gravity			Current Status			Maturity (%)			Remarks
		Dry	Wet	Expend	X_0	Y_0	Z_0	Dry	Wet	Expend	Est	Cal	Act	
CFE														
P/L Bay Service Panels	3.2.1.1.2.1.4	TBD						TBD						Payload Unique
Docking Module Kit	3.2.1.1.2.1.5	3900									100			Baseline Docking Module Plus Orbiter Modification. (Baseline Airlock of 912 lbs In Cabin Can Be Removed)
A/L Tunnel Adapter Kit		1022			625.7	0.8	366.2	715			100			EVA Airlock Mounts On Top Of Tunnel Adapter
Additional ATCS Radiator Panel Kit	3.2.1.1.2.1.7		387						355			100		Increase Rejection Capacity By 7500 Btu/hr
Closed					1214.9	±61.5	473.0							
Open					1214.9	±150.0	366.0							
Second Manipulator System	3.2.1.1.2.1.16	905			957.2	88.9	443.9	855			0	0	100	
RMS Installation		266			985.2	96.6	416.4	379						
P/L Bay Purge and Vent Kit	3.2.1.1.2.1.4	TBD												Payload Unique
Ballast Locations														
Nose Wheel Well		1926			292.0	0.0	326.3							OV-102 ONLY
Bay 2		1365			655.0	±91.0	408.0							Maximum/side
Bay 12		1388			1225.0	±91.0	408.0							Maximum/side
Bay 13		1349			1277.5	±91.0	408.0							Maximum/side
Aft Body		1000			1507.0	±51.0	310.0							Maximum/side

TABLE 10.1 - HARDWARE PAYLOAD WEIGHT CHARGEABLE OPTIONS (CONTINUED)

ITEM	JSC 07700 Vol X Reference	Control Weight			Center of Gravity			Current Status		Maturity (%)			Remarks
		Dry	Wet	Expend	X_0	Y_0	Z_0	Light Weight	Standard Weight	Est	Cal	Act	
CFE													
Bridge Fitting (Pair*)(1)	3.2.1.1.2.1.15												Any Special Equipment Added To The Baseline Attach Fitting Structure Such As A Unique Deployment Guide Is P/L Chargeable. * Passive Attach fittings Weight included in control wt. For each Active Attach fitting add 77 lbs. (1) Status weights do not include Passive attach fittings weight of 28 lbs. For each active fitting add 101 lbs. (If guide used, add 5 lbs.)
1		262			609.0	±94	404.0	110			100		
2		234			664.5	±94	404.0	-	158		100		
3		250			721.5	±94	404.0	174			100		
4		262			778.5	±94	404.0	-	252		100		
5		278			835.0	±94	404.0	-	292		100		
6		278			891.0	±94	404.0	-	192		100		
7		326			949.3	±94	404.0	-	260		100		
8		294			1009.8	±94	404.0	-	264		100		
9		270			1065.2	±94	404.0	-	220		100		
10		290			1115.5	±94	404.0	-	260		100		
11		290			1165.9	±94	404.0	-	232		100		
12		338			1220.0	±94	404.0	220	280		100		
13		390			1275.3	±94	404.0	134	198		100		
14		186			1304.3	±94	404.0			100			
Keel Fitting* (2)													* Keel fitting control weight includes active retention fitting weight. (2) Status weights do not include attach fittings. Add 27.5 lbs. for passive journal or 80 lbs. for active latch.
1		127			609.0	0	305.0	65	-		100		
2		131			664.5	0	305.0	106	-		100		
3		168			721.5	0	305.0	97	-		100		
4		191			778.5	0	305.0	96	-		100		
5		190			835.0	0	305.0	99	-		100		
6		188			891.0	0	305.0	91	191		100		
7		216			949.3	0	305.0	102	211		100		
8		239			1009.8	0	305.0	126	168		100		
9		219			1065.2	0	305.0	101	174		100		
10		240			1115.5	0	305.0	102	180		100		
11		233			1165.9	0	305.0	104	184		100		
12		327			1220.0	0	305.0	118	-		100		
Less P/L Fitting Allocation		-675			1074.0	26.0	395.0						
KU-band Comm Kit	3.2.1.1.2.1.11	290			590	-90	480.0			100			Second Set
GFE													
Aft Upper Deck Displays & Controls	3.2.1.1.2.1.11	TBS											P/L Peculiar
MSS PCM Recorder Kit	3.2.1.1.2.1.11	60											

TABLE 10.2 - CREW EQUIPMENT/LIFE SUPPORT PAYLOAD WEIGHT CHARGEABLE OPTIONS

ITEM	JSC 07700 Vol X Reference	Control Weight			Center of Gravity			Current Status			Maturity (%)			Remarks
		Dry	Wet	Expend	X_0	Y_0	Z_0	Dry	Wet	Expend	Est	Cal	Act	
GFE														
Crew Equipment	3.2.1.1.2.1.10													For Additional Crewmen or
Trash Container		.5/M									100			Mission Over 7-Day Duration
Seats & Restraints		101/M			543	-48.7	346				100			Seat No. 5
Seats & Restraints		101/M			490	-10	346				100			Seat No. 6
Seats & Restraints		101/M									100			Seat No. 7
Seats & Restraints		101/M			471	41	340				100			Seat No. 8 (Rescue only)
Seats & Restraints		101/M			506	52	342				100			Seat No. 9 (Rescue only)
Seats & Restraints		101/M			506	32	342				100			Seat No. 10 (Rescue only)
Stowage - Containers		TBS			437	-18	370	735			100			
Stowage - Containers		TBS			525	51	315	209			100			
Stowage - Packaging		SEE			437	-18	370	110			100			30% of Each Stowed Item's Wt.
Stowage - Packaging		NOTE			525	51	315	50			100			30% of Each Stowed Item's Wt.
Fecal Bags		0.8/M									100			Contingency Only
Urine Bags		1.0/M									100			Contingency Only
ARS Expendables & Hardware														
Aux O2 Sys		75	141		794	89	329				100			Required when only 2 EPS tank sets are used.
OXYGEN				1.92/D						1.92/D				Airlock in Cabin & Cabin Leakage 8 lb/day.
Orbiter Cabin Leakage	3.2.1.1.2.1.19			2.4/D						2.4/D				Airlock Outside Cabin on Tunnel Adapter & Cabin Leakage 10 lb/day.
Crewman metabolic consumption	3.2.1.1.2.1.9			2.08/MD	750	0	308			2.08/MD	100			
EVA Support														Orbiter provides 2-Man Capability With Expendables for 3 EVA's (Including Rescue)
(1) ALSA O_2 Recharge				1.6							100			
(2) EVA Airlock Repressurization				2.7							100			
(3) Prebreathe Cycle				1.5/M							100			
(4) Suit Purge Cycle				1.0/M							100			
NITROGEN														
N_2 Tank Kit (Dry) Including Tank Mounting Brackets & Plumbing		83	143								100			
Gaseous N_2 Per Tank				60							100			40 lb Minimum Usable/Tank
Orbiter Cabin Leakage	3.2.1.1.2.1.19			6.08/D						6.08/D	100			Airlock in Cabin & Cabin Leakage 8.0 lb/day.
Airlock Repress				7.6/D						7.6/D	100			Airlock Outside Cabin on Tunnel
LIOH Canisters		7.0/2MD			490	0	315	6.7/2MD			100			Above 28 md & 96 hr Contingency. Each Canister Has 2-man-day.

TABLE 10.2 - CREW EQUIPMENT/LIFE SUPPORT PAYLOAD WEIGHT CHARGEABLE OPTIONS (CONTINUED)

ITEM	JSC 07700 Vol X Reference	Control Weight			Center of Gravity			Current Status			Maturity (%)			Remarks
		Dry	Wet	Expend	X_0	Y_0	Z_0	Dry	Wet	Expend	Est	Cal	Act	
GFE														
EVA Hardware & Expendables	3.2.1.1.2.1.3													
Extravehicular Mobility Unit (EMU) Including One charge of Expendables.			256						256		100			Additional Units. Water not included.
LIOH Recharge		6.8												
Spare Battery		9.8												
Crewman W/O Personal Equip	3.2.1.1.2.1.10	170			495	10	344				100			No. 5
					495	-10	344							No. 6
					529	-49	345							No. 7
					467	41	343							No. 8 Rescue Only
					502	52	344							No. 9 Rescue Only
					502	32	344							No. 10 Rescue Only
Crew Equipment	3.2.1.1.2.1.10													
Clothing Module		22.0 lb/ man									100			7 Day Mission
Survival Kit		42						42			100			Up to 6 Crewmen.
Crew Life Vest		2.5/M						2.5/M			100			
Tissue W/Dispenser		1.5/M									100			7 Day Mission.
Ancillary Crew Provisions Shipset		41.5/ 2 men												
Orbiter Stowage Provisions Shipset		172/ 42 man-day												Stowage Packaging Such as Trays, Locker Inserts, Bags, Straps

TABLE 10.2 - CREW EQUIPMENT/LIFE SUPPORT PAYLOAD WEIGHT CHARGEABLE OPTIONS (CONCLUDED)

ITEM	JSC 07700 Vol X Reference	Control Weight			Center of Gravity			Current Status			Maturity (%)			Remarks
		Dry	Wet	Expend	X_0	Y_0	Z_0	Dry	Wet	Expend	Est	Cal	Act	
GFE														
Crew Equipment (Continued)	3.2.1.1.2.1.9 /.10													
Personal Hygiene Kit		3.2/M			557	-43	356				100			
Galley Equipment Food Tray		0.9/M												
Personal Rescue System (PRS)	3.2.1.1.2.1.10													PRS Assembly Includes the PRE and the POS.
Personal Rescue Enclosure (PRE)		24.5						24.5			100			
Portable Oxygen System (POS)			15.0						15.0		100			
Recharge Kit for POS				4.0							100			Recharge Kit for 3 Hour Capability.
FOOD														
Menu Food				3.33	465	-65	368	3.34/ md			100			Per Man-Day.
Pantry Food				2.06	465	-70	368	2.06/ md			100			Per Man-Day.
Contingency Food								6.06/M						Per Man-Mission

TABLE 10.3 - ELECTRICAL ENERGY PAYLOAD WEIGHT CHARGEABLE OPTIONS

ITEM	JSC 07700 Vol X Reference	Control Weight			Center of Gravity			Current Status			Maturity (%)			Remarks
		Dry	Wet	Expend	X_0	Y_0	Z_0	Dry	Wet	Expend	Est	Cal	Act	
Electrical Energy Supply	3.2.1.1.2.1.13													
EPS Kits Under Payload Bay Liner														56 lb O_2 available to ARS From Each Cryogenic O_2 Tank Added
Orbiter OV-102:														C.G.'s Reflect Tank Set Wet Condition
Tank Set #4 Lift-off Wt.		770	1643	844	1004.3	-34.7	300.9	699	1565	839		100		
Tank Set #4 Landing Wt.		770	799	0	955.0	- 5.0	300.7	699	726	0		100		
Tank Set #5 Lift-off Wt.		684	1803	844	947.8	-30.5	304.1	635	1501	839		100		
Tank Set #5 Landing Wt.		684	959	0	945.8	1.1	302.2	635	662	0		100		
Orbiters OV-099 & 103:														
Tank Set #4 Lift-off Wt.		770	1643	844	1005	-35.4	300.9	692	1558	839		100		
Tank Set #4 Landing Wt.		770	799	0	955.9	- 6.3	300.7	692	719	0		100		
Tank Set #5 Lift-off Wt.		684	1803	844	TBD	TBD	TBD	TBD	TBD	TBD				
Tank Set #5 Landing Wt.		684	959	0	TBD	TBD	TBD	TBD	TBD	0				
All Orbiters:														
Tank Set #6 Lift-off Wt.														P/L Bay Location TBD
Tank Set #6 Landing Wt.														P/L Bay Location TBD
Tank Set #7 Lift-off Wt.														P/L Bay Location TBD
Tank Set #7 Landing Wt.														P/L Bay Location TBD
EPS Tank Sets in Cargo Bay		TBD	TBD	TBD										Kits With P/L Unique Mounting
Electrical Power Umbilical Harness		TBD												

TABLE 10.4 - PROPULSION HARDWARE & PROPELLANTS PAYLOAD WEIGHT CHARGEABLE OPTIONS

ITEM	JSC 07700 Vol X Reference	Control Weight			Center of Gravity			Current Status			Maturity (%)			Remarks
		Dry	Wet	Expend	X_0	Y_0	Z_0	Dry	Wet	Expend	Est	Cal	Act	
GFE														
RCS Propellants	3.2.1.1.2.1.1			TBD						TBD				As Required by P/L Within Restraints of Orbiter RCS Tank Volumes
OMS V Kits		TBD	TBD	TBD										
V 500 ft/sec Lift-off Wt.														
V 500 ft/sec Landing Wt.														
V 1000 ft/sec Lift-off Wt														
V 100o ft/sec Landing Wt.														
V 1500 ft/sec Lift-off Wt														
V 1500 ft/sec Landing Wt.														
Payload Propellant Dump System														
Removable Kit (Storage Prop)		TBD												
Removable Kit (Cryo Prop)		TBD												

APPENDIX A MASS PROPERTIES

This Appendix provides Mass Properties for the missions defined in Section 1 of this document. Each mission consists of two pages; Cargo Module (Payload/STS operator) and the vehicle elements and consumables.

Table A-9 contains the Orbiter weight and c.g. data to be used for performance analysis of the Operational Missions STS-5 and subsequent.

TABLE A-1.1 STS-9 VEHICLE SUMMARY WEIGHT STATEMENT — W9[illegible] 83/11/04 11.45.57

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
ORBITER OV-102E STS-9 INERT	155430	1056.2	-.7	365.6	847839	5372593	5683679	-642	83609	-632
SSME X3 INERT	20729	1495.0	.4	384.5	23604	19202	17646	-191	-2475	100
BOUYANCY	80	1107.8	-.6	368.7	0	0	0	0	0	0
PERSONNEL	3175	502.8	2.3	381.8	2237	10039	9228	513	135	126
ORBITER WITHOUT CONSUMABLES	179414	1097.1	-.5	368.9	375071	6409799	6717093	416	106943	-302
NON-PROP CONSUM AT SRB IGN	6184	978.3	-4.3	338.0	10672	122557	124610	-1127	14789	-103
MPS PROPELLANT AT SRB IGN	5165	1404.5	6.8	352.7	4149	5527	5037	-1004	1041	-418
OMS PROPELLANT - LEFT	8000	1431.9	-95.0	476.3	1740	1267	1264	10	10	599
OMS PROPELLANT - RIGHT	8000	1431.9	95.0	476.3	1740	1267	1264	-10	10	-599
RCS PROPELLANT - FWD	2446	317.8	5.3	365.3	284	17	297	-2	5	-1
RCS PROPELLANT - AFT	5384	1345.0	0.0	470.1	9473	1075	9942	0	100	0
ORBITER MODULE TOTAL AT SRB IGN	214594	1123.4	-.3	378.2	933733	7462158	7762078	-477	265781	-642
CARGO MODULE TOTAL	33264	1020.8	1.1	384.0	32573	280121	281521	-2545	12047	2319
ORBITER PLUS CARGO AT SRB IGN	247858	1109.6	-.1	378.9	1016531	7807926	3109047	-3936	274102	1729
ET LWT-4 INERT	67542	1352.6	2.6	424.4	359303	4004377	4001872	3506	159103	6943
BOUYANCY	155	1352.6	2.6	424.4	0	0	0	0	0	0
MPS FUEL AT SRB IGN BUDGET J	229275	1608.2	0.0	400.0	0	3757206	3757206	0	0	0
MPS LOX AT SRB IGN BUDGET J	1364743	730.1	.6	401.4	74486	4804794	4754191	136112	315393	26930
MPS PRESSURANT	423	753.6	0.0	400.0	0	17697	17697	-12	-27	0
ET MODULE TOTAL AT SRB IGN	1662238	876.6	.6	402.1	442010	48717944	48657273	131921	584005	34638
SRB LEFT SEPARATION	182657	1809.4	-250.8	401.0	185422	11399523	11403262	-25553	3162	770
SRB LEFT INFLIGHT LOSSES	1115709	1696.5	-250.5	400.0	735614	35405175	35405189	1407	-103	0
SRB LEFT MODULE TOTAL-STD/DFI	1293366	1712.4	-250.5	400.1	922073	47236560	47240282	-25392	11879	760
SRB RIGHT SEPARATION	181620	1811.9	250.8	401.1	185054	11285315	11289107	24137	2370	-799
SRB RIGHT INFLIGHT LOSSES	1116353	1695.4	250.5	400.1	736063	35370309	35370320	-1610	169	-1
SRB RIGHT MODULE TOTAL	1297973	1712.6	250.5	400.2	922154	47105934	47109706	23695	6433	-789
ET-ICE/FROST/LIQ AIR+N2+TPS H2O	383	0.0	0.0	0.0	0	0	0	0	0	0

