

**U.S. ATLAS E.T.C.
Cost Book**

Funding Source: All

Funding Type: All

Institutions: All

U.S. Atlas Cost Book

2/24/00 4:56:58 PM

WBS Number: _____ **Description:** _____

Institution : _____ **Contact:** _____

COST SUMMARY: (Project)	Base	Cont	Cont	Total	EDIA	Mfg	EDIA	Mfg	FTEs	FTEs
	Cost	Cost		Cost	Labor	Labor	Matls	Matls	Project	Other
	(k\$)	(k\$)	%	(k\$)	(k\$)	(k\$)	(k\$)	(k\$)		

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
		0	0	0	0	0	0	0

WBS Number: 1.1.1.2

Description: Sensors

Institution :

Contact:

This estimate covers the US contribution to the ATLAS pixel detectors/sensors. We assume that detector procurement will be shared among the collaborating institutions via a common procurement or procurements, with the US providing about 20% of the total cost. In addition, the US will participate in the design and testing of the detectors, as described below. In addition, prototype detectors will be procured.

Details of Estimate: This estimate covers the US contribution to the ATLAS pixel detectors. We assume that detector procurement will be shared among the collaborating institutions via a common procurement or procurements, with the US providing about 20% of the total cost. In addition, the US will participate in the design and testing of the detectors, as described later. The number of sensor wafers required comes from the assembly yield spreadsheet.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	675	149	22	824	49	33	0	593	2.4	0.5

MANPOWER SUMMARY:	S.W.						Admin. Other		Contract		Tech.		Total w/ overhead (k\$)
	Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Super. (hrs)	Admin. (hrs)	Labor (hrs)	Shops (hrs)	Serv. (hrs)	Student (hrs)	
MFG P	0	0	0	0	0	0	0	0	0	0	0	3045	33.456
EDIA P	0	1118	0	0	0	0	0	0	0	0	0	0	49.134
EDIA B/I	0	880	0	0	0	0	0	0	0	0	0	0	38.675
	0	1998	0	0	0	0	0	0	0	0	0	3045	121.265

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	572	0	0	9	0	0.0	592.905
	572	0	0	9	0	0.0	592.905

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	168	245	301	0	0	0	714

WBS Number: 1.1.1.2.1

Description: Design/Engineering

Institution :

Contact:

This includes all phases of the design/testing activity and includes the cost of engineering labor.

Details of Estimate: This includes all phases of the design/testing activity and includes the cost of engineering labor.

COST SUMMARY:	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
(Project)	49	5	10	54	49	0	0	0	0.6	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
EDIA P	0	1118	0	0	0	0	0	0	0	0	0	0	49.134
	0	1118	0	0	0	0	0	0	0	0	0	0	49.134

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	49	0	0	0	0	0	49

WBS Number: 1.1.1.2.1.1

Description: Prototype design

Institution :

Contact:

This includes the design of prototype structures, single chip detectors and module arrays.

Details of Estimate: This includes the design of prototype structures, single chip detectors and module arrays.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

WBS Number: 1.1.1.2.1.1.1 **Description:** Design - New Mexico

Institution : U. of New Mexico

Contact:

The engineering design at UNM from physicists Grant Gorfine and Sally Seidel.

Basis of Estimate: Physicist estimate

Details of Estimate: The engineering design at UNM will be 110 mandays from physicists Grant Gorfine and Sally Seidel. This will be supported by New Mexico internal funds.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	4	4	4	4	2	1	1	20

WBS Number: 1.1.1.2.1.2

Description: Production design

Institution :

Contact:

This includes the design of production test structures, single chip detectors for testing, and full module arrays.

Details of Estimate: This includes the design of production test structures, single chip detectors for testing, and full module arrays.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

WBS Number: 1.1.1.2.1.2.1 **Description:** Design - New Mexico

Institution : U. of New Mexico

Contact:

The engineering design at UNM.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	4	4	4	4	2	1	1	20

WBS Number: 1.1.1.2.1.3

Description: Test design

Institution :

Contact:

This includes the engineering design needed for test fixtures, equipment procurement and assembly of test stations.

