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MISSION PROJECTIONS AND REQUIREMENTS.		
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# Advanced Space Power Requirements and Techniques

## Task 1: Mission Projections and Requirements

### Volume III: Appendices

Prepared by

Advanced Mission Analysis Directorate  
Advanced Orbital Systems Division

1 March 1978

Prepared for

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
Washington, D. C.

Contract No. NASW-3078



Systems Engineering Operations

THE AEROSPACE CORPORATION

ADVANCED SPACE POWER REQUIREMENTS  
AND TECHNIQUES

TASK 1: MISSION PROJECTIONS AND REQUIREMENTS  
Volume III: Appendices

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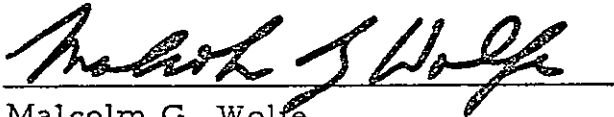
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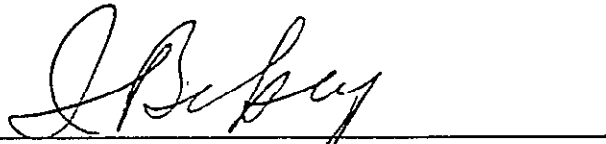
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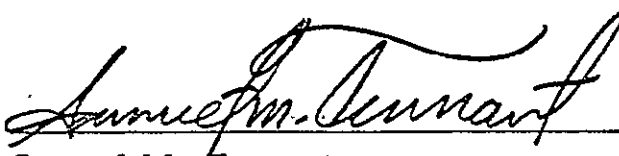


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## FOREWORD

This is Volume III of a three-volume report. The report documents the results of Task 1 of a study entitled, "Advanced Space Power Requirements and Techniques" performed under NASA Headquarters Contract No. NASW-3078 during fiscal years 1977 and 1978. Task 2 is documented separately.

The Task 1 effort was directed by Dr. Malcolm G. Wolfe of the Advanced Applications Analysis Office. Mr. Jerome P. Mullin (Code RP) of NASA Headquarters was the NASA study director. Technical direction was also provided by Mr. Lee Holcomb of NASA Headquarters, speaking for Mr. Mullin.

The report consists of the following three volumes:

- Volume I:      Technical Report
- Volume II:     Classified Addendum
- Volume III:    Appendices

Volume I is an unclassified volume which describes the results of the technical studies that were performed as part of the effort. The study encompassed DoD as well as NASA and civil missions and mission requirements. Volume II is a classified volume which includes data which could not be included in Volume I for national security reasons. Volume III is unclassified and contains ancillary information, such as computer printout, which was generated during the course of the study.

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## ACKNOWLEDGMENTS

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Appendix I  
General Study Guidelines  
and Assumptions

## GENERAL STUDY GUIDELINES AND ASSUMPTIONS

The following general guidelines and assumptions were used during the study:

1. Satellite descriptions were obtained, where possible, from existing documentation.
2. When documented satellite data were not available, descriptions for assumed-to-be similar satellites or best estimates were used.
3. An updated version of the Aerospace Corporation Systems Cost/Performance Model\* was used to synthesize satellite configurations and derive spacecraft weight and power requirements.
4. The updated Aerospace Corporation Cost Model (a derivative of the SAMSO Cost Model) was used to develop mission life cycle costs.
5. Planetary missions require dedicated flights.
6. DoD flights may not be shared with NASA or non-NASA flights.
7. North/south stationkeeping is required for all geosynchronous missions.
8. Satellites with orbit inclinations up to  $57^{\circ}$  will be launched from ETR.
9. Satellites with orbit inclinations above  $57^{\circ}$  will be launched from WTR.
10. The Shuttle delivers all high energy payloads to a circular parking orbit at 296 km (160 nmi) altitude.
11. STS IOC date out of ETR is 1980.

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\* Systems Cost/Performance Analysis (Study 2.3) Final Report. Aerospace Report No. ATR-74(7343)-1, Vols. I, II, and III, 27 September 1974.



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Appendix II  
Launch Vehicle Performance  
and Cost Assumptions

## LAUNCH VEHICLE PERFORMANCE AND COST ASSUMPTIONS

### I. INTRODUCTION

This appendix presents data pertinent to the ground rules used for launch vehicle selection, performance, and cost estimation. These data are used as inputs to the computer program which is used to generate life cycle costs.

### II. LAUNCH VEHICLE ENSEMBLES

Launch vehicle design and rocket performance computations are obviously outside the scope of this effort. Nevertheless, it is necessary to define a set of candidate launch vehicle elements in gross terms in order to generate the type of output desired by NASA. The selected launch vehicle ensembles are listed in Table II-1 together with their estimated gross payload capabilities. The payload weights represent deployment only; the costs represent launch costs only.

The candidate launch vehicle ensemble set is by no means exhaustive, but it is considered to be sufficiently comprehensive to serve the objectives of this study.

### III. MISSION DESTINATION SET

For the purposes of this study, a limited number of satellite destinations were selected. The selected destinations are identified in Table II-1 and are composed of the following elements:

Table II-1. Candidate Launch System Performance and Costs

Item	Launch Vehicle Ensemble	Code	Payload Capability (kg)						Launch Vehicle Cost (\$×10 <sup>6</sup> )*		
			I. Low Altitude			II. High Altitude			DoD	NASA	Civil
			(a) Low Inclination	(b) Intermed. Inclination	(c) High Inclination	(a) Elliptical	(b) Geosynch.	(c) Escape			
1	Shuttle	A	65,000	57,000	32,000	--	--	--	12	15	19
2	Shuttle + SSUS	A+C	--	--	--	--	2,500	--	13	16	20
3	Shuttle + IUS	A+D	--	--	--	6,000	5,000	--	18	21	25
4	Shuttle + OTV	A+E	--	--	--	24,000	10,000	9,000	21	24	28
5	Shuttle + OTV + SEPS	A+E +F	--	--	--	30,000	14,000	12,000	22	25	29
6	HLLV	B	1,200,000	1,100,000	600,000	--	--	--	23	23	23
7	HLLV + AOTV	B+G	--	--	--	300,000	140,000	120,000	33	33	33
8	HLLV + AOTV + SEPS	B+G +F	--	--	--	600,000	280,000	240,000	34	34	34
9	SCOUT	H	400	--	320	--	--	--	--	--	--
10	Thor/Delta	J	4,100	--	3,000	--	--	--	9	9	9
11	Atlas/Centaur	K	11,300	--	9,600	--	1,000	2,700	34	34	34
12	Titan IIIB	L	9,950	--	7,950	--	1,000	2,200	29	29	29
13	Titan IIIC	M	29,000	--	23,000	--	3,300	7,000	37	37	37
14	Titan IIID/Centaur	N	34,000	--	30,000	--	7,300	11,000	--	--	--

\* Does not include amortization of RDT&E costs

1. Altitude  
Low  
High - elliptical, geosynchronous, and escape
2. Inclination  
Low (0 to 34 deg.)  
Intermediate (35 to 69 deg.)  
High (70 to 108 deg.)

#### IV. LAUNCH VEHICLE ELEMENT SET

For the purposes of this study, a limited number of launch vehicle elements were selected. The selected launch vehicle ensembles are identified in Table II-1 and are composed of the following elements:

1. Element A  
A standard Shuttle with characteristics approximating the NASA July 1976 Shuttle configuration.
2. Element B  
A reusable Heavy Lift Launch Vehicle (HLLV), not defined in detail, but providing approximately 20 times the payload capability of Element A to low-earth orbit.
3. Element C  
A standard expendable spinning solid upper stage having a performance capability to geosynchronous orbit of approximately half of the Inertial Upper Stage (IUS) (Element D).
4. Element D  
The IUS, which is a solid propellant expendable stage with characteristics approximating the Boeing configuration of June 1977.

5. Element E

A standard Orbit Transfer Vehicle having a performance capability two times the IUS (Element D). It is approximately equivalent to the cryogenic Space Tug described in NASA baseline Tug document.

6. Element F

A Solar Electric Propulsion Stage (SEPS) similar to the configuration described by Rockwell International (RI) and used by RI in their SEPS applications studies.

7. Element G

A large reusable Orbit Transfer Vehicle, not defined in detail, but providing approximately 10 times the capability of the A+E+F configuration to geosynchronous orbit when used with the HLLV (Element B).

8. Element H

The standard SCOUT expendable launch vehicle.

9. Element J

The standard THOR/DELTA expendable launch vehicle.

10. Element K

The standard ATLAS/CENTAUR expendable launch vehicle.

11. Element L

The standard TITAN IIIB expendable launch vehicle.

12. Element M

The standard TITAN IIIC expendable launch vehicle.

13. Element N

The standard TITAN IIID/CENTAUR expendable launch vehicle.

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Appendix III

Satellite Programs 1959-1979

SATELLITE PROGRAMS 1959-1979

Satellite	User <sup>(1)</sup>	Function <sup>(2)</sup>	Power System Type	Launch Date	BOL Power Level (W)
GOES-A (SMSC)	N	O	Solar Array and Battery	19/75	165
SMS-A	N	O		5/74	157
SMS-B	N	O		2/75	157
ETS-II	C	C		2/77	113
SAS-C(3)	N	O		5/75	65
SAS-B (2)	N	O		11/72	27
SAS-A (1)	N	O		12/70	27
TIP-II	D	S		1975	100
TIP-I	D	S		9/72	35
GEOS-3	N	O		4/75	
OSO-7	N	O		9/71	97
SESP-P70-1	D	S		6/71	298
STP-P72-1	D	S		10/72	135
STP-	D	S		10/74	90
S73-5	D	S		12/75	90
-6, S74-2	D	S		4/76	90
IMP-H	N	O		9/72	150
IMP-J	N	O		10/73	150
NIMBUS-6	N	O		6/75	500
NIMBUS-G	N	O		11/78	500
BSE	C	C	3/77	780	
IME-M,	N	O	11/77	160	
-H	N	O	8/78	160	
-D	N	O	11/77	160	

I-III

Notes

(1) N = NASA; D = DoD; C = Civil

(2) O = Observation; C = Communication; S = Support

SATELLITE PROGRAMS 1959-1979

III-2

Satellite	User <sup>(1)</sup>	Function <sup>(2)</sup>	Power System Type	Launch Date	BOL Power Level (W)
OAO-3	N	O	Solar Array and Battery	8/75	333
OSO-8	N	O		1975	464
ANIK2 /WESTAR	C	C		1972-1974	320
GMS	C	O		7/77	212
AE-C	N	O		3/74	170
AE-D	N	O		9/75	170
AE-E	N	O		11/75	170
RCA SATCOM	C	C		3/76	750
TIROS-N	C	O		12/78	1250
ITOS G-1	C	O		6/74	434
NAVSTAR	D	S		1977-78	524
STP-P72-2	D	S		1975	420
HEAO-A, -B -C	N	O		4/77	958
	N	O		6/78	1180
	N	O		7/79	958
VIKING 1-2	N	O	Solar Array and Battery	1975	620
TRANSIT	D	S		1968-73	20
AGENA	D	S	Battery	1959-73	500
VELA	D	S		1963-70	99
LES 1	D	C		1965	33
LES 2	D	C		1965	36
LES 3-4	D	C		1965	36
LES 5-6	D	C		Battery	1967 & 1968

Notes

- (1) N = NASA; D = DoD; C = Civil
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SATELLITE PROGRAMS 1959-1979

Satellite	User <sup>(1)</sup>	Function <sup>(2)</sup>	Power System Type	Launch Date	BOL Power Level (W)	
LES 8-9	D	C	RTG	1975	290	
DMSP	D	O	Solar Array and Battery	1975	900	
IDCSP	D	C	Solar Array and Battery	1966-68	40	
TACSAT	D	C		1969	980	
SKYNET 1	D	C		1969 & 70	113	
NATO II	D	C		1970 & 71	113	
PROJECT A	D	O		1967	560	
DSCS-II	D	C		11/71, 12/73, 5/75	535	
SKYNET II	D	C		1974	260	
FLTSATCOM	D	C		1977	1800	
STP 71-2	D	S		1971	1400	
NATO III	D	C		1976	533	
INTELSAT-I	C	C		1965	45	
INTELSAT-II	C	C		1966	85	
INTELSAT-III	C	C		1968-70	160	
INTELSAT IV	C	C		1971-75	569	
INTELSAT IVA	C	C		1975	590	
ANIK	C	C		1972, 73, 75	300	
MARISAT	D	C		1975	350	
COMSTAR-AT&T	C	C		1975	600	
JAPANESE-CS	C	C		Solar Array and Battery	1977	538

Notes

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SATELLITE PROGRAMS 1959-1979

III-4

Satellite	User <sup>(1)</sup>	Function <sup>(2)</sup>	Power System Type	Launch Date	BOL Power Level (W)
RCA SATCOM	C	C	Solar Array and Battery	1975	740
JAPANESE GE B. S. E.	C	C		1978	1000
SYMPHONIE 1	C	C		1974	300
ATS 1-5	N	C		1966-69	130
ATS 6	N	C		1974	645
NIMBUS 1-5	N	O		1964-72	500
SMS A-B	N	O		1974-75	200
ITOS 1-E	N	O		1970-73	350
NOAA 1-4	N	O		1970-74	350
ERTS/ LANDSAT A-B	N	O		1972-75	550
SYMPHONIE 2	C	C		1975	300
NIMBUS 1	N	O		1964	500
NIMBUS 2	N	O		1966	500
ATS 1	N	C		1966	130
Lunar Orbiter 3	N	L		1967	450
OSO 3	N	O		1967	43
ATS 2	N	C		1967	130
Surveyor 3	N	O		1967	90
Surveyor 4	N	O		1967	90
Lunar Orbiter 4	N	O		1967	450
Explorer 34	N	O	Solar Array and Battery	1967	288

Notes

- (1) N = NASA; D = DoD; C = Civil
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SATELLITE PROGRAMS 1959-1979

III-5

Satellite	User <sup>(1)</sup>	Function <sup>(2)</sup>	Power System Type	Launch Date	BOL Power Level (W)
Mariner 5	N	O	Solar Array and Battery	1967	375
Explorer 35	N	O		1967	342
OGO 4	N	O		1967	600
Lunar Orbiter 5	N	O		1967	450
Surveyor 5	N	O		1967	90
OSO 4	N	O		1967	43
ATS 3	N	C		1967	175
Surveyor 6	N	O		1967	90
Pioneer 8	N	O		1967	500
TETR 1	N	O		1967	20
Surveyor 7	N	O		1968	90
Explorer 36	N	O		1968	45
OGO 5	N	O		1968	600
Explorer 37	N	O		1968	100
NIMBUS B/ SECOR 10	N	O/C		1968	500
Explorer 38	N	O		1968	245
Explorer 39/40	N	O		1968	5/100
ATS 4	N	C		1968	130
Pioneer 9/ TETR 2	N	O		1968	500/20
OAQ 2	N	O	1968	1400	
OSO 5	N	O	Solar Array and Battery	1969	43

Notes

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SATELLITE PROGRAMS 1959-1979

Satellite	User <sup>(1)</sup>	Function <sup>(2)</sup>	Power System Type	Launch Date	BOL Power Level (W)
Mariner 6	N	O	Solar Array and Battery	1969	475
Mariner 7	N	O		1969	475
NIMBUS 3	N	O		1969	500
NIMBUS 4	N	O		1970	600
OGO 6	N	O		1969	43
PAC 1	N	C		1969	115
ATS 5	N	C		1969	130
Pioneer E/ TETR C	N	O		1969	520
ITOS-1(TIROS M)	N	O		1970	350
OSCAR 5	N	C		1970	10
OSCAR 19	N	C			
OFO-1 Radiation/ Meteoroid	N	O			
OAQ-B	N	O			
NOAA-1	C	O			
Explorer 42 (SAS-A)	N	O			
Explorer 43 (IMPI)	N	O			
Mariner 9	N	O			
Explorer 44 (Solrad 10)	N	O			
OSO 7/TETR-D	N	O			
NOAA-2 (ITOS B)	C	O		Solar Array and Battery	1971

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Notes

(1) N = NASA; D = DoD; C = Civil

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SATELLITE PROGRAMS 1959-1979

Satellite	User <sup>(1)</sup>	Function <sup>(2)</sup>	Power System Type	Launch Date	BOL Power Level (W)
Explorer 45	N	O	Solar Array and Battery	1971	117
Pioneer 10	N	O		1972	
ERTS-1	N	O		1972	550
Explorer 46	N	O		1972	100
OA0 3 (Copernicus)	N	O		1972	1450
Explorer 47 (IMP-H)	N	O		1972	150
NOAA-2 (ITOS-D)/OSCAR 6	C	O		1972	615
Explorer 48 (SAS-B)	N	O		1972	27
NIMBUS 5	N	O		1972	500
Pioneer 11	N	O		1973	
Explorer 49	N	O		1973	252
ITOS-E	N	O		1973	615
Explorer 50 (IMP-J)	N	O		1973	150
NOAA 3 (ITOS-F)	C	O		1973	350
Explorer 51(AE-c)	N	O		1973	900
SMS-1	N	O	1974	212 157(EOL)	
ATS-6	N	C	1974	600	
Explorer 52 (HAWKEYE)	N	O	Solar Array and Battery	1974	10

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Notes

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SATELLITE PROGRAMS 1959-1979

Satellite	User <sup>(1)</sup>	Function <sup>(2)</sup>	Power System Type	Launch Date	BOL Power Level (W)	
NOAA 4(ITOS-G)	C	C/O	Solar Array and Battery	1974	350	
AMSAT-OSCAR 7	C	C		1974	10	
ERTS/LANDSAT 2	N	O	Solar Array and Battery	1975	550	
SMS-2	N	O		1975	212 157 (EOL)	
GEOS-3	N	O		1975	150	
Explorer 53	N	O		1975	65	
NIMBUS 6	N	O		1975	500	
OSO 8	N	O		1975	464	
Viking 1	N	O		1975	620	
Viking 2	N	O		1975	620	
Explorer 54	N	O		1975	120	
GOES 1 (SMS-c)	N	O		1975	200 128 (EOL)	
Explorer 55	N	O		1975	385	
LAGEOS-1	N	O		1976		
NOAA-5 (ITOSH)	C	O		1976		
Satellite Data System 2	N	C		1976		
TIP 3	D	C		1976		
AMS 1 Advanced Metsat	N	O		1976		
MARISAT 3	N	C		Solar Array and Battery	1976	
HEAO-A	N	O			1977	958

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Notes

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SATELLITE PROGRAMS 1959-1979

Satellite	User <sup>(1)</sup>	Function <sup>(2)</sup>	Power System Type	Launch Date	BOL Power Level (W)
VOYAGER	N	O	Solar Array and Battery	1977	523 384 (EOL)
IME-D	N	O		1977	160
IME-M	N	O		1977	160
HEAO-B	N	O		1978	1180
IME-H	N	O		1978	160
NIMBUS-G	N	O		1978	500
HEAO-C	N	- O		Solar Array and Battery	1979
SEASAT-A	N	O		1978	2000

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Notes

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Appendix IV

Initiative Mission and Design Characteristics



NASA Mission Description: Observation

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
NO1-1-1	WTR	STS	740/740/98.7	3 Axis	1.32	2	20,830	34	119	810
-2	WTR	STS	900/900/100	3 Axis	1.15	2	18,190	30	98	440
-3	ETR	STS	35810/35810/0	3 Axis	1.15	2	18,100	28	162	860
-4	WTR	STS	300/300/90	Spln	0.35	0.5	1,390	13	84	770
-5	ETR	STS	550/550/96	3 Axis	0.18	1	1,460	14	53	200
-6	ETR	STS	35810/35810/0	3 Axis	1.07	3	25,270	26	172	1010
-7	ETR	STS	35810/35810/0	3 Axis	1.05	3	24,740	26	176	1020
-8	ETR	STS	577/577/96.5	3 Axis	0.84	3	19,880	32	97	430
NO1-2-1	ETR	STS	200/200/60	Orb	7.5	7 day	1,260	--		2000
NO2-1-1	WTR	STS	700/700/87	3 Axis	3.45	3	81,550	88	277	1210
-2	WTR	STS	900/300/100	3 Axis	1.78	2	28,040	46	155	750
-3	WTR	STS	300/300/90	3 Axis	1.28	2	20,160	33	110	610
-4	ETR	STS	35810/35810/0	3 Axis	1.43	3	33,890	36	211	870
-5	ETR	STS	600/600/50	3 Axis	0.47	2	7,360	18	67	300
NO2-2-1	WTR	STS	200/200/90	Orb	1.9	7 day	320	--		475
-2	WTR	STS	200/200/90	Orb	3.0	7 day	500	--		1470

IV-1

NASA Mission Description: Communication

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
NC1-1-1	ETR	STS	35810/35810/0	3 Axis	2.0	5	78,840	50	320	2200
-2	ETR	STS	35810/35810/0	3 Axis	2.0	7	110,380	50	320	2700
-3	ETR	STS	35810/35810/0	3 Axis	3.5	7	193,160	85	560	3000
-4	ETR	STS	35810/35810/0	3 Axis	5.0	7	275,940	120	750	3500
NC2-1-1	ETR	STS	35810/35810/0	3 Axis	1.0	5	39,420	25	160	1360
-2	ETR	STS	35810/35810/0	3 Axis	50.0	7	2760 x 10 <sup>3</sup>	1100	1400	5500
NC3-1-1	ETR	STS	35810/35810/0	3 Axis	10.0	5	394 x 10 <sup>3</sup>	600	1050	5000
-2	ETR	STS	35810/35810/0	3 Axis	25.0	7	1380 x 10 <sup>3</sup>	1100	1400	6000
-3	ETR	STS	35810/35810/0	3 Axis	100.0	7	5519 x 10 <sup>3</sup>	2200	3000	7500
NC4-1-1	ETR	STS	35810/35810/0	3 Axis	5.0	7	275,940	120	750	3500
-2	ETR	STS	35810/35810/0	3 Axis	15.0	7	827,820	360	950	4500
NC4-2-1	ETR	STS	35810/35810/0	3 Axis	2.0	5	78,840	50	320	2200
-2	ETR	STS	35810/35810/0	3 Axis	5.0	7	275,940	120	750	3500
NC5-1-1	ETR	STS	35810/35810/0	3 Axis	10.0	7	551,900	250	900	4000
-2	ETR	STS	35810/35810/0	3 Axis	40.0	7	2208 x 10 <sup>3</sup>	950	1300	5500

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NASA Mission Description: Support

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
NS1-1-1	ETR	STS	350/350/28.5	Orb	5.0	7 day	840			11,800
-2	ETR	STS	350/350/28.5	Orb	10.0	7 day	1680			12,000
NS1-2-1	ETR	STS	500/500/55	3 Axis	5.5	10	433,620			9,000
NS2-1-1	ETR	STS	445/445/28.5	3 Axis	25.0	5	985,500			462,000
-2	ETR	STS	445/445/28.5	3 Axis	1.0	7 day	170			29,500
-3	ETR	STS	35810/35810/0	3 Axis	60.0	10	4730 x 10 <sup>3</sup>			380,000
-4	ETR	STS	35810/35810/0	3 Axis	1.0	7 day	170			29,500
-5	ETR	STS	445/445/28.5	3 Axis	100.0	10	7334 x 10 <sup>3</sup>			100,000
NS3-1-1	ETR	STS	445/445/28.5	3 Axis	10.0	7 day	1680			25,000
-2	ETR	STS	600/600/50	3 Axis	1.0	7 day	170			3,640
-3	ETR	STS	445/445/28.5	3 Axis	0.5	7 day	85			10,000
-4	ETR	STS	445/445/28.5	3 Axis	1.0	7 day	170			2,000
-5	ETR	STS	445/445/28.5	3 Axis	1.0	7 day	170			14,500
-6	ETR	STS	445/445/28.5	Orb	1.0	7 day	170			14,500
NS4-1-1	ETR	STS	445/445/28.5	3 Axis	25.0	7	1380 x 10 <sup>4</sup>			298
-2	ETR	STS	445/445/28.5	3 Axis	250.0	7	1380 x 10 <sup>4</sup>			28 x 10 <sup>2</sup>
-3	ETR	STS	445/445/28.5	3 Axis	2 x 10 <sup>3</sup>	7	1104 x 10 <sup>5</sup>			21 x 10 <sup>3</sup>
-4	ETR	HLLV	35810/35810/0	3 Axis	15 x 10 <sup>3</sup>	10	1183 x 10 <sup>6</sup>			97 x 10 <sup>3</sup>
-5	ETR	HLLV	35810/35810/0	3 Axis	12 x 10 <sup>5</sup>	10	9460 x 10 <sup>7</sup>			71 x 10 <sup>5</sup>
-6	ETR	HLLV	35810/35810/0	3 Axis	10 x 10 <sup>6</sup>	30	2365 x 10 <sup>9</sup>			54 x 10 <sup>6</sup>

NASA Mission Description: Scientific

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
NP1-1-1	ETR	STS	500/500/28.5	3 Axis	1.51	3	35,720	39	502	6650
-2	ETR	STS	463/463/28.5	3 Axis	2.70	2	42,540	69	480	5390
-3	ETR	STS	463/463/28.5	3 Axis	2.70	2	42,540	69	480	5390
-4A	ETR	STS	1 AU/28.5	Spin	0.21	2	3,340	15	123	660
-4B	ETR	STS	35810/35810/0	Spin	0.38	2	5,920	26	114	720
-5	WTR	STS	500/500/28.5	3 Axis	0.57	1	4,520	15	60	290
-6	WTR	STS	520/297/90	Spin	0.35	1	2,730	25	88	700
-7	WTR	STS	520/297/90	Spin	0.35	1	2,730	25	88	700
-8	WTR	STS	3500/3500/90	Spin	0.18	1	1,440	9	51	270
NP1-2-1	ETR	STS	400/400/28.5	Orb	6.20	7 day	1,040	--	--	9100
-2	ETR	STS	350/350/28.5	Orb	1.20	7 day	200	--	--	3160
-3	ETR	STS	300/300/28.5	Orb	0.72	7 day	120	--	--	2490
-4	ETR	STS	400/400/30	Orb	1.80	7 day	300	--	--	5860
NP2-1-1	ETR	STS	575/575/28.5	3 Axis	0.94	2	14,890	24	102	900
-2	ETR	STS	1 AU/28.5	3 Axis	0.22	1	1,730	15	97	560
-3	WTR	Delta	3500/260/90	Spin	0.31	1	2,430	22	71	340
-4	WTR	Scout	37000/1800/28.5	Spin	0.22	1	1,700	15	82	280
-5	ETR	STS	350/350/28.5	3 Axis	2.68	2	42,270	69	776	8020
NP2-2-1	ETR	STS	350/350/30	Orb	3.0	7 day	500	--	--	8170
-2	ETR	STS	375/375/56	Orb	2.9	7 day	490	--	--	5720
-3	ETR	STS	685/685/57	Orb	2.7	7 day	450	--	--	9300
-4	ETR	STS	210/210/57	Orb	3.9	7 day	660	--	--	14,900
NP3-1-1	ETR	STS	463/463/28.5	3 Axis	1.12	0.5	4,420	29	135	1500
-2	ETR	STS	463/463/28.5	3 Axis	1.12	0.5	4,420	29	135	1500
NP3-2-1	ETR	STS	370/370/28.5	Orb	3.7	7 day	620	--	--	2846
-2	ETR	STS	350/350/30	Orb	1.1	7 day	190	--	--	261
-3	ETR	STS	350/350/30	Orb	1.1	7 day	190	--	--	261
-4	ETR	STS	350/350/30	Orb	1.6	7 day	270	--	--	411
NP3-3-1	ETR	STS	500/500/55	3 Axis	5.2	10	455,520		640	9000

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NASA Mission Description: Planetary and Lunar

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
NL1-1-1	ETR	TIH Centaur	N/A	3 Axis	0.57	7	31,500	N/A RTG	187	1650
-2	ETR	STS	N/A	3 Axis	1.43	1.5	16,950	37	411	4030
-3	ETR	STS	N/A	3 Axis	0.74	2.3	13,620	19	95 <sup>b</sup>	840
-4	ETR	STS	N/A	Spin	0.30	7	16,700	15	76	370
-5	ETR	STS	N/A	3 Axis	1.07	3	25,350	27	152	520
-6	ETR	STS	N/A	3 Axis	1.27	6.7	67,000	N/A RTG	410 <sup>d</sup>	2100
-7	ETR	STS	N/A	3 Axis	0.89	3	21,100	23	165	1330
-8	ETR	STS	N/A	3 Axis	0.82	3	19,420	N/A RTG	442 <sup>c</sup>	1220
-9	ETR	STS	N/A	3 Axis	0.78	3	18,540	19	114 <sup>tr</sup>	440
-10	ETR	STS	N/A	3 Axis	0.78	3	18,540	19	118 <sup>c</sup>	550
-11	ETR	STS	N/A	3 Axis	0.52	2	8,140	13	93	330
-12	ETR	STS	N/A	3 Axis	1.59	3	37,540	41	354 <sup>tr</sup>	3300
NL2-1-1	ETR	TIH Centaur	N/A	3 Axis	0.590	2	9,300	15	100	830

<sup>c</sup>Includes SEPS

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Non-NASA/Non-DOD Mission Description: Outside Users

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
OBSERVATION	.									
CO1-1-1	WTR	STS	790/790/82	3-Axis	1.19	3	28,380	31	114	740
-2	ETR	Delta	35810/35810/0	Spin	0.44	5	17,450	31	133	620
-3	ETR	STS	35810/35810/0	Spin	0.58	5	22,970	40	171	830
CO1-2-1	WTR	STS	790/790/82	3-Axis	3.60	5	142,130	92	290	1200
CO2-1-1	WTR	STS	808/808/108	3-Axis	4.09	3	96,780	105	327	1590
CO3-1-1	WTR	STS	834/834/98.7	3-Axis	1.62	3	38,290	41	146	610
-2	WTR	STS	834/834/98.7	3-Axis	1.62	3	38,290	41	146	610
-3	ETR	STS	35810/35810/0	3-Axis	0.99	5	38,940	25	184	670
-4	ETR	STS	35810/35810/0	3-Axis	0.99	5	38,940	25	184	670
CO3-2-1	Kourou	Ariane	834/834/98.7	3-Axis	1.54	3	60,680	39	142	600
-2	Kourou	Ariane	834/834/98.7	3-Axis	1.62	3	38,290	41	146	610
-3	Tanega	N	834/834/98.7	3-Axis	0.98	3	23,230	25	86	280
-4	Tanega	N	834/834/98.7	3-Axis	0.98	3	23,230	25	86	280
-5	Kourou	Ariane	35810/35810/0	3-Axis	0.93	5	36,580	23	145	600
-6	ETR	STS	35810/35810/0	3-Axis	0.93	5	36,580	23	145	600
CO4-1-1	WTR	Delta	834/834/98.7	3-Axis	--	3	--	--	--	--
-2	WTR	Atlas F	834/834/98.7	3-Axis	1.20	3	28,470	31	105	590
-3	WTR	STS	834/834/98.7	3-Axis	1.52	3	35,960	39	127	640
CO4-2-1	ETR	Delta	35810/35810/0	Spin	--	3	--	--	--	--
-2	Kourou	Ariane	35810/35810/0	Spin	0.46	5	18,130	32	130	620
-3	ETR	Delta	35810/35810/0	Spin	--	5	--	--	--	--
-4	Tanega	N	35810/35810/0	3-Axis	0.81	5	31,960	20	125	650
-5	ETR	STS	35810/35810/0	3-Axis	0.81	5	31,960	20	125	650

Non-NASA/Non-DOD Mission Description: Outside Users (Continued)

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
COMMUNICATIONS										
CC1-1-1	ETR	A/C	35810/35810/0	Spin	1.44	5	56,890	99	259	1190
-2	ETR	STS		Spin	1.44	5	56,890	99	259	1190
-3	ETR	STS		3-Axis	1.91	7	105,320	47	312	1430
CC2-1-1	ETR	STS		3-Axis	0.98	5	38,520	24	163	790
-2	ETR	A/C		Spin/Dsp	1.04	7	57,590	72	207	930
-3	ETR	STS		3-Axis	1.91	7	105,320	47	314	1460
-4	ETR	Delta		Spin	0.35	5	13,910	24	102	510
-5	ETR	Delta		3-Axis	0.94	5	37,090	23	154	560
-6	ETR	STS		3-Axis	0.96	5	37,840	24	149	560
-7	ETR	STS		Spin	0.40	5	15,820	28	108	450
-8	ETR	STS		Spin	0.59	5	23,220	41	145	620
-9	ETR	STS		Spin	0.49	5	19,220	34	126	530
-10	ETR	STS		3-Axis	1.91	7	105,320	47	314	1460
-11	ETR	STS		Spin/Dsp	1.19	5	46,980	82	220	1100
-12	ETR	STS		3-Axis	1.91	7	105,320	47	314	1460
-13	ETR	STS		Spin	0.64	5	25,390	44	153	650
-14	ETR	STS		Spin	0.41	5	16,140	28	111	480
CC3-1-1	ETR	STS		Spin	0.42	5	16,400	29	115	490
-2	ETR	STS		Spin	0.49	5	19,220	34	126	550
-3	ETR	Delta		Spin	0.41	5	16,140	28	111	480
-4	Kourou	Ariane		Spin	0.41	5	16,140	28	111	480
-5	Kourou	Ariane		Spin	0.42	5	16,670	29	116	490
-6	ETR	Delta		Spin	0.40	5	15,610	27	108	470
-7	Kourou	Ariane		Spin	0.42	5	16,400	29	115	490
-8	Kourou	Ariane		3-Axis	1.57	7	86,390	39	237	1230
-9	Kourou	Ariane		3-Axis	1.56	7	86,330	39	237	1220
-10	Kourou	Ariane		3-Axis	0.48	5	19,030	12	84	400
-11	Kourou	Ariane		Spin	0.08	2	1,210	5	50	170
-12	Kourou	Ariane		Spin	0.36	5	14,180	25	100	420
-13	ETR	STS		Spin	0.42	5	16,400	29	115	490
-14	ETR	STS		Spin	0.47	5	18,420	32	123	530
-15	ETR	STS		3-Axis	0.48	5	19,030	12	84	400
-16	ETR	STS	35810/35810/0	3-Axis	1.20	5	47,240	30	154	710

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Non-NASA/Non-DOD Mission Description: Outside Users (Continued)

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
COMMUNICATIONS (CONT'D)										
CC3-1-17	ETR	STS	35810/35810/0	Spin	0.40	5	15,610	27	108	470
-18	ETR	STS		Spin	0.56	5	22,160	39	138	600
-19	ETR	Delta		Spin	--	5				
-20	Kourou	Ariane		Spin	0.38	5	14,810	26	102	450
-21	Kourou	Ariane		Spin	0.40	5	15,610	27	108	470
-22	Kourou	Ariane		Spin	0.42	5	16,400	29	116	500
-23	ETR	STS		Spin	0.59	5	23,220	41	145	620
-24	ETR	STS		Spin	0.62	5	24,330	43	151	640
-25	ETR	Delta		Spin	--	5				
-26	ETR	STS		Spin	0.64	5	25,390	44	160	820
-27	Tanega	N		Spin	--	5				
-28	Tanega	N		Spin	0.08	1	6,500	6	50	170
-29	ETR	Delta		Spin	--	5				
-30	Tanega	N		Spin	0.57	3.5	15,750	39	140	600
-31	ETR	Delta		Spin	--	5				
-32	Tanega	N		Spin	1.19	3	28,260	82	186	720
-33	Tanega	N		Spin	0.42	5	16,640	29	117	470
-34	ETR	Delta		Spin	--	5				
-35	ETR	STS		Spin	0.64	5	25,390	44	160	830
-36	ETR	STS		Spin	0.28	5	11,160	20	81	460
-37	ETR	STS		Spin	0.68	5	26,870	47	165	840
-38	ETR	STS		Spin	0.42	5	16,400	29	116	508
-39	ETR	STS		3-Axis	1.41	5	55,750	35	206	830
-40	ETR	STS		Spin	0.59	5	23,220	41	145	620
SUPPORT										
CSI-1-1	ETR	STS		3-Axis	4.20	5	165,470	104	555	1260
CS2-1-1	ETR	STS		Spin	0.52	5	20,570	36	131	550
-2	ETR	STS		Spin	0.62	5	24,330	43	151	640
-3	ETR	STS	35810/35810/0	3-Axis	0.76	5	29,870	19	118	630



Non-NASA/Non-DOD Mission Description: Outside Users (Continued)

CODE	LAUNCH SITE	LAUNCH VEHICLE	ORBITAL PARAMETERS km/km/deg	TYPE STAB.	BOL POWER (kW)	LIFETIME (Yrs)	kW-hrs	WEIGHT (kg)		
								SOLAR ARRAY	POWER SYSTEM	TOTAL
SUPPORT (CONT'D)										
CS3-1-1	ETR	STS	834/834/28	3-Axis	5.0	7 days	840			1500
-2	ETR	STS		3-Axis	10.0	7 days	1680			1500
-3	ETR	STS		3-Axis	15.0	7 days	2520			1500
-4	ETR	STS		3-Axis	1.0	7 days	168			1750
CS3-2-1	ETR	STS		3-Axis	5.0	7 days	840			1500
-2	ETR	STS		3-Axis	10.0	7 days	1680			1500
-3	ETR	STS		3-Axis	15.0	7 days	2520			1500
-4	ETR	STS		3-Axis	1.0	7 days	168			1750
-5	ETR	STS	834/834/28	3-Axis	3.8	15 days	1368			3000
SCIENTIFIC										
CP1-1-1	ETR	STS	834/834/28	3-Axis	4.16	3	98,380	107	313	1160
CP2-1-1	ETR	Delta	35810/35810/0	3-Axis	--	3				
-2	ETR	Delta	35810/35810/0	3-Axis	--	3				
-3	WTR	Delta	20000/300/90	Spin	0.38	1	3030	26	78	350
-4	Wallops	Scout	550/550/55	Spin	--	1				
-5	WTR	Delta	900/900/90	3-Axis	0.85	3	20,140	43	124	790
-6	Kourou	Ariane	834/834/98.7	3-Axis	0.84	3	19,860	61	170	200
-7	ETR	STS	35810/35810/0	Spin	0.11	1	850	7	57	200
-8	ETR	STS	35810/35810/0	Spin	0.11	3	2530	7	62	260
-9	Kago	MU	3960/826/65.9	3-Axis	--	3				
-10	Tanega	N	1012/990/69.7	3-Axis	--	3				
-11	Kago	MU	3074/256/31.6	3-Axis	--	3				
-12	Kago	MU	5000/350/65	3-Axis	--	3				
-13	Kago	MU	3000/250/30	3-Axis	--	3				
-14	Kago	MU	500/500/30	Spin	0.15	1	1190	8	66	210
-15	Kago	MU	500/500/30	Spin	0.16	1	1290	8	70	210
-16	Kago	MU	500/500/30	3-Axis	0.88	3	20,860	23	73	390

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Appendix V

Satellite Listing

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COMMUNICATIONS/COMMAND AND CONTROL

MC1-1-1	MC1-1-1
MC1-1-2	MC1-1-2
MC1-1-3	MC1-1-3
MC1-1-4	MC1-1-4
MC1-1-5	MC1-1-5
MC1-1-6	MC1-1-6
MC1-1-7	MC1-1-7
MC1-1-8	MC1-1-8
MC1-1-9	MC1-1-9

SUBTOTAL

ELECTRO-OPTICAL SURVEILLANCE

MO1-1-1	MO1-1-1
MO1-1-2	MO1-1-2
MO1-1-3	MO1-1-3
MO1-1-4	MO1-1-4
MO1-1-5	MO1-1-5
MO1-1-6	MO1-1-6
MO1-1-7	MO1-1-7
MO1-1-8	MO1-1-8
MO1-1-9	MO1-1-9
MO1-1-10	MO1-1-10

SUBTOTAL

RADAR SURVEILLANCE

MO2-1-1	MO2-1-1
MO2-1-2	MO2-1-2
MO2-1-3	MO2-1-3
MO2-1-4	MO2-1-4
MO2-1-5	MO2-1-5
MO2-1-6	MO2-1-6
MO2-1-7	MO2-1-7
MO2-1-8	MO2-1-8

SUBTOTAL

NAVIGATION

MS1-1-1	MS1-1-1
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SUBTOTAL

METEOROLOGY

MS2-1-1	MS2-1-1
MS2-1-2	MS2-1-2
MS2-1-3	MS2-1-3

SUBTOTAL

SPACE TECHNOLOGY PROGRAM

MS3-1-1	MS3-1-1
MS3-1-2	MS3-1-2
MS3-1-3	MS3-1-3
MS3-1-4	MS3-1-4
MS3-1-5	MS3-1-5

SUBTOTAL

DOD

TOTAL

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NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1	NC1-1-1 HOTLINE
NC1-1-2	NC1-1-2 INGOVT-1
NC1-1-3	NC1-1-3 INGOVT-2
NC1-1-4	NC1-1-4 INGOVT-3

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SUBTOTAL  
GOVERNMENT TO PEOPLE LINKS

NC2-1-1 NC2-1-1 VOTE I  
NC2-1-2 NC2-1-2 VOTE II

SUBTOTAL

PEOPLE TO PEOPLE LINKS

NC3-1-1 NC3-1-1 PRSNL COM  
NC3-1-2 NC3-1-2 TELECON-1  
NC3-1-3 NC3-1-3 TELECON-2

SUBTOTAL

INTRAGOVERNMENT LINKS

NC4-1-1 NC4-1-1 MAIL-I  
NC4-1-2 NC4-1-2 MAIL-II  
NC4-2-1 NC4-2-1 EMRGCY-1  
NC4-2-2 NC4-2-2 EMRGCY-2

SUBTOTAL

ENTERTAINMENT/COMMERCIAL LINKS

NC5-1-1 NC5-1-1 TV BCST-1  
NC5-1-2 NC5-1-2 TV BCST-2

SUBTOTAL

PLANETARY

NL1-1-1 NL1-1-1 JUP PROBE  
NL1-1-2 NL1-1-2 VOIR  
NL1-1-3 NL1-1-3 MERC ORB  
NL1-1-4 NL1-1-4 SAT-URAN  
NL1-1-5 NL1-1-5 DCFLYBY  
NL1-1-6 NL1-1-6 SO/T LHDR  
NL1-1-7 NL1-1-7 MARS POLR  
NL1-1-8 NL1-1-8 JUP SEPS2  
NL1-1-9 NL1-1-9 ENCKE RDZ  
NL1-1-10 NL1-1-10MULT-ASTR  
NL1-1-11 NL1-1-11JUP SWGBY  
NL1-1-12 NL1-1-12MARS SSR

SUBTOTAL

LUNAR

NL2-1-1 NL2-1-1 TBO

SUBTOTAL

PAGE  
NASA (CONTINUED)

EARTH RESOURCES MONITORING

NO1-1-1 NO1-1-1 LNDST F/O  
NO1-1-2 NO1-1-2 ESS  
NO1-1-3 NO1-1-3 SEOS  
NO1-1-4 NO1-1-4 GRAVSAT  
NO1-1-5 NO1-1-5 MAGSAT B  
NO1-1-6 NO1-1-6 SMIAS  
NO1-1-7 NO1-1-7 HCM1 2  
NO1-1-8 NO1-1-8 STEREOSAT  
NO1-2-1 NO1-2-1 SPCLAB PL

SUBTOTAL

ENVIRONMENTAL MONITORING

NO2-1-1 NO2-1-1 SEASAT B  
NO2-1-2 NO2-1-2 ENVIR MS  
NO2-1-3 NO2-1-3 HALOE  
NO2-1-4 NO2-1-4 STORHSAT  
NO2-1-5 NO2-1-5 ERBSS  
NO2-2-1 NO2-2-1 ACPL  
NO2-2-2 NO2-2-2 SPCLAB PL

SUBTOTAL

## ASTROPHYSICS

NP1-1-1	NP1-1-1 SP TLSCPE
NP1-1-2	NP1-1-2 HEAO-D
NP1-1-3	NP1-1-3 HEAO-E
NP1-1-4A	NP1-1-4A VLBI
NP1-1-4B	NP1-1-4B VLBI-B
NP1-1-5	NP1-1-5 GW DTCTR
NP1-1-6	NP1-1-6 GP B/C
NP1-1-7	NP1-1-7 ADV REL X
NP1-1-8	NP1-1-8 EXPLORER
NP1-2-1	NP1-2-1 PI SL PL
NP1-2-2	NP1-2-2 SIRTf
NP1-2-3	NP1-2-3 SUOT
NP1-2-4	NP1-2-4 IR INTFHR

SUBTOTAL

## SOLAR TERRESTRIAL

NP2-1-1	NP2-1-1 SNM
NP2-1-2	NP2-1-2 OESO
NP2-1-3	NP2-1-3 EXPLR DC
NP2-1-4	NP2-1-4 EXPLR SC
NP2-1-5	NP2-1-5 LSOBSRVTY
NP2-2-1	NP2-2-1 ST S/L PL
NP2-2-2	NP2-2-2 S/S IM OB
NP2-2-3	NP2-2-3 SP S/L B2
NP2-2-4	NP2-2-4 AMPS

SUBTOTAL

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NASA (CONTINUED)

## LIFE SCIENCES

NP3-1-1	NP3-1-1 BESS
NP3-1-2	NP3-1-2 VFR
NP3-2-1	NP3-2-1 LSDL
NP3-2-2	NP3-2-2 MINI-LAB
NP3-2-3	NP3-2-3 CARRY-ONL
NP3-2-4	NP3-2-4 KOSMOS
NP3-3-1	NP3-3-1 RSCH MDLE

SUBTOTAL

## SPACE PROCESSING-SPACE STATION

NS1-2-1	NS1-2-1 EXTMSNVEH
---------	-------------------

SUBTOTAL

## SPACE INDUSTRIALIZATION

NS2-1-1	NS2-1-1 ESC BASE
NS2-1-2	NS2-1-2 ESCBR
NS2-1-3	NS2-1-3 ASC BASE
NS2-1-4	NS2-1-4 ASCBR
NS2-1-5	NS2-1-5 SP MF FAC

SUBTOTAL

## ORBITAL OPERATIONS

NS3-1-1	NS3-1-1 LSD
NS3-1-2	NS3-1-2 SKYLAB R
NS3-1-3	NS3-1-3 TSO
NS3-1-4	NS3-1-4 SATRTRVL
NS3-1-5	NS3-1-5 SETU
NS3-1-6	NS3-1-6 LRRUS

SUBTOTAL

## SATELLITE POWER

NS4-1-1	NS4-1-1 25KW MOD
NS4-1-2	NS4-1-2 250KW MOD
NS4-1-3	NS4-1-3 2.1MW MOD

SUBTOTAL

TOTAL

NASA

PAGE

## OUTSIDE USERS (NON-NASA, NON-DOD)

## INTERNATIONAL COMMUNICATIONS

CC1-1-1	CC1-1-1 INTLSAT-5
CC1-1-2	CC1-1-2 INTLSAT-5
CC1-1-3	CC1-1-3 INTLSAT-6

SUBTOTAL

## US DOMESTIC COMMUNICATION

CC2-1-1	CC2-1-1 TDRS/WSTR
CC2-1-2	CC2-1-2 COMSTAR-1
CC2-1-3	CC2-1-3 COMSTAR-2
CC2-1-4	CC2-1-4 WESTAR
CC2-1-5	CC2-1-5 RCA STCM1
CC2-1-6	CC2-1-6 RCA STCM2
CC2-1-7	CC2-1-7 MARISAT
CC2-1-8	CC2-1-8 AM SAT CP
CC2-1-9	CC2-1-9 SBS-1
CC2-1-10	CC2-1-10SBS-2
CC2-1-11	CC2-1-11PBLG SVCE
CC2-1-12	CC2-1-12INGE XMSM
CC2-1-13	CC2-1-13HCVP BCST
CC2-1-14	CC2-1-14OTHER US

SUBTOTAL

## FOREIGN COMMUNICATION

CC3-1-1	CC3-1-1 ARCOMSAT1
CC3-1-2	CC3-1-2 ARCOMSAT2
CC3-1-4	CC3-1-4 ECS-1
CC3-1-5	CC3-1-5 ECS-2
CC3-1-6	CC3-1-6 MAROTS-1
CC3-1-7	CC3-1-7 MAROTS-2
CC3-1-8	CC3-1-8 TVBS-1
CC3-1-9	CC3-1-9 TVBS-2
CC3-1-10	CC3-1-10SYMPHNY-3
CC3-1-11	CC3-1-11ANSAT
CC3-1-12	CC3-1-12APPLE
CC3-1-13	CC3-1-13INSAT-1
CC3-1-14	CC3-1-14INSAT-2
CC3-1-16	CC3-1-16PALAPA-2
CC3-1-17	CC3-1-17IRAN-1
CC3-1-18	CC3-1-18IRAN-2
CC3-1-20	CC3-1-20SIRIO-2
CC3-1-21	CC3-1-21NORDSAT-1
CC3-1-22	CC3-1-22NORDSAT-2
CC3-1-23	CC3-1-23BRZLSAT-1
CC3-1-24	CC3-1-24BRZLSAT-2
CC3-1-26	CC3-1-26NATO 3-2
CC3-1-28	CC3-1-28ETS 4
CC3-1-30	CC3-1-30COMSAT-2
CC3-1-32	CC3-1-32BSE-2
CC3-1-33	CC3-1-33ECS
CC3-1-35	CC3-1-35TELESATC

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OTHER USERS (CONTINUED)

FOREIGN COMMUNICATION (CONT.)

CC3-1-36	CC3-1-36TELESATD1
CC3-1-37	CC3-1-37TELESATD
CC3-1-38	CC3-1-38UHF
CC3-1-39	CC3-1-39CDB
CC3-1-40	CC3-1-40OTHER RGL
SUBTOTAL	
ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN	
CO1-1-1	CO1-1-1 EMS
CO1-1-2	CO1-1-2 GOES-1
CO1-1-3	CO1-1-3 GOES-2
CO1-2-1	CO1-2-1 ALWEMIC
SUBTOTAL	
EARTH AND OCEAN MONITORING	
CO2-1-1	CO2-1-1 OP SEASAT
SUBTOTAL	
EARTH RESOURCES-US DOMESTIC AND FOREIGN	
CO3-1-1	CO3-1-1 GOVT LEO
CO3-1-2	CO3-1-2 PVT LEO
CO3-1-3	CO3-1-3 GOVT GEO
CO3-1-4	CO3-1-4 PVT GEO
CO3-2-1	CO3-2-1 SPOT-1
CO3-2-2	CO3-2-2 SPOT-2
CO3-2-3	CO3-2-3 ETS-3
CO3-2-4	CO3-2-4 EARTH OBS
CO3-2-5	CO3-2-5 ESA-GEO
CO3-2-6	CO3-2-6 OTHER GEO
SUBTOTAL	
WEATHER	
CO4-1-2	CO4-1-2 TIROS-2
CO4-1-3	CO4-1-3 NOAA
CO4-2-2	CO4-2-2 METEOSAT2
CO4-2-4	CO4-2-4 GMS-2
CO4-2-5	CO4-2-5 OTHER
SUBTOTAL	
US DOMESTIC	
CP1-1-1	CP1-1-1 MLTPR P/L
SUBTOTAL	
FOREIGN	
CP2-1-3	CP2-1-3 EXOSAT
CP2-1-5	CP2-1-5 IRAS
CP2-1-6	CP2-1-6 FRENCH SC
CP2-1-7	CP2-1-7 EUROPE SC
CP2-1-8	CP2-1-8 CANADA SC
CP2-1-14	CP2-1-14ASTRO A
CP2-1-15	CP2-1-15ASTRO B
CP2-1-16	CP2-1-16JAPAN SC
SUBTOTAL	
PAGE	
OTHER USERS (CONTINUED)	
DISASTER WARNING	
CS1-1-1	CS1-1-1 DSATR WRG
SUBTOTAL	
TRAFFIC MANAGEMENT	
CS2-1-1	CS2-1-1 INHARSAT1
CS2-1-2	CS2-1-2 INHARSAT2
CS2-1-3	CS2-1-3 INATSAT
SUBTOTAL	
SPACE MANUFACTURING-US DOMESTIC AND FOREIGN	
CS3-1-1	CS3-1-1 SPRD

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 OF POOR QUALITY

CS3-1-2	CS3-1-2 CMDEV
CS3-1-3	CS3-1-3 CMDEPLOY
CS3-1-4	CS3-1-4 CMSVCNG
CS3-2-1	CS3-2-1 SERD
CS3-2-2	CS3-2-2 CMDEV
CS3-2-3	CS3-2-3 CMDEPLOY
CS3-2-4	CS3-2-4 CMSVCNG
CS3-2-5	CS3-2-5 SPACELAB
SUBTOTAL	

USERS TOTAL  
OUTSIDE

ALL PROGRAMS  
TOTAL

ORIGINAL PAGE 15  
OF FOUR QUARTS

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Appendix VI

Spacecraft Design Model (SDM)

LANDSAT F/0 ND1-1-1

\*\*\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1\*\*\*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .200000 (DFG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 9660 (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = C. (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPT TABLE	32.	0.
NUMBER OF COMMANDS	64.	128.
NUMBER OF MAIN FRAME WORDS	16.	100.
MAIN FRAME SAMPLE RATE	8.	3.
MAIN FRAME WORD LENGTH	4.	2.
NUMBER OF SUBFRAMES	1250	1.0000
SUBFRAME RATE	64.	64.
NUMBER OF WORDS PER SUBFRAME		

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 508.84 WATTS  
 TOTAL SOLAR ARRAY AREA 107.26 SQ FT  
 INSTALLED BATTERY CAPACITY 34.00 AMP-HR  
 BEGINNING OF LIFE POWER 1321.16 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 NET SATELLITE WEIGHT = 1718.7 LBS ( 779.6 KG) LAUNCH WEIGHT = 1784.3 LBS ( 809.3 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 32.1 IN. ( .82 M) 53.5 IN. ( 1.36 M) 53.5 IN. ( 1.36 M)  
 MISSION EQUIPMENT 32.1 IN. ( .82 M) 53.6 IN. ( 1.36 M) 53.6 IN. ( 1.36 M)  
 TOTAL SATELLITE 64.3 IN. ( 1.63 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 262.1 IYY = 779468.2 IZZ = 1438099.2  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 38.2 IN. ( .97 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 400. / 400. / 98.7  
 MISSION LIFETIME 24.0 (MO)  
 MEAN MISSION DURATION 20.7 (MO)  
 RELIABILITY .1706

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LANDSAT F/D NO1-1-1

\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 1 1  
 WEIGHT 37.90 LBS VOLUME 1.18(FT\*\*3) POWER REQUIREMENT 78.9 WATT  
 RELIABILITY .9707  
 IERR 10

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 816 834 906 1003 499 203 1116 503 701 1203 603  
 EQUIPMENT QUANTITIES 12 4 5 9 1 1 1 1  
 WEIGHT 100.17 LBS VOLUME 4.20(FT\*\*3) POWER REQUIREMENT .3 WATT  
 DRY WEIGHT 53.23(LBS), EXPENDABLE WEIGHT 54.93(LBS)  
 RELIABILITY .9596  
 IERR 10

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 263 345 403  
 EQUIPMENT QUANTITIES 1 1 2 1  
 WEIGHT 63.71 LBS VOLUME 1.29(FT\*\*3) POWER REQUIREMENT 63.5 WATT  
 RELIABILITY .9136  
 IERR 2

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312  
 EQUIPMENT QUANTITIES 2 1 2 1 2 1 2  
 WEIGHT 23.62 LBS VOLUME .28(FT\*\*3) POWER REQUIREMENT 35.4 WATT  
 RELIABILITY .9875  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 406 515 233 609 702  
 EQUIPMENT QUANTITIES 2 12 2 2 1  
 WEIGHT 117.08 LBS VOLUME 1.60(FT\*\*3) POWER DISSIPATION 669.9 WATT  
 HARNESS WEIGHT 71.6(LBS), SOLAR ARRAY WEIGHT 74.7(LBS)  
 RELIABILITY .9336

MISSION EQUIPMENT  
 WEIGHT 1060.00 LBS VOLUME 41.90(FT\*\*3) POWER REQUIREMENT 240.0 WATT  
 RELIABILITY .9000

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LANDSAT F/O NO1-1-1

\*\*\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	20.1 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	1948.6 (BTU/HR),	TOTAL RADIATOR AREA	21.0 (FT**2)
HEAT PIPE	2 (148.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.0 (FT)	TOTAL HEATER POWER	2038.6 (BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	650.7 (WATT-IN)
		AVERAGE HEAT LOAD	1425.4 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		11.5
HEAT PIPES		4.2
PHASE CHANGE MATERIAL		2.9
RADIATOR (PASSIVE)		12.7
	TOTAL	31.3

IERR 1111011011

STRUCTURES			
SKIN THICKNESS	.019 (IN)		
STRINGER NO., THICKNESS, HT.	156. ,	3821.042 (IN),	.364 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.104 (IN),	.522 (IN)
GRID BEAM THICKNESS	.166 (IN),	SPACING 4.675 (IN),	HEIGHT 2.337 (IN)
ENCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	71.4 (LBS)		
SOLAR ARRAY BOOM AND CRIVL WT.	27.6 (LBS)		
ADAPTER WEIGHT	65.6 (LBS)		

LANDSAT F/O NO1-1-1

\*\*\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	FEACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	16.5	1.6	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	2	16.6	.4	25.0
403	COMM D:COD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

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LANDSAT F/O NO1-1-1

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	12	2.3	.0	0.0
233	BATTERY	2	26.7	.1	0.0
609	BATTERY CHARGER	2	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1060.0
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	53.2
DATA PROCESSING	63.7
COMMUNICATIONS	23.6
BATTERIES	53.5
POWER CONTROL	63.6
SOLAR ARRAY	74.7
HARNESS	71.6
STRUCTURE	118.2
SOLAR ARRAY DRIVE	12.4
THERMAL CONTROL	31.3
DFY WEIGHT	1663.8
PROPELLANT	54.9
SATELLITE ADAPTER	65.6
-----	
TOTAL LAUNCH WEIGHT	1784.3

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EARTH SURVEY SAT NO1-1-2

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .30000 (DFG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 4830. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	129.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	4.	2.
SUBFRAME RATE	64.	1.0000
NUMBER OF WORDS PER SUBFRAME	1250	64.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 129.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 458.84 WATTS  
 TOTAL SOLAR ARRAY AREA 93.64 SQ FT  
 INSTALLED BATTERY CAPACITY 30.00 AMP-HR  
 BEGINNING OF LIFE POWER 1153.39 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 930.4 LBS ( 422.0 KG) LAUNCH WEIGHT = 966.2 LBS ( 438.2 K  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 31.3 IN. ( .80 M) 52.2 IN. ( 1.33 M) 52.2 IN. ( 1.33 M)  
 MISSION EQUIPMENT 23.2 IN. ( .59 M) 38.7 IN. ( .98 M) 38.7 IN. ( .98 M)  
 TOTAL SATELLITE 54.5 IN. ( 1.39 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 167.8 IYY = 376264.0 IZZ = 876389.1  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 30.4 IN. ( .77 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APJGEE/PERIGEE/INCLINATION 486./ 486./100.0  
 MISSION LIFETIME 24.0 (MO)  
 MEAN MISSION DURATION 20.17 (MO)  
 RELIABILITY .1706

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EARTH SURVEY SAT NO1-1-2

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 1 1  
 WEIGHT 37.90 LBS VOLUME 1.18 (FT\*\*3)  
 RELIABILITY .9707  
 IERR 10

POWER REQUIREMENT 78.9 WATT

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1112  
 EQUIPMENT QUANTITIES 12 4 5 9 1 1 1  
 WEIGHT 61.72 LBS VOLUME 3.16 (FT\*\*3)  
 DRY WEIGHT 34.27 (LBS), EXPENDABLE WEIGHT  
 RELIABILITY .9560  
 IERR 10

503 701 1203 603  
 1 2 1 1  
 POWER REQUIREMENT .3 WATT  
 27.45 (LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 2 1  
 WEIGHT 62.71 LBS VOLUME 1.29 (FT\*\*3)  
 RELIABILITY .9136  
 IERR 2

POWER REQUIREMENT 63.5 WATT

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227  
 EQUIPMENT QUANTITIES 2 1 2 1 2 1 2  
 WEIGHT 23.62 LBS VOLUME .28 (FT\*\*3)  
 RELIABILITY .9875  
 IERR\*\*\*\*\*

312  
 2  
 POWER REQUIREMENT 35.4 WATT

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 515 227 609 702  
 EQUIPMENT QUANTITIES 2 11 2 2 1  
 WEIGHT 106.85 LBS VOLUME 2.00 (FT\*\*3)  
 HARNESS WEIGHT 41.3 (LBS), SOLAR ARRAY WEIGHT.  
 RELIABILITY .9369

POWER DISSIPATION 570.2 WATT  
 65.2 (LBS)

MISSION EQUIPMENT

WEIGHT 400.00 LBS VOLUME 15.83 (FT\*\*3)  
 RELIABILITY .9000

POWER REQUIREMENT 190.0 WATT

VI-7



EARTH SURVEY SAT NO1-1-2

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	16.5 (FT**2),	BATTERY RADIATOR AREA	.7 (FT**2)
HEATER POWER	1588.8 (BTU/HR),	TOTAL RADIATOR AREA	17.3 (FT**2)
HEAT PIPE	1.5053.7 (WATT-IN),	BATTERY HEATER POWER	66.6 (BTU/HR)
HEAT PIPE LENGTH	3.4 (FT)	TOTAL HEATER POWER	1655.3 (BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	552.2 (WATT-IN)
		AVERAGE HEAT LOAD	1254.9 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		10.2
HEAT PIPES		3.6
PHASE CHANGE MATERIAL		2.9
RADIATOR (PASSIVE)		10.5
	TOTAL	27.1

IERR 1111011011

STRUCTURES			
SKIN THICKNESS	.014 (IN)		
STIFFER NO., THICKNESS, HT.	179. ,	4034.933 (IN),	.307 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.088 (IN),	.441 (IN)
GRID BEAM THICKNESS	.122 (IN),	SPACING 3.425 (IN),	HEIGHT 1.712 (IN)
ENCLOSER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	60.3 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	26.0 (LBS)		
ADAPTER WEIGHT	35.8 (LBS)		

8-1A

EARTH SURVEY SAT NO1-1-2

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBLR 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELCTRNCS	2	7.1	.1	62.0
1815	EARTH SENSRLR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
819	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1112	TANK	1	2.7	.6	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	2	16.8	.4	25.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

6-1A

EARTH SURVEY SAT M01-1-2

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	11	2.3	.0	0.0
227	BATTERY	2	23.6	.3	0.0
609	BATTERY CHARGER	2	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	400.0
STABILITY AND CONTROL	37.4
AUXILIARY PROPULSION	34.3
DATA PROCESSING	63.7
COMMUNICATIONS	23.6
BATTERIES	47.5
POWER CONTROL	61.3
SOLAR ARRAY	65.2
HARNESS	41.3
STRUCTURE	90.1
SOLAR ARRAY DRIVE	10.8
THERMAL CONTROL	27.1
DRY WEIGHT	902.9
PROPELLANT	27.4
SATELLITE ADAPTER	35.8
	-----
TOTAL LAUNCH WEIGHT	966.2

VI-10

SYNCH EARTH CBS SAT (SEOS) NO1-1-3

\* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .200000 (D.F.G.)

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 TOTAL IMPULSE = 19256. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = C. (TPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	6.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	32.	64.

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 653.84 WATTS  
 TOTAL SOLAR ARRAY AREA 90.14 SQ FT  
 INSTALLED BATTERY CAPACITY 160.00 AMP-HR  
 BEGINNING OF LIFE PLWER 1147.67 WATTS

VEHICLE SIZING  
 CONFIGURATION - - CYLINDER  
 WET SATELLITE WEIGHT = 1917.2 LBS ( 824.3 KG) LAUNCH WEIGHT = 1884.4 LBS ( 854.8 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 36.3 IN. ( .92 M) 60.6 IN. ( 1.54 M) 60.6 IN. ( 1.54 M)  
 MISSION EQUIPMENT 30.5 IN. ( .78 M) 50.9 IN. ( 1.29 M) 50.9 IN. ( 1.29 M)  
 TOTAL SATELLITE 66.9 IN. ( 1.70 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 274.1 IYY = 989101.9 IZZ = 1500027.7  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 37.7 IN. ( .96 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION - - SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 24.0 (MO)  
 MEAN MISSION DURATION 21.3 (MO)  
 RELIABILITY .718

11-11

SYNCH EARTH OBS SAT (SEOS) NO1-1-3

\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 1 1  
 WEIGHT 37.90 LBS VOLUME 1.18(FT\*\*3)  
 RELIABILITY .9707  
 TERR 10

POWER REQUIREMENT 78.9 WATT

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 816 834 907 1003 499 203 1124  
 EQUIPMENT QUANTITIES 12 4 5 9 1 1 1  
 WEIGHT 159.21 LBS VOLUME 5.37(FT\*\*3)  
 DRY WEIGHT 50.53(LBS), EXPENDABLE WEIGHT  
 RELIABILITY .9049  
 TERR 0

506 701 1203 603  
 1 2 1 1  
 POWER REQUIREMENT .3 WATT  
 108.68(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 3 1  
 WEIGHT 80.51 LBS VOLUME 1.67(FT\*\*3)  
 RELIABILITY .9770  
 TERR 2

POWER REQUIREMENT 63.5 WATT

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1 1  
 WEIGHT 37.42 LBS VOLUME 1.68(FT\*\*3)  
 RELIABILITY .9862  
 TERR\*\*\*\*\*

POWER REQUIREMENT 35.4 WAT

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 414 515 269 650 702  
 EQUIPMENT QUANTITIES 2 11 2 2 1  
 WEIGHT 215.85 LBS VOLUME 2.50(FT\*\*3)  
 HARNESS WEIGHT 77.7(LBS), SOLAR ARRAY WEIGHT  
 RELIABILITY .9421

POWER DISSIPATION 136.6 WAT  
 62.8(LBS)

MISSION EQUIPMENT

WEIGHT 910.00 LBS VOLUME 35.97(FT\*\*3)  
 RELIABILITY .9000

POWER REQUIREMENT 560.0 WAT

VI-12

SYNCH EARTH OBS SAT (SEOS) NO1-1-3

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	25.2 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	2355.9 (BTU/HR),	TOTAL RADIATOR AREA	26.1 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.2 (FT)	TOTAL HEATER POWER	2445.9 (BTU/HR)
STORED ENERGY	123.7 (BTU)	VARIABLE CONDUCTANCE H.P.	677.3 (WATT-IN)
		AVERAGE HEAT LOAD	2516.6 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	12.8
HEAT PIPES	4.4
PHASE CHANGE MATERIAL	3.1
RADIATOR (ACTIVE)	56.0
TOTAL	76.3

IERR 11C0001011

STRUCTURES

SKIN THICKNESS	.019 (IN)		
STRINGER NO., THICKNESS, HT.	164,	81910.347 (IN),	.390 (IN)
FRAME NO., THICKNESS, HT.	5,	.112 (IN),	.560 (IN)
GRID BEAM THICKNESS	.169 (IN),	SPACING 4.757 (IN),	HEIGHT 2.379 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	107.8 (LBS)		
SOLAR ARRAY BOOM AND CRIVE WT.	25.6 (LBS)		
ADAPTER WEIGHT	67.3 (LBS)		

VI-13

SYNCH EARTH OBS SAT (SEOS). NO1-1-3

\* \* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1615	EARTH SENSOR	1	12.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	3	2.3	.0	15.0

VI-14

SYNCH EARTH OBS SAT (SEOS) NO1-1-3

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
414	DISCHGE REGULATOR	2	9.7	.2	9.0
515	SHUNT REGULATOR	11	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	910.0
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	50.5
DATA PROCESSING	80.5
COMMUNICATIONS	37.4
BATTERIES	142.6
POWER CONTROL	73.3
SOLAR ARRAY	62.8
HARNESS	77.7
STRUCTURE	149.1
SOLAR ARRAY DRIVE	10.4
THERMAL CONTROL	76.3
OPY WEIGHT	1708.5
PROPELLANT	108.7
SATELLITE ADAPTER	67.3

TOTAL LAUNCH WEIGHT 1884.4

V1-15



GRAVSAT NO1-1-4

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- THREE AXIS MASS EXPULSION  
 POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 87058. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0.1 (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPI TABLE		
NUMBER OF COMMANDS	64.	0.
NUMBER OF MAIN FRAME WORDS	64.	0.
MAIN FRAME SAMPLE RATE	100.	0.
MAIN FRAME WORD LENGTH	13.	0.
NUMBER OF SUBFRAMES	5.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 128.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 146.94 WATTS  
 TOTAL SOLAR ARRAY AREA 59.48 SQ FT  
 INSTALLED BATTERY CAPACITY 8.00 AMP-HR  
 BEGINNING OF LIFE POWER 351.85 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 1630.3 LBS ( 739.5 KG) LAUNCH WEIGHT = 1694.0 LBS ( 768.4 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 57.2 IN. ( 1.45 M) 95.3 IN. ( 2.42 M) 95.3 IN. ( 2.42 M)  
 MISSION EQUIPMENT 19.2 IN. ( .49 M) 32.0 IN. ( .81 M) 32.0 IN. ( .81 M)  
 TOTAL SATELLITE 76.4 IN. ( 1.94 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 421.4 IYY = 1633230.3 IZZ = 1633230.3  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 31.7 IN. ( .80 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 160.1/ 160.1/ 90.0  
 MISSION LIFETIME 6.0 (MO)  
 MEAN MISSION DURATION 5.6 (MO)  
 RELIABILITY .945

VI-16

GRAVSAT NO1-1-4

\*\*\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1\*\*\*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION - - THREE AXIS MASS EXPULSION  
 EQUIPMENT CODE IDENTIFIER 1501 1601 1413 1718 1803  
 EQUIPMENT QUANTITIES 1 2 1 1 1  
 WEIGHT 53.30 LBS VOLUME 1.23(FT\*\*3) POWER REQUIREMENT 56.0 WATT  
 RELIABILITY .9743  
 TERR 0

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1015 499 203 1118 536 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 7 1 1 1 1  
 WEIGHT 779.77 LBS VOLUME 15.92(FT\*\*3) POWER REQUIREMENT 1.0 WATT  
 DRY WEIGHT 241.89(LBS), EXPENDABLE WEIGHT 537.88(LBS)  
 RELIABILITY .982  
 TERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 406  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 19.93 LBS VOLUME .28(FT\*\*3) POWER REQUIREMENT 8.5 WATT  
 RELIABILITY .9928  
 TERR 1

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 1 1 2 1  
 WEIGHT 14.87 LBS VOLUME .19(FT\*\*3) POWER REQUIREMENT 9.5 WATT  
 RELIABILITY .9913  
 TERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 204 303 1202  
 EQUIPMENT QUANTITIES 6 2 2 1  
 WEIGHT 60.90 LBS VOLUME 1.31(FT\*\*3) POWER DISSIPATION 187.0 WATT  
 HARNESS WEIGHT 84.8(LBS), SOLAR ARRAY WEIGHT 29.2(LBS)  
 RELIABILITY .9905

MISSION EQUIPMENT  
 WEIGHT 225.00 LBS VOLUME 8.91(FT\*\*3) POWER REQUIREMENT 60.0 WATT  
 RELIABILITY .9000

VI-17

GRAVSAT N01-1-4

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	6.2 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER,	567.0 (BTU/HR),	TOTAL RADIATOR AREA	7.4 (FT**2)
HEAT PIPE	8310.3 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.8 (FT)	TOTAL HEATER POWER	682.0 (BTU/HR)
STORED ENERGY	97.6 (BTU)	VARIABLE CONDUCTANCE H.P.	988.2 (WATT-IN)
		AVERAGE HEAT LOAD	494.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	19.9
HEAT PIPES	5.0
PHASE CHANGE MATERIAL	2.4
RADIATOR (PASSIVE)	3.9
TOTAL	31.3

IERR 1111011011

STRUCTURES			
SKIN THICKNESS	.018 (IN)		
STRINGER NO., THICKNESS, HI.	211. ,	3184.862 (IN),	.476 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.137 (IN),	.684 (IN)
GRID BEAM THICKNESS	.160 (IN),	SPACING 4.504 (IN),	HEIGHT 2.252 (IN)
ENCLOSER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	253.7 (LBS)		
SOLAR ARRAY BODY AND DRIVE WT.	15.2 (LBS)		
ADAPTER WEIGHT	63.7 (LBS)		

VI-18

## GRAVSAT N01-1-4

\* \* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

## STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1501	CONTROL ELECT.	1	10.0	.1	4.0
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0
1718	PATE INTEGE GYRO	1	9.6	.2	32.0
1803	FARTH SENSOR	1	14.6	.2	19.0

## AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1015	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
2G3	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	7	10.2	1.3	0.0
536	TANK	1	110.0	4.5	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

## DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
406	COMMD DECOD+DISTR	1	11.0	.1	5.5

## COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-19

GRAVSAT NO1-1-4

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	6	4.2	.1	0.0
204	BATTERY	2	8.6	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	225.6
STABILITY AND CONTROL	43.3
AUXILIARY PROPULSION	241.9
DATA PROCESSING	19.9
COMMUNICATIONS	14.9
BATTERIES	17.2
POWER CONTROL	43.7
CONVERTERS	10.0
SOLAR ARRAY	29.2
HARNESS	84.8
STRUCTURE	331.3
THERMAL CONTROL	31.3
DRY WEIGHT	1092.4
PROPELLANT	537.9
SATELLITE ADAPTER	63.7
<hr/>	
TOTAL LAUNCH WEIGHT	1694.0

VI-20

MAGSAT-B NO1-1-5

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .500000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 6055 (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU,  
COMPUTER OPERATIONS RATE = 0. (IPS)

COPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 81.51 WATTS  
TOTAL SOLAR ARRAY AREA 60.59 SQ FT  
INSTALLED BATTERY CAPACITY 6.00 AMP-HR.  
BEGINNING OF LIFE POWER 184.80 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 433.1 LBS ( 196.4 KG) LAUNCH WEIGHT = 450.9 LBS ( 204.5 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 40.8 IN. ( 1.04 M) 68.0 IN. ( 1.73 M) 68.0 IN. ( 1.73 M)  
MISSION EQUIPMENT 12.8 IN. ( .32 M) 21.3 IN. ( .54 M) 21.3 IN. ( .54 M)  
TOTAL SATELLITE 53.6 IN. ( 1.36 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 55.6 IYY = 252242.6 IZZ = 252242.6  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 28.6 IN. ( .73 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 297.7 297.7 96.0  
MISSION LIFETIME 12.0 (MO)  
MEAN MISSION DURATION 10.8 (MO)  
RELIABILITY .738

VI-21

MAGSAT-B NO1-1-5

◆ ◆ SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 ◆ ◆ ◆ ◆

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 32.05 LBS VOLUME 1.29(FT\*\*3) POWER REQUIREMENT 10.4 WATT  
 RELIABILITY .9636  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1116 506 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 4 0 1 1 1 1 1 1 1  
 WEIGHT 89.43 LBS VOLUME 3.80(FT\*\*3) POWER REQUIREMENT 1.0 WATT  
 DRY WEIGHT 53.03(LBS), EXPENDABLE WEIGHT 36.40(LBS)  
 RELIABILITY .9078  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATT  
 RELIABILITY .9933  
 IERR 1

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 13.37 LBS VOLUME .17(FT\*\*3) POWER REQUIREMENT 19.5 WATT  
 RELIABILITY .9565  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 202 303 1202  
 EQUIPMENT QUANTITIES 3 2 2 1  
 WEIGHT 50.07 LBS VOLUME 1.05(FT\*\*3) POWER DISSIPATION 90.3 WATT  
 HARNESS WEIGHT 21.1(LBS), SOLAR ARRAY WEIGHT 29.8(LBS)  
 RELIABILITY .9862

MISSION EQUIPMENT

WEIGHT 66.00 LBS VOLUME 2.62(FT\*\*3) POWER REQUIREMENT 40.0 WATT  
 RELIABILITY .9000

VI-22

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	3.6 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	299.9(BTU/HR),	TOTAL RADIATOR AREA	4.9 (FT**2)
HEAT PIPE LENGTH	0.0(WATT-IN),	BATTERY HEATER POWER	122.2(BTU/HR)
HEAT PIPE LENGTH	3.3 (FT)	TOTAL HEATER POWER	422.1(BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	693.1(WATT-IN)
		AVERAGE HEAT LOAD	278.0 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	12.0
HEAT PIPES	3.5
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	2.3
TOTAL	19.5

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.009 (IN)			
STRINGER NO., THICKNESS, HT.	253.	3558.384 (IN),		.284 (IN)
FRAME NO., THICKNESS, HT.	5.	.081 (IN),		.407 (IN)
GRID BEAM THICKNESS	.080 (IN),	SPACING 2.240 (IN),	HEIGHT	1.120 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	57.1 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	17.8 (LBS)			

V1-23



MAGSAT-B NO1-1-5

ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	1	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	0.5
306	TRANSMITTER	1	2.1	.0	10.5
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	0.5
603	DIPLEXER	1	3.1	.0	1.0

VI-24

MAGSAT-B N01-1-5

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	3	4.2	.1	0.0
202	BATTERY	2	9.5	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	66.0
STABILITY AND CONTROL	16.2
AUXILIARY PROPULSION	53.0
DATA PROCESSING	21.2
COMMUNICATIONS	13.4
BATTERIES	19.0
POWER CONTROL	31.1
CONVERTERS	15.9
SOLAR ARRAY	29.8
HARNESS	21.1
STRUCTURE	90.5
THERMAL CONTROL	19.5
DRY WEIGHT	396.7
PROPELLANT	36.4
SATELLITE ADAPTER	17.8
	-----
TOTAL LAUNCH WEIGHT	450.9

V1-25

SPECIAL MULTISPEC IMAG/ANAL SYST (SMIAS) NO1-1-6

SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 52857. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS  
 NUMBER OF MAIN FRAME WORDS  
 MAIN FRAME SAMPLE RATE  
 MAIN FRAME WORD LENGTH  
 NUMBER OF SUBFRAMES  
 SUBFRAME RATE  
 NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
 64.  
 16.  
 8.  
 3.  
 1.0000  
 32.

MISSION EQUIPMENT DATA

0.  
 128.  
 100.  
 8.  
 2.  
 1.0000  
 64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE-MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 742.18 WATTS  
 TOTAL SOLAR ARRAY AREA 83.91 SQ FT  
 INSTALLED BATTERY CAPACITY 100.00 AMP-HR  
 BEGINNING OF LIFE POWER 1068.41 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 2142.8 LBS ( 972.0 KG) LAUNCH WEIGHT = 2223.3 LBS ( 1008.5 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 40.6 IN. ( 1.03 M) 67.6 IN. ( 1.72 M) 67.6 IN. ( 1.72 M)  
 MISSION EQUIPMENT 31.5 IN. ( .80 M) 52.5 IN. ( 1.33 M) 52.5 IN. ( 1.33 M)  
 TOTAL SATELLITE 72.1 IN. ( 1.83 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 357.9 IYY = 1454584.4 IZZ = 1939704.0  
 CENTER OF GRAVITY X-CG 39.4 IN. ( 1.00 M) Y-CG 0.0 IN. ( 0.00 M) Z-CG 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
 APGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 36.0 (MO)  
 MEAN MISSION DURATION 31.9 (MO)  
 RELIABILITY .9713

VI-26

346

SPECIAL MULTISPEC IMAG/ANAL SYST (SMIAS) NO1-1-6

\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1303					
EQUIPMENT QUANTITIES	2	2	2	2					
WEIGHT	56.40 LBS				VOLUME	1.77(FT**3)	POWER REQUIREMENT	78.9 WATT	
RELIABILITY			.9946						
IERR	10								

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	818	834	907	1003	499	203	1130	511	701	1203	603
EQUIPMENT QUANTITIES	18	6	5	9	2	1	2	1	2	1	1
WEIGHT	390.92 LBS				VOLUME	10.46(FT**3)	POWER REQUIREMENT	0.3 WATT			
DRY WEIGHT	92.60(LBS)				EXPENDABLE WEIGHT	298.32(LBS)					
RELIABILITY			.9050								
IERR	1										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	203	403
EQUIPMENT QUANTITIES	1	1	1
WEIGHT	30.11 LBS		
RELIABILITY		.9700	
IERR	2		
		VOLUME	.54(FT**3)
		POWER REQUIREMENT	13.5 WATT

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	202	103	306	401	503	603	202	312
EQUIPMENT QUANTITIES	1	1	2	2	3	1	1	2
WEIGHT	42.84 LBS				VOLUME	1.75(FT**3)	POWER REQUIREMENT	35.4 WATT
RELIABILITY			.9897					
IERR	*****							

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	412	515	269	650	702			
EQUIPMENT QUANTITIES	2	10	2	2	1			
WEIGHT	226.98 LBS				VOLUME	2.74(FT**3)	POWER DISSIPATION	125.3 WATT
HARNESS WEIGHT		92.9(LBS)			SOLAR ARRAY WEIGHT	58.4(LBS)		
RELIABILITY		.9167						

MISSION EQUIPMENT

WEIGHT	1000.00 LBS	VOLUME	39.53(FT**3)	POWER REQUIREMENT	500.0 WATT
RELIABILITY		.9000			

V1-27

SPECIAL MULTISPEC IMAG/ANAL SYST (SMIAS) NO1-1-6

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	21.4 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER,	2027.4 (BTU/HR),	TOTAL RADIATOR AREA	22.4 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.5 (FT)	TOTAL HEATER POWER	2117.4 (BTU/HR)
STORED ENERGY	106.7 (BTU)	VARIABLE CONDUCTANCE H.P.	730.1 (WATT-IN)
		AVERAGE HEAT LOAD	2141.5 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		14.6
HEAT PIPES		4.7
PHASE CHANGE MATERIAL		2.7
RADIATOR (PASSIVE)		13.6
	TOTAL	35.6

IERR 11C0001011

STRUCTURES			
SKIN THICKNESS	.021 (IN)		
STIFFER NO., THICKNESS, HT.	165. ,	81910.347 (IN),	.433 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.124 (IN),	.621 (IN)
GRID BEAM THICKNESS	.186 (IN),	SPACING 5.236 (IN),	HEIGHT 2.618 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT RAY STRUCTURE WT.	151.7 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	24.9 (LBS)		
ADAPTER WEIGHT	80.5 (LBS)		

VI-28

SPECIAL MULTISPEC IMAG/ANAL SYST (SMIAS) NO1-1-6

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTRCL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	4.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
618	THRUSTER	16	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
511	TANK	1	11.5	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMND DECCD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	PASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-29

SPECIAL MULTISPEC IMAG/ANAL SYST (SMIAS) NO1-1-6

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
412	DISCHGE REGULATOR	2	16.4	.4	0.0
515	SHUNT REGULATOR	10	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1000.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	92.6
DATA PROCESSING	30.1
COMMUNICATIONS	42.0
BATTERIES	142.6
POWER CONTROL	64.4
SOLAR ARRAY	58.4
HARNESS	92.9
STRUCTURE	196.9
SOLAR ARRAY DRIVE	9.7
THERMAL CONTROL	35.6
DRY WEIGHT	1844.5
PROPELLANT	298.3
SATELLITE ADAPTER	80.5
	-----
TOTAL LAUNCH WEIGHT	2223.3

V1-38

HEAT CAP MAP MISSION F/O (HCMM) NO1-1-7

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .300000 (DFG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 48053. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPT TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	32.	64.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 726.58 WATTS  
 TOTAL SOLAR ARRAY AREA 82.15 SQ FT  
 INSTALLED BATTERY CAPACITY 100.00 AMP-HR  
 BEGINNING OF LIFE PLWER 1045.95 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 2170.0 LBS ( 984.3 KG) LAUNCH WEIGHT = 2251.6 LBS ( 1021.3 KG)

	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	41.0 IN. ( 1.04 M)	68.4 IN. ( 1.74 M)	68.4 IN. ( 1.74 M)
MISSION EQUIPMENT	31.5 IN. ( .80 M)	52.5 IN. ( 1.33 M)	52.5 IN. ( 1.33 M)
TOTAL SATELLITE	72.6 IN. ( 1.84 M)		

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 363.0 IYY = 1491167.9 IZZ = 1962455.5  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 39.5 IN. ( 1.00 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 36.0 (MO)  
 MEAN MISSION DURATION 31.5 (MO)  
 RELIABILITY .721

V1-31



HEAT CAP MAP MISSION F/O (HCMM) NO1-1-7

\* \* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1303				
EQUIPMENT QUANTITIES	2	2	1	2				
WEIGHT	43.00 LBS				VOLUME	1.24 (FT**3)	POWER REQUIREMENT	78.9 WATT
RELIABILITY		.9675						
IERR	10							

AUXILIARY PROPULSION

CONFIGURATION - - NONPROPELLANT

EQUIPMENT CODE IDENTIFIER	818	834	907	1003	499	203	1130	509	701	1203	603
EQUIPMENT QUANTITIES	18	6	5	9	2	1	2	1	2	1	1
WEIGHT	369.24 LBS				VOLUME	10.45 (FT**3)	POWER REQUIREMENT	.3 WATT			
DRY WEIGHT	98.03 (LBS)				EXPENDABLE WEIGHT		271.21 (LBS)				
RELIABILITY		.9468									
IERR	1										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	203	345	403				
EQUIPMENT QUANTITIES	1	1	3	1				
WEIGHT	80.51 LBS				VOLUME	1.67 (FT**3)	POWER REQUIREMENT	63.5 WATT
RELIABILITY		.9637						
IERR	2							

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	202	103	306	401	503	603	202	312
EQUIPMENT QUANTITIES	1	1	2	2	3	1	1	2
WEIGHT	42.84 LBS				VOLUME	1.75 (FT**3)	POWER REQUIREMENT	35.4 WATT
RELIABILITY		.9897						
IERR	*****							

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	412	515	269	650	702			
EQUIPMENT QUANTITIES	2	10	2	2	1			
WEIGHT	226.98 LBS				VOLUME	2.74 (FT**3)	POWER DISSIPATION	122.7 WATT
HARNESS WEIGHT		103.3 (LBS)			SOLAR ARRAY WEIGHT	57.2 (LBS)		
RELIABILITY		.9167						

MISSION EQUIPMENT

WEIGHT	1000.00 LBS	VOLUME	39.53 (FT**3)	POWER REQUIREMENT	425.0 WATT
RELIABILITY	.9000				

VI-32

HEAT CAP MAP MISSION F/O (HCKM) NO1-1-7

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	20.6 (FT**2)	BATTERY RADIATOR AREA	0.9 (FT**2)
HEATER POWER.	1944.1 (BTU/HR)	TOTAL RADIATOR AREA	21.5 (FT**2)
HEAT PIPE	0.0 (WATT-IN)	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.5 (FT)	TOTAL HEATER POWER	2034.1 (BTU/HR)
STORED ENERGY	115.2 (BTU)	VARIABLE CONDUCTANCE H.P.	734.8 (WATT-IN)
		AVERAGE HEAT LOAD	2056.3 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	14.8
HEAT PIPES	4.8
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	13.0
TOTAL	35.5

IERR 110001011

STRUCTURES

SKIN THICKNESS	.021 (IN)		
STRINGER NO., THICKNESS, HT.	166. ,	81910.347 (IN),	.436 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.125 (IN),	.626 (IN)
GRID BEAM THICKNESS	.187 (IN),	SPACING 5.267 (IN),	HEIGHT 2.634 (IN)
ENCLOSURE THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	154.4 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	24.7 (LBS)		
ADAPTER WEIGHT	81.6 (LBS)		

VI-33

HEAT CAP MAP MISSION F/O (HCMM) NO1-1-7

\* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTRCL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-54

HEAT CAP MAP MISSION F/O (HCMM) NO1-1-7

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
412	DISCHGE REGULATOR	2	16.4	.4	0.0
515	SHUNT REGULATOR	10	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1000.0
STABILITY AND CONTRL	43.0
AUXILIARY PROPULSION	96.0
DATA PROCESSING	60.5
COMMUNICATIONS	42.8
BATTERIES	142.6
POWER CONTROL	64.4
SOLAR ARRAY	57.2
HARNESS	103.3
STRUCTURE	202.0
SOLAR ARRAY DRIVE	9.5
THERMAL CONTRL	35.5
DRY WEIGHT	1898.8
PROPELLANT	271.2
SATELLITE ADAPTER	81.6

TOTAL LAUNCH WEIGHT 2251.6

VI-35

STEREOSAT NG1-1-8

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1\*\*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .300000 (DFG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 2794. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0.1 (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPI TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	32.	128.
MAIN FRAME SAMPLE RATE	125.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	2.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	64.	64.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 343.54 WATTS  
 TOTAL SOLAR ARRAY AREA 142.06 SQ FT  
 INSTALLED BATTERY CAPACITY 14.00 AMP-HR  
 BEGINNING OF LIFE POWER 840.29 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 897.6 LBS ( 407.2 KG) LAUNCH WEIGHT = 948.1 LBS ( 430.1 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 108.5 IN. ( 2.76 M) 120.0 IN. ( 3.05 M) 120.0 IN. ( 3.05 M)  
 MISSION EQUIPMENT 15.1 IN. ( .38 M) 25.2 IN. ( .64 M) 25.2 IN. ( .64 M)  
 TOTAL SATELLITE 123.6 IN. ( 3.14 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 247.9 IYY = 1578116.1 IZZ = 1578116.1  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 60.0 IN. ( 1.52 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 312.0/ 312.0/ 96.5  
 MISSION LIFETIME 36.0 (MO)  
 MEAN MISSION DURATION 31.0 (MO)  
 RELIABILITY .708

Y1-3

STEREOSAT NO1-1-6

\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1305  
 EQUIPMENT QUANTITIES 2 2 1 1  
 WEIGHT 37.80 LBS VOLUME 1.19 (FT\*\*3) POWER REQUIREMENT 103.6 WATT  
 RELIABILITY .9550  
 IERR 10

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1109 503 701 1203 603  
 EQUIPMENT QUANTITIES 12 4 5 9 1 1 1 1 2 1 1  
 WEIGHT 51.11 LBS VOLUME 2.93 (FT\*\*3) POWER REQUIREMENT .3 WATT  
 DRY WEIGHT 35.23 (LBS), EXPENDABLE WEIGHT 15.68 (LBS)  
 RELIABILITY .9479  
 IERR 10

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 403  
 EQUIPMENT QUANTITIES 1 1 1  
 WEIGHT 30.11 LBS VOLUME .54 (FT\*\*3) POWER REQUIREMENT 13.5 WATT  
 RELIABILITY .9700  
 IERR 2

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312  
 EQUIPMENT QUANTITIES 2 1 2 1 2 1 2 2  
 WEIGHT 23.62 LBS VOLUME .28 (FT\*\*3) POWER REQUIREMENT 35.4 WATT  
 RELIABILITY .9793  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 106 212 303 1202  
 EQUIPMENT QUANTITIES 12 2 2 1  
 WEIGHT 101.47 LBS VOLUME 2.13 (FT\*\*3) POWER DISSIPATION 3750 WATT  
 HARNESS WEIGHT 43.2 (LBS), SOLAR ARRAY WEIGHT 69.0 (LBS)  
 RELIABILITY .9146

MISSION EQUIPMENT

WEIGHT 110.00 LBS VOLUME 4.36 (FT\*\*3) POWER REQUIREMENT 100.0 WATT  
 RELIABILITY .9000

VI-37

STEREOSAT NC1-1-8

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	11.4 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER,	1082.0 (BTU/HR),	TOTAL RADIATOR AREA	12.5 (FT**2)
HEAT PIPE	23434.7 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	7.7 (FT)	TOTAL HEATER POWER	1197.0 (BTU/HR)
STORCD ENFRGY	109.0 (BTU)	VARIABLE CONDUCTANCE H.P.	1599.6 (WATT-IN)
		AVERAGE HEAT LOAD	861.8 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	36.4
HEAT PIPES	8.1
PHASE CHANGE MATEFIAL	2.7
RADIATOR (PASSIVE)	7.2
TOTAL	54.4

IERR 1111011011

STRUCTURES			
SKIN THICKNESS	.012 (IN)		
STRINGER NO., THICKNESS, HT.	287. ,	3597.266 (IN),	.440 (IN)
FRAME NO., THICKNESS, HT.	7. ,	.126 (IN),	.632 (IN)
GRID BEAM THICKNESS	.096 (IN),	SPACING 2.706 (IN),	HEIGHT 1.353 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	72.4 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	15.12 (LBS)		
ADAPTER WEIGHT	50.5 (LBS)		

VI-38

STEREOSAT NO1-1-8

\* \* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1305	REACTION WHEEL	1	5.0	.1	25.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1109	TANK	1	3.5	.4	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	PASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-39



STEREOSAT NO1-1-8

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
106	SHUNT REGULATOR	12	4.3	.1	0.0
212	BATTERY	2	15.7	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	110.0
STABILITY AND CONTROL	37.8
AUXILIARY PROPULSION	35.2
DATA PROCESSING	30.1
COMMUNICATIONS	23.6
BATTERIES	31.4
POWER CONTROL	70.1
SOLAR ARRAY	69.8
HARNESS	43.2
STRUCTURE	376.1
THERMAL CONTROL	14.4
DRY WEIGHT	881.8
PROPELLANT	15.9
SATELLITE ADAPTER	50.5
<hr/>	
TOTAL LAUNCH WEIGHT	948.1

VI-40

366

SASAT-B NO2-1-1

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .250000 (DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 14626 (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = C. (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPI TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	32.	64.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 129.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 1263.94 WATTS  
 TOTAL SOLAR ARRAY AREA 279.92 SQ FT  
 INSTALLED BATTERY CAPACITY 100.00 AMP-HR  
 BEGINNING OF LIFE POWER 3447.97 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 2568.6 LBS ( 1165.1 KG) LAUNCH WEIGHT = 2661.2 LBS ( 1207.1 KG)

DIMENSIONS		LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	35.6 IN. ( .90 M)	59.4 IN. ( 1.51 M)	59.4 IN. ( 1.51 M)	
MISSION EQUIPMENT	35.0 IN. ( .89 M)	58.3 IN. ( 1.48 M)	58.3 IN. ( 1.48 M)	
TOTAL SATELLITE	70.6 IN. ( 1.79 M)			

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 1419.8 IYY = 1425947.3 IZZ = 7047975.5  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 40.2 IN. ( 1.02 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 380./ 380./ 87.0  
 MISSION LIFETIME 36.0 (MO)  
 MEAN MISSION DURATION 31.6 (MO)  
 RELIABILITY .1725

VI-11

SEASAT-B NO2-1-1

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 1 1  
 WEIGHT 37.96 LBS VOLUME 1.18 (FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9550  
 IERR 10

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1121 506 701 1203 603  
 EQUIPMENT QUANTITIES 12 4 5 9 1 1 1 1 2 1 1  
 WEIGHT 137.24 LBS VOLUME 4.25 (FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 54.13 (LBS), EXPENDABLE WEIGHT 83.10 (LBS)  
 RELIABILITY .9299  
 IERR 10

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 3 1  
 WEIGHT 8 (.51 LBS) VOLUME 1.67 (FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .9637  
 IERR 2

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312  
 EQUIPMENT QUANTITIES 2 1 2 1 2 1 2 2  
 WEIGHT 23.62 LBS VOLUME .28 (FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9793  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 424 532 269 650 702  
 EQUIPMENT QUANTITIES 2 10 2 2 1  
 WEIGHT 300.32 LBS VOLUME 4.29 (FT\*\*3) POWER DISSIPATION 1687.9 WATTS  
 HARNESS WEIGHT 115.0 (LBS), SOLAR ARRAY WEIGHT 194.9 (LBS)  
 RELIABILITY .9616

MISSION EQUIPMENT

WEIGHT 1367.00 LBS VOLUME 54.02 (FT\*\*3) POWER REQUIREMENT 670.0 WATTS  
 RELIABILITY .9000

VI-43

## SEASAT-B NO2-1-1

\* \* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

## STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

## AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	17.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

## DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

## COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	PASFBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	PLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-43

SEASAT-B NO2-1-1

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
424	DISCHGE REGULATOR	2	32.0	.8	0.0
532	SHUNT REGULATOR	10	6.5	.1	0.0
269	BATTERY	2	71.3	.4	0.0
650	PATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

EIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1367.0
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	54.1
DATA PROCESSING	80.5
COMMUNICATIONS	23.6
BATTERIES	142.6
POWER CONTROL	157.8
SOLAR ARRAY	194.9
HARNESSES	115.0
STRUCTURE	165.1
SOLAR ARRAY DRIVE	32.4
THERMAL CONTROL	114.7
DRY WEIGHT	2485.4
PROPELLANT	63.1
SATELLITE ADAPTER	92.7
	-----

TOTAL LAUNCH WEIGHT 2661.2

77-11

ENVIRONMENTAL MONITOR SAT (EMS) NO2-1-2

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 24306. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = C. (IPS)  
 CDPI TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	32.	128.
MAIN FRAME SAMPLE RATE	125.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	2.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	64.	64.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 603.54 WATTS  
 TOTAL SOLAR ARRAY AREA 144.38 SQ FT  
 INSTALLED BATTERY CAPACITY 40.00 AMP-HR  
 BEGINNING OF LIFE POWER 1778.38 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 NET SATELLITE WEIGHT = 1580.4 LBS ( 716.9 KG) LAUNCH WEIGHT = 1641.2 LBS ( 744.4 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 39.9 IN. ( 1.01 M) 66.5 IN. ( 1.69 M) 66.5 IN. ( 1.69 M)  
 MISSION EQUIPMENT 27.0 IN. ( .68 M) 44.9 IN. ( 1.14 M) 44.9 IN. ( 1.14 M)  
 TOTAL SATELLITE 66.8 IN. ( 1.70 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 457.2 IYY = 952103.3 IZZ = 2297330.4  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 36.5 IN. ( .93 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 486.0/ 160.0/100.0  
 MISSION LIFETIME 24.0 (MO)  
 MEAN MISSION DURATION 21.5 (MO)  
 RELIABILITY .728

VI-45

ENVIRONMENTAL MONITOR SAT (EMS) ND2-1-2

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1322  
 EQUIPMENT QUANTITIES 2 2 1 1  
 WEIGHT 63.80 LBS VOLUME 1.95(FT\*\*3) POWER REQUIREMENT 88.6 WATTS  
 RELIABILITY .9707  
 TERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONO PROPELLANT  
 EQUIPMENT CODE IDENTIFIER 629 834 907 1003 499 203 1124 521 701 1203 603  
 EQUIPMENT QUANTITIES 12 4 5 9 1 1 1 1 2 1 1  
 WEIGHT 226.25 LBS VOLUME 8.37(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 83.84(LBS), EXPENDABLE WEIGHT 142.41(LBS)  
 RELIABILITY .9003  
 TERR 0

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 3 1  
 WEIGHT 80.51 LBS VOLUME 1.67(FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .9770  
 TERR 2

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312  
 EQUIPMENT QUANTITIES 2 1 2 1 2 1 2 2  
 WEIGHT 23.62 LBS VOLUME .28(FT\*\*3) POWER REQUIREMENT 57.4 WATTS  
 RELIABILITY .9875  
 ILR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 409 531 239 609 702  
 EQUIPMENT QUANTITIES 2 8 2 2 1  
 WEIGHT 155.10 LBS VOLUME 4.10(FT\*\*3) POWER DISSIPATION 983.1 WATTS  
 HARNESS WEIGHT 82.8(LBS), SOLAR ARRAY WEIGHT 100.5(LBS)  
 RELIABILITY .9598

MISSION EQUIPMENT

WEIGHT 625.00 LBS VOLUME 24.72(FT\*\*3) POWER REQUIREMENT 3006 WATTS  
 RELIABILITY .9000

77-11

ENVIRONMENTAL MONITOR SAT (EMS) NO2-1-2

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

<p>THERMAL CONTROL          RADIATOR AREA 21.9 (FT**2),          HEATER POWER 2072.2 (BTU/HR),          HEAT PIPE 24447.4 (WATT-IN),          HEAT PIPE LENGTH 4.2 (FT),          STORED ENERGY 107.5 (BTU)</p>	<p>BATTERY RADIATOR AREA 1.1 (FT**2)          TOTAL RADIATOR AREA 23.0 (FT**2)          BATTERY HEATER POWER 96.9 (BTU/HR)          TOTAL HEATER POWER 2169.1 (BTU/HR)          VARIABLE CONDUCTANCE H.P. 676.7 (WATT-IN)          AVERAGE HEAT LOAD 1663.1 (BTU/HR)</p>
---	--

THERMAL CONTROL WEIGHT	
	UNIT WEIGHT (LBS)
INSULATION	13.7
HEAT PIPES	4.4
PHASE CHANGE MATERIAL	2.7
RADIATOR (PASSIVE)	13.9
	-----
TOTAL	34.7

IERR 1111011011

STRUCTURES

SKIN THICKNESS	.018 (IN)			
STRINGER NO., THICKNESS, HT.	177.		3184.682 (IN),	.270 (IN)
FRAME NO., THICKNESS, HT.	5.		.114 (IN),	.568 (IN)
GRID BEAM THICKNESS	.158 (IN),	SPACING	4.458 (IN),	HEIGHT 2.229 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	112.13 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	31.9 (LBS)			
ADAPTER WEIGHT	60.8 (LBS)			

VI-47



ENVIRONMENTAL MONITOR SAT (EMS) NO2-1-2

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1322	REACTION WHEEL	1	31.0	.8	10.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
634	THRUSTER	4	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECDLR	3	16.6	.4	25.0
403	COMM DFCUD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

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ENVIRONMENTAL MONITOR SAT (EMS) NO2-1-2

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
531	SHUNT REGULATOR	8	4.3	.1	0.0
239	BATTERY	2	33.7	.1	0.0
609	BATTERY CHARGER	2	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	625.0
STABILITY AND CONTROL	63.8
AUXILIARY PROPULSION	63.8
DATA PROCESSING	60.5
COMMUNICATIONS	23.6
BATTERIES	67.3
POWER CONTROL	91.9
SOLAR ARRAY	100.5
HARNESS	62.8
STRUCTURE	167.5
SOLAR ARRAY DRIVE	16.7
THERMAL CONTROL	34.7
OFF WEIGHT	1438.0
PROPELLANT	142.4
SATELLITE ADAPTER	60.8
-----	
TOTAL LAUNCH WEIGHT	1641.2

VI-1A

HALOGEN OCCULTATION EXP (HALOE) NO2-1-3

SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .300000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 21707.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
COPI TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1250	1.0000
NUMBER OF WORDS PER SUBFRAME	64.	64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 470.95 WATTS  
TOTAL SOLAR ARRAY AREA 103.77 SQ FT  
INSTALLED BATTERY CAPACITY 34.00 AMP-HR  
BEGINNING OF LIFE POWER 1278.14 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WET SATELLITE WEIGHT = 1299.7 LBS ( 589.5 KG) LAUNCH WEIGHT = 1349.1 LBS ( 611.1 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 33.2 IN.( .84 M) 55.4 IN.( 1.41 M) 55.4 IN.( 1.41 M)  
MISSION EQUIPMENT 26.6 IN.( .68 M) 44.3 IN.( 1.13 M) 44.3 IN.( 1.13 M)  
TOTAL SATELLITE 59.8 IN.( 1.52 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 233.9 IYY = 609278.7 IZZ = 1238645.7  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 33.1 IN.( .84 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 300.7 300.7 90.0  
MISSION LIFETIME 24.0(MO)  
MEAN MISSION DURATION 19.7(MO)  
RELIABILITY .605

VI-50

HALOGEN OCCULTATION EXP (HALOE) NO2-1-3

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1309				
EQUIPMENT QUANTITIES	2	1	1	1				
WEIGHT	34.120 LBS				VOLUME	1.08 (FT**3)	POWER REQUIREMENT	79.7 WATTS
RELIABILITY		.9335						
IERR	0							

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	829	834	907	1003	499	203	1124	511	701	1203	603
EQUIPMENT QUANTITIES	12	4	4	9	1	1	1	1	1	1	1
WEIGHT	185.39 LBS				VOLUME	5.26 (FT**3)	POWER REQUIREMENT				.3 WATTS
DRY WEIGHT	58.20 (LBS)				EXPENDABLE WEIGHT		127.18 (LBS)				
RELIABILITY		.8971									
IERR	0										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	203	345	403				
EQUIPMENT QUANTITIES	1	1	2	1				
WEIGHT	63.71 LBS				VOLUME	1.29 (FT**3)	POWER REQUIREMENT	63.5 WATTS
RELIABILITY		.9136						
IERR	2							

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	227	103	306	401	503	603	227	312
EQUIPMENT QUANTITIES	1	1	1	1	2	1	1	1
WEIGHT	17.02 LBS				VOLUME	.22 (FT**3)	POWER REQUIREMENT	35.4 WATTS
RELIABILITY		.9408						
IERR	*****							

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	406	515	233	609	702			
EQUIPMENT QUANTITIES	2	12	2	2	1			
WEIGHT	117.08 LBS				VOLUME	1.60 (FT**3)	POWER DISSIPATION	669.4 WATTS
HARNESS WEIGHT		53.2 (LBS)			SOLAR ARRAY WEIGHT	72.3 (LBS)		
RELIABILITY		.9336						

MISSION EQUIPMENT

WEIGHT	600.100 LBS	VOLUME	23.73 (FT**3)	POWER REQUIREMENT	290.0 WATTS
RELIABILITY		.9000			

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HALOGEN OCCULTATION EXP (HALOE) NO2-1-3

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	21.1 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	2031.8 (BTU/HR),	TOTAL RADIATOR AREA	22.0 (FT**2)
HEAT PIPE	21027.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	3.7 (FT)	TOTAL HEATER POWER	2121.8 (BTU/HR)
STORED ENERGY	106.1 (BTU)	VARIABLE CONDUCTANCE H.P.	605.5 (WATT-IN)
		AVERAGE HEAT LOAD	1598.6 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		11.2
HEAT PIPES		3.9
PHASE CHANGE MATERIAL		2.7
RADIATOR (PASSIVE)		13.4
	TOTAL	31.2

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.016 (IN)			
STRINGER NO., THICKNESS, HT.	169.	3566.181 (IN),		.345 (IN)
FRAME NO., THICKNESS, HT.	5.	.099 (IN),		.495 (IN)
GRID BEAM THICKNESS	.145 (IN),	SPACING 4.071 (IN),	HEIGHT	2.036 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	85.0 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	27.2 (LBS)			
ADAPTER WEIGHT	49.4 (LBS)			

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HALOGEN OCCULTATION EXP (HALOE) NO2-1-3

\* \* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNC'S	1	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1309	REACTION WHEEL	1	8.5	.1	1.1

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
834	THRUSTER	4	.7	.0	.1
907	ISOLATION VALVE	4	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
511	TANK	1	11.5	.6	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	2	16.8	.4	25.0
403	COMMD DECDD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	1	.8	.0	0.0
312	TRANSMITTER	1	2.2	.0	15.8

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HALOGEN OCCULTATION EXP (HALOE) NO2-1-3

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHG REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	12	2.3	.0	0.0
233	BATTERY	2	26.7	.1	0.0
609	BATTERY CHARGER	2	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	600.0
STABILITY AND CONTROL	34.2
AUXILIARY PROPULSION	58.2
DATA PROCESSING	63.7
COMMUNICATIONS	17.8
BATTERIES	53.5
POWER CONTROL	63.6
SOLAR ARRAY	72.3
HARNESS	53.2
STRUCTURE	112.8
SOLAR ARRAY DRIVE	12.0
THERMAL CONTROL	31.2
DRY WEIGHT	1172.5
PROPELLANT	127.2
SATELLITE ADAPTER	49.4

TOTAL LAUNCH WEIGHT. 1349.1

75-1A

STORMSAT NO2-1-4

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .300000(DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 33630.(LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	32.	

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 995.28 WATTS  
 TOTAL SOLAR ARRAY AREA 112.53 SQ FT  
 INSTALLED BATTERY CAPACITY 132.00 AMP-HR  
 BEGINNING OF LIFE POWER 1432.76 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 1837.5 LBS ( 833.5 KG) LAUNCH WEIGHT = 1904.4 LBS ( 863.8 K  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 38.7 IN.( .98 M) 64.5 IN.( 1.64 M) 64.5 IN.( 1.64 M)  
 MISSION EQUIPMENT 27.7 IN.( .70 M) 46.2 IN.( 1.17 M) 46.2 IN.( 1.17 M)  
 TOTAL SATELLITE 66.5 IN.( 1.69 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 365.3 IYY = 1082198.1 IZZ = 1888442.2  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 34.6 IN.( .88 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 19323./19323.// 0.(  
 MISSION LIFETIME 36.0(MO)  
 MEAN MISSION DURATION 31.1(MO)  
 RELIABILITY .701

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STORMSAT NO2-1-4

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 1 2  
 WEIGHT 43.00 LBS VOLUME 1.24(FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9675  
 IERR 10

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1130 509 701 1203 603  
 EQUIPMENT QUANTITIES 18 6 5 9 2 1 1 1 2 1 1  
 WEIGHT 265.36 LBS VOLUME 6.92(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 74.27(LBS), EXPENDABLE WEIGHT 191.08(LBS)  
 RELIABILITY .9563  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 3 1  
 WEIGHT 80.51 LBS VOLUME 1.67(FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .9637  
 IERR 2

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202 312  
 EQUIPMENT QUANTITIES 1 1 2 1 3 1 1 2  
 WEIGHT 38.92 LBS VOLUME 1.70(FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9820  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 530 260 650 702  
 EQUIPMENT QUANTITIES 4 11 4 4 1  
 WEIGHT 301.09 LBS VOLUME 3.46(FT\*\*3) POWER DISSIPATION 168.0 WATTS  
 HARNESS WEIGHT 85.1(LBS), SOLAR ARRAY WEIGHT 78.4(LBS)  
 RELIABILITY .8899

MISSION EQUIPMENT

WEIGHT 680.00 LBS VOLUME 26.89(FT\*\*3) POWER REQUIREMENT 700.0 WATTS  
 RELIABILITY .9000

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STORMSAT NO2-1-4 .

\* \* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	30.0 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	2861.2(BTU/HR),	TOTAL RADIATOR AREA	30.9 (FT**2)
HEAT PIPE	0.0(WATT-IN),	BATTERY HEATER POWER	90.0(BTU/HR)
HEAT PIPE LENGTH	4.2 (FT)	TOTAL HEATER POWER	2951.2(BTU/HR)
STORED ENERGY	123.2 (BTU)	VARIABLE CONDUCTANCE H.P.	672.8(WATT-IN)
		AVERAGE HEAT LOAD	2994.0 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	13.4
HEAT PIPES	4.4
PHASE CHANGE MATERIAL	3.1
RADIATOR (ACTIVE)	62.8
TOTAL	83.6

IERR 1100001011

STRUCTURES			
SKIN THICKNESS	.019 (IN)		
STRINGER NO., THICKNESS, HT.	169. ,	81910.347 (IN),	.405 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.116 (IN),	.581 (IN)
GRID BEAM THICKNESS	.171 (IN),	SPACING 4.804 (IN),	HEIGHT 2.402 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	147.6 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	28.2 (LBS)		
ADAPTER WEIGHT	66.9 (LBS)		

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C-2

STORMSAT NO2-1-4

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	1	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-58

STORMSAT NO2-1-4

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	4	9.8	.2	0.0
530	SHUNT REGULATOR	11	2.2	.0	0.0
260	BATTERY	4	47.5	.2	0.0
650	BATTERY CHARGER	4	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	680.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	74.3
DATA PROCESSING	80.5
COMMUNICATIONS	38.9
BATTERIES	190.1
POWER CONTROL	111.0
SOLAR ARRAY	78.4
HARNESS	85.1
STRUCTURE	168.5
SOLAR ARRAY DRIVE	13.0
THERMAL CONTROL	83.6
DRY WEIGHT	1646.4
PROPELLANT	191.1
SATELLITE ADAPTER	66.9

TOTAL LAUNCH WEIGHT 1904.4

VI-59

EARTH RADIATION BUDGET SAT (ERBSS) NO2-1-5

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 2551. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
64.  
16.  
8.  
4.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
128.  
100.  
8.  
2.  
1.0000  
64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 199.89 WATTS  
TOTAL SOLAR ARRAY AREA 78.90 SQ FT  
INSTALLED BATTERY CAPACITY 9.00 AMP-HR  
BEGINNING OF LIFE POWER 466.69 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT =	623.1 LBS ( 282.6 KG)	LAUNCH WEIGHT =	656.9 LBS ( 298.0 KI)
DIMENSIONS	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	65.9 IN. ( 1.67 M)	109.8 IN. ( 2.79 M)	109.8 IN. ( 2.79 M)
MISSION EQUIPMENT	12.0 IN. ( .30 M)	20.0 IN. ( .51 M)	20.0 IN. ( .51 M)
TOTAL SATELLITE	77.9 IN. ( 1.98 M)		
MOMENTS OF INERTIA (SLUGS*FT**2)	IXX = 148.0	IYY = 700052.5	IZZ = 700052.5
	X-CG	Y-CG	Z-CG
CENTER OF GRAVITY	23.2 IN. ( .59 M)	0.0 IN. ( 0.00 M)	0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 324./ 324./ 50.  
MISSION LIFETIME 24.0 (MO)  
MEAN MISSION DURATION 20.6 (MO)  
RELIABILITY .701

VI-60

EARTH RADIATION BUDGET SAT (ERBSS) NO2-1-5

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 1 1 1  
 WEIGHT 30.80 LBS VOLUME 1.04 (FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9335  
 IERR 10

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1109 503 701 1203 603  
 EQUIPMENT QUANTITIES 12 2 5 9 1 1 1 1 1 1  
 WEIGHT 48.13 LBS VOLUME 2.86 (FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 33.63 (LBS), EXPENDABLE WEIGHT 14.49 (LBS)  
 RELIABILITY .9476  
 IERR 10

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 403  
 EQUIPMENT QUANTITIES 1 1 1  
 WEIGHT 30.11 LBS VOLUME .54 (FT\*\*3) POWER REQUIREMENT 13.5 WATTS  
 RELIABILITY .9799  
 IERR 2

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312  
 EQUIPMENT QUANTITIES 1 1 1 1 2 1 1 1  
 WEIGHT 17.82 LBS VOLUME .22 (FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9408  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 205 303 1202  
 EQUIPMENT QUANTITIES 8 3 2 1  
 WEIGHT 80.94 LBS VOLUME 1.64 (FT\*\*3) POWER DISSIPATION 216.9 WATTS  
 HARNESS WEIGHT 29.0 (LBS), SOLAR ARRAY WEIGHT 38.8 (LBS)  
 RELIABILITY .9555

MISSION EQUIPMENT

WEIGHT 55.00 LBS VOLUME 2.18 (FT\*\*3) POWER REQUIREMENT 70.0 WATTS  
 RELIABILITY .9000

VI-61

EARTH RADIATION BUDGET SAT (ERBSS) NO2-1-5

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	8.9 (FT**2),	BATTERY RADIATOR AREA	1.1 (FT**2)
HEATER POWER	841.6 (BTU/HR),	TOTAL RADIATOR AREA	10.0 (FT**2)
HEAT PIPE	11565.6 (WATT-IN),	BATTERY HEATER POWER	116.7 (BTU/HR)
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	958.3 (BTU/HR)
STORED ENERGY	106.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1007.5 (WATT-IN)
		AVERAGE HEAT LOAD	675.2 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		22.7
HEAT PIPES		5.1
PHASE CHANGE MATERIAL		2.7
RADIATOR (PASSIVE)		5.6
	TOTAL	36.1

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.009 (IN)			
SPRINGER NO., THICKNESS, HT.	316. ,	3628.189 (IN),		.366 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.105 (IN),		.525 (IN)
GRID BEAM THICKNESS	.082 (IN),	SPACING 2.307 (IN),	HEIGHT	1.154 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	57.5 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	15.2 (LBS)			
ADAPTER WEIGHT	33.8 (LBS)			

VI-62

EARTH RADIATION BUDGET SAT (ERBSS) NO2-1-5

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	1	7.1	.1	62.0
1915	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1109	TANK	1	3.5	.4	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	1	.8	.0	0.0
312	TRANSMITTER	1	2.2	.0	15.8

V1-63



EARTH RADIATION BUDGET SAT (ERBSS) NO2-1-5

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
205	BATTERY	32	14.4	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	55.0
STABILITY AND CONTROL	30.8
AUXILIARY PROPULSION	33.6
DATA PROCESSING	30.1
COMMUNICATIONS	17.8
BATTERIES	28.8
POWER CONTROL	52.1
SOLAR ARRAY	38.8
HARNESS	29.0
STRUCTURE	256.4
THERMAL CONTROL	36.1
DRY WEIGHT	608.6
PROPELLANT	14.5
SATELLITE ADAPTER	33.8
<hr/>	
TOTAL LAUNCH WEIGHT	656.9

VI-64

SPACE TELESCOPE NP1-1-1

\* \* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1321  
 EQUIPMENT QUANTITIES 2 2 1 1  
 WEIGHT 50.00 LBS VOLUME 11.94(FT\*\*3) POWER REQUIREMENT 78.6 WATTS  
 RELIABILITY .9550  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 829 834 907 1003 499 203 1124 527 701 1203 603  
 EQUIPMENT QUANTITIES 12 6 5 9 2 1 3 1 2 1 1  
 WEIGHT 401.23 LBS VOLUME 11.68(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 115.04(LBS), EXPENDABLE WEIGHT 286.20(LBS)  
 RELIABILITY .9462  
 IERR 1

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 403  
 EQUIPMENT QUANTITIES 1 1 1  
 WEIGHT 30.11 LBS VOLUME .54(FT\*\*3) POWER REQUIREMENT 13.5 WATTS  
 RELIABILITY .9700  
 IERR 2

VI-65

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 203 103 306 401 503 603 203 312  
 EQUIPMENT QUANTITIES 1 1 2 2 3 1 1 2  
 WEIGHT 46.84 LBS VOLUME .58(FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9766  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 406 530 236 609 702  
 EQUIPMENT QUANTITIES 2 12 2 3 1  
 WEIGHT 128.74 LBS VOLUME 2.14(FT\*\*3) POWER DISSIPATION 767.0 WATTS  
 HARNESS WEIGHT 892.3(LBS), SOLAR ARRAY WEIGHT 85.4(LBS)  
 RELIABILITY .9104

MISSION EQUIPMENT

WEIGHT 12000.00 LBS VOLUME 480.00(FT\*\*3) POWER REQUIREMENT 300.0 WATTS  
 RELIABILITY .9000

SPACE TELESCOPE NP1-1-1

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	26.5 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	2563.5 (BTU/HR),	TOTAL RADIATOR AREA	27.4 (FT**2)
HEAT PIPE	38626.6 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	7.5 (FT)	TOTAL HEATER POWER	2653.4 (BTU/HR)
STORED ENERGY	93.3 (BTU)	VARIABLE CONDUCTANCE H.P.	1219.2 (WATT-IN)
		AVERAGE HEAT LOAD	1458.5 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		24.6
HEAT PIPES		7.9
PHASE CHANGE MATERIAL		2.3
RADIATOR (PASSIVE)		16.8
	TOTAL	51.6

IERR 1100010011

STRUCTURES				
SKIN THICKNESS	.054 (IN)			
STRINGER NO., THICKNESS, HT.	111. ,	3487.671 (IN),		.748 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.215 (IN),		1.073 (IN)
GRID BEAM THICKNESS	.479 (IN),	SPACING 13.495 (IN),	HEIGHT	6.747 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	133.2 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	29.4 (LBS)			
ADAPTER WEIGHT	359.7 (LBS)			

VI-66

SPACE TELESCOPE NP1-1-1

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1321	REACTION WHEEL	1	17.2	10.8	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	3	11.5	2.4	0.0
527	TANK	1	30.0	1.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECGD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
203	ANTENNA	1	10.4	.1	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-67

SPACE TELESCOPE NP1-1-1

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
530	SHUNT REGULATOR	12	2.2	.0	0.0
236	BATTERY	2	31.5	.3	0.0
609	BATTERY CHARGER	3	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	12000.0
STABILITY AND CONTROL	50.0
AUXILIARY PROPULSION	115.0
DATA PROCESSING	30.1
COMMUNICATIONS	46.8
BATTERIES	63.0
POWER CONTROL	65.8
SOLAR ARRAY	85.4
HARNESS	892.3
STRUCTURE	600.4
SOLAR ARRAY DRIVE	14.2
THERMAL CONTROL	51.6
DRY WEIGHT	14014.6
PROPELLANT	286.2
SATELLITE ADAPTER	359.7
	-----

TOTAL LAUNCH WEIGHT 14660.5

89-1A

HEAD-D NP1-1-2

\* \* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

POINTING ACCURACY = .200000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 49505. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
32.	128.
125.	100.
8.	8.
2.	2.
1.0000	1.0000
64.	64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)

SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

POWER REQUIREMENT 968.54 WATTS

TOTAL SOLAR ARRAY AREA 218.99 SQ FT

INSTALLED BATTERY CAPACITY 66.00 AMP-HR

BEGINNING OF LIFE PCWER 2697.46 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 11568.3 LBS ( 5247.3 KG) LAUNCH WEIGHT = 11889.0 LBS ( 5392.8 KG)

DIMENSIONS

EQUIPMENT BAY 42.3 IN. ( 1.07 M) 70.5 IN. ( 1.79 M) 70.5 IN. ( 1.79 M)

MISSION EQUIPMENT 66.2 IN. ( 1.68 M) 110.4 IN. ( 2.80 M) 110.4 IN. ( 2.80 M)

TOTAL SATELLITE 108.5 IN. ( 2.76 M)

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 2134.4 IYY = 9808947.5 IZZ = 13199381.3

CENTER OF GRAVITY 66.9 IN. ( 1.70 M) X-CG 0.0 IN. ( 0.00 M) Y-CG 0.0 IN. ( 0.00 M) Z-CG 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 250./ 250./ 28.5

MISSION LIFETIME 24.0 (MO)

MEAN MISSION DURATION 21.2 (MO)

RELIABILITY .708

VI-69

HEAD-D NP1-1-2

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1322						
EQUIPMENT QUANTITIES	2	2	1	1						
WEIGHT	63.80 LBS				VOLUME	1.95 (FT**3)		POWER REQUIREMENT	88.6 WATTS	
RELIABILITY		.9707								
IERR	0									

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	829	834	907	1003	499	203	1124	530	701	1203	603
EQUIPMENT QUANTITIES	12	4	5	9	2	1	3	1	2	1	1
WEIGHT	427.70 LBS				VOLUME	12.09 (FT**3)		POWER REQUIREMENT	.3 WATTS		
DRY WEIGHT	137.64 (LBS)				EXPENDABLE WEIGHT	290.06 (LBS)					
RELIABILITY		.9048									
IERR	1										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	203	345	403						
EQUIPMENT QUANTITIES	1	1	3	1						
WEIGHT	80.51 LBS				VOLUME	1.67 (FT**3)		POWER REQUIREMENT	63.5 WATTS	
RELIABILITY		.9770								
IERR	2									

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	203	103	306	401	503	603	203	312		
EQUIPMENT QUANTITIES	1	1	2	1	2	1	1	2		
WEIGHT	41.42 LBS				VOLUME	.51 (FT**3)		POWER REQUIREMENT	35.4 WATTS	
RELIABILITY		.9775								
IERR	*****									

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	418	531	260	650	702					
EQUIPMENT QUANTITIES	2	11	2	2	1					
WEIGHT	219.43 LBS				VOLUME	3.34 (FT**3)		POWER DISSIPATION	1438.1 WATTS	
HARNESS WEIGHT	687.8 (LBS)				SOLAR ARRAY WEIGHT	152.5 (LBS)				
RELIABILITY		.9384								

MISSION EQUIPMENT

WEIGHT	9300.00 LBS		VOLUME	366.78 (FT**3)	POWER REQUIREMENT	665.0 WATTS
RELIABILITY		.9000				

VI-70

HEAD-D NP1-1-2

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	52.9 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	5058.2 (BTU/HR),	TOTAL RADIATOR AREA	53.8 (FT**2)
HEAT PIPE	69418.8 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	6.8 (FT)	TOTAL HEATER POWER	5148.2 (BTU/HR)
STORED ENERGY	116.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1099.0 (WATT-IN)
		AVERAGE HEAT LOAD	2907.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	20.7
HEAT PIPES	7.1
PHASE CHANGE MATERIAL	2.9
RADIATOR (ACTIVE)	95.6
	-----
TOTAL	126.3

IERR 1100010011

STRUCTURES			
SKIN THICKNESS	.049 (IN)		
STRINGER NO., THICKNESS, HT.	111. ,	3434.591 (IN),	.673 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.193 (IN),	.966 (IN)
GRID BEAM THICKNESS	.431 (IN),	SPACING 12.149 (IN),	HEIGHT 6.074 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	168.5 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	40.5 (LBS)		
ADAPTER WEIGHT	320.7 (LBS)		

VI-71



HEAD-D NP1-1-2

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1322	REACTION WHEEL	1	31.0	.8	10.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
934	THRUSTER	4	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	3	11.5	2.4	0.0
530	TANK	1	50.0	2.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
203	ANTENNA	1	10.4	.1	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-72

HEAD-D NP1-1-2

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
418	DISCHGE REGULATOR	2	24.0	.6	0.0
531	SHUNT REGULATOR	11	4.3	.1	0.0
260	BATTERY	2	47.5	.2	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	7.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	9300.0
STABILITY AND CONTROL	63.8
AUXILIARY PROPULSION	137.6
DATA PROCESSING	80.5
COMMUNICATIONS	41.4
BATTERIES	95.0
POWER CONTROL	124.4
SOLAR ARRAY	152.5
HARNESS	687.8
STRUCTURE	443.6
SOLAR ARRAY DRIVE	25.3
THERMAL CONTROL	126.3
DRY WEIGHT	11278.3
PROPELLANT	290.1
SATELLITE ADAPTER	320.7

TOTAL LAUNCH WEIGHT 11889.0

VI-73

VERY LONG BASELINE INTERFEROMETER-A NP1-1-4A

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .600000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 11309.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	13.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	18.	0.
SUBFRAME RATE	.1250	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS

CONFIGURATION -- SEPARATE UPLINK AND DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 179.05 WATTS  
TOTAL SOLAR ARRAY AREA 65.41 SQ FT  
INSTALLED BATTERY CAPACITY 30.00 AMP-HR  
BEGINNING OF LIFE POWER 211.57 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1399.4 LBS ( 634.8 KG) LAUNCH WEIGHT = 1454.9 LBS ( 659.9 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 42.4 IN.( 1.08 M) 70.7 IN.( 1.80 M) 70.7 IN.( 1.80 M)  
MISSION EQUIPMENT 28.6 IN.( .73 M) 47.7 IN.( 1.21 M) 47.7 IN.( 1.21 M)  
TOTAL SATELLITE 71.1 IN.( 1.80 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 185.7 IYY = 960742.2 IZZ = 960742.2  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 43.0 IN.( 1.09 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 100000./\*\*\*\*\*/ 28.5  
MISSION LIFETIME 24.0(MO)  
MEAN MISSION DURATION 20.4(MO)  
RELIABILITY .559

VI-74

VERY LONG BASELINE INTERFEROMETER-A NP1-1-4A

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 2 1  
 WEIGHT 30.56 LBS VOLUME 1.21(FT\*\*3) POWER REQUIREMENT 9.4 WATTS  
 RELIABILITY .9617  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1116 509 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 4 9 1 1 1 1 1 1  
 WEIGHT 132.89 LBS VOLUME 4.16(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 64.91(LBS), EXPENDABLE WEIGHT 67.98(LBS)  
 RELIABILITY .7435  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9866  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 206 398 401 503 227  
 EQUIPMENT QUANTITIES 1 1 1 2 1  
 WEIGHT 21.27 LBS VOLUME 1.44(FT\*\*3) POWER REQUIREMENT 77.2 WATTS  
 RELIABILITY .9342  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 102 227 309 1202  
 EQUIPMENT QUANTITIES 12 2 2 1  
 WEIGHT 157.92 LBS VOLUME 3.04(FT\*\*3) POWER DISSIPATION 3.5 WATTS  
 HARNESS WEIGHT 65.8(LBS), SOLAR ARRAY WEIGHT 32.1(LBS)  
 RELIABILITY .9424

MISSION EQUIPMENT

WEIGHT 750.00 LBS VOLUME 29.65(FT\*\*3) POWER REQUIREMENT 80.0 WATTS  
 RELIABILITY .9000

VI-75

VERY LONG BASELINE INTERFEROMETER-A NP1-1-4A

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	5.6 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	378.1 (BTU/HR),	TOTAL RADIATOR AREA	6.5 (FT**2)
HEAT PIPE	9494.8 (WATT-IN),	BATTERY HEATER POWER	85.1 (BTU/HR)
HEAT PIPE LENGTH	4.4 (FT)	TOTAL HEATER POWER	463.2 (BTU/HR)
STORED ENERGY	68.3 (BTU)	VARIABLE CONDUCTANCE H.P.	919.3 (WATT-IN)
		AVERAGE HEAT LOAD	607.6 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		15.0
HEAT PIPES		4.7
PHASE CHANGE MATERIAL		2.2
RADIATOR (PASSIVE)		3.5
	TOTAL	25.4

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.017 (IN)		
STRINGER NO., THICKNESS, FT.	189.	825452.780 (IN),	.394 (IN)
FRAME NO., THICKNESS, FT.	5.	.113 (IN),	.566 (IN)
GRID BEAM THICKNESS	.148 (IN),	SPACING 4.161 (IN),	HEIGHT 2.081 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	100.2 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	55.4 (LBS)		

VI-76

VERY LONG BASELINE INTERFEROMETER-A NP1-1-4A

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
803	EARTH SENSOR	2	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	3.9	.2	3.0
403	CGMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
206	ANTENNA	1	1.5	.1	0.0
398	XTR	1	12.1	1.2	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
227	ANTENNA	1	.8	.0	0.0

VI-77

VERY LONG BASELINE INTERFEROMETER-A NP1-1-4A

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
102	SHUNT REGULATOR	12	5.0	.1	0.0
227	BATTERY	2	30.4	.4	0.0
309	BATTERY CHARGER	2	12.8	.2	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

#FIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	750.0
STABILITY AND CONTROL	14.7
AUXILIARY PROPULSION	64.9
DATA PROCESSING	21.2
COMMUNICATIONS	21.3
BATTERIES	60.7
POWER CONTROL	97.2 ✓
CONVERTERS	15.9 ✓
SOLAR ARRAY	32.1 ✓
HARNESSES	65.8 ✓
STRUCTURE	162.3
THERMAL CONTROL	25.4
DRY WEIGHT	1331.4
PROPELLANT	68.0
SATELLITE ADAPTER	55.4
TOTAL LAUNCH WEIGHT	1454.9

V1-78

VERY LONG BASELINE INTERFEROMETER-B NP1-1-4B

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 12110.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- SEPARATE UPLINK AND DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KRPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 300.05 WATTS  
TOTAL SOLAR ARRAY AREA 116.05 SQ FT  
INSTALLED BATTERY CAPACITY 24.00 AMP-HR  
BEGINNING OF LIFE POWER 375.40 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1508.6 LBS ( 684.3 KG) LAUNCH WEIGHT = 1574.2 LBS ( 714.0 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 56.5 IN.( 1.43 M) 94.2 IN.( 2.39 M) 94.2 IN.( 2.39 M)  
MISSION EQUIPMENT 28.6 IN.( .73 M) 47.7 IN.( 1.21 M) 47.7 IN.( 1.21 M)  
TOTAL SATELLITE 85.1 IN.( 2.16 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 324.0 IYY = 1536079.9 IZZ = 1536079.9  
CENTER OF GRAVITY X-CG Y-CG Z-CG  
55.4 IN.( 1.41 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 24.0(MO)  
MEAN MISSION DURATION 21.1(MO)  
RELIABILITY .704

VI-79



VERY LONG BASELINE INTERFEROMETER-B NP1-1-4B

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 141  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 32.05 LBS VOLUME 1.29(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9285  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1116 509 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 1 1 1 1 1  
 WEIGHT 138.41 LBS VOLUME 4.23(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 65.61(LBS), EXPENDABLE WEIGHT 72.80(LBS)  
 RELIABILITY .9088  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9866  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 206 342 401 503 22  
 EQUIPMENT QUANTITIES 1 1 1 2 1  
 WEIGHT 12.17 LBS VOLUME .26(FT\*\*3) POWER REQUIREMENT 77.2 WATTS  
 RELIABILITY .9678  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 221 306 1202  
 EQUIPMENT QUANTITIES 6 2 2 1  
 WEIGHT 113.00 LBS VOLUME 1.91(FT\*\*3) POWER DISSIPATION 23.9 WATTS  
 HARNESS WEIGHT 65.0(LBS), SOLAR ARRAY WEIGHT 57.0(LBS)  
 RELIABILITY .9707

MISSION EQUIPMENT

WEIGHT 750.00 LBS VOLUME 29.65(FT\*\*3) POWER REQUIREMENT 200.0 WATTS  
 RELIABILITY .9000

08-1A

VERY LONG BASELINE INTERFEROMETER-B NP1-1-4B

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	9.3 (FT**2),	BATTERY RADIATOR AREA	.8 (FT**2)
HEATER POWER	909.5 (BTU/HR),	TOTAL RADIATOR AREA	10.2 (FT**2)
HEAT PIPE	19103.0 (WATT-IN),	BATTERY HEATER POWER	63.6 (BTU/HR)
HEAT PIPE LENGTH	5.3 (FT)	TOTAL HEATER POWER	973.0 (BTU/HR)
STORED ENERGY	88.4 (BTU)	VARIABLE CONDUCTANCE H.P.	1101.5 (WATT-IN)
		AVERAGE HEAT LOAD	1020.2 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		21.5
FEAT PIPES		5.6
PHASE CHANGE MATERIAL		2.2
RADIATOR (PASSIVE)		5.9
	TOTAL	35.2

IERR 1100C10111

STRUCTURES				
SKIN THICKNESS	.017 (IN)			
STRINGER NO., THICKNESS, HT.	220. ,	81910.347 (IN),		.452 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.130 (IN),		.649 (IN)
GRID BEAM THICKNESS	.146 (IN),	SPACING 4.104 (IN),	HEIGHT	2.052 (IN)
ENDCLVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	87.4 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	65.6 (LBS)			

18-1A

VERY LONG BASELINE INTERFEROMETER-B NP1-1-

\* \* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	1	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
206	ANTENNA	1	1.5	.1	0.0
342	TRANSMITTER	1	3.0	.0	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
227	ANTENNA	1	.8	.0	0.0

V1-82

VERY LONG BASELINE INTERFEROMETER-B NP1-1-48

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	6	4.2	.1	0.0
221	BATTERY	2	25.3	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	750.0
STABILITY AND CONTROL	16.2
AUXILIARY PROPULSION	65.6
DATA PROCESSING	21.2
COMMUNICATIONS	12.2
BATTERIES	50.6
POWER CONTROL	62.4
CONVERTERS	15.7
SOLAR ARRAY	57.0
HARNES	65.0
STRUCTURE	284.5
THERMAL CONTROL	35.2
DRY WEIGHT	1435.8
PROPELLANT	72.8
SATELLITE ADAPTER	65.6

TOTAL LAUNCH WEIGHT 1574.2

VI-83

GRAVITY WAVE DETECTOR NP1-1-5

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONO PROPELLANT  
 TOTAL IMPULSE = 4812. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS  
 NUMBER OF MAIN FRAME WORDS  
 MAIN FRAME SAMPLE RATE  
 MAIN FRAME WORD LENGTH  
 NUMBER OF SUBFRAMES  
 SUBFRAME RATE  
 NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
64.	128.
16.	100.
8.	8.
4.	2.
.1250	1.0000
64.	64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 238.89 WATTS  
 TOTAL SOLAR ARRAY AREA 46.55 SQ FT  
 INSTALLED BATTERY CAPACITY 18.00 AMP-HR  
 BEGINNING OF LIFE POWER 573.40 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 612.2 LBS ( 277.7 KG)

LAUNCH WEIGHT = 635.8 LBS ( 288.4 KG)

DIMENSIONS  
 EQUIPMENT BAY 28.5 IN. ( .72 M)  
 MISSION EQUIPMENT 19.9 IN. ( .50 M)  
 TOTAL SATELLITE 48.4 IN. ( 1.23 M)  
 MOMENTS OF INERTIA (SLUGS\*FT<sup>2</sup>) IXX =

HEIGHT  
 47.5 IN. ( 1.21 M)  
 33.1 IN. ( .84 M)  
 47.5 IN. ( 1.21 M)  
 33.1 IN. ( .84 M)

IYY = 201679.8 IZZ = 342825.7

X-CG 26.9 IN. ( .68 M)

Y-CG 0.0 IN. ( 0.00 M) Z-CG 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 500./ 500./ 28.5  
 MISSION LIFETIME 12.0(MO)  
 MEAN MISSION DURATION 10.7(MO)  
 RELIABILITY .719

48-84

GRAVITY WAVE DETECTOR NP1-1-5

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1303					
EQUIPMENT QUANTITIES	1	1	1	1					
WEIGHT	29.20	LBS			VOLUME	.88	(FT**3)	POWER REQUIREMENT	78.9 WATTS
RELIABILITY			.9507						
IERR	10								

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	818	834	906	1003	499	203	1112	503	701	1203	603
EQUIPMENT QUANTITIES	12	2	4	9	1	1	1	1	1	1	1
WEIGHT	59.32	LBS			VOLUME	3.03	(FT**3)	POWER REQUIREMENT	.3 WATT		
DRY WEIGHT	31.97	(LBS)			EXPENDABLE WEIGHT	27.34	(LBS)				
RELIABILITY		.8966									
IERR	10										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	203	403						
EQUIPMENT QUANTITIES	1	1	1						
WEIGHT	30.11	LBS			VOLUME	.54	(FT**3)	POWER REQUIREMENT	13.5 WATT
RELIABILITY		.9899							
IERR	2								

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	227	103	306	401	503	603	227	312	
EQUIPMENT QUANTITIES	1	1	1	1	2	1	1	1	
WEIGHT	17.82	LBS			VOLUME	.22	(FT**3)	POWER REQUIREMENT	35.4 WATT
RELIABILITY		.9705							
IERR	*****								

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	406	515	213	603	702				
EQUIPMENT QUANTITIES	2	6	2	2	1				
WEIGHT	74.75	LBS			VOLUME	1.30	(FT**3)	POWER DISSIPATION	294.3 WATT
HARNESS WEIGHT		24.2	(LBS)		SOLAR ARRAY WEIGHT	32.4	(LBS)		
RELIABILITY		.9752							

MISSION EQUIPMENT

WEIGHT	250.00	LBS			VOLUME	9.90	(FT**3)	POWER REQUIREMENT	110.0 WATT
RELIABILITY		.9000							

VI-85

GRAVITY WAVE DETECTOR NP1-1-5

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	10.7 (FT**2),	BATTERY RADIATOR AREA	1.0 (FT**2)
HEATER POWER	1017.4 (BTU/HR),	TOTAL RADIATOR AREA	11.7 (FT**2)
HEAT PIPE	8635.6 (WATT-IN),	BATTERY HEATER POWER	89.2 (BTU/HR)
HEAT PIPE LENGTH	3.0 (FT)	TOTAL HEATER POWER	1106.6 (BTU/HR)
STORED ENERGY	106.1 (BTU)	VARIABLE CONDUCTANCE H.P.	489.8 (WATT-IN)
		AVERAGE HEAT LOAD	811.6 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		9.0
HEAT PIPES		3.2
PHASE CHANGE MATERIAL		2.7
RADIATOR (PASSIVE)		6.8
	TOTAL	21.6

IERR 1110011011

STRUCTURES				
SKIN THICKNESS	.011 (IN)			
STRINGER NO., THICKNESS, HT.	190. ,	4069.485 (IN),		.264 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.076 (IN),		.379 (IN)
GRID BEAM THICKNESS	.098 (IN),	SPACING 2.770 (IN),	HEIGHT	1.385 (IN)
ENDCOVER THICKNESS - FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	43.2 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	20.6 (LBS)			
ADAPTER WEIGHT	23.6 (LBS)			

VI-86

GRAVITY WAVE DETECTOR NP1-1-5

ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER - 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	1	1.6	.2	1.0
2203	CONTROL ELECTRNCS	1	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1112	TANK	1	2.7	.6	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMO DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	1	.8	.0	0.0
312	TRANSMITTER	1	2.2	.0	15.8

VI-87



GRAVITY WAVE DETECTOR NP1-1-5

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER			UNIT	UNIT	UNIT
IDENT	TYPE	NO.	WEIGHT	VOLUME	POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	6	2.3	.0	0.0
213	BATTERY	2	13.5	.1	0.0
603	BATTERY CHARGER	2	2.6	.0	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	250.0
STABILITY AND CONTROL	29.2
AUXILIARY PROPULSION	32.0
DATA PROCESSING	30.1
COMMUNICATIONS	17.8
BATTERIES	26.9
POWER CONTROL	47.8
SOLAR ARRAY	32.4
HARNESS	24.2
STRUCTURE	67.4
SOLAR ARRAY DRIVE	5.4
THERMAL CONTROL	21.6
DRY WEIGHT	584.8
PROPELLANT	27.3
SATELLITE ADAPTER	23.6
<hr/>	
TOTAL LAUNCH WEIGHT	635.8

88-17

GRAVITY PROBE B/C NP1-1-6

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 8105. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTL)  
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 151.51 WATTS  
TOTAL SOLAR ARRAY AREA 113.53 SQ FT  
INSTALLED BATTERY CAPACITY 8.00 AMP-HR  
BEGINNING OF LIFE POWER 346.24 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1488.2 LBS ( 675.0 KG) LAUNCH WEIGHT = 1553.9 LBS ( 704.8 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 55.9 IN. ( 1.42 M) 93.1 IN. ( 2.37 M) 93.1 IN. ( 2.37 M)  
MISSION EQUIPMENT\* 29.6 IN. ( .75 M) 49.4 IN. ( 1.25 M) 49.4 IN. ( 1.25 M)  
TOTAL SATELLITE 85.5 IN. ( 2.17 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 304.5 IYY = 1388002.9 IZZ = 1388002.9  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 58.4 IN. ( 1.48 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 280./ 280./ 90.0  
MISSION LIFETIME 12.0 (MO)  
MEAN MISSION DURATION 10.8 (MO)  
RELIABILITY .734

VI-89

830

300 refrigerant  
530 lb. payload cost opt.