ORBITER AND CARGO IN ORBITER COORDINATE SYSTEM, ET AND SRB IN SHUTTLE COORDINATE SYSTEM

TABLE A-1.2 STS-09 VEHICLE SUMMARY WEIGHT STATEMENT — WGLD 83/11/04 11.34.34

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
S/L 1 PAYLOAD	27933	1049.7	.2	395.4	22471	155919	158530	77	3599	-26
MV0073A P/L ATTACH HDW	1497	1126.3	3.3	374.4	2648	5931	7213	-406	266	132
MV0073A ORB RET FTG ALLOW	-575	1074.0	26.0	395.0	2	30	30	0	0	0
MV0519A TUNNEL ADAPTER	691	624.8	.4	366.2	97	168	146	-1	-9	1
MV0520A ATCS RADIATOR KIT	355	1214.9	-.1	473.3	360	237	550	0	0	0
MV0525A TANK SET 4 HDW	699	951.2	-2.7	300.7	872	1875	2684	-862	-15	17
MV0548A CCTV	72	968.6	-14.3	438.0	98	1915	2012	-432	-1	0
MV0610A MID-DECK SEAT - 6	92	483.0	10.0	346.0	5	6	2	0	0	0
MV0702A P/L TIMING BUFFER	3	516.0	-62.0	432.0	0	0	0	0	0	0
MV0710A S-L UTILITY KIT	45	539.1	20.6	438.9	27	4	30	-3	-1	2
MV0711A X603 I/F HARNESS	85	590.7	-22.4	373.4	116	15	109	1	0	-1
MV0712A SMCH	425	900.4	-34.8	348.0	448	2506	2950	16	7	-3
MV0713A 1307 B/H PAYLOAD WIRING	36	1215.7	-28.3	344.0	54	6	59	5	0	0
MV0719A AFD WIRING HARNESS	5	528.2	-57.7	425.9	1	3	2	-1	1	0
MV0722A STD. SW. PANEL	20	550.0	-47.0	446.0	1	1	1	0	0	0
MV0727A S-L FLUID KIT	43	775.0	-54.4	325.4	0	69	69	0	0	0
MV0728A S-L ELECT. KIT	261	771.9	13.6	332.1	297	442	689	-66	54	-1
MV0730A S-L MODULE KIT	159	373.5	-7.4	347.7	135	7	129	2	0	5
P/L UMBILICAL	10	1299.0	0.0	359.0	22	0	22	0	0	0
PERSONNEL	450	502.8	2.3	331.8	0	0	0	0	0	0
PRIMARY PAYLOAD	32261	1026.4	-.6	390.9	30429	252090	255639	-1185	9937	235
MV0525A TANK SET 4 CRYO	370	1047.2	-60.5	301.0	403	604	1031	-459	-18	13
PAYLOAD CHARGEABLE NPC	870	1047.2	-60.5	301.0	403	604	1031	-453	-17	13
TOTAL PAYLOAD CHARGEABLE	33131	1026.9	-2.2	383.5	32971	254251	257456	-1872	9576	1233
MV0032A RMS ARM	-1304	946.3	-35.4	437.8	155	10323	10353	-509	-184	42
DELETIONS	-134	504.8	1.5	434.3	6	3	5	0	1	0
AIRLOCK B HATCH-P/L CHARGE	-115	575.0	0.0	353.0	0	0	0	0	0	0
STABILIZER LINKS	-32	850.0	0.0	410.0	0	1	1	0	0	0
MV0532A P/L BAY LINER MODS	-7	1018.8	0.0	377.9	5	12	15	0	-3	0
ET SEP. CAMERA DOORS	12	1340.0	-16.2	267.0	24	0	24	0	0	0
EGRESS/ARM REST F. D. 4	5	538.0	30.0	433.0	0	0	0	0	0	0
MANIFEST ITEMS	-1575	873.4	-71.4	432.2	592	17335	17630	-2146	546	-101
MV0545A COMSEC	40	555.0	57.0	380.0	0	0	0	0	0	0
MV0550A AFT STATION CONTAINERS	43	542.0	-54.0	445.0	2	5	4	0	0	0
MV0564A PDRS SYS. TEST-VTR	65	550.0	-50.0	440.0	1	1	1	0	0	0
MV0566A TANK SET 5 HDW.	635	945.7	3.7	302.0	703	174	809	3	-1	-9
MV0570A ACIP	131	1215.6	-3.0	283.8	3	5	4	0	0	0
MV0575A TILE GAP HEATING	7	594.0	.4	295.0	2	0	2	0	0	0
MV0578A DAC HARNESS	6	793.4	-66.4	389.6	3	72	71	-5	-7	1
MV0581A OEX RECORDER	15	404.0	-2.4	347.9	3	18	11	1	-9	-1
MV0610A MID-DECK SEAT - 7	92	524.0	-46.3	346.0	5	6	2	0	0	0
PERSONNEL	450	502.8	2.3	331.8	0	0	0	0	0	0
AUXILLARY O2 HARDWARE	75	792.0	39.0	329.0	2	2	2	0	0	0
BALLAST PROVISIONS	22	1508.0	0.0	277.9	7	0	7	0	0	0
H2 SAMPLES	26	1375.0	0.0	375.0	55	0	55	0	0	0
SPARE KU BAND ELECTRONICS	95	554.0	-43.0	345.0	0	0	0	0	0	0
STS OPERATOR CHARGEABLE CARGO	1703	770.1	-2.0	340.6	1847	26652	26913	548	-3428	-145
PRIMARY PAYLOAD	32261	1026.4	-.6	390.9	30429	252090	255639	-1185	9937	235
PAYLOAD CHARGEABLE NPC	370	1047.2	-60.5	301.0	403	604	1031	-453	-17	13
MANIFEST ITEMS	-1575	873.4	-71.4	432.2	592	17335	17630	-2146	546	-101
STS OPERATOR CHARGEABLE CARGO	1703	770.1	-2.0	340.6	1847	26652	26913	548	-3428	-145
STS-9 CARGO MODULE TOTAL	33254	1020.3	1.1	384.0	32573	230121	231521	-2545	12047	2319
POTENTIAL JETTISON ITEMS:	TBD									
S/L 1 OUTER HATCH	45	1075.9	0.0	484.3	0	0	0	0	0	0
S/L 1 EXPERIMENT TABLE	46	1092.4	1.3	462.7	0	0	0	0	0	0

TABLE A-2.1 STS-11 VEHICLE SUMMARY WEIGHT STATEMENT — W14BD 83/10/31 14.19.02

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
ORBITER OV-099 STS-11 INERT	143295	1064.1	-.4	365.5	813522	5073090	5365954	3464	81743	-1202
SSME X3 INERT	20791	1495.6	.4	384.8	23543	19170	17525	61	-2427	100
BOUYANCY	80	1117.4	-.3	368.0	0	0	0	0	0	0
PERSONNEL 5M/3D	3944	513.6	2.0	384.4	1481	9517	9799	1085	791	132
ORBITER W/ I CONSUMABLES	173100	1103.4	-.2	363.2	840251	6139310	6429125	4814	104586	-377
NON-PROP CONSUM AT SRB IGN	6139	993.5	-5.6	337.4	10321	123216	125303	-2406	14097	8
MPS PROPELLANT AT SRB IGN	5166	1404.5	6.8	352.7	4149	5527	5037	-1004	1041	-418
OMS PROPELLANT - LEFT	11900	1419.0	-94.9	476.0	2573	2593	2546	-18	54	905
OMS PROPELLANT - RIGHT	11700	1419.6	95.0	476.0	2535	2509	2463	17	51	-390
RCS PROPELLANT - FWD	2446	317.8	5.3	365.3	284	17	297	-2	5	-1
RCS PROPELLANT - AFT	4970	1345.4	0.0	470.5	8709	1053	9197	0	93	0
ORBITER MODULE TOTAL AT SRB IGN	215421	1138.8	-.2	381.1	979538	7294315	7575909	1592	299173	-1453
CARGO MODULE TOTAL	34649	1023.3	3.0	380.6	33753	372768	385047	-1218	-5052	-170
ORBITER PLUS CARGO AT SRB IGN	250070	1122.8	.2	381.1	1013360	7752979	8046917	-2020	294514	-1633
ET LWT-3 INERT	67692	1353.6	2.7	424.2	360901	4039848	4036819	3001	162419	6931
BOUYANCY	155	1353.6	2.7	424.2	0	0	0	0	0	0
MPS FUEL AT SRB IGN-S BUDGET	229275	1608.2	0.0	400.0	0	3757206	3757206	0	0	0
MPS LOX AT SRB IGN-S BUDGET	1364743	730.1	.6	401.4	74486	4804794	4754191	136112	315393	26980
MPS PRESSURANT	423	753.6	0.0	400.0	0	17697	17697	-12	-27	0
ET MODULE TOTAL AT SRB IGN	1662288	376.7	.6	402.1	442934	48769590	48708625	132054	586360	34653
SRB LEFT SEPARATION	179593	1813.2	-250.8	401.1	183927	11272030	11275595	-23739	2773	641
SRB LEFT INFLIGHT LOSSES	1116227	1696.7	-250.5	400.0	736073	35439135	35439155	1357	-25	0
SRB LEFT MODULE TOTAL-MMC	1295825	1712.8	-250.5	400.2	920043	47164409	47167955	-23548	7027	630
SRB RIGHT SEPARATION	179519	1813.1	250.7	401.1	183959	11274934	11278531	24295	2732	-653
SRB RIGHT INFLIGHT LOSSES	1116227	1696.7	250.5	400.0	736073	35439163	35439177	-1383	-22	-1
SRB RIGHT MODULE TOTAL-MMC	1295846	1712.8	250.5	400.2	920074	47166557	47170229	23635	7036	-645
ET-ICE/FROST/LIQ AIR+N2+TPS H2O	317	0.0	0.0	0.0	0	0	0	0	0	0

ORBITER AND CARGO IN ORBITER COORDINATE SYSTEM, ET AND SRB IN SHUTTLE COORDINATE SYSTEM

TABLE A-2.2 STS-11 VEHICLE SUMMARY WEIGHT STATEMENT — W1\CD 83/10/31 14.11.43

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
WESTAR PAYLOAD	7331	1096.5	0.0	381.8	2281	2285	647	14	0	0
PALAPA PAYLOAD	7539	1238.1	0.0	381.6	2273	2283	648	10	1	1
DEPLOYED/USEABLE PAYLOAD	14870	1168.3	0.0	381.7	4554	20658	17380	24	-21	1
SPAS-01A PAYLOAD	3192	899.9	-2.9	399.2	2227	416	2070	-71	8	-36
MFR PLATFORM	104	994.5	-30.9	394.0	3	3	1	0	0	0
WESTAR CARRIER	2394	1095.7	11.5	368.8	2106	1024	1896	0	0	152
PALAPA CARRIER	2425	1237.3	11.5	368.8	2134	1038	1921	0	0	154
MMU (2) BAY 1	1200	610.4	0.0	397.9	3245	3	3238	0	0	0
CINEMA 360 (P/L BAY)	472	835.0	80.9	395.0	0	0	0	0	0	0
CINEMA 360 (MID-DECK)	74	433.8	-46.8	346.1	0	0	0	0	0	0
IEF EXPERIMENT	69	433.8	-46.8	329.3	0	0	0	0	0	0
ACES EXPERIMENT	246	433.8	18.7	357.4	0	0	0	0	0	0
RME EXPERIMENT	4	433.8	-28.1	340.5	0	0	0	0	0	0
PRIMARY PAYLOAD	25050	1038.6	2.9	382.0	15833	182573	186367	-339	-3964	144
I. R. T. BAY 2--DEPLOYED	210	664.5	-80.9	395.0	7	7	1	0	0	0
I. R. T. BAY 2--FIXED	305	664.5	-80.9	395.0	0	0	0	0	0	0
GET AWAY SPECIALS (3)BAYS 2-5	3100	760.0	22.8	399.2	4025	1739	5695	553	14	-18
GAS CONTROLLER	3	563.0	15.0	429.0	0	0	0	0	0	0
STUDENT EXPERIMENT (A. E. M.)	50	433.8	28.1	329.3	0	0	0	0	0	0
SESA BAY 2	387	657.0	80.9	393.8	0	0	0	0	0	0
MV0514A CONTAINER SUPPORT ASSY.	73	664.3	94.0	400.1	1	5	4	0	0	0
MV0736A MLR EXPERIMENT	170	433.8	-28.1	357.4	4	1	3	0	0	0
ANCILLARY PAYLOAD	4293	720.8	14.9	395.8	5742	7561	12995	1350	722	54
TOTAL PAYLOAD CHARGEABLE	29348	1034.7	4.7	384.0	21837	297382	305558	-2458	-7245	328
SPARE MCIU	18	433.8	9.3	329.3	0	0	0	0	0	0
MANIFEST ITEMS	18	433.8	9.3	329.3	0	0	0	0	0	0
MV0073A P/L ATTACH HDW	2303	1074.6	1.2	373.8	4115	10752	12644	39	422	-39
MV0073A ORB RET FTG ALLOW	-675	1074.0	26.0	395.0	2	45	45	0	0	0
MV0082A RMS ELBOW CAMERA	31	950.0	-74.0	459.0	1	0	0	0	0	0
MV0403A MADS 2	713	909.7	32.5	316.7	1103	12664	13383	249	-142	-77
MV0412A S-BAND FM	22	553.3	53.5	395.7	2	1	1	0	0	1
MV0520A ATCS RADIATOR KIT	355	1214.9	-.1	473.3	360	237	550	0	0	0
MV0525A TANK SET 4 HARDWARE	692	952.1	-4.0	300.7	833	1851	2622	-328	-14	16
MV0545A COMSEC	40	555.0	57.0	380.0	0	0	0	0	0	0
MV0548A CCTV	73	957.5	-13.8	438.3	100	1927	2025	-436	-3	1
MV0550A AFT STATION CONTAINERS	48	541.0	-54.0	445.0	2	5	4	0	0	0
MV0564A PDRS SYS TEST-VTR	66	524.1	54.3	440.8	5	0	5	2	0	1
MV0570A ACIP	131	1215.6	-8.0	283.8	3	5	4	0	0	0
MV0610A MID-DECK SEAT 7	92	524.0	-46.3	345.0	5	6	2	0	0	0
MV0702A P/L TIMING BUFFER	3	516.0	-62.0	432.0	0	0	0	0	0	0
MV0711A X603 I/F HARNESS	35	590.8	-22.2	373.6	116	15	109	1	0	-1
MV0712A SMCH	650	906.0	4.7	351.2	875	3554	4415	99	1	20
MV0713A 1307 B/H PAYLOAD WIRING	44	1228.1	-21.2	344.0	55	14	73	10	0	0
MV0719A AFD WIRING HARNESS	23	550.2	-65.9	438.7	1	1	1	0	0	0
MV0720A P/L RECORDER CABLE	1	415.0	-40.0	390.0	0	0	0	0	0	0
MV0722A STD SW PANEL	40	560.0	-45.5	443.0	0	1	1	0	0	0
MV0725A SIP SMCH	93	1125.1	0.0	403.1	172	262	432	0	-2	0
MV0728A S/L ELECT. KIT	13	750.0	0.0	330.6	9	1	9	0	0	0
MV0757A SPAS AFD + P/L WIRING	29	332.3	-15.1	422.6	55	76	130	0	-5	0
MV0766A LONGERON CABLE SUPPORT	11	997.6	-23.4	372.0	19	53	32	12	0	0
H2 SAMPLES	26	1375.0	0.0	375.0	55	0	55	0	0	0
CBSA + BEAM - BAY 3	363	725.3	-37.1	402.1	0	0	0	0	0	0
STS OPERATOR CHARGEABLE CARGO	5283	951.8	-5.5	361.5	11293	63393	71874	469	485	-741
PRIMARY PAYLOAD	25050	1033.6	2.9	382.0	15833	182573	186367	-339	-3964	144
ANCILLARY PAYLOAD	4293	720.8	14.9	395.8	5742	7561	12995	1350	722	54
MANIFEST ITEMS	18	433.8	9.3	329.3	0	0	0	0	0	0
STS OPERATOR CHARGEABLE CARGO	5283	951.8	-5.5	361.5	11293	63393	71874	469	435	-741
STS-11 CARGO MODULE TOTAL	34649	1023.3	3.0	380.6	33753	372753	385047	-1218	-5052	-170

TABLE A-3.1 STS-13 VEHICLE SUMMARY WEIGHT STATEMENT — W136D 83/11/01 14.48.41

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY, IN. X	Y	Z	MOMENTS-OF-INERTIA, SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA, SF2 PXY	PXZ	PYZ
ORBITER OV-099 STS-13 INERT	148287	1064.1	-.4	365.5	313524	5073141	5366003	3464	81733	-1200
SSME X3 INERT	20791	1495.6	.4	384.8	23548	19170	17525	61	-2427	100
BOUYANCY	80	1117.4	-.3	368.0	0	0	0	0	0	0
PERSONNEL 5M/6D	3694	513.6	2.0	384.4	1481	9517	9799	1085	791	132
ORBITER WITHOUT CONSUMABLES	172852	1104.3	-.3	368.2	840239	6120549	6410376	4886	105090	-877
NON-PROP CONSUM AT SRB IGN	6139	993.5	-5.6	337.4	10821	123216	125303	-2406	14097	8
MPS PROPELLANT AT SRB IGN	5166	1404.5	6.8	352.7	4149	5527	5037	-1004	1041	-418
OMS PROPELLANT - LEFT	12532	1417.0	-94.9	475.9	2709	2873	2822	-22	65	954
OMS PROPELLANT - RIGHT	12532	1417.0	94.9	475.9	2709	2873	2822	22	65	-954
RCS PROPELLANT - FWD	2446	317.8	5.3	365.3	284	17	297	-2	5	-1
RCS PROPELLANT - AFT	4970	1345.4	0.0	470.5	8709	1053	9197	0	93	0
ORBITER MODULE TOTAL AT SRB IGN	216637	1141.1	-.1	381.8	935367	7294370	7575959	2699	305310	-1097
CARGO MODULE TOTAL	37621	961.9	1.3	391.0	47973	344512	354019	-75	-2474	-187
ORBITER PLUS CARGO AT SRB IGN	254258	1114.6	.1	383.1	1033946	7851632	8152221	751	292371	-1191
ET LWT-5 INERT	67342	1351.0	2.6	424.1	360552	4005222	4003722	3644	164115	6864
BOUYANCY	155	1351.0	2.6	424.1	0	0	0	0	0	0
MPS FUEL AT SRB IGN-K4 BUDGET	229275	1608.2	0.0	400.0	0	3757206	3757206	0	0	0
MPS LOX AT SRB IGN-K4 BUDGET	1364743	730.1	.6	401.4	74486	4804794	4754191	136112	315393	26930
MPS PRESSURANT	423	753.6	0.0	400.0	0	17697	17697	-12	-27	0
ET MODULE TOTAL AT SRB IGN	1651938	876.5	.6	402.1	442538	48632732	48622291	131851	585734	34548
SRB LEFT SEPARATION	179593	1813.2	-250.8	401.1	183927	11272030	11275595	-23739	2773	641
SRB LEFT INFLIGHT LOSSES	1116227	1695.7	-250.5	400.0	736073	35439136	35439156	1357	-25	0
SRB LEFT MODULE TOTAL-MWC	1295825	1712.8	-250.5	400.2	920043	47164409	47167956	-23548	7027	630
SRB RIGHT SEPARATION	179619	1813.1	250.7	401.1	183959	11274934	11278581	24296	2782	-653
SRB RIGHT INFLIGHT LOSSES	1116227	1695.7	250.5	400.0	736073	35439163	35439177	-1388	-22	-1
SRB RIGHT MODULE TOTAL-MWC	1295846	1712.8	250.5	400.2	920074	47166557	47170229	23685	7036	-646
ET-ICE/FROST/LIQ AIR+N2+TPS H2O	317	0.0	0.0	0.0	0	0	0	0	0	0