Details of Estimate: This includes the engineering design needed for test fixtures, equipment procurement and assembly of test stations.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	49	5	10	54	49	0	0	0	0.6	0.0

MANPOWER SUMMARY:	S.W.						Admin. Super.	Other Admin.	Contract Labor	Tech. Serv.		Student	Total w/ overhead (k\$)
	Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	
EDIA P	0	1118	0	0	0	0	0	0	0	0	0	0	49.134
	0	1118	0	0	0	0	0	0	0	0	0	0	49.134

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	49	0	0	0	0	0	49

WBS Number: 1.1.1.2.1.3.1 **Description:** Design - New Mexico

Institution : U. of New Mexico

Contact:

The engineering design at UNM from Martin Hoferkamp and additional time from physicists at UNM.

Details of Estimate: The engineering design from Martin Hoferkamp. Additional time from physicists at UNM. This includes 30K in FY00 from BCP.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	49	5	10	54	49	0	0	0	0.6	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)		EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
EDIA P	0	1118	0	0	0	0	0	0	0	0	0	0	0	49.135
	0	1118	0	0	0	0	0	0	0	0	0	0	0	49.134

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	4	2	2	2	1	1	1	10

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	49	0	0	0	0	0	49

WBS Number: 1.1.1.2.2

Description: Development and Prototypes

Institution :

Contact:

This includes the procurement of prototype detectors, testing equipment and fixtures and technical labor needed for testing.

Details of Estimate: This includes the procurement of prototype detectors, testing equipment and fixtures and technical labor needed for testing.

COST SUMMARY:	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
(Project)	45	13	30	58	0	12	0	33	0.6	0.5

MANPOWER SUMMARY:	S.W.						Admin. Super.	Other Admin.	Contract Labor	Tech. Serv.		Student	Total w/ overhead (k\$)
	Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	
MFG P	0	0	0	0	0	0	0	0	0	0	0	1125	12.361
EDIA B/I	0	880	0	0	0	0	0	0	0	0	0	0	38.675
	0	880	0	0	0	0	0	0	0	0	0	1125	51.036

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	29	0	0	0	0	0.0	32.569
	29	0	0	0	0	0.0	32.569

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	45	19	19	0	0	0	84

WBS Number: 1.1.1.2.2.1

Description: Prototype Orders

Institution :

Contact:

Prototype orders will include test structures, single chip detectors and full-size module arrays.

Details of Estimate: Prototype orders will include test structures, single chip detectors and full-size module arrays.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	16	3	20	19	0	0	0	16	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	16	0	0	0	0	0.0	16.000
	16	0	0	0	0	0.0	16.000

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	16	0	0	0	0	0	16

WBS Number: 1.1.1.2.2.1.1

Description: First full-size prototypes

Institution : SUNY at Albany

Contact:

The first prototype wafers were ordered from CIS in Germany and Seiko in Japan. Ten wafers(3 of which are double metal) were ordered from each vendor. The US contribution to the purchase of the first prototypes was \$20K from ATLAS funds at Albany.

Basis of Estimate: Actual price

Details of Estimate: The first prototype wafers were ordered from CIS in Germany and Seiko in Japan. Ten wafers(3 of which are double metal) were ordered from each vendor. The US contribution to the purchase of the first prototypes was \$20K from ATLAS funds at Albany.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	1	0	0	0

WBS Number: 1.1.1.2.2.1.2 **Description:** Second full-size prototypes

Institution : SUNY at Albany

Contact:

The cost of the second prototype order. The US contribution is fixed.

Basis of Estimate: Physicist estimate

Details of Estimate: The cost of the second prototype order. The US contribution to this is \$20K at Albany.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	16	3	20	19	0	0	0	16	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	16	0	0	0	0	0.0	16.000
	16	0	0	0	0	0.0	16.000

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	4	4	4	4	2	1	1	20

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	16	0	0	0	0	0	16

WBS Number: 1.1.1.2.2.2

Description: Testing of prototypes

Institution :

Contact:

This covers equipment, fixtures and testing technical labor (but not physicist labor) associated with testing the detectors.

