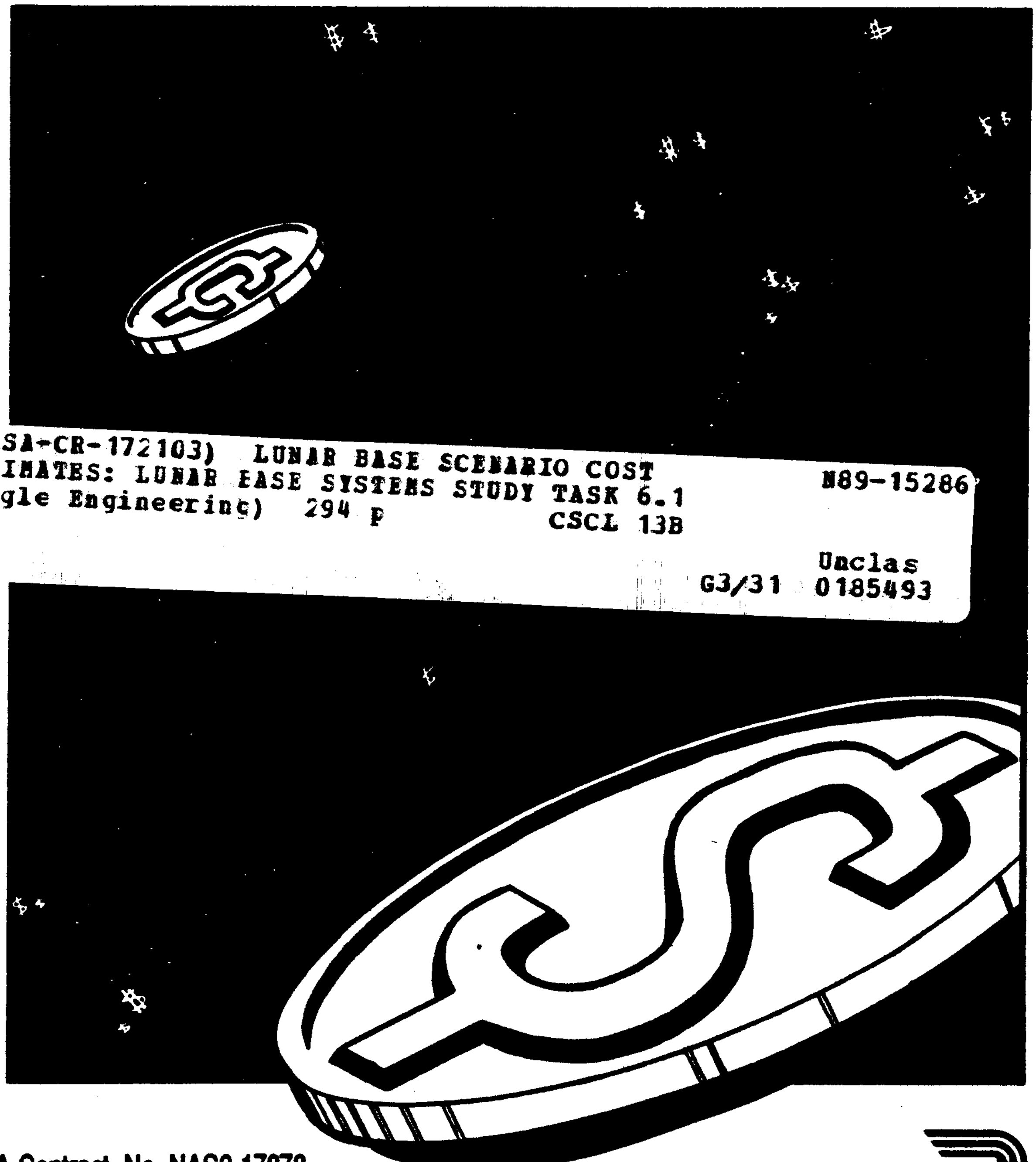
CR# 172103

LBSS

Lunar Base Scenario Cost Estimates



(NASA-CR-172103) LUNAR BASE SCENARIO COST ESTIMATES: LUNAR BASE SYSTEMS STUDY TASK 6.1 (Eagle Engineering) 294 p CSCL 13B

N89-15286

Unclas

G3/31 0185493

NASA Contract No. NAS9-17878

Eagle Eng. Report No. 88-215

October 31, 1988

EAGLE

Lunar Base Scenario
Cost Estimates

National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Advanced Projects Office

Lunar Base Systems Study Task 6.1

Prepared by:
Eagle Engineering, Inc.
Houston, Texas

NASA Contract NAS9-17878
Eagle Engineering Report No. 88-211

Foreword

The Lunar Base Scenario Cost Estimation Task was performed as a part of the Advanced Space Transportation Support Contract (ASTS), which is part of a NASA study to address planning for a Lunar Base near the year 2000. This report describes the projected development and production costs of each of the base's systems, and estimates unit costs for transporting the systems to the Lunar surface and for setting up the systems.

Dr. John Alred was the NASA Technical Monitor for the overall contract and also the task manager for the cost estimation task.

Mr. Bill Stump was the Eagle Project Manager for the ASTS contract. Mr. Steve Erickson was the Eagle Task Manager for this study, with significant contribution from Ms. Lisa Guerra. Other contributors include:

Gil Chisholm (Eagle Engineering)
Eric Christiansen (Eagle Engineering)
John Hirasaki (Eagle Engineering)
Owen Morris (Eagle Engineering)
Don Osgood (Eagle Engineering)
Paul Phillips (Eagle Technical Services)
Don Sullivan (Eagle Engineering)
Richard Whitlock (NASA JSC Space Station Projects Office)

Artwork by:

Mark Dowman (Eagle Engineering)
John Lowrey (Eagle Engineering)
Doug McLeod (Eagle Engineering)
Pat Rawlings (Eagle Engineering)
Mike Stovall (Eagle Engineering)

PRECEDING PAGE BLANK NOT FILMED

LUNAR BASE SCENARIO COST ESTIMATES
TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 Executive Summary

This report describes the estimated development and production costs, in constant 1988 dollars, of each of the systems conceptually designed under the Advanced Space Transportation Support Contract. In addition, estimates were derived for a unit cost (dollars per kilogram) to transport the systems from Earth to the Lunar surface and for a unit cost (dollars per EVA and IVA hour) to set up the systems on the Lunar surface. These estimates do not include the cost of spares, consumables, new facilities for system development and production, or ongoing operations on the lunar surface.

The ASTS contract did not include provisions for designing crew habitation and laboratory modules, nor for costing them. However, a price tag for the entire lunar system would not be complete without their inclusion. Solely for the purpose of providing a more complete picture of lunar system costs, gross cost estimates were made for these modules, using a cost estimating relationship developed for estimating space station module costs [14]. The projected pressurized volume is 658.17 m^3, and includes two habitation modules, one laboratory, one node, and two airlocks. The projected cost for pressurized volume is $4028/$m^3$, or $2,651,000,000 for the entire system. The development to production cost ratio was assumed to be 3:1 for these modules.

Table 1-1 summarizes the total system hardware costs, and Table 1-2 summarizes the unit costs for transport and setup.

Table 1-1, Summary of Lunar Base Scenario Estimated Costs ($Millions)

System	Development	Production	Total
Lunar Lander	$ 1,415	$ 649	$ 2,064
Lunar Oxygen Pilot Plant	732	122	854
Unpressurized Lunar Rover	140	47	187
Pressurized Lunar Rover	474	184	658
Solar Power Plant	314	118	432
Logistics Module	242	108	350
Storm Shelter	241	70	311
Transportation Node	7,219	2,361	9,580
Surface Construction Equipment	350	79	429
Fuel Cell Cart	70	13	82
Supplemental Cooling Cart	45	7	52
Orbital Transfer Vehicle	1,464	1,059	2,523
Low Earth Orbit Launcher	4,162	13,166	17,328
Lunar Landing Pad	581	104	685
Surface Habitats/Labs	1,988	663	2,651
Total	$19,437	$18,750	$38,186

Table 1-2, Summary of Lunar Base Scenario Transport and Setup Costs

Operation		Unit Cost
Transport		
	Earth-Lunar Surface	$ 23,732/kg
Setup		
	EVA	$ 84,237/hour
	IVA	$ 29,483/hour

As a point of comparison, the Apollo program cost $80 Billion in 1985 dollars, or $93 Billion in 1988 dollars [20]. It has been estimated that a manned Mars mission would cost $27 Billion in 1986 dollars, or $30 Billion in 1988 dollars [21].

2.0 Introduction

Lunar base scenario cost estimates were developed primarily with the aid of PRICE-H, a parametric cost model developed and operated by RCA. PRICE-H estimates development and production costs for a system by using the following fundamental data:

- Quantities of equipment to be developed
- Schedules for development and production
- Size and weight of structural and electronic elements
- Amount of new design required and complexity of the development engineering task
- Hardware structural and electronic design repeat
- Operational environment of the hardware
- Type and manufacturing complexity of the structural/mechanical and electronics portion of the hardware

The outputs of these cost model runs can be found in Appendix A. Each page of output represents the estimated cost beakdown of one subsystem.

There are some subsystems for which the PRICE-H model was not used to estimate costs. In these cases, the rationale for estimating the cost is explained in the appropriate section of the report. Generally, these were cases where the subsystems were similar to Apollo or Freedom Space Station subsystems, in which case estimates could be derived directly from historical costs; or design data in the system's conceptual design report was insufficient to provide PRICE-H with the parameters necessary to perform the estimation, in which case less detailed cost estimating relationships were used.

While the PRICE-H model provides cost estimates for the development and production of system hardware, it does not evaluate the costs associated with system software. The development and production costs for software were not considered in this analysis. Exceptions include the software for the Guidance, Navigation and Control Systems and Data Management Systems onboard the lunar lander and orbital transfer vehicles. These system costs are further explained in the appropriate sections of the report.

3.0 System-Wide Assumptions

The following assumptions, unless specifically overridden for a particular subsystem, apply to all the systems whose costs were estimated.

- No systems are presumed to be government or contractor furnished, or direct purchase with no modification.
- All costs are stated in constant 1988 dollars.
- All masses are in kilograms and all volumes are in cubic decimeters.
- All development is presumed to begin in January, 1995.
- All production is presumed to begin in January, 2000.
- All design is presumed to be new design, but within an established product line, continuing the state of the art.
- The engineers are presumed to have normal experience, having previously completed similar type designs.
- **No spares or consumables are included** in the costs.
- The costs do not include new facilities costs.
- **Operations costs are not included.**
- The governing tolerances for fabricated parts or assemblies is 0.002".
- For machined or fabricated items, the assembly tolerances are presumed to be the same as the parts tolerances.
- The organization developing the integration plans knows how to integrate systems, but has never integrated this type of system before. Although the process is understood, no existing drawings, plans, or procedures can be used.
- Development will generally include the construction of one fully-operational prototype; the equivalent of a half a prototype to test integration with the launch vehicle; and the equivalent of one full prototype to account for the development of subsystem subassemblies. In addition, for systems that are to be integrated on the moon or in orbit, development will include the construction of the equivalent of a half a prototype for integration testing on the Earth.
- Integration costs include only those costs to integrate whole subsystems to one another. They do not include intra-subsystem integration, nor integration that occurs on the surface of the moon or in orbit (which is covered in the EVA/IVA unit costs).

4.0 Lunar Lander Costs

4.1 Lunar Lander Assumptions

The Lunar Lander is a single stage, multi-purpose vehicle designed for reuse and maintenance in space. It can carry cargos or crew to the lunar surface and will be returned to the LEO space station after each mission for refurbishment and propellant loading [1]. See Figure 4.1-1.

Tables 4.1-1 through 4.1-15 summarize the characteristics assumed for each of the Lunar Lander subsystems. For the purposes of costing, it was presumed that seven prototype vehicle equivalents would be produced during the development phase, three of which would be fully-functioning vehicles. Ten production vehicles would be manufactured. In some cases, additional prototypes of subsystems would be developed that would not be a part of a full prototype vehicle.

The software development and production costs for the Guidance, Navigation and Control System (GN&C) and the Data Management System (DMS) were not estimated with the Price-H model. Based on guidelines used to project flight software requirements for the CERV, the software for the Lander systems was estimated to contain 143,000 lines of code [2]. Projecting 3000 lines per man-year for coding and debugging (which is about 15% of the total software development effort) the total estimated effort would occupy 317 man-years. At $100K per man-year the cost would be $31.7M. Sixty percent of the total cost is attributed to development, or $19.02M, and 40% of the total cost is for production, or $12.68M.

Table 4.1-1, Lunar Lander Structures Subsystem Assumptions

Number of Prototypes:	7
Production Quantity:	10
Number of Subsystems Per System:	1
Structural Integration Complexity:	New, but familiar and routine
Primary Structural Material:	Filament wound tubes
Estimated Number of Parts Per Subsystem:	30
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	40%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Figure 4.1-1, Lunar Lander

Table 4.1-2, Lunar Lander Engines Subsystem Assumptions

Number of Prototypes:	18 (12 for 3 proto vehicles + 6)
Production Quantity:	40
Number of Subsystems Per System:	4
Structural Integration Complexity:	Moderately difficult, requiring alignment
Primary Structural Material:	Titanium alloy equivalent
Estimated Number of Parts Per Subsystem:	300
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	Difficult, requiring matching or timing
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%
Other Assumptions:	Assembly tolerances about 2X tighter than build tolerances of parts. New, state of the art technology being advanced.

Table 4.1-3, Lunar Lander RCS Distribution Subsystem Assumptions

Number of Prototypes:	10 (6 for 3 proto vehicles + 4)
Production Quantity:	20
Number of Subsystems Per System:	2
Structural Integration Complexity:	Difficult, requiring alignment or matching
Primary Structural Material:	Copper equivalent
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	New, but familiar and routine
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table **4.1-4**, Lunar Lander RCS Nozzle Cluster Subsystem Assumptions

Number of Prototypes:	16 (12 for 3 proto vehicles + 4)
Production Quantity:	40
Number of Subsystems Per System:	4
Structural Integration Complexity:	Routine
Primary Structural Material:	Titanium alloy equivalent
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	75%
Percentage of Structural Parts That Are Repeated:	80%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table **4.1-5**, Lunar Lander Landing Subsystem Assumptions

Number of Prototypes:	28 (7 proto vehicles)
Production Quantity:	40
Number of Subsystems Per System:	4
Structural Integration Complexity:	New, but familiar and routine
Primary Structural Material:	2024 Aluminum
Estimated Number of Parts Per Subsystem:	15
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 4.1-6, Lunar Lander Thermal Protection Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	10
Number of Subsystems Per System:	1
Structural Integration Complexity:	Difficult, requiring alignment or matching
Primary Structural Material:	Aluminized Kapton foil
Estimated Number of Parts Per Subsystem:	N/A
Percent of Structure That Is New Design:	75%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 4.1-7, Lunar Lander LO_2 Tank Subsystem Assumptions

Number of Prototypes:	14 (7 proto vehicles)
Production Quantity:	20
Number of Subsystems Per System:	2
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 4.1-8, Lunar Lander H_2 Tank Subsystem Assumptions

Number of Prototypes:	14 (7 proto vehicles)
Production Quantity:	20
Number of Subsystems Per System:	2
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 4.1-9, Lunar Lander DMS/GN&C Subsystem Assumptions

Number of Prototypes:	5 (3 proto vehicles +2)
Production Quantity:	10
Number of Subsystems Per System:	1
Structural Integration Complexity:	Difficult, requiring alignment or matching
Primary Structural Material:	N/A
Estimated Number of Parts Per Subsystem:	N/A
Percent of Structure That Is New Design:	20%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	State of the art, requiring calibration
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%
Other Assumptions:	New, state of the art technology being advanced.

Table **4.1-10**, Lunar Lander Electrical Power Subsystem Assumptions

Number of Prototypes:	5 (3 proto vehicles + 2)
Production Quantity:	10
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	1000
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	State of the art, requiring adjustments
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table **4.1-11**, Lunar Lander Airlock/Tunnel Subsystem Assumptions

Number of Prototypes:	7
Production Quantity:	10
Number of Subsystems Per System:	1
Structural Integration Complexity:	Moderately difficult, requiring alignment
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	30
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	30%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 4.1-12, Lunar Lander Crew Module Shell Subsystem Assumptions

Number of Prototypes:	7
Production Quantity:	7
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	25%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 4.1-13, Lunar Lander Crew Module ECLSS Subsystem Assumptions

Number of Prototypes:	5 (3 proto vehicles + 2)
Production Quantity:	7
Number of Subsystems Per System:	1
Structural Integration Complexity:	New but familiar and routine interface
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	1500
Percent of Structure That Is New Design:	80%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 4.1-14, Lunar Lander Crew Module Controls Subsystem Assumptions

Number of Prototypes:	5 (3 proto vehicles + 2)
Production Quantity:	7
Number of Subsystems Per System:	1
Structural Integration Complexity:	Moderately difficult, requiring alignment
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	State of the art, requiring adjustments
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	90%
Percentage of Electronics Boards Repeated:	0%

Table 4.1-15, Lunar Lander Crew Module Hatches Subsystem Assumptions

Number of Prototypes:	8 (4 proto vehicles)
Production Quantity:	14
Number of Subsystems Per System:	2
Structural Integration Complexity:	Moderately difficult, requiring alignment
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	30
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

4.2 Lunar Lander Subsystem Costs

Table 4.2-1 summarizes development and production costs for each of the Lunar Lander's subsystems. These costs are based on the assumptions outlined in section 4.1. A detailed breakout of these costs can be found in Appendix A.

Table 4.2-1, Lunar Lander Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Structures	$ 127.754	$ 90.297	$ 218.051
Engines	613.580	189.323	802.903
RCS Distribution	23.628	18.747	42.375
RCS Nozzle Cluster	3.465	4.895	8.360
Landing System	30.091	16.092	46.182
Thermal Protection	20.562	15.049	35.610
Oxygen Tanks	80.142	44.929	125.071
Hydrogen Tanks	45.881	24.346	70.227
DMS/GN&C (hw/electrical)	87.891	35.115	123.006
DMS/GN&C (sw)	19.020	12.680	31.700
Electrical Power	64.262	57.704	121.966
Airlock/Tunnel	28.843	13.316	42.159
Crew Module Shell	82.140	34.370	116.510
Crew Module ECLSS	118.522	69.063	187.585
Crew Module Controls	17.668	5.706	23.374
Crew Module Hatches	2.965	1.650	4.614
Integration	48.456	15.902	64.358
Total	$ 1414.867	$ 649.181	$2064.047

5.0 Lunar Oxygen Pilot Plant Costs

5.1 Lunar Oxygen Pilot Plant Assumptions

The Lunar Oxygen Pilot Plant is designed as a predecessor to a larger scale production facility. The pilot plant will produce two metric tons of oxygen per month using the method of hydrogen reduction of ilmenite. Using extensive automation and robotics applications, the plant will be operated for continuous periods without on-site human attention [3]. See Figure 5.1-1.

Tables 5.1-1 through 5.1-28 summarize the characteristics assumed for each of the Lunar Oxygen Pilot Plant subsystems. For the purposes of costing, it was presumed that three equivalent prototype plants would be produced during the development phase. One production system would be manufactured. The cost to integrate each of the major subsystems is not included in this estimate, as it is presumed that integration will occur on the Lunar surface, and Lunar setup costs are addressed elsewhere in this report.

Table 5.1-1, Lunar Oxygen Pilot Plant Feed Bin Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	25%
Percentage of Structural Parts That Are Repeated:	25%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

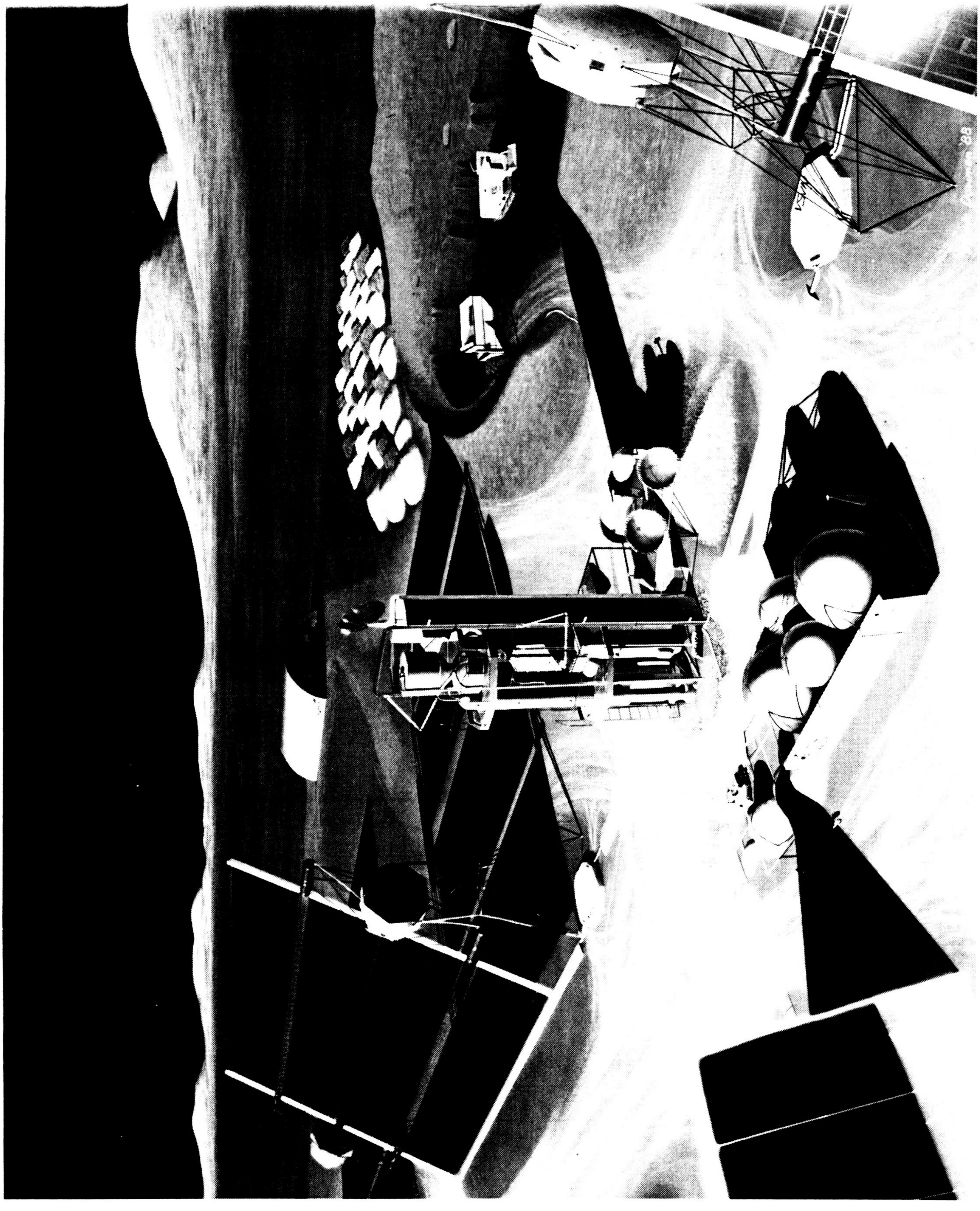


Figure 5.1-1, Lunar Oxygen Pilot Plant

Table 5.1-2, Lunar Oxygen Pilot Plant Primary Jaw Crusher Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Alloy Steel
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	10%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-3, Lunar Oxygen Pilot Plant Coarse Screen Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Alloy Steel
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	10%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-4, Lunar Oxygen Pilot Plant Secondary Crusher Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Alloy Steel
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	10%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-5, Lunar Oxygen Pilot Plant Secondary Screen Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Alloy Steel
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	10%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-6, Lunar Oxygen Pilot Plant Ball Mill Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Alloy Steel
Estimated Number of Parts Per Subsystem:	200
Percent of Structure That Is New Design:	80%
Percentage of Structural Parts That Are Repeated:	25%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-7, Lunar Oxygen Pilot Plant Fine Vibratory Screen Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Alloy Steel
Estimated Number of Parts Per Subsystem:	200
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	10%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table **5.1-8**, Lunar Oxygen Pilot Plant Storage Hopper Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	25%
Percentage of Structural Parts That Are Repeated:	25%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table **5.1-9**, Lunar Oxygen Pilot Plant Magnetic Separator Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	300
Percent of Structure That Is New Design:	80%
Percentage of Structural Parts That Are Repeated:	10%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-10, Lunar Oxygen Pilot Plant Low Pressure Feed Hopper Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	25%
Percentage of Structural Parts That Are Repeated:	25%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-11, Lunar Oxygen Pilot Plant High Pressure Feed Hopper Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Iron Base Alloy
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	25%
Percentage of Structural Parts That Are Repeated:	25%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-12, Lunar Oxygen Pilot Plant Reactor Subsystem Assumptions

Number of Prototypes:	5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Iron Base Alloy
Estimated Number of Parts Per Subsystem:	1000
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	40%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-13, Lunar Oxygen Pilot Plant Electric Heater Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Iron Base Alloy
Estimated Number of Parts Per Subsystem:	150
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	25%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-14, Lunar Oxygen Pilot Plant Electrolysis Cell Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Iron Base Alloy
Estimated Number of Parts Per Subsystem:	150
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	25%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%
Other Assumptions:	Build tolerances = .001"

Table 5.1-15, Lunar Oxygen Pilot Plant Blower Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Iron Base Alloy
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	25%
Percentage of Structural Parts That Are Repeated:	10%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-16, Lunar Oxygen Pilot Plant Cyclone Separators Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	3
Number of Subsystems Per System:	3
Structural Integration Complexity:	N/A
Primary Structural Material:	Iron Base Alloy
Estimated Number of Parts Per Subsystem:	20
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	40%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 5.1-17, Lunar Oxygen Pilot Plant Discharge Hopper Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Iron Base Alloy
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	25%
Percentage of Structural Parts That Are Repeated:	25%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-18, Lunar Oxygen Pilot Plant Tailings Conveyor Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	300
Percent of Structure That Is New Design:	70%
Percentage of Structural Parts That Are Repeated:	40%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-19, Lunar Oxygen Pilot Plant Oxygen Liquefier Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	300
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	10%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-20, Lunar Oxygen Pilot Plant LO_2 Storage Tanks Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	2
Number of Subsystems Per System:	2
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	150
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-21, Lunar Oxygen Pilot Plant Radiator/TCS Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	1000
Percent of Structure That Is New Design:	80%
Percentage of Structural Parts That Are Repeated:	40%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table **5.1-22**, Lunar Oxygen Pilot Plant Liquid Hydrogen Tank Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-23, Lunar Oxygen Pilot Plant Hydrogen Heater Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Iron Base Alloy
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	25%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 5.1-24, Lunar Oxygen Pilot Plant Hydrogen Blower Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Iron Base Alloy
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	25%
Percentage of Structural Parts That Are Repeated:	10%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0

Table 5.1-25, Lunar Oxygen Pilot Plant 3cm ID Pipe Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Iron Base Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	25%
Percentage of Structural Parts That Are Repeated:	75%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 5.1-26, Lunar Oxygen Pilot Plant 0.25cm Pipe Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Iron Base Alloy
Estimated Number of Parts Per Subsystem:	150
Percent of Structure That Is New Design:	25%
Percentage of Structural Parts That Are Repeated:	75%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 5.1-27, Lunar Oxygen Pilot Plant PV Power System Assumptions

Number of Prototypes:	4
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	N/A
Estimated Number of Parts Per Subsystem:	N/A
Percent of Structure That Is New Design:	75%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 5.1-28, Lunar Oxygen Pilot Plant Regenerative Fuel Cell Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Laminate Composite
Estimated Number of Parts Per Subsystem:	250
Percent of Structure That Is New Design:	75%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%
Other Assumptions:	Build tolerance = .001"

5.2 Lunar Oxygen Pilot Plant Subsystems Costs

Table 5.2-1 summarizes development and production costs for each of the Lunar Oxygen Pilot Plant's subsystems. These costs are based on the assumptions outlined in section 5.1. A detailed breakout of these costs can be found in Appendix A.

Table 5.2-1, Lunar Oxygen Pilot Plant Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Feed Bin	$ 4.263	$ .841	$ 5.104
Primary Jaw Crusher	25.868	5.474	31.342
Coarse Screen	.323	.038	.361
Secondary Crusher	10.785	2.086	12.871
Secondary Screen	.323	.038	.361
Ball Mill	74.330	14.230	88.560
Fine Vibrating Screen	22.502	5.155	27.656
Storage Hopper	1.015	.175	1.191
Magnetic Separator	15.468	2.466	17.934
Low Pressure Feed Hopper	.622	.093	.715
High Pressure Feed Hopper	2.384	.504	2.889
Reactor	256.608	26.986	283.594
Electric Heater	7.816	1.704	9.520
Electrolysis Cell	11.361	2.471	13.832
Blower	1.579	.367	1.946
Cyclone Separators	.087	.029	.116
Discharge Hopper	2.872	.637	3.509
Tailings Conveyor	1.955	.322	2.278
Oxygen Liquefier	10.275	2.066	12.341
LOX Storage Tanks	6.150	1.121	7.272
Radiator/TCS	65.605	13.846	79.451
Liquid Hydrogen Tanks	1.306	.110	1.417
Hydrogen Heater	.022	.002	.024
Hydrogen Blower	.496	.077	.574
3 Cm ID Pipe	5.352	1.307	6.659
.25 Cm ID Pipe	3.312	.824	4.136
Photovoltaic Power System	54.861	6.895	61.757
Regenerative Fuel Cell	144.275	32.434	176.709
Total	$ 731.815	$ 122.318	$ 854.133

6.0 Unpressurized Lunar Rover Costs

A subsystem weight and volume breakout was not provided in the conceptual design of the LOTRAN vehicle, so the PRICE-H cost model was not used to estimate costs for this system. Instead, a gross estimate was performed based on historical development and production costs for the Apollo Lunar Rover [4]. See Figure **6.1-1.**

Total development and production costs for prototypes and four production vehicles was $39,591,000 in 1969 dollars. Accounting for inflation, that would be $156,068,000 in 1988 dollars. A projected ratio of development costs to production costs for an equal number of prototypes and production vehicles was 3:1 [5]. Applying this ratio to the Apollo Lunar Rover program, costs could be broken out as follows:

Development -	$117,051,000
Production -	39,017,000
	$156,068,000

The Lunar Rover mass was 209.5 kg [6]. The LBSS Unpressurized Vehicle mass is estimated to be 550 kg, or 63% larger than the Lunar Rover [7]. An in-house cost-estimating relationship was used to scale up the costs to account for the increase in mass. The weight to cost relationship is log-log, and for structures a 60% increase in weight corresponds to approximately 20% increase in cost.

Applying this to the Lunar Rover costs, and presuming four prototype and four production vehicles will be manufactured, the Unpressurized Vehicle costs are estimated to be:

Development -	$140,000,000
Production -	47,000,000
	$187,000,000

Figure 6.1-1, Unpressurized Lunar Rover

7.0 Pressurized Lunar Rover Costs

7.1 Pressurized Lunar Rover Assumptions

The Pressurized Lunar Rover system is comprised of the Primary Control Research Vehicle (PCRV), the Habitation Trailer Unit (HTU), the Auxiliary Power Cart (APC), and the Experiment and Sample Trailer (EST) [7]. Collectively, this is known as MOSAP, or Mobile Surface Applications Traverse Vehicle. The complete rover assembles in a train configuration capable of traverses up to 1,500 km from the base. The pressurized rover missions would involve numerous stops and crew surface excursions, with an estimated trip time of 42 days. See Figure 7.1-1.

Tables 7.1-1 through 7.1-23 summarize the characteristics assumed for each of the PCRV subsystems. Tables 7.1-24 through 7.1-45 summarize the characteristics assumed for each of the HTU subsystems. Tables 7.1-46 through 7.1-52 summarize the characteristics assumed for each of the EST subsystems. The 1.5 megawatt-hour EST was chosen for costing. Tables 7.1-53 through 7.1-57 summarize the characteristics assumed for each of the APC subsystems.

For the purposes of costing, it was presumed that 4.5 prototype PCRV's, 3.5 prototype HTU's, 3.5 prototype EST's, and 1 prototype APC would be produced during the development phase. (The APC's are nearly identical to the Fuel Cell Power Cart described in Section 13, so additional prototypes were not deemed necessary). One production PCRV, one production HTU, five production EST's, and seven production APC's would be manufactured.

Many subsystems are similar or identical across these four vehicles. In such cases, the majority of the development work was arbitrarily assigned to the PCRV. New design was estimated to be 10% for the remaining vehicles for these subsystems.

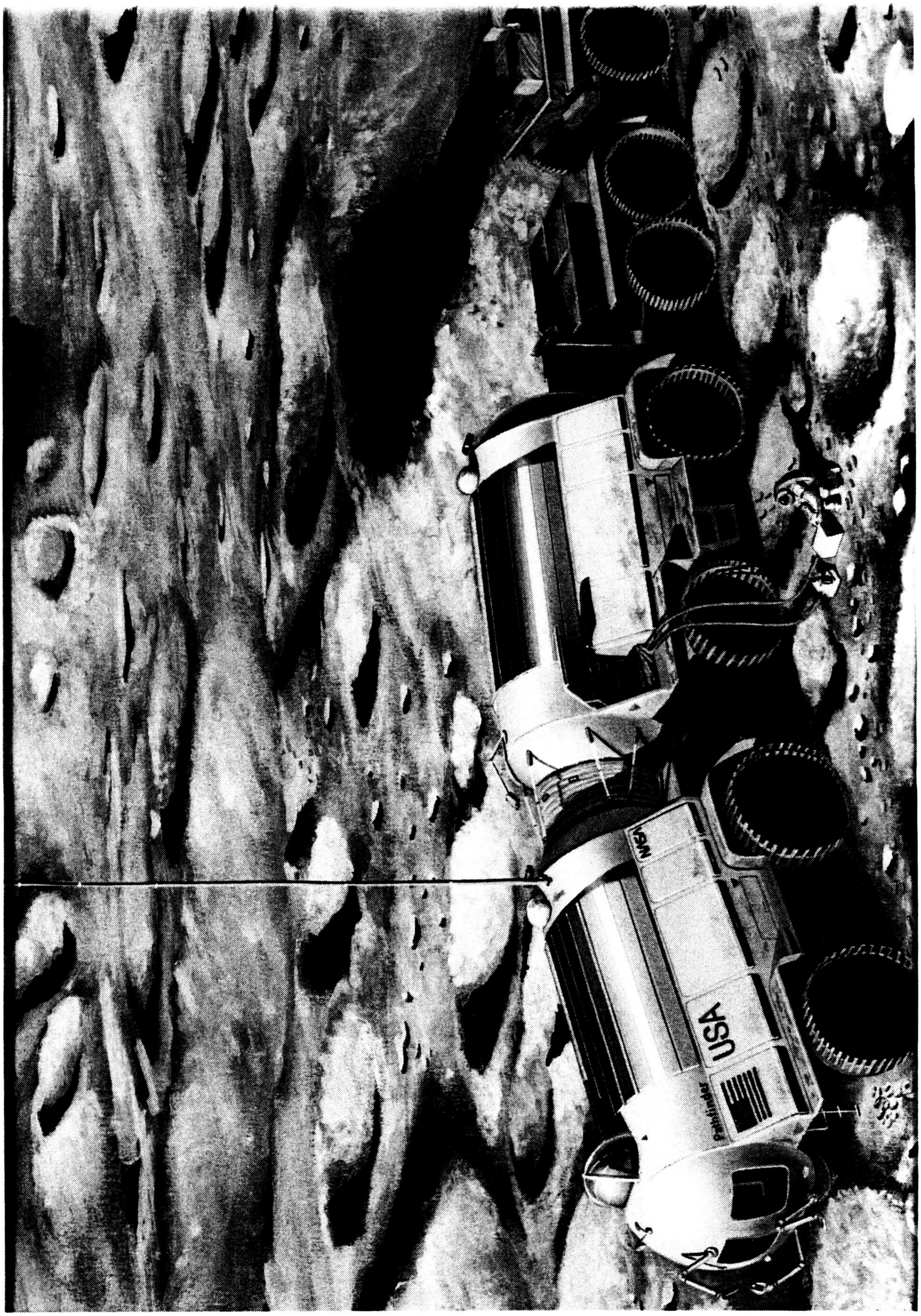


Figure 7.1-1, Pressurized Lunar Rover

Table 7.1-1, MOSAP PCRV Hydrogen Tanks Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-2, MOSAP PCRV Oxygen Tanks Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-3, MOSAP PCRV Water Tanks Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-4, MOSAP PCRV Non-regenerative Fuel Cells Subsystem Assumptions

Number of Prototypes:	6
Production Quantity:	2
Number of Subsystems Per System:	2
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Laminate composite, filament wound case
Estimated Number of Parts Per Subsystem:	250
Percent of Structure That Is New Design:	20%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	Advanced state of the art interfaces
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	50%
Percentage of Electronics Boards Repeated:	0%
Other Assumptions:	Build tolerance = .001"

Table 7.1-5, MOSAP PCRV Power Distribution Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	1000
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	Advanced state of the art interfaces
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-6, MOSAP PCRV Wheels and Locomotion Subsystem Assumptions

Number of Prototypes:	18
Production Quantity:	4
Number of Subsystems Per System:	4
Structural Integration Complexity:	Moderately difficult, requiring alignment
Primary Structural Material:	Steel
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-7, MOSAP PCRV Man Locks Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	2
Number of Subsystems Per System:	2
Structural Integration Complexity:	Moderately difficult, requiring alignment
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	Moderately difficult, requiring alignment
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-8, MOSAP PCRV Galley Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	Routine interfaces
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table **7.1-9**, MOSAP PCRV Personal Hygiene Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	2%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table **7.1-10**, MOSAP PCRV Emergency Equipment Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Simple interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-11, MOSAP PCRV Avionics Subsystem Assumptions

Number of Prototypes:	9
Production Quantity:	2
Number of Subsystems Per System:	2
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	N/A
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	Routine interfaces
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-12, MOSAP PCRV ECLSS Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	New, but familiar and routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	1500
Percent of Structure That Is New Design:	80%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	New, but familiar and routine interface
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-13, MOSAP PCRV Drive Stations Subsystem Assumptions

Number of Prototypes:	9
Production Quantity:	2
Number of Subsystems Per System:	2
Structural Integration Complexity:	New but familiar and routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	New but familiar and routine interfaces
Electronics Technology:	Digital VLSI, display with CRT
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-14, MOSAP PCRV Workstation Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	New, but familiar and routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	New, but familiar and routine interface
Electronics Technology:	Digital VLSI, display with CRT
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-15, MOSAP PCRV Sleep Quarters Subsystem Assumptions

Number of Prototypes:	9
Production Quantity:	2
Number of Subsystems Per System:	2
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	10
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-16, MOSAP PCRV Inner Shell Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Simple interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	10
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	80%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-17, MOSAP PCRV Outer Shell Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Simple interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	10
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	80%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-18, MOSAP PCRV Other Structure Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Simple interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	500
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-19, MOSAP PCRV Insulation Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminized Kapton Foil
Estimated Number of Parts Per Subsystem:	N/A
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-20, MOSAP PCRV Radiator Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	New but familiar and routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	90%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-21, MOSAP PCRV Thermal Pump Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	New but familiar and routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	10
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	New but familiar and routine interface
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-22, MOSAP PCRV Heat Exchanger Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	New but familiar and routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	10
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-23, MOSAP PCRV Thermal System Piping Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	500
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	60%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-24, MOSAP HTU Hydrogen Tanks Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-25, MOSAP HTU Oxygen Tanks Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-26, MOSAP HTU Water Tanks Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-27, MOSAP HTU Non-regenerative Fuel Cells Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	2
Number of Subsystems Per System:	2
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Laminate composite, filament wound case
Estimated Number of Parts Per Subsystem:	250
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	Advanced state of the art interfaces
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	10%
Percentage of Electronics Boards Repeated:	0%
Other Assumptions:	Build tolerance = .001"

Table 7.1-28, MOSAP HTU Power Distribution Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	1000
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	Advanced state of the art interfaces
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	10%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-29, MOSAP HTU Wheels and Locomotion Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	4
Number of Subsystems Per System:	4
Structural Integration Complexity:	Moderately difficult, requiring alignment
Primary Structural Material:	Steel
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-30, MOSAP HTU Man Locks Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	2
Number of Subsystems Per System:	2
Structural Integration Complexity:	Moderately difficult, requiring alignment
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	Moderately difficult, requiring alignment
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	10%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-31, MOSAP HTU Galley Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	Routine interfaces
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	10%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-32, MOSAP HTU Personal Hygiene Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	2%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-33, MOSAP HTU Shower Subsystem Assumptions

Number of Prototypes:	4.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Simple interface
Primary Structural Material:	Laminate composite
Estimated Number of Parts Per Subsystem:	20
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-34, MOSAP HTU Emergency Equipment Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Simple interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-35, MOSAP HTU Avionics Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	2
Number of Subsystems Per System:	2
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	N/A
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	Routine interfaces
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	10%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-36, MOSAP HTU ECLSS Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	New, but familiar and routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	1500
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	New, but familiar and routine interface
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	10%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-37, MOSAP HTU Workstation Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	New, but familiar and routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	New, but familiar and routine interface
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	10%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-38, MOSAP HTU Inner Shell Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Simple interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	10
Percent of Structure That Is New Design:	5%
Percentage of Structural Parts That Are Repeated:	80%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-39, MOSAP HTU Outer Shell Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Simple interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	10
Percent of Structure That Is New Design:	5%
Percentage of Structural Parts That Are Repeated:	80%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-40, MOSAP HTU Other Structure Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Simple interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	500
Percent of Structure That Is New Design:	5%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-41, MOSAP HTU Insulation Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	N/A
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-42, MOSAP HTU Radiator Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	New but familiar and routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	90%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-43, MOSAP HTU Thermal Pump Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	New but familiar and routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	10
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	New but familiar and routine interface
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	10%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-44, MOSAP HTU Heat Exchanger Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	New but familiar and routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	10
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-45, MOSAP HTU Thermal System Piping Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	500
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	60%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-46, MOSAP EST Bed Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	5
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	1
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-47, MOSAP EST Remote Manipulator Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	5
Number of Subsystems Per System:	1
Structural Integration Complexity:	New but familiar and routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	Advanced state of the art interfaces
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-48, MOSAP EST Hydrogen Tanks Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	5
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-49, MOSAP EST Oxygen Tanks Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	5
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-50, MOSAP EST Water Tanks Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	5
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-51, MOSAP EST Non-regenerative Fuel Cells Subsystem Assumptions

Number of Prototypes:	2.5
Production Quantity:	5
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Laminate composite
Estimated Number of Parts Per Subsystem:	250
Percent of Structure That Is New Design:	10%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	Advanced state of the art interfaces
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	10%
Percentage of Electronics Boards Repeated:	0%
Other Assumptions:	Build tolerance = .001"

Table 7.1-52, MOSAP EST Cart Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	5
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	20
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	40%
Electronics Integration Complexity:	Routine interface
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 7.1-53, MOSAP APC Hydrogen Tanks Subsystem Assumptions

Number of Prototypes:	1
Production Quantity:	28
Number of Subsystems Per System:	4
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Graphite/epoxy, filament wound
Estimated Number of Parts Per Subsystem:	3
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-54, MOSAP APC Oxygen Tanks Subsystem Assumptions

Number of Prototypes:	1
Production Quantity:	28
Number of Subsystems Per System:	4
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Graphite/epoxy, filament wound
Estimated Number of Parts Per Subsystem:	3
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-55, MOSAP APC Water Tanks Subsystem Assumptions

Number of Prototypes:	1
Production Quantity:	28
Number of Subsystems Per System:	4
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	3
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 7.1-56, MOSAP APC Fuel Cells Subsystem Assumptions

Number of Prototypes:	0
Production Quantity:	28
Number of Subsystems Per System:	4
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Laminate composite
Estimated Number of Parts Per Subsystem:	250
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	30%
Electronics Integration Complexity:	Advanced state of the art interfaces
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	50%
Percentage of Electronics Boards Repeated:	30%

Table 7.1-57, MOSAP APC Cart Subsystem Assumptions

Number of Prototypes:	2
Production Quantity:	7
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	20
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	40%
Electronics Integration Complexity:	Routine interface
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

7.2 Pressurized Lunar Rover Subsystems Costs

Tables 7.2-1 through 7.2-4 summarize development and production costs for each of the Pressurized Lunar Rover's subsystems. These costs are based on the assumptions outlined in section 7.1. A detailed breakout of these costs can be found in Appendix A.