ORBITER AND CARGO IN ORBITER COORDINATE SYSTEM, ET AND SRB IN SHUTTLE COORDINATE SYSTEM

TABLE A-3.2 STS-13 VEHICLE SUMMARY WEIGHT STATEMENT — W13CD 83/10/24 09.05.29

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
LDEF	21615	893.1	0.0	400.0	24290	72810	74910	2	7	-3
DEPLOYED/USEABLE PAYLOAD	21615	893.1	0.0	400.0	24290	72810	74910	2	7	-2
SMM FSS	8915	1207.0	1.9	387.3	8141	4656	7199	-130	-564	-104
MV0643A MMU (2) BAY 1	1200	610.4	0.0	397.9	3245	8	3238	0	0	0
MFR PLATFORM - BAY 10	104	1104.8	-30.9	394.0	0	0	0	0	0	0
CINEMA 360 CAMERA - BAY 10	472	1112.3	80.9	394.0	0	0	0	0	0	0
I MAX CAMERA - MID-DECK	245	433.8	-46.8	346.1	0	0	0	0	0	0
I MAX BATTERIES	80	524.1	65.0	440.8	0	0	0	0	0	0
RME EXPERIMENT	4	433.8	-28.1	340.5	0	0	0	0	0	0
PRIMARY PAYLOAD	32635	967.9	1.2	395.0	37066	268353	275334	2524	-5174	23
STUDENT EXPERIMENTS	50	520.9	51.8	374.1	0	0	0	0	0	0
ANCILLARY PAYLOAD	50	520.9	51.8	374.1	0	0	0	0	0	0
TOTAL PAYLOAD CHARGEABLE	32685	967.2	1.3	395.0	37111	270511	279026	2232	-5067	9
SPARE MCIU	18	433.8	9.3	329.3	0	0	0	0	0	0
MANIFEST ITEMS	18	433.8	9.3	329.3	0	0	0	0	0	0
MV0073A P/L ATTACH HDW	1995	1062.4	0.0	377.5	3513	8319	10275	0	391	0
MV0073A ORB RET FTG ALLOW	-675	1074.0	26.0	395.0	2	30	30	0	0	0
MV0082A RMS ELBOW CAMERA	31	950.0	-74.0	459.0	1	0	0	0	0	0
MV0408A MADS 2	713	909.7	32.5	316.7	1108	12664	13383	249	-142	-77
MV0412A S-BAND FM	22	553.3	58.5	395.7	2	1	1	0	0	1
MV0520A ATCS RADIATOR KIT	355	1214.9	-.1	473.3	355	238	546	0	0	0
MV0525A TANK SET 4 HARDWARE	692	952.1	-4.0	300.7	333	1851	2622	-328	-14	16
MV0545A COMSEC	40	555.0	57.0	330.0	0	0	0	0	0	0
MV0548A CCTV CAMERAS	73	967.5	-13.8	438.3	100	1927	2025	-436	-3	1
MV0550A AFT STATION CONTAINERS	48	541.0	-54.0	445.0	2	5	4	0	0	0
MV0564A PDRS SYS. TEST-VTR	66	524.1	54.3	440.8	5	0	5	2	0	1
MV0570A ACIP	131	1215.6	-3.0	293.8	3	5	4	0	0	0
MV0610A MID-DECK SEAT 7	92	524.0	-46.3	346.0	5	5	2	0	0	0
MV0702A P/L TIMING BUFFER	3	516.0	-62.0	432.0	0	0	0	0	0	0
MV0711A X603 I/F HARNESS	85	590.8	-22.2	373.6	116	15	109	1	0	-1
MV0712A SMCH	856	739.5	-10.7	341.4	71	7074	7037	62	33	3
MV0713A 1307 B/H PAYLOAD WIRING	44	1228.1	-21.2	344.0	55	14	73	10	0	0
MV0719A AFD WIRING HARNESS	15	537.5	-54.1	432.5	0	1	1	0	0	0
MV0720A P/L RECORDER CABLE	1	415.0	-40.0	390.0	0	0	0	0	0	0
MV0722A STD. SW. PANEL	40	550.0	-45.5	443.0	0	1	1	0	0	0
MV0766A LONGERON CABLE SUPPORT	11	997.6	-23.4	372.0	19	53	82	12	0	0
H2 SAMPLES	26	1375.0	0.0	375.0	55	0	55	0	0	0
CBSA - BAY 2	195	571.5	33.0	397.0	0	0	0	0	0	0
CBSA BEAM - BAY 2	57	564.5	92.0	403.0	0	0	0	0	0	0
STS OPERATOR CHARGEABLE CARGO	4918	928.2	1.1	353.0	9515	70169	72507	-2302	1101	-205
PRIMARY PAYLOAD	32635	967.9	1.2	395.0	37066	268353	275334	2524	-5174	23
ANCILLARY PAYLOAD	50	520.9	51.3	374.1	0	0	0	0	0	0
MANIFEST ITEMS	18	433.8	9.3	329.3	0	0	0	0	0	0
STS OPERATOR CHARGEABLE CARGO	4918	928.2	1.1	353.0	9515	70169	72507	-2302	1101	-205
STS-13 CARGO MODULE TOTAL	37621	951.9	1.3	391.0	47973	344512	354019	-75	-2474	-187

TABLE A-4.1 STS-14 VEHICLE SUMMARY WEIGHT STATEMENT -- W148D 83/11/09 09.52.03

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
ORBITER OV-103 STS-14 INERT	147079	1059.1	-.6	355.5	733100	4994063	5277493	3949	34233	-1066
SSME X3 INERT	20772	1495.0	.3	334.7	23517	19164	17550	-24	-2474	103
BOUYANCY	80	1112.9	-.5	368.0	0	0	0	0	0	0
PERSONNEL 6M/7D	4077	514.3	-.4	382.1	1660	9500	9906	1062	723	221
ORBITER WITHOUT CONSUMABLES	172003	1093.9	-.5	368.2	814902	6078903	6359416	5483	103050	-672
NON-PROP CONSUM AT SRB IGN	6139	993.5	-5.6	337.4	10321	123216	125303	-2406	14097	8
MPS PROPELLANT AT SRB IGN	5166	1404.5	6.8	352.7	4149	5527	5037	-1004	1041	-418
OMS PROPELLANT - LEFT	12532	1417.0	-94.9	475.9	2709	2873	2822	-23	65	954
OMS PROPELLANT - RIGHT	12532	1417.0	94.9	475.9	2709	2873	2822	23	65	-954
RCS PROPELLANT - FWD	2446	317.8	5.3	365.3	284	17	297	-2	5	-1
RCS PROPELLANT - AFT	4970	1345.4	0.0	470.5	8709	1053	9197	0	93	0
ORBITER MODULE TOTAL AT SRB IGN	215793	1136.9	-.3	381.8	950012	7267482	7539845	4560	311925	-775
CARGO MODULE TOTAL	42282	1034.4	-1.0	390.5	31324	371532	374872	4504	11799	645
ORBITER PLUS CARGO AT SRB IGN	258075	1120.1	-.4	383.2	991918	7719392	7994971	9593	316912	-173
ET LWT-6 INERT	67326	1352.6	2.6	424.5	350005	3997625	3995622	3702	159474	7002
BOUYANCY	155	1352.6	2.6	424.5	0	0	0	0	0	0
MPS FUEL AT SRB IGN-Y BUDGET	229273	1608.2	0.0	400.0	0	3757381	3757381	0	0	0
MPS LOX AT SRB IGN-Y BUDGET	1365010	730.1	.6	401.4	74485	4810065	4759463	136121	315415	26930
MPS PRESSURANT	423	753.6	0.0	400.0	0	17697	17697	-12	-27	0
ET MODULE TOTAL AT SRB IGN	1662192	876.5	.6	402.1	442238	48702795	48542595	131961	584369	34697
SRB LEFT SEPARATION	178263	1810.3	-250.8	401.1	182333	11225033	11228547	-23746	2900	641
SRB LEFT INFLIGHT LOSSES	1117284	1697.2	-250.5	400.0	736813	35499753	35499739	1320	-35	0
SRB LEFT MODULE TOTAL-LWC	1295552	1712.8	-250.5	400.2	919189	47149289	47152852	-23551	6993	630
SRB RIGHT SEPARATION	178289	1810.2	250.7	401.1	182365	11227903	11231504	24293	2909	-653
SRB RIGHT INFLIGHT LOSSES	1117284	1697.2	250.5	400.0	736312	35499326	35499356	-1352	-33	-1
SRB RIGHT MODULE TOTAL-LWC	1295573	1712.8	250.5	400.2	919218	47151530	47155117	23691	7001	-646
ET-ICE/FROST/LIQ AIR+N2+TPS H2O	317	0.0	0.0	0.0	0	0	0	0	0	0

ORBITER AND CARGO IN ORBITER COORDINATE SYSTEM, ET AND SRB IN SHUTTLE COORDINATE SYSTEM

TABLE A-4.2 STS-14 VEHICLE SUMMARY WEIGHT STATEMENT -- W14CD 83/11/09 09.44.29

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY, IN. X	Y	Z	MOMENTS-OF-INERTIA, SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA, SF2 PXY	PXZ	PYZ
TELESAT-I/ANIK C SPACECRAFT	7374	1042.5	0.0	381.6	2248	2263	653	-5	0	0
SYNCOM IV-1 SPACECRAFT	15306	1203.4	.1	406.0	6191	4291	5097	-13	-4	21
DEPLOYABLE PAYLOAD	22680	1154.5	.1	393.1	9079	36756	35313	-4	4344	24
UFC + MPESS CARRIER	3491	771.4	13.7	401.4	1792	972	1483	-195	-227	238
OAST-1 SAE + CARRIER	3175	928.5	.5	401.5	1957	1027	1645	4	-75	14
LESS ATT. HDW. ALLOW.	-222	928.5	.5	401.5	0	0	0	0	0	0
TELESAT-I/ASE	2422	1041.7	11.5	368.8	2106	1024	1896	0	0	152
SYNCOM IV-1/ASE	1743	1190.0	2.2	376.0	2601	763	2262	8	149	45
CINEMA 360 CAMERA - BAY 6	472	891.0	-30.9	394.0	0	0	0	0	0	0
I MAX CAMERA - MID-DECK	245	433.8	-46.8	346.0	0	0	0	0	0	0
I MAX BATTERIES	80	524.1	65.0	440.8	0	0	0	0	0	0
RME EXPERIMENT	4	433.8	-28.1	340.5	0	0	0	0	0	0
PRIMARY PAYLOAD	34090	1079.1	1.1	395.2	19358	191571	193923	-979	4217	549
GET AWAY SPECIAL (4) BAY 5	1795	833.0	0.0	404.0	0	0	0	0	0	0
GAS CONTROLLER	3	563.0	15.0	429.0	0	0	0	0	0	0
STUDENT EXPERIMENTS	50	520.9	51.8	374.1	0	0	0	0	0	0
CFES	779	463.5	-56.2	362.3	0	0	0	0	0	0
ANCILLARY PAYLOAD	2628	717.2	-15.5	391.1	645	16660	16333	2265	1840	261
TOTAL PAYLOAD CHARGEABLE	36718	1053.2	-.1	394.9	20156	277193	279910	4446	6331	846
GALLEY	-164	469.0	-67.0	367.0	14	14	3	0	0	0
H2O DISPENSING SYSTEM	26	473.1	-71.6	367.6	2	2	1	0	0	0
SPARE MCIU	18	433.8	9.3	329.3	0	0	0	0	0	0
MANIFEST ITEMS	-120	473.4	-77.4	372.5	-19	0	-28	12	-5	13
MV0073A P/L ATTACH HDW	2935	1012.8	0.0	371.0	5111	14463	16318	0	423	0
MV0073A ORB RET FTG ALLOW	-575	1074.0	26.0	395.0	2	30	30	0	0	0
MV0032A RMS ELBOW CAMERA	31	950.0	-74.0	459.0	1	0	0	0	0	0
MV0408A MINI-MADS	251	879.2	34.7	314.4	391	4075	4325	0	0	0
MV0412A S-BAND FM	22	553.3	58.5	395.7	2	1	1	0	0	1
MV0520A ATCS RADIATOR KIT	355	1214.9	-.1	473.3	355	238	546	0	0	0
MV0525A TANK SET 4 HARDWARE	693	951.4	-3.3	300.7	834	1346	2613	-327	-14	16
MV0545A COMSEC	40	555.0	57.0	380.0	0	0	0	0	0	0
MV0548A CCTV	73	967.5	-13.3	438.3	100	1927	2025	-436	-3	1
MV0550A AFT STATION CONTAINERS	48	541.0	-54.0	445.0	2	5	4	0	0	0
MV0564A PDRS SYS. TEST-VTR	66	524.1	54.3	440.8	2	1	3	1	0	0
MV0564A VTR (4) ASSY. KIT	264	524.1	-54.3	440.8	0	0	0	1	0	0
MV0568A PSA	124	603.3	0.0	327.4	0	0	0	0	0	0
MV0570A ACIP	131	1215.6	-3.0	288.8	3	5	4	0	0	0
MV0510A MID-DECK SEAT -5	92	483.0	-9.6	346.0	5	6	2	0	0	0
MV0610A MID-DECK SEAT -7	92	524.0	-46.3	346.0	5	6	2	0	0	0
MV0533A PSA LINER	20	608.3	0.0	327.4	0	0	0	0	0	0
MV0702A P/L TIMING BUFFER	3	516.0	-62.0	432.0	0	0	0	0	0	0
MV0711A X603 I/F HARNESS	85	590.7	-22.4	378.4	116	15	109	1	0	-1
MV0712A SMCH	356	789.5	-10.7	341.4	71	7074	7037	62	38	3
MV0713A 1307 B/H PAYLOAD WIRING	44	1228.1	-21.2	344.0	65	14	73	10	0	0
MV0719A AFD WIRING HARNESS	18	537.4	-53.3	433.0	0	1	1	0	0	0
MV0720A P/L RECORDER CABLE	1	415.0	-40.0	390.0	0	0	0	0	0	0
MV0722A STD. SW. PANEL	40	560.0	-45.5	443.0	0	1	1	0	0	0
MV0725A SIP SMCH	28	731.5	-93.5	400.3	0	1	1	0	0	0
MV0766A LONGERON CABLE SUPPORT	11	997.6	-23.4	372.0	19	63	82	12	0	0
H2 SAMPLES	26	1375.0	0.0	375.0	55	0	55	0	0	0
STS OPERATOR CHARGEABLE CARGO	5684	901.2	-3.4	362.1	10092	76340	73596	-172	-70	-442
PRIMARY PAYLOAD	34090	1079.1	1.1	395.2	19358	191571	193923	-979	4217	549
ANCILLARY PAYLOAD	2628	717.2	-15.5	391.1	645	16660	16333	2265	1840	261
MANIFEST ITEMS	-120	473.4	-77.4	372.5	-19	0	-28	12	-5	13
STS OPERATOR CHARGEABLE CARGO	5684	901.2	-3.4	362.1	10092	76340	73596	-172	-70	-442
STS-14 CARGO MODULE TOTAL	42282	1034.4	-1.0	390.5	31324	371532	374872	4504	11799	646

TABLE A-5.1 STS-16 VEHICLE SUMMARY WEIGHT STATEMENT — WN68D 83/11/08 09.13.05

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
ORBITER OV-103 STS-16 INERT	147079	1059.1	-.6	365.5	738100	4994063	5277493	3949	34238	-1066
SSME X3 INERT	20772	1495.0	.3	384.7	23517	19164	17550	-24	-2474	103
BOUYANCY	80	1112.9	-.5	368.0	0	0	0	0	0	0
PERSONNEL 5M/7D	3694	513.6	2.0	384.4	1481	9517	9799	1036	791	132
ORBITER WITHOUT CONSUMABLES	171625	1100.1	-.4	368.2	814767	6051208	6331658	5388	107707	-730
NON-PROP CONSUM AT SRB IGN	6139	993.5	-5.6	337.4	10821	123216	125303	-2406	14097	8
MPS PROPELLANT AT SRB IGN	5166	1404.5	6.8	352.7	4149	5527	5037	-1004	1041	-418
OMS PROPELLANT - LEFT	12532	1417.0	-94.9	475.9	2709	2873	2822	-23	65	954
OMS PROPELLANT - RIGHT	12532	1417.0	94.9	475.9	2709	2873	2822	23	65	-954
RCS PROPELLANT - FWD	2446	317.8	5.3	365.3	284	17	297	-2	5	-1
RCS PROPELLANT - AFT	4970	1345.4	0.0	470.5	8709	1053	9197	0	93	0
ORBITER MODULE TOTAL AT SRB IGN	215410	1138.0	-.3	381.8	959843	7235994	7508333	3385	310863	-859
CARGO MODULE TOTAL	47869	1012.8	.6	387.7	31517	386518	387428	-1534	11534	60
ORBITER PLUS CARGO AT SRB IGN	263279	1115.3	-.1	382.9	991657	7755406	8028371	856	316242	-754
ET LWT-8 INERT	66805	1357.0	2.6	424.6	357005	3955614	3953611	3705	158466	7002
BOUYANCY	155	1357.0	2.6	424.6	0	0	0	0	0	0
MPS FUEL AT SRB IGN-Z BUDGET	229278	1608.2	0.0	400.0	0	3757381	3757381	0	0	0
MPS LOX AT SRB IGN-Z BUDGET	1365010	730.1	.6	401.4	74486	4810056	4759463	136121	315415	26930
MPS PRESSURANT	423	753.6	0.0	400.0	0	17697	17697	-12	-27	0
ET MODULE TOTAL AT SRB IGN	1661671	876.5	.6	402.1	439246	48696135	48535926	131934	584281	34695
SRB LEFT SEPARATION	178268	1810.3	-250.8	401.1	182333	11225033	11228647	-23746	2900	641
SRB LEFT INFLIGHT LOSSES	1117284	1697.2	-250.5	400.0	736813	35499753	35499739	1320	-35	0
SRB LEFT MODULE TOTAL-LWC	1295552	1712.8	-250.5	400.2	919189	47149289	47152852	-23551	6993	630
SRB RIGHT SEPARATION	178289	1810.2	250.7	401.1	182365	11227903	11231504	24293	2909	-653
SRB RIGHT INFLIGHT LOSSES	1117284	1697.2	250.5	400.0	736812	35499326	35499356	-1352	-33	-1
SRB RIGHT MODULE TOTAL-LWC	1295573	1712.8	250.5	400.2	919218	47151530	47155117	23691	7001	-646
ET-ICE/FROST LIQ AIR+N2+TPS H2O	317	0.0	0.0	0.0	0	0	0	0	0	0