GRAVITY PROBE B/C NF1-1-6

\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL

EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 32.05 LBS VOLUME 1.29(FT\*\*3)  
 RELIABILITY .9636  
 IERR 0

POWER REQUIREMENT 10.4 WATTS

AUXILIARY PROPELLSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 834 834 907 1003 499 203 1116  
 EQUIPMENT QUANTITIES 6 2 4 1 1 1 1  
 WEIGHT 104.76 LBS VOLUME 4.08(FT\*\*3)  
 DRY WEIGHT 56.15(LBS), EXPENDABLE WEIGHT  
 RELIABILITY .9078  
 IERR 1

507 701 1203 603  
 1 1 1 1  
 POWER REQUIREMENT 1.0 WATTS  
 48.60(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3)  
 RELIABILITY .9933  
 IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 13.37 LBS VOLUME .17(FT\*\*3)  
 RELIABILITY .9565  
 IERR\*\*\*\*\*

POWER REQUIREMENT 19.5 WATTS

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 103 204 303 1202  
 EQUIPMENT QUANTITIES 6 2 2 1  
 WEIGHT 60.90 LBS VOLUME 1.31(FT\*\*3)  
 HARNESS WEIGHT 62.0(LBS), SOLAR ARRAY WEIGHT  
 RELIABILITY .9811

POWER DISSIPATION 170.4 WATTS  
 55.8(LBS)

MISSION EQUIPMENT

WEIGHT 830.00 LBS VOLUME 32.81(FT\*\*3)  
 RELIABILITY .9000

POWER REQUIREMENT 110.0 WATTS

VI-90

GRAVITY PROBE B/C NF1-1-5

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	6.7 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	604.4 (BTU/HR),	TOTAL RADIATOR AREA	7.9 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	5.3 (FT)	TOTAL HEATER POWER	719.3 (BTU/HR)
STORED ENERGY	64.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1106.2 (WATT-IN)
		AVERAGE HEAT LOAD	516.7 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		21.4
HEAT PIPES		5.6
PHASE CHANGE MATERIAL		1.6
RADIATOR (PASSIVE)		4.2
	TOTAL	32.8

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.16 (IN)			
STRINGER NO., THICKNESS, HT.	220. ,	3513.978 (IN),		.447 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.128 (IN),		.641 (IN)
GRID BEAM THICKNESS	.144 (IN),	SPACING 4.053 (IN),	HEIGHT	2.026 (IN)
ENCOVER THICKNESS - FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	64.2 (LBS)			
SOLAR APPAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	65.7 (LBS)			

VI-91

## GRAVITY PROBE B/C NP1-1-6

\* \* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

## STABILIZATION AND CONTROL

IDENT	TYPE	NC.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	1	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

## AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
907	ISOLATION VALVE	4	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
507	TANK	1	6.7	.3	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

## DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NC.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM D RECOD+DISTR	1	12.3	.2	7.5

## COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBNC ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-92

## GRAVITY PROBE B/C NF1-1-6

## \* \* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

## ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	6	4.2	.1	0.0
204	BATTERY	2	8.6	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

## WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	830.0
STABILITY AND CONTROL	16.2
AUXILIARY PROPULSION	56.2
DATA PROCESSING	21.2
COMMUNICATIONS	13.4
BATTERIES	17.2
POWER CONTROL	43.7
CONVERTERS	15.9
SOLAR ARRAY	55.9
HARNESS	62.0
STRUCTURE	275.3
THERMAL CONTROL	32.8
DRY WEIGHT	1439.6
PROPELLANT	48.6
SATELLITE ADAPTER	65.7
-----	
TOTAL LAUNCH WEIGHT	1553.9

VI-93

EXPLORER NP1-1-8

\*\*\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1\*\*\*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .700000(DEG.)

AUXILIARY PROPELLSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 8105.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDFI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK--COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 109.45 WATTS  
TOTAL SOLAR ARRAY AREA 41.93 SQ FT  
INSTALLED BATTERY CAPACITY 6.00 AMP-HR  
BEGINNING OF LIFE POWER 182.86 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 568.1 LBS ( 257.7 KG) LAUNCH WEIGHT = 590.1 LBS ( 267.6 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 34.0 IN.( .86 M) 56.6 IN.( 1.44 M) 56.6 IN.( 1.44 M)  
MISSION EQUIPMENT 18.4 IN.( .47 M) 30.7 IN.( .78 M) 30.7 IN.( .78 M)  
TOTAL SATELLITE 52.4 IN.( 1.33 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 51.8 IYY = 256698.5 IZZ = 256698.5  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 28.8 IN.( .73 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 1900./ 1900./ 90.0  
MISSION LIFETIME 12.0(MO)  
MEAN MISSION DURATION 10.8(MO)  
RELIABILITY .736

VI-94

EXPLORER NP1-1-8

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1\*\*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 32.05 LBS VOLUME 1.29(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9636  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 907 1003 499 203 1116 507 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 4 9 1 1 1 1 1 1 1  
 WEIGHT 104.76 LBS VOLUME 4.08(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 56.15(LBS), EXPENDABLE WEIGHT 48.60(LBS)  
 RELIABILITY .9078  
 IERR 1

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9933  
 IERR 1

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 203 103 309 401 503 603  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 22.72 LBS VOLUME .28(FT\*\*3) POWER REQUIREMENT 17.5 WATT  
 RELIABILITY .9543  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BLDY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 202 303 1202  
 EQUIPMENT QUANTITIES 3 2 2 1  
 WEIGHT 50.07 LBS VOLUME 1.05(FT\*\*3) POWER DISSIPATION 58.3 WATTS  
 HARNESS WEIGHT 25.6(LBS), SOLAR ARRAY WEIGHT 20.6(LBS)  
 RELIABILITY .9862

MISSION EQUIPMENT

WEIGHT 200.00 LBS VOLUME 7.92(FT\*\*3) POWER REQUIREMENT 70.0 WATTS  
 RELIABILITY .9000

VI-95



EXPLORER NPI-1-8

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	5.8 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	494.1 (BTU/HR),	TOTAL RADIATOR AREA	7.1 (FT**2)
HEAT PIPE	4301.6 (WATT-IN),	BATTERY HEATER POWER	122.2 (BTU/HR)
HEAT PIPE LENGTH	3.3 (F1)	TOTAL HEATER POWER	616.3 (BTU/HR)
STORED ENERGY	63.5 (BTU)	VARIABLE CONDUCTANCE H.P.	677.9 (WATT-IN)
		AVERAGE HEAT LOAD	373.2 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	10.5
HEAT PIPES	3.4
PHASE CHANGE MATERIAL	1.6
RADIATOR (PASSIVE)	3.7
	-----
TOTAL	19.2

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.011 (IN)		
STRINGER NO., THICKNESS, HT.	211. ,	7568.804 (IN),	.283 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.081 (IN),	.406 (IN)
GRID BEAM THICKNESS	.095 (IN),	SPACING 2.672 (IN),	HEIGHT 1.336 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	63.8 (LBS)		
SOLAR ARRAY BOOM AND DRIVE, WT.	0.0 (LBS)		
ADAPTER WEIGHT	21.9 (LBS)		

95-1A

EXPLORER NP1-1-8

\* \* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPLR	1	2.8	.3	0.0
603	CONTROL ELECTPNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	1	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
907	ISCLATION VALVE	4	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
507	TANK	1	6.7	.3	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	CGMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTIENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
309	TRANSMITTER	1	1.8	.0	8.8
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
603	DIFLEXER	1	3.1	.0	1.0

VI-97

EXPLORER NP1-1-8

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	3	4.2	.1	0.0
202	BATTERY	2	9.5	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	200.0
STABILITY AND CONTROL	16.2
AUXILIARY PROPULSION	56.2
DATA PROCESSING	21.2
COMMUNICATIONS	22.7
BATTERIES	19.0
POWER CONTROL	31.1
CONVERTERS	15.9
SOLAR ARRAY	20.6
HARNESS	25.6
STRUCTURE	71.9
THERMAL CONTROL	19.2
DRY WEIGHT	519.5
PROPELLANT	48.6
SATELLITE ADAPTER	21.9
	-----
TOTAL LAUNCH WEIGHT	590.1

VI-98

SOLAR MAX MISSION NP2-1-

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .200000 (DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 14476 (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPI TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	.1250	1.0000
NUMBER OF WORDS PER SUBFRAME	64.	64.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 349.64 WATTS  
 TOTAL SOLAR ARRAY AREA 76.67 SQ FT  
 INSTALLED BATTERY CAPACITY 24.00 AMP-HR  
 BEGINNING OF LIFE PCWER 944.33 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 1898.7 LBS ( 861.2 KG) LAUNCH WEIGHT = 1971.0 LBS ( 894.1 KG)

	LENGTH	HEIGHT	WIDTH
DIMENSIONS			
EQUIPMENT BAY	32.4 IN. ( .82 M)	54.1 IN. ( 1.37 M)	54.1 IN. ( 1.37 M)
MISSION EQUIPMENT	34.0 IN. ( .86 M)	56.6 IN. ( 1.44 M)	56.6 IN. ( 1.44 M)
TOTAL SATELLITE	66.4 IN. ( 1.69 M)		

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 214.3 IYY = 874777.9 IZZ = 1229236.3  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 40.1 IN. ( 1.02 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 310. / 310. / 28.5  
 MISSION LIFETIME 24.10 (MO)  
 MEAN MISSION DURATION 21.3 (MO)  
 RELIABILITY .0717

65-17

SOLAR MAX MISSION NP2-1-1

\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTRCL  
 CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1309  
 EQUIPMENT QUANTITIES 2 2 1 1  
 WEIGHT 41.30 LBS VOLUME 1.21 (FT\*\*3) POWER REQUIREMENT 79.7 WATTS  
 RELIABILITY .9707  
 IERR 0

AUXILIARY PROPULSION  
 CONFIGURATION - - MONCROPELLANT  
 EQUIPMENT CODE IDENTIFIER 829 834 906 1003 499 203 1124 509 701 1203 603  
 EQUIPMENT QUANTITIES 12 4 5 9 1 1 1 1 2 1 1  
 WEIGHT 148.06 LBS VOLUME 5.11 (FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 62.14 (LBS), EXPENDABLE WEIGHT 85.92 (LBS)  
 RELIABILITY .9109  
 IERR 10

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 403  
 EQUIPMENT QUANTITIES 1 1 1  
 WEIGHT 30.11 LBS VOLUME .54 (FT\*\*3) POWER REQUIREMENT 13.5 WATTS  
 RELIABILITY .9799  
 IERR 2

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 203 103 306 401 503 603 203 312  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1 1 2  
 WEIGHT 41.42 LBS VOLUME .51 (FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9775  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 406 515 221 603 702  
 EQUIPMENT QUANTITIES 2 9 2 2 1  
 WEIGHT 94.29 LBS VOLUME 1.43 (FT\*\*3) POWER DISSIPATION 492.9 WATTS  
 HARNESS WEIGHT 77.3 (LBS), SOLAR ARRAY WEIGHT 53.4 (LBS)  
 RELIABILITY .9409

MISSION EQUIPMENT  
 WEIGHT 1250.00 LBS VOLUME 49.40 (FT\*\*3) POWER REQUIREMENT 130.0 WATTS  
 RELIABILITY .9000

VI-100

SOLAR MAX MISSION NP2-1-1

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	16.0 (FT**2),	BATTERY RADIATOR AREA	1.6 (FT**2)
HEATER POWER	1539.8 (BTU/HR),	TOTAL RADIATOR AREA	16.7 (FT**2)
HEAT PIPE LENGTH	12886.6 (WATT-IN),	BATTERY HEATER POWER	49.8 (BTU/HR)
HEAT PIPE STORED ENERGY	4.1 (FT)	TOTAL HEATER POWER	1589.6 (BTU/HR)
	105.6 (BTU)	VARIABLE CONDUCTANCE H.P.	672.2 (WATT-IN)
		AVERAGE HEAT LOAD	882.6 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	11.8
HEAT PIPES	4.4
PHASE CHANGE MATERIAL	2.6
RADIATOR (PASSIVE)	10.2
TOTAL	29.0

IERR 1100010011

STRUCTURES				
SKIN THICKNESS	.020 (IN)			
STRINGER NO., THICKNESS, HT.	153. ,	3592.097 (IN),		.375 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.108 (IN),		.538 (IN)
GRID BEAM THICKNESS	.175 (IN),	SPACING 4.918 (IN),	HEIGHT	2.459 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	72.3 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	24.1 (LBS)			
ADAPTER WEIGHT	72.4 (LBS)			

VI-101

SOLAR MAX MISSION NP2-1-1

\* \* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTRCL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCs	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1309	REACTION WHEEL	1	8.5	.1	1.1

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
203	ANTENNA	1	10.4	.1	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-102

SOLAR MAX MISSION NP2-1-1

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
221	BATTERY	2	19.8	.1	0.0
603	BATTERY CHARGER	2	2.6	.0	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1250.0
STABILITY AND CONTROL	41.3
AUXILIARY PROPULSION	62.1
DATA PROCESSING	30.1
COMMUNICATIONS	41.4
BATTERIES	39.6
POWER CONTROL	54.7
SOLAR ARRAY	53.4
HARNESS	77.3
STRUCTURE	124.9
SOLAR ARRAY DRIVE	8.9
THERMAL CONTROL	29.0
DRY WEIGHT	1812.8
PROPELLANT	85.9
SATELLITE ADAPTER	72.4
	-----
TOTAL LAUNCH WEIGHT	1971.0

VI-103



OUT-OF-ECLIPTIC SOLAR OBS NP2-1-2

\* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
POINTING ACCURACY = .60000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 9335. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 198.17 WATTS  
TOTAL SOLAR ARRAY AREA 67.91 SQ FT  
INSTALLED BATTERY CAPACITY 34.00 AMP-HR  
BEGINNING OF LIFE POWER 219.67 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WET SATELLITE WEIGHT = 1170.1 LBS ( 530.7 KG) LAUNCH WEIGHT = 1217.4 LBS ( 552.2 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 43.2 IN. ( 1.10 M) 72.0 IN. ( 1.83 M) 72.0 IN. ( 1.83 M)  
MISSION EQUIPMENT 26.6 IN. ( .68 M) 44.3 IN. ( 1.13 M) 44.3 IN. ( 1.13 M)  
TOTAL SATELLITE 69.8 IN. ( 1.77 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 160.0 IYY = 807937.0 IZZ = 807937.0  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 42.8 IN. ( 1.09 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 100000./\*\*\*\*\*/ 28.5  
MISSION LIFETIME 12.0 (MO)  
MEAN MISSION DURATION 10.7 (MO)  
RELIABILITY .722

VI-104

OUT-OF-ECLIPTIC SOLAR OBS NP2-1-2

\*\*\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1\*\*\*\*\*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 29.28 LBS VOLUME 1.18 (FT\*\*3) POWER REQUIREMENT 9.4 WATTS  
 RELIABILITY .9591  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOC PROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1116 509 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 4 9 1 1 1 1 1 1  
 WEIGHT 121.03 LBS VOLUME 4.16 (FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 64.91 (LBS), EXPENDABLE WEIGHT 56.11 (LBS)  
 RELIABILITY .9101  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39 (FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9933  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 206 308 401 503 227  
 EQUIPMENT QUANTITIES 1 1 1 1 1  
 WEIGHT 19.77 LBS VOLUME 1.43 (FT\*\*3) POWER REQUIREMENT 77.2 WATTS  
 RELIABILITY .9415  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 233 315 1202  
 EQUIPMENT QUANTITIES 3 2 2 1  
 WEIGHT 116.51 LBS VOLUME 1.68 (FT\*\*3) POWER DISSIPATION 3.3 WATTS  
 HARNESS WEIGHT 48.6 (LBS), SOLAR ARRAY WEIGHT 33.4 (LBS)  
 RELIABILITY .9828

MISSION EQUIPMENT

WEIGHT 600.00 LBS VOLUME 23.73 (FT\*\*3) POWER REQUIREMENT 100.0 WATTS  
 RELIABILITY .9000

VI-105

OUT-OF-ECLIPTIC SOLAR OBS NP2-1-2

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	6.2 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	441.3 (BTU/HR),	TOTAL RADIATOR AREA	7.4 (FT**2)
HEAT PIPE	10375.2 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.4 (FT)	TOTAL HEATER POWER	556.3 (BTU/HR)
STORED ENERGY	88.3 (BTU)	VARIABLE CONDUCTANCE H.P.	903.1 (WATT-IN)
		AVERAGE HEAT LOAD	675.8 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		15.0
HEAT PIPES		4.6
PHASE CHANGE MATERIAL		2.2
RADIATOR (PASSIVE)		3.9
		-----
TOTAL		25.7

IERR 1100010111

STRUCTURES					
SKIN THICKNESS	.015 (IN)				
STRINGER NO., THICKNESS, HT.	201.		825452.780 (IN),		.379 (IN)
FRAME NO., THICKNESS, HT.	5.		.109 (IN),		.544 (IN)
GRID BEAM THICKNESS	.134 (IN),	SPACING	3.766 (IN),	HEIGHT	1.883 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	84.9 (LBS)				
SOLAR ARRAY BECM AND DRIVE WT.	0.0 (LBS)				
ADAPTER WEIGHT	47.3 (LBS)				

VI-106

OUT-OF-ECLIPTIC SOLAR OBS NP2-1-2

\* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTRPOL ELECTRNCS	1	7.4	.4	3.5
803	EARTH SENSOR	1	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGLLATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
206	ANTENNA	1	1.5	.1	0.0
398	XTRM	1	12.1	1.2	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
227	ANTENNA	1	.8	.0	0.0

VI-107

OUT-OF-ECLIPTIC SOLAR OBS NP2-1-2

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATER	3	4.2	.1	0.0
233	BATTERY	2	34.2	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	600.0
STABILITY AND CONTROL	13.4
AUXILIARY PROPULSION	64.9
DATA PROCESSING	21.2
COMMUNICATIONS	19.8
BATTERIES	68.3
POWER CONTROL	48.2
CONVERTERS	15.9
SOLAR ARRAY	33.4
HARNESS	48.6
STRUCTURE	154.7
THERMAL CONTROL	25.7
DRY WEIGHT	1114.0
PROPELLANT	56.1
SATELLITE ADAPTER	47.3
	-----
TOTAL LAUNCH WEIGHT	1217.4

801-1A

EXPLORER (DELTA CLASS) NP2-1-3

\*\*\* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
POINTING ACCURACY = 1.00000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 6055 (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0. (IPS)

COPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
32.	128.
10.	100.
8.	8.
3.	2.
1250	1.0000
64.	64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 4.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 122.34 WATTS  
TOTAL SOLAR ARRAY AREA 100.79 SQ FT  
INSTALLED BATTERY CAPACITY 6.00 AMP-HR  
BEGINNING OF LIFE POWER 307.41 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER			
WET SATELLITE WEIGHT =	708.0 LBS ( 321.2 KG)	LAUNCH WEIGHT =	740.2 LBS ( 335.7 KG)
DIMENSIONS	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	52.7 IN. ( 1.34 M)	87.8 IN. ( 2.23 M)	87.8 IN. ( 2.23 M)
MISSION EQUIPMENT	18.3 IN. ( .46 M)	30.5 IN. ( .77 M)	30.5 IN. ( .77 M)
TOTAL SATELLITE	70.9 IN. ( 1.80 M)		
MOMENTS OF INERTIA (SLUG*FT**2)	IXX = 134.0	IYY = 649248.7	IZZ = 649248.7
	X-CG	Y-CG	Z-CG
CENTER OF GRAVITY	42.3 IN. ( 1.07 M)	0.0 IN. ( 0.00 M)	0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION: 1900. / 140. / 90.0  
MISSION LIFETIME 12.0 (MO)  
MEAN MISSION DURATION 10.7 (MO)  
RELIABILITY .724

VI-109

EXPLORER (DELTA CLASS) NP2-1-3

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 32.05 LBS VOLUME 1.29 (FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9636  
 IERR 0

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1116 506 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 4 9 1 1 1 1 1 1 1  
 WEIGHT 89.43 LBS VOLUME 3.80 (FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 53.03 (LBS), EXPENDABLE WEIGHT 36.40 (LBS)  
 RELIABILITY .9079  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 403  
 EQUIPMENT QUANTITIES 1 1 1  
 WEIGHT 30.11 LBS VOLUME .54 (FT\*\*3) POWER REQUIREMENT 13.9 WATTS  
 RELIABILITY .9899  
 IERR 2

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1 1 1  
 WEIGHT 16.32 LBS VOLUME .20 (FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9448  
 IERR\*\*\*\*\*

ELECTRICAL POWER.  
 CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 202 303 1202  
 EQUIPMENT QUANTITIES 5 2 2 1  
 WEIGHT 58.47 LBS VOLUME 1.30 (FT\*\*3) POWER DISSIPATION 159.6 WATTS  
 HARNESS WEIGHT 33.0 (LBS), SOLAR ARRAY WEIGHT 49.5 (LBS)  
 RELIABILITY .9828

MISSION EQUIPMENT  
 WEIGHT 195.00 LBS VOLUME 7.72 (FT\*\*3) POWER REQUIREMENT 82.0 WATTS  
 RELIABILITY .9000

VI-110

EXPLORER (DELTA CLASS) NP2-1-3

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	5.9 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	541.5 (BTU/HR),	TOTAL RADIATOR AREA	7.2 (FT**2)
HEAT PIPE	6509.2 (WATT-IN),	BATTERY HEATER POWER	122.2 (BTU/HR)
HEAT PIPE LENGTH	4.4 (FT)	TOTAL HEATER POWER	663.7 (BTU/HR)
STORED ENERGY	77.4 (BTU)	VARIABLE CONDUCTANCE H.P.	917.8 (WATT-IN)
		AVERAGE HEAT LOAD	417.2 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		17.6
HEAT PIPES		4.7
PHASE CHANGE MATERIAL		1.9
RADIATOR (PASSIVE)		3.7
		-----
TOTAL		27.9

IERR 1110011011

STRUCTURES				
SKIN THICKNESS	.011 (IN)			
STRINGER NO., THICKNESS, HT.	260. ,	3125.798 (IN),		.356 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.102 (IN),		.511 (IN)
GRID BEAM THICKNESS	.097 (IN),	2.735 (IN),	SPACING	HEIGHT 1.367 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	0.000 (IN),	CENTER	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	62.6 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	32.1 (LBS)			

VI-111



EXPLORER (DELTA CLASS) NP2-1-3

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	1	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	1	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	1	.8	.0	0.0
312	TRANSMITTER	1	2.2	.0	15.8

VI-112

EXPLORER (DELTA CLASS) NP2-1-3

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	5	4.2	.1	0.0
202	BATTERY	2	9.5	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	195.0
STABILITY AND CONTROL	16.2
AUXILIARY PROPULSION	53.0
DATA PROCESSING	30.1
COMMUNICATIONS	16.3
BATTERIES	19.0
POWER CONTROL	39.5
CONVERTERS	15.9
SOLAR ARRAY	49.5
HARNESS	33.0
STRUCTURE	176.2
THERMAL CONTROL	27.9
DRY WEIGHT	671.6
PROPELLANT	36.4
SATELLITE ADAPTER	32.1
<b>TOTAL LAUNCH WEIGHT</b>	<b>740.2</b>

VI-113

EXPLORER (SCOUT CLASS) NP2-1-4

\* \* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL			
CONFIGURATION -- SPIN CONTROL			
POINTING ACCURACY = 2.000000 (DEG.)			
AUXILIARY PROPULSION			
CONFIGURATION -- MONOPROPELLANT			
TOTAL IMPULSE = 6055. (LB-SEC)			
DATA PROCESSING AND INSTRUMENTATION			
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)			
COMPUTER OPERATIONS RATE = 0. (IPS)			
CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA	
NUMBER OF COMMANDS	32.	0.	
NUMBER OF MAIN FRAME WORDS	256.	0.	
MAIN FRAME SAMPLE RATE	13.	0.	
MAIN FRAME WORD LENGTH	8.	0.	
NUMBER OF SUBFRAMES	18.	0.	
SUBFRAME RATE	1250	0.0000	
NUMBER OF WORDS PER SUBFRAME	64.	0.	
COMMUNICATIONS			
CONFIGURATION -- SEPARATE UPLINK AND DOWNLINK			
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)			
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)			
ELECTRICAL POWER			
CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY			
POWER REQUIREMENT 141.17 WATTS			
TOTAL SOLAR ARRAY AREA 66.48 SQ FT			
INSTALLED BATTERY CAPACITY 6.00 AMP-HR			
BEGINNING OF LIFE POWER 215.03 WATTS			
VEHICLE SIZING			
CONFIGURATION -- CYLINDER			
WET SATELLITE WEIGHT =	589.5 LBS ( 267.4 KG)	LAUNCH WEIGHT =	613.5 LBS ( 278.3 KG)
DIMENSIONS	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	42.8 IN. ( 1.09 M)	71.3 IN. ( 1.81 M)	71.3 IN. ( 1.81 M)
MISSION EQUIPMENT	15.6 IN. ( .40 M)	25.9 IN. ( .66 M)	25.9 IN. ( .66 M)
TOTAL SATELLITE	58.3 IN. ( 1.48 M)		
MOMENTS OF INERTIA (SLUGS*FT**2)	IXX = 81.9	IYY = 375214.0	IZZ = 375214.0
	X-CG	Y-CG	Z-CG
CENTER OF GRAVITY	31.2 IN. ( .79 M)	0.0 IN. ( 0.00 M)	0.0 IN. ( 0.00 M)
RELIABILITY			
CONFIGURATION -- SINGLE SYSTEM			
APOGEE/PERIGEE/INCLINATION 20000. / 1000. / 28.5			
MISSION LIFETIME 12.0 (MO)			
MEAN MISSION DURATION 10.6 (MO)			
RELIABILITY .710			

711-1A

EXPLORER (SCOUT CLASS) NP2-1-4

\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 29.28 LBS VOLUME 1.18 (FT\*\*3) POWER REQUIREMENT 9.4 WATTS  
 RELIABILITY .9591  
 IERR 0

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1116 506 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 4 9 1 1 1 1 1 1 1  
 WEIGHT 89.43 LBS VOLUME 3.80 (FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 53.03 (LBS), EXPENDABLE WEIGHT 36.40 (LBS)  
 RELIABILITY .9080  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39 (FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9933  
 IERR 1

COMMUNICATIONS  
 CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 203 398 401 503 227  
 EQUIPMENT QUANTITIES 1 1 1 1 1  
 WEIGHT 28.67 LBS VOLUME 1.41 (FT\*\*3) POWER REQUIREMENT 77.2 WATTS  
 RELIABILITY .9394  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 102 202 303 1202  
 EQUIPMENT QUANTITIES 12 2 2 1  
 WEIGHT 97.47 LBS VOLUME 2.18 (FT\*\*3) POWER DISSIPATION 56.1 WATTS  
 HARNESS WEIGHT 34.5 (LBS), SOLAR ARRAY WEIGHT 32.7 (LBS)  
 RELIABILITY .9708

MISSION EQUIPMENT  
 WEIGHT 120.00 LBS VOLUME 4.75 (FT\*\*3) POWER REQUIREMENT 43.0 WATTS  
 RELIABILITY .9000

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EXPLORER (SCOUT CLASS) NP2-1-4

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	6.8 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	483.2 (BTU/HR),	TOTAL RADIATOR AREA	8.1 (FT**2)
HEAT PIPE	6174.5 (WATT-IN),	BATTERY HEATER POWER	122.2 (BTU/HR)
HEAT PIPE LENGTH	3.6 (FT)	TOTAL HEATER POWER	605.5 (BTU/HR)
STORED ENERGY	88.3 (BTU)	VARIABLE CONDUCTANCE H.P.	754.5 (WATT-IN)
		AVERAGE HEAT LOAD	481.4 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	13.1
HEAT PIPES	3.8
PHASE CHANGE MATERIAL	2.2
RADIATOR (PASSIVE)	4.3
	-----
TOTAL	23.4

IERR 1110011011

STRUCTURES				
SKIN THICKNESS	.011 (IN)			
STRINGER NO., THICKNESS, HT.	238. ,	4920.000 (IN),		.315 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.090 (IN),		.452 (IN)
GRID BEAM THICKNESS	.094 (IN),	SPACING 2.637 (IN),	HEIGHT	1.318 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	73.5 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	24.0 (LBS)			

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EXPLORER (SCOUT CLASS) NP2-1-4

\* \* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
803	EARTH SENSOR	1	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
634	THRUSTER	2	.7	.0	.1
506	ISCLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
398	XTMR	1	12.1	1.2	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
227	ANTENNA	1	.8	.0	0.0

VI-117

EXPLORER (SCOUT CLASS) NP2-1-4

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
102	SHUNT REGULATOR	12	5.0	.1	0.0
202	BATTERY	2	9.5	.1	0.0
203	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	120.0
STABILITY AND CONTROL	13.4
AUXILIARY PROPULSION	53.0
DATA PROCESSING	21.2
COMMUNICATIONS	28.7
BATTERIES	19.0
POWER CONTROL	78.5
CONVERTERS	15.9
SOLAR ARRAY	32.7
FARNES	34.5
STRUCTURE	112.9
THERMAL CONTROL	23.4
DRY WEIGHT	553.1
PROPELLANT	36.4
SATELLITE ADAPTER	24.0
	-----
TOTAL LAUNCH WEIGHT	613.5

811-1A

LARGE SOLAR OBS NP2-1-5

\*\*\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1\*\*\*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- THREE AXIS MASS EXPULSION  
 POINTING ACCURACY = .200000 (DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 418355 (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	64.	0.
NUMBER OF MAIN FRAME WORDS	32.	128.
MAIN FRAME SAMPL. RATE	125.	100.
MAIN FRAME WORD LENGTH	13.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS P/R SUBFRAME	64.	64.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK--COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 64.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.0000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 928.62 WATTS  
 TOTAL SOLAR ARRAY AREA 217.62 SQ FT  
 INSTALLED BATTERY CAPACITY 66.00 AMP-HR  
 BEGINNING OF LIFE POWER 2680.56 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 17317.6 LBS ( 7855.1 KG) LAUNCH WEIGHT = 17689.9 LBS ( 8024.0 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 63.3 IN. ( 1.61 M) 105.5 IN. ( 2.68 M) 105.5 IN. ( 2.68 M)  
 MISSION EQUIPMENT 69.8 IN. ( 1.77 M) 116.4 IN. ( 2.96 M) 116.4 IN. ( 2.96 M)  
 TOTAL SATELLITE 133.1 IN. ( 3.38 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 5678.7 IYY = 31044736.0 IZZ = 35179815.0  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 75.9 IN. ( 1.93 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 190.7 / 190.7 / 28.5  
 MISSION LIFETIME 24.0 (MO)  
 MEAN MISSION DURATION 21.1 (MO)  
 RELIABILITY .702

VI-119



LARGE SOLAR OBS NF2-1-5

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- THREE AXIS MASS EXPULSION  
 EQUIPMENT CODE IDENTIFIER 1501 1601 1413 1718 1803  
 EQUIPMENT QUANTITIES 2 3 1 2 2  
 WEIGHT 89.10 LBS VOLUME 1.87(FT\*\*3) POWER REQUIREMENT 56.0 WATT  
 RELIABILITY .9835  
 IERR 0

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1130 536 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 13 3 2 1 1  
 WEIGHT 3181.49 LBS VOLUME 57.92(FT\*\*3) POWER REQUIREMENT 1.0 WATT  
 DRY WEIGHT 736.51(LBS), EXPENDABLE WEIGHT 2444.98(LBS)  
 RELIABILITY .8352  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 406  
 EQUIPMENT QUANTITIES 2 2 2  
 WEIGHT 57.72 LBS VOLUME .86(FT\*\*3) POWER REQUIREMENT 11.5 WATT  
 RELIABILITY .9995  
 IERR 2

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 203 103 306 401 503 603 203 312  
 EQUIPMENT QUANTITIES 1 2 2 2 3 2 1 2  
 WEIGHT 51.94 LBS VOLUME .65(FT\*\*3) POWER REQUIREMENT 35.4 WATT  
 RELIABILITY .9892  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 410 531 260 650 702  
 EQUIPMENT QUANTITIES 2 11 2 3 2  
 WEIGHT 238.52 LBS VOLUME 4.18(FT\*\*3) POWER DISSIPATION 1462.9 WATT  
 HARNESS WEIGHT 1311.5(LBS), SOLAR ARRAY WEIGHT 151.5(LBS)  
 RELIABILITY .9536

MISSION EQUIPMENT  
 WEIGHT 10900.00 LBS VOLUME 429.82(FT\*\*3) POWER REQUIREMENT 720.0 WATT  
 RELIABILITY .9000

X1-120

LARGE SOLAR CBS MP2-1-5

\* \* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

<p>THERMAL CONTROL          RADIATOR AREA 47.5 (FT**2),          HEATER POWER 4568.5 (BTU/HR),          HEAT PIPE 82249.3 (WATT-IN),          HEAT PIPE LENGTH 8.3 (FT)          STORED ENERGY 111.5 (BTU)</p>	<p>BATTERY RADIATOR AREA .9 (FT**2)          TOTAL RADIATOR AREA 48.4 (FT**2)          BATTERY HEATER POWER 90.0 (BTU/HR)          TOTAL HEATER POWER 4658.5 (BTU/HR)          VARIABLE CONDUCTANCE H.P. 1347.7 (WATT-IN)          AVERAGE HEAT LOAD 2809.4 (BTU/HR)</p>
--	--

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	34.6
HEAT PIPES	8.7
PHASE CHANGE MATERIAL	2.8
RADIATOR (ACTIVE)	87.9
TOTAL	134.1

IERR 1100010011

STRUCTURES			
SKIN THICKNESS	.060 (IN)		
STRINGER NO., THICKNESS, HT.	123. ,	3270.587 (IN),	.910 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.261 (IN),	1.307 (IN)
GRID BEAM THICKNESS	.528 (IN),	SPACING 14.867 (IN),	HEIGHT 7.434 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTLR 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	724.17 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	40.4 (LBS)		
ADAPTER WEIGHT	372.3 (LBS)		

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LARGE SOLAR OBS NP2-1-5

\* \* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1501	CONTROL ELECT.	2	10.0	.1	4.0
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0
1718	FATE INTEGR GYRO	2	9.6	.2	32.0
1803	EARTH SENSOR	2	14.6	.2	19.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	13	20.0	3.2	0.0
536	TANK	3	110.0	4.5	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1293	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
406	COMMD DECDD+DISTR	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
193	BASEBND ASSY UNIT	2	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	2	3.1	.0	1.0
203	ANTENNA	1	10.4	.1	0.0
312	TRANSMITTER	2	2.2	.0	15.8

V1-122

LARGE SOLAR OBS NP2-1-5

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
413	DISCHGE REGULATOR	2	24.0	.5	0.0
531	SHUNT REGULATOR	11	4.3	.1	0.0
260	BATTERY	2	47.5	.2	0.0
650	BATTERY CHARGER	3	9.7	.2	9.0
702	POWER CONTROL	2	4.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	10900.0
STABILITY AND CONTROL	79.1
AUXILIARY PROPULSION	736.5
DATA PROCESSING	57.7
COMMUNICATIONS	51.9
BATTERIES	95.0
POWER CONTROL	143.5
CONVERTERS	10.0
SOLAR ARRAY	151.5
HARNESS	1311.5
STRUCTURE	1176.6
SOLAR ARRAY DRIVE	25.2
THERMAL CONTROL	134.1
DRY WEIGHT	14872.6
PROPELLANT	2445.0
SATELLITE ADAPTER	372.3

TOTAL LAUNCH WEIGHT 17689.9

V1-123

OUTER PLANET ORB PROBE (JUP) NL1-1-1

\* \* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION -- THREE AXIS MASS EXPULSION  
 POINTING ACCURACY = .300000(DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 278675.(LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR  
 COMPUTER OPERATIONS RATE = 0.(IPS)  
 CDPI TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	64.	0.
NUMBER OF MAIN FRAME WORDS	64.	0.
MAIN FRAME SAMPLE RATE	100.	0.
MAIN FRAME WORD LENGTH	13.	0.
NUMBER OF SUBFRAMES	5.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
 CONFIGURATION -- SEPARATE UPLINK AND DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 128.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)  
 ELECTRICAL POWER  
 CONFIGURATION -- RTG POWER GENERATION  
 POWER REQUIREMENT 267.16 WATTS  
 INSTALLED BATTERY CAPACITY 0.00 AMP-HR  
 BEGINNING OF LIFE POWER 570.94 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 3523.8 LBS ( 1598.4 KG) LAUNCH WEIGHT = 3648.9 LBS ( 1655.1 KG)  
 DIMENSIONS  

	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	67.9 IN. ( 1.72 M)	113.1 IN. ( 2.87 M)	113.1 IN. ( 2.87 M)
MISSION EQUIPMENT	18.0 IN. ( .46 M)	30.0 IN. ( .76 M)	30.0 IN. ( .76 M)
TOTAL SATELLITE	85.8 IN. ( 2.18 M)		

 MOMENTS OF INERTIA (SLUGS\*FT\*2) IXX = 1356.7 IYY = 4675291.3 IZZ = 4675291.3  
 CENTER OF GRAVITY X-CG 38.7 IN. ( .98 M) Y-CG 0.0 IN. ( 0.00 M) Z-CG 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 5000./ 5000./ 28.5  
 MISSION LIFETIME 84.0(MO)  
 MEAN MISSION DURATION 73.4(MO)  
 RELIABILITY .564

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OUTER PLANET ORB PROBE (JUP) NL1-1-1

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- THREE AXIS MASS EXPULSION  
 EQUIPMENT CODE IDENTIFIER 1501 1601 1413 1718 1803  
 EQUIPMENT QUANTITIES 2 3 1 2 2  
 WEIGHT 89.10 LBS VOLUME 1.87(FT\*\*3) POWER REQUIREMENT 56.0 WATTS  
 RELIABILITY .9335  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 829 834 907 1003 499 203 1124 536 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 13 2 2 1 1  
 WEIGHT 2107.28 LBS VOLUME 43.18(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 474.48(LBS), EXPENDABLE WEIGHT 1632.80(LBS)  
 RELIABILITY .6796  
 IERR 1

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 406  
 EQUIPMENT QUANTITIES 2 2  
 WEIGHT 39.86 LBS VOLUME .56(FT\*\*3) POWER REQUIREMENT 8.5 WATTS  
 RELIABILITY .9951  
 IERR 1

COMMUNICATIONS

CONFIGURATION -- SEPARATE UPLINK AND DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 227 312 401 503 227  
 EQUIPMENT QUANTITIES 2 2 2 3 2  
 WEIGHT 19.74 LBS VOLUME .23(FT\*\*3) POWER REQUIREMENT 23.0 WATTS  
 RELIABILITY .9926  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION -- RTG POWER GENERATION  
 EQUIPMENT CODE IDENTIFIER \*\*\*  
 EQUIPMENT QUANTITIES 0  
 WEIGHT 175.00 LBS VOLUME 35.00(FT\*\*3) POWER DISSIPATION 0.0 WATTS  
 HARNESS WEIGHT 227.9(LBS), RTG WEIGHT 175.0(LBS)  
 RELIABILITY 1.0000

MISSION EQUIPMENT

WEIGHT 185.00 LBS VOLUME .32(FT\*\*3) POWER REQUIREMENT 90.0 WATTS  
 RELIABILITY .9000

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OUTER PLANET ORB PROBE (JUP) NL1-1-1

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	6.9 (FT**2),	NUCLEAR POWER RADIATOR AREA	3.9 (FT**2)
HEATER POWER	639.9 (BTU/HR),	TOTAL RADIATOR AREA	10.9 (FT**2)
HEAT PIPE	11445.2 (WATT-IN),	BATTERY HEATER POWER	0.0 (BTU/HR)
HEAT PIPE LENGTH	5.4 (FT)	TOTAL HEATER POWER	639.9 (BTU/HR)
STORED ENERGY	90.6 (BTU)	VARIABLE CONDUCTANCE H.P.	0.0 (WATT-IN)
		AVERAGE HEAT LOAD	606.2 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	25.2
HEAT PIPES	5.6
PHASE CHANGE MATERIAL	2.3
RADIATOR (PASSIVE)	4.4
	-----
TOTAL	37.5

IERR 1110011011

STRUCTURES

SKIN THICKNESS	.027 (IN)		
STRINGER NO., THICKNESS, HT.	187. ,	16804.806 (IN),	.637 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.183 (IN),	.915 (IN)
GRID BEAM THICKNESS	.241 (IN),	SPACING 6.799 (IN),	HEIGHT 3.400 (IN)
ENDCOVER THICKNESS - FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	658.5 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	125.1 (LBS)		

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OUTER PLANET ORB PROBE (JUP) NL1-1-1

\* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1501	CONTROL ELECT.	2	10.0	.1	4.0
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0
1718	RATE INTEGR GYRO	2	9.6	.2	32.0
1803	EARTH SENSOR	2	14.6	.2	19.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	6	.6	.0	0.0
834	THRUSTER	2	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	13	11.5	2.4	0.0
536	TANK	2	110.0	4.5	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
406	COMMD DECOD+DISTR	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
27	ANTENNA	2	.8	.0	0.0
12	TRANSMITTER	2	2.2	.0	15.8
701	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
227	ANTENNA	3	.8	.0	0.0

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OUTER PLANET ORB PROBE (JUP) NL1-1-1

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	185.0
STABILITY AND CONTROL	79.1
AUXILIARY PROPULSION	474.5
DATA PROCESSING	39.9
COMMUNICATIONS	19.7
BATTERIES	0.0
CONVERTERS	10.0
NUCLEAR POWER UNIT	175.0
HARNESS	227.9
STRUCTURE	642.4
THERMAL CONTROL	37.5
DRY WEIGHT	1891.0
PROPELLANT	1632.8
SATELLITE ADAPTER	125.1
	-----
TOTAL LAUNCH WEIGHT	3648.9

VI+129

VENUS ORB IMAG RADAR (VOIR) NL1-1-2

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- THREE AXIS MASS EXPULSION  
 POINTING ACCURACY = .250000(DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 813981.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0.(IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPI TABLE		
NUMBER OF COMMANDS	64.	0.
NUMBER OF MAIN FRAME WORDS	64.	0.
MAIN FRAME SAMPLE RATE	100.	0.
MAIN FRAME WORD LENGTH	13.	0.
NUMBER OF SUBFRAMES	6.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 128.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 906.46 WATTS  
 TOTAL SOLAR ARRAY AREA 116.34 SQ FT  
 INSTALLED BATTERY CAPACITY 72.00 AMP-HR  
 BEGINNING OF LIFE POWER 1433.01 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 8631.3 LBS ( 3915.1 KG) LAUNCH WEIGHT = 8885.6 LBS ( 4030.4 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 93.2 IN.( 2.37 M) 120.0 IN.( 3.05 M) 120.0 IN.( 3.05 M)  
 MISSION EQUIPMENT 21.1 IN.( .54 M) 35.2 IN.( .89 M) 35.2 IN.( .89 M)  
 TOTAL SATELLITE 114.3 IN.( 2.90 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 3927.7 IYY = 15270188.8 IZZ = 16641093.7  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 51.2 IN.( 1.30 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 5000./ 5000./ 28.5  
 MISSION LIFETIME 18.0(MO)  
 MEAN MISSION DURATION 16.5(MO)  
 RELIABILITY .703

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VENUS ORB IMAG RADAR (VOIR) NLI-1-2

\* \* \* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- THREE AXIS MASS EXPULSION  
 EQUIPMENT CODE IDENTIFIER 1501 1601 1413 1718 1803  
 EQUIPMENT QUANTITIES 2 3 2 2 2  
 WEIGHT 105.00 LBS VOLUME 2.30(FT\*\*3) POWER REQUIREMENT 56.0 WATTS  
 RELIABILITY .9978  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 829 834 907 1003 499 203 1124 536 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 37 5 2 1 1  
 WEIGHT 5971.08 LBS VOLUME 114.86(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 1201.68(LBS), EXPENDABLE WEIGHT 4769.40(LBS)  
 RELIABILITY .8060  
 IERR 1

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 406  
 EQUIPMENT QUANTITIES 2 2  
 WEIGHT 39.86 LBS VOLUME .56(FT\*\*3) POWER REQUIREMENT 8.5 WATTS  
 RELIABILITY .9998  
 IERR 1

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 203 103 354 401 503 618  
 EQUIPMENT QUANTITIES 2 2 4 2 3 2  
 WEIGHT 51.14 LBS VOLUME .60(FT\*\*3) POWER REQUIREMENT 97.7 WATTS  
 RELIABILITY .9996  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 418 530 263 650 702  
 EQUIPMENT QUANTITIES 3 11 2 3 2  
 WEIGHT 242.72 LBS VOLUME 4.81(FT\*\*3) POWER DISSIPATION 368.6 WATTS  
 HARNESS WEIGHT 572.0(LBS), SOLAR ARRAY WEIGHT 81.0(LBS)  
 RELIABILITY .9714

MISSION EQUIPMENT

WEIGHT 300.00 LBS VOLUME 11.87(FT\*\*3) POWER REQUIREMENT 400.0 WATTS  
 RELIABILITY .9000

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VENUS ORB IMAG RADAR (VOIR) NL1-1-2

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	26.1 (FT**2),	BATTERY RADIATOR AREA	.5 (FT**2)
HEATER POWER	2275.5 (BTU/HR),	TOTAL RADIATOR AREA	26.6 (FT**2)
HEAT PIPE	48201.5 (WATT-IN),	BATTERY HEATER POWER	33.3 (BTU/HR)
HEAT PIPE LENGTH	7.1 (FT)	TOTAL HEATER POWER	2308.8 (BTU/HR)
STORED ENERGY	126.0 (BTU)	VARIABLE CONDUCTANCE H.P.	1157.0 (WATT-IN)
		AVERAGE HEAT LOAD	1917.9 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	33.9
HEAT PIPES	7.5
PHASE CHANGE MATERIAL	3.2
RADIATOR (PASSIVE)	16.5
	----
TOTAL	61.1

IERR 110001011'

STRUCTURES				
SKIN THICKNESS	.046 (IN)			
STRINGER NO., THICKNESS, HT.	148. ,	16804.806 (IN),		.856 (IN)
FRAME NO., THICKNESS, HT.	6. ,	.246 (IN),		1.229 (IN)
GRID BEAM THICKNESS	.381 (IN),	SPACING 10.725 (IN),	HEIGHT	5.362 (IN)
ENDCLVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	1323.2 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	28.6 (LBS)			
ADAPTER WEIGHT	254.3 (LBS)			

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VENUS ORB IMAG RADAR (VOIR) NL1-1-2

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
418	DISCHGE REGULATOR	3	24.0	.6	0.0
530	SHUNT REGULATOR	11	2.2	.0	0.0
263	BATTERY	2	49.5	.4	0.0
650	BATTERY CHARGER	3	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	300.0
STABILITY AND CONTROL	95.0
AUXILIARY PROPULSION	1201.7
DATA PROCESSING	39.9
COMMUNICATIONS	51.1
BATTERIES	99.0
POWER CONTROL	143.7
CONVERTERS	10.0
SOLAR ARRAY	81.0
HARNESS	572.0
STRUCTURE	1193.9
SOLAR ARRAY DRIVE	13.4
THERMAL CONTROL	61.1
DRY WEIGHT	3861.9
PROPELLANT	4769.4
SATELLITE ADAPTER	254.3

TOTAL LAUNCH WEIGHT 8885.6

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MERCURY ORBITER/SEPS NL1-1-3

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- THREE AXIS MASS EXPULSION

POINTING ACCURACY = 1.300000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 42149.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DIO)

COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

64.	0.
64.	0.
100.	0.
13.	0.
5.	0.
1:0000	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

PRIMARY DOWNLINK DATA RATE = 128.000(KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

POWER REQUIREMENT 445.08 WATTS

TOTAL SOLAR ARRAY AREA 60.10 SQ FT

INSTALLED BATTERY CAPACITY 36.00 AMP-HR

BEGINNING OF LIFE POWER 740.31 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1792.3 LBS ( 813.0 KG)

LAUNCH WEIGHT = 1860.4 LBS ( 843.8 KG)

DIMENSIONS LENGTH

HEIGHT

EQUIPMENT BAY 37.4 IN.( .95 M)

62.4 IN.( 1.59 M)

MISSION EQUIPMENT 46.0 IN.( 1.17 M)

27.9 IN.( .71 M)

TOTAL SATELLITE 83.5 IN.( 2.12 M)

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX =

238.8 IYY = 1348759.5 IZZ = 1608807.0

CENTER OF GRAVITY 7.2 IN.( .18 M)

Y-CG 0.0 IN.( 0.00 M) Z-CG 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 5000.7 0.0

MISSION LIFETIME 28.0 (MO)

MEAN MISSION DURATION 23.3 (MO)

RELIABILITY .604

71-134

MERCURY ORBITER/SEPS NL1-1-3

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- THREE AXIS MASS EXPULSION  
 EQUIPMENT CODE IDENTIFIER 1501 1601 1413 1718 1801  
 EQUIPMENT QUANTITIES 1 2 1 1 1  
 WEIGHT 53.30 LBS VOLUME 1.23(FT\*\*3) POWER REQUIREMENT 56.0 WATTS  
 RELIABILITY .8849  
 IERR 0

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 907 1003 499 203 1130 521 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 1 1 1 1 1  
 WEIGHT 344.47 LBS VOLUME 9.90(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 101.61(LBS), EXPENDABLE WEIGHT 242.86(LBS)  
 RELIABILITY .8587  
 IERR 1

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 406  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 19.93 LBS VOLUME .28(FT\*\*3) POWER REQUIREMENT 0.5 WATTS  
 RELIABILITY .9669  
 IERR 1

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 203 103 354 401 503 618  
 EQUIPMENT QUANTITIES 1 1 3 1 2 1  
 WEIGHT 29.07 LBS VOLUME .33(FT\*\*3) POWER REQUIREMENT 97.7 WATTS  
 RELIABILITY .9700  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 406 515 236 609 702  
 EQUIPMENT QUANTITIES 2 7 2 2 1  
 WEIGHT 115.13 LBS VOLUME 1.82(FT\*\*3) POWER DISSIPATION 181.0 WATTS  
 HARNESS WEIGHT 42.1(LBS), SOLAR ARRAY WEIGHT 41.9(LBS)  
 RELIABILITY .9420

MISSION EQUIPMENT  
 WEIGHT 150.00 LBS VOLUME 37.57(FT\*\*3) POWER REQUIREMENT 100.0 WATTS  
 RELIABILITY .9000

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MERCURY ORBITER/SEPS NL1-1-3

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	12.2 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	919.5 (BTU/HR),	TOTAL RADIATOR AREA	13.1 (FT**2)
HEAT PIPE	16478.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	5.2 (FT)	TOTAL HEATER POWER	1009.5 (BTU/HR)
STORED ENERGY	117.5 (BTU)	VARIABLE CONDUCTANCE H.P.	845.2 (WATT-IN)
		AVERAGE HEAT LOAD	897.5 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	15.4
HEAT PIPES	5.5
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	7.7
TOTAL	31.5

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.019 (IN)		
STRINGER NO., THICKNESS, HT.	166. ,	16804.806 (IN),	.397 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.114 (IN),	.570 (IN)
GRID BEAM THICKNESS	.170 (IN),	SPACING 4.781 (IN),	HEIGHT 2.391 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	114.0 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	22.1 (LBS)		
ADAPTER WEIGHT	68.1 (LBS)		

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MERCURY ORBITER/SEPS NL1-1-3

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1501	CONTROL ELECT.	1	10.0	.1	4.0
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0
1718	RATE INTEGR GYRO	1	9.6	.2	32.0
1803	EARTH SENSOR	1	14.6	.2	19.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	20.0	3.2	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
406	COMHD DECOD+DISTR	1	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
354	TRANSMITTER	3	2.8	.0	90.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
618	DIPLEXER	1	1.5	.0	0.0

V1137

MERCURY ORBITER/SEPS NL1-1-3

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	7	2.3	.0	0.0
236	BATTERY	2	31.5	.3	0.0
609	BATTERY CHARGER	2	3.6	.1	0.0
702	POWER CONTROL	1	0.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	150.0
STABILITY AND CONTROL	43.3
AUXILIARY PROPULSION	101.6
DATA PROCESSING	19.9
COMMUNICATIONS	29.1
BATTERIES	63.0
POWER CONTROL	52.2
CONVERTERS	10.0
SOLAR ARRAY	41.9
HARNESS	42.1
STRUCTURE	157.9
SOLAR ARRAY DRIVE	6.9
THERMAL CONTROL	31.5
DRY WEIGHT	749.4
PROPELLANT	242.9
SATELLITE ADAPTER	68.1
AKM	800.0

TOTAL LAUNCH WEIGHT 1860.4

N1-13

SATURN-URANUS PROBE NL1-1-4

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STARILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = 1.300000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONO PROPELLANT  
TOTAL IMPULSE = 30800.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- SEPARATE UPLINK AND DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 219.44 WATTS  
TOTAL SOLAR ARRAY AREA 65.43 SQ FT  
INSTALLED BATTERY CAPACITY 18.00 AMP-HR  
BEGINNING OF LIFE POWER 302.64 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 778.9 LBS ( 353.3 KG) LAUNCH WEIGHT = 808.5 LBS ( 366.8 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 42.4 IN.( 1.08 M) 70.7 IN.( 1.80 M) 70.7 IN.( 1.80 M)  
MISSION EQUIPMENT 13.9 IN.( .35 M) 23.1 IN.( .59 M) 23.1 IN.( .59 M)  
TOTAL SATELLITE 56.3 IN.( 1.43 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 118.4 IYY = 485040.5 IZZ = 485040.5  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 27.5 IN.( .70 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 28.5  
MISSION LIFETIME 85.0(MO)  
MEAN MISSION DURATION 70.7(MO)  
RELIABILITY .509

V1-139

SATURN-URANUS PROBE NL1-1-4

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413  
 EQUIPMENT QUANTITIES 1 2 1 2 3 1  
 WEIGHT 39.54 LBS VOLUME 1.62 (FT\*\*3) POWER REQUIREMENT 9.4 WATTS  
 RELIABILITY .9533  
 IERR 0

AUXILIARY PROVISION

CONFIGURATION - - MONO PROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 907 1003 499 203 1118 521 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 3 1 2 1 1  
 WEIGHT 279.33 LBS VOLUME 7.89 (FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 94.63 (LBS), EXPENDABLE WEIGHT 184.70 (LBS)  
 RELIABILITY .8081  
 IERR 1

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39 (FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9532  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 203 398 401 503 203  
 EQUIPMENT QUANTITIES 1 2 1 3 1  
 WEIGHT 53.42 LBS VOLUME 2.78 (FT\*\*3) POWER REQUIREMENT 77.2 WATTS  
 RELIABILITY .9217  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 213 303 1202  
 EQUIPMENT QUANTITIES 5 2 3 1  
 WEIGHT 77.36 LBS VOLUME 1.34 (FT\*\*3) POWER DISSIPATION 20.6 WATTS  
 HARNESS WEIGHT 41.1 (LBS), SOLAR ARRAY WEIGHT 32.2 (LBS)  
 RELIABILITY .8350

MISSION EQUIPMENT

WEIGHT 85.100 LBS VOLUME 3.37 (FT\*\*3) POWER REQUIREMENT 46.0 WATTS  
 RELIABILITY .9000

041-11

SATURN-URANUS PPORE NL1-1-4

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL				
RADIATOR AREA	4.2 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)	
HEATER POWER	238.2 (BTU/HR),	TOTAL RADIATOR AREA	5.5 (FT**2)	
HEAT PIPE	6086.4 (WATT-IN),	BATTERY HEATER POWER	113.9 (BTU/HR)	
HEAT PIPE LENGTH	3.5 (FT)	TOTAL HEATER POWER	352.2 (BTU/HR)	
STORED ENERGY	80.4 (BTU)	VARIABLE CONDUCTANCE H.P.	728.3 (WATT-IN)	
		AVERAGE HEAT LOAD	491.6 (BTU/HR)	

THERMAL CONTROL WEIGHT		
	UNIT WEIGHT (LBS)	
INSULATION	12.7	
HEAT PIPES	3.7	
PHASE CHANGE MATERIAL	2.0	
RADIATOR (PASSIVE)	2.7	
	-----	
TOTAL	21.1	

IERP 1100010111

STRUCTURES				
SKIN THICKNESS	.013 (IN)			
STRINGER NO. THICKNESS, HT.	217. ,	81910.347 (IN),	.344 (IN)	
FRAME NO. THICKNESS, HT.	5. ,	.099 (IN),	.494 (IN)	
GRID BEAM THICKNESS	.112 (IN),	SPACING 3.164 (IN),	HEIGHT 1.582 (IN)	
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	129.4 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	29.6 (LBS)			

NL1-1-4

SATURN-URANUS PROBE NL1-1-4

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.5	.1	5.9
303	SUN SENSOR	2	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
803	EARTH SENSOR	3	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
409	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	3	10.2	1.3	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
398	XTRM	2	12.1	1.2	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
203	ANTENNA	1	10.4	.1	0.0

VI-142

SATJRN-URANUS PROBE NL1-1-4

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	5	4.2	.1	0.0
213	BATTERY	2	17.2	.1	0.0
303	BATTERY CHARGER	3	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	85.0
STABILITY AND CONTROL	23.6
AUXILIARY PROPULSION	94.6
DATA PROCESSING	21.2
COMMUNICATIONS	53.4
BATTERIES	34.4
POWER CONTROL	42.9
CONVERTERS	15.9
SOLAR ARRAY	32.2
HARNESS	41.1
STRUCTURE	128.8
THERMAL CONTROL	21.1
DRY WEIGHT	594.2
PROPELLANT	184.7
SATELLITE ADAPTER	29.6
-----	
TOTAL LAUNCH WEIGHT	808.6

VI-143

DUAL COMET FLYBY NL1-1-5

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .250000 (DFG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 11535. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0. (IPS)

COPT TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
64.  
16.  
8.  
4.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
128.  
100.  
8.  
2.  
1.0000  
64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 744.46 WATTS  
TOTAL SOLAR ARRAY AREA 84.17 SQ FT  
INSTALLED BATTERY CAPACITY 100.00 AMP-HR  
BEGINNING OF LIFE POWER 1071.69 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1101.5 LBS ( 499.7 KG) LAUNCH WEIGHT = 1143.1 LBS ( 518.5 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 36.2 IN. ( .92 M) 60.3 IN. ( 1.53 M) 60.3 IN. ( 1.53 M)  
MISSION EQUIPMENT 22.0 IN. ( .56 M) 36.7 IN. ( .93 M) 36.7 IN. ( .93 M)  
TOTAL SATELLITE 58.2 IN. ( 1.48 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 196.3 IYY = 537051.1 IZZ = 987066.9  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 30.1 IN. ( .77 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 19323./19323./ 28.5  
MISSION LIFETIME 36.0 (MO)  
MEAN MISSION DURATION 31.1 (MO)  
RELIABILITY .701

44-1-11



DUAL COMET FLYBY NL1-1-5

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 1 1  
 WEIGHT 37.90 LBS VOLUME 1.18 (FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9550  
 IERR 10

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1116 503 701 1203 603  
 EQUIPMENT QUANTITIES 12 4 5 9 2 1 1 1 2 1 1  
 WEIGHT 125.44 LBS VOLUME 4.90 (FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 60.33 (LBS), EXPENDABLE WEIGHT 65.10 (LBS)  
 RELIABILITY .9545  
 IERR 0

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 403  
 EQUIPMENT QUANTITIES 1 1 1  
 WEIGHT 30.11 LBS VOLUME .54 (FT\*\*3) POWER REQUIREMENT 13.5 WATTS  
 RELIABILITY .9700  
 IERR 2

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 203 103 336 401 503 618 203 398  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1 1 2  
 WEIGHT 60.42 LBS VOLUME 2.87 (FT\*\*3) POWER REQUIREMENT 147.7 WATTS  
 RELIABILITY .9557  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 412 515 269 650 702  
 EQUIPMENT QUANTITIES 2 9 2 2 1  
 WEIGHT 224.69 LBS VOLUME 2.73 (FT\*\*3) POWER DISSIPATION 125.1 WATTS  
 HARNESS WEIGHT 51.7 (LBS), SOLAR ARRAY WEIGHT 58.6 (LBS)  
 RELIABILITY .9215

MISSION EQUIPMENT  
 WEIGHT 340.00 LBS VOLUME 13.45 (FT\*\*3) POWER REQUIREMENT 300.0 WATTS  
 RELIABILITY .9000

VI-145

DUAL COMET FLYBY NL1-1-5

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	33.7 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	1238.7 (BTU/HR),	TOTAL RADIATOR AREA	34.6 (FT**2)
HEAT PIPE	23580.1 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	3.6 (FT)	TOTAL HEATER POWER	1326.7 (BTU/HR)
STORED ENERGY	141.4 (BTU)	VARIABLE CONDUCTANCE H.P.	589.2 (WATT-IN)
		AVERAGE HEAT LOAD	1842.5 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	11.7
HEAT PIPES	3.8
PHASE CHANGE MATERIAL	3.5
RADIATOR (PASSIVE)	21.4
	-----
TOTAL	40.4

IERR 11C0110111

STRUCTURES

SKIN THICKNESS	.015 (IN)		
STRINGER NO., THICKNESS, HT.	185.		
FRAME NO., THICKNESS, HT.	5.	81910.347 (IN),	.344 (IN)
GRID BEAM THICKNESS	.132 (IN),	.099 (IN),	.495 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	SPACING 3.724 (IN),	HEIGHT 1.862 (IN)
EQUIPMENT BAY STRUCTURE WT.	97.12 (LBS)	CENTER 0.000 (IN),	AFT .030 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	24.9 (LBS)		
ADAPTER WEIGHT	41.6 (LBS)		

971-1A

DUAL COMET FLYBY NL1-1-5

\* \* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
907	ISCLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
336	TRANSMITTER	2	2.5	.0	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
618	DIPLEXER	1	1.5	.0	0.0
203	ANTENNA	1	10.4	.1	0.0
398	XT.RR	2	12.1	1.2	70.0

VI-147

DUAL COMET FLYBY NL1-1-5

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
412	DISCHGE REGULATOR	2	16.4	.4	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	340.0
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	60.3
DATA PROCESSING	30.1
COMMUNICATIONS	60.4
BATTERIES	142.6
POWER CONTROL	82.1
SOLAR ARRAY	58.6
HARNES	51.7
STRUCTURE	122.6
SOLAR ARRAY DRIVE	9.7
THERMAL CONTROL	40.4
OPY WEIGHT	1036.4
PROPELLANT	65.1
SATELLITE ADAPTER	41.6

TOTAL LAUNCH WEIGHT 1143.1

971-17

SATURN ORB/TITAN LANDER NL1-1-6

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .300000 (DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 28901. (LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

COPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	4.	2.
SUBFRAME RATE	.1250	1.00
NUMBER OF WORDS PER SUBFRAME	64.	64.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- RTG POWER GENERATION  
 POWER REQUIREMENT 615.34 WATTS  
 INSTALLED BATTERY CAPACITY 0.00 AMP-HR  
 BEGINNING OF LIFE POWER 1274.69 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 4442.6 LBS ( 2015.1 KG) LAUNCH WEIGHT = 4620.7 LBS ( 2095.9 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 88.0 IN. ( 2.23 M) 120.0 IN. ( 3.05 M) 120.0 IN. ( 3.05 M)  
 MISSION EQUIPMENT 41.6 IN. ( 1.06 M) 69.3 IN. ( 1.76 M) 69.3 IN. ( 1.76 M)  
 TOTAL SATELLITE 129.6 IN. ( 3.29 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 1433.0 IYY = 7700067.8 IZZ = 7700067.8  
 CENTER OF GRAVITY X-CG 81.5 IN. ( 2.07 M) Y-CG 0.0 IN. ( 0.00 M) Z-CG 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APCGEE/PERIGEE/INCLINATION 19323./19323./ 28.5  
 MISSION LIFETIME 80.0 (MO)  
 MEAN MISSION DURATION 65.10 (MO)  
 RELIABILITY .1519

VI-149

SATURN ORB/TITAN LANDER NL1-1-6

\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 1 1  
 WEIGHT 37.90 LBS VOLUME 1.18(FT\*\*3) POWER REQUIREMENT 70.9 WATTS  
 RELIABILITY .8927  
 IERR 10

AUXILIARY PROPULSION  
 CONFIGURATION - - MONC PROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1127 509 701 1203 603  
 EQUIPMENT QUANTITIES 12 4 5 9 2 1 1 1 2 1 1  
 WEIGHT 233.92 LBS VOLUME 6.63(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 69.71(LBS), EXPENDABLE WEIGHT 164.22(LBS)  
 RELIABILITY .7736  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 403  
 EQUIPMENT QUANTITIES 1 1 1  
 WEIGHT 30.11 LBS VOLUME .54(FT\*\*3) POWER REQUIREMENT 13.5 WATTS  
 RELIABILITY .9346  
 IERR 2

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 203 103 336 401 503 618 203 398  
 EQUIPMENT QUANTITIES 1 1 2 1 3 1 1 2  
 WEIGHT 61.92 LBS VOLUME 2.89(FT\*\*3) POWER REQUIREMENT 147.7 WATTS  
 RELIABILITY .8931  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - RTG POWER GENERATION  
 EQUIPMENT CODE IDENTIFIER \*\*\*\*  
 EQUIPMENT QUANTITIES 0  
 WEIGHT 525.00 LBS VOLUME 105.00(FT\*\*3) POWER DISSIPATION 0.0 WATTS  
 HARNESS WEIGHT 381.9(LBS), RTG WEIGHT 525.0(LBS)  
 RELIABILITY 1.5330

MISSION EQUIPMENT  
 WEIGHT 2300.00 LBS VOLUME 90.84(FT\*\*3) POWER REQUIREMENT 170.0 WATTS  
 RELIABILITY .9000

VI-150

SATURN ORB/TITAN LANDER NL1-1-6

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	24.5 (FT**2),	NUCLEAR POWER RADIATOR AREA	17.8 (FT**2)
HEATER POWER	800.6 (BTU/HR),	TOTAL RADIATOR AREA	42.3 (FT**2)
HEAT PIPE	39870.4 (WATT-IN),	BATTERY HEATER POWER	0.0 (BTU/HR)
HEAT PIPE LENGTH	8.1 (FT)	TOTAL HEATER POWER	800.6 (BTU/HR)
STORED ENERGY	142.8 (BTU)	VARIABLE CONDUCTANCE H.P.	0.0 (WATT-IN)
		AVERAGE HEAT LOAD	1399.2 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		37.9
HEAT PIPES		8.5
PHASE CHANGE MATERIAL		3.6
RADIATOR (PASSIVE)		15.5
	TOTAL	65.5

IERR 1100110111

STRUCTURES				
SKIN THICKNESS	.030 (IN)			
STRINGER NO., THICKNESS, HT.	183. ,	81910.347 (IN),		.691 (IN)
FRAME NO., THICKNESS, HT.	6. ,	.198 (IN),		.992 (IN)
GRID BEAM THICKNESS	.253 (IN),	SPACING 7.117 (IN),	HEIGHT	3.558 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 9.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	251.13 (LBS)			
SOLAR ARRAY BOOM AND CRIVE WT.	15.2 (LBS)			
ADAPTER WEIGHT	178.1 (LBS)			

VI-151

SATURN ORB/TITAN LANDER NL1-1-6

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1127	TANK	1	16.7	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
336	TRANSMITTER	2	2.5	.0	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMAND SIG COND	3	1.5	.0	.9
618	DIPLEXER	1	1.5	.0	0.0
203	ANTENNA	1	10.4	.1	0.0
398	XTMR	2	12.1	1.2	70.0

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WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	2300.0 *
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	69.7
DATA PROCESSING	30.1
COMMUNICATIONS	61.9
BATTERIES	0.0
NUCLEAR POWER UNIT	525.0
HARNES	381.9
STRUCTURE	806.3
THERMAL CONTROL	65.5
DRY WEIGHT	4278.4
PROPELLANT	164.2
SATELLITE ADAPTER	178.1
	-----
TOTAL LAUNCH WEIGHT	4620.7

\* Incl. retrorocket wt (1300#)

VI-153

MARS POLAR ORBITER NL1-1-7

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- THREE AXIS MASS EXPULSION  
 POINTING ACCURACY = .300000( DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 151855. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	64.	0.
NUMBER OF MAIN FRAME WORDS	64.	0.1
MAIN FRAME SAMPLE RATE	100.	0.1
MAIN FRAME WORD LENGTH	13.	0.
NUMBER OF SUBFRAMES	5.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 128.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT -PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 582.76 WATTS  
 TOTAL SOLAR ARRAY AREA 72.43 SQ FT  
 INSTALLED BATTERY CAPACITY 34.00 AMP-HR  
 BEGINNING OF LIFE POWER 892.10 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 2829.5 LBS ( 1283.4 KG) LAUNCH WEIGHT = 2931.5 LBS ( 1329.7 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 49.1 IN. ( 1.25 M) 81.8 IN. ( 2.08 M) 81.8 IN. ( 2.08 M)  
 MISSION EQUIPMENT 26.6 IN. ( .68 M) 44.3 IN. ( 1.13 M) 44.3 IN. ( 1.13 M)  
 TOTAL SATELLITE 75.7 IN. ( 1.92 M)  
 MOMENTS OF INERTIA (SLUG\*FT\*\*2) IXX = 618.9 IYY = 2363842.1 IZZ = 2803556.1  
 CENTER OF GRAVITY X-CG 34.8 IN. ( .88 M) Y-CG 0.0 IN. ( 0.00 M) Z-CG 0.0 IN. ( 0.00 M)

LIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 5000./ 5000./ 28.5  
 MISSION LIFETIME 36.0 (MO)  
 MEAN MISSION DURATION 32.8 (MO)  
 RELIABILITY .754

VI-154

MARS POLAR ORBITER NL1-1-7

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- THREE AXIS MASS EXPULSION  
 EQUIPMENT CODE IDENTIFIER 1501 1601 1413 1718 1803  
 EQUIPMENT QUANTITIES 2 2 1 2 2  
 WEIGHT 87.50 LBS VOLUME 1.71 (FT\*\*3) POWER REQUIREMENT 56.0 WATTS  
 RELIABILITY .9786  
 IERR 0

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 536 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 11 2 2 1 1  
 WEIGHT 1357.59 LBS VOLUME 26.22 (FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 427.15 (LBS), EXPENDABLE WEIGHT 930.44 (LBS)  
 RELIABILITY .8908  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 406  
 EQUIPMENT QUANTITIES 1 2  
 WEIGHT 30.93 LBS VOLUME .40 (FT\*\*3) POWER REQUIREMENT 0.5 WATTS  
 RELIABILITY .9891  
 IERR 1

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 203 103 354 401 503 618  
 EQUIPMENT QUANTITIES 1 1 4 2 3 2  
 WEIGHT 38.74 LBS VOLUME .44 (FT\*\*3) POWER REQUIREMENT 97.7 WATTS  
 RELIABILITY .9859  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT -PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 112 233 315 1202  
 EQUIPMENT QUANTITIES 10 2 3 1  
 WEIGHT 129.41 LBS VOLUME 1.74 (FT\*\*3) POWER DISSIPATION 141.6 WATTS  
 HARNESS WEIGHT 174.0 (LBS), SOLAR ARRAY WEIGHT 50.4 (LBS)  
 RELIABILITY .9859

MISSION EQUIPMENT  
 WEIGHT 600.100 LBS VOLUME 23.73 (FT\*\*3) POWER REQUIREMENT 00.0 WATTS  
 RELIABILITY .9000

V1-155

5-3

MARS POLAR ORBITER NL1-1-7

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	11.3 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	926.3 (BTU/HR),	TOTAL RADIATOR AREA	12.5 (FT**2)
HEAT PIPE	13900.8 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.7 (FT)	TOTAL HEATER POWER	941.3 (BTU/HR)
STORED ENERGY	125.5 (BTU)	VARIABLE CONDUCTANCE H.P.	978.9 (WATT-IN)
		AVERAGE HEAT LOAD	829.3 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	17.5
HEAT PIPES	5.0
PHASE CHANGE MATERIAL	3.1
RADIATOR (PASSIVE)	7.2
	-----
TOTAL	32.8

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.025 (IN)			
STRINGER NO., THICKNESS, HT.	168. ,	16804.806 (IN),		.514 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.147 (IN),		.737 (IN)
GRID BEAM THICKNESS	.217 (IN),	SPACING 6.104 (IN),	HEIGHT	3.052 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	331.1 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	23.6 (LBS)			
ADAPTER WEIGHT	102.0 (LBS)			

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MARS POLAR ORBITER NL1-1-7

\* \* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1501	CONTROL ELECT.	2	10.0	.1	4.0
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0
1718	RATE INTEGR GYRO	2	9.6	.2	32.0
1803	EARTH SENSOR	2	14.6	.2	19.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	11	10.2	1.3	0.0
536	TANK	2	110.0	4.5	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
406	COMMO DECOD+DISTR	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
354	TRANSMITTER	4	1.8	.0	90.0
401	RECEIVER	2	1.9	.1	6.3
503	COMMAND SIG COND	3	.5	.0	.9
618	DIPLEXER	2	.5	.0	0.0

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MARS POLAR ORBITER NL1-1-7

\*\*\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
112	SHUNT REGULATOR	10	1.4	.0	0.0
233	BATTERY	2	34.2	.2	0.0
315	BATTERY CHARGER	3	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	600.0
STABILITY AND CONTROL	77.5
AUXILIARY PROPULSION	427.2
DATA PROCESSING	30.9
COMMUNICATIONS	38.7
BATTERIES	68.3
POWER CONTROL	61.1
CONVERTERS	10.0
SOLAR ARRAY	50.4
HARNESS	174.0
STRUCTURE	319.8
SOLAR ARRAY DRIVE	8.4
THERMAL CONTROL	32.8
DRY WEIGHT	1899.0
PROPELLANT	930.4
SATELLITE ADAPTER	102.0
	-----

TOTAL LAUNCH WEIGHT 2931.5

✓ 1-158

F/O JUPITER(SEPS) NL1-1-8

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1\*\*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 153137. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
COPI TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	32.	64.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- RTG POWER GENERATION  
 POWER REQUIREMENT 558.30 WATTS  
 INSTALLED BATTERY CAPACITY 0.00 AMP-HR  
 BEGINNING OF LIFE POWER 821.05 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 2595.3 LBS ( 1177.2 KG) LAUNCH WEIGHT = 2697.4 LBS ( 1223.5 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 73.6 IN. ( 1.87 M) 120.0 IN. ( 3.05 M) 120.0 IN. ( 3.05 M)  
 MISSION EQUIPMENT 16.8 IN. ( .43 M) 27.9 IN. ( .71 M) 27.9 IN. ( .71 M)  
 TOTAL SATELLITE 90.3 IN. ( 2.29 M)  
 MOMENTS OF INERTIA (SLUG\*FT\*\*2) IXX = 1008.6 IYY = 3545744.4 IZZ = 3545744.4  
 CENTER OF GRAVITY X-CG Y-CG Z-CG  
 42.1 IN. ( 1.07 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 19323.1/19323.1 28.5  
 MISSION LIFETIME 36.0 (MO)  
 MEAN MISSION DURATION 32.9 (MO)  
 RELIABILITY .753

VI-159

F/O JUPITER(SEPS) NL1-1-8

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 3 2 2 2  
 WEIGHT 60.00 LBS VOLUME 1.93(FT\*\*3) POWER REQUIREMENT 70.9 WATTS  
 RELIABILITY .9964  
 IERR 10

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130 527 701 1203 603  
 EQUIPMENT QUANTITIES 18 10 5 9 2 1 5 1 2 1 1  
 WEIGHT 1044.21 LBS VOLUME 21.22(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 179.91(LBS), EXPENDABLE WEIGHT 864.29(LBS)  
 RELIABILITY .8610  
 IERR 1

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 403  
 EQUIPMENT QUANTITIES 2 2 2  
 WEIGHT 60.22 LBS VOLUME 1.09(FT\*\*3) POWER REQUIREMENT 13.5 WATTS  
 RELIABILITY .9997  
 IERR 2

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 203 103 336 401 503 618 203 398  
 EQUIPMENT QUANTITIES 1 2 2 2 3 2 1 2  
 WEIGHT 69.34 LBS VOLUME 3.00(FT\*\*3) POWER REQUIREMENT 17.66 WATTS  
 RELIABILITY .9759  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - RTG POWER GENERATION

EQUIPMENT CODE IDENTIFIER \*\*\*  
 EQUIPMENT QUANTITIES 0  
 WEIGHT 350.00 LBS VOLUME 70.00(FT\*\*3) POWER DISSIPATION 0.0 WATTS  
 HARNESS WEIGHT 203.7(LBS), RTG WEIGHT 350.0(LBS)  
 RELIABILITY 1.5330

MISSION EQUIPMENT

WEIGHT 150.00 LBS VOLUME 5.94(FT\*\*3) POWER REQUIREMENT 75.0 WATTS  
 RELIABILITY .9000

VI-160



F/O JUPITER (SEPS) NL1-1-8

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

<p>THERMAL CONTROL RADIATOR AREA</p>	<p>18.8 (FT**2),</p>	<p>NUCLEAR POWER RADIATOR AREA</p>	<p>12.1 (FT**2)</p>
<p>HEATER POWER</p>	<p>515.8 (BTU/HR),</p>	<p>TOTAL RADIATOR AREA</p>	<p>31.0 (FT**2)</p>
<p>HEAT PIPE</p>	<p>21362.5 (WATT-IN),</p>	<p>BATTERY HEATER POWER</p>	<p>0.0 (BTU/HR)</p>
<p>HEAT PIPE LENGTH</p>	<p>5.6 (FT)</p>	<p>TOTAL HEATER POWER</p>	<p>515.8 (BTU/HR)</p>
<p>STORED ENERGY</p>	<p>132.9 (BTU)</p>	<p>VARIABLE CONDUCTANCE H.P.</p>	<p>0.0 (WATT-IN)</p>
		<p>AVERAGE HEAT LOAD</p>	<p>1075.2 (BTU/HR)</p>

<p>THERMAL CONTROL WEIGHT</p>	<p>UNIT WEIGHT (LBS)</p>
<p>INSULATION</p>	<p>27.6</p>
<p>HEAT PIPES</p>	<p>5.9</p>
<p>PHASE CHANGE MATERIAL</p>	<p>3.3</p>
<p>RADIATOR (PASSIVE)</p>	<p>11.9</p>
<p>TOTAL</p>	<p>48.8</p>

IERR 1100110111

<p>STRUCTURES</p>				
<p>SKIN THICKNESS</p>	<p>.023 (IN)</p>			
<p>STRINGER NO., THICKNESS, HT.</p>	<p>212. ,</p>	<p>81910.347 (IN),</p>		<p>.597 (IN)</p>
<p>FRAME NO., THICKNESS, HT.</p>	<p>5.1 ,</p>	<p>.171 (IN),</p>		<p>.857 (IN)</p>
<p>GRID BEAM THICKNESS</p>	<p>.199 (IN),</p>	<p>SPACING 5.593 (IN),</p>	<p>HEIGHT 2.796 (IN)</p>	
<p>ENDCOVER THICKNESS- FORWARD</p>	<p>.030 (IN),</p>	<p>CENTER 0.000 (IN),</p>	<p>AFT</p>	<p>.030 (IN)</p>
<p>EQUIPMENT BAY STRUCTURE WT.</p>	<p>432.2 (LBS)</p>			
<p>SOLAR ARRAY BOOM AND DRIVE WT.</p>	<p>0.0 (LBS)</p>			
<p>ADAPTER WEIGHT</p>	<p>102.11 (LBS)</p>			

VI-191

F/O JUPITER(SEPS) NL1-1-8

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	10	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	5	17.3	3.2	0.0
527	TANK	1	30.0	1.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
403	COMMD DECOD+DISTR	2	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	2	2.0	.0	.5
336	TRANSMITTER	2	2.5	.0	70.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
618	DIPLEXER	2	1.5	.0	0.0
203	ANTENNA	1	10.4	.1	0.0
398	XTMR	2	12.1	1.2	70.0

V1-162

F/O JUPITER(SEPS) NL1-1-8

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	150.0
STABILITY AND CONTROL	60.0
AUXILIARY PROPULSION	179.9
DATA PROCESSING	60.2
COMMUNICATIONS	69.3
BATTERIES	0.0
NUCLEAR POWER UNIT	350.0
HARNES	203.7
STRUCTURE	609.0
THERMAL CONTROL	48.6
DRY WEIGHT	1731.0
PROPELLANT	864.3
SATELLITE ADAPTER	102.1
	-----
TOTAL LAUNCH WEIGHT	2697.4

V1-163

MARS SURFACE SAMPLE RETURN NL1-1-12

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	21.5 (FT**2),	BATTERY RADIATOR AREA	.5 (FT**2)
HEATER POWER	1813.1 (BTU/HR),	TOTAL RADIATOR AREA	22.0 (FT**2)
HEAT PIPE	35918.3 (WATT-IN),	BATTERY HEATER POWER	33.3 (BTU/HR)
HEAT PIPE LENGTH	6.5 (FT)	TOTAL HEATER POWER	1846.5 (BTU/HR)
STORIED ENERGY	126.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1046.8 (WATT-IN)
		AVERAGE HEAT LOAD	1579.5 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	27.1
HEAT PIPES	6.8
PHASE CHANGE MATERIAL	3.2
RADIATOR (PASSIVE)	13.6
	-----
TOTAL	50.6

IERR 1100010111

STRUCTURES

SKIN THICKNESS	.039 (IN)			
STRINGER NO., THICKNESS, HT.	150.		16804.806 (IN),	.719 (IN)
FRAME NO., THICKNESS, HT.	5.		.207 (IN),	1.033 (IN)
GRID BEAM THICKNESS	.1340 (IN),	SPACING	9.582 (IN),	HEIGHT 4.791 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	670.9 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	30.11 (LBS)			
ADAPTER WEIGHT	226.18 (LBS)			

491-1A

MARS SURFACE SAMPLE RETURN NL1-1-12

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1501	CONTROL ELECT.	2	10.0	.1	4.0
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
1413	POWER CONVERTER	2	15.9	.4	0.0
1710	RATE INTEGR GYRO	2	9.6	.2	32.0
1803	EARTH SENSOR	3	14.6	.2	19.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
507	ISOLATION VALVE	5	1.3	.1	0.10
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	2	6.0	.6	0.0
1130	TANK	12	20.0	3.2	0.0
536	TANK	2	110.0	4.5	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
406	COMM DECOD+DISTR	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	2	10.4	.1	0.0
103	BASFBND ASSY UNIT	2	2.0	.0	.5
354	TRANSMITTER	5	2.8	.0	90.0
431	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
618	DIPLEXER	3	1.5	.0	0.0

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MARS SURFACE SAMPLE RETURN NL1-1-12

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
418	DISCHGE REGULATOR	3	24.0	.16	0.0
530	SHUNT REGULATOR	12	2.2	.0	0.0
263	BATTERY	2	49.5	.4	0.0
650	BATTERY CHARGER	3	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.5	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	2380.0
STABILITY AND CONTROL	109.6
AUXILIARY PROPULSION	569.5
DATA PROCESSING	39.7
COMMUNICATIONS	53.9
BATTERIES	99.0
POWER CONTROL	145.9
CONVERTERS	10.0
SOLAR ARRAY	89.7
HARNESS	437.0
STRUCTURE	734.9
SOLAR ARRAY DRIVE	14.9
THERMAL CONTROL	50.6
DRY WEIGHT	4754.9
PROPELLANT	2300.6
SATELLITE ADAPTER	226.8

TOTAL LAUNCH WEIGHT 7282.3

771-1A

TERRESTRIAL BODIES ORB(LUNAR) NL2-1-1

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

POINTING ACCURACY = .300000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 47809.(LB-SEC)

ATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
64.	128.
16.	100.
8.	8.
3.	2.
1.0000	1.0000
32.	64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)

SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

POWER REQUIREMENT 435.72 WATTS

TOTAL SOLAR ARRAY AREA 46.35 SQ FT

INSTALLED BATTERY CAPACITY 56.00 AMP-HR

BEGINNING OF LIFE POWER 590.13 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1754.1 LBS ( 795.7 KG) LAUNCH WEIGHT = 1820.5 LBS ( 825.8 KG)

DIMENSIONS LENGTH HEIGHT WIDTH

EQUIPMENT BAY 38.8 IN.( .98 M) 64.6 IN.( 1.64 M) 64.6 IN.( 1.64 M)

MISSION EQUIPMENT 46.8 IN.( 1.19 M) 35.2 IN.( .89 M) 42.9 IN.( 1.09 M)

TOTAL SATELLITE 85.6 IN.( 2.17 M)

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 231.4 IYY = 1428423.0 IZZ = 1606948.0

X-CG Y-CG Z-CG

CENTER OF GRAVITY 15.9 IN.( .40 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 28.5

MISSION LIFETIME 24.0(MO)

MEAN MISSION DURATION 20.4(MO)

RELIABILITY .656

VI-167

TERRESTRIAL BODIES ORB(LUNAR) NL2-1-1

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 1 1 1  
 WEIGHT 30.80 LBS VOLUME 1.04(FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9335  
 IERR 10

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130 509 701 1203 603  
 EQUIPMENT QUANTITIES 18 6 5 9 1 1 2 1 2 1 1  
 WEIGHT 370.24 LBS VOLUME 10.05(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 103.41(LBS), EXPENDABLE WEIGHT 269.83(LBS)  
 RELIABILITY .9002  
 IERR 1

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 403  
 EQUIPMENT QUANTITIES 1 1 1  
 WEIGHT 30.11 LBS VOLUME .54(FT\*\*3) POWER REQUIREMENT 13.5 WATTS  
 RELIABILITY .9799  
 IERR 2

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 203 103 336 401 503 518 203 398  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1 1 1  
 WEIGHT 48.32 LBS VOLUME 1.56(FT\*\*3) POWER REQUIREMENT 147.7 WATTS  
 RELIABILITY .9247  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 406 515 254 609 702  
 EQUIPMENT QUANTITIES 2 5 2 2 1  
 WEIGHT 138.67 LBS VOLUME 1.75(FT\*\*3) POWER DISSIPATION 73.6 WATTS  
 HARNESS WEIGHT 49.0(LBS), SOLAR ARRAY WEIGHT 32.3(LBS)  
 RELIABILITY .9568

MISCELLANEOUS EQUIPMENT

WEIGHT 300.00 LBS VOLUME 33.39(FT\*\*3) POWER REQUIREMENT 123.0 WATTS  
 RELIABILITY .9000

891-11



TERRESTRIAL BODIES ORB(LUNAR) NL2-1-1

\* \* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	1	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	5.0	.6	0.0
1130	TANK	2	20.0	3.2	0.0
509	TANK	1	15.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM D DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
336	TRANSMITTER	2	2.5	.0	70.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
618	DIPLEXER	1	1.5	.0	0.0
203	ANTENNA	1	10.4	.1	0.0
398	XTMR	1	12.1	1.2	0.0

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ENS C01-1-1

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\*\*\* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY \* 400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 21656.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
64.  
16.  
8.  
4.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
128.  
100.  
8.  
2.  
1.0000  
64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 599.72 WATTS  
TOTAL SOLAR ARRAY AREA 130.35 SQ FT  
INSTALLED BATTERY CAPACITY 40.00 AMP-HR  
BEGINNING OF LIFE POWER 1605.59 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WET SATELLITE WEIGHT = 1464.1 LBS ( 664.1 KG) LAUNCH WEIGHT = 1520.3 LBS ( 689.6 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 37.9 IN.( .96 M) 63.2 IN.( 1.61 M) 63.2 IN.( 1.61 M)  
MISSION EQUIPMENT 26.5 IN.( .67 M) 44.2 IN.( 1.12 M) 44.2 IN.( 1.12 M)  
TOTAL SATELLITE 64.4 IN.( 1.64 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 370.4 IYY = 818647.8 IZZ = 1881852.7  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 35.2 IN.( .89 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 427./ 427./ 82.0  
MISSION LIFETIME 36.0(MO)  
MEAN MISSION DURATION 31.5(MO)  
RELIABILITY .701

VI-171

EMS 001-1-1

\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 1 1  
 WEIGHT 37.90 LBS VOLUME 1.18 (FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9550  
 IERR 10

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 90  
 EQUIPMENT QUANTITIES 18 4 5 9 2  
 WEIGHT 185.70 LBS VOLUME 6.38 (FT\*\*3)<sup>1</sup> POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 63.48 (LBS), EXPENDABLE WEIGHT 122.22 (LBS)  
 RELIABILITY .9656  
 IERR 0

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 4 1  
 WEIGHT 97.31 LBS VOLUME 2.04 (FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .9047  
 IERR 2

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312  
 EQUIPMENT QUANTITIES 2 1 2 1 3 1 2 2  
 WEIGHT 25.12 LBS VOLUME .30 (FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9838  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 409 531 239 609 702  
 EQUIPMENT QUANTITIES 2 8 2 3 1  
 WEIGHT 162.70 LBS VOLUME 4.19 (FT\*\*3) POWER DISSIPATION 774.8 WATTS  
 HARNESS WEIGHT 74.0 (LBS), SOLAR ARRAY WEIGHT 90.8 (LBS)  
 RELIABILITY .9488

MISSION EQUIPMENT

WEIGHT 594.00 LBS VOLUME 23.49 (FT\*\*3) POWER REQUIREMENT 280.0 WATTS  
 RELIABILITY .9000

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ENS CO1-1-1

◆◆◆ SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	20.6 (FT**2)	BATTERY RADIATOR AREA	1.1 (FT**2)
HEATER POWER	1984.3 (BTU/HR)	TOTAL RADIATOR AREA	21.7 (FT**2)
HEAT PIPE	22132.9 (WATT-IN)	BATTERY HEATER POWER	96.9 (BTU/HR)
HEAT PIPE LENGTH	4.0 (FT)	TOTAL HEATER POWER	2081.2 (BTU/HR)
STORED ENERGY	106.7 (BTU)	VARIABLE CONDUCTANCE-H.P.	652.4 (WATT-IN)
		AVERAGE HEAT LOAD	1561.8 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	12.9
HEAT PIPES	4.2
PHASE CHANGE MATERIAL	2.7
RADIATOR (PASSIVE)	13.0
TOTAL	32.8

IERR 1111011011

STRUCTURES

SKIN THICKNESS	.012 (IN)		
STRINGER NO., THICKNESS, HT.	176.	3888.588 (IN)	.379 (IN)
FRAME NO., THICKNESS, HT.	5.	.109 (IN)	.544 (IN)
GRID BEAM THICKNESS	.153 (IN)	SPACING 4.300 (IN)	HEIGHT 2.150 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN)	CENTER 0.000 (IN)	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	103.3 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	30.3 (LBS)		
ADAPTER WEIGHT	56.2 (LBS)		

41-173

EMS C01-1-1

♦ ♦ ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 ♦ ♦ ♦ ♦

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
511	TANK	1	11.5	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COHHD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

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EMS C01-1-1

◆◆ ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409 DISCHGE REGULATOR	2	20.3	1.3	0.0
531 SHUNT REGULATOR	8	4.3	.1	0.0
239 BATTERY	2	33.7	.1	0.0
609 BATTERY CHARGER	3	3.6	.1	0.0
702 POWER CONTROL	1	9.4	.6	0.0

WGT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	594.0
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	63.5
DATA PROCESSING	97.3
COMMUNICATIONS	25.1
BATTERIES	67.3
POWER CONTROL	95.4
SOLAR ARRAY	90.8
HARNESS	74.0
STRUCTURE	148.7
SOLAR ARRAY DRIVE	15.1
THERMAL CONTROL	32.8
DRY WEIGHT	1341.9
PROPELLANT	122.2
SATELLITE ADAPTER	56.2

TOTAL LAUNCH WEIGHT 1520.3

VI-175

GOES CO1-1-2

\* \* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 28187.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
32.	128.
10.	100.
8.	8.
3.	2.
.1250	1.0000
64.	64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 4.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 329.08 WATTS  
TOTAL SOLAR ARRAY AREA 136.88 SQ FT  
INSTALLED BATTERY CAPACITY 28.00 AMP-HR  
BEGINNING OF LIFE POWER 442.78 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT =	1315.6 LBS ( 596.8 KG)	LAUNCH WEIGHT =	1372.4 LBS ( 622.5 KG)
DIMENSIONS	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	61.4 IN.( 1.56 M)	102.3 IN.( 2.60 M)	102.3 IN.( 2.60 M)
MISSION EQUIPMENT	19.8 IN.( .50 M)	33.0 IN.( .84 M)	33.0 IN.( .84 M)
TOTAL SATELLITE	81.1 IN.( 2.06 M)		
MOMENTS OF INERTIA (SLUGS*FT**2)	IXX = 356.3	IYY = 1600963.9	IZZ = 1600963.9
	X-CG	Y-CG	Z-CG

CENTER OF GRAVITY	43.3 IN.( 1.10 M)	0.0 IN.( 0.00 M)	0.0 IN.( 0.00 M)
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RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION	19323./19323./ 0.0
MISSION LIFETIME	60.0(MO)
MEAN MISSION DURATION	50.5(MO)
RELIABILITY	.600

VI-176

GOES CO1-1-2

\* \* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 2 2 2 2 1  
 WEIGHT 46.60 LBS VOLUME 2.10 (FT\*\*3) POWER REQUIREMENT -- 10.4 WATTS  
 RELIABILITY .9710  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 521 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 2 1 2 1  
 WEIGHT 248.83 LBS VOLUME 6.25 (FT\*\*3) POWER REQUIREMENT -- 1.0 WATTS  
 DRY WEIGHT 79.39 (LBS), EXPENDABLE WEIGHT 169.44 (LBS)  
 RELIABILITY .9457  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 4 1  
 WEIGHT 97.31 LBS VOLUME 2.04 (FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .7590  
 IERR 2

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202 312  
 EQUIPMENT QUANTITIES 1 2 2 2 3 2 1 2  
 WEIGHT 47.94 LBS VOLUME 1.82 (FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9921  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 224 306 1202  
 EQUIPMENT QUANTITIES 8 2 2 1  
 WEIGHT 128.99 LBS VOLUME 2.21 (FT\*\*3) POWER DISSIPATION 26.2 WATTS  
 HARNESS WEIGHT 80.3 (LBS), SOLAR ARRAY WEIGHT 67.3 (LBS)  
 RELIABILITY .9644

MISSION EQUIPMENT

WEIGHT 247.00 LBS VOLUME 9.78 (FT\*\*3) POWER REQUIREMENT 128.0 WATTS  
 RELIABILITY .9000

VI-177



GOES COI-1-2

\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	7.0 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	661.7 (BTU/HR),	TOTAL RADIATOR AREA	8.1 (FT**2)
HEAT PIPE	14504.8 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	5.1 (FT)	TOTAL HEATER POWER	776.7 (BTU/HR)
STORED ENERGY	85.9 (BTU)	VARIABLE CONDUCTANCE H.P.	1049.8 (WATT-IN)
		AVERAGE HEAT LOAD	812.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	22.1
HEAT PIPES	5.3
PHASE CHANGE MATERIAL	2.1
RADIATOR (PASSIVE)	4.4
TOTAL	<u>34.0</u>

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.015 (IN)		
STRINGER NO., THICKNESS, HT.	236.	81910.347 (IN),	.456 (IN)
FRAME NO., THICKNESS, HT.	5.	.131 (IN),	.654 (IN)
GRID BEAM THICKNESS	.137 (IN),	SPACING 3.846 (IN),	HEIGHT 1.923 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	156.3 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	56.8 (LBS)		

821-178

GOES CD1-1-2

ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	.0
403	NUTATION DAMPER	2	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	2	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLXER	2	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

V1-179

GOES C01-1-2

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
224	BATTERY	2	29.1	.2	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	247.0
STABILITY AND CONTROL	30.7
AUXILIARY PROPULSION	79.4
DATA PROCESSING	97.3
COMMUNICATIONS	47.9
BATTERIES	58.2
POWER CONTROL	70.8
CONVERTERS	15.9
SOLAR ARRAY	67.3
HARNESS	80.3
STRUCTURE	317.4
THERMAL CONTROL	34.0
DRY WEIGHT	1146.2
PROPELLANT	169.4
SATELLITE ADAPTER	<del>56.8</del>

TOTAL LAUNCH WEIGHT 1372.4

081-1A

GOES F/O COI-1-23

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .500000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 28187.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA	MISSION EQUIPMENT DATA
32.	0.
32.	128.
10.	100.
8.	8.
3.	2.
.1250	1.0000
64.	64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 4.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 433.08 WATTS  
TOTAL SOLAR ARRAY AREA 180.14 SQ FT  
INSTALLED BATTERY CAPACITY 36.00 AMP-HR  
BEGINNING OF LIFE POWER 582.71 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1757.8 LBS ( 797.3 KG) LAUNCH WEIGHT = 1837.3 LBS ( 833.4 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 70.4 IN.( 1.79 M) 117.3 IN.( 2.98 M) 117.3 IN.( 2.98 M)  
MISSION EQUIPMENT 24.2 IN.( .61 M) 40.3 IN.( 1.02 M) 40.3 IN.( 1.02 M)  
TOTAL SATELLITE 94.5 IN.( 2.40 M)  
MOMENTS OF INERTIA (SLUG\*FT\*\*2) IXX = 583.5 IYY = 2720836.0 IZZ = 2720836.0  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 53.9 IN.( 1.37 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MO)  
MEAN MISSION DURATION 50.5(MO)  
RELIABILITY .600

18-181

GOES F/O COI-1-23

◆ ◆ SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 ◆ ◆ ◆ ◆

STABILIZATION AND CONTROL  
 CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 141  
 EQUIPMENT QUANTITIES 1 2 2 2 2 1  
 WEIGHT 46.60 LBS VOLUME 2.10(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9710  
 IERR 0

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 521 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 2 1 2 1 1  
 WEIGHT 248.83 LBS VOLUME 6.25(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 79.39(LBS), EXPENDABLE WEIGHT 169.44(LBS)  
 RELIABILITY .9464  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 4 1  
 WEIGHT 97.31 LBS VOLUME 2.04(FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .7590  
 IERR 2

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202 312  
 EQUIPMENT QUANTITIES 1 2 2 2 3 2 1 2  
 WEIGHT 47.94 LBS VOLUME 1.82(FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9921  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 236 315 1202  
 EQUIPMENT QUANTITIES 10 2 3 1  
 WEIGHT 170.05 LBS VOLUME 3.29(FT\*\*3) POWER DISSIPATION 34.5 WATTS  
 HARNESS WEIGHT 103.2(LBS), SOLAR ARRAY WEIGHT 88.5(LBS)  
 RELIABILITY .9638

MISSION EQUIPMENT  
 WEIGHT 450.00 LBS VOLUME 17.80(FT\*\*3) POWER REQUIREMENT 232.0 WATTS  
 RELIABILITY .9000

VI 182

GOES F/O CD1-1-23

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

<p>THERMAL CONTROL RADIATOR AREA 10.0 (FT**2), HEATER POWER 966.7 (BTU/HR), HEAT PIPE 24276.0 (WATT-IN), HEAT PIPE LENGTH 5.9 (FT), STORED ENERGY 85.9 (BTU)</p>	<p>BATTERY RADIATOR AREA 1.2 (FT**2), TOTAL RADIATOR AREA 11.2 (FT**2), BATTERY HEATER POWER 115.0 (BTU/HR), TOTAL HEATER POWER 1081.7 (BTU/HR), VARIABLE CONDUCTANCE-H.P. 1223.2 (WATT-IN), AVERAGE HEAT LOAD 1167.4 (BTU/HR)</p>
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THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		28.2
HEAT PIPES		6.2
PHASE CHANGE MATERIAL		2.1
RADIATOR (PASSIVE)		6.3
TOTAL		42.9

IERR 1100010111

88-183

STRUCTURES				
SKIN THICKNESS	.017 (IN)			
STRINGER NO., THICKNESS, HT.	239.		81910.347 (IN),	.518 (IN)
FRAME NO., THICKNESS, HT.	5.		.149 (IN),	.744 (IN)
GRID BEAM THICKNESS	.154 (IN),	SPACING	4.329 (IN),	HEIGHT 2.165 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	167.5 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	79.5 (LBS)			

GOES F/O .COL-1-2<sup>3</sup>

ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	.0
403	ROTATION DAMPER	2	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	2	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	2	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

781-17

GOES F/O COI-1-~~2~~<sup>3</sup>

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
236	BATTERY	2	40.2	.4	0.0
315	BATTERY CHARGER	3	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	450.0
STABILITY AND CONTROL	30.7
AUXILIARY PROPULSION	79.4
DATA PROCESSING	97.3
COMMUNICATIONS	47.9
BATTERIES	80.5
POWER CONTROL	89.6
CONVERTERS	15.9
SOLAR ARRAY	88.5
HARNESS	103.2
STRUCTURE	462.4
THERMAL CONTROL	42.9
DRY WEIGHT	1588.4
PROPELLANT	169.4
SATELLITE ADAPTER	79.5

TOTAL LAUNCH WEIGHT 1837.3

V-1-185



ALL WEATHER MICROWAVE... COL-2-1

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 24242.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	4.	2.
SUBFRAME RATE	.1250	1.0000
NUMBER OF WORDS PER SUBFRAME	64.	64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 1278.18 WATTS  
TOTAL SOLAR ARRAY AREA 292.72 SQ FT  
INSTALLED BATTERY CAPACITY 100.00 AMP-HR  
BEGINNING OF LIFE POWER 3605.53 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 2554.3 LBS ( 1158.6 KG) LAUNCH WEIGHT = 2647.0 LBS ( 1200.7 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 39.6 IN.( 1.01 M) 66.0 IN.( 1.68 M) 66.0 IN.( 1.68 M)  
MISSION EQUIPMENT 33.4 IN.( .85 M) 55.6 IN.( 1.41 M) 55.6 IN.( 1.41 M)  
TOTAL SATELLITE 73.0 IN.( 1.85 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 1651.9 IYY = 1611596.8 IZZ = 8097897.1  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 40.7 IN.( 1.04 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 427./ 427./ 82.0  
MISSION LIFETIME 60.0(MD)  
MEAN MISSION DURATION 49.3(MD)  
RELIABILITY .605

981-186

ALL WEATHER MICROWAVE COL-2-1

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1303					
EQUIPMENT QUANTITIES	3	2	2	2					
WEIGHT	60.00 LBS				VOLUME	1.93(FT**3)	POWER REQUIREMENT	78.9	WATTS
RELIABILITY		.9903							
IERR	10								

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	818	834	907	1003	499	203	1127	507	701	1203	603
EQUIPMENT QUANTITIES	18	6	5	9	2	1	1	2	2	1	1
WEIGHT	208.87 LBS				VOLUME	7.18(FT**3)	POWER REQUIREMENT	136.82(LBS)			.3
DRY WEIGHT	72.05(LBS)				EXPENDABLE WEIGHT						
RELIABILITY		.9509									
IERR	1										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	203	345	403					
EQUIPMENT QUANTITIES	1	1	3	1					
WEIGHT	80.51 LBS				VOLUME	1.67(FT**3)	POWER REQUIREMENT	63.5	WATTS
RELIABILITY		.9342							
IERR	2								

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	227	103	306	401	503	603	227	312	
EQUIPMENT QUANTITIES	2	1	2	2	3	1	2	2	
WEIGHT	29.04 LBS				VOLUME	.35(FT**3)	POWER REQUIREMENT	35.4	WATTS
RELIABILITY		.9838							
IERR*****									

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	424	532	269	650	702				
EQUIPMENT QUANTITIES	2	10	2	2	2				
WEIGHT	309.74 LBS				VOLUME	4.89(FT**3)	POWER DISSIPATION	1021.0	WATTS
HARNESS WEIGHT	125.8(LBS)				SOLAR ARRAY WEIGHT	203.8(LBS)			
RELIABILITY		.8739							

MISSION EQUIPMENT

WEIGHT	1188.00 LBS	VOLUME	46.95(FT**3)	POWER REQUIREMENT	960.0	WATTS
RELIABILITY	.8000					

VI-187

ALL WEATHER MICROWAVE COI-2-1

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL				
RADIATOR AREA	51.2 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)	
HEATER POWER	4934.7 (BTU/HR),	TOTAL RADIATOR AREA	52.1 (FT**2)	
HEAT PIPE	62286.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)	
HEAT PIPE LENGTH	4.6 (FT)	TOTAL HEATER POWER	5024.7 (BTU/HR)	
STORED ENERGY	117.1 (BTU)	VARIABLE CONDUCTANCE H.P.	738.9 (WATT-IN)	
		AVERAGE HEAT LOAD	3880.6 (BTU/HR)	

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		14.5
HEAT PIPES		4.8
PHASE CHANGE MATERIAL		2.9
RADIATOR (ACTIVE)		93.2
TOTAL		115.4

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.023 (IN)			
STRINGER NO., THICKNESS, HT.	158. ,	3888.588 (IN),		.443 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.127 (IN),		.636 (IN)
GRID BEAM THICKNESS	.200 (IN),	SPACING 5.621 (IN),		HEIGHT 2.811 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),		AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	139.4 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	49.0 (LBS)			
ADAPTER WEIGHT	92.7 (LBS)			

88-1-188

ALL WEATHER MICROWAVE . . COL-2-1

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1127	TANK	1	16.7	3.2	0.0
507	TANK	2	6.7	.3	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMFMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

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ALL WEATHER MICROWAVE COL-2-

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
424	DISCHGE REGULATOR	2	32.0	.8	0.0
532	SHUNT REGULATOR	10	6.5	.1	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAM.	WEIGHT
MISSION EQUIPMENT	1188.0
STABILITY AND CONTROL	60.0
AUXILIARY PROPULSION	72.0
DATA PROCESSING	80.5
COMMUNICATIONS	29.0
BATTERIES	142.6
POWER CONTROL	167.2
SOLAR ARRAY	203.8
HARNES S	125.8
STRUCTURE	199.3
SOLAR ARRAY DRIVE	33.8
THERMAL CONTROL	115.4
DRY WEIGHT	2417.5
PROPELLANT	136.8
SATELLITE ADAPTER	92.7
-----	
TOTAL LAUNCH WEIGHT	2647.0

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OP SEASAT CO2-1-1

SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .200000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 17608. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	32.	64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 1535.92 WATTS  
TOTAL SOLAR ARRAY AREA 332.18 SQ FT  
INSTALLED BATTERY CAPACITY 100.00 AMP-HR  
BEGINNING OF LIFE POWER 4091.66 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WET SATELLITE WEIGHT = 3391.9 LBS ( 1538.5 KG) LAUNCH WEIGHT = 3512.9 LBS ( 1593.4 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 38.4 IN. ( .98 M) 64.1 IN. ( 1.63 M) 64.1 IN. ( 1.63 M)  
MISSION EQUIPMENT 39.4 IN. ( 1.00 M) 65.6 IN. ( 1.67 M) 65.6 IN. ( 1.67 M)  
TOTAL SATELLITE 77.8 IN. ( 1.98 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 2203.4 IYY = 2141440.7 IZZ = 10881018.7  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 45.2 IN. ( 1.15 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 440.1/ 440./108.0  
MISSION LIFETIME 36.0 (MO)  
MEAN MISSION DURATION 31.5 (MO)  
RELIABILITY .0711

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OP SEASAT CG2-1-1

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1303					
EQUIPMENT QUANTITIES	2	2	2	2					
WEIGHT	58.40	LBS			VOLUME	1.77	(FT**3)	POWER REQUIREMENT	78.9 WATTS
RELIABILITY			.9946						
IERR	10								

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	818	834	906	1003	499	203	1124	506	701	1203	603
EQUIPMENT QUANTITIES	18	4	5	9	2	1	1	1	2	1	1
WEIGHT	154.08	LBS			VOLUME	5.71	(FT**3)	POWER REQUIREMENT	.3 WATTS		
DRY WEIGHT	54.03	(LBS)			EXPENDABLE WEIGHT	100.05	(LBS)				
RELIABILITY			.9737								
IERR	10										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	203	345	403					
EQUIPMENT QUANTITIES	1	1	4	1					
WEIGHT	97.31	LBS			VOLUME	2.04	(FT**3)	POWER REQUIREMENT	63.5 WATTS
RELIABILITY			.9047						
IERR	2								

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER	227	103	306	401	503	603	227	312	
EQUIPMENT QUANTITIES	2	1	2	2	3	1	2	2	
WEIGHT	25.04	LBS			VOLUME	.35	(FT**3)	POWER REQUIREMENT	35.4 WATTS
RELIABILITY			.9916						
IERR	*****								

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	430	532	269	650	702				
EQUIPMENT QUANTITIES	2	11	2	2	1				
WEIGHT	322.82	LBS			VOLUME	4.78	(FT**3)	POWER DISSIPATION	1966.9 WATTS
HARNESS WEIGHT	166.4	(LBS)			SOLAR ARRAY WEIGHT	231.3	(LBS)		
RELIABILITY			.9087						

MISSION EQUIPMENT

WEIGHT	1950.00	LBS			VOLUME	77.03	(FT**3)	POWER REQUIREMENT	1194.0 WATTS
RELIABILITY			.9000						

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DP SEASAT C02-1-1

\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	61.7 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	5963.1 (BTU/HR),	TOTAL RADIATOR AREA	62.6 (FT**2)
HEAT PIPE	8063.7 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	6053.1 (BTU/HR)
STORED ENERGY	123.2 (BTU)	VARIABLE CONDUCTANCE H.P.	787.8 (WATT-IN)
		AVERAGE HEAT LOAD	4678.5 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	14.9
HEAT PIPES	5.1
PHASE CHANGE MATERIAL	3.1
RADIATOR (ACTIVE)	108.2
TOTAL	131.3

IEKR 1111011011

STRUCTURES				
SKIN THICKNESS	.026 (IN)			
STRINGER NO., THICKNESS, HT.	145. ,	3920.970 (IN),		.469 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.135 (IN),		.673 (IN)
GRID BEAM THICKNESS	.231 (IN),	SPACING 6.496 (IN),	HEIGHT 3.248 (IN)	
ENCLOSER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	134.1 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	53.6 (LBS)			
ADAPTER WEIGHT	121.0 (LBS)			

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OP SEASAT C02-1-1

\* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

761-1A



OP SEASAT C02-1-1

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
430	DISCHGE REGULATOR	2	40.0	1.0	0.0
532	SHUNT REGULATOR	11	6.5	.1	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1950.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	54.0
DATA PROCESSING	97.3
COMMUNICATIONS	29.0
BATTERIES	142.6
POWER CONTROL	180.3
SOLAR ARRAY	231.3
HARNESS	166.4
STRUCTURE	212.8
SOLAR ARRAY DRIVE	38.4
THERMAL CONTROL	131.3
DRY WEIGHT	3291.8
PROPELLANT	100.0
SATELLITE ADAPTER	121.0

TOTAL LAUNCH WEIGHT 3512.9

V1-195

US GOVT LEO CD3-1-1 , CD3-2-2

\* \* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 14449. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = C.(IPS)

CDPT TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	32.	64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 610.02 WATTS  
TOTAL SOLAR ARRAY AREA 131.44 SQ FT  
INSTALLED BATTERY CAPACITY 40.00 AMP-HR  
BEGINNING OF LIFE POWER 1619.01 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WET SATELLITE WEIGHT = 1302.2 LBS ( 590.7 KG) LAUNCH WEIGHT = 1352.1 LBS ( 613.3 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 36.6 IN. ( .93 M) 41.0 IN. ( 1.55 M) 61.0 IN. ( 1.55 M)  
MISSION EQUIPMENT 24.9 IN. ( .63 M) 41.4 IN. ( 1.05 M) 41.4 IN. ( 1.05 M)  
TOTAL SATELLITE 61.5 IN. ( 1.56 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 344.3 IYY = 676722.7 IZZ = 1736828.1  
CENTER OF GRAVITY 33.2 IN. ( .84 M) X-CG Y-CG Z-CG  
0.0 IN. ( 0.00 M) 7.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 450.7 / 450.7 / 98.7  
MISSION LIFETIME 36.0 (MO)  
MEAN MISSION DURATION 31.5 (MO)  
RELIABILITY .710

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US GOVT LED C03-1-1

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
EQUIPMENT QUANTITIES 2 2 1 2  
WEIGHT 43.00 LBS VOLUME 1.24 (FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
RELIABILITY .9675  
IERR 10

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT  
EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1121 506 701 1203 603  
EQUIPMENT QUANTITIES 18 4 5 9 2 1 1 1 2 1 1  
WEIGHT 142.73 LBS VOLUME 4.89 (FT\*\*3) POWER REQUIREMENT 3 WATTS  
DRY WEIGHT 60.63 (LBS), EXPENDABLE WEIGHT 82.09 (LBS)  
RELIABILITY .9655  
IERR 10

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
EQUIPMENT CODE IDENTIFIER 203 203 345 403  
EQUIPMENT QUANTITIES 1 1 4 1  
WEIGHT 97.31 LBS VOLUME 2.04 (FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
RELIABILITY .9047  
IERR 2

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312  
EQUIPMENT QUANTITIES 2 1 2 1 3 1 2 2  
WEIGHT 25.12 LBS VOLUME .30 (FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
RELIABILITY .9838  
IERR\*\*\*\*\*

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
EQUIPMENT CODE IDENTIFIER 409 531 239 609 702  
EQUIPMENT QUANTITIES 2 8 2 3 1  
WEIGHT 162.70 LBS VOLUME 4.19 (FT\*\*3) POWER DISSIPATION 776.0 WATTS  
HARNESS WEIGHT 68.7 (LBS), SOLAR ARRAY WEIGHT 91.5 (LBS)  
RELIABILITY .9488

MISSION EQUIPMENT  
WEIGHT 490.00 LBS VOLUME 19.38 (FT\*\*3) POWER REQUIREMENT 290.0 WATTS  
RELIABILITY .9000

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US GOVT LEO C03-1-1

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	21.0 (FT**2),	BATTERY RADIATOR AREA	1.1 (FT**2)
HEATER POWER	2028.3 (BTU/HR),	TOTAL RADIATOR AREA	22.1 (FT**2)
HEAT PIPE	21574.7 (WATT-IN),	BATTERY HEATER POWER	96.9 (BTU/HR)
HEAT PIPE LENGTH	3.8 (FT)	TOTAL HEATER POWER	2125.2 (BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	622.3 (WATT-IN)
		AVERAGE HEAT LOAD	1595.9 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	12.2
HEAT PIPES	4.0
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	13.3
TOTAL	32.4

IERR 1111011011

STRUCTURES

SKIN THICKNESS	.016 (IN)		
SPRINGER NO., THICKNESS, HT.	178.	3945.825 (IN),	.362 (IN)
FRAME NO., THICKNESS, HT.	5.	.104 (IN),	.519 (IN)
GRID BEAM THICKNESS	.144 (IN),	SPACING 4.057 (IN),	HEIGHT 2.029 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	95.17 (LBS)		
SOLAR ARRAY BOOM AND CRIVE WT.	30.4 (LBS)		
ADAPTER WEIGHT	49.19 (LBS)		

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US GOVT LEO C03-1-1

\* \* . ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	7.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.6	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG CCND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

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US GOVT LEO C03-1-1

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
531	SHUNT REGULATOR	8	4.3	.1	0.0
239	BATTERY	2	33.7	.1	0.0
609	BATTERY CHARGER	3	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	490.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	60.6
DATA PROCESSING	97.3
COMMUNICATIONS	25.1
BATTERIES	67.3
POWER CONTROL	95.4
SOLAR ARRAY	91.5
HARNESS	68.7
STRUCTURE	133.5
SOLAR ARRAY DRIVE	15.2
THERMAL CONTRDL	32.4
DRY WEIGHT	1220.1
PROPELLANT	62.1
SATELLITE ADAPTER	49.9

TOTAL LAUNCH WLIGHT 1352.1

V1-200

PRIVATE INDUSTRY LEO C03-1-12

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .300000 (DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 14449. (LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPT TABLE	ENGINEERING DATA	MISSION EQUIPMENT DAT
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.00
NUMBER OF WORDS PER SUBFRAME	32.	64.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 610.02 WATTS  
 TOTAL SOLAR ARRAY AREA 131.44 SQ FT  
 INSTALLED BATTERY CAPACITY 40.00 AMP-HR  
 BEGINNING OF LIFE PLWER 1619.01 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 1302.2 LBS ( 590.7 KG) LAUNCH WEIGHT = 1352.1 LBS ( 613.3 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 36.6 IN. ( .93 M) 61.0 IN. ( 1.55 M) 61.0 IN. ( 1.55 M)  
 MISSION EQUIPMENT 24.9 IN. ( .63 M) 41.4 IN. ( 1.05 M) 41.4 IN. ( 1.05 M)  
 TOTAL SATELLITE 61.5 IN. ( 1.56 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 344.3 IYY = 676722.7 IZZ = 1736828.1  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 33.2 IN. ( .84 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 450. / 450. / 98.7  
 MISSION LIFETIME 36.0 (MO)  
 MEAN MISSION DURATION 31.5 (MO)  
 RELIABILITY .710

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\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 1 2  
 WEIGHT 43.00 LBS VOLUME 1.24 (FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9675  
 IERR 10

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 816 834 906 1003 499 203 1121 506 701 1203 601  
 EQUIPMENT QUANTITIES 1 4 5 9 2 1 1 1 2 1 1  
 WEIGHT 142.73 LBS VOLUME 4.89 (FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 60.63 (LBS), EXPENDABLE WEIGHT 82.09 (LBS)  
 RELIABILITY .9655  
 IERR 10

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 4 1  
 WEIGHT 97.31 LBS VOLUME 2.04 (FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .9047  
 IERR 2

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312  
 EQUIPMENT QUANTITIES 2 1 2 1 3 1 2  
 WEIGHT 25.12 LBS VOLUME .30 (FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9838  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 409 531 239 609 702  
 EQUIPMENT QUANTITIES 2 8 2 3 1  
 WEIGHT 162.70 LBS VOLUME 4.19 (FT\*\*3) POWER DISSIPATION 776.0 WATTS  
 HARNESS WEIGHT 68.7 (LBS), SOLAR ARRAY WEIGHT 91.5 (LBS)  
 RELIABILITY .9488

MISSION EQUIPMENT

WEIGHT 490.00 LBS VOLUME 19.38 (FT\*\*3) POWER REQUIREMENT 290.0 WATTS  
 RELIABILITY .9000

VI-202

PRIVATE INDUSTRY LEO C03-1-1' 2

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	21.0 (FT**2),	BATTERY RADIATOR AREA	1.1 (FT**2)
HEATER POWER	2028.3 (BTU/HR),	TOTAL RADIATOR AREA	22.1 (FT**2)
HEAT PIPE	21574.7 (WATT-IN),	BATTERY HEATER POWER	96.9 (BTU/HR)
HEAT PIPE LENGTH	3.8 (FT)	TOTAL HEATER POWER	2125.2 (BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	622.3 (WATT-IN)
		AVERAGE HEAT LOAD	1595.9 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	12.2
HEAT PIPES	4.0
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	13.3
TOTAL	32.4

IERR 1111011011

STRUCTURES

SKIN THICKNESS	.016 (IN)			
STRINGER NO., THICKNESS, HT.	178. ,	3945.825 (IN),		.362 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.104 (IN),		.519 (IN)
GRID BEAM THICKNESS	.144 (IN),	SPACING 4.057 (IN),	HEIGHT	2.029 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	95.7 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	30.4 (LBS)			
ADAPTER WEIGHT	49.9 (LBS)			

VI-203

PRIVATE INDUSTRY LEO COB-1-2 2

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	FEACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	16	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	17.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	"	.8	.0	0.0
312	TRANSMITTER	"	2.2	.0	15.8

VI-204

PRIVATE INDUSTRY LEO CO3-1-1 ✓✓

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
531	SHUNT REGULATOR	8	4.3	.1	0.0
239	BATTERY	2	33.7	.1	0.0
609	BATTERY CHARGER	3	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	490.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	60.6
DATA PROCESSING	97.3
COMMUNICATIONS	25.1
BATTERIES	67.3
POWER CONTROL	95.4
SOLAR ARRAY	91.5
HARNESS	68.7
STRUCTURE	133.5
SOLAR ARRAY DRIVE	15.2
THERMAL CONTROL	32.4
DRY WEIGHT	1220.1
PROPELLANT	82.1
SATELLITE ADAPTER	49.9

TOTAL LAUNCH WEIGHT 1352.1

VI-205

US GOVT GEN 003-1-3 003-1-4

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .200000 (DEG.)