Table 7.2-1, MOSAP Primary Control Research Vehicle Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Inner Shell	$ 10.661	$ 1.240	$ 11.901
Outer Shell	10.836	1.262	12.097
Other Structure	19.042	2.478	21.519
Insulation	1.515	.297	1.812
Radiator	5.708	.861	6.568
Thermal Pump	3.885	.254	4.139
Heat Exchanger	5.213	.305	5.518
Thermal System Piping	9.779	1.277	11.056
Hydrogen Tanks	3.485	.268	3.752
Oxygen Tanks	2.818	.211	3.029
Water Tanks	5.825	.472	6.297
Fuel Cell	7.152	2.641	9.793
Power Distribution	16.218	2.934	19.152
Wheels and Locomotion	13.903	2.362	16.266
Man Locks	32.526	5.309	37.836
Galley	13.079	1.223	14.302
Personal Hygiene	7.133	1.037	8.169
Emergency Equipment	1.197	.326	1.523
Avionics	12.206	1.513	13.719
ECLSS	48.358	8.399	56.756
Drive Stations	24.943	3.872	28.815
Work Stations	20.720	2.846	23.567
Sleep Quarters	4.238	.330	4.568
Integration	11.242	1.163	12.405
Total	$ 291.679	$ 42.883	$ 334.562

Table 7.2-2, MOSAP Habitation Trailer Unit Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Inner Shell	$ 5.294	$ 1.264	$ 6.558
Outer Shell	5.379	1.299	6.678
Other Structure	7.387	2.600	9.987
Insulation	1.312	.302	1.614
Radiator	3.605	.870	4.474
Thermal Pump	.715	.267	.982
Heat Exchanger	1.120	.318	1.437
Thermal System Piping	4.218	1.319	5.537
Hydrogen Tanks	.421	.101	.522
Oxygen Tanks	.334	.080	.413
Water Tanks	.736	.180	.916
Fuel Cell	3.708	2.743	6.451
Power Distribution	6.575	3.083	9.659
Wheels and Locomotion	2.524	2.477	5.001
Man Locks	8.229	5.752	13.980
Galley	2.955	1.291	4.246
Personal Hygiene	2.971	1.079	4.050
Shower	12.571	1.178	13.749
Emergency Equipment	1.027	.332	1.360
Avionics	1.963	1.680	3.643
ECLSS	18.927	9.049	27.976
Work Stations	4.730	3.045	7.775
Integration	9.680	1.051	10.731
Total	$ 106.381	$ 41.359	$ 147.740

Table 7.2-3, MOSAP Experiment and Sample Trailer Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Bed	$ 6.732	$ 1.121	$ 7.852
Remote Manipulator System	9.597	2.343	11.940
Fuel Cell	2.689	4.386	7.074
Hydrogen Tank	.702	.107	.809
Oxygen Tank	.702	.107	.809
Water Tank	.702	.107	.809
Cart	14.119	4.219	18.338
Integration	1.874	.349	2.223
Total	$ 37.115	$ 12.739	$ 49.854

Table 7.2-4, MOSAP Auxiliary Power Cart Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Oxygen Tanks	$ 3.567	6.034	9.601
Hydrogen Tanks	4.690	8.385	13.075
Water Tanks	3.567	6.034	9.061
Fuel Cell	8.789	59.882	68.671
Cart	11.792	5.078	16.870
Integration	6.039	2.060	8.099
Total	$ 38.444	$ 87.473	$ 125.917

8.0 Solar Power Plant Costs

8.1 Solar Power Plant Assumptions

The Solar Power Plant consists of a fixed flat array of gallium arsenide cells for solar collection and a regenerative fuel cell system for lunar night energy storage. The fuel/electrolysis cell modules and associated tanks are sized for 25 kW. The plant is configured with four modules for a total of 100 kW [8]. See Figure **8.1-1**.

Tables **8.1-1** through **8.1-8** summarize the characteristics assumed for each of the Solar Power Plant subsystems. For the purposes of costing, it was presumed that six prototype equivalents would be produced during the development phase. One production system would be manufactured.

The PRICE-H cost model was not used to cost the solar arrays. Rather, a cost per watt calculation was performed based on an equation developed for the Space Station [9]. The projected total cost in 1983 dollars for a Gallium Arsenide array was $100-150 per watt, or $129-193 per watt in 1988 dollars. Using the upper end of the range, solar array cost for a 100 kW system would be $19,305,000.

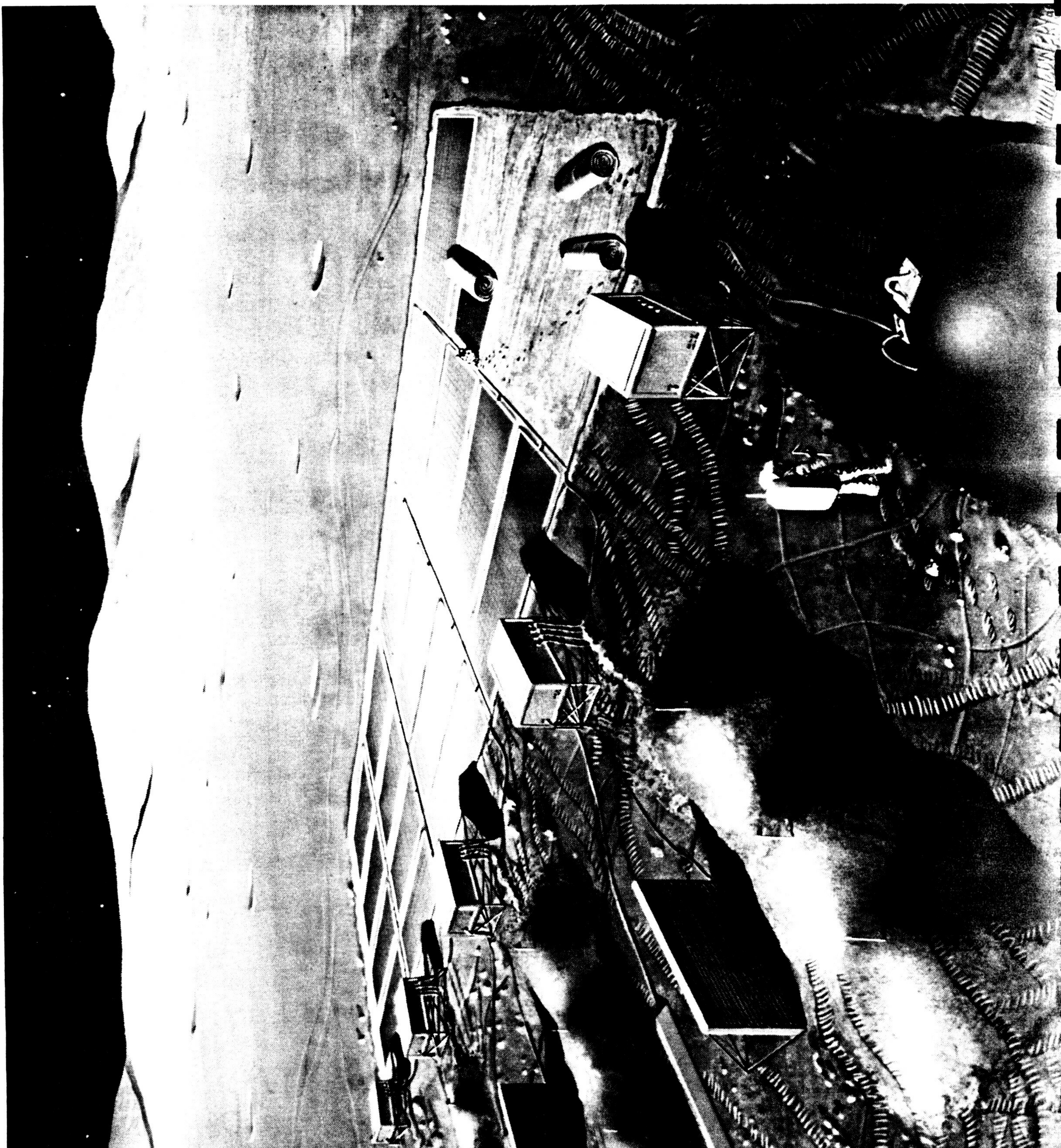


Figure 8.1-1, Solar Power Plant

Table 8.1-1, Solar Power Plant Regenerative Fuel Cells Subsystem Assumptions

Number of Prototypes:	6
Production Quantity:	4
Number of Subsystems Per System:	4
Structural Integration Complexity:	N/A
Primary Structural Material:	Laminate composite
Estimated Number of Parts Per Subsystem:	250
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%
Other Assumptions:	Build tolerance = .001"

Table 8.1-2, Solar Power Plant Electrolysis Cells Subsystem Assumptions

Number of Prototypes:	6
Production Quantity:	4
Number of Subsystems Per System:	4
Structural Integration Complexity:	N/A
Primary Structural Material:	Iron base alloy
Estimated Number of Parts Per Subsystem:	150
Percent of Structure That Is New Design:	25%
Percentage of Structural Parts That Are Repeated:	25%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%
Other Assumptions:	Build tolerance = .001"

Table 8.1-3, Solar Power Plant Radiator Subsystem Assumptions

Number of Prototypes:	6
Production Quantity:	4
Number of Subsystems Per System:	4
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	90%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 8.1-4, Solar Power Plant Oxygen Tanks Subsystem Assumptions

Number of Prototypes:	6
Production Quantity:	4
Number of Subsystems Per System:	4
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Laminate composite
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 8.1-5, Solar Power Plant Oxygen Tank Lining Subsystem Assumptions

Number of Prototypes:	6
Production Quantity:	4
Number of Subsystems Per System:	4
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	3
Percent of Structure That Is New Design:	75%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 8.1-6, Solar Power Plant Hydrogen Tanks Subsystem Assumptions

Number of Prototypes:	6
Production Quantity:	4
Number of Subsystems Per System:	4
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Laminate composite
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 8.1-7, Solar Power Plant Hydrogen Tank Lining Subsystem Assumptions

Number of Prototypes:	6
Production Quantity:	4
Number of Subsystems Per System:	4
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	3
Percent of Structure That Is New Design:	75%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 8.1-8, Solar Power Plant Water Tanks Subsystem Assumptions

Number of Prototypes:	6
Production Quantity:	4
Number of Subsystems Per System:	4
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

8.2 Solar Power Plant Subsystems Costs

Table 8.2-1 summarizes development and production costs for each of the Solar Power Plant's subsystems. These costs are based on the assumptions outlined in section 8.1. A detailed breakout of these costs can be found in Appendix A.

Table 8.2-1, Solar Power Plant Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Fuel Cells	$ 32.487	$ 13.416	$ 45.903
Electrolysis Cells	40.409	18.393	58.802
Radiators	32.149	15.971	48.120
Solar Array	7.722*	11.583*	19.305
Oxygen Tanks	66.249	19.946	86.195
Oxygen Tank Lining	2.016	.412	2.428
Hydrogen Tanks	100.513	30.971	131.484
Hydrogen Tank Lining	2.016	.412	2.428
Water Tank	16.112	3.635	19.747
Integration	14.100	3.603	17.704
Total	$ 313.773	$ 118.342	$ 432.116

* 40% of total has been allocated to development and 60% to production, the same ratio as the other Solar Power Plant subsystems.

9.0 Logistics Module Costs

9.1 Logistics Module Assumptions

In the case of permanent lunar base occupancy, Logistics Modules will be developed to deliver spares and consumables to the lunar surface. The design for the logistic supply module evolved into three module types depending on the requirements of the payload. These include a pressurized supply module, a tank module, and pallet modules [10]. See Figure **9.1-1**.

Tables **9.1-1** through **9.1-3** summarize the characteristics assumed for each of the Logistics Module subsystems. For the purposes of costing, it was presumed that 2.5 prototype module equivalents of the Supply and Fluid Shipping Modules would be produced during development, but no prototypes of the Pallets is necessary because they have already been developed. One production version of the Supply and Fluid Shipping Modules would be manufactured, and three production Pallets would be manufactured.

Table **9.1-1**, Logistics Supply Module Subsystem Assumptions

Number of Prototypes:	2.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	350
Percent of Structure That Is New Design:	40%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	0%
Percentage of Electronics Boards Repeated:	15%

PRECEDING PAGE BLANK NOT FILMED

PAGE 76 INTENTIONALLY BLANK

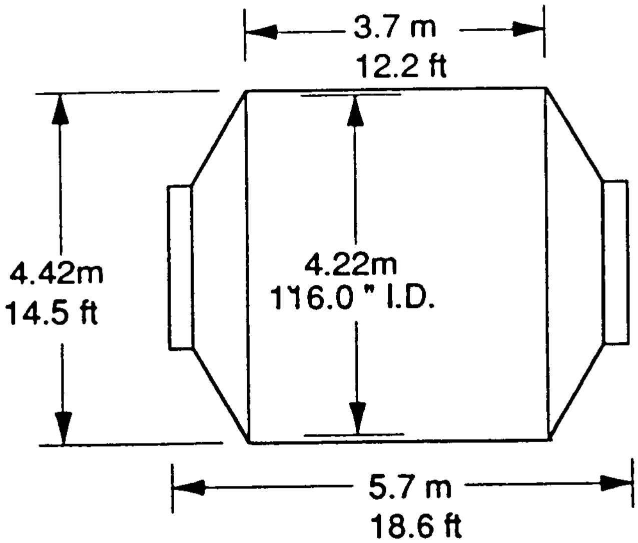


Figure 9.1-1 Logistics Supply Module

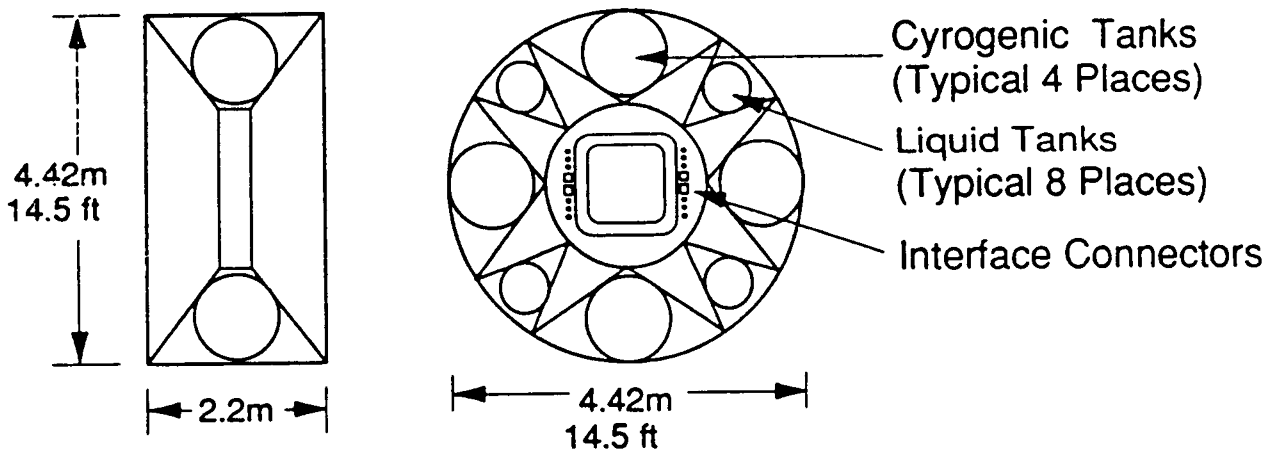


Figure 9.1-2 Fluid Shipping Module

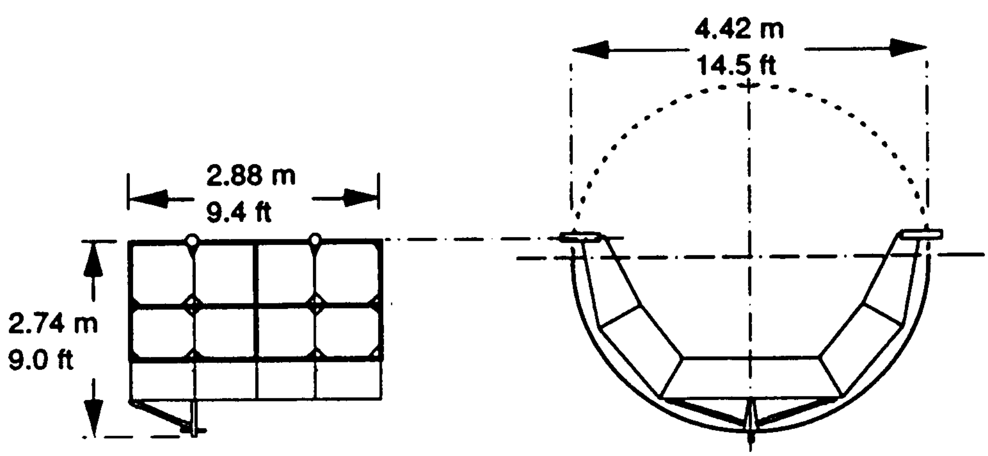


Figure 9.1-3 Logistics Module Pallets

Table 9.1-2, Fluid Shipping Module Subsystem Assumptions

Number of Prototypes:	2.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	350
Percent of Structure That Is New Design:	60%
Percentage of Structural Parts That Are Repeated:	30%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	0%
Percentage of Electronics Boards Repeated:	15%

Table 9.1-3, Logistics Module Pallets Subsystem Assumptions

Number of Prototypes:	0
Production Quantity:	3
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	0%
Percentage of Structural Parts That Are Repeated:	80%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

9.2 Logistics Module Subsystems Costs

Table 9.2-1 summarizes development and production costs for each of the Logistics Module subsystems. These costs are based on the assumptions outlined in section 9.1. A detailed breakout of these costs can be found in Appendix A.

Table 9.2-1, Logistics Module Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Logistics Supply Module	$ 161.439	$ 42.650	$ 204.089
Fluid Shipping Module	80.806	23.616	104.422
Logistics Module Pallets	-	41.274	41.274
Total	$ 242.245	$ 107.540	$ 349.785

10.0 Storm Shelter Costs

10.1 Storm Shelter Assumptions

The Earth-fabricated Storm Shelter is capable of supporting four men for a period of up to 10 days, while a solar flare is in progress. This type of shelter is considered applicable for missions of up to 30 days duration. A Partial Protection Garment is recommended for exposure to high radiation fields during surface operations performed in a spacesuit [11]. See Figures **10.1-1** and **10.1-2**.

Tables **10.1-1** and **10.1-2** summarize the characteristics assumed for the solar protection system. For the purposes of costing, it was presumed that four prototype Partial Protection Garments and 3.5 prototype Four-Man Storm Shelters would be produced during the development phase. Five production garments and two production shelters would be manufactured.

Figure 10.1-1, Partial Protection Garment

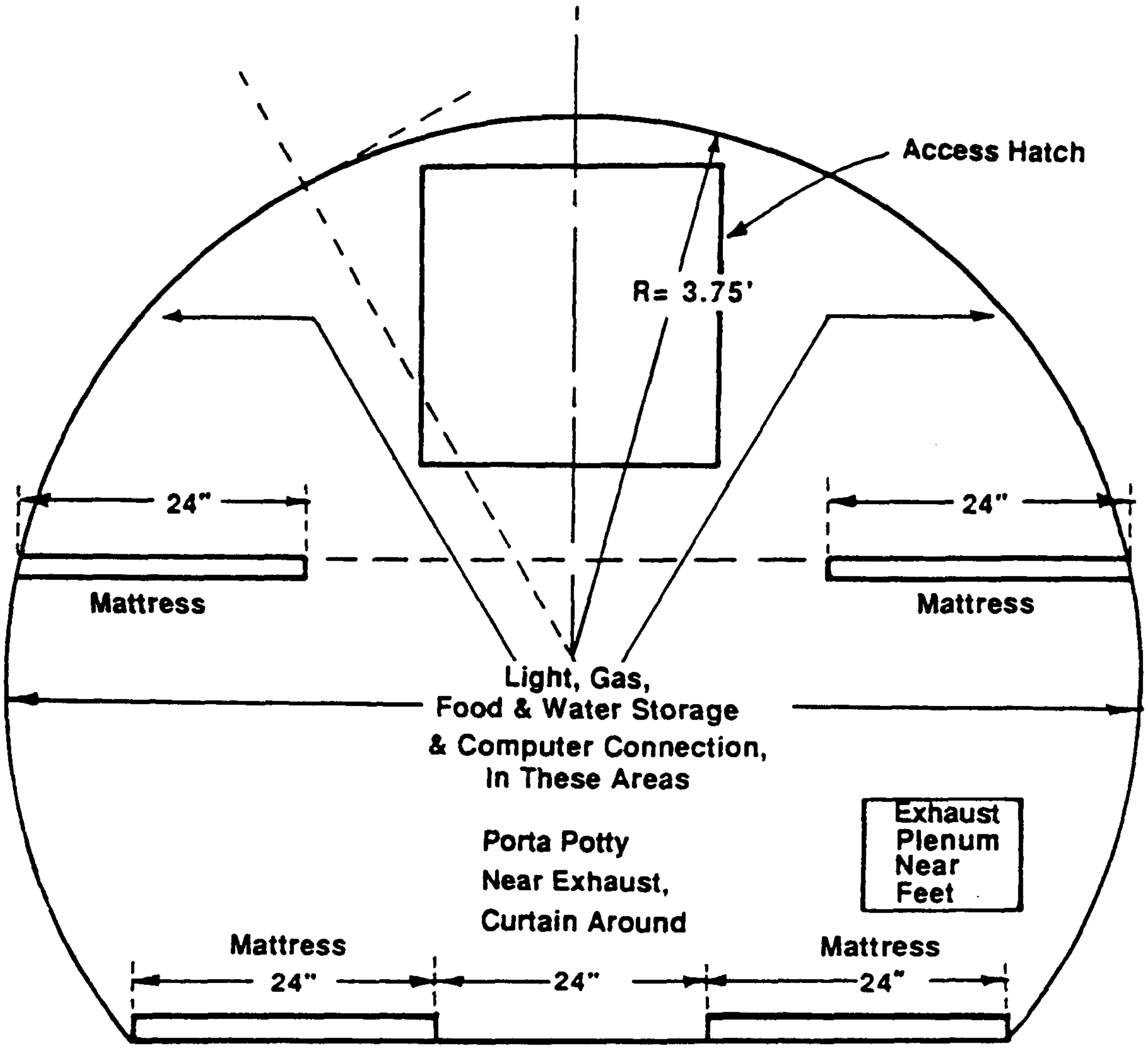


Figure 10.1-2, Four-Man Storm Shelter

Table 10.1-1, Partial Protection Garment Subsystem Assumptions

Number of Prototypes:	4
Production Quantity:	5
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Laminate composites
Estimated Number of Parts Per Subsystem:	3
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 10.1-2, Four-Man Storm Shelter Subsystem Assumptions

Number of Prototypes:	3.5
Production Quantity:	2
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	20
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	10%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	15%
Percentage of Electronics Boards Repeated:	10%

10.2 Storm Shelter Subsystems Costs

Table 10.2-1 summarizes development and production costs for each of the Storm Shelter subsystems. These costs are based on the assumptions outlined in section 10.1. A detailed breakout of these costs can be found in Appendix A.

Table 10.2-1, Storm Shelter Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Partial Protection Garment	$ 11.227	$ 3.994	$ 15.221
Four-Man Shelter	229.709	66.432	296.141
Total	$ 240.936	$ 70.426	$ 311.362

11.0 Space Transportation Node Costs

11.1 Space Transportation Node Assumptions

The low Earth orbit Space Transportation Node is intended to support a reusable transportation system for lunar flights. The node is oriented exclusively toward the assembly, refurbishment, maintenance, propellant loading, checkout, and repeated reuse and launch of cargo and piloted vehicles going to the lunar surface. The STN will support up to eight flights per year to the lunar surface and a fleet mainly consisting of reusable OTVs that deliver reusable lander/launchers to low lunar orbit [12]. See Figure **11.1-1**.

Tables **11.1-1** through **11.1-6** summarize the characteristics assumed for the Space Transportation Node subsystems unique to the LBSS design analysis. For the purposes of costing, it was presumed that three prototypes of each subsystem would be produced during the development phase. One Space Transportation Node would be manufactured for orbital operations.

The remaining subsystems that comprise the node are derived from the current Freedom Space Station design configuration. These subsystems include the truss/mobile transporter/airlock structures, habitation modules, nodes, solar power generation system, thermal control system, data management system, communications/tracking, GN&C, propulsion, mechanisms, utilities and EVA systems. The cost estimates for the common node subsystems were derived from current Space Station cost analyses [13].

However, projected cost ratios were used for estimating the power and pressurized volume costs. Cost per watt and cost per cubic meter calculations were performed based on equations developed for the Space Station [14]. The projected total cost for the solar power system in 1988 dollars is \$8.17K/watt. For the Space Transportation Node requirement of 65,809 watts, the power system cost would be \$537,660K. The projected total cost for pressurized volume in 1988 dollars is \$4028K/m^3. Note that pressurized volumes include the habitation modules and the nodes. For the Space Transportation Node requirement of five modules and ten nodes, totalling 1617 m^3, the pressurized volume cost would be \$6,513,276K.

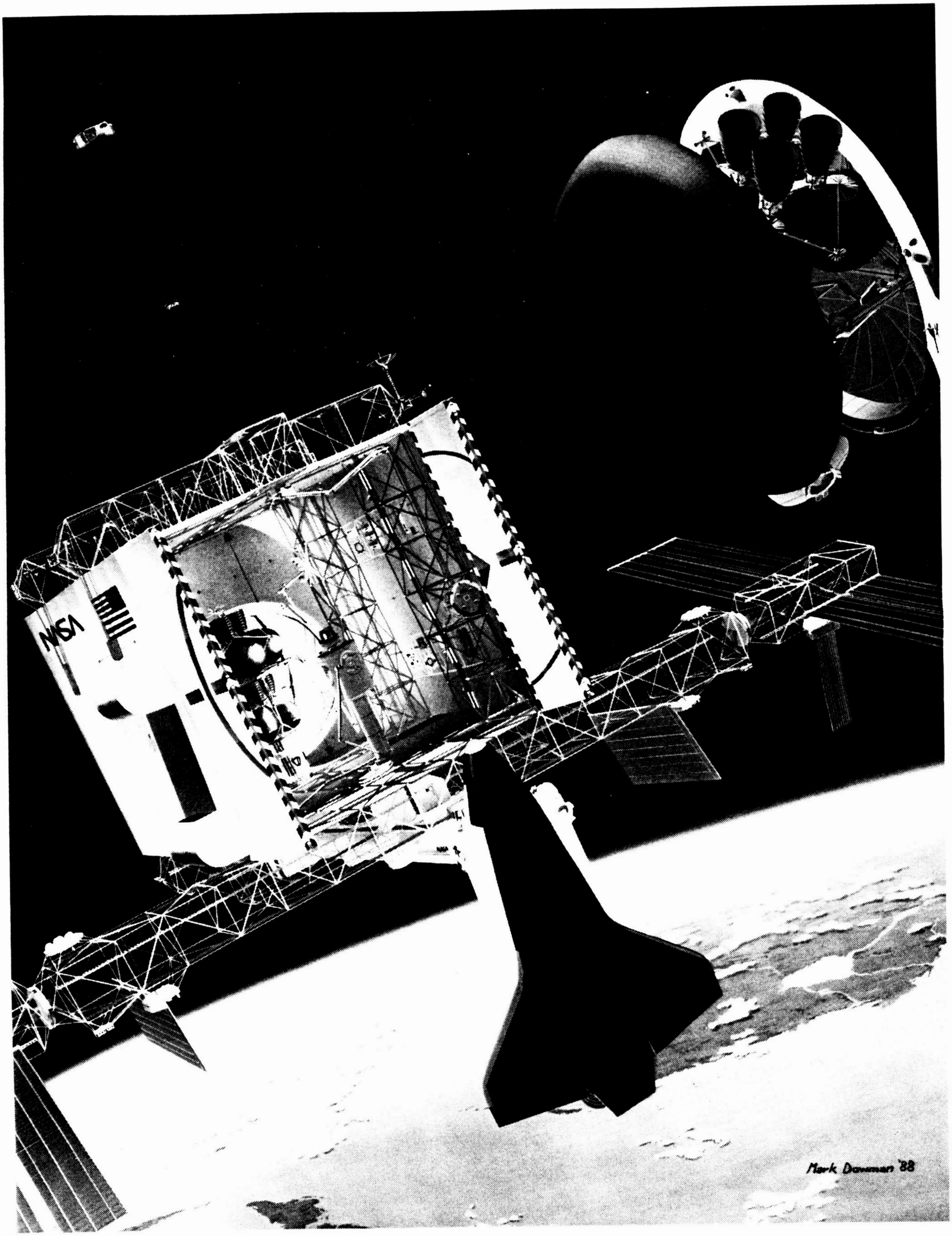


Figure 11.1-1, Space Transportation Node

Table 11.1-1, Space Transportation Node Hangar Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	75
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 11.1-2, Space Transportation Node Hangar Tunnel Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 11.1-3, Space Transportation Node Storage Tanks Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	8
Number of Subsystems Per System:	4
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	300
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 11.1-4, Space Transportation Node Propellant Transfer Lines Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	8
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 11.1-5, Space Transportation Node HLLV Resupply Interface Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 11.1-6, Space Transportation Node Lander/OTV Prop Interface Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	150
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

c-2

11.2 Space Transportation Node Subsystems Costs

Table 11.2-1 summarizes development and production costs for each of the Space Transportation Node subsystems. These costs are based on the assumptions outlined in section 11.1. A detailed breakout of these costs can be found in Appendix A.

Table 11.2-1. Space Transportation Node Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Hangar	$ 210.223	$ 31.947	$ 242.170
Hangar Tunnel	29.045	2.894	31.938
Storage Tanks	262.983	130.549	393.532
Propellant Transfer Lines	189.590	28.519	218.109
HLLV Tanker Resupply Intf.	11.730	1.138	12.868
Lander/OTV Prop Boom & Intf.	30.392	3.668	34.060
Truss, mbl transp., airlock	66.488	22.163	88.651
Habitation Modules & Nodes	4884.957	1628.319	6513.276
Solar Power System	403.245	134.415	537.660
Thermal Control Sys/Radiators	139.185	46.395	185.580
DMS	248.550	82.850	331.400
Communications & Tracking	266.573	88.858	355.431
GN&C	84.510	28.170	112.680
Propulsion/Attitude control	80.160	26.720	106.880
Mechanisms	64.620	21.540	86.160
Utilities	14.910	4.970	19.880
EVA Systems	232.295	77.465	309.860
Total	$7219.456	$2360.58	$9580.036

12.0 Surface Construction Equipment Costs

12.1 Surface Construction Equipment Assumptions

The equipment for lunar surface construction includes one crane, one loader, two haulers, and three trailers. See Figures **12.1-1** and **12.1-2**. Subsystem weight and volume breakdowns were not provided in the conceptual design report; therefore, the Price H cost model was not used to estimate costs for the construction equipment [15]. Instead, a gross estimate was performed based on comparisons with the development and unit production costs for the Unpressurized Lunar Rover.

The crane, consisting of two booms and a stationary/mobile platform, has a projected development cost ratio to the rover of 1:1 and a production cost ratio to the rover of 1.5:1. The front-end loader with manned controls has an estimated development cost ratio to the rover of 0.5:1 and a production cost ratio of 1:1. The haulers, or mobile repository bins, have a development cost ratio of 0.5:1 and a production cost ratio of 0.9:1. The trailer, consisting of a module caddy on a mobile platform, has a development ratio to the rover of 0.5:1 and a production ratio of 0.75:1.

Figure 12.1-1, Crane, Front-End Loader, and Hauler

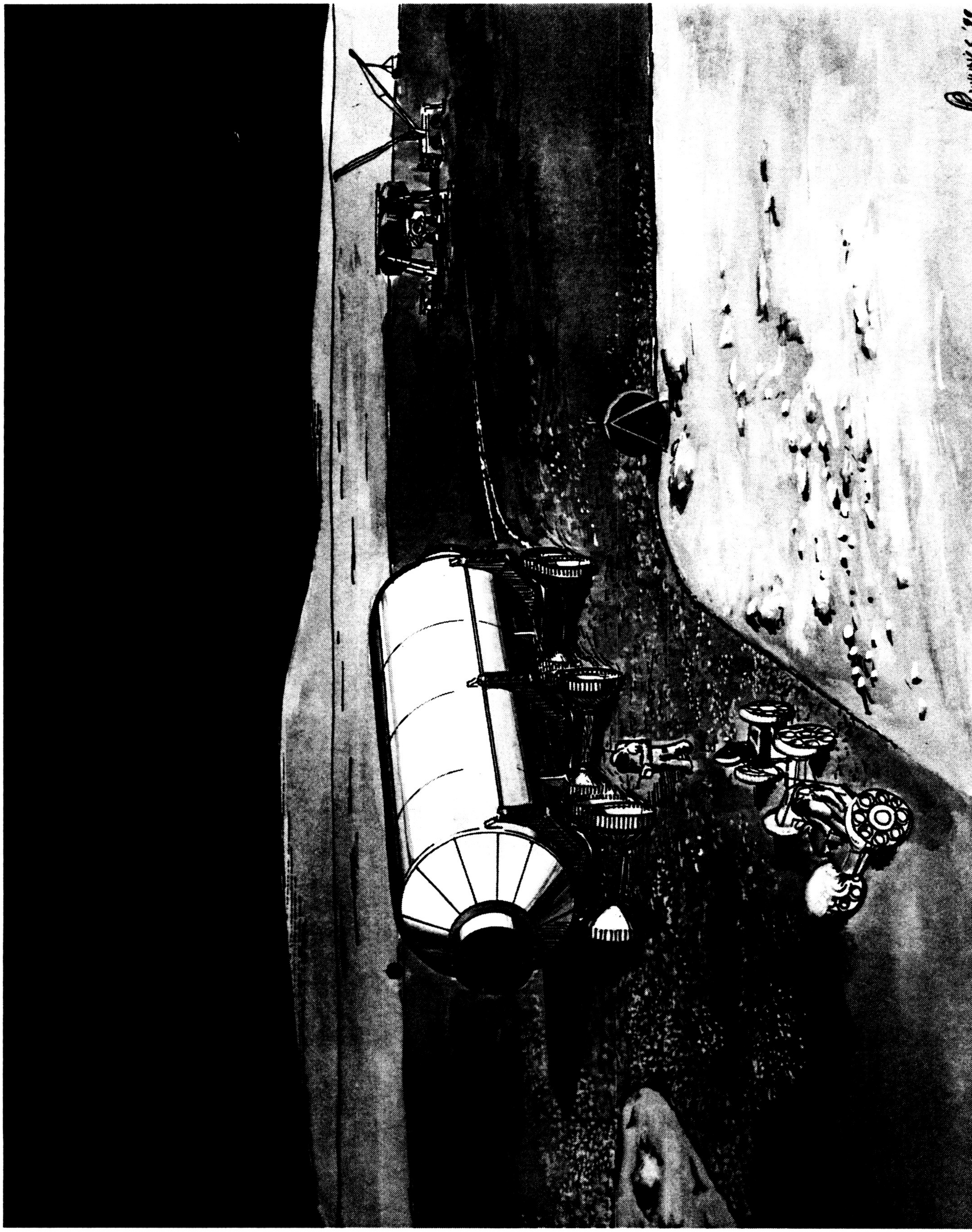


Figure 12.1-2, Trailers

12.2 Surface Construction Equipment Subsystems Costs

Table 12.2-1 summarizes development and production costs for each piece of surface construction equipment. These costs are based on the assumptions outlined in section 12.1.

Table 12.2-1, Surface Construction Equipment Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Cranes	$140	$18	$158
Front-End Loaders	70	12	82
Haulers	70	22	92
Trailers	70	27	97
Total	$350	$79	$429

13.0 Fuel Cell Power Cart Costs

13.1 Fuel Cell Power Cart Assumptions

The Fuel Cell Power Cart provides portable, supplemental power to vehicles stationed at the landing pad. The power system primarily consists of cryogenic hydrogen and oxygen tanks, liquid water tanks, and a fuel cell system mounted on a four-wheeled cart [16]. See Figure 13.1-1.

Table 13.1-1 summarizes the characteristics assumed for the Fuel Cell Power Cart system. For the purposes of costing, it was presumed that 2.5 prototype carts would be produced during the development phase, while one production cart would be manufactured.