Details of Estimate: This covers equipment, fixtures and testing technical labor (but not physicist labor) associated with testing the detectors.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	29	10	35	39	0	12	0	17	0.6	0.5

MANPOWER SUMMARY:	S.W.						Admin. Super.	Other Admin.	Contract Labor	Tech. Serv.		Student	Total w/ overhead (k\$)
	Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	
MFG P	0	0	0	0	0	0	0	0	0	0	0	1125	12.361
EDIA B/I	0	880	0	0	0	0	0	0	0	0	0	0	38.675
	0	880	0	0	0	0	0	0	0	0	0	1125	51.036

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	13	0	0	0	0	0.0	16.569
	13	0	0	0	0	0.0	16.569

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	29	19	19	0	0	0	68

WBS Number: 1.1.1.2.2.2.2 **Description:** Testing of prototypes at UNM

Institution : U. of New Mexico

Contact:

This covers equipment and technical labor for testing.

Details of Estimate: This covers equipment and technical labor for testing.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
		29	10	35	39	0	12	0	17	0.6

MANPOWER SUMMARY:	S.W.		ME	Design	ET	MT	Admin.	Other	Contract	Tech. Serv.	Student	Total w/ overhead (k\$)
	Prof	EE					Super.	Admin.	Labor			
MFG P	0	0	0	0	0	0	0	0	0	0	1125	12.361
EDIA B/I	0	880	0	0	0	0	0	0	0	0	0	38.675
	0	880	0	0	0	0	0	0	0	0	1125	51.036

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
	13	0	0	0	0	0.0	16.569

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
		0	0	0	0	29	19	19	0	0	0

WBS Number: 1.1.1.2.2.2.2.1 **Description:** Equipment for testing of prototypes at New Mexico

Institution : U. of New Mexico

Contact:

Equipment and fixtures needed for prototype tests at New Mexico.

Details of Estimate: Equipment and fixtures needed for prototype tests at New Mexico is estimated to cost \$25K.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	17	5	32	22	0	0	0	17	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	13	0	0	0	0	0.0	16.569
	13	0	0	0	0	0.0	16.569

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	8	8	4	8	2	1	0	32

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	17	0	0	0	0	0	17

WBS Number: 1.1.1.2.2.2.2.2 **Description:** Labor for testing of prototypes at New Mexico

Institution : U. of New Mexico

Contact:

This covers supervisory and junior technical labor.

Details of Estimate: This covers supervisory and junior technical labor.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	12	5	40	17	0	12	0	0	0.6	0.5

MANPOWER SUMMARY:	S.W.						Admin. Super.	Other Admin.	Contract Labor	Tech. Serv.		Student	Total w/ overhead (k\$)
	Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	(hrs)	(hrs)	(hrs)	Shops (hrs)	(hrs)	(hrs)	
MFG P	0	0	0	0	0	0	0	0	0	0	0	1125	12.361
EDIA B/I	0	880	0	0	0	0	0	0	0	0	0	0	38.675
	0	880	0	0	0	0	0	0	0	0	0	1125	51.036

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	12	19	19	0	0	0	51

WBS Number: 1.1.1.2.2.2.2.2.1 **Description:** Supervision

Institution : U. of New Mexico

Contact:

Supervision will be required.

Basis of Estimate: Physicist estimate

Details of Estimate: We estimate that 110 mandays of supervision from a senior technician will be required.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.5

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
EDIA B/I	0	880	0	0	0	0	0	0	0	0	0	0	38.675
	0	880	0	0	0	0	0	0	0	0	0	0	38.675

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	4	4	4	8	2	1	1	24

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	19	19	0	0	0	39

WBS Number: 1.1.1.2.2.2.2.2.2 **Description:** Tech/student labor for testing of prototypes at Ne

Institution : U. of New Mexico

Contact:

Students will be needed for testing prototypes.