AUXILIARY PROPULSION  
CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 35956. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.1 (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
PI TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	129.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	32.	64.

COMMUNICATIONS  
CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER  
CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 678.16 WATTS  
TOTAL SOLAR ARRAY AREA 77.58 SQ FT  
INSTALLED BATTERY CAPACITY 100.00 AMP-HR  
BEGINNING OF LIFE POWER 987.75 WATTS

VEHICLE SIZING  
CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1432.2 LBS ( 649.7 KG) LAUNCH WEIGHT = 1486.4 LBS ( 674.2 KG)

DIMENSIONS	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	42.4 IN. ( 1.08 M)	70.7 IN. ( 1.80 M)	70.7 IN. ( 1.80 M)
MISSION EQUIPMENT	20.9 IN. ( .53 M)	34.8 IN. ( .88 M)	34.8 IN. ( .88 M)
TOTAL SATELLITE	63.3 IN. ( 1.61 M)		

MOMENTS OF INERTIA (SLUGS\*FT\*2) IXX = 280.4 IYY = 859508.7 IZZ = 1297244.  
X-CG Y-CG Z-CG

CENTER OF GRAVITY 30.5 IN. ( .77 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323.1/19323.1 0.0  
MISSION LIFETIME 60.0 (MO)  
MEAN MISSION DURATION 50.6 (MO)  
RELIABILITY .1602

VI-206

US GOVT GEO C03-1-3, C03-1-4

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL.  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 3 2 2 2  
 WEIGHT 60.00 LBS VOLUME 1.93(FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9903  
 IERR 10

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1130 509 701 1203 603  
 EQUIPMENT QUANTITIES 18 6 5 9 2 1 1 1 2 1 1  
 WEIGHT 278.57 LBS VOLUME 6.92(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 74.27(LBS), EXPENDABLE WEIGHT 204.30(LBS)  
 RELIABILITY .9484  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 2 2 4 2  
 WEIGHT 127.42 LBS VOLUME 2.59(FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .7979  
 IERR 2

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202 312  
 EQUIPMENT QUANTITIES 1 2 2 2 3 2 1 2  
 WEIGHT 47.94 LBS VOLUME 1.82(FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9921  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 409 515 269 650 702  
 EQUIPMENT QUANTITIES 3 9 2 2 2  
 WEIGHT 262.13 LBS VOLUME 6.45(FT\*\*3) POWER DISSIPATION 114.5 WATTS  
 MASS WEIGHT 69.8(LBS), SOLAR ARRAY WEIGHT 54.0(LBS)  
 RELIABILITY .8994

MISSION EQUIPMENT  
 WEIGHT 290.00 LBS VOLUME 11.48(FT\*\*3) POWER REQUIREMENT 320.0 WATTS  
 RELIABILITY .9000

VI-207

US GOVT GED C03-1-3, C03-1-4

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	17.0 (FT**2)	BATTERY RADIATOR AREA	0.9 (FT**2)
HEATER POWER	1593.9 (BTU/HR)	TOTAL RADIATOR AREA	17.9 (FT**2)
HEAT PIPE	0.0 (WATT-IN)	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.0 (FT)	TOTAL HEATER POWER	683.9 (BTU/HR)
STORED ENERGY	123.2 (BTU)	VARIABLE CONDUCTANCE-H.P.	640.8 (WATT-IN)
		AVERAGE HEAT LOAD	1698.2 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	13.8
HEAT PIPES	4.2
PHASE CHANGE MATERIAL	3.1
RADIATOR (PASSIVE)	10.8
TOTAL	31.8

IERR 11C00G1011

STRUCTURES

SKIN THICKNESS	0.017 (IN)		
SPINGER NO., THICKNESS, HT.	187.0	81910.347 (IN)	0.400 (IN)
FRAME NO., THICKNESS, HT.	5.0	0.115 (IN)	0.574 (IN)
GRID BEAM THICKNESS	0.152 (IN)	SPACING 4.285 (IN)	HEIGHT 2.142 (IN)
ENCLOSER THICKNESS- FORWARD	0.030 (IN)	CENTER 0.000 (IN)	AFT 0.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	157.1 (LBS)		
SOLAR ARRAY BOOM AND CRIVE WT.	24.2 (LBS)		
ADAPTER WEIGHT	54.2 (LBS)		

N1-208

US GOVT GEO CO3-1-3, C.O.3-1-4

\* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION.

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	1	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMTRY	2	8.9	.2	3.0
203	DIGITAL TELEMTRY	2	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMMND DECGD+DISTR	2	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	FASEBND ASSY UNIT	2	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	2	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

V1-209



US GOVT GEO CD3-1-3, C03-1-4

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	3	20.3	1.3	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	290.0
STABILITY AND CONTROL	60.0
AUXILIARY PROPULSION	74.3
DATA PROCESSING	127.4
COMMUNICATIONS	47.9
BATTERIES	142.6
POWER CONTROL	119.6
SOLAR ARRAY	54.0
HARNESS	89.8
STRUCTURE	181.7
SOLAR ARRAY DRIVE	9.0
THERMAL CONTROL	31.8
DFY WEIGHT	1228.0
PROPELLANT	204.3
SATELLITE ADAPTER	54.2

TOTAL LAUNCH WEIGHT 1486.4

VI-210

SPOT CO3-2-1

\* \* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM  
POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 14443. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PLR SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA.

32.	0.
64.	128.
16.	100.
8.	8.
3.	2.
1.0000	1.0000
32.	64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 580.02 WATTS  
TOTAL SOLAR ARRAY AREA 124.98 SQ FT  
INSTALLED BATTERY CAPACITY 40.00 AMP-HR  
BEGINNING OF LIFE POWER 1539.39 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WET SATELLITE WEIGHT = 1279.0 LBS ( 580.2 KG) LAUNCH WEIGHT = 1328.1 LBS ( 602.4 KG)

DIMENSIONS

	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	36.6 IN. ( .93 M)	60.9 IN. ( 1.55 M)	60.9 IN. ( 1.55 M)
MISSION EQUIPMENT	24.7 IN. ( .63 M)	41.1 IN. ( 1.05 M)	41.1 IN. ( 1.05 M)
TOTAL SATELLITE	61.2 IN. ( 1.56 M)		

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 320.1 IYY = 661558.1 IZZ = 1618686.2  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 33.0 IN. ( .84 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 450.7 / 450.7 / 98.7  
MISSION LIFETIME 36.0 (MO)  
MEAN MISSION DURATION 31.5 (MO)  
RELIABILITY .710

VI-211

SPOT C03-2-1

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
EQUIPMENT QUANTITIES 2 2 1 2  
WEIGHT 43.00 LBS VOLUME 1.24 (FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
RELIABILITY .9675  
IERR 10

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1121 506 701 1203 603  
EQUIPMENT QUANTITIES 8 4 5 9 2 1 1 1 2 1 1  
WEIGHT 142.70 LBS VOLUME 4.89 (FT\*\*3) POWER REQUIREMENT .3 WATTS  
DRY WEIGHT 60.63 (LBS), EXPENDABLE WEIGHT 82.07 (LBS)  
RELIABILITY .9655  
IERR 10

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 203 345 403  
EQUIPMENT QUANTITIES 1 1 4 1  
WEIGHT 97.31 LBS VOLUME 2.04 (FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
RELIABILITY .9047  
IERR 2

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312  
EQUIPMENT QUANTITIES 2 1 2 1 3 1 2 2  
WEIGHT 25.12 LBS VOLUME .30 (FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
RELIABILITY .9838  
IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 409 531 239 609 702  
EQUIPMENT QUANTITIES 2 7 2 3 1  
WEIGHT 156.37 LBS VOLUME 4.13 (FT\*\*3) POWER DISSIPATION 737.8 WATTS  
HARNESS WEIGHT 67.3 (LBS), SOLAR ARRAY WEIGHT 87.0 (LBS)  
RELIABILITY .9490

MISSION EQUIPMENT

WEIGHT 480.00 LBS VOLUME 18.99 (FT\*\*3) POWER REQUIREMENT 260.0 WATTS  
RELIABILITY .9000

VI-215

SPOT C03-2-1

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	19.7 (FT**2),	BATTERY RADIATOR AREA	1.1 (FT**2)
HEATER POWER	1896.4 (BTU/HR),	TOTAL RADIATOR AREA	20.8 (FT**2)
HEAT PIPE	20117.8 (WATT-IN),	BATTERY HEATER POWER	96.9 (BTU/HR)
HEAT PIPE LENGTH	3.8 (FT)	TOTAL HEATER POWER	1993.3 (BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	620.1 (WATT-IN)
		AVERAGE HEAT LOAD	1493.6 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	12.1
HEAT PIPES	4.0
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	12.5
TOTAL	31.5

IERR 1111011011

STRUCTURES

SKIN THICKNESS	.016 (IN)		
STRINGER NO., THICKNESS, HT.	179. ,	3945.825 (IN),	.360 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.103 (IN),	.517 (IN)
GRID BEAM THICKNESS	.143 (IN),	SPACING 4.021 (IN),	HEIGHT 2.011 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	94.8 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	29.6 (LBS)		
ADAPTER WEIGHT	49.1 (LBS)		

VI-213

SPOT C03-2-1

ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTRL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	17.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.0	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

11-214

SPOT CO3-2-1

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
531	SHUNT REGULATOR	7	4.3	.1	0.0
239	BATTERY	2	33.7	.1	0.0
609	BATTERY CHARGER	3	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	480.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	60.6
DATA PROCESSING	97.3
COMMUNICATIONS	25.1
BATTERIES	67.3
POWER CONTROL	91.0
SOLAR ARRAY	87.0
HARNESS	67.3
STRUCTURE	132.2
SOLAR ARRAY DRIVE	14.4
THERMAL CONTROL	31.5
DRY WEIGHT	1197.0
PROPELLANT	62.1
SATELLITE ADAPTER	49.1

TOTAL LAUNCH WEIGHT 1328.1

V-215

ETS-III C03-2-3

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1\*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 3855. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	4.	2.
SUBFRAME RATE	1250	1.0000
NUMBER OF WORDS PER SUBFRAME	64.	64.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 370.02 WATTS  
 TOTAL SOLAR ARRAY AREA 79.73 SQ FT  
 INSTALLED BATTERY CAPACITY 24.00 AMP-HR  
 BEGINNING OF LIFE POWER 482.05 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 588.3 LBS ( 266.8 KG) LAUNCH WEIGHT = 610.7 LBS ( 277.0 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 32.9 IN. ( .84 M) 54.9 IN. ( 1.39 M) 54.9 IN. ( 1.39 M)  
 MISSION EQUIPMENT 12.0 IN. ( .30 M) 20.0 IN. ( .51 M) 20.0 IN. ( .51 M)  
 TOTAL SATELLITE 44.9 IN. ( 1.14 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 124.5 IYY = 213068.2 IZZ = 596961.0  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 22.5 IN. ( .57 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 450./ 450./ 98.7  
 MISSION LIFETIME 36.0 (MO)  
 MEAN MISSION DURATION 31.12 (MO)  
 RELIABILITY .703

VI-216

ETS-III C03-2-3

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 1 2  
 WEIGHT 43.00 LBS VOLUME 1.24 (FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9675  
 IERR 10

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1112 503 701 1203 603  
 EQUIPMENT QUANTITIES 12 4 5 9 2 1 2 1 2 1 1  
 WEIGHT 62.98 LBS VOLUME 4.15 (FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 41.07 (LBS), EXPENDABLE WEIGHT 21.90 (LBS)  
 RELIABILITY .9803  
 IERR 10

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROFESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 4 1  
 WEIGHT 97.31 LBS VOLUME 2.04 (FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .9047  
 IERR 2

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312  
 EQUIPMENT QUANTITIES 2 1 2 1 3 1 2 2  
 WEIGHT 25.12 LBS VOLUME .30 (FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9838  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 406 515 221 603 702  
 EQUIPMENT QUANTITIES 2 9 2 3 1  
 WEIGHT 96.66 LBS VOLUME 1.48 (FT\*\*3) POWER DISSIPATION 470.7 WATTS  
 HARNESS WEIGHT 37.5 (LBS), SOLAR ARRAY WEIGHT 55.5 (LBS)  
 RELIABILITY .9248

MISSION EQUIPMENT  
 WEIGHT 55.00 LBS VOLUME 2.18 (FT\*\*3) POWER REQUIREMENT 50.0 WATTS  
 RELIABILITY .9000

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ETS-III C03-2-3

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	10.3 (FT**2),	BATTERY RADIATOR AREA	10.6 (FT**2)
HEATER POWER	973.4 (BTU/HR),	TOTAL RADIATOR AREA	10.9 (FT**2)
HEAT PIPE	7684.9 (WATT-IN),	BATTERY HEATER POWER	49.8 (BTU/HR)
HEAT PIPE LENGTH	2.8 (FT)	TOTAL HEATER POWER	1023.2 (BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	455.0 (WATT-IN)
		AVERAGE HEAT LOAD	777.5 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	9.4
HEAT PIPES	2.9
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	6.5
TOTAL	21.7

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.011 (IN)			
STRINGER NO., THICKNESS, HT.	206.5	3945.825 (IN),		.281 (IN)
FRAME NO., THICKNESS, HT.	5	.081 (IN),		.404 (IN)
GRID BEAM THICKNESS	.097 (IN),	SPACING 2.728 (IN),	HEIGHT 1.364 (IN)	
ENCLOSER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	66.13 (LBS)			
SOLAR ARRAY BOOM AND CRIBE WT.	24.4 (LBS)			
ADAPTER WEIGHT	22.4 (LBS)			

VI-218

ETS-III C03-2-3

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTRCL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1112	TANK	2	2.7	.6	0.0
503	TANK	1	3.9	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	4	16.8	.4	25.0
403	COMM D DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG CGND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

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ETS-III C03-2-3

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
221	BATTERY	2	9.8	.1	0.0
603	BATTERY CHARGE	3	2.6	.0	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	55.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	41.1
DATA PROCESSING	97.3
COMMUNICATIONS	25.1
BATTERIES	39.6
POWER CONTROL	57.3
SOLAR ARRAY	55.5
HARNESS	37.5
STRUCTURE	84.0
SOLAR ARRAY DRIVE	9.2
THERMAL CONTROL	21.7
DRY WEIGHT	566.4
PROPELLANT	21.9
SATELLITE ADAPTER	22.4

TOTAL LAUNCH WEIGHT 610.7

VI-220

EARTH OBS C03-2-4

\* \* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 1 1  
 WEIGHT 37.90 LBS VOLUME 1.18(FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9550  
 IERR 10

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1121 506 701 1203 603  
 EQUIPMENT QUANTITIES 12 4 5 9 2 1 1 1 2 1 1  
 WEIGHT 140.30 LBS VOLUME 4.65(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 58.23(LBS), EXPENDABLE WEIGHT 82.07(LBS)  
 RELIABILITY .9478  
 IERR 10

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 3 1  
 WEIGHT 80.51 LBS VOLUME 1.67(FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .9637  
 IERR 2

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312  
 EQUIPMENT QUANTITIES 2 1 2 1 3 1 2 2  
 WEIGHT 25.12 LBS VOLUME .30(FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9838  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 406 530 236 609 702  
 EQUIPMENT QUANTITIES 2 12 2 3 1  
 WEIGHT 128.74 LBS VOLUME 2.14(FT\*\*3) POWER DISSIPATION 705.6 WATTS  
 HARNESS WEIGHT 54.8(LBS), SOLAR ARRAY WEIGHT 83.2(LBS)  
 RELIABILITY .9104

MISSION EQUIPMENT  
 WEIGHT 480.00 LBS VOLUME 18.99(FT\*\*3) POWER REQUIREMENT 260.0 WATTS  
 RELIABILITY .9000

VI-221

EARTH OBS CO3-2-4

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	19.7 (FT**2),	BATTERY RADIATOR AREA	20.9 (FT**2)
HEATER POWER	1896.4 (BTU/HR),	TOTAL RADIATOR AREA	90.0 (BTU/HR)
HEAT PIPE	19202.0 (WATT-IN),	BATTERY HEATER POWER	1986.4 (BTU/HR)
HEAT PIPE LENGTH	3.7 (FT)	TOTAL HEATER POWER	591.8 (WATT-IN)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	1493.6 (BTU/HR)
		AVERAGE HEAT LOAD	

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	11.2
HEAT PIPES	3.8
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	12.5
TOTAL	30.4

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.016 (IN)			
STRINGER NO., THICKNESS, HT.	175.		3945.825 (IN),	.340 (IN)
FRAME NO., THICKNESS, HT.	5.		.098 (IN),	.488 (IN)
GRID BEAM THICKNESS	.138 (IN),	SPACING	3.885 (IN),	HEIGHT 1.943 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	83.9 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	29.0 (LBS)			
ADAPTER WEIGHT	45.3 (LBS)			

V1-222

EARTH OBS CD3-2-4

\* \* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	12	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	17.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-223

EARTH OBS .. CO3-2-4

\*.\*.\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
530	SHUNT REGULATOR	12	2.2	.0	0.0
236	BATTERY	2	31.5	.3	0.0
609	BATTERY CHARGER	3	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	480.0
STABILITY AND CONTROL	37.9
AUXILIARY PROPULSION	58.2
DATA PROCESSING	80.5
COMMUNICATIONS	25.1
BATTERIES	63.0
POWER CONTROL	65.8
SOLAR ARRAY	83.2
HARNES	54.8
STRUCTURE	112.2
SOLAR ARRAY DRIVE	13.8
THERMAL CONTROL	30.4
DRY WEIGHT	1104.9
PROPELLANT	82.1
SATELLITE ADAPTER	45.3

TOTAL LAUNCH WEIGHT 1232.2

V1-224

\* \* . SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .200000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 35960. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	32.	2.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 637.18 WATTS  
TOTAL SOLAR ARRAY AREA 72.89 SQ FT  
INSTALLED BATTERY CAPACITY 80.00 AMP-HR  
BEGINNING OF LIFE POWER 928.06 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WET SATELLITE WEIGHT = 1264.9 LBS ( 573.7 KG) LAUNCH WEIGHT = 1312.8 LBS ( 595.5 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 40.0 IN. ( 1.02 M) 66.7 IN. ( 1.69 M) 66.7 IN. ( 1.69 M)  
MISSION EQUIPMENT 20.9 IN. ( .53 M) 34.8 IN. ( .88 M) 34.8 IN. ( .88 M)  
TOTAL SATELLITE 60.9 IN. ( 1.55 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 227.4 IYY = 702237.1 IZZ = 1078819.0  
CENTER OF GRAVITY X-CG 29.8 IN. ( .76 M) Y-CG 0.0 IN. ( 0.00 M) Z-CG 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0 (MO)  
MEAN MISSION DURATION 49.7 (MO)  
RELIABILITY .606

V1-225



ESA GEO C03-2-5, C03-2-6

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 2 2  
 WEIGHT 58.40 LBS VOLUME 1.77(FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9856  
 IERR 10

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1130 509 701 1203 603  
 EQUIPMENT QUANTITIES 18 6 5 9 2 1 1 1 2 1 1  
 WEIGHT 278.59 LBS VOLUME 6.92(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 74.27(LBS), EXPENDABLE WEIGHT 204.32(LBS)  
 RELIABILITY .9007  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 3 1  
 WEIGHT 80.51 LBS VOLUME 1.67(FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .9342  
 IERR 2

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202 312  
 EQUIPMENT QUANTITIES 1 1 2 2 3 1 1 2  
 WEIGHT 42.84 LBS VOLUME 1.75(FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9810  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 409 515 266 650 702  
 EQUIPMENT QUANTITIES 2 9 2 2 1  
 WEIGHT 200.77 LBS VOLUME 4.43(FT\*\*3) POWER DISSIPATION 107.6 WATTS  
 HARNESS WEIGHT 68.3(LBS), SOLAR ARRAY WEIGHT 50.8(LBS)  
 RELIABILITY .8280

MISSION EQUIPMENT  
 WEIGHT 290.00 LBS VOLUME 11.48(FT\*\*3) POWER REQUIREMENT 320.0 WATTS  
 RELIABILITY .9000

N1-226

ESA GEO C03-2-5, C03-2-6

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	17.0 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	1593.9 (BTU/HR),	TOTAL RADIATOR AREA	17.9 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	3.8 (FT)	TOTAL HEATER POWER	1683.9 (BTU/HR)
STORED ENERGY	123.2 (BTU)	VARIABLE CONDUCTANCE H.P.	616.5 (WATT-IN)
		AVERAGE HEAT LOAD	1698.2 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		12.9
HEAT PIPES		4.0
PHASE CHANGE MATERIAL		3.1
RADIATOR (PASSIVE)		10.8
	TOTAL	30.7

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.016 (IN)			
STRINGER NO., THICKNESS, HT.	187. ,	81910.347 (IN),		.377 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.108 (IN),		.541 (IN)
GRID BEAM THICKNESS	.143 (IN),	SPACING 4.026 (IN),	HEIGHT	2.013 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	134.0 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	23.6 (LBS)			
ADAPTER WEIGHT	47.9 (LBS)			

VI-227

ESA GEO C03-2-5, C03-2-6

\* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	1	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-2228

ESA GEO C03-2-5, C03-2-6

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
266	BATTERY	2	55.4	.3	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	290.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	74.3
DATA PROCESSING	80.5
COMMUNICATIONS	42.8
BATTERIES	110.9
POWER CONTROL	89.9
SOLAR ARRAY	50.8
HARNESSES	68.3
STRUCTURE	155.6
SOLAR ARRAY DRIVE	8.4
THERMAL CONTROL	30.7
DRY WEIGHT	1060.6
PROPELLANT	204.3
SATELLITE ADAPTER	47.9

TOTAL LAUNCH WEIGHT 1312.8

VI-229

ITOS F/O CD4-1-2

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 15399.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- GENERAL PURPOSE PROCESSOR  
COMPUTER OPERATIONS RATE = 12600.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
125.  
8.  
4.  
1.0000  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 560.86 WATTS  
TOTAL SOLAR ARRAY AREA 97.71 SQ FT  
INSTALLED BATTERY CAPACITY 24.00 AMP-HR  
BEGINNING OF LIFE POWER 1203.50 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1245.3 LBS ( 564.9 KG) LAUNCH WEIGHT = 1292.6 LBS ( 586.3 KG)

DIMENSIONS		LENGTH	HEIGHT	WIDTH	
EQUIPMENT BAY	32.9 IN.( .84 M)		54.9 IN.( 1.39 M)	54.9 IN.( 1.39 M)	
MISSION EQUIPMENT	25.7 IN.( .65 M)		42.8 IN.( 1.09 M)	42.8 IN.( 1.09 M)	
TOTAL SATELLITE	58.6 IN.( 1.49 M)				

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 212.8 IYY = 568273.0 IZZ = 1126480.0

CENTER OF GRAVITY 31.8 IN.( .81 M) X-CG Y-CG Z-CG  
0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 450./ 450./ 98.7  
MISSION LIFETIME 36.0(MO)  
MEAN MISSION DURATION 31.4(MO)  
RELIABILITY .712

VI-230

ITOS F/O C04-1-2

\*\*. SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 2 2  
 WEIGHT 58.40 LBS VOLUME 1.77(FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9946  
 IERR 10

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1121 506 701 1203 603  
 EQUIPMENT QUANTITIES 18 4 5 9 2 1 1 1 2 1 1  
 WEIGHT 148.13 LBS VOLUME 4.89(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 60.63(LBS), EXPENDABLE WEIGHT 87.49(LBS)  
 RELIABILITY .9655  
 IERR 10

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - GENERAL PURPOSE PROCESSOR  
 EQUIPMENT CODE IDENTIFIER 103 203 348 403  
 EQUIPMENT QUANTITIES 2 1 2 1  
 WEIGHT 89.78 LBS VOLUME .95(FT\*\*3) POWER REQUIREMENT 35.7 WATTS  
 RELIABILITY .8955  
 IERR 1

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 227 106 303 401 503 603  
 EQUIPMENT QUANTITIES 2 2 2 2 3 1  
 WEIGHT 25.34 LBS VOLUME .33(FT\*\*3) POWER REQUIREMENT 18.4 WATTS  
 RELIABILITY .9927  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 112 221 306 1202  
 EQUIPMENT QUANTITIES 12 2 2 1  
 WEIGHT 104.00 LBS VOLUME 1.27(FT\*\*3) POWER DISSIPATION 469.4 WATTS  
 HARNESS WEIGHT 60.5(LBS), SOLAR ARRAY WEIGHT 68.0(LBS)  
 RELIABILITY .9263

MISSION EQUIPMENT  
 WEIGHT 540.00 LBS VOLUME 21.36(FT\*\*3) POWER REQUIREMENT 305.0 WATTS  
 RELIABILITY .9000

VI-231

ITOS F/O C04-1-2

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	19.7 (FT**2),	BATTERY RADIATOR AREA	.8 (FT**2)
HEATER POWER	1899.3 (BTU/HR),	TOTAL RADIATOR AREA	20.5 (FT**2)
HEAT PIPE	19260.6 (WATT-IN),	BATTERY HEATER POWER	63.6 (BTU/HR)
HEAT PIPE LENGTH	3.7 (FT)	TOTAL HEATER POWER	1962.9 (BTU/HR)
STORED ENERGY	117.2 (BTU)	VARIABLE CONDUCTANCE H.P.	758.1 (WATT-IN)
		AVERAGE HEAT LOAD	1494.4 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	11.0
HEAT PIPES	3.8
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	12.5
TOTAL	30.3

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.016 (IN)			
STRINGER NO., THICKNESS, HT.	170. ,	3945.825 (IN),		.340 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.098 (IN),		.488 (IN)
GRID BEAM THICKNESS	.142 (IN),	SPACING 3.992 (IN),	HEIGHT	1.996 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	86.5 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	26.5 (LBS)			
ADAPTER WEIGHT	47.3 (LBS)			

VI-232

ITOS F/D C04-1-2

\* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	17.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	GEN PURP PROCESR	2	12.8	.0	15.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
348	TAPE RECORDER	2	21.5	.2	10.2
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
303	TRANSMITTER	2	2.2	.0	10.2
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-233



ITOS F/O CO4-1-2

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
112	SHUNT REGULATOR	12	1.4	.0	0.0
221	BATTERY	2	25.3	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	540.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	60.6
DATA PROCESSING	89.8
COMMUNICATIONS	25.3
BATTERIES	50.6
POWER CONTROL	53.4
SOLAR ARRAY	68.0
HARNESSES	60.5
STRUCTURE	109.6
SOLAR ARRAY DRIVE	11.3
THERMAL CONTROL	30.3
DRY WEIGHT	1157.8
PROPELLANT	87.5
SATELLITE ADAPTER	47.3

TOTAL LAUNCH WEIGHT 1292.6

V1-234

NOAA F/O C04-1-3

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

POINTING ACCURACY = .200000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

TOTAL IMPULSE = 15413. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- GENERAL PURPOSE PROCESSOR

COMPUTER OPERATIONS RATE = 12600. (IPS)

CDPI TABLE

NUMBER OF COMMANDS

NUMBER OF MAIN FRAME WORDS

MAIN FRAME SAMPLE RATE

MAIN FRAME WORD LENGTH

NUMBER OF SUBFRAMES

SUBFRAME RATE

NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
125.	0.
8.	0.
4.	0.
1.0000	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

PRIMARY DOWNLINK DATA RATE = 256.000 (KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT-PADDLE MOUNTED SOLAR ARRAY

POWER REQUIREMENT 655.86 WATTS

TOTAL SOLAR ARRAY AREA 123.44 SQ FT

INSTALLED BATTERY CAPACITY 28.00 AMP-HR

BEGINNING OF LIFE POWER 1520.50 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1360.0 LBS ( 616.9 KG) LAUNCH WEIGHT = 1411.3 LBS ( 640.2 KG)

DIMENSIONS LENGTH HEIGHT WIDTH

EQUIPMENT BAY 32.6 IN. ( .83 M) 54.3 IN. ( 1.38 M) 54.3 IN. ( 1.38 M)

MISSION EQUIPMENT 26.6 IN. ( .68 M) 44.3 IN. ( 1.13 M) 44.3 IN. ( 1.13 M)

TOTAL SATELLITE 59.2 IN. ( 1.50 M)

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 287.3 IYY = 625671.2 IZZ = 1503380.5

X-CG Y-CG Z-CG

CENTER OF GRAVITY 32.0 IN. ( .81 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 450./ 450./ 98.7

MISSION LIFETIME 36.0 (MO)

MEAN MISSION DURATION 31.3 (MO)

RELIABILITY .703

V1-235

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 2 2  
 WEIGHT 58.40 LBS VOLUME 1.77(FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9946  
 IERR 10

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1121 506 701 1203 603  
 EQUIPMENT QUANTITIES 18 4 5 9 2 1 1 1 2 1 1  
 WEIGHT 148.21 LBS VOLUME 4.89(FT\*\*3) POWER REQUIREMENT 87.3 WATTS  
 DRY WEIGHT 60.63(LBS), EXPENDABLE WEIGHT 87.58(LBS)  
 RELIABILITY .9655  
 IERR 10

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- GENERAL PURPOSE PROCESSOR  
 EQUIPMENT CODE IDENTIFIER 103 203 348 403  
 EQUIPMENT QUANTITIES 2 1 2 1  
 WEIGHT 89.78 LBS VOLUME .95(FT\*\*3) POWER REQUIREMENT 35.7 WATTS  
 RELIABILITY .8955  
 IERR 1

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 227 106 303 401 503 603  
 EQUIPMENT QUANTITIES 2 2 2 2 3 1  
 WEIGHT 25.34 LBS VOLUME .33(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9927  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT -PADOLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 130 224 309 1202  
 EQUIPMENT QUANTITIES 12 2 2 1  
 WEIGHT 127.79 LBS VOLUME 1.00(FT\*\*3) POWER DISSIPATION 645.8 WATTS  
 HARNESS WEIGHT 65.9(LBS), SOLAR ARRAY WEIGHT 86.0(LBS)  
 RELIABILITY .9146

MISSION EQUIPMENT  
 WEIGHT 600.00 LBS VOLUME 23.73(FT\*\*3) POWER REQUIREMENT 400.0 WATTS  
 RELIABILITY .9000

VI-236

NCAA F/O CD4-1-3

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	24.0 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	2316.8 (BTU/HR),	TOTAL RADIATOR AREA	25.2 (FT**2)
HEAT PIPE	23671.2 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	3.7 (FT)	TOTAL HEATER POWER	2431.8 (BTU/HR)
STORED ENERGY	117.2 (BTU)	VARIABLE CONDUCTANCE H.P.	765.8 (WATT-IN)
		AVERAGE HEAT LOAD	1818.3 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		11.0
HEAT PIPES		3.9
PHASE CHANGE MATERIAL		2.9
RADIATOR (PASSIVE)		15.2
	TOTAL	33.0

IERR 1111011011

STRUCTURES				
SKIN THICKNESS	.017 (IN)			
STRINGER NO., THICKNESS, HT.	166. ,	3945.825 (IN),		.346 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.099 (IN),		.497 (IN)
GRID BEAM THICKNESS	.148 (IN),	SPACING 4.177 (IN),	HEIGHT	2.089 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	91.4 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	29.5 (LBS)			
ADAPTER WEIGHT	51.3 (LBS)			

VI-237

NCAA F/O C04-1-3

\* \* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1121	TANK	1	17.0	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	GEN PURP PROCESR	2	12.8	.0	15.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
348	TAPE RECORDER	2	21.5	.2	10.2
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
303	TRANSMITTER	2	2.2	.0	10.2
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

V1-238

NOAA F/D C04-1-3

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER		NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
130	SHUNT REGULATOR	12	2.7	.0	0.0
224	BATTERY	2	29.1	.2	0.0
309	BATTERY CHARGER	2	12.8	.2	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	600.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	60.6
DATA PROCESSING	89.8
COMMUNICATIONS	25.3
BATTERIES	58.2
POWER CONTROL	69.6
SOLAR ARRAY	86.0
HARNESSES	65.9
STRUCTURE	111.4
SOLAR ARRAY DRIVE	14.3
THERMAL CONTROL	33.0
DRY WEIGHT	1272.4
PROPELLANT	87.6
SATELLITE ADAPTER	51.3

TOTAL LAUNCH WEIGHT 1411.3

V1-239

METEOSAT F/D C04-2-2

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 25784.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

COPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
32.  
10.  
8.  
3.  
.125(  
64.

MISSION EQUIPMENT DATA

0.  
128.  
100.  
8.  
2.  
1.000  
64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 4.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 337.41 WATTS  
TOTAL SOLAR ARRAY AREA 142.18 SQ FT  
INSTALLED BATTERY CAPACITY 28.00 AMP-HR  
BEGINNING OF LIFE POWER 459.90 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT =	1307.1 LBS ( 592.9 KG)	LAUNCH WEIGHT =	1364.7 LBS ( 619.0 KG)
DIMENSIONS	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	62.5 IN.( 1.59 M)	104.2 IN.( 2.65 M)	104.2 IN.( 2.65 M)
MISSION EQUIPMENT	20.9 IN.( .53 M)	34.8 IN.( .88 M)	34.8 IN.( .88 M)
TOTAL SATELLITE	83.4 IN.( 2.12 M)		
MOMENTS OF INERTIA (SLUG*FT**2)	IXX = 358.9	IYY = 1653353.2	IZZ = 1653353.2
CENTER OF GRAVITY	46.1 IN.( 1.17 M)	0.0 IN.( 0.00 M)	0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MO)  
MEAN MISSION DURATION 50.7(MO)  
RELIABILITY .603

V1-240

METEOSAT F/D CO4-2-2

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 2 2 1  
 WEIGHT 43.50 LBS VOLUME 1.80(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9618  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 223.33 LBS VOLUME 5.72(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 28.33(LBS), EXPENDABLE WEIGHT 154.99(LBS)  
 RELIABILITY .8252  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 3 1  
 WEIGHT 80.51 LBS VOLUME 1.67(FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .9342  
 IERR 2

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202 312  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1 1 2  
 WEIGHT 37.42 LBS VOLUME 1.68(FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9570  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 224 309 1202  
 EQUIPMENT QUANTITIES 8 2 2 1  
 WEIGHT 128.99 LBS VOLUME 2.01(FT\*\*3) POWER DISSIPATION 31.7 WATTS  
 HARNESS WEIGHT 72.2(LBS), SOLAR ARRAY WEIGHT 69.9(LBS)  
 RELIABILITY .9442

MISSION EQUIPMENT

WEIGHT 290.00 LBS VOLUME 11.48(FT\*\*3) POWER REQUIREMENT 170.0 WATTS  
 RELIABILITY .9000

VI-241



METEOSAT F/O CD4-2-2

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL  
RADIATOR AREA

8.2 (FT\*\*2),  
HEATER POWER 784.9(BTU/HR),  
HEAT PIPE .7536.3(WATT-IN),  
HEAT PIPE LENGTH 5.2 (FT)  
STORED ENERGY 85.9 (BTU)

BATTERY RADIATOR AREA  
TOTAL RADIATOR AREA  
BATTERY HEATER POWER  
TOTAL HEATER POWER  
VARIABLE CONDUCTANCE H.P.  
AVERAGE HEAT LOAD

1.2. (FT\*\*2)  
9.4 (FT\*\*2)  
115.0(BTU/HR)  
899.9(BTU/HR)  
1079.1(WATT-IN)  
956.0 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	23.0
HEAT PIPES	5.5
PHASE CHANGE MATERIAL	2.1
RADIATOR (PASSIVE)	5.2
TOTAL	35.8

IERR 1100010111

STRUCTURES

SKIN THICKNESS .015 (IN)  
STRINGER NO., THICKNESS, HT.  
FRAME NO., THICKNESS, HT.  
GRID BEAM THICKNESS  
ENDCOVER THICKNESS- FORWARD  
EQUIPMENT BAY STRUCTURE WT.  
SOLAR ARRAY ROOM AND DRIVE WT.  
ADAPTER WEIGHT

240.	,	81910.347 (IN),	.457 (IN)
5.	,	.131 (IN),	.656 (IN)
.134 (IN),	SPACING 3.788 (IN),	HEIGHT 1.894 (IN)	
.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)	
141.1 (LBS)			
0.0 (LBS)			
57.7 (LBS)			

VI-242

METEOSAT F/O CD4-2-2

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMND DECOD+OISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

VI-243

METEOSAT F/O CD4-2-2

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
224	BATTERY	2	29.1	.2	0.0
309	BATTERY CHARGER	2	12.8	.2	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	290.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	80.5
COMMUNICATIONS	37.4
BATTERIES	58.2
POWER CONTROL	70.8
CONVERTERS	15.9
SOLAR ARRAY	69.9
HARNESS	72.2
STRUCTURE	325.4
THERMAL CONTROL	35.8
DRY WEIGHT	1152.1
PROPELLANT	155.0
SATELLITE ADAPTER	57.7

TOTAL LAUNCH WEIGHT 1364.7

V1-244

GMS C04-2-4

SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 35996.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

COPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
64.  
16.  
8.  
3.  
1.0000  
32.

MISSION EQUIPMENT DATA

0.  
128.  
100.  
8.  
2.  
1.0000  
64.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 8.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 556.58 WATTS  
TOTAL SOLAR ARRAY AREA 63.67 SQ FT  
INSTALLED BATTERY CAPACITY 72.00 AMP-HR  
BEGINNING OF LIFE POWER 810.66 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 1388.8 LBS ( 630.0 KG)

LAUNCH WEIGHT = 1441.4 LBS ( 653.8 KG)

DIMENSIONS

EQUIPMENT BAY 37.8 IN.( .96 M)  
MISSION EQUIPMENT 24.8 IN.( .63 M)  
TOTAL SATELLITE 62.6 IN.( 1.59 M)

HEIGHT 63.0 IN.( 1.60 M)  
WIDTH 63.0 IN.( 1.60 M)  
41.3 IN.( 1.05 M)

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX =

205.7 IYY = 768115.4 IZZ = 1055790.9

CENTER OF GRAVITY 32.2 IN.( .82 M)

Y-CG 0.0 IN.( 0.00 M) Z-CG 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 60.0(MO)

MEAN MISSION DURATION 49.6(MO)

RELIABILITY .605

V1-245

GMS C04-2-4

\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 1 2  
 WEIGHT 43.00 LBS VOLUME 1.24 (FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9418  
 IERR 10

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1130 509 701 1203 603  
 EQUIPMENT QUANTITIES 18 6 5 9 2 1 1 1 2 1 1  
 WEIGHT 278.80 LBS VOLUME 6.92 (FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 74.27 (LBS) EXPENDABLE WEIGHT 204.52 (LBS)  
 RELIABILITY .9007  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 3 1  
 WEIGHT 80.51 LBS VOLUME 1.67 (FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .9342  
 IERR 2

772-11

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202 312  
 EQUIPMENT QUANTITIES 1 1 2 2 3 1 1 2  
 WEIGHT 42.84 LBS VOLUME 1.75 (FT\*\*3) POWER REQUIREMENT 32.4 WATTS  
 RELIABILITY .9810  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 406 515 263 650 702  
 EQUIPMENT QUANTITIES 2 8 2 2 1  
 WEIGHT 165.60 LBS VOLUME 2.35 (FT\*\*3) POWER DISSIPATION 94.0 WATTS  
 HARNESS WEIGHT 66.5 (LBS) SOLAR ARRAY WEIGHT 44.3 (LBS)  
 RELIABILITY .8651

MISSION EQUIPMENT  
 WEIGHT 485.00 LBS VOLUME 19.18 (FT\*\*3) POWER REQUIREMENT 255.0 WATTS  
 RELIABILITY .9000

GMS C04-2-4

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	14.8 (FT**2)	BATTERY RADIATOR AREA	.5 (FT**2)
HEATER POWER	1377.1 (BTU/HR)	TOTAL RADIATOR AREA	15.2 (FT**2)
HEAT PIPE	0.0 (WATT-IN)	BATTERY HEATER POWER	33.3 (BTU/HR)
HEAT PIPE LENGTH	3.9 (FT)	TOTAL HEATER POWER	1410.4 (BTU/HR)
STORED ENERGY	123.2 (BTU)	VARIABLE CONDUCTANCE H.P.	633.4 (WATT-IN)
		AVERAGE HEAT LOAD	1476.6 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	12.6
HEAT PIPES	4.1
PHASE CHANGE MATERIAL	3.1
RADIATOR (PASSIVE)	9.4
TOTAL	29.1

IERR 1100001011

STRUCTURES			
SKIN THICKNESS	.017 (IN)		
STRINGER NO. THICKNESS, HT.	177. ,	81910.347 (IN),	.375 (IN)
FRAME NO. THICKNESS, HT.	5. ,	.108 (IN),	.538 (IN)
GRID BEAM THICKNESS	.150 (IN),	SPACING 4.226 (IN),	HEIGHT 2.113 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	123.9 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	22.6 (LBS)		
ADAPTER WEIGHT	52.6 (LBS)		

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GMS C04-2-4

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISOLATION VALV.	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	1	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEAND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

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GHS C04-2-4

♦ ♦ ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	2	2.3	.0	0.0
263	BATTERY	2	9.5	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	485.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	74.3
DATA PROCESSING	80.5
COMMUNICATIONS	42.8
BATTERIES	99.0
POWER CONTROL	66.6
SOLAR ARRAY	44.3
HARNESS	66.5
STRUCTURE	145.7
SOLAR ARRAY DRIVE	7.4
THERMAL CONTROL	29.1
DRY WEIGHT	1184.3
PROPELLANT	204.5
SATELLITE ADAPTER	52.6

TOTAL LAUNCH WEIGHT 1441.4

VI-249



INTELSAT V CC1-1-2

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\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1.\*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .300000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 24125.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

COPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
32.  
10.  
8.  
3.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
128.  
100.  
8.  
2.  
1.0000  
64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 4.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 1072.51 WATTS  
TOTAL SOLAR ARRAY AREA 446.12 SQ FT  
INSTALLED BATTERY CAPACITY 100.00 AMP-HR  
BEGINNING OF LIFE POWER 1443.06 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
NET SATELLITE WEIGHT = 2517.9 LBS ( 1142.1 KG) LAUNCH WEIGHT = 2629.3 LBS ( 1192.6 KI)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 204.5 IN.( 5.19 M) 100.0 IN.( 2.54 M) 100.0 IN.( 2.54 M)  
MISSION EQUIPMENT 29.9 IN.( .76 M) 49.8 IN.( 1.26 M) 49.8 IN.( 1.26 M)  
TOTAL SATELLITE 234.3 IN.( 5.95 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 602.8 IYY = 17460586.1 IZZ = 17460586.1  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 167.1 IN.( 4.24 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MO)  
MEAN MISSION DURATION 49.9(MO)  
RELIABILITY .617

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INTELSAT V CCI-1-2

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMRFR 1\*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 2 2 1  
 WEIGHT 43.50 LBS VOLUME 1.80(FT\*\*3) POWER REQUIREMENT 10.4 WATT  
 RELIABILITY .9618  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 829 834 906 1003 499 203 1124 515 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 1 1 2 1 1  
 WEIGHT 216.82 LBS VOLUME 5.54(FT\*\*3) POWER REQUIREMENT .3 WATT  
 DRY WEIGHT 75.24(LBS), EXPENDABLE WEIGHT 141.58(LBS)  
 RELIABILITY .9013  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 403  
 EQUIPMENT QUANTITIES 1 1 1  
 WEIGHT 30.11 LBS VOLUME .54(FT\*\*3) POWER REQUIREMENT 13.5 WATT  
 RELIABILITY .9505  
 IERR 2

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603 202 312  
 EQUIPMENT QUANTITIES 1 1 2 1 3 1 1 2  
 WEIGHT 38.92 LBS VOLUME 1.70(FT\*\*3) POWER REQUIREMENT 35.4 WATT  
 RELIABILITY .9683  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 130 269 389 1202  
 EQUIPMENT QUANTITIES 1 2 2 1  
 WEIGHT 234.06 LBS VOLUME 1.48(FT\*\*3) POWER DISSIPATION 85.5 WATT  
 HARNESS WEIGHT 102.6(LBS), SOLAR ARRAY WEIGHT 219.3(LBS)  
 RELIABILITY .8593

MISSION EQUIPMENT

WEIGHT 850.00 LBS VOLUME 33.60(FT\*\*3) POWER REQUIREMENT 980.0 WATT  
 RELIABILITY .9970

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INTELSAT V C01-1-2

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	30.4 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	3011.4 (BTU/HR),	TOTAL RADIATOR AREA	31.5 (FT**2)
HEAT PIPE	182713.8 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	14.6 (FT)	TOTAL HEATER POWER	3126.4 (BTU/HR)
STORED ENERGY	77.4 (BTU)	VARIABLE CONDUCTANCE H.P.	3031.9 (WATT-IN)
		AVERAGE HEAT LOAD	3544.9 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	55.1
HEAT PIPES	15.4
PHASE CHANGE MATERIAL	1.9
RADIATOR (ACTIVE)	63.4
TOTAL	135.8

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.031 (IN)		
STRINGER NO., THICKNESS, HT.	166. ,	81910.347 (IN),	.637 (IN)
FRAME NO., THICKNESS, HT.	14. ,	.183 (IN),	.914 (IN)
GRID BEAM THICKNESS	.179 (IN),	SPACING 5.044 (IN),	HEIGHT 2.522 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	192.0 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	111.4 (LBS)		

V1-253

C-4

INTELSAT V CCI-1-2

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	6	.6	.0	0.0
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
515	TANK	1	27.8	.8	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM D DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

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INTELSAT V CC1-1-2

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
130	SHUNT REGULATOR	11	2.7	.0	0.0
269	BATTERY	2	91.1	.5	0.0
389	BATTERY CHARGER	2	5.3	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	850.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	75.2
DATA PROCESSING	30.1
COMMUNICATIONS	38.9
BATTERIES	182.2
POWER CONTROL	51.9
CONVERTERS	15.9
SOLAR ARRAY	219.3
HARNES S	102.6
STRUCTURE	646.8
THERMAL CONTROL	135.8
DRY WEIGHT	2376.3
PROPELLANT	141.6
SATELLITE ADAPTER	111.4

TOTAL LAUNCH WEIGHT 2629.3

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INTELSAT VI CCI-1-3

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 124720.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	125.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	4.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 1295.56 WATTS  
 TOTAL SOLAR ARRAY AREA 149.88 SQ FT  
 INSTALLED BATTERY CAPACITY 200.00 AMP-HR  
 BEGINNING OF LIFE POWER 1908.39 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 3051.5 LBS ( 1384.1 KG) LAUNCH WEIGHT = 3159.6 LBS ( 1433.2 KI)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 47.4 IN.( 1.20 M) 78.9 IN.( 2.00 M) 78.9 IN.( 2.00 M)  
 MISSION EQUIPMENT 30.9 IN.( .78 M) 51.5 IN.( 1.31 M) 51.5 IN.( 1.31 M)  
 TOTAL SATELLITE 78.3 IN.( 1.99 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 845.2 IYY = 2585661.6 IZZ = 4190166.9  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 38.5 IN.( .98 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 84.0(MO)  
 MEAN MISSION DURATION 70.1(MO)  
 RELIABILITY .501

VI-256

INTELSAT VI CC1-1-3

\* \* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 3 3 2 2  
 WEIGHT 67.10 LBS VOLUME 2.06(FT\*\*3) POWER REQUIREMENT 78.9 WATT  
 RELIABILITY .9937  
 IERR 10

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130 524 701 1203 603  
 EQUIPMENT QUANTITIES 18 8 5 9 2 1 4 1 2 1 1  
 WEIGHT 851.58 LBS VOLUME 17.81(FT\*\*3) POWER REQUIREMENT .3 WATT  
 DRY WEIGHT 147.67(LBS), EXPENDABLE WEIGHT 703.91(LBS)  
 RELIABILITY .8103  
 IERR 1

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 2 2  
 WEIGHT 42.36 LBS VOLUME .78(FT\*\*3) POWER REQUIREMENT 10.5 WATT  
 RELIABILITY .9990  
 IERR 1

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605  
 EQUIPMENT QUANTITIES 1 3 2 2 4 2  
 WEIGHT 39.14 LBS VOLUME 1.09(FT\*\*3) POWER REQUIREMENT 25.5 WATT  
 RELIABILITY .9928  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 412 531 269 650 702  
 EQUIPMENT QUANTITIES 4 9 4 4 2  
 WEIGHT 447.13 LBS VOLUME 5.70(FT\*\*3) POWER DISSIPATION 218.7 WATT  
 HARNESS WEIGHT 137.1(LBS), SOLAR ARRAY WEIGHT 104.4(LBS)  
 RELIABILITY .6974

MISSION EQUIPMENT  
 WEIGHT 941.00 LBS VOLUME 37.20(FT\*\*3) POWER REQUIREMENT 1000.0 WATT  
 RELIABILITY .9000

VI-257

INTELSAT VI CC1-1-3

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	38.0 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	3652.7 (BTU/HR),	TOTAL RADIATOR AREA	39.0 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	3742.7 (BTU/HR)
STORED ENERGY	103.0 (BTU)	VARIABLE CONDUCTANCE H.P.	792.3 (WATT-IN)
		AVERAGE HEAT LOAD	3802.6 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		17.5
HEAT PIPES		5.1
PHASE CHANGE MATERIAL		2.6
RADIATOR (ACTIVE)		74.4
	TOTAL	99.6

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.025 (IN)			
STRINGER NO., THICKNESS, HT.	163.			
FRAME NO., THICKNESS, HT.	5.	81910.347 (IN),		.510 (IN)
GRID BEAM THICKNESS	.222 (IN),	.147 (IN),		.733 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	SPACING 6.244 (IN),	HEIGHT	3.122 (IN)
EQUIPMENT BAY STRUCTURE WT.	291.7 (LBS)	CENTER 0.000 (IN),	AFT	.030 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	32.5 (LBS)			
ADAPTER WEIGHT	108.2 (LBS)			

VI-258



INTELSAT VI CC1-1-3

\* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	3	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	8	.7	.0	.1
907	ISCLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	4	17.3	3.2	0.0
524	TANK	1	21.6	1.4	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
403	COMMD DECOD+DISTR	2	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	3	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	4	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

VI-259

INTELSAT VI CC1-1-3

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
412	DISCHGE REGULATOR	4	16.4	.4	0.0
531	SHUNT REGULATOR	9	4.3	.1	0.0
269	BATTERY	4	71.3	.4	0.0
650	BATTERY CHARGER	4	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	941.0
STABILITY AND CONTROL	67.1
AUXILIARY PROPULSION	147.7
DATA PROCESSING	42.4
COMMUNICATIONS	39.1
BATTERIES	285.1
POWER CONTROL	162.0
SOLAR ARRAY	104.4
HARNES S	137.1
STRUCTURE	304.8
SOLAR ARRAY DRIVE	17.3
THERMAL CONTROL	99.6
DRY WEIGHT	2347.6
PROPELLANT	703.9
SATELLITE ADAPTER	108.2

TOTAL LAUNCH WEIGHT 3159.6

VI-260

TDRS/WESTAR CC2-1-1

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .300000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 47998.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
 NUMBER OF MAIN FRAME WORDS  
 MAIN FRAME SAMPLE RATE  
 MAIN FRAME WORD LENGTH  
 NUMBER OF SUBFRAMES  
 SUBFRAME RATE  
 NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
 256.  
 125.  
 8.  
 4.  
 1.0000  
 64.

MISSION EQUIPMENT DATA

0.  
 0.  
 0.  
 0.  
 0.  
 0.0000  
 0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 670.92 WATTS  
 TOTAL SOLAR ARRAY AREA 76.75 SQ FT  
 INSTALLED BATTERY CAPACITY 100.00 AMP-HR  
 BEGINNING OF LIFE POWER 977.20 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 1668.7 LBS ( 756.9 KG) LAUNCH WEIGHT = 1732.0 LBS ( 785.6 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 41.3 IN.( 1.05 M) 68.9 IN.( 1.75 M) 68.9 IN.( 1.75 M)  
 MISSION EQUIPMENT 26.6 IN.( .68 M) 44.3 IN.( 1.13 M) 44.3 IN.( 1.13 M)  
 TOTAL SATELLITE 67.9 IN.( 1.72 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 296.2 IYY = 1086057.2 IZZ = 1507336.6  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 35.4 IN.( .90 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
 APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0:  
 MISSION LIFETIME 60.0(MO)  
 MEAN MISSION DURATION 50.2(MO)  
 RELIABILITY .623

197-11-1

TDRS/WESTAR CC2-1-1

\* \* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
EQUIPMENT QUANTITIES 2 2 2 2  
WEIGHT 58.40 LBS VOLUME 1.77(FT\*\*3) POWER REQUIREMENT 78.9 WATT  
RELIABILITY .9856  
IERR 10

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130 509 701 1203 603  
EQUIPMENT QUANTITIES 18 6 5 9 2 1 2 1 2 1 1  
WEIGHT 368.93 LBS VOLUME 10.45(FT\*\*3) POWER REQUIREMENT .3 WATT  
DRY WEIGHT 98.03(LBS), EXPENDABLE WEIGHT 270.89(LBS)  
RELIABILITY .8862  
IERR 1

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403  
EQUIPMENT QUANTITIES 1 1  
WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.9 WATT  
RELIABILITY .9668  
IERR 1

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605  
EQUIPMENT QUANTITIES 1 2 2 2 3 2  
WEIGHT 35.64 LBS VOLUME 1.05(FT\*\*3) POWER REQUIREMENT 25.5 WATT  
RELIABILITY .9897  
IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 409 515 269 650 702  
EQUIPMENT QUANTITIES 2 9 2 2 1  
WEIGHT 232.45 LBS VOLUME 4.56(FT\*\*3) POWER DISSIPATION 113.3 WATT  
HARNESS WEIGHT 73.7(LBS), SOLAR ARRAY WEIGHT 53.4(LBS)  
RELIABILITY .8280

MISSION EQUIPMENT

WEIGHT 599.00 LBS VOLUME 23.69(FT\*\*3) POWER REQUIREMENT 450.0 WATT  
RELIABILITY .9000

V1-262

TDRS/WESTAR CC2-1-1

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	19.3 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	1818.3 (BTU/HR),	TOTAL RADIATOR AREA	20.2 (FT**2,
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.2 (FT)	TOTAL HEATER POWER	1908.3 (BTU/HR)
STORED ENERGY	103.0 (BTU)	VARIABLE CONDUCTANCE H.P.	687.5 (WATT-IN)
		AVERAGE HEAT LOAD	1927.1 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	14.2
HEAT PIPES	4.5
PHASE CHANGE MATERIAL	2.6
RADIATOR (PASSIVE)	12.2
TOTAL	33.5

IERR 1100001011

STRUCTURES			
SKIN THICKNESS	.019 (IN)		
STRINGER NO., THICKNESS, HT.	178. ,	81910.347 (IN),	.410 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.118 (IN),	.588 (IN)
GRID BEAM THICKNESS	.164 (IN),	SPACING 4.613 (IN),	HEIGHT 2.306 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	145.2 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	24.1 (LBS)		
ADAPTER WEIGHT	63.3 (LBS)		

VI-263

TDRS/WESTAR CC2-1-1

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMO DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

V1-264

TDRS/WESTAR CC2-1-1

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	599.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	98.0
DATA PROCESSING	21.2
COMMUNICATIONS	35.6
BATTERIES	142.6
POWER CONTROL <i>conv.</i>	89.9
SOLAR ARRAY	53.4
HARNESS	73.7
STRUCTURE	183.7
SOLAR ARRAY DRIVE	8.9
THERMAL CONTROL	33.5
DRY WEIGHT	1397.8
PROPELLANT	270.9
SATELLITE ADAPTER	63.3
<hr/>	
TOTAL LAUNCH WEIGHT	1732.0

V1-265

COMSTAR CC2-1-2

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- DUAL SPIN  
POINTING ACCURACY = .350000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 47286 (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

64.  
256.  
13.  
8.  
18.  
1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 766.92 WATTS  
TOTAL SOLAR ARRAY AREA 322.62 SQ FT  
INSTALLED BATTERY CAPACITY 66.00 AMP-HR  
BEGINNING OF LIFE POWER 1043.60 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1954.5 LBS ( 886.5 KG) LAUNCH WEIGHT = 2043.1 LBS ( 926.7 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 123.2 IN. ( 3.13 M) 120.0 IN. ( 3.05 M) 120.0 IN. ( 3.05 M)  
MISSION EQUIPMENT 20.0 IN. ( .51 M) 33.3 IN. ( .85 M) 33.3 IN. ( .85 M)  
TOTAL SATELLITE 143.2 IN. ( 3.64 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 708.9 IYY = 6286578.0 IZZ = 6286578.0  
CENTER OF GRAVITY 81.9 IN. ( 2.08 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 84.0 (MO)  
MEAN MISSION DURATION 66.13 (MO)  
RELIABILITY .503

V1-266



COMSTAR CC2-1-2

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

✓ CONFIGURATION - - DUAL SPIN  
 EQUIPMENT CODE IDENTIFIER 101 203 303 403 503 603 703 806 1413  
 EQUIPMENT QUANTITIES 1 1 2 2 3 2 2 3 1  
 WEIGHT 171.80 LBS VOLUME 4.86 (FT\*\*3) POWER REQUIREMENT 76.7 WATTS  
 RELIABILITY .8237  
 IERR 0

AUXILIARY PROPULSION

✓ CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 829 834 906 1003 459 203 1124 524 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 3 1 2 1 1  
 WEIGHT 372.90 LBS VOLUME 11.08 (FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 95.40 (LBS), EXPENDABLE WEIGHT 277.51 (LBS)  
 RELIABILITY .9104  
 IERR .11

DATA PROCESSING AND INSTRUMENTATION

✓ CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 406  
 EQUIPMENT QUANTITIES 2 2  
 WEIGHT 39.86 LBS VOLUME .56 (FT\*\*3) POWER REQUIREMENT 8.5 WATTS  
 RELIABILITY .9951  
 IERR 1

VI-267

COMMUNICATIONS

✓ CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 206 103 336 401 503 618  
 EQUIPMENT QUANTITIES 1 2 2 2 3 2  
 WEIGHT 25.84 LBS VOLUME .47 (FT\*\*3) POWER REQUIREMENT 77.7 WATTS  
 RELIABILITY .9739  
 IERR\*\*\*\*\*

ELECTRICAL POWER

✓ CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 112 260 389 1202  
 EQUIPMENT QUANTITIES 10 2 3 2  
 WEIGHT 174.04 LBS VOLUME 1.52 (FT\*\*3) POWER DISSIPATION 61.2 WATTS  
 HARNESS WEIGHT 108.9 (LBS), SOLAR ARRAY WEIGHT 158.6 (LBS)  
 RELIABILITY .7698

MISSION EQUIPMENT

WEIGHT 254.00 LBS VOLUME 10.05 (FT\*\*3) POWER REQUIREMENT 420.0 WATTS  
 RELIABILITY .9000

COMSTAR CC2-1-2

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	17.2 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1433.6 (BTU/HR),	TOTAL RADIATOR AREA	18.3 (FT**2)
HEAT PIPE	62635.1 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	9.0 (FT)	TOTAL HEATER POWER	1548.5 (BTU/HR)
STORED ENERGY	125.8 (BTU)	VARIABLE CONDUCTANCE H.P.	1852.7 (WATT-IN)
		AVERAGE HEAT LOAD	1988.6 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		41.5
HEAT PIPES		9.4
PHASE CHANGE MATERIAL		3.1
RADIATOR (PASSIVE)		10.9
		-----
	TOTAL	64.9

IERR 1100010111

V1-268

STRUCTURES			
SKIN THICKNESS	.021 (IN)		
STRINGER NO., THICKNESS, HT.	218. ,	81910.347 (IN),	.580 (IN)
FRAME NO., THICKNESS, HT.	8. ,	.167 (IN),	.833 (IN)
GRID BEAM THICKNESS	.160 (IN),	SPACING 4.510 (IN),	HEIGHT 2.255 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	235.13 (LBS)		
SOLAR ARRAY BOOM AND CRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	88.6 (LBS)		

COMSTAR CC2-1-2

\* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
101	DESPIN BEARING	1	73.6	.8	6.7
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	.0
403	ROTATION DAMPER	2	2.6	.3	0.0
503	GIMBAL ELECTRONCS	3	6.3	.3	31.6
603	CONTRDL ELECTRNCS	2	7.4	.4	3.5
703	PTAXIAL DRIVE	2	14.3	.5	28.0
806	FARTH SENSOR ASSY	3	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
✓829	THRUSTER	6	.6	.0	0.0
✓834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	3	11.5	2.4	0.0
524	TANK	1	21.6	1.4	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

VI-269

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
406	COMMD DECOD+DISTR	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
206	ANTENNA	1	1.5	.1	0.0
103	PASEBND ASSY UNIT	2	2.0	.0	.5
336	TRANSMITTER	2	2.5	.0	70.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
618	DIPLEXER	2	1.5	.0	0.0

*all*

COMSTAR CC2-1-2

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
112	SHUNT REGULATOR	10	1.4	.0	0.0
260	BATTERY	2	60.7	.3	0.0
389	BATTERY CHARGER	3	5.3	.1	0.0
1202	POWER CONTROL	2	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	254.0
STABILITY AND CONTROL	155.9
AUXILIARY PROPULSION	95.4
DATA PROCESSING	39.9
COMMUNICATIONS	25.8
BATTERIES	121.4
POWER CONTROL	52.6
CONVERTERS	15.9
SOLAR ARRAY	158.6
HARNESS	108.9
STRUCTURE	583.6
THERMAL CONTROL	64.9
DFY-WEIGHT	1676.9
PROPELLANT	277.5
SATELLITE ADAPTER	88.6

TOTAL LAUNCH WEIGHT 2043.1

VI-270

CCNSTAR F/D CC2-1-3 , -10,12

\* \* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL-  
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 124734.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
125.  
8.  
4.  
1.0000.  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 256.000(KB PS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KB PS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 1295.56 WATTS  
TOTAL SOLAR ARRAY AREA 149.88 SQ FT  
INSTALLED BATTERY CAPACITY 200.00 AMP-HR  
BEGINNING OF LIFE POWER 1908.39 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WET SATELLITE WEIGHT = 3116.7 LBS ( 1413.7 KG) LAUNCH WEIGHT = 3227.2 LBS ( 1463.8 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 47.4 IN.( 1.20 M) 78.9 IN.( 2.00 M) 78.9 IN.( 2.00 M)  
MISSION EQUIPMENT 31.5 IN.( .80 M) 52.5 IN.( 1.33 M) 52.5 IN.( 1.33 M)  
TOTAL SATELLITE 78.9 IN.( 2.00 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 855.1 IYY = 2667838.0 IZZ = 4272343.2  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 39.1 IN.( .99 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 84.0(MO)  
MEAN MISSION DURATION 70.1(MO)  
RELIABILITY .501

V1271

CONSTAR F/O CC2-1-3, -10, -12

\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
EQUIPMENT QUANTITIES 3 3 2 2  
WEIGHT 67.10 LBS VOLUME 2.06(FT\*\*3)  
RELIABILITY .9937 POWER REQUIREMENT 78.9 WATTS  
IERR 10

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130 524 701 1203 603  
EQUIPMENT QUANTITIES 18 8 5 9 2 1 4 1 2 1 1  
WEIGHT 851.66 LBS VOLUME 17.81(FT\*\*3) POWER REQUIREMENT WATTS  
DRY WEIGHT 147.67(LBS), EXPENDABLE WEIGHT 703.99(LBS)  
RELIABILITY .8103  
IERR 1

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403  
EQUIPMENT QUANTITIES 2 2  
WEIGHT 42.36 LBS VOLUME .78(FT\*\*3) POWER REQUIREMENT 10.3 WATTS  
RELIABILITY .9990  
IERR 1

V1-272

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605  
EQUIPMENT QUANTITIES 1 3 2 2 4 2  
WEIGHT 39.14 LBS VOLUME 1.09(FT\*\*3) POWER REQUIREMENT 25.9 WATTS  
RELIABILITY .9928  
IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 412 531 269 650 702  
EQUIPMENT QUANTITIES 4 9 4 4 2  
WEIGHT 447.13 LBS VOLUME 5.70(FT\*\*3) POWER DISSIPATION 218.7 WATTS  
HARNESS WEIGHT 140.4(LBS), SOLAR ARRAY WEIGHT 104.4(LBS)  
RELIABILITY .6974

MISSION EQUIPMENT

WEIGHT 1000.00 LBS VOLUME 39.53(FT\*\*3) POWER REQUIREMENT 1000.0 WATTS  
LIABILITY .9000

CCMSTAR F/O CC2-1-3, -10, -12

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	38.0 (FT**2),	BATTERY RADIATOR AREA	39.0 (FT**2)
HEATER POWER	3652.7 (BTU/HR),	TOTAL RADIATOR AREA	90.0 (BTU/HR)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	3742.7 (BTU/HR)
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	798.7 (WATT-IN)
STORED ENERGY	103.0 (BTU)	VARIABLE CONDUCTANCE H.P.	3802.6 (BTU/HR)
		AVERAGE HEAT LOAD	

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	17.6
HEAT PIPES	5.2
PHASE CHANGE MATERIAL	2.6
RADIATOR (ACTIVE)	74.4
TOTAL	99.7

IERR 1100001011

STRUCTURES

SKIN THICKNESS	.025 (IN)		
STRINGER NO., THICKNESS, HT.	163. ,	81910.347 (IN),	.513 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.147 (IN),	.737 (IN)
GRID BEAM THICKNESS	.224 (IN),	SPACING 6.310 (IN),	HEIGHT 3.155 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	291.7 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	32.9 (LBS)		
ADAPTER WEIGHT	110.4 (LBS)		

V1-273

COMSTAR F/O CC2-1-3, -10, -12

\* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	3	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	8	.7	.0	.1
907	ISCLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	4	17.3	3.2	0.0
524	TANK	1	21.6	1.4	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
403	COMM DECOD+DISTR	2	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	3	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	4	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

VI-274



CCNSTAR F/O CC2-1-3, -10, -12

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
412	DISCHGE REGULATOR	4	16.4	.4	0.0
531	SHUNT REGULATOR	9	4.3	.1	0.0
269	BATTERY	4	71.3	.4	0.0
650	BATTERY CHARGER	4	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1000.0
STABILITY AND CONTROL	67.1
AUXILIARY PROPULSION	147.7
DATA PROCESSING	42.4
COMMUNICATIONS	39.1
BATTERIES	285.1
POWER CONTROL	162.0
SOLAR ARRAY	104.4
HARNES	140.4
STRUCTURE	307.5
SOLAR ARRAY DRIVE	17.3
THERMAL CONTROL	99.7
DRY WEIGHT	2412.8
PROPELLANT	704.0
SATELLITE ADAPTER	110.4

TOTAL LAUNCH WEIGHT 3227.2

V1-275

WESTAR CC2-1-4

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .400000 (DEG.)

AUXILIARY PROPELLSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 25784. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
13.	0.
8.	0.
18.	)
.1250	)
64.	.0000
	)

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 262.25 WATTS  
TOTAL SOLAR ARRAY AREA 100.08 SQ FT  
INSTALLED BATTERY CAPACITY 22.00 AMP-HR  
BEGINNING OF LIFE POWER 352.86 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1068.4 LBS ( 484.6 KG) LAUNCH WEIGHT = 1114.0 LBS ( 505.3 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 54.8 IN. ( 1.39 M) 91.3 IN. ( 2.32 M) 91.3 IN. ( 2.32 M)  
MISSION EQUIPMENT 20.9 IN. ( .53 M) 34.8 IN. ( .88 M) 34.8 IN. ( .88 M)  
TOTAL SATELLITE 75.0 IN. ( 1.92 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 233.4 IYY = 1094196.0 IZZ = 1094196.0  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 42.6 IN. ( 1.08 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323.1/19323.1 0.0  
MISSION LIFETIME 60.0 (MO)  
MEAN MISSION DURATION 50.5 (MO)  
RELIABILITY .1602

VI-276

WESTAR CC2-1-4

\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

✓ CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 2 1  
 WEIGHT 36.10 LBS VOLUME 1.43 (FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9051  
 IERR 0

AUXILIARY PROPULSION

✓ CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 223.33 LBS VOLUME 5.72 (FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 68.33 (LBS), EXPENDABLE WEIGHT 154.99 (LBS)  
 RELIABILITY .8257  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

✓ CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39 (FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS

✓ CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92 (FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9601  
 IERR\*\*\*\*\*

ELECTRICAL POWER

✓ CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 218 306 1202  
 EQUIPMENT QUANTITIES 7 2 2 1  
 WEIGHT 108.60 LBS VOLUME 1.97 (FT\*\*3) POWER DISSIPATION 20.9 WATTS  
 HARNESS WEIGHT 47.8 (LBS), SOLAR ARRAY WEIGHT 53.6 (LBS)  
 RELIABILITY .9649

MISSION EQUIPMENT

WEIGHT 290.00 LBS VOLUME 11.48 (FT\*\*3) POWER REQUIREMENT 208.0 WATTS  
 RELIABILITY .9000

VI-277

WESTAR CC2-1-4

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	7.3 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	694.5 (BTU/HR),	TOTAL RADIATOR AREA	8.5 (FT**2)
HEAT PIPE	14155.9 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.7 (FT)	TOTAL HEATER POWER	809.4 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	978.7 (WATT-IN)
		AVERAGE HEAT LOAD	850.8 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		19.1
HEAT PIPES		5.0
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		4.6
	TOTAL	30.4

IERR 11C0010111

STRUCTURES			
SKIN THICKNESS	.014 (IN)		
SPRINGER NO., THICKNESS, HT.	235.		
FRAME NO., THICKNESS, HT.	5.	81910.347 (IN),	.410 (IN)
GRID BEAM THICKNESS	.124 (IN),	.118 (IN),	.588 (IN)
ENCOVER THICKNESS- FORWARD	.030 (IN),	3.483 (IN),	1.742 (IN)
EQUIPMENT BAY STRUCTURE WT.	113.9 (LBS)	0.000 (IN),	.030 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	45.7 (LBS)		

V1-278

WESTAR CC2-1-4

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	MUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNC	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
✓834	THRUSTER	6	.7	.0	.1
✓834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
✓203	DIGITAL TELEMETRY	1	8.9	.2	3.0
✓403	COMMDC DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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WESTAR CC2-1-4

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	7	4.2	.1	0.0
✓218	BATTERY	2	21.0	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	290.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	42.0
POWER CONTROL	66.6
CONVERTERS	15.9
SOLAR ARRAY	53.6
HARNESS	47.8
STRUCTURE	232.6
THERMAL CONTROL	30.4
DRY WEIGHT	913.4
PROPELLANT	155.0
SATELLITE ADAPTER	45.7
-----	
TOTAL LAUNCH WEIGHT	1114.0

VI-286

RCA SATCOM CC2-1-5

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .200000( DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 38343. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0. (IPS)

COPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
125.  
8.  
4.  
1.0000  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 645.92 WATTS  
TOTAL SOLAR ARRAY AREA 73.89 SQ FT  
INSTALLED BATTERY CAPACITY 100.00 AMP-HR  
BEGINNING OF LIFE POWER 940.79 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1192.5 LBS ( 540.9 KG) LAUNCH WEIGHT = 1237.8 LBS ( 561.5 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 41.1 IN.( 1.04 M) 68.5 IN.( 1.74 M) 68.5 IN.( 1.74 M)  
MISSION EQUIPMENT 19.2 IN.( .49 M) 32.0 IN.( .81 M) 32.0 IN.( .81 M)  
TOTAL SATELLITE 60.3 IN.( 1.53 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 230.7 IYY = 670587.1 IZZ = 1063884.3  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 29.3 IN.( .74 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MO)  
MEAN MISSION DURATION 50.2(MO)  
RELIABILITY .623

VI-281

RCA SATCOM CC2-1-5

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1303				
EQUIPMENT QUANTITIES	2	2	2	2				
WEIGHT	58.40 LBS				VOLUME	1.77(FT**3)	POWER REQUIREMENT	78.9 WATTS
RELIABILITY		.9856						
IERR	10							

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	818	834	906	1003	499	203	1130	509	701	1203	603
EQUIPMENT QUANTITIES	18	6	5	9	2	1	2	1	2	1	1
WEIGHT	312.89 LBS				VOLUME	10.15(FT**3)	POWER REQUIREMENT				.3 WATTS
DRY WEIGHT	95.03(LBS)				EXPENDABLE WEIGHT		217.86(LBS)				
RELIABILITY		.8866									
IERR	11										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403						
EQUIPMENT QUANTITIES	1	1						
WEIGHT	21.18 LBS				VOLUME	.39(FT**3)	POWER REQUIREMENT	10.9 WATT
RELIABILITY		.9668						
IERR	1							

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	202	106	327	401	503	605		
EQUIPMENT QUANTITIES	1	2	2	2	3	2		
WEIGHT	35.64 LBS				VOLUME	1.05(FT**3)	POWER REQUIREMENT	25.5 WATT
RELIABILITY		.9897						
IERR	*****							

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	409	515	269	650	702			
EQUIPMENT QUANTITIES	2	9	2	2	1			
WEIGHT	232.45 LBS				VOLUME	4.56(FT**3)	POWER DISSIPATION	109.1 WATTS
HARNESS WEIGHT		56.3(LBS)			SOLAR ARRAY WEIGHT		51.5(LBS)	
RELIABILITY		.8280						

MISSION EQUIPMENT

WEIGHT	225.00 LBS	VOLUME	8.91(FT**3)	POWER REQUIREMENT	425.0 WATTS
RELIABILITY		.9000			

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RCA SATCOM CC2-1-5

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	18.4 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	1735.0 (BTU/HR),	TOTAL RADIATOR AREA	19.4 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	3.8 (FT)	TOTAL HEATER POWER	1825.0 (BTU/HR)
STORED ENERGY	111.0 (BTU)	VARIABLE CONDUCTANCE H.P.	610.4 (WATT-IN)
		AVERAGE HEAT LOAD	1841.9 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	13.0
HEAT PIPES	4.0
PHASE CHANGE MATERIAL	2.8
RADIATOR (PASSIVE)	11.7
TOTAL	31.4

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.016 (IN)			
STRINGER NO., THICKNESS, HT.	192. ,	81910.347 (IN),		.376 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.108 (IN),		.539 (IN)
GRID BEAM THICKNESS	.138 (IN),	SPACING 3.898 (IN),	HEIGHT	1.949 (IN)
ENDCOVER THICKNESS - FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT
EQUIPMENT BAY STRUCTURE WT.	133.9 (LBS)			.030 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	23.7 (LBS)			
ADAPTER WEIGHT	45.3 (LBS)			

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RCA SATCOM CC2-1-5

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

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RCA SATCOM CC2-1-5

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
409	DISCHGE REGULATOR	2	20.3	1.3	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	225.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	95.0
DATA PROCESSING	21.2
COMMUNICATIONS	35.6
BATTERIES	142.6
POWER CONTROL	89.9
SOLAR ARRAY	51.5
HARNES	56.3
STRUCTURE	159.2
SOLAR ARRAY DRIVE	8.5
THERMAL CONTROL	31.4
DRY WEIGHT	974.6
PROPELLANT	217.9
SATELLITE ADAPTER	45.3

TOTAL LAUNCH WEIGHT 1237.8

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RCA F/0 CC2-1-6

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .200000 (DEG.)

AUXILIARY PROPULSION  
CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 40745. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0. (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPI TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	125.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	4.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 256.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER  
CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 659.02 WATTS  
TOTAL SOLAR ARRAY AREA 75.39 SQ FT  
INSTALLED BATTERY CAPACITY 100.00 AMP-HR  
BEGINNING OF LIFE POWER 959.87 WATTS

VEHICLE SIZING  
CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1186.5 LBS ( 538.2 KG) LAUNCH WEIGHT = 1231.2 LBS ( 558.5 KG)  
DIMENSIONS  
EQUIPMENT BAY 39.2 IN. ( .99 M) 65.3 IN. ( 1.66 M) 65.3 IN. ( 1.66 M)  
MISSION EQUIPMENT 19.9 IN. ( .50 M) 33.1 IN. ( .84 M) 33.1 IN. ( .84 M)  
TOTAL SATELLITE 59.0 IN. ( 1.50 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 217.9 IYY = 634022.5 IZZ = 1026466.8  
K-CG Y-CG Z-CG  
CENTER OF GRAVITY 28.7 IN. ( .73 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0 (MO)  
MEAN MISSION DURATION 49.8 (MO)  
RELIABILITY .612

982-11

RCA F/O CC2-1-6

\* \* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303

EQUIPMENT QUANTITIES 2 2 1 2

WEIGHT 43.00 LBS VOLUME 1.24(FT\*\*3)

RELIABILITY .9418

IERR 10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1130

EQUIPMENT QUANTITIES 18 6 5 9 2 1 2

WEIGHT 326.54 LBS VOLUME 10.15(FT\*\*3)

DRY WEIGHT 95.03(LBS), EXPENDABLE WEIGHT

RELIABILITY .8865

IERR 11

509 701 1203 603

1 2 1 1

POWER REQUIREMENT .3 WATTS

231.51(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403

EQUIPMENT QUANTITIES 1 1

WEIGHT 21.18 LBS VOLUME .39(FT\*\*3)

RELIABILITY .9668

IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605

EQUIPMENT QUANTITIES 1 2 2 1 3 2

WEIGHT 31.72 LBS VOLUME 1.00(FT\*\*3)

RELIABILITY .9770

IERR\*\*\*\*\*

POWER REQUIREMENT 29.9 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 412 515 269 650 702

EQUIPMENT QUANTITIES 2 9 2 2 1

WEIGHT 224.69 LBS VOLUME 2.73(FT\*\*3)

HARNESS WEIGHT 50.4(LBS), SOLAR ARRAY WEIGHT

RELIABILITY .8626

POWER DISSIPATION 111.3 WATTS

52.5(LBS)

MISSION EQUIPMENT

WEIGHT 250.00 LBS VOLUME 9.90(FT\*\*3)

RELIABILITY .9000

POWER REQUIREMENT 60.0 WATTS

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RCA F/O CC2-1-6

\* \*. SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	19.6 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	1851.7 (BTU/HR),	TOTAL RADIATOR AREA	20.5 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	3.7 (FT)	TOTAL HEATER POWER	1941.7 (BTU/HR)
STORED ENERGY	111.0 (BTU)	VARIABLE CONDUCTANCE H.P.	597.8 (WATT-IN)
		AVERAGE HEAT LOAD	1961.2 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		12.4
HEAT PIPES		3.9
PHASE CHANGE MATERIAL		2.8
RADIATOR (PASSIVE)		12.4
		-----
TOTAL		31.5

IERR 1100001011

STRUCTURES

SKIN THICKNESS	.016 (IN)	188.		81910.347 (IN),	.367 (IN)
STRINGER NO., THICKNESS, HT.		5.		.105 (IN),	.527 (IN)
FRAME NO., THICKNESS, HT.		.139 (IN),		SPACING 3.905 (IN),	HEIGHT 1.952 (IN)
GRID BEAM THICKNESS		.030 (IN),		CENTER 0.000 (IN),	AFT .030 (IN)
ENDCOVER THICKNESS- FORWARD		131.2 (LBS)			
EQUIPMENT BAY STRUCTURE WT.		23.9 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.		44.7 (LBS)			
ADAPTER WEIGHT					

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RCA F/D CC2-1-6

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

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RCA F/O CC2-1-6

◆ ◆ ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
412	DISCHGE REGULATOR	2	16.4	.4	0.0
515	SHUNT REGULATOR	9	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	250.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	95.0
DATA PROCESSING	21.2
COMMUNICATIONS	31.7
BATTERIES	142.6
POWER CONTROL	82.1
SOLAR ARRAY	52.5
HARNES	50.4
STRUCTURE	146.2
SOLAR ARRAY DRIVE	8.7
THERMAL CONTROL	31.5
DRY WEIGHT	955.0
PROPELLANT	231.5
SATELLITE ADAPTER	44.7

TOTAL LAUNCH WEIGHT 1231.2

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MARISAT F/O CC2-1-7

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- SPIN CONTROL  
 POINTING ACCURACY = .600000(DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 23324.(LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0.(IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPI TABLE	32.	0.
NUMBER OF COMMANDS	256.	0.
NUMBER OF MAIN FRAME WORDS	13.	0.
MAIN FRAME SAMPLE RATE	8.	0.
MAIN FRAME WORD LENGTH	18.	0.
NUMBER OF SUBFRAMES	64.	0.
SUBFRAME RATE	1250	0.0000
NUMBER OF WORDS PER SUBFRAME		0.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 298.25 WATTS  
 TOTAL SOLAR ARRAY AREA 124.06 SQ FT  
 INSTALLED BATTERY CAPACITY 24.00 AMP-HR  
 BEGINNING OF LIFE POWER 401.30 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 957.6 LBS ( 434.4 KG) LAUNCH WEIGHT = 1000.0 LBS ( 453.6 KI  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 58.4 IN.( 1.48 M) 97.4 IN.( 2.47 M) 97.4 IN.( 2.47 M)  
 MISSION EQUIPMENT 17.3 IN.( .44 M) 28.8 IN.( .73 M) 28.8 IN.( .73 M)  
 TOTAL SATELLITE 75.7 IN.( 1.92 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 234.8 IYY = 1070904.4 IZZ = 1070904.4  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 41.3 IN.( 1.05 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 60.0(MO)  
 MEAN MISSION DURATION 50.5(MO)  
 RELIABILITY .603

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MARISAT F/O CC2-1-7

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 ✓ CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 2 1  
 WEIGHT 36.10 LBS VOLUME 1.43(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9051  
 IERR 0

AUXILIARY PROPULSION  
 ✓ CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 208.54 LBS VOLUME 5.72(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT 140.20(LBS)  
 RELIABILITY .8261  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 ✓ CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS  
 ✓ CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92(FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9601  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 ✓ CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 221 306 1202  
 EQUIPMENT QUANTITIES 7 2 2 1  
 WEIGHT 117.20 LBS VOLUME 2.03(FT\*\*3) POWER DISSIPATION 23.8 WATTS  
 HARNESS WEIGHT 43.5(LBS), SOLAR ARRAY WEIGHT 61.0(LBS)  
 RELIABILITY .9649

MISSION EQUIPMENT  
 WEIGHT 165.00 LBS VOLUME 6.53(FT\*\*3) POWER REQUIREMENT 244.0 WATTS  
 RELIABILITY .9000

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MARISAT F/D CC2-1-7

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	8.3 (FT**2),	BATTERY RADIATOR AREA	.8 (FT**2)
HEATER POWER	800.0 (BTU/HR),	TOTAL RADIATOR AREA	9.2 (FT**2)
HEAT PIPE	16212.2 (WATT-IN),	BATTERY HEATER POWER	63.6 (BTU/HR)
HEAT PIPE LENGTH	4.7 (FT)	TOTAL HEATER POWER	863.6 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	979.5 (WATT-IN)
		AVERAGE HEAT LOAD	973.6 (BTU/HR)

THERMAL CONTROL WEIGHT		
	UNIT WEIGHT (LBS)	
INSULATION	20.1	
HEAT PIPES	5.0	
PHASE CHANGE MATERIAL	1.8	
RADIATOR (PASSIVE)	5.3	
	-----	
TOTAL	32.1	

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.013 (IN)			
STRINGER NO., THICKNESS, HT.	252. ,	81910.347 (IN),		.407 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.117 (IN),		.585 (IN)
GRID BEAM THICKNESS	.115 (IN),	SPACING 3.228 (IN),		HEIGHT 1.614 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),		AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	112.2 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	42.4 (LBS)			

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MARISAT F/U CC2-1-7

\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NU TATION DAMPER	1	2.8	.3	0.0
603	CONTRUL ELECTKNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM D DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIFLEXER	1	3.1	.0	1.0

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MARISAT F/O CC2-1-7

\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	7	4.2	.1	0.0
✓221	BATTERY	2	25.3	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	165.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	50.6
POWER CONTROL	66.6
CONVERTERS	15.9
SOLAR ARRAY	61.0
HARNESSES	43.5
STRUCTURE	248.3
THERMAL CONTROL	32.1
DRY WEIGHT	817.4
PROPELLANT	140.2
SATELLITE ADAPTER	42.4
<b>TOTAL LAUNCH WEIGHT</b>	<b>1000.0</b>

22  
 VI-295

AM SAT CORP (ASC) CC2-1-8, CC3-1-23, CC3-1-40

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1\*\*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- SPIN CONTROL  
 POINTING ACCURACY = .40000 (DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 23324. (LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPI TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	13.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	18.	0.
SUBFRAME RATE	1250	0.
NUMBER OF WORDS PER SUBFRAME	4.	0.0000

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 437.75 WATTS  
 TOTAL SOLAR ARRAY AREA 182.09 SQ FT  
 INSTALLED BATTERY CAPACITY 36.00 AMP-HR  
 BEGINNING OF LIFE POWER 588.99 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 1293.5 LBS ( 586.7 KG) LAUNCH WEIGHT = 1355.8 LBS ( 615.0 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 70.8 IN. ( 1.80 M) 117.9 IN. ( 3.00 M) 117.9 IN. ( 3.00 M)  
 MISSION EQUIPMENT 19.9 IN. ( .50 M) 33.1 IN. ( .84 M) 33.1 IN. ( .84 M)  
 TOTAL SATELLITE 90.6 IN. ( 2.30 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 425.8 IYY = 2005003.2 IZZ = 2005003.2  
 CENTER OF GRAVITY X-CG Y-CG Z-CG  
 51.9 IN. ( 1.32 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APJGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 60.0 (MO)  
 MEAN MISSION DURATION 51.0 (MO)  
 RELIABILITY .615

768-1A

AM SAT CORP (ASC) CC2-1-8, CC3-1-23, CC3-1-40

\* \* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

✓ CONFIGURATION -- SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 2 2 1  
 WEIGHT 48.50 LBS VOLUME 1.00 (FT\*\*3) POWER REQUIREMENT 10.4 WATT  
 RELIABILITY .9618  
 IERR 0

AUXILIARY PROPULSION

✓ CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER J34 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 208.54 LBS VOLUME 5.72 (FT\*\*3) POWER REQUIREMENT 1.0 WATT  
 DRY WEIGHT 68.33 (LBS), EXPENDABLE WEIGHT 140.20 (LBS)  
 RELIABILITY .8261  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

✓ CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39 (FT\*\*3) POWER REQUIREMENT 10.5 WATT  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS

✓ CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92 (FT\*\*3) POWER REQUIREMENT 19.5 WATT  
 RELIABILITY .9601  
 IERR\*\*\*\*\*

ELECTRICAL POWER

✓ CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 236 315 1202  
 EQUIPMENT QUANTITIES 10 2 2 1  
 WEIGHT 156.05 LBS VOLUME 2.95 (FT\*\*3) POWER DISSIPATION 34.9 WATT  
 HARNESS WEIGHT 56.8 (LBS), SOLAR ARRAY WEIGHT 89.5 (LBS)  
 RELIABILITY .9269

MISSION EQUIPMENT

WEIGHT 250.00 LBS VOLUME 9.90 (FT\*\*3) POWER REQUIREMENT 380.0 WATT  
 RELIABILITY .9000

VI-297

AM SAT CORP (ASC) CC2-1-8, CC3-1-23, CC3-1-40

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	12.3 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1198.9 (BTU/HR),	TOTAL RADIATOR AREA	13.5 (FT**2)
HEAT PIPE	28651.8 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	5.7 (FT)	TOTAL HEATER POWER	1313.9 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1172.6 (WATT-IN)
		AVERAGE HEAT LOAD	1437.3 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	27.3
HEAT PIPES	5.9
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	7.8
TOTAL	42.9

IERR 11CG010111

STRUCTURES			
SKIN THICKNESS	.014 (IN)		
SPRINGER NO., THICKNESS, HT.	263. ,	81910.347 (IN),	.473 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.136 (IN),	.679 (IN)
GRID BEAM THICKNESS	.128 (IN),	SPACING 3.592 (IN),	HEIGHT 1.796 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	125.3 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	62.2 (LBS)		

V1-298



AM SAT CORP (ASC) CC2-1-8, CC3-1-23, CC3-1-40

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPER	1	2.6	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMODO DECOD+DISTP	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-299

AM SAT CORP (ASC) CC2-1-8, CC3-1-23, CC3-1-40

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
✓236	BATTERY	2	40.2	.4	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	250.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	80.5
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	69.5
HARNESS	56.8
STRUCTURE	398.5
THERMAL CONTROL	42.9
DRY WEIGHT	1153.3
PROPELLANT	140.2
SATELLITE ADAPTER	62.2
	-----
TOTAL LAUNCH WEIGHT	1355.8

VI-300

SAT BUS SYST (SBS) CC2-1-9

\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION -- SPIN CONTROL  
 POINTING ACCURACY = .400000 (DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 23324. (LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	0.
NUMBER OF MAIN FRAME WORDS	0.
MAIN FRAME SAMPLE RATE	0.
MAIN FRAME WORD LENGTH	0.
NUMBER OF SUBFRAMES	0.
SUBFRAME RATE	0.0000
NUMBER OF WORDS PER SUBFRAME	0.
32.	
256.	
13.	
8.	
16.	
64.1250	

CDPI TABLE  
 COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 357.75 WATTS  
 TOTAL SOLAR ARRAY AREA 150.75 SQ FT  
 INSTALLED BATTERY CAPACITY 30.00 AMP-HR  
 BEGINNING OF LIFE POWER 487.63 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 1111.1 LBS ( 504.0 KG) LAUNCH WEIGHT = 1162.4 LBS ( 527.3 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 64.4 IN. ( 1.64 M) 107.3 IN. ( 2.73 M) 107.3 IN. ( 2.73 M)  
 MISSION EQUIPMENT 18.4 IN. ( .47 M) 30.7 IN. ( .78 M) 30.7 IN. ( .78 M)  
 TOTAL SATELLITE 82.8 IN. ( 2.10 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 316.8 IYY = 1467168.7 IZZ = 1467168.7  
 CENTER OF GRAVITY X-CG 46.2 IN. ( 1.17 M) Y-CG 0.0 IN. ( 0.00 M) Z-CG 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 19323.1/19323.1 0.0  
 MISSION LIFETIME 60.10 (MO)  
 MEAN MISSION DURATION 51.4 (MO)  
 RELIABILITY .626

VI-301

SAT BUS SYST (SBS) CC2-1-9

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

✓ CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 2 2 1  
 WEIGHT 43.50 LBS VOLUME 1.80 (FT\*\*3) POWER REQUIREMENT 10.4 WATT  
 RELIABILITY .9618  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 208.54 LBS VOLUME 5.72 (FT\*\*3) POWER REQUIREMENT 1.0 WATT  
 DRY WEIGHT 68.33 (LBS), EXPENDABLE WEIGHT 140.20 (LBS)  
 RELIABILITY .8259  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39 (FT\*\*3) POWER REQUIREMENT 10.5 WATT  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92 (FT\*\*3) POWER REQUIREMENT 19.5 WATT  
 RELIABILITY .9601  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 227 309 1202  
 EQUIPMENT QUANTITIES 9 2 2 1  
 WEIGHT 135.72 LBS VOLUME 2.68 (FT\*\*3) POWER DISSIPATION 33.6 WATT  
 HARNESS WEIGHT 51.2 (LBS), SOLAR ARRAY WEIGHT 74.1 (LBS)  
 RELIABILITY .9437

MISSION EQUIPMENT

WEIGHT 200.00 LBS VOLUME 7.92 (FT\*\*3) POWER REQUIREMENT 300.0 WATT  
 RELIABILITY .9000

VI-302

SAT BUS SYST (SBS) CC2-1-9

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	10.0 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	964.3 (BTU/HR),	TOTAL RADIATOR AREA	10.9 (FT**2)
HEAT PIPE	21216.2 (WATT-IN),	BATTERY HEATER POWER	85.1 (BTU/HR)
HEAT PIPE LENGTH	5.2 (FT)	TOTAL HEATER POWER	1049.3 (BTU/HR)
STORPED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1071.7 (WATT-IN)
		AVERAGE HEAT LOAD	1164.5 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	23.4
HEAT PIPES	5.4
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	6.3
TOTAL	----- 36.9

IERR 11C0010111

STRUCTURES

SKIN THICKNESS	.014 (IN)			
STRINGER NO., THICKNESS, HT.	257. ,	81910.347 (IN),		.439 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.126 (IN),		.631 (IN)
GRID BEAM THICKNESS	.121 (IN),	SPACING 3.404 (IN),	HEIGHT	1.702 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	119.3 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	51.3 (LBS)			

VI-303

SAT BUS SYST (SBS) CC2-1-9

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	ROTATION GAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMDC DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	P/ASEND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-304

SAT BUS SYST (SBS) CC2-1-9

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	9	4.2	.1	0.0
✓227	BATTERY	2	30.4	.4	0.0
309	BATTERY CHARGER	2	12.8	.2	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	200.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	60.7
POWER CONTROL	75.0
CONVERTERS	15.9
SOLAR ARRAY	74.1
HARNESS	51.2
STRUCTURE	315.4
THERMAL CONTROL	36.9
DRY WEIGHT	970.9
PROPELLANT	140.2
SATELLITE ADAPTER	51.3

TOTAL LAUNCH WEIGHT 1162.4

V-305

PUBLIC SERVICE CC2-1-11

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- DUAL SPIN  
 POINTING ACCURACY = .350000 (DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 33126. (LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)  
 CDPI TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	64.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	13.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	18.	0.
SUBFRAME RATE	.1250	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)  
 ELECTRICAL POWER  
 CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 885.84 WATTS  
 TOTAL SOLAR ARRAY AREA 368.47 SQ FT  
 INSTALLED BATTERY CAPACITY 72.00 AMP-HR  
 BEGINNING OF LIFE POWER 1191.90 WATTS  
 VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WFT SATELLITE WEIGHT = 2320.3 LBS ( 1052.5 KG) LAUNCH WEIGHT = 2425.8 LBS ( 1100.3 KG)  
 DIMENSIONS

	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	140.7 IN. ( 3.57 M)	120.0 IN. ( 3.05 M)	120.0 IN. ( 3.05 M)
MISSION EQUIPMENT	26.6 IN. ( .68 M)	44.3 IN. ( 1.13 M)	44.3 IN. ( 1.13 M)
TOTAL SATELLITE	167.3 IN. ( 4.25 M)		

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 784.9 IYY = 8908498.2 IZZ = 8908498.2  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 107.8 IN. ( 2.74 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)  
 RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 60.0 (MO)  
 MEAN MISSION DURATION 48.9 (MO)  
 RELIABILITY .603

V1-306



PUBLIC SERVICE CC2-1-11

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

✓ CONFIGURATION - - DUAL SPIN  
 EQUIPMENT CODE IDENTIFIER 101 203 303 403 503 603 703 806 1413  
 EQUIPMENT QUANTITIES 1 1 2 2 2 2 2 2 1  
 WEIGHT 161.50 LBS VOLUME 4.44(FT\*\*3) POWER REQUIREMENT 76.7 WATT  
 RELIABILITY .8575  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 829 834 906 1003 499 203 1124 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 2 1 2 1 1  
 WEIGHT 269.52 LBS VOLUME 8.21(FT\*\*3) POWER REQUIREMENT .3 WATT  
 DRY WEIGHT 75.12(LBS), EXPENDABLE WEIGHT 194.41(LBS)  
 RELIABILITY .9314  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 406  
 EQUIPMENT QUANTITIES 1 2  
 WEIGHT 30.93 LBS VOLUME .40(FT\*\*3) POWER REQUIREMENT 8.5 WATT  
 RELIABILITY .9810  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 206 103 336 401 503 618  
 EQUIPMENT QUANTITIES 1 1 2 2 3 2  
 WEIGHT 23.84 LBS VOLUME .43(FT\*\*3) POWER REQUIREMENT 77.7 WATT  
 RELIABILITY .9818  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 112 263 389 1202  
 EQUIPMENT QUANTITIES 12 2 3 1  
 WEIGHT 170.20 LBS VOLUME 1.73(FT\*\*3) POWER DISSIPATION 70.7 WATT  
 HARNESS WEIGHT 117.6(LBS), SOLAR ARRAY WEIGHT 181.1(LBS)  
 RELIABILITY .8711

MISSION EQUIPMENT

WEIGHT 600.00 LBS VOLUME 23.73(FT\*\*3) POWER REQUIREMENT 575.0 WATT  
 RELIABILITY .9000

VI-307

PUBLIC SERVICE CC2-1-11

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	21.7 (FT**2)	BATTERY RADIATOR AREA	0.6 (FT**2)
HEATER POWER	1891.4 (BTU/HR)	TOTAL RADIATOR AREA	22.3 (FT**2)
HEAT PIPE	92642.5 (WATT-IN)	BATTERY HEATER POWER	42.6 (BTU/HR)
HEAT PIPE LENGTH	10.5 (FT)	TOTAL HEATER POWER	1934.0 (BTU/HR)
STORED ENERGY	125.8 (BTU)	VARIABLE CONDUCTANCE H.P.	2164.9 (WATT-IN)
		AVERAGE HEAT LOAD	2517.2 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	47.8
HEAT PIPES	11.0
PHASE CHANGE MATERIAL	3.1
RADIATOR (ACTIVE)	51.0
TOTAL	113.0

IERR 11C0010111

STRUCTURES			
SKIN THICKNESS	.024 (IN)		
STRINGER NO., THICKNESS, HT.	206. ,	81910.347 (IN),	.614 (IN)
FRAME NO., THICKNESS, HT.	9 ,	.176 (IN),	.881 (IN)
GRID BEAM THICKNESS	.171 (IN),	SPACING 4.815 (IN),	HEIGHT 2.407 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	201.18 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.10 (LBS)		
ADAPTER WEIGHT	105.15 (LBS)		

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PUBLIC SERVICE CC2-1-11

\* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
101	DESPIN BEARING	1	73.8	.8	6.7
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	.0
403	MUTATION DAMPER	2	2.8	.3	0.0
503	GIMBAL ELECTRONICS	2	6.3	.3	31.6
603	CONTROL ELECTRONICS	2	7.4	.4	3.5
703	BIAXIAL DRIVE	2	14.3	.5	28.0
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	6	.6	.0	0.0
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	2	11.5	2.4	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
406	COMMDC DECOD+DISTK	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
206	ANTENNA	1	1.5	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
336	TRANSMITTER	2	2.5	.0	70.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
618	DIPLEXER	2	1.5	.0	0.0

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all

PUBLIC SERVICE CC2-1-11

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
112	SHUNT REGULATOR	12	1.4	.0	0.0
✓263	BATTERY	2	63.3	.5	0.0
389	BATTERY CHARGER	3	5.3	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	600.0
STABILITY AND CONTROL	145.6
AUXILIARY PROPULSION	75.1
DATA PROCESSING	30.9
COMMUNICATIONS	23.8
BATTERIES	126.5
POWER CONTROL	43.7
CONVERTERS	15.9
SOLAR ARRAY	181.1
HARNESSES	117.6
STRUCTURE	652.7
THERMAL CONTROL	113.0
DRY WEIGHT	2125.9
PROPELLANT	194.4
SATELLITE ADAPTER	105.5
-----	
TOTAL LAUNCH WEIGHT	2425.8

VI-310

HI CAP VIDEO BRDCST CC2-1-13

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTRLL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .400000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 24125. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0. (IPS)

CPY TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0,0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 478.63 WATTS  
TOTAL SOLAR ARRAY AREA 199.09 SQ FT  
INSTALLED BATTERY CAPACITY 40.00 AMP-HR  
BEGINNING OF LIFE POWER 644.00 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1372.6 LBS ( 622.6 KG) LAUNCH WEIGHT = 1439.0 LBS ( 652.7 K)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 76.0 IN. ( 1.93 M) 120.0 IN. ( 3.05 M) 120.0 IN. ( 3.05 M)  
MISSION EQUIPMENT 20.4 IN. ( .52 M) 34.0 IN. ( .86 M) 34.0 IN. ( .86 M)  
TOTAL SATELLITE 96.4 IN. ( 2.45 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 465.6 IYY = 2326383.3 IZZ = 2326383.3  
CENTER OF GRAVITY X-CG 56.0 IN. ( 1.42 M) Y-CG 0.0 IN. ( 0.00 M) Z-CG 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.10 (MO)  
MEAN MISSION DURATION 50.1 (MO)  
RELIABILITY .622

VI-311

HI CAP VIDEO BRDCST CC2-1-13

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 2 2 1  
 WEIGHT 43.50 LBS VOLUME 1.80(FT\*\*3) POWER REQUIREMENT 10.4 WATT  
 RELIABILITY .9618  
 IERR 0

AUXILIARY PROPULSION  
 CONFIGURATION - - MDNCPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 334 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 2 1 2 1 1  
 WEIGHT 217.45 LBS VOLUME 6.12(FT\*\*3) POWER REQUIREMENT 1.0 WATT  
 DRY WEIGHT 72.43(LBS), EXPENDABLE WEIGHT 145.02(LBS)  
 RELIABILITY .8986  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATT  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 3 1  
 WEIGHT 26.12 LBS VOLUME .94(FT\*\*3) POWER REQUIREMENT 19.5 WATT  
 RELIABILITY .9715  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 239 315 1202  
 EQUIPMENT QUANTITIES 10 2 2 1  
 WEIGHT 163.62 LBS VOLUME 2.59(FT\*\*3) POWER DISSIPATION 38.2 WATT  
 HARNESS WEIGHT 60.3(LBS), SOLAR ARRAY WEIGHT 97.9(LBS)  
 RELIABILITY .8520

MISSION EQUIPMENT  
 WEIGHT 270.00 LBS VOLUME 10.69(FT\*\*3) POWER REQUIREMENT 420.0 WATT  
 RELIABILITY .9000

VI-312

HI CAP VIDE0 BRDCST CC2-1-13

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	13.5 (FT**2),	BATTERY RADIATOR AREA	1.4 (FT**2)
HEATER POWER	1316.2 (BTU/HR),	TOTAL RADIATOR AREA	14.8 (FT**2)
HEAT PIPE	32377.4 (WATT-IN),	BATTERY HEATER POWER	123.8 (BTU/HR)
HEAT PIPE LENGTH	6.0 (FT)	TOTAL HEATER POWER	1440.0 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1247.6 (WATT-IN)
		AVERAGE HEAT LOAD	1573.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	29.2
HEAT PIPES	6.3
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	8.5
TOTAL	45.9

IERR 110010111

STRUCTURES

SKIN THICKNESS	.015 (IN)		
STRINGER NO., THICKNESS, HT.	259, ,	81910.347 (IN),	.487 (IN)
FRAME NO., THICKNESS, HT.	5, ,	.140 (IN),	.700 (IN)
GRID BEAM THICKNESS	.131 (IN),	SPACING 3.689 (IN),	HEIGHT 1.844 (IN)
ENCLOSER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	130.19 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	6.10 (LBS)		
ADAPTER WEIGHT	66.13 (LBS)		

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HI CAP VIDEO BRDCST CC2-1-13

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRONICS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMAND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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HI CAP VIDEO BRDCST CC2-1-13

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	QTY.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
239	BATTERY	2	43.0	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	270.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	72.4
DATA PROCESSING	21.2
COMMUNICATIONS	26.1
BATTERIES	86.0
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	97.9
HARNESS	60.3
STRUCTURE	426.7
THERMAL CONTROL	45.9
DPY WEIGHT	1227.6
PROPELLANT	145.0
SATELLITE ADAPTER	66.3

TOTAL LAUNCH WEIGHT 1439.0

VI-315

OTHER US CC2-1-14, 3-1-3, 3-1-4

\* \* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
POINTING ACCURACY = .40000 (DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 23324. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = C.(IPS)

CDPT TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 304.25 WATTS  
TOTAL SOLAR ARRAY AREA 126.55 SQ FT  
INSTALLED BATTERY CAPACITY 24.00 AMP-HR  
BEGINNING OF LIFE POWER 409.37 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WET SATELLITE WEIGHT = 1012.4 LBS ( 459.2 KG) LAUNCH WEIGHT = 1057.3 LBS ( 479.6 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 59.0 IN. ( 1.50 M) 98.3 IN. ( 2.50 M) 98.3 IN. ( 2.50 M)  
MISSION EQUIPMENT 18.4 IN. ( .47 M) 30.7 IN. ( .78 M) 30.7 IN. ( .78 M)  
TOTAL SATELLITE 77.4 IN. ( 1.97 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 251.0 IYY = 1156574.4 IZZ = 1156574.4  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY .42.8 IN. ( 1.09 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0 (MO)  
MEAN MISSION DURATION 50.5 (MO)  
RELIABILITY .1602

VI-316

OTHER US CC2-1-14, 3-1-3, 3-1-4

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 2 1  
 WEIGHT 36.10 LBS VOLUME 1.43 (FT\*\*3) POWER REQUIREMENT 10.4 WATT  
 RELIABILITY .9051  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 206.54 LBS VOLUME 5.72 (FT\*\*3) POWER REQUIREMENT 1.0 WATT  
 DRY WEIGHT 68.33 (LBS), EXPENDABLE WEIGHT 140.20 (LBS)  
 RELIABILITY .8258  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39 (FT\*\*3) POWER REQUIREMENT 10.5 WATT  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92 (FT\*\*3) POWER REQUIREMENT 19.5 WATT  
 RELIABILITY .9601  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 221 306 1202  
 EQUIPMENT QUANTITIES 8 2 2 1  
 WEIGHT 121.40 LBS VOLUME 2.16 (FT\*\*3) POWER DISSIPATION 24.3 WATT  
 HARNESS WEIGHT 46.3 (LBS), SOLAR ARRAY WEIGHT 62.2 (LBS)  
 RELIABILITY .9644

MISSION EQUIPMENT

WEIGHT 200.00 LBS VOLUME 7.92 (FT\*\*3) POWER REQUIREMENT 250.0 WATT  
 RELIABILITY .9000

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OTHER US CC2-1-14, 3-1-3, 3-1-4

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL				
RADIATOR AREA	8.5 (FT**2),	BATTERY RADIATOR AREA	.8 (FT**2)	
HEATER POWER	817.6 (BTU/HR),	TOTAL RADIATOR AREA	9.3 (FT**2)	
HEAT PIPE	16931.0 (WATT-IN),	BATTERY HEATER POWER	63.6 (BTU/HR)	
HEAT PIPE LENGTH	4.8 (FT)	TOTAL HEATER POWER	881.2 (BTU/HR)	
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1001.9 (WATT-IN)	
		AVERAGE HEAT LOAD	994.0 (BTU/HR)	

THERMAL CONTROL WEIGHT		
	UNIT WEIGHT (LBS)	
INSULATION	20.6	
HEAT PIPES	5.1	
PHASE CHANGE MATERIAL	1.8	
RADIATOR (PASSIVE)	5.4	
	-----	
TOTAL	32.9	

IERR 11C0010111

STRUCTURES				
SKIN THICKNESS	.013 (IN)			
SPRINGER NO., THICKNESS, HT.	250. ,	61910.347 (IN),	.415 (IN)	
FRAME NO., THICKNESS, HT.	5. ,	.119 (IN),	.596 (IN)	
GRID BEAM THICKNESS	.118 (IN),	SPACING 3.317 (IN),	HEIGHT 1.659 (IN)	
ENCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	113.3 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.10 (LBS)			
ADAPTER WEIGHT	44.19 (LBS)			

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OTHER US CC2-1-14, 3-1-3, 3-1-4

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPER	1	2.6	.3	0.0
603	CONTROL ELECTFNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
498	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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OTHER US: CC2-1-14, 3-1-3, 3-1-4

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
221	BATTERY	2	25.3	.1	0.0
306	BATTERY CHARGER	2	12.6	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	200.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	50.6
POWER CONTROL	70.8
CONVERTERS	15.9
SOLAR ARRAY	62.2
HARNESSES	46.3
STRUCTURE	259.1
THERMAL CONTROL	32.9
DRY WEIGHT	872.2
PROPELLANT	140.2
SATELLITE ADAPTER	44.9

TOTAL LAUNCH WEIGHT 1057.3

V1-320

ARAB COMSAT (ARCOMSAT) CC3-1-1, -1-7, -1-13

\*\*\* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION - - SPIN CONTROL  
 POINTING ACCURACY = .400000 (DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 TOTAL IMPULSE = 23324. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
COPI TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	13.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	18.	0.
SUBFRAME RATE	1250.	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 309.25 WATTS  
 TOTAL SOLAR ARRAY AREA 128.63 SQ FT  
 INSTALLED BATTERY CAPACITY 28.00 AMP-HR  
 BEGINNING OF LIFE POWER 416.10 WATTS

VEHICLE SIZING  
 CONFIGURATION - - CYLINDER  
 WET SATELLITE WEIGHT = 1072.2 LBS ( 486.9 KG) LAUNCH WEIGHT = 1072.9 LBS ( 486.7 K  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 59.5 IN. ( 1.51 M) 99.1 IN. ( 2.52 M) 99.1 IN. ( 2.52 M)  
 MISSION EQUIPMENT 18.4 IN. ( .47 M) 30.7 IN. ( .78 M) 30.7 IN. ( .78 M)  
 TOTAL SATELLITE 77.9 IN. ( 1.98 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 258.7 IYY = 1190747.5 IZZ = 1190747.5  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 43.0 IN. ( 1.09 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION - - SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 19323.1/19323.1 0.0  
 MISSION LIFETIME 60.0 (MO)  
 MEAN MISSION DURATION 50.5 (MO)  
 RELIABILITY .602

V1-321

ARAB COMSAT (ARCOMSAT) CC3-1-1, 3-1-7, 3-1-13

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL											
CONFIGURATION - - SPIN CONTROL											
EQUIPMENT CODE IDENTIFIER	203	303	403	603	806	1413					
EQUIPMENT QUANTITIES	1	1	1	1	2	1					
WEIGHT	36.10 LBS						VOLUME	1.43(FT**3)	POWER REQUIREMENT	10.4 WATT	
RELIABILITY		.9051									
IERR	0										
AUXILIARY PROPULSION											
CONFIGURATION - - MONI PROPELLANT											
EQUIPMENT CODE IDENTIFIER	834	834	906	1003	499	203	1118	518	701	1203	603
EQUIPMENT QUANTITIES	6	2	5	9	1	1	2	1	2	1	1
WEIGHT	208.54 LBS						VOLUME	5.72(FT**3)	POWER REQUIREMENT	1.0 WATT	
DAY WEIGHT		68.33(LBS)					EXPENDABLE WEIGHT		140.20(LBS)		
RELIABILITY		.8258									
IERR	11										
DATA PROCESSING AND INSTRUMENTATION											
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)											
EQUIPMENT CODE IDENTIFIER	203	403									
EQUIPMENT QUANTITIES	1	1									
WEIGHT	21.18 LBS						VOLUME	.39(FT**3)	POWER REQUIREMENT	10.5 WATT	
RELIABILITY		.9668									
IERR	1										
COMMUNICATIONS											
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS											
EQUIPMENT CODE IDENTIFIER	202	103	306	401	503	603					
EQUIPMENT QUANTITIES	1	1	2	1	2	1					
WEIGHT	24.62 LBS						VOLUME	.92(FT**3)	POWER REQUIREMENT	19.5 WATT	
RELIABILITY		.9601									
IERR	*****										
ELECTRICAL POWER											
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY											
EQUIPMENT CODE IDENTIFIER	103	224	306	1202							
EQUIPMENT QUANTITIES	0	2	2	1							
WEIGHT	128.99 LBS						VOLUME	2.21(FT**3)	POWER DISSIPATION	24.7 WATT	
HARNESS WEIGHT		46.5(LBS)					SOLAR ARRAY WEIGHT		63.2(LBS)		
RELIABILITY		.9644									
MISSION EQUIPMENT											
WEIGHT	200.00 LBS						VOLUME	7.92(FT**3)	POWER REQUIREMENT	255.0 WATT	
RELIABILITY		.9000									

VI-322



ARAB COMSAT (ARCOMSAT) CC3-1-1, 3-1-7, 3-1-13

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL				
RADIATOR AREA	8.7 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)	
HEATER POWER	832.3 (BTU/HR),	TOTAL RADIATOR AREA	9.8 (FT**2)	
HEAT PIPE	17328.7 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)	
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	947.3 (BTU/HR)	
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1008.1 (WATT-IN)	
		AVERAGE HEAT LOAD	1011.1 (BTU/HR)	

THERMAL CONTROL WEIGHT		
	UNIT WEIGHT (LBS)	
INSULATION	20.9	
HEAT PIPES	5.1	
PHASE CHANGE MATERIAL	1.8	
RADIATOR (PASSIVE)	5.5	
	-----	
TOTAL	33.3	

IERR 110010111

STRUCTURES				
SKIN THICKNESS	.013 (IN)			
STIFFENER NO., THICKNESS, HT.	250. ,	81910.347 (IN),	.418 (IN)	
FRAME NO., THICKNESS, HT.	5. ,	.120 (IN),	.600 (IN)	
GRID BEAM THICKNESS	.119 (IN),	SPACING 3.339 (IN),	HEIGHT 1.669 (IN)	
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	115.4 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	45.7 (LBS)			

VI-323

ARAB COMSAT (ARCOMSAT) CC3-1-1, 3-1-7, 3-1-12

\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	PASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-324

ARAB COMSAT (ARCOMSAT) CC3-1-1, 3-1-7, 3-1-13

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
224	BATTERY	2	29.1	.2	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	200.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	58.2
POWER CONTROL	70.8
CONVERTERS	15.9
SOLAR ARRAY	63.2
HARNESSES	46.5
STRUCTURE	264.8
THERMAL CONTROL	33.3
DRY WEIGHT	887.0
PROPELLANT	140.2
SATELLITE ADAPTER	45.7
	-----

TOTAL LAUNCH WEIGHT 1072.9

V1-325

ARCOMSAT F/O CC3-1-2

\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION -- SPIN CONTROL  
 POINTING ACCURACY = .400000 (DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 23324. (LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

ENGINEERING DATA	MISSION EQUIPMENT DATA
32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
1250	0.0000
64.	0.

CDPI TABLE  
 NUMBER OF COMMANDS  
 NUMBER OF MAIN FRAME WORDS  
 MAIN FRAME SAMPLE RATE  
 MAIN FRAME WORD LENGTH  
 NUMBER OF SUBFRAMES  
 SUBFRAME RATE  
 NUMBER OF WORDS PER SUBFRAME  
 COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 32.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 357.75 WATTS  
 TOTAL SOLAR ARRAY AREA 150.75 SQ FT  
 INSTALLED BATTERY CAPACITY 30.00 AMP-HR  
 BEGINNING OF LIFE POWER 487.63 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 1159.7 LBS ( 526.0 KG) LAUNCH WEIGHT = 1213.0 LBS ( 550.2 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 64.4 IN. ( 1.64 M) 107.3 IN. ( 2.73 M) 107.3 IN. ( 2.73 M)  
 MISSION EQUIPMENT 19.6 IN. ( .50 M) 32.7 IN. ( .83 M) 32.7 IN. ( .83 M)  
 TOTAL SATELLITE 84.0 IN. ( 2.13 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 329.2 IYY = 1536348.4 IZZ = 1536348.4  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 47.5 IN. ( 1.21 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 19323.1/19323.7 0.0  
 MISSION LIFETIME 60.0 (MO)  
 MEAN MISSION DURATION 51.4 (MO)  
 RELIABILITY .626

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ARCOMSAT F/O CC3-1-2

\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 2  
 WEIGHT 42.50 LBS VOLUME 1.80(FT\*\*3) POWER REQUIREMENT 10.4 WATT  
 RELIABILITY .9618  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2  
 WEIGHT 206.54 LBS VOLUME 5.72(FT\*\*3) POWER REQUIREMENT 1.0 WATT  
 DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT 140.20(LBS)  
 RELIABILITY .8259  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATT  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92(FT\*\*3) POWER REQUIREMENT 19.5 WATT  
 RELIABILITY .9601  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 227 309 1202  
 EQUIPMENT QUANTITIES 9 2 2 1  
 WEIGHT 135.72 LBS VOLUME 2.68(FT\*\*3) POWER DISSIPATION 33.6 WATT  
 HARNESS WEIGHT 53.1(LBS), SOLAR ARRAY WEIGHT 74.1(LBS)  
 RELIABILITY .9437

MISSION EQUIPMENT

WEIGHT 240.00 LBS VOLUME 9.50(FT\*\*3) POWER REQUIREMENT 300.0 WATT  
 RELIABILITY .9000

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ARCOMSAT F/O CC3-1-2

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	10.0 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	964.3 (BTU/HR),	TOTAL RADIATOR AREA	10.9 (FT**2)
HEAT PIPE	21511.9 (WATT-IN),	BATTERY HEATER POWER	85.1 (BTU/HR)
HEAT PIPE LENGTH	5.2 (FT)	TOTAL HEATER POWER	1049.3 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1086.6 (WATT-IN)
		AVERAGE HEAT LOAD	1164.5 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		23.7
HEAT PIPES		5.5
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		6.3
	TOTAL	37.3

IERR 11C0010111

STRUCTURES				
SKIN THICKNESS	.014 (IN)			
SPRINGER NO., THICKNESS, HT.	254. ,	81910.347 (IN),		.444 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.128 (IN),		.638 (IN)
GRID BEAM THICKNESS	.124 (IN),	SPACING 3.485 (IN),	HEIGHT	1.742 (IN)
ENCLOSER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	119.13 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	53.3 (LBS)			

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## ARCOMSAT F/O CC3-1-2

## \* \* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

## STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

## AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
490	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

## DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

## COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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ARCOMSAT F/O CC3-1-2

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	9	4.2	.1	0.0
227	BATTERY	2	30.4	.4	0.0
309	BATTERY CHARGER	2	12.8	.2	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	240.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	60.7
POWER CONTROL	75.0
CONVERTERS	15.9
SOLAR ARRAY	74.1
HARNESS	53.1
STRUCTURE	321.6
THERMAL CONTROL	37.3
DRY WEIGHT	1019.5
PROPELLANT	140.2
SATELLITE ADAPTER	53.3
	-----

TOTAL LAUNCH WEIGHT 1213.0

V1-330



ECS F/O CC3-1-5

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- SPIN CONTROL  
 POINTING ACCURACY = .400000( DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 23324. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

COPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	13.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	18.	0.
SUBFRAME RATE	.1250	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 314.25 WATTS  
 TOTAL SOLAR ARRAY AREA 130.71 SQ FT  
 INSTALLED BATTERY CAPACITY 28.00 AMP-HR  
 BEGINNING OF LIFE POWER 422.82 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 1033.2 LBS ( 468.7 KG) LAUNCH WEIGHT = 1079.4 LBS ( 489.6 KG)  
 DIMENSIONS

EQUIPMENT BAY	60.0 IN. ( 1.52 M)	99.9 IN. ( 2.54 M)	99.9 IN. ( 2.54 M)
MISSION EQUIPMENT	18.4 IN. ( .47 M)	30.7 IN. ( .78 M)	30.7 IN. ( .78 M)
TOTAL SATELLITE	78.4 IN. ( 1.99 M)		

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 263.5 IYY = 1213700.9 IZZ = 1213700.9  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 43.3 IN. ( 1.10 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 60.0(MO)  
 MEAN MISSION DURATION 50.5(MO)  
 RELIABILITY .602

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ECS F/D CC3-1-5

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 2 1  
 WEIGHT 36.10 LBS VOLUME 1.43(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9051  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 208.54 LBS VOLUME 5.72(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT 140.20(LBS)  
 RELIABILITY .8258  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92(FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9601  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 224 306 1202  
 EQUIPMENT QUANTITIES 8 2 2 1  
 WEIGHT 128.99 LBS VOLUME 2.21(FT\*\*3) POWER DISSIPATION 25.1 WATTS  
 HARNESS WEIGHT 46.7(LBS), SOLAR ARRAY WEIGHT 64.3(LBS)  
 RELIABILITY .9644

MISSION EQUIPMENT

WEIGHT 200.00 LBS VOLUME 7.92(FT\*\*3) POWER REQUIREMENT 260.0 WATTS  
 RELIABILITY .9000

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ECS F/O CC3-1-5

\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	8.8 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	847.0 (BTU/HR),	TOTAL RADIATOR AREA	10.0 (FT**2)
HEAT PIPE	17729.2 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	961.9 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1014.3 (WATT-IN)
		AVERAGE HEAT LOAD	1028.1 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		21.1
HEAT PIPES		5.1
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		5.6
	TOTAL	33.6

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.013 (IN)			
STRINGER NO., THICKNESS, HT.	251. ,	81910.347 (IN),		.420 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.121 (IN),		.603 (IN)
GRID BEAM THICKNESS	.119 (IN),	SPACING 3.341 (IN),	HEIGHT	1.671 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	115.4 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	46.1 (LBS)			

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ECS F/O CC3-1-5

\*\*\* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	CUMPD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-334

ECS F/O CC3-1-5

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
224	BATTERY	2	29.1	.2	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	200.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	58.2
POWER CONTROL	70.8
CONVERTERS	15.9
SOLAR ARRAY	64.3
HARNESSES	46.7
STRUCTURE	269.2
THERMAL CONTROL	33.6
DRY WEIGHT	893.0
PROPELLANT	140.2
SATELLITE ADAPTER	46.1

TOTAL LAUNCH WEIGHT 1079.4

V1-335

MAROTS CC3-1-6, -17, -21

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 23324.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTUI)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 294.25 WATTS  
TOTAL SOLAR ARRAY AREA 122.40 SQ FT  
INSTALLED BATTERY CAPACITY 24.00 AMP-HR  
BEGINNING OF LIFE POWER 395.91 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 994.5 LBS ( 451.1 KG)

LAUNCH WEIGHT = 1038.3 LBS ( 471.0 KG)

DIMENSIONS

EQUIPMENT BAY 58.0 IN.( 1.47 M)  
MISSION EQUIPMENT 18.4 IN.( .47 M)  
TOTAL SATELLITE 76.5 IN.( 1.94 M)

HEIGHT WIDTH  
96.7 IN.( 2.46 M) 96.7 IN.( 2.46 M)  
30.7 IN.( .78 M) 30.7 IN.( .78 M)

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX =

240.1 IYY = 1105686.2 IZZ = 1105686.2

X-CG  
CENTER OF GRAVITY 42.2 IN.( 1.07 M)

Y-CG Z-CG  
0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MD)  
MEAN MISSION DURATION 50.5(MD)  
RELIABILITY .602

71-336

MAROTS CC3-1-6, -17, -21

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1\*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 2 1  
 WEIGHT 36.10 LBS VOLUME 1.43(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9051  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 208.54 LBS VOLUME 5.72(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT 140.20(LBS)  
 RELIABILITY .8258  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9668  
 IERR

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92(FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9601  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 221 306 1202  
 EQUIPMENT QUANTITIES 7 2 2 1  
 WEIGHT 117.20 LBS VOLUME 2.03(FT\*\*3) POWER DISSIPATION 23.5 WATTS  
 HARNESS WEIGHT 45.0(LBS), SOLAR ARRAY WEIGHT 60.2(LBS)  
 RELIABILITY .9649

MISSION EQUIPMENT

WEIGHT 200.00 LBS VOLUME 7.92(FT\*\*3) POWER REQUIREMENT 240.0 WATTS  
 RELIABILITY .9000

V1-337

MAROTS CC3-1-6, -17, -21

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	8.2 (FT**2),	BATTERY RADIATOR AREA	.8 (FT**2)
HEATER POWER	788.3 (BTU/HR),	TOTAL RADIATOR AREA	9.0 (FT**2)
HEAT PIPE	16143.7 (WATT-IN),	BATTERY HEATER POWER	63.6 (BTU/HR)
HEAT PIPE LENGTH	4.8 (FT)	TOTAL HEATER POWER	851.9 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	989.2 (WATT-IN)
		AVERAGE HEAT LOAD	959.9 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		20.1
HEAT PIPES		5.0
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		5.2
	TOTAL	32.2

IERR 1100010111

VI-338

STRUCTURES				
SKIN THICKNESS	.013 (IN)			
STRINGER NO., THICKNESS, HT.	248.			
FRAME NO., THICKNESS, HT.	5.		81910.347 (IN),	.411 (IN)
GRID BEAM THICKNESS	.117 (IN),		.118 (IN),	.590 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER SPACING	3.300 (IN),	HEIGHT 1.650 (IN)
EQUIPMENT BAY STRUCTURE WT.	112.2 (LBS)		0.000 (IN),	AFT .030 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	43.9 (LBS)			



MAROTS CC3-1-6, -17, -21

\* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUITATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-339

MAROTS CC3-1-6, -17, -21

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	7	4.2	.1	0.0
221	BATTERY	2	25.3	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	200.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	50.6
POWER CONTROL	66.6
CONVERTERS	15.9
SOLAR ARRAY	60.2
HARNESSES	45.0
STRUCTURE	249.5
THERMAL CONTROL	32.2
DRY WEIGHT	854.2
PROPELLANT	140.2
SATELLITE ADAPTER	43.9

TOTAL LAUNCH WEIGHT 1038.3

V1-340

TV BRDCST SAT (TVBS) CC3-1-8

\* \* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 105543.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

COPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
125.	0.
8.	0.
4.	0.
1.0000	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 1062.68 WATTS  
TOTAL SOLAR ARRAY AREA 122.94 SQ FT  
INSTALLED BATTERY CAPACITY 144.00 AMP-HR  
BEGINNING OF LIFE POWER 1565.35 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WET SATELLITE WEIGHT = 2617.2 LBS ( 1187.2 KG) LAUNCH WEIGHT = 2711.8 LBS ( 1230.0 KG)

DIMENSIONS

	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	46.6 IN.( 1.18 M)	77.6 IN.( 1.97 M)	77.6 IN.( 1.97 M)
MISSION EQUIPMENT	29.6 IN.( .75 M)	49.4 IN.( 1.25 M)	49.4 IN.( 1.25 M)
TOTAL SATELLITE	76.2 IN.( 1.94 M)		

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 641.3 IYY = 2112428.1 IZZ = 3188326.3

	X-CG	Y-CG	Z-CG
CENTER OF GRAVITY	38.2 IN.( .97 M)	0.0 IN.( 0.00 M)	0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 84.0(MD)  
MEAN MISSION DURATION 64.8(MD)  
RELIABILITY .408

VI-341

TV BROCST SAT (TVBS) CC3-1-8

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1303				
EQUIPMENT QUANTITIES	3	2	2	2				
WEIGHT	60.00 LBS				VOLUME	1.93(FT**3)	POWER REQUIREMENT	78.9 WATTS
RELIABILITY		.9814						
IERR	10							

AUXILIARY PROPULSION

CONFIGURATION - - MONO PROPELLANT

EQUIPMENT CODE IDENTIFIER	818	834	907	1003	499	203	1130	521	701	1203	603
EQUIPMENT QUANTITIES	18	8	5	9	2	1	4	1	2	1	1
WEIGHT	743.83 LBS				VOLUME	17.50(FT**3)	POWER REQUIREMENT	.3 WATTS			
DRY WEIGHT	148.15(LBS)				EXPENDABLE WEIGHT		595.67(LBS)				
RELIABILITY		.7844									
IERR	1										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403					
EQUIPMENT QUANTITIES	2	2					
WEIGHT	42.36 LBS		VOLUME	.78(FT**3)	POWER REQUIREMENT	10.5 WATTS	
RELIABILITY		.9990					
IERR	1						

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	202	106	327	401	503	605	
EQUIPMENT QUANTITIES	1	3	2	2	3	2	
WEIGHT	37.64 LBS		VOLUME	1.08(FT**3)	POWER REQUIREMENT	25.5 WATTS	
RELIABILITY		.9902					
IERR*****							

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	406	530	263	650	702		
EQUIPMENT QUANTITIES	4	12	4	4	2		
WEIGHT	320.60 LBS		VOLUME	4.79(FT**3)	POWER DISSIPATION	179.4 WATTS	
HARNESS WEIGHT	117.1(LBS)		SOLAR ARRAY WEIGHT	85.6(LBS)			
RELIABILITY		.5952					

MISSION EQUIPMENT

WEIGHT	830.00 LBS	VOLUME	32.81(FT**3)	POWER REQUIREMENT	830.0 WATTS
RELIABILITY		.9000			

VI-342

TV BRDCST SAT (TVBS) CC3-1-8

\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	32.2 (FT**2),	BATTERY RADIATOR AREA	.5 (FT**2)
HEATER POWER	3085.7(BTU/HR),	TOTAL RADIATOR AREA	32.7 (FT**2)
HEAT PIPE	0.0(WATT-IN),	BATTERY HEATER POWER	33.3(BTU/HR)
HEAT PIPE LENGTH	4.8 (FT)	TOTAL HEATER POWER	3119.0(BTU/HR)
STORED ENERGY	103.0 (BTU)	VARIABLE CONDUCTANCE H.P.	771.4(WATT-IN)
		AVERAGE HEAT LOAD	3222.9 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	16.9
HEAT PIPES	5.0
PHASE CHANGE MATERIAL	2.6
RADIATOR (ACTIVE)	66.1
TOTAL	90.6

IERR 1100001011

STRUCTURES			
SKIN THICKNESS	.023 (IN)		
STRINGER NO., THICKNESS, HT.	169. ,	81910.347 (IN),	.486 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.139 (IN),	.697 (IN)
GRID BEAM THICKNESS	.204 (IN),	SPACING 5.755 (IN),	HEIGHT 2.878 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	243.1 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	29.4 (LBS)		
ADAPTER WEIGHT	94.6 (LBS)		

E 48-11  
71-343

TV BRDCST SAT (TVBS) CC3-1-8

◆ ◆ ◆ ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 ◆ ◆ ◆ ◆

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	8	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	4	17.3	3.2	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	2	8.9	.2	3.0
403	COMMD DECOD+DISTR	2	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	3	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

VI-344

TV BRDCST SAT (TVBS) CC3-1-8

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	4	9.8	.2	0.0
530	SHUNT REGULATOR	12	2.2	.0	0.0
263	BATTERY	4	49.5	.4	0.0
650	BATTERY CHARGER	4	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	830.0
STABILITY AND CONTROL	60.0
AUXILIARY PROPULSION	148.2
DATA PROCESSING	42.4
COMMUNICATIONS	37.6
BATTERIES	198.0
POWER CONTROL	122.6
SOLAR ARRAY	85.6
HARNESS	117.1
STRUCTURE	275.3
SOLAR ARRAY DRIVE	14.2
THERMAL CONTROL	90.6
DRY WEIGHT	2021.6
PROPELLANT	595.7
SATELLITE ADAPTER	94.6
	-----

TOTAL LAUNCH WEIGHT 2711.8

VI-345

TVBS F/O CC3-1-9

\* \* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

TOTAL IMPULSE = 105544.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

ENGINEERING DATA

MISSION EQUIPMENT DATA

NUMBER OF COMMANDS

32.