Table 13.1-1, Fuel Cell Power Cart System Assumptions

Number of Prototypes:	2.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	500
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	20%

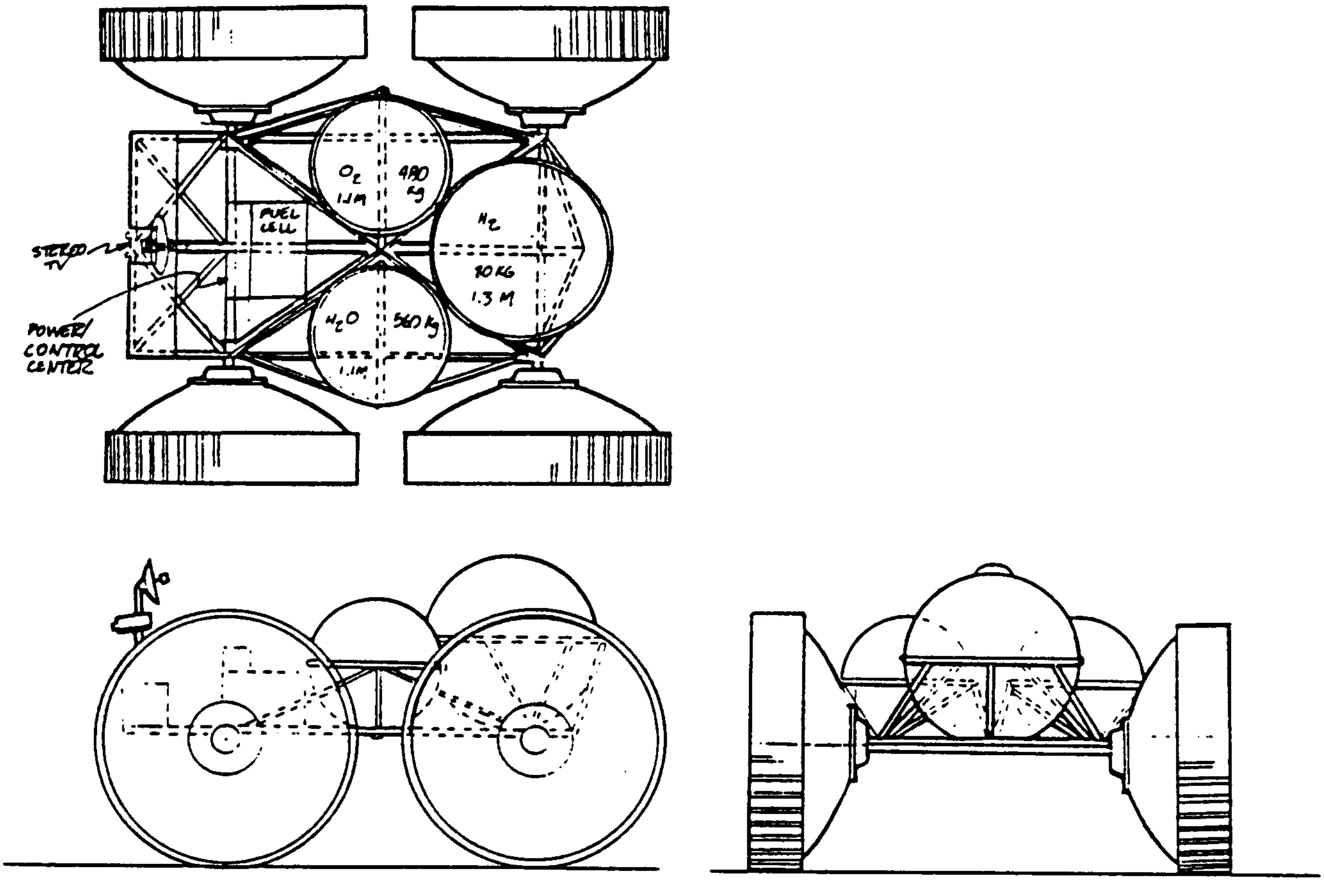


Figure 13.1-1, Fuel Cell Power Cart

13.2 Fuel Cell Power Cart System Costs

Table **13.2-1** summarizes development and production costs for the Fuel Cell Power Cart system. These costs are based on the assumptions outlined in section 13.1. A detailed breakout of these costs can be found in Appendix A.

Table **13.2-1**, Fuel Cell Power Cart System Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Fuel Cell Power Cart	$ 69.813	$ 13.310	$82.123

14.0 Supplemental Cooling Cart Costs

14.1 Supplemental Cooling Cart Assumptions

The Supplemental Cooling Cart provides additional cooling capability to piloted vehicles on the landing pad. A supplemental cooling system will add radiator surface area to the lander so the vehicle can handle the extensive heat loads experienced during lunar day [16]. See Figure 14.1-1.

Table 14.1-1 summarizes the characteristics assumed for the Supplemental Cooling Cart system. For the purposes of costing, it was presumed that 2.5 prototype carts would be produced during the development phase, while one production cart would be manufactured.

Table 14.1-1, Supplemental Cooling Cart System Assumptions

Number of Prototypes:	2.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	150
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

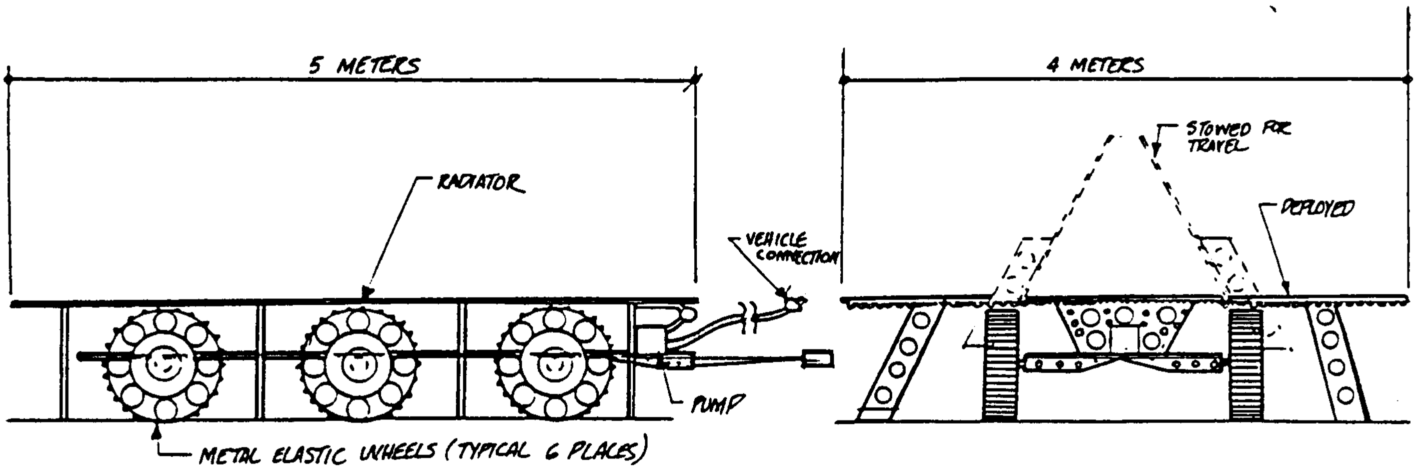


Figure 14.1-1, Supplemental Cooling Cart

14.2 Supplemental Cooling Cart Systems Costs

Table 14.2-1 summarizes development and production costs for the Supplemental Cooling Cart system. These costs are based on the assumptions outlined in section 14.1. A detailed breakout of these costs can be found in Appendix A.

Table 14.2-1, Supplemental Cooling Cart System Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Supplemental Cooling Cart	$ 45.067	$ 7.183	$ 52.250

15.0 Orbital Transfer Vehicle Costs

15.1 Orbital Transfer Vehicle Assumptions

The Orbital Transfer Vehicle is a multi-purpose vehicle designed for reuse and maintenance in space. Its payload capability includes crew or cargo to be transported from low Earth orbit to low lunar orbit. The OTV is intended to be returned to the LEO space station after each mission for refurbishment and refueling [17]. See Figure 15.1-1.

Tables 15.1-1 through 15.1-15 summarize the characteristics assumed for each of the Orbital Transfer Vehicle subsystems. For the purposes of costing, it was presumed that seven prototype vehicle equivalents would be produced during the development phase, three of which would be fully-functioning vehicles. Ten production vehicles would be manufactured. In some cases, additional prototypes of subsystems would be developed that would not be a part of a full prototype vehicle.

The software development and production costs for the Guidance, Navigation and Control System (GN&C) and the Data Management System (DMS) were not estimated with the Price-H model. Based on guidelines used to project flight software requirements for the CERV, the software for the OTV systems was estimated to contain 123,000 lines of code [2]. Projecting 3000 lines per man-year for coding and debugging, (which is about 15% of the total software development effort) the total estimated effort would occupy 273 man-years. At $100K per man-year the cost would be $27.3M. Sixty percent of the total cost is attributed to development, or $16.38M, and 40% of the total cost is for production, or $10.92M.

Table 15.1-1, OTV Structures Subsystem Assumptions

Number of Prototypes:	7
Production Quantity:	10
Number of Subsystems Per System:	1
Structural Integration Complexity:	New, but familiar and routine
Primary Structural Material:	Laminate composites
Estimated Number of Parts Per Subsystem:	30
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

PRECEDING PAGE BLANK NOT FILMED

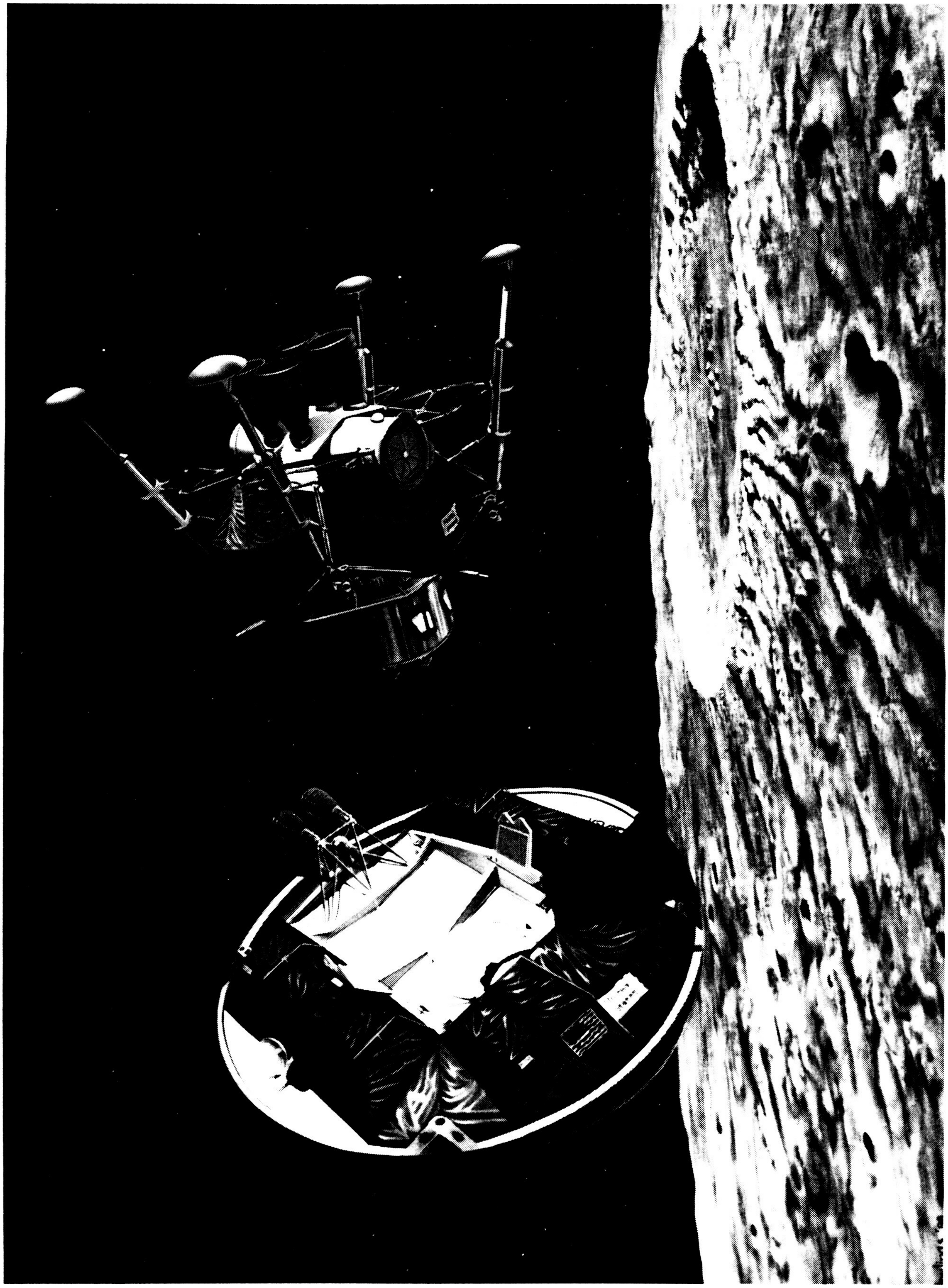


Figure 15.1-1, Orbital Transfer Vehicle

Table 15.1-2, OTV Engines Subsystem Assumptions

Number of Prototypes:	18 (12 for 3 proto vehicles + 6)
Production Quantity:	40
Number of Subsystems Per System:	4
Structural Integration Complexity:	Moderately difficult, requiring alignment
Primary Structural Material:	Titanium alloy equivalent
Estimated Number of Parts Per Subsystem:	300
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	Difficult, requiring matching or timing
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%
Other Assumptions:	Assembly tolerances about 2X tighter than build tolerances of parts. New, state of the art technology being advanced.

Table 15.1-3, OTV RCS Distribution Subsystem Assumptions

Number of Prototypes:	10 (6 for 3 proto vehicle, OTV Thermal Protection Subsystem Assumptions
Number of Prototypes:	3
Production Quantity:	10
Number of Subsystems Per System:	1
Structural Integration Complexity:	Difficult, requiring alignment or matching
Primary Structural Material:	Aluminized Kapton foil
Estimated Number of Parts Per Subsystem:	N/A
Percent of Structure That Is New Design:	75%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 15.1-4, OTV RCS Nozzle Cluster Subsystem Assumptions

Number of Prototypes:	36 (24 for 3 proto vehicles + 4)
Production Quantity:	80
Number of Subsystems Per System:	8
Structural Integration Complexity:	Routine
Primary Structural Material:	Titanium alloy equivalent
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	75%
Percentage of Structural Parts That Are Repeated:	67%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 15.1-5, OTV Thermal Protection Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	10
Number of Subsystems Per System:	1
Structural Integration Complexity:	Difficult, requiring alignment or matching
Primary Structural Material:	Aluminized Kapton foil
Estimated Number of Parts Per Subsystem:	N/A
Percent of Structure That Is New Design:	75%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 15.1-6, OTV Oxygen Tank Subsystem Assumptions

Number of Prototypes:	14 (7 proto vehicles)
Production Quantity:	20
Number of Subsystems Per System:	2
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 15.1-7, OTV Hydrogen Tank Subsystem Assumptions

Number of Prototypes:	14 (7 proto vehicles)
Production Quantity:	20
Number of Subsystems Per System:	2
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 15.1-8, OTV DMS/GN&C Subsystem Assumptions

Number of Prototypes:	5 (3 proto vehicles + 2)
Production Quantity:	10
Number of Subsystems Per System:	1
Structural Integration Complexity:	Difficult, requiring alignment or matching
Primary Structural Material:	N/A
Estimated Number of Parts Per Subsystem:	N/A
Percent of Structure That Is New Design:	20%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	State of the art, requiring calibration
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%
Other Assumptions:	New, state of the art technology being advanced.

Table 15.1-9, OTV Electrical Power Subsystem Assumptions

Number of Prototypes:	5 (3 proto vehicles + 2)
Production Quantity:	10
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine interface
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	1000
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	50%
Electronics Integration Complexity:	State of the art, requiring adjustments
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 15.1-10, OTV Crew Module Shell Subsystem Assumptions

Number of Prototypes:	7
Production Quantity:	7
Number of Subsystems Per System:	1
Structural Integration Complexity:	Routine
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	100
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	25%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 15.1-11, OTV Crew Module ECLSS Subsystem Assumptions

Number of Prototypes:	5 (3 proto vehicles + 2)
Production Quantity:	7
Number of Subsystems Per System:	1
Structural Integration Complexity:	New but familiar and routine interface
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	1500
Percent of Structure That Is New Design:	80%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table 15.1-12, OTV Crew Module Controls Subsystem Assumptions

Number of Prototypes:	5 (3 proto vehicles + 2)
Production Quantity:	7
Number of Subsystems Per System:	1
Structural Integration Complexity:	Moderately difficult, requiring alignment
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	50
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	State of the art, requiring adjustments
Electronics Technology:	Digital VLSI
Percent of Electronics That Is New Design:	90%
Percentage of Electronics Boards Repeated:	0%

Table 15.1-13, OTV Crew Module Hatches Subsystem Assumptions

Number of Prototypes:	8 (4 proto vehicles)
Production Quantity:	14
Number of Subsystems Per System:	2
Structural Integration Complexity:	Moderately difficult, requiring alignment
Primary Structural Material:	Aluminum alloy
Estimated Number of Parts Per Subsystem:	30
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

Table **15.1-14**, OTV Aerobrake Shell Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	10
Number of Subsystems Per System:	1
Structural Integration Complexity:	Moderately difficult, requiring alignment
Primary Structural Material:	Shuttle-type tiles
Estimated Number of Parts Per Subsystem:	4000
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	85%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A
Other Assumptions:	New, state of the art technology being advanced. Build tolerance = .001"

Table **15.1-15**, OTV Aerobrake Structure Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	10
Number of Subsystems Per System:	1
Structural Integration Complexity:	Moderately difficult, requiring alignment
Primary Structural Material:	Laminate composites
Estimated Number of Parts Per Subsystem:	20
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	25%
Electronics Integration Complexity:	N/A
Electronics Technology:	N/A
Percent of Electronics That Is New Design:	N/A
Percentage of Electronics Boards Repeated:	N/A

15.2 Orbital Transfer Vehicle Subsystem Costs

Table 15.2-1 summarizes development and production costs for the Orbital Transfer Vehicle subsystems. These costs are based on the assumptions outlined in section 15.1. A detailed breakout of these costs can be found in Appendix A.

Table 15.2-1, Orbital Transfer Vehicle Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Structures	$ 136.791	$ 104.315	$ 241.106
Engines	303.331	130.969	434.300
RCS Distribution	23.628	18.747	42.375
RCS Nozzle Cluster	7.022	8.549	15.571
Thermal Protection	20.562	15.049	35.610
Oxygen Tanks	79.387	44.467	123.854
Hydrogen Tanks	45.881	24.346	70.227
DMS/GN&C (hw/electrical)	87.891	35.115	123.006
DMS/GN&C (sw)	16.380	10.920	27.300
Electrical Power	39.678	26.470	66.148
Aerobrake Shell	373.631	469.473	843.103
Aerobrake Structure	58.756	41.394	100.150
Crew Module Shell	82.140	34.370	116.510
Crew Module ECLSS	101.399	54.604	156.002
Crew Module Controls	17.668	5.706	23.374
Crew Module Hatches	2.965	1.650	4.614
Integration	66.754	32.580	99.334
Total	$ 1463.862	$1058.723	$ 2522.584

16.0 Low Earth Orbit Launcher Costs

The Low Earth Orbit Launcher was not included in the LBSS design analyses; however, the launcher cost is discussed here in order to provide a more thorough estimate of the lunar transportation systems. The Saturn V rocket, stages S-IC and S-II, was selected as a reference since it has a history of lifting large masses into low Earth orbit, and development and production costs are available for this vehicle. Table 16.0-1 provides the relevant cost information in 1988 dollars for the subsystems of the two Saturn stages.

The Saturn-IC and Saturn-II combination were capable of delivering approximately 152,000 kg into low Earth orbit [18].

The production cost estimate accounts for the procurement of 47 expendable vehicles. Twenty-five of the 47 launches to low Earth orbit are dedicated to delivering ten OTV/lander stacks with accompanying propellant in addition to 250 mt of lunar base cargo. The remaining 22 launches are required to deliver 338 mt of cargo and the necessary OTV/lander propellant. Note that the total mass estimate for all the lunar base systems, excluding the OTV's and landers, equals approximately 588 mt, and one stack of OTV/lander propellant equals approximately 151 mt, or one Saturn V launch.

Table 16.0-1, Low Earth Orbit Launcher (Saturn V) Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
SATURN-IC			
Structures	$ 1252.914	$ 4449.302	$ 5702.216
Avionics	345.216	400.675	745.891
5 F1 Engines	1015.907	1880.000	2895.907
SATURN-II			
Structures	1113.335	3992.556	5105.891
Avionics	98.603	512.206	610.809
5 J2 Engines	336.230	1930.995	2267.225
Total	$4,162.205	$13,165.734	$17,327.939

17.0 Landing Pad Costs

17.1 Landing Pad Assumptions

The Landing Pad for an initial, manned lunar base requires a variety of facilities and equipment to assist in landing and launch operations [16]. The Landing Pad Markers are designed to assist flight crews in visually locating the pad. The Transfer Tunnel functions as a pressurized crew transport facility capable of interfacing between the lander and the pressurized rover. The Propellant Refill Vehicle is used for loading and unloading propellants, either liquid hydrogen or liquid oxygen, from tanks on board the lander vehicle. The Electric Cord Power Supply system allows for supplemental power to the landing pad. The system consists of a 1-kilometer long cord on a spool which is mounted on a cart for extension capability to the central, lunar-base, power supply. See Figure 17.1-1.

Tables 17.1-1 through 17.1-4 summarize the characteristics assumed for each of the Landing Pad subsystems. For the purposes of costing, it was presumed that 3 prototype equivalents of the Markers and Transfer Tunnel and 2.5 prototype equivalents of the Electric Cord Power Supply and the Propellant Refill Vehicle would be produced during development. One production version of the Landing Pad subsystems would be manufactured, except for the Markers which would be manufactured in quantities of eight.

Table 17.1-1, Landing Pad Markers Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	8
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	25
Percent of Structure That Is New Design:	50%
Percentage of Structural Parts That Are Repeated:	0%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

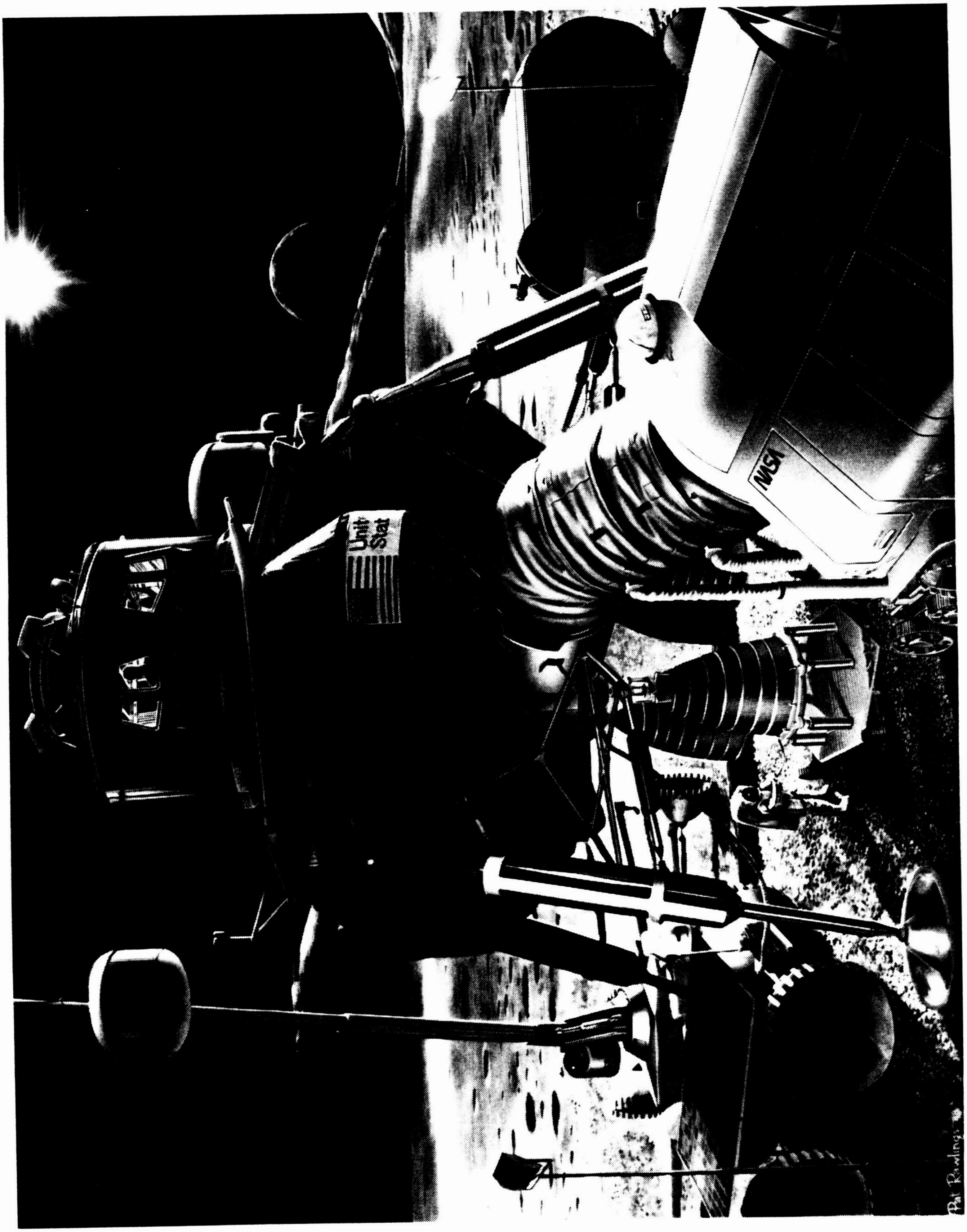


Figure 17.1-1, Landing Pad

Table 17.1-2, Landing Pad Electric Cord Power Supply Subsystem Assumptions

Number of Prototypes:	2.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Copper
Estimated Number of Parts Per Subsystem:	150
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 17.1-3, Landing Pad Propellant Refill Vehicle Subsystem Assumptions

Number of Prototypes:	2.5
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	150
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	0%

Table 17.1-4, Landing Pad Transfer Tunnel Subsystem Assumptions

Number of Prototypes:	3
Production Quantity:	1
Number of Subsystems Per System:	1
Structural Integration Complexity:	N/A
Primary Structural Material:	Aluminum Alloy
Estimated Number of Parts Per Subsystem:	300
Percent of Structure That Is New Design:	100%
Percentage of Structural Parts That Are Repeated:	15%
Electronics Integration Complexity:	N/A
Electronics Technology:	Digital LSI
Percent of Electronics That Is New Design:	100%
Percentage of Electronics Boards Repeated:	15%

17.2 Landing Pad Subsystems Costs

Table 17.2-1 summarizes development and production costs for the Landing Pad subsystems. These costs are based on the assumptions outlined in section 17.1. A detailed breakout of these costs can be found in Appendix A.

Table 17.2-1, Lunar Landing Pad Subsystem Estimated Costs ($Millions)

Subsystem	Development	Production	Total
Pad Markers	$ .927	$ .327	$ 1.254
Electric Cord Power Supply	39.210	6.287	45.497
Propellant Refill Vehicle	372.064	64.496	436.560
Transfer Tunnel	169.145	32.928	202.073
Total	$ 581.346	$ 104.038	$ 685.384

18.0 Transportation Costs

The cost to transport hardware from the Earth's surface to the lunar surface was estimated based on a five-stage process:

- an expendable heavy lift vehicle (HLV, described in section 16 of this report) would place the payload into Earth orbit, along with the propellants required to transport it to the moon;

- the payload would be moved to an Orbital Transfer Vehicle/Lander combination (described in sections 15 and 4, respectively), which would haul the Lander's propellant and the payload from Earth orbit to lunar orbit;

- the Lander would bring the payload to the surface of the moon, where it would be off-loaded;

- the Lander would ascend from the lunar surface and re-dock with the OTV;

- the OTV/Lander combination would return to low-Earth orbit.

The process is presumed to be essentially unmanned. Human physical intervention would occur at the Earth-orbiting transportation node to assist in transferring the payload to the OTV and to fuel the OTV and lander; and at the lunar surface, to assist in off-loading the payload. These human intervention costs are not included in the transportation costs (see section 19.0, Setup Costs).

An OTV/Lander combination can carry a 25 MT payload from LEO to the lunar surface, and return empty, using 150 MT of propellant [1]. The capacity of the HLV is 152 MT (see section 16 of this report). Therefore, seven HLV flights are required to deliver into orbit enough payload and propellant for six OTV/Lander flights. In order to calculate the per-kilogram transportation cost, a cost was derived for a 25 MT mission (one OTV/Lander and 7/6 of an HLV) and the result divided by 25 MT.

The transportation costs are comprised of:

- launch and flight operations costs;
- propellant costs;
- vehicle hardware costs;
- contractor administration costs;
- research & program management, or R&PM costs (civil service institutional costs);
- and tracking network support costs.

Each of these is discussed in turn. A summary of transportation costs is provided in table **18.0-1**.

Operations costs include such items as mission planning, vehicle assembly, payload processing and integration, launch control, and mission control. We assumed that operations activities would be similar to those presumed by the Congressional Office of Technology Assessment for the proposed Titan V heavy-lift ELV, whose per-launch operations costs were estimated to be

$157M [22]. Ten percent was added to this number to account for flight operations costs beyond Earth orbit.

Propellant estimates for the HLV were derived from Saturn V specifications, which used LO_2/RP-1 in a 2.55:1 ratio for the first stage, and LO_2/LH_2 in a 6:1 ratio for the second stage. The first stage used 2,085,736 kg of propellant, and the second stage used 441,218 kg. Therefore, the HLV is presumed to consume 1,876,392 kg of LO_2 (at $0.12 per kg), 63,031 kg of LH_2 (at $7.06 per kg), and 587,531 kg of RP-1 (at $0.52 per kg). The total propellant cost for one LEL flight is $975,682. Propellant cost for 7/6 of a LEL flight is $1,138,296.

The 150,000 kg of propellant required for the OTV/Lander is comprised of 128,571 kg of LO_2 and 21,429 kg of LH_2, costing a total of $194,500.

The entire hardware cost of the HLV is included in the transportation cost. Production cost for 47 vehicles was estimated to be $13,165,734,000, or $280,122,000 per vehicle. Seven-sixths of this is $326,809,000.

Although reusable, the OTV and Lander have a finite lifetime over which their production costs are spread. This amortized production cost is included in the transportation costs. It was presumed that these vehicles would be used ten times before refurbishment and maintenance costs would equal the cost of a whole new vehicle, therefore their production costs are spread over ten flights.

Contractor administration costs for the Shuttle are estimated to be 0.53% of operations and hardware costs. R&PM costs for the Shuttle are 13.5% of operations, hardware, and network support costs [23]. These same percentages were used for the HLV.

Network support costs were assumed to be approximately the same as for the Shuttle, which was estimated to be $2,555,098 per flight [23].

Table **18.0-1**, Summary of Transportation Costs To Emplace 25 MT on the Lunar Surface

Operations	$172,700,000	
Propellant		
- 1st Stage To LEO	566,184	
- 2nd Stage to LEO	572,113	
- OTV and Lander	194,500	
Hardware		
- HLV	326,809,000	
- OTV	10,587,230	
- Lander	6,491,810	
Contractor Administration	2,737,917	
R&PM	70,084,324	
Network Support	2,555,098	
Total	$593,298,176	Cost per Kilogram: $23,732

19.0 Setup Costs

The setup costs to emplace systems on the lunar surface include the hours associated with extravehicular activity (EVA) and intravehicular activity (IVA). Any activity requiring the use of an extravehicular mobility unit (EMU) and portable life support system constitutes an EVA; whereas an activity performed in a pressurized volume is considered an IVA.

The cost estimate for an EVA hour was based on the current rates charged by NASA for EVA performance during a National Space Transportation System mission [19]. The EVA optional service is divided into two types: a planned payload EVA, which is incorporated into the mission timeline, and a contingency payload EVA, which is not incorporated into the mission timeline but may be required for mission success. A planned EVA requires more extensive crew training and integrated simulations and includes the cost of EMU refurbishment and expendables. Because of the uncertainty of a contingency EVA, the price does not include the costs for premission integrated simulations, refurbishments, or expendables. With respect to the setup of a lunar base, it is assumed that a lunar EVA qualifies for the planned category.

NSTS EVA's are further classified by level of complexity: simple, intermediate, and complex. For the purposes of extrapolating for a lunar scenario, the EVA complexity is estimated as the equivalent of an NSTS intermediate. An intermediate EVA requires development of new payload-unique tools and equipment. Existing procedures and techniques require modifications and more extensive crew training in order to accomplish the tasks. A lunar surface EVA was not considered complex since the designated activities are performed in a gravity environment, therefore access or restraint problems and mobility aids are not as important an issue as in zero gravity.

The cost for an NSTS planned, intermediate (two-person) EVA is $505,420 in 1988 dollars. Using an average EVA duration of six hours, the cost is $84,237 per hour. This EVA unit cost does not include extensive training, such as the practice sessions performed in the wet facility. It is assumed that extensive crew training in specialized facilities will not be required for a lunar EVA; rather the crew will be generally trained for a variety of surface activities. Note that the projected EVA costs do not include the procurement of EVA equipment, such as EMU's, portable life support systems, and tools. An estimate for EVA system costs is not provided here since the crew size and EVA equipment designs have not been defined.

The projected unit cost for a Space Station EVA is quoted as $58,000 per hour and an accompanying IVA unit cost of $20,000 per hour [14]. The Space Station comparison of EVA cost to IVA cost, approximately 35%, was used to derive the IVA unit cost for a lunar base. For the setup of the lunar base, IVA cost is estimated at $29,483 per hour.

20.0 References

1. Lunar Lander Conceptual Design, NASA Contract #NAS9-17878, EEI Report #88-181, March 30, 1988.

2. Don Osgood, CERV Flight Software Position Paper, Eagle Engineering, Inc., June 17, 1988.

3. Conceptual Design of a Lunar Oxygen Production Plant, NASA Contract #NAS9-17878, EEI Report #88-182, July 1, 1988.

4. An Illustrated Chronology of the NASA Marshall Center and MSFC Programs, May 1974, p231.

5. Interim Study Report - Lunar Logistic Vehicle, Boeing Document Number D2-100042, December 10, 1962.

6. Kenneth Gatland, The Illustrated Encyclopedia of Space Technology, Harmony Books, New York, 1981, p161.

7. Lunar Surface Transportation Systems Conceptual Design, NASA Contract #NAS9-17878, EEI Report #88-188, July 7, 1988.

8. Conceptual Design of a Lunar Base Solar Power Plant, NASA Contract #NAS9-17878, EEI Report #88-199, August 14, 1988.

9. Space Station Study Report - Electrical Power, NASA-Marshall Space Flight Center, PD14, December, 1983.

10. Maintenance and Supply Options, NASA Contract #NAS9-17878, EEI Report #87-173, May, 1988.

11. Lunar Storm Shelter Conceptual Design, NASA Contract #NAS9-17878, EEI Report #88-189, May 1, 1988.

12. Transportation Node Space Station Conceptual Design, NASA Contract #NAS9-17878, EEI Report #88-207, September 30, 1988.

13. Richard Whitlock, Personal Communication, NASA-JSC Space Station Projects Office, October 11, 1988.

14. J.J. Spaeth, Program Integration Review-Node/Airlock ATCS Study, McDonnell Douglas, August 22, 1988.

15. Lunar Surface Construction and Assembly Equipment Study, NASA Contract #NAS9-17878, EEI Report #88-194, September 1, 1988.

16. Lunar Base Launch and Landing Facility Conceptual Design, NASA Contract #NAS9-17878, EEI Report #88-178, March 25, 1988.

17. A. J. Petro, Lunar Transportation System, NASA-JSC Advanced Programs Office, October 4, 1988.

18. Assembly of Phobos Mission Spacecraft in Low Earth Orbit, NASA Contract #NAS-17900, EEI/Lemsco Report #88-198, August 22, 1988.

19. Optional Services Pricing Manual, National Space Transportation System, NASA, JSC-20109, October, 1984.

20 Gordon R. Woocock, Mission and Operations Modes For Lunar Basing, Lunar Bases and Space Activities of the 21st Century, a public symposium, October 29-31, 1984.

21. Manned Mars Mission, Volume II, Working Group Papers, Marshall Space Flight Center, NASA M002, June 1986.

22. Launch Options For The Future, Special Report, Office of Technology Assessment, Congressional Board of the 100th Congress, July, 1988.