Basis of Estimate: Physicist estimate

Details of Estimate: We estimate that 440 mandays of students will be needed for testing prototypes.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	12	5	40	17	0	12	0	0	0.6	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	0	0	0	0	0	0	1125	12.361
	0	0	0	0	0	0	0	0	0	0	0	1125	12.361

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	8	8	8	8	2	1	1	40

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	12	0	0	0	0	0	12

WBS Number: 1.1.1.2.3

Description: Production

Institution :

Contact: Not available

Preproduction and production fabrication and testing

Details of Estimate: The number of production wafers follows from the yield spreadsheet.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	581	131	22	712	0	21	0	560	1.1	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	0	0	0	0	0	0	1920	21.095
	0	0	0	0	0	0	0	0	0	0	0	1920	21.095

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	543	0	0	9	0	0.0	560.336
	543	0	0	9	0	0.0	560.336

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	74	226	282	0	0	0	581

WBS Number: 1.1.1.2.3.1

Description: Layers 1/2 and Disks and B-layer

Institution :

Contact: Not available

Preproduction and production for barrel layers 1 and 2 and for disks and B-layer. B-layer will be broken out later as cost differences are better known.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	581	131	22	712	0	21	0	560	1.1	0.0

MANPOWER SUMMARY:	S.W.						Admin. Super.	Other Admin.	Contract Labor	Tech.		Total w/ overhead (k\$)	
	Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	(hrs)	(hrs)	(hrs)	Shops (hrs)	Serv. (hrs)	Student (hrs)	
MFG P	0	0	0	0	0	0	0	0	0	0	0	1920	21.095
	0	0	0	0	0	0	0	0	0	0	0	1920	21.095

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	543	0	0	9	0	0.0	560.336
	543	0	0	9	0	0.0	560.336

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	74	226	282	0	0	0	581

WBS Number: 1.1.1.2.3.1.1 **Description:** Preproduction

Institution : **Contact:** Not available

Preproduction fabrication costs. These are split among institutions as shown at lower levels.

Basis of Estimate: Level of Effort

Details of Estimate: Funds are taken as fixed contribution to prototypes in FY00. These funds were provided by BCP in FY00.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	73	0	0	73	0	0	0	73	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	57	0	0	9	0	0.0	72.776
	57	0	0	9	0	0.0	72.776

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	73	0	0	0	0	0	73

WBS Number: 1.1.1.2.3.1.1.1

Description: Preproduction costs - Albany

Institution : SUNY at Albany

Contact: Not available

Albany funded fabrication

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	43	0	0	43	0	0	0	43	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	43	0	0	0	0	0.0	43.350
	43	0	0	0	0	0.0	43.350

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	43	0	0	0	0	0	43

WBS Number: 1.1.1.2.3.1.1.2 **Description:** Preproduction - Ohio State

Institution : Ohio State U.

Contact: Not available

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	20	0	0	20	0	0	0	20	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	14	0	0	0	0	0.0	20.206
	14	0	0	0	0	0.0	20.206

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	20	0	0	0	0	0	20

WBS Number: 1.1.1.2.3.1.1.3

Description: Preproduction - Oklahoma

Institution : U. of Oklahoma

Contact: Not available

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	9	0	0	9	0	0	0	9	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	0	0	0	9	0	0.0	9.220
	0	0	0	9	0	0.0	9.220

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	9	0	0	0	0	0	9

WBS Number: 1.1.1.2.3.1.2 **Description:** Production

Institution : SUNY at Albany

Contact: Not available

Production fabrication costs.

Basis of Estimate: Vendor quotation

Details of Estimate: The price per wafer can be estimated either from the 1999 ATLAS Price Enquiry (4 manufacturers provided estimates ranging from \$2141 to \$6273 per wafer) or from the quotations provided to a similar experiment (2 vendors who also provided ATLAS Second Prototype sensors provided quotations that average to \$1940 per wafer. On the basis of these numbers we estimate a cost of \$2000 per wafer.

Layers 1 and 2 and the disks require 1980 tiles. Assuming 83% yield on sensors and 75% yield on modules, we estimate that we require 3160 tiles. At 3 tiles per wafer this predicts 1054 wafers for Layers 1 and 2 and the disks.

The B Layer requires 273 tiles. Assuming 83% yield on sensors and 75% yield on modules, we estimate that we require 436 tiles. At 3 tiles per wafer this predicts 146 wafers. We assume for now that the B-layer costs are the same.