0.

NUMBER OF MAIN FRAME WORDS

256.

0.

MAIN FRAME SAMPLE RATE

125.

0.

MAIN FRAME WORD LENGTH

8.

0.

NUMBER OF SUBFRAMES

4.

0.

SUBFRAME RATE

1.0000

0.0000

NUMBER OF WORDS PER SUBFRAME

64.

0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)

SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

POWER REQUIREMENT 1061.92 WATTS

TOTAL SOLAR ARRAY AREA 122.85 SQ FT

INSTALLED BATTERY CAPACITY 144.00 AMP-HR

BEGINNING OF LIFE POWER 1564.23 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER

WET SATELLITE WEIGHT = 2601.4 LBS ( 1180.0 KG)

LAUNCH WEIGHT = 2695.4 LBS ( 1222.6 KG)

DIMENSIONS

EQUIPMENT BAY 46.3 IN. ( 1.18 M)

HEIGHT 77.2 IN. ( 1.96 M)

WIDTH 77.2 IN. ( 1.96 M)

MISSION EQUIPMENT 29.7 IN. ( 0.76 M)

49.6 IN. ( 1.26 M)

49.6 IN. ( 1.26 M)

TOTAL SATELLITE 76.1 IN. ( 1.93 M)

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX =

633.8 IYY = 2090912.0

IZZ = 3161864.7

CENTER OF GRAVITY 38.3 IN. ( .97 M)

X-CG 0.0 IN. ( 0.00 M)

Y-CG 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 84.0(MO)

MEAN MISSION DURATION 67.2(MO)

RELIABILITY .401

978-346



TVBS F/O CC3-1-9

\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
EQUIPMENT QUANTITIES 3 2 2 2  
WEIGHT 60.00 LBS VOLUME 1.93(FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
RELIABILITY .9814  
IERR 10

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130 521 701 1203 603  
EQUIPMENT QUANTITIES 18 6 5 9 2 1 4 1 2 1 1  
WEIGHT 742.44 LBS VOLUME 17.45(FT\*\*3) POWER REQUIREMENT 4.3 WATTS  
DRY WEIGHT 146.75(LBS), EXPENDABLE WEIGHT 595.68(LBS)  
RELIABILITY .6991  
IERR 1

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403  
EQUIPMENT QUANTITIES 1 1  
WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
RELIABILITY .9538  
IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605  
EQUIPMENT QUANTITIES 1 3 2 2 3 2  
WEIGHT 37.64 LBS VOLUME 1.08(FT\*\*3) POWER REQUIREMENT 25.5 WATTS  
RELIABILITY .9902  
IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 406 531 263 650 702  
EQUIPMENT QUANTITIES 4 7 4 4 2  
WEIGHT 324.87 LBS VOLUME 4.85(FT\*\*3) POWER DISSIPATION 17963 WATTS  
HARNESS WEIGHT 112.5(LBS), SOLAR ARRAY WEIGHT 85.5(LBS)  
RELIABILITY .6874

MISSION EQUIPMENT

WEIGHT 840.00 LBS VOLUME 33.21(FT\*\*3) POWER REQUIREMENT 6400 WATTS  
RELIABILITY 9000

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TVBS F/D CC3-1-9

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	32.6 (FT**2),	BATTERY RADIATOR AREA	.5 (FT**2)
HEATER POWER	3119.1 (BTU/HR),	TOTAL RADIATOR AREA	33.1 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	33.3 (BTU/HR)
HEAT PIPE LENGTH	4.8 (FT)	TOTAL HEATER POWER	3152.4 (BTU/HR)
STORED ENERGY	103.0 (BTU)	VARIABLE CONDUCTANCE H.P.	770.3 (WATT-IN)
		AVERAGE HEAT LOAD	3257.0 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		16.8
HEAT PIPES		5.0
PHASE CHANGE MATERIAL		2.6
RADIATOR (ACTIVE)		66.6
	TOTAL	91.0

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.023 (IN)			
STRINGER NO., THICKNESS, HT.	169.		81910.347 (IN),	.484 (IN)
FRAME NO., THICKNESS, HT.	5.		.139 (IN),	.695 (IN)
GRID BEAM THICKNESS	.204 (IN),	SPACING	5.736 (IN),	HEIGHT 2.868 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	239.4 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	29.4 (LBS)			
ADAPTER WEIGHT	94.0 (LBS)			

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TVBS F/O CC3-1-9

\* \* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	4	17.3	3.2	0.0
521	TANK	1	22.0	1.1	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	3	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

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TVBS F/O CC3-1-9

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	4	9.8	.2	0.0
531	SHUNT REGULATOR	7	4.3	.1	0.0
263	BATTERY	4	49.5	.4	0.0
650	BATTERY CHARGER	4	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	840.0
STABILITY AND CONTROL	60.0
AUXILIARY PROPULSION	146.8
DATA PROCESSING	21.2
COMMUNICATIONS	37.6
BATTERIES	198.0
POWER CONTROL	126.9
SOLAR ARRAY	85.5
HARNESS	112.5
STRUCTURE	272.0
SOLAR ARRAY DRIVE	14.2
THERMAL CONTROL	91.0
DRY WEIGHT	2005.7
PROPELLANT	595.7
SATELLITE ADAPTER	94.0

TOTAL LAUNCH WEIGHT 2695.4

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SYMPHONIE 3 CC3-1-10, -15

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS. EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .500000( DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 20143. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	125.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	9.	0.
SUBFRAME RATE	1250	0.
NUMBER OF WORDS PER SUBFRAME	128.	0.0000

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 333.78 WATTS  
 TOTAL SOLAR ARRAY AREA 37.91 SQ FT  
 INSTALLED BATTERY CAPACITY 44.00 AMP-HR  
 BEGINNING OF LIFE POWER 482.70 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 838.7 LBS ( 380.4 KG) LAUNCH WEIGHT = 870.7 LBS ( 394.9 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 34.2 IN.( .87 M) 56.9 IN.( 1.45 M) 56.9 IN.( 1.45 M)  
 MISSION EQUIPMENT 19.3 IN.( .49 M) 32.2 IN.( .82 M) 32.2 IN.( .82 M)  
 TOTAL SATELLITE 53.5 IN.( 1.36 M)  
 MOMENTS OF INERTIA (SLUG\*FT\*\*2) IXX = 97.2 IYY = 358436.5 IZZ = 477613.4  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 26.9 IN.( .68 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 60.0(MO)  
 MEAN MISSION DURATION 49.1(MO)  
 RELIABILITY .559

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SYMPHONIE 3 CC3-1-10, -15

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1809	1303				
EQUIPMENT QUANTITIES	2	2	2	1				
WEIGHT	66.90 LBS				VOLUME	2.21 (FT**3)	POWER REQUIREMENT	64.7 WATTS
RELIABILITY		.9351						
IERR	.0							

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	829	834	907	1003	499	203	1124	509	701	1203	603
EQUIPMENT QUANTITIES	12	4	5	9	1	1	1	1	2	1	1
WEIGHT	183.16 LBS				VOLUME	5.41 (FT**3)	POWER REQUIREMENT				.3 WATTS
DRY WEIGHT	65.14 (LBS)				EXPENDABLE WEIGHT		118.02 (LBS)				
RELIABILITY		.8388									
IERR	0										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403						
EQUIPMENT QUANTITIES	1	1						
WEIGHT	21.18 LBS				VOLUME	.39 (FT**3)	POWER REQUIREMENT	10.5 WATTS
RELIABILITY		.9668						
IERR	1							

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	202	106	327	401	503	605		
EQUIPMENT QUANTITIES	1	2	1	1	2	2		
WEIGHT	25.52 LBS				VOLUME	.94 (FT**3)	POWER REQUIREMENT	25.5 WATTS
RELIABILITY		.9256						
IERR	*****							

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	406	515	243	609	702			
EQUIPMENT QUANTITIES	2	5	2	2	1			
WEIGHT	121.64 LBS				VOLUME	1.35 (FT**3)	POWER DISSIPATION	53.6 WATTS
HARNESS WEIGHT		37.7 (LBS)			SOLAR ARRAY WEIGHT	26.4 (LBS)		
RELIABILITY		.8846						

MISSION EQUIPMENT

WEIGHT	229.00 LBS				VOLUME	9.07 (FT**3)	POWER REQUIREMENT	167.0 WATTS
RELIABILITY		.9000						

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SYMPHONIE 3 CC3-1-10, -15

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	7.9 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	746.2 (BTU/HR),	TOTAL RADIATOR AREA	8.9 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	85.6 (BTU/HR)
HEAT PIPE LENGTH	3.3 (FT)	TOTAL HEATER POWER	831.7 (BTU/HR)
STORED ENERGY	92.0 (BTU)	VARIABLE CONDUCTANCE H.P.	541.3 (WATT-IN)
		AVERAGE HEAT LOAD	913.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	10.6
HEAT PIPES	3.5
PHASE CHANGE MATERIAL	2.3
RADIATOR (PASSIVE)	5.0
	-----
TOTAL	21.5

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.013 (IN)			
STRINGER NO., THICKNESS, HT.	191, 5, 81910.347 (IN),			.314 (IN)
FRAME NO., THICKNESS, HT.	.117 (IN),			.451 (IN)
GRID BEAM THICKNESS	.030 (IN),	SPACING	3.282 (IN),	HEIGHT
ENDCOVER THICKNESS- FORWARD	85.1 (LBS)	CENTER	7.000 (IN),	AFT
EQUIPMENT BAY STRUCTURE WT.	19.6 (LBS)			.030 (IN)
SOLAR ARRAY ROOM AND DRIVE WT.	32.0 (LBS)			
ADAPTER WEIGHT				

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. SYMPHONIE 3 CC3-1-10, -15

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1809	EARTH SENSOR	2	22.2	.8	1.4
1303	REACTION WHEEL	1	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
834	THRUSTER	4	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
327	TRANSMITTER	1	4.7	.0	18.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

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SYMPHONIE 3 CC3-1-10, -15

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	5	2.3	.0	0.0
243	BATTERY	2	37.0	.1	0.0
609	BATTERY CHARGER	2	3.6	.1	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	229.0
STABILITY AND CONTROL	66.9
AUXILIARY PROPULSION	65.1
DATA PROCESSING	21.2
COMMUNICATIONS	25.5
BATTERIES	74.1
POWER CONTROL	47.6
SOLAR ARRAY	26.4
HARNES	37.7
STRUCTURE	101.3
SOLAR ARRAY DRIVE	4.4
THERMAL CONTROL	21.5
DRY WEIGHT	720.7
PROPELLANT	118.0
SATELLITE ADAPTER	32.0
	-----

TOTAL LAUNCH WEIGHT 870.7

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AM RADIO SAT (AMSAT) CC3-1-11

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1\*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = 1.400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 7619.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPT TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	13.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	18.	0.
SUBFRAME RATE	.1250	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 60.51 WATTS  
TOTAL SOLAR ARRAY AREA 23.71 SQ FT  
INSTALLED BATTERY CAPACITY 6.00 AMP-HR  
BEGINNING OF LIFE POWER 76.69 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 365.7 LBS ( 165.9 KG) LAUNCH WEIGHT = 379.1 LBS ( 171.9 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 30.9 IN. ( .78 M) 51.4 IN. ( 1.31 M) 51.4 IN. ( 1.31 M)  
MISSION EQUIPMENT 10.3 IN. ( .26 M) 17.2 IN. ( .44 M) 17.2 IN. ( .44 M)  
TOTAL SATELLITE 41.2 IN. ( 1.05 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 30.0 IYY = 114678.6 IZZ = 114678.6  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 20.2 IN. ( .51 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APCGEE/PERYGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 24.0(MO)  
MEAN MISSION DURATION 20.0(MO)  
RELIABILITY .1537

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AM RADIO SAT (AMSAT) CC3-1-11

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 29.28 LBS VOLUME 1.18(FT\*\*3) POWER REQUIREMENT 9.4 WATTS  
 RELIABILITY .9198  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOC PROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1116 507 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 4 9 1 1 1 1 1 1 1  
 WEIGHT 99.55 LBS VOLUME 3.84(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 53.75(LBS), EXPENDABLE WEIGHT 45.80(LBS)  
 RELIABILITY .7398  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9866  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 21.02 LBS VOLUME .87(FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9206  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 102 202 303 1202  
 EQUIPMENT QUANTITIES 5 2 2 1  
 WEIGHT 62.47 LBS VOLUME 1.29(FT\*\*3) POWER DISSIPATION 5.7 WATTS  
 HARNESS WEIGHT 20.3(LBS), SOLAR ARRAY WEIGHT 11.7(LBS)  
 RELIABILITY .9658

MISSION EQUIPMENT

WEIGHT 25.00 LBS VOLUME 1.39(FT\*\*3) POWER REQUIREMENT 20.0 WATTS  
 RELIABILITY .9000

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AM RADIO SAT (AMSAT) CC3-1-11

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	1.9 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	153.0 (BTU/HR),	TOTAL RADIATOR AREA	3.2 (FT**2)
HEAT PIPE	1869.0 (WATT-IN),	BATTERY HEATER POWER	122.2 (BTU/HR)
HEAT PIPE LENGTH	2.6 (FT)	TOTAL HEATER POWER	276.1 (BTU/HR)
STORED ENERGY	72.0 (BTU)	VARIABLE CONDUCTANCE H.P.	532.8 (WATT-IN)
		AVERAGE HEAT LOAD	206.3 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		8.6
HEAT PIPES		2.7
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		1.2
	TOTAL	14.3

IERR 11C0010111

STRUCTURES				
SKIN THICKNESS	.009 (IN)			
STRINGER NO., THICKNESS, HT.	222. ,	81910.347 (IN),		.244 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.070 (IN),		.351 (IN)
GRID BEAM THICKNESS	.078 (IN),	SPACING 2.195 (IN),	HEIGHT	1.097 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	64.6 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	13.14 (LBS)			

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AM RADIO SAT (AMSAT) CC3-1-11

\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTRLL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	MUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
803	EARTH SENSOR	1	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
507	TANK	1	6.7	.3	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMDD DECDD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	PASEBND ASSY UNIT	1	2.0	.0	.5
206	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
603	DIPLXER	1	3.1	.0	1.0

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AM RADIO SAT (AMSAT) CC3-1-11

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

ICENT TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
102 SHUNT REGULATOR	5	5.0	.1	0.0
202 BATTERY	2	9.5	.1	0.0
303 BATTERY CHARGER	2	3.5	.1	0.0
1202 POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	35.0
STABILITY AND CONTROL	13.4
AUXILIARY PROPULSION	53.8
DATA PROCESSING	21.2
COMMUNICATIONS	21.0
BATTERIES	19.0
POWER CONTROL	43.5
CONVERTERS	15.9
SOLAR ARRAY	11.7
FARNESSES	20.3
STRUCTURE	50.9
THERMAL CONTROL	14.3
DRY WEIGHT	319.9
PROPPELLANT	45.8
SATELLITE ADAPTER	13.4

TOTAL LAUNCH WEIGHT 379.1

VI-360

APEX PASS P/L EXP (APPLE) CC3-1-12

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .500000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 23324.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 267.25 WATTS  
TOTAL SOLAR ARRAY AREA 111.16 SQ FT  
INSTALLED BATTERY CAPACITY 22.00 AMP-HR  
BEGINNING OF LIFE POWER 359.59 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 880.0 LBS ( 399.2 KG) LAUNCH WEIGHT = 918.1 LBS ( 416.5 K)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 55.3 IN.( 1.40 M) 92.2 IN.( 2.34 M) 92.2 IN.( 2.34 M)  
MISSION EQUIPMENT 16.6 IN.( .42 M) 27.6 IN.( .70 M) 27.6 IN.( .70 M)  
TOTAL SATELLITE 71.9 IN.( 1.83 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 197.9 IYY = 893526.1 IZZ = 893526.1  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 38.6 IN.( .98 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MO)  
MEAN MISSION DURATION 50.4(MO)  
RELIABILITY .601

V1-361

APEX PASS P/L EXP (APPLE) CC3-1-12

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 2 1  
 WEIGHT 30.56 LBS VOLUME 1.21(FT\*\*3) POWER REQUIREMENT 9.4 WATTS  
 RELIABILITY .9022  
 IERR 0

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 208.54 LBS VOLUME 5.72(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT 140.20(LBS)  
 RELIABILITY .8259  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92(FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9601  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 218 306 1202  
 EQUIPMENT QUANTITIES 7 2 2 1  
 WEIGHT 109.60 LBS VOLUME 1.97(FT\*\*3) POWER DISSIPATION 21.2 WATTS  
 HARNESS WEIGHT 40.3(LBS), SOLAR ARRAY WEIGHT 54.6(LBS)  
 RELIABILITY .9649

MISSION EQUIPMENT  
 WEIGHT 145.00 LBS VOLUME 5.74(FT\*\*3) POWER REQUIREMENT 215.0 WATTS  
 RELIABILITY .9000

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APEX PASS P/L EXP (APPLE) CC3-1-12

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL				
RADIATOR AREA	7.5 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)	
HEATER POWER	712.1 (BTU/HR),	TOTAL RADIATOR AREA	8.6 (FT**2)	
HEAT PIPE	13771.4 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)	
HEAT PIPE LENGTH	4.5 (FT)	TOTAL HEATER POWER	827.0 (BTU/HR)	
STORED ENERGY	72.0 (BTU)	VARIABLE CONDUCTANCE H.P.	929.7 (WATT-IN)	
		AVERAGE HEAT LOAD	871.3 (BTU/HR)	

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		18.4
HEAT PIPES		4.7
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		4.7
	TOTAL	29.7

IERP 1100010111

STRUCTURES				
SKIN THICKNESS	.013 (IN)			
STRINGER NO., THICKNESS, HT.	249. ,	81910.347 (IN),	.390 (IN)	
FRAME NO., THICKNESS, HT.	5. ,	.112 (IN),	.560 (IN)	
GRID BEAM THICKNESS	.111 (IN),	SPACING 3.129 (IN),	HEIGHT 1.564 (IN)	
ENCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	108.3 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT.	38.2 (LBS)			

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APEX PASS P/L EXP (APPLE) CC3-1-12

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
803	EARTH SENSOR	2	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	RASERNO ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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APEX PASS P/L EXP (APPLE) CC3-1-12

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	7	4.2	.1	0.0
218	BATTERY	2	21.0	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	145.0
STABILITY AND CONTROL	14.7
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	42.0
POWER CONTROL	66.6
CONVERTERS	15.9
SOLAR ARRAY	54.6
HARNESS	40.3
STRUCTURE	216.8
THERMAL CONTROL	29.7
DRY WEIGHT	739.8
PROPELLANT	140.2
SATELLITE ADAPTER	38.2
	-----
TOTAL LAUNCH WEIGHT	918.1

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INSAT F/D CC3-1-14

\* \* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 23324.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 342.75 WATTS  
TOTAL SOLAR ARRAY AREA 144.43 SQ FT  
INSTALLED BATTERY CAPACITY 28.00 AMP-HR  
BEGINNING OF LIFE POWER 467.18 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WET SATELLITE WEIGHT = 1119.9 LBS ( 508.0 KG) LAUNCH WEIGHT = 1170.9 LBS ( 531.1 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 63.0 IN.( 1.60 M) 105.0 IN.( 2.67 M) 105.0 IN.( 2.67 M)  
MISSION EQUIPMENT 19.2 IN.( .49 M) 32.0 IN.( .81 M) 32.0 IN.( .81 M)  
TOTAL SATELLITE 82.2 IN.( 2.09 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 307.9 IYY = 1430292.5 IZZ = 1430292.5  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 46.1 IN.( 1.17 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MO)  
MEAN MISSION DURATION 51.4(MO)  
RELIABILITY .626

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INSAT F/O CC3-1-14

\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL											
EQUIPMENT CODE IDENTIFIER	203	303	403	603	806	1413					
EQUIPMENT QUANTITIES	1	1	1	2	2	1					
WEIGHT	43.50 LBS										
VOLUME					1.80 (FT**3)						
POWER REQUIREMENT											10.4 WATTS
RELIABILITY		.9618									
IERR	0										

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT											
EQUIPMENT CODE IDENTIFIER	834	834	906	1003	499	203	1118	518	701	1203	603
EQUIPMENT QUANTITIES	6	2	5	9	1	1	2	1	2	1	1
WEIGHT	208.54 LBS										
VOLUME					5.72 (FT**3)						
POWER REQUIREMENT											1.0 WATTS
DRY WEIGHT	68.33 (LBS)										
EXPENDABLE WEIGHT								140.20 (LBS)			
RELIABILITY		.8259									
IERR	11										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)											
EQUIPMENT CODE IDENTIFIER	203	403									
EQUIPMENT QUANTITIES	1	1									
WEIGHT	21.18 LBS										
VOLUME					.39 (FT**3)						
POWER REQUIREMENT											10.5 WATTS
RELIABILITY		.9668									
IERR											

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS											
EQUIPMENT CODE IDENTIFIER	202	103	306	401	503	603					
EQUIPMENT QUANTITIES	1	1	2	1	2	1					
WEIGHT	24.62 LBS										
VOLUME					.92 (FT**3)						
POWER REQUIREMENT											19.5 WATTS
RELIABILITY		.9601									
IERR*****											

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY											
EQUIPMENT CODE IDENTIFIER	103	224	309	1202							
EQUIPMENT QUANTITIES	9	2	2	1							
WEIGHT	133.19 LBS										
VOLUME					2.14 (FT**3)						
POWER DISSIPATION											32.2 WATTS
HARNESS WEIGHT		51.9 (LBS)									
SOLAR ARRAY WEIGHT								71.0 (LBS)			
RELIABILITY		.9437									

MISSION EQUIPMENT

WEIGHT	225.00 LBS										
VOLUME					8.91 (FT**3)						
POWER REQUIREMENT											285.0 WATTS
RELIABILITY		.9000									

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INSAT F/O CC3-1-14

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	9.5 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	920.3 (BTU/HR),	TOTAL RADIATOR AREA	10.7 (FT**2)
HEAT PIPE	20130.9 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	5.1 (FT)	TOTAL HEATER POWER	1035.3 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1063.5 (WATT-IN)
		AVERAGE HEAT LOAD	1113.4 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		22.8
HEAT PIPES		5.4
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		6.0
	TOTAL	36.1

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.014 (IN)		
STRINGER NO., THICKNESS, HT.	253.		
FRAME NO., THICKNESS, HT.	5.	81910.347 (IN),	.437 (IN)
GRID BEAM THICKNESS	.122 (IN),	.125 (IN),	.627 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	SPACING 3.442 (IN),	HEIGHT 1.721 (IN)
EQUIPMENT BAY STRUCTURE WT.	118.6 (LBS)	CENTER 0.000 (IN),	AFT .030 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	51.0 (LBS)		

898-1A

INSAT F/O CC3-1-14

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	RASERND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	1.5	.0	1.0

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INSAT F/O CC3-1-14

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NT	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	9	4.2	.1	0.0
224	BATTERY	2	29.1	.2	0.0
309	BATTERY CHARGER	2	12.8	.2	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	225.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	58.2
POWER CONTROL	75.0
CONVERTERS	15.9
SOLAR ARRAY	71.0
HARNESS	51.9
STRUCTURE	304.9
THERMAL CONTROL	36.1
DRY WEIGHT	979.7
PROPELLANT	140.2
SATELLITE ADAPTER	51.0

TOTAL LAUNCH WEIGHT 1170.9

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PALAPA F/O CC3-1-16

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION  
CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 38403.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

DPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	125.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	4.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER  
CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 829.02 WATTS  
TOTAL SOLAR ARRAY AREA 94.11 SQ FT  
INSTALLED BATTERY CAPACITY 100.00 AMP-HR  
BEGINNING OF LIFE POWER 1198.34 WATTS

VEHICLE SIZING  
CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1493.1 LBS ( 677.3 KG) LAUNCH WEIGHT = 1548.1 LBS ( 702.2 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 39.0 IN.( .99 M) 65.0 IN.( 1.65 M) 65.0 IN.( 1.65 M)  
MISSION EQUIPMENT 25.0 IN.( .64 M) 41.7 IN.( 1.06 M) 41.7 IN.( 1.06 M)  
TOTAL SATELLITE 64.0 IN.( 1.63 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 281.7 IYY = 846768.4 IZZ = 1425887.1  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 33.3 IN.( .85 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY  
CONFIGURATION -- SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MO)  
MEAN MISSION DURATION 49.5(MO)  
RELIABILITY .604

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PALAPA F/D CC3-1-16

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1\*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 1 2  
 WEIGHT 43.00 LBS VOLUME 1.24(FT\*\*3) POWER REQUIREMENT 78.9 WATT  
 RELIABILITY .9418  
 IERR 10

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1130 509 701 1203 603  
 EQUIPMENT QUANTITIES 18 6 5 9 2 1 2 1 2 1 1  
 WEIGHT 313.24 LBS VOLUME 10.15(FT\*\*3) POWER REQUIREMENT 73 WATT  
 DRY WEIGHT 95.03(LBS), EXPENDABLE WEIGHT 218.20(LBS)  
 RELIABILITY .8866  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATT  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605  
 EQUIPMENT QUANTITIES 1 2 2 1 3 2  
 WEIGHT 31.72 LBS VOLUME 1.00(FT\*\*3) POWER REQUIREMENT 75.5 WATT  
 RELIABILITY .9770  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 414 515 269 650 702  
 EQUIPMENT QUANTITIES 2 11 2 2 1  
 WEIGHT 215.85 LBS VOLUME 2.50(FT\*\*3) POWER DISSIPATION 132.6 WATT  
 HARNESS WEIGHT 58.9(LBS), SOLAR ARRAY WEIGHT 65.5(LBS)  
 RELIABILITY .8509

MISSION EQUIPMENT

WEIGHT 500.00 LBS VOLUME 19.78(FT\*\*3) POWER REQUIREMENT 630.0 WATT  
 RELIABILITY .9000

41-372

PALAPA F/O CC3-1-16

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

HERMAL CONTROL RADIATOR AREA	25.4 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	2380.3 (BTU/HR),	TOTAL RADIATOR AREA	26.3 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.0 (FT)	TOTAL HEATER POWER	2470.3 (BTU/HR)
STORED ENERGY	119.5 (BTU)	VARIABLE CONDUCTANCE H.P.	648.0 (WATT-IN)
		AVERAGE HEAT LOAD	2540.9 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		13.1
HEAT PIPES		4.2
PHASE CHANGE MATERIAL		3.0
RADIATOR (ACTIVE)		56.4
	TOTAL	76.6

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.017 (IN)			
STRINGER NO., THICKNESS, HT.	179. ,	81910.347 (IN),		.384 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.110 (IN),		.552 (IN)
GRID BEAM THICKNESS	.153 (IN),	SPACING 4.302 (IN),	HEIGHT	2.151 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	126.7 (LBS)			
SOLAR ARRAY BOOM AND DRIVE, WT.	26.1 (LBS)			
ADAPTER WEIGHT	55.0 (LBS)			

VI-373

PALAPA F/O CC3-1-16

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

VI-374

PALAPA F/O CC3-1-16

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
414	DISCHGE REGULATOR	2	9.7	.2	9.0
515	SHUNT REGULATOR	11	2.3	.0	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	500.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	95.0
DATA PROCESSING	21.2
COMMUNICATIONS	31.7
BATTERIES	142.6
POWER CONTROL	73.3
SOLAR ARRAY	65.5
HARNESS	58.9
STRUCTURE	156.2
SOLAR ARRAY DRIVE	10.9
THERMAL CONTROL	76.6
DRY WEIGHT	1274.9
PROPELLANT	218.2
SATELLITE ADAPTER	55.0

TOTAL LAUNCH WEIGHT 1548.1

VI-375

IRAN F/O CC3-1-18

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 23324.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 417.75 WATTS  
TOTAL SOLAR ARRAY AREA 173.77 SQ FT  
INSTALLED BATTERY CAPACITY 34.00 AMP-HR  
BEGINNING OF LIFE POWER 562.08 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1266.1 LBS ( 574.3 KG) LAUNCH WEIGHT = 1326.3 LBS ( 601.6 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 69.1 IN.( 1.76 M) 115.2 IN.( 2.93 M) 115.2 IN.( 2.93 M)  
MISSION EQUIPMENT 20.1 IN.( .51 M) 33.5 IN.( .85 M) 33.5 IN.( .85 M)  
TOTAL SATELLITE 89.3 IN.( 2.27 M)  
MOMENTS OF INERTIA (SLUG\*FT\*\*2) IXX = 400.3 IYY = 1886268.9 IZZ = 1886268.9  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 51.3 IN.( 1.30 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MO)  
MEAN MISSION DURATION 51.0(MO)  
RELIABILITY .615

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IRAN F/O CC3-1-18

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL														
EQUIPMENT CODE IDENTIFIER	203	303	403	603	806	1413								
EQUIPMENT QUANTITIES	1	1	1	2	2	1								
WEIGHT	43.50 LBS					1.80(FT**3)				POWER REQUIREMENT				10.4 WATTS
RELIABILITY		.9618												
IERR	0													

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT														
EQUIPMENT CODE IDENTIFIER	834	834	906	1003	499	203	1118	518	701	1203	603			
EQUIPMENT QUANTITIES	6	2	5	9	1	1	2	1	2	1	1			
WEIGHT	208.54 LBS					5.72(FT**3)				POWER REQUIREMENT				1.0 WATTS
DRY WEIGHT	68.33(LBS)							140.20(LBS)						
RELIABILITY		.8260												
IERR	11													

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)														
EQUIPMENT CODE IDENTIFIER	203	403												
EQUIPMENT QUANTITIES	1	1												
WEIGHT	21.18 LBS					.39(FT**3)				POWER REQUIREMENT				10.5 WATTS
RELIABILITY		.9668												
IERR	1													

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS														
EQUIPMENT CODE IDENTIFIER	202	103	306	401	503	603								
EQUIPMENT QUANTITIES	1	1	2	1	2	1								
WEIGHT	24.62 LBS					.92(FT**3)				POWER REQUIREMENT				19.5 WATTS
RELIABILITY		.9601												
IERR*****														

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY														
EQUIPMENT CODE IDENTIFIER	103	233	315	1202										
EQUIPMENT QUANTITIES	10	2	2	1										
WEIGHT	145.91 LBS					2.57(FT**3)				POWER DISSIPATION				33.3 WATTS
HARNESS WEIGHT		56.7(LBS)								85.4(LBS)				
RELIABILITY		.9269												

MISSION EQUIPMENT

WEIGHT	260.00 LBS					10.29(FT**3)				POWER REQUIREMENT				360.0 WATTS
RELIABILITY		.9000												

N1-377

IRAN F/O CC3-1-18

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

HERMAL CONTROL RADIATOR AREA	11.7 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1140.2 (BTU/HR),	TOTAL RADIATOR AREA	12.9 (FT**2)
HEAT PIPE	26878.5 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	5.6 (FT)	TOTAL HEATER POWER	1255.2 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1154.8 (WATT-IN)
		AVERAGE HEAT LOAD	1369.1 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		26.4
HEAT PIPES		5.9
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		7.4
	TOTAL	41.5

IERR 1100010111

STRUCTURES:				
SKIN THICKNESS	.014 (IN)			
STRINGER NO., THICKNESS, HT.	260.		81910.347 (IN),	.466 (IN)
FRAME NO., THICKNESS, HT.	5.		.134 (IN),	.670 (IN)
GRID BEAM THICKNESS	.127 (IN),	SPACING	3.574 (IN),	HEIGHT 1.787 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	122.0 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	60.3 (LBS)			

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IRAN F/O CC3-1-18

\*\*\* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

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DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

IRAN F/O CC3-1-18

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
233	BATTERY	2	34.2	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	260.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	68.3
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	85.4
HARNES	56.7
STRUCTURE	378.7
THERMAL CONTROL	41.5
DRY WEIGHT	1125.8
PROPELLANT	140.2
SATELLITE ADAPTER	60.3

TOTAL LAUNCH WEIGHT 1326.3

11-380

SIRIO F/O CC3-1-20

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .400000(DEG.)  
AUXILIARY PROPULSION  
CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 23324.(LB-SEC)  
DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)  
CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
.1250	0.0000.
64.	0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT -- BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 279.25 WATTS  
TOTAL SOLAR ARRAY AREA 116.16 SQ FT  
INSTALLED BATTERY CAPACITY 22.00 AMP-HR  
BEGINNING OF LIFE POWER 375.73 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 954.9 LBS ( 433.1 KG) LAUNCH WEIGHT = 996.6 LBS ( 452.0 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 56.5 IN.( 1.44 M) 94.2 IN.( 2.39 M) 94.2 IN.( 2.39 M)  
MISSION EQUIPMENT 18.1 IN.( .46 M) 30.2 IN.( .77 M) 30.2 IN.( .77 M)  
TOTAL SATELLITE 74.7 IN.( 1.90 M)  
MOMENTS OF INERTIA (\_\_\_G\*FT\*\*2) IXX = 220.8 IYY = 1013835.1 IZZ = 1013835.1  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 41.0 IN.( 1.04 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MO)  
MEAN MISSION DURATION 50.5(MO)  
RELIABILITY .602

VI-381

SIRIO F/O CC3-1-20

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 2 1  
 WEIGHT 36.10 LBS VOLUME 1.43(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9051  
 IERR 0

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 208.54 LBS VOLUME 5.72(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT 140.20(LBS)  
 RELIABILITY .8257  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92(FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9601  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 218 306 1202  
 EQUIPMENT QUANTITIES 7 2 2 1  
 WEIGHT 108.60 LBS VOLUME 1.97(FT\*\*3) POWER DISSIPATION 22.3 WATTS  
 HARNESS WEIGHT 44.0(LBS), SOLAR ARRAY WEIGHT 57.1(LBS)  
 RELIABILITY .9649

MISSION EQUIPMENT  
 WEIGHT 190.00 LBS VOLUME 7.52(FT\*\*3) POWER REQUIREMENT 225.0 WATTS  
 RELIABILITY .9000

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SIRIO F/O CC3-1-20

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	7.8 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	744.3 (BTU/HR),	TOTAL RADIATOR AREA	9.0 (FT**2)
HEAT PIPE	14921.7 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.7 (FT)	TOTAL HEATER POWER	859.3 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	965.8 (WATT-IN)
		AVERAGE HEAT LOAD	908.8 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	19.3
HEAT PIPES	4.9
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	4.9
TOTAL	31.0

IERR 1100010111

VI-383

STRUCTURES			
SKIN THICKNESS	.013 (IN)		
STRINGER NO., THICKNESS, HT.	247.	81910.347 (IN),	.402 (IN)
FRAME NO., THICKNESS, HT.	5.	.115 (IN),	.577 (IN)
GRID BEAM THICKNESS	.115 (IN),	SPACING 3.249 (IN),	HEIGHT 1.625 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	109.8 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	41.7 (LBS)		

SIRIO F/O CC3-1-20

\* \* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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SIRIO F/O CC3-1-20

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	7	4.2	.1	0.0
218	BATTERY	2	21.0	.1	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	190.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	42.0
POWER CONTROL	66.6
CONVERTERS	15.9
SOLAR ARRAY	57.1
HARNES	44.0
STRUCTURE	233.8
THERMAL CONTROL	31.0
DRY WEIGHT	814.7
PROPELLANT	140.2
SATELLITE ADAPTER	41.7
<b>TOTAL LAUNCH WEIGHT</b>	<b>996.6</b>

VI-385

NERDSAT F/O CC3-1-22,-38

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 23324.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KB PS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KB PS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 309.25 WATTS  
TOTAL SOLAR ARRAY AREA 128.63 SQ FT  
INSTALLED BATTERY CAPACITY 28.00 AMP-HR  
BEGINNING OF LIFE POWER 416.10 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1051.0 LBS ( 476.7 KG) LAUNCH WEIGHT = 1097.7 LBS ( 497.9 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 59.5 IN.( 1.51 M) 99.1 IN.( 2.52 M) 99.1 IN.( 2.52 M)  
MISSION EQUIPMENT 19.0 IN.( .48 M) 31.7 IN.( .81 M) 31.7 IN.( .81 M)  
TOTAL SATELLITE 78.5 IN.( 1.99 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 264.0 IYY = 1221379.0 IZZ = 1221379.0  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 43.7 IN.( 1.11 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MO)  
MEAN MISSION DURATION 50.5(MO)  
RELIABILITY .602

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\* \* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL											
CONFIGURATION -- SPIN CONTROL											
EQUIPMENT CODE IDENTIFIER	203	303	403	603	806	1413					
EQUIPMENT QUANTITIES	1	1	1	1	2	1					
WEIGHT	36.10 LBS						VOLUME	1.43(FT**3)	POWER REQUIREMENT	10.4 WATTS	
RELIABILITY		.9051									
IERR	0										
UXILIARY PROPULSION											
CONFIGURATION -- MONOPROPELLANT											
EQUIPMENT CODE IDENTIFIER	834	834	906	1003	499	203	1118	518	701	1203	603
EQUIPMENT QUANTITIES	6	2	5	9	1	1	2	1	2	1	1
WEIGHT	208.54 LBS						VOLUME	5.72(FT**3)	POWER REQUIREMENT	1.0 WATTS	
DRY WEIGHT	68.33(LBS)								140.20(LBS)		
RELIABILITY		.8258									
IERR	11										
DATA PROCESSING AND INSTRUMENTATION											
CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (OTU)											
EQUIPMENT CODE IDENTIFIER	203	403									
EQUIPMENT QUANTITIES	1	1									
WEIGHT	21.18 LBS						VOLUME	.39(FT**3)	POWER REQUIREMENT	10.5 WATTS	
RELIABILITY		.9668									
IERR	1										
COMMUNICATIONS											
CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS											
EQUIPMENT CODE IDENTIFIER	202	103	306	401	503	603					
EQUIPMENT QUANTITIES	1	1	2	1	2	1					
WEIGHT	24.62 LBS						VOLUME	.92(FT**3)	POWER REQUIREMENT	19.5 WATTS	
RELIABILITY		.9601									
IERR	*****										
ELECTRICAL POWER											
CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY											
EQUIPMENT CODE IDENTIFIER	103	224	306	1202							
EQUIPMENT QUANTITIES	8	2	2	1							
WEIGHT	128.99 LBS						VOLUME	2.21(FT**3)	POWER DISSIPATION	24.7 WATTS	
HARNESS WEIGHT		47.5(LBS)							63.2(LBS)		
RELIABILITY		.9644									
MISSION EQUIPMENT											
WEIGHT	220.00 LBS						VOLUME	8.71(FT**3)	POWER REQUIREMENT	255.0 WATTS	
RELIABILITY		.9000									

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NERDSAT F/O CC3-1-22, - 38

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

HERMAL CONTROL RADIATOR AREA	8.7 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	832.3 (BTU/HR),	TOTAL RADIATOR AREA	9.8 (FT**2)
HEAT PIPE	17461.0 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	947.3 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1015.8 (WATT-IN)
		AVERAGE HEAT LOAD	1011.1 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		21.0
HEAT PIPES		5.2
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		5.5
	TOTAL	33.4

IERR 1100010111

STRUCTURES

SKIN THICKNESS	.014 (IN)		
STRINGER NO., THICKNESS, HT.	248.		81910.347 (IN), .421 (IN)
FRAME NO., THICKNESS, HT.	5.		.121 (IN), .604 (IN)
GRID BEAM THICKNESS	.120 (IN),	SPACING	3.380 (IN), HEIGHT 1.690 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN), AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	115.4 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	46.7 (LBS)		

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NERDSAT F/O CC3-1-22, - 38

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECDD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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NORDSAT F/O CC3-1-22, -38

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
224	BATTERY	2	29.1	.2	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	220.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	58.2
POWER CONTROL	70.8
CONVERTERS	15.9
SOLAR ARRAY	63.2
HARNES	47.5
STRUCTURE	267.5
THERMAL CONTROL	33.4
DRY WEIGHT	910.8
PROPELLANT	140.2
SATELLITE ADAPTEI	46.7

TOTAL LAUNCH WEIGHT 1097.7

VI-390

BRAZILSAT F/O CC3-1-24

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION -- SPIN CONTROL  
 POINTING ACCURACY = .400000(DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 24125.(LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTG,  
 COMPUTER OPERATIONS RATE = 0.(IPS)  
 CDPI TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	13.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	18.	0.
SUBFRAME RATE	.1250	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)  
 ELECTRICAL POWER  
 CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 458.63 WATTS  
 TOTAL SOLAR ARRAY AREA 190.77 SQ FT  
 INSTALLED BATTERY CAPACITY 40.00 AMP-HR  
 BEGINNING OF LIFE POWER 617.09 WATTS  
 VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 1349.6 LBS ( 612.2 KG) LAUNCH WEIGHT = 1414.8 LBS ( 641.7 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 72.9 IN.( 1.85 M) 120.0 IN.( 3.05 M) 120.0 IN.( 3.05 M)  
 MISSION EQUIPMENT 20.1 IN.( .51 M) 33.9 IN.( .85 M) 33.9 IN.( .85 M)  
 TOTAL SATELLITE 93.0 IN.( 2.36 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 457.8 IYY = 2182168.8 IZZ = 2182168.8  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 53.4 IN.( 1.36 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)  
 RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 60.0(MO)  
 MEAN MISSION DURATION 50.1(MO)  
 RELIABILITY .622

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BRAZILSAT F/O CC3-1-24

\* \* . SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION -- SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 2 2 1  
 WEIGHT 43.50 LBS VOLUME 1.80(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9618  
 IERR 0

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 2 1 2 1 1  
 WEIGHT 217.45 LBS VOLUME 6.12(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 72.43(LBS), EXPENDABLE WEIGHT 145.02(LBS)  
 RELIABILITY .8986  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 3 1  
 WEIGHT 26.12 LBS VOLUME .94(FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9715  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 239 315 1202  
 EQUIPMENT QUANTITIES 10 2 2 1  
 WEIGHT 163.62 LBS VOLUME 2.59(FT\*\*3) POWER DISSIPATION 36.6 WATTS  
 HARNESS WEIGHT 59.4(LBS), SOLAR ARRAY WEIGHT 93.8(LBS)  
 RELIABILITY .8520

MISSION EQUIPMENT  
 WEIGHT 260.00 LBS VOLUME 10.29(FT\*\*3) POWER REQUIREMENT 400.0 WATTS  
 RELIABILITY .9000

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BRAZILSAT F/O CC3-1-24

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	12.9 (FT**2),	BATTERY RADIATOR AREA	1.4 (FT**2)
HEATER POWER	1257.5 (BTU/HR),	TOTAL RADIATOR AREA	14.3 (FT**2)
HEAT PIPE	30794.5 (WATT-IN),	BATTERY HEATER POWER	123.8 (BTU/HR)
HEAT PIPE LENGTH	5.8 (FT)	TOTAL HEATER POWER	1381.3 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1203.2 (WATT-IN)
		AVERAGE HEAT LOAD	1505.5 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		28.3
HEAT PIPES		6.1
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		8.2
TOTAL		44.4

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.015 (IN)		
STRINGER NO., THICKNESS, HT.	262. ,	81910.347 (IN),	.483 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.139 (IN),	.693 (IN)
GRID BEAM THICKNESS	.130 (IN),	SPACING- 3.660 (IN),	HEIGHT- 1.830 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	130.0 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	65.2 (LBS)		

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BRAZILSAT F/O CC3-1-24

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

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DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMO DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0



BRAZILSAT F/O CC3-1-24

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
239	BATTERY	2	43.0	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	260.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	72.4
DATA PROCESSING	21.2
COMMUNICATIONS	26.1
BATTERIES	86.0
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	93.8
HARNES S	59.4
STRUCTURE	420.1
THERMAL CONTROL	44.4
DRY WEIGHT	1204.6
PROPELLANT	145.0
SATELLITE ADAPTER	65.2

TOTAL LAUNCH WEIGHT 1414.8

VI-395

NATO F/O CC3-1-26.

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 24125.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
64.  
1250

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 478.63 WATTS  
TOTAL SOLAR ARRAY AREA 199.09 SQ FT  
INSTALLED BATTERY CAPACITY 40.00 AMP-HR  
BEGINNING OF LIFE POWER 644.00 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1718.5 LBS ( 779.5 KG) LAUNCH WEIGHT = 1799.5 LBS ( 816.2 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 76.0 IN.( 1.93 M) 120.0 IN.( 3.05 M) 120.0 IN.( 3.05 M)  
MISSION EQUIPMENT 25.8 IN.( .66 M) 43.1 IN.( 1.09 M) 43.1 IN.( 1.09 M)  
TOTAL SATELLITE 101.9 IN.( 2.59 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 574.3 IYY = 2881804.9 IZZ = 2881804.9  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 63.3 IN.( 1.61 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MO)  
MEAN MISSION DURATION 50.1(MO)  
RELIABILITY .622

V1+396

NATO F/O CC3-1-26

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
EQUIPMENT QUANTITIES 1 1 1 2 2 1  
WEIGHT 43.50 LBS VOLUME 1.80(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
RELIABILITY .9618  
IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
EQUIPMENT QUANTITIES 6 2 5 9 2 1 2 1 2 1 1  
WEIGHT 217.45 LBS VOLUME 6.12(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
DRY WEIGHT 72.43(LBS), EXPENDABLE WEIGHT 145.02(LBS)  
RELIABILITY .8986  
IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
EQUIPMENT CODE IDENTIFIER 203 403  
EQUIPMENT QUANTITIES 1 1  
WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATT  
RELIABILITY .9668  
IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
EQUIPMENT CODE IDENTIFIER 202 103 306 401 503  
EQUIPMENT QUANTITIES 1 1 2 1 3  
WEIGHT 26.12 LBS VOLUME .94(FT\*\*3) POWER REQUIREMENT 19.5 WATT  
RELIABILITY .9715  
IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
EQUIPMENT CODE IDENTIFIER 103 239 315 1202  
EQUIPMENT QUANTITIES 10 2 2 1  
WEIGHT 163.62 LBS VOLUME 2.59(FT\*\*3) POWER DISSIPATION 38.2 WATTS  
HARNESS WEIGHT 75.8(LBS), SOLAR ARRAY WEIGHT 97.9(LBS)  
RELIABILITY .8520

MISSION EQUIPMENT

WEIGHT 550.00 LBS VOLUME 21.75(FT\*\*3) POWER REQUIREMENT 420.0 WATTS  
RELIABILITY .9000

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NATO F/O CC3-1-26

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	13.5 (FT**2),	BATTERY RADIATOR AREA	1.4 (FT**2)
HEATER POWER	1316.2 (BTU/HR),	TOTAL RADIATOR AREA	14.8 (FT**2)
HEAT PIPE	35263.6 (WATT-IN),	BATTERY HEATER POWER	123.8 (BTU/HR)
HEAT PIPE LENGTH	6.4 (FT)	TOTAL HEATER POWER	1440.0 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1318.1 (WATT-IN)
		AVERAGE HEAT LOAD	1573.7 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		30.7
HEAT PIPES		6.7
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		8.5
	TOTAL	47.7

IERR 1100010111

STRUCTURES

SKIN THICKNESS	.017 (IN)			
STRINGER NO., THICKNESS, HT.	244.	,	81910.347 (IN),	.519 (IN)
FRAME NO., THICKNESS, HT.	5.	,	.149 (IN),	.745 (IN)
GRID BEAM THICKNESS	.149 (IN),	SPACING	4.184 (IN),	HEIGHT 2.092 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER	0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	130.9 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	81.0 (LBS)			

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NATO F/O CC3-1-26

\* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUITATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

V1-399

NATO F/D CC3-1-26

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
239	BATTERY	2	43.0	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	550.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	72.4
DATA PROCESSING	21.2
COMMUNICATIONS	26.1
BATTERIES	86.0
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	97.9
HARNESSES	75.8
STRUCTURE	475.2
THERMAL CONTROL	47.7
DRY WEIGHT	1573.4
PROPELLANT	145.0
SATELLITE ADAPTER	81.0
	-----

TOTAL LAUNCH WEIGHT 1799.5

VI 400

ETS IV CC3-1-20

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = 1.500000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 5235.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 68.51 WATTS  
TOTAL SOLAR ARRAY AREA 25.26 SQ FT  
INSTALLED BATTERY CAPACITY 6.00 AMP-HR  
BEGINNING OF LIFE POWER 81.70 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 350.2 LBS ( 158.8 KG)

LAUNCH WEIGHT = 363.1 LBS ( 164.7 KG)

DIMENSIONS  
EQUIPMENT BAY 30.8 IN. ( .78 M)  
MISSION EQUIPMENT 10.3 IN. ( .26 M)  
TOTAL SATELLITE 41.1 IN. ( 1.04 M)

HEIGHT  
51.3 IN. ( 1.30 M)  
WIDTH  
17.2 IN. ( .44 M)  
51.3 IN. ( 1.30 M)  
17.2 IN. ( .44 M)

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX =

28.4 IYY = 109906.7 IZZ = 109906.7

CENTER OF GRAVITY 20.3 IN. ( .52 M)

X-CG 0.0 IN. ( 0.00 M) Y-CG 0.0 IN. ( 0.00 M) Z-CG 0.0 IN. ( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323.7 0.0  
MISSION LIFETIME 12.0(MO)  
MEAN MISSION DURATION 10.8(MO)  
RELIABILITY .724

VI-401

ETS IV CC3-1-28

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 29.28 LBS VOLUME 1.18 (FT\*\*3) POWER REQUIREMENT 9.4 WATTS  
 RELIABILITY .9591  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1116 506 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 4 9 1 1 1 1 1 1 1  
 WEIGHT 84.50 LBS VOLUME 3.80 (FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 53.03 (LBS), EXPENDABLE WEIGHT 31.47 (LBS)  
 RELIABILITY .9079  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39 (FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9933  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 21.02 LBS VOLUME .87 (FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9595  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 102 202 303 1202  
 EQUIPMENT QUANTITIES 5 2 2 1  
 WEIGHT 62.47 LBS VOLUME 1.29 (FT\*\*3) POWER DISSIPATION 0.9 WATTS  
 HARNESS WEIGHT 20.1 (LBS), SOLAR ARRAY WEIGHT 12.4 (LBS)  
 RELIABILITY .9828

MISSION EQUIPMENT

WEIGHT 35.00 LBS VOLUME 1.39 (FT\*\*3) POWER REQUIREMENT 28.0 WATTS  
 RELIABILITY .9000

VI-402



ETS IV CC3-1-28

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	2.1 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	179.1 (BTU/HR),	TOTAL RADIATOR AREA	3.5 (FT**2)
HEAT PIPE	2112.9 (WATT-IN),	BATTERY HEATER POWER	122.2 (BTU/HR)
HEAT PIPE LENGTH	2.6 (FT)	TOTAL HEATER POWER	301.4 (BTU/HR)
STORED ENERGY	72.0 (BTU)	VARIABLE CONDUCTANCE H.P.	532.0 (WATT-IN)
		AVERAGE HEAT LOAD	233.6 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	8.6
HEAT PIPES	2.7
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	1.4
TOTAL	14.5

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.009 (IN)			
STRINGER NO., THICKNESS, HT.	225, ,	81910.347 (IN),		.241 (IN)
FRAME NO., THICKNESS, HT.	5, ,	.069 (IN),		.346 (IN)
GRID BEAM THICKNESS	.076 (IN),	SPACING 2.138 (IN),	HEIGHT	1.069 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	60.5 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	12.9 (LBS)			

V1-403

ETS IV CC3-1-28

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
803	EARTH SENSOR	1	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

707-1A

ETS IV CC3-1-28

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER		NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
102	SHUNT REGULATOR	5	5.0	.1	0.0
202	BATTERY	2	9.5	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	35.0
STABILITY AND CONTROL	13.4
AUXILIARY PROPULSION	53.0
DATA PROCESSING	21.2
COMMUNICATIONS	21.0
BATTERIES	19.0
POWER CONTROL	43.5
CONVERTERS	15.9
SOLAR ARRAY	12.4
HARNESS	20.1
STRUCTURE	49.7
THERMAL CONTROL	14.5
DRY WEIGHT	318.7
PROPELLANT	31.5
SATELLITE ADAPTER	12.9
-----	
TOTAL LAUNCH WEIGHT	363.1

V1-405

CS F/O CC3-1-30

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 18518.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 427.75 WATTS  
TOTAL SOLAR ARRAY AREA 176.44 SQ FT  
INSTALLED BATTERY CAPACITY 34.00 AMP-HR  
BEGINNING OF LIFE POWER 570.74 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 1247.9 LBS ( 566.0 KG)

LAUNCH WEIGHT = 1307.9 LBS ( 593.3 KG)

DIMENSIONS EQUIPMENT RAY 69.7 IN.( 1.77 M)

HEIGHT 116.1 IN.( 2.95 M)

WIDTH 116.1 IN.( 2.95 M)

MISSION EQUIPMENT 19.9 IN.( .50 M)

33.1 IN.( .84 M)

33.1 IN.( .84 M)

TOTAL SATELLITE 89.5 IN.( 2.27 M)

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 395.4

IYY = 1870540.6

IZZ = 1870540.6

CENTER OF GRAVITY 51.6 IN.( 1.31 M)

X-CG 0.0 IN.( 0.00 M)

Z-CG 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 42.0(MO)

MEAN MISSION DURATION 37.2(MO)

RELIABILITY .727

90406

CS F/O CC3-1-30

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 2 2 1  
 WEIGHT 43.50 LBS VOLUME 1.80 (FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9749  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 515 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 193.57 LBS VOLUME 5.47 (FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 82.25 (LBS) EXPENDABLE WEIGHT 111.31 (LBS)  
 RELIABILITY .9105  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39 (FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9766  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92 (FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9747  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 233 315 1202  
 EQUIPMENT QUANTITIES 10 2 2 1  
 WEIGHT 145.91 LBS VOLUME 2.57 (FT\*\*3) POWER DISSIPATION 34.1 WATTS  
 HARNESS WEIGHT 60.0 (LBS) SOLAR ARRAY WEIGHT 86.7 (LBS)  
 RELIABILITY .9561

MISSION EQUIPMENT

WEIGHT 250.00 LBS VOLUME 9.90 (FT\*\*3) POWER REQUIREMENT 370.0 WATTS  
 RELIABILITY .9000

VI-407

CS F/O CC3-1-30

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	12.0 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1169.5 (BTU/HR),	TOTAL RADIATOR AREA	13.2 (FT**2)
HEAT PIPE	27630.9 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	5.6 (FT)	TOTAL HEATER POWER	1284.5 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1158.3 (WATT-IN)
		AVERAGE HEAT LOAD	1403.2 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	26.7
HEAT PIPES	5.9
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	7.6
TOTAL	42.0

IERR 1100010111

STRUCTURES

SKIN THICKNESS	.014 (IN)		
STRINGER NO., THICKNESS, HT.	263.	81910.347 (IN),	.465 (IN)
FRAME NO., THICKNESS, HT.	5.	.134 (IN),	.668 (IN)
GRID BEAM THICKNESS	.125 (IN),	SPACING 3.529 (IN),	HEIGHT 1.764 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	118.0 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	60.0 (LBS)		

V1-408

CS F/O CC3-1-30

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTRGL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
515	TANK	1	27.8	.8	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-409

CS F/O CC3-1-30

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
233	BATTERY	2	34.2	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	250.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	82.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	68.3
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	86.7
HARNESS	60.0
STRUCTURE	380.4
THERMAL CONTROL	42.0
DRY WEIGHT	1136.6
PROPELLANT	111.3
SATELLITE ADAPTER	60.0

TOTAL LAUNCH WEIGHT 1307.9

VI-410



BSE F/O CC3-1-32

\*\*\* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 16916.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 898.47 WATTS  
TOTAL SOLAR ARRAY AREA 369.38 SQ FT  
INSTALLED BATTERY CAPACITY 72.00 AMP-HR  
BEGINNING OF LIFE POWER 1194.83 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WET SATELLITE WEIGHT = 1501.3 LBS ( 681.0 KG) LAUNCH WEIGHT = 1575.9 LBS ( 714.8 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 141.1 IN.( 3.58 M) 120.0 IN.( 3.05 M) 120.0 IN.( 3.05 M)  
MISSION EQUIPMENT 19.7 IN.( .50 M) 32.9 IN.( .84 M) 32.9 IN.( .84 M)  
TOTAL SATELLITE 160.8 IN.( 4.08 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 489.3 IYY = 6376419.7 IZZ = 6376419.7  
CENTER OF GRAVITY 104.8 IN.( 2.66 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 36.0(MO)  
MEAN MISSION DURATION 31.1(MO)  
RELIABILITY .705

V-411

BSE F70 CC3-1-3:

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 2 1  
 WEIGHT 36.10 LBS VOLUME 1.43(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9432  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 829 834 906 1003 499 203 1124 509 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 1 1 2 1 1  
 WEIGHT 156.25 LBS VOLUME 4.98(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 56.98(LBS), EXPENDABLE WEIGHT 99.28(LBS)  
 RELIABILITY .9462  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9799  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92(FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9791  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 112 263 389 1202  
 EQUIPMENT QUANTITIES 12 2 2 1  
 WEIGHT 164.90 LBS VOLUME 1.61(FT\*\*3) POWER DISSIPATION 71.7 WATTS  
 HARNESS WEIGHT 47.1(LBS), SOLAR ARRAY WEIGHT 181.6(LBS)  
 RELIABILITY .9146

MISSION EQUIPMENT

WEIGHT 245.00 LBS VOLUME 9.70(FT\*\*3) POWER REQUIREMENT 845.0 WATTS  
 RELIABILITY .9000

VI-412

BSE F/O CC3-1-32

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL				
RADIATOR AREA	25.9 (FT**2),	BATTERY RADIATOR AREA	.6 (FT**2)	
HEATER POWER	2560.2 (BTU/HR),	TOTAL RADIATOR AREA	26.5 (FT**2)	
HEAT PIPE	106935.8 (WATT-IN),	BATTERY HEATER POWER	42.6 (BTU/HR)	
HEAT PIPE LENGTH	10.1 (FT)	TOTAL HEATER POWER	2602.8 (BTU/HR)	
STORED ENERGY	72.0 (BTU)	VARIABLE CONDUCTANCE H.P.	2080.7 (WATT-IN)	
		AVERAGE HEAT LOAD	3020.3 (BTU/HR)	

THERMAL CONTROL WEIGHT		
	UNIT WEIGHT (LBS)	
INSULATION	46.1	
HEAT PIPES	10.6	
PHASE CHANGE MATERIAL	1.8	
RADIATOR (ACTIVE)	57.0	
	-----	
TOTAL	115.4	

IERR 1100010111

STRUCTURES

SKIN THICKNESS	.018 (IN)			
STRINGER NO., THICKNESS, HT.	237.	81910.347 (IN),	.533 (IN)	
FRAME NO., THICKNESS, HT.	9.	.153 (IN),	.766 (IN)	
GRID BEAM THICKNESS	.129 (IN),	SPACING 3.635 (IN),	HEIGHT 1.818 (IN)	
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)	
EQUIPMENT BAY STRUCTURE WT.	124.6 (LBS)			
SOLAR ARRAY BODM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	74.6 (LBS)			

VI-413

BSE F/O CC3-1-32

\* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELFCTRNC S	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	6	.6	.0	0.0
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATOR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND.	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-414

RSE F/D CC3-1-32

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
112	SHUNT REGULATOR	1	1.4	.0	0.0
263	BATTERY	2	63.3	.5	0.0
389	BATTERY CHARGER	2	5.3	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	245.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	57.0
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	126.5
POWER CONTROL	38.4
CONVERTERS	15.9
SOLAR ARRAY	181.6
HARNESS	47.1
STRUCTURE	509.2
THERMAL CONTROL	115.4
DRY WEIGHT	1402.1
PROPELLANT	99.3
SATELLITE ADAPTER	74.6

TOTAL LAUNCH WEIGHT 1575.9

VI-415

EXP COMM SAT (ECS) CG3-1-33

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = .250000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 18518.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.1

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 316.25 WATTS  
TOTAL SOLAR ARRAY AREA 130.45 SQ FT  
INSTALLED BATTERY CAPACITY 28.00 AMP-HR  
BEGINNING OF LIFE POWER 421.97 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1000.8 LBS ( 453.9 KG) LAUNCH WEIGHT = 1045.7 LBS ( 474.3 KG)

DIMENSIONS	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	59.9 IN.( 1.52 M)	99.8 IN.( 2.54 M)	99.8 IN.( 2.54 M)
MISSION EQUIPMENT	18.0 IN.( .46 M)	30.0 IN.( .76 M)	30.0 IN.( .76 M)
TOTAL SATELLITE	77.9 IN.( 1.98 M)		

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 252.6 IYY = 1164361.9 IZZ = 1164361.9

CENTER OF GRAVITY	43.0 IN.( 1.09 M)	X-CG	0.0 IN.( 0.00 M)	Y-CG	0.0 IN.( 0.00 M)	Z-CG	0.0 IN.( 0.00 M)
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RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0

MISSION LIFETIME 42.0(MO)  
MEAN MISSION DURATION 36.9(MO)  
RELIABILITY .716

717-416

EXP COMM SAT (ECS) CC3-1-33

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

✓ CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1+15  
 EQUIPMENT QUANTITIES 1 1 1 1 2 1  
 WEIGHT 36.10 LBS VOLUME 1.43 (FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9337  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 515 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 193.57 LBS VOLUME 5.47 (FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 82.25 (LBS), EXPENDABLE WEIGHT 111.31 (LBS)  
 RELIABILITY .9105  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39 (FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9766  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92 (FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9747  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 224 306 1202  
 EQUIPMENT QUANTITIES 8 2 2 1  
 WEIGHT 128.99 LBS VOLUME 2.21 (FT\*\*3) POWER DISSIPATION 25.2 WATTS  
 HARNESS WEIGHT 49.3 (LBS), SOLAR ARRAY WEIGHT 64.1 (LBS)  
 RELIABILITY .9828

MISSION EQUIPMENT

WEIGHT 185.00 LBS VOLUME 7.32 (FT\*\*3) POWER REQUIREMENT 262.0 WATTS  
 RELIABILITY .9000

71-417

EXP COMM SAT (ECS) CC3-1-33

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL				
RADIATOR AREA	8.9 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)	
HEATER POWER	852.8 (BTU/HR),	TOTAL RADIATOR AREA	10.0 (FT**2)	
HEAT PIPE	17725.4 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)	
HEAT PIPE LENGTH	4.9 (FT)	TOTAL HEATER POWER	967.8 (BTU/HR)	
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1007.4 (WATT-IN)	
		AVERAGE HEAT LOAD	1035.0 (BTU/HR)	

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		21.0
HEAT PIPES		5.1
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		5.6
	TOTAL	33.5

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.013 (IN)			
STRINGER NO., THICKNESS, HT.	253.0			
FRAME NO., THICKNESS, HT.	5.0	81910.347 (IN),		.416 (IN)
GRID BEAM THICKNESS	.116 (IN),			.597 (IN)
ENCOVER THICKNESS - FORWARD	.030 (IN),	CENTER SPACING	3.278 (IN),	HEIGHT 1.639 (IN)
EQUIPMENT BAY STRUCTURE WT.	111.3 (LBS)		0.000 (IN),	AFT .030 (IN)
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	44.9 (LBS)			

VI-418



EXP COMM SAT (ECS) CC3-1-33

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
515	TANK	1	27.8	.8	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-419

all

all

EXP COMM SAT (ECS) CC3-1-33

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	8	4.2	.1	0.0
✓224	BATTERY	2	29.1	.2	0.0
306	BATTERY CHARGER	2	12.8	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
- MISSION EQUIPMENT	185.0
- STABILITY AND CONTROL	20.2
- AUXILIARY PROPULSION	82.3
- DATA PROCESSING	21.2
- COMMUNICATIONS	24.6
- BATTERIES	58.2
- POWER CONTROL	70.8
- CONVERTERS	15.9
- SOLAR ARRAY	64.1
- HARNESS	49.3
- STRUCTURE	264.4
- THERMAL CONTROL	33.5
- DRY WEIGHT	889.5
- PROPELLANT	111.3
- SATELLITE ADAPTER	44.9

TOTAL LAUNCH WEIGHT 1045.7

V1-420

TELESAT-C CC3-1-35

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- SPIN CONTROL  
 POINTING ACCURACY = .400000(DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 26175.(LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0.(IPS)  
 CDPI TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	13.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	18.	0.
SUBFRAME RATE	.1250	0.
NUMBER OF WORDS PER SUBFRAME	64.	0.0000

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)  
 ELECTRICAL POWER  
 CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 478.64 WATTS  
 TOTAL SOLAR ARRAY AREA 199.09 SQ FT  
 INSTALLED BATTERY CAPACITY 40.00 AMP-HR  
 BEGINNING OF LIFE POWER 644.01 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 1733.7 LBS ( 786.4 KG) LAUNCH WEIGHT = 1815.1 LBS ( 823.3 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 76.0 IN.( 1.93 M) 120.0 IN.( 3.05 M) 120.0 IN.( 3.05 M)  
 MISSION EQUIPMENT 25.8 IN.( .66 M) 43.1 IN.( 1.09 M) 43.1 IN.( 1.09 M)  
 TOTAL SATELLITE 101.9 IN.( 2.59 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 581.9 IYY = 2917439.7 IZZ = 2917439.7  
 CENTER OF GRAVITY X-CG Y-CG Z-CG  
 63.0 IN.( 1.60 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 60.0(MO)  
 MEAN MISSION DURATION 50.2(MO)  
 RELIABILITY .624

V1-421

TELESAT-C CC3-1-35

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 2 1 2 2 1  
 WEIGHT 43.80 LBS VOLUME 1.82(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9638  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONO PROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 2 1 2 1 1  
 WEIGHT 229.78 LBS VOLUME 6.12(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 72.43(LBS), EXPENDABLE WEIGHT 157.34(LBS)  
 RELIABILITY .8986  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 3 1  
 WEIGHT 26.12 LBS VOLUME .94(FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9715  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 239 315 1202  
 EQUIPMENT QUANTITIES 10 2 2 1  
 WEIGHT 163.62 LBS VOLUME 2.59(FT\*\*3) POWER DISSIPATION 38.2 WATTS  
 HARNESS WEIGHT 75.9(LBS), SOLAR ARRAY WEIGHT 97.9(LBS)  
 RELIABILITY .8520

MISSION EQUIPMENT

WEIGHT 550.00 LBS VOLUME 21.75(FT\*\*3) POWER REQUIREMENT 420.0 WATTS  
 RELIABILITY .9000

VI-422

TELESAT-C CC3-1-35

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	13.5 (FT**2),	BATTERY RADIATOR AREA	1.4 (FT**2)
HEATER POWER	1316.2 (BTU/HR),	TOTAL RADIATOR AREA	14.8 (FT**2)
HEAT PIPE	35264.1 (WATT-IN),	BATTERY HEATER POWER	123.8 (BTU/HR)
HEAT PIPE LENGTH	6.4 (FT)	TOTAL HEATER POWER	1440.0 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1318.1 (WATT-IN)
		AVERAGE HEAT LOAD	1573.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	30.7
HEAT PIPES	6.7
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	8.5
TOTAL	47.7

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.017 (IN)		
STRINGER NO., THICKNESS, HT.	243. ,	81910.347 (IN),	.521 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.149 (IN),	.747 (IN)
GRID BEAM THICKNESS	.149 (IN),	SPACING 4.210 (IN),	HEIGHT 2.105 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	134.4 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	81.5 (LBS)		

VI-423

TELESAT-C CC3-1-35

\* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	0.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-424

TELESAT-C CC3-1-35

◆ ◆ ◆ ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
239	BATTERY	2	43.0	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	550.0
STABILITY AND CONTROL	27.9
AUXILIARY PROPULSION	72.4
DATA PROCESSING	21.2
COMMUNICATIONS	26.1
BATTERIES	86.0
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	97.9
HARNESS	75.9
STRUCTURE	477.7
THERMAL CONTROL	47.7
DRY WEIGHT	1576.3
PROPELLANT	157.3
SATELLITE ADAPTER	81.5

TOTAL LAUNCH WEIGHT 1015.1

V1-425

TELESAT-D CC3-1-36

\* \* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION - - SPIN CONTROL  
 POINTING ACCURACY = .400000(DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 TOTAL IMPULSE = 23324.(LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE 0.(IPS)  
 CDPI TABLE

	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	13.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	18.	0.
SUBFRAME RATE	1250	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)  
 ELECTRICAL POWER  
 CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 207.75 WATTS  
 TOTAL SOLAR ARRAY AREA 87.54 SQ FT  
 INSTALLED BATTERY CAPACITY 18.00 AMP-HR  
 BEGINNING OF LIFE POWER 283.17 WATTS  
 VEHICLE SIZING  
 CONFIGURATION - - CYLINDER  
 WET SATELLITE WEIGHT = 958.5 LBS ( 434.8 KG) LAUNCH WEIGHT = 998.2 LBS ( 452.8 KG)  
 DIMENSIONS

	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	49.1 IN.( 1.25 M)	81.8 IN.( 2.08 M)	81.8 IN.( 2.08 M)
MISSION EQUIPMENT	20.9 IN.( .53 M)	34.8 IN.( .88 M)	34.8 IN.( .88 M)
TOTAL SATELLITE	69.9 IN.( 1.78 M)		

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 172.9 IYY = 819799.3 IZZ = 819799.3  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 39.2 IN.( 1.00 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)  
 RELIABILITY  
 CONFIGURATION - - SINGLE SYSTEM  
 APD/GEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME .0(MO)  
 MEAN MISSION DURATION .4(MO)  
 RELIABILITY .627

V1-426



TELESAT-D CC3-1-36

\*\*\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 2 2 1  
 WEIGHT 43.50 LBS VOLUME 1.80 (FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9618  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 208.54 LBS VOLUME 5.72 (FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 68.33 (LBS), EXPENDABLE WEIGHT 140.20 (LBS)  
 RELIABILITY .8254  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39 (FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92 (FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9601  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 213 303 1202  
 EQUIPMENT QUANTITIES 6 2 2 1  
 WEIGHT 78.11 LBS VOLUME 1.38 (FT\*\*3) POWER DISSIPATION 19.5 WATTS  
 HARNESS WEIGHT 42.1 (LBS), SOLAR ARRAY WEIGHT 43.0 (LBS)  
 RELIABILITY .9451

MISSION EQUIPMENT

WEIGHT 290.00 LBS VOLUME 11.48 (FT\*\*3) POWER REQUIREMENT 150.0 WATTS  
 RELIABILITY .9000

V1-427

TELESAT-D CC3-1-36

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	5.6 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	524.4 (BTU/HR),	TOTAL RADIATOR AREA	6.8 (FT**2)
HEAT PIPE	10045.8 (WATT-IN),	BATTERY HEATER POWER	113.9 (BTU/HR)
HEAT PIPE LENGTH	4.4 (FT)	TOTAL HEATER POWER	638.3 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	904.9 (WATT-IN)
		AVERAGE HEAT LOAD	653.0 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		16.5
HEAT PIPES		4.6
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		3.5
	TOTAL	26.4

IERR 1100010111

STRUCTURES				
SKIN THICKNESS	.014 (IN)			
STRINGER NO., THICKNESS, HT.	226. ,	81910.347 (IN),		.381 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.109 (IN),		.547 (IN)
GRID BEAM THICKNESS	.119 (IN),	SPACING 3.358 (IN),		HEIGHT 1.679 (IN)
ENCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	103.5 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	39.7 (LBS)			

V1-428

TELESAT-D CC3-1-36

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

VI-429

TELESAT-D CC3-1-36

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	6	4.2	.1	0.0
213	BATTERY	2	17.2	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	290.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	34.4
POWER CONTROL	43.7
CONVERTERS	15.9
SOLAR ARRAY	43.0
HARNESS	42.1
STRUCTURE	181.1
THERMAL CONTROL	26.4
DRY WEIGHT	818.3
PROPELLANT	140.2
SATELLITE ADAPTER	39.7

TOTAL LAUNCH WEIGHT 998.2

N1-430

TELESAT F/O CC3-1-37

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- SPIN CONTROL  
 POINTING ACCURACY = .400000(DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 26175.(LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR I  
 COMPUTER OPERATIONS RATE = 0.(IPS)

ENGINEERING DATA	MISSION EQUIPMENT DATA
32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
.1250	0.0000
64.	0.

CDPI TABLE  
 NUMBER OF COMMANDS  
 NUMBER OF MAIN FRAME WORDS  
 MAIN FRAME SAMPLE RATE  
 MAIN FRAME WORD LENGTH  
 NUMBER OF SUBFRAMES  
 SUBFRAME RATE  
 NUMBER OF WORDS PER SUBFRAME  
 COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 506.64 WATTS  
 TOTAL SOLAR ARRAY AREA 210.74 SQ FT  
 INSTALLED BATTERY CAPACITY 40.00 AMP-HR  
 BEGINNING OF LIFE POWER 681.68 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 1761.6 LBS ( 799.0 KG) LAUNCH WEIGHT = 1844.4 LBS ( 836.6 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 80.5 IN.( 2.04 M) 120.0 IN.( 3.05 M) 120.0 IN.( 3.05 M)  
 MISSION EQUIPMENT 26.0 IN.( .66 M) 43.3 IN.( 1.10 M) 43.3 IN.( 1.10 M)  
 TOTAL SATELLITE 106.5 IN.( 2.70 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 591.2 IYY = 3145297.1 IZZ = 3145297.1  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 66.6 IN.( 1.69 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 60.0(MO)  
 MEAN MISSION DURATION 50.0(MO)  
 RELIABILITY .622

VI-431

TELESAT F/D CC3-1-37

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413  
 EQUIPMENT QUANTITIES 1 2 1 2 3 1  
 WEIGHT 39.54 LBS VOLUME 1.62 (FT\*\*3) POWER REQUIREMENT 9.4 WAT1  
 RELIABILITY .9690  
 IERR 0

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 2 1 2 1 1  
 WEIGHT 229.78 LBS VOLUME 6.12 (FT\*\*3) POWER REQUIREMENT 1.0 WAT1  
 DRY WEIGHT 72.43 (LBS), EXPENDABLE WEIGHT 157.34 (LBS)  
 RELIABILITY .8986  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39 (FT\*\*3) POWER REQUIREMENT 10.5 WAT1  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 3 1  
 WEIGHT 26.12 LBS VOLUME .94 (FT\*\*3) POWER REQUIREMENT 19.5 WAT1  
 RELIABILITY .9715  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 239 315 1202  
 EQUIPMENT QUANTITIES 11 2 2 1  
 WEIGHT 167.82 LBS VOLUME 2.72 (FT\*\*3) POWER DISSIPATION 40.4 WAT1  
 HARNESS WEIGHT 77.1 (LBS), SOLAR ARRAY WEIGHT 103.6 (LBS)  
 RELIABILITY .8446

MISSION EQUIPMENT  
 WEIGHT 560.00 LBS VOLUME 22.15 (FT\*\*3) POWER REQUIREMENT 450.0 WAT1  
 RELIABILITY .9000

V1-432

TELESAT F/D CC3-1-37

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	14.3 (FT**2),	BATTERY RADIATOR AREA	1.4 (FT**2)
HEATER POWER	1401.2 (BTU/HR),	TOTAL RADIATOR AREA	15.7 (FT**2)
HEAT PIPE	39173.8 (WATT-IN),	BATTERY HEATER POWER	123.8 (BTU/HR)
HEAT PIPE LENGTH	6.7 (FT)	TOTAL HEATER POWER	1525.0 (BTU/HR)
STORED ENERGY	72.0 (BTU)	VARIABLE CONDUCTANCE H.P.	1377.6 (WATT-IN)
		AVERAGE HEAT LOAD	1672.6 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		31.9
HEAT PIPES		7.0
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		9.1
	TOTAL	49.7

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.018 (IN)		
STRINGER NO., THICKNESS, HT.	240, ,	81910.347 (IN),	.526 (IN)
FRAME NO., THICKNESS, HT.	6, ,	.151 (IN),	.756 (IN)
GRID BEAM THICKNESS	.150 (IN),	SPACING 4.238 (IN),	HEIGHT 2.119 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	135.6 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	82.8 (LBS)		

VI-433

TELESAT F/O CC3-1-37

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	0.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
803	EARTH SENSOR	3	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOO+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

V1-434



TELESAT F/O CC3-1-37

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	11	4.2	.1	0.0
239	BATTERY	2	43.0	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	560.0
STABILITY AND CONTROL	23.6
AUXILIARY PROPULSION	72.4
DATA PROCESSING	21.2
COMMUNICATIONS	26.1
BATTERIES	86.0
POWER CONTROL	81.8
CONVERTERS	15.9
SOLAR ARRAY	103.6
HARNESS	77.1
STRUCTURE	486.7
THERMAL CONTROL	49.7
DRY WEIGHT	1604.2
PROPELLANT	157.3
SATELLITE ADAPTER	82.8

TOTAL LAUNCH WEIGHT 1844.4

VI-435

CANADIAN DIRECT BROADCAST CC3-1-39

\* \* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .200000(DEG.)  
 AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 TOTAL IMPULSE = 47991.(LB-SEC)  
 DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0.(IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPT TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	125.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	4.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - - PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 970.92 WATTS  
 TOTAL SOLAR ARRAY AREA 111.06 SQ FT  
 INSTALLED BATTERY CAPACITY 132.00 AMP-HR  
 BEGINNING OF LIFE POWER 1414.15 WATTS

VEHICLE SIZING  
 CONFIGURATION - - CYLINDER  
 WET SATELLITE WEIGHT = 1752.4 LBS ( 794.9 KG) LAUNCH WEIGHT = 1816.2 LBS ( 823.8 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 40.5 IN.( 1.03 M) 67.5 IN.( 1.71 M) 67.5 IN.( 1.71 M)  
 MISSION EQUIPMENT 25.7 IN.( .65 M) 42.8 IN.( 1.09 M) 42.8 IN.( 1.09 M)  
 TOTAL SATELLITE 66.2 IN.( 1.68 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 376.0 IYY = 1068487.8 IZZ = 1877025.9  
 CENTER OF GRAVITY X-CG Y-CG Z-CG  
 33.5 IN.( .85 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY  
 CONFIGURATION - - SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 60.0(MO)  
 MEAN MISSION DURATION 49.8(MO)  
 RELIABILITY .605

VI-436

CANADIAN DIRECT BRDCST CC3-1-39

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1303				
EQUIPMENT QUANTITIES	2	2	2	2				
WEIGHT	58.40	LBS			VOLUME	1.77(FT**3)	POWER REQUIREMENT	78.9 WATTS
RELIABILITY			.9856					
IERR	10							

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	813	834	907	1003	499	203	1130	509	701	1203	603
EQUIPMENT QUANTITIES	18	6	5	9	2	1	2	1	2	1	1
WEIGHT	368.89	LBS			VOLUME	10.45(FT**3)	POWER REQUIREMENT	.3 WATTS			
DRY WEIGHT	98.03	(LBS)			EXPENDABLE WEIGHT	270.85(LBS)					
RELIABILITY			.8862								
IERR	1										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403						
EQUIPMENT QUANTITIES	1	1						
WEIGHT	21.18	LBS			VOLUME	.39(FT**3)	POWER REQUIREMENT	10.5 WATTS
RELIABILITY			.9668					
IERR	1							

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	202	106	327	401	503	605		
EQUIPMENT QUANTITIES	1	2	2	2	3	2		
WEIGHT	35.64	LBS			VOLUME	1.05(FT**3)	POWER REQUIREMENT	25.5 WATTS
RELIABILITY			.9897					
IERR*****								

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	406	530	260	650	702			
EQUIPMENT QUANTITIES	4	11	4	4	1			
WEIGHT	301.09	LBS			VOLUME	3.46(FT**3)	POWER DISSIPATION	163.9 WATTS
HARNESS WEIGHT			75.0	(LBS),	SOLAR ARRAY WEIGHT	77.3(LBS)		
RELIABILITY			.8044					

MISSION EQUIPMENT

WEIGHT	540.00	LBS			VOLUME	21.36(FT**3)	POWER REQUIREMENT	750.0 WATTS
RELIABILITY			.9000					

VI-437

CANADIAN DIRECT BRDCST CC3-1-39

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	29.5 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	2818.9(BTU/HR),	TOTAL RADIATOR AREA	30.4 (FT**2)
HEAT PIPE	0.0(WATT-IN),	BATTERY HEATER POWER	90.0(BTU/HR)
HEAT PIPE LENGTH	4.1 (FT)	TOTAL HEATER POWER	2908.9(BTU/HR)
STORED ENERGY	103.0 (BTU)	VARIABLE CONDUCTANCE H.P.	669.8(WATT-IN)
		AVERAGE HEAT LOAD	2950.1 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	13.7
HEAT PIPES	4.3
PHASE CHANGE MATERIAL	2.6
RADIATOR (ACTIVE)	62.2
	-----
TOTAL	82.9

IERR 1100001011

V1-438

STRUCTURES			
SKIN THICKNESS	.019 (IN)		
STRINGER NO., THICKNESS, HT.	174. ,	81910.347 (IN),	.409 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.117 (IN),	.587 (IN)
GRID BEAM THICKNESS	.166 (IN),	SPACING 4.687 (IN),	HEIGHT 2.344 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	158.9 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	28.0 (LBS)		
ADAPTER WEIGHT	63.8 (LBS)		

CANADIAN DIRECT BROADCAST CC3-1-39

\*\*\* ASSEMBLY DESCRIPTIONS DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
934	THRUSTER	6	.7	.0	.1
907	ISOLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
702	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

V1-439

CANADIAN DIRECT BRDCST CC3-1-39

\*\*\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	4	9.8	.2	0.0
530	SHUNT REGULATOR	11	2.2	.0	0.0
260	BATTERY	4	47.5	.2	0.0
650	BATTERY CHARGER	4	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	540.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	98.0
DATA PROCESSING	21.2
COMMUNICATIONS	35.6
BATTERIES	190.1
POWER CONTROL	111.0
SOLAR ARRAY	77.3
HARNESS	75.0
STRUCTURE	179.1
SOLAR ARRAY DRIVE	12.8
THERMAL CONTROL	82.9
DRY WEIGHT	1481.5
PROPELLANT	270.9
SATELLITE ADAPTER	63.8
TOTAL LAUNCH WEIGHT	1816.2

VI-446

DISASTER WARNING CS1-1-1

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .200000( DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 48132. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	125.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	4.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 256.000(KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 2881.92 WATTS  
 TOTAL SOLAR ARRAY AREA 329.67 SQ FT  
 INSTALLED BATTERY CAPACITY 400.00 AMP-HR  
 BEGINNING OF LIFE POWER 4197.53 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 2691.5 LBS ( 1220.8 KG) LAUNCH WEIGHT = 2783.8 LBS ( 1262.7 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 45.3 IN.( 1.15 M) 75.4 IN.( 1.92 M) 75.4 IN.( 1.92 M)  
 MISSION EQUIPMENT 25.0 IN.( .64 M) 41.7 IN.( 1.06 M) 41.7 IN.( 1.06 M)  
 TOTAL SATELLITE 70.3 IN.( 1.79 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 2321.7 IYY = 1862565.2 IZZ = 10916960.9  
 CENTER OF GRAVITY X-CG 33.5 IN.( .85 M) Y-CG 0.0 IN.( 0.00 M) Z-CG 0.0 IN.( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 60.0(MO)  
 MEAN MISSION DURATION 49.5(MO)  
 RELIABILITY .605

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DISASTER WARNING CS1-1-1

\* \* \* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 3 2 2 2  
 WEIGHT 60.00 LBS VOLUME 1.93(FT\*\*3)  
 RELIABILITY .9903  
 IERR .10

POWER REQUIREMENT 78.9 WATTS

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER 818 834 907 1003 499 203 1130  
 EQUIPMENT QUANTITIES 18 6 5 9 2 1 2  
 WEIGHT 369.69 LBS VOLUME 10.45(FT\*\*3)  
 DRY WEIGHT 98.03(LBS), EXPENDABLE WEIGHT  
 RELIABILITY .9157  
 IERR 1

509 701 1203 603  
 1 2 1 1  
 POWER REQUIREMENT .3 WATTS  
 271.65(LBS)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3)  
 RELIABILITY .9668  
 IERR 1

POWER REQUIREMENT 10.5 WATTS

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER 202 106 327 401 503 605  
 EQUIPMENT QUANTITIES 1 3 2 2 3 2  
 WEIGHT 37.64 LBS VOLUME 1.08(FT\*\*3)  
 RELIABILITY .9949  
 IERR\*\*\*\*\*

POWER REQUIREMENT 25.5 WATTS

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER 412 532 269 650 702  
 EQUIPMENT QUANTITIES 8 11 8 8 2  
 WEIGHT 868.98 LBS VOLUME 10.11(FT\*\*3)  
 HARNESS WEIGHT 125.8(LBS), SOLAR ARRAY WEIGHT  
 RELIABILITY .7710

POWER DISSIPATION 486.6 WATTS  
 229.6(LBS)

MISSION EQUIPMENT

WEIGHT 500.00 LBS VOLUME 19.78(FT\*\*3)  
 RELIABILITY .9000

POWER REQUIREMENT 2660.0 WATTS

V1-442



DISASTER WARNING CS1-1-1

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	94.7 (FT**2),	BATTERY RADIATOR AREA	0.9 (FT**2)
HEATER POWER	9189.1 (BTU/HR),	TOTAL RADIATOR AREA	95.6 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.4 (FT)	TOTAL HEATER POWER	9279.1 (BTU/HR)
STORED ENERGY	103.0 (BTU)	VARIABLE CONDUCTANCE H.P.	711.7 (WATT-IN)
		AVERAGE HEAT LOAD	9463.2 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	15.6
HEAT PIPES	4.6
PHASE CHANGE MATERIAL	2.6
RADIATOR (ACTIVE)	155.4
	<hr/>
TOTAL	178.2

IERR 1100001011

STRUCTURES

SKIN THICKNESS	.023 (IN)			
STRINGER NO., THICKNESS, HT.	166. ,	81910.347 (IN),		.480 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.138 (IN),		.690 (IN)
GRID BEAM THICKNESS	.206 (IN),	SPACING 5.790 (IN),	HEIGHT	2.895 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	273.7 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	53.3 (LBS)			
ADAPTER WEIGHT	92.4 (LBS)			

V1-443

DISASTER WARNING CS1-1-1

\* \* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	3	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
907	ISCLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
106	BASEBND ASSY UNIT	3	2.0	.0	0.0
327	TRANSMITTER	2	4.7	.0	18.0
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
605	DIPLEXER	2	.7	.0	.3

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DISASTER WARNING CS1-1-1

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
412	DISCHGE REGULATOR	8	16.4	.4	0.0
532	SHUNT REGULATOR	11	6.5	.1	0.0
269	BATTERY	8	71.3	.4	0.0
650	BATTERY CHARGER	8	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	500.0
STABILITY AND CONTROL	60.0
AUXILIARY PROPULSION	98.0
DATA PROCESSING	21.2
COMMUNICATIONS	37.6
BATTERIES	570.2
POWER CONTROL	298.7
SOLAR ARRAY	229.6
HARNES	125.8
STRUCTURE	262.3
SOLAR ARRAY DRIVE	38.1
THERMAL CONTROL	178.2
DRY WEIGHT	2419.8
PROPELLANT	271.7
SATELLITE ADAPTER	92.4

TOTAL LAUNCH WEIGHT 2783.8

VI-445-

INMARSAT CS2-1-1

\* \* \* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
POINTING ACCURACY = .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 23324. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 387.75 WATTS  
TOTAL SOLAR ARRAY AREA 161.29 SQ FT  
INSTALLED BATTERY CAPACITY 34.00 AMP-HR  
BEGINNING OF LIFE POWER 521.72 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WEI SATELLITE WEIGHT = 1154.9 LBS ( 523.9 KG) LAUNCH WEIGHT = 1209.1 LBS ( 548.4 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 66.6 IN.( 1.69 M) 111.0 IN.( 2.82 M) 111.0 IN.( 2.82 M)  
MISSION EQUIPMENT 18.6 IN.( .47 M) 31.0 IN.( .79 M) 31.0 IN.( .79 M)  
TOTAL SATELLITE 85.2 IN.( 2.16 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 347.1 IYY = 1615038.4 IZZ = 1615038.4  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 47.8 IN.( 1.21 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MO)  
MEAN MISSION DURATION 51.0(MO)  
RELIABILITY .616

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INMARSAT CS2-1-1

\* \* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 2 2 1  
 WEIGHT 43.50 LBS VOLUME 1.80(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9618  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 2 1 2 1 1  
 WEIGHT 208.54 LBS VOLUME 5.72(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 68.33(LBS), EXPENDABLE WEIGHT 140.20(LBS)  
 RELIABILITY .8260  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92(FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9601  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 233 315 1202  
 EQUIPMENT QUANTITIES 9 2 2 1  
 WEIGHT 141.71 LBS VOLUME 2.44(FT\*\*3) POWER DISSIPATION 30.9 WATTS  
 HARNESS WEIGHT 51.8(LBS), SOLAR ARRAY WEIGHT 79.3(LBS)  
 RELIABILITY .9275

MISSION EQUIPMENT

WEIGHT 205.00 LBS VOLUME 8.12(FT\*\*3) POWER REQUIREMENT 330.0 WATTS  
 RELIABILITY .9000

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IMARSAT CS2-1-1

\* \* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL

RADIATOR AREA	10.8 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1052.2 (BTU/HR),	TOTAL RADIATOR AREA	12.0 (FT**2)
HEAT PIPE	23738.9 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	5.3 (FT)	TOTAL HEATER POWER	1167.2 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1102.2 (WATT-IN)
		AVERAGE HEAT LOAD	1266.8 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	24.6
HEAT PIPES	5.6
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	6.9
TOTAL	38.9

IERR 1100010111

STRUCTURES

SKIN THICKNESS	.014 (IN)		
STRINGER NO., THICKNESS, HT.	260. ,	81910.347 (IN),	.449 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.129 (IN),	.645 (IN)
GRID BEAM THICKNESS	.122 (IN),	SPACING 3.440 (IN),	HEIGHT 1.720 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	120.9 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	54.2 (LBS)		

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9-6

INMARSAT CS2-1-1

\* \* \* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	ROTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIFLEXER	1	3.1	.0	1.0

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IHMARSAT CS2-1-1

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER			UNIT	UNIT	UNIT
IDENT	TYPE	NO.	WEIGHT	VOLUME	POWER
103	SHUNT REGULATOR	9	4.2	.1	0.0
233	BATTERY	2	34.2	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	205.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	68.3
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	68.3
POWER CONTROL	73.4
CONVERTERS	15.9
SOLAR ARRAY	79.3
HARNESS	51.8
STRUCTURE	340.4
THERMAL CONTROL	38.9
DRY WEIGHT	1014.7
PROPELLANT	140.2
SATELLITE ADAPTER	54.2

TOTAL LAUNCH WEIGHT 1209.1

VI-450



INMARSAT F/O CS2-1-2

\* \* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY \* .400000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE \* 24125.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE \* 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE \* 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE \* 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 458.63 WATTS  
TOTAL SOLAR ARRAY AREA 190.77 SQ FT  
INSTALLED BATTERY CAPACITY 40.00 AMP-HR  
BEGINNING OF LIFE POWER 617.09 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT \* 1337.1 LBS ( 606.5 KG) LAUNCH WEIGHT \* 1401.8 LBS ( 635.8 KG)

DIMENSIONS

	LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	72.9 IN.( 1.85 M)	120.0 IN.( 3.05 M)	120.0 IN.( 3.05 M)
MISSION EQUIPMENT	19.9 IN.( .50 M)	33.1 IN.( .84 M)	33.1 IN.( .84 M)
TOTAL SATELLITE	92.7 IN.( 2.36 M)		

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 453.9 IYY = 2161411.9 IZZ = 2161411.9  
X-CG Y-CG Z-CG  
0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

CENTER OF GRAVITY 53.1 IN.( 1.35 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 60.0(MO)  
MEAN MISSION DURATION 50.1(MO)  
RELIABILITY .622

V1-451

INMARSAT F/U CS2-1-2

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 2 2 1  
 WEIGHT 43.50 LBS VOLUME 1.80(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9618  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1118 518 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 2 1 2 1 1  
 WEIGHT 217.45 LBS VOLUME 6.12(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 72.43(LBS), EXPENDABLE WEIGHT 145.02(LBS)  
 RELIABILITY .8986  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9668  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 3 1  
 WEIGHT 26.12 LBS VOLUME .94(FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9715  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 103 239 315 1202  
 EQUIPMENT QUANTITIES 10 2 2 1  
 WEIGHT 163.62 LBS VOLUME 2.59(FT\*\*3) POWER DISSIPATION 36.6 WATTS  
 HARNESS WEIGHT 58.9(LBS), SOLAR ARRAY WEIGHT 93.8(LBS)  
 RELIABILITY .8520

MISSION EQUIPMENT

WEIGHT 250.00 LBS VOLUME 9.90(FT\*\*3) POWER REQUIREMENT 400.0 WATTS  
 RELIABILITY .9000

V1-452

INMARSAT F/D CS2-1-2

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	12.9 (FT**2),	BATTERY RADIATOR AREA	1.4 (FT**2)
HEATER POWER	1257.5 (BTU/HR),	TOTAL RADIATOR AREA	14.3 (FT**2)
HEAT PIPE	30708.0 (WATT-IN),	BATTERY HEATER POWER	123.8 (BTU/HR)
HEAT PIPE LENGTH	5.8 (FT)	TOTAL HEATER POWER	1381.3 (BTU/HR)
STORED ENERGY	72.1 (BTU)	VARIABLE CONDUCTANCE H.P.	1199.8 (WATT-IN)
		AVERAGE HEAT LOAD	1505.5 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	28.3
HEAT PIPES	6.1
PHASE CHANGE MATERIAL	1.8
RADIATOR (PASSIVE)	8.2
TOTAL	44.3

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.015 (IN)		
STRINGER NO., THICKNESS, HT.	263. ,	81910.347 (IN),	.481 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.138 (IN),	.691 (IN)
GRID BEAM THICKNESS	.129 (IN),	SPACING 3.641 (IN),	HEIGHT 1.821 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	130.0 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	64.7 (LBS)		

V1-453

IMARSAT F/D CS2-1-2

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
518	TANK	1	16.2	1.0	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMM D DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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INMARSAT F/D CS2-1-2

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
103	SHUNT REGULATOR	10	4.2	.1	0.0
239	BATTERY	2	43.0	.2	0.0
315	BATTERY CHARGER	2	12.0	.3	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	250.0
STABILITY AND CONTROL	27.6
AUXILIARY PROPULSION	72.4
DATA PROCESSING	21.2
COMMUNICATIONS	26.1
BATTERIES	86.0
POWER CONTROL	77.6
CONVERTERS	15.9
SOLAR ARRAY	93.8
HARNES	58.9
STRUCTURE	418.3
THERMAL CONTROL	44.3
DRY WEIGHT	1192.1
PROPELLANT	145.0
SATELLITE ADAPTER	64.7

TOTAL LAUNCH WEIGHT 1401.8

V1-455

INATSAT CS2-1-3

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .300000 (DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 38388. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

	ENGINEERING DATA	MISSION EQUIPMENT DATA
CDPT TABLE		
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	3.	2.
SUBFRAME RATE	1.0000	1.0000
NUMBER OF WORDS PER SUBFRAME	32.	64.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION -- PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 520.28 WATTS  
 TOTAL SOLAR ARRAY AREA 59.52 SQ FT  
 INSTALLED BATTERY CAPACITY 66.00 AMP-HR  
 BEGINNING OF LIFE POWER 757.79 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 1323.2 LBS ( 600.2 KG) LAUNCH WEIGHT = 1373.8 LBS ( 623.2 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 39.3 IN. ( 1.00 M) 65.4 IN. ( 1.66 M) 65.4 IN. ( 1.66 M)  
 MISSION EQUIPMENT 24.2 IN. ( .61 M) 40.3 IN. ( 1.02 M) 40.3 IN. ( 1.02 M)  
 TOTAL SATELLITE 63.4 IN. ( 1.61 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 204.1 IYY = 763741.9 IZZ = 1029482.0  
 X-CG Y-CG Z-CG  
 CENTER OF GRAVITY 33.0 IN. ( .84 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
 MISSION LIFETIME 60.0 (MO)  
 MEAN MISSION DURATION 49.4 (MO)  
 RELIABILITY .1604

V1-456



INATSAT CS2-1-3

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	14.6 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER,	1360.4 (BTU/HR),	TOTAL RADIATOR AREA	15.5 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.0 (FT)	TOTAL HEATER POWER	1450.4 (BTU/HR)
STORED ENERGY	114.6 (BTU)	VARIABLE CONDUCTANCE H.P.	642.1 (WATT-IN)
		AVERAGE HEAT LOAD	1459.5 (BTU/HR)

THERMAL CONTROL WEIGHT

	UNIT WEIGHT (LBS)
INSULATION	13.1
HEAT PIPES	4.2
PHASE CHANGE MATERIAL	2.9
RADIATOR (PASSIVE)	9.3
	-----
TOTAL	29.3

IERR 11C0001011

STRUCTURES

SKIN THICKNESS	.016 (IN)		
SPRINGER NO., THICKNESS, HT.	183. ,	81910.347 (IN),	.377 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.108 (IN),	.541 (IN)
GRID BEAM THICKNESS	.146 (IN),	SPACING 4.102 (IN),	HEIGHT 2.051 (IN)
ENCLOSURE THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	118.6 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	22.1 (LBS)		
ADAPTER WEIGHT	50.6 (LBS)		

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INATSAT CS2-1-3

\*\*\* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1E15	EARTH SENSOR	1	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
E18	THRUSTER	18	.4	.0	0.0
E34	THRUSTER	6	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1130	TANK	2	17.3	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
202	ANTENNA	1	8.4	.7	0.0
312	TRANSMITTER	2	2.2	.0	15.8

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INATSAT CS2-1-3

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	7	2.3	.0	0.0
260	BATTERY	2	47.5	.2	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	450.0
STABILITY AND CONTROL	43.0
AUXILIARY PROPULSION	95.0
DATA PROCESSING	30.1
COMMUNICATIONS	38.9
BATTERIES	95.0
POWER CONTROL	64.3
SOLAR ARRAY	41.4
HARNESSES	58.5
STRUCTURE	152.5
SOLAR ARRAY DRIVE	6.9
THERMAL CONTROL	29.3
DRY WEIGHT	1105.1
PROPELLANT	218.1
SATELLITE ADAPTER	50.6

TOTAL LAUNCH WEIGHT 1373.8

VI-460

MULTIPURPOSE P/L CP1-1-1

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
POINTING ACCURACY = .300000 (DFG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 29089. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0. (IPS)

COPI TABLE

ENGINEERING DATA

MISSION EQUIPMENT DATA

NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	64.	128.
MAIN FRAME SAMPLE RATE	16.	100.
MAIN FRAME WORD LENGTH	8.	8.
NUMBER OF SUBFRAMES	4.	2.
SUBFRAME RATE	1250.	1.0000
NUMBER OF WORDS PER SUBFRAME	64.	64.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
PRIMARY DOWNLINK DATA RATE = 8.000 (KBPS)  
SEPARATE DOWNLINK DATA RATE = 128.000 (KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 1567.18 WATTS  
TOTAL SOLAR ARRAY AREA 337.68 SQ FT  
INSTALLED BATTERY CAPACITY 100.00 AMP-HR  
BEGINNING OF LIFE POWER 4159.33 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER

WET SATELLITE WEIGHT = 2465.6 LBS ( 1118.4 KG) LAUNCH WEIGHT = 2554.0 LBS ( 1158.5 KG)

DIMENSIONS		LENGTH	HEIGHT	WIDTH
EQUIPMENT BAY	39.6 IN. ( 1.01 M)	66.1 IN. ( 1.68 M)	66.1 IN. ( 1.68 M)	
MISSION EQUIPMENT	31.5 IN. ( .80 M)	52.5 IN. ( 1.33 M)	52.5 IN. ( 1.33 M)	
TOTAL SATELLITE	71.2 IN. ( 1.81 M)			

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 2221.4 IYY = 1531803.3 IZZ = 10719380.9

CENTER OF GRAVITY		X-CG	Y-CG	Z-CG
	38.6 IN. ( .98 M)	0.0 IN. ( 0.00 M)	0.0 IN. ( 0.00 M)	

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM

APCGEE/PERIGEE/INCLINATION 450./ 450./ 28.5  
MISSION LIFETIME 36.0 (MO)  
MEAN MISSION DURATION 32.2 (MO)  
RELIABILITY .756

VI-461

MULTIPURPOSE P/L CP1-1-1

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL  
 CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 EQUIPMENT CODE IDENTIFIER 1601 2203 1815 1303  
 EQUIPMENT QUANTITIES 2 2 2 2  
 WEIGHT 58.40 LBS VOLUME 1.77(FT\*\*3) POWER REQUIREMENT 78.9 WATTS  
 RELIABILITY .9946  
 IERR 10

AUXILIARY PROPULSION  
 CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 818 834 906 1003 499 203 1127 509 701 1203 603  
 EQUIPMENT QUANTITIES 18 6 5 9 2 1 1 1 2 1 1  
 WEIGHT 238.79 LBS VOLUME 6.92(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 73.51(LBS), EXPENDABLE WEIGHT 165.28(LBS)  
 RELIABILITY .9561  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 203 345 403  
 EQUIPMENT QUANTITIES 1 1 3 1  
 WEIGHT 80.51 LBS VOLUME 1.67(FT\*\*3) POWER REQUIREMENT 63.5 WATTS  
 RELIABILITY .9637  
 IERR 2

COMMUNICATIONS  
 CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK  
 EQUIPMENT CODE IDENTIFIER 227 103 306 401 503 603 227 312  
 EQUIPMENT QUANTITIES 2 1 2 2 3 1 2 2  
 WEIGHT 25.04 LBS VOLUME .35(FT\*\*3) POWER REQUIREMENT 35.4 WATTS  
 RELIABILITY .9916  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 430 532 269 650 702  
 EQUIPMENT QUANTITIES 2 11 2 2 2  
 WEIGHT 332.24 LBS VOLUME 5.38(FT\*\*3) POWER DISSIPATION 1993.5 WATTS  
 HARNESS WEIGHT 122.0(LBS), SOLAR ARRAY WEIGHT 235.1(LBS)  
 RELIABILITY .9241

MISSION EQUIPMENT  
 WEIGHT 1000.00 LBS VOLUME 39.53(FT\*\*3) POWER REQUIREMENT 1250.0 WATTS  
 RELIABILITY .9000

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MULTIPURPOSE P/L CP1-1-1

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	64.2 (FT**2),	BATTERY RADIATOR AREA	.9 (FT**2)
HEATER POWER	6209.3 (BTU/HR),	TOTAL RADIATOR AREA	65.1 (FT**2)
HEAT PIPE	76221.2 (WATT-IN),	BATTERY HEATER POWER	90.0 (BTU/HR)
HEAT PIPE LENGTH	4.4 (FT)	TOTAL HEATER POWER	6299.3 (BTU/HR)
STORED ENERGY	125.0 (BTU)	VARIABLE CONDUCTANCE H.P.	720.6 (WATT-IN)
		AVERAGE HEAT LOAD	4869.5 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	14.3
HEAT PIPES	4.7
PHASE CHANGE MATERIAL	3.1
RADIATOR (ACTIVE)	111.8
TOTAL	133.9

IERR 1111011011

STRUCTURES			
SKIN THICKNESS	.022 (IN)		
STRINGER NO., THICKNESS, HT.	159. ,	3945.825 (IN),	.439 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.126 (IN),	.630 (IN)
GRID BEAM THICKNESS	.196 (IN),	SPACING 5.510 (IN),	HEIGHT 2.755 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	149.7 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	54.2 (LBS)		
ADAPTER WEIGHT	88.4 (LBS)		

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MULTIPURPOSE P/L CP1-1-1

\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	2	15.4	.5	15.6
1303	REACTION WHEEL	2	5.1	.1	.3

AUXILIARY PROPULSION

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
818	THRUSTER	18	.4	.0	0.0
834	THRUSTER	6	.7	.0	.1
506	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1127	TANK	1	16.7	3.2	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	3.9	.2	3.0
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
345	TAPE RECORDER	3	16.8	.4	25.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

ICENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
103	PASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	2	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0
227	ANTENNA	2	.8	.0	0.0
312	TRANSMITTER	2	2.2	.0	15.8

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MULTIPURPOSE P/L CP1-1-1

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
430	DISCHGE REGULATOR	2	40.0	1.0	0.0
532	SHUNT REGULATOR	11	6.5	.1	0.0
269	BATTERY	2	71.3	.4	0.0
650	BATTERY CHARGER	2	9.7	.2	9.0
702	POWER CONTROL	2	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	1000.0
STABILITY AND CONTROL	58.4
AUXILIARY PROPULSION	73.5
DATA PROCESSING	80.5
COMMUNICATIONS	29.0
BATTERIES	142.6
POWER CONTROL	169.7
SOLAR ARRAY	235.1
HARNESSES	122.0
STRUCTURE	196.6
SOLAR ARRAY DRIVE	39.0
THERMAL CONTROL	133.9
DRY WEIGHT	2300.3
PROPELLANT	165.3
SATELLITE ADAPTER	88.4

TOTAL LAUNCH WEIGHT 2554.0

V1-465

IR ASTRO SAT (IRAS) CP2-1-5

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- DUAL SPIN  
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 16916.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

64.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 371.65 WATTS  
TOTAL SOLAR ARRAY AREA 195.19 SQ FT  
INSTALLED BATTERY CAPACITY 18.00 AMP-HR  
BEGINNING OF LIFE POWER 851.31 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1656.1 LBS ( 751.2 KG) LAUNCH WEIGHT = 1734.4 LBS ( 786.7 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 74.6 IN.( 1.89 M) 120.0 IN.( 3.05 M) 120.0 IN.( 3.05 M)  
MISSION EQUIPMENT 24.9 IN.( .63 M) 41.4 IN.( 1.05 M) 41.4 IN.( 1.05 M)  
TOTAL SATELLITE 99.4 IN.( 2.53 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 541.7 IYY = 2670730.6 IZZ = 2670730.6  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 60.6 IN.( 1.54 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APGEEE/PERIGEE/INCLINATION 486./ 486./ 90.0  
MISSION LIFETIME 36.0(MO)  
MEAN MISSION DURATION 31.2(MO)  
RELIABILITY .709

VI-466





IR ASTRO SAT (IRAS) CP2-1-5

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	17.8 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1648.5 (BTU/HR),	TOTAL RADIATOR AREA	19.1 (FT**2)
HEAT PIPE	22056.4 (WATT-IN),	BATTERY HEATER POWER	113.9 (BTU/HR)
HEAT PIPE LENGTH	6.2 (FT)	TOTAL HEATER POWER	1762.4 (BTU/HR)
STORED ENERGY	106.5 (BTU)	VARIABLE CONDUCTANCE H.P.	1286.2 (WATT-IN)
		AVERAGE HEAT LOAD	1008.7 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	30.0
HEAT PIPES	6.5
PHASE CHANGE MATERIAL	2.7
RADIATOR (PASSIVE)	11.3
TOTAL	50.5

IERR 1110011011

STRUCTURES			
SKIN THICKNESS	.017 (IN)		
STRINGER NO., THICKNESS, HT.	247. ,	4034.953 (IN),	.512 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.147 (IN),	.735 (IN)
GRID BEAM THICKNESS	.145 (IN),	SPACING 4.092 (IN),	HEIGHT 2.046 (IN)
ENDCOVER THICKNESS - FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	127.0 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	78.4 (LBS)		

894-1A

IF ASTRO SAT (IRAS) CP2-1-5

\* \* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
101	DESPIN BEARING	1	73.8	.8	6.7
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUJATION DAMPER	1	2.8	.3	0.0
503	GIMBAL ELECTRONCS	2	6.3	.3	31.6
603	CONTROL ELECTRNCS	2	7.4	.4	3.5
703	BIAXIAL DRIVE	2	14.3	.5	28.0
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	2	10.2	1.3	0.0
515	TANK	1	27.8	.8	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

V1-469

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
406	COMMO DECOD+DISTR	1	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMFAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

IR ASTRO SAT (IRAS) CP2-1-5

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
112	SHUNT REGULATOR	10	1.4	.0	0.0
213	BATTERY	2	17.2	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	490.0
STABILITY AND CONTROL	142.5
AUXILIARY PROPULSION	86.4
DATA PROCESSING	19.9
COMMUNICATIONS	26.6
BATTERIES	34.4
POWER CONTROL	32.0
CONVERTERS	15.9
SOLAR ARRAY	95.9
HARNESSES	96.0
STRUCTURE	464.2
THERMAL CONTROL	50.5
DRY WEIGHT	1554.4
PROPELLANT	101.7
SATELLITE ADAPTER	78.4

TOTAL LAUNCH WEIGHT 1734.4

V1-470

FRENCH SCIENTIFIC CP2-1-6

\* \* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION -- DUAL SPIN  
POINTING ACCURACY = .200000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 16916.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

COPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

64.	0.
256.	0.
13.	0.
8.	0.
18.	0.
.1250	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 362.26 WATTS  
TOTAL SOLAR ARRAY AREA 275.37 SQ FT  
INSTALLED BATTERY CAPACITY 18.00 AMP-HR  
BEGINNING OF LIFE POWER 839.84 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 1812.5 LBS ( 822.2 KG) LAUNCH WEIGHT = 1898.7 LBS ( 861.2 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 105.2 IN.( 2.67 M) 120.0 IN.( 3.05 M) 120.0 IN.( 3.05 M)  
MISSION EQUIPMENT 24.7 IN.( .63 M) 41.1 IN.( 1.05 M) 41.1 IN.( 1.05 M)  
TOTAL SATELLITE 129.9 IN.( 3.30 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 599.4 IYY = 4482468.8 IZZ = 4482468.8  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 81.9 IN.( 2.08 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APOGEE/PERIGEE/INCLINATION 450./ 450./ 98.7  
MISSION LIFETIME 36.0(MO)  
MEAN MISSION DURATION 31.1(MO)  
RELIABILITY .704

VI-471

FRENCH SCIENTIFIC CP2-1-6

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - DUAL SPIN  
 EQUIPMENT CODE IDENTIFIER 101 203 303 403 503 603 703 806 1413  
 EQUIPMENT QUANTITIES 1 1 2 1 2 2 2 2 1  
 WEIGHT 158.70 LBS VOLUME 4.15(FT\*\*3) POWER REQUIREMENT 76.7 WATTS  
 RELIABILITY .9124  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 829 834 906 1003 499 203 1124 515 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 2 1 1 1 2 1 1  
 WEIGHT 174.51 LBS VOLUME 5.54(FT\*\*3) POWER REQUIREMENT .3 WATTS  
 DRY WEIGHT 75.24(LBS), EXPENDABLE WEIGHT 99.28(LBS)  
 RELIABILITY .9570  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 406  
 EQUIPMENT QUANTITIES 1 2  
 WEIGHT 30.93 LBS VOLUME .40(FT\*\*3) POWER REQUIREMENT 8.5 WATTS  
 RELIABILITY .9891  
 IERR 1

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 203 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 3 1  
 WEIGHT 28.12 LBS VOLUME .35(FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9770  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 106 213 303 1202  
 EQUIPMENT QUANTITIES 12 2 3 1  
 WEIGHT 107.96 LBS VOLUME 2.23(FT\*\*3) POWER DISSIPATION 356.7 WATTS  
 HARNESS WEIGHT 114.6(LBS), SOLAR ARRAY WEIGHT 135.4(LBS)  
 RELIABILITY .9270

MISSION EQUIPMENT

WEIGHT 480.00 LBS VOLUME 18.99(FT\*\*3) POWER REQUIREMENT 175.0 WATTS  
 RELIABILITY .9000

VI-472

FRENCH SCIENTIFIC CP2-1-6

\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	11.4 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	1060.2 (BTU/HR),	TOTAL RADIATOR AREA	12.7 (FT**2)
HEAT PIPE	0.0 (WATT-IN),	BATTERY HEATER POWER	113.9 (BTU/HR)
HEAT PIPE LENGTH	8.1 (FT)	TOTAL HEATER POWER	1174.1 (BTU/HR)
STORED ENERGY	106.5 (BTU)	VARIABLE CONDUCTANCE H.P.	1680.2 (WATT-IN)
		AVERAGE HEAT LOAD	954.9 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		38.0
HEAT PIPES		8.5
PHASE CHANGE MATERIAL		2.7
RADIATOR (PASSIVE)		7.2
	TOTAL	56.4

IERR 1100001011

STRUCTURES				
SKIN THICKNESS	.019 (IN)			
STRINGER NO., THICKNESS, HT.	230.	3945.825 (IN),		.550 (IN)
FRAME NO., THICKNESS, HT.	7.	.158 (IN),		.789 (IN)
GRID BEAM THICKNESS	.151 (IN),	SPACING 4.263 (IN),	HEIGHT	2.131 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT	.030 (IN)
EQUIPMENT BAY STRUCTURE WT.	146.6 (LBS)			
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)			
ADAPTER WEIGHT	86.1 (LBS)			

VI-473

FRENCH SCIENTIFIC CP2-1-6

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
101	DESPIN BEARING	1	73.8	.8	6.7
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	2	.3	.0	0.0
403	NUTATION DAMPER	1	2.8	.3	0.0
503	GIMBAL ELECTRONCS	2	6.3	.3	31.6
603	CONTROL ELECTRONCS	2	7.4	.4	3.5
703	BIAXIAL DRIVE	2	14.3	.5	28.0
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	6	.6	.0	0.0
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	2	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1124	TANK	1	11.5	2.4	0.0
515	TANK	1	27.8	.8	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

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DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
406	CPMD DECOD+DISTR	2	11.0	.1	5.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	3	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0



FRENCH SCIENTIFIC CP2-1-6

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
106	SHUNT REGULATOR	12	4.3	.1	0.0
213	BATTERY	2	17.2	.1	0.0
303	BATTERY CHARGER	3	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT	
MISSION EQUIPMENT	480.0	
STABILITY AND CONTROL	142.8	
AUXILIARY PROPULSION	75.2	
DATA PROCESSING	30.9	
COMMUNICATIONS	28.1	
BATTERIES	34.4	
POWER CONTROL	73.5	
CONVERTERS	15.9	
SOLAR ARRAY	135.4	
HARNESS	114.6	173.8
STRUCTURE	525.7	
THERMAL CONTROL	56.4	
DRY WEIGHT	1713.3	
PROPELLANT	99.3	
SATELLITE ADAPTER	86.1	

TOTAL LAUNCH WEIGHT 1898.7

VI-475

CANADIAN SCIENTIFIC CP2-1-8

\* SYSTEM DESCRIPTION - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
POINTING ACCURACY = .750000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
TOTAL IMPULSE = 14065.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDPI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

MISSION EQUIPMENT DATA

32.	0.
256.	0.
13.	0.
8.	0.
18.	0.
.1250	0.0000
64.	0.

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 79.25 WATTS  
TOTAL SOLAR ARRAY AREA 33.01 SQ FT  
INSTALLED BATTERY CAPACITY 8.00 AMP-HR  
BEGINNING OF LIFE POWER 106.76 WATTS

VEHICLE SIZING

CONFIGURATION - - CYLINDER  
WET SATELLITE WEIGHT = 551.0 LBS ( 249.9 KG) LAUNCH WEIGHT = 571.4 LBS ( 259.2 KG)

DIMENSIONS		LENGTH	HEIGHT	WIDTH	
EQUIPMENT BAY	32.1 IN.( .82 M)	53.6 IN.( 1.36 M)	53.6 IN.( 1.36 M)	26.3 IN.( .67 M)	26.3 IN.( .67 M)
MISSION EQUIPMENT	15.8 IN.( .40 M)	26.3 IN.( .67 M)	26.3 IN.( .67 M)		
TOTAL SATELLITE	47.9 IN.( 1.22 M)				

MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 48.3 IYY = 215233.8 IZZ = 215233.8

CENTER OF GRAVITY	23.9 IN.( .61 M)	X-CG	0.0 IN.( 0.00 M)	Y-CG	0.0 IN.( 0.00 M)	Z-CG	0.0 IN.( 0.00 M)
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RELIABILITY

CONFIGURATION - - SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 19323./19323./ 0.0  
MISSION LIFETIME 36.0(MO)  
MEAN MISSION DURATION 31.9(MO)  
RELIABILITY .715

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CANADIAN SCIENTIFIC CP2-1-8

\*\*\* SUBSYSTEM DESCRIPTIONS -- DESIGN NUMBER 1\*\*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 806 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 2 1  
 WEIGHT 36.10 LBS VOLUME 1.43(FT\*\*3) POWER REQUIREMENT 10.4 WATTS  
 RELIABILITY .9432  
 IERR 0

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 907 1003 499 203 1118 509 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 5 9 1 1 1 1 2 1 1  
 WEIGHT 143.20 LBS VOLUME 4.26(FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 58.85(LBS), EXPENDABLE WEIGHT 84.34(LBS)  
 RELIABILITY .9020  
 IERR 1

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39(FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9799  
 IERR 1

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER 202 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 2 1 2 1  
 WEIGHT 24.62 LBS VOLUME .92(FT\*\*3) POWER REQUIREMENT 19.5 WATTS  
 RELIABILITY .9791  
 IERR\*\*\*\*\*

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER 102 204 303 1202  
 EQUIPMENT QUANTITIES 8 2 2 1  
 WEIGHT 75.70 LBS VOLUME 1.55(FT\*\*3) POWER DISSIPATION 7.4 WATTS  
 HARNESS WEIGHT 28.4(LBS), SOLAR ARRAY WEIGHT 16.2(LBS)  
 RELIABILITY .9734

MISSION EQUIPMENT  
 WEIGHT 125.00 LBS VOLUME 4.95(FT\*\*3) POWER REQUIREMENT 25.0 WATTS  
 RELIABILITY .9000

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CANADIAN SCIENTIFIC CP2-1-8

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			
RADIATOR AREA	1.9 (FT**2),	BATTERY RADIATOR AREA	1.2 (FT**2)
HEATER POWER	157.8 (BTU/HR),	TOTAL RADIATOR AREA	3.1 (FT**2)
HEAT PIPE	2389.5 (WATT-IN),	BATTERY HEATER POWER	115.0 (BTU/HR)
HEAT PIPE LENGTH	3.0 (FT)	TOTAL HEATER POWER	272.8 (BTU/HR)
STORED ENERGY	64.1 (BTU)	VARIABLE CONDUCTANCE H.P.	619.7 (WATT-IN)
		AVERAGE HEAT LOAD	226.8 (BTU/HR)

THERMAL CONTROL WEIGHT	UNIT WEIGHT (LBS)
INSULATION	9.6
HEAT PIPES	3.1
PHASE CHANGE MATERIAL	1.6
RADIATOR (PASSIVE)	1.2
	-----
TOTAL	15.6

IERR 1100010111

STRUCTURES			
SKIN THICKNESS	.011 (IN)		
STRINGER NO., THICKNESS, HT.	204. ,	81910.347 (IN),	.277 (IN)
FRAME NO., THICKNESS, HT.	5. ,	.079 (IN),	.397 (IN)
GRID BEAM THICKNESS	.096 (IN),	SPACING 2.703 (IN),	HEIGHT 1.351 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	83.0 (LBS)		
SOLAR ARRAY BOOP AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	20.4 (LBS)		

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CANADIAN SCIENTIFIC CP2-1-8

\*\*\* ASSEMBLY DESCRIPTIONS -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	0.0
403	NUTATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
806	EARTH SENSOR ASSY	2	4.1	.1	1.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
907	ISCLATION VALVE	5	1.3	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1118	TANK	1	10.2	1.3	0.0
509	TANK	1	16.0	.6	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

647-11

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
202	ANTENNA	1	8.4	.7	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	2	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

CANADIAN SCIENTIFIC CP2-1-8

\* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
102	SHUNT REGULATOR	8	5.0	.1	0.0
204	BATTERY	2	8.6	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	125.0
STABILITY AND CONTROL	20.2
AUXILIARY PROPULSION	58.9
DATA PROCESSING	21.2
COMMUNICATIONS	24.6
BATTERIES	17.2
POWER CONTROL	58.5
CONVERTERS	15.9
SOLAR ARRAY	16.2
HARNES	28.4
STRUCTURE	65.0
THERMAL CONTROL	15.6
DRY WEIGHT	466.7
PROPELLANT	84.3
SATELLITE ADAPTER	20.4

TOTAL LAUNCH WEIGHT 571.4

087-1A

ASTRO-A CP2-1-14

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL

CONFIGURATION -- SPIN CONTROL  
POINTING ACCURACY = 1.600000(DEG.)

AUXILIARY PROPULSION

CONFIGURATION -- MONOPROPELLANT  
TOTAL IMPULSE = 4415.(LB-SEC)

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
COMPUTER OPERATIONS RATE = 0.(IPS)

CDFI TABLE

NUMBER OF COMMANDS  
NUMBER OF MAIN FRAME WORDS  
MAIN FRAME SAMPLE RATE  
MAIN FRAME WORD LENGTH  
NUMBER OF SUBFRAMES  
SUBFRAME RATE  
NUMBER OF WORDS PER SUBFRAME

ENGINEERING DATA

32.  
256.  
13.  
8.  
18.  
.1250  
64.

MISSION EQUIPMENT DATA

0.  
0.  
0.  
0.  
0.  
0.0000  
0.

COMMUNICATIONS

CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
PRIMARY DOWNLINK DATA RATE = 32.000(KBPS)  
SEPARATE DOWNLINK DATA RATE = 0.000(KBPS)

ELECTRICAL POWER

CONFIGURATION -- SHUNT - BODY MOUNTED SOLAR ARRAY  
POWER REQUIREMENT 65.51 WATTS  
TOTAL SOLAR ARRAY AREA 34.49 SQ FT  
INSTALLED BATTERY CAPACITY 6.00 AMP-HR  
BEGINNING OF LIFE POWER 150.43 WATTS

VEHICLE SIZING

CONFIGURATION -- CYLINDER  
WET SATELLITE WEIGHT = 450.1 LBS ( 204.1 KG) LAUNCH WEIGHT = 466.8 LBS ( 211.7 KG)  
DIMENSIONS LENGTH HEIGHT WIDTH  
EQUIPMENT BAY 30.9 IN.( .78 M) 51.4 IN.( 1.31 M) 51.4 IN.( 1.31 M)  
MISSION EQUIPMENT 14.4 IN.( .37 M) 24.0 IN.( .61 M) 24.0 IN.( .61 M)  
TOTAL SATELLITE 45.3 IN.( 1.15 M)  
MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 35.8 IYY = 162105.7 IZZ = 162105.7  
X-CG Y-CG Z-CG  
CENTER OF GRAVITY 22.8 IN.( .58 M) 0.0 IN.( 0.00 M) 0.0 IN.( 0.00 M)

RELIABILITY

CONFIGURATION -- SINGLE SYSTEM  
APCGEE/PERIGEE/INCLINATION 270./ 270./ 30.0  
MISSION LIFETIME 12.0(MO)  
MEAN MISSION DURATION 10.7(MO)  
RELIABILITY .726

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ASTRO-A CP2-1-14

\* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - SPIN CONTROL  
 EQUIPMENT CODE IDENTIFIER 203 303 403 603 803 1413  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 29.28 LBS VOLUME 1.18 (FT\*\*3) POWER REQUIREMENT 9.4 WATTS  
 RELIABILITY .9591  
 IERR 0

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT  
 EQUIPMENT CODE IDENTIFIER 834 834 906 1003 499 203 1116 506 701 1203 603  
 EQUIPMENT QUANTITIES 6 2 4 9 1 1 1 1 1 1  
 WEIGHT 79.57 LBS VOLUME 3.80 (FT\*\*3) POWER REQUIREMENT 1.0 WATTS  
 DRY WEIGHT 53.03 (LBS), EXPENDABLE WEIGHT 26.54 (LBS)  
 RELIABILITY .9079  
 IERR 11

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)  
 EQUIPMENT CODE IDENTIFIER ... 203 403  
 EQUIPMENT QUANTITIES 1 1  
 WEIGHT 21.18 LBS VOLUME .39 (FT\*\*3) POWER REQUIREMENT 10.5 WATTS  
 RELIABILITY .9933  
 IERR

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS  
 EQUIPMENT CODE IDENTIFIER ... 203 103 306 401 503 603  
 EQUIPMENT QUANTITIES 1 1 1 1 1 1  
 WEIGHT 23.02 LBS VOLUME .29 (FT\*\*3) POWER REQUIREMENT 19.9 WATTS  
 RELIABILITY .9574  
 IERR\*\*\*\*\*

ELECTRICAL POWER

CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY  
 EQUIPMENT CODE IDENTIFIER ... 102 202 303 1202  
 EQUIPMENT QUANTITIES 10 2 2 1  
 WEIGHT 87.47 LBS VOLUME 1.92 (FT\*\*3) POWER DISSIPATION 74.4 WATTS  
 HARNESS WEIGHT 26.2 (LBS), SOLAR ARRAY WEIGHT 17.0 (LBS)  
 RELIABILITY .9742

MISSION EQUIPMENT

WEIGHT 95.00 LBS VOLUME 3.76 (FT\*\*3) POWER REQUIREMENT 25.0 WATTS  
 RELIABILITY .9000

787-17



ASTRO-A CP2-1-14

\* \* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL RADIATOR AREA	4.0 (FT**2),	BATTERY RADIATOR AREA	1.3 (FT**2)
HEATER POWER	353.1 (BTU/HR),	TOTAL RADIATOR AREA	5.3 (FT**2)
HEAT PIPE	2223.5 (WATT-IN),	BATTERY HEATER POWER	122.2 (BTU/HR)
HEAT PIPE LENGTH	2.8 (FT)	TOTAL HEATER POWER	475.3 (BTU/HR)
STORED ENERGY	72.0 (BTU)	VARIABLE CONDUCTANCE H.P.	585.5 (WATT-IN)
		AVERAGE HEAT LOAD	223.4 (BTU/HR)

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		9.1
HEAT PIPES		3.0
PHASE CHANGE MATERIAL		1.8
RADIATOR (PASSIVE)		2.5
	TOTAL	16.4

IERR 1100010011

STRUCTURES			
SKIN THICKNESS	.010 (IN)		
STRINGER NO., THICKNESS, HT.	211.	3487.671 (IN),	.257 (IN)
FRAME NO., THICKNESS, HT.	5.	.074 (IN),	.368 (IN)
GRID BEAM THICKNESS	.086 (IN),	SPACING 2.424 (IN),	HEIGHT 1.212 (IN)
ENDCOVER THICKNESS- FORWARD	.030 (IN),	CENTER 0.000 (IN),	AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	66.5 (LBS)		
SOLAR ARRAY BOOM AND DRIVE WT.	0.0 (LBS)		
ADAPTER WEIGHT	16.7 (LBS)		

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ASTRO-A CP2-1-14

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	VALVE DRIVER ASSY	1	1.6	.1	5.9
303	SUN SENSOR	1	.3	.0	.0
403	NUITATION DAMPER	1	2.8	.3	0.0
603	CONTROL ELECTRNCS	1	7.4	.4	3.5
803	EARTH SENSOR	1	1.3	.0	0.0
1413	POWER CONVERTER	1	15.9	.4	0.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
834	THRUSTER	6	.7	.0	.1
834	THRUSTER	2	.7	.0	.1
906	ISCLATION VALVE	4	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PRESSURE REGULATR	1	4.1	.4	0.0
203	ISCLATION VALVE	1	6.0	.6	0.0
1116	TANK	1	18.5	1.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	1	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMD DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	ANTENNA	1	10.4	.1	0.0
103	BASEBND ASSY UNIT	1	2.0	.0	.5
306	TRANSMITTER	1	2.1	.0	10.9
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	1	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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ASTRO-A CP2-1-14

\* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
102	SHLNT REGULATOR	10	5.0	.1	0.0
202	BATTERY	2	9.5	.1	0.0
303	BATTERY CHARGER	2	3.5	.1	0.0
1202	POWER CONTROL	1	11.6	.3	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	95.0
STABILITY AND CONTROL	13.4
AUXILIARY PROPULSION	53.0
DATA PROCESSING	21.2
COMMUNICATIONS	23.0
BATTERIES	19.0
POWER CONTROL	68.5
CONVERTERS	15.9
SOLAR ARRAY	17.0
HARNESSES	26.2
STRUCTURE	55.0
THERMAL CONTROL	16.4
DRY WEIGHT	423.5
PROPELLANT	26.5
SATELLITE ADAPTER	16.7

TOTAL LAUNCH WEIGHT 466.8

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JAPAN SCI CP2-1-16

\*\*\* SYSTEM DESCRIPTION -- DESIGN NUMBER 1 \*\*\*

STABILIZATION AND CONTROL  
 CONFIGURATION -- MASS EXPULSION WITH PITCH MOMENTUM WHEEL  
 POINTING ACCURACY = .30000 (DEG.)