ORBITER AND CARGO IN ORBITER COORDINATE SYSTEM, ET AND SRB IN SHUTTLE COORDINATE SYSTEM

TABLE A-5.2 STS-16 VEHICLE SUMMARY WEIGHT STATEMENT — W16CD 83/11/08 09.02.55

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
SBS SPACECRAFT	7211	834.1	-.1	380.7	2139	2156	510	5	2	2
TELSTAR-3C SPACECRAFT	7503	1025.7	0.0	381.3	2223	2227	630	13	1	0
SYNCOM IV-2 SPACECRAFT	15450	1203.4	-.1	403.1	6331	4442	5203	31	-43	-29
DEPLOYABLE PAYLOAD	30164	1035.4	-.1	392.3	11487	128911	125740	39	9033	-28
SPARTAN 1 PAYLOAD	2000	772.0	0.0	430.0	0	0	0	0	0	0
SPARTAN 1 MPESS CARRIER	1371	771.3	0.0	386.0	0	0	0	0	0	0
SBS ASE	2419	833.3	11.5	363.8	2106	1024	1896	0	0	152
TELSTAR-ASE	2425	1024.9	11.0	369.8	2190	1090	1944	12	5	175
SYNCOM IV-2/ASE	1810	1190.0	2.2	376.0	2525	745	2196	28	138	44
IEF EXPERIMENT	69	520.0	0.0	375.0	0	0	0	0	0	0
ADSF	304	520.0	0.0	375.0	773	6549	6541	0	0	0
RME EXPERIMENT	4	433.8	-28.1	329.3	0	0	0	0	0	0
PRIMARY PAYLOAD	40566	1043.1	1.4	390.3	20475	249054	247894	-364	7332	83
STUDENT EXPERIMENTS	50	520.9	51.8	374.1	0	0	0	0	0	0
GET AWAY SPECIAL (4) BAY 2	1795	652.0	0.0	400.0	0	0	0	0	0	0
GAS CONTROLLER	3	563.0	15.0	429.0	0	0	0	0	0	0
ANCILLARY PAYLOAD	1849	648.3	1.7	399.3	48	193	225	-35	34	-16
TOTAL PAYLOAD CHARGEABLE	42415	1025.9	1.4	390.7	20554	303770	307611	-996	6006	68
SPARE MCIU	18	433.8	9.3	329.3	0	0	0	0	0	0
MANIFEST ITEMS	18	433.8	9.3	329.3	0	0	0	0	0	0
MV0073A P/L ATTACH HDW	3115	990.4	-0.0	376.4	5611	17238	20202	0	253	0
MV0073A ORB RET FTG ALLOW	-675	1074.0	26.0	395.0	2	30	30	0	0	0
MV0082A RMS ELBOW CAMERA	31	950.0	-74.0	459.0	1	0	0	0	0	0
MV0403A MINI-MADS	261	879.2	34.7	314.4	391	4075	4325	0	0	0
MV0412A S-BAND FM	22	553.3	58.5	395.7	2	1	1	0	0	1
MV0520A ATCS RADIATOR KIT	355	1214.9	-.1	473.3	355	238	546	0	0	0
MV0525A TANK SET 4 HARDWARE	693	951.4	-3.3	300.7	334	1846	2618	-327	-14	16
MV0545A COMSEC	40	555.0	57.0	380.0	0	0	0	0	0	0
MV0548A CCTV	73	957.5	-13.8	438.3	102	1927	2025	-436	-3	1
MV0550A AFT STATION CONTAINERS	48	541.0	-54.0	445.0	2	5	4	0	0	0
MV0564A PDRS SYS. TEST-VTR	65	524.1	54.5	440.8	5	0	5	2	0	1
MV0568A PSA	124	608.3	0.0	327.4	0	0	0	0	0	0
MV0610A MID-DECK SEAT - 7	92	524.0	-46.3	346.0	5	6	2	0	0	0
MV0633A PSA LINER	20	608.3	0.0	327.4	0	0	0	0	0	0
MV0702A P/L TIMING BUFFER	3	516.0	-62.0	432.0	0	0	0	0	0	0
MV0711A X603 I/F HARNESS	85	590.8	-22.2	373.6	116	15	109	1	0	-1
MV0712A SMCH	356	739.5	-10.7	341.4	71	7074	7037	62	38	3
MV0713A 1307 B/H PAYLOAD WIRING	44	1228.1	-21.2	344.0	65	14	73	10	0	0
MV0719A AFD WIRING HARNESS	15	537.5	-54.1	432.6	0	0	0	0	0	0
MV0720A P/L RECORDER CABLE	1	415.0	-40.0	390.0	0	0	0	0	0	0
MV0722A STD. SW. PANEL	40	550.0	-45.5	443.0	0	1	1	0	0	0
MV0725A SIP SMCH	89	1022.0	-35.3	404.6	131	143	273	29	0	0
MV0766A LONGERON CABLE SUPPORT	11	997.6	-23.4	372.0	19	53	82	12	0	0
H2 SAMPLES	26	1375.0	0.0	375.0	55	0	55	0	0	0
STS OPERATOR CHARGEABLE CARGO	5436	912.8	-5.9	364.2	10160	62333	65148	-1428	2322	-203
PRIMARY PAYLOAD	40566	1043.1	1.4	390.3	20475	249054	247894	-364	7332	83
ANCILLARY PAYLOAD	1849	648.3	1.7	399.3	48	193	225	-35	34	-16
MANIFEST ITEMS	18	433.8	9.3	329.3	0	0	0	0	0	0
STS OPERATOR CHARGEABLE CARGO	5436	912.8	-5.9	364.2	10160	62333	65148	-1428	2322	-203
STS-16 CARGO MODULE TOTAL	47869	1012.8	.6	387.7	31517	385518	387428	-1534	11534	60

TABLE A-6.1 STS-17 VEHICLE SUMMARY WEIGHT STATEMENT — WIDBP 83/11/03 09.42.31

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
ORBITER OV-102E STS-17 INERT	155430	1056.2	-.7	366.6	847839	5372593	5683679	-642	83609	-632
SSME X3 INERT	20729	1495.0	.4	384.5	23604	19202	17646	-191	-2475	100
BOUYANCY	80	1107.8	-.6	368.7	0	0	0	0	0	0
PERSONNEL 5M/10D	3861	513.6	2.0	384.4	1481	9517	9799	1036	791	132
ORBITER WITHOUT CONSUMABLES	180100	1095.1	-.5	369.0	374400	6450351	6759203	913	105327	-288
NON-PROP CONSUM AT SRB IGN	7050	936.7	-11.2	333.4	11844	124165	126936	-2233	14355	245
MPS PROPELLANT AT SRB IGN	5166	1404.5	6.8	352.7	4149	5527	5037	-1004	1041	-418
OMS PROPELLANT - LEFT	12000	1418.9	-94.7	475.9	2612	2615	2589	-3	49	905
OMS PROPELLANT - RIGHT	12000	1418.9	94.7	475.9	2612	2615	2589	3	49	-905
RCS PROPELLANT - FWD	2446	317.8	5.3	365.3	284	17	297	-2	5	-1
RCS PROPELLANT - AFT	5384	1345.0	0.0	470.1	9473	1075	9942	0	100	0
ORBITER MODULE TOTAL AT SRB IGN	224146	1131.0	-.6	381.4	1047933	7649582	7950218	651	309366	339
CARGO MODULE TOTAL	24452	965.4	-1.8	384.4	26914	243410	246948	-533	9030	535
ORBITER PLUS CARGO AT SRB IGN	248593	1114.7	-.7	381.7	1044948	8023646	8327633	1102	316561	856
ET LWT-9 INERT	66305	1357.0	2.6	424.6	357005	3955614	3953611	3705	158466	7002
BOUYANCY	155	1357.0	2.6	424.6	0	0	0	0	0	0
MPS FUEL AT SRB IGN-Z BUDGET	229278	1603.2	0.0	400.0	0	3757381	3757381	0	0	0
MPS LOX AT SRB IGN-Z BUDGET	1355010	730.1	.6	401.4	74485	4810066	4759463	136121	315415	26930
MPS PRESSURANT	423	753.6	0.0	400.0	0	17697	17697	-12	-27	0
ET MODULE TOTAL AT SRB IGN	1661671	876.5	.6	402.1	439246	48595135	48535926	131934	584281	34695
SRB LEFT SEPARATION	178268	1810.3	-250.8	401.1	182333	11225033	11228547	-23746	2900	641
SRB LEFT INFLIGHT LOSSES	1117284	1697.2	-250.5	400.0	736813	35499753	35499739	1320	-35	0
SRB LEFT MODULE TOTAL-LWC	1295552	1712.8	-250.5	400.2	919189	47149289	47152852	-23551	6993	630
SRB RIGHT SEPARATION	178289	1810.2	250.7	401.1	182365	11227908	11231504	24293	2909	-653
SRB RIGHT INFLIGHT LOSSES	1117284	1697.2	250.5	400.0	736812	35499326	35499356	-1352	-33	-1
SRB RIGHT MODULE TOTAL-LWC	1295573	1712.8	250.5	400.2	919218	47151530	47155117	23691	7001	-646
ET-ICE/FROST/LIQ AIR+N2+TPS H2O	317	0.0	0.0	0.0	0	0	0	0	0	0

ORBITER AND CARGO IN ORBITER COORDINATE SYSTEM, ET AND SRB IN SHUTTLE COORDINATE SYSTEM

TABLE A-6.2 STS-17 VEHICLE SUMMARY WEIGHT STATEMENT — W17CD 83/10/26 11.23.02

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
ERBS OBSERVATORY	5400	1065.5	-1.6	388.1	2733	1336	1838	45	-74	-2
DEPLOYABLE PAYLOAD	5400	1065.5	-1.6	388.1	2733	1336	1838	45	-73	-1
OSTA-3 PAYLOAD/CARRIER	4500	793.5	-1.6	383.4	3634	2626	3217	-114	92	262
SPARX	1600	958.9	0.0	399.2	2227	416	2070	-71	8	-95
ERBS ASE	200	1065.3	0.0	332.3	3587	2396	2812	-14	37	0
DFC-ORS PAYLOAD	5072	1213.9	.8	409.9	2604	1412	2155	-283	-330	346
ARC EXPERIMENT	215	520.0	0.0	375.0	0	0	0	0	0	0
RME EXPERIMENT	4	433.8	-28.1	340.5	0	0	0	0	0	0
I MAX CAMERA - MID-DECK	245	433.8	-46.8	346.1	0	0	0	0	0	0
I MAX BATTERIES	80	524.1	65.0	440.8	0	0	0	0	0	0
PRIMARY PAYLOAD	17316	1011.4	-1.0	393.7	15595	135437	138924	367	6485	724
GET AWAY SPECIAL (4) BAY 2	1796	652.0	0.0	400.0	0	0	0	0	0	0
GAS CONTROLLER	3	553.0	15.0	429.0	0	0	0	0	0	0
STUDENT EXPERIMENTS	50	520.9	61.8	374.1	0	0	0	0	0	0
ANCILLARY PAYLOAD	1849	648.3	1.7	399.3	48	193	225	-35	34	-16
TOTAL PAYLOAD CHARGEABLE	19165	976.3	-.8	394.2	15758	183171	185682	422	5730	713
SPARE MCIU	18	433.8	9.3	329.3	0	0	0	0	0	0
DELETIONS	-134	504.8	1.5	434.3	6	3	5	0	1	0
MANIFEST ITEMS	-116	515.8	.3	450.6	-43	-63	-17	2	-31	4
MV0073A P/L ATTACH HDW	2587	933.9	1.0	368.8	4434	15625	17522	41	-347	20
MV0073A ORB RET FTG ALLOW	-675	1074.0	26.0	395.0	2	30	30	0	0	0
MV0082A RMS ELBOW CAMERA	31	950.0	-74.0	459.0	1	0	0	0	0	0
MV0412A S-BAND FM	22	553.3	58.5	395.7	2	1	1	0	0	1
MV0520A ATCS RADIATOR KIT	355	1214.9	-.1	473.3	355	238	546	0	0	0
MV0525A TANK SET 4 HARDWARE	699	951.2	-2.7	300.7	872	1875	2684	-362	-15	17
MV0545A COMSEC	40	555.0	57.0	380.0	0	0	0	0	0	0
MV0548A CCTV	72	968.6	-14.3	438.0	93	1915	2012	-432	-1	0
MV0565A TANK SET 5 HARDWARE	635	945.7	3.7	302.0	703	174	809	3	-1	-9
MV0570A ACIP	131	1215.6	-3.0	288.8	3	5	4	0	0	0
MV0550A AFT STATION CONTAINERS	48	542.0	-54.0	445.0	2	5	4	0	0	0
MV0564A PDRS SYS. TEST-VTR	65	550.0	-50.0	440.0	0	0	0	0	0	0
MV0568A PSA	124	603.3	0.0	327.4	42	39	16	5	-10	-13
MV0610A MID-DECK SEAT - 7	92	488.0	-9.6	346.0	5	6	2	0	0	0
MV0633A PSA LINER	20	603.3	0.0	327.4	0	0	0	0	0	0
MV0702A P/L TIMING BUFFER	3	516.0	-62.0	432.0	0	0	0	0	0	0
MV0711A X503 I/F HARNESS	85	590.7	-22.4	378.4	116	15	109	1	0	-1
MV0712A SMCH	356	739.5	-10.7	341.4	71	7074	7037	62	38	3
MV0713A 1307 B/H PAYLOAD WIRING	44	1228.1	-21.2	344.0	65	14	78	10	0	0
MV0719A AFD WIRING HARNESS	5	528.2	-57.7	425.9	1	3	2	-1	1	0
MV0720A P/L RECORDER CABLE	1	415.0	-40.0	390.0	0	0	0	0	0	0
MV0722A STD. SW. PANEL	40	560.0	-45.5	443.0	0	1	1	0	0	0
AUXILLARY O2 HARDWARE	75	792.0	39.0	329.0	2	2	2	0	0	0
BALLAST PROVISIONS	22	1503.0	0.0	277.9	7	0	7	0	0	0
H2 SAMPLES	26	1375.0	0.0	375.0	55	0	55	0	0	0
STS OPERATOR CHARGEABLE CARGO	5403	916.7	-5.5	350.8	9487	60369	62033	-1234	173	-357
PRIMARY PAYLOAD	17316	1011.4	-1.0	393.7	15595	135437	138924	367	6485	724
ANCILLARY PAYLOAD	1849	648.3	1.7	399.3	48	193	225	-35	34	-16
MANIFEST ITEMS	-116	515.8	.3	450.6	-43	-63	-17	2	-31	4
STS OPERATOR CHARGEABLE CARGO	5403	916.7	-5.5	350.8	9487	60369	62033	-1234	173	-357
STS-17 CARGO MODULE TOTAL	24452	955.4	-1.8	384.4	26914	243410	246948	-533	9030	535

TABLE A-7.1 STS-19 VEHICLE SUMMARY WEIGHT STATEMENT — WHBT 83/11/04 16.26.25

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY, IN. X	Y	Z	MOMENTS-OF-INERTIA, SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA, SF2 PXY	PXZ	PYZ
ORBITER OV-103 STS-19 INERT	147079	1059.1	-.6	365.5	733100	4934063	5277493	3949	34238	-1066
SSME X3 INERT	20772	1495.0	.3	384.7	23517	19164	17550	-24	-2474	103
BOUYANCY	80	1112.9	-.5	368.0	0	0	0	0	0	0
PERSONNEL 6M/6D	4077	514.3	-.4	382.1	1660	9500	9906	1062	723	221
ORBITER WITHOUT CONSUMABLES	172008	1093.9	-.5	363.2	814902	6078903	6359416	5483	103050	-672
NON-PROP CONSUM AT SRB IGN	6139	993.5	-5.6	337.4	10321	123216	125303	-2406	14097	3
MPS PROPELLANT AT SRB IGN	5166	1404.5	5.8	352.7	4149	5527	5037	-1004	1041	-418
OMS PROPELLANT - LEFT	9600	1426.4	-95.2	476.2	2075	1741	1707	-5	25	730
OMS PROPELLANT - RIGHT	9600	1426.4	95.2	476.2	2075	1741	1707	5	25	-730
RCS PROPELLANT - FWD	2446	317.8	5.3	365.3	234	17	297	-2	5	-1
RCS PROPELLANT - AFT	4970	1345.4	0.0	470.5	8709	1053	9197	0	93	0
ORBITER MODULE TOTAL AT SRB IGN	209929	1130.0	-.3	379.2	936301	7174659	7447175	4455	281699	-314
CARGO MODULE TOTAL	28924	1076.4	1.3	387.0	16159	230639	230077	2737	3926	968
ORBITER PLUS CARGO AT SRB IGN	238853	1123.5	-.1	380.1	952809	7421438	7693023	6712	283330	224
ET LWT-11 INERT	66853	1353.1	2.6	424.6	359005	3958365	3956362	3705	153467	7002
BOUYANCY	155	1358.1	2.6	424.6	0	0	0	0	0	0
MPS FUEL AT SRB IGN	229278	1608.2	0.0	400.0	0	3757381	3757381	0	0	0
MPS LOX AT SRB IGN	1365934	729.9	.6	401.4	74486	4837487	4776834	136153	315483	26931
MPS PRESSURANT	423	753.6	0.0	400.0	0	17697	17697	-12	-27	0
ET MODULE TOTAL AT SRB IGN	1662643	876.3	.6	402.1	441251	43765554	43695339	132057	534889	34696
SRB LEFT SEPARATION	173268	1810.3	-250.8	401.1	182333	11225033	11228547	-23746	2900	641
SRB LEFT INFLIGHT LOSSES	1117284	1697.2	-250.5	400.0	736813	35499753	35499739	1320	-35	0
SRB LEFT MODULE TOTAL-LWC	1295552	1712.8	-250.5	400.2	919189	47149239	47152852	-23551	6993	630
SRB RIGHT SEPARATION	173239	1810.2	250.7	401.1	182365	11227903	11231504	24293	2909	-653
SRB RIGHT INFLIGHT LOSSES	1117284	1697.2	250.5	400.0	736812	35499826	35499356	-1352	-33	-1
SRB RIGHT MODULE TOTAL-LWC	1295573	1712.8	250.5	400.2	919218	47151530	47155117	23691	7001	-646
ET-ICE/FROST LIQ AIR+N2+TPS H2O	317	0.0	0.0	0.0	0	0	0	0	0	0