23. POP 88 - Shuttle Cost Per Flight Review presentation, H. Renfro, NSTS Program Control Office, July 28, 1988.

Appendix A - PRICE-H Cost Model Subsystem Cost Reports

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: LA 17-OCT-88 13:57
(188225)

LUNAR LANDER - STRUCTURES

PRODUCTION QUANTITY	10	UNIT WEIGHT	1681.00	MODE	2
PROTOTYPE QUANTITY	7.000	UNIT VOLUME	74999.98	QUANTITY/NHA	1

UNIT PROD COST 6204.76 MONTHLY PROD RATE 0.58

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	10038.	660.	10698.
DESIGN	34807.	2888.	37695.
SYSTEMS	4488.	-	4488.
PROJECT MGMT	7263.	6401.	13664.
DATA	2054.	6674.	8728.
SUBTOTAL(ENG)	58650.	16623.	75273.
MANUFACTURING			
PRODUCTION	-	62048.	62048.
PROTOTYPE	63522.	-	63522.
TOOL-TEST EQ	5582.	11626.	17209.
SUBTOTAL(MFG)	69104.	73674.	142778.
TOTAL COST	127754.	90297.	218051.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1681.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.022*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.370	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.400	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.021*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.263	MTBF(FIELD)	5538*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(30)	JUN 97*	(13)	JUL 98*	(43)
PRODUCTION	JAN 00	(30)	JUN 02*	(16)	OCT 03*	(46)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	8269.73*	RATE TOOLING	0
AMORTIZED UNIT COST	9029.68*	PRICE IMPROVEMENT FACTOR	0.965*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.872*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LA 17-OCT-88 13:57
(188225)

LUNAR LANDER - ENGINES

PRODUCTION QUANTITY	40	UNIT WEIGHT	400.50	MODE	1
PROTOTYPE QUANTITY	18.000	UNIT VOLUME	3000.00	QUANTITY/NHA	4

UNIT PROD COST 3526.33 MONTHLY PROD RATE 1.12

PROGRAM COST ($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	39278.	867.	40145.
DESIGN	193009.	4217.	197227.
SYSTEMS	57506.	-	57506.
PROJECT MGMT	74078.	11487.	85564.
DATA	29235.	11823.	41058.
SUBTOTAL (ENG)	393106.	28395.	421501.
MANUFACTURING			
PRODUCTION	-	141053.	141053.
PROTOTYPE	195113.	-	195113.
TOOL-TEST EQ	25361.	19875.	45236.
SUBTOTAL (MFG)	220474.	160928.	381402.
TOTAL COST	613580.	189323.	802903.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	0.500*	400.000	ENGINEERING COMPLEXITY	2.300
DENSITY	1.667	0.133*	PROTOTYPE SUPPORT	1.5
MFG. COMPLEXITY	10.320	9.160	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	1.000	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.000	PLATFORM	2.500
ENGINEERING CHANGES	0.037*	0.021*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.484	0.350	MTBF (FIELD)	534150*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(61)	JAN 00*	(40)	MAY 03*	(101)
PRODUCTION	JAN 00	(28)	APR 02*	(35)	MAR 05*	(63)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	5995.43*	RATE TOOLING	0
AMORTIZED UNIT COST	4733.07*	PRICE IMPROVEMENT FACTOR	0.953*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.872*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
ELECTRONIC ITEM

INPUT FILENAME: LA   17-OCT-88 13:57
(188225)

LUNAR LANDER - RCS DISTRIBUTION

PRODUCTION QUANTITY	20	UNIT WEIGHT	156.00	MODE	1
PROTOTYPE QUANTITY	10.000	UNIT VOLUME	1000.00	QUANTITY/NHA	2

UNIT PROD COST 672.64   MONTHLY PROD RATE 1.02

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	2104.	203.	2307.
DESIGN	7908.	874.	8782.
SYSTEMS	845.	-	845.
PROJECT MGMT	1235.	1211.	2446.
DATA	351.	1252.	1603.
SUBTOTAL(ENG)	12442.	3540.	15983.
MANUFACTURING			
PRODUCTION	-	13453.	13453.
PROTOTYPE	9940.	-	9940.
TOOL-TEST EQ	1245.	1754.	2999.
SUBTOTAL(MFG)	11186.	15207.	26392.
TOTAL COST	23628.	18747.	42375.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1.000*	155.000	ENGINEERING COMPLEXITY	1.000
DENSITY	10.000	0.155*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	10.320	8.240	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	1.000	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.500	PLATFORM	2.500
ENGINEERING CHANGES	0.056*	0.024*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.263	0.484	MTBF(FIELD)	270803*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(11)	JUL 97*	(31)
PRODUCTION	JAN 00	(20)	AUG 01*	(18)	FEB 03*	(38)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	958.21*	RATE TOOLING	0
AMORTIZED UNIT COST	937.35*	PRICE IMPROVEMENT FACTOR	0.955*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.888*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: LA   17-OCT-88 13:57
(188225)

LUNAR LANDER - RCS NOZZLE CLUSTER

PRODUCTION QUANTITY	40	UNIT WEIGHT	25.00	MODE	2
PROTOTYPE QUANTITY	16.000	UNIT VOLUME	125.00	QUANTITY/NHA	4

UNIT PROD COST 92.38   MONTHLY PROD RATE 3.64

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	118.	9.	126.
DESIGN	414.	36.	450.
SYSTEMS	53.	-	53.
PROJECT MGMT	200.	313.	512.
DATA	44.	323.	366.
SUBTOTAL(ENG)	828.	680.	1508.
MANUFACTURING			
PRODUCTION	-	3695.	3695.
PROTOTYPE	2436.	-	2436.
TOOL-TEST EQ	201.	519.	720.
SUBTOTAL(MFG)	2637.	4215.	6852.
TOTAL COST	3465.	4895.	8360.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	25.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.200*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.070	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.750	PLATFORM	2.500
DESIGN REPEAT	0.800	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.023*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	21997*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(10)	JAN 97*	(25)
PRODUCTION	JAN 00	(14)	FEB 01*	(11)	JAN 02*	(25)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	146.97*	RATE TOOLING	0
AMORTIZED UNIT COST	122.36*	PRICE IMPROVEMENT FACTOR	0.933*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.887*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: LA   17-OCT-88 13:57
(188225)

LUNAR LANDER - LANDING SYSTEM

PRODUCTION QUANTITY	40	UNIT WEIGHT	196.00	MODE	2
PROTOTYPE QUANTITY	28.000	UNIT VOLUME	8000.00	QUANTITY/NHA	4

UNIT PROD COST 296.00   MONTHLY PROD RATE 2.82

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	2485.	109.	2594.
DESIGN	8629.	423.	9053.
SYSTEMS	1150.	-	1150.
PROJECT MGMT	2034.	1053.	3087.
DATA	544.	1089.	1633.
SUBTOTAL(ENG)	14842.	2675.	17517.
MANUFACTURING			
PRODUCTION	-	11840.	11840.
PROTOTYPE	14256.	-	14256.
TOOL-TEST EQ	993.	1576.	2570.
SUBTOTAL(MFG)	15249.	13417.	28666.
TOTAL COST	30091.	16092.	46182.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	196.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.025*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.400	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.016*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.263	MTBF(FIELD)	15650*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(18)	JUN 96*	(13)	JUL 97*	(31)
PRODUCTION	JAN 00	(17)	MAY 01*	(14)	JUL 02*	(31)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	469.72*	RATE TOOLING	0
AMORTIZED UNIT COST	402.29*	PRICE IMPROVEMENT FACTOR	0.937*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.888*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: LA 17-OCT-88 13:57
(188225)

LUNAR LANDER - THERMAL PROTECTION

PRODUCTION QUANTITY	10	UNIT WEIGHT	2017.00	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	49999.99	QUANTITY/NHA	1

UNIT PROD COST 1027.31 MONTHLY PROD RATE 1.21

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	2684.	153.	2838.
DESIGN	8232.	522.	8755.
SYSTEMS	1389.	-	1389.
PROJECT MGMT	1387.	1116.	2503.
DATA	508.	1168.	1676.
SUBTOTAL(ENG)	14201.	2960.	17161.
MANUFACTURING			
PRODUCTION	-	10273.	10273.
PROTOTYPE	5918.	-	5918.
TOOL-TEST EQ	442.	1816.	2258.
SUBTOTAL(MFG)	6360.	12089.	18449.
TOTAL COST	20562.	15049.	35610.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	2017.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.040*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	6.510	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.750	PLATFORM	2.500
DESIGN REPEAT	0.500	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.017*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.350	MTBF(FIELD)	11718*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(6)	FEB 97*	(26)
PRODUCTION	JAN 00	(20)	AUG 01*	(7)	MAR 02*	(27)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	1312.05*	RATE TOOLING	0
AMORTIZED UNIT COST	1504.86*	PRICE IMPROVEMENT FACTOR	0.952*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.891*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: LA   17-OCT-88 13:57
(188225)

LUNAR LANDER - O2 TANK

PRODUCTION QUANTITY	20	UNIT WEIGHT	1012.00	MODE	2
PROTOTYPE QUANTITY	14.000	UNIT VOLUME	6000.00	QUANTITY/NHA	2

UNIT PROD COST 1600.66   MONTHLY PROD RATE 1.23

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	7025.	353.	7378.
DESIGN	24117.	1391.	25508.
SYSTEMS	3255.	-	3255.
PROJECT MGMT	5187.	3090.	8277.
DATA	1460.	3210.	4670.
SUBTOTAL(ENG)	41044.	8043.	49087.
MANUFACTURING			
PRODUCTION	-	32013.	32013.
PROTOTYPE	36434.	-	36434.
TOOL-TEST EQ	2664.	4872.	7536.
SUBTOTAL(MFG)	39098.	36886.	75984.
TOTAL COST	80142.	44929.	125071.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1012.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.169*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.550	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.017*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	8969*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(23)	NOV 96*	(14)	JAN 98*	(37)
PRODUCTION	JAN 00	(23)	NOV 01*	(16)	MAR 03*	(39)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	2325.66*	RATE TOOLING	0
AMORTIZED UNIT COST	2246.44*	PRICE IMPROVEMENT FACTOR	0.952*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.882*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: LA 17-OCT-88 13:57
(188225)

LUNAR LANDER - H2 TANK

PRODUCTION QUANTITY	20	UNIT WEIGHT	500.00	MODE	2
PROTOTYPE QUANTITY	14.000	UNIT VOLUME	33999.99	QUANTITY/NHA	2

UNIT PROD COST 860.89 MONTHLY PROD RATE 1.46

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	4281.	218.	4499.
DESIGN	14695.	861.	15556.
SYSTEMS	1984.	-	1984.
PROJECT MGMT	2996.	1673.	4669.
DATA	861.	1738.	2599.
SUBTOTAL(ENG)	24817.	4490.	29306.
MANUFACTURING			
PRODUCTION	-	17218.	17218.
PROTOTYPE	19623.	-	19623.
TOOL-TEST EQ	1441.	2639.	4080.
SUBTOTAL(MFG)	21064.	19857.	40921.
TOTAL COST	45881.	24346.	70227.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	500.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.015*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.550	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.018*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	11082*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(13)	SEP 97*	(33)
PRODUCTION	JAN 00	(21)	SEP 01*	(13)	OCT 02*	(34)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	1242.80*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	1217.32*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.948*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.884*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LA   17-OCT-88 13:57
(188225)

LUNAR LANDER - DMS/GN&C

PRODUCTION QUANTITY	10	UNIT WEIGHT	150.00	MODE	1
PROTOTYPE QUANTITY	5.000	UNIT VOLUME	130.00	QUANTITY/NHA	1

UNIT PROD COST 2243.32   MONTHLY PROD RATE 0.66

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	6265.	675.	6941.
DESIGN	29423.	2940.	32362.
SYSTEMS	9428.	-	9428.
PROJECT MGMT	11010.	2395.	13405.
DATA	4456.	2489.	6945.
SUBTOTAL(ENG)	60582.	8499.	69080.
MANUFACTURING			
PRODUCTION	-	22433.	22433.
PROTOTYPE	22715.	-	22715.
TOOL-TEST EQ	4594.	4183.	8777.
SUBTOTAL(MFG)	27309.	26616.	53926.
TOTAL COST	87891.	35115.	123006.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	5.000*	145.000	ENGINEERING COMPLEXITY	2.300
DENSITY	43.000	1.115*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	10.320	9.400	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	0.200	ELECT VOL FRACTION	0.001*
DESIGN REPEAT	0.000	0.000	PLATFORM	2.500
ENGINEERING CHANGES	0.045*	0.027*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.500		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.305	0.151	MTBF(FIELD)	55932*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(34)	OCT 97*	(13)	NOV 98*	(47)
PRODUCTION	JAN 00	(25)	JAN 02*	(14)	MAR 03*	(39)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	2891.53*	RATE TOOLING	0
AMORTIZED UNIT COST	3511.50*	PRICE IMPROVEMENT FACTOR	0.963*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.887*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
THRU-PUT COST

INPUT FILENAME: LA   17-OCT-88 13:57 (188225)   GLOBAL FILENAME:
ESCALATION FILENAME:

LUNAR LANDER - DMS/GN&C THRUPUT

CATEGORY 3   MODE 8

PROGRAM COST	DEVELOPMENT	PRODUCTION	TOTAL COST
THRU-PUT COST	19020.	12680.	31700.

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LA 17-OCT-88 13:57
(188225)

LUNAR LANDER - ELECTRICAL POWER

PRODUCTION QUANTITY	10	UNIT WEIGHT	478.00	MODE	1
PROTOTYPE QUANTITY	5.000	UNIT VOLUME	1000.00	QUANTITY/NHA	1

UNIT PROD COST 3954.42 MONTHLY PROD RATE 0.50

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	5687.	613.	6300.
DESIGN	20801.	2684.	23485.
SYSTEMS	2321.	-	2321.
PROJECT MGMT	3177.	3925.	7102.
DATA	948.	4080.	5028.
SUBTOTAL(ENG)	32934.	11302.	44237.
MANUFACTURING			
PRODUCTION	-	39544.	39544.
PROTOTYPE	27800.	-	27800.
TOOL-TEST EQ	3528.	6858.	10385.
SUBTOTAL(MFG)	31327.	46402.	77729.
TOTAL COST	64262.	57704.	121966.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	3.000*	475.000
DENSITY	30.000	0.475*
MFG. COMPLEXITY	10.320	8.970
NEW DESIGN	1.000	1.000
DESIGN REPEAT	0.000	0.500
ENGINEERING CHANGES	0.056*	0.030*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.843	0.201

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	92273*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(27)	MAR 97*	(11)	FEB 98*	(38)
PRODUCTION	JAN 00	(28)	APR 02*	(18)	OCT 03*	(46)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	5090.45*
AMORTIZED UNIT COST	5770.41*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.967*
UNIT LEARNING CURVE	0.887*

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: LA 17-OCT-88 13:57
(188225)

LUNAR LANDER - AIRLOCK/TUNNEL

PRODUCTION QUANTITY	10	UNIT WEIGHT	455.00	MODE	2
PROTOTYPE QUANTITY	7.000	UNIT VOLUME	24000.00	QUANTITY/NHA	1

UNIT PROD COST 879.81 MONTHLY PROD RATE 1.09

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	3246.	177.	3423.
DESIGN	10890.	703.	11593.
SYSTEMS	1523.	-	1523.
PROJECT MGMT	1851.	961.	2812.
DATA	592.	1003.	1595.
SUBTOTAL(ENG)	18102.	2844.	20946.
MANUFACTURING			
PRODUCTION	-	8798.	8798.
PROTOTYPE	9973.	-	9973.
TOOL-TEST EQ	768.	1674.	2442.
SUBTOTAL(MFG)	10741.	10472.	21213.
TOTAL COST	28843.	13316.	42159.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	455.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.019*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.610	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.300	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.021*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.350	MTBF(FIELD)	11115*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(9)	MAY 97*	(29)
PRODUCTION	JAN 00	(20)	AUG 01*	(9)	MAY 02*	(29)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	1142.49*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	1331.56*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.954*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.884*

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: LA   17-OCT-88 13:57
(188225)

LUNAR LANDER - CREW MODULE SHELL

PRODUCTION QUANTITY	7	UNIT WEIGHT	1200.00	MODE	2
PROTOTYPE QUANTITY	7.000	UNIT VOLUME	24000.00	QUANTITY/NHA	1

UNIT PROD COST 3116.30   MONTHLY PROD RATE 0.63

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	8241.	508.	8750.
DESIGN	28110.	2285.	30395.
SYSTEMS	3775.	-	3775.
PROJECT MGMT	5008.	2535.	7543.
DATA	1535.	2653.	4188.
SUBTOTAL(ENG)	46670.	7981.	54651.
MANUFACTURING			
PRODUCTION	-	21814.	21814.
PROTOTYPE	32811.	-	32811.
TOOL-TEST EQ	2659.	4575.	7233.
SUBTOTAL(MFG)	35470.	26389.	61859.
TOTAL COST	82140.	34370.	116510.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1200.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.050*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.980	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.250	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.021*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.097	MTBF(FIELD)	7138*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(26)	FEB 97*	(12)	FEB 98*	(38)
PRODUCTION	JAN 00	(26)	FEB 02*	(10)	DEC 02*	(36)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	3891.84*	RATE TOOLING	0
AMORTIZED UNIT COST	4910.03*	PRICE IMPROVEMENT FACTOR	0.963*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.877*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: LA 17-OCT-88 13:57
(188225)

LUNAR LANDER - CREW MODULE ECLSS

PRODUCTION QUANTITY	7	UNIT WEIGHT	1390.00	MODE	2
PROTOTYPE QUANTITY	5.000	UNIT VOLUME	5000.00	QUANTITY/NHA	1

UNIT PROD COST 6208.93 MONTHLY PROD RATE 0.50

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	12265.	1162.	13427.
DESIGN	42165.	4993.	47158.
SYSTEMS	5484.	-	5484.
PROJECT MGMT	6785.	5027.	11812.
DATA	2149.	5254.	7403.
SUBTOTAL(ENG)	68849.	16436.	85284.
MANUFACTURING			
PRODUCTION	-	43463.	43463.
PROTOTYPE	45483.	-	45483.
TOOL-TEST EQ	4190.	9165.	13355.
SUBTOTAL(MFG)	49673.	52628.	102301.
TOTAL COST	118522.	69063.	187585.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1390.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.278*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.510	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.800	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.024*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.120	MTBF(FIELD)	5559*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(30)	JUN 97*	(11)	MAY 98*	(41)
PRODUCTION	JAN 00	(30)	JUN 02*	(12)	JUN 03*	(42)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	7835.69*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	9866.20*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.968*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.871*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LA   17-OCT-88 13:57
(188225)

LUNAR LANDER - CREW MODULE CONTROLS

PRODUCTION QUANTITY	7	UNIT WEIGHT	55.00	MODE	1
PROTOTYPE QUANTITY	5.000	UNIT VOLUME	50.00	QUANTITY/NHA	1

UNIT PROD COST 376.12   MONTHLY PROD RATE 1.28

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	2654.	314.	2969.
DESIGN	9710.	1256.	10966.
SYSTEMS	1083.	-	1083.
PROJECT MGMT	984.	400.	1384.
DATA	351.	417.	767.
SUBTOTAL(ENG)	14782.	2387.	17169.
MANUFACTURING			
PRODUCTION	-	2633.	2633.
PROTOTYPE	2545.	-	2545.
TOOL-TEST EQ	341.	685.	1026.
SUBTOTAL(MFG)	2886.	3318.	6204.
TOTAL COST	17668.	5706.	23374.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	5.000*	50.000
DENSITY	40.000	1.000*
MFG. COMPLEXITY	10.320	7.760
NEW DESIGN	0.900	1.000
DESIGN REPEAT	0.000	0.000
ENGINEERING CHANGES	0.064*	0.024*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.305	0.151

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.002*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	55932*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(7)	MAR 97*	(27)
PRODUCTION	JAN 00	(17)	MAY 01*	(5)	OCT 01*	(22)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	451.38*
AMORTIZED UNIT COST	815.07*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.951*
UNIT LEARNING CURVE	0.899*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: LA   17-OCT-88 13:57
(188225)

LUNAR LANDER - CREW MODULE HATCHES

PRODUCTION QUANTITY	14	UNIT WEIGHT	29.00	MODE	2
PROTOTYPE QUANTITY	8.000	UNIT VOLUME	1000.00	QUANTITY/NHA	2

UNIT PROD COST 76.01   MONTHLY PROD RATE 2.54

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	337.	29.	366.
DESIGN	1136.	115.	1251.
SYSTEMS	158.	-	158.
PROJECT MGMT	193.	116.	308.
DATA	61.	120.	182.
SUBTOTAL(ENG)	1885.	380.	2265.
MANUFACTURING			
PRODUCTION	-	1064.	1064.
PROTOTYPE	1000.	-	1000.
TOOL-TEST EQ	79.	206.	285.
SUBTOTAL(MFG)	1080.	1270.	2350.
TOTAL COST	2965.	1650.	4614.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	29.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.029*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.610	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.500	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.023*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.151	MTBF(FIELD)	25386*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(14)	FEB 96*	(7)	SEP 96*	(21)
PRODUCTION	JAN 00	(13)	JAN 01*	(5)	JUN 01*	(18)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	101.55*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	117.84*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.939*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.892*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LA   17-OCT-88 13:57
(188225)

LUNAR LANDER - CREW MODULE INTEGRATION

PRODUCTION QUANTITY	7	UNIT WEIGHT	65.71	MODE	1
PROTOTYPE QUANTITY	7.000	UNIT VOLUME	270.21	QUANTITY/NHA	1

UNIT PROD COST 197.29   MONTHLY PROD RATE 1.15

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1161.	79.	1241.
DESIGN	4202.	314.	4516.
SYSTEMS	488.	-	488.
PROJECT MGMT	520.	181.	701.
DATA	172.	189.	360.
SUBTOTAL(ENG)	6542.	763.	7305.
MANUFACTURING			
PRODUCTION	-	1381.	1381.
PROTOTYPE	2272.	-	2272.
TOOL-TEST EQ	261.	375.	636.
SUBTOTAL(MFG)	2533.	1756.	4289.
TOTAL COST	9076.	2519.	11595.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	0.786*	64.926*	ENGINEERING COMPLEXITY	1.000
DENSITY	0.582*	0.240*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	9.548	7.775	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.700	0.700	ELECT VOL FRACTION	0.005
DESIGN REPEAT	0.000	0.000	PLATFORM	2.500
ENGINEERING CHANGES	0.034*	0.015*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	3.000	0.500	MTBF(FIELD)	274850*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(16)	APR 96*	(8)	DEC 96*	(24)
PRODUCTION	JAN 97*	(16)	APR 98*	(5)	SEP 98*	(21)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00*
T-1 COST	233.90*	PRODUCTION TOOLING	1.00*
AMORTIZED UNIT COST	359.85*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.900*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.905*

- - - PRICE HARDWARE MODEL METRIC - - -
HARDWARE SOFTWARE INTEGRATION

INPUT FILENAME: LA 17-OCT-88 13:57
(188225)

LUNAR LANDER - DMS/GN&C INTEGRATION

MODE 52

LANGUAGE Ada SOURCE CODE 143000 NON-EXECUTABLE SLOC 0.01

APPLICATION 10.95 MGMT COMPLEXITY 1.00

PROGRAM COST ($ 1000)	DEVELOPMENT
ENGINEERING	
DRAFTING	686.
DESIGN	5802.
SYSTEMS	1264.
PROJECT MGMT	915.
DATA	456.
TOTAL COST	9123.

SCHEDULE	START		END
DEVELOPMENT	JAN 99	(31)	JUL 01*

SUPPLEMENTAL INFORMATION
ECONOMIC BASE 199*
ESCALATION 0.00 DEV COST MULTIPLIER 1.00*

- - - PRICE HARDWARE MODEL METRIC - - -
INTEGRATION AND TEST

INPUT FILENAME: LA   17-OCT-88 13:57
(188225)

LUNAR LANDER INTEGRATION

PRODUCTION QUANTITY	10	INT WEIGHT	312.069*	MODE	5
PROTOTYPE QUANTITY	7.000	INT VOLUME	1291.252*	QUANTITY/NHA	0

UNIT PROD COST 817.27   MONTHLY PROD RATE 0.86

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	3381.	278.	3659.
DESIGN	12261.	1121.	13382.
SYSTEMS	1415.	-	1415.
PROJECT MGMT	1679.	931.	2609.
DATA	528.	968.	1497.
SUBTOTAL(ENG)	19264.	3298.	22563.
MANUFACTURING			
PRODUCTION	-	8173.	8173.
PROTOTYPE	9872.	-	9872.
TOOL-TEST EQ	1121.	1912.	3032.
SUBTOTAL(MFG)	10992.	10084.	21077.
TOTAL COST	30257.	13383.	43640.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	1.807*	310.261*
DENSITY	0.561*	0.240*
MFG. COMPLEXITY	9.622*	7.942*
NEW PLANS LEVEL	0.700	0.700
ENGINEERING CHANGES	0.035*	0.016*
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000*
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.002
PLATFORM	2.500
YEAR OF TECHNOLOGY	1999*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	124222*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 99	(20)	AUG 00*	(10)	JUN 01*	(30)
PRODUCTION	JUL 01*	(21)	MAR 03*	(10)	JAN 04*	(31)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
AMORTIZED UNIT COST	1338.28*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00*
PRODUCTION TOOLING	1.00*

- - - PRICE HARDWARE MODEL METRIC - - -
SYSTEM COST SUMMARY

INPUT FILENAME: LA 17-OCT-88 13:57
(188225)

TOTAL COST, WITH INTEGRATION COST

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	111935.	6409.	118345.
DESIGN	456312.	27622.	483934.
SYSTEMS	97610.	-	97610.
PROJ MGMT	126501.	42814.	169315.
DATA	46304.	44450.	90754.
SUBTOTAL(ENG)	838663.	121295.	959958.
MANUFACTURING			
PRODUCTION	-	440896.	440896.
PROTOTYPE	501714.	-	501714.
TOOL-TEST EQ	55470.	74311.	129780.
PURCH ITEMS	0.	0.	0.
SUBTOTAL(MFG)	557184.	515206.	1072390.
TOTAL COST	1395847.	636501.	2032347.

THRU-PUT COSTS	DEVELOPMENT	PRODUCTION	TOTAL COST
FIELD SUPPORT	0.	0.	0.
FIELD TEST	0.	0.	0.
SOFTWARE	19020.	12680.	31700.
OTHER	0.	0.	0.
TOTAL THRU-PUT COST	19020.	12680.	31700.

TOTAL COST, WITH THRU-PUT COSTS

DEVELOPMENT	PRODUCTION	TOTAL COST
1414867.	649181.	2064047.

--- PRICE HARDWARE MODEL METRIC ---
ELECTRONIC ITEM

INPUT FILENAME: LOX   10-OCT-88 12:01
(188012)

O2 PLANT - FEED BIN

PRODUCTION QUANTITY	1	UNIT WEIGHT	215.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	22700.00	QUANTITY/NHA	1

UNIT PROD COST 371.44   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	388.	68.	456.
DESIGN	1349.	256.	1606.
SYSTEMS	167.	-	167.
PROJECT MGMT	211.	77.	288.
DATA	67.	39.	106.
SUBTOTAL(ENG)	2183.	440.	2623.
MANUFACTURING			
PRODUCTION	-	371.	371.
PROTOTYPE	1849.	-	1849.
TOOL-TEST EQ	230.	30.	260.
SUBTOTAL(MFG)	2079.	401.	2481.
TOTAL COST	4263.	841.	5104.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.500*	214.500
DENSITY	0.220	0.009*
MFG. COMPLEXITY	9.560	7.230
NEW DESIGN	1.000	0.250
DESIGN REPEAT	0.000	0.250
ENGINEERING CHANGES	0.075*	0.028*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	656461*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(3)	JUN 96*	(18)
PRODUCTION	JAN 00	(17)	MAY 01*	(0)	MAY 01*	(17)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	371.26*
AMORTIZED UNIT COST	841.05*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.926*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX   10-OCT-88 12:01
(188012)

O2 PLANT - PRIMARY JAW CRUSHER

PRODUCTION QUANTITY	1	UNIT WEIGHT	724.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	400.00	QUANTITY/NHA	1

UNIT PROD COST 2496.15   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	2328.	385.	2713.
DESIGN	8091.	1627.	9718.
SYSTEMS	1001.	-	1001.
PROJECT MGMT	1279.	500.	1778.
DATA	404.	251.	655.
SUBTOTAL(ENG)	13104.	2762.	15866.
MANUFACTURING			
PRODUCTION	-	2496.	2496.
PROTOTYPE	11434.	-	11434.
TOOL-TEST EQ	1330.	216.	1545.
SUBTOTAL(MFG)	12764.	2712.	15476.
TOTAL COST	25868.	5474.	31342.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	1.500*	722.500
DENSITY	37.500	1.806*
MFG. COMPLEXITY	9.560	8.070
NEW DESIGN	1.000	0.500
DESIGN REPEAT	0.000	0.100
ENGINEERING CHANGES	0.068*	0.034*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	223681*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(22)	OCT 96*	(6)	APR 97*	(28)
PRODUCTION	JAN 00	(25)	JAN 02*	(0)	JAN 02*	(25)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	2494.79*
AMORTIZED UNIT COST	5474.08*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.918*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01 (188012)

O2 PLANT - COARSE SCREEN

PRODUCTION QUANTITY	1	UNIT WEIGHT	3.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	40.00	QUANTITY/NHA	1

UNIT PROD COST 13.77 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	47.	3.	50.
DESIGN	162.	14.	176.
SYSTEMS	20.	-	20.
PROJECT MGMT	18.	3.	21.
DATA	7.	2.	8.
SUBTOTAL(ENG)	253.	23.	276.
MANUFACTURING			
PRODUCTION	-	14.	14.
PROTOTYPE	62.	-	62.
TOOL-TEST EQ	8.	1.	10.
SUBTOTAL(MFG)	71.	15.	86.
TOTAL COST	323.	38.	361.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	0.010*	2.990	ENGINEERING COMPLEXITY	1.000
DENSITY	2.500	0.075*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	9.560	7.640	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	0.500	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.100	PLATFORM	2.000
ENGINEERING CHANGES	0.078*	0.034*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	0.000	MTBF(FIELD)	30352644*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(10)	OCT 95*	(3)	JAN 96*	(13)
PRODUCTION	JAN 00	(9)	SEP 00*	(0)	SEP 00*	(9)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	13.76*	RATE TOOLING	0
AMORTIZED UNIT COST	37.83*	PRICE IMPROVEMENT FACTOR	0.995*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.931*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01 (188012)

O2 PLANT - SECONDARY CRUSHER

PRODUCTION QUANTITY	1	UNIT WEIGHT	239.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	240.00	QUANTITY/NHA	1

UNIT PROD COST 946.47 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1071.	162.	1233.
DESIGN	3719.	610.	4329.
SYSTEMS	461.	-	461.
PROJECT MGMT	544.	190.	735.
DATA	177.	95.	273.
SUBTOTAL(ENG)	5972.	1058.	7030.
MANUFACTURING			
PRODUCTION	-	946.	946.
PROTOTYPE	4290.	-	4290.
TOOL-TEST EQ	522.	82.	604.
SUBTOTAL(MFG)	4813.	1028.	5841.
TOTAL COST	10785.	2086.	12871.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.500*	238.500
DENSITY	20.833	0.994*
MFG. COMPLEXITY	9.560	8.070
NEW DESIGN	1.000	0.500
DESIGN REPEAT	0.000	0.100
ENGINEERING CHANGES	0.070*	0.035*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	656461*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(19)	JUL 96*	(5)	DEC 96*	(24)
PRODUCTION	JAN 00	(21)	SEP 01*	(0)	SEP 01*	(21)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	945.97*
AMORTIZED UNIT COST	2086.05*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.920*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - SECONDARY SCREEN

PRODUCTION QUANTITY	1	UNIT WEIGHT	3.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	40.00	QUANTITY/NHA	1

UNIT PROD COST 13.77 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	47.	3.	50.
DESIGN	162.	14.	176.
SYSTEMS	20.	-	20.
PROJECT MGMT	18.	3.	21.
DATA	7.	2.	8.
SUBTOTAL(ENG)	253.	23.	276.
MANUFACTURING			
PRODUCTION	-	14.	14.
PROTOTYPE	62.	-	62.
TOOL-TEST EQ	8.	1.	10.
SUBTOTAL(MFG)	71.	15.	86.
TOTAL COST	323.	38.	361.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	0.010*	2.990	ENGINEERING COMPLEXITY	1.000
DENSITY	2.500	0.075*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	9.560	7.640	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	0.500	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.100	PLATFORM	2.000
ENGINEERING CHANGES	0.078*	0.034*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	0.000	MTBF(FIELD)	30352644*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(10)	OCT 95*	(3)	JAN 96*	(13)
PRODUCTION	JAN 00	(9)	SEP 00*	(0)	SEP 00*	(9)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	13.76*	RATE TOOLING	0
AMORTIZED UNIT COST	37.83*	PRICE IMPROVEMENT FACTOR	0.995*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.931*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - BALL MILL

PRODUCTION QUANTITY	1	UNIT WEIGHT	1914.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	400.00	QUANTITY/NHA	1

UNIT PROD COST 7426.27 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	6534.	784.	7319.
DESIGN	22711.	3419.	26130.
SYSTEMS	2809.	-	2809.
PROJECT MGMT	3656.	1297.	4953.
DATA	1148.	651.	1798.
SUBTOTAL(ENG)	36858.	6151.	43009.
MANUFACTURING			
PRODUCTION	-	7426.	7426.
PROTOTYPE	33640.	-	33640.
TOOL-TEST EQ	3832.	653.	4485.
SUBTOTAL(MFG)	37472.	8079.	45551.
TOTAL COST	74330.	14230.	88560.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	4.000*	1910.000
DENSITY	41.000	4.775*
MFG. COMPLEXITY	9.560	8.300
NEW DESIGN	1.000	0.800
DESIGN REPEAT	0.000	0.250
ENGINEERING CHANGES	0.060*	0.032*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	85542*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(29)	MAY 97*	(8)	JAN 98*	(37)
PRODUCTION	JAN 00	(31)	JUL 02*	(0)	JUL 02*	(31)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	7422.01*
AMORTIZED UNIT COST	14229.85*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.915*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - FINE VIBRATING SCREEN

PRODUCTION QUANTITY	1	UNIT WEIGHT	500.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	9000.00	QUANTITY/NHA	1

UNIT PROD COST 2288.19 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1969.	346.	2315.
DESIGN	6841.	1614.	8455.
SYSTEMS	847.	-	847.
PROJECT MGMT	1106.	470.	1576.
DATA	347.	236.	583.
SUBTOTAL(ENG)	11110.	2665.	13776.
MANUFACTURING			
PRODUCTION	-	2288.	2288.
PROTOTYPE	10221.	-	10221.
TOOL-TEST EQ	1171.	201.	1371.
SUBTOTAL(MFG)	11391.	2489.	13880.
TOTAL COST	22502.	5155.	27656.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1.000*	499.000	ENGINEERING COMPLEXITY	1.000
DENSITY	1.111	0.055*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	9.560	8.300	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	0.500	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.100	PLATFORM	2.000
ENGINEERING CHANGES	0.068*	0.037*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	0.000	MTBF(FIELD)	332812*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(22)	OCT 96*	(6)	APR 97*	(28)
PRODUCTION	JAN 00	(25)	JAN 02*	(0)	JAN 02*	(25)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	2286.92*	RATE TOOLING	0
AMORTIZED UNIT COST	5154.59*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.917*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - STORAGE HOPPER

PRODUCTION QUANTITY	1	UNIT WEIGHT	32.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	11600.00	QUANTITY/NHA	1

UNIT PROD COST 72.65 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	111.	15.	127.
DESIGN	387.	57.	444.
SYSTEMS	48.	-	48.
PROJECT MGMT	52.	16.	68.
DATA	18.	8.	26.
SUBTOTAL(ENG)	616.	97.	713.
MANUFACTURING			
PRODUCTION	-	73.	73.
PROTOTYPE	353.	-	353.
TOOL-TEST EQ	46.	6.	52.
SUBTOTAL(MFG)	399.	78.	478.
TOTAL COST	1015.	175.	1191.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	0.100*	31.900	ENGINEERING COMPLEXITY	1.000
DENSITY	0.086	0.003*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	9.560	7.230	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	0.250	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.250	PLATFORM	2.000
ENGINEERING CHANGES	0.077*	0.029*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	0.000	MTBF(FIELD)	3178122*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(11)	NOV 95*	(3)	FEB 96*	(14)
PRODUCTION	JAN 00	(12)	DEC 00*	(0)	DEC 00*	(12)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	72.62*	RATE TOOLING	0
AMORTIZED UNIT COST	175.19*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.929*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX   10-OCT-88 12:01
(188012)

O2 PLANT - MAGNETIC SEPARATOR

PRODUCTION QUANTITY	1	UNIT WEIGHT	248.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	200.00	QUANTITY/NHA	1

UNIT PROD COST 1138.38   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1770.	187.	1956.
DESIGN	6148.	704.	6852.
SYSTEMS	761.	-	761.
PROJECT MGMT	806.	225.	1031.
DATA	275.	113.	388.
SUBTOTAL(ENG)	9760.	1228.	10988.
MANUFACTURING			
PRODUCTION	-	1138.	1138.
PROTOTYPE	5092.	-	5092.
TOOL-TEST EQ	617.	99.	716.
SUBTOTAL(MFG)	5708.	1238.	6946.
TOTAL COST	15468.	2466.	17934.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.500*	247.500
DENSITY	25.000	1.237*
MFG. COMPLEXITY	9.560	8.220
NEW DESIGN	1.000	0.800
DESIGN REPEAT	0.000	0.100
ENGINEERING CHANGES	0.069*	0.036*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	656461*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(21)	SEP 96*	(5)	FEB 97*	(26)
PRODUCTION	JAN 00	(22)	OCT 01*	(0)	OCT 01*	(22)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	1137.77*
AMORTIZED UNIT COST	2465.75*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.919*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - LOW PRESS. FEED HOPPER

PRODUCTION QUANTITY	1	UNIT WEIGHT	12.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	2700.00	QUANTITY/NHA	1

UNIT PROD COST 33.22 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	81.	9.	90.
DESIGN	282.	35.	317.
SYSTEMS	35.	-	35.
PROJECT MGMT	34.	9.	42.
DATA	12.	4.	16.
SUBTOTAL(ENG)	444.	57.	501.
MANUFACTURING			
PRODUCTION	-	33.	33.
PROTOTYPE	157.	-	157.
TOOL-TEST EQ	21.	3.	24.
SUBTOTAL(MFG)	179.	36.	214.
TOTAL COST	622.	93.	715.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	0.100*	11.900	ENGINEERING COMPLEXITY	1.000
DENSITY	0.370	0.004*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	9.560	7.230	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	0.250	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.250	PLATFORM	2.000
ENGINEERING CHANGES	0.079*	0.030*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	0.000	MTBF(FIELD)	3178338*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(10)	OCT 95*	(3)	JAN 96*	(13)
PRODUCTION	JAN 00	(10)	OCT 00*	(0)	OCT 00*	(10)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	33.20*	RATE TOOLING	0
AMORTIZED UNIT COST	92.92*	PRICE IMPROVEMENT FACTOR	0.997*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.931*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - HIGH PRESS. FEED HOPPER

PRODUCTION QUANTITY	1	UNIT WEIGHT	77.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	2700.00	QUANTITY/NHA	1

UNIT PROD COST 218.84 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	218.	40.	258.
DESIGN	757.	158.	916.
SYSTEMS	94.	-	94.
PROJECT MGMT	118.	46.	164.
DATA	38.	23.	61.
SUBTOTAL(ENG)	1225.	267.	1492.
MANUFACTURING			
PRODUCTION	-	219.	219.
PROTOTYPE	1031.	-	1031.
TOOL-TEST EQ	128.	18.	146.
SUBTOTAL(MFG)	1159.	237.	1396.
TOTAL COST	2384.	504.	2889.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.200*	76.800
DENSITY	0.741	0.028*
MFG. COMPLEXITY	9.560	7.590
NEW DESIGN	1.000	0.250
DESIGN REPEAT	0.000	0.250
ENGINEERING CHANGES	0.075*	0.032*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	1611243*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(14)	FEB 96*	(4)	JUN 96*	(18)
PRODUCTION	JAN 00	(15)	MAR 01*	(0)	MAR 01*	(15)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	218.73*
AMORTIZED UNIT COST	504.10*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.925*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - REACTOR

PRODUCTION QUANTITY	1	UNIT WEIGHT	1963.00	MODE	1
PROTOTYPE QUANTITY	5.000	UNIT VOLUME	4400.00	QUANTITY/NHA	1

UNIT PROD COST16680.74 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	12310.	927.	13237.
DESIGN	43903.	4145.	48048.
SYSTEMS	5214.	-	5214.
PROJECT MGMT	9800.	2457.	12257.
DATA	3056.	1233.	4289.
SUBTOTAL(ENG)	74284.	8761.	83045.
MANUFACTURING			
PRODUCTION	-	16681.	16681.
PROTOTYPE	169724.	-	169724.
TOOL-TEST EQ	12600.	1545.	14144.
SUBTOTAL(MFG)	182324.	18225.	200549.
TOTAL COST	256608.	26986.	283594.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	4.000*	1959.000	ENGINEERING COMPLEXITY	1.000
DENSITY	9.091	0.445*	PROTOTYPE SUPPORT	1.5
MFG. COMPLEXITY	9.560	9.050	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	1.000	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.400	PLATFORM	2.000
ENGINEERING CHANGES	0.043*	0.029*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	0.000	MTBF(FIELD)	85542*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(45)	SEP 98*	(17)	FEB 00*	(62)
PRODUCTION	JAN 00	(36)	DEC 02*	(0)	DEC 02*	(36)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	16670.48*	RATE TOOLING	0
AMORTIZED UNIT COST	26986.36*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.911*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX   10-OCT-88 12:01
(188012)

O2 PLANT - ELECTRIC HEATER

PRODUCTION QUANTITY	1	UNIT WEIGHT	134.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	700.00	QUANTITY/NHA	1

UNIT PROD COST 789.48   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	701.	114.	816.
DESIGN	2437.	498.	2934.
SYSTEMS	302.	-	302.
PROJECT MGMT	386.	155.	542.
DATA	122.	78.	200.
SUBTOTAL(ENG)	3948.	845.	4793.
MANUFACTURING			
PRODUCTION	-	789.	789.
PROTOTYPE	3459.	-	3459.
TOOL-TEST EQ	408.	70.	478.
SUBTOTAL(MFG)	3868.	859.	4727.
TOTAL COST	7816.	1704.	9520.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.300*	133.700
DENSITY	4.286	0.191*
MFG. COMPLEXITY	9.560	8.390
NEW DESIGN	1.000	0.500
DESIGN REPEAT	0.000	0.250
ENGINEERING CHANGES	0.070*	0.039*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	1082786*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(5)	JAN 97*	(25)
PRODUCTION	JAN 00	(20)	AUG 01*	(0)	AUG 01*	(20)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	789.06*
AMORTIZED UNIT COST	1704.46*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.919*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - ELECTROLYSIS CELL

PRODUCTION QUANTITY	1	UNIT WEIGHT	213.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	400.00	QUANTITY/NHA	1

UNIT PROD COST 1187.47 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	976.	166.	1142.
DESIGN	3391.	675.	4066.
SYSTEMS	420.	-	420.
PROJECT MGMT	557.	225.	782.
DATA	174.	113.	286.
SUBTOTAL(ENG)	5517.	1178.	6696.
MANUFACTURING			
PRODUCTION	-	1187.	1187.
PROTOTYPE	5223.	-	5223.
TOOL-TEST EQ	621.	105.	726.
SUBTOTAL(MFG)	5844.	1292.	7136.
TOTAL COST	11361.	2471.	13832.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.500*	212.500
DENSITY	12.500	0.531*
MFG. COMPLEXITY	9.560	8.390
NEW DESIGN	1.000	0.500
DESIGN REPEAT	0.000	0.250
ENGINEERING CHANGES	0.069*	0.039*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	656461*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(21)	SEP 96*	(5)	FEB 97*	(26)
PRODUCTION	JAN 00	(22)	OCT 01*	(0)	OCT 01*	(22)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	1186.82*
AMORTIZED UNIT COST	2470.72*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.918*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX   10-OCT-88 12:01
(188012)

02 PLANT - BLOWER

PRODUCTION QUANTITY	1	UNIT WEIGHT	29.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	10.00	QUANTITY/NHA	1

UNIT PROD COST 144.77   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	153.	31.	183.
DESIGN	530.	129.	659.
SYSTEMS	66.	-	66.
PROJECT MGMT	79.	34.	113.
DATA	26.	17.	42.
SUBTOTAL(ENG)	854.	210.	1064.
MANUFACTURING			
PRODUCTION	-	145.	145.
PROTOTYPE	645.	-	645.
TOOL-TEST EQ	80.	12.	92.
SUBTOTAL(MFG)	725.	157.	882.
TOTAL COST	1579.	367.	1946.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.100*	28.900
DENSITY	41.000	2.890*
MFG. COMPLEXITY	9.560	8.030
NEW DESIGN	1.000	0.250
DESIGN REPEAT	0.000	0.100
ENGINEERING CHANGES	0.075*	0.037*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	3178230*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(14)	FEB 96*	(4)	JUN 96*	(18)
PRODUCTION	JAN 00	(15)	MAR 01*	(0)	MAR 01*	(15)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	144.70*
AMORTIZED UNIT COST	367.32*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.924*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: LOX   10-OCT-88 12:01
(188012)

O2 PLANT - CYCLONE SEPARATORS

PRODUCTION QUANTITY	3	UNIT WEIGHT	1.00	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	10.00	QUANTITY/NHA	3

UNIT PROD COST 5.31   MONTHLY PROD RATE 2.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	11.	1.	12.
DESIGN	36.	3.	39.
SYSTEMS	5.	-	5.
PROJECT MGMT	5.	2.	8.
DATA	2.	1.	3.
SUBTOTAL(ENG)	59.	7.	67.
MANUFACTURING			
PRODUCTION	-	16.	16.
PROTOTYPE	25.	-	25.
TOOL-TEST EQ	3.	5.	8.
SUBTOTAL(MFG)	28.	21.	49.
TOTAL COST	87.	29.	116.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.100*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.740	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.500	PLATFORM	2.000
DESIGN REPEAT	0.400	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.036*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	MTBF(FIELD)	100904*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(9)	SEP 95*	(3)	DEC 95*	(12)
PRODUCTION	JAN 00	(8)	AUG 00*	(0)	AUG 00*	(8)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	5.80*	RATE TOOLING	0
AMORTIZED UNIT COST	9.53*	PRICE IMPROVEMENT FACTOR	0.931*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.900*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX   10-OCT-88 12:01
(188012)