AUXILIARY PROPULSION  
 CONFIGURATION -- MONOPROPELLANT  
 TOTAL IMPULSE = 4924. (LB-SEC)

DATA PROCESSING AND INSTRUMENTATION  
 CONFIGURATION -- SPECIAL PURPOSE PROCESSOR (DTU)  
 COMPUTER OPERATIONS RATE = 0. (IPS)

CDPI TABLE	ENGINEERING DATA	MISSION EQUIPMENT DATA
NUMBER OF COMMANDS	32.	0.
NUMBER OF MAIN FRAME WORDS	256.	0.
MAIN FRAME SAMPLE RATE	125.	0.
MAIN FRAME WORD LENGTH	8.	0.
NUMBER OF SUBFRAMES	4.	0.
SUBFRAME RATE	1.0000	0.0000
NUMBER OF WORDS PER SUBFRAME	64.	0.

COMMUNICATIONS  
 CONFIGURATION -- UNIFIED LINK-COMMON ANTENNAS  
 PRIMARY DOWNLINK DATA RATE = 256.000 (KBPS)  
 SEPARATE DOWNLINK DATA RATE = 0.000 (KBPS)

ELECTRICAL POWER  
 CONFIGURATION -- SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY  
 POWER REQUIREMENT 307.08 WATTS  
 TOTAL SOLAR ARRAY AREA 71.59 SQ FT  
 INSTALLED BATTERY CAPACITY 20.00 AMP-HR  
 BEGINNING OF LIFE POWER 681.80 WATTS

VEHICLE SIZING  
 CONFIGURATION -- CYLINDER  
 WET SATELLITE WEIGHT = 815.7 LBS ( 370.0 KG) LAUNCH WEIGHT = 847.3 LBS ( 384.3 KG)  
 DIMENSIONS LENGTH HEIGHT WIDTH  
 EQUIPMENT BAY 28.8 IN. ( .73 M) 48.0 IN. ( 1.22 M) 48.0 IN. ( 1.22 M)  
 MISSION EQUIPMENT 23.2 IN. ( .59 M) 38.7 IN. ( .98 M) 38.7 IN. ( .98 M)  
 TOTAL SATELLITE 52.0 IN. ( 1.32 M)  
 MOMENTS OF INERTIA (SLUGS\*FT\*\*2) IXX = 107.6 IYY = 289634.4 IZZ = 580749.1  
 CENTER OF GRAVITY 29.8 IN. ( .76 M) 0.0 IN. ( 0.00 M) 0.0 IN. ( 0.00 M)

RELIABILITY  
 CONFIGURATION -- SINGLE SYSTEM  
 APOGEE/PERIGEE/INCLINATION 270.0 / 270.0 / 30.0  
 MISSION LIFETIME 36.0 (MO)  
 MEAN MISSION DURATION 31.3 (MO)  
 RELIABILITY .712

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JAPAN SCI CP2-1-16

\* \* SUBSYSTEM DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

EQUIPMENT CODE IDENTIFIER	1601	2203	1815	1305				
EQUIPMENT QUANTITIES	2	2	1	1				
WEIGHT	37.80 LBS				VOLUME	1.19 (FT**3)	POWER REQUIREMENT	103.6 WATTS
RELIABILITY		.9550						
IERR	0							

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

EQUIPMENT CODE IDENTIFIER	829	834	906	1003	499	203	1115	506	701	1203	603
EQUIPMENT QUANTITIES	12	4	5	9	1	1	1	1	2	1	1
WEIGHT	69.88 LBS				VOLUME	2.96 (FT**3)	POWER REQUIREMENT				.3 WATTS
DRY WEIGHT	40.66 (LBS)				EXPENDABLE WEIGHT		29.22 (LBS)				
RELIABILITY		.9400									
IERR	10										

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

EQUIPMENT CODE IDENTIFIER	203	403						
EQUIPMENT QUANTITIES	1	1						
WEIGHT	21.18 LBS				VOLUME	.39 (FT**3)	POWER REQUIREMENT	10.5 WATTS
RELIABILITY		.9799						
IERR								

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

EQUIPMENT CODE IDENTIFIER	227	106	303	401	503	603		
EQUIPMENT QUANTITIES	2	2	2	1	2	1		
WEIGHT	19.92 LBS				VOLUME	.26 (FT**3)	POWER REQUIREMENT	18.4 WATTS
RELIABILITY		.9805						
IERR*****								

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

EQUIPMENT CODE IDENTIFIER	406	515	215	603	702			
EQUIPMENT QUANTITIES	2	8	2	2	1			
WEIGHT	80.12 LBS				VOLUME	1.35 (FT**3)	POWER DISSIPATION	447.8 WATTS
HARNESS WEIGHT		31.4 (LBS)			SOLAR ARRAY WEIGHT		49.9 (LBS)	
RELIABILITY		.9172						

MISSION EQUIPMENT

WEIGHT	400.00 LBS				VOLUME	15.83 (FT**3)	POWER REQUIREMENT	100.0 WATTS
RELIABILITY		.9000						

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JAPAN SCI CP2-1-16

\*\*\* SUBSYSTEM DESCRIPTIONS (CONTINUED)

THERMAL CONTROL			BATTERY RADIATOR AREA		0.8 (FT**2)
RADIATOR AREA	10.5 (FT**2),		TOTAL RADIATOR AREA		11.2 (FT**2)
HEATER POWER	996.1 (BTU/HR),		BATTERY HEATER POWER		70.7 (BTU/HR)
HEAT PIPE			TOTAL HEATER POWER		1066.8 (BTU/HR)
HEAT PIPE LENGTH	5079.9 (WATT-IN),		VARIABLE CONDUCTANCE H.P.		526.7 (WATT-IN)
HEAT PIPE LENGTH	3.3 (FT)		AVERAGE HEAT LOAD		793.6 (BTU/HR)
STORED ENERGY	102.7 (BTU)				

THERMAL CONTROL WEIGHT		UNIT WEIGHT (LBS)
INSULATION		5.4
HEAT PIPES		3.4
PHASE CHANGE MATERIAL		2.6
RADIATOR (PASSIVE)		6.6
	TOTAL	22.1

IERR 1111011011

STRUCTURES					
SKIN THICKNESS	.013 (IN)				
STRINGER NO., THICKNESS, HT.	178. ,		3487.671 (IN),		.285 (IN)
FRAME NO., THICKNESS, HT.	5 ,		.082 (IN),		.409 (IN)
GRID BEAM THICKNESS	.114 (IN),		SPACING 3.209 (IN),		HEIGHT 1.605 (IN)
ENCLOSURE THICKNESS - FORWARD	.030 (IN),		CENTER 0.000 (IN),		AFT .030 (IN)
EQUIPMENT BAY STRUCTURE WT.	46.7 (LBS)				
SOLAR ARRAY BOOM AND DRIVE WT.	23.5 (LBS)				
ADAPTER WEIGHT	31.6 (LBS)				

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JAPAN SCI CP2-1-16

\* \* ASSEMBLY DESCRIPTIONS - - DESIGN NUMBER 1 \* \* \* \*

STABILIZATION AND CONTRCL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
1601	VALVE DRIVER ASSY	2	1.6	.2	1.0
2203	CONTROL ELECTRNCS	2	7.1	.1	62.0
1815	EARTH SENSOR	1	15.4	.5	15.6
1305	PEACTION WHEEL	1	5.0	.1	25.0

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
829	THRUSTER	12	.6	.0	0.0
634	THRUSTER	4	.7	.0	.1
906	ISOLATION VALVE	5	.7	.1	0.0
1003	FILTER	9	.5	.1	0.0
499	PPESSURE REGULATR	1	4.1	.4	0.0
203	ISOLATION VALVE	1	6.0	.6	0.0
1115	TANK	1	3.5	.6	0.0
506	TANK	1	6.1	.2	0.0
701	RELIEF VALVE	2	.2	.0	0.0
1203	FILL + DRAIN VALV	1	.2	.0	0.0
603	FILL + VENT VALVE	1	.1	.0	0.0

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
203	DIGITAL TELEMETRY	1	8.9	.2	3.0
403	COMMND DECOD+DISTR	1	12.3	.2	7.5

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
227	ANTENNA	2	.8	.0	0.0
106	BASEBND ASSY UNIT	2	2.0	.0	0.0
303	TRANSMITTER	2	2.2	.0	10.2
401	RECEIVER	1	3.9	.1	6.3
503	COMMAND SIG COND	2	1.5	.0	.9
603	DIPLEXER	1	3.1	.0	1.0

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JAPAN SCI CP2-1-16

\* \* \* ASSEMBLY DESCRIPTIONS (CONTINUED)

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT VOLUME	UNIT POWER
406	DISCHGE REGULATOR	2	9.8	.2	0.0
515	SHUNT REGULATOR	8	2.3	.0	0.0
215	BATTERY	2	13.9	.1	0.0
603	BATTERY CHARGER	2	2.6	.0	0.0
702	POWER CONTROL	1	9.4	.6	0.0

WEIGHT SUMMARY

NAME	WEIGHT
MISSION EQUIPMENT	400.0
STABILITY AND CONTROL	37.8
AUXILIARY PROPULSION	40.7
DATA PROCESSING	21.2
COMMUNICATIONS	19.9
BATTERIES	27.7
POWER CONTROL	52.4
SOLAR ARRAY	49.9
HAPNESS	31.4
STRUCTURE	75.2
SOLAR ARRAY DRIVE	8.3
THERMAL CONTROL	22.1
DPY WEIGHT	786.5
PROPELLANT	29.2
SATELLITE ADAPTER	31.6

TOTAL LAUNCH WEIGHT 847.3

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Appendix VII

Spacecraft Cost Model (SCM)

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
NDI-1-1 LADST F/0

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 400. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1321. ARRAY AREA = 107.3 SQ FT BATT CAP = 34. AMP-HR

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SPACECRAFT COST MODEL

NO1-1-1 LNDST F/O

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.4	1.3	6.7	7.5	5.0	12.5
THERMAL CONTROL	.6	.2	.8	.9	.8	1.6
ELECTRICAL POWER	3.2	.9	4.1	5.0	6.8	11.8
COMMUNICATIONS	.9	.4	1.3	1.8	2.3	4.1
DATA HANDLING	8.4	1.1	9.4	14.2	4.7	18.9
STABILITY AND CONTROL	4.2	1.6	5.8	7.8	6.1	14.0
AUXILIARY PROPULSION	1.3	.7	2.0	2.8	3.3	6.1
SPACECRAFT MISSION EQUIPMENT	24.0	6.0	30.0	40.0	8.9	68.9
			54.6			146.8
SATELLITE QUALIFICATION UNIT(S)			84.6			215.6
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.1			
CONTRACTOR FEE			2.2			2.7
						5.0
TOTAL SATELLITE			88.9			223.4
AVERAGE UNIT COST ( 6 SATELLITES)						37.2
TOTAL SATELLITE DDT+E AND RECURRING COST						312.3

2-11-77

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NO1-1-1 LNDST F/O

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	19691.	23114.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	29381.	23899.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	284348.	270636.
2203	CONTROL ELECTRNCS.	2	7.1	62.0	1.00	1154954.	749743.	386145.	449924.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	73834.	66265.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	40718.	37973.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1138585.	139061.	243439.	443547.
345	TAPE RECORDER	2	16.8	25.0	1.00	499633.	583549.	260694.	194637.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3278662.	47819.	46506.	756569.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	27463.	10297.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	12358.	21532.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	12358.	21532.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	70886.	39543.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	72985.	40928.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	30443.	17827.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	31712.	7851.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16711.	13247.

VII-3

NO1-1-1 LNDST F/O

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	26.8	0.0	.10	36087.	24319.	85283.	61151.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	74.7	1.00	614420.	124360.	241919.	141781.
WIRING HARNESS	71.6	1.00	307038.	180625.	186086.	70851.
THERMAL CONTROL	31.3	1.00	369455.	113210.	88379.	85254.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	53.2	1.00	731772.	414573.	268825.	168861.
STRUCTURE	118.2	1.00	2496558.	627873.	305352.	576095.
POWER CONTROL UNITS	63.6	1.00	934531.	291011.	283054.	215648.
SOLAR ARRAY DRIVE	12.4	1.00	550688.	249051.	242241.	127074.
SATELLITE ADAPTER	65.6	1.00	134358.	60028.	34812.	31004.
PROPELLANT WEIGHT	54.9					
MISSION EQUIP WEIGHT	1060.0					

TOTAL SATELLITE WEIGHT 1784.2

VII-4

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NØ1-1-2 ESS.*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 486. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1153. ARRAY AREA = 93.6 SQ FT BATT CAP = 30. AMP-HR

VII-5

SPACECRAFT COST MODEL

NO1-1-2 ESS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.7	1.0	4.7	5.1	4.1	9.2
THERMAL CONTROL	.5	.1	.7	.8	.7	1.4
ELECTRICAL POWER	2.8	.7	3.5	4.4	5.8	10.2
COMMUNICATIONS	.9	.4	1.3	1.8	2.3	4.1
DATA HANDLING	5.3	1.1	6.3	9.2	4.7	13.8
STABILITY AND CONTROL	4.2	1.6	5.8	7.8	6.1	14.0
AUXILIARY PROPULSION	.9	.5	1.5	2.3	2.6	4.9
SPACECRAFT MISSION EQUIPMENT	18.4	5.4	23.8 29.9	31.3	26.4	57.7 68.0
SATELLITE QUALIFICATION UNIT(S)			53.7			125.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			2.5
CONTRACTOR FEE			1.8			4.2
TOTAL SATELLITE			57.2			132.4
AVERAGE UNIT COST ( 6 SATELLITES)						22.1
TOTAL SATELLITE DDT+E AND RECURRING COST						189.6

VII-6

NO1-1-2 ESS

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	19691.	23114.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	29381.	23899.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	284348.	270636.
2203	CONTROL ELECTRNCS	3	7.1	62.0	1.00	1154954.	749743.	386145.	449924.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	73834.	66265.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	40718.	37973.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	642664.	139061.	243439.	250356.
345	TAPE RECORDER	2	16.8	25.0	1.00	499633.	583549.	260694.	194637.
403	COMPD DECOD+DISTR	1	2.3	7.5	1.00	1960200.	47819.	46506.	452327.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	27463.	10297.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	12358.	21532.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	12358.	21532.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	70886.	39543.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	72985.	40928.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	30443.	17827.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	31712.	7851.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16711.	13247.

VII-7



NO1-1-2 ESS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
227	BATTERY	2	23.8	0.0	.10	32587.	22323.	78283.	55220.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D. E. COST	T. E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	65.2	1.00	558391.	109642.	213289.	128852.
WIRING HARNESS	41.3	1.00	192554.	113276.	116701.	44433.
THERMAL CONTROL	27.1	1.00	321108.	102673.	81235.	74097.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	34.3	1.00	535045.	296332.	192153.	123465.
STRUCTURE	90.1	1.00	1612765.	498498.	242433.	372154.
POWER CONTROL UNITS	61.3	1.00	863049.	284808.	277020.	199153.
SOLAR ARRAY DRIVE	10.8	1.00	501449.	221457.	215402.	115712.
SATELLITE ADAPTER	35.8	1.00	53531.	33709.	24426.	12353.
PROPELLANT WEIGHT	27.4					
MISSION EQUIP WEIGHT	400.0					
TOTAL SATELLITE WEIGHT	700.0					

8-11-8

**\*\* SATELLITE SYSTEMS COST MODEL \*\***

*N01-1-3 steps*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**

CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**

CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**

APOGEE = 19323. NUMBER OF QUAL UNITS = 0

BOL POWER = 1148. ARRAY AREA = 90.1 SQ FT BATT CAP = 100. AMP-HR

*6-11-7*

*107*

SPACECRAFT COST MODEL

NO1-1-3 SEOS

(MILLIONS OF 1977 DOLLARS)

VII-10

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.4	1.4	6.9	5.2	3.7	8.9
THERMAL CONTROL	1.3	.3	1.6	1.2	.9	2.1
ELECTRICAL POWER	3.1	.9	4.0	3.9	5.3	9.2
COMMUNICATIONS	2.1	.6	2.7	2.4	2.6	5.1
DATA HANDLING	8.5	1.1	9.5	10.8	4.0	14.8
STABILITY AND CONTROL	4.2	1.6	5.8	5.7	4.3	10.0
AUXILIARY PROPULSION	1.2	.7	1.9	1.9	2.2	4.1
SPACECRAFT MISSION EQUIPMENT	25.8	6.6	32.3	31.1	23.1	54.2
			51.9			93.0
SATELLITE QUALIFICATION UNIT(S)			84.2			147.2
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.2			
CONTRACTOR FEE			2.4			1.9
						3.9
TOTAL SATELLITE			88.9			153.1
AVERAGE UNIT COST ( 4 SATELLITES)						38.3
TOTAL SATELLITE DDT+E AND RECURRING COST						242.0

NO1-1-3 SEOS

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	20942.	24011.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	75208.	70390.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41476.	40336.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1155439.	139061.	258914.	503068.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3322281.	47819.	49463.	796384.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

11-11

N01-1-3 SEOS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.3	0.0	.10	86935.	49261.	175964.	156484.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	62.8	1.00	543692.	105900.	219104.	130329.
WIRING HARNESS	77.7	1.00	329081.	193593.	212124.	78884.
THERMAL CONTROL	76.3	1.00	743801.	207136.	158307.	178297.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	50.5	1.00	706105.	398379.	274745.	169260.
STRUCTURE	149.1	1.00	2567683.	764897.	395638.	615500.
POWER CONTROL UNITS	73.3	1.00	860858.	316208.	327114.	206356.
SOLAR ARRAY DRIVE	10.4	1.00	488781.	214466.	221862.	117166.
SATELLITE ADAPTER	67.3	1.00	137312.	63260.	37583.	32915.
PROPELLANT WEIGHT	108.7					
MISSION EQUIP WEIGHT	910.0					
TOTAL SATELLITE WEIGHT	1884.5					

VII-12

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NØ1-1-4 GRAVSAT*

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 160. NUMBER OF QUAL UNITS = 0  
VOL POWER = 352. ARRAY AREA = 59.5 SQ FT BATT CAP = 8. AMP-HR

V11-13

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SPACECRAFT COST MODEL

NOI-1-4 GRAVSAT

(MILLIONS OF 1977 DOLLARS)

71-117

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.9	2.2	6.1	0.0	1.4	1.4
THERMAL CONTROL	.8	.2	.9	0.0	.2	.2
ELECTRICAL POWER	2.7	1.1	3.8	.0	1.3	1.3
COMMUNICATIONS	.6	.2	.8	.0	.3	.3
DATA HANDLING	4.2	.4	4.7	0.0	.6	.6
STABILITY AND CONTROL	5.7	1.4	7.1	.0	1.4	1.4
AUXILIARY PROPULSION	3.3	1.9	5.2	.1	1.7	1.8
SPACECRAFT						
MISSION EQUIPMENT	21.2	7.3	28.5	.2	6.9	7.1
			20.1			9.4
SATELLITE			48.6			6.5
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.9			.4
LAUNCH SITE SUPPORT						.5
CONTRACTOR FEE			2.1			
TOTAL SATELLITE			52.6			7.5
AVERAGE UNIT COST ( 1 SATELLITES)						17.5
TOTAL SATELLITE DDT+E AND RECURRING COST						70.1

NO1-1-4 GRAVSAT

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1501	CONTROL ELECT.	1	10.0	4.0	1.00	1349183.	500699.	358223.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1718	RATE INTEGR GYRO	1	9.6	32.0	1.00	800266.	172894.	220785.	0.
1803	EARTH SENSOR	1	14.6	19.0	1.00	1118880.	282384.	356862.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	567538.	139061.	177581.	0.
406	COMMD DECOD+DISTR	1	11.0	5.5	1.00	1929232.	184082.	235073.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	9015.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	51709.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

VII-15



NO1-1-4 GRAVSAT

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
204	BATTERY	2	8.6	0.0	.10	11097.	10743.	39719.	22394.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	29.2	1.00	406638.	52111.	133106.	0.
WIRING HARNESS	84.8	1.00	354410.	208493.	282037.	0.
THERMAL CONTROL	31.3	1.00	455973.	113210.	116046.	0.
POWER CONVERTERS	10.0	1.00	410936.	256004.	163477.	0.
PROPULSION FEED SYS	241.9	1.00	1915834.	1320566.	1124364.	0.
STRUCTURE	331.3	1.00	2167327.	1507771.	962816.	0.
POWER CONTROL UNITS	43.7	1.00	431115.	233652.	298406.	0.
SATELLITE ADAPTER	63.7	1.00	131043.	57127.	44930.	0.
PROPELLANT WEIGHT	537.9					
MISSION EQUIP WEIGHT	225.0					
TOTAL SATELLITE WEIGHT	1694.1					

VI-16

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NO 1-1-5 MAGBAT-13*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - SPIN CONTROL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 297. NUMBER OF QUAL UNITS = 0  
BOL POWER = 185. ARRAY AREA = 60.6 SQ FT BATT CAP = 6. AMP-HR

✓ 11-17

SPACECRAFT COST MODEL

NOI-1-5 MAGSAT-B

(MILLIONS OF 1977 DOLLARS)

81-11A

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.5	.7	2.2	0.0	.5	.5
THERMAL CONTROL	.4	.1	.5	0.0	.1	.1
ELECTRICAL POWER	2.4	.9	3.4	.0	1.1	1.1
COMMUNICATIONS	.6	.2	.8	0.0	.3	.3
DATA HANDLING	2.0	.3	2.2	0.0	.3	.3
STABILITY AND CONTROL	3.0	.8	3.8	0.0	.7	.7
AUXILIARY PROPULSION	1.3	.6	1.9	.1	.6	.7
SPACECRAFT MISSION EQUIPMENT	11.2	3.7	14.8	.2	3.5	3.7
			8.8			3.6
SATELLITE QUALIFICATION UNIT(S)			23.7			7.3
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.2			
CONTRACTOR FEE			1.1			.3
			1.1			.3
TOTAL SATELLITE			26.0			7.9
AVERAGE UNIT COST ( 1 SATELLITES)						7.9
TOTAL SATELLITE DDT+E AND RECURRING COST						13.8

ND1-1-5 MAGSAT-B

\*\*\* ASSEMBLY DESCRIPTIONS \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	120258.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	249220.	139061.	177581.	0.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	920290.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	9015.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	51709.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

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NO1-1-5 MAGSAT-B

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202 BATTERY	2	9.5	0.0	.10	8778.	11541.	42670.	17714.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	29.8	1.00	411885.	53102.	135637.	0.
WIRING HARNESS	21.1	1.00	108948.	64092.	86700.	0.
THERMAL CONTROL	19.5	1.00	206830.	82139.	87985.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	351963.	0.
STRUCTURE	90.5	1.00	877931.	500378.	319526.	0.
POWER CONTROL UNITS	31.1	1.00	295911.	191493.	244563.	0.
SATELLITE ADAPTER	17.8	1.00	14779.	16432.	21311.	0.
PROPELLANT WEIGHT	36.4					
MISSION EQUIP WEIGHT	66.0					
TOTAL SATELLITE WEIGHT	450.9					

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**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NO 1-1-6 S.M.E.B.S*

**UBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1068. ARRAY AREA = 83.9 SQ FT BATT CAP = 100. AMP-HR

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SPACECRAFT COST MODEL

NO1-1-6 SMIAS

(MILLIONS OF 1977 DOLLARS)

VII-22

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.9	1.7	7.6	0.0	1.3	1.3
THERMAL CONTROL	1.5	.2	1.6	0.0	.2	.2
ELECTRICAL POWER	3.1	1.0	4.1	.3	1.7	2.0
COMMUNICATIONS	2.1	.7	2.7	.3	.9	1.2
DATA HANDLING	8.0	.3	8.2	.8	.5	1.4
STABILITY AND CONTROL	4.5	1.9	6.4	1.8	1.8	3.6
AUXILIARY PROPULSION	1.8	1.0	2.8	.3	1.0	1.3
SPACECRAFT MISSION EQUIPMENT	26.8	6.7	33.5	3.5	7.4	10.9
			55.4			31.0
SATELLITE QUALIFICATION UNIT(S)			88.9			41.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.3			
CONTRACTOR FEE			2.5			.5
						.8
TOTAL SATELLITE			93.7			43.2
AVERAGE UNIT COST ( 1 SATELLITES)						43.1
TOTAL SATELLITE DDT+E AND RECURRING COST						136.9

NO1-1-6 SMIAS

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	46538.	44528.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	672052.	521367.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	109787.	116814.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	60545.	60616.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1216794.	139061.	319646.	486214.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3480535.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	139615.	60841.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	143749.	62973.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
603	DTPL FXFR	1	1.1	1.0	1.00	57409.	15451.	21942.	0.

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NO1-1-6 SMIAS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	72.3	0.0	.10	86935.	49758.	183967.	175436.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	58.4	1.00	517224.	99011.	252902.	0.
WIRING HARNESS	92.9	1.00	382916.	225263.	304722.	0.
THERMAL CONTROL	35.6	1.00	865004.	123534.	125122.	0.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	92.6	1.00	1025585.	633485.	539365.	0.
STRUCTURE	196.9	1.00	2852239.	968849.	618677.	0.
POWER CONTROL UNITS	84.4	1.00	825239.	343398.	438567.	0.
SOLAR ARRAY DRIVE	9.7	1.00	466226.	202132.	258151.	0.
SATELLITE ADAPTER	80.5	1.00	159891.	73922.	51524.	0.
PROPELLANT WEIGHT	298.3					
MISSION EQUIP WEIGHT	1000.0					
TOTAL SATELLITE WEIGHT	2225.2					

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**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NO 1-7 HCM 2*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 1046.      ARRAY AREA = 82.2 SQ FT      BATT CAP = 100. AMP-HR

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SPACECRAFT COST MODEL

NO1-1-7 HCMM-2

(MILLIONS OF 1977 DOLLARS)

VII-26

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.9	1.7	7.7	5.7	4.3	10.0
THERMAL CONTROL	1.6	.2	1.8	1.5	.6	2.1
ELECTRICAL POWER	3.1	1.0	4.1	3.9	5.7	9.6
COMMUNICATIONS	2.1	.7	2.7	2.6	2.9	5.4
DATA HANDLING	9.0	1.1	10.1	11.5	4.0	15.5
STABILITY AND CONTROL	4.3	1.6	5.9	5.8	4.4	10.3
AUXILIARY PROPULSION	1.9	1.1	2.9	2.8	3.5	6.3
SPACECRAFT MISSION EQUIPMENT	27.8	7.3	35.2 55.4	33.8	25.4	59.2 100.5
SATELLITE QUALIFICATION UNIT(S)			90.6			159.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.3			
CONTRACTOR FEE			2.6			2.0 4.3
TOTAL SATELLITE			95.6			166.1
AVERAGE UNIT COST ( 4 SATELLITES)						41.5
TOTAL SATELLITE DDT+E AND RECURRING COST						261.6

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NO1-1-7 HCMM-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1248062.	139061.	258914.	543396.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3560875.	47819.	49463.	853578.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
301	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	58281.	37421.
303	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
303	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

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NO1-1-7 HCMM-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.3	0.0	.10	86935.	49261.	175964.	156484.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	57.2	1.00	509866.	97126.	200951.	122220
WIRING HARNESS	103.3	1.00	418970.	246473.	270066.	100431
THERMAL CONTROL	35.5	1.00	936473.	123299.	101183.	224482
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0
PROPULSION FEED SYS	98.0	1.00	1064951.	661556.	456247.	255279
STRUCTURE	102.0	1.00	2872260.	990138.	512143.	688510
POWER CONTROL UNITS	84.4	1.00	815251.	343398.	355241.	195424
SOLAR ARRAY DRIVE	9.5	1.00	459687.	198584.	205433.	110192
SATELLITE ADAPTER	81.6	1.00	161746.	74741.	1067.	38772
PROPELLANT WEIGHT	271.2					
MISSION EQUIP WEIGHT	1000.0					
TOTAL SATELLITE WEIGHT	2251.6					

VII-2.8

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*N01-1-8 STEREO/SAT*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 312. NUMBER OF QUAL UNITS = 0  
BOL POWER = 840. ARRAY AREA = 142.0 SQ FT BATT CAP = 14. AMP-HR

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SPACECRAFT COST MODEL

NO1-1-8 STEREOSAT

(MILLIONS OF 1977 DOLLARS)

VI-30

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.1	2.4	4.5	1.5	4.0	5.5
THERMAL CONTROL	.4	.2	.7	.3	.6	.9
ELECTRICAL POWER	2.9	.8	3.6	2.2	3.3	5.5
COMMUNICATIONS	.9	.4	1.3	1.0	1.3	2.3
DATA HANDLING	2.9	.3	3.2	2.5	1.4	3.9
STABILITY AND CONTROL	4.2	1.6	5.8	4.4	3.4	7.8
AUXILIARY PROPULSION	1.0	.5	1.5	1.2	1.4	2.7
SPACECRAFT MISSION EQUIPMENT	14.4	6.1	20.5 12.4	13.1	5.4	28.5 13.6
SATELLITE QUALIFICATION UNIT(S)			32.9			42.1
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.4			
CONTRACTOR FEE			1.5			1.2 2.1
TOTAL SATELLITE			35.9			5.3
AVERAGE UNIT COST ( 3 SATELLITES)						15.1
TOTAL SATELLITE DDT+E AND RECURRING COST						81.2

NO1-1-8 STEREOSAT

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1305	REACTION WHEEL	1	5.0	25.0	1.00	98701.	39694.	21447.	23153.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	32645.	28313.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	315942.	275122.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	429049.	533024.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	75994.	72844.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41909.	41743.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	407362.	139061.	270487.	188002.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1300811.	47819.	51673.	305145.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
227	ANTIENNA	2	.8	0.0	1.00	55273.	46873.	13732.	25509.
227	ANTENNA	2	.8	0.0	1.00	55273.	873.	13732.	5509.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	779.	78763.	846.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	590.	81094.	8488.
401	RECEIVER	1	3.9	6.3	1.00	77256.	775.	33825.	123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	796.	35236.	301.
603	DIFLEXER	1	3.1	1.0	1.00	57409.	451.	18568.	8467.

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NO1-1-8 STEREOSAT

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
212	BATTERY	2	15.7	0.0	.10	17510.	16570.	59808.	32618.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	69.8	1.00	747562.	116787.	252430.	175364.
WIRING HARNESS	43.2	1.00	200040.	117680.	134708.	46925.
THERMAL CONTROL	54.4	1.00	264090.	164680.	135687.	61950.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	35.2	1.00	545523.	302262.	217775.	127969.
STRUCTURE	376.1	1.00	1167275.	1679403.	907488.	273820.
POWER CONTROL UNITS	70.1	1.00	717082.	308058.	332927.	168214.
SATELLITE ADAPTER	50.5	1.00	71714.	32598.	22101.	16823.
PROPELLANT WEIGHT	15.9					
MISSION EQUIP WEIGHT	110.0					

TOTAL SATELLITE WEIGHT " 948.1

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**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NP2-1-1 SEASAT B*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 380.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 3448.      ARRAY AREA = 280.0 SQ FT      BATT CAP = 100. AMP-....

VII-33

SPACECRAFT COST MODEL

NO2-1-1 SEASAT B

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.0	9.7	0.0	1.9	1.9
THERMAL CONTROL	.9	.4	1.3	0.0	.4	.4
ELECTRICAL POWER	5.8	1.5	7.3	.3	2.8	3.1
COMMUNICATIONS	.9	.4	1.3	.2	.5	.7
DATA HANDLING	10.9	1.1	11.9	1.7	1.2	2.9
STABILITY AND CONTROL	4.2	1.6	5.8	.8	1.3	2.2
AUXILIARY PROPULSION	1.3	.7	2.0	.2	.7	.9
SPACECRAFT MISSION EQUIPMENT	31.6	7.7	39.3	3.2	8.7	12.0
			68.0			39.6
SATELLITE QUALIFICATION UNIT(S)			107.2			51.6
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.6			.5
CONTRACTOR FEE			2.0			.9
TOTAL SATELLITE			112.7			53.0
AVERAGE UNIT COST ( 1 SATELLITES)						53.0
TOTAL SATELLITE DDT+E AND RECURRING COST						65.7

78-117  
11-34

NO2-1-1 SEASAT B

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1554192.	139061.	319646.	621033.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	482765.	351613.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	4337524.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	16227.	22086.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	16227.	22086.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	93077.	40561.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	95833.	41982.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

V11-35

NO2-1-1 SEASAT B

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.3	0.0	.10	86935.	49261.	182131.	175436.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	194.9	1.00	1202420.	302239.	772004.	0.
WIRING HARNESS	115.0	1.00	458878.	269950.	365173.	0.
THERMAL CONTROL	114.7	1.00	534452.	273079.	248074.	0.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	54.1	1.00	740187.	419928.	357537.	0.
STRUCTURE	165.1	1.00	3289269.	834127.	532648.	0.
POWER CONTROL UNITS	157.8	1.00	1638107.	495200.	632439.	0.
SOLAR ARRAY DRIVE	32.4	1.00	1056124.	563434.	719583.	0.
SATELLITE ADAPTER	92.7	1.00	180266.	87583.	55958.	0.
PROPELLANT WEIGHT	83.1					
MISSION EQUIP WEIGHT	1367.0					
TOTAL SATELLITE WEIGHT	2661.4					

VII-36

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NØR-1-2 ENVIR MS*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 486. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1778. ARRAY AREA = 144.4 SQ FT BATT CAP = 40. AMP-HR

*VII-37*

*175*

SPACECRAFT COST MODEL

NO2-1-2 ENVIR MS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.3	1.7	6.9	5.0	4.6	9.6
THERMAL CONTROL	.8	.2	1.0	.8	.6	1.4
ELECTRICAL POWER	3.8	1.0	4.9	4.1	5.9	10.0
COMMUNICATIONS	.9	.4	1.3	1.3	1.7	3.0
DATA HANDLING	7.1	1.1	8.2	9.3	4.0	13.2
STABILITY AND CONTROL	4.2	1.6	5.8	5.7	4.3	10.0
AUXILIARY PROPULSION	1.7	.9	2.6	2.5	3.1	5.6
SPACECRAFT MISSION EQUIPMENT	23.8	6.8	30.7 39.8	28.6	24.1	52.7 69.1
SATELLITE QUALIFICATION UNIT(S)			70.5			121.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.1			
CONTRACTOR FEE			2.3			1.9 3.8
TOTAL SATELLITE			74.9			127.5
AVERAGE UNIT COST ( 4 SATELLITES)						31.9
TOTAL SATELLITE DDT+E AND RECURRING COST						202.4

VII-38

136

NO2-1-2 ENVIR MS

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1322	REACTION WHEEL	1	31.0	10.0	1.00	98701.	39694.	20529.	23660.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	98213.	90519.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41476.	40336.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	938426.	139061.	258914.	408582.
345	TAFE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2755353.	47819.	49463.	660486.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	13144.	24065.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	13144.	24065.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	75393.	44195.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	77625.	45744.
401	RECEIVER	2	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

VI-39



NO2-1-2 ENVIR MS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	33.7	0.0	.10	41198.	28669.	102477.	74157.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	100.5	1.00	756385.	163678.	338646.	181313.
WIRING HARNESS	82.8	1.00	347309.	204316.	223874.	83253.
THERMAL CONTROL	34.7	1.00	480738.	121408.	99843.	115238.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	83.8	1.00	967334.	586895.	404757.	231880.
STRUCTURE	167.5	1.00	2294301.	844422.	436772.	549967.
POWER CONTROL UNITS	91.8	1.00	1111925.	360704.	373143.	266540.
SOLAR ARRAY DRIVE	16.7	1.00	673856.	320766.	331829.	161530.
SATELLITE ADAPTER	60.8	1.00	125955.	55479.	35415.	30193.
PROPELLANT WEIGHT	142.4					
MISSION EQUIP WEIGHT	625.0					

TOTAL SATELLITE WEIGHT 1641.2

VII-40

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*ND 2-1-73 HAIDE*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**

APOGEE = 300.1      NUMBER OF QUAL UNITS = 0  
BOL POWER = 1278.1      ARRAY AREA = 103.7 SQ FT      BATT CAP = 34. AMP-HR

VII-41

SPACECRAFT COST MODEL

NO2-1-3 HALOE

(MILLIONS OF 1977 DOLLARS)

2A-11A

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.6	1.2	5.8	0.0	1.0	1.0
THERMAL CONTROL	.6	.2	.7	0.0	.2	.2
ELECTRICAL POWER	3.0	.8	3.8	.1	1.4	1.5
COMMUNICATIONS	.7	.3	1.0	.1	.4	.4
DATA HANDLING	6.3	1.1	7.4	.9	1.0	1.9
STABILITY AND CONTROL	4.1	1.2	5.3	.0	1.0	1.1
AUXILIARY PROPULSION	1.3	.7	2.1	.2	.7	1.0
SPACECRAFT MISSION EQUIPMENT	20.7	5.4	26.1 39.1	1.4	5.7	7.1 20.6
SATELLITE QUALIFICATION UNIT(S)			65.2			27.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			.4
CONTRACTOR FEE			2.0			.5
<b>TOTAL SATELLITE</b>			<b>69.0</b>			<b>28.7</b>
<b>AVERAGE UNIT COST ( 1 SATELLITES)</b>						<b>28.7</b>
<b>TOTAL SATELLITE DDT+E AND RECURRING COST</b>						<b>97.7</b>

NO2-1-3 HALOE

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1309	REACTION WHEEL	1	8.5	1.1	1.00	148118.	59540.	39803.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	1	7.1	62.0	1.00	1038161.	441025.	281680.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	101655.	101482.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	813073.	139061.	319646.	324892.
345	TAPE RECORDER	2	16.8	25.0	1.00	499633.	583549.	342303.	199646.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2421981.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	16227.	22086.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	51709.	0.
312	TRANSMITTER	1	2.2	15.8	1.00	94439.	29171.	53240.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

11-43

ND2-1-3 HALOE

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	26.8	0.0	.10	36087.	24319.1	89915.	72824.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	72.3	1.00	599916.	120656.	308188.	0.
WIRING HARNESS	53.2	1.00	238671.	140406.	189933.	0.
THERMAL CONTROL	31.2	1.00	348620.	112964.	115829.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	58.2	1.00	752923.	444063.	378087.	0.
STRUCTURE	112.8	1.00	2038579.	603406.	385317.	0.
POWER CONTROL UNITS	63.6	1.00	916613.	291011.	371662.	0.
SOLAR ARRAY DRIVE	12.0	1.00	538580.	242205.	309330.	0.
SATELLITE ADAPTER	49.4	1.00	105576.	46164.	38721.1	0.
PROPELLANT WEIGHT	127.2					
MISSION EQUIP WEIGHT	600.0					

TOTAL SATELLITE WEIGHT 1349.1

VII-4

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NOR-1-A STORMSAT*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 1433.      ARRAY AREA = 112.5 SQ FT      BATT CAP. = 132. AMP-HR

V-11-45

SPACECRAFT COST MODEL

NO2-1-4 STORMSAT

(MILLIONS OF 1977 DOLLARS)

97-117

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.6	1.6	7.2	5.3	4.2	9.6
THERMAL CONTROL	1.5	.3	1.8	1.5	.9	2.4
ELECTRICAL POWER	3.5	1.1	4.6	4.5	6.4	11.0
COMMUNICATIONS	2.1	.7	2.7	2.4	2.7	5.2
DATA HANDLING	8.1	1.1	9.1	10.4	4.0	14.3
STABILITY AND CONTROL	4.3	1.6	5.9	5.8	4.4	10.3
AUXILIARY PROPULSION	1.5	.9	2.4	2.5	3.0	5.5
SPACECRAFT MISSION EQUIPMENT	26.6	7.2	33.8	32.5	25.8	58.3
			41.7			74.4
SATELLITE QUALIFICATION UNIT(S)			75.5			132.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.2			
CONTRACTOR FEE			2.5			2.0
						4.2
TOTAL SATELLITE			80.3			138.9
AVERAGE UNIT COST ( 4 SATELLITES)						34.7
TOTAL SATELLITE DDT+E AND RECURRING COST						219.2

NO2-1-4 STORMSAT

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1091767.	139061.	258914.	475346.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3157151.	47819.	49463.	756801.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

7-11-47



NO2-1-4 STORMSAT

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
260	BATTERY	4	47.5	0.0	.10	109009.	60591.	216433.	196218.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	78.4	1.00	635115.	130053.	269077.	152244.
WIRING HARNESS	85.1	1.00	355473.	209119.	229136.	85210.
THERMAL CONTROL	83.6	1.00	896779.	220374.	166999.	214967.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	74.3	1.00	883267.	535285.	369164.	211728.
STRUCTURE	168.5	1.00	2568622.	848705.	438987.	615725.
POWER CONTROL UNITS	111.0	1.00	980098.	403090.	416991.	234939.
SOLAR ARRAY DRIVE	13.0	1.00	568616.	259258.	268199.	136303.
SATELLITE ADAPTER	66.9	1.00	136618.	63924.	37452.	32749.
PROPELLANT WEIGHT	191.1					
MISSION EQUIP WEIGHT	680.0					
TOTAL SATELLITE WEIGHT	1904.4					

87-11A

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NPR-15 ERBSS*

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 324. NUMBER OF QUAL UNITS = 0  
BOL POWER = 467. ARRAY AREA = 78.9 SQ FT BATT CAP = 9. AMP-HR

67-1117

SPACECRAFT COST MODEL

NO2-1-5 ERBSS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	1.6	1.7	3.4	0.0	1.1	1.1
THERMAL CONTROL	.4	.2	.6	0.0	.2	.2
ELECTRICAL POWER	2.0	.6	2.6	.0	1.0	1.0
COMMUNICATIONS	.8	.3	1.1	.0	.4	.4
DATA HANDLING	2.2	.3	2.5	.2	.5	.7
STABILITY AND CONTROL	4.0	1.1	5.2	.0	1.0	1.1
AUXILIARY PROPULSION	1.0	.5	1.4	.2	.5	.7
SPACECRAFT MISSION EQUIPMENT	12.1	4.6	16.7	.5	4.7	5.2
			7.8			3.1
SATELLITE QUALIFICATION UNIT(S)			24.5			8.3
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.3			.3
CONTRACTOR FEE			1.3			.4
TOTAL SATELLITE			27.0			9.0
AVERAGE UNIT COST ( 1 SATELLITES)						9.0
TOTAL SATELLITE DDT+E AND RECURRING COST						36.0

VII-50

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NO2-1-5 ERBSS

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24914.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	1	7.1	62.0	1.00	1038161.	441025.	281680.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23850.	29043.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	308226.	139061.	319646.	123163.
403	COMD DECOD+DISTR	1	2.3	7.5	1.00	1012245.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	9015.	0.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	9015.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	51709.	0.
312	TRANSMITTER	1	2.2	15.8	1.00	94439.	29171.	53240.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

VII-51

149

NO2-1-5 ERBSs

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
205	BATTERY	2	14.4	0.0	.10	12215.	15570.	57568.	24651.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	38.8	1.00	495450.	67802.	173186.	0.
WIRING HARNESS	29.0	1.00	142672.	83932.	113538.	0.
THERMAL CONTROL	36.1	1.00	226155.	124708.	126147.	0.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	33.6	1.00	543207.	291694.	248356.	0.
STRUCTURE	256.4	1.00	919173.	1212627.	774347.	0.
POWER CONTROL UNITS	52.1	1.00	508646.	258963.	330732.	0.
SATELLITE ADAPTER	33.8	1.00	50978.	23126.	31012.	0.
PROPELLANT WEIGHT	14.5					
MISSION EQUIP WEIGHT	55.0					
TOTAL SATELLITE WEIGHT	656.8					

✓ 11-52

\*\* SATELLITE SYSTEMS COST MODEL \*\*

*NCI-1-1 HOTLINE*

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APDGE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 2000. ARRAY AREA = 160.0 SQ FT BATT CAP = 120. AMP-HR

VII-53

C-7

SPACECRAFT COST MODEL

NC1-1-1 HOTLINE

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	9.2	6.9	16.1	6.4	12.4	18.9
THERMAL CONTROL	2.0	.4	2.3	1.4	.8	2.2
ELECTRICAL POWER	4.3	1.3	5.6	3.8	5.9	9.7
COMMUNICATIONS	2.0	.9	2.9	3.4	3.9	7.3
DATA HANDLING	11.6	.8	12.4	12.2	4.7	16.9
STABILITY AND CONTROL	6.8	3.6	10.5	15.1	6.8	21.9
AUXILIARY PROPULSION	1.7	.9	2.5	1.6	2.1	3.7
SPACECRAFT MISSION EQUIPMENT	37.5	14.8	52.3	44.0	36.7	80.7
			108.1			152.6
SATELLITE QUALIFICATION UNIT(S)			160.4			233.3
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.9			2.3
CONTRACTOR FEE			3.9			5.8
TOTAL SATELLITE			167.2			241.5
AVERAGE UNIT COST ( 3 SATELLITES)						80.5
TOTAL SATELLITE DDT+E AND RECURRING COST						408.6

VII-54

NCL-1-1 HOTLINE

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	2	1.8	35.2	1.00	74092.	56610.	38863.	34195.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.	37829.	156734.	165402.
1318	REACTION WHEEL	2	19.5	10.5	.25	77723.	47779.	92740.	81053.
1461	SUN SENSOR ELECTR	1	5.0	4.6	.10	100419.	12587.	102718.	187059.
1815	EARTH SENSOR	2	15.4	15.6	.10	130477.	50338.	429460.	340169.
1901	CONTROL ELECT.	3	10.3	25.5	2.00	3380882.	2430207.	785615.	2144309.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	55133.	52474.
842	THRUSTER	2	1.0	0.0	.10	12974.	18388.	28957.	33824.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	1	15.0	20.0	.50	942656.	109091.	206632.	351192.
209	DIGITAL TELEMETRY	2	18.5	14.0	.75	1590289.	168931.	330851.	552809.
430	COMMAND DIST UNIT	2	26.0	4.8	.75	4301722.	286813.	561722.	1495346.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.	34419.	201328.	104658.
327	TRANSMITTER	2	4.7	18.0	.25	68239.	22644.	145567.	71153.
401	RECEIVER	2	3.9	6.3	.25	21487.	10529.	45979.	22407.
424	RECEIVER	2	5.0	3.0	.25	53458.	24116.	103892.	55748.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.	81652.	88233.	19154.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62395.	25814.	32645.	28792.

VII-55



NCL-1-1 HOTLINE

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
266 BATTERY	4	50.0	0.0	.10	100862.1	62846.	226837.	187884.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	110.0	1.00	812599.	177957.	384646.	190643.
WIRING HARNESS	100.0	1.00	407592.	239780.	274476.	95613.
THERMAL CONTROL	105.0	1.00	1158291.	257200.	199347.	271713.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	80.0	1.00	972984.	566425.	408100.	228220.
STRUCTURE	1170.0	1.00	4309307.	4406614.	2381172.	1010880.
POWER CONTROL UNITS	140.0	1.00	1191154.	461713.	498986.	279422.
SOLAR ARRAY DRIVE	25.0	1.00	885869.	451990.	488477.	207807.
SATELLITE ADAPTER	100.0	1.00	192263.	156092.	49499.	45101.
PROPELLANT WEIGHT	400.0					
MISSION EQUIP WEIGHT	2100.0					
TOTAL SATELLITE WEIGHT	4850.0					

VII-56

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NC 1-1-2 INGOVT-1*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 19300. NUMBER OF QUAL UNITS = 0  
BDL POWER = 2000. ARRAY AREA = 160.0 SQ FT BATT CAP = 120. AMP-HR

VII-57

SPACECRAFT COST MODEL

NC1-1-2 INQV1-1

(MILLIONS OF 1977 DOLLARS)

VII-58

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	10.6	7.3	17.8	7.4	13.0	20.4
THERMAL CONTROL	2.4	.4	2.7	1.7	.9	2.5
ELECTRICAL POWER	4.3	1.3	5.6	3.8	5.9	9.7
COMMUNICATIONS	2.1	1.0	3.1	3.9	4.6	8.5
DATA HANDLING	14.7	.9	15.6	20.0	7.5	27.5
STABILITY AND CONTROL	7.6	4.7	12.4	21.3	8.6	29.9
AUXILIARY PROPULSION	1.9	1.1	2.9	2.0	2.7	4.7
SPACECRAFT MISSION EQUIPMENT	43.6	16.6	53.2	60.1	43.2	103.3
			110.2			198.4
SATELLITE QUALIFICATION UNIT(S)			170.4			301.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.1			2.8
CONTRACTOR FEE			4.3			7.4
TOTAL SATELLITE			175.8			312.0
AVERAGE UNIT COST ( 3 SATELLITES)						104.0
TOTAL SATELLITE DDT+E AND RECURRING COST						487.8

NCI-1-2 INGOVT-1

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.	79920.	54810.	51745.
112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.	37829.	156734.	165402.
206	EARTH SENSOR	2	3.8	6.5	.10	85866.	33513.	291524.	226470.
318	REACTION WHEEL	4	19.5	10.5	.25	93442.	87126.	166932.	136384.
301	CONTROL ELECT.	4	10.3	25.5	2.00	3591372.	3139018.	1002670.	2876020.
115	STAR SENSOR ASSY	2	23.0	3.0	.10	274142.	56610.	352177.	714721.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
329	THRUSTER	12	.6	0.0	.10	15068.	62143.	99239.	93676.
342	THRJSTER	4	1.0	0.0	.10	14433.	31260.	52122.	52665.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.	185454.	371938.	546820.
209	DIGITAL TELEMETRY	4	18.5	14.0	.75	2378360.	168931.	595533.	1157115.
330	COMMAND DIST UNIT	3	25.0	4.8	.75	5234961.	286813.	792222.	2215221.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.	34419.	201928.	104658.
345	TRANSMITTER	2	13.0	130.0	.25	142702.	50553.	270002.	148817.
401	RECEIVER	2	3.9	6.3	.25	21487.	10529.	45979.	22407.
424	RECEIVER	3	5.0	3.0	.25	58864.	34046.	146524.	74726.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
509	COMMAND SIG COND	1	15.7	15.0	1.00	81652.	81652.	88233.	19154.
512	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.	25814.	32645.	28792.

VII-59

NCL-1-2 INGVJT-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	4	50.0	0.0	.10	100862.1	62846.	226837.	187884.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	110.0	1.00	812599.	177957.	384646.	190643.
WIRING HARNESS	100.0	1.00	407592.	239780.	274476.	95613.
THERMAL CONTROL	110.0	1.00	1390867.	265441.	204847.	326270.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	100.0	1.00	1077815.1	671860.	484064.	252835.
STRUCTURE	1240.0	1.00	5096392.	4629728.	2501735.	1195515.
POWER CONTRL UNITS	140.0	1.00	1191154.	461713.	498986.	279422.
SOLAR ARRAY DRIVE	25.0	1.00	885868.	451990.	488477.	207807.
SATELLITE ADAPTER	125.0	1.00	232419.1	189089.	56401.	54521.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	2800.0					

TOTAL SATELLITE WEIGHT 5950.0

VII-60

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NCI-1-3 INGPVT-2*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 3500.      ARRAY AREA = 270.0 SQ FT      BATT CAP = 150. AMP-HR

VII-61

4

SPACECRAFT COST MODEL

NC1-1-3 INGOVT-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	11.6	7.7	19.3	8.2	13.9	22.1
THERMAL CONTROL	2.5	.4	2.9	1.8	.9	2.7
ELECTRICAL POWER	6.0	1.6	7.6	5.2	7.6	12.8
COMMUNICATIONS	2.1	1.0	3.1	3.9	4.6	8.5
DATA HANDLING	16.0	.9	16.9	21.6	7.5	29.1
STABILITY AND CONTROL	7.6	4.7	12.4	21.3	8.6	29.9
AUXILIARY PROPULSION	1.9	1.1	2.9	2.0	2.7	4.7
SPACECRAFT MISSION EQUIPMENT	47.7	17.4	65.1	64.0	45.9	109.9
			155.2			225.5
SATELLITE QUALIFICATION UNIT(S)			229.2			335.4
GSE (AGE)			3.0			
LAUNCH SITE SUPPORT			3.5			
CONTRACTOR FEE			4.8			2.9
						7.9
TOTAL SATELLITE			229.5			346.1
AVERAGE UNIT COST ( 3 SATELLITES)						115.4
TOTAL SATELLITE DDT+E AND RECURRING COST						574.6

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NC1-1-3 INGOVT-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRDD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.	79920.	54810.	51745.
1112	RATE GYRO ASSY	3	3.3	3.8	.50	260582.	37829.	156734.	165402.
1206	EARTH SENSOR	2	9.8	5.5	.10	66866.	33513.	291524.	226470.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.	87126.	166932.	136384.
1901	CONTROL ELECT.	4	10.3	26.5	2.00	3691372.	3139018.	1002670.	2876020.
2115	STAR SENSOR ASSY	2	23.0	8.0	.10	274142.	56610.	352177.	714721.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRDD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.5	0.0	.10	15068.	62143.	99239.	93676.
842	THRUSTER	4	1.0	0.0	.10	14433.	31260.	52122.	52665.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRDD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.	185454.	371938.	546820.
209	DIGITAL TELEMETRY	4	18.5	14.0	.75	2521354.	168931.	595533.	1275336.
430	COMMAND DIST UNIT	3	26.0	4.8	.75	5713625.	286813.	792222.	2417772.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRDD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.	34419.	201328.	104658.
345	TRANSMITTER	2	13.0	130.0	.25	142702.	50553.	270002.	148817.
401	RECEIVER	2	3.9	6.3	.25	21487.	10529.	45979.	22407.
424	RECEIVER	3	5.0	3.0	.25	58854.	34046.	146524.	74726.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.	81652.	88233.	19154.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.	25814.	32645.	28792.

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NCL-1-3 INGOVT-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	3	70.0	0.0	.10	120979.	65093.	234947.	225357.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	190.0	1.00	1172195.	295196.	638053.	274973.
WIRING HARNESS	150.0	1.00	574845.	338172.	387105.	134848.
THERMAL CONTROL	118.0	1.00	1471927.	278381.	213435.	345286.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	100.0	1.00	1077915.	671860.	484064.	252835.
STRUCTURE	1300.0	1.00	5514169.	4819466.	2604262.	1293517.
POWER CONTRL UNITS	150.0	1.00	1652515.	480730.	519537.	387648.
SOLAR ARRAY DRIVE	32.0	1.00	1047265.	557516.	602522.	245668.
SATELLITE ADAPTER	150.0	1.00	271373.	208101.	62749.	63660.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	3200.0					
TOTAL SATELLITE WEIGHT	6600.0					

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\*\* SATELLITE SYSTEMS COST MODEL \*\*  
XCI-1-4 INGOVT-3

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 5000. ARRAY AREA = 400.0 SQ FT BATT CAP = 150. AMP-HR

VII-65

SPACECRAFT COST MODEL

NC1-1-4 INGOVT-3

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	13.2	7.9	21.1	9.3	14.5	23.8
THERMAL CONTROL	2.6	.4	2.9	1.8	.9	2.7
ELECTRICAL POWER	7.3	1.8	9.2	6.2	8.8	15.0
COMMUNICATIONS	2.1	1.0	3.1	3.9	4.6	8.5
DATA HANDLING	18.4	.9	19.3	24.9	7.5	32.4
STABILITY AND CONTROL	7.6	4.7	12.4	21.3	8.6	29.9
AUXILIARY PROPULSION	1.9	1.1	2.9	2.0	2.7	4.7
SPACECRAFT MISSION EQUIPMENT	53.2	17.8	71.0	69.4	47.6	117.1
			195.8			290.7
SATELLITE QUALIFICATION UNIT(S)			265.8			407.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			3.7			
CONTRACTOR FEE						3.0
			5.2			8.4
TOTAL SATELLITE			275.8			419.2
AVERAGE UNIT COST ( 3 SATELLITES)						139.7
TOTAL SATELLITE DDT+E AND RECURRING COST						695.0

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NCI-1-4 INGOVT-3

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.1	79920.	54810.	51745.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	156734.	165402.
1206	EARTH SENSOR	2	9.8	6.5	.10	86866.1	33513.	291524.	226470.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.1	87126.	166932.	136384.
1901	CONTROL ELECT.	4	10.3	26.5	2.00	3591372.1	3139018.	1002670.	2876020.
2115	STAR SENSOR ASSY	2	23.0	8.0	.10	274142.1	56610.	352177.	714721.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.1	62143.	99239.	93676.
842	THRUSTER	4	1.0	0.0	.10	14433.1	31260.	52122.	52665.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.1	185454.	371938.	546820.
209	DIGITAL TELEMETRY	4	18.5	14.0	.75	3119651.1	168931.	595533.	1517771.
430	COMMAND DIST UNIT	3	25.0	4.8	.75	6581753.1	286813.	792222.	2827445.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	201328.	104658.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	270002.	148817.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45979.	22407.
424	RECEIVER	3	5.0	3.0	.25	58854.1	34046.	146524.	74726.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	35236.	9301.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	88233.	19154.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	32645.	28792.

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NC1-1-4 INGOVT-3

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	JNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST.	VEHICLE ENG. COST
269	BATTERY	3	70.0	0.0	.10	120979.	65093.	234947.	225357.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	275.0	1.00	1543433.	415726.	898573.	362059.
WIRING HARNESS	160.0	1.00	607183.	357196.	408882.	142433.
THERMAL CONTROL	115.0	1.00	1502549.	273563.	210243.	352469.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	100.0	1.00	1077816.	671860.	484064.	252835.
STRUCTURE	1300.0	1.00	5290959.	4819466.	2604262.	1475737.
POWER CONTROL UNITS	155.0	1.00	2035931.	490040.	529599.	477590.
SOLAR ARRAY DRIVE	40.0	1.00	1218322.	673954.	728360.	285795.
SATELLITE ADAPTER	145.0	1.00	263669.	241451.	61517.	61852.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	4200.0					
TOTAL SATELLITE WEIGHT	7700.0					

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**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NC2-1-1 VOTE-1*

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BDL POWER = 1000.      ARRAY AREA = 80.0 SQ FT      BATT CAP = 120. AMP-HR

69-117

SPACECRAFT COST MODEL

NC2-1-1 VOTE-1

(MILLIONS OF 1977 DOLLARS)

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SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	6.4	5.1	11.5	4.5	9.1	13.6
THERMAL CONTROL	2.0	.3	2.3	1.4	.7	2.1
ELECTRICAL POWER	3.1	1.2	4.3	3.0	5.2	8.2
COMMUNICATIONS	2.0	.9	2.9	3.4	3.9	7.3
DATA HANDLING	9.8	1.0	10.8	13.1	5.9	19.0
STABILITY AND CONTROL	6.8	3.6	10.5	15.1	6.8	21.9
AUXILIARY PROPULSION	1.7	.9	2.5	1.6	2.1	3.7
SPACECRAFT MISSION EQUIPMENT	31.8	13.0	44.8 42.6	42.1	33.8	75.9 6.4
SATELLITE QUALIFICATION UNIT(S)			87.4 0.0			82.3
GSE (AGE)			2.6			2.1
LAUNCH SITE SUPPORT						5.5
CONTRACTOR FEE			3.3			
TOTAL SATELLITE			93.3			89.9
AVERAGE UNIT COST ( 3 SATELLITES)						30.0
TOTAL SATELLITE DDT+E AND RECURRING COST						183.2

NC2-1-1 VOTE-1

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	2	1.8	35.2	1.00	74092.1	56610.	38863.	34195.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	156734.	165402.
1318	REACTION WHEEL	2	19.5	10.5	.25	77723.1	47779.	92740.	81053.
1461	SUN SENSOR ELECTR	1	6.0	4.6	.10	100419.1	12587.	102718.	187059.
1815	EARTH SENSOR	2	15.4	15.6	.10	130477.1	50338.	429460.	340169.
1901	CONTROL ELECT.	3	10.3	26.5	2.00	3380882.1	2430207.	785615.	2144309.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.1	33143.	55133.	52474.
842	THRUSTER	2	1.0	0.0	.10	12974.1	18388.	28957.	33824.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	1	15.0	20.0	.50	942656.1	109091.	206632.	351192.
209	DIGITAL TELEMETRY	2	13.5	14.0	1.00	1248320.1	225241.	438117.	576113.
430	COMMAND DIST UNIT	2	26.0	4.8	1.00	3561535.1	382417.	743840.	1643688.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	201328.	104658.
327	TRANSMITTER	2	4.7	18.0	.25	68239.1	22644.	145567.	71163.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45979.	22407.
424	RECEIVER	2	5.0	3.0	.25	53458.1	24116.	103892.	55748.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	35236.	9301.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	88233.	19154.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.1	32645.	28792.

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NC2-1-1 VDTE-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
266	BATTERY	3	66.7	0.0	.10	100862.1	62846.	226837.	187884.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	55.0	1.00	500275.	93662.	202445.	117355.
WIRING HARNESS	105.0	1.00	424813.1	249903.	286070.	99652.
THERMAL CONTROL	80.0	1.00	1181344.	213894.	170029.	277120.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	80.0	1.00	972884.	566425.	408100.	228220.
STRUCTURE	830.0	1.00	2996660.1	3291269.	1778481.	702959.
POWER CONTROL UNITS	140.0	1.00	794082.	461713.	498986.	186276.
SOLAR ARRAY DRIVE	15.0	1.00	626549.	292791.	316427.	146976.
SATELLITE ADAPTER	75.0	1.00	150556.	98957.	41832.	35318.

PROPELLANT WEIGHT 400.0

MISSION EQUIP WEIGHT 700.0

TOTAL SATELLITE WEIGHT 3000.0

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\*\* SATELLITE SYSTEMS COST MODEL \*\*  
NCR-1-2 VOTE-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BDL POWER = 50000. ARRAY AREA = 1965.0 SQ FT BATT CAP = 600. AMP-HR

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SPACECRAFT COST MODEL

NC2-1-2 VOTE II

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	19.8	12.1	31.9	0.0	9.4	9.4
THERMAL CONTROL	3.4	.5	3.9	0.0	.5	.5
ELECTRICAL POWER	16.6	3.8	20.4	1.3	9.3	10.5
COMMUNICATIONS	2.1	1.0	3.1	1.2	1.7	2.9
DATA HANDLING	16.9	.7	17.6	11.9	2.6	14.5
STABILITY AND CONTROL	8.3	5.8	14.1	11.6	4.3	15.9
AUXILIARY PROPULSION	2.1	1.3	3.4	.4	1.3	1.7
SPACECRAFT MISSION EQUIPMENT	69.2	25.2	94.4	26.5	28.9	55.3
			275.0			164.0
SATELLITE QUALIFICATION UNIT(S)			369.4			219.3
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			4.5			1.3
CONTRACTOR FEE			5.9			4.0
TOTAL SATELLITE			380.9			224.5
AVERAGE UNIT COST ( 1 SATELLITES)						224.5
TOTAL SATELLITE DDT+E AND RECURRING COST						605.4

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NC2-1-2 VOTE II

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.1	79920.	64772.	57415.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	160549.	179185.
1206	EARTH SENSOR	4	9.8	6.5	.10	104434.1	61112.	537519.	412825.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.1	87126.	170996.	147749.
1901	CONTROL ELECT.	5	10.3	26.5	2.00	401861.1	3847828.	1431727.	4733130.
2115	STAR SENSOR ASSY	4	23.0	3.0	.10	329587.1	103230.	649352.	1302843.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
829	THRUSTER	18	.6	0.0	.10	18323.1	91143.	143369.	150220.
842	THRUSTER	6	1.0	0.0	.10	15893.1	44132.	75300.	76476.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1548705.1	185454.	380993.	592388.
209	DIGITAL TELEMETRY	4	18.5	14.0	.50	2900997.1	112621.1	610030.	2293504.
430	COMMAND DIST UNIT	3	26.0	4.8	.50	6308855.1	191209.	811508.	4131889.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	42488.	14021.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	158904.	184625.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	104712.	115169.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	206229.	113380.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	276575.	161218.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	47098.	24275.
424	RECEIVER	3	5.0	3.0	.25	58854.1	34046.	150091.	80953.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	41640.	8053.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	104269.	0.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	38578.	24929.

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NC2-1-2 VOTE II

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
276	BATTERY	3	120.0	0.0	.10	374445.1	95957.	354778.	755635.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	1375.0	1.00	4703265.	1845243.	4713265.	0.
WIRING HARNESS	220.0	1.00	795427.	457936.	632996.	0.
THERMAL CONTROL	175.0	1.00	1979709.	353650.	317624.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	125.0	1.00	1209143.	796920.	678519.	0.
STRUCTURE	1900.0	1.00	8647185.	6654074.	4249089.	0.
POWER CONTROL UNITS	245.0	.50	3915011.	320273.	818065.	0.
SOLAR ARRAY DRIVE	125.0	1.00	2637974.	1775224.	2267208.	0.
SATELLITE ADAPTER	200.0	1.00	346555.	370086.	87745.	0.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	6300.0					
TOTAL SATELLITE WEIGHT	12100.0					

VII-76

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NCB-H PRSNL COM*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BDL POWER = 10000.      ARRAY AREA = 800.0 SQ FT      BATT CAP = 150. AHP-HI

MI-77

SPACECRAFT COST MODEL

NC3-1-1 PRSNL COM

(MILLIONS OF 1977 DOLLARS)

84-78

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	16.7	12.6	29.3	16.0	29.3	45.3
THERMAL CONTROL	2.5	.6	3.1	2.4	1.6	4.0
ELECTRICAL POWER	9.5	2.2	11.7	10.4	16.0	26.4
COMMUNICATIONS	2.1	1.0	3.1	5.0	6.0	11.0
DATA HANDLING	16.0	.7	16.7	40.3	9.9	50.1
STABILITY AND CONTROL	7.7	4.8	12.4	27.3	12.5	39.8
AUXILIARY PROPULSION	1.7	.9	2.5	2.2	2.7	4.8
SPACECRAFT MISSION EQUIPMENT	56.3	22.7	79.0	103.5	78.0	181.5
			267.5			518.0
SATELLITE QUALIFICATION UNIT(S)			346.5			699.6
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			3.9			4.5
CONTRACTOR FEE			5.8			13.0
TOTAL SATELLITE			355.2			717.0
AVERAGE UNIT COST ( 4 SATELLITES)						179.3
TOTAL SATELLITE DDT+E AND RECURRING COST						1073.2

NC3-1-1 PRSNL COM

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.1	79920.	52465.	47673.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	155112.	159828.
1206	EARTH SENSOR	4	9.8	6.5	.10	104434.1	61112.	519317.	368229.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.1	87126.	165206.	131789.
1901	CONTROL ELECT.	4	10.3	26.5	2.00	3591372.1	3139018.	959770.	2618157.
2115	STAR SENSOR ASSY	2	23.0	8.0	.10	274142.1	56610.	348534.	690638.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.1	33143.	54563.	50706.
842	THRUSTER	2	1.0	0.0	.10	12974.1	18388.	28657.	32684.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.1	185454.	368091.	528394.
209	DIGITAL TELEMETRY	4	18.5	14.0	.50	2717381.1	112621.	589372.	1916262.1
430	COMMAND DIST UNIT	3	25.0	4.8	.50	5565673.1	191209.	784028.	3475045.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	41050.	12506.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	128713.	201169.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	84817.	125488.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.1	199245.	101132.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	267209.	143802.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45503.	21652.
424	RECEIVER	3	5.0	3.0	.25	58864.1	34046.	145008.	72208.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.1	33728.	8775.1
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	84458.	19573.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	31248.	27162.

6/11/79



NC3-1-1 PRSNL COM

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	3	70.0	0.0	.10	120979.	65093.	232517.	217764.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	550.0	1.00	2507314.1	789880.	1634242.	601028.
WIRING HARNESS	175.0	1.00	655122.	385397.	422289.	157039.
THERMAL CONTROL	205.0	1.00	1495231.	404830.	282228.	358422.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	80.0	1.00	972884.1	566425.	390640.	233210.
STRUCTURE	2280.0	1.00	7726445.	7769475.	4018711.	1852107.
POWER CONTROL UNITS	165.0	.75	2290481.	381221.	525825.	549052.
SOLAR ARRAY DRIVE	65.0	1.00	1693249.	1018254.	1053370.	405889.
SATELLITE ADAPTER	250.0	1.00	418934.1	336366.	80984.	100423.
PROPELLANT WEIGHT	400.0					
MISSION EQUIP WEIGHT	6100.0					
TOTAL SATELLITE WEIGHT	11000.0					

VII-80

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
NC3-1-2 TELECOM-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BDL POWER = 25000. ARRAY AREA = 1200.0 SQ FT BATT CAP = 280. AMP-HR

18-111A

SPACECRAFT COST MODEL

NC3-1-2 TELECON-1

(MILLIONS OF 1977 DOLLARS)

VII-82

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	19.3	14.3	33.6	13.6	26.3	39.8
THERMAL CONTROL	3.1	.6	3.7	2.2	1.3	3.5
ELECTRICAL POWER	11.9	2.8	14.7	10.0	17.0	27.1
COMMUNICATIONS	2.1	1.0	3.1	3.9	4.6	8.5
DATA HANDLING	18.2	.7	18.9	35.6	7.5	43.1
STABILITY AND CONTROL	8.3	5.8	14.1	28.4	11.7	40.1
AUXILIARY PROPULSION	2.1	1.3	3.4	2.5	3.4	5.9
SPACECRAFT MISSION EQUIPMENT	65.0	26.5	91.5	96.2	71.8	168.0
			308.2			468.3
SATELLITE QUALIFICATION UNIT(S)			399.7			636.3
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			4.3			3.7
CONTRACTOR FEE			5.7			12.0
TOTAL SATELLITE			410.7			652.1
AVERAGE UNIT COST ( 3 SATELLITES)						217.4
TOTAL SATELLITE DDT+E AND RECURRING COST						1062.8

NC3-1-2 TELECON-1

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	33.2	1.00	81585.1	79920.	54810.	51745.
1112	RATE GYRO ASSY	3	3.3	3.8	.50	260582.1	37829.	156734.	165402.
1206	EARTH SENSOR	4	9.8	6.5	.10	104434.1	61112.	524745.	381069.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.1	87126.	166932.	136384.
1901	CONTROL ELECT.	5	10.3	26.5	2.00	4001851.1	3847828.	1211540.	3626769.
2115	STAR SENSOR ASSY	4	23.0	8.0	.10	329587.1	103230.	633920.	1202624.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	18	.6	0.0	.10	18323.1	91143.	139962.	138664.
842	THRUSTER	6	1.0	0.0	.10	15893.1	44132.	73510.	70593.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.1	185454.	371938.	546820.
209	DIGITAL TELEMETRY	4	18.5	14.0	.50	3159901.1	112621.	595533.	2306023.
430	COMMAND DIST UNIT	3	26.0	4.8	.50	6489083.1	191209.	792222.	4118871.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	201328.	104658.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	270002.	148817.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45979.	22407.
424	RECEIVER	3	5.0	3.0	.25	58864.1	34046.	146524.	74726.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	35236.	9301.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.1	88233.	19154.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	32645.	28792.

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NC3-1-2 TELECON

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
272	BATTERY	4	85.0	0.0	.10	201201.0	92088.	332382.	374792.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	820.0	1.00	3330217.	1143344.	2471285.	781204.
WIRING HARNESS	240.0	1.00	856339.	503769.	576664.	200880.
THERMAL CONTROL	225.0	1.00	1852133.	431205.	311344.	434475.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	125.0	1.00	1209143.	796920.	574169.	283641.
STRUCTURE	2600.0	1.00	8828037.	8687091.	4694185.	2070887.
POWER CONTRL UNITS	200.0	.50	2609939.	284420.	614761.	612241.
SOLAR ARRAY DRIVE	85.0	1.00	2031007.	1279044.	1382297.	476435.
SATELLITE ADAPTER	290.0	1.00	475254.	399539.	92278.	111488.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	7200.0					
TOTAL SATELLITE WEIGHT	13200.0					

78-11A

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
NC3-1-3 TELECON-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 99000. ARRAY AREA = 3360.0 SQ FT BATT CAP = 400. AMP-HR

VII-85

SPACECRAFT COST MODEL

NC3-1-3 TELECON-2

(MILLIONS OF 1977 DOLLARS)

98-111A

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	25.0	16.9	41.9	10.0	23.8	33.8
THERMAL CONTROL	3.1	.6	3.7	1.2	1.0	2.2
ELECTRICAL POWER	18.6	5.2	23.8	9.0	24.1	33.1
COMMUNICATIONS	2.1	1.0	3.1	2.7	3.2	5.9
DATA HANDLING	16.7	.6	17.3	27.8	5.1	32.8
STABILITY AND CONTROL	8.3	5.8	14.1	20.8	8.1	28.9
AUXILIARY PROPULSION	2.1	1.3	3.4	1.6	2.3	3.9
SPACECRAFT MISSION EQUIPMENT	75.9	31.4	107.3	73.1	67.6	140.6
			365.9			405.9
SATELLITE QUALIFICATION UNIT(S)			473.3			546.5
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			4.9			
CONTRACTOR FEE			7.9			2.8
						10.0
TOTAL SATELLITE			485.0			559.3
AVERAGE UNIT COST ( 2 SATELLITES)						279.7
TOTAL SATELLITE DDT+E AND RECURRING COST						1045.3

NC3-1-3 TELECON-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.0	79920.	58295.	56479.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.0	37829.	158531.	171774.
1206	EARTH SENSOR	4	9.8	6.5	.10	104434.0	61112.	530763.	395751.
1318	REACTION WHEEL	4	19.5	19.5	.25	93442.0	87126.	168847.	141639.
1901	CONTROL ELECT.	5	10.3	26.5	2.00	4001851.0	3847828.	1288557.	4111754.
2115	STAR SENSOR ASSY	4	23.0	8.0	.10	329587.0	103230.	641190.	1248959.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	18	.6	0.0	.10	18323.0	91143.	141567.	144007.
842	THRUSTER	6	1.0	0.0	.10	15893.0	44132.	74353.	73313.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048795.0	185454.	376203.	567887.
209	DIGITAL TELEMETRY	4	18.5	14.0	.40	2905494.0	90096.	602362.	2752570.
430	COMMAND DIST UNIT	3	26.0	4.8	.40	5383671.0	152967.	801308.	4848099.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.0	6850.	41954.	13441.
203	ANTENNA	2	19.4	0.0	1.00	462041.0	268784.	143014.	221512.
221	ANTENNA	2	5.8	0.0	1.00	288220.0	182284.	94241.	138178.
326	TRANSMITTER	2	8.0	25.0	.25	100358.0	34419.	203637.	108691.
345	TRANSMITTER	2	13.0	130.0	.25	142702.0	50553.	273099.	154550.
401	RECEIVER	2	3.9	6.3	.25	21487.0	10529.	46506.	23271.
424	RECEIVER	3	5.0	3.0	.25	58864.0	34046.	148204.	77605.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.0	30796.	37476.	9662.
509	COMMAND SIG COND	1	19.7	15.0	1.00	81652.0	81652.	93842.	16313.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.0	25814.	34720.	29909.

VII-87



NC3-1-3 TELECON-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
275	BATTERY	2	100.0	0.0	.10	269075.1	62846.	229439.	520540.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	2350.0	1.00	6846729.	3031057.	6967963.	1367928.
WIRING HARNESS	250.0	1.00	886501.	521513.	634926.	177117.
THERMAL CONTROL	250.0	1.00	1825952.	463135.	352188.	364812.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	125.0	1.00	1209143.	796920.	610668.	241578.
STRUCTURE	2750.0	1.00	10571789.	9111289.	5236384.	2112169.
POWER CONTRL UNITS	200.0	.25	2919121.	142210.	653841.	583220.
SOLAR ARRAY DRIVE	200.0	1.00	3627971.	2647007.	3042543.	724843.
SATELLITE ADAPTER	300.0	1.00	489159.	494575.	100110.	97730.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	8800.0					
TOTAL SATELLITE WEIGHT	16500.0					

88-111

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NC A-1-2 MAIL-II*

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 15000. ARRAY AREA = 1000.0 SQ FT BATT CAP = 180. AMP-HR

V11-89

SPACECRAFT COST MODEL

NC4-1-2 MAIL-II

(MILLIONS OF 1977 DOLLARS)

VII-90

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	16.5	9.9	26.4	11.6	18.8	30.4
THERMAL CONTROL	2.9	.4	3.4	2.1	1.0	3.1
ELECTRICAL POWER	11.4	2.6	13.9	9.2	14.6	23.7
COMMUNICATIONS	2.1	1.0	3.1	3.9	4.6	8.5
DATA HANDLING	17.8	.8	18.6	29.5	7.5	37.0
STABILITY AND CONTROL	8.3	5.8	14.1	28.4	11.7	40.1
AUXILIARY PROPULSION	2.1	1.3	3.4	2.5	3.4	5.9
SPACECRAFT MISSION EQUIPMENT	61.1	21.8	82.9 241.8	87.1	61.6	148.7 364.3
SATELLITE QUALIFICATION UNIT(S)			324.7 0.0			512.9
GSE (AGE)			4.1			3.5
LAUNCH SITE SUPPORT						10.6
CONTRACTOR FEE			5.1			
TOTAL SATELLITE			335.0			527.0
AVERAGE UNIT COST ( 3 SATELLITES)						175.7
TOTAL SATELLITE DDT+E AND RECURRING COST						862.0

NC4-1-2 MAIL-II

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81535.1	79920.	54810.	51745.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	156734.	165402.
1206	EARTH SENSOR	4	9.8	6.5	.10	104434.1	61112.	524745.	381069.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.1	87126.	166932.	136384.
1901	CONTROL ELECT.	5	19.3	26.5	2.00	400185.1	3847828.	1211540.	3626769.
2115	STAR SENSOR ASSY	4	23.0	8.0	.10	329587.1	103230.	633920.	1202624.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	18	.6	0.0	.10	18323.1	91143.	139962.	138664.
842	THRUSTER	6	1.0	0.0	.10	15899.1	44132.	73510.	70593.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP. PROCESR	2	15.0	20.0	.50	1048705.1	185454.	371938.	546820.
209	DIGITAL TELEMETRY	4	13.5	14.0	.60	3943318.1	135145.	595533.	1850787.
430	COMMAND DIST UNIT	3	26.0	4.8	.60	6389464.1	229450.	792222.	3379700.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	41479.	12942.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	134466.	213237.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	88608.	133017.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	201328.	104658.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	270002.	148817.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45979.	22407.
424	RECEIVER	3	5.0	3.0	.25	58854.1	34046.	146524.	74726.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	35236.	9301.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	88233.	19154.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	32645.	28792.

VII-91

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NC4-1-2 MAIL-II

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
272	BATTERY	3	80.0	0.0	.10	140350.	71662.	258657.	261459.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	690.0	1.00	2931201.	974450.	2106228.	687603.
WIRING HARNESS	190.0	1.00	702440.	413233.	473028.	164779.
THERMAL CONTROL	145.0	1.00	1719427.	320119.	240777.	403344.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	125.0	1.00	1209143.	796920.	574169.	283641.
STRUCTURE	1600.0	1.00	7508510.	5749751.	3106954.	1761351.
POWER CONTROL UNITS	180.0	.75	2903523.	401128.	578013.	681134.
SOLAR ARRAY DRIVE	75.0	1.00	1855755.	1149957.	1242789.	437672.
SATELLITE ADAPTER	180.0	1.00	316868.	305981.	69812.	74331.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	5400.0					
TOTAL SATELLITE WEIGHT	9900.0					

VII-92

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NLS-1-1 TVBCST-1*

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 10000.      ARRAY AREA = 800.0 SQ FT      BATT CAP = 150. AMP-HR

V11-93

SPACECRAFT COST MODEL

NC5-1-1 TV BCST-1'

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	15.0	9.4	24.5	17.8	27.3	45.1
THERMAL CONTROL	2.8	.4	3.2	3.3	1.5	4.8
ELECTRICAL POWER	9.5	2.2	11.7	12.8	19.4	32.1
COMMUNICATIONS	2.1	1.0	3.1	6.0	7.4	13.4
DATA HANDLING	16.2	.8	17.0	41.8	12.2	54.0
STABILITY AND CONTROL	8.3	5.8	14.1	41.0	18.6	59.6
AUXILIARY PROPULSION	2.1	1.3	3.4	4.1	5.3	9.4
SPACECRAFT MISSION EQUIPMENT	56.0	20.9	77.0	126.7	91.7	218.4
			205.9			484.2
SATELLITE QUALIFICATION UNIT(S)			283.8			702.6
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			3.9			5.6
CONTRACTOR FEE			5.7			15.7
TOTAL SATELLITE			293.4			723.8
AVERAGE UNIT COST ( 5 SATELLITES)						144.8
TOTAL SATELLITE DDT+E AND RECURRING COST						1017.2

76-11A

NC5-1-1 IV BCS1-1

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.1	79920.	50716.	44363.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	153635.	154889.
1206	EARTH SENSOR	4	9.8	6.5	.10	104434.	61112.	514372.	356848.
1318	REACTION WHEEL	4	17.5	10.5	.25	93442.1	87126.	163632.	127715.
1901	CONTROL ELECT.	5	10.3	26.5	2.00	4001851.1	3847828.	1121029.	3012857.
2115	STAR SENSOR ASSY	4	23.0	8.0	.10	329587.1	103230.	621388.	1126184.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	18	.6	0.0	.10	18323.1	91143.	137195.	129851.
842	THRUSTER	6	1.0	0.0	.10	15893.1	44132.	72057.	66106.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.1	185454.	364585.	512063.
209	DIGITAL TELEMETRY	4	18.5	14.0	.60	2713383.1	135145.	583760.	1545253.
430	COMMAND DIST UNIT	3	26.0	4.8	.60	5762903.1	229450.	776561.	2854529.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	40659.	12120.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	124421.	189891.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.	81988.	118454.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	197348.	98006.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	264665.	139358.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45070.	20983.
424	RECEIVER	3	5.0	3.0	.25	59864.1	34046.	143627.	69976.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	32603.	8283.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	81642.	19314.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	30206.	25640.

56-11A



NC5-1-1 IV BCST-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	3	70.0	0.0	.10	120979.1	65093.	230303.	211033.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	550.0	1.00	2507314.	789880.	1579741.	593096.
WIRING HARNESS	175.0	1.00	655122.	385397.	408206.	154967.
THERMAL CONTROL	135.0	1.00	1651562.	304979.	213667.	390671.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	125.0	1.00	1209143.	796920.	531274.	286018.
STRUCTURE	1530.0	1.00	5855323.	5535218.	2767576.	1621602.
POWER CONTRL UNITS	165.0	.75	2290481.	381221.	508289.	541805.
SOLAR ARRAY DRIVE	65.0	1.00	1693249.	1018254.	1018241.	400532.
SATELLITE ADAPTER	170.0	1.00	301941.	273614.	62472.	71399.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	4600.0					
TOTAL SATELLITE WEIGHT	8800.0					

VII-96

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
NCS-1-R TVBCST-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 40000. ARRAY AREA = 1575.0 SQ FT BATT CAP = 400. ANP-HR

VII-97

SPACECRAFT COST MODEL

NC5-1-2 TV BCST-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	19.4	11.9	31.3	18.6	29.4	48.0
THERMAL CONTROL	3.5	.5	4.0	3.3	1.5	4.8
ELECTRICAL POWER	14.6	3.4	17.9	16.8	26.7	43.6
COMMUNICATIONS	2.1	1.0	3.1	5.0	6.0	11.0
DATA HANDLING	17.3	.7	18.0	43.6	9.9	53.5
STABILITY AND CONTROL	8.3	5.8	14.1	35.0	15.2	50.2
AUXILIARY PROPULSION	2.1	1.3	3.4	3.3	4.3	7.7
SPACECRAFT MISSION EQUIPMENT	67.3	24.6	91.8	125.6	93.0	218.7
SATELLITE QUALIFICATION UNIT(S)			374.3			763.3
GSE (AGE)			3.0			
LAUNCH SITE SUPPORT			4.5			5.0
CONTRACTOR FEE			6.7			15.7
TOTAL SATELLITE			385.5			783.9
AVERAGE UNIT COST ( 4 SATELLITES)						196.0
TOTAL SATELLITE DDT+E AND RECURRING COST						1169.4

86-1198

NC5-1-2 TV 8CST-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
209	VALVE DRIVER	3	1.8	35.2	1.00	81585.1	79920.	52465.	47673.
1112	RATE GYRO ASSY	3	3.3	8.8	.50	260582.1	37829.	155112.	159828.
1206	EARTH SENSOR	4	9.8	6.5	.10	104434.1	61112.	519317.	368229.
1318	REACTION WHEEL	4	19.5	10.5	.25	93442.1	87126.	165206.	131789.
1901	CONTROL ELECT.	5	10.3	25.5	2.00	4001851.1	3947828.	1159704.	3277148.
2115	STAR SENSOR ASSY	4	23.0	8.0	.10	329587.1	103230.	627363.	1162101.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	18	.6	0.0	.10	18323.1	91143.	138514.	133992.
842	THRUSTER	6	1.0	0.0	.10	15893.1	44132.	72750.	68215.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
109	GEN PURP PROCESR	2	15.0	20.0	.50	1048705.1	185454.	368091.	528394.
209	DIGITAL TELEMETRY	4	13.5	14.0	.50	2980749.1	112621.	589372.	2101985.
430	COMMAND DIST UNIT	3	26.0	4.8	.50	6157225.1	191209.	784028.	3776539.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	.25	12410.1	6850.	41050.	12506.
203	ANTENNA	2	10.4	0.0	1.00	462041.1	268784.	128713.	201169.
221	ANTENNA	2	5.8	0.0	1.00	288220.1	182284.1	84817.	125488.
326	TRANSMITTER	2	8.0	25.0	.25	100358.1	34419.	199245.	101132.
345	TRANSMITTER	2	13.0	130.0	.25	142702.1	50553.	267209.	143802.
401	RECEIVER	2	3.9	6.3	.25	21487.1	10529.	45503.	21652.
424	RECEIVER	3	5.0	3.0	.25	58864.1	34046.	145008.	72208.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	33728.	8775.
509	COMMAND SIG COND	1	10.7	15.0	1.00	81652.1	81652.	84458.	19573.
612	DIPLEXER ASSY	2	3.0	0.0	1.00	62386.1	25814.	31248.	27162.

66-111-99

NC5-1-2 TV BCST-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
275	BATTERY	4	100.0	0.0	.10	269076.1	103519.	369777.	484339.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	1100.0	1.00	4028489.	1500773.	3105061.	965669.
WIRING HARNESS	230.0	1.00	825983.	485912.	532425.	197997.
THERMAL CONTROL	180.0	1.00	2039389.	370663.	261552.	488862.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	125.0	1.00	1209143.	796920.	549602.	289844.
STRUCTURE	1905.0	1.00	8641322.	6668955.	3449474.	2071412.
POWER CONTROL UNITS	270.0	.50	3435901.	339004.	701392.	823620.
SOLAR ARRAY DRIVE	110.0	1.00	2418965.	1592441.	1647360.	579851.
SATELLITE ADAPTER	205.0	1.00	353906.	369939.	72108.	84835.
PROPELLANT WEIGHT	500.0					
MISSION EQUIP WEIGHT	6500.0					
TOTAL SATELLITE WEIGHT	12100.0					

V11-100

SPACECRAFT COST MODEL

NP1-1-2 HEAO-D

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	18.2	3.8	22.0	12.8	7.0	19.8
THERMAL CONTROL	1.6	.4	2.0	1.1	.9	2.1
ELECTRICAL POWER	7.8	2.7	10.5	6.0	10.8	16.8 ✓
COMMUNICATIONS	1.5	.6	2.1	1.8	1.6	3.4
DATA HANDLING	15.0	.9	16.0	23.8	2.8	26.5
STABILITY AND CONTROL	4.2	1.6	5.8	4.4	3.4	7.8
AUXILIARY PROPULSION	2.3	1.3	3.6	2.3	3.2	5.5
SPACECRAFT MISSION EQUIPMENT	50.7	11.3	62.0 11.4	52.2	29.7	81.9 17.8
SATELLITE QUALIFICATION UNIT(S)			73.3 0.0			99.7
GSE (AGE)			3.6			
LAUNCH SITE SUPPORT						2.3
CONTRACTOR FEE			4.6			5.9
TOTAL SATELLITE			81.5			107.9
AVERAGE UNIT COST ( 3 SATELLITES)						36.0
TOTAL SATELLITE DDT+E AND RECURRING COST						189.4

VII-101

NP1-1-2 HEAD-D

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1322	REACTION WHEEL	1	31.0	10.0	1.00	98701.	39694.	21447.	23153.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	32645.	28313.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	315942.	275122.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	429049.	533024.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	99239.	93676.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41909.	41743.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	.40	2432527.	55624.	204263.	1585471.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	408520.	316890.
403	CDU	1	12.3	7.5	.40	5918273.	19128.	39022.	2756107.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	89644.	213237.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	78763.	46846.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	81094.	48488.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

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NP1-1-2 HEAD-0

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
260	BATTERY	2	47.5	0.0	.10	61962.	36770.	132719.	115421.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	152.5	1.00	1012410.	240820.	520522.	237492.
WIRING HARNESS	687.8	1.00	2091192.	1230213.	1408224.	490553.
THERMAL CONTROL	126.3	1.00	956246.	291511.	222093.	224317.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	137.6	1.00	1334007.	857673.	617940.	312932.
STRUCTURE	443.6	1.00	9295189.	1932368.	1044181.	2180471.
POWER CONTROL UNITS	124.4	1.00	1418832.	430881.	465665.	332830.
SOLAR ARRAY DRIVE	25.3	1.00	893061.	456596.	493455.	209495.
SATELLITE ADAPTER	320.7	1.00	517703.	360381.	97873.	121443.
PROPELLANT WEIGHT	290.1					
MISSION EQUIP WEIGHT	9300.0					
TOTAL SATELLITE WEIGHT	11889.0					

VII-103

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**\*\* SATELLITE SYSTEMS COST MODEL \*\***

*NPI-13 HEAD-E*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**

CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**

CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**

APOGEE = 250. NUMBER OF QUAL UNITS = 0  
BOL POWER = 2697. ARRAY AREA = 219.0 SQ FT BATT CAP = 66. AMP-HR

*701-111*

SPACECRAFT COST MODEL

NP1-1-3 HEAC-E

(MILLIONS OF 1977 DOLLARS)

VII-105

SUBSYSTEM COST	-----DOT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	18.2	3.8	22.0	17.5	8.9	26.3
THERMAL CONTROL	1.6	.4	2.0	1.6	1.2	2.8
ELECTRICAL POWER	7.8	2.7	10.5	8.1	13.8	21.9
COMMUNICATIONS	1.5	.6	2.1	2.3	2.0	4.3
DATA HANDLING	15.0	.9	16.0	30.5	3.6	34.1
STABILITY AND CONTROL	4.2	1.6	5.8	5.7	4.3	10.0
AUXILIARY PROPULSION	2.3	1.3	3.6	3.1	4.2	7.2
SPACECRAFT MISSION EQUIPMENT	50.7	11.3	62.0	68.7	37.9	106.7
			11.4			22.1
SATELLITE QUALIFICATION UNIT(S)			73.3			128.8
USE (AGE)			0.0			
LAUNCH SITE SUPPORT			3.6			
CONTRACTOR FEE			4.6			3.1
						7.7
TOTAL SATELLITE			81.5			139.5
AVERAGE UNIT COST ( 4 SATELLITES)						34.9
TOTAL SATELLITE DOT+E AND RECURRING COST						221.1

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NP1-1-3 HEAC-E

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1322	REACTION WHEEL	1	31.0	10.0	1.00	98701.	39694.	20529.	23660.
1601	VALVE IRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	98213.	90519.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41476.	40336.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	.40	2432527.	55624.	202150.	1532048.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	CDU	1	12.3	7.5	.40	5918273.	19128.	38618.	2663239.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	85809.	201169.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	75393.	44195.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	77625.	45744.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

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NP1-1-3 HEAO-E

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
260	BATTERY	2	47.5	0.0	.10	61962.	36770.	131346.	111532.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	152.5	1.00	1012410.	240820.	498251.	242685.
WIRING HARNESS	687.8	1.00	2091192.	1230213.	1347973.	501280.
THERMAL CONTROL	126.3	1.00	956246.	291511.	212591.	229222.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	137.6	1.00	1334007.	857673.	591501.	319775.
STRUCTURE	443.6	1.00	9295189.	1932368.	999505.	2228151.
POWER CONTROL UNITS	124.4	1.00	1418832.	430881.	445741.	340188.
SOLAR ARRAY DRIVE	25.3	1.00	893061.	456596.	472343.	214076.
SATELLITE ADAPTER	320.7	1.00	517703.	360381.	93686.	124099.
PROPELLANT WEIGHT	290.1					
MISSION EQUIP WEIGHT	9300.0					

TOTAL SATELLITE WEIGHT 11889.0

VII-107

\*\* SATELLITE SYSTEMS COST MODEL \*\*

NP1-4A VLBI

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - SEPARATE UFLINK AND DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 100000. NUMBER OF QUAL UNITS = 0  
BOL POWER = 212. ARRAY AREA = 65.0 SQ FT BATT CAP = 30. AMP-HR

V11-108

SPACECRAFT COST MODEL

NP1-1-4A VLBI

(MILLIONS OF 1977 DOLLARS)

VII-109

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	3.8	1.2	5.0	1.5	1.4	3.0
THERMAL CONTROL	1.0	1.4	2.4	.4	.3	.7
ELECTRICAL POWER	2.8	1.4	4.2	1.3	3.0	4.4
COMMUNICATIONS	.7	.7	1.4	.3	.6	.9
DATA HANDLING	6.0	.3	6.2	2.4	.6	3.0
STABILITY AND CONTROL	2.7	.8	3.4	1.2	1.1	2.3
AUXILIARY PROPULSION	1.5	.7	2.2	.8	1.3	2.1
SPACECRAFT MISSION EQUIPMENT	18.5	6.4	24.9	8.0	8.3	16.3
			4.0			3.8
SATELLITE QUALIFICATION UNIT(S)			28.9			20.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			.7
CONTRACTOR FEE			1.9			1.2
.. TOTAL SATELLITE			32.4			22.0
... AVERAGE UNIT COST ( 2 SATELLITES)						11.0
TOTAL SATELLITE DDT+E AND RECURRING COST						54.4

NP1-1-4A VLBI

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
803	EARTH SENSOR	2	1.3	0.0	1.00	142702.	55025.	73298.	68414.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45752.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	823441.	139061.	159823.	164518.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	2696267.	47819.	54958.	538695.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
206	ANTENNA	1	1.5	0.0	1.00	130270.	174226.	33296.	26027.
227	ANTENNA	1	.8	0.0	1.00	74525.	110290.	20284.	14890.
398	TRANSMITTER	1	2.1	16.0	1.00	136863.	168631.	69808.	27344.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.

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NP1-1-4A VLBI

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
227	BATTERY	2	30.4	0.0	.10	32 587.	26634.	97235.	63042.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	32.1	1.00	43 2598.	56886.	130774.	86430.
WIRING HARNESS	65.8	1.00	28 5813.	168139.	204704.	57103.
THERMAL CONTROL	25.4	1.00	60 3593.	982610.	92429.	120594.
POWER CONVERTERS	15.9	1.00	59 0016.	367568.	211246.	117881.
PROPULSION FEED SYS	64.9	1.00	85 3333.	482665.	369859.	170490.
STRUCTURE	162.3	1.00	20 96761.	822087.	472465.	418918.
POWER CONTROL UNITS	97.2	1.00	32 0459.	372969.	428701.	64025.
SATELLITE ADAPTER	55.4	1.00	11 6380....	49488.	37266.	23252.

PROPELLANT WEIGHT 68.0

MISSION EQUIP WEIGHT 750.0

TOTAL SATELLITE WEIGHT 1454.9

VI-111



\*\* SATELLITE SYSTEMS COST MODEL \*\*

NPI-1-AB VLBI-B

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 375. ARRAY AREA = 116.0 SQ FT BATT CAP = 24. AMP-HR

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SPACECRAFT COST MODEL

NP1-1-4B VLBI-B

(MILLIONS OF 1977 DOLLARS)

VII-113

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	3.8	1.9	5.7	1.5	2.3	3.8
THERMAL CONTROL	.9	.2	1.0	.3	.3	.7
ELECTRICAL POWER	3.4	1.3	4.7	1.5	3.0	4.5
COMMUNICATIONS	.7	.2	.9	.3	.5	.8
DATA HANDLING	5.8	.3	6.1	2.3	.6	2.9
STABILITY AND CONTROL	3.0	.8	3.8	1.2	1.2	2.4
AUXILIARY PROPULSION	1.5	.7	2.2	.7	1.1	1.8
SPACECRAFT MISSION EQUIPMENT	19.1	5.4	24.5	7.9	9.0	16.9
			4.0			3.8
SATELLITE QUALIFICATION UNIT(S)			28.5			20.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.8			1.7
CONTRACTOR FEE			1.8			1.2
TOTAL SATELLITE			32.1			22.7
AVERAGE UNIT COST ( 2 SATELLITES)						11.3
TOTAL SATELLITE DDT+E AND RECURRING COST						54.7

NP1-1-4B VLBI-B

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	108233.	71375.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	1	.7	.1	.10	10283.	14762.	13083.	10893.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	797174.	139061.	159823.	159270.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2618784.	47819.	54958.	523214.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
206	ANTENNA	1	1.5	0.0	1.00	86846.	43556.	19978.	17351.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	2170.	9926.
342	TRANSMITTER	1	3.0	70.0	1.00	177223.	37296.	6800.	35408.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	5975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	7476.	9662.

VIIIA

NP1-1-4B VLBI-B

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
	221 BATTERY	2	25.3	0.0	.10	27169.	23363.	85293.	52559.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	57.0	1.00	648883.	96811.	222555.	129642.
WIRING HARNESS	65.0	1.00	282863.	166404.	202591.	56514.
THERMAL CONTROL	35.2	1.00	504913.	122591.	111868.	100878.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	65.6	1.00	899590.	486643.	372907.	179732.
STRUCTURE	284.5	1.00	2081683.	1324698.	761322.	415906.
POWER CONTROL UNITS	62.4	1.00	447377.	287787.	330790.	89383.
SATELLITE ADAPTER	65.6	1.00	134358.	53107.	41139.	26844.
PROPELLANT WEIGHT	72.8					
MISSION EQUIP WEIGHT	750.0					

TOTAL SATELLITE WEIGHT 1574.2

NILES

NLI-1-6 SO/T LNDR

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	I.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
NUCLEAR POWER UNIT	525.0	1.00	4649079.	14123328.	9017745.	0.
WIRING HARNESS	381.9	1.00	1269753.	746974.	1010461.	0.
THERMAL CONTROL	65.5	1.00	844268.	186774.	178747.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	69.7	1.00	876678.	509744.	434009.	0.
STRUCTURE	806.3	1.00	3226447.	3211214.	2050583.	0.
SATELLITE ADAPTER	178.1	1.00	314023.	105859.	81989.	0.
PROPELLANT WEIGHT	164.2					
MISSION EQUIP WEIGHT	1000.0					

TOTAL SATELLITE WEIGHT 3320.6

VII-116

SPACECRAFT COST MODEL

NP1-1-5 GW DTCTR

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.6	.7	3.4	1.9	1.6	3.4
THERMAL CONTROL	.4	.1	.5	.3	.3	.6
ELECTRICAL POWER	1.8	.5	2.3	1.4	2.2	3.7
COMMUNICATIONS	.7	.3	1.0	.6	.9	1.6
DATA HANDLING	3.2	.3	3.4	2.7	1.4	4.1
STABILITY AND CONTROL	4.0	1.1	5.1	2.8	2.5	5.4
AUXILIARY PROPULSION	.9	.5	1.4	1.1	1.3	2.4
SPACECRAFT MISSION EQUIPMENT	13.7	3.5	17.2	10.9	10.3	21.2
			21.6			26.8
SATELLITE QUALIFICATION UNIT(S)			38.8			47.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.4			
CONTRACTOR FEE			1.3			1.0
						1.5
TOTAL SATELLITE			41.5			50.5
AVERAGE UNIT COST ( 3 SATELLITES)						16.8
TOTAL SATELLITE DDT+E AND RECURRING COST						92.0

VII-117

NP1-1-5 GW DTCTR

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

.. STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	21878.	23497.
1601	VALVE DRIVER ASSY	1	1.6	1.0	1.00	55145.	30236.	18136.	12936.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	315942.	275122.
2203	CONTROL ELECTRNCS	1	7.1	62.0	1.00	1038161.	441025.	238360.	243532.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	75994.	72844.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23283.	26809.

.. DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	445897.	139061.	270487.	205786.
403	CDU	1	12.3	7.5	1.00	1410976.	47819.	51673.	330988.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	13732.	25509.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	43757.	21404.
312	TRANSMITTER	1	2.2	15.8	1.00	94439.	29171.	45052.	22154.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIFLEXER	1	3.1	1.0	1.00	97409.	15451.	18568.	13467.

VII-118

NP1-1-5 GW ETCTR

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
213	BATTERY	2	13.5	0.0	.10	21490.	14824.	53505.	40032.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	32.4	1.00	344758.	57379.	124021.	80874.
WIRING HARNESS	24.2	1.00	122377.	71993.	82410.	28707.
THERMAL CONTROL	21.6	1.00	226613.	88037.	79044.	53159.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	32.0	1.00	524420.	281008.	202462.	123019.
STRUCTURE	67.4	1.00	1202235.	389500.	210472.	282021.
POWER CONTROL UNITS	47.8	1.00	573305.	246237.	266115.	134486.
SOLAR ARRAY DRIVE	5.4	1.00	313421.	122861.	132779.	73523.
SATELLITE ADAPTER	23.6	1.00	37565.	22746.	21269.	8812.
PROPELLANT WEIGHT	27.3					
MISSION EQUIP WEIGHT	250.0					
TOTAL SATELLITE WEIGHT	635.7					

611-11A



\*\* SATELLITE SYSTEMS COST MODEL \*\*

NPI-1-6 GP B/K

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 280.1      NUMBER OF QUAL UNITS = 0  
BOL POWER = 346.4      ARRAY AREA = 114.0 SQ FT      BATT CAP = 8. AMP-HR

VII-120

145

SPACECRAFT COST MODEL

NP1-1-6 GP B/C

(MILLIONS OF 1977 DOLLARS)

VII-121

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.7	1.9	5.6	1.5	2.2	3.7
THERMAL CONTROL	.4	.2	.6	.2	.3	.5
ELECTRICAL POWER	3.3	1.2	4.5	1.4	2.6	4.0
COMMUNICATIONS	.6	.2	.8	.2	.5	.7
DATA HANDLING	5.9	.3	6.1	2.3	.6	3.0
STABILITY AND CONTROL	3.0	.8	3.8	1.2	1.2	2.4
AUXILIARY PROPULSION	1.3	.7	2.0	.8	1.2	1.9
SPACECRAFT MISSION EQUIPMENT	18.3	5.1	23.4	7.6	8.6	16.2
			35.5			33.7
SATELLITE QUALIFICATION UNIT(S)			58.9			49.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.8			.7
						1.2
TOTAL SATELLITE			62.4			51.8
AVERAGE UNIT COST ( 2 SATELLITE)						25.9
TOTAL SATELLITE DDT+E AND RECURRING COST						114.2

NP1-1-6 GP B/C

\*\*\* ASSEMBLY DESCRIPTIONS \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	108233.	71375.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	805967.	139061.	159823.	161027.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	2644751.	47819.	54958.	528403.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	8114.	9226.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	46538.	18230.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	20820.	3619.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

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NP1-1-6 GP B/C

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
204	BATTERY	2	8.6	0.0	.10	11097.	10743.	39220.	21468.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	55.8	1.00	641031.	94922.	218213.	128073.
WIRING HARNESS	62.0	1.00	271753.	159868.	194634.	54294.
THERMAL CONTROL	32.8	1.00	248365.	116860.	107341.	49622.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	56.2	1.00	777696.	432342.	331297.	155378.
STRUCTURE	275.3	1.00	2068866.	1288197.	740345.	413345.
POWER CONTROL UNITS	43.7	1.00	426801.	233652.	268566.	85272.
SATELLITE ADAPTER	65.7	1.00	134533.	52435.	41175.	26879.

PROPELLANT WEIGHT 48.6

MISSION EQUIP WEIGHT 830.0

TOTAL SATELLITE WEIGHT 1554.0

VII-123

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
NP11-7 ADV REL X

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 280. NUMBER OF QUAL UNITS = 0  
BOL POWER = 346. ARRAY AREA = 114.0 SQ FT BATT CAP = 8. AMP-HR

VII-124

SPACECRAFT COST MODEL

NP1-1-7 ADV REL X

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.7	1.9	5.6	1.5	2.2	3.7
THERMAL CONTROL	.4	.2	.6	.2	.3	.5
ELECTRICAL POWER	2.4	.8	3.3	1.0	1.6	2.7
COMMUNICATIONS	.6	.2	.8	.2	.5	.7
DATA HANDLING	5.9	.3	6.1	2.3	.6	3.0
STABILITY AND CONTROL	3.0	.8	3.8	1.2	1.2	2.4
AUXILIARY PROPULSION	1.3	.7	2.0	.8	1.2	1.9
SPACECRAFT MISSION EQUIPMENT	17.4	4.8	22.2	7.3	7.6	14.9
			35.5			33.7
SATELLITE QUALIFICATION UNIT(S)			57.7			48.6
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			.7
CONTRACTOR FEE			1.7			1.1
TOTAL SATELLITE			61.0			50.3
AVERAGE UNIT COST ( 2 SATELLITES)						25.2
TOTAL SATELLITE DDT+E AND RECURRING COST						111.4

VII-12.5

\*\*\* ASSEMBLY DESCRIPTIONS \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	108233.	71375.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	805967.	139061.	159823.	161027.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2644751.	47819.	54958.	528403.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	8114.	9926.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	46538.	18230.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	20820.	3619.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

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ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
204	BATTERY	2	8.6	0.0	.10	11097.	10743.	39220.	21468.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	55.8	1.00	129152.	40227.	92477.	25804.
WIRING HARNESS	62.0	1.00	271753.	159868.	194634.	54294.
THERMAL CONTROL	32.8	1.00	248365.	116860.	107341.	49622.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	56.2	1.00	777696.	432342.	331297.	155378.
STRUCTURE	275.3	1.00	2068866.	1288197.	740345.	413345.
POWER CONTROL UNITS	43.7	1.00	426801.	32044.	36832.	85272.
SATELLITE ADAPTER	65.7	1.00	134533.	52435.	41175.	26879.

PROPELLANT WEIGHT 48.6

MISSION EQUIP WEIGHT 830.0

TOTAL SATELLITE WEIGHT 1554.0

VII-127



**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NPL-8 EXPLORER*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - SPIN CONTROL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**

APOGEE = 0. NUMBER OF QUAL UNITS = 0  
BDL POWER = 183. ARRAY AREA = 42.0 SQ FT BATT CAP = 6. AMP-HR

VII-128

SPACECRAFT COST MODEL

NP1-1-8 EXPLORER

(MILLIONS OF 1977 DOLLARS)

VII-129

SUBSYSTEM COST	DDT+E			RECURRING		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	2.0	.6	2.6	.8	.7	1.5
THERMAL CONTROL	.4	.1	.5	.2	.2	.4
ELECTRICAL POWER	2.3	.9	3.2	1.0	1.9	2.8
COMMUNICATIONS	1.2	.4	1.5	.5	.6	1.1
DATA HANDLING	2.8	.3	3.0	1.1	.6	1.7
STABILITY AND CONTROL	1.2	.2	1.4	.5	.5	1.0
AUXILIARY PROPULSION	1.3	.7	2.0	.8	1.2	1.9
SPACECRAFT MISSION EQUIPMENT	11.2	3.1	14.3	4.8	5.6	10.4
			2.3			2.2
SATELLITE QUALIFICATION UNIT(S)			16.6			12.5
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.2			
CONTRACTOR FEE			1.1			.6
						.8
TOTAL SATELLITE			18.9			13.9
AVERAGE UNIT COST ( 2 SATELLITES)						6.9
TOTAL SATELLITE DDT+E AND RECURRING COST						32.8

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NP1-1-8 EXPLORER

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
503	GIMBAL ELECTRONCS	1	6.3	31.6	1.00	0.	0.	0.	0.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	108233.	71375.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	359982.	139061.	159823.	71922.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1281027.	47819.	54958.	255940.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	52968.	82978.
309	TRANSMITTER	1	1.8	8.8	1.00	81652.	24908.	42405.	16313.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	20820.	3619.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

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NP1-1-8 EXPLORER

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202	BATTERY	1	19.0	0.0	.10	8778.	11541.	42134.	16081.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	20.6	1.00	318655.	37725.	86724.	63665.
WIRING HARNESS	25.6	1.00	128355.	75509.	91930.	25644.
THERMAL CONTROL	19.2	1.00	223898.	81280.	78471.	44733.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	56.2	1.00	777696.	432342.	331297.	155378.
STRUCTURE	71.9	1.00	1128728.	411497.	236493.	225512.
POWER CONTROL UNITS	31.1	1.00	294035.	191493.	220107.	58746.
SATELLITE ADAPTER	21.9	1.00	35252.	21209.	21653.	7043.
PROPELLANT WEIGHT	48.6					
MISSION EQUIP WEIGHT	200.0					
TOTAL SATELLITE WEIGHT	590.1					

VI-131

\*\* SATELLITE SYSTEMS COST MODEL \*\*

*NP2-1-1 SMM*

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 310. NUMBER OF QUAL UNITS = 0  
BOL POWER = 944. ARRAY AREA = 76.7 SQ FT BATT CAP = 24. AMP-HR

V11-132

SPACECRAFT COST MODEL

NP2-1-1 SMM

(MILLIONS OF 1977 DOLLARS)

11-13

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.5	1.3	6.8	8.7	5.2	13.9
THERMAL CONTROL	.6	.1	.7	.9	.8	1.8
ELECTRICAL POWER	2.7	.8	3.5	4.8	6.8	11.6
COMMUNICATIONS	1.5	.6	2.1	3.5	3.2	6.7
DATA HANDLING	8.2	.3	8.4	15.0	2.8	17.8
STABILITY AND CONTROL	4.3	1.6	5.9	8.9	7.1	16.0
AUXILIARY PROPULSION	1.4	.8	2.1	3.5	4.3	7.8
SPACECRAFT MISSION EQUIPMENT	4.2	5.4	29.6 4.9	45.3	30.3	75.6 16.6
SATELLITE QUALIFICATION UNIT(S)			34.5			92.2
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.1			3.1
CONTRACTOR FEE			2.2			5.5
TOTAL SATELLITE			38.8			100.9
(AVERAGE UNIT COST ( 7 SATELLITES)						14.4
TOTAL SATELLITE DDT+E AND RECURRING COST						139.7

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NP2-1-1 SMM

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1309	REACTION WHEEL	1	8.5	1.1	1.00	148118.1	59540.	29611.	33213.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.1	51402.	28700.	22755.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.1	295104.	277763.	262988.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.1	749743.	377202.	428395.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15058.1	62143.	95624.	82949.
834	THRUSTER	4	.7	.1	.10	11440.1	25095.	40382.	36963.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1244717.1	139061.	237801.	461689.
403	CDU	1	12.3	7.5	1.00	3552289.1	47819.	45429.	796546.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.1	16117.	26827.	10006.
203	ANTENNA	2	0.4	0.0	1.00	462041.1	268784.	78812.	171380.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.1	47779.	69245.	37651.
312	TRANSMITTER	2	2.2	15.8	1.00	105053.1	49590.	71295.	38970.
401	RECEIVER	1	3.9	6.3	1.00	77256.1	24775.	29738.	17323.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.1	30796.	30978.	7475.
503	DIPLEXER	1	3.1	1.0	1.00	57409.1	15451.	16324.	12873.

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NP2-1-1 SMM

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221	BATTERY	2	19.8	0.0	.10	27169.1	19583.	68108.	44814.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	53.4	1.00	485739.	91136.	173182.	108919.
WIRING HARNESS	77.3	1.00	327544.	192747.	193976.	73469.
THERMAL CONTROL	29.0	1.00	350709.	107500.	82563.	78641.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	62.1	1.00	788219.1	466653.	295587.	176746.
STRUCTURE	124.9	1.00	2676798.	657999.	312592.	600230.
POWER CONTROL UNITS	54.7	1.00	767758.	266447.	253159.	172158.
SOLAR ARRAY DRIVE	8.9	1.00	439797.	187872.	178503.	98618.
SATELLITE ADAPTER	72.4	1.00	146103.1	65920.	36026.	32762.
PROPELLANT WEIGHT	85.9					
MISSION EQUIP WEIGHT	1250.0					

TOTAL SATELLITE WEIGHT 1971.0.

Y11-135

(19)



\*\* SATELLITE SYSTEMS COST MODEL \*\*

NP2-1-2 DESØ

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 1900. NUMBER OF QUAL UNITS = 0  
BOL POWER = 183. ARRAY AREA = 41.9 SQ FT BATT CAP = 6. AMP-HR

V11-136

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SPACECRAFT COST MODEL

NP2-1-2 OES0

(MILLIONS OF 1977 DOLLARS)

V11-137

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.3	1.1	4.4	0.0	.8	.8
THERMAL CONTROL	.9	.1	.7	0.0	.1	.1
ELECTRICAL POWER	2.4	1.1	3.6	.0	1.4	1.4
COMMUNICATIONS	.5	.2	.7	0.0	.2	.2
DATA HANDLING	5.1	.3	5.4	0.0	.3	.3
STABILITY AND CONTROL	2.7	.7	3.4	0.0	.6	.6
AUXILIARY PROPULSION	1.5	.7	2.2	.1	.7	.8
SPACECRAFT MISSION EQUIPMENT	16.0	4.3	20.4	.2	4.1	4.3
			3.8			2.0
SATELLITE QUALIFICATION UNIT(S)			24.1			6.3
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.5			.3
						.3
TOTAL SATELLITE			27.2			7.0
AVERAGE UNIT COST ( 1 SATELLITES)						7.0
TOTAL SATELLITE DDT+E AND RECURRING COST						34.2

NP2-1-2 JESO

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	NUTATION DAMPER	1	2.3	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
803	EARTH SENSOR	1	1.3	0.0	1.00	128272.	32368.	45246.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	692260.	139061.	177581.	0.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2306643.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
206	ANTENNA	1	1.5	0.0	1.00	86246.	43556.	14798.	0.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	9015.	0.
398	TRANSMITTER	1	2.1	16.0	1.00	91242.	28105.	51709.	0.
401	RECEIVER	1	3.9	5.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.

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ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	34.1	0.0	.10	8778.	28995.	107202.	17714.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	33.4	1.00	318123.	59017.	150745.	0.
WIRING HARNESS	48.6	1.00	221052.	130041.	175911.	0.
THERMAL CONTROL	25.7	1.00	304259.	99046.	103406.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	64.9	1.00	853333.	482665.	410954.	0.
STRUCTURE	154.7	1.00	1834019.	789249.	503990.	0.
POWER CONTROL UNITS	48.2	1.00	294035.	247440.	316015.	0.
SATELLITE ADAPTER	47.3	1.00	101749.	41827.	37750.	0.
PROPELLANT WEIGHT	56.1					
MISSION EQUIP WEIGHT	600.0					
TOTAL SATELLITE WEIGHT	1217.5					

V11-139

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**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NPC-1-3 EXPLR DC*

SUBSYSTEM CONFIGURATIONS .

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 0. NUMBER OF QUAL UNITS = 0  
BOL POWER = 307. ARRAY AREA = 100.8 SQ FT BATT CAP = 6. AMP-HR

071-140

SPACECRAFT COST MODEL

NP2-1-3 EXPLR DC

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	2.1	1.3	3.3	8.6	14.5	23.3
THERMAL CONTROL	.4	.1	.5	1.6	2.7	4.3
ELECTRICAL POWER	3.0	1.1	4.0	12.7	22.7	35.4
COMMUNICATIONS	.7	.2	1.0	3.3	6.0	9.2
DATA HANDLING	3.0	.3	3.2	13.6	9.4	23.0
STABILITY AND CONTROL	3.0	.8	3.8	12.5	11.6	24.2
AUXILIARY PROPULSION	1.3	.6	1.9	7.4	11.4	18.8
SPACECRAFT MISSION EQUIPMENT	13.5	4.4	17.9	59.7	78.4	138.1
			2.0			15.7
SATELLITE QUALIFICATION UNIT(S)			19.9			153.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.4			9.6
CONTRACTOR FEE			1.3			10.3
TOTAL SATELLITE			22.6			173.8
AVERAGE UNIT COST ( 29 SATELLITES)						6.0
TOTAL SATELLITE DDT+E AND RECURRING COST						196.4

VII-141

NP2-1-3 EXPLR DC

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	15395.	23559.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	11113.	16501.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	10196.	10975.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	173936.	152237.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	72083.	50752.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	65040.	43529.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	415325.	139061.	191595.	88303.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1323660.	47819.	36602.	188047.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	21615.	6339.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	9727.	11752.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	30994.	12962.
312	TRANSMITTER	1	2.2	15.8	1.00	94439.	29171.	31912.	13417.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	23960.	10975.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	13866.	2574.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	13152.	8156.

VII-142

NP2-1-3 EXPLR DC

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202	BATTERY	2	9.5	0.0	.10	8778.	11541.	35915.	10133.

EQUIPHENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	49.5	1.00	588123.	84955.	130069.	83552.
WIRING HARNESS	33.0	1.00	159194.	93651.	75935.	22616.
THERMAL CONTROL	27.9	1.00	230580.	104719.	65033.	32758.
POWER CONVERTERS	15.9	1.00	590016.	367568.	140689.	83821.
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	210956.	106341.
STRUCTURE	176.2	1.00	1182857.	881560.	337424.	168044.
POWER CONTROL UNITS	39.5	1.00	397962.	220240.	169597.	56537.
SATELLITE ADAPTER	32.1	1.00	48790.	26081.	18036.	6931.
PROPELLANT WEIGHT	36.4					
MISSION EQUIP WEIGHT	195.0					

TOTAL SATELLITE WEIGHT 740.1

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0/98



SPACECRAFT COST MODEL

NP2-1-4 EXPLR SC

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.9	.9	2.8	8.0	10.1	18.1
THERMAL CONTROL	.8	.1	.9	3.2	2.4	5.6
ELECTRICAL POWER	2.6	1.2	3.8	11.1	24.5	35.7
COMMUNICATIONS	1.2	.4	1.5	4.9	6.0	10.9
DATA HANDLING	2.7	.3	2.9	11.1	5.9	17.0
STABILITY AND CONTROL	2.7	.7	3.4	10.9	9.8	20.7
AUXILIARY PROPULSION	1.3	.6	1.9	7.4	11.4	18.8
SPACECRAFT MISSION EQUIPMENT	13.1	4.2	17.3 1.9	56.6	70.1	126.7 12.8
SATELLITE QUALIFICATION UNIT(S GSE (AGE)			19.1 0.0 1.3			139.5
LAUNCH SITE SUPPORT CONTRACTOR FEE			1.3			9.1 9.5
TOTAL SATELLITE			21.8			158.2
AVERAGE UNIT COST ( 29 SATELLITES)						5.5
TOTAL SATELLITE DDT+E AND RECURRING COST						179.9

771-111

2.177

NPZ-1-EXPLR SC

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	15395.	23559.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	11113.	16501.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	10196.	10975.
603	CONTROL ELECTRONCS	1	7.4	3.5	1.00	1071594.	447818.	173936.	152237.
803	EARTH SENSOR	1	1.3	0.0	1.00	128272.	32368.	27120.	18223.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	65040.	43529.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	346043.	139061.	106442.	49161.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1236329.	47819.	36602.	175640.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	52915.	59003.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	8105.	7058.
398	TRANSMITTER	1	2.1	16.0	1.00	136863.	28105.	46492.	19444.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	23960.	10975.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	13866.	2574.

541-145

NP2-1-4 EXPLR SC

ELECTRICAL POWER		UNIT	UNIT	DDTE	D.E. COST	T.E. COST	VEHICLE	VEHICLE
IDENT	TYPE	NO.	WEIGHT	POWER	FACTOR		PROD. COST	ENG. COST
202	BATTERY	2	9.5	0.0	.10	8778.	35915.	10133.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE	D.E. COST	T.E. COST	VEHICLE	VEHICLE
		FACTOR			PROD. COST	ENG. COST
SOLAR ARRAY	32.7	1.00	439563.	57870.	88601.	62447.
WIRING HARNESS	34.5	1.00	165309.	97248.	78852.	23485.
THERMAL CONTROL	23.4	1.00	455413.	92946.	58674.	64699.
POWER CONVERTERS	15.9	1.00	590016.	367568.	140689.	83821.
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	210966.	106341.
STRUCTURE	112.9	1.00	1098310.	603861.	231132.	156033.
POWER CONTROL UNITS	78.5	1.00	323104.	329144.	251965.	45902.
SATELLITE ADAPTER	24.0	1.00	38105.	21959.	15214.	5413.

PROPELLANT WEIGHT 36.4

MISSION EQUIP WEIGHT 120.0

TOTAL SATELLITE WEIGHT 613.6

971-117

**\*\* SATELLITE SYSTEMS COST MODEL \*\***

*NPL-1-5 SQ OBSRVTRY*

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**

--- APOGEE \* 190. NUMBER OF QUAL UNITS \* 0  
--- BOL POWER \* 2680. ARRAY AREA \* 217.6 SQ FT. BATT CAP \* 66. AMP-HR

*VI-117*

*03*  
*774*

SPACECRAFT COST MODEL

NP2-1-5 SO OBSRVTRY

(MILLIONS OF 1977 DOLLARS)

871-11X

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	22.9	7.5	30.3	0.0	5.0	5.0
THERMAL CONTROL	3.1	.4	3.5	0.0	.4	.4
ELECTRICAL POWER	11.1	4.3	15.4	.2	6.2	6.4
COMMUNICATIONS	1.5	.7	2.2	.6	.8	1.4
DATA HANDLING	18.1	.2	18.3	4.5	.9	15.4
STABILITY AND CONTROL	6.3	2.2	8.5	2.6	2.9	5.0
AUXILIARY PROPULSION	6.3	4.3	10.7	.1	3.9	4.0
SPACECRAFT MISSION EQUIPMENT	69.3	19.6	88.8	18.0	19.6	37.7
			12.4			7.7
SATELLITE QUALIFICATION UNIT(S)			101.2			45.4
GSE (AGE)			3.0			
LAUNCH SITE SUPPORT			4.5			1.1
CONTRACTOR FEE			5.5			2.7
TOTAL SATELLITE			112.3			49.1
AVERAGE UNIT COST ( 1 SATELLITES)						49.1
TOTAL SATELLITE DDT+E AND RECURRING COST						161.4

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NP2-1-5 SO OBSRVTRY

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1501	CONTROL ELECT.	2	10.0	4.0	1.00	1500956.	851188.	644803.	599765.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	54408.	47539.
1718	RATE INTEGR GYRO	2	9.6	32.0	1.00	990295.	172894.	397414.	355749.
1803	EARTH SENSOR	2	14.6	19.0	1.00	1244754.	480053.	642353.	497386.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	4	8.9	3.0	.40	3574179.	55624.	376624.	3532145.
406	COMM DECOD+DISTR	2	11.0	5.5	.40	7088524.	73633.	276976.	5005166.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UN1	2	2.0	.5	1.00	49542.	27399.	64909.	19836.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	105936.	184625.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	93077.	40561.
312	TRANSMITTER	2	2.2	15.8	1.00	105053.	49590.	95833.	41982.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
603	DIPLEXER	2	3.1	1.0	1.00	63868.	26267.	39496.	25521.

N11-119

NP2-1-5 SO OBSRVTRY

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
260	BATTERY	2	47.5	0.0	.10	61952.1	36770.	135950.	125039.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	151.5	1.00	1007875.	239358.	611386.	0.
WIRING HARNESS	1311.5	1.00	3614875.	2126570.	2876695.	0.
THERMAL CONTROL	134.1	1.00	1809175.	303599.	271821.	0.
POWER CONVERTERS	10.0	1.00	410935.	256004.	163477.	0.
PROPULSION FEED SYS	736.5	1.00	3708843.	3095037.	2635195.	0.
STRUCTURE	1176.5	1.00	11963317.	4427734.	2827417.	0.
POWER CONTROL UNITS	143.5	1.00	1413593.	468431.	598252.	0.
SOLAR ARRAY DRIVE	25.2	1.00	890665.	455061.	581177.	0.
SATELLITE ADAPTER	372.3	1.00	587700.	526583.	126209.	0.
PROPELLANT WEIGHT	2445.0					
MISSION EQUIP WEIGHT	10900.0					

TOTAL SATELLITE WEIGHT 17689.9

11-150

**\*\* SATELLITE SYSTEMS COST MODEL \*\***

*NP3-1-1 BESS*

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**

APOGEE = 300. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1122. ARRAY AREA = 91.0 SQ FT BATT CAP = 30. AMP-HR

*VII-151*

*8-8*

*207*



SPACECRAFT COST MODEL

NP3-1-1 BESS

(MILLIONS OF 1977 DOLLARS)

VII-152

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.8	1.5	9.3	9.2	4.6	13.8
THERMAL CONTROL	.6	.2	.8	.8	.7	1.4
ELECTRICAL POWER	3.3	1.0	4.3	4.3	6.3	10.6
COMMUNICATIONS	.7	.2	1.0	.9	1.3	2.2
DATA HANDLING	9.0	.2	9.2	12.4	1.7	14.1
STABILITY AND CONTROL	4.2	1.2	5.4	4.9	4.1	9.0
AUXILIARY PROPULSION	1.4	.7	2.1	2.5	2.2	4.7
SPACECRAFT MISSION EQUIPMENT	27.0	4.9	31.9	35.0	21.6	56.6
			100.6			251.5
SATELLITE QUALIFICATION UNIT(S)			132.5			308.1
GSE (AGE)			3.0			
LAUNCH SITE SUPPORT			2.3			2.3
CONTRACTOR FEE			2.4			4.1
TOTAL SATELLITE			137.1			314.5
AVERAGE UNIT COST ( 5 SATELLITES)						62.9
TOTAL SATELLITE DDT+E AND RECURRING COST						451.7

208

NP3-1-1 BESS

\*\*\* ASSEMBLY DESCRIPTIONS \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1315	REACTION WHEEL	1	12.2	12.0	1.00	195271.1	78588.	42352.	46191.
1601	VALVE DRIVER ASSY	1	1.6	1.0	1.00	55145.1	30236.	16781.	13044.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	292339.	277428.
2203	CONTROL ELECTRNCS	1	7.1	62.0	1.00	1038151.1	441025.	220553.	245573.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15058.1	62143.	97278.	87722.
834	THRUSTER	2	.7	.1	.10	10283.1	14762.	22823.	25105.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	.70	1423617.	97343.	200225.	496518.
403	CDU	1	12.3	7.5	.70	3867072.1	33473.	38251.	963662.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	28235.	10555.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	7059.	11732.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	40488.	21583.
312	TRANSMITTER	1	2.2	15.8	1.00	94439.	29171.	41687.	22339.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	31298.	18275.
503	COMMAND SIG COND	1	1.5	.9	1.00	18113.	18113.	18113.	4285.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17181.	13580.

NP3-1-1 BESS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRDD. COST	VEHICLE ENG. COST
227	BATTERY	2	23.8	0.0	.10	32587.	22357.	79100.	56845.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRDD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.4	1.00	547483.	106837.	213671.	129506.
WIRING HARNESS	126.4	1.00	497173.	292478.	307788.	117604.
THERMAL CONTROL	34.1	1.00	373552.	119981.	95533.	88362.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	59.5	1.00	777480.	451631.	301084.	183910.
STRUCTURE	148.0	1.00	3859184.	760098.	380044.	912876.
POWER CONTROL UNIT	61.3	1.00	849399.	284808.	284804.	200922.
SOLAR ARRAY DRIVE	10.3	1.00	491962.	216217.	216215.	116372.
SATELLITE ADAPTER	117.9	1.00	221149.	107375.	50432.	52312.
PROPELLANT WEIGHT	56.9					
MISSION EQUIP WEIGHT	2500.0					
TOTAL SATELLITE WEIGHT	3308.3					

VII-154

**\*\* SATELLITE SYSTEMS COST MODEL \*\***

*NP3-1-2 VFR*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPELLSION**

CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**

CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**

APOGEE = 300. NUMBER OF QUAL UNITS = 0

BOL POWER = 1122. ARRAY AREA = 91.0 SQ FT BATT CAP = 30. AMP-HR

VII-155

SPACECRAFT COST MODEL

NP3-1-2 VFR

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.8	1.5	9.3	16.0	8.3	24.2
THERMAL CONTROL	.6	.2	.8	1.3	1.2	2.5
ELECTRICAL POWER	3.3	1.0	4.3	7.5	11.4	18.9
COMMUNICATIONS	.7	.2	1.0	1.5	2.4	3.9
DATA HANDLING	9.0	.2	9.2	21.9	3.3	25.1
STABILITY AND CONTROL	4.2	1.2	5.4	8.6	7.3	15.9
AUXILIARY PROPULSION	1.4	.7	2.1	4.4	5.5	9.9
SPACECRAFT MISSION EQUIPMENT	27.0	4.9	31.9	61.1	39.3	100.4
SATELLITE QUALIFICATION UNIT(S)			132.5			742.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.3			
CONTRACTOR FEE			2.4			4.7
						7.4
TOTAL SATELLITE			137.1			754.8
AVERAGE UNIT COST ( 10 SATELLITES)						75.5
TOTAL SATELLITE DDT+E AND RECURRING COST						891.9

VII-156

NP3-1-2 VFR

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1315	REACTION WHEEL	1	12.2	12.0	1.00	195271.	78588.	38117.	40127.
1601	VALVE DRIVER ASSY	1	1.6	1.0	1.00	55145.	30236.	15103.	11332.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	263105.	241006.
2203	CONTROL ELECTRNCS	1	7.1	62.0	1.00	1038161.	441025.	198498.	213334.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	93546.	77247.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	21947.	22107.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	.70	1423617.	97343.	192543.	437229.
403	CDU	1	12.3	7.5	.70	3867072.	33473.	36783.	848590.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	25412.	9169.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	6353.	10210.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	36439.	18750.
312	TRANSMITTER	1	2.2	15.8	1.00	94439.	29171.	37518.	19406.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	28168.	15875.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	16302.	3723.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	15463.	11797.