ORBITER AND CARGO IN ORBITER COORDINATE SYSTEM, ET AND SRB IN SHUTTLE COORDINATE SYSTEM

TABLE A-7.2 STS-19 VEHICLE SUMMARY WEIGHT STATEMENT — WINCO 33/11/07 03.10.30

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY, IN. X	Y	Z	MOMENTS-OF-INERTIA, SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA, SF2 PXY	PXZ	PYZ
TELESAT-H/ANIK D SPACECRAFT	7542	1242.1	0.0	381.0	2218	2231	629	3	2	1
DEPLOYABLE PAYLOAD	7542	1242.1	0.0	381.0	2218	2231	629	3	2	1
MSL-1/MPESS	5143	1014.9	-1.9	411.0	3303	1304	2728	-161	93	-172
ABS-GAS	6200	1122.0	0.0	404.5	0	0	0	0	0	0
TELESAT-H/ASE	2394	1241.3	11.5	368.8	2106	1024	1895	0	0	152
RME EXPERIMENT	4	433.8	-28.1	329.3	0	0	0	0	0	0
PRIMARY PAYLOAD	21283	1152.0	.3	393.7	3777	45484	45173	634	-5942	-201
GET AWAY SPECIALS (4) BAY 5	1795	335.0	0.0	404.0	0	0	0	0	0	0
GET AWAY SPECIALS (4) BAY 6	1795	891.0	0.0	404.0	0	0	0	0	0	0
GAS CONTROLLER	3	563.0	15.0	429.0	0	0	0	0	0	0
STUDENT EXPERIMENTS	50	520.9	51.8	374.1	0	0	0	0	0	0
CFES	779	463.5	-56.2	362.3	0	0	0	0	0	0
ANCILLARY PAYLOAD	4424	783.6	-9.2	396.3	738	23723	23958	2891	2362	307
TOTAL PAYLOAD CHARGEABLE	25707	1039.4	-.9	394.2	9500	173603	173611	6453	-4332	85
MV0032A RMS ARM	-935	926.2	-33.5	444.6	36	12941	12990	-378	-25	15
GALLEY	-164	469.0	-67.0	367.0	14	14	3	0	0	0
H2O DISPENSING SYSTEM	26	473.1	-71.6	367.6	2	2	1	0	0	0
MANIFEST ITEMS	-1073	867.3	-31.3	434.6	262	18553	18443	-533	899	-19
MV0073A P/L ATTACH HDW	1995	1131.2	0.0	369.8	3529	4852	6436	0	356	0
MV0073A ORB RET FTG ALLOW	-575	1074.0	26.0	395.0	2	45	45	0	0	0
MV0408A MINI-MADS	251	879.2	34.7	314.4	391	4075	4325	0	0	0
MV0412A S-BAND FM	22	553.3	53.5	395.7	2	1	1	0	0	1
MV0520A ATCS RADIATOR KIT	355	1214.9	-.1	473.3	360	237	550	0	0	0
MV0525A EPS T/S 4 HARDWARE	693	951.4	-3.3	300.7	334	1845	2618	-327	-14	16
MV0545A COMSEC	40	555.0	57.0	380.0	0	0	0	0	0	0
MV0548A CCTV	73	967.5	-13.8	438.3	100	1927	2025	-436	-3	1
MV0550A AFT STATION CONTAINERS	43	541.0	-54.0	445.0	2	5	4	0	0	0
MV0564A PDRS SYS. TEST-VTR	66	524.1	54.5	440.8	5	0	6	2	0	1
MV0563A PSA	124	603.3	0.0	327.4	0	0	0	0	0	0
MV0610A MID-DECK SEAT - 5	92	483.0	-9.6	346.0	5	6	2	0	0	0
MV0610A MID-DECK SEAT - 7	92	524.0	-46.3	346.0	5	6	2	0	0	0
MV0633A PSA LINER	20	503.3	0.0	327.4	0	0	0	0	0	0
MV0702A P/L TIMING BUFFER	3	516.0	-62.0	432.0	0	0	0	0	0	0
MV0711A X603 I/F HARNESS	85	590.7	-22.4	373.4	116	15	109	1	0	-1
MV0712A SMCH	356	739.5	-10.7	341.4	71	7074	7037	62	38	3
MV0713A 1307 B/H PAYLOAD WIRING	44	1228.1	-21.2	344.0	55	14	73	10	0	0
MV0719A AFD WIRING HARNESS	18	537.4	-53.3	433.0	0	1	1	0	0	0
MV0722A STD. SW. PANEL	40	550.0	-45.5	443.0	0	1	1	0	0	0
MV0765A LONGERON CABLE SUPPORT	11	997.6	-23.4	372.0	19	53	32	12	0	0
H2 SAMPLES	26	1375.0	0.0	375.0	55	0	55	0	0	0
STS OPERATOR CHARGEABLE CARGO	4290	946.2	-6.4	356.0	7659	63473	69333	-1075	2600	-131
PRIMARY PAYLOAD	21283	1152.0	.3	393.7	3777	45484	45173	634	-5942	-201
ANCILLARY PAYLOAD	4424	783.6	-9.2	396.3	738	23723	23958	2891	2362	307
MANIFEST ITEMS	-1073	867.3	-31.3	434.6	262	18553	18443	-533	899	-19
STS OPERATOR CHARGEABLE CARGO	4290	946.2	-6.4	356.0	7659	63473	69333	-1075	2600	-131
STS-19 CARGO MODULE TOTAL	23924	1076.4	1.3	387.0	16159	230639	230077	2737	3926	353

TABLE A-8.1 STS-20 VEHICLE SUMMARY WEIGHT STATEMENT — W20680 83/11/03 11.22.41

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
ORBITER OV-099 STS-20 INERT	148230	1064.1	-.4	365.5	313489	5073123	5365951	3383	31745	-1193
SSME X3 INERT	20791	1495.6	.4	384.8	23548	19170	17525	61	-2427	100
BOUYANCY	80	1117.4	-.3	368.0	0	0	0	0	0	0
PERSONNEL 5M/7D	3502	514.8	2.9	383.8	2094	11068	10140	472	-38	105
ORBITER WITHOUT CONSUMABLES	172653	1104.9	-.2	363.2	840795	6106509	5395120	3851	104902	-338
NON-PROP CONSUM AT SRB IGN	5273	934.6	3.4	343.4	9449	121694	122937	-1305	14541	-439
MPS PROPELLANT AT SRB IGN	5165	1404.5	6.8	352.7	4149	5527	5037	-1004	1041	-418
OMS PROPELLANT - LEFT	11450	1420.4	-95.0	476.0	2481	2407	2362	-15	47	371
OMS PROPELLANT - RIGHT	11450	1420.4	95.0	476.0	2481	2407	2362	15	47	-371
RCS PROPELLANT - FWD	2446	317.8	5.3	365.3	284	17	297	-2	5	-1
RCS PROPELLANT - AFT	4970	1345.4	0.0	470.5	3709	1053	9197	0	93	0
ORBITER MODULE TOTAL AT SRB IGN	213403	1139.7	.1	381.1	974979	7243611	7524107	955	293903	-2038
CARGO MODULE TOTAL	33405	954.8	.4	384.0	30686	228273	231005	-2144	8513	2095
ORBITER PLUS CARGO AT SRB IGN	246813	1116.0	.2	381.5	1005717	7662540	7945713	-1496	299283	62
ET LWT-12 INERT	66853	1353.1	2.6	424.6	359005	3953365	3956362	3705	153467	7002
BOUYANCY	155	1353.1	2.6	424.6	0	0	0	0	0	0
MPS FUEL AT SRB IGN-Z BUDGET	229278	1603.2	0.0	400.0	0	3757381	3757381	0	0	0
MPS LOX AT SRB IGN-Z BUDGET	1365010	730.1	.6	401.4	74485	4810055	4759463	136121	315415	26930
MPS PRESSURANT	423	753.6	0.0	400.0	0	17697	17697	-12	-27	0
ET MODULE TOTAL AT SRB IGN	1661719	376.6	.6	402.1	441251	48716533	48556373	132026	534751	34695
SRB LEFT SEPARATION	178268	1810.3	-250.8	401.1	182333	11225033	11228547	-23746	2900	541
SRB LEFT INFLIGHT LOSSES	1117284	1697.2	-250.5	400.0	736813	35499753	35499739	1320	-35	0
SRB LEFT MODULE TOTAL-LWC	1295552	1712.8	-250.5	400.2	919189	47149239	47152852	-23551	6993	630
SRB RIGHT SEPARATION	178239	1810.2	250.7	401.1	182365	11227903	11231504	24293	2909	-553
SRB RIGHT INFLIGHT LOSSES	1117234	1697.2	250.5	400.0	736812	35499326	35499356	-1352	-33	-1
SRB RIGHT MODULE TOTAL-LWC	1295573	1712.8	250.5	400.2	919218	47151530	47155117	23691	7001	-546
ET-ICE/FROST/LIQ AIR+N2+TPS H2O	383	0.0	0.0	0.0	0	0	0	0	0	0

ORBITER AND CARGO IN ORBITER COORDINATE SYSTEM, ET AND SRB IN SHUTTLE COORDINATE SYSTEM

TABLE A-8.2 STS-20 VEHICLE SUMMARY WEIGHT STATEMENT — M20CC 83/11/03 11.14.47

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY, IN. X	Y	Z	MOMENTS-OF-INERTIA, SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA, SF2 PXY	PXZ	PYZ
S/L 3 PAYLOAD	22336	937.4	-.5	397.2	18652	101241	103614	1493	4254	341
MV0073A P/L ATTACH HDW	1390	1019.1	7.9	380.6	3450	13753	15760	-238	-799	75
MV0073A ORB RET FTG ALLOW	-675	1074.0	26.0	395.0	2	30	30	0	0	0
MV0519A TUNNEL ADAPTER	691	624.8	.4	366.2	97	163	146	-1	-9	1
MV0520A ATCS RADIATOR KIT	355	1214.9	-.1	473.3	355	238	546	0	0	0
MV0525A TANK SET 4 HDW	692	952.1	-4.0	300.7	333	1851	2622	-328	-14	16
MV0548A CCTV	73	967.5	-13.8	433.3	100	1927	2025	-436	-3	1
MV0610A MID-DECK SEAT - 6	92	483.0	10.0	346.0	5	5	2	0	0	0
MV0610A MID-DECK SEAT - 7	92	524.0	-46.3	346.0	5	6	2	0	0	0
MV0702A P/L TIMING BUFFER	3	516.0	-62.0	432.0	0	0	0	0	0	0
MV0710A S-L UTILITY KIT	45	539.1	20.6	438.9	27	4	30	-3	-1	2
MV0711A X603 I/F HARNESS	85	590.7	-22.4	373.4	116	15	109	1	0	-1
MV0712A SMCH	577	909.3	-25.5	348.0	477	3622	4094	42	7	-3
MV0713A 1307 B/H PAYLOAD WIRING	35	1215.7	-28.3	344.0	54	6	59	0	0	0
MV0719A AFD WIRING HARNESS	5	528.2	-57.7	425.9	1	3	2	-1	1	0
MV0722A STD. SW. PANEL	20	550.0	-47.0	446.0	1	1	1	0	0	0
MV0725A SIP SMCH	31	1178.1	-90.1	401.7	0	1	1	0	0	0
MV0727A S-L FLUID KIT	43	775.0	-54.4	325.4	0	69	69	0	0	0
MV0728A S-L ELECT. KIT	261	771.9	13.6	332.1	297	442	639	-65	54	-1
MV0730A S-L MODULE KIT	159	373.5	-7.4	347.7	135	7	129	2	0	5
P/L UMBILICAL	10	1299.0	0.0	359.0	22	0	22	0	0	0
PERSONNEL	900	514.8	2.4	383.8	0	0	0	0	0	0
WEIGHT GROWTH ALLOWANCE	4569	975.4	.7	382.2	0	0	0	0	0	0
PRIMARY PAYLOAD	32295	955.2	-1.1	389.9	27554	210186	214033	-34	9399	571
MV0525A TANK SET 4 CRYO	866	1047.2	-60.5	301.0	403	604	1031	-459	-18	13
PAYLOAD CHARGEABLE NPC	866	1047.2	-60.5	301.0	403	604	1031	-453	-17	13
TOTAL PAYLOAD CHARGEABLE	33162	957.3	-2.7	387.6	30143	213454	216935	-1428	8053	1545
MV0082A RMS ARM	-935	926.2	-83.5	444.6	75	12941	12990	-378	-25	15
AIRLOCK B HATCH-P/L CHARGE	-115	576.0	0.0	353.0	0	0	0	0	0	0
MANIFEST ITEMS	-1050	337.8	-74.4	435.1	396	15317	15355	-1023	645	-144
MV0403A MADS 2	713	909.7	32.5	316.7	1103	12664	13383	249	-142	-77
MV0412A S-BAND FM	22	553.3	53.5	395.7	2	1	1	0	0	0
MV0545A COMSEC	40	555.0	57.0	380.0	0	0	0	0	0	0
MV0550A AFT STATION CONTAINERS	43	541.0	-54.0	445.0	2	5	4	0	0	0
MV0564A PDRS SYS. TEST-VTR	65	524.1	54.3	440.8	5	0	5	2	0	1
MV0568A PSA	124	508.3	0.0	327.4	42	39	16	5	-10	-13
MV0570A ACIP	131	1215.6	-3.0	293.8	3	5	4	0	0	0
MV0610A MID-DECK SEAT - 5	92	483.0	-9.6	346.0	5	6	2	0	0	0
MV0633A PSA LINER	20	508.3	0.0	327.4	0	0	0	0	0	0
MV0765A LONGERON CABLE SUPPORT	11	997.6	-23.4	372.0	19	63	82	12	0	0
H2 SAMPLES	26	1375.0	0.0	375.0	55	0	55	0	0	0
STS OPERATOR CHARGEABLE CARGO	1293	836.8	19.8	334.2	1841	27175	27695	311	-1631	-112
PRIMARY PAYLOAD	32295	955.2	-1.1	389.9	27554	210186	214033	-34	9399	571
PAYLOAD CHARGEABLE NPC	866	1047.2	-60.5	301.0	403	604	1031	-453	-17	13
MANIFEST ITEMS	-1050	337.8	-74.4	435.1	396	15317	15355	-1023	645	-144
STS OPERATOR CHARGEABLE CARGO	1293	836.8	19.8	334.2	1841	27175	27695	311	-1631	-112
STS-20 CARGO MODULE TOTAL	33405	964.8	.4	384.0	30636	223273	231005	-2144	8513	2095

TABLE A-9.1 STS-21 VEHICLE SUMMARY WEIGHT STATEMENT — W21 80 83/11/01 15.53.26

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
ORBITER OV-103 STS-21 INERT	147079	1059.1	-.6	365.5	788100	4994053	5277493	3949	34238	-1066
SSME X3 INERT	20772	1495.0	.3	384.7	23517	19164	17550	-24	-2474	103
BOUYANCY	80	1112.9	-.5	363.0	0	0	0	0	0	0
PERSONNEL 5M/4D	3694	513.6	2.0	384.4	1481	9517	9799	1035	791	132
ORBITER WITHOUT CONSUMABLES	171625	1100.1	-.4	368.2	814767	6051203	6331658	5383	107707	-730
NON-PROP CONSUM AT SRB IGN	6139	993.5	-5.6	337.4	10321	123216	125303	-2406	14097	3
MPS PROPELLANT AT SRB IGN	5166	1404.5	5.8	352.7	4149	5527	5037	-1004	1041	-418
OMS PROPELLANT - LEFT	9550	1426.5	-94.9	476.2	2099	1739	1727	7	21	725
OMS PROPELLANT - RIGHT	9650	1426.5	94.9	476.2	2099	1739	1727	-7	21	-725
RCS PROPELLANT - FWD	2446	317.8	5.3	365.3	284	17	297	-2	5	-1
RCS PROPELLANT - AFT	4970	1345.4	0.0	470.5	3709	1053	9197	0	93	0
ORBITER MODULE TOTAL AT SRB IGN	209546	1131.2	-.3	379.3	936349	7146212	7418492	3295	281431	-393
CARGO MODULE TOTAL	47767	1086.2	1.9	397.0	19325	205676	209209	-1792	9361	758
ORBITER PLUS CARGO AT SRB IGN	257313	1122.9	.1	382.6	953352	7372557	7644732	675	284037	191
ET LWT-13 INERT	66853	1353.1	2.6	424.6	359005	3953365	3956362	3705	153467	7002
BOUYANCY	155	1353.1	2.6	424.6	0	0	0	0	0	0
MPS FUEL AT SRB IGN-K4 BUDGET	229275	1603.2	0.0	400.0	0	3757206	3757206	0	0	0
MPS LOX AT SRB IGN-K4 BUDGET	1364743	730.1	.6	401.4	74486	4804794	4754191	136112	315393	26930
MPS PRESSURANT	423	753.6	0.0	400.0	0	17697	17697	-12	-27	0
ET MODULE TOTAL AT SRB IGN	1661449	376.6	.6	402.1	441251	48709557	48549343	132017	584724	34695
SRB LEFT SEPARATION	179593	1813.2	-250.8	401.1	183927	11272030	11275595	-23739	2773	641
SRB LEFT INFLIGHT LOSSES	1116227	1696.7	-250.5	400.0	736073	35439136	35439156	1357	-25	0
SRB LEFT MODULE TOTAL-MWC	1295825	1712.8	-250.5	400.2	920043	47164409	47167956	-23548	7027	630
SRB RIGHT SEPARATION	179519	1813.1	250.7	401.1	183959	11274934	11278531	24295	2782	-553
SRB RIGHT INFLIGHT LOSSES	1116227	1696.7	250.5	400.0	736073	35439163	35439177	-1383	-22	-1
SRB RIGHT MODULE TOTAL-MWC	1295346	1712.8	250.5	400.2	920074	47165557	47170229	23635	7036	-646
ET-ICE/FROST/LIQ AIR+N2+TPS H2O	317	0.0	0.0	0.0	0	0	0	0	0	0