02 PLANT - DISCHARGE HOPPER

PRODUCTION QUANTITY	1	UNIT WEIGHT	102.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	1600.00	QUANTITY/NHA	1

UNIT PROD COST 277.53   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	248.	48.	295.
DESIGN	860.	201.	1061.
SYSTEMS	107.	-	107.
PROJECT MGMT	141.	58.	199.
DATA	44.	29.	73.
SUBTOTAL(ENG)	1399.	336.	1736.
MANUFACTURING			
PRODUCTION	-	278.	278.
PROTOTYPE	1313.	-	1313.
TOOL-TEST EQ	160.	23.	183.
SUBTOTAL(MFG)	1473.	300.	1773.
TOTAL COST	2872.	637.	3509.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.200*	101.800
DENSITY	1.250	0.064*
MFG. COMPLEXITY	9.560	7.590
NEW DESIGN	1.000	0.250
DESIGN REPEAT	0.000	0.250
ENGINEERING CHANGES	0.075*	0.032*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	1611243*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(3)	JUN 96*	(18)
PRODUCTION	JAN 00	(16)	APR 01*	(0)	APR 01*	(16)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	277.40*
AMORTIZED UNIT COST	636.74*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.925*

--- PRICE HARDWARE MODEL METRIC ---
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01 (188012)

O2 PLANT - TAILINGS CONVEYOR

PRODUCTION QUANTITY	1	UNIT WEIGHT	23.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	300.00	QUANTITY/NHA	1

UNIT PROD COST 142.84 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	228.	22.	250.
DESIGN	791.	101.	892.
SYSTEMS	98.	-	98.
PROJECT MGMT	102.	29.	132.
DATA	35.	15.	50.
SUBTOTAL(ENG)	1255.	167.	1422.
MANUFACTURING			
PRODUCTION	-	143.	143.
PROTOTYPE	624.	-	624.
TOOL-TEST EQ	76.	12.	88.
SUBTOTAL(MFG)	700.	155.	856.
TOTAL COST	1955.	322.	2278.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.100*	22.900
DENSITY	3.333	0.076*
MFG. COMPLEXITY	9.560	8.220
NEW DESIGN	1.000	0.700
DESIGN REPEAT	0.000	0.400
ENGINEERING CHANGES	0.074*	0.039*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	3178230*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(16)	APR 96*	(4)	AUG 96*	(20)
PRODUCTION	JAN 00	(15)	MAR 01*	(0)	MAR 01*	(15)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	142.77*
AMORTIZED UNIT COST	322.28*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.924*

--- PRICE HARDWARE MODEL METRIC ---
ELECTRONIC ITEM

INPUT FILENAME: LOX   10-OCT-88 12:01
(188012)

O2 PLANT - OXYGEN LIQUIFIER

PRODUCTION QUANTITY	1	UNIT WEIGHT	199.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	200.00	QUANTITY/NHA	1

UNIT PROD COST 938.80   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	998.	158.	1156.
DESIGN	3468.	605.	4072.
SYSTEMS	429.	-	429.
PROJECT MGMT	516.	188.	705.
DATA	167.	95.	262.
SUBTOTAL(ENG)	5578.	1046.	6624.
MANUFACTURING			
PRODUCTION	-	939.	939.
PROTOTYPE	4189.	-	4189.
TOOL-TEST EQ	508.	82.	590.
SUBTOTAL(MFG)	4697.	1021.	5718.
TOTAL COST	10275.	2066.	12341.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.400*	198.600
DENSITY	20.001	0.993*
MFG. COMPLEXITY	9.560	8.220
NEW DESIGN	1.000	0.500
DESIGN REPEAT	0.000	0.100
ENGINEERING CHANGES	0.070*	0.037*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	816867*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(5)	JAN 97*	(25)
PRODUCTION	JAN 00	(21)	SEP 01*	(0)	SEP 01*	(21)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	938.30*
AMORTIZED UNIT COST	2066.31*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.920*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - LOX STORAGE TANKS

PRODUCTION QUANTITY	2	UNIT WEIGHT	109.50	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	5100.00	QUANTITY/NHA	2

UNIT PROD COST 278.31 MONTHLY PROD RATE 0.53

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	852.	57.	909.
DESIGN	2959.	225.	3184.
SYSTEMS	366.	-	366.
PROJECT MGMT	337.	96.	433.
DATA	123.	48.	171.
SUBTOTAL(ENG)	4636.	426.	5063.
MANUFACTURING			
PRODUCTION	-	557.	557.
PROTOTYPE	1347.	-	1347.
TOOL-TEST EQ	167.	138.	305.
SUBTOTAL(MFG)	1514.	695.	2209.
TOTAL COST	6150.	1121.	7272.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.200*	109.300
DENSITY	0.392	0.021*
MFG. COMPLEXITY	9.560	7.550
NEW DESIGN	1.000	1.000
DESIGN REPEAT	0.000	0.150
ENGINEERING CHANGES	0.073*	0.031*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	1611243*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(17)	MAY 96*	(4)	SEP 96*	(21)
PRODUCTION	JAN 00	(16)	APR 01*	(2)	JUN 01*	(18)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	288.90*
AMORTIZED UNIT COST	560.69*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.966*
UNIT LEARNING CURVE	0.925*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - RADIATOR/TCS

PRODUCTION QUANTITY	1	UNIT WEIGHT	1362.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	700.00	QUANTITY/NHA	1

UNIT PROD COST 7713.50 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	4847.	641.	5488.
DESIGN	16844.	2909.	19753.
SYSTEMS	2084.	-	2084.
PROJECT MGMT	3127.	1258.	4385.
DATA	932.	631.	1563.
SUBTOTAL(ENG)	27833.	5440.	33273.
MANUFACTURING			
PRODUCTION	-	7713.	7713.
PROTOTYPE	33929.	-	33929.
TOOL-TEST EQ	3843.	693.	4536.
SUBTOTAL(MFG)	37772.	8407.	46178.
TOTAL COST	65605.	13846.	79451.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	3.000*	1359.000
DENSITY	41.000	1.941*
MFG. COMPLEXITY	9.560	8.620
NEW DESIGN	1.000	0.800
DESIGN REPEAT	0.000	0.400
ENGINEERING CHANGES	0.060*	0.036*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	113402*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(29)	MAY 97*	(8)	JAN 98*	(37)
PRODUCTION	JAN 00	(31)	JUL 02*	(0)	JUL 02*	(31)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	7708.97*
AMORTIZED UNIT COST	13846.25*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.914*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - LIQUID H2 TANK

PRODUCTION QUANTITY	1	UNIT WEIGHT	12.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	600.00	QUANTITY/NHA	1

UNIT PROD COST 39.60 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	203.	11.	214.
DESIGN	705.	42.	747.
SYSTEMS	87.	-	87.
PROJECT MGMT	74.	10.	84.
DATA	28.	5.	33.
SUBTOTAL(ENG)	1098.	68.	1165.
MANUFACTURING			
PRODUCTION	-	40.	40.
PROTOTYPE	184.	-	184.
TOOL-TEST EQ	25.	3.	28.
SUBTOTAL(MFG)	209.	43.	251.
TOTAL COST	1306.	110.	1417.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	0.100*	11.900	ENGINEERING COMPLEXITY	1.000
DENSITY	1.667	0.020*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	9.560	7.430	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	1.000	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.150	PLATFORM	2.000
ENGINEERING CHANGES	0.076*	0.031*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	0.000	MTBF(FIELD)	3178338*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(13)	JAN 96*	(3)	APR 96*	(16)
PRODUCTION	JAN 00	(11)	NOV 00*	(0)	NOV 00*	(11)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	39.58*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	110.38*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.998*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.930*

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: LOX   10-OCT-88 12:01 (188012)

O2 PLANT - H2 HEATER

PRODUCTION QUANTITY	1	UNIT WEIGHT	0.10	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	1.00	QUANTITY/NHA	1

UNIT PROD COST 0.99   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	3.	0.	3.
DESIGN	10.	1.	11.
SYSTEMS	1.	-	1.
PROJECT MGMT	1.	0.	2.
DATA	0.	0.	1.
SUBTOTAL(ENG)	17.	1.	18.
MANUFACTURING			
PRODUCTION	-	1.	1.
PROTOTYPE	4.	-	4.
TOOL-TEST EQ	1.	0.	1.
SUBTOTAL(MFG)	5.	1.	6.
TOTAL COST	22.	2.	24.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	0.100	ENGINEERING COMPLEXITY	1.000
DENSITY	0.100*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.030	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.500	PLATFORM	2.000
DESIGN REPEAT	0.250	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.040*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	MTBF(FIELD)	178974*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(7)	JUL 95*	(1)	AUG 95*	(8)
PRODUCTION	JAN 00	(6)	JUN 00*	(0)	JUN 00*	(6)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	0.99*	RATE TOOLING	0
AMORTIZED UNIT COST	2.26*	PRICE IMPROVEMENT FACTOR	0.987*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.905*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - H2 BLOWER

PRODUCTION QUANTITY	1	UNIT WEIGHT	3.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	1.00	QUANTITY/NHA	1

UNIT PROD COST 22.61 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	71.	8.	79.
DESIGN	247.	34.	282.
SYSTEMS	31.	-	31.
PROJECT MGMT	27.	7.	35.
DATA	10.	4.	14.
SUBTOTAL(ENG)	387.	53.	440.
MANUFACTURING			
PRODUCTION	-	23.	23.
PROTOTYPE	97.	-	97.
TOOL-TEST EQ	13.	2.	15.
SUBTOTAL(MFG)	109.	25.	134.
TOTAL COST	496.	77.	574.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.100*	2.900
DENSITY	41.000	2.900*
MFG. COMPLEXITY	9.560	8.030
NEW DESIGN	1.000	0.250
DESIGN REPEAT	0.000	0.100
ENGINEERING CHANGES	0.078*	0.039*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.002*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	3178311*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(11)	NOV 95*	(3)	FEB 96*	(14)
PRODUCTION	JAN 00	(10)	OCT 00*	(0)	OCT 00*	(10)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	22.60*
AMORTIZED UNIT COST	77.44*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.997*
UNIT LEARNING CURVE	0.928*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01 (188012)

O2 PLANT - 3 CM ID PIPE

PRODUCTION QUANTITY	1	UNIT WEIGHT	302.00	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	60.00	QUANTITY/NHA	1

UNIT PROD COST 864.97 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	131.	36.	167.
DESIGN	426.	148.	575.
SYSTEMS	62.	-	62.
PROJECT MGMT	259.	123.	381.
DATA	61.	62.	123.
SUBTOTAL(ENG)	939.	369.	1308.
MANUFACTURING			
PRODUCTION	-	865.	865.
PROTOTYPE	4056.	-	4056.
TOOL-TEST EQ	357.	73.	430.
SUBTOTAL(MFG)	4414.	938.	5351.
TOTAL COST	5352.	1307.	6659.

DESIGN FACTORS	MECHANICAL
WEIGHT	302.000
DENSITY	5.033*
MFG. COMPLEXITY	7.800
NEW DESIGN	0.250
DESIGN REPEAT	0.750
ENGINEERING CHANGES	0.033*
INTEGRATION LEVEL	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	17749*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(17)	MAY 96*	(5)	OCT 96*	(22)
PRODUCTION	JAN 00	(20)	AUG 01*	(0)	AUG 01*	(20)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	864.20*
AMORTIZED UNIT COST	1306.81*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.882*

\- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: LOX   10-OCT-88 12:01
(188012)

O2 PLANT - 0.25 CM ID PIPE

PRODUCTION QUANTITY	1	UNIT WEIGHT	151.00	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	0.60	QUANTITY/NHA	1

UNIT PROD COST 540.61   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	86.	24.	110.
DESIGN	281.	98.	379.
SYSTEMS	40.	-	40.
PROJECT MGMT	159.	77.	236.
DATA	38.	39.	77.
SUBTOTAL(ENG)	604.	238.	842.
MANUFACTURING			
PRODUCTION	-	541.	541.
PROTOTYPE	2482.	-	2482.
TOOL-TEST EQ	226.	46.	272.
SUBTOTAL(MFG)	2708.	587.	3294.
TOTAL COST	3312.	824.	4136.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	151.000	ENGINEERING COMPLEXITY	1.000
DENSITY	251.667*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.930	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.250	PLATFORM	2.000
DESIGN REPEAT	0.750	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.035*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	MTBF(FIELD)	20725*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(16)	APR 96*	(4)	AUG 96*	(20)
PRODUCTION	JAN 00	(19)	JUL 01*	(0)	JUL 01*	(19)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	540.13*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	824.41*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	1.000*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.883*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - PV POWER SYSTEM

PRODUCTION QUANTITY	1	UNIT WEIGHT	5721.00	MODE	1
PROTOTYPE QUANTITY	4.000	UNIT VOLUME	13200.00	QUANTITY/NHA	1

UNIT PROD COST 3588.64 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	5026.	443.	5468.
DESIGN	17738.	1639.	19376.
SYSTEMS	2141.	-	2141.
PROJECT MGMT	2804.	632.	3435.
DATA	866.	317.	1183.
SUBTOTAL(ENG)	28574.	3030.	31604.
MANUFACTURING			
PRODUCTION	-	3589.	3589.
PROTOTYPE	23479.	-	23479.
TOOL-TEST EQ	2808.	277.	3084.
SUBTOTAL(MFG)	26287.	3865.	30152.
TOTAL COST	54861.	6895.	61757.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	12.000*	5708.999
DENSITY	9.091	0.432*
MFG. COMPLEXITY	9.560	6.700
NEW DESIGN	1.000	0.750
DESIGN REPEAT	0.000	0.500
ENGINEERING CHANGES	0.060*	0.019*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	29147*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(25)	JAN 97*	(8)	SEP 97*	(33)
PRODUCTION	JAN 00	(25)	JAN 02*	(0)	JAN 02*	(25)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	3586.83*
AMORTIZED UNIT COST	6895.45*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.923*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOX 10-OCT-88 12:01
(188012)

O2 PLANT - REGENERATIVE FUEL CELL

PRODUCTION QUANTITY	1	UNIT WEIGHT	3285.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	101999.98	QUANTITY/NHA	1

UNIT PROD COST20048.70 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	7738.	1090.	8828.
DESIGN	26896.	5047.	31944.
SYSTEMS	3326.	-	3326.
PROJECT MGMT	6555.	2947.	9502.
DATA	1791.	1478.	3270.
SUBTOTAL(ENG)	46307.	10562.	56869.
MANUFACTURING			
PRODUCTION	-	20049.	20049.
PROTOTYPE	88114.	-	88114.
TOOL-TEST EQ	9854.	1824.	11677.
SUBTOTAL(MFG)	97968.	21872.	119840.
TOTAL COST	144275.	32434.	176709.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	7.000*	3278.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.686	0.032*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	9.560	8.790	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	0.750	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.500	PLATFORM	2.000
ENGINEERING CHANGES	0.052*	0.033*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	0.000	MTBF(FIELD)	49430*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(35)	NOV 97*	(9)	AUG 98*	(44)
PRODUCTION	JAN 00	(37)	JAN 03*	(0)	JAN 03*	(37)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	20036.51*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	32434.00*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	1.000*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.911*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: PCR   10-OCT-88 12:10
(188012)

MOSAP PCRV - INNER SHELL

PRODUCTION QUANTITY	1	UNIT WEIGHT	490.00	MODE	2
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	86199.98	QUANTITY/NHA	1

UNIT PROD COST 767.20   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	821.	35.	857.
DESIGN	2667.	134.	2802.
SYSTEMS	398.	-	398.
PROJECT MGMT	634.	109.	743.
DATA	187.	116.	303.
SUBTOTAL(ENG)	4707.	395.	5102.
MANUFACTURING			
PRODUCTION	-	767.	767.
PROTOTYPE	5530.	-	5530.
TOOL-TEST EQ	424.	78.	502.
SUBTOTAL(MFG)	5955.	845.	6800.
TOTAL COST	10661.	1240.	11901.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	490.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.006*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.280	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.800	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.021*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.134	MTBF(FIELD)	12527*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(18)	JUN 96*	(7)	JAN 97*	(25)
PRODUCTION	JAN 00	(19)	JUL 01*	(0)	JUL 01*	(19)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	766.55*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	1240.14*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	1.000*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.886*

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: PCR   10-OCT-88 12:10
(188012)

MOSAP PCRV - OUTER SHELL

PRODUCTION QUANTITY	1	UNIT WEIGHT	500.00	MODE	2
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	86199.98	QUANTITY/NHA	1

UNIT PROD COST 780.67   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	833.	36.	869.
DESIGN	2705.	137.	2842.
SYSTEMS	403.	-	403.
PROJECT MGMT	644.	111.	755.
DATA	189.	118.	308.
SUBTOTAL(ENG)	4775.	402.	5177.
MANUFACTURING			
PRODUCTION	-	781.	781.
PROTOTYPE	5629.	-	5629.
TOOL-TEST EQ	432.	79.	511.
SUBTOTAL(MFG)	6060.	860.	6920.
TOTAL COST	10836.	1262.	12097.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	500.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.006*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.280	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.800	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.021*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.134	MTBF(FIELD)	12452*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(18)	JUN 96*	(7)	JAN 97*	(25)
PRODUCTION	JAN 00	(19)	JUL 01*	(0)	JUL 01*	(19)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	780.01*	RATE TOOLING	0
AMORTIZED UNIT COST	1261.65*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.886*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - OTHER STRUCTURE

PRODUCTION QUANTITY	1	UNIT WEIGHT	200.00	MODE	2
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	6000.00	QUANTITY/NHA	1

UNIT PROD COST 1194.97 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1956.	131.	2086.
DESIGN	6688.	582.	7270.
SYSTEMS	877.	-	877.
PROJECT MGMT	1079.	212.	1291.
DATA	344.	226.	570.
SUBTOTAL(ENG)	10945.	1150.	12095.
MANUFACTURING			
PRODUCTION	-	1195.	1195.
PROTOTYPE	7400.	-	7400.
TOOL-TEST EQ	697.	133.	830.
SUBTOTAL(MFG)	8097.	1328.	9425.
TOTAL COST	19042.	2478.	21519.

DESIGN FACTORS	MECHANICAL
WEIGHT	200.000
DENSITY	0.033*
MFG. COMPLEXITY	8.510
NEW DESIGN	1.000
DESIGN REPEAT	0.500
ENGINEERING CHANGES	0.030*
INTEGRATION LEVEL	0.134

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	9946*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(22)	OCT 96*	(8)	JUN 97*	(30)
PRODUCTION	JAN 00	(22)	OCT 01*	(0)	OCT 01*	(22)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	1193.84*
AMORTIZED UNIT COST	2477.71*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.877*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - INSULATION

PRODUCTION QUANTITY	1	UNIT WEIGHT	130.00	MODE	2
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	10.00	QUANTITY/NHA	1

UNIT PROD COST 112.40 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	107.	27.	134.
DESIGN	334.	92.	426.
SYSTEMS	55.	-	55.
PROJECT MGMT	96.	27.	122.
DATA	28.	29.	56.
SUBTOTAL(ENG)	619.	174.	794.
MANUFACTURING			
PRODUCTION	-	112.	112.
PROTOTYPE	833.	-	833.
TOOL-TEST EQ	63.	11.	73.
SUBTOTAL(MFG)	895.	123.	1018.
TOTAL COST	1515.	297.	1812.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	130.000	ENGINEERING COMPLEXITY	1.000
DENSITY	13.000*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	6.510	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.100	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.018*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	26675*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(10)	OCT 95*	(3)	JAN 96*	(13)
PRODUCTION	JAN 00	(13)	JAN 01*	(0)	JAN 01*	(13)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	112.32*	RATE TOOLING	0
AMORTIZED UNIT COST	297.29*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.899*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: PCR   10-OCT-88 12:10
(188012)

MOSAP PCRV - RADIATOR

PRODUCTION QUANTITY	1	UNIT WEIGHT	160.00	MODE	2
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	1000.00	QUANTITY/NHA	1

UNIT PROD COST 574.48   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	261.	14.	275.
DESIGN	872.	58.	930.
SYSTEMS	121.	-	121.
PROJECT MGMT	301.	74.	375.
DATA	77.	79.	156.
SUBTOTAL(ENG)	1632.	225.	1856.
MANUFACTURING			
PRODUCTION	-	574.	574.
PROTOTYPE	3751.	-	3751.
TOOL-TEST EQ	325.	61.	387.
SUBTOTAL(MFG)	4076.	636.	4712.
TOTAL COST	5708.	861.	6568.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	160.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.160*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.980	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.900	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.027*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.263	MTBF(FIELD)	13064*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(18)	JUN 96*	(7)	JAN 97*	(25)
PRODUCTION	JAN 00	(19)	JUL 01*	(0)	JUL 01*	(19)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	573.98*	RATE TOOLING	0
AMORTIZED UNIT COST	860.55*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.883*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - THERMAL PUMP

PRODUCTION QUANTITY	1	UNIT WEIGHT	20.00	MODE	1
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	2.00	QUANTITY/NHA	1

UNIT PROD COST 60.42 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	623.	30.	653.
DESIGN	2244.	114.	2358.
SYSTEMS	259.	-	259.
PROJECT MGMT	223.	21.	245.
DATA	82.	23.	105.
SUBTOTAL(ENG)	3433.	188.	3620.
MANUFACTURING			
PRODUCTION	-	60.	60.
PROTOTYPE	399.	-	399.
TOOL-TEST EQ	53.	6.	60.
SUBTOTAL(MFG)	452.	67.	519.
TOTAL COST	3885.	254.	4139.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.250*	19.750
DENSITY	43.000	9.875*
MFG. COMPLEXITY	9.960	7.280
NEW DESIGN	1.000	1.000
DESIGN REPEAT	0.000	0.000
ENGINEERING CHANGES	0.066*	0.022*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.263	0.263

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.003*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	952465*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(14)	FEB 96*	(5)	JUL 96*	(19)
PRODUCTION	JAN 00	(11)	NOV 00*	(0)	NOV 00*	(11)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	60.39*
AMORTIZED UNIT COST	254.36*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.999*
UNIT LEARNING CURVE	0.928*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10 (188012)

MOSAP PCRV - HEAT EXCHANGER

PRODUCTION QUANTITY	1	UNIT WEIGHT	50.00	MODE	2
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	4.00	QUANTITY/NHA	1

UNIT PROD COST 107.20 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	826.	27.	853.
DESIGN	2680.	104.	2785.
SYSTEMS	400.	-	400.
PROJECT MGMT	359.	27.	386.
DATA	134.	29.	163.
SUBTOTAL(ENG)	4399.	187.	4587.
MANUFACTURING			
PRODUCTION	-	107.	107.
PROTOTYPE	752.	-	752.
TOOL-TEST EQ	61.	11.	72.
SUBTOTAL(MFG)	814.	118.	932.
TOTAL COST	5213.	305.	5518.

DESIGN FACTORS	MECHANICAL
WEIGHT	50.000
DENSITY	12.500*
MFG. COMPLEXITY	7.280
NEW DESIGN	1.000
DESIGN REPEAT	0.000
ENGINEERING CHANGES	0.022*
INTEGRATION LEVEL	0.263

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	24845*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(6)	SEP 96*	(21)
PRODUCTION	JAN 00	(13)	JAN 01*	(0)	JAN 01*	(13)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	107.12*
AMORTIZED UNIT COST	305.47*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.893*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10 (188012)

MOSAP PCRV - THERMAL SYSTEM PIPING

PRODUCTION QUANTITY	1	UNIT WEIGHT	100.00	MODE	2
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	8.00	QUANTITY/NHA	1

UNIT PROD COST 648.76 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	962.	61.	1023.
DESIGN	3289.	270.	3559.
SYSTEMS	432.	-	432.
PROJECT MGMT	550.	109.	659.
DATA	173.	116.	289.
SUBTOTAL(ENG)	5405.	557.	5961.
MANUFACTURING			
PRODUCTION	-	649.	649.
PROTOTYPE	3994.	-	3994.
TOOL-TEST EQ	380.	72.	452.
SUBTOTAL(MFG)	4374.	721.	5095.
TOTAL COST	9779.	1277.	11056.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	100.000	ENGINEERING COMPLEXITY	1.000
DENSITY	12.500*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.510	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.600	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.030*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	12245*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(21)	SEP 96*	(7)	APR 97*	(28)
PRODUCTION	JAN 00	(20)	AUG 01*	(0)	AUG 01*	(20)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	648.16*	RATE TOOLING	0
AMORTIZED UNIT COST	1277.45*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.879*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - HYDROGEN TANKS

PRODUCTION QUANTITY	1	UNIT WEIGHT	20.00	MODE	2
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	100.00	QUANTITY/NHA	1

UNIT PROD COST 96.06 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	522.	22.	544.
DESIGN	1747.	91.	1838.
SYSTEMS	242.	-	242.
PROJECT MGMT	224.	23.	247.
DATA	81.	25.	106.
SUBTOTAL(ENG)	2815.	161.	2976.
MANUFACTURING			
PRODUCTION	-	96.	96.
PROTOTYPE	613.	-	613.
TOOL-TEST EQ	56.	10.	66.
SUBTOTAL(MFG)	669.	106.	776.
TOTAL COST	3485.	268.	3752.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	20.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.200*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.010	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.028*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	24089*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(16)	APR 96*	(5)	SEP 96*	(21)
PRODUCTION	JAN 00	(14)	FEB 01*	(0)	FEB 01*	(14)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	95.98*	RATE TOOLING	0
AMORTIZED UNIT COST	267.56*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.888*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - OXYGEN TANKS

PRODUCTION QUANTITY	1	UNIT WEIGHT	15.00	MODE	2
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	100.00	QUANTITY/NHA	1

UNIT PROD COST 74.69 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	426.	17.	444.
DESIGN	1427.	73.	1500.
SYSTEMS	197.	-	197.
PROJECT MGMT	181.	18.	200.
DATA	66.	20.	86.
SUBTOTAL(ENG)	2298.	128.	2427.
MANUFACTURING			
PRODUCTION	-	75.	75.
PROTOTYPE	476.	-	476.
TOOL-TEST EQ	43.	8.	51.
SUBTOTAL(MFG)	519.	83.	602.
TOTAL COST	2818.	211.	3029.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	15.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.150*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.010	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.028*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	26260*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(6)	SEP 96*	(21)
PRODUCTION	JAN 00	(13)	JAN 01*	(0)	JAN 01*	(13)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	74.62*	RATE TOOLING	0
AMORTIZED UNIT COST	211.17*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.889*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - WATER TANKS

PRODUCTION QUANTITY	1	UNIT WEIGHT	40.00	MODE	2
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	100.00	QUANTITY/NHA	1

UNIT PROD COST 176.11 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	849.	39.	888.
DESIGN	2843.	153.	2996.
SYSTEMS	393.	-	393.
PROJECT MGMT	371.	41.	412.
DATA	134.	44.	178.
SUBTOTAL(ENG)	4590.	277.	4868.
MANUFACTURING			
PRODUCTION	-	176.	176.
PROTOTYPE	1132.	-	1132.
TOOL-TEST EQ	103.	19.	122.
SUBTOTAL(MFG)	1235.	195.	1430.
TOTAL COST	5825.	472.	6297.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	40.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.400*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.010	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.027*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	19566*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(17)	MAY 96*	(6)	NOV 96*	(23)
PRODUCTION	JAN 00	(15)	MAR 01*	(0)	MAR 01*	(15)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	175.96*	RATE TOOLING	0
AMORTIZED UNIT COST	472.10*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.886*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: PCR   10-OCT-88 12:10 (188012)

MOSAP PCRV - FUEL CELL

PRODUCTION QUANTITY	2	UNIT WEIGHT	45.00	MODE	1
PROTOTYPE QUANTITY	6.000	UNIT VOLUME	200.00	QUANTITY/NHA	2

UNIT PROD COST 530.35   MONTHLY PROD RATE 0.58

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	429.	128.	557.
DESIGN	1565.	587.	2152.
SYSTEMS	177.	-	177.
PROJECT MGMT	346.	208.	555.
DATA	91.	219.	310.
SUBTOTAL(ENG)	2609.	1142.	3750.
MANUFACTURING			
PRODUCTION	-	1061.	1061.
PROTOTYPE	4052.	-	4052.
TOOL-TEST EQ	491.	439.	930.
SUBTOTAL(MFG)	4543.	1500.	6043.
TOTAL COST	7152.	2641.	9793.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1.000*	44.000	ENGINEERING COMPLEXITY	1.000
DENSITY	43.000	0.220*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	9.960	8.970	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.500	0.200	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.500	PLATFORM	2.500
ENGINEERING CHANGES	0.058*	0.034*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.843	0.201	MTBF(FIELD)	244812*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(19)	JUL 96*	(8)	MAR 97*	(27)
PRODUCTION	JAN 00	(19)	JUL 01*	(2)	SEP 01*	(21)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	552.49*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	1320.61*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.965*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.918*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - POWER DISTRIBUTION

PRODUCTION QUANTITY	1	UNIT WEIGHT	100.00	MODE	1
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	10.00	QUANTITY/NHA	1

UNIT PROD COST 938.62 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1756.	248.	2004.
DESIGN	6391.	1137.	7528.
SYSTEMS	719.	-	719.
PROJECT MGMT	827.	244.	1071.
DATA	266.	259.	525.
SUBTOTAL(ENG)	9959.	1888.	11847.
MANUFACTURING			
PRODUCTION	-	939.	939.
PROTOTYPE	5542.	-	5542.
TOOL-TEST EQ	717.	107.	824.
SUBTOTAL(MFG)	6259.	1046.	7305.
TOTAL COST	16218.	2934.	19152.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	2.500*	97.500
DENSITY	43.000	9.750*
MFG. COMPLEXITY	10.320	8.750
NEW DESIGN	1.000	0.500
DESIGN REPEAT	0.000	0.500
ENGINEERING CHANGES	0.065*	0.033*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.843	0.201

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.006*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	110324*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(21)	SEP 96*	(7)	APR 97*	(28)
PRODUCTION	JAN 00	(21)	SEP 01*	(0)	SEP 01*	(21)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	938.10*
AMORTIZED UNIT COST	2934.02*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.917*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - WHEELS AND LOCOMOTION

PRODUCTION QUANTITY	4	UNIT WEIGHT	75.00	MODE	2
PROTOTYPE QUANTITY	18.000	UNIT VOLUME	1000.00	QUANTITY/NHA	4

UNIT PROD COST 329.33 MONTHLY PROD RATE 1.04

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	892.	42.	933.
DESIGN	3161.	186.	3346.
SYSTEMS	396.	-	396.
PROJECT MGMT	840.	184.	1024.
DATA	211.	193.	404.
SUBTOTAL(ENG)	5500.	604.	6104.
MANUFACTURING			
PRODUCTION	-	1317.	1317.
PROTOTYPE	7762.	-	7762.
TOOL-TEST EQ	641.	441.	1082.
SUBTOTAL(MFG)	8403.	1759.	10161.
TOTAL COST	13903.	2362.	16266.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	75.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.075*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.160	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.500	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.022*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.350	MTBF(FIELD)	15269*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(18)	JUN 96*	(13)	JUL 97*	(31)
PRODUCTION	JAN 00	(17)	MAY 01*	(3)	AUG 01*	(20)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	377.68*	RATE TOOLING	0
AMORTIZED UNIT COST	590.62*	PRICE IMPROVEMENT FACTOR	0.954*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.883*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: PCR   10-OCT-88 12:10
(188012)

MOSAP PCRV - MAN LOCKS

PRODUCTION QUANTITY	2	UNIT WEIGHT	230.00	MODE	1
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	4000.00	QUANTITY/NHA	2

UNIT PROD COST 911.96   MONTHLY PROD RATE 0.38

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	4678.	382.	5060.
DESIGN	16847.	1701.	18548.
SYSTEMS	1945.	-	1945.
PROJECT MGMT	1812.	420.	2232.
DATA	642.	443.	1085.
SUBTOTAL(ENG)	25924.	2946.	28870.
MANUFACTURING			
PRODUCTION	-	1824.	1824.
PROTOTYPE	5879.	-	5879.
TOOL-TEST EQ	723.	540.	1263.
SUBTOTAL(MFG)	6603.	2364.	8966.
TOTAL COST	32526.	5309.	37836.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	4.000*	226.000	ENGINEERING COMPLEXITY	1.000
DENSITY	10.000	0.057*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	9.960	7.980	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	1.000	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.000	PLATFORM	2.500
ENGINEERING CHANGES	0.060*	0.026*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.350	0.350	MTBF(FIELD)	62924*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(21)	SEP 96*	(7)	APR 97*	(28)
PRODUCTION	JAN 00	(20)	AUG 01*	(3)	NOV 01*	(23)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	948.87*	RATE TOOLING	0
AMORTIZED UNIT COST	2654.72*	PRICE IMPROVEMENT FACTOR	0.972*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.920*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - GALLEY

PRODUCTION QUANTITY	1	UNIT WEIGHT	70.00	MODE	1
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	1700.00	QUANTITY/NHA	1

UNIT PROD COST 317.96 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1956.	128.	2084.
DESIGN	7044.	531.	7575.
SYSTEMS	814.	-	814.
PROJECT MGMT	737.	103.	839.
DATA	265.	109.	374.
SUBTOTAL(ENG)	10815.	870.	11686.
MANUFACTURING			
PRODUCTION	-	318.	318.
PROTOTYPE	2010.	-	2010.
TOOL-TEST EQ	253.	35.	288.
SUBTOTAL(MFG)	2264.	353.	2616.
TOTAL COST	13079.	1223.	14302.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1.000*	69.000	ENGINEERING COMPLEXITY	1.000
DENSITY	5.882	0.041*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	9.960	7.980	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	1.000	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.000	PLATFORM	2.500
ENGINEERING CHANGES	0.062*	0.027*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	0.201	MTBF(FIELD)	244814*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(18)	JUN 96*	(6)	DEC 96*	(24)
PRODUCTION	JAN 00	(16)	APR 01*	(0)	APR 01*	(16)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	317.80*	RATE TOOLING	0
AMORTIZED UNIT COST	1222.85*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.923*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - PERSONAL HYGIENE

PRODUCTION QUANTITY	1	UNIT WEIGHT	90.00	MODE	2
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	1700.00	QUANTITY/NHA	1

UNIT PROD COST 347.41 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	853.	85.	938.
DESIGN	2852.	381.	3233.
SYSTEMS	396.	-	396.
PROJECT MGMT	435.	90.	525.
DATA	146.	96.	243.
SUBTOTAL(ENG)	4682.	652.	5334.
MANUFACTURING			
PRODUCTION	-	347.	347.
PROTOTYPE	2256.	-	2256.
TOOL-TEST EQ	194.	37.	231.
SUBTOTAL(MFG)	2451.	385.	2835.
TOTAL COST	7133.	1037.	8169.

DESIGN FACTORS	MECHANICAL
WEIGHT	90.000
DENSITY	0.053*
MFG. COMPLEXITY	7.980
NEW DESIGN	0.500
DESIGN REPEAT	0.020
ENGINEERING CHANGES	0.027*
INTEGRATION LEVEL	0.201

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	15526*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(17)	MAY 96*	(7)	DEC 96*	(24)
PRODUCTION	JAN 00	(17)	MAY 01*	(0)	MAY 01*	(17)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	347.11*
AMORTIZED UNIT COST	1036.92*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.884*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - EMERGENCY EQUIPMENT

PRODUCTION QUANTITY	1	UNIT WEIGHT	30.00	MODE	2
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	800.00	QUANTITY/NHA	1

UNIT PROD COST 107.15 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	72.	30.	102.
DESIGN	239.	120.	359.
SYSTEMS	34.	-	34.
PROJECT MGMT	66.	29.	95.
DATA	18.	30.	49.
SUBTOTAL(ENG)	430.	208.	638.
MANUFACTURING			
PRODUCTION	-	107.	107.
PROTOTYPE	705.	-	705.
TOOL-TEST EQ	61.	11.	73.
SUBTOTAL(MFG)	767.	118.	885.
TOTAL COST	1197.	326.	1523.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	30.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.037*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.760	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.100	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.027*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.134	MTBF(FIELD)	23607*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(11)	NOV 95*	(4)	MAR 96*	(15)
PRODUCTION	JAN 00	(14)	FEB 01*	(0)	FEB 01*	(14)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	107.06*	RATE TOOLING	0
AMORTIZED UNIT COST	326.46*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.890*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
ELECTRONIC ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - AVIONICS

PRODUCTION QUANTITY	2	UNIT WEIGHT	45.00	MODE	1
PROTOTYPE QUANTITY	9.000	UNIT VOLUME	1700.00	QUANTITY/NHA	2

UNIT PROD COST 185.24 MONTHLY PROD RATE 1.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1748.	139.	1887.
DESIGN	6548.	554.	7102.
SYSTEMS	704.	-	704.
PROJECT MGMT	696.	119.	816.
DATA	235.	126.	360.
SUBTOTAL(ENG)	9931.	937.	10868.
MANUFACTURING			
PRODUCTION	-	370.	370.
PROTOTYPE	2014.	-	2014.
TOOL-TEST EQ	261.	205.	466.
SUBTOTAL(MFG)	2275.	576.	2851.
TOTAL COST	12206.	1513.	13719.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	2.500*	42.500	ENGINEERING COMPLEXITY	1.000
DENSITY	14.706	0.025*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	10.320	6.850	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	1.000	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.000	PLATFORM	2.500
ENGINEERING CHANGES	0.059*	0.016*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	0.201	MTBF(FIELD)	110324*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(19)	JUL 96*	(9)	APR 97*	(28)
PRODUCTION	JAN 00	(15)	MAR 01*	(1)	APR 01*	(16)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	192.69*	RATE TOOLING	0
AMORTIZED UNIT COST	756.54*	PRICE IMPROVEMENT FACTOR	0.953*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.921*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
ELECTRONIC ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - ECLSS

PRODUCTION QUANTITY	1	UNIT WEIGHT	200.00	MODE	1
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	2600.00	QUANTITY/NHA	1

UNIT PROD COST 2830.01 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	5319.	616.	5935.
DESIGN	19154.	3172.	22326.
SYSTEMS	2212.	-	2212.
PROJECT MGMT	2524.	703.	3227.
DATA	817.	745.	1562.
SUBTOTAL(ENG)	30025.	5236.	35261.
MANUFACTURING			
PRODUCTION	-	2830.	2830.
PROTOTYPE	16376.	-	16376.
TOOL-TEST EQ	1956.	333.	2289.
SUBTOTAL(MFG)	18332.	3163.	21495.
TOTAL COST	48358.	8399.	56756.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	2.000*	198.000	ENGINEERING COMPLEXITY	1.000
DENSITY	7.692	0.076*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	9.960	9.340	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	0.800	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.000	PLATFORM	2.500
ENGINEERING CHANGES	0.053*	0.034*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.263	0.263	MTBF(FIELD)	124115*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(27)	MAR 97*	(10)	JAN 98*	(37)
PRODUCTION	JAN 00	(26)	FEB 02*	(0)	FEB 02*	(26)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	2828.34*	RATE TOOLING	0
AMORTIZED UNIT COST	8398.96*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.913*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - DRIVE STATIONS

PRODUCTION QUANTITY	2	UNIT WEIGHT	40.00	MODE	1
PROTOTYPE QUANTITY	9.000	UNIT VOLUME	2500.00	QUANTITY/NHA	2

UNIT PROD COST 556.17 MONTHLY PROD RATE 0.58

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	3188.	300.	3488.
DESIGN	11945.	1374.	13319.
SYSTEMS	1282.	-	1282.
PROJECT MGMT	1386.	305.	1690.
DATA	448.	321.	769.
SUBTOTAL(ENG)	18248.	2301.	20549.
MANUFACTURING			
PRODUCTION	-	1112.	1112.
PROTOTYPE	5943.	-	5943.
TOOL-TEST EQ	752.	459.	1211.
SUBTOTAL(MFG)	6695.	1572.	8267.
TOTAL COST	24943.	3872.	28815.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	5.000*	35.000	ENGINEERING COMPLEXITY	1.000
DENSITY	20.000	0.014*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	10.290	8.750	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	1.000	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.000	PLATFORM	2.500
ENGINEERING CHANGES	0.057*	0.029*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.263	0.263	MTBF(FIELD)	55472*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(11)	JUL 97*	(31)
PRODUCTION	JAN 00	(17)	MAY 01*	(2)	JUL 01*	(19)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	579.55*	RATE TOOLING	0
AMORTIZED UNIT COST	1936.18*	PRICE IMPROVEMENT FACTOR	0.965*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.917*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

MOSAP PCRV - WORKSTATIONS

PRODUCTION QUANTITY	1	UNIT WEIGHT	40.00	MODE	1
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	1700.00	QUANTITY/NHA	1

UNIT PROD COST 572.62 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	3073.	308.	3381.
DESIGN	11189.	1409.	12599.
SYSTEMS	1257.	-	1257.
PROJECT MGMT	1141.	237.	1378.
DATA	408.	252.	660.
SUBTOTAL(ENG)	17069.	2207.	19276.
MANUFACTURING			
PRODUCTION	-	573.	573.
PROTOTYPE	3227.	-	3227.
TOOL-TEST EQ	424.	67.	491.
SUBTOTAL(MFG)	3651.	640.	4291.
TOTAL COST	20720.	2846.	23567.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	5.000*	35.000	ENGINEERING COMPLEXITY	1.000
DENSITY	29.412	0.021*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	10.290	8.750	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	1.000	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.000	PLATFORM	2.500
ENGINEERING CHANGES	0.066*	0.033*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.263	0.263	MTBF(FIELD)	55472*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(7)	MAR 97*	(27)
PRODUCTION	JAN 00	(17)	MAY 01*	(0)	MAY 01*	(17)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	572.30*	RATE TOOLING	0
AMORTIZED UNIT COST	2846.48*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.917*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: PCR   10-OCT-88 12:10
(188012)

MOSAP PCRV - SLEEP QUARTERS

PRODUCTION QUANTITY	2	UNIT WEIGHT	30.00	MODE	2
PROTOTYPE QUANTITY	9.000	UNIT VOLUME	6800.00	QUANTITY/NHA	2

UNIT PROD COST 66.59   MONTHLY PROD RATE 1.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	598.	17.	615.
DESIGN	1998.	65.	2063.
SYSTEMS	285.	-	285.
PROJECT MGMT	297.	28.	324.
DATA	101.	29.	131.
SUBTOTAL(ENG)	3279.	139.	3419.
MANUFACTURING			
PRODUCTION	-	133.	133.
PROTOTYPE	892.	-	892.
TOOL-TEST EQ	67.	58.	124.
SUBTOTAL(MFG)	959.	191.	1150.
TOTAL COST	4238.	330.	4568.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	30.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.004*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.280	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.020*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	28959*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(7)	OCT 96*	(22)
PRODUCTION	JAN 00	(12)	DEC 00*	(1)	JAN 01*	(13)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	70.21*	RATE TOOLING	0
AMORTIZED UNIT COST	165.22*	PRICE IMPROVEMENT FACTOR	0.945*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.895*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
INTEGRATION AND TEST

INPUT FILENAME: PCR   10-OCT-88 12:10
(188012)

PCRV INTEGRATION

PRODUCTION QUANTITY	1	INT WEIGHT	73.480*	MODE	5
PROTOTYPE QUANTITY	4.500	INT VOLUME	294.774*	QUANTITY/NHA	0

UNIT PROD COST 335.80   MONTHLY PROD RATE 0.00

PROGRAM COST ($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1610.	117.	1727.
DESIGN	5722.	470.	6192.
SYSTEMS	682.	-	682.
PROJECT MGMT	640.	98.	739.
DATA	227.	104.	331.
SUBTOTAL (ENG)	8881.	790.	9671.
MANUFACTURING			
PRODUCTION	-	336.	336.
PROTOTYPE	2109.	-	2109.
TOOL-TEST EQ	252.	37.	289.
SUBTOTAL (MFG)	2361.	372.	2733.
TOTAL COST	11242.	1163.	12405.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	2.652*	70.828*
DENSITY	0.561*	0.240*
MFG. COMPLEXITY	9.601*	7.926*
NEW PLANS LEVEL	0.700	0.700
ENGINEERING CHANGES	0.037*	0.017*
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000*
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.016
PLATFORM	2.500
YEAR OF TECHNOLOGY	1999*
RELIABILITY FACTOR	1.0
MTBF (FIELD)	84788*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 99	(17)	MAY 00*	(6)	NOV 00*	(23)
PRODUCTION	DEC 00*	(17)	APR 02*	(0)	APR 02*	(17)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
AMORTIZED UNIT COST	1162.57*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00*
PRODUCTION TOOLING	1.00*

- - - PRICE HARDWARE MODEL METRIC - - -
SYSTEM COST SUMMARY

INPUT FILENAME: PCR 10-OCT-88 12:10
(188012)

TOTAL COST, WITH INTEGRATION COST

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	34358.	2979.	37337.
DESIGN	122153.	13495.	135648.
SYSTEMS	14680.	-	14680.
PROJ MGMT	16409.	3541.	19951.
DATA	5371.	3749.	9120.
SUBTOTAL(ENG)	192970.	23765.	216735.
MANUFACTURING			
PRODUCTION	-	15860.	15860.
PROTOTYPE	89278.	-	89278.
TOOL-TEST EQ	9431.	3257.	12688.
PURCH ITEMS	0.	0.	0.
SUBTOTAL(MFG)	98709.	19118.	117827.
TOTAL COST	291679.	42883.	334562.