The total cost of 1054 wafers for Layers 1 and 2 and the disks at \$2000 per wafer is \$2,108,000. If the US purchases 20% of the wafers, the cost to the US is \$421,600.

The total cost of 146 wafers for the B Layer at \$2000 per wafer is \$292,000. If the US purchases 20% of the wafers, the cost to the US is \$58,400.

For the materials estimate, we assume that the following fraction of wafers for Layers 1, 2, and the disks are fabricated in FY01 and FY02 in equal amounts. We assume that all of the B Layer wafers are fabricated in FY02.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	480	125	26	605	0	0	0	480	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	480	0	0	0	0	0.0	480.000
	480	0	0	0	0	0.0	480.000

Units	Unit Cost
240	2000

CONTINGENCY FACTORS:	Risk				Weight			Cont %
	Technical	Cost	Schedule	Design	Technical	Cost	Schedule	
	6	2	8	4	2	1	1	26

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	211	269	0	0	0	480

WBS Number: 1.1.1.2.3.1.3 **Description:** Testing

Institution : U. of New Mexico

Contact: Not available

Preproduction and production testing equipment and labor.

Basis of Estimate: Physicist estimate

Details of Estimate: We assume that the US will test 20% of wafers for Layers 1 and 2, the disks, and the B Layer. The total number of wafers is estimated to be 1054 for Layers 1 and 2 and the disks and 146 wafers for the B Layer. The total number of wafers consequently is 1200, so the US will test 240 wafers. The cost of equipment and materials and supplies is based on experience from testing production quantities of wafers for similar experiments (e.g., CDF SVXII). Specific equipment, material, and supply needs at each institution at which testing will occur are listed below:
 wafer storage: \$2000
 probestation maintenance: \$2000
 miscellaneous supplies: \$2000
 Consequently the total cost per institution (excluding overhead charges) is about \$6000.

Labor costs are derived by multiplying the number of wafers to be tested by the predicted time required to test each wafer. The time required to probe a wafer must cover a range whose low end is the time required by an experienced prober (where experience has been gained on prototypes and on studies of similar devices used for similar applications (e.g., CDF SVXII) and whose high end accounts both for the time needed by a less experienced prober and for multiple measurements of the same device at different institutes, for calibration purposes. We consequently use 1 person-day as our estimator. The total time required to probe 240 wafers is consequently 240 person-days. We take this to also include preproduction testing.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	29	6	20	34	0	21	0	8	1.1	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	0	0	0	0	0	0	1920	21.095
	0	0	0	0	0	0	0	0	0	0	0	1920	21.095

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	6	0	0	0	0	0.0	7.560
	6	0	0	0	0	0.0	7.560

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i g n	Technical	C o s t	Schedule	
	2	4	8	4	2	1	1	20

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	1	15	12	0	0	0	29

WBS Number: 1.1.1.3

Description: Electronics

Institution :

Contact:

This covers the US contribution to the design, prototype fabrication and testing, production and final testing of the pixel array ICs. The total number of required array ICs is 37376. Of these, 4000 are for a "small" chip of 24 x 132 pixels and the remainder are "large" chips with 24 x 160 pixels. The present die size for the large chip is assumed to be 7.4 x 10.2 mm = 75.5 mm². For purposes of this estimate, we neglect the differences in cost arising from the smaller size die. Wafer numbers are given later.

Details of Estimate: This covers the US contribution to the design, prototype fabrication and testing, production and final testing of the pixel array ICs. The total number of required array ICs is 37376. Of these, 4000 are for a "small" chip of 24 x 132 pixels and the remainder are "large" chips with 24 x 160 pixels. The present die size for the large chip is assumed to be 7.4 x 10.2 mm = 75.5 mm². For purposes of this estimate, we neglect the differences in cost arising from the smaller size die. Wafer numbers are given later.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	2680	1713	64	4393	119	73	0	2487	3.0	0.9