ORBITER AND CARGO IN ORBITER COORDINATE SYSTEM, ET AND SRB IN SHUTTLE COORDINATE SYSTEM

TABLE A-9.2 STS-21 VEHICLE SUMMARY WEIGHT STATEMENT -- W2\C1 83/11/01 15.49.24

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
TDRS-B SPACECRAFT	5000	965.2	.3	400.3	1235	1756	1812	-41	7	-13
TWO-STAGE IUS	32546	1132.5	.2	400.1	6660	17304	17971	-90	-3	5
DEPLOYABLE PAYLOAD	37546	1110.2	.2	400.1	7895	45744	45967	-146	-31	-7
PAYLOAD OF OPPORTUNITY	TBD									
IUS-ASE (LAUNCH - RETURN)	5603	1156.4	2.2	404.8	5805	5793	9267	59	1073	15
IUS AFD EQUIPMENT	161	532.0	-52.0	450.0	3	2	2	0	0	0
MV0718A IUS UTILITY KIT	64	1100.8	3.6	375.8	93	511	574	65	-36	-3
MV0720A P/L RECORDER CABLE	1	415.0	-40.0	390.0	0	0	0	0	0	0
P/L RECORDER	60	421.0	-6.0	378.0	0	1	1	0	0	0
OASIS PAYLOAD	307	1115.9	33.0	395.0	0	0	0	0	0	0
PRIMARY PAYLOAD	43742	1113.1	.9	400.8	14477	72560	76741	1212	446	-106
GET AWAY SPECIAL (4) BAY 2	1796	564.5	0.0	404.0	0	0	0	0	0	0
GAS CONTROLLER	3	553.0	15.0	429.0	0	0	0	0	0	0
STUDENT EXPERIMENTS	50	520.9	51.8	374.1	0	0	0	0	0	0
ANCILLARY PAYLOAD	1849	560.5	1.7	403.2	50	232	263	-93	43	-18
TOTAL PAYLOAD CHARGEABLE	45591	1094.7	.9	400.9	14530	151238	155448	972	69	-123
MV0082A RMS ARM	-935	926.2	-33.5	444.6	76	12941	12990	-378	-25	15
P/L RECORDER - P/L CHG.	-60	421.0	-6.0	378.0	0	1	1	0	0	0
MANIFEST ITEMS	-995	895.7	-78.8	440.6	203	16102	16170	-353	384	-47
MV0073A P/L ATTACH HDW	878	1156.8	0.0	375.4	1572	1159	1957	0	504	0
MV0073A ORB RET FTG ALLOW	-675	1074.0	26.0	395.0	2	30	30	0	0	0
MV0408A MINI-MADS	261	879.2	34.7	314.4	391	4075	4325	0	0	0
MV0412A S-BAND FM	22	553.3	58.5	395.7	2	1	1	0	0	1
MV0520A ATCS RADIATOR KIT	355	1214.9	-.1	473.3	355	238	546	0	0	0
MV0525A TANK SET 4 HARDWARE	693	951.4	-3.3	300.7	334	1846	2618	-327	-14	16
MV0545A COMSEC	40	555.0	57.0	390.0	0	0	0	0	0	0
MV0548A CCTV	73	967.5	-13.8	438.3	100	1927	2025	-436	-3	1
MV0550A AFT STATION CONTAINERS	48	541.0	-54.0	445.0	2	5	4	0	0	0
MV0564A PDRS SYS. TEST-VTR	66	524.1	54.5	440.8	5	0	5	2	0	1
MV0568A PSA	124	608.3	0.0	327.4	0	0	0	0	0	0
MV0589A IUS COLOUMB DAMPER	68	1191.8	0.0	400.6	111	1	110	0	0	0
MV0610A MID-DECK SEAT - 7	92	524.0	-46.3	346.0	5	6	2	0	0	0
MV0633A PSA LINER	20	608.3	0.0	327.4	0	0	0	0	0	0
MV0702A P/L TIMING BUFFER	3	516.0	-62.0	432.0	0	0	0	0	0	0
MV0711A X603 I/F HARNESS	86	590.8	-22.2	378.6	116	15	109	1	0	-1
MV0712A SMCH	856	789.5	-10.7	341.4	71	7074	7037	62	38	3
MV0713A 1307 B/H PAYLOAD WIRING	44	1228.1	-21.2	344.0	65	14	73	10	0	0
MV0719A AFD WIRING HARNESS	40	527.0	0.0	440.0	0	0	0	0	0	0
MV0722A STD. SW. PANEL	40	550.0	-45.5	443.0	0	1	1	0	0	0
MV0766A LONGERON CABLE SUPPORT	11	997.6	-23.4	372.0	19	53	82	12	0	0
H2 SAMPLES	26	1375.0	0.0	375.0	55	0	55	0	0	0
STS OPERATOR CHARGEABLE CARGO	3171	903.7	-3.1	354.6	5846	54847	55532	-1485	2269	-174
PRIMARY PAYLOAD	43742	1113.1	.9	400.8	14477	72560	76741	1212	446	-106
ANCILLARY PAYLOAD	1849	560.5	1.7	403.2	50	232	263	-93	43	-18
MANIFEST ITEMS	-995	895.7	-78.8	440.6	203	16102	16170	-353	384	-47
STS OPERATOR CHARGEABLE CARGO	3171	903.7	-3.1	354.6	5846	54847	55532	-1485	2269	-174
STS-21 CARGO MODULE TOTAL	47767	1036.2	1.9	397.0	19325	206676	209209	-1792	9361	758

TABLE A-10.1 STS-22 VEHICLE SUMMARY WEIGHT STATEMENT — W2260 83/11/01 15.12.05

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
ORBITER OV-099 STS-22 INERT	148280	1054.1	-.4	365.5	813489	5073123	5365951	3383	81745	-1193
SSME X3 INERT	20791	1495.6	.4	384.8	23548	19170	17525	61	-2427	100
BOUYANCY	80	1117.4	-.3	368.0	0	0	0	0	0	0
PERSONNEL 5M/6D	3694	513.6	2.0	384.4	1481	9517	9799	1036	791	132
ORBITER WITHOUT CONSUMABLES	172845	1104.3	-.3	368.2	840204	6120529	6410322	4810	105102	-370
NON-PROP CONSUM AT SRB IGN	6139	993.5	-5.6	337.4	10321	123216	125303	-2406	14097	8
MPS PROPELLANT AT SRB IGN	5166	1404.5	6.8	352.7	4149	5527	5037	-1004	1041	-418
OMS PROPELLANT - LEFT	12532	1417.0	-94.9	475.9	2709	2873	2822	-23	65	954
OMS PROPELLANT - RIGHT	12532	1417.0	94.9	475.9	2709	2873	2822	23	65	-954
RCS PROPELLANT - FWD	2446	317.8	5.3	365.3	284	17	297	-2	5	-1
RCS PROPELLANT - AFT	4970	1345.4	0.0	470.5	9709	1053	9197	0	93	0
ORBITER MODULE TOTAL AT SRB IGN	216630	1141.1	-.1	381.8	935331	7294282	7575903	2533	306320	-1090
CARGO MODULE TOTAL	23354	1104.4	2.9	388.6	21770	211690	215833	-7978	10108	-98
ORBITER PLUS CARGO AT SRB IGN	239984	1137.5	.2	382.4	1007356	7512321	7797918	-5952	315284	-1092
ET LWT-14 INERT	66853	1358.1	2.6	424.6	359005	3953365	3956362	3705	158467	7002
BOUYANCY	155	1358.1	2.6	424.6	0	0	0	0	0	0
MPS FUEL AT SRB IGN-Z BUDGET	229278	1608.2	0.0	400.0	0	3757381	3757381	0	0	0
MPS LOX AT SRB IGN-Z BUDGET	1365010	730.1	.6	401.4	74485	4810065	4759463	136121	315415	26930
MPS PRESSURANT	423	753.6	0.0	400.0	1	17697	17697	-12	-27	0
ET MODULE TOTAL AT SRB IGN	1651719	376.6	.6	402.1	441251	48716588	48656373	132026	584751	34695
SRB LEFT SEPARATION	178268	1810.3	-250.8	401.1	182333	11225033	11228647	-23746	2900	541
SRB LEFT INFLIGHT LOSSES	1117284	1697.2	-250.5	400.0	736813	35499753	35499739	1320	-35	0
SRB LEFT MODULE TOTAL-LWC	1295552	1712.8	-250.5	400.2	919189	47149239	47152852	-23551	6993	630
SRB RIGHT SEPARATION	178289	1810.2	250.7	401.1	182365	11227908	11231504	24293	2909	-653
SRB RIGHT INFLIGHT LOSSES	1117284	1697.2	250.5	400.0	736812	35499326	35499356	-1352	-33	-1
SRB RIGHT MODULE TOTAL-LWC	1295573	1712.8	250.5	400.2	919218	47151530	47155117	23691	7001	-646
ET-ICE/FROST/LIQ AIR+N2+TPS H2O	317	0.0	0.0	0.0	0	0	0	0	0	0

ORBITER AND CARGO IN ORBITER COORDINATE SYSTEM, ET AND SRB IN SHUTTLE COORDINATE SYSTEM

TABLE A-10.2 STS-22 VEHICLE SUMMARY WEIGHT STATEMENT -- W22CD 83/11/15 14.59.40

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
SYNCOM IV-3 SPACECRAFT	15450	1192.7	.1	400.2	6331	4142	5203	31	-43	-29
DEPLOYABLE PAYLOAD	15450	1192.7	.1	400.2	6331	4142	5203	31	-42	-23
SYNCOM IV-3/ASE	1310	1174.3	2.2	370.0	2525	745	2195	23	133	44
ADSF EXPERIMENT	304	520.0	0.0	375.0	773	6549	6541	0	0	0
PRIMARY PAYLOAD	17554	1179.2	.3	395.7	9331	40916	43075	59	1242	-5
GET AWAY SPECIAL (2) BAY 2	393	654.5	73.8	404.0	0	0	0	0	0	0
GAS CONTROLLER	3	563.0	15.0	429.0	0	0	0	0	0	0
STUDENT EXPERIMENTS	50	520.9	51.3	374.1	0	0	0	0	0	0
ANCILLARY PAYLOAD	951	655.6	77.7	402.5	15	226	222	29	42	4
TOTAL PAYLOAD CHARGEABLE	18515	1152.3	4.3	397.0	11169	94315	97631	-7735	639	36
SPARE MCIU	18	433.8	9.3	329.3	0	0	0	0	0	0
MANIFEST ITEMS	18	433.8	9.3	329.3	0	0	0	0	0	0
MV0073A P/L ATTACH HDW	2003	1041.7	0.0	332.1	3705	10792	13037	0	73	0
MV0073A ORB RET FTG ALLOW	-675	1074.0	26.0	395.0	2	30	30	0	0	0
MV0032A RMS ELBOW CAMERA	31	950.0	-74.0	459.0	1	0	0	0	0	0
MV0403A MADS 2	713	909.7	32.5	316.7	1103	12654	13333	249	-142	-77
MV0412A S-BAND FM	22	553.3	53.5	395.7	2	1	1	0	0	1
MV0520A ATCS RADIATOR KIT	355	1214.9	-.1	473.3	355	238	545	0	0	0
MV0525A TANK SET 4 HARDWARE	692	952.1	-4.0	300.7	833	1351	2622	-328	-14	16
MV0545A COMSEC	40	555.0	57.0	380.0	0	0	0	0	0	0
MV0548A CCTV	73	957.5	-13.3	438.3	100	1927	2025	-436	-3	1
MV0550A AFT STATION CONTAINERS	43	541.0	-54.0	445.0	2	5	4	0	0	0
MV0564A PDRS SYS. TEST-VTR	55	524.1	54.3	440.3	5	0	5	2	0	1
MV0568A PSA	124	608.3	0.0	327.4	42	39	16	5	-10	-13
MV0570A ACIP	131	1215.5	-3.0	293.3	3	5	4	0	0	0
MV0610A MID-DECK SEAT - 7	92	438.0	-9.6	346.0	5	5	2	0	0	0
MV0633A PSA LINER	20	603.3	0.0	327.4	0	0	0	0	0	0
MV0702A P/L TIMING BUFFER	3	515.0	-52.0	432.0	0	0	0	0	0	0
MV0711A X603 I/F HARNESS	35	590.3	-22.2	373.6	116	15	109	1	0	-1
MV0712A SMCH	355	739.5	-10.7	341.4	71	7074	7037	62	33	3
MV0713A 1307 B/H PAYLOAD WIRING	44	1223.1	-21.2	344.0	55	14	78	10	0	0
MV0719A AFD WIRING HARNESS	19	527.0	0.0	440.0	0	0	0	0	0	0
MV0720A P/L RECORDER CABLE	1	415.0	-40.0	390.0	0	0	0	0	0	0
MV0722A STD. SW. PANEL	40	560.0	-45.5	443.0	0	1	1	0	0	0
MV0755A LONGERON CABLE SUPPORT	11	997.6	-23.4	372.0	19	53	32	12	0	0
H2 SAMPLES	26	1375.0	0.0	375.0	55	0	55	0	0	0
STS OPERATOR CHARGEABLE CARGO	4321	922.3	-2.5	357.0	9223	70301	72924	-1467	1635	-409
PRIMARY PAYLOAD	17554	1179.2	.3	395.7	9331	40916	43075	59	1242	-5
ANCILLARY PAYLOAD	951	655.6	77.7	402.5	15	226	222	29	42	4
MANIFEST ITEMS	18	433.8	9.3	329.3	0	0	0	0	0	0
STS OPERATOR CHARGEABLE CARGO	4321	922.3	-2.5	357.0	9223	70301	72924	-1467	1635	-409
STS-22 CARGO MODULE AT SRB IGN	23354	1104.4	2.9	333.5	21770	211690	215333	-7373	10103	-93
SYNCOM IV-3 SPACECRAFT DEPLOYED	-15450	1192.7	.1	400.2	6331	4142	5203	31	-43	-29
LDEF - RETRIEVED	21615	335.2	0.0	400.0	24290	72310	74910	2	7	-3
STS-22 CARGO MODULE AT DEORBIT	29519	337.7	2.2	390.9	39353	205345	211403	-5097	-1371	-103

TABLE A-11.1 STS-23 VEHICLE SUMMARY WEIGHT STATEMENT — W2380 83/11/01 15.13.02

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY, IN. X	Y	Z	MOMENTS-OF-INERTIA, SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA, SF2 PXY	PXZ	PYZ
ORBITER OV-103 STS-23 INERT	147079	1059.1	-.6	365.5	733100	4994063	5277493	3949	34233	-1056
SSME X3 INERT	20772	1495.0	.3	334.7	23517	19164	17550	-24	-2474	103
BOUYANCY	80	1112.9	-.5	368.0	0	0	0	0	0	0
PERSONNEL 5M/4D	3694	513.6	2.0	384.4	1481	9517	9799	1086	791	132
ORBITER WITHOUT CONSUMABLES	171625	1100.1	-.4	368.2	814767	6051203	6331658	5388	107707	-730
NON-PROP CONSUM AT SRB IGN	6139	993.5	-5.6	337.4	10321	123216	125303	-2406	14097	8
MPS PROPELLANT AT SRB IGN	5166	1404.5	5.8	352.7	4149	5527	5037	-1004	1041	-418
OMS PROPELLANT - LEFT	9650	1426.5	-94.9	476.2	2099	7395	1727	7	21	725
OMS PROPELLANT - LEFT	9550	1426.5	-94.9	476.2	2099	1739	1727	-7	21	-725
RCS PROPELLANT - FWD	2446	317.8	5.3	365.3	284	17	297	-2	5	-1
RCS PROPELLANT - AFT	4970	1345.4	0.0	470.5	8709	1053	9197	0	93	0
ORBITER MODULE TOTAL AT SRB IGN	209546	1131.2	-9.0	379.3	932665	7151868	7414809	-113424	281426	-39210
CARGO MODULE TOTAL	52727	1051.4	.8	393.0	27111	303247	310048	-1444	6681	543
ORBITER PLUS CARGO AT SRB IGN	262373	1117.2	-7.1	383.0	953843	7502670	7770102	-121109	276214	-36993
ET LWT-15 INERT	66853	1358.1	2.6	424.6	359005	3953365	3956362	3705	153467	7002
BOUYANCY	155	1358.1	2.6	424.6	0	0	0	0	0	0
MPS FUEL AT SRB IGN-Z BUDGET	229278	1608.2	0.0	400.0	0	3757371	3757371	0	0	0
MPS LOX AT SRB IGN-Z BUDGET	1365010	730.1	.6	401.4	74486	4810066	4759463	136121	315415	26930
MPS PRESSURANT	423	753.6	0.0	400.0	0	17697	17697	-12	-27	0
ET MODULE TOTAL AT SRB IGN	1661719	876.6	.6	402.1	441251	48716578	48556363	132026	584751	34695
SRB LEFT SEPARATION	179593	1813.2	-250.8	401.1	183927	11272030	11275595	-23739	2773	641
SRB LEFT INFLIGHT LOSSES	1116227	1695.7	-250.5	400.0	736073	35439136	35439156	1357	-25	0
SRB LEFT MODULE TOTAL-MWC	1295325	1712.8	-250.5	400.2	920043	47164409	47167956	-23548	7027	630
SRB RIGHT SEPARATION	179519	1813.1	250.7	401.1	183659	11274934	11278531	24295	2782	-653
SRB RIGHT INFLIGHT LOSSES	1116227	1695.7	250.5	400.0	736073	35439163	35439177	-1383	-22	-1
SRB RIGHT MODULE TOTAL-MWC	1295846	1712.8	250.5	400.2	919774	47165657	47170229	23685	7036	-646
ET-ICE/FROST/LIQ AIR+N2+TPS H2O	317	0.0	0.0	0.0	0	0	0	0	0	0