****
* SYSTEM WT 3334.99 SYSTEM WS 3299.24 *
* SYSTEM SERIES MTBF HRS. 826 AV SYSTEM COST 42883 *
* SYSTEM QUANTITY 1 *
****

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16 (188012)

MOSAP HTU - INNER SHELL

PRODUCTION QUANTITY	1	UNIT WEIGHT	490.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	86199.98	QUANTITY/NHA	1

UNIT PROD COST 769.66 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	40.	39.	79.
DESIGN	130.	148.	278.
SYSTEMS	20.	-	20.
PROJECT MGMT	264.	111.	375.
DATA	55.	118.	173.
SUBTOTAL(ENG)	508.	416.	925.
MANUFACTURING			
PRODUCTION	-	770.	770.
PROTOTYPE	4433.	-	4433.
TOOL-TEST EQ	353.	78.	431.
SUBTOTAL(MFG)	4786.	848.	5634.
TOTAL COST	5294.	1264.	6558.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	490.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.006*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.280	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.050	PLATFORM	2.500
DESIGN REPEAT	0.800	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.025*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.134	MTBF(FIELD)	12527*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(11)	NOV 95*	(3)	FEB 96*	(14)
PRODUCTION	JAN 00	(19)	JUL 01*	(0)	JUL 01*	(19)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	769.01*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	1263.96*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	1.000*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.886*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: HTU   10-OCT-88 12:16
(188012)

MOSAP HTU - OUTER SHELL

PRODUCTION QUANTITY	1	UNIT WEIGHT	500.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	8620.00	QUANTITY/NHA	1

UNIT PROD COST 783.19   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	41.	40.	81.
DESIGN	132.	161.	292.
SYSTEMS	20.	-	20.
PROJECT MGMT	268.	114.	382.
DATA	56.	122.	177.
SUBTOTAL(ENG)	516.	436.	952.
MANUFACTURING			
PRODUCTION	-	783.	783.
PROTOTYPE	4512.	-	4512.
TOOL-TEST EQ	351.	79.	430.
SUBTOTAL(MFG)	4863.	863.	5726.
TOTAL COST	5379.	1299.	6678.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	500.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.058*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.280	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.050	PLATFORM	2.500
DESIGN REPEAT	0.800	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.025*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.134	MTBF(FIELD)	12452*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(11)	NOV 95*	(3)	FEB 96*	(14)
PRODUCTION	JAN 00	(19)	JUL 01*	(0)	JUL 01*	(19)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	782.52*	RATE TOOLING	0
AMORTIZED UNIT COST	1298.52*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.886*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: HTU   10-OCT-88 12:16
(188012)

MOSAP HTU - OTHER STRUCTURE

PRODUCTION QUANTITY	1	UNIT WEIGHT	200.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	6000.00	QUANTITY/NHA	1

UNIT PROD COST 1201.84   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	96.	148.	244.
DESIGN	325.	658.	983.
SYSTEMS	44.	-	44.
PROJECT MGMT	335.	222.	557.
DATA	72.	236.	308.
SUBTOTAL(ENG)	872.	1264.	2136.
MANUFACTURING			
PRODUCTION	-	1202.	1202.
PROTOTYPE	5944.	-	5944.
TOOL-TEST EQ	571.	133.	705.
SUBTOTAL(MFG)	6516.	1335.	7851.
TOTAL COST	7387.	2600.	9987.

DESIGN FACTORS	MECHANICAL
WEIGHT	200.000
DENSITY	0.033*
MFG. COMPLEXITY	8.510
NEW DESIGN	0.050
DESIGN REPEAT	0.500
ENGINEERING CHANGES	0.035*
INTEGRATION LEVEL	0.134

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	9946*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(13)	JAN 96*	(4)	MAY 96*	(17)
PRODUCTION	JAN 00	(22)	OCT 01*	(0)	OCT 01*	(22)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	1200.70*
AMORTIZED UNIT COST	2599.72*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.877*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - INSULATION

PRODUCTION QUANTITY	1	UNIT WEIGHT	130.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	10.00	QUANTITY/NHA	1

UNIT PROD COST 112.49 MONTHLY PROD RATE 0.00

PROGRAM COST ($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	105.	28.	133.
DESIGN	325.	95.	420.
SYSTEMS	54.	-	54.
PROJECT MGMT	82.	27.	109.
DATA	25.	29.	54.
SUBTOTAL (ENG)	592.	179.	771.
MANUFACTURING			
PRODUCTION	-	112.	112.
PROTOTYPE	666.	-	666.
TOOL-TEST EQ	54.	11.	64.
SUBTOTAL (MFG)	720.	123.	843.
TOTAL COST	1312.	302.	1614.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	130.000	ENGINEERING COMPLEXITY	1.000
DENSITY	13.000*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	6.510	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.100	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.019*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF (FIELD)	26675*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(10)	OCT 95*	(2)	DEC 95*	(12)
PRODUCTION	JAN 00	(13)	JAN 01*	(0)	JAN 01*	(13)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	112.40*	RATE TOOLING	0
AMORTIZED UNIT COST	301.75*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.899*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - RADIATOR

PRODUCTION QUANTITY	1	UNIT WEIGHT	160.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	1000.00	QUANTITY/NHA	1

UNIT PROD COST 576.32 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	26.	15.	41.
DESIGN	85.	62.	147.
SYSTEMS	12.	-	12.
PROJECT MGMT	169.	75.	244.
DATA	35.	80.	114.
SUBTOTAL(ENG)	326.	232.	558.
MANUFACTURING			
PRODUCTION	-	576.	576.
PROTOTYPE	3010.	-	3010.
TOOL-TEST EQ	268.	62.	330.
SUBTOTAL(MFG)	3279.	638.	3917.
TOTAL COST	3605.	870.	4474.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	160.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.160*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.980	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.100	PLATFORM	2.500
DESIGN REPEAT	0.900	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.030*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.263	MTBF(FIELD)	13064*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(13)	JAN 96*	(4)	MAY 96*	(17)
PRODUCTION	JAN 00	(19)	JUL 01*	(0)	JUL 01*	(19)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	575.81*	RATE TOOLING	0
AMORTIZED UNIT COST	869.71*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.883*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: HTU — 10-OCT-88 12:16 (188012)

MOSAP HTU - THERMAL PUMP

PRODUCTION QUANTITY	1	UNIT WEIGHT	20.00	MODE	1
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	2.00	QUANTITY/NHA	1

UNIT PROD COST 60.62 — MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	61.	32.	93.
DESIGN	218.	122.	341.
SYSTEMS	26.	-	26.
PROJECT MGMT	35.	22.	57.
DATA	11.	24.	34.
SUBTOTAL(ENG)	351.	200.	551.
MANUFACTURING			
PRODUCTION	-	61.	61.
PROTOTYPE	320.	-	320.
TOOL-TEST EQ	44.	6.	51.
SUBTOTAL(MFG)	364.	67.	431.
TOTAL COST	715.	267.	982.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.250*	19.750
DENSITY	43.000	9.875*
MFG. COMPLEXITY	9.960	7.280
NEW DESIGN	0.100	0.100
DESIGN REPEAT	0.000	0.000
ENGINEERING CHANGES	0.073*	0.025*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.263	0.263

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.003*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	952465*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(9)	SEP 95*	(3)	DEC 95*	(12)
PRODUCTION	JAN 00	(11)	NOV 00*	(0)	NOV 00*	(11)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	60.59*
AMORTIZED UNIT COST	267.16*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.999*
UNIT LEARNING CURVE	0.928*

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - HEAT EXCHANGER

PRODUCTION QUANTITY	1	UNIT WEIGHT	50.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	4.00	QUANTITY/NHA	1

UNIT PROD COST 107.46 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	81.	29.	111.
DESIGN	261.	112.	373.
SYSTEMS	40.	-	40.
PROJECT MGMT	64.	28.	92.
DATA	19.	30.	49.
SUBTOTAL(ENG)	465.	199.	664.
MANUFACTURING			
PRODUCTION	-	107.	107.
PROTOTYPE	603.	-	603.
TOOL-TEST EQ	52.	11.	63.
SUBTOTAL(MFG)	655.	118.	773.
TOTAL COST	1120.	318.	1437.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	50.000	ENGINEERING COMPLEXITY	1.000
DENSITY	12.500*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.280	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.100	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.025*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.263	MTBF(FIELD)	24845*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(10)	OCT 95*	(3)	JAN 96*	(13)
PRODUCTION	JAN 00	(13)	JAN 01*	(0)	JAN 01*	(13)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	107.38*	RATE TOOLING	0
AMORTIZED UNIT COST	317.61*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.893*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - THERMAL SYSTEM PIPING

PRODUCTION QUANTITY	1	UNIT WEIGHT	100.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	8.00	QUANTITY/NHA	1

UNIT PROD COST 651.50 MONTHLY PROD RATE 0.00

PROGRAM COST ($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	95.	67.	161.
DESIGN	320.	296.	616.
SYSTEMS	43.	-	43.
PROJECT MGMT	196.	113.	308.
DATA	45.	120.	164.
SUBTOTAL(ENG)	698.	595.	1293.
MANUFACTURING			
PRODUCTION	-	651.	651.
PROTOTYPE	3209.	-	3209.
TOOL-TEST EQ	312.	72.	384.
SUBTOTAL(MFG)	3521.	724.	4244.
TOTAL COST	4218.	1319.	5537.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	100.000	ENGINEERING COMPLEXITY	1.000
DENSITY	12.500*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.510	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.100	PLATFORM	2.500
DESIGN REPEAT	0.600	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.035*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	12245*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(4)	JUL 96*	(19)
PRODUCTION	JAN 00	(20)	AUG 01*	(0)	AUG 01*	(20)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	650.90*	RATE TOOLING	0
AMORTIZED UNIT COST	1318.72*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.879*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - HYDROGEN TANKS

PRODUCTION QUANTITY	1	UNIT WEIGHT	20.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	100.00	QUANTITY/NHA	1

UNIT PROD COST 38.29 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	32.	9.	41.
DESIGN	101.	32.	133.
SYSTEMS	16.	-	16.
PROJECT MGMT	25.	9.	34.
DATA	7.	10.	17.
SUBTOTAL(ENG)	181.	59.	240.
MANUFACTURING			
PRODUCTION	-	38.	38.
PROTOTYPE	220.	-	220.
TOOL-TEST EQ	19.	4.	23.
SUBTOTAL(MFG)	240.	42.	282.
TOTAL COST	421.	101.	522.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	20.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.200*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.030	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.100	PLATFORM	2.500
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.023*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	36575*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(9)	SEP 95*	(2)	NOV 95*	(11)
PRODUCTION	JAN 00	(11)	NOV 00*	(0)	NOV 00*	(11)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	38.26*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	101.15*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.998*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.898*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: HTU   10-OCT-88 12:16 (188012)

MOSAP HTU - OXYGEN TANKS

PRODUCTION QUANTITY	1	UNIT WEIGHT	15.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	100.00	QUANTITY/NHA	1

UNIT PROD COST 29.92   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	26.	7.	33.
DESIGN	82.	25.	108.
SYSTEMS	13.	-	13.
PROJECT MGMT	20.	7.	27.
DATA	6.	8.	14.
SUBTOTAL(ENG)	147.	47.	194.
MANUFACTURING			
PRODUCTION	-	30.	30.
PROTOTYPE	171.	-	171.
TOOL-TEST EQ	15.	3.	18.
SUBTOTAL(MFG)	187.	33.	219.
TOTAL COST	334.	80.	413.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	15.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.150*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.030	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.100	PLATFORM	2.500
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.023*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	39871*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(8)	AUG 95*	(3)	NOV 95*	(11)
PRODUCTION	JAN 00	(10)	OCT 00*	(0)	OCT 00*	(10)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	29.90*	RATE TOOLING	0
AMORTIZED UNIT COST	79.56*	PRICE IMPROVEMENT FACTOR	0.997*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.899*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - WATER TANKS

PRODUCTION QUANTITY	1	UNIT WEIGHT	40.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	100.00	QUANTITY/NHA	1

UNIT PROD COST 69.38 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	52.	16.	68.
DESIGN	164.	55.	220.
SYSTEMS	26.	-	26.
PROJECT MGMT	43.	16.	59.
DATA	13.	17.	30.
SUBTOTAL(ENG)	298.	104.	402.
MANUFACTURING			
PRODUCTION	-	69.	69.
PROTOTYPE	402.	-	402.
TOOL-TEST EQ	35.	7.	42.
SUBTOTAL(MFG)	438.	76.	514.
TOTAL COST	736.	180.	916.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	40.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.400*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.030	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.100	PLATFORM	2.500
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.023*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	29708*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(9)	SEP 95*	(3)	DEC 95*	(12)
PRODUCTION	JAN 00	(12)	DEC 00*	(0)	DEC 00*	(12)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	69.33*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	180.38*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	1.000*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.896*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - FUEL CELLS

PRODUCTION QUANTITY	2	UNIT WEIGHT	45.00	MODE	1
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	200.00	QUANTITY/NHA	2

UNIT PROD COST 533.38 MONTHLY PROD RATE 0.58

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	132.	141.	274.
DESIGN	470.	651.	1121.
SYSTEMS	55.	-	55.
PROJECT MGMT	160.	216.	376.
DATA	39.	227.	267.
SUBTOTAL(ENG)	857.	1235.	2092.
MANUFACTURING			
PRODUCTION	-	1067.	1067.
PROTOTYPE	2533.	-	2533.
TOOL-TEST EQ	318.	441.	759.
SUBTOTAL(MFG)	2851.	1508.	4359.
TOTAL COST	3708.	2743.	6451.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	1.000*	44.000
DENSITY	43.000	0.220*
MFG. COMPLEXITY	9.960	8.970
NEW DESIGN	0.100	0.100
DESIGN REPEAT	0.000	0.500
ENGINEERING CHANGES	0.068*	0.040*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.843	0.201

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	244812*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(5)	AUG 96*	(20)
PRODUCTION	JAN 00	(19)	JUL 01*	(2)	SEP 01*	(21)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	555.65*
AMORTIZED UNIT COST	1371.64*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.965*
UNIT LEARNING CURVE	0.918*

--- PRICE HARDWARE MODEL METRIC ---
ELECTRONIC ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - POWER DISTIBUTION

PRODUCTION QUANTITY	1	UNIT WEIGHT	100.00	MODE	1
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	10.00	QUANTITY/NHA	1

UNIT PROD COST 942.96 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	238.	270.	508.
DESIGN	855.	1235.	2089.
SYSTEMS	98.	-	98.
PROJECT MGMT	278.	256.	534.
DATA	68.	272.	340.
SUBTOTAL(ENG)	1536.	2033.	3569.
MANUFACTURING			
PRODUCTION	-	943.	943.
PROTOTYPE	4453.	-	4453.
TOOL-TEST EQ	585.	108.	693.
SUBTOTAL(MFG)	5039.	1051.	6090.
TOTAL COST	6575.	3083.	9659.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	2.500*	97.500
DENSITY	43.000	9.750*
MFG. COMPLEXITY	10.320	8.750
NEW DESIGN	0.100	0.100
DESIGN REPEAT	0.000	0.500
ENGINEERING CHANGES	0.073*	0.037*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.843	0.201

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.006*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	110324*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(16)	APR 96*	(4)	AUG 96*	(20)
PRODUCTION	JAN 00	(21)	SEP 01*	(0)	SEP 01*	(21)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	942.44*
AMORTIZED UNIT COST	3083.39*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.917*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - WHEELS & LOCOMOTION

PRODUCTION QUANTITY	4	UNIT WEIGHT	75.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	1000.00	QUANTITY/NHA	4

UNIT PROD COST 337.67 MONTHLY PROD RATE 1.04

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	82.	53.	136.
DESIGN	274.	238.	512.
SYSTEMS	38.	-	38.
PROJECT MGMT	124.	190.	314.
DATA	30.	200.	230.
SUBTOTAL(ENG)	547.	682.	1229.
MANUFACTURING			
PRODUCTION	-	1351.	1351.
PROTOTYPE	1811.	-	1811.
TOOL-TEST EQ	166.	445.	611.
SUBTOTAL(MFG)	1977.	1796.	3772.
TOTAL COST	2524.	2477.	5001.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	75.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.075*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.160	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.100	PLATFORM	2.500
DESIGN REPEAT	0.500	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.032*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.350	MTBF(FIELD)	15269*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(13)	JAN 96*	(4)	MAY 96*	(17)
PRODUCTION	JAN 00	(17)	MAY 01*	(3)	AUG 01*	(20)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	387.23*	RATE TOOLING	0
AMORTIZED UNIT COST	619.33*	PRICE IMPROVEMENT FACTOR	0.954*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.883*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - MAN LOCKS

PRODUCTION QUANTITY	2	UNIT WEIGHT	230.00	MODE	1
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	4000.00	QUANTITY/NHA	2

UNIT PROD COST 933.88 MONTHLY PROD RATE 0.38

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	474.	439.	913.
DESIGN	1685.	1957.	3642.
SYSTEMS	198.	-	198.
PROJECT MGMT	374.	455.	828.
DATA	102.	479.	581.
SUBTOTAL(ENG)	2833.	3330.	6163.
MANUFACTURING			
PRODUCTION	-	1868.	1868.
PROTOTYPE	4794.	-	4794.
TOOL-TEST EQ	601.	554.	1155.
SUBTOTAL(MFG)	5395.	2422.	7817.
TOTAL COST	8229.	5752.	13980.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	4.600*	225.400
DENSITY	11.500	0.056*
MFG. COMPLEXITY	9.960	7.980
NEW DESIGN	0.100	0.100
DESIGN REPEAT	0.000	0.000
ENGINEERING CHANGES	0.069*	0.029*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.350	0.350

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	54868*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(4)	JUL 96*	(19)
PRODUCTION	JAN 00	(20)	AUG 01*	(3)	NOV 01*	(23)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	971.74*
AMORTIZED UNIT COST	2875.81*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.972*
UNIT LEARNING CURVE	0.920*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: HTU   10-OCT-88 12:16
(188012)

MOSAP HTU - GALLEY

PRODUCTION QUANTITY	1	UNIT WEIGHT	70.00	MODE	1
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	1700.00	QUANTITY/NHA	1

UNIT PROD COST 319.17   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	193.	138.	331.
DESIGN	685.	575.	1260.
SYSTEMS	81.	-	81.
PROJECT MGMT	137.	108.	245.
DATA	39.	115.	153.
SUBTOTAL(ENG)	1134.	937.	2071.
MANUFACTURING			
PRODUCTION	-	319.	319.
PROTOTYPE	1613.	-	1613.
TOOL-TEST EQ	208.	35.	243.
SUBTOTAL(MFG)	1821.	354.	2175.
TOTAL COST	2955.	1291.	4246.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	1.000*	69.000
DENSITY	5.882	0.041*
MFG. COMPLEXITY	9.960	7.980
NEW DESIGN	0.100	0.100
DESIGN REPEAT	0.000	0.000
ENGINEERING CHANGES	0.070*	0.030*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.201	0.201

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	244814*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(13)	JAN 96*	(4)	MAY 96*	(17)
PRODUCTION	JAN 00	(16)	APR 01*	(0)	APR 01*	(16)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	319.01*
AMORTIZED UNIT COST	1290.68*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.923*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: HTU   10-OCT-88 12:16
(188012)

MOSAP HTU - PERSONAL HYGIENE

PRODUCTION QUANTITY	1	UNIT WEIGHT	90.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	1700.00	QUANTITY/NHA	1

UNIT PROD COST 348.41   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	168.	91.	259.
DESIGN	555.	409.	963.
SYSTEMS	78.	-	78.
PROJECT MGMT	156.	94.	250.
DATA	43.	100.	143.
SUBTOTAL(ENG)	1000.	694.	1694.
MANUFACTURING			
PRODUCTION	-	348.	348.
PROTOTYPE	1811.	-	1811.
TOOL-TEST EQ	160.	37.	197.
SUBTOTAL(MFG)	1971.	386.	2357.
TOTAL COST	2971.	1079.	4050.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	90.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.053*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.980	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.100	PLATFORM	2.500
DESIGN REPEAT	0.020	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.030*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	15526*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(13)	JAN 96*	(4)	MAY 96*	(17)
PRODUCTION	JAN 00	(17)	MAY 01*	(0)	MAY 01*	(17)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	348.11*	RATE TOOLING	0
AMORTIZED UNIT COST	1079.32*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.884*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - SHOWER

PRODUCTION QUANTITY	1	UNIT WEIGHT	80.00	MODE	2
PROTOTYPE QUANTITY	4.500	UNIT VOLUME	2000.00	QUANTITY/NHA	1

UNIT PROD COST 402.45 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1805.	98.	1904.
DESIGN	6101.	423.	6524.
SYSTEMS	824.	-	824.
PROJECT MGMT	785.	102.	887.
DATA	281.	108.	390.
SUBTOTAL(ENG)	9796.	732.	10528.
MANUFACTURING			
PRODUCTION	-	402.	402.
PROTOTYPE	2543.	-	2543.
TOOL-TEST EQ	232.	44.	276.
SUBTOTAL(MFG)	2775.	446.	3221.
TOTAL COST	12571.	1178.	13749.

DESIGN FACTORS	MECHANICAL
WEIGHT	80.000
DENSITY	0.040*
MFG. COMPLEXITY	8.230
NEW DESIGN	1.000
DESIGN REPEAT	0.000
ENGINEERING CHANGES	0.028*
INTEGRATION LEVEL	0.134

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	14572*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(19)	JUL 96*	(7)	FEB 97*	(26)
PRODUCTION	JAN 00	(18)	JUN 01*	(0)	JUN 01*	(18)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	402.09*
AMORTIZED UNIT COST	1177.88*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.882*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - EMERGENCY EQUIPMENT

PRODUCTION QUANTITY	1	UNIT WEIGHT	30.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	800.00	QUANTITY/NHA	1

UNIT PROD COST 107.28 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	71.	31.	102.
DESIGN	233.	123.	356.
SYSTEMS	34.	-	34.
PROJECT MGMT	56.	29.	85.
DATA	16.	31.	47.
SUBTOTAL(ENG)	410.	214.	624.
MANUFACTURING			
PRODUCTION	-	107.	107.
PROTOTYPE	566.	-	566.
TOOL-TEST EQ	51.	11.	63.
SUBTOTAL(MFG)	617.	119.	736.
TOTAL COST	1027.	332.	1360.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	30.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.037*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.760	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.100	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.029*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.134	MTBF(FIELD)	23607*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(11)	NOV 95*	(3)	FEB 96*	(14)
PRODUCTION	JAN 00	(14)	FEB 01*	(0)	FEB 01*	(14)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	107.19*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	332.15*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	1.000*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.890*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - AVIONICS

PRODUCTION QUANTITY	2	UNIT WEIGHT	45.00	MODE	1
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	1700.00	QUANTITY/NHA	2

UNIT PROD COST 188.66 MONTHLY PROD RATE 1.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	166.	165.	331.
DESIGN	597.	659.	1256.
SYSTEMS	68.	-	68.
PROJECT MGMT	93.	132.	225.
DATA	28.	139.	167.
SUBTOTAL(ENG)	952.	1095.	2047.
MANUFACTURING			
PRODUCTION	-	377.	377.
PROTOTYPE	886.	-	886.
TOOL-TEST EQ	125.	208.	333.
SUBTOTAL(MFG)	1011.	585.	1596.
TOTAL COST	1963.	1680.	3643.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	2.500*	42.500
DENSITY	14.706	0.025*
MFG. COMPLEXITY	10.320	6.850
NEW DESIGN	0.100	0.100
DESIGN REPEAT	0.000	0.000
ENGINEERING CHANGES	0.076*	0.020*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.201	0.201

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	110324*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(13)	JAN 96*	(4)	MAY 96*	(17)
PRODUCTION	JAN 00	(15)	MAR 01*	(1)	APR 01*	(16)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	196.25*
AMORTIZED UNIT COST	840.00*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.953*
UNIT LEARNING CURVE	0.921*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - ECLSS

PRODUCTION QUANTITY	1	UNIT WEIGHT	200.00	MODE	1
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	2600.00	QUANTITY/NHA	1

UNIT PROD COST 2849.81 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	634.	701.	1335.
DESIGN	2256.	3606.	5862.
SYSTEMS	266.	-	266.
PROJECT MGMT	812.	756.	1568.
DATA	196.	802.	998.
SUBTOTAL(ENG)	4163.	5864.	10028.
MANUFACTURING			
PRODUCTION	-	2850.	2850.
PROTOTYPE	13173.	-	13173.
TOOL-TEST EQ	1591.	335.	1926.
SUBTOTAL(MFG)	14764.	3185.	17949.
TOTAL COST	18927.	9049.	27976.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	2.000*	198.000
DENSITY	7.692	0.076*
MFG. COMPLEXITY	9.960	9.340
NEW DESIGN	0.100	0.100
DESIGN REPEAT	0.000	0.000
ENGINEERING CHANGES	0.064*	0.041*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.263	0.263

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	124115*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(6)	FEB 97*	(26)
PRODUCTION	JAN 00	(26)	FEB 02*	(0)	FEB 02*	(26)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	2848.12*
AMORTIZED UNIT COST	9049.22*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.913*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

MOSAP HTU - WORKSTATION

PRODUCTION QUANTITY	1	UNIT WEIGHT	40.00	MODE	1
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	1700.00	QUANTITY/NHA	1

UNIT PROD COST 576.19 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	303.	337.	640.
DESIGN	1088.	1541.	2630.
SYSTEMS	125.	-	125.
PROJECT MGMT	213.	254.	467.
DATA	60.	269.	329.
SUBTOTAL(ENG)	1789.	2401.	4190.
MANUFACTURING			
PRODUCTION	-	576.	576.
PROTOTYPE	2594.	-	2594.
TOOL-TEST EQ	347.	68.	415.
SUBTOTAL(MFG)	2941.	644.	3584.
TOTAL COST	4730.	3045.	7775.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	5.000*	35.000
DENSITY	29.412	0.021*
MFG. COMPLEXITY	10.290	8.750
NEW DESIGN	0.100	0.100
DESIGN REPEAT	0.000	0.000
ENGINEERING CHANGES	0.075*	0.038*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.263	0.263

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	55472*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(14)	FEB 96*	(5)	JUL 96*	(19)
PRODUCTION	JAN 00	(17)	MAY 01*	(0)	MAY 01*	(17)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	575.87*
AMORTIZED UNIT COST	3045.02*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.917*

- - - PRICE HARDWARE MODEL METRIC - - -
INTEGRATION AND TEST

INPUT FILENAME: HTU   10-OCT-88 12:16
(188012)

HTU INTEGRATION

PRODUCTION QUANTITY	1	INT WEIGHT	70.887*	MODE	5
PROTOTYPE QUANTITY	3.500	INT VOLUME	286.178*	QUANTITY/NHA	0

UNIT PROD COST 307.27   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1456.	105.	1561.
DESIGN	5101.	421.	5522.
SYSTEMS	623.	-	623.
PROJECT MGMT	550.	89.	639.
DATA	203.	94.	297.
SUBTOTAL(ENG)	7931.	710.	8642.
MANUFACTURING			
PRODUCTION	-	307.	307.
PROTOTYPE	1559.	-	1559.
TOOL-TEST EQ	190.	33.	223.
SUBTOTAL(MFG)	1749.	341.	2089.
TOTAL COST	9680.	1051.	10731.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	2.125*	68.763*
DENSITY	0.561*	0.240*
MFG. COMPLEXITY	9.549*	7.901*
NEW PLANS LEVEL	0.700	0.700
ENGINEERING CHANGES	0.038*	0.018*
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000*
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.013
PLATFORM	2.500
YEAR OF TECHNOLOGY	1999*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	103732*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 99	(17)	MAY 00*	(5)	OCT 00*	(22)
PRODUCTION	NOV 00*	(16)	FEB 02*	(0)	FEB 02*	(16)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
AMORTIZED UNIT COST	1050.67*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00*
PRODUCTION TOOLING	1.00*

- - - PRICE HARDWARE MODEL METRIC - - -
SYSTEM COST SUMMARY

INPUT FILENAME: HTU 10-OCT-88 12:16
(188012)

TOTAL COST, WITH INTEGRATION COST

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	6377.	2999.	9376.
DESIGN	22041.	13605.	35646.
SYSTEMS	2801.	-	2801.
PROJ MGMT	5236.	3425.	8661.
DATA	1448.	3628.	5076.
SUBTOTAL(ENG)	37904.	23657.	61561.
MANUFACTURING			
PRODUCTION	-	14917.	14917.
PROTOTYPE	61827.	-	61827.
TOOL-TEST EQ	6650.	2785.	9435.
PURCH ITEMS	0.	0.	0.
SUBTOTAL(MFG)	68477.	17702.	86179.
TOTAL COST	106381.	41359.	147740.

****
* SYSTEM WT 3274.99 SYSTEM WS 3248.04 *
* SYSTEM SERIES MTBF HRS. 883 AV SYSTEM COST 41359 *
* SYSTEM QUANTITY 1 *
****

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: EST 10-OCT-88 12:19
(188012)

MOSAP EST - Bed

PRODUCTION QUANTITY	5	UNIT WEIGHT	130.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	1.00	QUANTITY/NHA	1

UNIT PROD COST 118.63 MONTHLY PROD RATE 1.92

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1132.	35.	1167.
DESIGN	3522.	121.	3644.
SYSTEMS	578.	-	578.
PROJECT MGMT	487.	88.	575.
DATA	192.	93.	284.
SUBTOTAL(ENG)	5911.	337.	6248.
MANUFACTURING			
PRODUCTION	-	593.	593.
PROTOTYPE	760.	-	760.
TOOL-TEST EQ	61.	190.	252.
SUBTOTAL(MFG)	821.	784.	1604.
TOTAL COST	6732.	1121.	7852.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	130.000	ENGINEERING COMPLEXITY	1.000
DENSITY	130.000*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	6.640	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.019*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	25039*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(4)	JUL 96*	(19)
PRODUCTION	JAN 00	(13)	JAN 01*	(2)	MAR 01*	(15)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	137.14*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	224.13*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.944*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.897*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: EST 10-OCT-88 12:19
(188012)

MOSAP EST - Remote Manipulator System

PRODUCTION QUANTITY	5	UNIT WEIGHT	40.00	MODE	1
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	100.00	QUANTITY/NHA	1

UNIT PROD COST 212.50 MONTHLY PROD RATE 0.80

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1521.	142.	1663.
DESIGN	5466.	567.	6033.
SYSTEMS	627.	-	627.
PROJECT MGMT	529.	170.	699.
DATA	198.	177.	375.
SUBTOTAL(ENG)	8341.	1056.	9396.
MANUFACTURING			
PRODUCTION	-	1063.	1063.
PROTOTYPE	1104.	-	1104.
TOOL-TEST EQ	153.	225.	378.
SUBTOTAL(MFG)	1257.	1287.	2544.
TOTAL COST	9597.	2343.	11940.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1.000*	39.000	ENGINEERING COMPLEXITY	1.000
DENSITY	40.000	0.390*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	10.320	7.980	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	1.000	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.000	PLATFORM	2.500
ENGINEERING CHANGES	0.072*	0.029*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.843	0.263	MTBF(FIELD)	270801*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(17)	MAY 96*	(5)	OCT 96*	(22)
PRODUCTION	JAN 00	(15)	MAR 01*	(5)	AUG 01*	(20)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	242.00*	RATE TOOLING	0
AMORTIZED UNIT COST	468.63*	PRICE IMPROVEMENT FACTOR	0.959*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.908*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: EST 10-OCT-88 12:19
(188012)

MOSAP EST - Fuel Cells

PRODUCTION QUANTITY	5	UNIT WEIGHT	40.00	MODE	1
PROTOTYPE QUANTITY	2.500	UNIT VOLUME	60.00	QUANTITY/NHA	1

UNIT PROD COST 466.32 MONTHLY PROD RATE 0.78

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	123.	155.	278.
DESIGN	429.	666.	1095.
SYSTEMS	52.	-	52.
PROJECT MGMT	114.	317.	431.
DATA	30.	332.	362.
SUBTOTAL(ENG)	747.	1470.	2218.
MANUFACTURING			
PRODUCTION	-	2332.	2332.
PROTOTYPE	1715.	-	1715.
TOOL-TEST EQ	226.	583.	810.
SUBTOTAL(MFG)	1942.	2915.	4857.
TOTAL COST	2689.	4386.	7074.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	1.000*	39.000
DENSITY	43.000	0.650*
MFG. COMPLEXITY	9.960	8.970
NEW DESIGN	0.100	0.100
DESIGN REPEAT	0.000	0.500
ENGINEERING CHANGES	0.073*	0.043*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.843	0.201

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	244812*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(3)	JUN 96*	(18)
PRODUCTION	JAN 00	(19)	JUL 01*	(5)	DEC 01*	(24)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	535.06*
AMORTIZED UNIT COST	877.11*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.959*
UNIT LEARNING CURVE	0.902*

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: EST 10-OCT-88 12:19
(188012)

MOSAP EST - Hydrogen Tanks

PRODUCTION QUANTITY	5	UNIT WEIGHT	5.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	65.00	QUANTITY/NHA	1

UNIT PROD COST 10.58 MONTHLY PROD RATE 3.88

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	120.	3.	123.
DESIGN	381.	11.	392.
SYSTEMS	60.	-	60.
PROJECT MGMT	49.	8.	58.
DATA	20.	9.	28.
SUBTOTAL(ENG)	630.	31.	661.
MANUFACTURING			
PRODUCTION	-	53.	53.
PROTOTYPE	66.	-	66.
TOOL-TEST EQ	6.	23.	29.
SUBTOTAL(MFG)	72.	76.	148.
TOTAL COST	702.	107.	809.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	5.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.077*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.030	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.022*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	55437*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(12)	DEC 95*	(4)	APR 96*	(16)
PRODUCTION	JAN 00	(9)	SEP 00*	(1)	OCT 00*	(10)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	12.14*	RATE TOOLING	0
AMORTIZED UNIT COST	21.40*	PRICE IMPROVEMENT FACTOR	0.932*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.903*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: EST 10-OCT-88 12:19
(188012)

MOSAP EST - Oxygen Tanks

PRODUCTION QUANTITY	5	UNIT WEIGHT	5.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	65.00	QUANTITY/NHA	1

UNIT PROD COST 10.58 MONTHLY PROD RATE 3.88

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	120.	3.	123.
DESIGN	381.	11.	392.
SYSTEMS	60.	-	60.
PROJECT MGMT	49.	8.	58.
DATA	20.	9.	28.
SUBTOTAL(ENG)	630.	31.	661.
MANUFACTURING			
PRODUCTION	-	53.	53.
PROTOTYPE	66.	-	66.
TOOL-TEST EQ	6.	23.	29.
SUBTOTAL(MFG)	72.	76.	148.
TOTAL COST	702.	107.	809.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	5.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.077*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.030	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.022*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	55437*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(12)	DEC 95*	(4)	APR 96*	(16)
PRODUCTION	JAN 00	(9)	SEP 00*	(1)	OCT 00*	(10)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	12.14*	RATE TOOLING	0
AMORTIZED UNIT COST	21.40*	PRICE IMPROVEMENT FACTOR	0.932*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.903*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: EST 10-OCT-88 12:19
(188012)

MOSAP EST - Water Tanks

PRODUCTION QUANTITY	5	UNIT WEIGHT	5.00	MODE	2
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	65.00	QUANTITY/NHA	1

UNIT PROD COST 10.58 MONTHLY PROD RATE 3.88

PROGRAM COST ($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	120.	3.	123.
DESIGN	381.	11.	392.
SYSTEMS	60.	-	60.
PROJECT MGMT	49.	8.	58.
DATA	20.	9.	28.
SUBTOTAL (ENG)	630.	31.	661.
MANUFACTURING			
PRODUCTION	-	53.	53.
PROTOTYPE	66.	-	66.
TOOL-TEST EQ	6.	23.	29.
SUBTOTAL (MFG)	72.	76.	148.
TOTAL COST	702.	107.	809.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	5.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.077*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.030	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.022*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF (FIELD)	55437*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(12)	DEC 95*	(4)	APR 96*	(16)
PRODUCTION	JAN 00	(9)	SEP 00*	(1)	OCT 00*	(10)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	12.14*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	21.40*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.932*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.903*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: EST 10-OCT-88 12:19
(188012)

MOSAP EST - Cart

PRODUCTION QUANTITY	5	UNIT WEIGHT	150.00	MODE	1
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	4000.00	QUANTITY/NHA	1

UNIT PROD COST 423.62 MONTHLY PROD RATE 0.58

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	2087.	219.	2306.
DESIGN	7500.	874.	8375.
SYSTEMS	861.	-	861.
PROJECT MGMT	762.	305.	1068.
DATA	278.	319.	597.
SUBTOTAL(ENG)	11488.	1718.	13206.
MANUFACTURING			
PRODUCTION	-	2118.	2118.
PROTOTYPE	2315.	-	2315.
TOOL-TEST EQ	316.	383.	699.
SUBTOTAL(MFG)	2631.	2501.	5133.
TOTAL COST	14119.	4219.	18338.