MANPOWER SUMMARY:	S.W.		Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)	
Prof (hrs)	EE (hrs)	ME (hrs)										
MFG P	0	0	0	0	0	0	0	3056	0	0	480	72.988
EDIA P	0	1680	0	0	0	0	0	0	0	0	0	119.194
EDIA B/I	0	1600	0	0	0	0	0	0	0	0	0	168.095
	0	3280	0	0	0	0	0	3056	0	0	480	360.277

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	394	0	0	0	0	1905.1	2487.425
	394	0	0	0	0	1905.1	2487.425

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	673	783	1392	0	0	0	2848

WBS Number: 1.1.1.3.1

Description: Design/Engineering

Institution :

Contact:

This covers the engineering design in the US for the pixel array readout chip. This design time amounts to about 40% of the total design effort, the remainder coming from Europe. This does not include the engineering design of the Module Clock and Control chip (to be done entirely in Europe) or other chips that are located on data/control hybrids on each barrel ladder or disk sector.

Details of Estimate: This covers the engineering design in the US for the pixel array readout chip. This does not include the engineering design of the Module Clock and Control chip (to be done entirely in Europe) or other chips that are located on data/control hybrids on each barrel ladder or disk sector.

COST SUMMARY:	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
(Project)	119	15	13	134	119	0	0	0	1.0	0.9

MANPOWER SUMMARY:	S.W.		Design				Admin. Other		Contract		Tech.		Total w/ overhead (k\$)
	Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Super. (hrs)	Admin. (hrs)	Labor (hrs)	Shops (hrs)	Serv. (hrs)	Student (hrs)	
EDIA P	0	1680	0	0	0	0	0	0	0	0	0	0	119.194
EDIA B/I	0	1600	0	0	0	0	0	0	0	0	0	0	168.095
	0	3280	0	0	0	0	0	0	0	0	0	0	287.289

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	237	50	0	0	0	0	287

WBS Number: 1.1.1.3.1.1

Description: Prototype design

Institution :

Contact:

This covers the engineering design of prototype chips in FY1996-FY2000.

Details of Estimate: This covers the engineering design of prototype chips in FY1996-FY2000.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	57	0	0	57	57	0	0	0	0.5	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
EDIA P	0	800	0	0	0	0	0	0	0	0	0	0	56.759
	0	800	0	0	0	0	0	0	0	0	0	0	56.759

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	57	0	0	0	0	0	57

WBS Number: 1.1.1.3.1.1.1

Description: Design - LBNL

Institution :

Contact:

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	57	0	0	57	57	0	0	0	0.5	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
EDIA P	0	800	0	0	0	0	0	0	0	0	0	0	56.759
	0	800	0	0	0	0	0	0	0	0	0	0	56.759

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	57	0	0	0	0	0	57

WBS Number: 1.1.1.3.1.1.1.1 **Description:** Senior Engineering

Institution : LBNL/UC- Senior

Contact:

Senior IC engineering will be needed to produce the two major prototype submissions(referred to in the following as ATLAS1 and ATLAS2) and the associated test chips over a period of roughly two years.

Basis of Estimate: Physicist estimate

Details of Estimate: We estimate that a total of 600 mandays of senior IC engineering will be needed to produce the two major prototype submissions and the associated test chips (referred to in the following as ATLAS1 and ATLAS2) over a period of roughly two years. Supported by LBNL internal funds.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	8	4	8	8	2	1	1	36

WBS Number: 1.1.1.3.1.1.1.2 **Description:** Junior Engineering

Institution : LBNL/UC-Junior

Contact:

Junior IC engineering will be needed to produce the two major prototype submissions (referred to in the following as ATLAS1 and ATLAS2) and the associated test chipover a period of roughly two years.

Basis of Estimate: Physicist estimate

Details of Estimate: We estimate that a total of 1280 mandays of junior IC engineering will be needed to produce the two major prototype submissions and the associated test chips (referred to in the following as ATLAS1 and ATLAS2) over a period of roughly two years. Most of this will be supported by internal funds and we assume here a fixed level(no contingency) support from the project.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	57	0	0	57	57	0	0	0	0.5	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)		EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Tech. Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
EDIA P	0	800	0	0	0	0	0	0	0	0	0	0	0	56.759
	0	800	0	0	0	0	0	0	0	0	0	0	0	56.759

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i g n	Technical	C o s t	Schedule	
	0	0	0	0	2	1	1	0

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	57	0	0	0	0	0	57

WBS Number: 1.1.1.3.1.2

Description: Production design

Institution :

Contact:

This covers the production design of the array chip. Much of the design work will have been done during the prototyping stage.