ORBITER AND CARGO IN ORBITER COORDINATE SYSTEM, ET AND SRB IN SHUTTLE COORDINATE SYSTEM

TABLE A-11.2 STS-23 VEHICLE SUMMARY WEIGHT STATEMENT — W23<0 83/10/22 10.31.53

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
TDRS-C SPACECRAFT	5000	965.2	.3	400.3	1235	1756	1812	-41	7	-13
TWO-STAGE IUS	32546	1132.5	.2	400.1	6550	17304	17971	-90	-3	5
DEPLOYABLE PAYLOAD	37546	1110.2	.2	400.1	7395	45744	45967	-146	-31	-7
MSL-2/MPESS	3850	767.1	-1.9	411.0	3308	1304	2723	-161	93	-172
IUS-ASE (LAUNCH - RETURN)	5603	1155.4	2.2	404.8	5805	5793	9267	59	1073	15
IUS AFD EQUIPMENT	161	532.0	-52.0	450.0	3	2	2	0	0	0
MV0718A IUS UTILITY KIT	64	1100.8	3.6	375.8	93	511	574	55	-35	-3
MV0720A P/L RECORDER CABLE	1	415.0	-40.0	390.0	0	0	0	0	0	0
P/L RECORDER	60	421.0	-5.0	373.0	0	1	1	0	0	0
PRIMARY PAYLOAD	47285	1034.9	.1	401.7	17414	165297	170379	1509	-2140	-263
GET AWAY SPECIAL (4) BAY 2	1795	554.5	0.0	404.0	0	0	0	0	0	0
GAS CONTROLLER	3	563.0	15.0	429.0	0	0	0	0	0	0
STUDENT EXPERIMENTS	50	520.9	61.8	374.1	0	0	0	0	0	0
ANCILLARY PAYLOAD	1849	560.5	1.7	403.2	50	232	263	-93	43	-13
TOTAL PAYLOAD CHARGEABLE	49134	1063.9	.2	401.7	17465	234713	239330	1254	-2349	-230
MV0032A RMS ARM	-935	926.2	-33.5	444.5	35	12941	12930	-373	-25	15
P/L RECORDER - P/L CHG.	-60	421.0	-5.0	373.0	0	1	1	0	0	0
MANIFEST ITEMS	-995	395.7	-73.8	440.5	213	15102	15170	-353	384	-47
MV0073A P/L ATTACH HDW	2288	1073.4	-7.2	389.6	5315	20338	24905	-201	633	-40
MV0073A ORB RET FTG ALLOW	-575	1074.0	26.0	395.0	2	45	45	0	0	0
MV0403A MINI-MADS	261	879.2	34.7	314.4	391	4075	4325	0	0	0
MV0412A S-BAND FM	22	553.3	53.5	395.7	2	1	1	0	0	1
MV0520A ATCS RADIATOR KIT	355	1214.9	-.1	473.3	355	238	546	0	0	0
MV0525A TANK SET 4 HARDWARE	693	951.4	-3.3	300.7	334	1846	2613	-327	-14	16
MV0545A COMSEC	40	555.0	57.0	380.0	0	0	0	0	0	0
MV0548A CCTV	73	957.5	-13.8	438.3	100	1927	2025	-436	-3	1
MV0550A AFT STATION CONTAINERS	43	541.0	-54.0	445.0	2	5	4	0	0	0
MV0564A PDRS SYS. TEST-VTR	66	524.1	54.5	440.8	5	0	5	2	0	1
MV0568A PSA	124	603.3	0.0	327.4	0	0	0	0	0	0
MV0589A IUS COLOUMB DAMPER	63	1191.1	.2	400.5	111	9	113	-1	1	0
MV0610A MID-DECK SEAT - 7	92	524.0	-46.3	345.0	5	6	2	0	0	0
MV0633A PSA LINER	20	603.3	0.0	327.4	0	0	0	0	0	0
MV0702A P/L TIMING BUFFER	3	516.0	-62.0	432.0	0	0	0	0	0	0
MV0704A PALLET UTILITY KIT	25	1028.3	4.0	373.9	43	274	317	1	2	0
MV0711A X603 I/F HARNESS	35	590.3	-22.2	373.6	116	15	109	1	0	-1
MV0712A SMCH	356	739.5	-10.7	341.4	71	7074	7037	52	33	3
MV0713A 1307 B/H PAYLOAD WIRING	44	1228.1	-21.2	344.0	55	14	73	10	0	0
MV0719A AFD WIRING HARNESS	18	537.4	-53.3	433.0	0	1	1	0	0	0
MV0722A STD. SW. PANEL	40	560.0	-45.5	443.0	0	1	1	0	0	0
MV0725A SIP SMCH	4	705.0	2.2	392.0	7	0	7	0	0	0
MV0765A LONGERON CABLE SUPPORT	11	937.6	-23.4	372.0	19	53	82	12	0	0
H2 SAMPLES	25	1375.0	0.0	375.0	55	0	55	0	0	0
STS OPERATOR CHARGEABLE CARGO	4533	944.7	-0.4	367.8	10449	75733	79457	-1346	4110	-232
PRIMARY PAYLOAD	47285	1034.9	.1	401.7	17414	165297	170379	1509	-2140	-263
ANCILLARY PAYLOAD	1849	560.5	1.7	403.2	50	232	263	-93	43	-13
MANIFEST ITEMS	-995	395.7	-73.8	440.5	213	15102	15170	-353	384	-47
STS OPERATOR CHARGEABLE CARGO	4533	944.7	-0.4	367.8	10449	75733	79457	-1346	4110	-232
STS-23 CARGO MODULE TOTAL	52727	1051.4	.8	393.0	27111	303247	310043	-1444	5631	543

TABLE A-12.1 STS-24 VEHICLE SUMMARY WEIGHT STATEMENT — W24 80 83/11/03 09.26.39

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY, IN. X	Y	Z	MOMENTS-OF-INERTIA, SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA, SF2 PXY	PXZ	PYZ
ORBITER OV-099 STS-24 INERT	149280	1064.1	-.4	365.5	913489	5073123	5365951	3383	81745	-1193
SSME X3 INERT	20791	1495.6	.4	384.8	23548	19170	17525	61	-2427	100
BOUYANCY	80	1117.4	-.3	368.0	0	0	0	0	0	0
PERSONNEL 4M/7D	3177	514.8	2.4	383.8	2094	11068	10140	472	-33	105
ORBITER WITHOUT CONSUMABLES	172328	1106.1	-.3	368.2	840775	6082015	6370641	4184	105549	-397
NON-PROP CONSUM AT SRB IGN	5273	934.6	3.4	343.4	9449	121694	122937	-1305	14541	-439
MPS PROPELLANT AT SRB IGN	5166	1404.5	6.8	352.7	4149	5527	5037	-1004	1041	-418
OMS PROPELLANT - LEFT	12532	1417.0	-94.9	475.9	2709	2873	2822	-23	65	954
OMS PROPELLANT - RIGHT	12532	1417.0	94.9	475.9	2709	2873	2822	23	65	-954
RCS PROPELLANT - FWD	2446	317.8	5.3	365.3	284	17	297	-2	5	-1
RCS PROPELLANT - AFT	4970	1345.4	0.0	470.5	8709	1053	9197	0	93	0
ORBITER MODULE TOTAL AT SRB IGN	215247	1143.0	.1	382.1	933605	7247237	7527772	1280	304460	-2044
CARGO MODULE TOTAL	33534	945.8	-1.6	379.3	26510	294032	296030	-2790	7030	1388
ORBITER PLUS CARGO AT SRB IGN	248331	1116.4	-.1	381.7	1010281	7785262	8067715	599	314908	-625
ET LWT-16 INERT	66795	1353.2	2.6	424.6	359005	3953342	3951339	3705	159467	7002
BOUYANCY	155	1353.2	2.6	424.6	0	0	0	0	0	0
MPS FUEL AT SRB IGN-Z BUDGET	229273	1608.2	0.0	400.0	0	3757381	3757381	0	0	0
MPS LOX AT SRB IGN-Z BUDGET	1365010	730.1	.6	401.4	74485	4810066	4759463	136121	315415	26930
MPS PRESSURANT	423	753.6	0.0	400.0	0	17697	17697	-12	-27	0
ET MODULE TOTAL AT SRB IGN	1651661	876.6	.6	402.1	441245	48710047	48549339	132016	584648	34695
SRB LEFT SEPARATION	179593	1813.2	-250.8	401.1	183927	11272030	11275595	-23739	2773	641
SRB LEFT INFLIGHT LOSSES	1116227	1695.7	-250.5	400.0	736073	35439136	35439156	1357	-25	0
SRB LEFT MODULE TOTAL-MWC	1295825	1712.8	-250.5	400.2	920043	47164409	47167956	-23548	7027	630
SRB RIGHT SEPARATION	179519	1813.1	250.7	401.1	183659	11274934	11273531	24295	2782	-653
SRB RIGHT INFLIGHT LOSSES	1116227	1695.7	250.5	400.0	736073	35439163	35439177	-1383	-22	-1
SRB RIGHT MODULE TOTAL-MWC	1295346	1712.8	250.5	400.2	919774	47165557	47170229	23695	7036	-646
ET-ICE/FROST'LIQ AIR+N2+TPS H2O	317	0.0	0.0	0.0	0	0	0	0	0	0

ORBITER AND CARGO IN ORBITER COORDINATE SYSTEM, ET AND SRB IN SHUTTLE COORDINATE SYSTEM

TABLE A-12.2 STS-24 VEHICLE SUMMARY WEIGHT STATEMENT — W24CP 83/11/01 15.18.46

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY, IN. X	Y	Z	MOMENTS-OF-INERTIA, SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA, SF2 PXY	PXZ	PYZ
S/L 2 PAYLOAD	26542	967.6	-2.3	389.1	14355	177275	177599	1057	5324	-209
MV0073A P/L ATTACH HDW	2524	1014.0	0.0	376.8	4555	16502	19028	0	-251	0
MV0073A ORB RET FTG ALLOW	-675	1074.0	26.0	395.0	2	30	30	0	0	0
MV0519A TUNNEL ADAPTER	691	624.8	.4	366.2	97	168	146	-1	-9	1
MV0520A ATCS RADIATOR KIT	355	1214.9	-.1	473.3	355	238	546	0	0	0
MV0525A TANK SET 4 HDW	692	952.1	-4.0	300.7	833	1851	2622	-328	-14	16
MV0548A CCTV	73	967.5	-13.8	438.3	100	1927	2025	-436	-3	1
MV0610A MID-DECK SEAT - 6	92	488.0	10.0	346.0	5	6	2	0	0	0
MV0610A MID-DECK SEAT - 7	92	524.0	-46.3	346.0	5	6	2	0	0	0
MV0702A P/L TIMING BUFFER	3	516.0	-62.0	432.0	0	0	0	0	0	0
MV0710A S-L UTILITY KIT	45	539.1	20.6	438.9	27	4	30	-3	-1	2
MV0711A X603 I/F HARNESS	86	590.7	-22.4	373.4	116	15	109	1	0	-1
MV0712A SMCH	577	909.3	-25.5	348.0	477	3622	4094	42	7	-3
MV0713A 1307 B/H PAYLOAD WIRING	36	1215.7	-28.3	344.0	54	6	59	0	0	0
MV0719A AFD WIRING HARNESS	5	528.2	-57.7	425.9	1	3	2	-1	1	0
MV0722A STD. SW. PANEL	20	560.0	-47.0	446.0	1	1	1	0	0	0
MV0725A SIP SMCH	31	1178.1	-90.1	401.7	0	1	1	0	0	0
MV0727A S-L FLUID KIT	48	775.0	-54.4	325.4	0	69	69	0	0	0
MV0728A S-L ELECT. KIT	261	771.9	13.6	332.1	294	442	689	-66	54	-1
MV0730A S-L MODULE KIT	159	378.5	-7.4	347.7	135	7	129	2	0	5
P/L UMBILICAL	10	1299.0	0.0	359.0	22	0	22	0	0	0
PERSONNEL	900	514.8	2.4	383.8	0	0	0	0	0	0
PRIMARY PAYLOAD	32567	944.3	-3.2	384.9	23967	280602	283246	-339	9064	-103
MV0525A TANK SET 4 CRYO	866	1047.2	-60.5	301.0	403	604	1031	-459	-17	13
PAYLOAD CHARGEABLE NPC	866	1047.2	-60.5	301.0	403	604	1031	-458	-17	13
TOTAL PAYLOAD CHARGEABLE	33433	946.9	-4.7	382.7	26253	284415	285304	-2421	7474	785
MV0082A RMS ARM	-935	926.2	-33.5	444.6	76	12941	12990	-378	-25	15
AIRLOCK B HATCH-P/L CHARGE	-115	575.0	0.0	353.0	0	0	0	0	0	0
MANIFEST ITEMS	-1050	837.8	-74.4	435.1	396	15317	15855	-1023	645	-144
MV0403A MADS 2	713	909.7	32.5	316.7	1103	12664	13383	249	-142	-77
MV0412A S-BAND FM	22	553.3	58.5	395.7	2	1	1	0	0	0
MV0545A COMSEC	40	555.0	57.0	380.0	0	0	0	0	0	0
MV0550A AFT STATION CONTAINERS	48	542.0	-54.0	445.0	2	5	4	0	0	0
MV0564A PDRS SYS. TEST-VTR	66	524.1	54.3	440.8	5	0	6	2	0	1
MV0633A PSA	124	608.3	0.0	327.4	42	39	16	5	-10	-13
MV0570A ACIP	131	1215.6	-3.0	293.8	3	5	4	0	0	0
MV0633A PSA LINER	20	503.3	0.0	327.4	0	0	0	0	0	0
MV0765A LONGERON CABLE SUPPORT	11	997.6	-23.4	372.0	19	63	82	12	0	0
H2 SAMPLES	26	1375.0	0.0	375.0	55	0	55	0	0	0
STS OPERATOR CHARGEABLE CARGO	1201	863.6	22.0	333.3	1814	24558	25067	91	-1542	-104
PRIMARY PAYLOAD	32567	944.3	-3.2	384.9	23967	280602	283246	-339	9064	-103
PAYLOAD CHARGEABLE NPC	866	1047.2	-60.5	301.0	403	604	1031	-458	-17	13
MANIFEST ITEMS	-1050	837.8	-74.4	435.1	396	15317	15855	-1023	645	-144
STS OPERATOR CHARGEABLE CARGO	1201	863.6	22.0	333.3	1814	24558	25067	91	-1542	-104
STS-24 CARGO MODULE TOTAL	33584	945.8	-1.6	379.3	26610	294032	295030	-2790	7030	1338

TABLE A-13.1 STS-25 VEHICLE SUMMARY WEIGHT STATEMENT -- WDS80 83/11/03 09.27.53

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY,IN. X	Y	Z	MOMENTS-OF-INERTIA,SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA,SF2 PXY	PXZ	PYZ
ORBITER OV-104 STS-25 INERT	147314	1059.2	-.4	365.5	733312	4994104	5277749	4041	84244	-1052
SSME X3 INERT	20772	1495.0	.3	394.7	23517	19164	17550	-24	-2474	103
BOUYANCY	80	1112.6	-.3	367.9	0	0	0	0	0	0
PERSONNEL 5M/7D	3694	513.6	2.0	384.4	1481	9517	9799	1036	791	132
ORBITER WITHOUT CONSUMABLES	172360	1100.1	-.3	363.2	314979	5051255	5331912	5220	107722	-733
NON-PROP CONSUM AT SRB IGN	6139	993.5	-5.6	337.4	10321	123216	125303	-2406	14097	8
MPS PROPELLANT AT SRB IGN	5166	1404.5	6.8	352.7	4149	5527	5037	-1004	1041	-418
OMS PROPELLANT - LEFT	12000	1418.9	-94.7	475.9	2612	2615	2539	-3	49	905
OMS PROPELLANT - RIGHT	12000	1418.9	94.7	475.9	2612	2615	2539	3	49	-905
RCS PROPELLANT - FWD	2446	317.8	5.3	365.3	234	17	297	-2	5	-1
RCS PROPELLANT - AFT	4970	1345.4	0.0	470.5	3709	1053	9197	0	93	0
ORBITER MODULE TOTAL AT SRB IGN	215031	1136.7	-.1	381.3	955590	7221555	7493837	2970	305361	-952
CARGO MODULE TOTAL	37760	1059.8	3.7	377.0	20722	241346	239779	-1764	676	1370
ORBITER PLUS CARGO AT SRB IGN	252841	1125.0	.4	380.7	976544	7505076	7775814	-371	303366	303
ET LWT-17 INERT	66795	1358.2	2.6	424.6	359005	3953342	3951339	3705	158467	7002
BOUYANCY	155	1358.2	2.6	424.6	0	0	0	0	0	0
MPS FUEL AT SRB IGN	229278	1608.2	0.0	400.0	0	3757331	3757381	0	0	0
MPS LOX AT SRB IGN	1365934	729.9	.6	401.4	74436	4837487	4776834	136153	315488	26931
MPS PRESSURANT	423	753.6	0.0	400.0	0	17697	17697	-12	-27	0
ET MODULE TOTAL AT SRB IGN	1652585	876.3	.6	402.1	441245	48759011	43593303	132048	534736	34696
SRB LEFT SEPARATION	179593	1313.2	-250.3	401.1	183927	11272030	11275595	-23739	2773	641
SRB LEFT INFLIGHT LOSSES	1116227	1695.7	-250.5	400.0	736073	35439136	35439155	1357	-25	0
SRB LEFT MODULE TOTAL-MWC	1295325	1712.8	-250.5	400.2	920043	47164409	47167956	-23548	7027	630
SRB RIGHT SEPARATION	179619	1813.1	250.7	401.1	183659	11274934	11278531	24295	2782	-653
SRB RIGHT INFLIGHT LOSSES	1116227	1696.7	250.5	400.0	736073	35439163	35439177	-1383	-22	-1
SRB RIGHT MODULE TOTAL-MWC	1295346	1712.3	250.5	400.2	919774	47166557	47170229	23535	7036	-546
ET-ICE/FROST LIQ AIR+N2+TPS H2O	317	0.0	0.0	0.0	0	0	0	0	0	0