DESIGN FACTORS	ELECTRONIC	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	2.000*	148.000	ENGINEERING COMPLEXITY	1.000
DENSITY	5.000	0.037*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	10.320	7.490	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	1.000	ELECT VOL FRACTION	0.000*
DESIGN REPEAT	0.000	0.400	PLATFORM	2.500
ENGINEERING CHANGES	0.071*	0.024*	YEAR OF TECHNOLOGY	1995*
HW/SW INTEG. LEVEL	0.000		RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	0.201	MTBF(FIELD)	137291*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(18)	JUN 96*	(6)	DEC 96*	(24)
PRODUCTION	JAN 00	(17)	MAY 01*	(7)	DEC 01*	(24)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	482.25*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	843.85*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.965*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.908*

- - - PRICE HARDWARE MODEL METRIC - - -
INTEGRATION AND TEST

INPUT FILENAME: EST 10-OCT-88 12:19 (188012)

EST INTEGRATION

PRODUCTION QUANTITY	5	INT WEIGHT	7.511*	MODE	5
PROTOTYPE QUANTITY	3.500	INT VOLUME	29.560*	QUANTITY/NHA	0

UNIT PROD COST 29.88 MONTHLY PROD RATE 1.93

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	310.	19.	329.
DESIGN	1084.	71.	1155.
SYSTEMS	133.	-	133.
PROJECT MGMT	109.	26.	135.
DATA	42.	27.	69.
SUBTOTAL(ENG)	1677.	143.	1820.
MANUFACTURING			
PRODUCTION	-	149.	149.
PROTOTYPE	173.	-	173.
TOOL-TEST EQ	23.	56.	80.
SUBTOTAL(MFG)	196.	206.	402.
TOTAL COST	1874.	349.	2223.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.408*	7.103*
DENSITY	0.561*	0.240*
MFG. COMPLEXITY	9.545*	7.374*
NEW PLANS LEVEL	0.700	0.700
ENGINEERING CHANGES	0.038*	0.015*
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000*
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.025
PLATFORM	2.500
YEAR OF TECHNOLOGY	1999*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	521579*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 99	(12)	DEC 99*	(4)	APR 00*	(16)
PRODUCTION	MAY 00*	(10)	FEB 01*	(2)	APR 01*	(12)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
AMORTIZED UNIT COST	69.80*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00*
PRODUCTION TOOLING	1.00*

- - - PRICE HARDWARE MODEL METRIC - - -
SYSTEM COST SUMMARY

INPUT FILENAME: EST 10-OCT-88 12:19
(188012)

TOTAL COST, WITH INTEGRATION COST

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	5533.	579.	6112.
DESIGN	19143.	2333.	21476.
SYSTEMS	2430.	-	2430.
PROJ MGMT	2149.	931.	3080.
DATA	798.	974.	1772.
SUBTOTAL(ENG)	30054.	4817.	34871.
MANUFACTURING			
PRODUCTION	-	6414.	6414.
PROTOTYPE	6264.	-	6264.
TOOL-TEST EQ	798.	1508.	2305.
PURCH ITEMS	0.	0.	0.
SUBTOTAL(MFG)	7062.	7921.	14983.
TOTAL COST	37115.	12739.	49854.

****
* SYSTEM WT 375.00 SYSTEM WS 371.00 *
* SYSTEM SERIES MTBF HRS. 9007 AV SYSTEM COST 2548 *
* SYSTEM QUANTITY 5 *
****

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: APC 10-OCT-88 12:22
(188012)

MOSAP APC - OXYGEN TANKS

PRODUCTION QUANTITY	28	UNIT WEIGHT	130.00	MODE	2
PROTOTYPE QUANTITY	1.000	UNIT VOLUME	100.00	QUANTITY/NHA	4

UNIT PROD COST 152.57 MONTHLY PROD RATE 3.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	635.	81.	717.
DESIGN	1846.	261.	2107.
SYSTEMS	331.	-	331.
PROJECT MGMT	221.	402.	623.
DATA	103.	417.	520.
SUBTOTAL(ENG)	3136.	1161.	4296.
MANUFACTURING			
PRODUCTION	-	4272.	4272.
PROTOTYPE	379.	-	379.
TOOL-TEST EQ	52.	601.	654.
SUBTOTAL(MFG)	432.	4873.	5305.
TOTAL COST	3567.	6034.	9601.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	130.000	ENGINEERING COMPLEXITY	1.000
DENSITY	1.300*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.030	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.500	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.028*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	20859*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(14)	FEB 96*	(0)	FEB 96*	(14)
PRODUCTION	JAN 00	(15)	MAR 01*	(9)	DEC 01*	(24)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	224.53*	RATE TOOLING	0
AMORTIZED UNIT COST	215.50*	PRICE IMPROVEMENT FACTOR	0.936*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.893*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: APC   10-OCT-88 12:22
(188012)

MOSAP APC - HYDROGEN TANKS

PRODUCTION QUANTITY	28	UNIT WEIGHT	190.00	MODE	2
PROTOTYPE QUANTITY	1.000	UNIT VOLUME	200.00	QUANTITY/NHA	4

UNIT PROD COST 212.49   MONTHLY PROD RATE 2.73

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	830.	111.	940.
DESIGN	2410.	362.	2772.
SYSTEMS	432.	-	432.
PROJECT MGMT	290.	558.	848.
DATA	135.	579.	714.
SUBTOTAL(ENG)	4096.	1610.	5706.
MANUFACTURING			
PRODUCTION	-	5950.	5950.
PROTOTYPE	525.	-	525.
TOOL-TEST EQ	69.	825.	894.
SUBTOTAL(MFG)	594.	6775.	7369.
TOTAL COST	4690.	8385.	13075.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	190.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.950*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.030	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.500	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.028*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	18615*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(0)	MAR 96*	(15)
PRODUCTION	JAN 00	(16)	APR 01*	(9)	JAN 02*	(25)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	314.00*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	299.47*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.938*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.892*

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: APC 10-OCT-88 12:22
(188012)

MOSAP APC - WATER TANKS

PRODUCTION QUANTITY	28	UNIT WEIGHT	130.00	MODE 2
PROTOTYPE QUANTITY	1.000	UNIT VOLUME	100.00	QUANTITY/NHA 4

UNIT PROD COST 152.57 MONTHLY PROD RATE 3.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	635.	81.	717.
DESIGN	1846.	261.	2107.
SYSTEMS	331.	-	331.
PROJECT MGMT	221.	402.	623.
DATA	103.	417.	520.
SUBTOTAL(ENG)	3136.	1161.	4296.
MANUFACTURING			
PRODUCTION	-	4272.	4272.
PROTOTYPE	379.	-	379.
TOOL-TEST EQ	52.	601.	654.
SUBTOTAL(MFG)	432.	4873.	5305.
TOTAL COST	3567.	6034.	9601.

DESIGN FACTORS	MECHANICAL
WEIGHT	130.000
DENSITY	1.300*
MFG. COMPLEXITY	7.030
NEW DESIGN	0.500
DESIGN REPEAT	0.000
ENGINEERING CHANGES	0.028*
INTEGRATION LEVEL	0.201

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	20859*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(14)	FEB 96*	(0)	FEB 96*	(14)
PRODUCTION	JAN 00	(15)	MAR 01*	(9)	DEC 01*	(24)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	224.53*
AMORTIZED UNIT COST	215.50*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.936*
UNIT LEARNING CURVE	0.893*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: APC 10-OCT-88 12:22
(188012)

MOSAP APC - NON-REGENERATIVE FUEL CELLS

PRODUCTION QUANTITY	28	UNIT WEIGHT	180.00	MODE	1
PROTOTYPE QUANTITY	0.000	UNIT VOLUME	400.00	QUANTITY/NHA	4

UNIT PROD COST 1541.17 MONTHLY PROD RATE 1.25

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1717.	566.	2283.
DESIGN	5519.	2488.	8008.
SYSTEMS	769.	-	769.
PROJECT MGMT	476.	3714.	4189.
DATA	222.	3835.	4058.
SUBTOTAL(ENG)	8703.	10603.	19306.
MANUFACTURING			
PRODUCTION	-	43153.	43153.
PROTOTYPE	0.	-	0.
TOOL-TEST EQ	86.	6126.	6212.
SUBTOTAL(MFG)	86.	49279.	49364.
TOTAL COST	8789.	59882.	68671.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	3.600*	176.400
DENSITY	43.000	0.441*
MFG. COMPLEXITY	9.560	8.970
NEW DESIGN	0.500	0.500
DESIGN REPEAT	0.300	0.300
ENGINEERING CHANGES	0.080*	0.052*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.843	0.201

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	62070*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(0)	MAR 96*	(15)
PRODUCTION	JAN 00	(24)	DEC 01*	(21)	SEP 03*	(45)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	2392.99*
AMORTIZED UNIT COST	2138.63*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.951*
UNIT LEARNING CURVE	0.879*

--- PRICE HARDWARE MODEL METRIC ---
ELECTRONIC ITEM

INPUT FILENAME: APC 10-OCT-88 12:22
(188012)

MOSAP APC - CART

PRODUCTION QUANTITY	7	UNIT WEIGHT	150.00	MODE 1
PROTOTYPE QUANTITY	2.000	UNIT VOLUME	4000.00	QUANTITY/NHA 1

UNIT PROD COST 404.58 MONTHLY PROD RATE 0.71

PROGRAM COST ($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1915.	212.	2128.
DESIGN	6568.	838.	7406.
SYSTEMS	821.	-	821.
PROJECT MGMT	637.	359.	996.
DATA	255.	375.	629.
SUBTOTAL (ENG)	10196.	1784.	11980.
MANUFACTURING			
PRODUCTION	-	2832.	2832.
PROTOTYPE	1402.	-	1402.
TOOL-TEST EQ	193.	462.	655.
SUBTOTAL (MFG)	1596.	3294.	4890.
TOTAL COST	11792.	5078.	16870.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	2.000*	148.000
DENSITY	5.000	0.037*
MFG. COMPLEXITY	9.870	7.550
NEW DESIGN	1.000	1.000
DESIGN REPEAT	0.000	0.400
ENGINEERING CHANGES	0.072*	0.028*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.201	0.201

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF (FIELD)	120948*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(17)	MAY 96*	(3)	AUG 96*	(20)
PRODUCTION	JAN 00	(17)	MAY 01*	(8)	JAN 02*	(25)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	480.64*
AMORTIZED UNIT COST	725.46*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.961*
UNIT LEARNING CURVE	0.904*

- - - PRICE HARDWARE MODEL METRIC - - -
INTEGRATION AND TEST

INPUT FILENAME: APC 10-OCT-88 12:22
(188012)

APC INTEGRATION

PRODUCTION QUANTITY	7	INT WEIGHT	53.020*	MODE	5
PROTOTYPE QUANTITY	2.000	INT VOLUME	211.583*	QUANTITY/NHA	0

UNIT PROD COST 150.30 MONTHLY PROD RATE 1.45

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1027.	80.	1108.
DESIGN	3399.	311.	3710.
SYSTEMS	464.	-	464.
PROJECT MGMT	353.	150.	503.
DATA	144.	156.	301.
SUBTOTAL(ENG)	5388.	698.	6085.
MANUFACTURING			
PRODUCTION	-	1052.	1052.
PROTOTYPE	579.	-	579.
TOOL-TEST EQ	72.	310.	382.
SUBTOTAL(MFG)	652.	1362.	2014.
TOTAL COST	6039.	2060.	8099.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	2.181*	50.839*
DENSITY	0.561*	0.240*
MFG. COMPLEXITY	8.884*	7.636*
NEW PLANS LEVEL	0.700	0.700
ENGINEERING CHANGES	0.035*	0.018*
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000*
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.018
PLATFORM	2.500
YEAR OF TECHNOLOGY	1999*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	82195*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 99	(15)	MAR 00*	(3)	JUN 00*	(18)
PRODUCTION	JUL 00*	(14)	AUG 01*	(4)	DEC 01*	(18)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
AMORTIZED UNIT COST	294.27*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00*
PRODUCTION TOOLING	1.00*

- - - PRICE HARDWARE MODEL METRIC - - -
SYSTEM COST SUMMARY

INPUT FILENAME: APC 10-OCT-88 12:22
(188012)

TOTAL COST, WITH INTEGRATION COST

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	6760.	1132.	7892.
DESIGN	21587.	4522.	26109.
SYSTEMS	3146.	-	3146.
PROJ MGMT	2198.	5584.	7782.
DATA	962.	5778.	6741.
SUBTOTAL(ENG)	34654.	17016.	51670.
MANUFACTURING			
PRODUCTION	-	61530.	61530.
PROTOTYPE	3266.	-	3266.
TOOL-TEST EQ	524.	8926.	9450.
PURCH ITEMS	0.	0.	0.
SUBTOTAL(MFG)	3790.	70457.	74247.
TOTAL COST	38444.	87473.	125917.

****
* SYSTEM WT 2670.00 SYSTEM WS 2653.60 *
* SYSTEM SERIES MTBF HRS. 1464 AV SYSTEM COST 12496 *
* SYSTEM QUANTITY 7 *
****

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: SPP 13-OCT-88 12:24
(188012)

Solar Power Plant - Fuel Cells

PRODUCTION QUANTITY	4	UNIT WEIGHT	215.00	MODE	1
PROTOTYPE QUANTITY	6.000	UNIT VOLUME	380.00	QUANTITY/NHA	4

UNIT PROD COST 2139.30 MONTHLY PROD RATE 0.50

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	2231.	269.	2499.
DESIGN	8020.	1171.	9191.
SYSTEMS	940.	-	940.
PROJECT MGMT	1647.	1077.	2724.
DATA	450.	534.	984.
SUBTOTAL(ENG)	13288.	3051.	16339.
MANUFACTURING			
PRODUCTION	-	8557.	8557.
PROTOTYPE	17273.	-	17273.
TOOL-TEST EQ	1927.	1808.	3735.
SUBTOTAL(MFG)	19199.	10365.	29564.
TOTAL COST	32487.	13416.	45903.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	4.300*	210.700
DENSITY	43.000	0.554*
MFG. COMPLEXITY	9.560	8.970
NEW DESIGN	1.000	1.000
DESIGN REPEAT	0.000	0.500
ENGINEERING CHANGES	0.055*	0.037*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	79687*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(25)	JAN 97*	(10)	NOV 97*	(35)
PRODUCTION	JAN 00	(25)	JAN 02*	(6)	JUL 02*	(31)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	2397.71*
AMORTIZED UNIT COST	3354.04*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.968*
UNIT LEARNING CURVE	0.902*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: SPP   13-OCT-88 12:24
(188012)

Solar Power Plant - Electrolysis Cells

PRODUCTION QUANTITY	4	UNIT WEIGHT	560.00	MODE	1
PROTOTYPE QUANTITY	6.000	UNIT VOLUME	850.00	QUANTITY/NHA	4

UNIT PROD COST 2844.13   MONTHLY PROD RATE 0.40

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	2289.	547.	2836.
DESIGN	8229.	2203.	10432.
SYSTEMS	965.	-	965.
PROJECT MGMT	1998.	1480.	3479.
DATA	518.	733.	1251.
SUBTOTAL(ENG)	13999.	4964.	18963.
MANUFACTURING			
PRODUCTION	-	11377.	11377.
PROTOTYPE	23745.	-	23745.
TOOL-TEST EQ	2665.	2053.	4717.
SUBTOTAL(MFG)	26410.	13429.	39839.
TOTAL COST	40409.	18393.	58802.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	11.200*	548.800
DENSITY	43.000	0.646*
MFG. COMPLEXITY	9.560	8.390
NEW DESIGN	1.000	0.250
DESIGN REPEAT	0.000	0.250
ENGINEERING CHANGES	0.059*	0.033*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	31186*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(22)	OCT 96*	(9)	JUL 97*	(31)
PRODUCTION	JAN 00	(25)	JAN 02*	(8)	SEP 02*	(33)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	3180.00*
AMORTIZED UNIT COST	4598.29*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.972*
UNIT LEARNING CURVE	0.904*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: SPP 13-OCT-88 12:25
(188012)

Solar Power Plant - Radiators

PRODUCTION QUANTITY	4	UNIT WEIGHT	1000.00	MODE	2
PROTOTYPE QUANTITY	6.000	UNIT VOLUME	1500.00	QUANTITY/NHA	4

UNIT PROD COST 2840.05 MONTHLY PROD RATE 0.53

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	553.	43.	596.
DESIGN	1879.	163.	2042.
SYSTEMS	254.	-	254.
PROJECT MGMT	1644.	1327.	2971.
DATA	346.	659.	1005.
SUBTOTAL(ENG)	4676.	2192.	6868.
MANUFACTURING			
PRODUCTION	-	11360.	11360.
PROTOTYPE	25333.	-	25333.
TOOL-TEST EQ	2140.	2419.	4559.
SUBTOTAL(MFG)	27473.	13779.	41253.
TOTAL COST	32149.	15971.	48120.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1000.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.667*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.980	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.000
DESIGN REPEAT	0.900	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.028*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	MTBF(FIELD)	11520*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(23)	NOV 96*	(10)	SEP 97*	(33)
PRODUCTION	JAN 00	(26)	FEB 02*	(5)	JUL 02*	(31)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	3279.86*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	3992.79*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.966*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.877*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: SPP 13-OCT-88 12:25
(188012)

SOLAR POWER PLANT - OXYGEN TANKS

PRODUCTION QUANTITY	4	UNIT WEIGHT	1774.60	MODE	2
PROTOTYPE QUANTITY	6.000	UNIT VOLUME	50302.99	QUANTITY/NHA	4

UNIT PROD COST 3223.28 MONTHLY PROD RATE 0.53

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	5911.	392.	6303.
DESIGN	19764.	1565.	21329.
SYSTEMS	2774.	-	2774.
PROJECT MGMT	4014.	1678.	5693.
DATA	1202.	835.	2037.
SUBTOTAL(ENG)	33666.	4469.	38135.
MANUFACTURING			
PRODUCTION	-	12893.	12893.
PROTOTYPE	30241.	-	30241.
TOOL-TEST EQ	2342.	2583.	4926.
SUBTOTAL(MFG)	32583.	15476.	48060.
TOTAL COST	66249.	19946.	86195.

DESIGN FACTORS	MECHANICAL
WEIGHT	1774.599
DENSITY	0.035*
MFG. COMPLEXITY	7.630
NEW DESIGN	1.000
DESIGN REPEAT	0.150
ENGINEERING CHANGES	0.024*
INTEGRATION LEVEL	0.097

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	11196*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(25)	JAN 97*	(11)	DEC 97*	(36)
PRODUCTION	JAN 00	(26)	FEB 02*	(6)	AUG 02*	(32)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	3713.43*
AMORTIZED UNIT COST	4986.39*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.967*
UNIT LEARNING CURVE	0.879*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: SPP 13-OCT-88 12:25 (188012)

SOLAR POWER PLANT - OXYGEN TANK LINING

PRODUCTION QUANTITY	4	UNIT WEIGHT	40.45	MODE	2
PROTOTYPE QUANTITY	6.000	UNIT VOLUME	15.00	QUANTITY/NHA	4

UNIT PROD COST 58.19 MONTHLY PROD RATE 2.21

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	253.	11.	264.
DESIGN	817.	41.	858.
SYSTEMS	125.	-	125.
PROJECT MGMT	138.	35.	174.
DATA	47.	18.	64.
SUBTOTAL(ENG)	1380.	105.	1485.
MANUFACTURING			
PRODUCTION	-	233.	233.
PROTOTYPE	592.	-	592.
TOOL-TEST EQ	44.	75.	119.
SUBTOTAL(MFG)	636.	307.	944.
TOTAL COST	2016.	412.	2428.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	40.450	ENGINEERING COMPLEXITY	1.000
DENSITY	2.697*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	6.930	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.750	PLATFORM	2.000
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.023*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.097	MTBF(FIELD)	47365*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(12)	DEC 95*	(5)	MAY 96*	(17)
PRODUCTION	JAN 00	(12)	DEC 00*	(1)	JAN 01*	(13)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	65.58*	RATE TOOLING	0
AMORTIZED UNIT COST	103.06*	PRICE IMPROVEMENT FACTOR	0.941*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.898*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: SPP 13-OCT-88 12:25
(188012)

SOLAR POWER PLANT - HYDROGEN TANKS

PRODUCTION QUANTITY	4	UNIT WEIGHT	2995.60	MODE	2
PROTOTYPE QUANTITY	6.000	UNIT VOLUME	86639.36	QUANTITY/NHA	4

UNIT PROD COST 5087.80 MONTHLY PROD RATE 0.45

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	8538.	558.	9096.
DESIGN	28549.	2230.	30779.
SYSTEMS	4006.	-	4006.
PROJECT MGMT	6043.	2608.	8650.
DATA	1781.	1297.	3078.
SUBTOTAL(ENG)	48917.	6692.	55610.
MANUFACTURING			
PRODUCTION	-	20351.	20351.
PROTOTYPE	47907.	-	47907.
TOOL-TEST EQ	3689.	3927.	7616.
SUBTOTAL(MFG)	51596.	24279.	75875.
TOTAL COST	100513.	30971.	131484.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	2995.599	ENGINEERING COMPLEXITY	1.000
DENSITY	0.035*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.630	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.000
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.022*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.097	MTBF(FIELD)	9568*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(28)	APR 97*	(12)	APR 98*	(40)
PRODUCTION	JAN 00	(28)	APR 02*	(7)	NOV 02*	(35)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	5871.61*	RATE TOOLING	0
AMORTIZED UNIT COST	7742.76*	PRICE IMPROVEMENT FACTOR	0.969*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.878*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: SPP   13-OCT-88 12:25
(188012)

SOLAR POWER PLANT - HYDROGEN TANK LINING

PRODUCTION QUANTITY	4	UNIT WEIGHT	40.45	MODE	2
PROTOTYPE QUANTITY	6.000	UNIT VOLUME	15.00	QUANTITY/NHA	4

UNIT PROD COST 58.19   MONTHLY PROD RATE 2.21

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	253.	11.	264.
DESIGN	817.	41.	858.
SYSTEMS	125.	-	125.
PROJECT MGMT	138.	35.	174.
DATA	47.	18.	64.
SUBTOTAL(ENG)	1380.	105.	1485.
MANUFACTURING			
PRODUCTION	-	233.	233.
PROTOTYPE	592.	-	592.
TOOL-TEST EQ	44.	75.	119.
SUBTOTAL(MFG)	636.	307.	944.
TOTAL COST	2016.	412.	2428.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	40.450	ENGINEERING COMPLEXITY	1.000
DENSITY	2.697*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	6.930	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.750	PLATFORM	2.000
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.023*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.097	MTBF(FIELD)	47365*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(12)	DEC 95*	(5)	MAY 96*	(17)
PRODUCTION	JAN 00	(12)	DEC 00*	(1)	JAN 01*	(13)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	65.58*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	103.06*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.941*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.898*

\- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: SPP 13-OCT-88 12:25
(188012)

SOLAR POWER PLANT - H2O TANKS

PRODUCTION QUANTITY	4	UNIT WEIGHT	564.00	MODE	2
PROTOTYPE QUANTITY	6.000	UNIT VOLUME	4644.20	QUANTITY/NHA	4

UNIT PROD COST 562.61 MONTHLY PROD RATE 1.03

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1828.	83.	1911.
DESIGN	5912.	306.	6218.
SYSTEMS	901.	-	901.
PROJECT MGMT	1083.	312.	1394.
DATA	354.	155.	509.
SUBTOTAL(ENG)	10077.	856.	10933.
MANUFACTURING			
PRODUCTION	-	2250.	2250.
PROTOTYPE	5641.	-	5641.
TOOL-TEST EQ	394.	528.	922.
SUBTOTAL(MFG)	6035.	2779.	8814.
TOTAL COST	16112.	3635.	19747.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	564.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.121*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	6.930	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.000
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.021*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	MTBF(FIELD)	21485*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(17)	MAY 96*	(8)	JAN 97*	(25)
PRODUCTION	JAN 00	(18)	JUN 01*	(3)	SEP 01*	(21)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	639.88*	RATE TOOLING	0
AMORTIZED UNIT COST	908.72*	PRICE IMPROVEMENT FACTOR	0.955*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.890*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: SPP 13-OCT-88 12:25
(188012)

SPP OXYGEN TANK INTEGRATION

PRODUCTION QUANTITY	4	UNIT WEIGHT	139.81	MODE	2
PROTOTYPE QUANTITY	6.000	UNIT VOLUME	581.87	QUANTITY/NHA	0

UNIT PROD COST 194.82 MONTHLY PROD RATE 1.85

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	624.	28.	652.
DESIGN	2036.	100.	2137.
SYSTEMS	304.	-	304.
PROJECT MGMT	372.	122.	494.
DATA	120.	61.	181.
SUBTOTAL(ENG)	3457.	311.	3768.
MANUFACTURING			
PRODUCTION	-	779.	779.
PROTOTYPE	2050.	-	2050.
TOOL-TEST EQ	153.	331.	484.
SUBTOTAL(MFG)	2203.	1110.	3313.
TOTAL COST	5660.	1421.	7081.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	139.810*	ENGINEERING COMPLEXITY	1.000
DENSITY	0.240*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.132	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.700	PLATFORM	2.000
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1999*
ENGINEERING CHANGES	0.015*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	MTBF(FIELD)	29786*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 99	(15)	MAR 00*	(6)	SEP 00*	(21)
PRODUCTION	OCT 00*	(15)	DEC 01*	(2)	FEB 02*	(17)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00*
ESCALATION	0.00	PRODUCTION TOOLING	1.00*
T-1 COST	221.09*	RATE TOOLING	0
AMORTIZED UNIT COST	355.20*	PRICE IMPROVEMENT FACTOR	0.900*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.892*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: SPP 13-OCT-88 12:25 (188012)

SPP HYDROGEN TANK INTEGRATION

PRODUCTION QUANTITY	4	UNIT WEIGHT	234.07	MODE	2
PROTOTYPE QUANTITY	6.000	UNIT VOLUME	974.14	QUANTITY/NHA	0

UNIT PROD COST 303.55 MONTHLY PROD RATE 1.61

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	897.	43.	940.
DESIGN	2927.	154.	3082.
SYSTEMS	437.	-	437.
PROJECT MGMT	551.	187.	739.
DATA	176.	93.	269.
SUBTOTAL(ENG)	4988.	478.	5466.
MANUFACTURING			
PRODUCTION	-	1214.	1214.
PROTOTYPE	3215.	-	3215.
TOOL-TEST EQ	237.	491.	728.
SUBTOTAL(MFG)	3452.	1705.	5157.
TOTAL COST	8440.	2182.	10623.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	234.067*	ENGINEERING COMPLEXITY	1.000
DENSITY	0.240*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.132	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.700	PLATFORM	2.000
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1999*
ENGINEERING CHANGES	0.015*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	MTBF(FIELD)	25510*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 99	(16)	APR 00*	(7)	NOV 00*	(23)
PRODUCTION	DEC 00*	(16)	MAR 02*	(2)	MAY 02*	(18)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00*
ESCALATION	0.00	PRODUCTION TOOLING	1.00*
T-1 COST	345.10*	RATE TOOLING	0
AMORTIZED UNIT COST	545.60*	PRICE IMPROVEMENT FACTOR	0.900*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.890*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
INTEGRATION AND TEST

INPUT FILENAME: SPP 13-OCT-88 12:25
(188012)

SOLAR POWER PLANT INTEGRATION

PRODUCTION QUANTITY	1	INT WEIGHT	208.732*	MODE	5
PROTOTYPE QUANTITY	6.000	INT VOLUME	868.705*	QUANTITY/NHA	0

UNIT PROD COST 335.88 MONTHLY PROD RATE 0.00

PROGRAM COST ($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	864.	39.	903.
DESIGN	2828.	143.	2971.
SYSTEMS	418.	-	418.
PROJECT MGMT	529.	61.	590.
DATA	168.	31.	199.
SUBTOTAL (ENG)	4807.	275.	5081.
MANUFACTURING			
PRODUCTION	-	336.	336.
PROTOTYPE	3120.	-	3120.
TOOL-TEST EQ	234.	27.	260.
SUBTOTAL (MFG)	3354.	362.	3716.
TOTAL COST	8161.	637.	8798.

DESIGN FACTORS	MECHANICAL
WEIGHT	208.732*
DENSITY	0.240*
MFG. COMPLEXITY	7.212*
NEW PLANS LEVEL	0.700
ENGINEERING CHANGES	0.015*
INTEGRATION LEVEL	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000*
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1999*
RELIABILITY FACTOR	1.0
MTBF (FIELD)	25480*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 99	(16)	APR 00*	(7)	NOV 00*	(23)
PRODUCTION	DEC 00*	(16)	MAR 02*	(0)	MAR 02*	(16)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
AMORTIZED UNIT COST	637.11*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00*
PRODUCTION TOOLING	1.00*

- - - PRICE HARDWARE MODEL METRIC - - -
SYSTEM COST SUMMARY

INPUT FILENAME: SPP 13-OCT-88 12:25
(188012)

TOTAL COST, WITH INTEGRATION COST

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	24240.	2024.	26264.
DESIGN	81779.	8116.	89896.
SYSTEMS	11248.	-	11248.
PROJ MGMT	18158.	8924.	27082.
DATA	5209.	4433.	9642.
SUBTOTAL(ENG)	140635.	23497.	164132.
MANUFACTURING			
PRODUCTION	-	69584.	69584.
PROTOTYPE	159709.	-	159709.
TOOL-TEST EQ	13869.	14316.	28185.
PURCH ITEMS	0.	0.	0.
SUBTOTAL(MFG)	173577.	83900.	257477.
TOTAL COST	314212.	107397.	421609.

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LOG 10-OCT-88 12:33
(188012)

MAINTENANCE & SUPPLY-LOGISTICS SUPPLY MODULE

PRODUCTION QUANTITY	1	UNIT WEIGHT	14891.00	MODE	1
PROTOTYPE QUANTITY	2.500	UNIT VOLUME	87459.98	QUANTITY/NHA	1

UNIT PROD COST26213.64 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	6381.	1651.	8032.
DESIGN	21950.	6728.	28678.
SYSTEMS	2758.	-	2758.
PROJECT MGMT	6899.	3892.	10791.
DATA	1794.	1952.	3746.
SUBTOTAL(ENG)	39782.	14223.	54005.
MANUFACTURING			
PRODUCTION	-	26214.	26214.
PROTOTYPE	109158.	-	109158.
TOOL-TEST EQ	12498.	2214.	14712.
SUBTOTAL(MFG)	121656.	28427.	150084.
TOTAL COST	161439.	42650.	204089.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	29.781*	14861.217
DENSITY	3.405	0.170*
MFG. COMPLEXITY	9.560	7.800
NEW DESIGN	0.000	0.400
DESIGN REPEAT	0.150	0.500
ENGINEERING CHANGES	0.054*	0.025*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	11960*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(36)	DEC 97*	(7)	JUL 98*	(43)
PRODUCTION	JAN 00	(38)	FEB 03*	(0)	FEB 03*	(38)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	26198.52*
AMORTIZED UNIT COST	42650.43*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.915*

--- PRICE HARDWARE MODEL METRIC ---
ELECTRONIC ITEM

INPUT FILENAME: LOG 10-OCT-88 12:33
(188012)

MAINTENANCE & SUPPLY-FLUID SHIPPING MODULE

PRODUCTION QUANTITY	1	UNIT WEIGHT	4576.00	MODE	1
PROTOTYPE QUANTITY	2.500	UNIT VOLUME	33759.99	QUANTITY/NHA	1

UNIT PROD COST10697.85 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	5779.	1705.	7484.
DESIGN	19882.	7057.	26939.
SYSTEMS	2497.	-	2497.
PROJECT MGMT	3739.	2156.	5894.
DATA	1127.	1081.	2209.
SUBTOTAL(ENG)	33024.	12000.	45024.
MANUFACTURING			
PRODUCTION	-	10698.	10698.
PROTOTYPE	42795.	-	42795.
TOOL-TEST EQ	4988.	918.	5905.
SUBTOTAL(MFG)	47782.	11616.	59398.
TOTAL COST	80806.	23616.	104422.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	91.521*	4484.478
DENSITY	27.109	0.133*
MFG. COMPLEXITY	9.560	7.800
NEW DESIGN	0.000	0.600
DESIGN REPEAT	0.150	0.300
ENGINEERING CHANGES	0.062*	0.029*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	3980*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(30)	JUN 97*	(6)	DEC 97*	(36)
PRODUCTION	JAN 00	(31)	JUL 02*	(0)	JUL 02*	(31)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	10691.81*
AMORTIZED UNIT COST	23615.75*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.916*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: LOG 10-OCT-88 12:33
(188012)

MAINTENANCE & SUPPLY-LOGISTICS MODULE PALLETS

PRODUCTION QUANTITY	3	UNIT WEIGHT	7852.00	MODE	2
		UNIT VOLUME	21020.00	QUANTITY/NHA	1

UNIT PROD COST 9832.82 MONTHLY PROD RATE 0.32

PROGRAM COST ($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	-	212.	212.
DESIGN	-	782.	782.
SYSTEMS	-	-	-
PROJECT MGMT	-	3551.	3551.
DATA	-	1769.	1769.
SUBTOTAL (ENG)	-	6315.	6315.
MANUFACTURING			
PRODUCTION	-	29498.	29498.
PROTOTYPE	-	-	-
TOOL-TEST EQ	-	5460.	5460.
SUBTOTAL (MFG)	-	34959.	34959.
TOTAL COST	-	41274.	41274.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	7851.998	PLATFORM	2.000
DENSITY	0.374*	YEAR OF TECHNOLOGY	1995*
MFG. COMPLEXITY	7.420	RELIABILITY FACTOR	1.0
ENGINEERING CHANGES	0.012*	MTBF (FIELD)	7836*
INTEGRATION LEVEL	0.000		

SCHEDULE	START		FIRST ITEM		FINISH	
PRODUCTION	JAN 95	(32)	AUG 97*	(6)	FEB 98*	(38)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	PRODUCTION TOOLING	1.00
ESCALATION	0.00	RATE TOOLING	0
T-1 COST	10952.02*	PRICE IMPROVEMENT FACTOR	1.000
AMORTIZED UNIT COST	13757.85*	UNIT LEARNING CURVE	0.877*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: SHELTR 10-OCT-88 12:35
(188012)

STORM SHELTER-PARTIAL PROTECTION GARMENT

PRODUCTION QUANTITY	5	UNIT WEIGHT	170.00	MODE	2
PROTOTYPE QUANTITY	4.000	UNIT VOLUME	556.23	QUANTITY/NHA	1

UNIT PROD COST 496.21 MONTHLY PROD RATE 1.01

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1433.	99.	1532.
DESIGN	4737.	389.	5126.
SYSTEMS	672.	-	672.
PROJECT MGMT	694.	327.	1022.
DATA	242.	162.	404.
SUBTOTAL(ENG)	7779.	978.	8756.
MANUFACTURING			
PRODUCTION	-	2481.	2481.
PROTOTYPE	3172.	-	3172.
TOOL-TEST EQ	277.	536.	812.
SUBTOTAL(MFG)	3448.	3017.	6465.
TOTAL COST	11227.	3994.	15221.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	170.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.306*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.810	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.000
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.031*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	MTBF(FIELD)	21002*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(19)	JUL 96*	(6)	JAN 97*	(25)
PRODUCTION	JAN 00	(18)	JUN 01*	(4)	OCT 01*	(22)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	584.75*	RATE TOOLING	0
AMORTIZED UNIT COST	798.86*	PRICE IMPROVEMENT FACTOR	0.955*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.884*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: SHELTR 10-OCT-88 12:35
(188012)

FOUR-MAN STORM SHELTER

PRODUCTION QUANTITY	2	UNIT WEIGHT	14700.00	MODE	1
PROTOTYPE QUANTITY	3.500	UNIT VOLUME	7507.08	QUANTITY/NHA	1

UNIT PROD COST17667.63 MONTHLY PROD RATE 0.11

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	21734.	3595.	25328.
DESIGN	77315.	13912.	91227.
SYSTEMS	9098.	-	9098.
PROJECT MGMT	11334.	5666.	16999.
DATA	3575.	2821.	6396.
SUBTOTAL(ENG)	123055.	25994.	149049.
MANUFACTURING			
PRODUCTION	-	35335.	35335.
PROTOTYPE	94952.	-	94952.
TOOL-TEST EQ	11701.	5104.	16805.
SUBTOTAL(MFG)	106653.	40439.	147092.
TOTAL COST	229709.	66432.	296141.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	294.000*	14405.998
DENSITY	40.000	1.919*
MFG. COMPLEXITY	9.960	7.050
NEW DESIGN	0.150	1.000
DESIGN REPEAT	0.100	0.100
ENGINEERING CHANGES	0.052*	0.016*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.001*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	1425*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(36)	DEC 97*	(11)	NOV 98*	(47)
PRODUCTION	JAN 00	(32)	AUG 02*	(8)	APR 03*	(40)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	18426.32*
AMORTIZED UNIT COST	33216.23*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.994*
UNIT LEARNING CURVE	0.916*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: STN   12-OCT-88 17:53
(188012)

SPACE TRANSPORTATION NODE - HANGAR

PRODUCTION QUANTITY	1	UNIT WEIGHT	21935.00	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	43749992.00	QUANTITY/NHA	1

UNIT PROD COST20992.46   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	16637.	965.	17602.
DESIGN	53045.	3699.	56745.
SYSTEMS	8126.	-	8126.
PROJECT MGMT	11954.	3060.	15013.
DATA	3692.	1543.	5235.
SUBTOTAL(ENG)	93453.	9267.	102721.
MANUFACTURING			
PRODUCTION	-	20992.	20992.
PROTOTYPE	108616.	-	108616.
TOOL-TEST EQ	8154.	1687.	9841.
SUBTOTAL(MFG)	116770.	22679.	139449.
TOTAL COST	210223.	31947.	242170.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	21934.996	ENGINEERING COMPLEXITY	1.000
DENSITY	0.001*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.320	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.000
DESIGN REPEAT	0.500	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.018*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	MTBF(FIELD)	6013*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(40)	APR 98*	(10)	FEB 99*	(50)
PRODUCTION	JAN 00	(36)	DEC 02*	(0)	DEC 02*	(36)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	20972.35*	RATE TOOLING	0
AMORTIZED UNIT COST	31946.55*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.876*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: STN 12-OCT-88 17:53
(188012)

SPACE TRANSPORTATION NODE - HANGAR TUNNEL

PRODUCTION QUANTITY	1	UNIT WEIGHT	1390.00	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	549999.88	QUANTITY/NHA	1

UNIT PROD COST 1386.11 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	4041.	210.	4251.
DESIGN	12682.	769.	13451.
SYSTEMS	2021.	-	2021.
PROJECT MGMT	1910.	280.	2190.
DATA	711.	141.	852.
SUBTOTAL(ENG)	21365.	1400.	22765.
MANUFACTURING			
PRODUCTION	-	1386.	1386.
PROTOTYPE	7130.	-	7130.
TOOL-TEST EQ	550.	108.	657.
SUBTOTAL(MFG)	7680.	1494.	9174.
TOTAL COST	29045.	2894.	31938.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1390.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.003*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.000	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.000
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.024*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	MTBF(FIELD)	15873*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(21)	SEP 96*	(6)	MAR 97*	(27)
PRODUCTION	JAN 00	(21)	SEP 01*	(0)	SEP 01*	(21)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	1384.94*	RATE TOOLING	0
AMORTIZED UNIT COST	2893.78*	PRICE IMPROVEMENT FACTOR	1.000*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.887*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: STN   12-OCT-88 17:53
(188012)

SPACE TRANSPORTATION NODE - STORAGE TANKS

PRODUCTION QUANTITY	4	UNIT WEIGHT	13937.75	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	149999.97	QUANTITY/NHA	4

UNIT PROD COST22272.68   MONTHLY PROD RATE 0.28

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	25604.	1725.	27329.
DESIGN	83237.	7263.	90500.
SYSTEMS	12149.	-	12149.
PROJECT MGMT	14968.	10962.	25930.
DATA	4907.	5449.	10356.
SUBTOTAL(ENG)	140865.	25400.	166266.
MANUFACTURING			
PRODUCTION	-	89091.	89091.
PROTOTYPE	112998.	-	112998.
TOOL-TEST EQ	9120.	16057.	25177.
SUBTOTAL(MFG)	122118.	105148.	227266.
TOTAL COST	262983.	130549.	393532.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	13937.748	ENGINEERING COMPLEXITY	1.000
DENSITY	0.093*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.750	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.000
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.021*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	MTBF(FIELD)	5739*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(40)	APR 98*	(10)	FEB 99*	(50)
PRODUCTION	JAN 00	(37)	JAN 03*	(11)	DEC 03*	(48)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	25870.29*	RATE TOOLING	0
AMORTIZED UNIT COST	32637.15*	PRICE IMPROVEMENT FACTOR	0.978*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.872*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: STN   12-OCT-88 17:53
(188012)

SPACE TRANSPORTATION NODE - PROPELLANT TRANSFER LINES

PRODUCTION QUANTITY	1	UNIT WEIGHT	17222.00	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	10000.00	QUANTITY/NHA	1

UNIT PROD COST19045.43   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	14784.	885.	15669.
DESIGN	47353.	2947.	50301.
SYSTEMS	7172.	-	7172.
PROJECT MGMT	10661.	2724.	13385.
DATA	3275.	1373.	4648.
SUBTOTAL(ENG)	83246.	7929.	91175.
MANUFACTURING			
PRODUCTION	-	19045.	19045.
PROTOTYPE	98501.	-	98501.
TOOL-TEST EQ	7843.	1545.	9388.
SUBTOTAL(MFG)	106344.	20590.	126935.
TOTAL COST	189590.	28519.	218109.