VIFIST

NP3-1-2 VFR

ELECTRICAL POWER

IDENT TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
227 BATTERY	2	23.8	0.0	.10	32587.	22357.	76066.	50057.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.4	1.00	547488.	106837.	192304.	112504.
WIRING HARNESS	126.4	1.00	497173.	292478.	278810.	102165.
THERMAL CONTROL	34.1	1.00	373552.	119981.	85980.	76762.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	59.5	1.00	777480.	451631.	270976.	159766.
STRUCTURE	148.0	1.00	3859184.	760098.	342041.	793032.
POWER CONTROL UNITS	61.3	1.00	849398.	284808.	256325.	174545.
SOLAR ARRAY DRIVE	10.5	1.00	491962.	216217.	194594.	101094.
SATELLITE ADAPTER	117.9	1.00	221148.	107375.	45389.	45444.
PROPELLANT WEIGHT	56.9					
MISSION EQUIP HEIGHT	2500.0					

TOTAL SATELLITE HEIGHT 3308.3

VII-158

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
NL1-H1 JOP PROBE

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - NUCLEAR POWER GENERATION

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE \* 5000. NUMBER OF QUAL UNITS = 0

VII-159



SPACECRAFT COST MODEL

NL1-1-1 JUP PROBE

(MILLIONS OF 1977 DOLLARS)

VII-160

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	6.7	3.8	10.5	2.7	4.5	7.2
THERMAL CONTROL	1.3	.2	1.5	.5	.3	.8
ELECTRICAL POWER	6.9	11.6	18.4	2.8	15.0	17.8
COMMUNICATIONS	.5	.3	.8	.6	.7	1.2
DATA HANDLING	5.8	.4	6.3	5.6	1.9	7.5
STABILITY AND CONTROL	6.3	2.2	8.5	6.1	4.4	10.5
AUXILIARY PROPULSION	4.9	3.1	8.0	2.2	5.0	7.3
SPACECRAFT	32.4	21.6	54.0	20.4	31.9	52.3
MISSION EQUIPMENT			14.4			11.3
SATELLITE			68.4			63.6
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			2.6			
LAUNCH SITE SUPPORT						1.4
CONTRACTOR FEE			4.0			3.8
TOTAL SATELLITE			75.0			68.7
AVERAGE UNIT COST ( 2 SATELLITES)						34.4
TOTAL SATELLITE DDT+E AND RECURRING COST						143.7

NL1-1-1 JUP PROBE

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
15C1	CONTROL ELECT.	2	10.0	4.0	1.00	1500966.	851188.	580324.	719594.
16C1	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	48967.	46764.
1718	RATE INTEGR GYRO	2	9.6	32.0	1.00	890295.	172894.	357673.	426826.
18C3	EARTH SENSOR	2	14.6	19.0	1.00	1244754.	480053.	578119.	596760.

ALXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	55765.	54496.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23550.	27842.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	865786.	139061.	287682.	415075.
406	COMMD DECOD+DISTR	2	11.0	5.5	1.00	2562757.	184082.	380820.	1228638.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	26288.	57865.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	86249.	50369.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.

191-11A

NL1-1-1 JUP PROBE

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
NUCLEAR POWER UNIT	175.0	1.00	2818729.	7636141.	4388118.	563162.
WIRING HARNESS	227.9	1.00	819583.	482147.	586998.	163747.
THERMAL CONTROL	37.5	1.00	763778.	127967.	116088.	152597.
POWER CONVERTERS	10.0	1.00	410936.	256004.	147129.	82102.
PROPULSION FEED SYS	474.5	1.00	2862205.	2211054.	1694298.	571848.
STRUCTURE	642.4	1.00	3710755.	2647169.	1521365.	741383.
SATELLITE ADAPTER	125.1	1.00	232576.	117576.	60015.	46467.
PROPELLANT WEIGHT	1632.8					
MISSION EQUIP WEIGHT	185.0					

TOTAL SATELLITE WEIGHT 3638.9

VII-162

\*\* SATELLITE SYSTEMS COST MODEL \*\*

NAI-1-2 VDIR

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 5000. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1433. ARRAY AREA = 116.3 SQ FT BATT CAP = 72. AMP-HR

VII-163

SPACECRAFT COST MODEL

NL1-1-2 VOIR

(MILLIONS OF 1977 DOLLARS)

791-117

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	13.7	6.9	20.7	5.5	8.4	13.9
THERMAL CONTROL	3.1	.2	3.3	1.2	.4	1.7
ELECTRICAL POWER	6.6	2.7	9.3	3.0	6.9	9.9
COMMUNICATIONS	1.4	.7	2.1	1.5	1.3	2.9
DATA HANDLING	11.7	.4	12.1	11.2	1.9	13.1
STABILITY AND CONTROL	6.3	2.2	8.5	6.1	4.4	10.5
AUXILIARY PROPULSION	8.4	6.3	14.7	3.6	10.0	13.7
SPACECRAFT MISSION EQUIPMENT	51.2	19.5	70.7	32.2	33.4	65.7
			2.7			2.6
SATELLITE QUALIFICATION UNIT(S)						68.2
GSE (AGE)						1.6
LAUNCH SITE SUPPORT						4.7
CONTRACTOR FEE						
TOTAL SATELLITE						74.5
AVERAGE UNIT COST ( 2 SATELLITES)						37.3
TOTAL SATELLITE DDT+E AND RECURRING COST						156.8

53

NL1-1-2 VOIR

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1501	CONTROL ELECT.	2	10.0	4.0	1.00	1500966.	851186.	580324.	719594.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	48967.	46764.
1718	RATE INTEGR GYRO	2	9.6	32.0	1.00	890295.	172894.	357673.	426826.
1803	EARTH SENSOR	2	14.6	19.0	1.00	1244754.	480053.	578119.	596760.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	55765.	54496.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23550.	27842.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1634770.	139061.	287682.	879626.
406	COMMD DECOD+DISTR	2	11.0	5.5	1.00	5035800.	184082.	380820.	2414265.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	58418.	23799.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	95343.	221512.
354	TRANSMITTER	4	2.8	90.0	1.00	148403.	108185.	178066.	129227.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
618	DIPLEXER	2	1.5	0.0	1.00	38973.	17662.	21769.	18684.

VII-165

NL1-1-2 VOIR

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	2	49.5	0.0	.10	66515.	37879.	138287.	128677.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	81.0	1.00	650057.	134042.	308144.	129877.
WIRING HARNESS	572.0	1.00	1788536.	1052166.	1280978.	357337.
THERMAL CONTROL	61.1	1.00	1813700.	178172.	154459.	362364.
POWER CONVERTERS	10.0	1.00	410936.	256004.	147129.	82102.
PROPULSION FEED SYS	1201.7	1.00	4948443.	4501141.	3449158.	988664.
STRUCTURE	1193.9	1.00	7074477.	4483011.	2576449.	1413431.
POWER CONTROL UNITS	143.7	1.00	980098.	468813.	538867.	195817.
SOLAR ARRAY DRIVE	13.4	1.00	580420.	266023.	305774.	115964.
SATELLITE ADAPTER	254.3	1.00	425051.	273650.	90884.	84922.
PROPELLANT WEIGHT	4769.4					
MISSION EQUIP WEIGHT	300.0					
TOTAL SATELLITE WEIGHT	8885.5					

VII-166

\*\* SATELLITE SYSTEMS COST MODEL \*\*

NL 1-1-3 MER ORB

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 5000. NUMBER OF QUAL UNITS = 0  
BOL POWER = 740. ARRAY AREA = 60.1 SQ FT BATT CAP = 36. AMP-HR

VII-167



SPACECRAFT COST MODEL

ML1-1-3 MEF ORB

(MILLIONS OF 1977 DOLLARS)

891-118

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	5.2	1.4	6.6	2.1	1.9	4.0
THERMAL CONTROL	.6	.2	.8	.2	.3	.5
ELECTRICAL POWER	2.4	.6	3.0	1.2	1.4	2.6
COMMUNICATIONS	1.2	.4	1.7	.7	.9	1.6
DATA HANDLING	6.8	.4	7.3	2.7	1.1	3.8
STABILITY AND CONTROL	5.7	1.4	7.1	2.3	2.5	4.8
AUXILIARY PROPULSION	1.9	1.0	2.9	1.0	1.7	2.7
SPACECRAFT			29.3			20.1
MISSION EQUIPMENT	23.8	5.5	16.0	10.3	9.8	12.7
SATELLITE QUALIFICATION UNIT(S)			45.3			32.7
GSE (ACF)			0.0			
LAUNCH SITE SUPPORT			2.1			.8
CONTRACTOR FEE			2.2			1.5
TOTAL SATELLITE			49.6			35.0
AVERAGE UNIT COST ( 2 SATELLITES)						17.5
TOTAL SATELLITE DDT+E AND RECURRING COST						84.6

NL1-1-3 MER DRB

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1501	CONTROL ELECT.	1	10.0	4.0	1.00	1349183.	500699.	322401.	269557.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	34720.	29412.
1718	RATE INTEGR GYRO	1	9.6	32.0	1.00	800266.	172894.	198707.	159887.
1803	EARTH SENSOR	1	14.6	19.0	1.00	1118880.	282384.	321177.	223544.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	951713.	139061.	159823.	190146.
406	COMMD DECOD+DISTR	1	11.0	5.5	1.00	3071226.	184082.	211566.	613609.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	52968.	82978.
354	TRANSMITTER	3	2.8	90.0	1.00	135921.	83756.	139519.	94093.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	12094.	6999.

691-169

NL1-1-3 MER ORB

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
236	BATTERY	2	31.5	0.0	.10	37808.	27357.	99874.	73141.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	41.9	1.00	86679.	32306.	74266.	17318.
WIRING HARNESS	42.1	1.00	195712.	115134.	140172.	39102.
THERMAL CONTROL	31.5	1.00	358953.	113700.	104831.	71716.
POWER CONVERTERS	10.0	1.00	410936.	256004.	147129.	82102.
PFC PULSION FEED SYS	101.6	1.00	1131124.	680068.	521126.	225991.
STRUCTURE	157.9	1.00	2532397.	803104.	461555.	505955.
POWER CONTROL UNITS	52.2	1.00	665834.	35555.	40868.	133029.
SOLAR ARRAY DRIVE	6.9	1.00	370088.	151322.	173933.	73941.
SATELLITE ADAPTER	68.1	1.00	138698.	62444.	42049.	27711.
PROPELLANT WEIGHT	242.9					
MISSION EQUIP WEIGHT	950.0					
TOTAL SATELLITE WEIGHT	1860.4					

VII-170

**\*\* SATELLITE SYSTEMS COST MODEL \*\***

*NLI-1-A SAT-URAN*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL**

**AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT**

**DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)**

**COMMUNICATIONS  
CONFIGURATION - - SEPARATE UPLINK AND DOWNLINK**

**ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY**

**VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL**

**MISCELLANEDUS INFORMATION**

APDGE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 303.      ARRAY AREA = 65.4 SQ FT      BATT CAP = 18. AMP-HR

711-171

60

SPACECRAFT COST MODEL

NL1-1-4 SAT-URAN

(MILLIONS OF 1977 DOLLARS)

VII-172

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.4	1.0	3.4	2.3	2.1	4.4
THERMAL CONTROL	1.0	.1	1.1	.9	.4	1.3
ELECTRICAL POWER	2.2	.8	3.0	2.3	2.6	5.0
COMMUNICATIONS	1.2	.5	1.7	2.0	1.8	3.9
DATA HANDLING	2.8	.3	3.1	2.7	1.1	3.8
STABILITY AND CONTROL	2.9	1.2	4.1	4.9	3.3	8.2
AUXILIARY PROPULSION	1.9	1.0	2.8	2.2	2.9	5.2
SPACECRAFT MISSION EQUIPMENT	14.4	4.8	19.2	17.4	14.3	31.8
SATELLITE QUALIFICATION UNIT(S)			29.4			46.1
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.4			1.4
CONTRACTOR FEE			1.4			2.3
<b>TOTAL SATELLITE</b>			<b>32.3</b>			<b>49.8</b>
<b>AVERAGE UNIT COST ( 4 SATELLITES)</b>						<b>12.4</b>
<b>TOTAL SATELLITE DDT+E AND RECURRING COST</b>						<b>82.1</b>

NL1-1-4 SAT-URAN

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	27032.	56260.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	423092.	519051.
803	EARTH SENSOR	3	1.3	0.0	1.00	157133.	77682.	93038.	91819.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	364321.	139061.	143841.	87331.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	1294909.	47819.	49463.	310403.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	128713.	201169.
398	TRANSMITTER	2	2.1	16.0	1.00	152260.	47779.	113089.	66293.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.

VII-173

NL1-1-4 SAT-URAN

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
213 BATTERY	2	17.2	0.0	.10	21490.	17695.1	63209.	38683.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	32.2	1.00	91365.	26408.	54637.	21901.
WIRING HARNESS	41.1	1.00	191763.	112811.	123609.	45967.
THERMAL CONTROL	21.1	1.00	562203.	86650.	74633.	134766.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	141433.
PROPULSION FEED SYS	94.6	1.00	1082118.	643925.	444088.	259395.
STRUCTURE	128.8	1.00	1355424.	675423.	349358.	324909.
POWER CONTROL UNITS	42.9	1.00	394920.	31699.	32792.	94666.
SATELLITE ADAPTER	29.6	1.00	45541.	28529.	23244.	10917.
PROPELLANT WEIGHT	184.7					
MISSION EQUIP. WEIGHT	85.0					
TOTAL SATELLITE WEIGHT	808.5					

VII-174

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NLI-1-5 PC FLYBY*

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
ROL POWER = 1072. ARRAY AREA = 84.2 SQ FT BATT CAP = 100. AMP-HR

VII-175



SPACECRAFT COST MODEL

NLI-1-5 DC FLYBY

(MILLIONS OF 1977 DOLLARS)

NLI-176

SUBSYSTEM COST	DDT+E			RECURRING		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	4.0	1.2	5.2	1.6	1.8	3.4
THERMAL CONTROL	1.3	.2	1.4	.5	.3	.8
ELECTRICAL POWER	2.8	.9	3.7	1.6	2.7	4.4
COMMUNICATIONS	1.6	.6	2.3	1.4	1.5	2.9
DATA HANDLING	4.9	.3	5.2	2.6	1.0	3.6
STABILITY AND CONTROL	4.2	1.6	5.8	2.8	2.4	5.3
AUXILIARY PROPULSION	1.4	.7	2.1	.9	1.3	2.3
SPACECRAFT MISSION EQUIPMENT	20.3	5.5	25.7	11.6	11.1	22.7
			26.6			23.9
SATELLITE QUALIFICATION UNIT(S)			52.4			46.6
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.8			
CONTRACTOR FEE			1.9			.9
						1.7
TOTAL SATELLITE			56.1			49.1
AVERAGE UNIT COST ( 2 SATELLITES)						24.5
TOTAL SATELLITE DDT+E AND RECURRING COST						105.2

NLI-1-5 DC FLYBY

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	23269.	20013.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	34720.	29412.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	336026.	234322.
2203	CONTRDL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	76866.	75651.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42390.	43351.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	720079.	139061.	287682.	345220.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2171338.	47819.	54958.	433818.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	143014.	221512.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	139708.	82800.
398	TRANSMITTER	2	2.1	16.0	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	12094.	6999.

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1.0

NLI-1-5 DC FLYBY

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.3	0.0	.10	86935.	49261.	179842.	168180.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	58.6	1.00	518518.	99325.	228334.	103596.
WIRING HARNESS	51.7	1.00	232952.	137042.	166844.	46542.
THERMAL CONTROL	40.4	1.00	736217.	134596.	121259.	147091.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	60.3	1.00	796417.	456269.	349633.	159119.
STRUCTURE	122.6	1.00	1788938.	647685.	372234.	357417.
POWER CONTROL UNITS	82.1	1.00	827046.	337892.	388383.	165238.
SOLAR ARRAY DRIVE	9.7	1.00	466226.	202132.	232336.	93149.
SATELLITE ADAPTER	41.6	1.00	91228.	39514.	31516.	18227.
PROPELLANT WEIGHT	65.1					
MISSION EQUIP WEIGHT	340.0					

TOTAL SATELLITE WEIGHT 1143.1

VIN-178

\*\* SATELLITE SYSTEMS COST MODEL \*\*

NL1-1-6 SPT LADR

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - NUCLEAR POWER GENERATION

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0

671-179

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SPACECRAFT COST MODEL

NL1-1-6 S0/T LNDR

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	6.0	4.6	10.6	0.0	3.0	3.0
THERMAL CONTROL	1.4	.3	1.7	0.0	.3	.3
ELECTRICAL POWER	10.1	20.5	30.6	0.0	14.7	14.7
COMMUNICATIONS	1.6	.6	2.3	.6	.9	1.4
DATA HANDLING	8.2	.3	8.5	.9	.5	1.4
STABILITY AND CONTROL	4.2	1.6	5.8	.8	1.3	2.2
AUXILIARY PROPULSION	1.5	.8	2.3	.2	.8	1.0
SPACECRAFT MISSION EQUIPMENT	33.1	28.6	61.8	2.4	21.5	23.9
			54.6			31.0
SATELLITE QUALIFICATION UNIT(S)			116.3			54.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.6			
CONTRACTOR FEE			4.5			.7
						1.7
TOTAL SATELLITE			123.5			57.4
AVERAGE UNIT COST ( 1 SATELLITES):						57.4
TOTAL SATELLITE DDT+E AND RECURRING COST						180.8

NL1-1-6 SO/T LNR

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

DENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

DENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

DENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1252821.	139061.	319646.	500609.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3573083.	47819.	61065.	0.

COMMUNICATIONS

DENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	158904.	184625.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
398	TRANSMITTER	2	2.1	16.0	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	13438.	0.

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NL1-1-6 SO/T LNDR

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
NUCLEAR POWER UNIT	525.0	1.00	4649079.	14123328.	9017745.	0.
WIRING HARNESS	381.9	1.00	1269753.	746974.	1010461.	0.
THERMAL CONTROL	65.5	1.00	844268.	186774.	178747.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	69.7	1.00	876678.	509744.	434009.	0.
STRUCTURE	806.3	1.00	3226447.	3211214.	2050583.	0.
SATELLITE ADAPTER	178.1	1.00	314023.	105859.	81989.	0.
PROPELLANT WEIGHT	164.2					
MISSION EQUIP WEIGHT	1000.0					
TOTAL SATELLITE WEIGHT	3320.6					

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**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NL1-1-7 MARS PAIR*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - THREE AXIS MASS EXPULSION

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 5000. NUMBER OF QUAL UNITS = 0  
BOL POWER = 892.4 ARRAY AREA = 72.4 SQ FT BATT CAP = 34. AMP-HR

VII-183



SPACECRAFT COST MODEL

NL1-1-7 MARS POLR

(MILLIONS OF 1977 DOLLARS)

781-117

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	6.8	2.4	9.2	2.7	3.1	5.8
THERMAL CONTROL	1.4	.2	1.6	.6	.3	.9
ELECTRICAL POWER	3.3	1.0	4.3	1.5	2.4	3.9
COMMUNICATIONS	0.0	0.0	0.0	0.0	0.0	0.0
DATA HANDLING	7.5	.4	8.0	6.2	1.5	7.8
STABILITY AND CONTROL	6.3	2.1	8.4	6.0	4.4	10.4
AUXILIARY PROPULSION	4.6	2.9	7.5	2.1	4.7	6.7
SPACECRAFT MISSION EQUIPMENT	29.9	9.1	39.0 36.9	19.1	16.4	35.6 35.9
SATELLITE QUALIFICATION UNIT(S)			75.9 0.0			71.5
GSE (AGE)			2.5			
LAUNCH SITE SUPPORT						1.1
CONTRACTOR FEE			2.9			2.6
TOTAL SATELLITE			81.3			75.2
AVERAGE UNIT COST ( 2 SATELLITES)						37.6
TOTAL SATELLITE DDT+E AND RECURRING COST						156.4

NL1-1-7 MARS POLR

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1501 CONTROL ELECT.	2	10.0	4.0	1.00	1500966.	851188.	580324.	719594.
1601 VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	34720.	29412.
1718 RATE INTEGR GYRO	2	9.6	32.0	1.00	890295.	172894.	357673.	426826.
1803 EARTH SENSOR	2	14.6	19.0	1.00	1244754.	480053.	578119.	596760.

AUXILIARY PROPULSION

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834 THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203 DIGITAL TELEMETRY	1	8.9	3.0	1.00	1057507.	139061.	159823.	211282.
406 COMMD DECOD+DISTR	2	11.0	5.5	1.00	3376634.	184082.	380820.	1618827.

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233 BATTERY	2	34.1	0.0	.10	36087.	28995.	105854.	69812.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	50.4	1.00	97339.	37212.	85545.	19448.
WIRING HARNESS	174.0	1.00	651946.	383529.	466934.	130254.
THERMAL CONTROL	32.8	1.00	828092.	116860.	107341.	165447.
POWER CONVERTERS	10.0	1.00	410936.	256004.	147129.	82102.
PROPULSION FEED SYS	427.2	1.00	2688118.	2040382.	1563515.	537067.
STRUCTURE	319.8	1.00	3387025.	1463166.	840902.	676704.
POWER CONTROL UNITS	61.1	1.00	742727.	38985.	44810.	148392.
SOLAR ARRAY DRIVE	8.4	1.00	422889.	178862.	205588.	84490.
SATELLITE ADAPTER	102.0	1.00	195527.	95917.	53259.	39065.

PROPELLANT WEIGHT 930.4

MISSION EQUIP WEIGHT 600.0

TOTAL SATELLITE WEIGHT 2931.5

VII-185

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*NL1-1-8 JUP SEPS-2*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - NUCLEAR POWER GENERATION

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0

*981-111A*

SPACECRAFT COST MODEL

NL1-1-8 JUP SEPS-2

(MILLIONS OF 1977 DOLLARS)

VII-187

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.2	3.6	8.9	0.0	2.4	2.4
THERMAL CONTROL	1.5	.2	1.7	0.0	.2	.2
ELECTRICAL POWER	7.3	14.5	21.8	0.0	10.3	10.3
COMMUNICATIONS	1.7	.7	2.4	.7	1.0	1.6
DATA HANDLING	4.8	.3	5.0	2.7	1.0	3.6
STABILITY AND CONTROL	4.5	1.9	6.4	1.8	1.8	3.6
AUXILIARY PROPULSION	3.1	3.2	6.3	1.3	1.7	3.0
SPACECRAFT MISSION EQUIPMENT	28.0	24.4	52.5	6.4	18.4	24.8
			11.4			5.2
SATELLITE QUALIFICATION UNIT(S)			63.9			30.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.3			
CONTRACTOR FEE						.7
			3.8			1.8
TOTAL SATELLITE			70.1			32.5
AVERAGE UNIT COST ( 1 SATELLITES)						32.5
TOTAL SATELLITE DDT+E AND RECURRING COST						102.6

NL1-1-8 JUP SEPS-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	46538.	44528.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	54408.	47539.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	672052.	521367.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	1.00	142484.	701098.	167720.	436376.
834	THRUSTER	10	.7	.1	1.00	149104.	560952.	142640.	306397.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	4	8.9	3.0	1.00	793900.	139061.	575364.	761223.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	2008641.	47819.	109917.	802625.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASERND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	64909.	19836.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	158904.	184625.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
398	TRANSMITTER	2	2.1	16.0	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
618	DIPLEXER	2	1.5	0.0	1.00	38973.	17662.	24188.	15573.

881-111A

NL1-1-8 JUP SEPS-2

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D. E. COST	T. E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
NUCLEAR POWER UNIT	350.0	1.00	3534183.	10083207.	6438128.	0.
WIRING HARNESS	203.7	1.00	745161.	438366.	592995.	0.
THERMAL CONTROL	48.8	1.00	857684.	152986.	150474.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	179.9	1.00	1556629.	1052877.	896447.	0.
STRUCTURE	609.0	1.00	2890243.	2529716.	1615400.	0.
SATELLITE ADAPTER	102.1	1.00	195690.	88432.	59210.	0.
PROPELLANT WEIGHT	864.3					
MISSION EQUIP WEIGHT	150.0					

TOTAL SATELLITE WEIGHT 2697.3

681-11A

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**\*\* SATELLITE SYSTEMS COST MODEL \*\***

*NL1-1-9 ENCKE RDZ*

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 783.      ARRAY AREA = 61.6 SQ FT      BATT CAP = 72. AMP-HR

*V11-190*

SPACECRAFT COST MODEL

NL1-1-9 ENCKE RDZ

(MILLIONS OF 1977 DOLLARS)

161-11A

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.4	1.1	4.5	0.0	.9	.9
THERMAL CONTROL	1.1	.2	1.3	0.0	.2	.2
ELECTRICAL POWER	2.3	.7	3.1	.2	1.2	1.5
COMMUNICATIONS	1.6	.6	2.3	.5	.8	1.4
DATA HANDLING	4.3	.3	4.5	.4	.5	1.0
STABILITY AND CONTROL	4.2	1.6	5.8	.8	1.3	2.2
AUXILIARY PROPULSION	1.3	.7	2.1	.2	.7	.9
SPACECRAFT	18.4	5.1	23.5	2.2	5.7	7.9
MISSION EQUIPMENT			23.8			11.5
SATELLITE			47.3			19.4
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.7			
LAUNCH SITE SUPPORT						.4
CONTRACTOR FEE			1.8			.6
TOTAL SATELLITE			50.7			20.4
AVERAGE UNIT COST ( 1 SATELLITES)						20.4
TOTAL SATELLITE DDT+E AND RECURRING COST						71.1

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NL1-1-9 ENCKE RDZ

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	621459.	139061.	319646.	248326.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1901929.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	158904.	184625.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
398	TRANSMITTER	2	2.1	16.0	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	13438.	0.

VII-192

NL1-1-9 ENCKE RDZ

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	2	49.5	0.0	.10	66515.	37879.	140048.	134229.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	42.9	1.00	416632.	74412.	190068.	0.
WIRING HARNESS	45.0	1.00	207086.	121825.	164797.	0.
THERMAL CONTROL	32.1	1.00	645197.	115163.	117772.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	57.3	1.00	769573.	438800.	373606.	0.
STRUCTURE	111.1	1.00	1581119.	595668.	380375.	0.
POWER CONTROL UNITS	64.3	1.00	688202.	292881.	374050.	0.
SOLAR ARRAY DRIVE	7.1	1.00	377328.	155042.	198010.	0.
SATELLITE ADAPTER	35.5	1.00	53150.	33600.	31916.	0.
PROPELLANT WEIGHT	54.6					
MISSION EQUIP WEIGHT	286.0					
TOTAL SATELLITE WEIGHT	662.5					

VI-193

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*DL-1-10 MULT-BSTR*

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 784.      ARRAY AREA = 61.6 SQ FT      BATT CAP = 72. AMP-HR

761-11N

X3

SPACECRAFT COST MODEL

NLI-1-10 MULT-ASTR

(MILLIONS OF 1977 DOLLARS)

NLI-195

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.0	1.2	5.1	0.0	.9	.9
THERMAL CONTROL	1.1	.2	1.3	0.0	.2	.2
ELECTRICAL POWER	2.4	.8	3.2	.2	1.3	1.5
COMMUNICATIONS	1.6	.6	2.3	.5	.8	1.4
DATA HANDLING	5.3	.3	5.6	.5	.5	1.1
STABILITY AND CONTROL	4.2	.6	5.8	.8	1.3	2.2
AUXILIARY PROPULSION	1.3	.7	2.1	.2	.7	.9
SPACECRAFT MISSION EQUIPMENT	20.0	.2	25.2	2.3	5.8	8.1
			34.3			17.8
SATELLITE QUALIFICATION UNIT(S)			59.6			25.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.8			.4
CONTRACTOR FEE			1.9			.6
TOTAL SATELLITE			63.3			26.9
AVERAGE UNIT COST ( 1 SATELLITES)						26.9
TOTAL SATELLITE DDT+E AND RECURRING COST						90.2

NL1-1-10 MULT-ASTR

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	781859.	139061.	319646.	312420.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	2338190.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASE RND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	158904.	184625.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
398	TRANSMITTER	2	2.1	16.0	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	13438.	0.

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NLI-1-10 MULT-ASTR

ELECTRICAL POWER

IDFNT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
263	BATTERY	2	49.6	0.0	.10	66515.	37934.	140251.	134229.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
SOLAR ARRAY	42.9	1.00	416632.	74412.	190068.	0.
WIRING HARNESS	53.4	1.00	239431.	140853.	190538.	0.
THERMAL CONTROL	33.0	1.00	657141.	117343.	119693.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	57.3	1.00	769573.	438800.	373606.	0.
STRUCTURE	120.7	1.00	1864268.	639143.	408137.	0.
POWER CONTROL UNITS	64.3	1.00	688716.	292881.	374050.	0.
SOLAR ARRAY DRIVE	7.1	1.00	377328.	155042.	198010.	0.
SATELLITE ADAPTER	44.6	1.00	96790.	41517.	36474.	0.
PROPELLANT WEIGHT	54.7					
MISSION EQUIP WEIGHT	500.0					
TOTAL SATELLITE WEIGHT	1205.6					

711-197

**\*\* SATELLITE SYSTEMS COST MODEL \*\***

*NLI-1-11 JUP SW62Y*

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 516. ARRAY AREA = 59.8 SQ FT BATT CAP = 34. AMP-HR

VII-11A  
861-11A

SPACECRAFT COST MODEL

NL1-1-11 JUP SWGBY

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.9	1.5	3.4	0.0	1.0	1.0
THERMAL CONTROL	.9	.2	1.1	0.0	.2	.2
ELECTRICAL POWER	2.0	.7	2.7	.1	1.1	1.2
COMMUNICATIONS	1.6	.6	2.2	.4	.7	1.2
DATA HANDLING	2.7	.3	3.0	0.0	.3	.3
STABILITY AND CONTROL	4.0	1.1	5.2	.0	1.0	1.1
AUXILIARY PROPULSION	.9	.5	1.5	.2	.5	.7
SPACECRAFT MISSION EQUIPMENT	14.1	4.9	19.0	.8	4.9	5.7
			8.3			3.3
SATELLITE QUALIFICATION UNIT(S)			27.3			9.1
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.4			.4
CONTRACTOR FEE			1.4			.4
TOTAL SATELLITE			30.1			9.9
AVERAGE UNIT COST ( 1 SATELLITES)						9.9
TOTAL SATELLITE DDT+E AND RECURRING COST						40.0

VII-199

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NL1-1-11 JUP SHGBY

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	1	7.1	62.0	1.00	1038361.	441025.	281680.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	353561.	139061.	177581.	0.
403	COMMD TECO+DISTR	1	2.3	7.5	1.00	1260459.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	158904.	184625.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
398	TRANSMITTER	1	2.1	16.0	1.00	136863.	28105.	77564.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	CCMMANC SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	13438.	0.

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NL1-1-11 JUP SWGBY

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	34.2	0.0	.10	36087.	28995.	107202.	72824.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	29.4	1.00	408072.	52441.	133950.	0.
WIRING HARNESS	37.6	1.00	177822.	104610.	141510.	0.
THERMAL CONTROL	39.5	1.00	513894.	132555.	132968.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	34.3	1.00	535045.	296332.	252305.	0.
STRUCTURE	219.5	1.00	1095184.	1062592.	678539.	0.
POWER CONTROL UNITS	69.2	1.00	539219.	305738.	390470.	0.
SATELLITE ADAPTER	31.5	1.00	48014.	25603.	29760.	0.
PROPELLANT WEIGHT	27.2					
MISSION EQUIP WEIGHT	60.0					

TOTAL SATELLITE WEIGHT 725.7

VII-201

**\*\* SATELLITE SYSTEMS COST MODEL \*\***

*NL1-1-12 MARS SSR*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL  
CONFIGURATION - - THREE AXIS MASS EXPULSION**

**AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT**

**DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)**

**COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS**

**ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY**

**VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL**

**MISCELLANEOUS INFORMATION**  
APOGEE = 5000. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1587. ARRAY AREA = 128.9 SQ FT BATT CAP = 72. AMP-HR

*VII-202*

SPACECRAFT COST MODEL

NLI-1-12 MARS SSR

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	12.5	4.8	17.3	0.0	3.4	3.4
THERMAL CONTROL	2.2	.2	2.4	0.0	.2	.2
ELECTRICAL POWER	6.2	2.4	8.6	.2	3.4	3.7
COMMUNICATIONS	1.4	.7	2.1	.8	.8	1.6
DATA HANDLING	16.2	.4	16.7	6.5	1.1	7.5
STABILITY AND CONTROL	6.5	2.4	9.0	3.3	2.8	6.2
AUXILIARY PROPULSION	5.6	3.7	9.2	.1	3.3	3.4
SPACECRAFT MISSION EQUIPMENT	50.5	14.7	65.2	11.0	15.0	25.9
			96.3			60.1
SATELLITE QUALIFICATION UNIT(S)			161.5			86.1
GSE (AGE)			0.0			.8
LAUNCH SITE SUPPORT			3.6			1.9
CONTRACTOR FEE			4.8			
TOTAL SATELLITE			170.0			88.7
AVERAGE UNIT COST ( 1 SATELLITES)						88.7
TOTAL SATELLITE DDT+E AND RECURRING COST						258.6

VII-203

NL1-1-12 MARS SSR

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1501	CONTROL ELECT.	2	10.0	4.0	1.00	1500966.	851188.	644803.	599765.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	54408.	47539.
1718	RATE INTEGR GYRO	2	9.6	32.0	1.00	890295.	172894.	397414.	355749.
1803	EARTH SENSOR	3	14.6	19.0	1.00	1370628.	677722.	905940.	964568.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE NG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	2612597.	139061.	319646.	043957.
406	COMM DECOD+DISTR	2	11.0	5.5	1.00	6920213.	184082.	423133.	765219.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE NG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	64909.	19836.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	105936.	184625.
354	TRANSMITTER	5	2.8	90.0	1.00	160886.	132614.	239065.	190285.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
618	DIPLEXER	2	1.5	0.0	1.00	38973.	17662.	24188.	15573.

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NLI-1-12 MARS SSR

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	2	49.5	0.0	.10	66515.	37879.	140048.	134229.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	89.7	1.00	698591.	147323.	376304.	0.
WIRING HARNESS	437.0	1.00	1423489.	837415.	1132804.	0.
THERMAL CONTROL	50.6	1.00	1273883.	156790.	153697.	0.
POWER CONVERTERS	10.0	1.00	410936.	256004.	163477.	0.
PROPULSION FEED SYS	589.5	1.00	3252292.	2610350.	2222520.	0.
STRUCTURE	734.9	1.00	6335617.	2967844.	1895175.	0.
POWER CONTROL UNITS	145.9	1.00	1040406.	472999.	604085.	0.
SOLAR ARRAY DRIVE	14.9	1.00	623714.	291131.	371814.	0.
SATELLITE ADAPTER	226.8	1.00	385650.	226414.	94443.	0.

PROPELLANT WEIGHT 2300.6

MISSION EQUIP WEIGHT 2380.0

TOTAL SATELLITE WEIGHT 7282.3

NLI-205

\*\* SATELLITE SYSTEMS COST MODEL \*\*

NL2-1-1 TR0

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 590. ARRAY AREA = 46.4 SQ FT BATT CAP = .56. AMP-HR

VII-206

SPACECRAFT COST MODEL

NL2-1-1 TBO

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.0	1.4	6.4	0.0	1.1	1.1
THERMAL CONTROL	1.1	.2	1.3	0.0	.2	.2
ELECTRICAL POWER	1.6	.3	1.9	.2	.6	.8
COMMUNICATIONS	1.6	.6	2.2	.4	.7	1.2
DATA HANDLING	6.8	.3	7.0	.7	.5	1.2
STABILITY AND CONTROL	4.0	1.1	5.2	.0	1.0	1.1
AUXILIARY PROPULSION	1.9	1.1	3.0	.3	1.1	1.4
SPACECRAFT MISSION EQUIPMENT	21.9	5.0	26.9	1.7	5.2	6.9
			3.2			1.7
SATELLITE QUALIFICATION UNIT(S)			30.2			8.5
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			.4
CONTRACTOR FEE			2.0			.5
<b>TOTAL SATELLITE</b>			<b>34.1</b>			<b>9.5</b>
<b>AVERAGE UNIT COST ( 1 SATELLITES)</b>						<b>9.5</b>
<b>TOTAL SATELLITE DDT+E AND RECURRING COST</b>						<b>43.6</b>

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NL2-1-1 TBO

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25955.	0.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	1	7.1	62.0	1.00	1038161.	441025.	281680.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	109787.	116814.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	60545.	60616.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1016129.	139061.	319646.	406031.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2959721.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
203	ANTENNA	2	10.4	0.0	1.00	462041.	268784.	158904.	184625.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
398	TRANSMITTER	1	2.1	16.0	1.00	136863.	28105.	77564.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
618	DIPLEXER	1	1.5	0.0	1.00	35032.	10390.	13438.	0.

VII-208

NL2-1-1 TRO

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
254	BATTERY	2	45.6	0.0	.10	54196.	35677.	131908.	109368.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	32.3	1.00	73778.	26471.	67614.	0.
WIRING HARNESS	49.0	1.00	222593.	130948.	177138.	0.
THERMAL CONTROL	38.8	1.00	635711.	130958.	131584.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	100.4	1.00	1082118.	673915.	573789.	0.
STRUCTURE	166.6	1.00	2483003.	840564.	536759.	0.
POWER CONTROL UNITS	47.6	1.00	583195.	33687.	43023.	0.
SOLAR ARRAY DRIVE	5.4	1.00	313421.	122861.	156911.	0.
SATELLITE ADAPTER	66.4	1.00	135750.	61196.	46035.	0.

PROPELLANT WEIGHT 269.8

MISSION EQUIP WEIGHT 844.0

TOTAL SATELLITE WEIGHT 1820.6

VII-209

\*\* SATELLITE SYSTEMS COST MODEL \*\*

601-11 EMS

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-SEPARATE ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 920. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1194. ARRAY AREA = 96.9 SQ FT BATT CAP = 34. AMP-HR

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VII-211

SPACECRAFT COST MODEL

CJ1-1-1 EMS

(MILLIONS OF 1977 DOLLARS)

VII-212

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.1	1.2	6.3	3.6	2.6	6.2
THERMAL CONTROL	.7	.2	.8	.5	.4	.9
ELECTRICAL POWER	3.0	.8	3.9	2.4	3.6	6.0
COMMUNICATIONS	.8	.4	1.2	1.0	1.3	2.3
DATA HANDLING	7.8	1.1	8.9	7.7	3.1	10.8
STABILITY AND CONTROL	4.1	1.6	5.7	4.3	3.3	7.7
AUXILIARY PROPULSION	1.4	.8	2.2	1.6	2.0	3.7
SPACECRAFT MISSION EQUIPMENT	22.9	6.0	28.9	21.1	16.4	37.6
			49.2			72.2
SATELLITE QUALIFICATION UNIT(S)			78.1			109.7
GSE (AGE)			0.0			0
LAUNCH SITE SUPPORT			2.0			2
CONTRACTOR FEE			2.2			1.4
						2.7
TOTAL SATELLITE			82.3			113.8
AVERAGE UNIT COST ( 3 SATELLITES)						37.9
TOTAL SATELLITE DDT+E AND RECURRING COST						196.1

CD1-1-1 EMS

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	21378.	23497.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	32645.	28313.
1803	EARTH SENSOR	1	14.6	19.0	1.00	1118880.	282384.	301980.	262468.
2203	CONTROL ELECTRONCS	2	7.1	62.0	1.00	1154954.	749743.	429049.	533024.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	99239.	93676.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41909.	41743.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1045773.	139061.	270487.	482636.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	408520.	316890.
403	COMMND DECOD+DISTR	1	2.3	7.5	1.00	3037269.	47819.	51673.	712484.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
103	RASEND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
227	ANTENNA	4	.3	0.0	1.00	66452.	85474.	24717.	51774.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	78763.	46846.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	81094.	48488.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

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CJ1-1-1 EMS

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
233 BATTERY	2	26.8	0.0	.10	36087.	24319.1	87778.	67222.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJ. COST	VEHICLE ENG. COST
SOLAR ARRAY	67.5	1.00	572100.	113219.	244718.	134204.
WIRING HARNESS	69.9	1.00	300845.	176982.	202591.	70572.
THERMAL CONTROL	30.5	1.00	388610.	111240.	76723.	91160.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	62.4	1.00	790887.	468376.	337458.	185527.
STRUCTURE	115.2	1.00	2339450.	614302.	331946.	548790.
POWER CONTROL UNITS	61.3	1.00	880872.	264808.	307779.	206636.
SOLAR ARRAY DRIVE	11.2	1.00	513967.	228410.	246849.	120567.
SATELLITE ADAPTER	59.8	1.00	124192.	55113.	36641.	29133.

PROPELLANT WEIGHT 56.6

MISSION EQUIP WEIGHT 900.0

TOTAL SATELLITE WEIGHT 1629.1

VII-214

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
C01-1-2 G0ES-1 V

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 443. ARRAY AREA = 137.0 SQ FT BATT CAP = 28. AMP-HR

V11-215

SPACECRAFT COST MODEL

CO1-1-2 GOES-1

(MILLIONS OF 1977 DOLLARS)

VII-216

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.3	2.1	5.4	2.3	3.5	5.8
THERMAL CONTROL	1.3	.2	1.5	2.9	.4	1.3
ELECTRICAL POWER	3.7	1.4	5.1	2.9	4.7	7.6
COMMUNICATIONS	1.6	.6	2.2	2.2	2.4	4.5
DATA HANDLING	5.3	1.1	6.4	5.9	3.6	9.5
STABILITY AND CONTROL	3.3	1.3	4.7	4.4	3.0	7.4
AUXILIARY PROPULSION	1.7	.8	2.5	1.5	2.0	3.6
SPACECRAFT MISSION EQUIPMENT	20.2	7.5	27.7 20.0	20.1	19.6	39.7 25.7
SATELLITE QUALIFICATION UNIT(S)			47.7			65.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.8			1.4
CONTRACTOR FEE			2.1			2.9
TOTAL SATELLITE			51.6			69.7
AVERAGE UNIT COST ( 3 SATELLITES)						23.2
TOTAL SATELLITE DDT+E AND RECURRING COST						121.3



CO1-1-2 GOES-1

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	28241.	59635.
403	NUTATION DAMPER	2	2.8	0.0	1.00	85947.	27173.	25909.	39666.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	442003.	550190.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397402.	153300.	183175.	183419.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13764.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	653183.	139061.	270487.	301451.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	521388.	389274.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1989032.	47819.	51673.	466588.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	49442.	27399.	54927.	22910.
202	ANTENNA	2	8.4	0.0	1.00	388837.1	233007.	115423.	179453.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	121641.	72732.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	60886.	39666.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	49695.	14075.
603	DIPLEXER	2	3.1	1.0	1.00	63868.1	26267.	33422.	29476.

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CO1-1-2 GOES-1.

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDIC FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224	BATTERY	2	29.5	0.0	.10	30816.	26095.	94186.	57384.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	67.0	1.00	729138.	112443.	243039.	171018.
WIRING HARNESS	80.0	1.00	337823.	198442.	227156.	79129.
THERMAL CONTROL	34.0	1.00	760184.	119742.	103069.	178324.
POWER CONVERTERS	16.0	1.00	592909.	369370.	199594.	139085.
PROPULSION FEED SYS	79.0	1.00	966749.	561001.	404192.	226781.
STRUCTURE	317.0	1.00	1812530.	1452270.	784753.	425185.
POWER CONTROL UNITS	71.0	1.00	493187.	310366.	335420.	115692.
SATELLITE ADAPTER	57.0	1.00	119231.	46674.	35627.	27969.

PROPELLANT WEIGHT 169.0

MISSION EQUIP WEIGHT 247.0

TOTAL SATELLITE WEIGHT 1372.0

VII-218

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
C-01-1-3 G0ES-2 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 583. ARRAY AREA = 180.0 SQ FT BATT CAP = 36. AMP-HR

V11-219

SPACECRAFT COST MODEL

CO1-1-3 GOES-2

(MILLIONS OF 1977 DOLLARS)

VII-220

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.9	2.8	6.8	6.9	11.0	17.9
THERMAL CONTROL	1.4	.2	1.6	2.5	1.2	3.6
ELECTRICAL POWER	4.3	1.6	5.9	8.1	12.8	21.0
COMMUNICATIONS	1.6	.6	2.2	4.5	5.4	9.9
DATA HANDLING	6.6	1.1	7.6	15.2	8.3	23.5
STABILITY AND CONTROL	3.3	1.3	4.5	8.3	6.1	14.4
AUXILIARY PROPULSION	1.7	.8	2.5	3.7	4.8	8.5
SPACECRAFT MISSION EQUIPMENT	22.7	8.4	31.1 32.1	49.2	49.5	98.7 95.6
SATELLITE QUALIFICATION UNIT(S)			63.2			194.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			
CONTRACTOR FEE			2.3			3.9 7.2
TOTAL SATELLITE			67.6			205.5
AVERAGE UNIT COST ( 8 SATELLITES)						25.6
TOTAL SATELLITE DDT+E AND RECURRING COST						273.0

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COI-1-3 GOES-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	18724.	36101.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	24329.	45825.
403	NUTATION DAMPER	2	2.8	0.0	1.00	85947.	27173.	22320.	30480.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	380783.	422774.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	87669.	77770.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	72127.	60647.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	847453.	139061.	233023.	300534.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	449173.	272943.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2513899.	47819.	44516.	547265.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	47319.	17605.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	99437.	137894.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	101780.	53996.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	104794.	55888.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	52453.	30480.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	42812.	10183.
603	DIPLEXER	2	3.1	1.0	1.00	63868.	26267.	28793.	22650.

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CO1-1-3 GUES-2

ELECTRICAL POWER		UNIT	UNIT	DDTE			VEHICLE	VEHICLE	
IDENT	TYPE	NO.	WEIGHT	POWER	FACTOR	D.E. COST	T.E. COST	PROD. COST	ENG. COST
236	BATTERY	2	40.0	0.0	.10	37808.	32491.	112127.	60811.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	89.0	1.00	882544.	146258.	272345.	192126
WIRING HARNESS	103.0	1.00	417938.	245866.	242461.	90983
THERMAL CONTROL	43.0	1.00	829040.	140409.	101870.	180478
POWER CONVERTERS	16.0	1.00	592909.	369370.	171949.	129074
PROPULSION FEED SYS	79.0	1.00	966749.	561001.	348210.	210457
STRUCTURE	462.0	1.00	2162687.	2000289.	931175.	470808
POWER CONTROL UNITS	90.0	1.00	579137.	356549.	331962.	126076
SATELLITE ADAPTER	80.0	1.00	159046.	61288.	37425.	34624
PROPELLANT WEIGHT	169.0					
MISSION EQUIP WEIGHT	450.0					

TOTAL SATELLITE WEIGHT 1837.0

VII-222

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\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CPI-2-1 ALWEMTC ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - MIDDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 427. NUMBER OF QUAL UNITS = 0  
BOL POWER = 3605. ARRAY AREA = 293.0 SQ FT BATT CAP = 100. AMP-HR

V1-223

SPACECRAFT COST MODEL

CD1-2-1 ALWEMTC

(MILLIONS OF 1977 DOLLARS)

VII-224

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.3	10.0	3.1	3.7	6.7
THERMAL CONTROL	1.0	.4	1.4	.4	.6	1.0
ELECTRICAL POWER	6.0	1.6	7.6	2.9	5.2	8.1
COMMUNICATIONS	.8	.4	1.2	.8	1.0	1.8
DATA HANDLING	10.5	1.1	11.5	6.4	2.2	8.6
STABILITY AND CONTROL	4.5	1.9	6.4	4.4	3.3	7.6
AUXILIARY PROPULSION	1.5	.9	2.4	1.2	1.6	2.8
SPACECRAFT MISSION EQUIPMENT	31.9	8.5	40.4	19.1	17.7	36.8
			61.8			63.7
SATELLITE QUALIFICATION UNIT(S)			102.3			100.5
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.6			
CONTRACTOR FEE			3.0			1.1
						2.7
TOTAL SATELLITE			107.9			104.3
AVERAGE UNIT COST ( 2 SATELLITES)						92.1
TOTAL SATELLITE DDT+E AND RECURRING COST						212.1



COI-2-1 ALWEMIC

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	41885.	53424.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	48967.	46764.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	604848.	625533.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	108407.	111983.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	59784.	58109.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1484954.	139061.	287682.	711917.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	434489.	345879.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	4163333.	47819.	54958.	831804.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	26288.	57865.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	83769.	48664.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	86249.	50369.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VI-225

CO1-2-1 ALWEMIC

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.0	0.0	.10	86935.	49112.	179297.	168180.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	204.0	1.00	1241232.	315285.	724794.	247989.
WIRING HARNESS	126.0	1.00	495838.	291693.	355127.	99065.
THERMAL CONTROL	115.0	1.00	581651.	273563.	223608.	116210.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	72.0	1.00	864227.	522562.	400432.	172667.
STRUCTURE	199.0	1.00	3244028.	977625.	561854.	648134.
POWER CONTROL UNITS	167.0	1.00	1681339.	511890.	588381.	335919.
SOLAR ARRAY DRIVE	34.0	1.00	1091210.	586998.	674712.	218016.
SATELLITE ADAPTER	93.0	1.00	180762.	87112.	50457.	36115.
PROPELLANT WEIGHT	137.0					
MISSION EQUIP WEIGHT	1188.0					
TOTAL SATELLITE WEIGHT	2647.0					

V11-226

\*\* SATELLITE SYSTEMS COST MODEL \*\*

C02-1-1 OP SEABAT ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APGEE = 440. NUMBER OF QUAL UNITS = 0  
BOL POWER = 4092. ARRAY AREA = 332.0 SQ FT BATT CAP = 100. AMP-HR

VII-227

205

SPACECRAFT COST MODEL

CO2-1-1 OP SEASAT

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+F-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+F	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	9.2	2.5	11.6	12.7	10.1	22.8
THERMAL CONTROL	1.0	.4	1.5	1.5	1.7	3.2
ELECTRICAL POWER	6.6	1.8	6.4	10.4	15.0	25.5
COMMUNICATIONS	.8	.4	1.2	1.9	2.6	4.6
DATA HANDLING	13.4	1.1	14.5	23.8	6.5	30.2
STABILITY AND CONTROL	4.5	1.9	6.4	10.5	8.2	18.7
AUXILIARY PROPULSION	1.3	.7	2.0	3.1	3.6	6.6
SPACECRAFT MISSION EQUIPMENT	36.8	8.8	45.6	63.8	47.7	111.5
			85.6			240.4
SATELLITE QUALIFICATION UNIT(S)			131.2			352.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.9			
CONTRACTOR FEE			3.4			3.6
						8.1
TOTAL SATELLITE			137.4			363.6
AVERAGE UNIT COST ( 6 SATELLITES)						60.6
TOTAL SATELLITE DDT+F AND RECURRING COST						501.1

VII-328

CO2-1-1 OP SEASAT

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTF FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	88611.	35443.	43411.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	29381.	23899.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	511628.	508286.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	386145.	449924.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTF FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	104131.	98090.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	40718.	37973.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTF FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1990132.	139061.	243439.	775276.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	469251.	305686.
403	COMMND DECOD+DISTR	1	2.3	7.5	1.00	5417737.	47819.	46506.	1250173.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTF FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	27463.	10297.
227	ANTENNA	4	.6	0.0	1.00	66452.	85474.	22245.	40657.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	70886.	39543.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	72585.	40928.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	54797.	33482.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	44725.	11327.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16711.	13247.

VII-229

CO2-1-1 OP SEASAT

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.5	0.0	.10	86935.	49360.	173098.	147314.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	231.3	1.00	1354697.	354170.	688971.	312604.
WIRING HARNESS	166.4	1.00	627717.	369275.	380439.	144849.
THERMAL CONTROL	131.3	1.00	616858.	299287.	204476.	142349.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	54.0	1.00	716641.	419334.	271912.	165369.
STRUCTURE	213.0	1.00	3976169.	1035785.	503731.	917523.
POWER CONTROL UNITS	180.3	1.00	1810706.	535359.	520720.	417830.
SOLAR ARRAY DRIVE	38.4	1.00	1185065.	650970.	633170.	273460.
SATELLITE ADAPTER	121.0	1.00	226081.	113753.	49804.	52169.
PROPELLANT WEIGHT	100.0					
MISSION EQUIP WEIGHT	1950.0					
TOTAL SATELLITE WEIGHT	3513.4					

V11+230

\*\* SATELLITE SYSTEMS COST MODEL \*\*

C03-1-1 GOVT LEAD ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 450. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1619. ARFAY AREA = 131.0 SQ FT BATT CAP = 40. AMP-HR

VII-231

SPACECRAFT COST MODEL

C03-1-1 GOVT LEG

(MILLIONS OF 1977 DOLLARS)

VII-232

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.7	1.4	6.1	15.8	16.1	31.9
THERMAL CONTROL	3.8	1.2	5.0	2.6	2.2	4.8
ELECTRICAL POWER	3.6	1.0	4.6	13.7	23.2	36.9
COMMUNICATIONS	3.8	1.4	5.2	3.9	7.0	11.0
DATA HANDLING	6.4	1.1	7.5	27.6	18.7	46.3
STABILITY AND CONTROL	4.3	1.6	5.9	18.3	18.1	36.4
AUXILIARY PROPULSION	1.4	.8	2.2	8.1	11.3	19.4
SPACECRAFT MISSION EQUIPMENT	21.8	6.4	28.2 34.0	90.0	96.7	186.7 233.1
SATELLITE QUALIFICATION UNIT(S)			62.2			419.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			9.8
CONTRACTOR FEE			2.1			13.8
TOTAL SATELLITE			66.3			443.4
AVERAGE UNIT COST ( 21 SATELLITES)						21.1
TOTAL SATELLITE DDT+E AND RECURRING COST						509.7



CO3-1-1 GOVT LEO

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	29298.	27208.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	24286.	14979.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	235046.	188658.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	319192.	281995.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	95283.	73683.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	37258.	28524.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	818497.	139061.	201230.	199846.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	387888.	180244.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2436508.	47819.	38443.	391930.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	22701.	7178.
227	ANTENNA	4	.6	0.0	1.00	66452.	85474.	18388.	23973.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	58596.	24784.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	60330.	25652.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	25164.	12427.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	36971.	6825.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	13814.	9235.

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CO3-1-1 GOVT LEG

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	33.7	0.0	.10	41198.	28719.	92155.	52441.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. CO
SOLAR ARRAY	91.5	1.00	706538.	150059.	241297.	11365
WIPING HARNESS	68.7	1.00	296459.	174402.	148521.	4768
THERMAL CONTROL	32.4	1.00	451414.	115892.	74547.	7261
POWER CONVERTERS	0.0	0.00	0.	0.	0.	
PROPULSION FEED SYS	61.0	1.00	781266.	460316.	246732.	12567
STRUCTURE	133.5	1.00	2017332.	696316.	279922.	32450
POWER CONTROL UNITS	95.4	1.00	1052628.	368913.	296609.	16932
SOLAR ARRAY DRIVE	15.0	1.00	626549.	292791.	235406.	10078
SATELLITE ADAPTER	50.0	1.00	106665.	46247.	24549.	1715
PROPELLANT WEIGHT	82.0					
MISSION EQUIP WEIGHT	490.0					
TOTAL SATELLITE WEIGHT	1352.2					

VII-234

\*\* SATELLITE SYSTEMS COST MODEL \*\*

C03-1-2 PVT LEON

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 450. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1619. ARRAY AREA = 131.0 SQ FT BATT CAP = 40. AMP-HR

VII-235

SPACECRAFT COST MODEL

CO3-1-2 PVT LEO

(MILLIONS OF 1977 DOLLARS)

N11-236

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.7	1.4	6.1	4.5	3.9	8.4
THERMAL CONTROL	.8	.2	.9	.7	.5	1.3
ELECTRICAL POWER	3.6	1.0	4.6	3.9	5.6	9.5
COMMUNICATIONS	.8	.4	1.2	1.3	1.7	3.0
DATA HANDLING	6.4	1.1	7.4	8.8	4.6	13.4
STABILITY AND CONTROL	4.3	1.6	5.9	5.8	4.4	10.3
AUXILIARY PROPULSION	1.4	.8	2.1	2.3	2.6	4.9
SPACECRAFT	21.8	6.4	28.2	27.3	23.5	50.8
MISSION EQUIPMENT			34.0			57.6
SATELLITE			62.2			108.3
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.9			
LAUNCH SITE SUPPORT						1.9
CONTRACTOR FEE			2.1			3.7
TOTAL SATELLITE			66.3			113.9
AVERAGE UNIT COST ( 4 SATELLITES)						28.5
TOTAL SATELLITE DDT+E AND RECURRING COST						180.2

CO3-1-2 PVT LEO

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.1	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.1	106069.	104195.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41476.	40336.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	818497.	139061.	258914.	356366.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	499081.	354372.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	2436508.	47819.	49463.	584056.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	23659.	47132.1
306	TRANSMITTER	2	2.1	10.7	1.00	101507.	47779.	75393.	44195.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	77625.	45744.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.1	47569.	12967.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.1	17773.	13762.

VII-237

CO3-1-2 PVT LEO

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	33.7	0.0	.10	41198.	28719.	102587.	74157.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SCLAR ARRAY	91.5	1.00	706538.	150059.	310468.	169364
WIRING HARNESS	68.7	1.00	296459.	174402.	191096.	71064
THERMAL CONTROL	32.4	1.00	451414.	115892.	95916.	108208
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0
PROPULSION FEED SYS	61.0	1.00	781286.	460316.	317451.	187282
STRUCTURE	133.5	1.00	2017332.	696316.	360165.	483575
POWER CONTROL UNITS	95.4	1.00	1052628.	368913.	381635.	252326
SOLAR ARRAY DRIVE	15.0	1.00	626549.	292791.	302888.	150190
SATELLITE ADAPTER	50.0	1.00	106665.	46247.	31587.	25569
PROPELLANT WEIGHT	82.0					
MISSION EQUIP WEIGHT	490.0					

TOTAL SATELLITE WEIGHT 1352.2

VII-238

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
C03-13 GOVT REQ ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 988. ARRAY AREA = 78.0 SQ FT BATT CAP = 100. AMP-HR

V11-239

SPACECRAFT COST MODEL

CO3-1-3 GOVT GEO

(MILLIONS OF 1977 DOLLARS)

072-1117

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.5	1.6	6.1	1.8	2.2	4.0
THERMAL CONTROL	1.8	.2	1.9	.7	.3	1.0
ELECTRICAL POWER	3.0	1.1	4.0	1.7	3.2	4.9
COMMUNICATIONS	1.6	.6	2.2	1.5	1.7	3.2
DATA HANDLING	6.6	1.1	7.7	8.3	3.3	11.7
STABILITY AND CONTROL	4.5	1.9	6.4	4.4	3.3	7.6
AUXILIARY PROPULSION	1.5	.9	2.4	1.2	1.6	2.8
SPACECRAFT MISSION EQUIPMENT	23.5	7.3	30.9	19.6	15.7	35.3
			24.1			20.8
SATELLITE QUALIFICATION UNIT(S)			54.9			56.1
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.1			
CONTRACTOR FEE			2.3			1.1
						2.5
TOTAL SATELLITE			59.3			59.7
AVERAGE UNIT COST ( 2 SATELLITES)						29.8
TOTAL SATELLITE DDT+E AND RECURRING COST						119.0



CO3-1-3 GOVT GEO

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	41885.	53424.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	48967.	46764.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	604848.	625533.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	108407.	111983.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	59784.	58109.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	4	8.9	3.0	1.00	981361.	139061.	517828.	854552.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	554533.	435072.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	2430551.	47819.	98925.	1165256.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	58418.	23799.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	122761.	186417.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	129374.	75554.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
603	DIPLEXER	2	3.1	1.0	1.00	63868.	26267.	35547.	30619.

VII-241

CO3-1-3 GOVT GEO

ELECTRICAL POWER		UNIT	UNIT	DDTE			VEHICLE	VEHICLE	
IDENT	TYPE	NO.	WEIGHT	POWER	FACTOR	D.E. COST	T.E. COST	PROD. COST	ENG. COST
269	BATTERY	2	71.0	0.0	.10	86935.	49112.	179297.	168180.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE	D.E. COST	T.E. COST	VEHICLE	VEHICLE
		FACTOR			PROD. COST	ENG. COST
SOLAR ARRAY	54.0	1.00	491487.	92084.	211687.	98191.
WIRING HARNESS	90.0	1.00	372755.	219285.	266973.	74471.
THERMAL CONTROL	32.0	1.00	1048090.	114920.	105802.	20940.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS.	74.0	1.00	880800.	533631.	408913.	175971.
STRUCTURE	182.0	1.00	2111445.	906166.	520786.	42185.
POWER CONTROL UNITS	120.0	1.00	788494.	421899.	484943.	15753.
SOLAR ARRAY DRIVE	9.0	1.00	443141.	189664.	218005.	8853.
SATELLITE ADAPTER	54.0	1.00	113876.	50568.	36712.	2275.
PROPELLANT WEIGHT	204.0					
MISSION EQUIP WEIGHT	290.0					

TOTAL SATELLITE WEIGHT 1486.0

VII-242

♦♦ SATELLITE SYSTEMS COST MODEL ♦♦  
CQ3-1-4 INT GEQ

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL.

AUXILIARY PROPULSION  
CONFIGURATION - - NONPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU).

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 988. ARRAY AREA = 78.0 SQ FT BATT CAP = 100. AMP-HR

VII-243

SPACECRAFT COST MODEL

CO3-1-4 PVT GEO

(MILLIONS OF 1977 DOLLARS)

778-111

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.5	1.6	6.1	1.8	2.2	4.0
THERMAL CONTROL	1.8	.2	1.9	.7	.3	1.0
ELECTRICAL POWER	3.0	1.1	4.0	1.7	3.2	4.9
COMMUNICATIONS	1.6	1.6	2.2	1.5	1.7	3.2
DATA HANDLING	6.6	1.1	7.7	8.3	3.3	11.7
STABILITY AND CONTROL	4.5	1.9	6.4	4.4	3.3	7.6
AUXILIARY PROPULSION	1.5	.9	2.4	1.2	1.6	2.8
SPACECRAFT MISSION EQUIPMENT	23.5	7.3	30.9	19.6	15.7	35.3
			24.1			20.8
SATELLITE QUALIFICATION UNIT(S)			54.9			56.1
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.1			
CONTRACTOR FEE			2.3			1.1
						2.5
TOTAL SATELLITE			59.3			59.7
AVERAGE UNIT COST (2 SATELLITES)						29.8
TOTAL SATELLITE DDT+E AND RECURRING COST						119.0

CO3-1-4 PVT GEO

\*\*\* ASSEMBLY DESCRIPTIONS \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	41885.	53424.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	48967.	46764.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	604848.	625533.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	108407.	111983.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	59784.	58109.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	4	8.9	3.0	1.00	981361.	139061.	517828.	854552.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	554533.	435072.
403	COMM DECOD+DISTR	2	2.3	7.5	1.00	2430551.	47819.	98925.	1165256.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	19642.	27399.	58418.	23799.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	122761.	186417.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	129374.	75554.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15382.
603	DIPLEXER	2	3.1	1.0	1.00	63868.	26267.	35547.	30619.

VII-245

CO3-1-4 PVT GEO

ELECTRICAL POWER		UNIT	UNIT	DDTE	D.E. COST	T.E. COST	VEHICLE	VEHICLE
IDENT	TYPE	NO.	WEIGHT	POWER FACTOR			PROD. COST	ENG. COST
269	BATTERY	2	71.0	0.0	86935.	49112.	179297.	168180.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. CO
SOLAR ARRAY	54.0	1.00	491487.	92084.	211687.	9819
WIRING HARNESS	90.0	1.00	372755.	219285.	266973.	7447
THERMAL CONTROL	32.0	1.00	1048090.	114920.	105802.	20940
POWER CONVERTERS	0.0	0.00	0.	0.	0.	
PROPULSION FEED SYS	74.0	1.00	880800.	533631.	408913.	17597
STRUCTURE	182.0	1.00	2111445.	906166.	520786.	42185
POWER CONTROL UNITS	120.0	1.00	788494.	421899.	484943.	15759
SOLAR ARRAY DRIVE	9.0	1.00	443141.	189664.	218005.	8853
SATELLITE ADAPTER	54.0	1.00	113876.	50568.	36712.	2275
PROPELLANT WEIGHT	204.0					
MISSION EQUIP WEIGHT	290.0					
TOTAL SATELLITE WEIGHT			1486.0			

VII-246

\*\* SATELLITE SYSTEMS COST MODEL \*\*

Cφ 3-2-1 SPφT-1 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APCGEE = 450. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1539. ARRAY AREA = 125.0 SQ FT BATT CAP = 40. AMP-HR

111-247

SPACECRAFT COST MODEL

CO3-2-1 SPOT-1

(MILLIONS OF 1977 DOLLARS)

VII-248

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.6	1.4	6.0	1.8	2.1	4.0
THERMAL CONTROL	.8	.2	.9	.3	.3	.6
ELECTRICAL POWER	3.5	1.0	4.4	1.6	3.0	4.6
COMMUNICATIONS	.8	.4	1.2	.7	1.0	1.7
DATA HANDLING	6.3	1.1	7.4	4.4	2.5	7.0
STABILITY AND CONTROL	4.3	1.6	5.9	3.0	2.5	5.4
AUXILIARY PROPULSION	.9	1.1	2.0	2.1	2.2	4.4
SPACECRAFT MISSION EQUIPMENT	21.1	6.6	27.8	14.0	13.6	27.7
			33.4			31.2
SATELLITE QUALIFICATION UNIT(S)			61.1			58.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			
CONTRACTOR FEE			2.1			1.0
						2.0
TOTAL SATELLITE			65.1			61.9
AVERAGE UNIT COST ( 2 SATELLITES)						30.9
TOTAL SATELLITE DDT+E AND RECURRING COST						127.0



CO3-2-1 SPOT-1

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTF FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	41885.	53424.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	34720.	29412.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	336026.	234322.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTF FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
618	THRUSTER	18	.4	0.0	.10	14248.	70110.	108407.	111983.
834	THRUSTER	44	.7	.1	.10	34577.	231762.	323864.	419216.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTF FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	806736.	139061.	287682.	386766.
345	TAPE RECORDER	4	16.6	25.0	1.00	499633.	583549.	554533.	435072.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	2404998.	47819.	54958.	480502.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTF FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	RASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	26288.	57865.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	83769.	48664.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	86249.	50369.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-249

CD3-2-1 SPDT-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	33.7	0.0	.10	41198.	28689.	104736.	79699.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. CC
SOLAR ARRAY	87.0	1.00	683727.	143212.	329224.	13660
WIRING HARNESS	67.3	1.00	291328.	171384.	208654.	5820
THERMAL CONTROL	32.0	1.00	446269.	114920.	105802.	8916
POWER CONVERTERS	C.V	0.00	0.	0.	0.	
PROPULSION FEED SYS	61.0	1.00	490334.	460316.	352733.	9796
STRUCTURE	132.0	1.00	1992213.	689660.	396357.	39803
POWER CONTROL UNITS	91.0	1.00	1021860.	358861.	412485.	20416
SOLAR ARRAY DRIVE	14.4	1.00	609446.	282805.	325064.	12176
SATELLITE ADAPTER	49.0	1.00	104849.	45482.	34684.	2094
PROPELLANT WEIGHT	82.0					
MISSION EQUIP WEIGHT	480.0					
TOTAL SATELLITE WEIGHT	1328.3					

VII-250

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
C03-2-2 SP0T-2

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 450. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1619. ARRAY AREA = 131.0 SQ FT BATT CAP = 40. AHP-HR

VII-251

SPACECRAFT COST MODEL

CO3-2-2 SPOT-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	--- DDT+E ---			--- RECURRING ---		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.7	1.4	6.1	1.9	2.2	4.1
THERMAL CONTROL	.8	.2	.9	.3	.3	.6
ELECTRICAL POWER	3.6	1.0	4.6	1.7	3.1	4.8
COMMUNICATIONS	.8	.4	1.2	.7	1.0	1.7
DATA HANDLING	6.4	1.1	7.4	4.5	2.5	7.0
STABILITY AND CONTROL	4.3	1.6	5.9	3.0	2.5	5.4
AUXILIARY PROPULSION	1.4	.8	2.1	1.1	1.4	2.5
SPACECRAFT MISSION EQUIPMENT	21.8	6.4	28.2	13.0	13.0	26.0
			34.0			32.0
SATELLITE QUALIFICATION UNIT(S)			62.2			58.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			1.9
CONTRACTOR FEE			2.1			1.9
<b>TOTAL SATELLITE</b>			<b>66.3</b>			<b>60.8</b>
<b>AVERAGE UNIT COST (2 SATELLITES)</b>						<b>30.4</b>
<b>TOTAL SATELLITE DDT+E AND RECURRING COST</b>						<b>127.1</b>

VII-252

CO3-2-2 SPOT-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	41885.	53424.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	34720.	29412.
1615	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	336026.	234322.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
618	THRUSTER	18	.4	0.0	.10	14248.	70110.	108407.	111983.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42390.	43351.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	818497.	139061.	287682.	392404.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	554533.	435072.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	2436508.	47819.	54958.	486797.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	26288.	57865.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	83769.	48664.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	86249.	50369.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-353

CO3-2-2 SPOT-2

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	33.7	0.0	.10	41198.	28719.	104848.	79699.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	91.5	1.00	706538.	150059.	344963.	14116.
WIRING HARNESS	68.7	1.00	296459.	174402.	212329.	5923.
THERMAL CONTROL	32.4	1.00	451414.	115892.	106573.	9018.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	61.0	1.00	781286.	460316.	352733.	15609.
STRUCTURE	133.5	1.00	2017332.	696316.	400182.	40304.
POWER CONTROL UNITS	95.4	1.00	1052628.	368913.	424038.	21030.
SOLAR ARRAY DRIVE	15.0	1.00	626549.	292791.	336542.	12518.
SATELLITE ADAPTER	50.0	1.00	106665.	46247.	35096.	2131.
PROPELLANT WEIGHT	82.0					
MISSION EQUIP WEIGHT	490.0					

TOTAL SATELLITE WEIGHT 1352.2

11-854

\*\* SATELLITE SYSTEMS COST MODEL \*\*

C43-2-3 ETS-3 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 450. NUMBER OF QUAL UNITS = 0  
BOL POWER = 982. ARRAY AREA = 80.0 SQ FT BATT CAP = 24. AMP-HR

V11-255

SPACECRAFT COST MODEL

C03-2-3 ETS-3

(MILLIONS OF 1977 DOLLARS)

958-117

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.8	.9	3.7	0.0	.6	.8
THERMAL CONTROL	.6	.1	.7	0.0	.1	.1
ELECTRICAL POWER	2.5	.7	3.2	.1	1.1	1.2
COMMUNICATIONS	.8	.4	1.2	.3	.5	.8
DATA HANDLING	3.6	1.1	4.7	.8	1.2	2.0
STABILITY AND CONTROL	4.3	1.6	5.9	.9	1.4	2.3
AUXILIARY PROPULSION	1.1	.6	1.6	.2	.6	.8
SPACECRAFT MISSION EQUIPMENT	15.7	5.4	21.1	2.3	5.8	8.1
			7.8			3.1
SATELLITE QUALIFICATION UNIT(S)			28.9			11.2
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.5			.4
CONTRACTOR FEE			1.6			.6
TOTAL SATELLITE			32.0			12.2
AVERAGE UNIT COST ( 1 SATELLITES)						12.2
TOTAL SATELLITE DDT+E AND RECURRING COST						44.2



\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	69611.	46538.	44528.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	FARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	373362.	0.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	77844.	78915.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	359910.	139061.	177581.	0.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	616146.	479069.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1280799.	47019.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	29209.	63717.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	93077.	40561.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	95838.	41982.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

VII-257

ELECTRICAL POWER		NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
IDENT	TYPE	2	19.9	0.0	.10	27169.	19619.	72535.	54827.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	55.5	1.00	500275.	94450.	241251.	0.
WIRING HARNESS	37.5	1.00	177421.	104374.	141190.	0.
THERMAL CONTROL	22.0	1.00	357468.	89139.	94418.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	41.0	1.00	609921.	339671.	289205.	0.
STRUCTURE	84.0	1.00	1141339.	469661.	299911.	0.
POWER CONTROL UNITS	57.3	1.00	785689.	273784.	349660.	0.
SOLAR ARRAY DRIVE	9.2	1.00	449794.	193241.	246796.	0.
SATELLITE ADAPTER	22.4	1.00	35935.	21920.	24379.	0.
PROPELLANT WEIGHT	22.0					
MISSION EQUIP WEIGHT	55.0					
TOTAL SATELLITE WEIGHT	610.9					

VII-258

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
C03-2-4 EARTH ORS ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 450. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1472. ARRAY AREA = 120.0 SQ FT BATT CAP = 36. AMP-HR

VII-259

SPACECRAFT COST MODEL

CJ3-2-4 EARTH OBS

(MILLIONS OF 1977 DOLLARS)

VII-266

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.4	1.3	5.7	5.2	4.3	9.5
THERMAL CONTROL	.7	.2	.8	.8	.6	1.4
ELECTRICAL POWER	3.3	.8	4.1	4.4	5.8	10.2
COMMUNICATIONS	.8	.4	1.2	1.6	2.1	3.6
DATA HANDLING	6.0	1.1	7.1	9.5	4.8	14.3
STABILITY AND CONTROL	4.2	1.6	5.8	6.8	5.3	12.1
AUXILIARY PROPULSION	1.4	.7	2.1	2.5	2.9	5.4
SPACECRAFT MISSION EQUIPMENT	20.8	6.0	26.8	30.8	25.8	56.6
			33.5			67.4
SATELLITE QUALIFICATION UNIT(S)			60.3			124.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			2.2
CONTRACTOR FEE			2.0			4.1
TOTAL SATELLITE			64.2			130.3
AVERAGE UNIT COST ( 5 SATELLITES)						26.1
TOTAL SATELLITE DDT+E AND RECURRING COST						194.5

101

CO3-2-4 EARTH OBS

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	20244.	23694.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	30206.	25213.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	292339.	277428.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	396995.	474668.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	12	.4	0.0	.10	11717.	47802.	74492.	68214.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	41081.	39090.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	758879.	139061.	250280.	311887.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	378000.	271682.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2276289.	47819.	47813.	538448.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	28235.	10555.
227	ANTENNA	4	.8	0.0	1.00	66452.	85474.	22870.	43534.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	72878.	41718.
312	TRANSMITTER	2	2.2	15.8	1.00	105063.	49590.	75036.	43179.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	31298.	18275.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	45982.	12067.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17181.	13580.

198-117

CO3-2-4 EARTH OBS

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
236	BATTERY	2	31.5	0.0	.10	37808.	27357.	96789.	65951.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	83.0	1.00	664466.	137104.	274206.	157177
WIRING HARNESS	55.0	1.00	245501.	144424.	152971.	58072
THERMAL CONTROL	30.0	1.00	389820.	110000.	88636.	92210
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0
PROPULSION FEED SYS	58.0	1.00	775895.	442895.	295260.	183535
STRUCTURE	112.0	1.00	1906205.	599767.	299880.	450906
POWER CONTROL UNITS	66.0	1.00	995615.	297386.	297383.	235509
SOLAR ARRAY DRIVE	14.0	1.00	597916.	276114.	276111.	141435
SATELLITE ADAPTER	45.0	1.00	97528.	42391.	28708.	23070
PROPELLANT WEIGHT	82.0					
MISSION EQUIP WEIGHT	480.0					
TOTAL SATELLITE WEIGHT	1232.0					

VII-262

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*Cφ3-2-5 ESA GEP V*

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 928. ARRAY AREA = 73.0 SQ FT BATT CAP = 80. AMP-HR

V11-263

SPACECRAFT COST MODEL

CO3-2-5 ESA-GEO

(MILLIONS OF 1977 DOLLARS)

VII-264

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.2	1.4	5.6	1.7	2.0	3.7
THERMAL CONTROL	1.4	.2	1.6	.6	.3	.9
ELECTRICAL POWER	2.7	.9	3.6	1.5	2.8	4.3
COMMUNICATIONS	1.5	.6	2.2	1.4	1.6	3.0
DATA HANDLING	5.8	1.1	6.8	3.8	2.2	6.0
STABILITY AND CONTROL	4.5	1.9	6.4	4.3	3.2	7.5
AUXILIARY PROPULSION	1.5	.9	2.4	1.2	1.6	2.8
SPACECRAFT MISSION EQUIPMENT	21.7	6.9	28.6 23.9	14.5	13.7	28.1 20.9
SATELLITE QUALIFICATION UNIT(S)			52.5			49.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			
CONTRACTOR FEE			2.1			1.0 2.0
TOTAL SATELLITE			56.5			52.0
AVERAGE UNIT COST ( 2 SATELLITES)						26.0
TOTAL SATELLITE DDT+E AND RECURRING COST						108.6



CO3-2-5 ESA-GEO

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	41885.	53424.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	34720.	29412.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	604848.	625533.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	456323.	553708.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	108407.	111983.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	59784.	58109.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	719509.	139061.	287682.	344947.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	434489.	345879.
403	COMMND DECOD+DISTR	1	2.3	7.5	1.00	2169794.	47819.	54958.	433509.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	122761.	186417.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	129374.	75554.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

11-265

CO3-2-5 ESA-GEO

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
266	BATTERY	2	55.5	0.0	.10	72479.	41131.	150161.	140215.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	51.0	1.00	469215.	87336.	200774.	93746.
WIRING HARNESS	68.0	1.00	293896.	172894.	210493.	58718.
THERMAL CONTROL	31.0	1.00	847697.	112473.	103855.	169364.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	74.0	1.00	880800.	533631.	408913.	175978.
STRUCTURE	156.0	1.00	1947352.	794883.	456830.	389067.
POWER CONTROL UNITS	90.0	1.00	760118.	356549.	409828.	151866.
SOLAR ARRAY DRIVE	8.4	1.00	422889.	178862.	205588.	84490.
SATELLITE ADAPTER	48.0	1.00	103027.	45018.	34268.	20584.
PROPELLANT WEIGHT	204.0					
MISSION EQUIP WEIGHT	290.0					
TOTAL SATELLITE WEIGHT	1313.4					

V11-266

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*CØ3-2-6 ØTHER GEP*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 988.      ARRAY AREA = 78.0 SQ FT      BATT CAP = 100. AMP-HR

*V11-267*

SPACECRAFT COST MODEL

CD3-2-6 OTHER GEO

(MILLIONS OF 1977 DOLLARS)

VII-268

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.5	1.6	6.1	0.0	1.2	1.2
THERMAL CONTROL	1.8	.2	1.9	0.0	.2	.2
ELECTRICAL POWER	3.0	1.1	4.0	.3	1.8	2.1
COMMUNICATIONS	1.6	.6	2.2	.6	.9	1.6
DATA HANDLING	6.6	1.1	7.7	4.1	1.8	5.9
STABILITY AND CONTROL	4.5	1.9	6.4	1.8	1.8	3.6
AUXILIARY PROPULSION	1.5	.9	2.4	.3	.9	1.2
SPACECRAFT MISSION EQUIPMENT	23.5	7.3	30.9 24.1	7.1	8.7	15.8 11.5
SATELLITE QUALIFICATION UNIT(S)			54.9			27.3
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.1			
CONTRACTOR FEE			2.3			1.1
TOTAL SATELLITE			59.3			29.0
AVERAGE UNIT COST ( 1 SATELLITES)						29.0
TOTAL SATELLITE DDT+E AND RECURRING COST						88.5

CO3-2-6 OTHER GEO

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	46538.	44528.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	54408.	47539.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	672052.	521367.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	109787.	116814.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	60545.	60616.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	4	8.9	3.0	1.00	981361.	139061.	575364.	940969.
345	TAPE RECORDER	4	16.8	25.0	1.00	499633.	583549.	616146.	479069.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	2430551.	47819.	109917.	971214.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	64909.	19836.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	136401.	155374.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	139615.	60861.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	143749.	62973.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	98726.	15617.
603	DIPLEXER	2	3.1	1.0	1.00	63868.	26267.	39496.	25521.

692-111  
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CO3-2-6, OTHER GEO

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.0	0.0	.10	86935.	49112.1	181579.	175436.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	54.0	1.00	491487.	92084.	235207.	0.
WIRING HARNESS	90.0	1.00	372755.	219285.	296636.	0.
THERMAL CONTROL	32.0	1.00	1048090.	114920.	117557.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	74.0	1.00	880800.	533631.	454347.	0.
STRUCTURE	182.0	1.00	2111445.	906166.	578650.	0.
POWER CONTROL UNITS	120.0	1.00	788494.	421899.	538824.	0.
SOLAR ARRAY DRIVE	9.0	1.00	443141.	189664.	242228.	0.
SATELLITE ADAPTER	54.0	1.00	113876.	50568.	40791.	0.
PROPELLANT WEIGHT	204.0					
MISSION EQUIP WEIGHT	290.0					

TOTAL SATELLITE WEIGHT 1486.0

VII-270

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
C04-1-2 TIR08-2 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 450. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1204. ARRAY AREA = 98.0 SQ FT BATT CAP = 24. AMP-HR

VII-271

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SPACECRAFT COST MODEL

CO4-1-2 TIROS-2

(MILLIONS OF 1977 DOLLARS)

VII-272

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.4	1.2	5.6	7.7	5.9	13.6
THERMAL CONTROL	.7	.2	.8	1.2	.9	2.1
ELECTRICAL POWER	3.0	.8	3.8	5.7	7.9	13.6
COMMUNICATIONS	.6	.3	.9	1.7	2.7	4.5
DATA HANDLING	7.6	1.6	9.1	15.6	7.9	23.5
STABILITY AND CONTROL	4.5	1.9	6.4	12.7	10.5	23.2
AUXILIARY PROPULSION	1.4	.8	2.1	4.1	4.9	8.9
SPACECRAFT MISSION EQUIPMENT	22.1	6.6	28.8	48.7	40.6	89.3
			36.4			111.6
SATELLITE QUALIFICATION UNIT(S)			65.2			200.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			
CONTRACTOR FEE			2.2			3.7
						6.5
TOTAL SATELLITE			69.3			211.1
AVERAGE UNIT COST ( 8 SATELLITES)						26.4
TOTAL SATELLITE DDT+E AND RECURRING COST						280.4



CO4-1-2 TIROS-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	33927.	39518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	28124.	21756.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	489929.	462713.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	369623.	409584.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	102475.	93105.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	40070.	36043.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	GEN PURP PROCESR	2	12.8	15.0	1.00	740925.	226440.	223202.	262756.
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	726597.	139061.	129457.	158177.
348	TAPE RECORDER	2	21.5	10.2	1.00	577156.	709956.	294850.	204678.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2409294.	47819.	44516.	524493.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	47319.	17605.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	11830.	19602.
303	TRANSMITTER	2	2.2	10.2	1.00	105063.	49590.	69862.	37259.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	52453.	30480.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	42812.	10183.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	15996.	12498.

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CO4-1-2 TIROS-2

ELECTRICAL POWER		NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
IDENT	TYPE	2	25.3	0.0	.10	27169.	23363.	80626.	43698.
221	BATTERY								

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	68.0	1.00	576639.	113996.	212269.	125532.
WIRING HARNESS	61.0	1.00	268031.	157678.	155495.	58349.
THERMAL CONTROL	30.3	1.00	398683.	110744.	83006.	86791.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	61.0	1.00	781286.	460316.	285715.	170083.
STRUCTURE	110.0	1.00	1979597.	590651.	274960.	430950.
POWER CONTROL UNITS	53.4	1.00	885181.	262724.	244606.	192700.
SOLAR ARRAY DRIVE	11.3	1.00	517074.	230142.	214272.	112565.
SATELLITE ADAPTER	47.0	1.00	101200.	44389.	27417.	22031.
PROPELLANT WEIGHT	88.0					
MISSION EQUIP WEIGHT	540.0					

TOTAL SATELLITE WEIGHT 1293.6

VII-274

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CBA-1-3 NPA ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - GENERAL PURPOSE PROCESSOR

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT -PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 450. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1521. ARRAY AREA = 123.0 SQ FT BATT CAP = 28. AMP-HR

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SPACECRAFT COST MODEL

CO4-1-3 NOAA

(MILLIONS OF 1977 DOLLARS)

976-111V

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.8	1.3	6.1	8.4	6.5	14.8
THERMAL CONTROL	.7	.2	.9	1.3	1.0	2.2
ELECTRICAL POWER	3.4	.9	4.3	6.5	9.2	15.7
COMMUNICATIONS	.5	.3	.8	1.7	2.7	4.4
DATA HANDLING	8.0	1.6	9.5	16.3	7.9	24.2
STABILITY AND CONTROL	4.5	1.9	6.4	12.7	10.5	23.2
AUXILIARY PROPULSION	1.4	.8	2.1	4.1	4.9	8.9
SPACECRAFT MISSION EQUIPMENT	23.3	6.8	30.1	50.9	42.5	93.4
			49.4			121.1
SATELLITE QUALIFICATION UNIT(S)			79.6			214.6
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			
CONTRACTOR FEE			2.3			3.8
						6.8
TOTAL SATELLITE			83.9			225.2
AVERAGE UNIT COST ( 8 SATELLITES)						28.2
TOTAL SATELLITE DDT+E AND RECURRING COST						309.1

CO4-1-3 NOAA

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	33927.	39518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	28124.	21756.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	489929.	462713.
2203	CONTR'L ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	369623.	409584.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	102475.	93105.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	40070.	36043.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	GEN PURP PROCESR	2	12.8	15.0	1.00	740925.	226440.	223202.	262756.
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	785894.	139061.	129457.	171086.
348	TAPE RECORDER	2	21.5	10.2	1.00	577156.	709956.	294850.	204678.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2585433.	47819.	44516.	562838.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	47319.	17605.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	11830.	19602.
303	TRANSMITTER	2	2.2	10.2	1.00	105063.	49590.	69862.	37259.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	52453.	30480.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	42812.	10183.
603	DIPLEXER	1	3.1	1.0	0.00	0.	0.	13407.	9234.

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CO4-1-3 NOAA

ELECTRICAL POWER		UNIT	UNIT	DOT	D.E. COST	T.E. COST	VEHICLE	VEHICLE
IDENT	TYPE	NO.	WEIGHT	POWER FACTOR			PROD. COST	ENG. COST
224	BATTERY	2	29.0	0.0	30806.	25775.	88952.	49548.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DOT	D.E. COST	T.E. COST	VEHICLE	VEHICLE
		FACTOR			PROD. COST	ENG. COST
SOLAR ARRAY	86.0	1.00	676051.	141687.	263833.	147173
WIRING HARNESS	66.0	1.00	286549.	168572.	166238.	62381
THERMAL CONTROL	33.0	1.00	423858.	117343.	87256.	92272
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0
PROPULSION FEED SYS	61.0	1.00	781286.	460316.	285715.	170083
STRUCTURE	111.4	1.00	2111445.	597035.	277932.	459652
POWER CONTROL UNITS	70.0	1.00	1014872.	307801.	286575.	220933
SOLAR ARRAY DRIVE	14.3	1.00	606573.	281135.	261748.	132048
SATELLITE ADAPTER	51.3	1.00	109018.	48221.	28858.	23733
PROPELLANT WEIGHT	88.0					
MISSION EQUIP WEIGHT	600.0					

TOTAL SATELLITE WEIGHT 1412.7

VII-278

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**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*CBA-2-2 METEORATE V*

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 460.      ARRAY AREA = 142.0 SQ FT      BATT CAP = 28. AMP-HR

SPACECRAFT COST MODEL

CO4-2-2 METEOSAT2

(MILLIONS OF 1977 DOLLARS)

VII-280

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.3	2.1	5.4	3.1	4.6	7.7
THERMAL CONTROL	1.2	.2	1.3	1.1	.6	1.7
ELECTRICAL POWER	3.7	1.4	5.1	3.9	5.9	9.8
COMMUNICATIONS	1.5	.6	2.1	2.4	2.6	5.0
DATA HANDLING	5.3	1.1	6.4	7.1	4.0	11.1
STABILITY AND CONTROL	3.3	1.3	4.6	5.3	3.7	9.0
AUXILIARY PROPULSION	1.5	.8	2.3	1.9	2.4	4.3
SPACECRAFT MISSION EQUIPMENT	19.8	7.4	27.2 23.9	24.9	23.7	48.6 37.6
SATELLITE QUALIFICATION UNIT(S)			51.1			86.2
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.8			1.8
CONTRACTOR FEE			2.0			3.5
TOTAL SATELLITE			54.9			91.5
AVERAGE UNIT COST ( 4 SATELLITES)						22.9
TOTAL SATELLITE DDT+E AND RECURRING COST						146.4



CO4-2-2 METEOSAT2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	423092.	519051.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	175338.	173039.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	650067.	139061.	258914.	283033.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1980496.	47819.	49463.	474745.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	110485.	169296.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

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CO4-2-2 METEOSAT2

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRODD. COST	VEHICLE ENG. COST
224 BATTERY	2	29.0	0.0	.10	30806.	25775.	92072.	55450.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRODD. COST	VEHICLE ENG. COST
SOLAR ARRAY	70.0	1.00	747562.	117097.	242271.	179198.
WIRING HARNESS	72.0	1.00	308492.	181481.	198853.	73949.
THERMAL CONTROL	36.0	1.00	682986.	124474.	102014.	163719.
POWER CONVERTERS	16.0	1.00	592909.	369370.	191054.	142126.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	346134.	211334.
STRUCTURE	325.4	1.00	1793644.	1484916.	768063.	429955.
POWER CONTROL UNITS	71.0	1.00	504172.	310366.	321069.	120855.
SATELLITE ADAPTER	58.0	1.00	121007.	46444.	34452.	29007.

PROPELLANT WEIGHT 155.0

MISSION EQUIP WEIGHT 290.0

TOTAL SATELLITE WEIGHT 1366.1

V11-282

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CPA-2-A GMS-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 811. ARRAY AREA = 64.0 SQ FT BATT CAP = 72. AMP-HR

VII-283

259

SPACECRAFT COST MODEL

CD4-2-4 GMS-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.4	1.3	5.8	4.2	3.3	7.6
THERMAL CONTROL	1.3	.1	1.5	1.3	.5	1.8
ELECTRICAL POWER	2.5	.8	3.3	3.1	4.5	7.6
COMMUNICATIONS	1.5	.6	2.2	2.6	2.8	5.4
DATA HANDLING	6.4	1.1	7.4	8.4	4.0	12.3
STABILITY AND CONTROL	4.3	1.6	5.9	5.8	4.4	10.3
AUXILIARY PROPULSION	1.5	.9	2.4	2.5	3.0	5.5
SPACECRAFT MISSION EQUIPMENT	22.0	6.5	28.4 33.7	27.9	22.6	50.5 56.7
SATELLITE QUALIFICATION UNIT(S)			62.1			107.2
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			
CONTRACTOR FEE			2.1			1.9 3.7
TOTAL SATELLITE			66.2			112.7
AVERAGE UNIT COST ( 4 SATELLITES)						28.2
TOTAL SATELLITE DDT+E AND RECURRING COST						179.0

782-111

260

CO4-2-4 GMS-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	817524.	139061.	258914.	355943.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	391041.	291956.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2433903.	47819.	49463.	583431.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	110485.	169296.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	58281.	37421.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
603	DI PLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

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CO4-2-4 GMS-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	2	49.3	0.0	.10	66515.	37768.	134911.	119728.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	44.3	1.00	427929.	76658.	158603.	102579.
WIRING HARNESS	66.5	1.00	288389.	169654.	185894.	69130.
THERMAL CONTROL	29.0	1.00	773830.	107500.	89893.	185495.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	74.3	1.00	883267.	535285.	369164.	211728.
STRUCTURE	146.0	1.00	2103536.	751358.	388635.	504239.
POWER CONTROL UNITS	67.0	1.00	702494.	300014.	310361.	168395.
SOLAR ARRAY DRIVE	7.4	1.00	388065.	160593.	166131.	93023.
SATELLITE ADAPTER	53.0	1.00	112081.	49143.	32682.	26867.
PROPELLANT WEIGHT	205.0					
MISSION EQUIP WEIGHT	485.0					
TOTAL SATELLITE WEIGHT	1442.1					

VII-286

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*CPA-2-5 OTHER*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 811. ARRAY AREA = 54.0 SQ FT BATT CAP = 72. AMP-HR

VII-287

SPACECRAFT COST MODEL

C04-2-5 OTHER

(MILLIONS OF 1977 DOLLARS)

VII-288

SUBSYSTEM COST	DOT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.4	1.3	5.8	5.2	4.0	9.3
THERMAL CONTROL	1.3	.1	1.5	1.6	.6	2.2
ELECTRICAL POWER	2.5	.8	3.3	3.8	5.4	9.3
COMMUNICATIONS	1.5	.6	2.2	3.0	3.4	6.4
DATA HANDLING	6.4	1.1	7.4	10.1	4.8	14.9
STABILITY AND CONTROL	4.3	1.6	5.9	7.0	5.4	12.4
AUXILIARY PROPULSION	1.5	.9	2.4	3.1	3.7	6.8
SPACECRAFT MISSION EQUIPMENT	22.0	6.5	28.4	33.8	27.3	61.1
SATELLITE QUALIFICATION UNIT(S)			33.7			68.5
GSE (AGE)			62.1			129.6
LAUNCH SITE SUPPORT			0.0			
CONTRACTOR FEE			2.0			
TOTAL SATELLITE			2.1			2.3
						4.4
			66.2			136.4
AVERAGE UNIT COST ( 5 SATELLITES)						
TOTAL SATELLITE DOT+E AND RECURRING COST						- 27.3
						202.6

202.6



CO4-2-5 OTHER

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	36439.	45798.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	30206.	25213.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	292339.	277428.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	396995.	474668.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	105059.	100975.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	57938.	52396.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	817524.	139061.	250280.	335989.
345	TAPE RECORDER	3	16.8	25.0	1.00	499633.	583549.	378000.	271682.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2433903.	47819.	47813.	575731.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	28235.	10555.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	106800.	159806.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	109310.	62576.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	112554.	64769.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	56337.	35323.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	45982.	12067.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17181.	13580.

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C04-2-5 OTHER

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263 BATTERY	2	49.3	0.0	.10	66515.	37768.	133627.	116028.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	44.3	1.00	427929.	76658.	153313.	101225.
WIRING HARNESS	66.5	1.00	288389.	169654.	179695.	68217.
THERMAL CONTROL	29.0	1.00	773830.	107500.	86895.	183047.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	74.3	1.00	883267.	535285.	356852.	208934.
STRUCTURE	146.0	1.00	2103536.	751358.	375675.	497584.
POWER CONTROL UNITS	67.0	1.00	702494.	300014.	300010.	166172.
SOLAR ARRAY DRIVE	7.4	1.00	388065.	160593.	160591.	91795.
SATELLITE ADAPTER	53.0	1.00	112081.	49143.	31592.	26512.
PROPELLANT WEIGHT	205.0					
MISSION EQUIP WEIGHT	485.0					
TOTAL SATELLITE WEIGHT	1442.1					

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\*\* SATELLITE SYSTEMS COST MODEL \*\*

CCI-1-1 INTLSAT-5

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1443. ARRAY AREA = 446.0 SQ FT BATT CAP = 100. AMP-HR.

ORIGINAL PAGE IS  
OF POOR QUALITY

158-111  
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SPACECRAFT COST MODEL

CG1-1-1 INTLSAT-5

(MILLIONS OF 1977 DOLLARS)

VII-292

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.1	3.8	8.9	4.9	8.1	13.0
THERMAL CONTROL	1.3	.4	1.7	1.2	1.3	2.5
ELECTRICAL POWER	6.4	1.8	8.1	7.0	9.3	16.3
COMMUNICATIONS	1.5	.6	2.1	2.4	2.7	5.1
DATA HANDLING	7.7	.3	7.9	8.9	1.8	10.7
STABILITY AND CONTROL	3.3	1.3	4.6	5.3	3.7	9.0
AUXILIARY PROPULSION	1.6	.8	2.4	2.1	2.6	4.6
SPACECRAFT MISSION EQUIPMENT	26.9	9.0	35.8 50.3	31.8	29.3	61.1 83.2
SATELLITE QUALIFICATION UNIT(S)			86.1			144.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.3			
CONTRACTOR FEE			2.7			2.1 4.4
TOTAL SATELLITE			91.1			150.8
AVERAGE UNIT COST ( 4 SATELLITES)						37.7
TOTAL SATELLITE DDT+E AND RECURRING COST						241.9

CG1-1-1 INTL SAT-5

\* \* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	423092.	519051.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	175338.	173039.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	54563.	50706.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23042.	25906.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1164826.	139061.	258914.	507155.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3346547.	47819.	49463.	802201.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBNC ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	110485.	169296.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

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CG1-1-1 INTLSAT-5

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269 BATTERY	2	91.0	0.0	.10	86935.	58720.	209753.	156484.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	219.0	1.00	1665636.	336695.	696613.	399270
WIRING HARNESS	103.0	1.00	417938.	245866.	269401.	100184
THERMAL CONTROL	136.0	1.00	751840.	306509.	221995.	180224
POWER CONVERTERS	16.0	1.00	592909.	369370.	191054.	142126
PROPULSION FEED SYS	75.0	1.00	939021.	539139.	371821.	225093
STRUCTURE	647.0	1.00	2776503.	2663273.	1377561.	665556
POWER CONTROL UNITS	52.0	1.00	984093.	258672.	267593.	235897
SATELLITE ADAPTER	111.0	1.00	210098.	85989.	50364.	50363
PROPELLANT WEIGHT	142.0					
MISSION EQUIP WEIGHT	650.0					

TOTAL SATELLITE WEIGHT 2630.0

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CCI-1-2 INTLSAT 5 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1443. ARRAY AREA = 446.0 SQ FT BATT CAP = 100. AMP-HR

VII-295

SPACECRAFT COST MODEL

CC1-1-2 INTLSAT-5

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	5.1	3.8	8.9	11.2	19.1	30.3
THERMAL CONTROL	1.3	.4	1.7	2.8	3.0	5.8
ELECTRICAL POWER	6.4	1.8	8.1	16.1	22.2	38.3
COMMUNICATIONS	1.5	.6	2.1	5.0	6.3	11.2
DATA HANDLING	7.7	.3	7.9	19.4	4.1	23.5
STABILITY AND CONTROL	3.3	1.3	4.6	10.7	8.7	19.4
AUXILIARY PROPULSION	1.6	.8	2.4	4.7	6.1	10.8
SPACECRAFT MISSION EQUIPMENT	26.9	9.0	35.8	69.9	69.5	139.4
			50.3			193.7
SATELLITE QUALIFICATION UNIT(S)			86.1			333.1
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.3			5.7
CONTRACTOR FEE			2.7			10.2
TOTAL SATELLITE			91.1			348.9
AVERAGE UNIT COST ( 11 SATELLITES)						31.7
TOTAL SATELLITE DDT+E AND RECURRING COST						440.0

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CC1-1-2 INTLSAT-5

\*\*\* ASSEMBLY DESCRIPTIONS \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	17839.	33159.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	12877.	23224.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	11814.	15447.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	362790.	376925.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	150348.	125657.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	51630.	42365.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	21804.	21645.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1164826.	139061.	222012.	368287.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	3346547.	47819.	42413.	669142.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	RASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	25046.	8922.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	94738.	122940.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	96971.	48141.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	99842.	49827.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	27763.	15447.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	40789.	8979.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	15240.	11479.

VH-297

CC1-1-2 INTLSAT-5

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269 BATTERY	2	91.0	0.0	.10	86935.	58720.	198481.	130745.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	219.0	1.00	1665636.	336695.	597328.	333044.
WIRING HARNESS	103.0	1.00	417938.	245866.	231005.	83567.
THERMAL CONTROL	136.0	1.00	751840.	306509.	190355.	150331.
POWER CONVERTERS	16.0	1.00	592909.	369370.	163824.	118552.
PROPULSION FEED SYS	75.0	1.00	939021.	539139.	318828.	187757.
STRUCTURE	647.0	1.00	2776503.	2663273.	1181224.	555162.
POWER CONTROL UNITS	52.0	1.00	984093.	258672.	229454.	196770.
SATELLITE ADAPTER	111.0	1.00	210098.	85989.	43186.	42009.
PROPELLANT WEIGHT	142.0					
MISSION EQUIP WEIGHT	850.0					

TOTAL SATELLITE WEIGHT 2630.0

VII-398

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CCI-1-3 INTLSAT 6✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - THREE AXIS MASS EXPULSION

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1908. ARRAY AREA = 150.0 SQ FT BATT CAP = 200. AMP-HR

VII-299

SPACECRAFT COST MODEL

CC1-1-3 INTLSAT-6

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DOT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.5	10.2	15.8	13.9	29.7
THERMAL CONTROL	2.0	.3	2.4	4.2	2.3	6.5
ELECTRICAL POWER	4.5	1.5	5.9	12.6	18.9	31.5
COMMUNICATIONS	1.4	.5	1.9	3.9	5.5	9.4
DATA HANDLING	9.3	.3	9.6	30.5	4.3	34.8
STABILITY AND CONTROL	4.7	2.4	7.0	17.5	14.9	32.4
AUXILIARY PROPULSION	2.4	1.4	3.8	7.3	10.2	17.5
SPACECRAFT MISSION EQUIPMENT	31.9	8.9	40.8	91.8	70.0	161.8
			55.1			207.0
SATELLITE QUALIFICATION UNIT(S)			95.9			368.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.6			6.0
CONTRACTOR FEE			3.0			11.7
TOTAL SATELLITE			101.6			386.6
AVERAGE UNIT COST ( 10 SATELLITES)						38.7
TOTAL SATELLITE DOT+E AND RECURRING COST						488.1

VII-300

CC1-1-3 INTLSAT-6

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	32795.	36502.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	38341.	28404.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	473591.	427393.
2203	CONTROL ELECTRNCS	3	7.1	62.0	1.00	1271747.	1058460.	503912.	534744.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	101029.	88918.
834	THRUSTER	8	.7	.1	.10	13754.	45762.	71109.	57920.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1438716.	139061.	225252.	471269.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	4046553.	47819.	77457.	1325499.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	54662.	38681.	64510.	22984.
202	ANTEVNA	1	8.4	0.0	1.00	349517.	137063.	53400.	71823.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	160525.	89410.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	50703.	28153.
503	COMMAND SIG COND	4	1.5	.9	1.00	24229.	56157.	52818.	12076.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6473.	4369.

106-11A

CC1-1-3 INTLSAT-6

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269 BATTERY	4	71.3	0.0	.10	152945.	81101.	275931.	234936.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	104.0	1.00	776801.	168950.	304107.	159626.
WIRING HARNESS	137.0	1.00	532310.	313149.	298514.	109386.
THERMAL CONTROL	101.0	1.00	1201663.	250515.	162280.	246932.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	148.0	1.00	1381984.	906836.	544096.	283987.
STRUCTURE	304.0	1.00	3600982.	1401489.	630664.	739973.
POWER CONTROL UNITS	162.0	1.00	1158788.	502868.	452577.	238122.
SOLAR ARRAY DRIVE	18.0	1.00	708990.	341870.	307680.	145692.
SATELLITE ADAPTER	108.0	1.00	205261.	102959.	43119.	42180.
PROPELLANT WEIGHT	703.0					
MISSION EQUIP WEIGHT	941.0					

TOTAL SATELLITE WEIGHT 3159.0

VII-302

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CC2-1-1 TDRS/WSTR ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 977. ARRAY AREA = 76.8 SQ FT BATT CAP = 100. AMP-HR

VII-303

SPACECRAFT COST MODEL

CC2-1-1 TDRS/WSTR

(MILLIONS OF 1977 DOLLARS)

VII-304

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.0	1.6	6.6	11.0	9.4	20.4
THERMAL CONTROL	1.4	.2	1.6	3.1	1.3	4.4
ELECTRICAL POWER	2.8	.9	3.8	8.4	12.8	21.1
COMMUNICATIONS	1.3	.5	1.8	4.0	5.5	9.5
DATA HANDLING	6.1	.3	6.3	13.4	2.6	16.0
STABILITY AND CONTROL	4.5	1.9	6.4	15.6	13.7	29.3
AUXILIARY PROPULSION	1.9	1.1	2.9	6.5	8.5	15.0
SPACECRAFT MISSION EQUIPMENT	23.0	6.4	29.4	61.8	53.9	115.7
			37.3			141.0
SATELLITE			66.8			256.7
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			2.0			
LAUNCH SITE SUPPORT						5.2
CONTRACTOR FEE			2.2			8.5
TOTAL SATELLITE			71.0			270.3
AVERAGE UNIT COST ( 11 SATELLITES)						24.6
TOTAL SATELLITE DDT+E AND RECURRING COST						341.3



CC2-1-1 TDRS/WSTR

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	32324.	35233.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	26795.	19397.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	466779.	412533.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	352158.	365166.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	100369.	87057.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	55351.	45174.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	837920.	139061.	123340.	167542.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	2738871.	47819.	42413.	547637.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	45083.	15695.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	52632.	69886.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	158216.	86302.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	49974.	27174.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	40789.	8979.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6380.	4217.

VII-305

CC2-1-1 TDRS/WSTR

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.3	0.0	.10	86935.	49261.	166507.	130745.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	53.4	1.00	485960.	91136.	161683.	97168
WIRING HARNESS	73.7	1.00	314658.	185108.	173919.	62916
THERMAL CONTROL	33.5	1.00	831578.	118545.	83868.	166274
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0
PROPULSION FEED SYS	98.0	1.00	1064951.	661556.	391221.	212937
STRUCTURE	183.7	1.00	2373150.	913355.	405095.	474511
POWER CONTROL UNITS	89.9	1.00	783346.	356317.	316070.	156630
SOLAR ARRAY DRIVE	8.9	1.00	439797.	187872.	166651.	87937
SATELLITE ADAPTER	63.3	1.00	130344.	58391.	31092.	26062
PROPELLANT WEIGHT	270.9					
MISSION EQUIP WEIGHT	599.0					
TOTAL SATELLITE WEIGHT	1732.1					

VII-306

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CCP-1-2 COMSTAR ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - DUAL SPIN

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BDL POWER = 1043. ARRAY AREA = 322.6 SQ FT BATT CAP = 66. AMP-HR

VII-307

SPACECRAFT COST MODEL

CC2-1-2 COMSTAR-1

(MILLIONS OF 1977 DOLLARS)

VI-308

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.1	1.8	5.9	0.0	1.2	1.2
THERMAL CONTROL	1.5	.3	1.8	0.0	.3	.3
ELECTRICAL POWER	5.5	1.6	7.1	.2	2.4	2.6
COMMUNICATIONS	.8	.3	1.1	.3	.6	.8
DATA HANDLING	5.3	.4	5.7	2.1	1.1	3.2
STABILITY AND CONTROL	5.2	1.8	7.0	1.1	1.3	2.4
AUXILIARY PROPULSION	1.9	1.0	2.9	.1	.9	1.0
SPACECRAFT MISSION EQUIPMENT	27.2	7.2	31.4 16.7	3.9	7.7	11.5 8.5
SATELLITE QUALIFICATION UNIT(S)			48.1			20.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.1			.5
CONTRACTOR FEE			2.3			.8
TOTAL SATELLITE			52.6			21.3
AVERAGE UNIT COST ( 1 SATELLITES)						21.3
TOTAL SATELLITE DDT+E AND RECURRING COST						73.9

CC2-1-2 COMSTAR-21

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
101	DESPIN BEARING	1	73.8	6.7	1.00	1314817.	278921.	240006.	0.
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	33373.	51633.
403	NUITATION DAMPER	2	2.8	0.0	1.00	85947.	27173.	30617.	34343.
503	GIMBAL ELECTRONCS	3	6.3	31.6	1.00	0.	0.	0.	0.
603	CONTROL ELECTRONCS	2	7.4	3.5	1.00	1192148.	761291.	261167.	476366.
703	BIAXIAL DRIVE	2	14.3	28.0	1.00	0.	0.	0.	0.
806	EARTH SENSOR ASSY	3	4.1	1.0	1.00	145874.	216423.	305291.	102658.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	56475.	56847.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23850.	29043.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	776249.	139061.	319646.	310178.
406	COMMD DECOD+DISTR	2	11.0	5.5	1.00	2323094.	184082.	423133.	928276.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	2	2.0	.5	1.00	49642.	27399.	64909.	19836.
206	ANTENNA	1	1.5	0.0	1.00	85846.	43556.	22198.	0.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	155230.	69012.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
618	DIPLEXER	2	1.5	0.0	1.00	38973.	17662.	24188.	15573.

VII-309

CC2-1-2 COMSTAR-21

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
260	BATTERY	2	60.7	0.0	.10	61962.	43871.	162202.	125039.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	158.6	1.00	1327790.	249727.	637873.	0.
WIRING HARNESS	108.9	1.00	438153.	257758.	348679.	0.
THERMAL CONTROL	64.9	1.00	889781.	185612.	177787.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	95.4	1.00	1090899.	648087.	551798.	0.
STRUCTURE	563.6	1.00	2247725.	1219874.	778975.	0.
POWER CONTROL UNITS	52.6	1.00	813883.	260414.	332585.	0.
SATELLITE ADAPTER	88.6	1.00	173466.	67739.	54496.	0.
PROPELLANT WEIGHT	277.5					
MISSION EQUIP WEIGHT	254.0					
TOTAL SATELLITE WEIGHT	2043.0					

VII-310

## SATELLITE SYSTEMS COST MODEL. ##

CC 2-1-3 COMSTAR-2 ✓  
also -12 IMAGE XMSN

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL	5
AUXILIARY PROPULSION CONFIGURATION - - MONOPROPELLANT	2
DATA PROCESSING AND INSTRUMENTATION CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)	2
COMMUNICATIONS CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS	2
ELECTRICAL POWER CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY	3
VEHICLE SIZING CONFIGURATION - - CYLINDRICAL	
MISCELLANEOUS INFORMATION APOGEE = 19323. NUMBER OF QUAL UNITS = 0 BOL POWER = 1908. ARRAY AREA = 150.0 SQ FT BATT CAP = 200. AMP-HR	

SPACECRAFT COST MODEL

CC2-1-3 COMSTAR-2

(MILLIONS OF 1977 DOLLARS)

VII-312

SUBSYSTEM COST	-----DOT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.6	10.3	10.7	9.0	19.7
THERMAL CONTROL	2.1	.3	2.4	2.8	1.5	4.3
ELECTRICAL POWER	4.5	1.5	6.0	8.5	12.2	20.7
COMMUNICATIONS	1.4	.5	1.9	2.7	3.6	6.3
DATA HANDLING	9.6	.3	9.8	22.3	2.8	25.1
STABILITY AND CONTROL	4.7	2.4	7.0	12.6	9.7	22.3
AUXILIARY PROPULSION	2.4	1.4	3.8	4.9	6.5	11.4
SPACECRAFT MISSION EQUIPMENT	32.3	8.9	41.2	64.6	45.2	109.8
			52.9			137.4
SATELLITE QUALIFICATION UNIT(S)			94.1			247.2
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.6			3.6
CONTRACTOR FEE			3.1			7.9
TOTAL SATELLITE			99.8			258.8
AVERAGE UNIT COST ( 6 SATELLITES)						43.1
TOTAL SATELLITE DOT+E AND RECURRING COST						358.5



CC2-1-3 COMSTAR-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	35443.	43411.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	41437.	34481.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	511828.	508286.
2203	CONTROL ELECTRNCS	3	7.1	62.0	1.00	1271747.	1058460.	544597.	649148.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	104131.	98090.
834	THRUSTER	8	.7	.1	.10	13754.	45762.	73292.	63895.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1476726.	139061.	243439.	575273.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	4142578.	47819.	83711.	1613782.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	54662.	38681.	69719.	27902.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	57712.	80653.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	173485.	106333.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	54797.	33482.
503	COMMAND SIG COND	4	1.5	.9	1.00	24229.	56157.	57082.	14824.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6995.	5195.

111-313

CG2-1-3 COMSTAR-2

ELECTRICAL POWER

IDENT TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269 BATTERY	4	71.3	0.0	.10	152945.	81142.	284549.	259170.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	104.4	1.00	776801.	169552.	329831.	179251.
WIRING HARNESS	140.4	1.00	543492.	319727.	329393.	125414.
THERMAL CONTROL	99.7	1.00	1206763.	248324.	174058.	278467.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	147.7	1.00	1380189.	905430.	587114.	318486.
STRUCTURE	307.5	1.00	3656064.	1415192.	688248.	843657.
POWER CONTROL UNITS	162.0	1.00	1158788.	502868.	489117.	267397.
SOLAR ARRAY DRIVE	17.3	1.00	690177.	330536.	321498.	159262.
SATELLITE ADAPTER	110.4	1.00	209132.	105042.	47204.	48258.
PROPELLANT WEIGHT	704.0					
MISSION EQUIP WEIGHT	1000.0					
TOTAL SATELLITE HEIGHT	3227.1					

VII-314

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC2-1-4 WESTAR ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED, LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 353. ARRAY AREA = 109.1 SQ FT BATT CAP = 22. AMP-HR

VII-315

SPACECRAFT COST MODEL

CC2-1-4 WESTAR

(MILLIONS OF 1977 DOLLARS)

N11-316

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.9	1.6	4.5	1.2	1.9	3.1
THERMAL CONTROL	.9	.2	1.0	.3	.3	.6
ELECTRICAL POWER	3.2	1.3	4.5	1.4	2.8	4.3
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.8	.3	4.0	1.5	.6	2.1
STABILITY AND CONTROL	3.1	.9	4.0	1.6	1.5	3.1
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT			21.8			16.9
MISSION EQUIPMENT	16.6	5.3	11.6	7.5	9.3	17.2
SATELLITE			33.4			34.1
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.6			
LAUNCH SITE SUPPORT			1.6			.7
CONTRACTOR FEE						1.2
TOTAL SATELLITE			36.6			36.0
AVERAGE UNIT COST ( 2 SATELLITES)						18.0
TOTAL SATELLITE DDT+E AND RECURRING COST						72.7

CC2-1-4 WESTAR

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	497936.	139061.	159823.	99484.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1715060.	47819.	54958.	342657.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

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CC2-1-4 WESTAR

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
218	BATTERY	2	21.0	0.0	.10	25309.	20430.	74587.	48961.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	53.6	1.00	621537.	91452.	210234.	124179.
WIRING HARNESS	47.8	1.00	217952.	128223.	156108.	43547.
THERMAL CONTROL	30.4	1.00	508018.	110992.	102674.	101498.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142.
STRUCTURE	232.6	1.00	1606903.	1116260.	641530.	321048.
POWER CONTROL UNITS	66.6	1.00	431759.	298965.	343638.	86262.
SATELLITE ADAPTER	45.7	1.00	98816.	38390.	33298.	19743.
PROPELLANT WEIGHT	155.0					
MISSION EQUIP WEIGHT	290.0					
TOTAL SATELLITE WEIGHT	1113.9					

VII-318

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\*\* SATELLITE SYSTEMS COST MODEL \*\*

CC2-1-5 RCA STCM1 ✓

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 941. ARRAY AREA = 74.0 SQ FT BATT CAP = 100. AMP-HR

VII-319

SPACECRAFT COST MODEL

CC2-1-5 RCA STCM1

(MILLIONS OF 1977 DOLLARS)

VII-320

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.0					
THERMAL CONTROL	1.4	1.4	5.5	0.0	1.1	1.1
ELECTRICAL POWER	2.7	.2	1.5	0.0	.2	.2
COMMUNICATIONS	1.3	.9	3.6	.3	1.5	1.8
DATA HANDLING	4.4	.5	1.8	.3	.7	1.0
STABILITY AND CONTROL	4.5	1.3	4.6	0.0	.3	.3
AUXILIARY PROPULSION	1.8	1.9	6.4	1.8	1.6	3.6
SPACECRAFT MISSION EQUIPMENT	20.1	1.0	2.9	.3	1.0	1.3
		6.1	26.3			
			16.4	2.7	6.7	9.4
SATELLITE QUALIFICATION UNIT(S)			42.6			7.5
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.8			16.9
CONTRACTOR FEE						
			2.0			.5
TOTAL SATELLITE			46.4			.7
						18.0
AVERAGE UNIT COST ( 1 SATELLITES)						18.0
TOTAL SATELLITE DDT+E AND RECURRING COST						64.5



CC2-1-5 RCA STCM1

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	46538.	44528.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1815	EARTH SENSOR	2	12.4	15.6	1.00	1304769.	503376.	672052.	521367.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	109787.	116814.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	60545.	60616.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	588237.	139061.	177581.	0.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1492403.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	64909.	19836.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	227794.	109070.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	9185.	5329.

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CC2-1-5 RCA STCH1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.2	0.0	.10	86935.	49236.	182039.	175436.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	51.5	1.00	47370.5	88129.	225106.	0.
WIRING HARNESS	56.3	1.00	250413.	147314.	199277.	0.
THERMAL CONTRL	31.4	1.00	807149.	113455.	116263.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	95.0	1.00	1043211.	646007.	550027.	0.
STRUCTURE	159.0	1.00	1855632.	807857.	515873.	0.
POWER CONTROL UNITS	90.0	1.00	766329.	356549.	455363.	0.
SOLAR ARRAY DRIVE	8.5	1.00	426296.	180670.	230741.	0.
SATELLITE ADAPTER	45.3	1.00	98080.	42565.	36807.	0.
PROPELLANT WEIGHT	218.0					
MISSION EQUIP WEIGHT	225.0					
TOTAL SATELLITE WEIGHT	1237.5					

VII-322

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CC2-1-6 RCA STCME2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 960. ARRAY AREA = 75.0 SQ FT BATT CAP = 100. AMP-HR

VII-323

SPACECRAFT COST MODEL

CC2-1-6 RCA STCM2

(MILLIONS OF 1977 DOLLARS)

VII-324

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.1	1.4	5.4	6.4	5.6	12.0
THERMAL CONTROL	1.3	.2	1.4	2.0	.9	2.9
ELECTRICAL POWER	2.7	.8	3.5	5.7	7.9	13.6
COMMUNICATIONS	1.3	.5	1.8	2.7	3.5	6.3
DATA HANDLING	4.4	.3	4.6	6.8	1.8	8.6
STABILITY AND CONTROL	4.3	1.6	5.9	9.0	7.1	16.1
AUXILIARY PROPULSION	1.8	1.0	2.9	4.5	5.7	10.2
SPACECRAFT MISSION EQUIPMENT	19.8	5.7	25.5 17.8	37.2	32.4	69.6 49.4
SATELLITE QUALIFICATION UNIT(S)			43.3			119.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.8			
CONTRACTOR FEE			1.9			3.0 5.1
TOTAL SATELLITE			47.0			127.1
AVERAGE UNIT COST ( 7 SATELLITES)						
TOTAL SATELLITE DDT+E AND RECURRING COST						

CC2-1-6 RCA STCM2

\*\*\* ASSEMBLY DESCRIPTIONS \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	34622.	41333.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	28700.	22755.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	277763.	262988.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	377202.	428395.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	103273.	95481.
894	THRUSTER	6	.7	.1	.10	12597.	35429.	56953.	49546.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	583417.	139061.	132112.	130822.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1977714.	47819.	45429.	443472.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	48289.	18413.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	56375.	78374.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	169468.	101245.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	29738.	17323.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	43690.	10709.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6833.	4947.

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CC2-1-6 RCA STCM2

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269 BATTERY	2	71.4	0.0	.10	86935.	49286.	171412.	143397.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	52.5	1.00	478177.	89712.	170477.	107224.
WIRING HARNESS	50.4	1.00	227975.	134114.	134969.	51120.
THERMAL CONTROL	31.5	1.00	758150.	113700.	86655.	170003.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	95.0	1.00	1043211.	646007.	409194.	233924.
STRUCTURE	146.2	1.00	1864268.	752233.	357360.	418033.
POWER CONTROL UNITS	82.0	1.00	775344.	337652.	320813.	173859.
SOLAR ARRAY DRIVE	8.7	1.00	433071.	184277.	175087.	97110.
SATELLITE ADAPTER	44.7	1.00	96975.	42374.	27170.	21745.
PROPELLANT WEIGHT	231.5					
MISSION EQUIP WEIGHT	250.0					
TOTAL SATELLITE WEIGHT	1231.2					

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\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CCA-17 MAREBAT

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 401. ARRAY AREA = 124.1 SQ FT BATT CAP = 24. AMP-HR

VII-327

SPACECRAFT COST MODEL

CC2-1-7 MARISAT

(MILLIONS OF 1977 DOLLARS)

VII-328

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.5	1.7	4.2	3.5	5.1	8.6
THERMAL CONTROL	.9	.2	1.0	1.2	.8	2.0
ELECTRICAL POWER	3.3	1.3	4.6	5.0	7.4	12.5
COMMUNICATIONS	1.2	.4	1.6	1.9	2.3	4.2
DATA HANDLING	3.2	.3	3.5	4.4	1.5	6.0
STABILITY AND CONTROL	3.1	.9	4.0	4.9	3.7	8.6
AUXILIARY PROPULSION	1.5	.8	2.3	2.7	3.4	6.1
SPACECRAFT MISSION EQUIPMENT	15.8	5.4	21.1	23.8	24.3	48.1
			12.5			26.9
SATELLITE QUALIFICATION UNIT(S)			33.7			74.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.5			
CONTRACTOR FEE			1.6			2.2
						3.5
TOTAL SATELLITE			36.8			80.6
AVERAGE UNIT COST ( 6 SATELLITES)						13.4
TOTAL SATELLITE DDT+E AND RECURRING COST						117.4

30



CG2-1-7 MARISAT

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DATE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	19561.	38267.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	14120.	26802.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	12954.	17827.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	221001.	247276.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	164858.	154824.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DATE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	73292.	63895.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DATE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	416809.	139061.	135244.	96181.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1461546.	47819.	46506.	337260.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DATE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	27463.	10297.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	57712.	80653.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	106330.	59314.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	30443.	17827.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	31712.	7851.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16711.	13247.

VII-329

CC2-1-7 MARISAT

ELECTRICAL POWER		NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
IDENT TYPE									
221 BATTERY		2	25.3	0.0	.10	27169.	23363.	81929.	46038.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	61.0	1.00	680124.	103086.	200535.	156942.
WIRING HARNESS	43.5	1.00	201217.	118373.	121951.	46432.
THERMAL CONTROL	32.1	1.00	511801.	115163.	89694.	118101.
POWER CONVERTERS	15.9	1.00	590016.	367568.	178758.	136149.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	325446.	203439.
STRUCTURE	248.3	1.00	1437792.	1179987.	573861.	331778.
POWER CONTROL UNITS	66.6	1.00	461474.	298965.	290790.	107411.
SATELLITE ADAPTER	42.4	1.00	61811.	34638.	26968.	14263.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	165.0					
TOTAL SATELLITE WEIGHT	999.9					

VII-330

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*CC2-1-8 AM SAT CP*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - SPIN CONTROL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 589.      ARRAY AREA = 182.1 SQ FT      BATT CAP = 36. AMP-HR

VII-331

SPACECRAFT COST MODEL

CC2-1-8 AM SAT CP

(MILLIONS OF 1977 DOLLARS)

VII-332

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.1	2.5	5.6	1.2	3.0	4.2
THERMAL CONTROL	1.0	.2	1.2	.4	.4	.8
ELECTRICAL POWER	4.0	1.4	5.4	1.8	3.5	5.3
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.9	.3	4.2	1.6	.6	2.2
STABILITY AND CONTROL	3.3	1.3	4.6	2.8	2.0	4.9
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT						
MISSION EQUIPMENT	18.0	6.8	24.9	9.3	11.7	21.0
			17.7			15.0
SATELLITE						
QUALIFICATION UNIT(S)			42.5			36.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.9			.8
						1.5
TOTAL SATELLITE			46.1			38.4
AVERAGE UNIT COST ( 2 SATELLITES)						19.2
TOTAL SATELLITE DDT+E AND RECURRING COST						84.5

CC2-1-8 AM SAT CP

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	470101.	571540.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	523586.	139061.	159823.	104609.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1794316.	47819.	54958.	358492.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-333

CC2-1-8 AM SAT CP

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
236 BATTERY	2	40.3	0.0	.10	37808.	32637.	119151.	73141.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	89.5	1.00	889705.	147019.	337975.	177757.
WIRING HARNESS	56.8	1.00	252298.	148422.	180700.	50407.
THERMAL CONTRL	42.9	1.00	586940.	140188.	125594.	117267.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142.
STRUCTURE	398.5	1.00	1683618.	1764051.	1013825.	336375.
POWER CONTROL UNITS	77.6	1.00	582617.	326931.	375784.	116403.
SATELLITE ADAPTER	62.2	1.00	128416.	45960.	39878.	25657.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 250.0

TOTAL SATELLITE WEIGHT 1355.8

VII-334

## SATELLITE SYSTEMS COST MODEL ##  
CCR-1-9 385-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 488. ARRAY AREA = 150.8 SQ FT BATT CAP = 30. AMP-HR

VII-335

SPACECRAFT COST MODEL

CC2-1-9 SBS-1

(MILLIENS OF 1977 DOLLARS)

788-11K  
11-336

SUBSYSTEM COST	DDT+E			RECURRING		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	2.8	2.1	4.9	2.0	3.5	5.5
THERMAL CONTROL	3.9	.2	1.1	.7	.5	1.1
ELECTRICAL POWER	3.7	1.3	5.0	2.8	4.5	7.4
COMMUNICATIONS	1.2	.4	1.6	1.0	1.3	2.3
DATA HANDLING	3.5	.3	3.8	2.5	.9	3.4
STABILITY AND CONTROL	3.3	1.3	4.6	4.2	2.9	7.1
AUXILIARY PROPULSION	1.5	.8	2.3	1.4	1.9	3.3
SPACECRAFT MISSION EQUIPMENT	17.0	6.3	23.3	14.6	15.3	30.0
			14.8			17.2
SATELLITE QUALIFICATION UNIT(S)			38.1			47.1
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			1.2
CONTRACTOR FEE			1.7			2.2
TOTAL SATELLITE			41.4			50.5
AVERAGE UNIT COST ( 3 SATELLITES)						16.8
TOTAL SATELLITE DDT+E AND RECURRING COST						91.9



CC2-1-9 SBS-1

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	442003.	550190.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	467158.	139061.	150270.	109586.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1619411.	47819.	51673.	379882.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	2	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

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CC2-1-9 SBS-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
227	BATTERY	2	30.4	0.0	.10	32587.	26634.	96132.	60703.

EQUIPMENTS USING CCST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	74.1	1.00	779517.	123435.	266798.	182860.
WIRING HARNESS	51.2	1.00	231040.	135917.	155584.	54197.
THERMAL CONTROL	36.9	1.00	554382.	126575.	108125.	130047.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	361606.	206812.
STRUCTURE	315.4	1.00	1554472.	1446037.	781385.	364649.
POWER CONTROL UNITS	75.0	1.00	521654.	320478.	346349.	122370.
SATELLITE ADAPTER	51.3	1.00	109018.	39838.	33498.	25573.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	200.0					
TOTAL SATELLITE WEIGHT	1162.4					

V11-338

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC2-1-10

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APDGE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1908. ARRAY AREA = 150.0 SQ FT BATT CAP = 200. ANP = HR

VII-339

SPACECRAFT COST MODEL

CC2-1-10 SBS-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.6	10.3	14.7	12.7	27.4
THERMAL CONTROL	2.1	.3	2.4	3.9	2.1	6.0
ELECTRICAL POWER	4.5	1.5	6.0	11.7	17.4	29.0
COMMUNICATIONS	1.4	.5	1.9	3.6	5.0	8.7
DATA HANDLING	9.6	.3	9.8	29.3	3.9	33.2
STABILITY AND CONTROL	4.7	2.4	7.0	16.4	13.6	30.0
AUXILIARY PROPULSION	2.4	1.4	3.8	6.8	9.3	16.0
SPACECRAFT MISSION EQUIPMENT	32.3	8.9	41.2	86.3	64.0	150.3
			52.9			193.8
SATELLITE QUALIFICATION UNIT(S)			94.1			344.1
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.6			
CONTRACTOR FEE			3.1			5.4
						10.9
TOTAL SATELLITE			99.8			360.4
AVERAGE UNIT COST (9-SATELLITES)						40.0
TOTAL SATELLITE DDT+E AND RECURRING COST						460.2

VII-340

CC2-1-10 SBS-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTRCL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	33325.	37920.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	38960.	29614.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	481236.	444003.
2203	CONTROL ELECTRNCS	3	7.1	62.0	1.00	1271747.	1058460.	512047.	557522.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	101729.	90926.
834	THRUSTER	8	.7	.1	.10	13754.	45762.	71602.	59228.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1476726.	139061.	228889.	502518.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	4142578.	47819.	78708.	1409687.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	34662.	38681.	65552.	23963.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	54262.	73893.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	163116.	92885.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	51522.	29247.
503	COMMAND SIG COND	4	1.5	.9	1.00	24229.	56157.	53671.	12615.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6577.	2448.