ORBITER AND CARGO IN ORBITER COORDINATE SYSTEM, ET AND SRB IN SHUTTLE COORDINATE SYSTEM

TABLE A-13.2 STS-25 VEHICLE SUMMARY WEIGHT STATEMENT — WDSCO 83/11/09 09.06.37

DESCRIPTION	WEIGHT LB	CENTER-OF-GRAVITY, IN. X	Y	Z	MOMENTS-OF-INERTIA, SF2 IXX	IYY	IZZ	PRODUCTS-OF-INERTIA, SF2 PXY	PXZ	PYZ
TELSTAR-3D SPACECRAFT	7503	936.4	0.0	381.0	2218	2231	629	3	2	1
MEXSAT-A SPACECRAFT	7306	1095.6	0.0	381.8	2281	2235	647	14	0	0
ARABSAT-A SPACECRAFT	7513	1242.0	0.0	381.8	2281	2235	647	14	0	0
DEPLOYABLE PAYLOAD	22922	1108.8	0.0	381.5	57 1	60469	55590	36	161	1
TELSTAR-3D/ASE	2425	935.6	11.5	353.8	2106	1024	1895	0	0	152
MEXSAT-A/ASE	2394	1095.8	11.5	353.8	2106	1024	1895	0	0	152
ARABSAT-A/ASE	2545	1241.2	11.5	353.8	2106	1024	1895	0	0	152
PRIMARY PAYLOAD	30285	1109.0	2.8	373.4	13453	81397	79093	49	146	281
GET AWAY SPECIALS (4) BAY 2	1795	659.9	0.0	404.0	0	0	0	0	0	0
GET AWAY SPECIALS (4) BAY 5	1795	333.0	0.0	404.0	0	0	0	0	0	0
GAS CONTROLLER	3	563.0	15.0	429.0	0	0	0	0	0	0
STUDENT EXPERIMENTS	50	520.9	51.8	374.1	0	0	0	0	0	0
ANCILLARY PAYLOAD	3645	743.2	.9	403.6	51	6380	6411	-149	69	-18
TOTAL PAYLOAD CHARGEABLE	33931	1059.7	2.6	381.1	13951	182209	179493	396	-5250	227
MV0082A RMS ARM	-935	926.2	-33.5	444.6	35	12941	12990	-378	-25	15
MANIFEST ITEMS	-935	926.2	-33.5	444.6	35	12941	12990	-377	-24	15
MV0073A P/L ATTACH HDW	2551	1090.0	0.0	375.3	4583	3018	10369	0	485	0
MV0073A ORB RET FTG ALLOW	-575	1074.0	26.0	395.0	2	45	45	0	0	0
MV0408A MINI-MADS	261	879.2	34.7	314.4	391	4075	4325	0	0	0
MV0412A S-BAND FM	22	553.3	53.5	395.7	2	1	1	0	0	1
MV0520A ATCS RADIATOR KIT	355	1214.9	-.1	473.3	360	237	550	0	0	0
MV0525A EPS T/S 4 HARDWARE	693	951.4	-3.3	300.7	334	1846	2618	-327	-14	16
MV0545A COMSEC	40	555.0	57.0	380.0	0	0	0	0	0	0
MV0548A CCTV	73	957.5	-13.8	438.3	100	1927	2025	-436	-3	1
MV0550A AFT STATION CONTAINERS	48	541.0	-54.0	445.0	2	5	4	0	0	0
MV0564A PDRS SYS. TEST-VTR	65	524.1	54.5	440.8	5	0	6	2	0	1
MV0568A PSA	124	503.3	0.0	327.4	0	0	0	0	0	0
MV0610A MID-DECK SEAT - 7	92	524.0	-46.3	346.0	5	6	2	0	0	0
MV0633A PSA LINER	20	503.3	0.0	327.4	0	0	0	0	0	0
MV0702A P/L TIMING BUFFER	3	516.0	-62.0	432.0	0	0	0	0	0	0
MV0711A X603 I/F HARNESS	85	590.7	-22.4	373.4	116	15	109	1	0	-1
MV0712A SMCH	855	739.5	-10.7	341.4	71	7074	7037	62	33	3
MV0713A 1307 B/H PAYLOAD WIRING	44	1228.1	-21.2	344.0	55	14	73	10	0	0
MV0719A AFD WIRING HARNESS	13	537.4	-53.3	433.0	0	1	1	0	0	0
MV0722A STD. SW. PANEL	40	550.0	-45.5	443.0	0	1	1	0	0	0
MV0765A LONGERON CABLE SUPPORT	11	997.6	-23.4	372.0	19	53	82	12	0	0
H2 SAMPLES	25	1375.0	0.0	375.0	55	0	55	0	0	0
STS OPERATOR CHARGEABLE CARGO	4754	954.9	-5.6	360.8	3320	64163	65270	-1112	3031	-155
PRIMARY PAYLOAD	30285	1109.0	2.8	373.4	13453	81397	79093	49	146	281
ANCILLARY PAYLOAD	3545	743.2	.9	403.6	51	6380	6411	-149	69	-18
MANIFEST ITEMS	-935	926.2	-33.5	444.6	35	12941	12990	-377	-24	15
STS OPERATOR CHARGEABLE CARGO	4754	954.9	-5.6	360.8	3320	64163	65270	-1112	3031	-155
STS-25 CARGO MODULE TOTAL	37760	1053.8	3.7	377.0	20722	241346	239779	-1754	675	1370

TABLE A-9 - ORBITER DEFINITION - WEIGHT & C.G.

VEHICLE	REFERENCE	WEIGHT (LBS)	X_0 (IN.)	Y_0 (IN.)	Z_0 (IN.)
OV-102 OPERATIONAL INERT	STATUS - TABLE 4.1	154354	1059.4	-0.3	366.2
OV-099 OPERATIONAL INERT	STATUS - TABLE 4.1	148280	1064.1	-0.4	365.5
OV-103 OPERATIONAL INERT	STATUS - TABLE 4.1	147079	1059.1	-0.6	365.5
OV-104 OPERATIONAL INERT	STATUS - TABLE 4.1	147814	1059.2	-0.4	365.5

INCLUDED IN INERT WEIGHT*			MANIFEST MODIFICATIONS ITEM	WEIGHT (LBS)	X_0 (IN.)	Y_0 (IN.)	Z_0 (IN.)
OV-102 OPER	OV-099 OPER	OV-103/104 OPER					
X	X	X	ORBITER RETENTION FTG ALLOWANCE	675	1074.0	26.0	395.0
X	X	X	RENDEZVOUS RADAR (Ku BAND)	359	589.0	69.0	424.0
X	X	X	MISSION SPEC SEAT	102	541.0	23.0	433.0
X	X	X	P/L SPEC SEAT	102	543.0	0.0	433.0
			RMS CLOSEOUT PANEL (1)	6	560.5	30.5	453.0
X	X	X	RMS	941	926.2	-83.5	444.6
X			EPS TNK SET 3-TANKS	561	1047.7	-15.7	299.7
	X	X	EPS TNK SET 3-TANKS	542	1049.6	-14.7	299.5
X	X	X	GALLEY	164	469.0	-67.0	367.0

*X Denotes items included in Inert Weight
(1) When RMS installation is removed closeout panel added.

* U.S. GOVERNMENT PRINTING OFFICE: 1983-769-013/4047

NASA DISTRIBUTION

JSC

AP3/Terry White
BC42/A. Sullivan
CA
DA6/S. A. Liebergot
DA8/P. Frank
CB/John Young
CH3/M. F. Collins
DF6/R. N. Fitts
DF6/J. A. Kamman
DF4/G. Ulrich
DG6/R. K. Holkan
EB/W. Heineman
EC (4)
EC2/B. D. Sevier
EE
EF2/C. Watkins
EH
EN4/L. K. Redmond
EN5/R. C. Dyer (5)
EP/H. J. Brasseaux
ER/C. Jones
ET/J. Hondros
ET311/S. Millar
ET411/W. L. Richards
FA/Rose
FE42/W. K. Williams
FM (2)
FM2/G. Babb
FM2/H. Beck
FM2/L. D. Davis
FM2/G. L. Hunt
FM2/R. Lee
FM2/D. A. Nelson
FM4/A. J. Bordano
FM4/R. D. Davis
FM4/D. Heath
FM4/E. Henderson
FM4/J. McNeely
FM5/J.C. Harpold
JM26/(3)
LA/R. Kohrs
LA2
LA3
LA5/
LA44/John Ryan
LA22/W. F. Nelson, Jr.
LE
LM(2)
LM/A. Bishop
LO/C. Gay Jr.
LP/C. M. Hatlelid
LP/H. Battaglia
LA43/H. Mandell
LH/J. McCuen
LT (11)
LT/R. Custer
LT/R. Hautamaki
LV
LV/E. Gauldin
LX/R. Bond
MA
MD/M. A. Collins
MF2/D. Cordiner (2)
MD2/E. R. Hischke (2)
ME2/S. M. Andrich
ME3/P. M. Deans
MT
NA2/HS01
LF/R. Heselmeyer
LP/J. Liller
LN/L. E. Bell
LJ/R. Everline (4)
SM/R. Baldwin
SM/W. Huffstetler (2)
ZR1/Z. Taylor
ZR/Col. G. M. Risch
ZR2/Col. Icard
ZR12/B. Cobb

NASA HEADQUARTERS

MOF-8/E. W. Land
MGF-9/E. L. Harkelroad
MOF-8/J. Hammersmith
MPE/T. Albert (2)
MPE-5/W. Goldsby
MOF-8/H. T. Gawrylowicz
MOF-8/A. Jordan
OSE-5/R. Lohman
MC-7/C. M. Lee
OTI/J. Saavedra (2)
OTI/R. Ott
OTI-6/W. D. Green
EM8/R. Benson
MOB-8/N. Frandsen

MSFC

AS240/Documentation Repository (5)
ED21/R. S. Ryan
EE01/L. McNair
EL24/J. Redus
EL33/J. Daniels (2)
EL52/J. Patterson
EL52/R. Scott
EL63/B. Dunn
NA01/J. W. Thomas (2)
PD24/B. Shelton
PD33/M. Croft
SA21/Zoller
SA24/W. H. Patterson
SA32/J. Newton
SA52/J. Splawn

AFTEC/OL -BF/TDD
Patrick AFB, FLA 32925

ARC

244-14/C. Wiltsee

GSFC

420/Library
470/J. A. Yienger
408/W. Woodruff

JPL

264-2351/W. Purdy, Jr.
180/401/P. Barnett

KSC

NWSI-D/KSC Library (6)

LaRC

423/R. L. Shearel
258/C. Tynan

LeRC

E. Muckley (6)
MS500-116

OTHER DISTRIBUTION

Aerojet Liquid Rocket Co. (2)
P. O. Box 13222
Sacramento, CA 95813
R. Hankins-2001/5700
C. Williams-2001/5110

Aerospace Corporation (6)
P. O. Box 92957
Los Angeles, CA 90009
Attn.: S. T. Chu, MS-578

Aerospace Corporation
P. O. Box 5068
Vandenber AFB, CA 93437
Attn: W. Alarid

AFSD-Los Angeles
P. O. Box 92960
World Postal Center
Los Angeles, CA 90009
Attn.: Lt. M. Mielke, YOCC
Ltc. T. Kumashiro, YO6

Barrios Tech., Inc.
G. D. Zoerner/FM111

BAC - KENT
P. O. Box 3999
Seattle, Wash 98124
Attn: A. Fields, 8A-07
W. Johnson, 81-62
D. Rohrbaugh, 8A-38
D. Hanford, 81-83

Boeing/Houston
J. Johnson HP-10
C. Purple (2)

Boeing/Huntsville
A. Haraway, JC-54

CSC/Houston
T. Pykosz, M-30

DOD STS GSS
Data Depository
Field Box 168
Vandenberg AFB, CA 93437

Eagle Engineering, Inc.
17629 El Camino Real
Suite 125
Houston, TX 77058

J. Schils
Erno Raumfahrttechnik
28 Bremen 1
Postfach 1199
Bremen, West Germany

G. Boulton/LE
European Space & Technology Center
Domeinweg, Noorwizk, The Netherlands

John Crenshaw (5)
General Dynamics
1730 NASA Rd. I, Suite 202
Houston, TX 77058

General Dynamics Convair Div (5)
5001 Kearny Villa Road
San Diego, CA 92138
Attn: Joan Sherley

GTE Satellite Corp.
R. Fillers
1 Stamford Forum
Stamford, Conn. 06904

Draper Laboratory, Inc.
555 Technology Square

Hughes Aircraft (2)
P. O. Box 92919
Airport Station
Los Angeles, CA 90009
Attn.: M. Martin
Bldg. S32, M/S C321
Attn.: B. W. Campbell
Bldg. E, M/S E110

Intelstat
490 L'Enfant Plaza, S. W.
Washington, D.C. 20024
Attn.: F. M. Costanzo

LMSC (2)
Sunnyvale, CA 94088
Dept. 6261/6303
Bldg. 104, Facility 1
Attn.: A. Tilley/D. Trapp

LMSC (3)
Sunnyvale, CA 94086
Attn: R. Runnels, 6262
R. F. Witt, 6091
D. Stuart, MS-12

Lockheed Electronics Co., Inc. (3)
1830 NASA Rd. I
Houston, TX 77058
Attn.: C. Nosworthy, M/S C26
W. Redwine, M/S A02

Lockheed Missiles & Space Co., Inc.
Attn.: J. R. Cretcher (4)
STS Data Bank 6223/538
P. O. Box 504
Sunnyvale, CA 94086

R. Day
11709 McGruder Lane
Rockville, MD 20852

Martin Marietta Michoud Operations
Attn.: C. Klein (6)
J. Garnett, Dept. 3017 (3)

MATSCO (2)
1050 Bay Area Blvd.
Houston, TX 77058
Attn: J. Johnson
O. Newbrough

MDTSCO - Houston
J. Allison/A3
D. Hull/A3
M. Baldwin/A3
W. Solcher/D3
S. Zobal/A3
G. D. Venables/A3
S. Gotch/C3
T. Grems/C4

MDAC - HB
5301 Bolsa Ave.
Huntington Beach, Ca. 92647
D. J. Chappell
T. Simko
D. A. Kasulka

MMC
888 N. Sepulveda Blvd.
El Segundo, CA 90245
Attn.: PIC/C. Tsiknes

MMC/Aerospace Denver Division
P. O. Box 179
Denver, CO 80201
Attn.: PIC/TIC, Nadine Schooley/
G5243 (4);
Leonard Jenkins/G5101 (3);
D. Clausen/5101 (4)
H. Zeiner/G5495 (3)
R. McNamara/G5494 (3)

MMC/Sunyvale Operations
1183 Bordeaux Dr.
Suite 10
Sunnyvale, CA 94086
Attn.: G. Bauknight

NASA Scientific and Technical
Information Facility
P. O. Box 8757
Baltimore/Washington International
Airport Maryland 21240

ORI, Inc.
Attn: Pete Wyman
1400 Spring St.
Silver Spring, MD 20910

OUSDRE/DIMO
Institute for Defense Analysis
1801 N. Beauregard
Alexandria, VA. 22311
Attn.: R. Finke
Science & Technology Division

PERKIN-ELMER
100 Wooster Heights Road
Danbury, CONN 06810
Attn.: F. Bennett, MS-813

The Rand Corporation
VIA: Air Force Contracting Office
1700 Main Street
Santa Monica, CA 90406
Attn.: Library - 98

Rockwell-Downey/L. W. Tucholski, FB18
Rockwell-Downey/T. Labuszewski, AD35 (3)
Rockwell-Downey/Data Mgmt., FA89 (4)
Rockwell-Downey/J. Bertani, AA96
Rockwell-Downey/J. Heinlein/AC61 (6)
Rockwell-Downey/J. Wolfelt, AC15 (3)
Rockwell-Downey/W. L. Norton, FB81 (4)
Rockwell-Downey/R. Friday, FB27
Rockwell-Downey/R. G. Minor, FB98
Rockwell-Downey/F. Torres, AA06
Rockwell-Downey/L. Jones, BA41
Rockwell-Houston/J. Snowden, ZC01
Rockwell-Houston/L. D. Bowles, ZC01
Rockwell-Houston/F. Patterson, ZC01
Rockwell-Houston/M. Silver, ZC01
Rockwell-Houston/J. Yoder, ZC08
Rockwell-Rocketdyne/D. Carson,
126-545-055-ACIZ
Rockwell-KSC/J. R. Crawford, ZK14

M. Kinna
WSMC/SEY
Bldg. 10577
Vandenberg AFB, CA 93437

SINGER-LINK (3)
Data Library, Singer Bldg.

Space Div/YVCT TIC (13)
P. O. Box 92960
Worldway Postal Center
Los Angeles, CA 90009

SPAR Aerospace Limited
1700 Ormont Drive,
Weston, Ontario, Canada M9L2W7
Attn.: FOP Program Manager

Technical Info. Consultant
82 Laythorpe Avenue
Seacraft, Skegness
Lincolnshire, England
P E 25 3BZ
Attn.: David Baker

Thiokol Corp. (2)
Wasatch Division
P. O. Box 524
Brigham City, UT 83402
Attn.: Frank Call M-S-704

TRW - Houston
C. Peterson (3)

TRW - J. R. Vail
1 Space Park
Building 110/1870
Redondo Beach, CA