DESIGN FACTORS	MECHANICAL
WEIGHT	17221.996
DENSITY	1.722*
MFG. COMPLEXITY	7.420
NEW DESIGN	1.000
DESIGN REPEAT	0.500
ENGINEERING CHANGES	0.019*
INTEGRATION LEVEL	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	6191*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(38)	FEB 98*	(10)	DEC 98*	(48)
PRODUCTION	JAN 00	(36)	DEC 02*	(0)	DEC 02*	(36)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	19027.10*
AMORTIZED UNIT COST	28519.49*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.875*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: STN 12-OCT-88 17:53 (188012)

SPACE TRANSPORTATION NODE - HLLV TANKER RESUPPLY INTERFACE

PRODUCTION QUANTITY	1	UNIT WEIGHT	337.00	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	89999.98	QUANTITY/NHA	1

UNIT PROD COST 518.99 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1680.	87.	1767.
DESIGN	5326.	327.	5653.
SYSTEMS	827.	-	827.
PROJECT MGMT	763.	109.	873.
DATA	286.	55.	341.
SUBTOTAL(ENG)	8883.	578.	9460.
MANUFACTURING			
PRODUCTION	-	519.	519.
PROTOTYPE	2632.	-	2632.
TOOL-TEST EQ	216.	41.	257.
SUBTOTAL(MFG)	2847.	560.	3408.
TOTAL COST	11730.	1138.	12868.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	337.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.004*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.220	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.000
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.027*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	MTBF(FIELD)	21992*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(18)	JUN 96*	(4)	OCT 96*	(22)
PRODUCTION	JAN 00	(18)	JUN 01*	(0)	JUN 01*	(18)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	518.56*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	1137.98*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	1.000*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.888*

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: STN   12-OCT-88 17:53
(188012)

SPACE TRANSPORTATION NODE - LANDER/OTV PROP BOOM & INTERFACE

PRODUCTION QUANTITY	1	UNIT WEIGHT	909.00	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	89999.98	QUANTITY/NHA	1

UNIT PROD COST 1712.25   MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	3984.	261.	4245.
DESIGN	12825.	1029.	13854.
SYSTEMS	1919.	-	1919.
PROJECT MGMT	1883.	349.	2232.
DATA	682.	176.	858.
SUBTOTAL(ENG)	21293.	1815.	23108.
MANUFACTURING			
PRODUCTION	-	1712.	1712.
PROTOTYPE	8403.	-	8403.
TOOL-TEST EQ	696.	140.	836.
SUBTOTAL(MFG)	9099.	1853.	10952.
TOTAL COST	30392.	3668.	34060.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	909.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.010*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.540	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.000
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.029*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.000	MTBF(FIELD)	14214*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(22)	OCT 96*	(6)	APR 97*	(28)
PRODUCTION	JAN 00	(23)	NOV 01*	(0)	NOV 01*	(23)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	1710.73*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	3667.52*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	1.000*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.882*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: FCCART 10-OCT-88 12:37
(188012)

FUEL CELL POWER CART

PRODUCTION QUANTITY	1	UNIT WEIGHT	1290.00	MODE	1
PROTOTYPE QUANTITY	2.500	UNIT VOLUME	7267.00	QUANTITY/NHA	1

UNIT PROD COST 5863.56 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	8237.	953.	9190.
DESIGN	28335.	4152.	32487.
SYSTEMS	3561.	-	3561.
PROJECT MGMT	3591.	1213.	4805.
DATA	1263.	609.	1871.
SUBTOTAL(ENG)	44987.	6927.	51914.
MANUFACTURING			
PRODUCTION	-	5864.	5864.
PROTOTYPE	22233.	-	22233.
TOOL-TEST EQ	2593.	520.	3113.
SUBTOTAL(MFG)	24826.	6383.	31209.
TOTAL COST	69813.	13310.	83123.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	25.800*	1264.200
DENSITY	35.503	0.174*
MFG. COMPLEXITY	9.560	8.340
NEW DESIGN	1.000	1.000
DESIGN REPEAT	0.200	0.150
ENGINEERING CHANGES	0.065*	0.035*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	13766*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(28)	APR 97*	(6)	OCT 97*	(34)
PRODUCTION	JAN 00	(29)	MAY 02*	(0)	MAY 02*	(29)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	5860.22*
AMORTIZED UNIT COST	13309.78*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.916*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: RADCAR 10-OCT-88 12:36
(188012)

SUPPLEMENTAL COOLING CART

PRODUCTION QUANTITY	1	UNIT WEIGHT	1170.00	MODE	1
PROTOTYPE QUANTITY	2.500	UNIT VOLUME	22000.00	QUANTITY/NHA	1

UNIT PROD COST 2542.84 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	6216.	657.	6874.
DESIGN	21383.	2782.	24165.
SYSTEMS	2687.	-	2687.
PROJECT MGMT	2418.	657.	3075.
DATA	895.	330.	1225.
SUBTOTAL(ENG)	33600.	4426.	38026.
MANUFACTURING			
PRODUCTION	-	2543.	2543.
PROTOTYPE	10245.	-	10245.
TOOL-TEST EQ	1223.	214.	1437.
SUBTOTAL(MFG)	11467.	2757.	14225.
TOTAL COST	45067.	7183.	52250.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	23.400*	1146.600
DENSITY	10.636	0.052*
MFG. COMPLEXITY	9.560	7.520
NEW DESIGN	1.000	1.000
DESIGN REPEAT	0.000	0.150
ENGINEERING CHANGES	0.070*	0.029*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	15148*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(23)	NOV 96*	(5)	APR 97*	(28)
PRODUCTION	JAN 00	(23)	NOV 01*	(0)	NOV 01*	(23)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	2541.48*
AMORTIZED UNIT COST	7183.28*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.920*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - STRUCTURES

PRODUCTION QUANTITY	10	UNIT WEIGHT	2000.00	MODE	2
PROTOTYPE QUANTITY	7.000	UNIT VOLUME	74999.98	QUANTITY/NHA	1

UNIT PROD COST 7239.32 MONTHLY PROD RATE 0.55

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	9450.	605.	10055.
DESIGN	32770.	2646.	35416.
SYSTEMS	4225.	-	4225.
PROJECT MGMT	7641.	7397.	15038.
DATA	2080.	7712.	9792.
SUBTOTAL(ENG)	56167.	18359.	74526.
MANUFACTURING			
PRODUCTION	-	72393.	72393.
PROTOTYPE	74118.	-	74118.
TOOL-TEST EQ	6506.	13563.	20069.
SUBTOTAL(MFG)	80625.	85956.	166581.
TOTAL COST	136791.	104315.	241106.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	2000.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.027*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.370	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.500	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.020*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.263	MTBF(FIELD)	5256*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(31)	JUL 97*	(14)	SEP 98*	(45)
PRODUCTION	JAN 00	(31)	JUL 02*	(16)	NOV 03*	(47)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	9659.09*	RATE TOOLING	0
AMORTIZED UNIT COST	10431.52*	PRICE IMPROVEMENT FACTOR	0.966*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.872*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - ENGINES

PRODUCTION QUANTITY	40	UNIT WEIGHT	250.00	MODE	1
PROTOTYPE QUANTITY	18.000	UNIT VOLUME	3000.00	QUANTITY/NHA	4

UNIT PROD COST 2412.44 MONTHLY PROD RATE 1.26

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	19171.	809.	19980.
DESIGN	94239.	4062.	98300.
SYSTEMS	28055.	-	28055.
PROJECT MGMT	40702.	8005.	48707.
DATA	14496.	8240.	22735.
SUBTOTAL(ENG)	196662.	21115.	217777.
MANUFACTURING			
PRODUCTION	-	96497.	96497.
PROTOTYPE	89370.	-	89370.
TOOL-TEST EQ	17299.	13356.	30655.
SUBTOTAL(MFG)	106669.	109853.	216523.
TOTAL COST	303331.	130969.	434300.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	5.000*	245.000
DENSITY	16.667	0.082*
MFG. COMPLEXITY	10.320	9.160
NEW DESIGN	1.000	1.000
DESIGN REPEAT	0.000	0.000
ENGINEERING CHANGES	0.039*	0.022*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.609	0.350

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	2.300
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	55932*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(39)	MAR 98*	(27)	JUN 00*	(66)
PRODUCTION	JAN 00	(26)	FEB 02*	(31)	SEP 04*	(57)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	4080.28*
AMORTIZED UNIT COST	3274.22*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.951*
UNIT LEARNING CURVE	0.873*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - RCS DISTRIBUTION

PRODUCTION QUANTITY	20	UNIT WEIGHT	156.00	MODE	1
PROTOTYPE QUANTITY	10.000	UNIT VOLUME	1000.00	QUANTITY/NHA	2

UNIT PROD COST 672.64 MONTHLY PROD RATE 1.02

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	2104.	203.	2307.
DESIGN	7908.	874.	8782.
SYSTEMS	845.	-	845.
PROJECT MGMT	1235.	1211.	2446.
DATA	351.	1252.	1603.
SUBTOTAL(ENG)	12442.	3540.	15983.
MANUFACTURING			
PRODUCTION	-	13453.	13453.
PROTOTYPE	9940.	-	9940.
TOOL-TEST EQ	1245.	1754.	2999.
SUBTOTAL(MFG)	11186.	15207.	26392.
TOTAL COST	23628.	18747.	42375.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	1.000*	155.000
DENSITY	10.000	0.155*
MFG. COMPLEXITY	10.320	8.240
NEW DESIGN	1.000	1.000
DESIGN REPEAT	0.000	0.500
ENGINEERING CHANGES	0.056*	0.024*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.263	0.484

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	270803*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(11)	JUL 97*	(31)
PRODUCTION	JAN 00	(20)	AUG 01*	(18)	FEB 03*	(38)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	958.21*
AMORTIZED UNIT COST	937.35*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.955*
UNIT LEARNING CURVE	0.888*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - RCS NOZZLE CLUSTER

PRODUCTION QUANTITY	80	UNIT WEIGHT	25.00	MODE	2
PROTOTYPE QUANTITY	36.000	UNIT VOLUME	125.00	QUANTITY/NHA	8

UNIT PROD COST 82.37 MONTHLY PROD RATE 5.49

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	200.	14.	214.
DESIGN	718.	59.	777.
SYSTEMS	88.	-	88.
PROJECT MGMT	423.	519.	941.
DATA	86.	533.	619.
SUBTOTAL(ENG)	1515.	1125.	2640.
MANUFACTURING			
PRODUCTION	-	6590.	6590.
PROTOTYPE	5099.	-	5099.
TOOL-TEST EQ	409.	834.	1243.
SUBTOTAL(MFG)	5508.	7424.	12932.
TOTAL COST	7022.	8549.	15571.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	25.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.200*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.070	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.750	PLATFORM	2.500
DESIGN REPEAT	0.670	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.021*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.201	MTBF(FIELD)	21997*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(15)	MAR 96*	(13)	APR 97*	(28)
PRODUCTION	JAN 00	(14)	FEB 01*	(15)	MAY 02*	(29)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	146.73*	RATE TOOLING	0
AMORTIZED UNIT COST	106.86*	PRICE IMPROVEMENT FACTOR	0.926*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.887*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57 (188225)

OTV - THERMAL PROTECTION

PRODUCTION QUANTITY	10	UNIT WEIGHT	2017.00	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	49999.99	QUANTITY/NHA	1

UNIT PROD COST 1027.31 MONTHLY PROD RATE 1.21

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	2684.	153.	2838.
DESIGN	8232.	522.	8755.
SYSTEMS	1389.	-	1389.
PROJECT MGMT	1387.	1116.	2503.
DATA	508.	1168.	1676.
SUBTOTAL(ENG)	14201.	2960.	17161.
MANUFACTURING			
PRODUCTION	-	10273.	10273.
PROTOTYPE	5918.	-	5918.
TOOL-TEST EQ	442.	1816.	2258.
SUBTOTAL(MFG)	6360.	12089.	18449.
TOTAL COST	20562.	15049.	35610.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	2017.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.040*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	6.510	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.750	PLATFORM	2.500
DESIGN REPEAT	0.500	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.017*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.350	MTBF(FIELD)	11718*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(6)	FEB 97*	(26)
PRODUCTION	JAN 00	(20)	AUG 01*	(7)	MAR 02*	(27)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	1312.05*	RATE TOOLING	0
AMORTIZED UNIT COST	1504.86*	PRICE IMPROVEMENT FACTOR	0.952*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.891*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: OTVSYS   17-OCT-88 13:57
(188225)

OTV - OXYGEN TANKS

PRODUCTION QUANTITY	20	UNIT WEIGHT	1000.00	MODE	2
PROTOTYPE QUANTITY	14.000	UNIT VOLUME	6000.00	QUANTITY/NHA	2

UNIT PROD COST 1583.96   MONTHLY PROD RATE 1.23

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	6966.	350.	7317.
DESIGN	23916.	1381.	25297.
SYSTEMS	3228.	-	3228.
PROJECT MGMT	5139.	3058.	8197.
DATA	1447.	3176.	4624.
SUBTOTAL(ENG)	40696.	7966.	48662.
MANUFACTURING			
PRODUCTION	-	31679.	31679.
PROTOTYPE	36055.	-	36055.
TOOL-TEST EQ	2636.	4822.	7458.
SUBTOTAL(MFG)	38691.	36501.	75192.
TOTAL COST	79387.	44467.	123854.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1000.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.167*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.550	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.150	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.017*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.263	MTBF(FIELD)	9001*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(23)	NOV 96*	(14)	JAN 98*	(37)
PRODUCTION	JAN 00	(23)	NOV 01*	(16)	MAR 03*	(39)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	2301.14*	RATE TOOLING	0
AMORTIZED UNIT COST	2223.35*	PRICE IMPROVEMENT FACTOR	0.951*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.882*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - HYDROGEN TANKS

PRODUCTION QUANTITY	20	UNIT WEIGHT	500.00	MODE	2
PROTOTYPE QUANTITY	14.000	UNIT VOLUME	33999.99	QUANTITY/NHA	2

UNIT PROD COST 860.89 MONTHLY PROD RATE 1.46

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	4281.	218.	4499.
DESIGN	14695.	861.	15556.
SYSTEMS	1984.	-	1984.
PROJECT MGMT	2996.	1673.	4669.
DATA	861.	1738.	2599.
SUBTOTAL(ENG)	24817.	4490.	29306.
MANUFACTURING			
PRODUCTION	-	17218.	17218.
PROTOTYPE	19623.	-	19623.
TOOL-TEST EQ	1441.	2639.	4080.
SUBTOTAL(MFG)	21064.	19857.	40921.
TOTAL COST	45881.	24346.	70227.

DESIGN FACTORS	MECHANICAL
WEIGHT	500.000
DENSITY	0.015*
MFG. COMPLEXITY	7.550
NEW DESIGN	1.000
DESIGN REPEAT	0.150
ENGINEERING CHANGES	0.018*
INTEGRATION LEVEL	0.263

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	11082*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(13)	SEP 97*	(33)
PRODUCTION	JAN 00	(21)	SEP 01*	(13)	OCT 02*	(34)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	1242.80*
AMORTIZED UNIT COST	1217.32*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.948*
UNIT LEARNING CURVE	0.884*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - DMS/GN&C

PRODUCTION QUANTITY	10	UNIT WEIGHT	150.00	MODE	1
PROTOTYPE QUANTITY	5.000	UNIT VOLUME	130.00	QUANTITY/NHA	1

UNIT PROD COST 2243.32 MONTHLY PROD RATE 0.66

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	6265.	675.	6941.
DESIGN	29423.	2940.	32362.
SYSTEMS	9428.	-	9428.
PROJECT MGMT	11010.	2395.	13405.
DATA	4456.	2489.	6945.
SUBTOTAL(ENG)	60582.	8499.	69080.
MANUFACTURING			
PRODUCTION	-	22433.	22433.
PROTOTYPE	22715.	-	22715.
TOOL-TEST EQ	4594.	4183.	8777.
SUBTOTAL(MFG)	27309.	26616.	53926.
TOTAL COST	87891.	35115.	123006.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	5.000*	145.000
DENSITY	43.000	1.115*
MFG. COMPLEXITY	10.320	9.400
NEW DESIGN	1.000	0.200
DESIGN REPEAT	0.000	0.000
ENGINEERING CHANGES	0.045*	0.027*
HW/SW INTEG. LEVEL	0.500	
INTEGRATION LEVEL	0.305	0.151

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	2.300
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.001*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	55932*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(34)	OCT 97*	(13)	NOV 98*	(47)
PRODUCTION	JAN 00	(25)	JAN 02*	(14)	MAR 03*	(39)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	2891.53*
AMORTIZED UNIT COST	3511.50*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.963*
UNIT LEARNING CURVE	0.887*

- - - PRICE HARDWARE MODEL METRIC - - -
THRU-PUT COST

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - DMS/GN&C THRUPUT

CATEGORY 3 MODE 8

PROGRAM COST	DEVELOPMENT	PRODUCTION	TOTAL COST
THRU-PUT COST	16380.	10920.	27300.

--- PRICE HARDWARE MODEL METRIC ---
ELECTRONIC ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - ELECTRIC POWER

PRODUCTION QUANTITY	10	UNIT WEIGHT	478.00	MODE	1
PROTOTYPE QUANTITY	5.000	UNIT VOLUME	1000.00	QUANTITY/NHA	1

UNIT PROD COST 1782.41 MONTHLY PROD RATE 0.54

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	4306.	458.	4764.
DESIGN	15749.	1829.	17577.
SYSTEMS	1758.	-	1758.
PROJECT MGMT	2042.	1804.	3846.
DATA	651.	1875.	2526.
SUBTOTAL(ENG)	24505.	5966.	30471.
MANUFACTURING			
PRODUCTION	-	17824.	17824.
PROTOTYPE	13436.	-	13436.
TOOL-TEST EQ	1736.	2680.	4416.
SUBTOTAL(MFG)	15172.	20505.	35677.
TOTAL COST	39678.	26470.	66148.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	3.000*	475.000
DENSITY	30.000	0.475*
MFG. COMPLEXITY	10.320	8.150
NEW DESIGN	1.000	1.000
DESIGN REPEAT	0.000	0.500
ENGINEERING CHANGES	0.061*	0.026*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.843	0.201

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	92273*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(23)	NOV 96*	(8)	JUL 97*	(31)
PRODUCTION	JAN 00	(23)	NOV 01*	(17)	APR 03*	(40)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	2263.14*
AMORTIZED UNIT COST	2647.01*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.966*
UNIT LEARNING CURVE	0.893*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - AEROBRAKE SHELL

PRODUCTION QUANTITY	10	UNIT WEIGHT	455.00	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	3199999.50	QUANTITY/NHA	1

UNIT PROD COST32629.04 MONTHLY PROD RATE 0.37

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	7200.	643.	7843.
DESIGN	34225.	3788.	38013.
SYSTEMS	10418.	-	10418.
PROJECT MGMT	37639.	30985.	68625.
DATA	10778.	32150.	42927.
SUBTOTAL(ENG)	100259.	67566.	167825.
MANUFACTURING			
PRODUCTION	-	326290.	326290.
PROTOTYPE	220353.	-	220353.
TOOL-TEST EQ	53019.	75616.	128635.
SUBTOTAL(MFG)	273372.	401906.	675278.
TOTAL COST	373631.	469473.	843103.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	455.000	ENGINEERING COMPLEXITY	2.300
DENSITY	0.000*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	11.000	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.850	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.046*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.151	MTBF(FIELD)	3418*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(51)	MAR 99*	(14)	MAY 00*	(65)
PRODUCTION	JAN 00	(41)	MAY 03*	(25)	JUN 05*	(66)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	45696.31*	RATE TOOLING	0
AMORTIZED UNIT COST	46947.25*	PRICE IMPROVEMENT FACTOR	0.973*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.851*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - AEROBRAKE STRUCTURE

PRODUCTION QUANTITY	10	UNIT WEIGHT	1545.00	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	59999.98	QUANTITY/NHA	1

UNIT PROD COST 2753.08 MONTHLY PROD RATE 0.77

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	8050.	550.	8600.
DESIGN	26025.	2200.	28225.
SYSTEMS	3851.	-	3851.
PROJECT MGMT	3651.	2977.	6628.
DATA	1342.	3108.	4450.
SUBTOTAL(ENG)	42919.	8834.	51753.
MANUFACTURING			
PRODUCTION	-	27531.	27531.
PROTOTYPE	14626.	-	14626.
TOOL-TEST EQ	1211.	5029.	6240.
SUBTOTAL(MFG)	15837.	32560.	48397.
TOTAL COST	58756.	41394.	100150.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1545.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.026*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.670	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.250	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.023*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.151	MTBF(FIELD)	7511*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(26)	FEB 97*	(6)	AUG 97*	(32)
PRODUCTION	JAN 00	(25)	JAN 02*	(12)	JAN 03*	(37)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188		
ESCALATION	0.00	DEVELOPMENT TOOLING	1.00
T-1 COST	3608.51*	PRODUCTION TOOLING	1.00
AMORTIZED UNIT COST	4139.39*	RATE TOOLING	0
DEV COST MULTIPLIER	1.00*	PRICE IMPROVEMENT FACTOR	0.960*
PROD COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.879*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - CREW MODULE SHELL

PRODUCTION QUANTITY	7	UNIT WEIGHT	1200.00	MODE	2
PROTOTYPE QUANTITY	7.000	UNIT VOLUME	24000.00	QUANTITY/NHA	1

UNIT PROD COST 3116.30 MONTHLY PROD RATE 0.63

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	8241.	508.	8750.
DESIGN	28110.	2285.	30395.
SYSTEMS	3775.	-	3775.
PROJECT MGMT	5008.	2535.	7543.
DATA	1535.	2653.	4188.
SUBTOTAL(ENG)	46670.	7981.	54651.
MANUFACTURING			
PRODUCTION	-	21814.	21814.
PROTOTYPE	32811.	-	32811.
TOOL-TEST EQ	2659.	4575.	7233.
SUBTOTAL(MFG)	35470.	26389.	61859.
TOTAL COST	82140.	34370.	116510.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1200.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.050*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.980	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	1.000	PLATFORM	2.500
DESIGN REPEAT	0.250	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.021*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.097	MTBF(FIELD)	7138*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(26)	FEB 97*	(12)	FEB 98*	(38)
PRODUCTION	JAN 00	(26)	FEB 02*	(10)	DEC 02*	(36)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	3891.84*	RATE TOOLING	0
AMORTIZED UNIT COST	4910.03*	PRICE IMPROVEMENT FACTOR	0.963*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.877*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - CREW MODULE ECLSS

PRODUCTION QUANTITY	7	UNIT WEIGHT	1390.00	MODE	2
PROTOTYPE QUANTITY	5.000	UNIT VOLUME	5000.00	QUANTITY/NHA	1

UNIT PROD COST 4876.16 MONTHLY PROD RATE 0.54

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	11031.	994.	12025.
DESIGN	37566.	4152.	41718.
SYSTEMS	5002.	-	5002.
PROJECT MGMT	5967.	3996.	9963.
DATA	1925.	4179.	6103.
SUBTOTAL(ENG)	61491.	13320.	74811.
MANUFACTURING			
PRODUCTION	-	34133.	34133.
PROTOTYPE	36668.	-	36668.
TOOL-TEST EQ	3241.	7150.	10391.
SUBTOTAL(MFG)	39908.	41283.	81191.
TOTAL COST	101399.	54604.	156002.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	1390.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.278*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	8.280	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.800	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.024*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.120	MTBF(FIELD)	6069*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(28)	APR 97*	(11)	MAR 98*	(39)
PRODUCTION	JAN 00	(29)	MAY 02*	(11)	APR 03*	(40)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	6128.07*	RATE TOOLING	0
AMORTIZED UNIT COST	7800.52*	PRICE IMPROVEMENT FACTOR	0.966*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.874*
PROD COST MULTIPLIER	1.00*		

--- PRICE HARDWARE MODEL METRIC ---
ELECTRONIC ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - CREW MODULE CONTROLS

PRODUCTION QUANTITY	7	UNIT WEIGHT	55.00	MODE	1
PROTOTYPE QUANTITY	5.000	UNIT VOLUME	50.00	QUANTITY/NHA	1

UNIT PROD COST 376.12 MONTHLY PROD RATE 1.28

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	2654.	314.	2969.
DESIGN	9710.	1256.	10966.
SYSTEMS	1083.	-	1083.
PROJECT MGMT	984.	400.	1384.
DATA	351.	417.	767.
SUBTOTAL(ENG)	14782.	2387.	17169.
MANUFACTURING			
PRODUCTION	-	2633.	2633.
PROTOTYPE	2545.	-	2545.
TOOL-TEST EQ	341.	685.	1026.
SUBTOTAL(MFG)	2886.	3318.	6204.
TOTAL COST	17668.	5706.	23374.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	5.000*	50.000
DENSITY	43.000	1.000*
MFG. COMPLEXITY	10.320	7.760
NEW DESIGN	0.900	1.000
DESIGN REPEAT	0.000	0.000
ENGINEERING CHANGES	0.064*	0.024*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.305	0.151

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.002*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	55932*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(20)	AUG 96*	(7)	MAR 97*	(27)
PRODUCTION	JAN 00	(17)	MAY 01*	(5)	OCT 01*	(22)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	451.38*
AMORTIZED UNIT COST	815.07*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.951*
UNIT LEARNING CURVE	0.899*

- - - PRICE HARDWARE MODEL METRIC - - -
MECHANICAL ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - CREW MODULE HATCHES

PRODUCTION QUANTITY	14	UNIT WEIGHT	29.00	MODE	2
PROTOTYPE QUANTITY	8.000	UNIT VOLUME	1000.00	QUANTITY/NHA	2

UNIT PROD COST 76.01 MONTHLY PROD RATE 2.54

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	337.	29.	366.
DESIGN	1136.	115.	1251.
SYSTEMS	158.	-	158.
PROJECT MGMT	193.	116.	308.
DATA	61.	120.	182.
SUBTOTAL(ENG)	1885.	380.	2265.
MANUFACTURING			
PRODUCTION	-	1064.	1064.
PROTOTYPE	1000.	-	1000.
TOOL-TEST EQ	79.	206.	285.
SUBTOTAL(MFG)	1080.	1270.	2350.
TOTAL COST	2965.	1650.	4614.

DESIGN FACTORS	MECHANICAL	PRODUCT DESCRIPTORS	
WEIGHT	29.000	ENGINEERING COMPLEXITY	1.000
DENSITY	0.029*	PROTOTYPE SUPPORT	1.0
MFG. COMPLEXITY	7.610	PROTO SCHEDULE FACTOR	0.250*
NEW DESIGN	0.500	PLATFORM	2.500
DESIGN REPEAT	0.000	YEAR OF TECHNOLOGY	1995*
ENGINEERING CHANGES	0.023*	RELIABILITY FACTOR	1.0
INTEGRATION LEVEL	0.151	MTBF(FIELD)	25386*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(14)	FEB 96*	(7)	SEP 96*	(21)
PRODUCTION	JAN 00	(13)	JAN 01*	(5)	JUN 01*	(18)

SUPPLEMENTAL INFORMATION		TOOLING & PROCESS FACTORS	
ECONOMIC BASE	188	DEVELOPMENT TOOLING	1.00
ESCALATION	0.00	PRODUCTION TOOLING	1.00
T-1 COST	101.55*	RATE TOOLING	0
AMORTIZED UNIT COST	117.84*	PRICE IMPROVEMENT FACTOR	0.939*
DEV COST MULTIPLIER	1.00*	UNIT LEARNING CURVE	0.892*
PROD COST MULTIPLIER	1.00*		

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - CREW MODULE INTEGRATION

PRODUCTION QUANTITY	7	UNIT WEIGHT	64.64	MODE	1
PROTOTYPE QUANTITY	5.000	UNIT VOLUME	265.74	QUANTITY/NHA	0

UNIT PROD COST 169.52 MONTHLY PROD RATE 1.18

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1063.	73.	1137.
DESIGN	3790.	284.	4074.
SYSTEMS	451.	-	451.
PROJECT MGMT	432.	157.	589.
DATA	151.	163.	315.
SUBTOTAL(ENG)	5887.	677.	6564.
MANUFACTURING			
PRODUCTION	-	1187.	1187.
PROTOTYPE	1468.	-	1468.
TOOL-TEST EQ	174.	314.	489.
SUBTOTAL(MFG)	1642.	1501.	3143.
TOTAL COST	7529.	2178.	9707.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.786*	63.851*
DENSITY	0.591*	0.240*
MFG. COMPLEXITY	9.548	7.635
NEW DESIGN	0.700	0.700
DESIGN REPEAT	0.000	0.000
ENGINEERING CHANGES	0.036*	0.015*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.005
PLATFORM	2.500
YEAR OF TECHNOLOGY	1999*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	274855*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 99	(16)	APR 00*	(6)	OCT 00*	(22)
PRODUCTION	NOV 00*	(15)	JAN 02*	(5)	JUN 02*	(20)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	200.57*
AMORTIZED UNIT COST	311.15*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00*
PRODUCTION TOOLING	1.00*
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.900*
UNIT LEARNING CURVE	0.906*

--- PRICE HARDWARE MODEL METRIC ---
HARDWARE SOFTWARE INTEGRATION

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV - DMS/GN&C INTEGRATION

MODE 52

LANGUAGE	Ada	SOURCE CODE	123000	NON-EXECUTABLE SLOC	0.01
APPLICATION	10.95			MGMT COMPLEXITY	1.00

PROGRAM COST($ 1000)	DEVELOPMENT
ENGINEERING	
DRAFTING	656.
DESIGN	5546.
SYSTEMS	1155.
PROJECT MGMT	868.
DATA	433.
TOTAL COST	8657.

SCHEDULE	START		END
DEVELOPMENT	JAN 99	(30)	JUN 01*

SUPPLEMENTAL INFORMATION

ECONOMIC BASE	199*		
ESCALATION	0.00	DEV COST MULTIPLIER	1.00*

--- PRICE HARDWARE MODEL METRIC ---
MECHANICAL ITEM

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV-AEROBRAKE INTEGRATION

PRODUCTION QUANTITY	10	UNIT WEIGHT	66.93	MODE	2
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	278.56	QUANTITY/NHA	0

UNIT PROD COST 719.20 MONTHLY PROD RATE 1.22

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	1664.	191.	1854.
DESIGN	5720.	896.	6616.
SYSTEMS	727.	-	727.
PROJECT MGMT	714.	860.	1574.
DATA	253.	895.	1148.
SUBTOTAL(ENG)	9077.	2842.	11919.
MANUFACTURING			
PRODUCTION	-	7192.	7192.
PROTOTYPE	3627.	-	3627.
TOOL-TEST EQ	400.	2308.	2708.
SUBTOTAL(MFG)	4027.	9500.	13527.
TOTAL COST	13104.	12342.	25446.

DESIGN FACTORS	MECHANICAL
WEIGHT	66.932*
DENSITY	0.240*
MFG. COMPLEXITY	9.207
NEW DESIGN	0.700
DESIGN REPEAT	0.000
ENGINEERING CHANGES	0.027*
INTEGRATION LEVEL	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
PLATFORM	2.500
YEAR OF TECHNOLOGY	1999*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	10735*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 99	(23)	NOV 00*	(6)	MAY 01*	(29)
PRODUCTION	JUN 01*	(21)	FEB 03*	(8)	OCT 03*	(29)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	956.53*
AMORTIZED UNIT COST	1234.21*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00*
PRODUCTION TOOLING	1.00*
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.900*
UNIT LEARNING CURVE	0.873*

- - - PRICE HARDWARE MODEL METRIC - - -
INTEGRATION AND TEST

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

OTV INTEGRATION

PRODUCTION QUANTITY	10	INT WEIGHT	313.152*	MODE	5
PROTOTYPE QUANTITY	7.000	INT VOLUME	1287.820*	QUANTITY/NHA	0

UNIT PROD COST 1086.97 MONTHLY PROD RATE 0.84

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	4081.	383.	4465.
DESIGN	14818.	1597.	16416.
SYSTEMS	1705.	-	1705.
PROJECT MGMT	2063.	1254.	3317.
DATA	643.	1305.	1948.
SUBTOTAL(ENG)	23311.	4540.	27850.
MANUFACTURING			
PRODUCTION	-	10870.	10870.
PROTOTYPE	12709.	-	12709.
TOOL-TEST EQ	1445.	2651.	4096.
SUBTOTAL(MFG)	14154.	13521.	27674.
TOTAL COST	37464.	18060.	55525.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	3.715*	309.437*
DENSITY	0.561*	0.240*
MFG. COMPLEXITY	9.657*	8.199*
NEW PLANS LEVEL	0.700	0.700
ENGINEERING CHANGES	0.035*	0.017*
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000*
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.005
PLATFORM	2.500
YEAR OF TECHNOLOGY	1999*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	61948*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 99	(22)	OCT 00*	(10)	AUG 01*	(32)
PRODUCTION	SEP 01*	(22)	JUN 03*	(10)	APR 04*	(32)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
AMORTIZED UNIT COST	1806.05*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00*
PRODUCTION TOOLING	1.00*

- - - PRICE HARDWARE MODEL METRIC - - -
SYSTEM COST SUMMARY

INPUT FILENAME: OTVSYS 17-OCT-88 13:57
(188225)

TOTAL COST, WITH INTEGRATION COST

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	100404.	7172.	107576.
DESIGN	394294.	31745.	426039.
SYSTEMS	79324.	-	79324.
PROJ MGMT	130094.	70457.	200551.
DATA	42407.	73173.	115580.
SUBTOTAL(ENG)	746523.	182546.	929070.
MANUFACTURING			
PRODUCTION	-	721074.	721074.
PROTOTYPE	602082.	-	602082.
TOOL-TEST EQ	98877.	144182.	243059.
PURCH ITEMS	0.	0.	0.
SUBTOTAL(MFG)	700959.	865256.	1566215.
TOTAL COST	1447482.	1047803.	2495284.

THRU-PUT COSTS	DEVELOPMENT	PRODUCTION	TOTAL COST
FIELD SUPPORT	0.	0.	0.
FIELD TEST	0.	0.	0.
SOFTWARE	16380.	10920.	27300.
OTHER	0.	0.	0.
TOTAL THRU-PUT COST	16380.	10920.	27300.

TOTAL COST, WITH THRU-PUT COSTS

DEVELOPMENT	PRODUCTION	TOTAL COST
1463862.	1058723.	2522584.

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LANPAD 13-OCT-88 12:26
(188012)

LANDING PAD - MARKERS

PRODUCTION QUANTITY	8	UNIT WEIGHT	10.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	25.00	QUANTITY/NHA	1

UNIT PROD COST 24.15 MONTHLY PROD RATE 1.77

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	145.	15.	160.
DESIGN	504.	55.	559.
SYSTEMS	62.	-	62.
PROJECT MGMT	53.	25.	77.
DATA	20.	12.	32.
SUBTOTAL(ENG)	783.	107.	890.
MANUFACTURING			
PRODUCTION	-	193.	193.
PROTOTYPE	126.	-	126.
TOOL-TEST EQ	18.	27.	45.
SUBTOTAL(MFG)	144.	220.	364.
TOTAL COST	927.	327.	1254.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	0.200*	9.800
DENSITY	40.000	0.392*
MFG. COMPLEXITY	9.560	7.000
NEW DESIGN	1.000	0.500
DESIGN REPEAT	0.000	0.000
ENGINEERING CHANGES	0.079*	0.027*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	1611339*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(10)	OCT 95*	(3)	JAN 96*	(13)
PRODUCTION	JAN 00	(9)	SEP 00*	(4)	JAN 01*	(13)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	28.66*
AMORTIZED UNIT COST	40.88*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.945*
UNIT LEARNING CURVE	0.912*

- - - PRICE HARDWARE MODEL METRIC - - -
ELECTRONIC ITEM

INPUT FILENAME: LANPAD 13-OCT-88 12:26
(188012)

LANDING PAD - ELECTRIC CORD POWER SUPPLY

PRODUCTION QUANTITY	1	UNIT WEIGHT	820.00	MODE	1
PROTOTYPE QUANTITY	2.500	UNIT VOLUME	3080.00	QUANTITY/NHA	1

UNIT PROD COST 2385.00 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	5305.	572.	5877.
DESIGN	18245.	2263.	20508.
SYSTEMS	2293.	-	2293.
PROJECT MGMT	2092.	575.	2667.
DATA	770.	288.	1058.
SUBTOTAL(ENG)	28705.	3698.	32403.
MANUFACTURING			
PRODUCTION	-	2385.	2385.
PROTOTYPE	9371.	-	9371.
TOOL-TEST EQ	1134.	204.	1338.
SUBTOTAL(MFG)	10505.	2589.	13094.
TOTAL COST	39210.	6287.	45497.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	16.400*	803.600
DENSITY	40.000	0.261*
MFG. COMPLEXITY	9.560	7.800
NEW DESIGN	1.000	1.000
DESIGN REPEAT	0.000	0.150
ENGINEERING CHANGES	0.070*	0.032*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	21461*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(23)	NOV 96*	(5)	APR 97*	(28)
PRODUCTION	JAN 00	(24)	DEC 01*	(0)	DEC 01*	(24)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	2383.71*
AMORTIZED UNIT COST	6287.26*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.919*

--- PRICE HARDWARE MODEL METRIC ---
ELECTRONIC ITEM

INPUT FILENAME: LANPAD 13-OCT-88 12:26
(188012)

LANDING PAD - PROPELLANT REFILL VEHICLE

PRODUCTION QUANTITY	1	UNIT WEIGHT	14000.00	MODE	1
PROTOTYPE QUANTITY	2.500	UNIT VOLUME	15000.00	QUANTITY/NHA	1

UNIT PROD COST32835.78 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	40974.	4218.	45192.
DESIGN	140995.	15734.	156729.
SYSTEMS	17704.	-	17704.
PROJECT MGMT	18801.	5897.	24698.
DATA	6464.	2958.	9423.
SUBTOTAL(ENG)	224938.	28808.	253745.
MANUFACTURING			
PRODUCTION	-	32836.	32836.
PROTOTYPE	131799.	-	131799.
TOOL-TEST EQ	15326.	2853.	18179.
SUBTOTAL(MFG)	147126.	35688.	182814.
TOTAL COST	372064.	64496.	436560.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	279.999*	13719.998
DENSITY	40.000	0.915*
MFG. COMPLEXITY	9.560	7.960
NEW DESIGN	1.000	1.000
DESIGN REPEAT	0.000	0.150
ENGINEERING CHANGES	0.048*	0.023*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF(FIELD)	1330*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(41)	MAY 98*	(9)	FEB 99*	(50)
PRODUCTION	JAN 00	(39)	MAR 03*	(0)	MAR 03*	(39)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	32816.48*
AMORTIZED UNIT COST	64495.96*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.914*

--- PRICE HARDWARE MODEL METRIC ---
ELECTRONIC ITEM

INPUT FILENAME: LANPAD 13-OCT-88 12:26
(188012)

LANDING PAD - TRANSFER TUNNEL

PRODUCTION QUANTITY	1	UNIT WEIGHT	2780.00	MODE	1
PROTOTYPE QUANTITY	3.000	UNIT VOLUME	41999.99	QUANTITY/NHA	1

UNIT PROD COST15473.66 MONTHLY PROD RATE 0.00

PROGRAM COST($ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	16618.	1994.	18612.
DESIGN	58611.	9584.	68195.
SYSTEMS	6992.	-	6992.
PROJECT MGMT	8279.	2981.	11260.
DATA	2685.	1494.	4179.
SUBTOTAL (ENG)	93185.	16054.	109239.
MANUFACTURING			
PRODUCTION	-	15474.	15474.
PROTOTYPE	67776.	-	67776.
TOOL-TEST EQ	8185.	1401.	9585.
SUBTOTAL (MFG)	75961.	16874.	92835.
TOTAL COST	169145.	32928.	202073.

DESIGN FACTORS	ELECTRONIC	MECHANICAL
WEIGHT	55.600*	2724.399
DENSITY	13.238	0.065*
MFG. COMPLEXITY	9.960	8.610
NEW DESIGN	1.000	1.000
DESIGN REPEAT	0.150	0.150
ENGINEERING CHANGES	0.059*	0.032*
HW/SW INTEG. LEVEL	0.000	
INTEGRATION LEVEL	0.000	0.000

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
ELECT VOL FRACTION	0.000*
PLATFORM	2.000
YEAR OF TECHNOLOGY	1995*
RELIABILITY FACTOR	1.0
MTBF (FIELD)	7291*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	JAN 95	(34)	OCT 97*	(9)	JUL 98*	(43)
PRODUCTION	JAN 00	(35)	NOV 02*	(0)	NOV 02*	(35)

SUPPLEMENTAL INFORMATION	
ECONOMIC BASE	188
ESCALATION	0.00
T-1 COST	15464.42*
AMORTIZED UNIT COST	32927.98*
DEV COST MULTIPLIER	1.00*
PROD COST MULTIPLIER	1.00*

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00
PRODUCTION TOOLING	1.00
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	1.000*
UNIT LEARNING CURVE	0.913*