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11-341

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ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	4	71.3	0.0	.10	152945.	81142.	277984.	240243.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	104.4	1.00	776801.	169552.	310117.	164227.
WIRING HARNESS	140.4	1.00	543492.	319727.	309705.	114902.
THERMAL CONTROL	99.7	1.00	1206763.	248324.	163655.	255128.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	147.7	1.00	1380189.	905430.	552023.	291793.
STRUCTURE	307.5	1.00	3656064.	1415192.	647111.	772947.
POWER CONTROL UNITS	162.0	1.00	1158788.	502868.	459883.	244985.
SOLAR ARRAY DRIVE	17.3	1.00	690177.	330536.	302282.	145914.
SATELLITE ADAPTER	110.4	1.00	209132.	105042.	44382.	44214.
PROPELLANT WEIGHT	704.0					
MISSION EQUIP WEIGHT	1000.0					
TOTAL SATELLITE WEIGHT	3227.1					

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\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC2-1-11 PBLK SVCE

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - DUAL SPIN

AUXILIARY PROPULSION  
CONFIGURATION - - MONO-PROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BDL POWER = 1192. ARRAY AREA = 368.5 SQ FT BATT CAP = 72. AMP-HR

VII-343

SPACECRAFT COST MODEL

CC2-1-11 P8LC SVCE

(MILLIONS OF 1977 DOLLARS)

7-11-344

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.7	2.0	6.7	1.9	2.3	4.2
THERMAL CONTROL	1.4	.4	1.8	.6	.6	1.2
ELECTRICAL POWER	5.9	1.7	7.5	2.7	4.6	7.4
COMMUNICATIONS	.8	.3	1.1	.6	.9	1.6
DATA HANDLING	6.6	.4	7.1	5.5	1.5	7.0
STABILITY AND CONTROL	5.1	1.7	6.9	3.5	2.1	5.6
AUXILIARY PROPULSION	1.6	.8	2.4	.9	1.4	2.3
SPACECRAFT MISSION EQUIPMENT	26.1	7.3	33.4 37.5	15.7	13.5	29.2 33.5
SATELLITE QUALIFICATION UNIT(S)			70.9			62.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.2			
CONTRACTOR FEE			2.5			1.0 2.1
TOTAL SATELLITE			75.6			65.8
AVERAGE UNIT COST ( 2 SATELLITES)						32.9
TOTAL SATELLITE DDT+E AND RECURRING COST						141.4

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CC2-1-11 PBLC SVCE

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
101	DES PIN BEARING	1	73.8	6.7	1.00	1314817.	278921.	216006.	262691.
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	30036.	61949.
403	NUTATION DAMPER	2	2.8	0.0	1.00	85947.	27173.	27556.	41205.
503	GIMBAL ELECTRONCS	2	6.3	31.6	1.00	0.	0.	0.	0.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	235050.	571540.
703	BIAXIAL DRIVE	2	14.3	28.0	1.00	0.	0.	0.	0.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	132477.	153300.	194819.	63512.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	55765.	54496.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23550.	27842.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	917335.	139061.	159823.	183277.
406	COMM DECOD+DISTR	2	11.0	5.5	1.00	2971262.	184082.	380820.	1424483.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
206	ANTENNA	1	1.5	0.0	1.00	86846.	43556.	19978.	17351.
336	TRANSMITTER	2	2.5	70.0	1.00	172710.	55025.	139708.	82800.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	64756.	41205.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
618	DIPLEXER	2	1.5	0.0	1.00	38973.	17662.	21769.	18684.

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CC2-1-11 P8LC SVCE

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	2	63.2	0.0	.10	66515.	45190.	164980.	128677.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	181.1	1.00	1457227.	282370.	649127.	291144.
WIRING HARNESS	117.6	1.00	467661.	275117.	334946.	93435.
THERMAL CONTROL	113.0	1.00	815116.	270329.	221325.	162854.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	75.1	1.00	939807.	539689.	413555.	187767.
STRUCTURE	652.7	1.00	2567161.	1341602.	771037.	512901.
POWER CONTROL UNITS	43.7	1.00	880009.	233652.	268566.	175820.
SATELLITE ADAPTER	105.5	1.00	201215.	79598.	54321.	40201.
PROPELLANT WEIGHT	194.4					
MISSION EQUIP WEIGHT	600.0					

TOTAL SATELLITE WEIGHT 2425.8

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**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*CC2-1-12 IMAGE XMSN*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDE MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 1908.      ARRAY AREA = 150.0 SQ FT      BATT CAP = 200. AMP-HR

*VII-347*

SPACECRAFT COST MODEL

CC2-1-12 IMGE XMSN

(MILLIONS OF 1977 DOLLARS)

878-111  
11-348

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.6	10.3	10.7	9.0	19.7
THERMAL CONTROL	2.1	.3	2.4	2.8	1.5	4.3
ELECTRICAL POWER	4.5	1.5	6.0	8.5	12.2	20.7
COMMUNICATIONS	1.4	.5	1.9	2.7	3.6	6.3
DATA HANDLING	9.6	.3	9.8	22.3	2.8	25.1
STABILITY AND CONTROL	4.7	2.4	7.0	12.6	9.7	22.3
AUXILIARY PROPULSION	2.4	1.4	3.8	4.9	6.5	11.4
SPACECRAFT MISSION EQUIPMENT	32.3	8.9	41.2	64.6	45.2	109.8
			57.8			136.1
SATELLITE QUALIFICATION UNIT(S)			98.9			246.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.6			
CONTRACTOR FEE			3.1			3.6
						7.9
TOTAL SATELLITE			104.6			257.5
AVERAGE UNIT COST ( 6 SATELLITES)						42.9
TOTAL SATELLITE DDT+E AND RECURRING COST						362.1

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CC2-1-12 IMGE XMSN

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	35443.	43411.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	41437.	34481.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	511828.	508286.
2203	CONTROL ELECTRNCS	3	7.1	62.0	1.00	1271747.	1058460.	544597.	649148.

AUXILIARY PROPELLSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	104131.	98090.
834	THRUSTER	8	.7	.1	.10	13754.	45762.	73292.	63895.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1476726.	139061.	243439.	575273.
403	COMMD DECOD+DISTR	2	2.3	7.5	1.00	4142578.	47819.	83711.	1613782.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	54662.	38681.	69719.	27902.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	57712.	80653.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	173485.	106333.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	54797.	33482.
503	COMMANE SIG COND	4	1.5	.9	1.00	24229.	56157.	57082.	14824.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6995.	5195.

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CC2-1-12 IMGE XMSN

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269 BATTERY	4	71.3	0.0	.10	152945.	81142.	284549.	259170.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	104.4	1.00	776801.	169552.	329831.	179251.
WIRING HARNESS	140.4	1.00	543492.	319727.	329393.	125414.
THERMAL CONTROL	99.7	1.00	1206763.	248324.	174058.	278467.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	147.7	1.00	1380189.	905430.	587114.	318486.
STRUCTURE	307.5	1.00	3656064.	1415192.	688248.	843657.
POWER CONTROL UNITS	162.0	1.00	1158788.	502868.	489117.	267397.
SOLAR ARRAY DRIVE	17.3	1.00	690177.	330536.	321498.	159262.
SATELLITE ADAPTER	110.4	1.00	209132.	105042.	47204.	48258.
PROPELLANT WEIGHT	704.0					
MISSION EQUIP WEIGHT	1000.0					

TOTAL SATELLITE WEIGHT 3227.1

VII-350

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**\*\* SATELLITE SYSTEMS COST MODEL \*\***

*CC2-1-13 HCF BCST*

**SUBSYSTEM CONFIGURATIONS**

**STABILIZATION AND CONTROL**  
CONFIGURATION - - SPIN CONTROL

**AUXILIARY PROPULSION**  
CONFIGURATION - - MONOPROPELLANT

**DATA PROCESSING AND INSTRUMENTATION**  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

**COMMUNICATIONS**  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

**ELECTRICAL POWER**  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

**VEHICLE SIZING**  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 644.      ARRAY AREA = 199.0 SQ FT      BATT CAP. = 40. AMP-HR

V11-351

SPACECRAFT COST MODEL

CC2-1-13 NCVF BCST

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.2	2.6	5.8	0.0	1.8	1.8
THERMAL CONTROL	1.0	.2	1.2	0.0	.2	.2
ELECTRICAL POWER	4.2	1.4	5.6	.1	2.0	2.1
COMMUNICATIONS	1.2	.4	1.6	.1	.5	.7
DATA HANDLING	4.1	.3	4.4	0.0	.3	.3
STABILITY AND CONTROL	3.3	1.3	4.6	1.1	1.1	2.2
AUXILIARY PROPULSION	1.6	.8	2.4	.1	.7	.9
SPACECRAFT MISSION EQUIPMENT	18.6	7.1	25.7 19.1	1.5	6.7	8.2 9.2
SATELLITE QUALIFICATION UNIT(S)			44.7			17.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.9			.4 .6
TOTAL SATELLITE			48.4			18.4
AVERAGE UNIT COST ( 1 SATELLITES)						18.4
TOTAL SATELLITE DDT+E AND RECURRING COST						66.8

11-352



CC2-1-13 HQVF BCST

\* \* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	522333.	476366.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	216465.	158808.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	548347.	139061.	177581.	0.
403	COU	1	12.3	7.5	1.00	1870458.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
202	ANTENNA	1	8.4	0.7	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

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CG2-1-13 HCVF BCST

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239 BATTERY	2	43.0	0.0	.10	41198.	34199.	126443.	83138.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	98.0	1.00	946766.	159904.	408441.	0.
WIRING HARNESS	60.3	1.00	265421.	156143.	211220.	0.
THERMAL CONTROL	45.9	1.00	603804.	146762.	145177.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	72.4	1.00	914905.	524782.	446813.	0.
STRUCTURE	426.7	1.00	1747699.	1869611.	1193877.	0.
POWER CONTROL UNITS	77.6	1.00	613852.	326931.	417537.	0.
SATELLITE ADAPTER	66.3	1.00	135576.	48590.	45994.	0.

PROPELLANT WEIGHT 145.0

MISSION EQUIP WEIGHT 270.0

TOTAL SATELLITE WEIGHT 1438.0

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1.4

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CC2-1-1A OTHER VS, CC3-1-3, -4

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 409. APRAY AREA = 127.0 SQ FT BATT CAP = 24. AHP-HR

V11-355

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SPACECRAFT COST MODEL

CC2-1-14 OTHER US, CC3-1-3, -4

(MILLIONS OF 1977 DOLLARS)

V11-356

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.7	4.4	4.3	6.0	10.3
THERMAL CONTROL	.9	.2	1.0	1.4	.9	2.3
ELECTRICAL POWER	3.4	1.3	4.7	5.8	8.7	14.5
COMMUNICATIONS	1.2	.4	1.6	2.2	2.6	4.8
DATA HANDLING	3.4	.3	3.7	5.3	1.8	7.1
STABILITY AND CONTROL	3.1	.9	4.0	5.6	4.2	9.8
AUXILIARY PROPULSION	1.5	.8	2.3	3.1	3.9	7.0
SPACECRAFT MISSION EQUIPMENT	16.2	5.5	21.7 14.8	27.6	28.1	55.7 35.2
SATELLITE QUALIFICATION UNIT(S)			36.4			90.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			2.6
CONTRACTOR FEE			1.6			4.1
TOTAL SATELLITE			39.6			97.6
AVERAGE UNIT COST ( 7 SATELLITES)						13.9
TOTAL SATELLITE DDT+E AND RECURRING COST						137.2

CC2-1-14 OTHER US, CC3-1-3, -4

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	19108.	37186.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	13793.	26045.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	12654.	17323.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447818.	215683.	240288.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	161040.	147415.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	72688.	62195.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELMETRY	1	8.9	3.0	1.00	446296.	139061.	132112.	100075.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1554216.	47819.	45429.	348509.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	26827.	10006.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	56375.	78374.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	103867.	56476.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	29738.	17323.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	30978.	7475.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16324.	12873.

VII-357

CC2-1-14 OTHER US, CC3-1-3, -4

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221	BATTERY	2	25.3	0.0	.10	27169.	23363.	81254.	44814.

EQUIPMENTS USING CCST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	62.2	1.00	691366.	104963.	199457.	15502.
WIRING HARNESS	46.3	1.00	212148.	124803.	125598.	4757.
THERMAL CONTROL	32.9	1.00	521022.	117102.	88888.	11683.
POWER CONVERTERS	15.9	1.00	590016.	367568.	174619.	13230.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	317909.	19769.
STRUCTURE	259.0	1.00	1497414.	1223071.	581039.	33577.
POWER CONTROL UNITS	70.8	1.00	470678.	309854.	294402.	10554.
SATELLITE ADAPTER	45.0	1.00	97528.	36489.	27277.	2186.
PROPELLANT WEIGHT	140.0					
MISSION EQUIP WEIGHT	200.0					

TOTAL SATELLITE WEIGHT 1057.0

11-358

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC3-1-1 ARCADH SAT-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS.  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 416. ARRAY AREA = 129.0 SQ FT BATT CAP = 28. AMP-HR

VII-359

SPACECRAFT COST MODEL

CC3-1-1 ARCOMSAT1

(MILLIONS OF 1977 DOLLARS)

VII-360

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.8	4.5	1.1	2.1	3.2
THERMAL CONTROL	.9	.2	1.1	.4	.3	.7
ELECTRICAL POWER	3.4	1.3	4.7	1.5	3.0	4.6
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.4	.3	3.7	1.4	.6	2.0
STABILITY AND CONTROL	3.1	.9	4.0	1.6	1.5	3.1
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT MISSION EQUIPMENT	16.3	5.5	21.8 14.8	7.5	9.7	17.2 13.5
SATELLITE QUALIFICATION UNIT(S)			36.6			30.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.6			.7 1.3
TOTAL SATELLITE			39.8			32.7
AVERAGE UNIT COST ( 2 SATELLITES)						16.4
TOTAL SATELLITE DDT+E AND RECURRING COST						72.5

7/11



CC3-1-1 ARCOMSAT1

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	451904.	139061.	159823.	90287.
403	COMM DECED+DISTR	1	2.3	7.5	1.00	1571770.	47819.	54958.	314026.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG CEND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

11-361

CC3-1-1 ARCOMSAT1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224	BATTERY	2	29.1	0.0	.10	30806.	25839.	94334.	59595.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.2	1.00	698970.	106524.	244884.	139649
WIRING HARNESS	46.5	1.00	212925.	125260.	152500.	42541
THERMAL CONTROL	33.3	1.00	531991.	118065.	108295.	106288
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142
STRUCTURE	264.8	1.00	1510062.	1246314.	716274.	301700
POWER CONTROL UNITS	70.8	1.00	475374.	309854.	356155.	94976
SATELLITE ADAPTER	45.7	1.00	98816.	37004.	33298.	19743
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	200.0					
TOTAL SATELLITE WEIGHT	1072.9					

V11-362

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC3-1-2 ARCOMSAT-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 488. ARRAY AREA = 150.8 SQ FT BATT CAP = 30. AMP-HR

V11-363

SPACECRAFT COST MODEL

CC3-1-2 ARCOMSAT-2

MILLIONS OF 1977 DOLLARS)

VII-364

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.9	2.1	5.0	2.8	4.5	7.3
THERMAL CONTROL	.9	.2	1.1	.9	.6	1.5
ELECTRICAL POWER	3.7	1.4	5.0	3.9	5.8	9.7
COMMUNICATIONS	1.2	.4	1.6	1.4	1.6	3.0
DATA HANDLING	3.7	.3	4.0	3.6	1.1	4.7
STABILITY AND CONTROL	3.3	1.3	4.6	5.3	3.7	9.0
AUXILIARY PROPULSION	1.5	.8	2.3	1.9	2.4	4.3
SPACECRAFT MISSION EQUIPMENT	17.3	6.3	23.7 17.3	19.7	19.7	39.5 25.9
SATELLITE QUALIFICATION UNIT(S)			41.0			65.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.8			1.6 2.9
TOTAL SATELLITE			44.4			69.9
AVERAGE UNIT COST ( 4 SATELLITES)						17.5
TOTAL SATELLITE DDT+E AND RECURRING COST						114.3

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CC3-1-2 ARCOMSAT-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	NUTATION CAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	423092.	519051.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	175338.	173039.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	495721.	139061.	143841.	118829.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	1708195.	47819.	49463.	409472.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

V11-365

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CC3-1-2 ARCOMSAT-2

ELECTRICAL POWER

IDENT TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
227 BATTERY	2	30.4	0.0	.10	32587.	26634.	95138.	58658.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	74.1	1.00	779698.	123435.	255383.	186902.
WIRING HARNESS	53.1	1.00	238290.	140182.	153601.	57121.
THERMAL CONTROL	37.3	1.00	556596.	127504.	104153.	133422.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	141433.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	346134.	211334.
STRUCTURE	321.6	1.00	1610031.	1470164.	760433.	385941.
POWER CONTROL UNITS	75.0	1.00	521905.	320478.	331531.	125106.
SATELLITE ADAPTER	53.3	1.00	112620.	41470.	32790.	26996.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 240.0

TOTAL SATELLITE WEIGHT 1212.9

V11-366

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
CC3-1-# ECS-1

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - NONPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

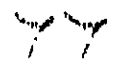
ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 409. ARRAY AREA = 127.0 SQ FT BATT CAP = 24. ANP-HR

V11-367



SPACECRAFT COST MODEL

CC3-1-~~4~~ ECS-1

(MILLIONS OF 1977 DOLLARS)

NII-368

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.7	4.4	1.1	2.1	3.2
THERMAL CONTROL	.9	.2	1.0	.4	.3	.7
ELECTRICAL POWER	3.4	1.3	4.7	1.5	3.0	4.5
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.4	.3	3.7	1.4	.6	2.0
STABILITY AND CONTROL	3.1	.9	4.0	1.6	1.5	3.1
AUXILIARY PROVISION	1.5	.8	2.3	.8	1.3	2.1
SPACECRAFT MISSION EQUIPMENT	16.2	5.5	21.7	7.4	9.6	17.1
			14.8			12.2
SATELLITE QUALIFICATION UNIT(S)			36.4			29.2
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			.7
CONTRACTOR FEE			1.6			1.2
TOTAL SATELLITE			39.6			31.2
AVERAGE UNIT COST (— 2 SATELLITES)						19.6
TOTAL SATELLITE DDT+E AND RECURRING COST						70.9



CC3-1-// ECS-1

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	446296.	139061.	159823.	89167.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1554216.	47819.	54958.	310521.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

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CC3-1-4 ECS-1

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221	BATTERY	2	25.3	0.0	.10	27169.	23363.	85293.	52559.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	62.2	1.00	691366.	104963.	241294.	13813.
WIRING HARNESS	46.3	1.00	212148.	124803.	151944.	4238.
THERMAL CONTROL	32.9	1.00	521022.	117102.	107532.	10405.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	11788.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	17614.
STRUCTURE	259.0	1.00	1497414.	1223071.	702916.	29917.
POWER CONTROL UNITS	70.8	1.00	470678.	309854.	356155.	9403.
SATELLITE ADAPTER	45.0	1.00	97528.	36489.	32998.	1948.

PROPELLANT WEIGHT 140.0

MISSION EQUIP WEIGHT 200.0

TOTAL SATELLITE WEIGHT 1097.0

VII-370

8-17

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*CC3-45 ELS-2*

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 423. ARRAY AREA = 130.7 SQ FT BATT CAP = 28. AMP-HR

*111-371*

*P/*

SPACECRAFT COST MODEL

CC3-1-5 ECS-2

(MILLIONS OF 1977 DOLLARS)

VII-372

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.8	4.5	2.6	3.9	6.5
THERMAL CONTROL	.9	.2	1.1	.9	.6	1.4
ELECTRICAL POWER	3.4	1.3	4.7	3.6	5.5	9.1
COMMUNICATIONS	1.2	.4	1.6	1.4	1.6	3.0
DATA HANDLING	3.4	.3	3.7	3.3	1.1	4.4
STABILITY AND CONTROL	3.1	.9	4.0	3.5	2.6	6.1
AUXILIARY PROPULSION	1.5	.8	2.3	1.9	2.4	4.3
SPACECRAFT MISSION EQUIPMENT	16.3	5.5	21.9 14.8	17.2	17.7	34.8 21.9
SATELLITE QUALIFICATION UNIT(S)			36.6			56.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			1.5
CONTRACTOR FEE			1.6			2.5
TOTAL SATELLITE			39.9			60.8
AVERAGE UNIT COST ( 4 SATELLITES)						15.2
TOTAL SATELLITE DDT+E AND RECURRING COST						100.7

CC3-1-5 ECS-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRMCS	1	7.4	3.5	1.00	1071594.	447818.	235050.	256872.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	175338.	173039.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	452245.	139061.	143841.	108408.
403	COMMO DECCD+DISTR	1	2.3	7.5	1.00	1572838.	47819.	49463.	377025.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASERND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG CCND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
703	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

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CC3-1-5 ECS-2

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224 BATTERY	2	29.1	0.0	.10	30806.	25839.	92300.	55450.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	64.3	1.00	705405.	108240.	223946.	16909.
WIPING HARNESS	46.7	1.00	213701.	125717.	137751.	5122.
THERMAL CONTROL	33.6	1.00	531835.	118785.	97979.	12748.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	14143.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	346134.	21133.
STRUCTURE	269.2	1.00	1512210.	1263895.	653741.	36249.
POWER CONTROL UNITS	70.8	1.00	480037.	309854.	320540.	11507.
SATELLITE ADAPTER	46.1	1.00	99550.	37207.	30121.	2386.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	200.0					
TOTAL SATELLITE WEIGHT	1079.3					

VII-374

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC3-1-6 MAR 67-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 396. ARRAY AREA = 122.0 SQ FT BATT CAP = 24. AMP-HR

11-375

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SPACECRAFT COST MODEL

CC3-1-6 MAROTS-1

(MILLIONS OF 1977 DOLLARS)

VII-376

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.6	1.7	4.3	0.0	1.1	1.1
THERMAL CONTROL	.9	.2	1.0	0.0	.2	.2
ELECTRICAL POWER	3.3	1.3	4.6	.1	1.6	1.7
COMMUNICATIONS	1.2	.4	1.6	.1	.5	.6
DATA HANDLING	3.4	.3	3.6	0.0	.3	.3
STABILITY AND CONTROL	3.1	.9	4.0	.3	.8	1.1
AUXILIARY PROPULSION	1.5	.8	2.3	.1	.7	.8
SPACECRAFT MISSION EQUIPMENT	16.0	5.4	21.4	.6	5.3	5.9
			14.8			6.8
SATELLITE QUALIFICATION UNIT(S)			36.2			12.6
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.6			.4
						.4
TOTAL SATELLITE			39.3			13.4
AVERAGE UNIT COST ( 1 SATELLITES)						13.4
TOTAL SATELLITE DDT+E AND RECURRING COST						52.8

PC



CC3-1-6 MAROTS-1

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTRCL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	216465.	158808.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	442047.	139061.	177581.	0.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1540902.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG CCND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

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CC3-1-6 MAROTS-1

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221 BATTERY	2	25.3	0.0	.10	27169.	23363.	86379.	54827.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	60.2	1.00	672198.	101834.	260112.	0.
WIRING HARNESS	45.0	1.00	207086.	121825.	164797.	0.
THERMAL CONTRCL	32.2	1.00	513887.	115407.	117986.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	427324.	0.
STRUCTURE	249.5	1.00	1486609.	1184833.	756598.	0.
POWER CONTROL UNITS	66.6	1.00	461867.	298965.	381820.	0.
SATELLITE ADAPTER	43.9	1.00	63665.	35895.	36138.	0.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 200.0

TOTAL SATELLITE WEIGHT 1038.4

11-378

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CC3-17 MARΦTS-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 416.      ARRAY AREA = 129.0 SQ FT      BATT CAP = 28. AMP-HR

VII-379

SPACECRAFT COST MODEL

CC3-1-7 MARCTS-2

(MILLIONS OF 1977 DOLLARS)

VII-380

SUBSYSTEM COST	---DDT+E---			---RECURRING---		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.8	4.5	3.8	5.4	9.2
THERMAL CONTROL	.9	.2	1.1	1.3	.8	2.0
ELECTRICAL POWER	3.4	1.3	4.7	5.2	7.7	12.9
COMMUNICATIONS	1.2	.4	1.6	1.9	2.3	4.2
DATA HANDLING	3.4	.3	3.7	4.8	1.5	6.3
STABILITY AND CONTROL	3.1	.9	4.0	4.9	3.7	8.6
AUXILIARY PROPULSION	1.5	.8	2.3	2.7	3.4	6.1
SPACECRAFT MISSION EQUIPMENT	16.3	5.5	21.8 14.8	24.6	24.8	49.4 30.9
SATELLITE QUALIFICATION UNIT(S)			36.6			80.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			2.2
CONTRACTOR FEE			1.6			3.6
TOTAL SATELLITE			39.8			86.2
AVERAGE UNIT COST ( 6 SATELLITES)						14.4
TOTAL SATELLITE DDT+E AND RECURRING COST						126.0

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CC3-1-7 MAROTS-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	19561.	38267.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	14120.	26802.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	12954.	17827.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	221001.	247276.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	164858.	154824.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	73292.	63895.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	451904.	139061.	135244.	104279.
403	CDU	1	12.3	7.5	1.00	1571770.	47819.	46506.	362695.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	27463.	10297.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	57712.	80653.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	106330.	59314.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	30443.	17827.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	31712.	7851.
603	DIFLEXER	1	3.1	1.0	1.00	57409.	15451.	16711.	13247.

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91.

CC3-1-7 MARCTS-2

ELECTRICAL POWER

IDENT TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224 BATTERY	2	29.1	0.0	.10	30806.	25839.	90614.	52201.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	DOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.2	1.00	698970.	106524.	207223.	161291.
WIRING HARNESS	46.5	1.00	212925.	125260.	129047.	49134.
THERMAL CONTROL	33.3	1.00	531991.	118065.	91640.	122760.
POWER CONVERTERS	15.9	1.00	590016.	367568.	178758.	136149.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	325446.	203439.
STRUCTURE	264.8	1.00	1510062.	1246314.	606117.	348455.
POWER CONTROL UNITS	70.8	1.00	475374.	309854.	301381.	109695.
SATELLITE ADAPTER	45.7	1.00	98816.	37004.	28177.	22802.
PROPELLANT HEIGHT	140.2					
MISSION EQUIP WEIGHT	200.0					
TOTAL SATELLITE WEIGHT	1072.9					

VII-382

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC3-1-8 TVBS-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1565. ARRAY AREA = 123.0 SQ FT BATT CAP = 144. AMP-HR

VII-383

SPACECRAFT COST MODEL

CC3-1-B TVBS-1

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	6.8	2.3	9.1	0.0	1.8	1.8
THERMAL CONTROL	1.7	.3	2.1	0.0	.3	.3
ELECTRICAL POWER	3.9	1.2	5.1	.4	2.1	2.5
COMMUNICATIONS	1.4	.5	1.9	.3	.8	1.1
DATA HANDLING	8.3	.3	8.5	3.3	.6	3.9
STABILITY AND CONTROL	4.5	1.9	6.4	1.8	1.8	3.6
AUXILIARY PROPULSION	2.4	1.4	3.8	.3	1.4	1.7
SPACECRAFT MISSION EQUIPMENT	29.0	7.9	36.9	6.2	8.8	15.0
			49.2			25.3
SATELLITE QUALIFICATION UNIT(S)			86.1			40.2
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.4			
CONTRACTOR FEE			2.8			.6
						1.1
TOTAL SATELLITE			91.3			41.9
AVERAGE UNIT COST ( 1 SATELLITES)						41.9
TOTAL SATELLITE DDT+E AND RECURRING COST						133.2

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CC3-1-8 TVBS-1

\*\*\* ASSEMBLY DESCRIPTIONS \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	46538.	44528.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	54408.	47539.
1815	EARTH SENSGR	2	15.4	15.6	1.00	1304769.	503376.	672052.	521367.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	109787.	116814.
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	1261621.	139061.	319646.	504126.
403	COMMD DECCD+DISTR	2	2.3	7.5	1.00	3595649.	47819.	109917.	1436770.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	54662.	38681.	91544.	38468.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	227794.	109070.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	71951.	34343.
503	COMMAND SIG CCND	3	1.5	.9	1.00	22191.	43476.	58726.	15617.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	9185.	5329.

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CC3-1-8 TVBS-1

ELECTRICAL POWER

IDENT TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263 BATTERY	4	49.5	0.0	.10	117020.	62393.	230684.	236148.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	85.6	1.00	676051.	141077.	360350.	0.
WIRING HARNESS	117.1	1.00	465975.	274125.	370820.	0.
THERMAL CONTRLL	90.6	1.00	1019844.	232722.	216101.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	148.2	1.00	1383179.	907774.	772902.	0.
STRUCTURE	275.3	1.00	3231876.	1288197.	822604.	0.
POWER CONTROL UNITS	122.6	1.00	1031945.	427223.	545623.	0.
SOLAR ARRAY DRIVE	14.2	1.00	603694.	279463.	356913.	0.
SATELLITE ADAPTER	94.6	1.00	183402.	89140.	56626.	0.

PROPELLANT WEIGHT 595.7  
MISSION EQUIP WEIGHT 830.0

TOTAL SATELLITE WEIGHT 2711.9

VII-386

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC3-1-9 TYBS-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1564. ARRAY AREA = 123.0 SQ FT BATT CAP = 144. AMP-HR

1111-28-7

SPACECRAFT COST MODEL

CC3-1-9 TVBS-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	6.8	2.3	9.1	6.5	5.6	12.2
THERMAL CONTROL	1.7	.3	2.0	1.6	1.0	2.6
ELECTRICAL POWER	3.9	1.2	5.1	4.9	7.1	12.1
COMMUNICATIONS	1.4	.5	1.9	2.0	2.5	4.4
DATA HANDLING	8.0	.3	8.3	7.7	1.1	8.8
STABILITY AND CONTROL	4.5	1.9	6.4	7.9	5.9	13.8
AUXILIARY PROPULSION	2.4	1.4	3.8	3.3	4.5	7.8
SPACECRAFT MISSION EQUIPMENT	28.6	7.9	36.5	33.9	27.7	61.6
			49.8			83.2
SATELLITE QUALIFICATION UNIT(S)			86.3			144.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.4			
CONTRACTOR FEE			2.7			2.1
						4.5
TOTAL SATELLITE			91.4			151.4
AVERAGE UNIT COST ( 4 SATELLITES)						37.9
TOTAL SATELLITE DDT+E AND RECURRING COST						242.8

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CC3-1-9 TVBS-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.	72567.	44071.	39474.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	544365.	568085.
2203	CONTROL ELECTPNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	1126824.	139061.	143841.	270111.
403	COMMD DECCD+CISTR	1	2.3	7.5	1.00	3575061.	47819.	49463.	856978.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	54662.	38691.	74151.	31941.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	184514.	118843.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	582816.	37421.
503	COMMAND SIG CCND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	7440.	5807.

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CC3-1-9 TVBS-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	4	49.5	0.0	.10	117020.	62393.	222872.	210638.

EQUIPMENTS USING CCST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	85.5	1.00	676051.	140924.	291569.	162056.
WIRING HARNESS	112.5	1.00	450405.	264966.	290329.	107967.
THERMAL CONTROL	91.0	1.00	991399.	233418.	175494.	237648.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	146.8	1.00	1383179.	901206.	621524.	331562.
STRUCTURE	272.0	1.00	3220077.	1275060.	659517.	771885.
POWER CONTROL UNITS	126.9	1.00	1031559.	435926.	450960.	247275.
SOLAR ARRAY DRIVE	14.2	1.00	603694.	279463.	289101.	144712.
SATELLITE ADAPTER	94.0	1.00	182413.	88630.	45697.	43726.
PROPELLANT WEIGHT	595.7					
MISSION EQUIP WEIGHT	840.0					
TOTAL SATELLITE WEIGHT	2695.4					

VII-390

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC3-110 SYMPHY-3

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 483.      ARRAY AREA = 38.0 SQ FT      BATT CAP = 44. AMP-HR

VII-391

SPACECRAFT COST MODEL

CC3-1-10 SYMPHNY-3

(MILLIONS OF 1977 DOLLARS)

VII-392

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.1	.9	4.0	0.0	.7	.7
THERMAL CONTROL	1.0	.1	1.1	0.0	.1	.1
ELECTRICAL POWER	1.8	.6	2.4	.2	1.0	1.1
COMMUNICATIONS	1.3	.4	1.7	.1	.5	.6
DATA HANDLING	3.6	.3	3.9	0.0	.3	.3
STABILITY AND CONTROL	5.3	2.1	7.4	2.1	2.1	4.2
AUXILIARY PROPULSION	1.4	.8	2.2	.2	.8	1.0
SPACECRAFT MISSION EQUIPMENT	17.4	5.2	22.7 16.5	2.5	5.6	8.1 7.7
SATELLITE QUALIFICATION UNIT(S)			39.1			15.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.7			.4 .6
TOTAL SATELLITE			42.5			16.8
AVERAGE UNIT COST ( 1 SATELLITES)						16.8
TOTAL SATELLITE DDT+E AND RECURRING COST						59.3



CC3-1-10 SYMPHNY-3

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	1	5.1	.3	1.00	100166.	40360.	25855.	0.
1401	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	38578.	24514.
1809	EARTH SENSOR	2	22.2	1.4	1.00	1807116.	696982.	916379.	722098.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	507024.	461503.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	101655.	101482.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	42929.	45221.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	475022.	139061.	177581.	0.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1643908.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	64909.	19836.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
327	TRANSMITTER	1	4.7	18.0	1.00	245354.	53280.	126552.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG CCND.	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	9185.	5329.

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CC3-1-10 SYMPHNY-3

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
243	BATTERY	2	37.1	0.0	.10	44526.	30747.	113681.	89853.

EQUIPMENTS USING CCST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	26.4	1.00	297094.	47467.	121244.	0.
WIRING HARNESS	37.7	1.00	178223.	104845.	141829.	0.
THERMAL CONTRCL	21.5	1.00	585642.	87760.	93156.	0.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	65.1	1.00	814623.	483803.	411922.	0.
STRUCTURE	101.3	1.00	1476310.	550700.	351660.	0.
POWER CONTROL UNITS	47.6	1.00	518770.	245634.	313708.	0.
SOLAR ARRAY DRIVE	4.4	1.00	272789.	103232.	131842.	0.
SATELLITE ADAPTER	32.0	1.00	48661.	30583.	30035.	0.
PROPELLANT WEIGHT	118.0					
MISSION EQUIP WEIGHT	229.0					
TOTAL SATELLITE WEIGHT	870.7					

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\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC3-1-11 AMSAT

JRSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 77.1      ARRAY AREA = 23.7 SQ FT      BATT CAP = 6.6 AMP-HR

VII-395

SPACECRAFT COST MODEL

CC3-1-11 AMSAT

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.4	.4	1.9	0.0	.3	.3
THERMAL CONTROL	.7	.1	.7	0.0	.1	.1
ELECTRICAL POWER	1.9	1.0	2.8	0.0	1.0	1.0
COMMUNICATIONS	1.2	.3	1.5	0.0	.4	.4
DATA HANDLING	1.9	.3	2.1	0.0	.3	.3
STABILITY AND CONTROL	2.7	.7	3.4	0.0	.6	.6
AUXILIARY PROPULSION	1.3	.6	1.9	.1	.6	.7
SPACECRAFT MISSION EQUIPMENT	10.9	3.5	14.4	.2	3.3	3.5
			3.7			1.4
SATELLITE QUALIFICATION UNIT(S)			18.1			4.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.2			
CONTRACTOR FEE			1.1			.3
						.3
TOTAL SATELLITE			20.4			5.4
AVERAGE UNIT COST ( 1 SATELLITES)						5.4
TOTAL SATELLITE DDT+E AND RECURRING COST						25.8

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CC3-1-11 AMSAT

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
803	EARTH SENSOR	1	1.3	0.0	1.00	128272.	32368.	45246.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	234664.	139061.	177581.	0.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	871803.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	136863.	28105.	77564.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

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CC3-1-11 AMSAT

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202	BATTERY	2	9.5	0.0	.10	8778.	11541.	42670.	17714.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	11.7	1.00	213486.	22342.	57068.	0.
WIRING HARNESS	20.3	1.00	105434.	62025.	83904.	0.
THERMAL CONTROL	14.3	1.00	386332.	66561.	73385.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	53.8	1.00	755900.	418145.	356020.	0.
STRUCTURE	50.9	1.00	829155.	306801.	195914.	0.
POWER CONTROL UNITS	43.5	1.00	176795.	233026.	297606.	0.
SATELLITE ADAPTER	13.4	1.00	11610.	14020.	18050.	0.
PROPELLANT WEIGHT	45.8					
MISSION EQUIP WEIGHT	35.0					
<b>TOTAL SATELLITE WEIGHT</b>	<b>379.2</b>					

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1 DP

SATELLITE SYSTEMS COST MODEL \*\*  
23-1-12 APPLE

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 360. ARRAY AREA = 111.0 SQ FT BATT CAP = 22. AMP-HR

SPACECRAFT COST MODEL

CC3-1-12 APPLE

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.4	1.5	3.9	0.0	1.0	1.0
THERMAL CONTROL	.8	.2	1.0	0.0	.2	.2
ELECTRICAL POWER	3.2	1.2	4.4	.1	1.5	1.6
COMMUNICATIONS	1.2	.4	1.6	.1	.5	.6
DATA HANDLING	3.0	.3	3.3	0.0	.3	.3
STABILITY AND CONTROL	3.1	.9	4.0	.3	.8	1.1
AUXILIARY PROPULSION	1.5	.8	2.3	.1	.7	.8
SPACECRAFT MISSION EQUIPMENT	15.3	5.2	20.4	.6	5.1	5.7
			11.2			5.0
SATELLITE QUALIFICATION UNIT(S)			31.7			10.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.5			
CONTRACTOR FEE			1.5			.4
						.4
TOTAL SATELLITE			34.7			11.5
AVERAGE UNIT COST ( 1 SATELLITES)						11.5
TOTAL SATELLITE DDT+E AND RECURRING COST						46.2

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CC3-1-12 APPLE

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	216465.	158808.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
934	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	389113.	139061.	177581.	0.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1373897.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	8053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

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CC3-1-12 APPLE

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
218	BATTERY	2	21.0	0.0	.10	25309.	20430.	75537.	51073.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	54.6	1.00	629175.	93031.	237626.	0.
WIRING HARNESS	40.3	1.00	188593.	110946.	150081.	0.
THERMAL CONTROL	29.7	1.00	489505.	109253.	112538.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	427324.	0.
STRUCTURE	216.3	1.00	1373743.	1049410.	670121.	0.
POWER CONTROL UNITS	66.6	1.00	436820.	298965.	381820.	0.
SATELLITE ADAPTER	38.2	1.00	56567.	31976.	33314.	0.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	145.0					
TOTAL SATELLITE WEIGHT	917.6					

VII-402.

\*\* SATELLITE SYSTEMS COST MODEL \*\*

003-1-13 INSAT-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 416. ARRAY AREA = 129.0 SQ FT BATT CAP = 28. AMP-HR

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SPACECRAFT COST MODEL

CC3-1-13 INSAT-1

(MILLIONS OF 1977 DOLLARS)

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SUBSYSTEM COST	-----DOT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.8	4.5	1.1	2.1	3.2
THERMAL CONTROL	.9	.2	1.1	.4	.3	.7
ELECTRICAL POWER	3.4	1.3	4.7	1.5	3.0	4.5
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.4	.3	3.7	1.4	.6	2.0
STABILITY AND CONTROL	3.1	.9	4.0	1.6	1.5	3.1
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT MISSION EQUIPMENT	16.3	5.5	21.8 14.8	7.5	9.7	17.2 12.2
SATELLITE QUALIFICATION UNIT(S)			36.6			29.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.6			.7 1.3
TOTAL SATELLITE			39.8			31.4
AVERAGE UNIT COST ( 2 SATELLITES)						15.7
TOTAL SATELLITE DOT+E AND RECURRING COST						71.2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203 VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303 SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403 NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603 CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806 EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834 THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203 DIGITAL TELEMETRY	1	8.9	3.0	1.00	451904.	139061.	159823.	90287.
403 COMMD DECOD+DISTR	1	2.3	7.5	1.00	1571770.	47819.	54958.	314028.

COMMUNICATIONS

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103 BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202 ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306 TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401 RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503 COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603 DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-405

CC3-1-13 INSAT-1

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224 BATTERY	2	29.1	0.0	.10	30806.	25839.	94334.	59595.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	DOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.2	1.00	698970.	106524.	244884.	139649.
WIRING HARNESS	46.5	1.00	212925.	125260.	152500.	42541.
THERMAL CONTROL	33.3	1.00	531991.	118065.	108295.	106288.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142.
STRUCTURE	264.8	1.00	1510062.	1246314.	716274.	301700.
POWER CONTROL UNITS	70.8	1.00	475374.	309854.	356155.	94976.
SATELLITE ADAPTER	45.7	1.00	98816.	37004.	33298.	19743.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	200.0					
TOTAL SATELLITE WEIGHT	1072.9					

V11-406

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC3-114 INSAT-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 467. ARRAY AREA = 144.0 SQ FT BATT CAP = 28. AMP-HR

11-407

SPACECRAFT COST MODEL

CC3-1-14 INSAT-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.9	2.0	4.9	2.8	4.3	7.1
THERMAL CONTROL	.9	.2	1.1	.9	.6	1.5
ELECTRICAL POWER	3.6	1.3	4.9	3.8	5.7	9.5
COMMUNICATIONS	1.3	.4	1.7	1.5	1.7	3.2
DATA HANDLING	3.7	.3	3.9	3.5	1.1	4.6
STABILITY AND CONTROL	3.3	1.3	4.6	5.3	3.7	9.0
AUXILIARY PROPULSION	1.5	.8	2.3	1.9	2.4	4.3
SPACECRAFT MISSION EQUIPMENT	17.2	6.2	23.5	19.6	19.5	39.1
			16.4			24.6
SATELLITE QUALIFICATION UNIT(S)			39.8			63.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.8			1.6
						2.8
TOTAL SATELLITE			43.2			68.1
AVERAGE UNIT COST ( 4 SATELLITES)						17.0
TOTAL SATELLITE DDT+E AND RECURRING COST						111.3

807-1118

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CC3-1-14 INSAT-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	ROTATION DAMPER	1	2.3	0.0	1.00	77256.	15934.	13778.	18519.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	423092.	519051.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	175338.	173039.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	482322.	139061.	143841.	115618.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1666613.	47819.	49463.	399504.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	71507.	99556.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG CCND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

607-409

CC3-1-14 INSAT-2

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224 BATTERY	2	29.1	0.0	.10	30806.	25839.	92300.	55450.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	71.0	1.00	754917.	118645.	245474.	180961.
WIRING HARNESS	51.9	1.00	233716.	137491.	150652.	56024.
THERMAL CONTROL	36.1	1.00	552877.	124708.	102180.	132530.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	141433.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	346134.	211334.
STRUCTURE	304.9	1.00	1579936.	1405015.	726735.	378727.
POWER CONTROL UNITS	75.0	1.00	508646.	320478.	331531.	121928.
SATELLITE ADAPTER	51.0	1.00	108475.	40134.	31955.	26003.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	225.0					

TOTAL SATELLITE WEIGHT 1170.9

017-11A

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CC3-1-16 PALAPA-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1198. ARRAY AREA = 94.0 SQ FT BATT CAP = 100. AMP-HR

117-111

SPACECRAFT COST MODEL

CC3-1-16 PALAPA-2

(MILLIONS OF 1977 DOLLARS)

V-11-412

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.8	1.5	6.3	4.6	3.8	8.5
THERMAL CONTROL	1.2	.3	1.5	1.1	.9	2.0
ELECTRICAL POWER	3.0	.9	3.9	3.8	5.1	8.9
COMMUNICATIONS	1.3	.5	1.8	1.8	2.2	4.0
DATA HANDLING	5.6	.3	5.9	5.4	1.1	6.5
STABILITY AND CONTROL	4.3	1.6	5.9	5.8	4.4	10.3
AUXILIARY PROPULSION	1.8	1.0	2.9	2.8	3.5	6.2
SPACECRAFT	22.1	6.0	28.1	25.4	21.0	46.4
MISSION EQUIPMENT			32.1			51.0
SATELLITE			60.2			97.4
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			2.0			
LAUNCH SITE SUPPORT						1.8
CONTRACTOR FEE			2.1			3.4
TOTAL SATELLITE			64.2			102.6
AVERAGE UNIT COST ( 4 SATELLITES)						25.6
TOTAL SATELLITE DDT+E AND RECURRING COST						166.8

CC3-1-16 PALAPA-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVE ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	771799.	139061.	143841.	185008.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	2543690.	47819.	49463.	609748.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	52576.	21614.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	184514.	118843.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	7440.	5807.

11-413

CC3-1-16 PALAPA-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.3	0.0	.10	86935.	49261.	175964.	156484.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	65.5	1.00	560061.	110109.	227814.	134252.
WIRING HARNESS	58.9	1.00	260186.	153063.	167715.	62369.
THERMAL CONTRCL	76.6	1.00	700933.	207688.	159671.	168021.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	95.0	1.00	1043211.	646007.	445524.	250068.
STRUCTURE	156.2	1.00	2209886.	795749.	411596.	529732.
POWER CONTROL UNITS	73.3	1.00	882598.	316208.	327114.	211568.
SOLAR ARRAY DRIVE	10.9	1.00	504592.	223199.	230896.	120956.
SATELLITE ADAPTER	55.0	1.00	115666.	52593.	33398.	27726.
PROPELLANT WEIGHT	218.2					
MISSION EQUIP WEIGHT	500.0					
TOTAL SATELLITE WEIGHT	1548.1					

717-11A

##. SATELLITE SYSTEMS COST MODEL ##  
CC 3-17 IRAN-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 396. ARRAY AREA = 122.0 SQ FT BATT CAP = 24. AMP-HR

VIII-415

SPACECRAFT COST MODEL

CC3-1-17 IRAN-1

(MILLIONS OF 1977 DOLLARS)

917-117

SUBSYSTEM COST	---DDT+E---			---RECURRING---		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.6	1.7	4.3	1.9	2.9	4.7
THERMAL CONTROL	3.9	1.2	1.0	2.6	4.4	1.0
ELECTRICAL POWER	3.3	1.3	4.6	2.6	4.1	6.7
COMMUNICATIONS	1.2	.4	1.6	1.0	1.3	2.3
DATA HANDLING	3.4	.3	3.6	2.4	.9	3.2
STABILITY AND CONTROL	3.1	.9	4.0	2.6	2.0	4.7
AUXILIARY PROPULSION	1.5	.8	2.3	1.4	1.9	3.3
SPACECRAFT MISSION EQUIPMENT	16.0	5.4	21.4 14.8	12.5	13.4	26.0 17.2
SATELLITE QUALIFICATION UNIT(S)			36.2			43.1
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.6			1.6
TOTAL SATELLITE			39.3			46.1
AVERAGE UNIT COST (3 SATELLITES)						19.4
TOTAL SATELLITE ODT+E AND RECURRING COST						85.5

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CC3-1-17 IRAN-1

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	245557.	251375.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	442047.	139061.	150270.	103696.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1540902.	47819.	51673.	361466.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

LH-117

CC3-1-17 IRAN-1

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221	BATTERY	2	25.3	0.0	.10	27169.	23363.	84326.	50609.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	60.2	1.00	672198.	101834.	220109.	157685.
WIRING HARNESS	45.0	1.00	207086.	121825.	139453.	48578.
THERMAL CONTROL	32.2	1.00	513887.	115407.	99841.	120548.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	361606.	206812.
STRUCTURE	249.5	1.00	1486609.	1184833.	640240.	348730.
POWER CONTROL UNITS	66.6	1.00	461867.	298965.	323099.	108345.
SATELLITE ADAPTER	43.9	1.00	63665.	35895.	30580.	14935.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	200.0					

TOTAL SATELLITE WEIGHT 1038.4

8:17-11X  
VII-418

\*\* SATELLITE SYSTEMS COST MODEL \*\*

623-118 IRAN-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS.

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BDL POWER = 562. APRAY AREA = 174.0 SQ FT BATT CAP = 34. AMP-HR

617-117

SPACECRAFT COST MODEL

CC3-1-18 IRAN-2

(MILLIONS OF 1977 DOLLARS)

V11-420

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.1	2.4	5.5	4.8	8.3	13.1
THERMAL CONTROL	1.0	.2	1.2	1.5	1.0	2.5
ELECTRICAL POWER	3.9	1.4	5.3	6.8	10.0	16.7
COMMUNICATIONS	1.2	.4	1.6	2.2	2.6	4.8
DATA HANDLING	3.9	.3	4.2	6.2	1.8	7.9
STABILITY AND CONTROL	3.3	1.3	4.6	8.0	5.9	13.9
AUXILIARY PROPULSION	1.5	.8	2.3	3.1	3.9	7.0
SPACECRAFT MISSION EQUIPMENT	17.9	6.7	24.6	32.5	33.5	66.0
			18.5			45.2
SATELLITE QUALIFICATION UNIT(S)			43.1			111.2
GSF (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			2.9
CONTRACTOR FEE			1.8			4.8
TOTAL SATELLITE			46.6			118.9
AVERAGE UNIT COST ( 7 SATELLITES)						17.0
TOTAL SATELLITE DDT+E AND RECURRING COST						165.5

CC3-1-18 IRAN-2

\*\*\*\*\* ASSEMBLY DESCRIPTIONS \*\*\*\*\*

STABILIZATION AND CONTROL									
IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	19108.	37186.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	13793.	26045.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	12654.	17323.
603	CONTROL ELECTPNCS	2	7.4	3.5	1.00	1192148.	761291.	388591.	442191.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	161040.	147415.

AUXILIARY PROPULSION									
IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	72688.	62195.

DATA PROCESSING AND INSTRUMENTATION									
IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	521124.	139061.	132112.	116854.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1786728.	47819.	45429.	400646.

COMMUNICATIONS									
IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	26827.	10006.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	56375.	78374.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	103867.	56476.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	29738.	17323.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	30978.	7475.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16324.	12873.

17421

CC3-1-18 IRAN-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	34.1	0.0	.10	36087.	28995.	100841.	59524.

EQUIPMENTS USING CGST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SCLAR ARRAY	85.4	1.00	861847.	140772.	267503.	193256.
WIRING HARNESS	56.7	1.00	251921.	148201.	149145.	56489.
THERMAL CONTRCL	41.5	1.00	571134.	137069.	101822.	128068.
POWER CONVERTERS	15.9	1.00	590016.	367568.	174619.	132302.
PROPULSION FELD SYS	68.3	1.00	881623.	501892.	317909.	197690.
STRUCTURE	378.7	1.00	1673657.	1689266.	802512.	375292.
POWER CONTROL UNITS	77.6	1.00	566841.	326931.	310628.	127105.
SATELLITE ADAPTER	60.3	1.00	125074.	45038.	32370.	28046.

PROPELLANT WEIGHT 140.2

MISSION EQUIP WEIGHT 260.0

TOTAL SATELLITE WEIGHT 1326.3

V11-422

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CC-3-1-20 SIRIO-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 376. ARRAY AREA = 116.0 SQ FT BATT CAP = 22. AMP-HR

V11-423

SPACECRAFT COST MODEL

CC3-1-20 SIRIO-2

(MILLIONS OF 1977 DOLLARS)

711-424

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.6	1.6	4.2	1.0	1.9	2.9
THERMAL CONTROL	.9	.2	1.0	.3	.3	.6
ELECTRICAL POWER	3.3	1.2	4.5	1.5	2.8	4.3
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.3	.3	3.5	1.3	.6	1.9
STABILITY AND CONTROL	3.1	.9	4.0	1.6	1.5	3.1
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT	15.8	5.3	21.1	7.2	9.3	16.6
MISSION EQUIPMENT			14.2			11.6
SATELLITE			35.3			28.1
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.5			
LAUNCH SITE SUPPORT						.7
CONTRACTOR FEE			1.6			1.2
TOTAL SATELLITE			38.4			30.1
AVERAGE UNIT COST ( 2 SATELLITES)						15.0
TOTAL SATELLITE DDT+E AND RECURRING COST						68.5



CC3-1-20 SIRIO-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTPNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	427738.	139061.	159823.	85459.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1495966.	47819.	54958.	298883.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	RASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137053.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

V11-425

CC3-1-20 SIRIO-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
218	BATTERY	2	21.0	0.0	.10	25309.	20430.	74587.	48961.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAP ARRAY	57.1	1.00	648883.	96968.	222916.	129642.
WIRING HARNESS	44.0	1.00	203177.	119525.	145518.	40593.
THERMAL CONTRCL	31.0	1.00	501349.	112473.	103855.	100166.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142.
STRUCTURE	233.8	1.00	1454105.	1121153.	644342.	290520.
POWER CONTROL UNITS	66.6	1.00	448075.	298965.	343638.	89522.
SATELLITE ADAPTER	41.7	1.00	60943.	34550.	31560.	12176.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	190.0					
TOTAL SATELLITE WEIGHT	996.6					

7/5/71

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC3-1-21 NORDSAT-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SFIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 396. ARRAY AREA = 122.0 SQ FT BATT CAP = 24. AHP-HR

V11-427

SPACECRAFT COST MODEL

GC3-1-21 NORCSAT-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.6	1.7	4.3	1.1	2.0	3.1
THERMAL CONTROL	.9	.2	1.0	.3	.3	.7
ELECTRICAL POWER	3.3	1.3	4.6	1.5	2.9	4.4
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.4	.3	3.6	1.3	.6	2.0
STABILITY AND CONTROL	3.1	.9	4.0	1.6	1.5	3.1
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT MISSION EQUIPMENT	16.0	5.4	21.4 14.8	7.3	9.5	16.9 12.2
SATELLITE QUALIFICATION UNIT(S)			36.2 0.0			29.0
GSE (AGE)			1.6			
LAUNCH SITE SUPPORT						.7
CONTRACTOR FEE			1.6			1.2
TOTAL SATELLITE			39.3			31.0
AVERAGE UNIT COST ( 2 SATELLITES)						15.5
TOTAL SATELLITE DDT+E AND RECURRING COST						70.3

827-111  
V11-428

CC3-1-21 NORCSAT-2

\* \* \* \* ASSEMBLY DESCRIPTIONS

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	261167.	214097.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	442047.	139861.	159823.	88318.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	1540902.	47819.	54958.	307861.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32456.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-429

CC3-1-21 NOROSAT-2

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
221 BATTERY	2	25.3	0.0	.10	27169.	23363.	85293.	52559.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	60.2	1.00	672198.	101834.	234101.	134301.
WIRING HARNESS	45.0	1.00	207086.	121825.	148318.	41374.
THERMAL CONTROL	32.2	1.00	513887.	115407.	106188.	102671.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142.
STRUCTURE	249.5	1.00	1486609.	1184833.	680940.	297014.
POWER CONTROL UNITS	66.6	1.00	461867.	298965.	343638.	92278.
SATELLITE ADAPTER	43.9	1.00	63665.	35895.	32524.	12720.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	200.0					
TOTAL SATELLITE WEIGHT	1038.4					

VII-430

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CC 3-1-22 NORDSAT-2, -34

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 416. ARRAY AREA = 128.6 SQ FT BATT CAP = 28. AMP-HR

VII-431

SPACECRAFT COST MODEL

CC3-1-22 NORDSAT-2, - 34

(MILLIONS OF 1977 DOLLARS)

VII-432

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.8	1.8	4.6	2.0	3.0	5.0
THERMAL CONTROL	.9	.2	1.1	.6	.4	1.1
ELECTRICAL POWER	3.4	1.3	4.7	2.7	4.3	6.9
COMMUNICATIONS	1.2	.4	1.6	1.0	1.3	2.3
DATA HANDLING	3.5	.3	3.8	2.5	.9	3.4
STABILITY AND CONTROL	3.1	.9	4.0	2.6	2.0	4.7
AUXILIARY PROPULSION	1.5	.8	2.3	1.4	1.9	3.3
SPACECRAFT MISSION EQUIPMENT	16.5	5.5	22.0	12.9	13.8	26.6
			16.1			18.7
SATELLITE QUALIFICATION UNIT(S)			38.1			45.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.7			1.1
						1.9
TOTAL SATELLITE			41.3			48.4
AVERAGE UNIT COST ( 3 SATELLITES)						16.1
TOTAL SATELLITE DDT+E AND RECURRING COST						89.7



\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15251.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	MUTATION CAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	245557.	251375.
806	EARTH SENSOF ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	466276.	139061.	150270.	109379.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1616658.	47819.	51673.	379237.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	37063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG CCND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

11-433

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224	BATTERY	2	29.1	0.0	.10	30806.	25839.	93265.	57384.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.2	1.00	697452.	106524.	230248.	163609.
WIRING HARNESS	47.5	1.00	216801.	127541.	145996.	50857.
THERMAL CONTRCL	33.4	1.00	533321.	118305.	102001.	125107.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	58.3	1.00	861623.	501892.	361606.	206812.
STRUCTURE	267.5	1.00	1538272.	1257107.	679294.	360849.
POWER CONTROL UNITS	70.8	1.00	475374.	309854.	334867.	111513.
SATELLITE ADAPTER	46.7	1.00	100651.	37809.	31706.	23611.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	220.0					
TOTAL SATELLITE WEIGHT	1097.7					

V11-434

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
CC3-123

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 589. ARRAY AREA = 182.1 SQ FT BATT CAP = 366 AMP-HR

V11435

SPACECRAFT COST MODEL

CC3-1-23 BRZL SAT

(MILLIONS OF 1977 DOLLARS)

957-117  
411-436

SUBSYSTEM COST	DDT+E			RECURRING		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	3.1	2.5	5.6	1.2	3.0	4.2
THERMAL CONTROL	1.0	.2	1.2	.4	.4	.8
ELECTRICAL POWER	4.0	1.4	5.4	1.8	3.5	5.3
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	3.9	.3	4.2	1.6	.6	2.2
STABILITY AND CONTROL	3.3	1.3	4.6	2.8	2.0	4.9
AUXILIARY PROPULSION	1.5	.8	2.3	.8	1.3	2.2
SPACECRAFT MISSION EQUIPMENT	18.0	6.8	24.9	9.3	11.7	21.0
			17.7			15.0
SATELLITE QUALIFICATION UNIT(S)			42.5			36.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.9			.8
						1.5
TOTAL SATELLITE			46.1			38.4
AVERAGE UNIT COST (2 SATELLITES)						19.2
TOTAL SATELLITE DDT+E AND RECURRING COST						84.9

CC3-1-23 BRZL SAT

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	470101.	571540.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	523586.	139061.	159823.	104609.
403	COMHD DECOD+DISTR	1	2.3	7.5	1.00	1794316.	47819.	54958.	358492.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	67779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-437

CC3-1-23 BRZL SAT

ELECTRICAL POWER		UNIT	UNIT	DDTE	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
NO.	TYPE	WEIGHT	POWER	FACTOR				
236	BATTERY	40.3	0.0	.10	37808.	32637.	119151.	73141.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	89.5	1.00	889705.	147019.	337975.	177757.
WIRING HARNESS	56.8	1.00	252298.	148422.	180700.	50407.
THERMAL CONTROL	42.9	1.00	586940.	140188.	125594.	117267.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	384593.	176142.
STRUCTURE	398.5	1.00	1683618.	1764051.	1013825.	336375.
POWER CONTROL UNITS	77.6	1.00	582617.	326931.	375784.	116403.
SATELLITE ADAPTER	62.2	1.00	128416.	45960.	39878.	25657.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	250.0					
TOTAL SATELLITE WEIGHT			1399.8			

VII-438

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CCB-124 BRZL SAT-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 617. ARRAY AREA = 191.0 SQ FT BATT CAP = 40. AMP-HR

V11-439

SPACECRAFT COST MODEL

CC3-1-24 BRZL SAT-2

(MILLIONS OF 1977 DOLLARS)

077-11A

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.2	2.6	5.8	1.3	3.1	4.4
THERMAL CONTROL	1.0	.2	1.2	.4	.4	.8
ELECTRICAL POWER	4.1	1.4	5.5	1.9	3.6	5.4
COMMUNICATIONS	1.2	.4	1.6	.7	1.0	1.6
DATA HANDLING	4.1	.3	4.3	1.6	.6	2.2
STABILITY AND CONTROL	3.3	1.3	4.6	2.8	2.0	4.9
AUXILIARY PROPULSION	1.6	.8	2.4	.9	1.4	2.2
SPACECRAFT MISSION EQUIPMENT	18.4	7.0	25.4 18.5	9.5	12.0	21.6 15.5
SATELLITE QUALIFICATION UNIT(S)			43.9 0.0			37.1
GSE (AGE)			1.7			.8
LAUNCH SITE SUPPORT						1.6
CONTRACTOR FEE			1.9			
TOTAL SATELLITE			47.6			39.5
AVERAGE UNIT COST ( 2 SATELLITES)						19.7
TOTAL SATELLITE DDT+E AND RECURRING COST						87.0

157



CC3-1-24 BRZL SAT-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRONICS	2	7.4	3.5	1.00	1192148.	761291.	470101.	571540.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	540293.	139061.	159823.	107947.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	1845730.	47819.	54958.	368764.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	52854.	15362.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19748.	11470.

VII-44

CC3-1-24 BRZL SAT-2

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	43.0	0.0	.10	41198.	34228.	124958.	79699.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	93.8	1.00	919960.	153548.	352985.	183802.
WIRING HARNESS	59.4	1.00	262058.	154164.	187690.	52357.
THERMAL CONTRCL	44.4	1.00	604499.	143493.	128144.	120775.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	72.4	1.00	914905.	524782.	402132.	182791.
STRUCTURE	420.1	1.00	1727095.	1845002.	1060348.	345061.
POWER CONTROL UNITS	77.6	1.00	598663.	326931.	375784.	119609.
SATELLITE ADAPTER	65.2	1.00	133662.	47825.	40992.	26705.

PROPELLANT WEIGHT 145.0

MISSION EQUIP WEIGHT 260.0

TOTAL SATELLITE WEIGHT 1414.7

VII-442

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CC 3-1-26 NATO 3 -2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 644. ARRAY AREA = 199.0 SQ FT BATT CAP = 40. AMP-HR

VII-443

SPACECRAFT COST MODEL

CC3-1-26 NATO 3-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.8	2.9	6.8	5.3	8.8	14.2
THERMAL CONTROL	1.1	.2	1.3	1.5	1.0	2.4
ELECTRICAL POWER	4.3	1.5	5.8	6.5	9.6	16.1
COMMUNICATIONS	1.2	.4	1.6	2.0	2.4	4.4
DATA HANDLING	5.4	.3	5.7	7.5	1.5	9.0
STABILITY AND CONTROL	3.3	1.3	4.6	7.2	5.2	12.4
AUXILIARY PROPULSION	1.6	.8	2.4	2.8	3.5	6.3
SPACECRAFT MISSION EQUIPMENT	20.7	7.4	28.1 34.8	32.8	32.0	64.8 84.9
SATELLITE QUALIFICATION UNIT(S)			62.8			149.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			
CONTRACTOR FEE			2.1			2.6 4.7
TOTAL SATELLITE			66.8			157.1
AVERAGE UNIT COST ( 6 SATELLITES						26.2
TOTAL SATELLITE DDT+E AND RECURRING COST						223.9

7/17/77

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	19561.	38267.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	14120.	26802.
403	NUTATION CAMPER	1	2.8	0.0	1.00	77256.	15984.	12954.	17827.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	397803.	464413.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	164858.	154824.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	73292.	63895.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	738912.	139061.	135244.	170508.
403	COMMD DECCD+DISTR	1	2.3	7.5	1.00	2445992.	47819.	46506.	564426.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	27463.	10297.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	57712.	80653.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	106330.	59314.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	30443.	17827.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	44725.	11327.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16711.	13247.

547-11A

CC3-1-26 NATO 3-2

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	43.0	0.0	.10	41198.	34228.	120030.	69811.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	97.9	1.00	946766.	159753.	310770.	218472.
WIRING HARNESS	75.8	1.00	322244.	187571.	195302.	74360.
THERMAL CONTROL	47.7	1.00	623692.	150640.	113081.	143920.
POWER CONVERTERS	15.9	1.00	590016.	367568.	178758.	136149.
PROPULSION FEED SYS	72.4	1.00	914905.	524782.	340288.	211119.
STRUCTURE	475.2	1.00	2103650.	2048764.	996371.	485429.
POWER CONTROL UNITS	77.6	1.00	613852.	326931.	317992.	141650.
SATELLITE ADAFTER	81.0	1.00	160734.	60021.	39382.	37090.
PROPELLANT WEIGHT	145.0					
MISSION EQUIP WEIGHT	550.0					
TOTAL SATELLITE WEIGHT	1799.4					

77-117

## SATELLITE SYSTEMS COST MODEL ##  
CCS-1-28 ETS-4

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 82.1 ARRAY AREA = 25.0 SQ FT BATT CAP = 6. AMP-HR

744-111

SPACECRAFT COST MODEL

CC3-1-28 ETS-4

(MILLIONS OF 1977 DOLLARS)

877-117

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.4	.4	1.8	0.0	.3	.3
THERMAL CONTROL	.7	.1	.7	0.0	.1	.1
ELECTRICAL POWER	1.9	1.0	2.8	0.0	1.0	1.1
COMMUNICATIONS	1.2	.3	1.5	0.0	.4	.4
DATA HANDLING	1.9	.3	2.1	0.0	.3	.3
STABILITY AND CONTROL	2.7	.7	3.4	0.0	.6	.6
AUXILIARY PROPULSION	1.3	.6	1.9	.1	.6	.7
SPACECRAFT MISSION EQUIPMENT	10.9	3.4	14.3	.2	3.3	3.5
			3.4			1.4
SATELLITE QUALIFICATION UNIT(S)			17.8			4.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.2			
CONTRACTOR FEE			1.1			.3
						.3
TOTAL SATELLITE			20.0			5.4
AVERAGE UNIT COST ( 1 SATELLITES)						5.4
TOTAL SATELLITE DDT+E AND RECURRING COST						29.4



## \* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

## STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	MUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
803	EARTH SENSOR	1	1.3	0.0	1.00	128272.	32368.	45246.	0.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

## AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

## DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	234048.	139061.	177581.	0.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	869743.	47819.	61065.	0.

## COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	136863.	28105.	77564.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

b7h-111

ELECTRICAL POWER

IDENT TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202 BATTERY	2	9.5	0.0	.10	8778.	11541.	42670.	17714.1

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	12.4	1.00	221617.	23577.	60223.	0.
WIRING HARNESS	20.1	1.00	104553.	61507.	83203.	0.
THERMAL CONTROL	14.5	1.00	383939.	67191.	73984.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	351963.1	0.
STRUCTURE	49.7	1.00	804161.	300642.	191981.	0.
POWER CONTROL UNITS	43.5	1.00	183843.	233026.	297606.	0.
SATELLITE ADAPTER	12.9	1.00	11240.	13475.	17653.	0.

PROPELLANT WEIGHT 32.0

MISSION EQUIP WEIGHT 35.0

TOTAL SATELLITE WEIGHT 363.6

11-450

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CC 3-1-30 CAMSAT-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 571. ARRAY AREA = 176.0 SQ FT BATT CAP = 34. AMP-HR

11-11-51

SPACECRAFT COST MODEL

CC3-1-30 COMSAT-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DOT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.0	2.4	5.4	1.2	2.9	4.1
THERMAL CONTROL	1.0	.2	1.2	.4	.4	.8
ELECTRICAL POWER	4.0	1.4	5.4	1.8	3.4	5.2
COMMUNICATIONS	1.2	.4	1.6	.6	.9	1.5
DATA HANDLING	4.0	.3	4.2	1.6	.6	2.2
STABILITY AND CONTROL	3.3	1.3	4.6	2.8	2.0	4.9
AUXILIARY PROPULSION	1.7	.9	2.6	.9	1.5	2.4
SPACECRAFT	18.2	6.8	25.0	9.4	11.7	21.1
MISSION EQUIPMENT			17.9			15.0
SATELLITE			42.9			36.1
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.7			
LAUNCH SITE SUPPORT			1.9			.8
CONTRACTOR FEE						1.5
TOTAL SATELLITE			46.4			38.5
AVERAGE UNIT COST ( 2 SATELLITES)						19.2
TOTAL SATELLITE DOT+E AND RECURRING COST						84.9

11.2

CC3-1-30 COPSAT-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	23116.	33132.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	16686.	23206.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	15309.	15435.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	470101.	571540.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	194819.	190537.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	76302.	72945.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	526310.	139061.	159823.	105153.
403	COU	1	12.3	7.5	1.00	1802712.	47819.	54958.	360169.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	32454.	8915.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	68200.	69831.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	125654.	72997.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	35975.	15435.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	37476.	9662.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	19768.	44790.

11-453

CC3-1-30 COMSAT-2

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	34.2	0.0	.10	36087.	28995.	105854.	69812.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	86.7	1.00	868769.	142755.	328173.	173574.
WIRING HARNESS	60.0	1.00	264301.	155484.	189296.	52805.
THERMAL CONTROL	42.0	1.00	595101.	138187.	124045.	118897.
POWER CONVERTERS	15.9	1.00	590016.	367568.	211246.	117881.
PROPULSION FEED SYS	82.3	1.00	991943.	578841.	443558.	198183.
STRUCTURE	380.4	1.00	1648244.	1695710.	974548.	329307.
POWER CONTROL UNITS	77.6	1.00	572134.	326931.	375784.	114308.
SATELLITE ADAPTER	60.0	1.00	124545.	44432.	39046.	24883.
PROPELLANT WEIGHT	111.3					
MISSION EQUIP WEIGHT	250.0					
TOTAL SATELLITE WEIGHT	1307.9					

7-54-111N

**\*\* SATELLITE SYSTEMS COST MODEL \*\***

*CBS-1-32 BSE-2*

**SUBSYSTEM CONFIGURATIONS**

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

**MISCELLANEOUS INFORMATION**

APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 1195.      ARRAY AREA = 369.0 SQ FT      BATT CAP. = 72.6 AMP-HR

*11-4-56*

SPACECRAFT COST MODEL

CC3-1-32 BSE-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.3	3.1	6.4	2.3	5.2	7.5
THERMAL CONTROL	.9	.4	1.3	.7	.9	1.6
ELECTRICAL POWER	5.5	1.4	6.9	4.4	5.8	10.2
COMMUNICATIONS	1.2	.4	1.6	1.0	1.3	2.3
DATA HANDLING	4.2	.3	4.4	2.9	.9	3.8
STABILITY AND CONTROL	3.1	.9	4.0	2.6	2.0	4.7
AUXILIARY PROPULSION	1.4	.7	2.0	1.3	1.7	3.0
SPACECRAFT MISSION EQUIPMENT	19.5	7.1	26.6 17.4	15.3	17.7	33.0 20.8
SATELLITE QUALIFICATION UNIT(S)			44.1			93.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.8			1.8
CONTRACTOR FEE			2.0			2.4
TOTAL SATELLITE			47.6			57.5
AVERAGE UNIT COST (3 SATELLITES)						19.2
TOTAL SATELLITE DDT+E AND RECURRING COST						109.4

954-111



CC3-1-32 BSE-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDYE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	245557.	251375.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDYE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	55133.	52474.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23283.	26809.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDYE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	553946.	139061.	150270.	129945.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1887627.	47819.	51673.	442801.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDYE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

VII-45-7

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
263	BATTERY	2	63.2	0.0	.10	66515.	45190.	163109.	123903.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	181.6	1.00	1458694.	283091.	611889.	342181.
WIRING HARNESS	47.1	1.00	215252.	126629.	144952.	50494.
THERMAL CONTROL	115.4	1.00	547016.	274208.	210671.	128319.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	57.0	1.00	788771.	437042.	314882.	185030.
STRUCTURE	509.2	1.00	1805382.	2172712.	1174054.	423508.
POWER CONTROL UNITS	38.4	1.00	881304.	216631.	234119.	206737.
SATELLITE ADAPTER	74.6	1.00	149873.	52868.	41701.	35157.

PROPELLANT WEIGHT 99.3

MISSION EQUIP WEIGHT 245.0

TOTAL SATELLITE WEIGHT 1576.0

857-111

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CC 3-133 ECS

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 422.      ARRAY AREA = 130.5 SQ FT      BATT CAP = 28. AMP-HR

VI-459

SPACECRAFT COST MODEL

CC3-1-33 ECS

(MILLIONS OF 1977 DOLLARS)

097-117  
11-460

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.8	4.4	0.0	1.2	1.2
THERMAL CONTROL	.9	.2	1.1	0.0	.2	.2
ELECTRICAL POWER	3.4	1.3	4.7	.1	1.7	1.8
COMMUNICATIONS	1.2	.4	1.6	.1	.5	.6
DATA HANDLING	3.4	.3	3.7	0.0	.3	.3
STABILITY AND CONTROL	3.1	.9	4.0	.3	.8	1.1
AUXILIARY PROPULSION	1.7	.9	2.6	.1	.8	.9
SPACECRAFT	16.5	5.6	22.1	.6	5.5	6.1
MISSION EQUIPMENT			13.7			6.3
SATELLITE			35.8			12.4
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			1.6			
LAUNCH SITE SUPPORT						.4
CONTRACTOR FEE			1.7			.5
TOTAL SATELLITE			39.1			13.2
AVERAGE UNIT COST ( 1 SATELLITES)						13.2
TOTAL SATELLITE DDT+E AND RECURRING COST						52.3

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTPNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	216465.	158808.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	453269.	139061.	177581.	0.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1576042.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	RASERND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36050.	0.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	75778.	0.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	139615.	60841.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	41640.	1053.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

197-111  
VII-461

CC3-1-33 ECS

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
224 BATTERY	2	29.1	0.0	.10	30806.	25839.	95535.	62166.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	64.1	1.00	704460.	107929.	275679.	0.
WIRING HARNESS	49.3	1.00	223748.	131627.	178058.	0.
THERMAL CONTROL	33.5	1.00	556556.	118545.	120750.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPELLSION FEED SYS	82.3	1.00	991943.	578841.	492841.	0.
STRUCTURE	264.4	1.00	1474952.	1244713.	794836.	0.
POWER CONTROL UNITS	70.8	1.00	479373.	309854.	395727.	0.
SATELLITE ADAPTER	44.9	1.00	97343.	36109.	36617.	0.
PROPELLANT WEIGHT	111.3					
MISSION EQUIP WEIGHT	185.0					

TOTAL SATELLITE WEIGHT 1045.7

111-462

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC3-1-35 TELESATC

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEDUS INFORMATION  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 644.      ARRAY AREA = 199.0 SQ FT      BATT CAP = 40. AMP-HR

VII-463

SPACECRAFT COST MODEL

CC3-1-35 TELESATC

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.9	2.9	6.8	2.7	4.9	7.7
THERMAL CONTROL	1.1	.2	1.3	.7	.5	1.3
ELECTRICAL POWER	4.3	1.5	5.8	3.4	5.3	8.6
COMMUNICATIONS	1.2	.4	1.6	1.1	1.3	2.4
DATA HANDLING	5.4	.3	5.7	3.8	.9	4.7
STABILITY AND CONTROL	3.3	1.3	4.7	4.3	2.9	7.3
AUXILIARY PROPULSION	1.6	.8	2.4	1.5	1.9	3.4
SPACECRAFT MISSION EQUIPMENT	20.7	7.4	28.1 34.8	17.5	17.8	35.3 43.7
SATELLITE QUALIFICATION UNIT(S)			62.9			79.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			
CONTRACTOR FEE			2.1			1.3 2.6
TOTAL SATELLITE			66.9			82.9
AVERAGE UNIT COST ( 3 SATELLITES)						27.6
TOTAL SATELLITE DDT+E AND RECURRING COST						149.8

477-11A

174



CC3-1-35 TELESATC

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	28241.	59635.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	442003.	550190.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	739162.	139061.	150270.	173393.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2446735.	47819.	51673.	573957.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	49695.	14075.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

V11-465

CC3-1-35 TELESATC

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239	BATTERY	2	43.0	0.0	.10	41198.	34228.	123541.	76742.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	97.9	1.00	946766.	159753.	345299.	222093.
WIRING HARNESS	75.9	1.00	322605.	189783.	217245.	75677.
THERMAL CONTROL	47.7	1.00	624246.	150640.	125646.	146436.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	72.4	1.00	914905.	524782.	378097.	214619.
STRUCTURE	477.7	1.00	2118197.	2057922.	1112026.	496888.
POWER CONTROL UNITS	77.6	1.00	613852.	326931.	353324.	143998.
SATELLITE ADAPTER	81.5	1.00	161577.	60520.	43916.	37903.

PROPELLANT WEIGHT 157.3

MISSION EQUIP WEIGHT 550.0

TOTAL SATELLITE WEIGHT 1815.1

997-111

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CCS-1-36 TELESATD-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 283. ARRAY AREA = 88.0 SQ FT BATT CAP = 18. AMP-HR

V11-467

SPACECRAFT COST MODEL

CC3-1-36 TELESATD1

(MILLIONS OF 1977 DOLLARS)

874-117

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.7	1.3	4.0	1.9	2.2	4.1
THERMAL CONTROL	.8	.1	.9	.6	.4	.9
ELECTRICAL POWER	2.9	1.1	4.0	2.2	3.4	5.7
COMMUNICATIONS	1.2	.4	1.6	1.0	1.3	2.3
DATA HANDLING	3.6	.3	3.9	2.5	.9	3.4
STABILITY AND CONTROL	3.3	1.3	4.6	4.2	2.9	7.1
AUXILIARY PROPULSION	1.5	.8	2.3	1.4	1.9	3.3
SPACECRAFT MISSION EQUIPMENT	16.1	5.3	21.3	13.9	12.9	26.8
			20.1			16.4
SATELLITE QUALIFICATION UNIT(S)			41.4			43.1
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.6			1.1
						2.0
TOTAL SATELLITE			44.6			46.2
AVERAGE UNIT COST ( 3 SATELLITES)						15.4
TOTAL SATELLITE DDT+E AND RECURRING COST						90.8

148

CC3-1-36 TELESATD1

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	442003.	550190.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	475834.	139061.	150270.	111622.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1646436.	47819.	51673.	386222.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

697-11A

CC3-1-36 TELESATD1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
213	BATTERY	2	17.2	0.0	.10	21490.	17695.	63870.	40032.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	43.0	1.00	534790.	74572.	161184.	125451.
WIRING HARNESS	42.1	1.00	195712.	115134.	131794.	45910.
THERMAL CONTROL	26.4	1.00	470898.	100868.	88890.	110464.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	361606.	206812.
STRUCTURE	181.1	1.00	1529875.	902356.	487600.	358879.
POWER CONTROL UNITS	43.7	1.00	379455.	233652.	252514.	89013.
SATELLITE ADAPTER	39.7	1.00	58449.	34666.	28833.	13711.
PROPELLANT WEIGHT	140.0					
MISSION EQUIP WEIGHT	290.0					
TOTAL SATELLITE WEIGHT	998.0					

027-117

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CCB-1-37 TELESAT D

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BDL POWER = 682. ARRAY AREA = 211.0 SQ FT BATT CAP = 40. AMP-HR

167-111

181

SPACECRAFT COST MODEL

CC3-1-37 TELESATD

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	3.9	3.0	6.9	4.6	7.7	12.3
THERMAL CONTROL	1.1	.2	1.3	1.3	.8	2.1
ELECTRICAL POWER	4.4	1.5	5.9	5.7	8.4	14.1
COMMUNICATIONS	1.2	.4	1.6	1.7	2.1	3.8
DATA HANDLING	5.5	.3	5.7	6.5	1.3	7.8
STABILITY AND CONTROL	2.9	1.2	4.1	5.8	4.0	9.8
AUXILIARY PROPULSION	1.6	.8	2.4	2.4	3.0	5.4
SPACECRAFT MISSION EQUIPMENT	20.5	7.4	27.9 35.3	28.0	27.3	55.3 68.5
SATELLITE QUALIFICATION UNIT(S)			63.2			123.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			
CONTRACTOR FEE			2.1			2.2 4.0
TOTAL SATELLITE			67.1			130.0
AVERAGE UNIT COST ( 5 SATELLITES)						26.0
TOTAL SATELLITE DDT+E AND RECURRING COST						197.2

N11-472



CC3-1-37 TELESATO

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20111.	39227.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	26131.	53106.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13318.	18275.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	408982.	489954.
803	EARTH SENSOR	3	1.3	0.0	1.00	157133.	77682.	89936.	85443.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	73945.	65774.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	747330.	139061.	139044.	176778.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	2471039.	47819.	47813.	584516.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	28235.	10555.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	59333.	82677.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	109318.	62576.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	31298.	18275.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	45982.	12067.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17181.	13580.

VI-473

CC3-1-37 TELESATD

ELECTRICAL POWER

IDENT TYPE	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239 BATTERY	2 43.0	0.0	.10	41198.	34228.	121099.	71865.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	103.6	1.00	986378.	168348.	336692.	233324.
WIRING HARNESS	77.1	1.00	326925.	192324.	203707.	77333.
THERMAL CONTROL	49.7	1.00	623705.	154894.	119086.	147535.
POWER CONVERTERS	15.9	1.00	590016.	367568.	183782.	139566.
PROPULSION FEED SYS	72.4	1.00	914905.	524782.	349850.	216417.
STRUCTURE	486.7	1.00	2139643.	2090832.	1045404.	506125.
POWER CONTROL UNITS	81.8	1.00	634789.	337170.	337165.	150157.
SATELLITE ADAPTER	82.8	1.00	163766.	61432.	41013.	38738.
PROPELLANT WEIGHT	157.3					
MISSION EQUIP WEIGHT	560.0					

TOTAL SATELLITE WEIGHT 1844.2

PLT-111

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CCS-138

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 416. ARRAY AREA = 128.6 SQ FT BATT CAP = 20% AHP-HR.

VII-475

125

SPACECRAFT COST MODEL

CC3-1-30 UHF

(MILLIONS OF 1977 DOLLARS)

VII-476

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.8	1.8	4.6	2.7	3.9	6.5
THERMAL CONTROL	.9	.2	1.1	.9	.6	1.4
ELECTRICAL POWER	3.4	1.3	4.7	3.6	5.5	9.1
COMMUNICATIONS	1.2	.4	1.6	1.4	1.6	3.0
DATA HANDLING	3.5	.3	3.8	3.4	1.1	4.5
STABILITY AND CONTROL	3.1	.9	4.0	3.5	2.6	6.1
AUXILIARY PROPULSION	1.5	.8	2.3	1.9	2.4	4.3
-----						
SPACECRAFT MISSION EQUIPMENT	16.5	5.5	22.0 16.1	17.3	17.6	34.9 23.9
-----						
SATELLITE QUALIFICATION UNIT(S)			38.1			38.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.7			1.5 2.6
TOTAL SATELLITE			41.3			62.9
-----						
AVERAGE UNIT COST (--- 4 SATELLITES)						15.7
-----						
TOTAL SATELLITE DDT+E AND RECURRING COST						104.2

186

CC3-1-38 UHF

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	235050.	256872.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	175338.	173039.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	466276.	139061.	143841.	111771.
403	COMMO DECOD+DISTR	1	2.3	7.5	1.00	1616658.	47819.	49463.	387529.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	68293.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIFLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

V11-477

187

CC3-1-38 UHF

ELECTRICAL POWER

IDENT TYPE  
224 BATTERY

NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
2	29.1	0.0	.10	30806.	25839.	92300.	55450.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	63.2	1.00	697452.	106524.	220396.	167186.
WIRING HARNESS	47.5	1.00	216801.	127541.	139749.	51969.
THERMAL CONTROL	33.4	1.00	533321.	118305.	97637.	127842.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	141433.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	346134.	211334.
STRUCTURE	267.5	1.00	1538272.	1257107.	650231.	368739.
POWER CONTROL UNITS	70.8	1.00	475374.	309854.	320540.	113952.
SATELLITE ADAPTER	46.7	1.00	100651.	37809.	30350.	24127.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	220.0					
TOTAL SATELLITE WEIGHT	1097.7					

V-11-478

102

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC3-F39 CDR

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 1414. ARRAY AREA = 111.1 SQ FT BATT CAP = 132. AMP-HR

627-11A

SPACECRAFT COST MODEL

CC3-1-39 CDB

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	5.4	1.7	7.0	7.4	6.1	13.6
THERMAL CONTROL	1.5	.3	1.8	2.0	1.3	3.3
ELECTRICAL POWER	3.5	1.1	4.5	6.4	8.9	15.3
COMMUNICATIONS	1.3	.5	1.8	2.6	3.3	5.9
DATA HANDLING	6.3	.3	6.6	8.8	1.5	10.3
STABILITY AND CONTROL	4.5	1.9	6.4	10.5	8.2	18.7
AUXILIARY PROPULSION	1.9	1.1	2.9	4.0	5.0	9.1
SPACECRAFT						
MISSION EQUIPMENT	24.3	6.7	31.0	41.7	34.5	76.2
			34.2			78.0
SATELLITE			65.3			154.2
QUALIFICATION UNIT(S)			0.0			
GSE (AGE)			2.1			
LAUNCH SITE SUPPORT						2.9
CONTRACTOR FEE			2.3			5.5
TOTAL SATELLITE			69.7			162.7
AVERAGE UNIT COST ( 6 SATELLITES)						27.1
TOTAL SATELLITE DDT+E AND RECURRING COST						232.4

VII-480



\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	35443.	43411.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	29381.	23899.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304769.	503376.	511828.	508286.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	386145.	449924.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	104131.	98090.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	57426.	50899.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	876915.	139061.	135244.	202353.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2853247.	47819.	46506.	658402.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	49434.	19339.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	57712.	80653.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.	90576.	173485.	106333.
401	RECEIVER	2	3.9	6.3	1.00	85947.	42118.	54797.	33482.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	44725.	11327.
605	DIPLEXER	2	.7	.3	1.00	13337.	5661.	6995.	5195.

187-11A

CC3-1-39 CDB

ELECTRICAL POWER		UNIT	UNIT	DDTE			VEHICLE	VEHICLE	
IDENT	TYPE	NO.	WEIGHT	POWER	FACTOR	D.E. COST	T.E. COST	PROD. COST	ENG. COST
260	BATTERY	4	47.5	0.0	.10	109009.	60591.1	212479.	184720.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	77.3	1.00	629413.	128363.	249706.	145241.
WIRING HARNESS	75.0	1.00	319358.	187873.	193553.	73694.
THERMAL CONTROL	82.9	1.00	855129.	219121.	156247.	197326.
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0.
PROPULSION FEED SYS	98.0	1.00	1064951.	661556.	428978.	245743.
STRUCTURE	179.1	1.00	2467711.	893878.	434718.	569438.
POWER CONTROL UNITS	111.0	1.00	972475.	403090.	392067.	224404.
SOLAR ARRAY DRIVE	12.8	1.00	562670.	255863.	248867.	129839.
SATELLITE ADAPTER	63.8	1.00	131218.	61134.	34250.	30279.
PROPELLANT WEIGHT	270.9					
MISSION EQUIP WEIGHT	540.0					

TOTAL SATELLITE WEIGHT 1816.1

VII-482

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CC3-1-40 OTHER RGL

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 589. ARRAY AREA = 182.1 SQ FT BATT CAP = 36. AMP-HR

VII-483

SPACECRAFT COST MODEL

CC3-1-40. OTHER RGL

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.1	2.5	5.6	3.0	5.4	8.3
THERMAL CONTROL	1.0	.2	1.2	1.0	.6	1.6
ELECTRICAL POWER	4.0	1.4	5.4	4.2	6.3	10.6
COMMUNICATIONS	1.2	.4	1.6	1.4	1.6	3.0
DATA HANDLING	3.9	.3	4.2	3.8	1.1	4.9
STABILITY AND CONTROL	3.3	1.3	4.6	5.3	3.7	9.0
AUXILIARY PROPULSION	1.5	.8	2.3	1.9	2.4	4.3
SPACECRAFT MISSION EQUIPMENT	18.0	6.8	24.9	20.5	21.1	41.6
			17.7			27.0
SATELLITE QUALIFICATION UNIT(S)			42.5			68.6
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.9			1.7
						3.0
TOTAL SATELLITE			46.1			73.3
AVERAGE UNIT COST ( 4 SATELLITES)						18.3
TOTAL SATELLITE DDT+E AND RECURRING COST						119.4

VII-487

CC3-1-40 OTHER RGL

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165 834.	15851.	20805.	39752.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15018.	27842.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
603	CONTROL ELECTRNCs	2	7.4	3.5	1.00	1192148.	761291.	423092.	519051.
806	EARTH SENSOR ASSY	2	4.1	1.1	1.00	397432.	153300.	175338.	173039.
1413	POWER CONVERTER	1	15.9	0.0	1.00	0.	0.	0.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	74656.	67872.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	523586.	139061.	143841.	125509.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1794316.	47819.	49463.	430116.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	61380.	83783.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	33728.	8775.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

VII-48

CC3-1-40 OTHER RGL

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT HEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
236	BATTERY	2	40.3	0.0	.10	37808.	32637.	116582.	68055.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	HEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	89.5	1.00	889705.	147019.	304179.	213271.
WIRING HARNESS	56.8	1.00	252298.	148422.	162630.	60478.
THERMAL CONTROL	42.9	1.00	586940.	140188.	113034.	140696.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	141433.
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	346134.	211334.
STRUCTURE	398.5	1.00	1683618.	1764051.	912444.	403580.
POWER CONTROL UNITS	77.6	1.00	582617.	326931.	338206.	139659.
SATELLITE ADAPTER	62.2	1.00	128416.	45960.	35890.	30783.
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	250.0					
TOTAL SATELLITE WEIGHT	1355.8					

V11-486

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CS1-1-1 DSATR WRG

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 4198. ARRAY AREA = 329.7 SQ.FT BATT CAP = 400. AMP-HR

VII-487

SPACECRAFT COST MODEL

CS1-1-1 DSATR WRG

(MILLIONS OF 1977 DOLLARS)

V11-488

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.9	2.7	10.7	7.6	7.7	15.3
THERMAL CONTROL	2.6	.5	3.1	2.5	1.5	4.0
ELECTRICAL POWER	6.7	2.1	8.8	9.3	12.9	22.2
COMMUNICATIONS	1.4	.5	1.9	2.0	2.5	4.4
DATA HANDLING	9.0	.3	9.3	8.7	1.1	9.8
STABILITY AND CONTROL	4.5	1.9	6.4	7.9	5.9	13.8
AUXILIARY PROPULSION	1.9	1.1	2.9	2.8	3.5	6.3
SPACECRAFT MISSION EQUIPMENT	34.0	9.0	43.0	40.8	35.0	75.8
			32.1			51.4
SATELLITE QUALIFICATION UNIT(S)			75.1			127.1
GSE (AGE)			3.0			
LAUNCH SITE SUPPORT			2.7			
CONTRACTOR FEE			3.2			2.4
						5.5
TOTAL SATELLITE			81.0			135.0
AVERAGE UNIT COST ( 4 SATELLITES)						33.7
TOTAL SATELLITE DDT+E AND RECURRING COST						216.0

7.2.7



CS1-1-1 DSATR WRG

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.1	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	3	1.6	1.0	1.00	67552.1	72567.	44071.	39474.
1815	EARTH SENSOR	2	15.4	15.6	1.00	1304759.1	503376.	544365.	568085.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.1	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.1	70110.1	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.1	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	1286296.1	139061.	143841.	308338.
403	CDU	1	12.3	7.5	1.00	4527040.1	47819.	49463.	965322.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	3	2.0	0.0	1.00	54652.1	38681.	74151.	31941.
202	ANTENNA	1	3.4	0.0	1.00	349517.1	137063.	61380.	83783.
327	TRANSMITTER	2	4.7	18.0	1.00	272957.1	90576.	184514.	118843.
401	RECEIVER	2	3.9	6.3	1.00	85947.1	42118.	58281.	37421.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.1	43476.	47569.	12967.
605	DIPLEXER	2	.7	.3	1.00	13337.1	5661.	7440.	5807.

684-111

CS1-1-1 DSATR WRG

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	8	71.3	0.0	.10	269075.1	133622.	477306.	484339.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	229.6	1.00	1348121.	351759.	727780.	323158
WIRING HARNESS	125.8	1.00	495171.1	291301.	319185.	118697
THERMAL CONTROL	178.1	1.00	1543525.	368005.	259933.	370022
POWER CONVERTERS	0.0	1.00	0.	0.	0.	0
PROPULSION FEED SYS	98.0	1.00	1064951.	661556.	456247.	255279
STRUCTURE	262.3	1.00	3312795.	1236305.	639471.	794111
POWER CONTROL UNITS	298.7	1.00	1837999.	719284.	744090.	440587
SOLAR ARRAY DRIVE	38.1	1.00	1178780.	646645.	668946.	282565
SATELLITE ADAPTER	92.4	1.00	179770.	91507.	45240.	43093
PROPELLANT WEIGHT	271.7					
MISSION EQUIP WEIGHT	500.0					
TOTAL SATELLITE WEIGHT 2783.7						

06A-11A

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CSF-1-1 INMARSAT-1

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APDGE = 19323. NUMBER OF QUAL UNITS = 0  
ROL POWER = 522. ARRAY AREA = 161.3 SQ FT BATT CAP = 34.1 AHP-HR

V11-491

SPACECRAFT COST MODEL

CS2-1-1 INMARSAT-1

(MILLIONS OF 1977 DOLLARS)

V11-497

SUBSYSTEM COST	DDT+E			RECURRING		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.9	2.2	5.1	2.0	3.7	5.7
THERMAL CONTROL	1.0	.2	1.1	.7	.5	1.1
ELECTRICAL POWER	3.8	1.4	5.1	3.0	4.6	7.6
COMMUNICATIONS	1.2	.4	1.6	1.0	1.3	2.3
DATA HANDLING	3.6	.3	3.9	2.5	.9	3.4
STABILITY AND CONTROL	3.3	1.3	4.6	4.2	2.9	7.1
AUXILIARY PROPULSION	1.5	.8	2.3	1.4	1.9	3.3
SPACECRAFT MISSION EQUIPMENT	17.2	6.4	23.7 15.0	14.8	15.7	30.5 17.5
SATELLITE QUALIFICATION UNIT(S)			38.7			48.0
GSE (AGF)			0.0			
LAUNCH SITE SUPPORT			1.6			
CONTRACTOR FEE			1.8			1.2 2.2
TOTAL SATELLITE			42.1			51.5
AVERAGE UNIT COST ( 3 SATELLITES)						17.2
TOTAL SATELLITE DDT+E AND RECURRING COST						93.5

304

CS2-1-1 INMARSAT-1

\*\*\* ASSEMBLY DESCRIPTIONS \*\*\*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	442003.	550190.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	476376.	139061.	150270.	111749.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1648120.	47819.	51673.	386617.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

867-11A

CS2-1-1 INMARSAT-1

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
233	BATTERY	2	34.2	0.0	.10	36087.	28995.	104654.	67222.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	79.3	1.00	817315.	131435.	284091.	19172
WIRING HARNESS	51.8	1.00	233334.	137266.	157129.	5473
THERMAL CONTROL	38.9	1.00	561285.	131187.	111515.	13166
POWER CONVERTERS	15.9	1.00	590016.	367569.	198620.	13840
PROPULSION FEED SYS	68.3	1.00	881623.	501892.	361606.	20681
STRUCTURE	340.4	1.00	1579279.	1542901.	833727.	37046
POWER CONTROL UNITS	73.4	1.00	542879.	316461.	342007.	12734
SATELLITE ADAPTER	54.2	1.00	114234.	41312.	34593.	2679
PROPELLANT WEIGHT	140.2					
MISSION EQUIP WEIGHT	205.0					

TOTAL SATELLITE WEIGHT 1209.1

767-111

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CS2-1-2 INMARSAT-2

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 617. ARRAY AREA = 190.8 SQ FT BATT CAP = 40. AMP-HR

VII-495

SPACECRAFT COST MODEL

CS2-1-2 INMARSAT-2

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.1	2.6	5.7	2.2	4.4	6.6
THERMAL CONTROL	1.0	.2	1.2	.7	.5	1.2
ELECTRICAL POWER	4.1	1.4	5.5	3.2	5.0	8.3
COMMUNICATIONS	1.2	.4	1.6	1.1	1.3	2.4
DATA HANDLING	4.0	.3	4.3	2.8	.9	3.7
STABILITY AND CONTROL	3.3	1.3	4.6	4.2	2.9	7.1
AUXILIARY PROPULSION	1.6	.8	2.4	1.5	1.9	3.4
SPACECRAFT MISSION EQUIPMENT	18.4	7.0	25.3	15.7	17.0	32.6
			17.7			21.2
SATELLITE QUALIFICATION UNIT(S)			43.0			53.8
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.7			
CONTRACTOR FEE			1.9			1.3
						2.4
TOTAL SATELLITE			46.6			57.4
AVERAGE UNIT COST ( 3 SATELLITES)						19.1
TOTAL SATELLITE DDT+E AND RECURRING COST						104.0

V11-496



CS2-1-2 INMARSAT-2

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
603	CONTROL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	442003.	550190.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	183175.	183419.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	533277.	139061.	150270.	125096.
403	COMMD DECOD+OISTR	1	2.3	7.5	1.00	1824159.	47819.	51673.	427912.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	64124.	81990.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	118144.	70270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	49695.	14075.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

267-11A

713

CS2-1-2 INMARSAT-2

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DCTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
239 BATTERY	2	43.0	0.0	.10	41198.	34228.	123541.	76742.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DCTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	93.8	1.00	919286.	153548.	331888.	2150.
WIRING HARNESS	58.9	1.00	260186.	153063.	175211.	610.
THERMAL CONTROL	44.3	1.00	603913.	143273.	120326.	1410.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	1380.
PROPULSION FEED SYS	72.4	1.00	914905.	524782.	378097.	2140.
STRUCTURE	418.3	1.00	1713715.	1838280.	993339.	4020.
POWER CONTROL UNITS	77.6	1.00	598663.	326931.	353324.	1400.
SATELLITE ADAPTER	64.7	1.00	132790.	47411.	38368.	310.
PROPELLANT WEIGHT	145.0					
MISSION EQUIP WEIGHT	250.0					

TOTAL SATELLITE WEIGHT 1401.8

867-11A

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CS2-1-3 INATSAT

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL

CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION

CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS

CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER

CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING

CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 19323. NUMBER OF QUAL UNITS = 0  
BOL POWER = 758. ARRAY AREA = 59.5 SQ FT BATT CAP = 66. AMP-HR

VII-499

3/5

SPACECRAFT COST MODEL

CS2-1-3 INATSAT

(MILLIONS OF 1977 DOLLARS)

VII-500

SUBSYSTEM COST	-----DOT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DOT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	4.2	1.3	5.6	4.1	3.4	7.4
THERMAL CONTROL	1.2	.1	1.3	1.1	.5	1.7
ELECTRICAL POWER	2.4	.8	3.1	2.9	4.3	7.2
COMMUNICATIONS	1.5	.6	2.1	2.4	2.7	5.1
DATA HANDLING	5.2	.3	5.4	6.0	1.8	7.7
STABILITY AND CONTROL	4.3	1.6	5.9	5.8	4.4	10.3
AUXILIARY PROPULSION	1.8	1.0	2.9	2.8	3.5	6.2
SPACECRAFT MISSION EQUIPMENT	20.6	5.8	26.3	25.2	20.4	45.6
SATELLITE QUALIFICATION UNIT(S)			58.4			89.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.9			
CONTRACTOR FEE			2.0			1.0
						3.3
TOTAL SATELLITE			62.3			95.0
AVERAGE UNIT COST ( 4 SATELLITES)						23.7
TOTAL SATELLITE DOT+E AND RECURRING COST						157.8

CS2-1-3 INATSAT

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1303	REACTION WHEEL	2	5.1	.3	1.00	111435.	68611.	37696.	48518.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	31248.	26711.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	302424.	281138.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	410692.	502857.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
818	THRUSTER	18	.4	0.0	.10	14248.	70110.	106069.	104195.
834	THRUSTER	6	.7	.1	.10	12597.	35429.	58495.	54067.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	2	8.9	3.0	1.00	759514.	139061.	258914.	330686.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	2278000.	47819.	49463.	546060.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
202	ANTENNA	2	8.4	0.0	1.00	388837.	233007.	110485.	169296.
306	TRANSMITTER	2	2.1	10.9	1.00	152260.	47779.	113089.	66293.
312	TRANSMITTER	2	2.2	15.8	1.00	157595.	49590.	116437.	68615.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
603	DIFLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

VII-501

717

CS2-1-3 INASAT

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
260	BATTERY	2	47.5	0.0	.10	61962.	36770.	131346.	111532.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	41.4	1.00	406638.	71999.	148964.	97475.
WIRING HARNESS	58.5	1.00	258687.	152181.	166748.	62010.
THERMAL CONTROL	29.3	1.00	699625.	108253.	90436.	167707.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	95.0	1.00	1043211.	646007.	445524.	250068.
STRUCTURE	152.5	1.00	2019204.	779598.	403294.	484024.
POWER CONTROL UNITS	64.3	1.00	675262.	292881.	302982.	161867.
SOLAR ARRAY DRIVE	6.9	1.00	370088.	151322.	156540.	88714.
SATELLITE ADAPTER	50.6	1.00	107752.	46935.	31808.	25829.
PROPELLANT WEIGHT	218.0					
MISSION EQUIP WEIGHT	450.0					
TOTAL SATELLITE WEIGHT	1373.4					

V11-5702

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CPL-1 MLTPR P/L

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONO PROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS PLUS DOWNLINK

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 450. NUMBER OF QUAL UNITS = 0  
ROL POWER = 4159. ARRAY AREA = 337.7 SQ FT BATT CAP = 100. AMP-HR

VII-503

SPACECRAFT COST MODEL

CPI-1-1 MLTPR P/L

(MILLIONS OF 1977 DOLLARS)

VII-504

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	7.7	2.4	10.1	14.7	13.9	28.5
THERMAL CONTROL	1.0	.4	1.4	1.9	2.5	4.4
ELECTRICAL POWER	6.4	1.7	8.1	14.0	20.5	34.5
COMMUNICATIONS	.8	.4	1.2	2.5	3.7	6.3
DATA HANDLING	9.9	1.1	11.0	23.3	7.9	31.2
STABILITY AND CONTROL	4.5	1.9	6.4	13.7	11.6	25.3
AUXILIARY PROPULSION	1.5	.9	2.4	4.9	6.2	11.1
SPACECRAFT MISSION EQUIPMENT	31.9	8.7	40.6 4.5	75.1	66.2	141.3 9.4
SATELLITE QUALIFICATION UNIT(S)			45.1			150.7
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.6			5.2
CONTRACTOR FEE			3.0			10.3
TOTAL SATELLITE			50.7			166.1
AVERAGE UNIT COST ( 9 SATELLITES)						18.5
TOTAL SATELLITE DDT+E AND RECURRING COST						216.8

268



CP1-1-1 MLTPR P/L

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
269	BATTERY	2	71.3	0.0	.10	86935.	49261.	168764.	136556.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	235.1	1.00	1370937.	359555.	657641.	289837.
WIRING HARNESS	122.0	1.00	482457.	283822.	274925.	101999.
THERMAL CONTROL	133.9	1.00	594400.	303292.	194473.	125665.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	73.5	1.00	876678.	530870.	323661.	185343.
STRUCTURE	196.6	1.00	3163228.	967594.	442442.	668754.
POWER CONTROL UNITS	189.7	1.00	1827991.	551515.	504371.	386465.
SOLAR ARRAY DRIVE	39.0	1.00	1197588.	659606.	603223.	253188.
SATELLITE ADAPTER	88.4	1.00	173134.	84274.	38972.	36603.
PROPELLANT WEIGHT	165.3					
MISSION EQUIP WEIGHT	1000.0					
TOTAL SATELLITE WEIGHT	2554.0					

VII-505

\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CPR-1-3 EXOSAT

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 10800. NUMBER OF QUAL UNITS = 0  
BOL POWER = 384. ARRAY AREA = 118.7 SQ FT BATT CAP = 85 AHP-HR

V11-506

271

SPACECRAFT COST MODEL

CP2-1-3 EXOSAT

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	2.1	1.4	3.6			1.0
THERMAL CONTROL	.4	.2	.6			.2
ELECTRICAL POWER	3.2	1.1	4.3			1.4
COMMUNICATIONS	.6	.2	.8			.3
DATA HANDLING	3.9	1.3	5.2			.7
STABILITY AND CONTROL	2.7	.7	3.4			.6
AUXILIARY PROPULSION	1.3	.6	1.9			.7
SPACECRAFT MISSION EQUIPMENT	14.3	5.6	19.8			4.8
			17.7			8.1
SATELLITE QUALIFICATION UNIT(S)			37.5			12.9
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.4			
CONTRACTOR FEE			1.5			.3
						.4
TOTAL SATELLITE			40.4			13.6
AVERAGE UNIT COST ( 1 SATELLITES)						13.6
TOTAL SATELLITE DDT+E AND RECURRING COST						93.9

VII-507

272

CP2-1-3 EXOSAT

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	NUITATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
803	EARTH SENSOR	1	1.3	0.0	1.00	128272.	32368.	45246.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	379119.	139061.	177581.	0.
333	TAPE RECORDER	1	23.0	8.0	1.00	600466.	749117.	235243.	0.
403	COMMD DECND+DISTR	1	2.3	7.5	1.00	1342119.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
227	ANTENNA	1	.8	0.0	1.00	49684.	27572.	9015.	0.
327	TRANSMITTER	1	4.7	18.0	1.00	163570.	53280.	84368.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.
605	DIPLEXER	1	.7	.3	1.00	11988.	3330.	5103.	0.

805-111

CP2-1-3 EXOSAT

ELECTRICAL POWER

IDENT	TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
204	BATTERY	2	8.6	0.0	.10	11097.	10743.	39719.	22394.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	58.3	1.00	659419.	98854.	252501.	0.
WIRING HARNESS	36.7	1.00	174206.	102482.	138632.	0.
THERMAL CONTROL	31.3	1.00	242017.	113210.	116046.	0.
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	0.
PROPULSION FEED SYS	53.1	1.00	749458.	413977.	352471.	0.
STRUCTURE	208.1	1.00	1193541.	1015496.	648465.	0.
POWER CONTROL UNITS	43.7	1.00	453627.	233652.	298406.	0.
SATELLITE ADAPTER	35.3	1.00	52895.	27429.	31810.	0.
PROPELLANT WEIGHT	26.5					
MISSION EQUIP WEIGHT	189.0					
TOTAL SATELLITE WEIGHT	782.3					

609-11N

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CPZ-15 IRAS

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - DUAL SPIN

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 486. NUMBER OF ORBITAL UNITS = 0  
BOL POWER = 851. ARRAY AREA = 195.2 SQ FT BATT CAP = 18. AMP-HR

015-111

175

SPACECRAFT COST MODEL

CP2-1-5 IRAS

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.7	1.5	5.2	2.6	2.5	5.1
THERMAL CONTROL	.7	.2	.9	.5	.6	1.0
ELECTRICAL POWER	4.5	1.3	5.9	3.4	4.6	8.0
COMMUNICATIONS	1.2	.4	1.6	1.0	1.1	2.0
DATA HANDLING	5.4	.4	5.8	3.8	1.5	5.3
STABILITY AND CONTROL	5.1	1.7	6.8	5.1	2.8	7.9
AUXILIARY PROPULSION	1.8	.9	2.7	1.6	2.2	3.7
SPACECRAFT MISSION EQUIPMENT	22.4	6.5	28.9	18.0	15.1	33.1
			3.4			4.4
SATELLITE QUALIFICATION UNIT(S)			32.3			37.5
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			
CONTRACTOR FEE			2.2			1.3
						2.4
TOTAL SATELLITE			36.4			41.2
AVERAGE UNIT COST ( 3 SATELLITES)						13.7
TOTAL SATELLITE DDT+E AND RECURRING COST						77.6

VII-5-11

CP2-1-5 IRAS

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTR'L									
IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
101	DESPIN BEARING	1	73.8	6.7	1.00	1314817.	278921.	203095.	308431.
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	21734.	38901.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	15689.	27247.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	14394.	18123.
503	GIMBAL ELECTRONCS	2	6.3	31.6	1.00	0.	0.	0.	0.
603	CONTR'DL ELECTRNCS	2	7.4	3.5	1.00	1192148.	761291.	221001.	550190.
703	BIAXIAL DRIVE	2	14.3	28.0	1.00	0.	0.	0.	0.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	132477.	153300.	183175.	61140.
AUXILIARY PROPULSION									
IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	75437.	70238.
DATA PROCESSING AND INSTRUMENTATION									
IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	735103.	139061.	150270.	172441.
406	COMMD DECOD+DISTR	1	11.0	5.5	1.00	2434647.	184082.	198921.	571121.
COMMUNICATIONS									
IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	30515.	10467.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	49802.	97425.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	78763.	46846.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	33825.	18123.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	35236.	9301.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	18568.	13467.

VII-512



CP2-1-5 IRAS

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
213	BATTERY	2	17.2	0.0	.10	21490.	17695.	63870.	40032.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	95.9	1.00	934075.	156729.	338762.	219116.
WIRING HARNESS	96.0	1.00	393724.	231621.	265137.	92360.
THERMAL CONTROL	50.5	1.00	414456.	156580.	129909.	97223.
POWER CONVERTERS	15.9	1.00	590016.	367568.	198620.	138406.
PROPULSION FEED SYS	86.4	1.00	1022627.	600775.	432849.	239888.
STRUCTURE	464.2	1.00	2044281.	1004191.	542628.	479549.
POWER CONTROL UNITS	32.0	1.00	722561.	194715.	210434.	169499.
SATELLITE ADAPTER	78.4	1.00	156338.	57970.	42931.	36674.
PROPELLANT WEIGHT	101.7					
MISSION EQUIP WEIGHT	490.0					

TOTAL SATELLITE WEIGHT 1734.4

VII-513

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CP2-1-L FRENCH S/L

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - DUAL SPIN

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION

APOGEE = 450. NUMBER OF QUAL UNITS = 0  
POL POWER = 840. ARRAY AREA = 275.4 SQ FT BATT CAP = 18.1 AMP-HR

VII-514

SPACECRAFT COST MODEL

CP2-1-6 FRENCH SC

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.9	1.6	5.6	3.8	3.5	7.3
THERMAL CONTROL	.8	.2	1.0	.8	.8	1.5
ELECTRICAL POWER	5.1	1.6	6.7	5.1	7.5	12.6
COMMUNICATIONS	1.2	.4	1.6	1.4	1.4	2.8
DATA HANDLING	5.6	.4	6.1	8.8	2.8	11.5
STABILITY AND CONTROL	5.1	1.7	6.8	6.8	3.7	10.5
AUXILIARY PROPULSION	1.6	.8	2.4	2.1	2.6	4.6
SPACECRAFT MISSION EQUIPMENT	23.4	6.9	30.3 5.5	28.6	22.2	50.8 5.3
SATELLITE QUALIFICATION UNIT(S)			35.7			56.2
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			2.0			
CONTRACTOR FEE			2.3			1.8 3.7
TOTAL SATELLITE			40.1			61.7
AVERAGE UNIT COST ( 4 SATELLITES)						15.4
TOTAL SATELLITE DDT+E AND RECURRING COST						101.7

VII-5/5

280

CP2-1-6 FRENCH SC

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
101	DESPIN BEARING	1	73.8	6.7	1.00	1314817.	278921.	194406.	315175.
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	20805.	39752.
303	SUN SENSOR	2	.3	.0	1.00	129217.	14519.	27032.	56260.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	13778.	18519.
503	GIMBAL ELECTRONCS	2	6.3	31.6	1.00	0.	0.	0.	0.
603	CONTROL ELECTRONCS	2	7.4	3.5	1.00	1192148.	761291.	211546.	519051.
703	BIAXIAL DRIVE	2	14.3	28.0	1.00	0.	0.	0.	0.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	132477.	153300.	175338.	57680.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	6	.6	0.0	.10	11814.	33143.	54563.	50706.
834	THRUSTER	2	.7	.1	.10	10283.	14762.	23042.	25906.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	770932.	139061.	143841.	184800.
406	COMMD DECOD+DISTR	2	11.0	5.5	1.00	2541120.	184082.	342739.	1106382.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEAND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	29209.	10696.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	47671.	99556.
306	TRANSMITTER	2	2.1	10.9	1.00	101507.	47779.	75393.	44195.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	32378.	18519.
503	COMMAND SIG COND	3	1.5	.9	1.00	22191.	43476.	47569.	12967.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	17773.	13762.

711-516

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CP2-1-6 FRENCH SC

ELECTRICAL POWER

IDENT TYPE	UNIT NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
213 BATTERY	2	17.2	0.0	.10	21490.	17695.	63209.	38683.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	135.4	1.00	1188558.	215707.	446292.	284909.
WIRING HARNESS	114.6	1.00	457525.	269154.	294918.	109673.
THERMAL CONTROL	56.4	1.00	460360.	168761.	132654.	110353.
POWER CONVERTERS	15.9	1.00	590016.	367568.	190122.	141433.
PROPULSION FEED SYS	75.2	1.00	940593.	540233.	372580.	225470.
STRUCTURE	525.9	1.00	2153052.	1116567.	577537.	516109.
POWER CONTROL UNITS	73.5	1.00	717082.	316713.	327635.	171892.
SATELLITE ADAPTER	86.1	1.00	169297.	63103.	43409.	40582.

PROPELLANT WEIGHT 99.3

MISSION EQUIP WEIGHT 480.0

TOTAL SATELLITE WEIGHT 1898.5

VII-517

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*CTR-17 EUROPE SIC*

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19323.      NUMBER OF QUAL UNITS = 0  
BDL POWER = 108.      ARRAY AREA = 33.4 SQ FT      BATT CAP = 8. AMP-HR

VII-518

SPACECRAFT COST MODEL

CP2-1-7 EUROPE SC

(MILLIONS OF 1977 DOLLARS)

VII-519

SUBSYSTEM COST	-----DDT+F-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+F	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.6	.5	2.1	2.8	1.9	4.7
THERMAL CONTROL	.7	.1	.8	1.2	.6	1.8
ELECTRICAL POWER	2.1	1.0	3.1	3.8	6.6	10.4
COMMUNICATIONS	1.2	.3	1.5	2.0	2.3	4.3
DATA HANDLING	2.3	.3	2.6	4.0	2.0	6.0
STABILITY AND CONTROL	2.7	.7	3.4	4.6	3.3	7.9
AUXILIARY PROPULSION	1.3	.6	1.9	3.0	3.7	6.8
SPACECRAFT MISSION EQUIPMENT	11.8	3.5	15.3	21.5	20.4	41.9
SATELLITE QUALIFICATION UNIT(S)			27.1			71.0
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.2			2.4
CONTRACTOR FEE			1.2			3.1
TOTAL SATELLITE			29.5			76.4
AVERAGE UNIT COST ( 8 SATELLITES)						9.6
TOTAL SATELLITE DDT+F AND RECURRING COST						105.9

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C<sup>2</sup>-1-7 EUROPE SC

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	UDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	18724.	36101.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	13516.	25285.
403	ROTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	12400.	16818.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447318.	211546.	233281.
803	EARTH SENSOR	1	1.3	0.0	1.00	126272.	32368.	32934.	27924.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	UDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	72127.	60647.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	UDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	292892.	139061.	129457.	63761.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1064132.	47819.	44516.	231657.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	UDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	26288.	9714.
202	ANTENNA	1	8.4	0.0	1.00	349517.	137063.	55242.	76088.
306	TRANSMITTER	1	2.1	10.9	1.00	136863.	28105.	56544.	29794.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	29140.	16818.
503	COMMAND SIG COND	1	1.5	.3	1.00	18115.	18115.	16864.	3944.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	15996.	12498.

VII-520



CP2-1-7 EUROPE SC

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
204	BATTERY	2	8.6	0.3	.10	11097.	10743.	37074.	17849.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
SOLAR ARRAY	16.4	1.00	271436.	30544.	56876.	59091.
WIRING HARNESS	23.7	1.00	120230.	70729.	69750.	26174.
THERMAL CONTROL	15.7	1.00	400432.	70913.	56503.	87172.
POWER CONVERTERS	15.9	1.00	590016.	367563.	171110.	128444.
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	256582.	162953.
STRUCTURE	54.3	1.00	937615.	324135.	150892.	204115.
POWER CONTROL UNITS	53.5	1.00	215982.	263011.	244874.	47018.
SATELLITE ADAPTER	16.2	1.00	13642.	16385.	14703.	2970.
PROPELLANT WEIGHT	26.5					
MISSION EQUIP WEIGHT	100.0					
TOTAL SATELLITE WEIGHT	448.0					

VII-521

**\*\* SATELLITE SYSTEMS COST MODEL \*\***  
*CPL-1-B CANADA SC*

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPELLSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 19373.      NUMBER OF QUAL UNITS = 0  
BOL POWER = 107.      ARRAY AREA = 33.0 SQ FT      BATT CAP = 8. AMP-HR

VII-522

207

SPACECRAFT COST MODEL

GP2-1-8 CANADA SC

(MILLIONS OF 1977 DOLLARS)

VII-523

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	1.9	.5	2.5	3.1	2.0	5.0
THERMAL CONTROL	.8	.1	.9	1.2	.6	1.8
ELECTRICAL POWER	2.1	1.1	3.1	3.5	6.1	9.6
COMMUNICATIONS	1.2	.4	1.6	2.2	2.6	4.8
DATA HANDLING	2.0	.3	2.3	4.0	1.8	5.8
STABILITY AND CONTROL	3.1	.9	4.0	5.6	4.2	9.8
AUXILIARY PROPULSION	1.4	.7	2.1	2.9	3.5	6.4
SPACECRAFT MISSION EQUIPMENT	13.1	3.9	17.0	22.4	20.8	43.1
SATELLITE QUALIFICATION UNIT(S)			30.6			76.6
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.3			2.2
CONTRACTOR FEE			1.3			3.2
TOTAL SATELLITE			33.2			82.0
AVERAGE UNIT COST ( 7 SATELLITES)						11.7
TOTAL SATELLITE DDT+E AND RECURRING COST						115.2

CP2-1-8 CANADA SC

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVEN ASSY	1	1.0	3.3	1.00	165334.	15851.	19108.	37186.
303	SUN SENSOR	1	.3	.0	1.00	115150.	14519.	13793.	26045.
403	ROTATION DAMPER	1	2.3	3.0	1.00	77256.	15984.	12654.	17323.
603	CONTROL ELECTRONICS	1	7.4	7.5	1.00	1071594.	447819.	215833.	240288.
806	EARTH SENSOR ASSY	2	4.1	1.0	1.00	397432.	153300.	161040.	147415.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45752.	72688.	62195.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	3.9	3.0	1.00	330121.	139061.	132112.	74025.
403	COMM DECOD+DIST	1	2.3	7.5	1.00	1185044.	47819.	45429.	265728.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	26827.	10006.
202	ANTENNA	1	9.4	0.0	1.00	349517.	137063.	56375.	78374.
306	TRANSMITTER	1	2.1	10.9	1.00	152260.	47779.	103867.	56476.
401	RECEIVER	1	3.3	0.3	1.00	77256.	24775.	29738.	17323.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	30978.	7475.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	16324.	12873.

VII-524

CP2-1-3 CANADA SC

ELECTRICAL POWER		UNIT	UNIT	UNIT				VEHICLE	VEHICLE
IDENT	TYPE	NO.	WEIGHT	POWER	FACTOR	D.E. COST	T.E. COST	PROD. COST	ENG. COST
204	BATTERY	2	8.5	9.0	.10	11097.	10743.	37363.	18304.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	UNIT FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	16.2	1.00	263157.	30199.	57386.	60354.
WIRING HARNESS	28.4	1.00	149165.	82457.	82982.	31430.
THERMAL CONTROL	15.6	1.00	445174.	70606.	57446.	99823.
POWER CONVERTERS	15.3	1.00	590016.	367568.	174619.	132302.
PROPULSION FEED SYS	58.9	1.00	801709.	448143.	283863.	179771.
STRUCTURE	65.0	1.00	1112792.	377679.	179422.	249526.
POWER CONTROL UNITS	58.5	1.00	214810.	277124.	263304.	48168.
SATELLITE ADAPTER	20.4	1.00	33189.	20605.	17171.	7442.
PROPELLANT WEIGHT	84.3					
MISSION EQUIP WEIGHT	125.0					
TOTAL SATELLITE WEIGHT	571.4					

VII-525

\*\* SATELLITE SYSTEMS COST MODEL \*\*

CPZ-1-1A ASTROA

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (OTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE = 270. NUMBER OF QUAL UNITS = 0  
BOL POWER = 154. ARRAY AREA = 34.5 SQ FT BATT CAP = 6. AMP-HR

VII-526

SPACECRAFT COST MODEL

CP2-1-14 ASTRO A

(MILLIONS OF 1977 DOLLARS)

VII-527

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	1.7	.5	2.1	0.0	.3	.3
THERMAL CONTROL	.4	.1	.5	0.0	.1	.1
ELECTRICAL POWER	2.2	1.1	3.2	.0	1.2	1.2
COMMUNICATIONS	1.2	.4	1.6	0.0	.3	.3
DATA HANDLING	2.4	.3	2.7	0.0	.3	.3
STABILITY AND CONTROL	2.7	.7	3.4	0.0	.6	.6
AUXILIARY PROPULSION	1.3	.6	1.9	.1	.6	.7
SPACECRAFT						
MISSION EQUIPMENT	11.8	3.6	15.5	.2	3.5	3.6
			11.2			4.8
SATELLITE						
QUALIFICATION UNIT(S)			26.7			8.4
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.2			
CONTRACTOR FEE						.3
						.3
TOTAL SATELLITE			29.1			9.0
AVERAGE UNIT COST ( 1 SATELLITES)						9.0
TOTAL SATELLITE DDT+E AND RECURRING COST						38.1

CP2-1-14 ASTPO A

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NC.	UNIT WEIGHT	UNIT POWER	DDTF FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.3	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	118150.	14519.	18541.	0.
403	NUTATION DAMPER	1	2.3	0.0	1.00	77256.	15994.	17010.	0.
603	CONTROL ELECTRNCS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
803	EARTH SENSOR	1	1.3	0.0	1.00	128272.	32368.	45246.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NC.	UNIT WEIGHT	UNIT POWER	DDTF FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NC.	UNIT WEIGHT	UNIT POWER	DDTF FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.7	1.00	305418.	139061.	177581.	0.
403	COMM DECOD+DISTP	1	2.3	7.5	1.00	1104977.	47819.	61065.	0.

COMMUNICATIONS

IDENT	TYPE	NC.	UNIT WEIGHT	UNIT POWER	DDTF FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
103	BASEND ASSY UNIT	1	2.0	.3	1.00	44622.	16117.	36060.	0.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	58853.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	51709.	0.
401	RECEIVER	1	3.0	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

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CP2-1-14 ASTRO A

ELECTRICAL POWER

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202	BATTERY	2	3.5	0.3	.10	8778.	11541.	42670.	17714.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	17.0	1.00	277664.	31577.	80658.	
WIRING HARNESS	26.2	1.00	130902.	77007.	104171.	
THERMAL CONTROL	16.4	1.00	265591.	73041.	79510.	
POWER CONVERTERS	15.9	1.00	590016.	367568.	234718.	
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	351963.	
STRUCTURE	53.0	1.00	967035.	327684.	209249.	
POWER CONTROL UNITS	68.2	1.00	261745.	303325.	388155.	
SATELLITE ADAPTER	16.2	1.00	13999.	17537.	20531.	
PROPELLANT WEIGHT	26.3					
MISSION EQUIP WEIGHT	95.0					
TOTAL SATELLITE WEIGHT	466.8					

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\*\* SATELLITE SYSTEMS COST MODEL \*\*  
CPR-1-15 ASTRØ B

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - SPIN CONTROL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT - BODY MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APDGE = 270. NUMBER OF QUAL UNITS = 0  
PDL POWER = 164. ARRAY AREA = 37.7 SQ FT BATT CAP = 6. AMP-HR

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SPACECRAFT COST MODEL

CP2-1-15 ASTRO B

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		TOTAL RECURRING
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	
STRUCTURE	1.7	.5	2.2	0.0	.3	.3
THERMAL CONTROL	.5	.1	.6	0.0	.1	.1
ELECTRICAL POWER	2.2	1.1	3.3	.0	1.2	1.3
COMMUNICATIONS	1.2	.4	1.6	0.0	.3	.3
DATA HANDLING	2.4	.3	2.7	0.0	.3	.3
STABILITY AND CONTROL	3.0	.8	3.8	0.0	.7	.7
AUXILIARY PROPULSION	1.3	.6	1.9	.1	.6	.7
SPACECRAFT MISSION EQUIPMENT	12.3	3.8	16.1	.2	3.7	3.8
			.6			.3
SATELLITE QUALIFICATION UNIT(S)			16.7			4.1
GSE (AFE)			0.0			
LAUNCH SITE SUPPORT			1.3			
CONTRACTOR FEE			1.2			.3
						.3
TOTAL SATELLITE			19.2			4.7
AVERAGE UNIT COST ( 1 SATELLITES)						4.7
TOTAL SATELLITE DDT+E AND RECURRING COST						23.9

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CP2-1-15 ASTRO B

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
203	VALVE DRIVER ASSY	1	1.6	5.9	1.00	165834.	15851.	25685.	0.
303	SUN SENSOR	1	.3	.0	1.00	116150.	14519.	18541.	0.
403	NUTATION DAMPER	1	2.8	0.0	1.00	77256.	15984.	17010.	0.
603	CONTROL ELECTRONICS	1	7.4	3.5	1.00	1071594.	447818.	290184.	0.
806	EARTH SENSOR ASSY	1	4.1	1.0	1.00	357242.	90176.	120258.	0.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
834	THRUSTER	8	.7	.1	.10	13754.	45762.	77273.	76092.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	305344.	139061.	177581.	0.
403	COMM DECOD+DISTR	1	2.3	7.5	1.00	1104738.	47819.	61055.	0.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRJD. COST	VEHICLE ENG. COST
103	BASEBND ASSY UNIT	1	2.0	.5	1.00	44622.	16117.	36060.	0.
203	ANTENNA	1	10.4	0.0	1.00	415318.	158108.	58853.	0.
306	TRANSMITTER	1	2.1	10.9	1.00	91242.	28105.	51709.	0.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	39973.	0.
503	COMMAND SIG COND	1	1.5	.9	1.00	18115.	18115.	23133.	0.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	21942.	0.

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CP2-1-15 ASTRJ B

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
202 BATTERY	2	9.5	0.0	.10	8778.	11541.	42670.	17714.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	NOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	18.5	1.00	295450.	34150.	87228.	0.
WIPING HARNESS	27.7	1.00	137230.	80730.	109207.	0.
THERMAL CONTROL	17.0	1.00	268823.	74843.	81199.	0.
POWER CONVERTERS	15.9	1.00	590016.	367563.	234718.	0.
PROPULSION FEED SYS	53.0	1.00	748535.	413380.	351963.	0.
STRUCTURE	60.0	1.00	969357.	352839.	225312.	0.
POWER CONTROL UNITS	73.5	1.00	275771.	316713.	404486.	0.
SATELLITE ADAPTER	17.0	1.00	14212.	17265.	20746.	0.
PROPELLANT WEIGHT	26.5					
MISSION EQUIP WEIGHT	85.0					
TOTAL SATELLITE WEIGHT	473.5					

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\*\* SATELLITE SYSTEMS COST MODEL \*\*

CPR-1-16 JAPAN S/C

SUBSYSTEM CONFIGURATIONS

STABILIZATION AND CONTROL  
CONFIGURATION - - MASS EXPULSION WITH PITCH MOMENTUM WHEEL

AUXILIARY PROPULSION  
CONFIGURATION - - MONOPROPELLANT

DATA PROCESSING AND INSTRUMENTATION  
CONFIGURATION - - SPECIAL PURPOSE PROCESSOR (DTU)

COMMUNICATIONS  
CONFIGURATION - - UNIFIED LINK-COMMON ANTENNAS

ELECTRICAL POWER  
CONFIGURATION - - SHUNT AND DISCHARGE REGULATION - PADDLE MOUNTED SOLAR ARRAY

VEHICLE SIZING  
CONFIGURATION - - CYLINDRICAL

MISCELLANEOUS INFORMATION  
APOGEE \* 270. NUMBER OF QUAL UNITS \* 0  
BOL POWER \* 882. ARRAY AREA \* 71.6 SQ FT BATT CAP \* 20. AMP-HR

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SPACECRAFT COST MODEL

CP2-1-16 JAPAN SC

(MILLIONS OF 1977 DOLLARS)

SUBSYSTEM COST	-----DDT+E-----			-----RECURRING-----		
	DESIGN ENGINEERING	TEST AND EVALUATION	TOTAL DDT+E	PRODUCTION ENGINEERING	FAB AND ASSEMBLY	TOTAL RECURRING
STRUCTURE	3.3	.9	4.2	8.6	7.0	15.6
THERMAL CONTROL	.4	.1	.6	1.1	1.3	2.4
ELECTRICAL POWER	2.3	.6	3.0	6.8	9.9	16.7
COMMUNICATIONS	.6	.3	.9	2.2	3.7	5.9
DATA HANDLING	3.9	.3	4.2	10.2	3.2	13.4
STABILITY AND CONTROL	4.2	1.6	5.8	14.0	12.6	26.5
AUXILIARY PROPULSION	1.0	.6	1.6	5.0	6.4	11.4
SPACECRAFT MISSION EQUIPMENT	15.9	4.3	20.2	47.8	44.1	91.9
			29.7			139.6
SATELLITE QUALIFICATION UNIT(S)			49.9			231.5
GSE (AGE)			0.0			
LAUNCH SITE SUPPORT			1.5			5.1
CONTRACTOR FEE			1.5			6.8
TOTAL SATELLITE			53.0			243.4
AVERAGE UNIT COST ( 14 SATELLITES)						17.4
TOTAL SATELLITE DDT+E AND RECURRING COST						296.4

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CP2-1-16 JAPAN SC

\* \* \* \* ASSEMBLY DESCRIPTIONS \* \* \* \*

STABILIZATION AND CONTROL

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
1305	REACTION WHEEL	1	5.0	25.0	1.00	98701.	39694.	16970.	18305.
1601	VALVE DRIVER ASSY	2	1.6	1.0	1.00	61349.	51402.	25830.	17675.
1815	EARTH SENSOR	1	15.4	15.6	1.00	1172826.	296104.	249987.	217512.
2203	CONTROL ELECTRNCS	2	7.1	62.0	1.00	1154954.	749743.	339483.	332752.