Details of Estimate: This covers the production design of the array chip. Much of the design work will have been done during the prototyping stage.

COST SUMMARY:	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
(Project)	0	0	0	0	0	0	0	0	0.0	0.4

MANPOWER SUMMARY:	S.W.							Admin.	Other	Contract	Tech.		Total w/ overhead (k\$)
	Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Super. (hrs)	Admin. (hrs)	Labor (hrs)	Shops (hrs)	Serv. (hrs)	Student (hrs)	
EDIA B/I	0	640	0	0	0	0	0	0	0	0	0	0	67.238
	0	640	0	0	0	0	0	0	0	0	0	0	67.238

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	67	0	0	0	0	0	67

WBS Number: 1.1.1.3.1.2.1

Description: Design - LBNL

Institution :

Contact:

COST SUMMARY:	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
(Project)	0	0	0	0	0	0	0	0	0.0	0.4

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
EDIA B/I	0	640	0	0	0	0	0	0	0	0	0	0	67.238
	0	640	0	0	0	0	0	0	0	0	0	0	67.238

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	67	0	0	0	0	0	67

WBS Number: 1.1.1.3.1.2.1.1 **Description:** Senior Engineering

Institution : LBNL/UC- Senior

Contact:

Senior IC engineering will be needed.

Basis of Estimate: Physicist estimate

Details of Estimate: We estimate that 300 mandays of senior IC engineering will be needed. Supported by LBNL internal funds.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.4

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
EDIA B/I	0	640	0	0	0	0	0	0	0	0	0	0	67.238
	0	640	0	0	0	0	0	0	0	0	0	0	67.238

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	8	4	8	8	2	1	1	36

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	67	0	0	0	0	0	67

WBS Number: 1.1.1.3.1.2.1.2 **Description:** Junior Engineering

Institution : LBNL/UC-Junior

Contact:

Junior IC engineering will be needed.

Basis of Estimate: Physicist estimate

Details of Estimate: We estimate that 300 mandays of junior IC engineering will be needed. We estimate that contingency to be 30%. ATLAS funds.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	8	4	8	8	2	1	1	36

WBS Number: 1.1.1.3.1.3 **Description:** Production oversight

Institution : LBNL/UC- Senior **Contact:**

Production oversight will be supplied by LBNL with senior engineering over a two year period. .

Basis of Estimate: Physicist estimate

Details of Estimate: Production oversight will be supplied by LBNL. We estimate that 120 mandays of a senior engineering will be needed over a two year period. Supported by LBNL internal funds.

COST SUMMARY: (Project)	Base Cost	Cont Cost	Cont %	Total Cost	EDIA Labor	Mfg Labor	EDIA Matls	Mfg Matls	FTEs Project	FTEs Other
	(k\$)	(k\$)		(k\$)	(k\$)	(k\$)	(k\$)	(k\$)		
	0	0	0	0	0	0	0	0	0.0	0.5

MANPOWER SUMMARY:	S.W. Prof	EE	ME	Design	ET	MT	Admin. Super.	Other Admin.	Contract Labor	Tech. Shops	Serv.	Student	Total w/ overhead
	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(hrs)	(k\$)
EDIA B/I	0	960	0	0	0	0	0	0	0	0	0	0	100.857
	0	960	0	0	0	0	0	0	0	0	0	0	100.857

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	8	4	8	8	2	1	1	

PROFILE SUMMARY:	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	Total
	(k\$)	(k\$)	(k\$)	(k\$)	(k\$)	(k\$)	(k\$)	(k\$)	(k\$)	(k\$)	(k\$)
	0	0	0	0	50	50	0	0	0	0	101

WBS Number: 1.1.1.3.1.4

Description: Test design

Institution :

Contact:

This covers the engineering design of test boards and the development of test procedures.