AUXILIARY PROPULSION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
829	THRUSTER	12	.6	0.0	.10	15068.	62143.	91289.	71403.
834	THRUSTER	4	.7	.1	.10	11440.	25095.	38552.	31818.

DATA PROCESSING AND INSTRUMENTATION

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
203	DIGITAL TELEMETRY	1	8.9	3.0	1.00	520991.	139061.1	118901.	96623.
403	COMMD DECOD+DISTR	1	2.3	7.5	1.00	1786317.	47819.	40886.	331290.

COMMUNICATIONS

IDENT	TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
106	BASEBND ASSY UNIT	2	2.0	0.0	1.00	49642.	27399.	43460.	14302.
227	ANTENNA	2	.8	0.0	1.00	55273.	46873.	10865.	15925.
303	TRANSMITTER	2	2.2	10.2	1.00	105063.	49590.	64165.	30270.
401	RECEIVER	1	3.9	6.3	1.00	77256.	24775.	26764.	14328.
503	COMMAND SIG COND	2	1.5	.9	1.00	20153.	30796.	27880.	5806.
603	DIPLEXER	1	3.1	1.0	1.00	57409.	15451.	14692.	10647.

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CP2-1-16 JAPAN SC

ELECTRICAL POWER

IDENT	TYPE	VO.	UNIT WEIGHT	UNIT POWER	DOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
215	BATTERY	2	13.9	0.0	.10	23417.	15140.	50268.	33250.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DOTE FACTOR	D.E. COST	T.E. COST	VEHICLE PRD. COST	VEHICLE ENG. COST
SOLAR ARRAY	49.9	1.00	462897.	85591.	146380.	85849.
WIRING HARNESS	31.4	1.00	152624.	89786.	81323.	28306.
THERMAL CONTROL	22.1	1.00	251084.	89413.	63386.	46566.
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0.
PROPULSION FEED SYS	40.7	1.00	576982.	337768.	192555.	107007.
STRUCTURE	75.2	1.00	1480650.	427496.	182780.	274601.
POWER CONTROL UNITS	52.4	1.00	737844.	259834.	222189.	136840.
SOLAR ARRAY DRIVE	8.3	1.00	419470.	177050.	151399.	77795.
SATELLITE ADAPTER	31.6	1.00	48144.	29797.	19963.	8929.
PROPELLANT WEIGHT	29.2					
MISSION EQUIP WEIGHT	400.0					
TOTAL SATELLITE WEIGHT	847.4					

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CP2-1-16 JAPAN SC

ELECTRICAL POWER

IDENT TYPE	NO.	UNIT WEIGHT	UNIT POWER	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
215 BATTERY	2	13.9	0.0	.10	23417.	15140.	50268.	33250.

EQUIPMENTS USING COST ESTIMATING RELATIONSHIPS

NAME	WEIGHT	DDTE FACTOR	D.E. COST	T.E. COST	VEHICLE PROD. COST	VEHICLE ENG. COST
SOLAR ARRAY	49.9	1.00	462897.	85591.	146380.	85849
WIRING HARNESS	31.4	1.00	152624.	89786.	81323.	28306
THERMAL CONTROL	22.1	1.00	251084.	89413.	63386.	46566
POWER CONVERTERS	0.0	0.00	0.	0.	0.	0
PROPULSION FEED SYS	40.7	1.00	576982.	337768.	192555.	107007
STRUCTURE	75.2	1.00	1480650.	427496.	182780.	274601
POWER CONTROL UNITS	52.4	1.00	737844.	259834.	222189.	136840
SOLAR ARRAY DRIVE	8.3	1.00	419470.	177050.	151399.	77795
SATELLITE ADAPTER	31.6	1.00	48164.	29797.	19963.	8929
PROPELLANT WEIGHT	29.2					
MISSION EQUIP WEIGHT	400.0					
TOTAL SATELLITE WEIGHT	847.4					

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Appendix VIII

Mission Cost Model (MISSCM)

Payload and Launch Vehicle Fiscal Year Data



TOTAL ELCC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
ENVIRONMENTAL MONITORING																							
NO2-1-1							3																
NO2-1-2								2				2					1				2		
NO2-1-3							1																
NO2-1-4														1			2		1				2
NO2-1-5																							
NO2-2-1																							
NO2-2-2																							
SUBTOTAL							1	3		2			2	1			3			1	2		2
ASTROPHYSICS																							
NP1-1-1										2												2	
NP1-1-2									3		2		3				3						
NP1-1-3													3									3	
NP1-1-4A														2									
NP1-1-4B																							
NP1-1-5													1				1						1
NP1-1-6																							
NP1-1-7														1									
NP1-1-8																			1				
NP1-2-1																							
NP1-2-2																							
NP1-2-3																							
NP1-2-4																							
SUBTOTAL								3	2	2	3	4	4				4	4			5	1	
SOLAR TERRESTRIAL																							
NP2-1-1										1		1		1			1		1			1	
NP2-1-2																							
NP2-1-3							1				1		1				1	1		1		1	1
NP2-1-4								1				1					1				1		
NP2-1-5																							
NP2-2-1																							
NP2-2-2																							
NP2-2-3																							
NP2-2-4																							
SUBTOTAL							1	1		1	1	2	1	1	2	1	5	2	1	2	1	2	1
LIFE SCIENCES																							
NP3-1-1										1	1	2	2										
NP3-1-2																							
NP3-2-1								1															
NP3-2-2																							
NP3-2-3																							
NP3-2-4																							
NP3-3-1																							
SUBTOTAL							1	1	1	1	2	2											5
																							5

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TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996		
SPACE PROCESSING-SPACE STATION																									
NS1-2-1																							6		
SUBTOTAL																							6		
ORBITAL OPERATIONS																									
NS3-1-1							10		10		10					10		10		10					
NS3-1-2																									
NS3-1-3							25																		
NS3-1-4																									
NS3-1-5																									
NS3-1-6																									
SUBTOTAL							25	10		10		10				10		10		10					
SATELLITE POWER																									
NS4-1-1												25													
NS4-1-2																250									
NS4-1-3																							2000	4000	
SUBTOTAL												25				250							2000	4000	
TOTAL																									
NASA							30	18	11	18	15	22	54	16	10	262	41	14	22	72	29	2019	4009		

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TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-NASA, NON-DOD)

INTERNATIONAL COMMUNICATIONS

CC1-1-1 1 5  
 SUBTOTAL 1 5

US DOMESTIC COMMUNICATION

CC2-1-1 2 2 1 1 2 1 2 1 2  
 CC2-1-2 1 1 2 1 2  
 CC2-1-4 1 1  
 CC2-1-5 1 1 2 1 2  
 CC2-1-6 1 2 1 2  
 CC2-1-7 1 1  
 CC2-1-8 1 1  
 CC2-1-9 1 1  
 CC2-1-11 1 1  
 CC2-1-12 2 4 2 4  
 SUBTOTAL 2 2 2 2 3 1 1 3 2 1 4 5 2 4 4

FOREIGN COMMUNICATION

CC3-1-1 1  
 CC3-1-2 1 1  
 CC3-1-4 1 1  
 CC3-1-5 1 1  
 CC3-1-6 1 1  
 CC3-1-10  
 CC3-1-11  
 CC3-1-12  
 CC3-1-13 1  
 CC3-1-14 1 1  
 CC3-1-16 2 1 1  
 CC3-1-17 1 1 1 1  
 CC3-1-18 1 1 1 1  
 CC3-1-20 1 1  
 CC3-1-21 1 1  
 CC3-1-22 1 1  
 CC3-1-23 1 1  
 CC3-1-24 1 1  
 CC3-1-26 1 1 1 1  
 CC3-1-28 1 1  
 CC3-1-30 1 1  
 CC3-1-32 1 1 2  
 CC3-1-33 1 1  
 CC3-1-35 1 1  
 CC3-1-36 1 1  
 CC3-1-37 1 1 1  
 CC3-1-38 1 1 1  
 CC3-1-39 1 2 1 1 2 1 1  
 CC3-1-40 1 1 5 4 3 4 1 2 3 4 2 3 5 4 3 3 4  
 SUBTOTAL 1 1 5 4 3 4 1 2 3 4 2 3 5 4 3 3 4

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TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN

CO1-1-1																	1		1		2
CO1-1-2																					
CO1-2-1													4						3		
SUBTOTAL													4				1		4		2

EARTH AND OCEAN MONITORING

CO2-1-1																				8	5
SUBTOTAL																				8	5

EARTH RESOURCES-US DOMESTIC AND FOREIGN

CO3-1-1													2	1	2	1	4	3	3	3	5	5	5
CO3-2-1													2										
CO3-2-2																						1	
CO3-2-3													1										
SUBTOTAL													5	1	2	2	4	3	5	3	5	6	5

WEATHER

CO4-1-2				1	1	2	1	1	1	1	2											
CO4-1-3													2	1	2	1	2	1	2	1		
CO4-2-2													1									1
SUBTOTAL				1	1	2	1	1	1	1	2		3	1	2	1	2	1	2	1	1	1

US DOMESTIC

CP1-1-1													4	4	4	5	4	4	4	4	4
SUBTOTAL													4	4	4	5	4	4	4	4	4

FOREIGN

CP2-1-3																					1	
CP2-1-5													1									
CP2-1-6														1								1
CP2-1-7															1							
CP2-1-8																1						
CP2-1-14																						
CP2-1-15																						
SUBTOTAL																						

USERS TOTAL

OUTSIDE					1	4	11	5	8	13	6	17	12	15	15	17	25	27	17	17	14	12	8
---------	--	--	--	--	---	---	----	---	---	----	---	----	----	----	----	----	----	----	----	----	----	----	---

ALL PROGRAMS

TOTAL					1	4	53	36	30	55	43	60	140	61	50	315	143	131	105	172	124	2116	4106
-------	--	--	--	--	---	---	----	----	----	----	----	----	-----	----	----	-----	-----	-----	-----	-----	-----	------	------

VIII-5



TOTAL SOL ARRAY LBS BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1	110							110										110			
NC1-1-2								110											110		
NC1-1-3																					190
NC1-1-4																					280
SUBTOTAL	110							110	190			280	110	190				110	280	110	190

GOVERNMENT TO PEOPLE LINKS

HC2-1-1																					60	
HC2-1-2																					1380	
SUBTOTAL																					1380	60

INTRAGOVERNMENT LINKS

NC4-1-1																					280			
NC4-1-2																					690			
NC4-2-1	110																				110	690		
NC4-2-2																					280	280		
SUBTOTAL	110																				280	110	690	280

PLANETARY

NL1-1-1																													
NL1-1-2																					80								
NL1-1-3																						40							
NL1-1-4																					30	30							
NL1-1-5																					120	60							
NL1-1-6																													
NL1-1-7																						50							
NL1-1-8																													
NL1-1-9																						40							
NL1-1-10																						40							
NL1-1-11																						30							
NL1-1-12																						90							
SUBTOTAL																					30	230	90	40	40	120	80	90	120

LUNAR

NL2-1-1	30																				
SUBTOTAL	30																				

EARTH RESOURCES MONITORING

NO1-1-1	70																																
NO1-1-2																						70											
NO1-1-3																						60											
NO1-1-4																						30											
NO1-1-5																						30											
NO1-1-6																						60											
NO1-1-7																						60											
NO1-1-8																						60											
NO1-2-1																						70											
SUBTOTAL	70	120																				70	130	200	60	130	140	130	60	140	70	190	70

VIII-6

TOTAL SOL ARRAY LBS BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
ENVIRONMENTAL MONITORING																							
HO2-1-1							190																
HO2-1-2									100			100					100				100		
HO2-1-3							70																
HO2-1-4														80			80			80			80
HO2-1-5									40														
HO2-2-1																							
HO2-2-2																							
SUBTOTAL						70	190		140			100	80			180			80	100			80
ASTROPHYSICS																							
NP1-1-1									90					90							90		
NP1-1-2								150		150		150				150							
NP1-1-3										150		150					150				150		
NP1-1-4A											30								30				
NP1-1-4B															60								60
NP1-1-5												30		30		30							
NP1-1-6									60					60									
NP1-1-7																			120				
NP1-1-8						20		20															
NP1-2-1																							
NP1-2-2																							
NP1-2-3																							
NP1-2-4																							
SUBTOTAL						20		170	150	150	150	210	300	30	60	180	270	30		240			60
SOLAR TERRESTRIAL																							
NP2-1-1										50		50		50		50			50		50		
NP2-1-2										30													
NP2-1-3						50	50	50	50	50	50	50	100	100	100	100	100	100	100	100	100	100	100
NP2-1-4						30	30	30	30	30	30	30	60	60	60	60	60	60	60	60	60	60	60
NP2-1-5																							
NP2-2-1																							
NP2-2-2																							
NP2-2-3																							
NP2-2-4																							
SUBTOTAL						80	80	80	80	160	80	130	160	210	160	210	310	210	160	210	160	210	160
LIFE SCIENCES																							
NP3-1-1									60	60	120	60											
NP3-1-2									60														
NP3-2-1																							
NP3-2-2																							
NP3-2-3																							
NP3-2-4																							
NP3-3-1																							290
SUBTOTAL							60	60	60	120	60												290

7-111

TOTAL SOL APRAY LBS BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
SPACE PROCESSING-SPACE STATION																							
NS1-2-1																							310
SUBTOTAL																							310
ORBITAL OPERATIONS																							
NS3-1-1							550			550		550				550			550		550		
NS3-1-2																							
NS3-1-3					820																		
NS3-1-4																							
NS3-1-5																							
NS3-1-6																							
SUBTOTAL					820	550				550		550				550			550		550		
SATELLITE POWER																							
NS4-1-1										820													
NS4-1-2															3100								
NS4-1-3																							2215044300
SUBTOTAL										820					3100								2215044300
TOTAL																							
NASA					80	1130	1060	710	1170	920	1190	2370	1180	680	3970	2150	840	1360	2660	1600	23320	44900	

8-1111

TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996  
(000'S OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1  
NC1-1-2  
NC1-1-3  
NC1-1-4

1 1

SUBTOTAL

1 1

GOVERNMENT TO PEOPLE LINKS

NC2-1-1  
NC2-1-2  
SUBTOTAL

1 2 2 1

INTRAGOVERNMENT LINKS

NC4-1-1  
NC4-1-2  
NC4-2-1  
NC4-2-2  
SUBTOTAL

1 1

PLANETARY

NL1-1-1  
NL1-1-2  
NL1-1-3  
NL1-1-4  
NL1-1-5  
NL1-1-6  
NL1-1-7  
NL1-1-8  
NL1-1-9  
NL1-1-10  
NL1-1-11  
NL1-1-12

1 1

SUBTOTAL

2 1

LUNAR

NL2-1-1  
SUBTOTAL

1 1

EARTH RESOURCES MONITORING

HO1-1-1  
HO1-1-2  
HO1-1-3  
HO1-1-4  
HO1-1-5  
HO1-1-6  
HO1-1-7  
HO1-1-8  
HO1-2-1  
SUBTOTAL

1 1

6-1117

TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996  
(000's of LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
ENVIRONMENTAL MONITORING																							
NO2-1-1							1																
NO2-1-2													1										
NO2-1-3																							
NO2-1-4																		1					1
NO2-1-5																							
NO2-2-1																							
NO2-2-2																							
SUBTOTAL							1						1				1						1
ASTROPHYSICS																							
NP1-1-1										1													1
NP1-1-2									1		1		1				1						
NP1-1-3												1			1							1	
NP1-1-4A																			1				
NP1-1-4B																							1
NP1-1-5																							
NP1-1-6																							
NP1-1-7																							
NP1-1-8																							
NP1-2-1																							
NP1-2-2																							
NP1-2-3																							
NP1-2-4																							
SUBTOTAL								1	1	1	1	1	1	2			1	1	1		2	1	
SOLAR TERRESTRIAL																							
NP2-1-1														1									1
NP2-1-2																							
NP2-1-3									1					1					1				1
NP2-1-4							1					1							1				1
NP2-1-5																							
NP2-2-1																							
NP2-2-2																							
NP2-2-3																							
NP2-2-4																							
SUBTOTAL							1	1					1	2		1	3		1	1		2	1
LIFE SCIENCES																							
NP3-1-1																							
NP3-1-2										1													
NP3-2-1																							
NP3-2-2																							
NP3-2-3																							
NP3-2-4																							
NP3-3-1																							1
SUBTOTAL										1													1

91-111A

TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996  
(000's OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

SPACE PROCESSING-SPACE STATION

NS1-2-1 1  
 SUBTOTAL 1

ORBITAL OPERATIONS

NS3-1-1 1 1 1 1 1 2  
 NS3-1-2  
 NS3-1-3 2  
 NS3-1-4  
 NS3-1-5  
 NS3-1-6  
 SUBTOTAL 2 1 1 1 1 2

SATELLITE POWER

NS4-1-1 2  
 NS4-1-2 6  
 NS4-1-3 46 93  
 SUBTOTAL 2 6 46 93

TOTAL  
 NASA 3 4 3 4 4 4 4 7 6 1 10 8 3 4 8 7 52 97

// - // //

TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996  
(000's OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-HASA, NON-DOD)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
INTERNATIONAL COMMUNICATIONS																							
CC1-1-1							1	1															
SUBTOTAL							1	1															
US DOMESTIC COMMUNICATION																							
CC2-1-1							1			1					1							1	
CC2-1-2																							
CC2-1-4																							
CC2-1-5																							
CC2-1-6										1							1						
CC2-1-7																		1					
CC2-1-8															1								
CC2-1-9															1								
CC2-1-11														1									
CC2-1-12																					1		
SUBTOTAL							1		1	1			1		3		1	1			1	1	1
FOREIGN COMMUNICATION																							
CC3-1-1									1														
CC3-1-2										1													
CC3-1-4																1							
CC3-1-5																							
CC3-1-6													1										
CC3-1-10																							
CC3-1-11																							
CC3-1-12																							
CC3-1-13									1														
CC3-1-14																							
CC3-1-16																1							
CC3-1-17									1														
CC3-1-18																							
CC3-1-20															1								1
CC3-1-21																							
CC3-1-22																							
CC3-1-23																							
CC3-1-24											1												
CC3-1-26																					1		
CC3-1-28										1													
CC3-1-30																							
CC3-1-32																1							
CC3-1-33																1							
CC3-1-35																							
CC3-1-36										1													
CC3-1-37															1								
CC3-1-38																				1			1
CC3-1-39								1															
CC3-1-40																					1		1
SUBTOTAL									5	2		3		3	3	2	2			2	1		3

VIII-12

TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996  
(000'S OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN																							
CO1-1-1																		1					
CO1-1-2							1																
CO1-2-1												1											
SUBTOTAL							1					1						1					
EARTH AND OCEAN MONITORING																							
CO2-1-1																	1	1				2	
SUBTOTAL																	1	1				2	
EARTH RESOURCES-US DOMESTIC AND FOREIGN																							
CO3-1-1										1				1	1		1	1	1	1			
CO3-2-1													1										
CO3-2-2																				1			
CO3-2-3																							
SUBTOTAL										1		1	1	1			1	1	2	1			
WEATHER																							
CO4-1-2							1																
CO4-1-3														1				1					
CO4-2-2													1										
SUBTOTAL							1			1			1	1				1					
US DOMESTIC																							
CP1-1-1												1		1	1		1	1	1				
SUBTOTAL												1		1	1		1	1	1				
FOREIGN																							
CP2-1-3																							
CP2-1-5													1										
CP2-1-6														1									
CP2-1-7														1									
CP2-1-8																						1	
CP2-1-14																							
CP2-1-15																							
SUBTOTAL													1	2								1	
USERS TOTAL																							
OUTSIDE						1	4		6	3	2	5	4	8	8	3	7	6	3	3	4	2	4
ALL PROGRAMS TOTAL						1	7	4	9	7	6	9	11	14	9	13	15	9	7	11	11	54	101

5/11/13



TOTAL SOLAR ARRAY \$ BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS																					
INTERGOVERNMENT LINKS																					
HC1-1-1			2	1						1							1				
HC1-1-2			1		2							1							1		
HC1-1-3				1	1	1						1		1					1		
HC1-1-4						1	1	3								1	1				
SUBTOTAL			3	2	3	1	1	2	3	2			1		1	2	1		2		
GOVERNMENT TO PEOPLE LINKS																					
HC2-1-1								1						1							
HC2-1-2															1	3	6	5	3		
SUBTOTAL								1					1	1	3	6	5	3			
INTRAGOVERNMENT LINKS																					
HC4-1-1							1	1	3					1	1			1	1		
HC4-1-2								1	2	3	3	1		1	2	1		1	3		
HC4-2-1			2	1								1								1	
HC4-2-2			1		2									1							1
SUBTOTAL			3	1	3	2	5	3	3	2	1	3	2	1	3	2	1	1	2	4	1
PLANETARY																					
HL1-1-1																					
HL1-1-2								1	1												
HL1-1-3																					
HL1-1-4																					
HL1-1-5									2												
HL1-1-6																					
HL1-1-7																					
HL1-1-8																					
HL1-1-9														1							
HL1-1-10																1					
HL1-1-11																	1				
HL1-1-12																		1			
SUBTOTAL								1	3				1	1	1	1	1				
LUNAR																					
HL2-1-1																					
SUBTOTAL																					
EARTH RESOURCES MONITORING																					
HO1-1-1			1				1				1							1			
HO1-1-2									1	1					1				1		
HO1-1-3								1			1							1			
HO1-1-4														1							
HO1-1-5														1							
HO1-1-6						1															
HO1-1-7						1					1									1	
HO1-1-8											2									1	
HO1-2-1																					
SUBTOTAL			1	2	1				2	4	2	2		1				2	3		

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TOTAL SOLAR ARRAY \$ BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

ENVIRONMENTAL MONITORING

HO2-1-1						1	2															
HO2-1-2								1	1	1			1					1				
HO2-1-3						1																
HO2-1-4												1	1									
HO2-1-5										1								1				1
HO2-2-1																						
HO2-2-2																						
SUBTOTAL						2	2	1	1	2		1	2					2				1

ASTROPHYSICS

NP1-1-1									2													1
NP1-1-2							1	2		1	1				1		1					
NP1-1-3										1	2		1									1
NP1-1-4A																						
NP1-1-4B												1						1	1			
NP1-1-5											1			1								
NP1-1-6									1	1												
NP1-1-7																						
NP1-1-8																						
NP1-2-1							1															
NP1-2-2																						
NP1-2-3																						
NP1-2-4																						
SUBTOTAL							2	2	3	3	3	2	1	1	2	2	1	1	2			

SOLAR TERRESTRIAL

HP2-1-1																						
HP2-1-2																						
HP2-1-3																						
HP2-1-4																						
HP2-1-5																						
HP2-2-1																						
HP2-2-2																						
HP2-2-3																						
HP2-2-4																						
SUBTOTAL						2	1	1		2	2	1	1	2		3	4		2	1	2	1

LIFE SCIENCES

HP3-1-1																						
HP3-1-2																						
HP3-2-1																						
HP3-2-2																						
HP3-2-3																						
HP3-2-4																						
HP3-3-1																						
SUBTOTAL							1	1	1		1		1								2	3

VIII-15

TOTAL SOLAR ARRAY \$ BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

SPACE PROCESSING-SPACE STATION

HS1-2-1

2 3

SUBTOTAL

2 3

ORBITAL OPERATIONS

HS3-1-1

1 1 3 3 1 2 1 2 1 1 1 2 2 3

HS3-1-2

HS3-1-3

3 7 2

HS3-1-4

HS3-1-5

HS3-1-6

SUBTOTAL

1 4 10 5 1 2 1 2 1 1 1 2 2 3

SATELLITE POWER

HS4-1-1

1 7 4

HS4-1-2

9 19 6

HS4-1-3

SUBTOTAL

1 7 4 9 19 6 8 26 50 99 110 32

TOTAL

NASA

1 6 18 17 11 13 16 17 22 16 16 30 19 8 23 44 66 105 115 34

91-111A

TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1

2 5 2 1 2 1 2 1 2 1

NC1-1-2

1 1 3 3 1 1 2 1 2 1 2 1

NC1-1-3

1 2 4 3 2 1 3 1 3 1 2 1

NC1-1-4

1 3 4 5 1 3 4 5 1 3 1 2 1

SUBTOTAL

3 7 7 7 5 6 6 6 4 3 2 3 5 4 3 1

GOVERNMENT TO PEOPLE LINKS

NC2-1-1

1 2 3 1 2 1 2

NC2-1-2

2 6 10 9 3

SUBTOTAL

1 2 3 1 4 6 10 10 5

INTRAGOVERNMENT LINKS

NC4-1-1

1 3 4 5 1 1 3 1 1 3 1

NC4-1-2

1 5 6 7 3 2 4 2 2 4 2

NC4-2-1

2 5 2 1 2 1 2 1 2 1

NC4-2-2

1 3 4 5 1 1 3 1 3 1 2 1

SUBTOTAL

3 8 7 8 6 10 7 8 6 4 6 5 3 4 5 6 5 1

PLANETARY

NL1-1-1

NL1-1-2

1 5 6 2 1 3 1

NL1-1-3

1 2 1 1 1 1

NL1-1-4

1 2 2 1 1 1 1

NL1-1-5

2 5 1 1 1 1

NL1-1-6

1 2 3 2

NL1-1-7

NL1-1-8

NL1-1-9

NL1-1-10

NL1-1-11

NL1-1-12

SUBTOTAL

2 10 16 8 2 3 4 8 6 4 5 4 4 1

LUNAR

NL2-1-1

3

SUBTOTAL

3

EARTH RESOURCES MONITORING

NO1-1-1

3 3 2 2 2 2 2

NO1-1-2

1 3 1 1 1 1 1 2

NO1-1-3

3 3 1 1 1 1 1 1 1

NO1-1-4

1 3 1 1 3

NO1-1-5

3 3 1 1 1 1 2 1 1 1

NO1-1-6

3 3 1 1 1 1 2 1 1 1

NO1-1-7

NO1-1-8

NO1-2-1

SUBTOTAL

3 9 6 3 7 8 8 9 3 5 3 2 4 3 4 3

TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

ENVIRONMENTAL MONITORING

NO2-1-1				1	4	4	1															
NO2-1-2						1	3	2	2		2			1	1	1			2			
NO2-1-3		1	3	1																		
NO2-1-4										1	3	2	2		2	1		2		1	2	
NO2-1-5								2	2													

NO2-2-1																						
NO2-2-2																						
SUBTOTAL	2	7	6	4	4	4	1	5	2	2	1	3	2			2	2	1	2			

ASTROPHYSICS

NP1-1-1					4	8	3	2	3	1							1	3	1		
NP1-1-2		1	6	6	4	3	3	3	1				1	3	1			1	3	1	
NP1-1-3					1	5	5	2	3					1	3	1	1	1	2	1	
NP1-1-4A								2	3	1						1	1				
NP1-1-4B													2	4	1				1	1	1
NP1-1-5								1	2				1		1				1	1	1
NP1-1-6					2	4				2											
NP1-1-7																					
NP1-1-8	1	3	1	1											2	3	1				

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NP1-2-1																					
NP1-2-2																					
NP1-2-3																					
NP1-2-4																					

SUBTOTAL

SOLAR TERRESTRIAL

NP2-1-1					1	3	1	1	1	1				1	1	1	1	1	1		
NP2-1-2																					
NP2-1-3	1	3	2	2	1	1	1	2	2	2	3	2	3	2	2	3	2	3	1	1	
NP2-1-4	1	3	2	2	1	1	1	2	2	2	3	2	3	2	2	3	2	3	1	1	
NP2-1-5																					
NP2-2-1												2	8	9	2						
NP2-2-2																					
NP2-2-3																					
NP2-2-4																					

SUBTOTAL

LIFE SCIENCES

NP3-1-1																					
NP3-1-2																					
NP3-2-1		1	1	2	3	3	3	2													
NP3-2-2																					
NP3-2-3																					
NP3-2-4																					
NP3-3-1																					
SUBTOTAL	2	6	4	4	3	8	5	5	5	5	9	12	16	7	5	7	5	7	2	2	

	1	2	4	3	3	3	2										1	4	5	2	
																	1	4	5	2	

TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
NASA (CONTINUED)																								
SPACE PROCESSING-SPACE STATION																								
NS1-2-1																			1	5	5	2		
SUBTOTAL																			1	5	5	2		
ORBITAL OPERATIONS																								
NS3-1-1				1	4	6	5	4	4	2	4	1			2	3	3	5	5	1				
NS3-1-2																								
NS3-1-3					6	13	5																	
NS3-1-4																								
NS3-1-5																								
NS3-1-6																								
SUBTOTAL				1	10	19	10	4	4	2	4	1			2	3	3	5	5	1				
SATELLITE POWER																								
NS4-1-1										2	12	10												
NS4-1-2														17	40	15								
NS4-1-3																		19	57	101	181	193	56	
SUBTOTAL										2	12	10	17	40	15			19	57	101	181	193	56	
TOTAL																								
NASA				3	23	53	54	48	51	54	63	68	50	52	76	69	41	57	102	142	215	210	60	

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TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-NASA, NON-DOD)

INTERNATIONAL COMMUNICATIONS

CC1-1-1 1 5 8 2  
 SUBTOTAL 1 5 8 2

US DOMESTIC COMMUNICATION

CC2-1-1 3 4 4 2 1 1 1 2 1 1 1  
 CC2-1-2 3 5 2 1 1 1 1 1 1 1 1  
 CC2-1-4 2 4 1 1  
 CC2-1-5 1 3 2  
 CC2-1-6 1 4 3 1 2 3  
 CC2-1-7 2 6 3 1 3 1 1  
 CC2-1-8 2 5 3  
 CC2-1-9 2 7 3  
 CC2-1-11 1 4 5 1 1 2  
 CC2-1-12 1 3 5 6 1 1 2  
 SUBTOTAL 2 8 11 8 5 7 4 2 4 15 20 10 6 9 7 1 2 7 9 7 1

FOREIGN COMMUNICATION

CC3-1-1 2 4 3 1  
 CC3-1-2 2 5 2 1  
 CC3-1-4 2 4 3 1 2 4 3 1  
 CC3-1-5 1 4 2 2 2  
 CC3-1-6 1 4 2  
 CC3-1-10 1 2 1  
 CC3-1-11 1 2 1 4 1  
 CC3-1-12 1 4 3 1  
 CC3-1-13 2 4 3 1  
 CC3-1-14 2 5 2 1 2 2 1  
 CC3-1-16 2 6 3 1 2 3 3 1 2 1 1  
 CC3-1-17 2 6 3 1 2 3 3  
 CC3-1-18 2 6 4 2 6 4 1 4 4 1  
 CC3-1-20 2 4 3 2 4 1 1  
 CC3-1-21 2 4 3 2 4 3 1  
 CC3-1-22 2 5 3 2 4 3 1  
 CC3-1-23 2 5 3  
 CC3-1-24 2 5 3  
 CC3-1-26 2 8 4 1 4 3  
 CC3-1-28 1 2 1 1 4 3  
 CC3-1-30 2 4 2 3 6 1 2 1 2  
 CC3-1-32 1 4 2 3 6 1 1 2 1 2  
 CC3-1-33 1 4 2 3 6 1 1 2 1 2  
 CC3-1-35 2 4 2 6 3 2 1 1 2 2 1  
 CC3-1-36 1 4 2 6 3 2 1 1 1 2 2 1  
 CC3-1-37 2 4 3 1 2 5 2 2 1 2 3 2 2 1  
 CC3-1-38 2 4 3 1 1 1 2 2 6 4 3 2 2 1  
 CC3-1-39 2 4 3 1 2 2 1 3 2 2 1  
 SUBTOTAL 2 11 28 33 33 36 27 18 8 13 26 17 11 15 17 11 9 13 14 6

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TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN

CO1-1-1													3	3		2		2				
CO1-1-2				2	7	3																
CO1-2-1								1	4	5	2					1	2	1				
SUBTOTAL				2	7	3		1	4	5	2		3	3	1	4	1	2				

EARTH AND OCEAN MONITORING

CO2-1-1													1	6	9	4	1	2	6	4	1	
SUBTOTAL													1	6	9	4	1	2	6	4	1	

EARTH RESOURCES-US DOMESTIC AND FOREIGN

CO3-1-1							1	5	3	1	3	3	4	3	4	5	6	4	1			
CO3-2-1							2	4		1	1	1										
CO3-2-2													2	4	1	1	1	1				
CO3-2-3							1	3														
SUBTOTAL							4	12	3	2	4	4	6	7	5	6	7	5	1			

WEATHER

CO4-1-2		1	4	2	2	2	2	1	2	1	1											
CO4-1-3									1	2	3	2	2	2	2	2	2	2				
CO4-2-2						2	4	2			2		1	1	1	1						2
SUBTOTAL		1	4	2	2	4	6	3	3	3	6	2	2	3	3	3	2	2	2			

US DOMESTIC

CP1-1-1								3	7	6	4	3	4	4	4	4	4	2	1			
SUBTOTAL								3	7	6	4	3	4	4	4	4	4	2	1			

FOREIGN

CP2-1-3		1	3	1																		
CP2-1-5			2	6	2				1	2					1	2	1					
CP2-1-6						3	5	2	1	2			1	2	1			2	1			
CP2-1-7			1	2	2		1	1		1	1	1	1	1	1			1		1		1
CP2-1-8			1	2	3		1					1	1	1						1		2
CP2-1-14		1	3																			
CP2-1-15					3	1																
SUBTOTAL		2	10	14	8	3	7	4	3	3	2	2	5	4	1	3	2	3				

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USERS TOTAL

OUTSIDE	3	15	33	63	61	58	59	49	43	44	46	53	48	47	47	34	29	28	29	22	7
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ALL PROGRAMS

TOTAL	3	18	56	116	115	106	110	103	106	112	96	105	124	116	88	91	131	170	244	232	67
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TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
NASA MISSIONS																								
INTERGOVERNMENT LINKS																								
NC1-1-1		6	66	141	51		6	25	49	17		6	24	49	18									
NC1-1-2			18	58	93	94	35		6	31	63	22		6	31	63	22							
NC1-1-3				23	74	114	111	39		6	34	70	24		6	34	69	24						
NC1-1-4							28	88	137	132	49			6	40	82	29							
SUBTOTAL		6	84	222	218	208	180	152	192	186	146	98	54	95	137	126	91	24						
GOVERNMENT TO PEOPLE LINKS																								
NC2-1-1								17	52	54	16	6	12	22	7	6	11	22	7					
NC2-1-2															38	120	195	199	73					
SUBTOTAL								17	52	54	16	6	12	60	127	201	210	95	7					
INTRAGOVERNMENT LINKS																								
NC4-1-1				28	88	137	132	49	6	40	82	29	6	40	83	29								
NC4-1-2					33	107	166	164	59	6	49	102	36	6	49	103	36							
NC4-2-1	6	67	142	51				6	25	50	17			6	25	50	18							
NC4-2-2		28	88	137	132	49			6	40	82	29			6	40	83	29						
SUBTOTAL	6	95	230	216	220	219	239	221	195	155	145	160	137	82	114	134	161	119	29					
PLANETARY																								
NL1-1-1									9	51	57	16			19	31	9							
NL1-1-2					10	54	62	17							20	32	10							
NL1-1-3						1	26	50	15							1	15	21	6					
NL1-1-4				6	23	41	24	5							6	15	23	18	5					
NL1-1-5					.12	38	73	24							6	12	21	6						
NL1-1-6									16	77	87	25												
NL1-1-7					10	54	61	18										19	33	9				
NL1-1-8						7	32	63	22															
NL1-1-9							7	24	46	16														
NL1-1-10									7	29	57	19												
NL1-1-11												20	34	10										
NL1-1-12											17	51	97	99	34									
SUBTOTAL					6	45	144	255	247	193	185	183	199	171	107	69	88	78	20					
LUNAR																								
NL2-1-1		25	41	14																				
SUBTOTAL		25	41	14																				
EARTH RESOURCES MONITORING																								
NO1-1-1		11	48	52	16	10	22	7	11	20	8	10	21	8	10	21	7	10	22	7				
NO1-1-2							21	44	22	13	11	12	11	13	11	12	11	13	5					
NO1-1-3							17	52	57	23	15	26	15	13	26	15	14	27	8					
NO1-1-4										18	39	14												
NO1-1-5									6	12	24	8												
NO1-1-6			17	57	62	19																		
NO1-1-7			17	58	63	20		6	17	30	10	6	16	30	10	6	17	30	10					
NO1-1-8							6	18	34	11	6	9	14	4	6	9	14	4						
NO1-2-1				9	22	14	10	9	10	9	10	9	9	9	10	9	10	9	7	1				
SUBTOTAL		11	82	176	163	63	76	136	157	136	123	94	86	77	73	72	73	93	52	8				

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TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

ENVIRONMENTAL MONITORING

NO2-1-1		14	62	70	23																
NO2-1-2					9	41	44	14	9	18	7		9	17	7		9	18	7		
NO2-1-3		25	54	20																	
NO2-1-4								16	47	52	22	13	24	14	13	24	14	14	14	24	8
NO2-1-5				6	8	26	17														
NO2-2-1				1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	1
NO2-2-2				1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	1
SUBTOTAL		39	116	107	74	72	35	27	69	61	26	24	45	23	17	35	36	23	26	8	

ASTROPHYSICS

NP1-1-1					35	74	27		14	26	9						13	26	9		
NP1-1-2			10	45	48	25	21	17	20	7			10	21	7						
NP1-1-3						10	45	47	25	20	7			10	19	7	9	21	7		
NP1-1-4A							6	17	31	10				6	9	13	4				
NP1-1-4B									6	15	29	9					6	8	11	4	
NP1-1-5								15	32	17	10	9	9	3							
NP1-1-6					23	49	17		7	16	5										
NP1-1-7														29	61	22					
NP1-1-8		1	8	17	8	5	2														
NP1-2-1					2	4	4	5	4	5	4	5	4	5	4	5	4	5	4	3	
NP1-2-2					1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	
NP1-2-3					1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	1	
NP1-2-4									1	2											
SUBTOTAL		1	8	27	57	119	168	126	104	140	112	56	56	94	107	52	40	65	35	10	

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SOLAR TERRESTRIAL

NP2-1-1						15	29	15	9	7	8	8	9	7	8	8	9	7	8	3	
NP2-1-2						3	18	14													
NP2-1-3		12	23	21	16	15	10	12	14	17	20	18	19	19	19	18	19	19	17	11	3
NP2-1-4		18	44	40	36	24	10	7	8	12	12	13	12	13	12	13	12	13	12	9	2
NP2-1-5												13	63	68	21						
NP2-2-1								1	1	1	2	1	2	1	2	1	2	1	1		
NP2-2-2								1	3	3	3	3	3	3	3	3	3	3	3	2	
NP2-2-3								2	4	4	5	4	5	4	5	4	5	4	3		
NP2-2-4					4	11	17	18	18	18	18	18	18	18	18	18	18	18	18	11	2
SUBTOTAL		30	67	61	52	61	78	69	57	62	68	78	131	133	88	65	68	65	61	34	7

LIFE SCIENCES

NP3-1-1				16	76	99	95	99	61	12											
NP3-1-2		14	41	80	92	34															
NP3-2-1				1	3	3	3	3	2												
NP3-2-2				1	1	1	2	1	1												
NP3-2-3				1	1	1	2	1	1												
NP3-2-4			1																		
NP3-3-1																		24	113	127	40
SUBTOTAL		14	42	99	173	138	102	104	65	12								24	113	127	40

TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
NASA (CONTINUED)																								
SPACE PROCESSING-SPACE STATION																								
NS1-2-1																				24	113	127	40	
SUBTOTAL																				24	113	127	40	
ORBITAL OPERATIONS																								
NS3-1-1	20	60	94	84	55	48	40	48	16			25	48	40	73	64	16							
NS3-1-2			1	2		1	2		1	2														
NS3-1-3		40	84	30																				
NS3-1-4				1		1	1	1								1	1	1			1	1		
NS3-1-5				3	4																			
NS3-1-6				3	4							3	4	1						3	4			
SUBTOTAL	20	100	179	123	63	50	43	49	17	5	4	26	48	41	74	68	20	1	1					
SATELLITE POWER																								
NS4-1-1									3	19	15													
NS4-1-2														19	42	15								
NS4-1-3																			19	57	105	195	205	58
SUBTOTAL									3	19	15	19	42	15				19	57	105	195	205	58	
TOTAL																								
NASA	71	393	919	1140	1062	1005	1033	1121	1164	947	788	826	871	811	859	903	936	876	544	121				

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TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-NASA, NON-DOD)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996		
INTERNATIONAL COMMUNICATIONS																									
CC1-1-1				16	81	115	77																		
SUBTOTAL				16	81	115	77																		
US DOMESTIC COMMUNICATION																									
CC2-1-1				11	49	74	58	25	7	7	16	8	15	32	12	8	15	5	3	17	31	11			
CC2-1-2				25	51	32																			
CC2-1-4			17	34	14		1	5	12	5															
CC2-1-5				20	39	15																			
CC2-1-6						1	21	49	37	8															
CC2-1-7																									
CC2-1-8												2	8	24	28	8					1	6	12	4	
CC2-1-9												1	20	43	26	4									
CC2-1-11										2	22	51	27	3											
CC2-1-12											15	46	51	16							6	14	24	9	
SUBTOTAL			17	90	153	122	80	79	56	22	56	145	181	128	115	135	106	34	34	94	124	98	24		
FOREIGN COMMUNICATION																									
CC3-1-1					1	17	38	23	4																
CC3-1-2												1	18	42	23	5				1	7	18	15	4	
CC3-1-4					1	17	37	22	4																
CC3-1-5							1	17	37	21	4				1	7	16	14	3						
CC3-1-6			17	33	12																				
CC3-1-10			1	17	33	13																			
CC3-1-11			10	18	7																				
CC3-1-12			1	14	26	10																			
CC3-1-13				1	17	37	22	4																	
CC3-1-14												1	18	41	23	4				1	7	18	15	3	
CC3-1-16							1	25	59	34	6					1	10	24	21	5					
CC3-1-17				2	22	46	26	3																	
CC3-1-18												2	25	52	30	3				3	13	35	30	8	
CC3-1-20							1	16	30	11							1	5	10	4					
CC3-1-21					1	17	36	22	4																
CC3-1-22														1	17	39	22	4			1	5	11	3	
CC3-1-23							1	20	43	26	4														
CC3-1-24																	1	20	45	26	5				
CC3-1-26						2	34	76	42	6						3	17	41	27	6					
CC3-1-28				1	8	15	6																		
CC3-1-30				31	52	19						1	7	12	5	6	13	5							
CC3-1-32						1	19	37	15			1	6	13	4		1	6	13	4					
CC3-1-33			1	15	30	11																			
CC3-1-35					1	27	62	37	14	17	6														
CC3-1-36						1	18	40	24	9	10	3													
CC3-1-37																	1	26	62	45	31	29	23	5	
CC3-1-38				1	17	38	22	4		1	5	13	9	11	3										
CC3-1-39									1	27	64	46	22	5						2	10	26	31	22	7
CC3-1-40						1	19	36	13	1	6	12	5	1	5	12	4	2	6	13	3				
SUBTOTAL			30	135	260	312	295	308	284	187	121	156	219	159	99	130	173	135	109	149	119	30			

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TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(BILLIONS OF 1977 DOLLARS)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
OTHER USERS (CONTINUED)																								
ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN																								
CO1-1-1													10	45	51	26	22	18	22	8				
CO1-1-2				32	71	41	7																	
CO1-2-1									13	60	68	21				14	30	10						
SUBTOTAL				32	71	41	7		13	60	68	21	10	45	51	40	52	28	22	8				
EARTH AND OCEAN MONITORING																								
CO2-1-1														16	94	137	75	12	34	89	61	13		
SUBTOTAL														16	94	137	75	12	34	89	61	13		
EARTH RESOURCES-US DOMESTIC AND FOREIGN																								
CO3-1-1								23	54	36	23	30	42	45	46	52	63	67	49	13				
CO3-2-1								25	54	19	9	18	6											
CO3-2-2														26	53	19	9	18	6					
CO3-2-3								12	26	8														
SUBTOTAL								60	134	63	32	48	48	71	99	71	72	85	55	13				
WEATHER																								
CO4-1-2		25	61	47	34	33	33	34	33	26	10													
CO4-1-3									10	44	54	38	30	30	30	31	30	22	6					
CO4-2-2					1	22	43	17	1	7	14	6	1	7	14	5	2	7	15	5				
SUBTOTAL		25	61	47	35	55	76	51	44	77	78	44	31	37	44	36	32	29	21	5				
US DOMESTIC																								
CP1-1-1									19	43	31	20	21	20	21	20	21	15	3					
SUBTOTAL									19	43	31	20	21	20	21	20	21	15	3					
FOREIGN																								
CP2-1-3			17	34	13																			
CP2-1-5				16	32	12			4	9	2			4	8	4								
CP2-1-6								15	31	11	5	10	3	5	9	3	4	10	4					
CP2-1-7			6	14	36	17	17	12	18	10	18	12	18	11	18	11	18	11	18	11	12	3		
CP2-1-8			6	22	40	29	12	14	3		6	14	21	17	3	7	15	22	17	3				
CP2-1-14			13	25	10																			
CP2-1-15				5	17	12																		
SUBTOTAL			42	116	148	70	44	57	36	24	36	29	44	41	32	26	43	37	29	6				
USERS TOTAL																								
OUTSIDE	42	197	490	719	713	587	606	549	499	468	495	560	619	588	523	411	367	374	368	236	54			
ALL PROGRAMS																								
TOTAL	42	274	1017	2025	2433	2296	2270	2292	2377	2358	2068	1961	2106	2189	2110	1980	1963	2029	1907	1384	343			

VII-26

TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1	2				2												2				
NC1-1-2										2									2		
NC1-1-3											3									3	
NC1-1-4													5					5			
SUBTOTAL	2				2	3		2	5	2	4					2	5	2	3		

GOVERNMENT TO PEOPLE LINKS

NC2-1-1								1							1						1
NC2-1-2																			50		
SUBTOTAL								1							1				50	1	

PEOPLE TO PEOPLE LINKS

NC3-1-1		10						10								10					10
NC3-1-2													25						25		
NC3-1-3																	100				100
SUBTOTAL		10						10				25				110			25		10 100

INTRAGOVERNMENT LINKS

NC4-1-1										5				5					5		
NC4-1-2									15											15	
NC4-2-1						2							2						2		
NC4-2-2																					5
SUBTOTAL						2		5	5	15	2	5	5	15					5	2	15 5

ENTERTAINMENT/COMMERCIAL LINKS

NCS-1-1							10					10				10					10
NCS-1-2																	40		40		40
SUBTOTAL							10					10		40	10	40	10				50

PLANETARY

NL1-1-1																					
NL1-1-2																				2	
NL1-1-3																					
NL1-1-4																					
NL1-1-5																					1
NL1-1-6																					
NL1-1-7																					1
NL1-1-8																					
NL1-1-9																					
NL1-1-10																					
NL1-1-11																					1
NL1-1-12																					2
SUBTOTAL								4	2			1		1		3			2	1	1

LUNAR

NL2-1-1																					1
SUBTOTAL																					1

7111-27

TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

EARTH RESOURCES MONITORING

NO1-1-1							1			2				1		1			2			1
NO1-1-2												1		1		1			2		1	1
NO1-1-3													1					1			2	
NO1-1-4																						
NO1-1-5																						
NO1-1-6																						
NO1-1-7																						
NO1-1-8																						
NO1-2-1													1			1					1	
SUBTOTAL							1	2		2	1	2	3		2	2	3	1	3	1	4	1

ENVIRONMENTAL MONITORING

NO2-1-1							3															
NO2-1-2										2			2									
NO2-1-3							1														2	
NO2-1-4														1								2
NO2-1-5																						
NO2-2-1																						
NO2-2-2																						
SUBTOTAL							1	3		2		2	1		3			1	2		2	

ASTROPHYSICS

NP1-1-1																						
NP1-1-2																						
NP1-1-3																						
NP1-1-4A																						
NP1-1-4B																						
NP1-1-5																						1
NP1-1-6																						
NP1-1-7																						
NP1-1-8																						
NP1-2-1																						
NP1-2-2																						
NP1-2-3																						
NP1-2-4																						
SUBTOTAL								3	2	2	3	4	4		4	4				5	1	

SOLAR TERRESTRIAL

NP2-1-1																							
NP2-1-2																							
NP2-1-3																							
NP2-1-4							1			1		1		1	1				1		1	1	
NP2-1-5																							
NP2-2-1																							
NP2-2-2																							
NP2-2-3																							
NP2-2-4																							
SUBTOTAL							1	1		1	1	2	1	1	2	1	5	2	1	2	1	2	1

VII-28

TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

LIFE SCIENCES

NP3-1-1 1 1 2 2  
 NP3-1-2 1

NP3-2-1  
 NP3-2-2  
 NP3-2-3  
 NP3-2-4  
 NP3-3-1 5  
 SUBTOTAL 1 1 1 2 2 5

SPACE PROCESSING-SPACE STATION

NS1-2-1 6  
 SUBTOTAL 6

SPACE INDUSTRIALIZATION

NS2-1-1 25  
 NS2-1-2  
 NS2-1-3 60  
 NS2-1-4  
 NS2-1-5  
 SUBTOTAL 25 60

ORBITAL OPERATIONS

NS3-1-1 10 10 10 10 10 10  
 NS3-1-2  
 NS3-1-3 25  
 NS3-1-4  
 NS3-1-5  
 NS3-1-6  
 SUBTOTAL 25 10 10 10 10 10 10

SATELLITE POWER

HS4-1-1 25  
 HS4-1-2 250  
 HS4-1-3 2000  
 HS4-1-4 30000 30000 15000 30000 45000  
 SUBTOTAL 25 250 2000 30000 30000 15000 30000 45000

TOTAL

NASA 30 18 46 28 15 297 34 36 2010 137 51 1643003830097150293007345104

VIII-29



TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-NASA, NON-DOD)

INTERNATIONAL COMMUNICATIONS

CC1-1-1	1	5																				
CC1-1-2			4		5	4	3															
CC1-1-3																						
SUBTOTAL	1	5	4		5	4	3		4	4	3	2					2	4				

US DOMESTIC COMMUNICATION

CC2-1-1		2	2	1			1					2					1				2	
CC2-1-2	1																					
CC2-1-3					4	2							2							3	2	2
CC2-1-4					1																	
CC2-1-5	1																					
CC2-1-6				1	2								1	2								1
CC2-1-7												1								1		
CC2-1-8												1										
CC2-1-9											1											
CC2-1-10									4	2												
CC2-1-11													1									
CC2-1-12													1							1		
CC2-1-13															2	4					2	3
CC2-1-14												1										
SUBTOTAL	2	2	2	2	7	2	5	4	6	3	3	4	8	5	2	5	6	6				

FOREIGN COMMUNICATION

CC3-1-1					1																	
CC3-1-2															1							1
CC3-1-4					1																	
CC3-1-5								1										1				
CC3-1-6																						
CC3-1-7																						
CC3-1-8													1									
CC3-1-9	2																					
CC3-1-10						2				1						2					1	
CC3-1-11																						
CC3-1-12																						
CC3-1-13							1															
CC3-1-14																						
CC3-1-16																						1
CC3-1-17																					2	1
CC3-1-18						1																
CC3-1-20															1	1					1	1
CC3-1-21																						
CC3-1-22																						
CC3-1-23																						
CC3-1-24																						
CC3-1-26																						
CC3-1-28																						
CC3-1-30																						
CC3-1-32																						
CC3-1-33																						
CC3-1-35																						

VIII-30

TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS.(CONTINUED)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
FOREIGN COMMUNICATION (CONT.)																							
CC3-1-36												1							1		1	1	
CC3-1-37																							
CC3-1-38				1												1							
CC3-1-39												1	2	1							2	1	1
CC3-1-40										1							1						
SUBTOTAL						2	1	1	6	6	3	4	2	3	3	4	2	5	5	5	3	4	4
ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN																							
CO1-1-1																1		1			2		
CO1-1-2							1																
CO1-1-3										1		1				1			1		1		
CO1-2-1											4						3						
SUBTOTAL						1				1	4	1				2		4	1	3			
EARTH AND OCEAN MONITORING																							
CO2-1-1																	8	4	4	9	16	16	17
SUBTOTAL																	8	4	4	9	16	16	17
EARTH RESOURCES-US DOMESTIC AND FOREIGN																							
CO3-1-1									2	1	2	1	4	3	3	3	5	5	5				
CO3-1-2										2				1		2			1				
CO3-1-3																1			1				
CO3-1-4																		1		1			
CO3-2-1									2			1											
CO3-2-2																2			1				
CO3-2-3										1													
CO3-2-4											1		2		1		2			1			
CO3-2-5																	1		1				
CO3-2-6																					1		
SUBTOTAL										5	1	5	2	6	4	6	6	9	9	8			
WEATHER																							
CO4-1-2					1	1	2	1	1	1	1	2											
CO4-1-3													2	1	2	1	2	1	2	1			
CO4-2-2													1									1	
CO4-2-4																						1	
CO4-2-5																	1				1		
SUBTOTAL					1	1	2	2	2	2	1	2	2	4	1	2	1	3	1	2	3	1	
US DOMESTIC																							
CP1-1-1												4	4	4	5	4	4	4	4	4	5	4	4
SUBTOTAL												4	4	4	5	4	4	4	4	4	5	4	4
FOREIGN																							
CP2-1-3																							
CP2-1-5							1						1					1					
CP2-1-6										1				1							1		
CP2-1-7																1							
CP2-1-8																							
CP2-1-14																							
CP2-1-15																							
CP2-1-16								1	1	1	1			1	1	1	1	1	1	1		1	
SUBTOTAL								1	1	1	2	1	1	2	1	2	3	2	1	2		1	

VIII-31

TOTAL ELEC PWR (KW) BY FISCAL YEAR THROUGH 1996

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
OTHER USERS (CONTINUED)																								
DISASTER WARNING																								
CS1-1-1													4	4					5	4				
SUBTOTAL													4	4					5	4				
TRAFFIC MANAGEMENT																								
CS2-1-1														1	1									
CS2-1-2																	1	1						
CS2-1-3										1	1											1		
SUBTOTAL										1	1	1	1				1	1			1			
SPACE MANUFACTURING-US DOMESTIC AND FOREIGN																								
CS3-1-1																								
CS3-1-2																								
CS3-1-3																								
CS3-1-4																								
CS3-2-1																								
CS3-2-2																								
CS3-2-3																								
CS3-2-4																								
CS3-2-5																								
SUBTOTAL																								
USERS TOTAL																								
OUTSIDE		1	6	11	10	11	25	15	28	19	31	27	26	32	38	39	45	30	31	31				
ALL PROGRAMS																								
TOTAL		1	6	53	41	68	87	57	407	151	137	2288	289	209	6333021930267156163021045750									

VIII-32

TOTAL SOL ARRAY LBS BY FISCAL YEAR THROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1						1						1						1				
NC1-1-2								1						1					1			
NC1-1-3										2						2					2	
NC1-1-4													3					3				
SUBTOTAL						1		1		2		1	3	1	2			1	3	1	2	

GOVERNMENT TO PEOPLE LINKS

NC2-1-1												1									1	
NC2-1-2																			14			
SUBTOTAL												1							14		1	

PEOPLE TO PEOPLE LINKS

NC3-1-1						5							6			5				8		6
NC3-1-2																					8	
NC3-1-3																	24					23
SUBTOTAL						5						6			8	29				8		6 23

INTRAGOVERNMENT LINKS

NC4-1-1										3				3						2		
NC4-1-2												7				7					7	
NC4-2-1						1							1							1		
NC4-2-2										3						3						2
SUBTOTAL						1			3		3	7	1	3	3	7			2	1	7	2

ENTERTAINMENT/COMMERCIAL LINKS

NC5-1-1											5			6		5			6			5
NC5-1-2																						11
SUBTOTAL											5		6		11	5	11		6			16

PLANETARY

NL1-1-1																						
NL1-1-2													1							1		
NL1-1-3																						1
NL1-1-4													1									
NL1-1-5																						1
NL1-1-6																						
NL1-1-7													1									
NL1-1-8																						
NL1-1-9																						
NL1-1-10																						
NL1-1-11																						
NL1-1-12																						1
SUBTOTAL											3	1							1	1	1	1

LUNAR

NL2-1-1																						
SUBTOTAL																						

V-11-33

TOTAL SOL ARRAY LBS BY FISCAL YEAR THROUGH 1996  
(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

EARTH RESOURCES MONITORING

NO1-1-1							1						1				1					1
NO1-1-2											1				1		1			1		1
NO1-1-3										1								1				
NO1-1-4																						
NO1-1-5																						
NO1-1-6								1														
NO1-1-7								1									1					
NO1-1-8												1										1
NO1-2-1																						
SUBTOTAL							1	2			1	2	1		1	1	2	1	2	1		1

ENVIRONMENTAL MONITORING

NO2-1-1							2															
NO2-1-2									1			1				1						1
NO2-1-3							1															
NO2-1-4													1									1
NO2-1-5																						
NO2-2-1																						
NO2-2-2																						
SUBTOTAL							1	2			1		1			2					1	1

ASTROPHYSICS

NP1-1-1																						1
NP1-1-2							2			1		2	2			1						1
NP1-1-3																		2				1
NP1-1-4A																			1			
NP1-1-4B																						
NP1-1-5														1								
NP1-1-6																						
NP1-1-7																						
NP1-1-8																						
NP1-2-1																						
NP1-2-2																						
NP1-2-3																						
NP1-2-4																						
SUBTOTAL							2	2	1	2	2	2	1	1	1	3	1				2	

SOLAR TERRESTRIAL

NP2-1-1																						1	
NP2-1-2																							
NP2-1-3							1		1		1	1	1	1	1	1	1	1	1	1	1	1	
NP2-1-4								1			1		1			1					1	1	
NP2-1-5																2							
NP2-2-1																							
NP2-2-2																							
NP2-2-3																							
NP2-2-4																							
SUBTOTAL							1	1	1		2	1	2	2	2	1	4	3	1	2	1	3	2

VIII-34

TOTAL SOL ARRAY LBS BY FISCAL YEAR THROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

LIFE SCIENCES

NP3-1-1								1		1		1										
NP3-1-2							1															
NP3-2-1																						
NP3-2-2																						
NP3-2-3																						
NP3-2-4																						
NP3-3-1																						3
SUBTOTAL							1	1		1	1		3									3

SPACE PROCESSING-SPACE STATION

NS1-2-1																						3
SUBTOTAL																						3

SPACE INDUSTRIALIZATION

NS2-1-1											8											
NS2-1-2																						
NS2-1-3																16						
NS2-1-4																						
NS2-1-5																						
SUBTOTAL											8				16							

ORBITAL OPERATIONS

NS3-1-1						5		6		5					6		5		6			
NS3-1-2																						
NS3-1-3						8																
NS3-1-4																						
NS3-1-5																						
NS3-1-6																						
SUBTOTAL						8	5	6		5					6		5		6			

SATELLITE POWER

NS4-1-1								8															
NS4-1-2										31													
NS4-1-3														222									
NS4-1-4																							
SUBTOTAL								8		31				222					2140	2140	1070	2140	3210
TOTAL								8		31				222					2140	2140	1070	2140	3210

TOTAL NASA						1	11	11	21	17	8	52	20	22	229	43	26	50	2162	2175	1086	2168	3236
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VIII-35

TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
<b>NASA MISSIONS</b>																								
<b>INTERGOVERNMENT LINKS</b>																								
NC1-1-1							5					6					5							
NC1-1-2									5						6					5				
NC1-1-3										7						7						7		
NC1-1-4													8						8					
SUBTOTAL							5		5	7		6	8	6	7		5	8	5	7				
<b>GOVERNMENT TO PEOPLE LINKS</b>																								
NC2-1-1													5				5					5		
NC2-1-2																				22				
SUBTOTAL													5				5			22		5		
<b>PEOPLE TO PEOPLE LINKS</b>																								
NC3-1-1								11						11			11						11	
NC3-1-2															16					16				
NC3-1-3																								30
SUBTOTAL								11						11	16		41			16			11	30
<b>INTRAGOVERNMENT LINKS</b>																								
NC4-1-1											8				8					8				
NC4-1-2													13				13					13		
NC4-2-1							5							6						5				
NC4-2-2										8						8							8	
SUBTOTAL							5		8	8		13	6	8	8	13			8	5	13		8	
<b>ENTERTAINMENT/COMMERCIAL LINKS</b>																								
NC5-1-1										11							11			11				11
NC5-1-2																20								20
SUBTOTAL										11						20	11	20		11				31
<b>PLANETARY</b>																								
NL1-1-1																								
NL1-1-2												9								9				
NL1-1-3														2									2	
NL1-1-4											2	1										2	2	
NL1-1-5												7										3		
NL1-1-6																								
NL1-1-7														4										3
NL1-1-8																								
NL1-1-9																3								
NL1-1-10																	3							
NL1-1-11																								
NL1-1-12																				2				
SUBTOTAL										2	17	6		3		3	10			9	5	7		
<b>LUNAR</b>																								
NL2-1-1																								
SUBTOTAL																								

VIII-36

TOTAL ELECT PWR LBS BY FISCAL YEA ROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)																						
EARTH RESOURCES MONITORING																						
N01-1-1						3				2				3			2			3		3
N01-1-2									2				2							2		2
N01-1-3												4										3
N01-1-4														2								
N01-1-5														1								
N01-1-6									4													
N01-1-7								4					4									4
N01-1-8													2								2	
N01-2-1																						
SUBTOTAL						3	8		2	2	6	9	3	6	4	6	4	5	2	9	3	
ENVIRONMENTAL MONITORING																						
N02-1-1						6																
N02-1-2									3			4								4		
N02-1-3						2																
N02-1-4													5			4			5			4
N02-1-5									2													
N02-2-1																						
N02-2-2																						
SUBTOTAL						2	6		5			4	5		7			5	4		4	
ASTROPHYSICS																						
NP1-1-1									11				11							11		
NP1-1-2								11		10		11			10							
NP1-1-3										11			10				11			10		
NP1-1-4A												3						2				
NP1-1-4B															3							2
NP1-1-5												1		2		1						
NP1-1-6									2				2									
NP1-1-7																				4		
NP1-1-8						1		1														
NP1-2-1																						
NP1-2-2																						
NP1-2-3																						
NP1-2-4																						
SUBTOTAL						1		12	13	10	11	15	23	2	3	11	15	2		21	2	
SOLAR TERRESTRIAL																						
HP2-1-1									2		3		2		2			3			2	
HP2-1-2									2													
HP2-1-3						2	1	2	1	2	2	1	3	4	3	3	3	4	3	3	3	3
HP2-1-4						2	2	1	2	2	2	2	3	4	3	4	3	4	3	3	4	3
HP2-1-5																						
HP2-2-1																17						
HP2-2-2																						
HP2-2-3																						
HP2-2-4																						
SUBTOTAL						4	3	3	3	8	4	6	6	10	6	9	24	8	8	9	7	9

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TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

LIFE SCIENCES

NP3-1-1								3	3	6	3											
NP3-1-2							3															
NP3-2-1																						
NP3-2-2																						
NP3-2-3																						
NP3-2-4																						
NP3-3-1																						9
SUBTOTAL							3	3	3	6	3	9										

SPACE PROCESSING-SPACE STATION

NS1-2-1																						9
SUBTOTAL																						9

SPACE INDUSTRIALIZATION

NS2-1-1										16												
NS2-1-2																						
NS2-1-3															24							
NS2-1-4																						
NS2-1-5																						
SUBTOTAL										16					24							

ORBITAL OPERATIONS

NS3-1-1							11		11	11						11		11	11			
NS3-1-2																						
NS3-1-3						16																
NS3-1-4																						
NS3-1-5																						
NS3-1-6																						
SUBTOTAL						16	11		11	11					11		11	11				

SATELLITE POWER

NS4-1-1								16														
NS4-1-2										62												
NS4-1-3															463							
NS4-1-4																						
SUBTOTAL								16		62					463			4280	4280	2140	4280	6420

TOTAL								16		62					463			4280	4280	2140	4280	6420
-------	--	--	--	--	--	--	--	----	--	----	--	--	--	--	-----	--	--	------	------	------	------	------

NASA						4	29	31	61	56	39	128	70	83	491	93	89	105	4341	4367	2204	4357	6463
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TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-NASA, NON-DOD)

INTERNATIONAL COMMUNICATIONS

CC1-1-1	6	17																				
CC1-1-2			17		17	17	12															
CC1-1-3										14	14	13	7				7	14				
SUBTOTAL	6	17	17		17	17	12			14	14	13	7				7	14				

US DOMESTIC COMMUNICATION

CC2-1-1		7	7	4			4			7							3				8	
CC2-1-2		5																				
CC2-1-3							14	7					7							13	7	7
CC2-1-4	2						3															
CC2-1-5		3																				
CC2-1-6					3	7									3	7						3
CC2-1-7										5	2									5	2	
CC2-1-8										3	3											
CC2-1-9											6	2										
CC2-1-10								14	7	7							13	14	7			
CC2-1-11										5										5		
CC2-1-12															7	14					7	13
CC2-1-13											3											
CC2-1-14							3		5			2			5		3					
SUBTOTAL	2	8	7	7	7	24	10	18	18	25	14	10	19	30	17	7	23	24	23			

FOREIGN COMMUNICATION

CC3-1-1				3	2																	
CC3-1-2												3	3								2	3
CC3-1-4				3	2																	
CC3-1-5							3	2							3	2						
CC3-1-6		2																				
CC3-1-7				3	2			3	2								3	3				
CC3-1-8		5																				
CC3-1-9							5				5					6					5	
CC3-1-10					2																	
CC3-1-11		1																				
CC3-1-12				2																		
CC3-1-13					3	2																
CC3-1-14												3	2								3	3
CC3-1-16							3	4									3	4				
CC3-1-17				5	2																	
CC3-1-18													6	3							6	6
CC3-1-20									2												3	
CC3-1-21					2	3																
CC3-1-22															3	2						3
CC3-1-23										3	3											
CC3-1-24																		3	4			
CC3-1-26							7	3							7	4						
CC3-1-28							1															
CC3-1-30														3			3					
CC3-1-32														4							4	
CC3-1-33																						
CC3-1-35								3	4		3											

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TOTAL ELECT PWR LBS BY FISCAL YEAR THROUGH 1996

(HUNDREDS OF LBS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

DISASTER WARNING

CS1-1-1 12 12 13 12

SUBTOTAL 12 12 13 12

TRAFFIC MANAGEMENT

CS2-1-1 6 3

CS2-1-2 7 3

CS2-1-3 3 2 3 2

SUBTOTAL 3 2 6 3 7 6 2

SPACE MANUFACTURING-US DOMESTIC AND FOREIGN

CS3-1-1

CS3-1-2

CS3-1-3

CS3-1-4

CS3-2-1

CS3-2-2

CS3-2-3

CS3-2-4

CS3-2-5

SUBTOTAL

USERS TOTAL

OUTSIDE 4 25 46 60 36 81 60 80 56 96 93 72 91 111 104 116 74 90 83

ALL PROGRAMS

TOTAL 4 29 75 91 97 137 99 208 126 179 584 165 180 216 4445 4483 2278 4447 6546

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TOTAL SOLAR ARRAY \$ BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996		
NASA MISSIONS																									
INTERGOVERNMENT LINKS																									
NC1-1-1				2	1							1						1							
NC1-1-2				1					2					1								1			
NC1-1-3					1	1	1							1								1			
NC1-1-4										1	1	3							1	1					
SUBTOTAL				3	2	3	1	1	1	2	3	2				1		2	1	2					
GOVERNMENT TO PEOPLE LINKS																									
NC2-1-1										1					1										
NC2-1-2																1	3	6	5	3					
SUBTOTAL										1					1	1	3	6	5	3					
PEOPLE TO PEOPLE LINKS																									
NC3-1-1					1	1	3	3				1	2	1		1	1	1			1	2			
NC3-1-2												1	2	3	5	1		1	3		1				
NC3-1-3														2	4	9	10	3					3	7	2
SUBTOTAL				1	1	3	3					2	4	6	9	11	11	5	3	2	5	7	2		
INTRAGOVERNMENT LINKS																									
NC4-1-1								1	1	3					1				1	1					
NC4-1-2																									
NC4-2-1						2	1							1											
NC4-2-2						1	2	3	3	1															
SUBTOTAL				3	1	3	2	5	3	3	2	1		3	2	1	1	1	2	4			1		
ENTERTAINMENT/COMMERCIAL LINKS																									
NC5-1-1						1	1	3	3			1	2		1	2	2	1	1	1	1	2			
NC5-1-2												1	3	5	4	4	3	1							
SUBTOTAL				1	1	3	3					2	5	5	5	6	5	2	1	3	5	1			
PLANETARY																									
NL1-1-1																									
NL1-1-2																									
NL1-1-3									1	1															
NL1-1-4																									
NL1-1-5																									
NL1-1-6											2														
NL1-1-7																									
NL1-1-8																									
NL1-1-9															1										
NL1-1-10																									
NL1-1-11																	1								
NL1-1-12																		1							
SUBTOTAL										1	3			1	1	1	1	1							
LUNAR																									
NL2-1-1																									
SUBTOTAL																									

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TOTAL SOLAR ARRAY \$ BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

EARTH RESOURCES MONITORING

NO1-1-1

NO1-1-2

NO1-1-3

NO1-1-4

NO1-1-5

NO1-1-6

NO1-1-7

NO1-1-8

NO1-2-1

SUBTOTAL

ENVIRONMENTAL MONITORING

NO2-1-1

NO2-1-2

NO2-1-3

NO2-1-4

NO2-1-5

NO2-2-1

NO2-2-2

SUBTOTAL

ASTROPHYSICS

NP1-1-1

NP1-1-2

NP1-1-3

NP1-1-4A

NP1-1-4B

NP1-1-5

NP1-1-6

NP1-1-7

NP1-1-8

NP1-2-1

NP1-2-2

NP1-2-3

NP1-2-4

SUBTOTAL

SOLAR TERRESTRIAL

NP2-1-1

NP2-1-2

NP2-1-3

NP2-1-4

NP2-1-5

NP2-2-1

NP2-2-2

NP2-2-3

NP2-2-4

SUBTOTAL

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	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
NASA (CONTINUED)																							
EARTH RESOURCES MONITORING																							
NO1-1-1				1				1					1						1				
NO1-1-2											1	1				1				1			
NO1-1-3										1		1						1					
NO1-1-4														1					1				
NO1-1-5														1									
NO1-1-6							1																
NO1-1-7							1					1									1		
NO1-1-8												2									1		
NO1-2-1																							
SUBTOTAL				1			2	1			2	4	2	2		1			2		3		
ENVIRONMENTAL MONITORING																							
NO2-1-1				1			2																
NO2-1-2									1	1	1			1						1			
NO2-1-3				1																			
NO2-1-4												1	1							1			1
NO2-1-5												1											
NO2-2-1																							
NO2-2-2																							
SUBTOTAL				2	2	1	1	2				1	2							2			1
ASTROPHYSICS																							
NP1-1-1									2											1			
NP1-1-2				1	2			1	1						1		1						
NP1-1-3								1	2			1				1				1			
NP1-1-4A												1							1				
NP1-1-4B															1	1							
NP1-1-5												1		1									
NP1-1-6																							
NP1-1-7									1	1													
NP1-1-8								1															
NP1-2-1																							
NP1-2-2																							
NP1-2-3																							
NP1-2-4																							
SUBTOTAL							2	2	3	3	3	2	1	1	2	2	1	1	2				
SOLAR TERRESTRIAL																							
NP2-1-1										1	1					1					1		
NP2-1-2											1												
NP2-1-3				1	1					1	1				1	1		1	1		1		1
NP2-1-4				1						1		1				1				1		1	
NP2-1-5																1	2						
NP2-2-1																							
NP2-2-2																							
NP2-2-3																							
NP2-2-4																							
SUBTOTAL				2	1	1			2	2	1	1	2		3	4			2	1	2	1	1

TOTAL SOLAR ARRAY \$ BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

LIFE SCIENCES

NP3-1-1						1	1		1		1											
NP3-1-2						1																
NP3-2-1																						
NP3-2-2																						
NP3-2-3																						
NP3-2-4																						
NP3-3-1												2	3									
SUBTOTAL						1	1	1		1	2	4										

SPACE PROCESSING-SPACE STATION

NS1-2-1																	2	3				
SUBTOTAL																	2	3				

SPACE INDUSTRIALIZATION

NS2-1-1							1	2	3	5	1											
NS2-1-2																						
NS2-1-3												1	4	6	6	3						
NS2-1-4																						
NS2-1-5																						
SUBTOTAL							1	2	3	5	2	4	6	6	3							

ORBITAL OPERATIONS

NS3-1-1			1	1	3	3	1	2	1	2	1				1	1	2	2	3			
NS3-1-2																						
NS3-1-3			3	7	2																	
NS3-1-4																						
NS3-1-5																						
NS3-1-6																						
SUBTOTAL			1	4	10	5	1	2	1	2	1			1	1	2	2	3				

SATELLITE POWER

NS4-1-1						1	7	4														
NS4-1-2									9	19	6											
NS4-1-3										8	26	50	59	22								
NS4-1-4														28	82	254	553	571	456	646	646	189
SUBTOTAL						1	7	4	9	27	32	50	59	50	82	254	553	571	456	646	646	189

TOTAL

NASA			1	7	20	22	25	22	28	50	56	75	83	81	115	280	578	593	475	657	656	193
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TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS

INTERGOVERNMENT LINKS

NC1-1-1			2	5	2					1	2				1	2	1					
NC1-1-2			1	1	3	3	1					1	2				1	2	1			
NC1-1-3				1	2	4	3	2					1	3	1			1	2	1		
NC1-1-4							1	3	4	5	1					1	3	1	2	1		
SUBTOTAL			3	7	7	7	5	6	6	6	4	3	2	3	2	3	5	4	3	1		

GOVERNMENT TO PEOPLE LINKS

NC2-1-1							1	2	3	1					2			1	2			
NC2-1-2															2	6	10	9	3			
SUBTOTAL							1	2	3	1				4	6	10	10	5				

PEOPLE TO PEOPLE LINKS

NC3-1-1	1	4	6	5	3					1	4	1			2	3	2		1	4	1	
NC3-1-2										1	5	7	8	3			2	5	2			
NC3-1-3												2	8	12	13	5						
SUBTOTAL	1	4	6	5	3					2	9	10	16	17	16	9	5	3	9	10	3	

INTRAGOVERNMENT LINKS

NC4-1-1				1	3	4	5	1		1	3	1			1	3	1					
NC4-1-2						1	5	6	7	3	3	2	4	2			1	2	1			
NC4-2-1	2	5	2						1	2												
NC4-2-2	1	3	4	5	1						1	3	1			1	2	1				
SUBTOTAL	3	8	7	8	6	10	7	8	6	4	6	5	3	4	5	6	5	1	3	1		

ENTERTAINMENT/COMMERCIAL LINKS

NC5-1-1			1	4	6	5	2		2	4	1	1	4	3	3	2	1	4	1			
NC5-1-2									2	5	9	10	6	6	2		3	6	2			
SUBTOTAL			1	4	6	5	2		4	9	10	11	10	9	5	2	4	10	3			

PLANETARY

NL1-1-1																						
NL1-1-2																						
NL1-1-3						1	5	6	2							1	3	1				
NL1-1-4								1	2	1								1				1
NL1-1-5						1	2	2										1	1	1		
NL1-1-6							2	5	1								1	1	1			
NL1-1-7																						
NL1-1-8							1	2	3													2
NL1-1-9																						
NL1-1-10										1	2	1										
NL1-1-11																1	3					
NL1-1-12																1	2	1				
SUBTOTAL											2	10	16	8	2	3	4	8	6	4	5	4

LUNAR

NL2-1-1																						
SUBTOTAL																						3

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TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

HASA (CONTINUED)

EARTH RESOURCES MONITORING

HO1-1-1																						
HO1-1-2		3	3						2						2						2	
HO1-1-3								1	3	1	1	1	1	1	1	1	1	1	1	1	1	2
HO1-1-4									3	3			1	1	1		1	1			2	
HO1-1-5												1	3	1								
HO1-1-6												1	3									
HO1-1-7			3	3							1	1	1			2			1	1	1	
HO1-1-8									1	3	2				1	1			1			
HO1-2-1																						

SUBTOTAL		3	9	6				3	7	8	8	9	3	5	3	2	4	3	4	3		
----------	--	---	---	---	--	--	--	---	---	---	---	---	---	---	---	---	---	---	---	---	--	--

ENVIRONMENTAL MONITORING

HO2-1-1					1	4	4	1														
HO2-1-2							1	3	2	2												
HO2-1-3					1	3	1							1	1	1			2			
HO2-1-4																						
HO2-1-5										1	3	2	2		2	1		2		1	2	
HO2-2-1								2	2													

HO2-2-2																						
SUBTOTAL		2	7	6	4	4	4	1	5	2	2	1	3	2		2	2	1	2			

ASTROPHYSICS

NP1-1-1						4	8	3		2	3	1					1	3	1			
NP1-1-2					1	6	6	4	3	3	3	1		1	3	1						
NP1-1-3							1	5	5	2	3				1	3	1	1	2	1		
NP1-1-4A									2	3	1					1	1					
NP1-1-4B																						
NP1-1-5									1	2	2	1		4	1				1	1	1	
NP1-1-6											2				1							
NP1-1-7						2	4															
NP1-1-8															2	3	1					

NP1-2-1		1	3	1	1																	
NP1-2-2																						
NP1-2-3																						
NP1-2-4																						
SUBTOTAL		1	4	7	13	17	11	11	12	10	4	5	8	8	3	2	6	3	1			

SOLAR TERRESTRIAL

NP2-1-1						1	3	1	1	1	1				1	1	1	1	1					
NP2-1-2							3	2							1	1	1	1	1					
NP2-1-3					1	3	2	2	1	1	1	2	2	2	3	2	3	2	2	3	2	3	1	1
NP2-1-4					1	3	2	2	1	1	1	2	2	2	3	2	3	2	2	3	2	3	1	1
NP2-1-5																								
NP2-2-1													2	8	9	2								

NP2-2-2																							
NP2-2-3																							
NP2-2-4																							
SUBTOTAL		2	6	4	4	3	8	5	5	5	5	5	9	12	16	7	5	7	5	7	2	2	

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TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

HASA (CONTINUED)

LIFE SCIENCES

NP3-1-1			1	2	3	3	3	2														
NP3-1-2	1		1	2																		
NP3-2-1																						
NP3-2-2																						
NP3-2-3																						
NP3-2-4																						
NP3-3-1									1	4	5	2										
SUBTOTAL	1	2	4	3	3	4	6	5	2													

SPACE PROCESSING-SPACE STATION

HS1-2-1															1	5	5	2				
SUBTOTAL															1	5	5	2				

SPACE INDUSTRIALIZATION

HS2-1-1						1	5	7	8	3												
HS2-1-2																						
HS2-1-3											2	6	11	11	4							
HS2-1-4																						
HS2-1-5																						
SUBTOTAL						1	5	7	8	5	6	11	11	4								

ORBITAL OPERATIONS

HS3-1-1	1	4	6	5	4	4	2	4	1					2	3	3	5	5	1			
HS3-1-2																						
HS3-1-3		6	13	5																		
HS3-1-4																						
HS3-1-5																						
HS3-1-6																						
SUBTOTAL	1	10	19	10	4	4	2	4	1					2	3	3	5	5	1			

SATELLITE POWER

HS4-1-1				2	12	10																
HS4-1-2								17	40	15												
HS4-1-3									19	57	101	111	41									
HS4-1-4														51	155	436	914	934	744	1052	1051	308
SUBTOTAL				2	12	10	17	59	72	101	111	92	155	436	914	934	744	1052	1051	308		

TOTAL

HASA	3	24	58	66	72	74	81	132	144	167	177	166	241	507	971	987	786	1096	1074	313		
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TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
OUTSIDE USERS (NON-NASA, NON-DOD)																								
INTERNATIONAL COMMUNICATIONS																								
CC1-1-1	1	5	8	2																				
CC1-1-2		1	6	8	6	9	9	6	1															
CC1-1-3									1	4	7	7	6	3	1	4	4	1						
SUBTOTAL	1	6	14	10	6	9	9	7	5	7	7	6	3	1	4	4	1							
US DOMESTIC COMMUNICATION																								
CC2-1-1		3	4	4	2		1	1		1	2	1	1	1						1	2	1		
CC2-1-2		3	5	2																				
CC2-1-3					1	4	6	5						1	2	1		1	4	6	6	2	1	
CC2-1-4	2	4					1	1																
CC2-1-5		1	3	2																				
CC2-1-6					1	4	3	1							2	3						1	1	
CC2-1-7												2	6	3						1	3	2	1	
CC2-1-8												2	5	3										
CC2-1-9									2	7	3													
CC2-1-10							1	4	6	5	2	1			1	6	5	3	1					
CC2-1-11									1	4	5	1						1	2					
CC2-1-12														1	3	5	6	1		1	4	4	1	
CC2-1-13										2	4	3												
CC2-1-14							2	4	2	2	2	1	1	3	1	1	1							
SUBTOTAL	2	8	11	8	6	11	13	15	12	24	28	16	9	14	14	8	10	14	15	9	2			
FOREIGN COMMUNICATION																								
CC3-1-1				2	4	3	1																	
CC3-1-2												2	5	2	1						2	2	1	
CC3-1-4				2	4	3	1																	
CC3-1-5							2	4	3	1							2	2						
CC3-1-6		1	4	2																				
CC3-1-7				2	4	3		1	2	1	1						2	2						
CC3-1-8	1	3	3	1																				
CC3-1-9					1	3	3	1		1	1	1			1	1	1			1	1	1		
CC3-1-10			1	2																				
CC3-1-11		1	2	1																				
CC3-1-12			1	4	1																			
CC3-1-13				2	4	3	1																	
CC3-1-14												2	5	2	1						2	2	1	
CC3-1-16							2	3	3								1	2	1	1				
CC3-1-17				2	6	3	1																	
CC3-1-18												2	6	4							1	4	4	1
CC3-1-20								2	4								1	1						
CC3-1-21					2	4	3																	
CC3-1-22												2	4	3	1								1	1
CC3-1-23							2	5	3															
CC3-1-24																	2	5	3					
CC3-1-26							2	8	4					1	4	3								
CC3-1-28			1	2	1																			
CC3-1-30		2	4	2										2		1	2							
CC3-1-32					3	6	1					1	2	1				1	2					
CC3-1-33		1	4	2																				
CC3-1-35					2	6	3	2	1	1														

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TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

FOREIGN COMMUNICATION (CONT.)

CC3-1-36								1	4	2	1	1	1									
CC3-1-37																						
CC3-1-38						2	4	3	1				1	1	2	2	6	4	3	2	2	1
CC3-1-39										2	5	2	2	1								
CC3-1-40								2	4	2		2							3	2	2	1
SUBTOTAL		1	5	14	31	38	39	39	29	20	10	15	27	17	12	16	20	13	10	14	15	6

ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN

CO1-1-1																						
CO1-1-2				2	7	3							3	3		2		2				
CO1-1-3																						
CO1-2-1								2	6	4	2	1	2	3	2	1	3	2				
SUBTOTAL				2	7	3		3	10	9	4	1	5	6	3	5	4	4				

EARTH AND OCEAN MONITORING

CO2-1-1																						
SUBTOTAL													1	6	9	5	6	14	19	18	13	3

EARTH RESOURCES-US DOMESTIC AND FOREIGN

CO3-1-1							1	5	3	1	3	3	4	3	4	5	6	4	1			
CO3-1-2									2	4	1	1	1	1	2	1	1	1				
CO3-1-3																						
CO3-1-4															2	3	2	1	1			
CO3-2-1							2	4		1	1	1			2	3	2	1	1			
CO3-2-2																						
CO3-2-3							1	3					2	4	1	1	1	1				
CO3-2-4										2	3	1	2									
CO3-2-5																2	2		2			
CO3-2-6																2	3	3				
SUBTOTAL							4	12	7	9	6	7	7	12	14	17	16	13	3	1		

WEATHER

CO4-1-2																						
CO4-1-3																						
CO4-2-2																						
CO4-2-4																						
CO4-2-5																						
SUBTOTAL		1	4	2	3	9	10	3	4	4	7	4	3	3	5	5	2	4	3			

US DOMESTIC

CP1-1-1																						
SUBTOTAL																						

FOREIGN

CP2-1-3																						
CP2-1-5																						
CP2-1-6																						
CP2-1-7																						
CP2-1-8																						
CP2-1-14																						
CP2-1-15																						
CP2-1-16																						
SUBTOTAL		2	10	14	10	5	9	4	4	4	4	3	4	6	5	1	4	4	4			

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TOTAL ELEC PWR COST BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OTHER USERS (CONTINUED)

DISASTER WARNING

CS1-1-1 1 5 8 5 1 2 4 4 1

SUBTOTAL 1 5 8 5 1 2 4 4 1

TRAFFIC MANAGEMENT

CS2-1-1 2 7 3

CS2-1-2 2 7 4

CS2-1-3 1 3 2 1 2 7 1 2

SUBTOTAL 1 3 4 8 3 2 7 5 2

SPACE MANUFACTURING-US DOMESTIC AND FOREIGN

CS3-1-1

CS3-1-2

CS3-1-3

CS3-1-4

CS3-2-1

CS3-2-2

CS3-2-3

CS3-2-4

CS3-2-5

SUBTOTAL

USERS TOTAL

OUTSIDE 4 18 37 73 80 80 84 86 74 74 82 85 71 72 81 74 77 64 56 40 12

ALL PROGRAMS

TOTAL 4 21 61 131 146 152 158 167 206 218 249 262 237 313 588 1045 1064 850 1152 1114 325

VI-11-56

TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA MISSIONS																					
INTERGOVERNMENT LINKS																					
HC1-1-1	6	66	141	51		6	25	49	17		6	24	49	18							
HC1-1-2		18	58	93	94	35		6	31	63	22		6	31	63	22					
HC1-1-3			23	74	114	111	39		6	34	70	24		6	34	69	24				
HC1-1-4						28	88	137	132	49		6	40	82	29						
SUBTOTAL	6	84	222	218	208	180	152	192	186	146	98	54	95	137	126	91	24				
GOVERNMENT TO PEOPLE LINKS																					
HC2-1-1							17	52	54	16	6	12	22	7	6	11	22	7			
HC2-1-2													38	120	195	199	73				
SUBTOTAL							17	52	54	16	6	12	60	127	201	210	95	7			
PEOPLE TO PEOPLE LINKS																					
HC3-1-1	36	112	174	169	62		6	51	106	37	6	49	106	37	6	51	105	37			
HC3-1-2								41	129	203	201	73	6	61	126	45					
HC3-1-3									48	152	245	248	91			6	76	160	57		
SUBTOTAL	36	112	174	169	62		6	92	235	288	359	367	360	189	132	102	181	197	57		
INTRAGOVERNMENT LINKS																					
NC4-1-1			28	88	137	132	49	6	40	82	29	6	40	83	29						
NC4-1-2					33	107	166	164	59	6	49	102	36	6	49	103	36				
NC4-2-1	6	67	142	51			6	25	50	17			6	25	50	18					
NC4-2-2		28	88	137	132	49			6	40	82	29			6	40	83	29			
SUBTOTAL	6	95	230	216	220	219	239	221	195	155	145	160	137	82	114	134	161	119	29		
ENTERTAINMENT/COMMERCIAL LINKS																					
NC5-1-1		29	94	144	139	50	6	41	86	36	41	91	72	85	36	41	86	30			
NC5-1-2								39	121	189	191	121	115	40	6	54	115	40			
SUBTOTAL		29	94	144	139	50	6	80	207	225	232	212	187	125	42	95	201	70			
PLANETARY																					
NL1-1-1							9	51	57	16			19	31	9						
NL1-1-2					10	54	62	17						20	32	10					
NL1-1-3						1	26	50	15						1	15	21	6			
NL1-1-4			6	23	41	24	5							6	15	23	18	5			
NL1-1-5				12	38	73	24							6	12	21	6				
NL1-1-6								16	77	87	25										
NL1-1-7					10	54	61	18								19	33	9			
NL1-1-8						7	32	63	22												
NL1-1-9						7	24	46	16												
NL1-1-10								7	29	57	19										
NL1-1-11									20	34	10										
NL1-1-12									17	51	97	99	34								
SUBTOTAL				6	45	144	255	247	193	185	183	199	171	107	69	88	78	20			
LUNAR																					
NL2-1-1	25	41	14																		
SUBTOTAL	25	41	14																		

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TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

EARTH RESOURCES MONITORING

NO1-1-1	11	48	52	16	10	22	7	11	20	8	10	21	8	10	21	7	10	22	7
NO1-1-2						21	44	22	13	11	12	11	13	11	12	11	13	5	
NO1-1-3						17	52	57	23	15	26	15	13	26	15	14	27	8	
NO1-1-4									18	39	14								
NO1-1-5								6	12	24	8								
NO1-1-6		17	57	62	19														
NO1-1-7		17	58	63	20			6	17	30	10	6	16	30	10	6	17	30	10
NO1-1-8						6	18	34	11	6	9	14	4	6	9	14	4		
NO1-2-1			9	22	14	10	9	10	9	10	9	9	9	10	9	10	9	7	1
SUBTOTAL	11	82	176	163	63	76	136	157	136	123	94	86	77	73	72	73	93	52	8

ENVIRONMENTAL MONITORING

NO2-1-1	14	62	70	23															
NO2-1-2			9	41	44	14	9	18	7		9	17	7		9	18	7		
NO2-1-3	25	54	20																
NO2-1-4								16	47	52	22	13	24	14	13	24	14	14	24
NO2-1-5			6	8	26	17													8
NO2-2-1			1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	1	
NO2-2-2			1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	1	
SUBTOTAL	39	116	107	74	72	35	27	69	61	26	24	45	23	17	35	36	23	26	8

ASTROPHYSICS

NP1-1-1				35	74	27		14	26	9						13	26	9	
NP1-1-2		10	45	48	25	21	17	20	7		10	21	7						
NP1-1-3					10	45	47	25	20	7		10	19	7	9	21	7		
NP1-1-4A						6	17	31	10			6	9	13	4				
NP1-1-4B									6	15	29	9				6	8	11	4
NP1-1-5								15	32	17	10	9	9	3					
NP1-1-6				23	49	17		7	16	5					29	61	22		
NP1-1-7																			
NP1-1-8	1	8	17	8	5	2													
NP1-2-1				2	4	4	5	4	5	4	5	4	5	4	5	4	5	4	3
NP1-2-2				1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2
NP1-2-3				1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	1
NP1-2-4								1	2										
SUBTOTAL	1	8	27	57	119	168	126	104	140	112	56	56	94	107	52	40	65	35	10

SOLAR TERRESTRIAL

NP2-1-1				15	29	15	9	7	8	8	9	7	8	8	9	7	8	3	
NP2-1-2				3	18	14													
NP2-1-3	12	23	21	16	15	10	12	14	17	20	18	19	19	19	18	19	19	17	11
NP2-1-4	10	24	20	15	12	8	7	8	12	12	13	12	13	12	13	12	13	12	9
NP2-1-5											13	63	68	21					
NP2-2-1							1	1	1	2	1	2	1	2	1	2	1	1	
NP2-2-2							1	3	3	3	3	3	3	3	3	3	3	2	
NP2-2-3							2	4	4	5	4	5	4	5	4	5	4	3	
NP2-2-4				4	11	17	18	18	18	18	18	18	18	18	18	18	18	18	11
SUBTOTAL	22	47	41	31	49	76	69	57	62	68	78	131	133	88	65	68	65	61	34

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TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

NASA (CONTINUED)

LIFE SCIENCES

NP3-1-1					16	76	99	95	99	61	12											
NP3-1-2	14	41		80	92	34																
NP3-2-1				1	3	3	3	3	2													
NP3-2-2				1	1	1	2	1	1													
NP3-2-3				1	1	1	2	1	1													
NP3-2-4				1																		
NP3-3-1									24	113	127	40										
SUBTOTAL	14	42	99	173	138	102	128	178	139	40												

SPACE PROCESSING-SPACE STATION

HS1-2-1															24	113	127	40				
SUBTOTAL															24	113	127	40				

SPACE INDUSTRIALIZATION

NS2-1-1						200	600	1084	1196	443												
NS2-1-2									6	13	15	15	15	15	15	15	15	15	15	9	2	
NS2-1-3										165	495	963	1072	381								
NS2-1-4												16	35	39	39	39	39	39	38	24	4	
NS2-1-5									18	23	4											
SUBTOTAL						200	600	1102	1225	625	510	994	1122	435	54	54	54	54	53	33	6	

ORBITAL OPERATIONS

NS3-1-1	20	60	94	84	55	48	40	40	16					25	48	40	73	64	16			
NS3-1-2			1	2		1	2		1	2												
NS3-1-3	40	84	30																			
NS3-1-4			1			1	1	1							1	1	1		1	1		
NS3-1-5			3	4																		
NS3-1-6			3	4						3	4	1					3	4				
SUBTOTAL	20	100	179	123	63	50	43	49	17	5	4	26	48	41	74	68	20	1	1			

SATELLITE POWER

NS4-1-1				3	19	15																
NS4-1-2								19	42	15												
NS4-1-3									19	57	105	117	41									
NS4-1-4													51	155	488	1031	1038	841	1201	1162	327	
SUBTOTAL				3	19	15	19	61	72	105	117	92	155	488	1031	1038	841	1201	1162	327		

TOTAL

NASA	63	409	1040	1390	1582	1819	2228	2529	2141	2029	2393	2589	2049	2013	2366	2128	1786	2077	1634	413		
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TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

OUTSIDE USERS (NON-NASA, NON-DOD)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	
<b>INTERNATIONAL COMMUNICATIONS</b>																								
CC1-1-1			16	81	115	77																		
CC1-1-2				29	77	121	89	120	119	70	15													
CC1-1-3										24	84	131	117	86	51	35	55	64	17					
SUBTOTAL			16	110	192	198	89	120	119	94	99	131	117	86	51	35	55	64	17					
<b>US DOMESTIC COMMUNICATION</b>																								
CC2-1-1			11	49	74	58	25	7	7	16	8	15	32	12	8	15	5	3	17	31	11			
CC2-1-2			25	51	32																			
CC2-1-3						24	82	113	60	10		6	16	31	9		25	82	119	77	40	10		
CC2-1-4	17	34	14			1	5	12	5															
CC2-1-5		20	39	15																				
CC2-1-6					1	21	49	37	8			2	8	24	28	8				1	6	12	4	
CC2-1-7										2	20	43	24	2			3	11	24	15	3			
CC2-1-8										1	20	43	26	4										
CC2-1-9									2	22	51	27	3											
CC2-1-10							24	80	115	73	38	9	13	43	96	93	47	9						
CC2-1-11									15	46	51	16					6	14	24	9				
CC2-1-12												19	73	99	83	20	6	28	63	72	20			
CC2-1-13										1	19	38	13											
CC2-1-14							1	15	33	22	21	11	12	13	20	11	10	3						
SUBTOTAL	17	90	153	122	104	162	208	195	204	258	274	178	172	207	213	162	166	222	201	138	34			
<b>FOREIGN COMMUNICATION</b>																								
CC3-1-1				1	17	38	23	4																
CC3-1-2												1	18	42	23	5			1	7	18	15	4	
CC3-1-4				1	17	37	22	4																
CC3-1-5						1	17	37	21	4					1	7	16	14	3					
CC3-1-6		17	33	12																				
CC3-1-7				1	17	36	21	5	6	16	13	3			1	6	15	13	3					
CC3-1-8	11	56	66	34																				
CC3-1-9					17	53	60	18	6	15	27	10	6	14	28	9	6	14	28	9				
CC3-1-10		1	17	33	13																			
CC3-1-11		10	18	7																				
CC3-1-12		1	14	26	10																			
CC3-1-13			1	17	37	22	4																	
CC3-1-14										1	18	41	23	4			1	7	18	15	3			
CC3-1-16						1	25	59	34	6					1	10	24	21	5					
CC3-1-17			2	22	46	26	3																	
CC3-1-18										2	25	52	30	3				3	13	35	30	8		
CC3-1-20							1	16	30	11						1	5	10	4					
CC3-1-21					1	17	36	22	4															
CC3-1-22												1	17	39	22	4				1	5	11	3	
CC3-1-23						1	20	43	26	4														
CC3-1-24															1	20	45	26	5					
CC3-1-26						2	34	76	42	6				3	17	41	27	6						
CC3-1-28			1	8	15	6																		
CC3-1-30			31	52	19						1	7	12	5	6	13	5							
CC3-1-32					1	19	37	15		1	6	13	4			1	6	13	4					
CC3-1-33		1	15	30	11																			
CC3-1-35					1	27	62	37	14	17	6													

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TOTAL PROGRAM COSTS BY FISCAL YEAR THROUGH 1996

(MILLIONS OF 1977 DOLLARS)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996			
OTHER USERS (CONTINUED)																										
DISASTER WARNING																										
CS1-1-1										11	46	58	36	7	1	12	31	27	7							
SUBTOTAL										11	46	58	36	7	1	12	31	27	7							
TRAFFIC MANAGEMENT																										
CS2-1-1											12	37	64	34	5											
CS2-1-2														12	39	68	38	5								
CS2-1-3									6	33	65	38	6	6	17	31	26	6								
SUBTOTAL									6	33	77	75	70	46	50	85	69	31	6							
SPACE MANUFACTURING-US DOMESTIC AND FOREIGN																										
CS3-1-1								1	2	5	5	7	8	9	10	9	10	9	10	5	1					
CS3-1-2										1	1	2	2													
CS3-1-3												1	1					1	1							
CS3-1-4												1	2	4	4	3	4	6	7	7	5	1				
CS3-2-1									1	1	2	2	2	2	3	3	4	2	1							
CS3-2-2										1	1	2	2													
CS3-2-3												1	1					1	1							
CS3-2-4												1	2	4	4	3	4	6	7	7	5	1				
CS3-2-5						1	1	2	2		2	2	1	1	2	2	1	2	1	2						
SUBTOTAL						1	1	2	3	3	10	11	18	21	21	23	19	25	27	26	21	11	2			
USERS TOTAL																										
OUTSIDE						53	253	592	883	1020	970	1043	1038	1018	969	995	970	989	1043	1091	1057	1068	893	757	496	121
ALL PROGRAMS																										
TOTAL						53	322	1135	2302	2983	3225	3651	4228	4727	4228	4287	4772	5048	4685	4833	4942	4933	4662	4778	3977	1091

25-1117

Appendix IX

Nominal and Optimistic Budget

Program Cost Summaries

**PRECEDING PAGE BLANK NOT FILMED**

## PROGRAM COSTS

## SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC				LAUNCH VEHICLE TRAFFIC			PROGRAM COSTS					PROG TOTAL				
	N	R	M	D	EXP	IUS	TUG	SHTL	RDTE	INV	OPS	LOSS		TOTAL	INV	OPS	LOSS
NASA MISSIONS																	
INTERGOVERNMENT LINKS																	
NC1-1-1	3				2.1	3.0			167	242			409	49		49	458
NC1-1-2	3				2.4	3.0			176	312			488	54		54	542
NC1-1-3	3				2.4	3.0			228	346			574	54		54	628
NC1-1-4	2				1.6	2.0			276	279			555	36		36	591
SUBTOTAL	11				8.5	11.0			847	1179			2026	193		193	2219
GOVERNMENT TO PEOPLE LINKS																	
NC2-1-1	3				2.1	3.0			93	90			183	49		49	232
NC2-1-2	1				.9	1.0			381	225			606	19		19	625
SUBTOTAL	4				3.0	4.0			474	315			789	68		68	857
INTRAGOVERNMENT LINKS																	
NC4-1-1	3				2.4	3.0			276	419			695	54		54	749
NC4-1-2	3				2.4	3.0			335	527			862	54		54	916
NC4-2-1	3				2.4	3.0			167	242			409	54		54	463
NC4-2-2	3				2.4	3.0			276	419			695	54		54	749
SUBTOTAL	12				9.6	12.0			1054	1607			2661	216		216	2877
PLANETARY																	
NL1-1-1	2				4.0				75	69			144	48		48	192
NL1-1-2	2				4.0				82	75			157	48		48	205
NL1-1-3	2				4.0	2.0			50	35			85	50		50	135
NL1-1-4	4				4.0	4.0			32	50			82	64		64	166
NL1-1-5	3				3.0	3.0			56	73			129	63		63	192
NL1-1-6	1				2.0	1.0			123	57			180	25		25	205
NL1-1-7	2				4.0				61	75			156	48		48	204
NL1-1-8	1				1.0	2.0			70	32			102	22		22	124
NL1-1-9	1				1.0	2.0			51	20			71	22		22	93
NL1-1-10	1				1.0	2.0			63	27			90	22		22	112
NL1-1-11	1				2.0				30	10			40	24		24	64
NL1-1-12	1				3.0				170	89			259	39		39	298
SUBTOTAL	21				33.0	16.0			883	612			1495	495		495	1990
LUNAR																	
NL2-1-1	1				1.0				34	9			43	34	3	37	80
SUBTOTAL	1				1.0				34	9			43	34	3	37	80
EARTH RESOURCES MONITORING																	
NO1-1-1	6				.6				89	223			312	9		9	321
NO1-1-2	6				.6				57	133			190	9		9	199
NO1-1-3	4				2.8	4.0			89	153			242	66		66	308
NO1-1-4	1				.1				53	17			70	1		1	71
NO1-1-5	1				.7	1.0			26	8			34	16		16	50
NO1-1-6	1				.8	1.0			94	43			137	18		18	155
NO1-1-7	4				4.0	4.0			96	166			262	84		84	346
NO1-1-8	3				2.4	3.0			36	45			81	54		54	135
NO1-2-1	15				1.5				26	118			144	22		22	166
SUBTOTAL	41				13.5	13.0			566	906			1472	279		279	1751

## PROGRAM COSTS

## SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC N R H D	EXP	LAUNCH VEHICLE TRAFFIC			SHTL	RDTE	PROGRAM COSTS				PROG TOTAL		
			IUS	TUG				PAYLOAD COSTS	LAUNCH VEHICLE COSTS					
							INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL
NASA (CONTINUED)														
ENVIRONMENTAL MONITORING														
NO2-1-1	1	.2					113	53		166	3		3	169
NO2-1-2	4	.4					75	128		203	6		6	209
NO2-1-3	1	.1					69	29		98	1		1	99
NO2-1-4	4	2.8	4.0				80	139		219	66		66	285
NO2-1-5	1	1.0	1.0				27	9		36	21		21	57
NO2-2-1	15	1.5									22		22	22
NO2-2-2	15	1.5									22		22	22
SUBTOTAL	41	7.5	5.0				364	358		722	141		141	863
ASTROPHYSICS														
NP1-1-1	3	2.1					88	114		202	31		31	233
NP1-1-2	4	.4					81	144		225	6		6	231
NP1-1-3	4	.4					81	140		221	6		6	227
NP1-1-4A	2	2.0	2.0				32	22		54	42		42	96
NP1-1-4B	2	1.4	2.0				32	23		55	33		33	88
NP1-1-5	3	.3					41	50		91	4		4	95
NP1-1-6	2	.2					62	52		114	3		3	117
NP1-1-7	2	.1					61	50		111	1		1	112
NP1-1-8	2	.4	2.0				19	14		33	8		8	41
NP1-2-1	15	4.5									67		67	67
NP1-2-2	15	3.0									45		45	45
NP1-2-3	15	1.5									22		22	22
NP1-2-4	1	.2									3		3	3
SUBTOTAL	70	16.5	6.0				497	609		1106	271		271	1377
SOLAR TERRESTRIAL														
NP2-1-1	7	.7					39	101		140	10		10	150
NP2-1-2	1	.1					27	7		34	1		1	35
NP2-1-3	29	7.9	25.0				23	174		197	123	2	125	322
NP2-1-4	29	21.4					22	159		181	141		141	322
NP2-1-5	1	.3					112	49		161	4		4	165
NP2-2-1	11	1.1									16		16	16
NP2-2-2	11	2.2									33		33	33
NP2-2-3	11	3.3									49		49	49
NP2-2-4	27	16.2									243		243	243
SUBTOTAL	127	53.2	25.0				223	490		713	620	2	622	1335
LIFE SCIENCES														
NP3-1-1	5	.5					137	314		451	7		7	458
NP3-1-2	1	.1					137	123		260	1		1	261
NP3-2-1	10	1.0									15		15	15
NP3-2-2	10	.5									7		7	7
NP3-2-3	10	.5									7		7	7
NP3-2-4	1	.1									1		1	1
NP3-3-1	1	.3					200	100		300	4		4	304
SUBTOTAL	38	3.0					474	537		1011	42		42	1053

## PROGRAM COSTS

## SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC				EXP	LAUNCH VEHICLE TRAFFIC			SHTL	PROGRAM COSTS				PROG TOTAL			
	N	R	M	D		IUS	TUG	ROTE		PAYLOAD COSTS			LAUNCH VEHICLE COSTS				
-----																	
NASA (CONTINUED)																	
SPACE PROCESSING-SPACE STATION																	
IS1-2-1	1				.3					200	100		300	4		4	304
SUBTOTAL	1				.3					200	100		300	4		4	304
ORBITAL OPERATIONS																	
IS3-1-1	6				5.4					200	450		650	81		81	731
IS3-1-2	3				.6									9		9	9
IS3-1-3	1				.3					100	50		150	4		4	154
IS3-1-4	6				.6									9		9	9
IS3-1-5	1				.5									7		7	7
IS3-1-6	3				1.5									22		22	22
SUBTOTAL	20				8.9					300	500		800	132		132	932
SATELLITE POWER																	
IS4-1-1	1				.1					26	10		36	1		1	37
IS4-1-2	1				.1					49	26		75	1		1	76
IS4-1-3	3				2.1					190	418		608	31		31	639
SUBTOTAL	5				2.3					265	454		719	33		33	752
TOTAL																	
NASA	392				160.3	92.0				6181	7676		13857	2528	5	2533	16390

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## PROGRAM COSTS

## SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC			LAUNCH VEHICLE TRAFFIC			PROGRAM COSTS										
	N	R	M D	EXP	IUS	TUG	SHTL	RDTE	PAYLOAD COSTS			LAUNCH VEHICLE COSTS			PROG		
									INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL	TOTAL
OUTSIDE USERS (NON-NASA, NON-DOO)																	
INTERNATIONAL COMMUNICATIONS																	
CC1-1-1	4			4.0					151			151	74	64		138	289
SUBTOTAL	4			4.0					151			151	74	64		138	289
US DOMESTIC COMMUNICATION																	
CC2-1-1	11			2.6	11.0			71	271			342	62			62	404
CC2-1-2	1			1.0				53	21			74	18	16		34	108
CC2-1-4	2			1.2	1.0			37	36			73	14	1		15	88
CC2-1-5	1			1.0				46	18			64	9	1		10	74
CC2-1-6	7			1.4	7.0			47	127			174	35			35	209
CC2-1-7	6			1.2	6.0			37	80			117	30			30	147
CC2-1-8	2			.4	2.0			46	38			84	10			10	94
CC2-1-9	3			.6	3.0			41	50			91	14			14	105
CC2-1-11	2			1.4	2.0			76	66			142	39			39	181
CC2-1-12	6			4.4	6.0			105	257			362	121			121	483
SUBTOTAL	41			15.2	38.0			559	964			1523	352	18		370	1893
FOREIGN COMMUNICATION																	
CC3-1-1	2			.4	2.0			40	33			73	10			10	83
CC3-1-2	4			.8	4.0			44	70			114	20			20	134
CC3-1-4	2			.4	2.0			40	31			71	10			10	81
CC3-1-5	4			.8	4.0			40	61			101	20			20	121
CC3-1-6	1			1.0				39	13			52	9	1		10	62
CC3-1-10	1			.2	1.0			42	17			59	5			5	64
CC3-1-11	1			1.0				20	5			25	9	1		10	35
CC3-1-12	1			.2	1.0			35	11			46	5			5	51
CC3-1-13	2			.4	2.0			40	31			71	10			10	81
CC3-1-14	4			.8	4.0			43	68			111	20			20	131
CC3-1-16	4			.8	4.0			64	102			166	20			20	186
CC3-1-17	3			.6	3.0			39	46			85	14			14	99
CC3-1-18	7			1.4	7.0			47	119			166	35			35	201
CC3-1-20	2			.4	2.0			38	30			68	10			10	78
CC3-1-21	2			.4	2.0			39	31			70	10			10	80
CC3-1-22	3			.6	3.0			41	48			89	14			14	103
CC3-1-23	2			.4	2.0			46	38			84	10			10	94
CC3-1-24	2			.4	2.0			48	39			87	10			10	97
CC3-1-26	6			1.2	6.0			67	157			224	30			30	254
CC3-1-28	1			.2	1.0			20	5			25	5			5	30
CC3-1-30	3			1.4	2.0			46	58			104	44	3		47	151
CC3-1-32	3			.6	3.0			48	58			106	14			14	120
CC3-1-33	1			.2	1.0			39	13			52	5			5	57
CC3-1-35	3			.6	3.0			67	83			150	14			14	164
CC3-1-36	3			.6	3.0			45	46			91	14			14	105
CC3-1-37	5			1.0	5.0			67	130			197	25			25	222
CC3-1-38	4			.8	4.0			41	63			104	20			20	124
CC3-1-39	6			1.2	6.0			70	163			233	30			30	263
CC3-1-40	4			.8	4.0			46	73			119	20			20	139
SUBTOTAL	86			19.6	83.0			1301	1642			2943	462	5		467	3410



## PROGRAM COSTS

## SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC			LAUNCH VEHICLE TRAFFIC			RDTE	PROGRAM COSTS				PROG TOTAL			
	N	R	M D	EXP	IUS	TUG		SHTL	PAYLOAD COSTS				LAUNCH VEHICLE COSTS		
								INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL
OTHER USERS (CONTINUED)															
ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN															
CO1-1-1	3			.3				82	114		196	6		6	202
CO1-1-2	3			3.0				52	70		122	27	2	29	151
CO1-2-1	2			.2				108	104		212	4		4	216
SUBTOTAL	8			3.5				242	288		530	37	2	39	569
EARTH AND OCEAN MONITORING															
CO2-1-1	6			1.6				137	364		501	30		30	531
SUBTOTAL	6			1.6				137	364		501	30		30	531
EARTH RESOURCES-US DOMESTIC AND FOREIGN															
CO3-1-1	21			1.8				66	443		509	34		34	543
CO3-2-1	2			.2				65	62		127	4		4	131
CO3-2-2	2			.2				66	61		127	4		4	131
CO3-2-3	1			.1				32	12		44	2		2	46
SUBTOTAL	26			2.3				229	578		607	44		44	651
WEATHER															
CO4-1-2	8			8.0				69	211		280	16	40	56	336
CO4-1-3	8			.8				84	226		310	15		15	325
CO4-2-2	4			.8	4.0			55	92		147	20		20	167
SUBTOTAL	20			9.6	4.0			208	529		737	51	40	91	828
US DOMESTIC															
CP1-1-1	9			.9				51	166		217	17		17	234
SUBTOTAL	9			.9				51	166		217	17		17	234
FOREIGN															
CP2-1-3	1			1.0				40	14		54	9	1	10	64
CP2-1-5	3			1.2				36	41		77	13	1	14	91
CP2-1-6	4			.4				40	62		102	8		8	110
CP2-1-7	8			5.6	8.0			30	77		107	155		155	262
CP2-1-8	7			4.9	7.0			33	82		115	136		136	251
CP2-1-14	1			1.0				29	9		38	9	1	10	48
CP2-1-15	1			1.0				19	5		24	9	1	10	34
SUBTOTAL	25			15.1	15.0			227	290		517	339	4	343	860
USERS TOTAL															
OUTSIDE	225			71.8	140.0			2954	4972		7926	1406	133	1539	9465
ALL PROGRAMS															
TOTAL	913			483.1	355.0			10368	18708	121	29197	7882	425	8307	37504
USERS TOTAL															
OUTSIDE	225			71.8	140.0			2954	4972		7926	1406	133	1539	9465

## PROGRAM COSTS

## SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

PRECEDING PAGE BLANK NOT FILMED

SATELLITE NAME	PAYLOAD TRAFFIC				LAUNCH VEHICLE TRAFFIC			PROGRAM COSTS					PROG TOTAL				
	N	R	M	D	EXP	IUS	TUG	SHTL	ROTE	PAYLOAD COSTS				LAUNCH VEHICLE COSTS			
										INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL
NASA MISSIONS																	
INTERGOVERNMENT LINKS																	
HC1-1-1	3				2.1	3.0				167	242		409	49		49	458
HC1-1-2	3				2.4	3.0				176	312		488	54		54	542
HC1-1-3	3				2.4	3.0				228	346		574	54		54	628
HC1-1-4	2				1.6	2.0				276	279		555	36		36	591
SUBTOTAL	11				8.5	11.0				847	1179		2026	193		193	2219
GOVERNMENT TO PEOPLE LINKS																	
HC2-1-1	3				2.1	3.0				93	90		183	49		49	232
HC2-1-2	1				.9	1.0				381	225		606	19		19	625
SUBTOTAL	4				3.0	4.0				474	315		789	68		68	857
PEOPLE TO PEOPLE LINKS																	
HC3-1-1	4				3.6	4.0				355	717		1072	78		78	1150
HC3-1-2	2				1.8	2.0				411	435		846	39		39	885
HC3-1-3	2				1.8	2.0				485	559		1044	39		39	1083
SUBTOTAL	8				7.2	8.0				1251	1711		2962	156		156	3118
INTRAGOVERNMENT LINKS																	
HC4-1-1	3				2.4	3.0				276	419		695	54		54	749
HC4-1-2	3				2.4	3.0				335	527		862	54		54	916
HC4-2-1	3				2.4	3.0				167	242		409	54		54	463
HC4-2-2	3				2.4	3.0				276	419		695	54		54	749
SUBTOTAL	12				9.6	12.0				1054	1607		2661	216		216	2877
ENTERTAINMENT/COMMERCIAL LINKS																	
HC5-1-1	5				4.0	5.0				293	724		1017	90		90	1107
HC5-1-2	3				2.7	3.0				385	588		973	58		58	1031
SUBTOTAL	8				6.7	8.0				678	1312		1990	148		148	2138
PLANETARY																	
HL1-1-1	2				4.0					75	69		144	48		48	192
HL1-1-2	2				4.0					82	75		157	48		48	205
HL1-1-3	2				4.0	2.0				50	35		85	50		50	135
HL1-1-4	4				4.0	4.0				32	50		82	84		84	166
HL1-1-5	3				3.0	3.0				56	73		129	63		63	192
HL1-1-6	1				2.0	1.0				123	57		180	25		25	205
HL1-1-7	2				4.0					81	75		156	48		48	204
HL1-1-8	1				1.0	2.0				70	32		102	22		22	124
HL1-1-9	1				1.0	2.0				51	20		71	22		22	93
HL1-1-10	1				1.0	2.0				63	27		90	22		22	112
HL1-1-11	1				2.0					30	10		40	24		24	64
HL1-1-12	1				3.0					170	89		259	39		39	298
UBTOTAL	21				33.0	16.0				883	612		1495	495		495	1990
LUNAR																	
L2-1-1	1				1.0					34	9		43	34	3	37	80
UBTOTAL	1				1.0					34	9		43	34	3	37	80

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## PROGRAM COSTS

## SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC				LAUNCH VEHICLE TRAFFIC			PROGRAM COSTS										
	N	R	M	D	EXP	IUS	TUG	SHTL	RDTE	PAYLOAD COSTS			LAUNCH VEHICLE COSTS				PROG TOTAL	
										INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL	
NASA (CONTINUED)																		
EARTH RESOURCES MONITORING																		
NO1-1-1	6				.6					89	223		312	9			9	321
NO1-1-2	6				.6					57	133		190	9			9	199
NO1-1-3	4				2.8	4.0				89	153		242	66			66	308
NO1-1-4	1				.1					53	17		70	1			1	71
NO1-1-5	1				.7	1.0				26	8		34	16			16	50
NO1-1-6	1				.8	1.0				94	43		137	18			18	155
NO1-1-7	4				4.0	4.0				96	166		262	84			84	346
NO1-1-8	3				2.4	3.0				36	45		81	54			54	135
NO1-2-1	15				1.5					26	118		144	22			22	166
SUBTOTAL	41				13.5	13.0				566	906		1472	279			279	1751
ENVIRONMENTAL MONITORING																		
NO2-1-1	1				.2					113	53		166	3			3	169
NO2-1-2	4				.4					75	128		203	6			6	209
NO2-1-3	1				.1					69	29		98	1			1	99
NO2-1-4	4				2.8	4.0				80	139		219	66			66	285
NO2-1-5	1				1.0	1.0				27	9		36	21			21	57
NO2-2-1	15				1.5									22			22	22
NO2-2-2	15				1.5									22			22	22
SUBTOTAL	41				7.5	5.0				364	358		722	141			141	863
ASTROPHYSICS																		
NP1-1-1	3				2.1					88	114		202	31			31	233
NP1-1-2	4				.4					81	144		225	6			6	231
NP1-1-3	4				.4					81	140		221	6			6	227
NP1-1-4A	2				2.0	2.0				32	22		54	42			42	96
NP1-1-4B	2				1.4	2.0				32	23		55	33			33	88
NP1-1-5	3				.3					41	50		91	4			4	95
NP1-1-6	2				.2					62	52		114	3			3	117
NP1-1-7	2				.1					61	50		111	1			1	112
NP1-1-8	2				.4	2.0				19	14		33	8			8	41
NP1-2-1	15				4.5									67			67	67
NP1-2-2	15				3.0									45			45	45
NP1-2-3	15				1.5									22			22	22
NP1-2-4	1				.2									3			3	3
SUBTOTAL	70				16.5	6.0				497	609		1106	271			271	1377
SOLAR TERRESTRIAL																		
NP2-1-1	7				.7					39	101		140	10			10	150
NP2-1-2	1				.1					27	7		34	1			1	35
NP2-1-3	29				7.9	25.0				23	174		197	123	2		125	322
NP2-1-4	29				5.4					22	159		181	56	2		58	239
NP2-1-5	1				.3					112	49		161	4			4	165
NP2-2-1	11				1.1									16			16	16
NP2-2-2	11				2.2									33			33	33
NP2-2-3	11				3.3									49			49	49
NP2-2-4	27				16.2									243			243	243
SUBTOTAL	127				37.2	25.0				223	490		713	535	4		539	1252

## PROGRAM COSTS

## SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC				LAUNCH VEHICLE TRAFFIC			PROGRAM COSTS				PROG TOTAL				
	N	R	M	D	IUS	TUG	SHTL	RDTE	PAYLOAD COSTS				LAUNCH VEHICLE COSTS			
									INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL
NASA (CONTINUED)																
LIFE SCIENCES																
NP3-1-1	5			.5				137	314			451	7		7	458
NP3-1-2	1			.1				137	123			260	1		1	261
NP3-2-1	10			1.0									15		15	15
NP3-2-2	10			.5									7		7	7
NP3-2-3	10			.5									7		7	7
NP3-2-4	1			.1									1		1	1
NP3-3-1	1			.3				200	100			300	4		4	304
SUBTOTAL	38			3.0				474	537			1011	42		42	1053
SPACE PROCESSING-SPACE STATION																
NS1-2-1	1			.3				200	100			300	4		4	304
SUBTOTAL	1			.3				200	100			300	4		4	304
SPACE INDUSTRIALIZATION																
NS2-1-1	1			1.0				2000	1500			3500	23		23	3523
NS2-1-2	11			11.0									165		165	165
NS2-1-3	1			12.0				1650	1230			2880	196		196	3076
NS2-1-4	8			24.0									312		312	312
NS2-1-5	1			2.0									45		45	45
SUBTOTAL	22			50.0				3650	2730			6300	741		741	7121
ORBITAL OPERATIONS																
NS3-1-1	6			5.4				200	450			650	81		81	731
NS3-1-2	3			.6									9		9	9
NS3-1-3	1			.3				100	50			150	4		4	154
NS3-1-4	6			.6									9		9	9
NS3-1-5	1			.5									7		7	7
NS3-1-6	3			1.5									22		22	22
SUBTOTAL	20			8.9				300	500			800	132		132	932
SATELLITE POWER																
NS4-1-1	1			.1				26	10			36	1		1	37
NS4-1-2	1			.1				49	26			75	1		1	76
NS4-1-3	1			.7				190	139			329	10		10	339
NS4-1-4	10			40.0				515	5125			5640	654		654	6294
SUBTOTAL	13			40.9				780	5300			6080	666		666	6746
TOTAL																
NASA	438			246.8	108.0			12275	10275			30550	4121	7	4128	34678

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## PROGRAM COSTS

## SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC			LAUNCH VEHICLE TRAFFIC			SHTL	PROGRAM COSTS				PROG TOTAL				
	N	R	M D	EXP	IUS	TUG		RDTE	INV	OPS	LOSS		TOTAL			
OUTSIDE USERS (NON-NASA, NON-DOD)																
INTERNATIONAL COMMUNICATIONS																
CC1-1-1	4			4.0				151				151	74	64	138	289
CC1-1-2	11			7.0	11.0			91	349			440	200		200	640
CC1-1-3	10			6.0	10.0			102	387			489	175		175	664
SUBTOTAL	25			17.0	21.0			193	887			1080	449	64	513	1593
US DOMESTIC COMMUNICATION																
CC2-1-1	11			2.6	11.0			71	271			342	62		62	404
CC2-1-2	1			1.0				53	21			74	18	16	34	108
CC2-1-3	8			5.8	8.0			200	345			545	159		159	704
CC2-1-4	2			1.2	1.0			37	36			73	14	1	15	88
CC2-1-5	1			1.0				46	18			64	9	1	10	74
CC2-1-6	7			1.4	7.0			47	127			174	35		35	209
CC2-1-7	6			1.2	6.0			37	80			117	30		30	147
CC2-1-8	2			.4	2.0			46	38			84	10		10	94
CC2-1-9	3			.6	3.0			41	50			91	14		14	105
CC2-1-10	9			6.6	9.0			100	360			460	180		180	640
CC2-1-11	2			1.4	2.0			76	66			142	39		39	181
CC2-1-12	6			4.4	6.0			105	257			362	121		121	483
CC2-1-13	1			.2	1.0			48	18			66	5		5	71
CC2-1-14	7			1.4	7.0			40	97			137	35		35	172
SUBTOTAL	66			29.2	63.0			947	1784			2731	731	18	749	3480
FOREIGN COMMUNICATION																
CC3-1-1	2			.4	2.0			40	33			73	10		10	83
CC3-1-2	4			.8	4.0			44	70			114	20		20	134
CC3-1-4	2			.4	2.0			40	31			71	10		10	81
CC3-1-5	4			.8	4.0			40	61			101	20		20	121
CC3-1-6	1			1.0				39	13			52	9	1	10	62
CC3-1-7	6			1.2	6.0			40	86			126	30		30	156
CC3-1-8	1			1.0				91	42			133	18	16	34	167
CC3-1-9	4			2.8	4.0			91	152			243	77		77	320
CC3-1-10	1			.2	1.0			42	17			59	5		5	64
CC3-1-11	1			1.0				20	5			25	9	1	10	35
CC3-1-12	1			.2	1.0			35	11			46	5		5	51
CC3-1-13	2			.4	2.0			40	31			71	10		10	81
CC3-1-14	4			.8	4.0			43	68			111	20		20	131
CC3-1-16	4			.8	4.0			64	102			166	20		20	186
CC3-1-17	3			.6	3.0			39	46			85	14		14	99
CC3-1-18	7			1.4	7.0			47	119			166	35		35	201
CC3-1-20	2			.4	2.0			38	30			68	10		10	78
CC3-1-21	2			.4	2.0			39	31			70	10		10	80
CC3-1-22	3			.6	3.0			41	48			89	14		14	103
CC3-1-23	2			.4	2.0			46	38			84	10		10	94
CC3-1-24	2			.4	2.0			48	39			87	10		10	97
CC3-1-26	6			1.2	6.0			67	157			224	30		30	254
CC3-1-28	1			.2	1.0			20	5			25	5		5	30
CC3-1-30	3			1.4	2.0			46	58			104	44	3	47	151
CC3-1-32	3			.6	3.0			48	58			106	14		14	120
CC3-1-33	1			.2	1.0			39	13			52	5		5	57
CC3-1-35	3			.6	3.0			67	83			150	14		14	164

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SATELLITE NAME	PAYLOAD TRAFFIC		EXP	LAUNCH VEHICLE TRAFFIC			SHTL	ROTE	PROGRAM COSTS				PROG TOTAL		
	N	R II D		IUS	TUG	PAYLOAD COSTS			LAUNCH VEHICLE COSTS						
								INV	OPS	LOSS	TOTAL	INV	OPS	LOSS	TOTAL
OTHER USERS (CONTINUED)															
FOREIGN COMMUNICATION (CONT.)															
CC3-1-36	3		.6	3.0			45	46			91	14		14	105
CC3-1-37	5		1.0	5.0			67	130			197	25		25	222
CC3-1-38	4		.8	4.0			41	63			104	20		20	124
CC3-1-39	6		1.2	6.0			70	163			233	30		30	263
CC3-1-40	4		.8	4.0			46	73			119	20		20	139
SUBTOTAL	97		24.6	93.0			1523	1922			3445	587	21	608	4053
ENVIRONMENTAL MONITORING-US DOMESTIC AND FOREIGN															
CO1-1-1	3		.3				82	114			196	6		6	202
CO1-1-2	3		3.0				52	70			122	27	2	29	151
CO1-1-3	8		1.6	8.0			68	206			274	39		39	313
CO1-2-1	2		.2				108	104			212	4		4	216
SUBTOTAL	16		5.1	8.0			310	494			804	76	2	78	882
EARTH AND OCEAN MONITORING															
CO2-1-1	18		4.6				275	1091			1366	87		87	1453
SUBTOTAL	18		4.6				275	1091			1366	87		87	1453
EARTH RESOURCES-US DOMESTIC AND FOREIGN															
CO3-1-1	21		1.8				66	443			509	34		34	543
CO3-1-2	4		.4				66	114			180	8		8	188
CO3-1-3	2		1.4	2.0			59	60			119	39		39	158
CO3-1-4	2		1.4	2.0			59	60			119	39		39	158
CO3-2-1	2		.2				65	62			127	4		4	131
CO3-2-2	2		.2				66	61			127	4		4	131
CO3-2-3	1		.1				32	12			44	2		2	46
CO3-2-4	5		.5				64	130			194	9		9	203
CO3-2-5	2		1.4	2.0			56	52			108	39		39	147
CO3-2-6	1		.7	1.0			59	29			88	19		19	107
SUBTOTAL	42		8.1	7.0			592	1023			1615	197		197	1812
WEATHER															
CO4-1-2	8		8.0				69	211			280	16	40	56	336
CO4-1-3	8		.8				84	226			310	15		15	325
CO4-2-2	4		.8	4.0			55	92			147	20		20	167
CO4-2-4	4		2.8	4.0			66	113			179	77		77	256
CO4-2-5	5		3.5	5.0			66	136			202	96		96	298
SUBTOTAL	29		15.9	13.0			340	778			1118	224	40	264	1382
US DOMESTIC															
CP1-1-1	12		1.2				101	222			323	23		23	346
SUBTOTAL	12		1.2				101	222			323	23		23	346
FOREIGN															
CP2-1-3	1		1.0				40	14			54	9	1	10	64
CP2-1-5	3		1.2				36	41			77	13	1	14	91
CP2-1-6	4		.4				40	62			102	8		8	110
CP2-1-7	8		5.6	8.0			30	77			107	155		155	262
CP2-1-8	7		4.9	7.0			33	82			115	136		136	251
CP2-1-14	1		1.0				29	9			38	9	1	10	48
CP2-1-15	1		1.0				19	5			24	9	1	10	34
CP2-1-16	14		14.0				53	244			297	124	8	132	429
SUBTOTAL	39		29.1	15.0			280	534			814	463	12	475	1289

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PROGRAM COSTS

SATELLITE TRAFFIC AND COST SUMMARY THROUGH 1996 (MILLIONS OF 1977 DOLLARS)

SATELLITE NAME	PAYLOAD TRAFFIC				LAUNCH VEHICLE TRAFFIC			PROGRAM COSTS								
	N	R	M	D	IUS	TUG	SHTL	RDTE	PAYLOAD COSTS			LAUNCH VEHICLE COSTS			PROG TOTAL	
-----																
OTHER USERS (CONTINUED)																
DISASTER WARNING																
CS1-1-1	4				4.0			81	135			216	20		20	236
SUBTOTAL	4				4.0			81	135			216	20		20	236
TRAFFIC MANAGEMENT																
CS2-1-1	3				3.0			42	52			94	58		58	152
CS2-1-2	3				3.0			47	57			104	58		58	162
CS2-1-3	4				4.0			62	95			157	77		77	234
SUBTOTAL	10				10.0			151	204			355	193		193	548
SPACE MANUFACTURING-US DOMESTIC AND FOREIGN																
CS3-1-1	86				4.8								91		91	91
CS3-1-2	4				.3								6		6	6
CS3-1-3	2				.2								4		4	4
CS3-1-4	34				2.3								44		44	44
CS3-2-1	20				1.2								23		23	23
CS3-2-2	5				.3								6		6	6
CS3-2-3	2				.2								4		4	4
CS3-2-4	34				2.3								44		44	44
CS3-2-5	12				1.2								23		23	23
SUBTOTAL	199				12.8								245		245	245
USERS TOTAL																
OUTSIDE	557				155.4	234.0		4793	9074			13867	3295	157	3452	17319
ALL PROGRAMS																
TOTAL	***				863.2	515.0		20928	39367	121		60416	13990	456	14446	74862

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