Details of Estimate: This covers the engineering design of test boards and the development of test procedures.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	62	15	24	77	62	0	0	0	0.5	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
EDIA P	0	880	0	0	0	0	0	0	0	0	0	0	62.435
	0	880	0	0	0	0	0	0	0	0	0	0	62.435

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	62	0	0	0	0	0	62

WBS Number: 1.1.1.3.1.4.1 **Description:** Senior Engineering

Institution : LBNL/UC- Senior

Contact:

Senior IC engineering will be needed for test design.

Basis of Estimate: Physicist estimate

Details of Estimate: We estimate that 120 mandays of senior IC engineering will be needed. Supported by LBNL internal funds.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	8	4	8	8	2	1	1	36

WBS Number: 1.1.1.3.1.4.2 **Description:** Junior Engineering

Institution : LBNL/UC-Junior

Contact:

Junior IC engineering will be needed for test design.

Basis of Estimate: Physicist estimate

Details of Estimate: We estimate that 880 hrs of junior IC engineering will be needed.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	62	15	24	77	62	0	0	0	0.5	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
EDIA P	0	880	0	0	0	0	0	0	0	0	0	0	62.435
	0	880	0	0	0	0	0	0	0	0	0	0	62.435

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	8	4	8	4	1	1	1	24

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	62	0	0	0	0	0	62

WBS Number: 1.1.1.3.2

Description: Development and Prototypes

Institution :

Contact:

This covers the procurement of prototype chips and the technical labor needed for test board layout, assembly and testing.

Details of Estimate: This covers the procurement of prototype chips and the technical labor needed for test board layout, assembly and testing.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	436	110	25	546	0	0	0	436	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	364	0	0	0	0	0.0	435.765
	364	0	0	0	0	0.0	435.765

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	436	0	0	0	0	0	436

WBS Number: 1.1.1.3.2.1

Description: Rad-soft prototypes

Institution :

Contact:

This covers the fabrication of rad-soft prototypes via MOSIS.

Details of Estimate: This covers the fabrication of rad-soft prototypes via MOSIS.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

WBS Number: 1.1.1.3.2.1.1 **Description:** Front-end test chips

Institution : LBNL/UC- Senior

Contact:

We assume that there are three generations of front-end test chips: (1) late 1996 (completed), 1997 and 1998.

Basis of Estimate: Physicist estimate

Details of Estimate: We assume that there are three generations of front-end test chips: (1) late 1996 (completed), 1997 and 1998. We estimate that each will cost \$6K, assuming the MOSIS cost of \$650/mm², and a die area of 3 x 3 mm. Contingency is taken as \$6K, corresponding to an additional chip submission. Supported by LBL internal funds.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	4	4	8	8	2	1	1	28

WBS Number: 1.1.1.3.2.1.2 **Description:** Digital test chips

Institution : LBNL/UC- Senior

Contact:

We assume there are three generations of digital test chips: 1996 (completed), 1997 and 1998.

Basis of Estimate: Physicist estimate

Details of Estimate: We assume there are three generations of digital test chips: 1996 (completed), 1997 and 1998. We estimate that each chip will cost \$13K, assuming a die area of 2 x 10 mm. Contingency is taken as \$13K, corresponding to an additional chip submission. Supported by internal funds at LBNL.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	4	4	8	8	2	1	1	28

WBS Number: 1.1.1.3.2.1.3

Description: 12x 64 array prototypes

Institution : LBNL/UC- Senior

Contact:

Two generations of 12 x 64 array prototypes have been already fabricated in 1996 and 1997.

Basis of Estimate: Actual price

Details of Estimate: Two generations of 12 x 64 array prototypes have been already fabricated in 1996 and 1997 at a cost of \$61K.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	1	0	0	0

WBS Number: 1.1.1.3.2.1.4 **Description:** ATLAS1 prototypes

Institution : LBNL/UC- Senior

Contact:

This is a wafer scale submission via MOSIS in the HP 0.8 micron process of the first ATLAS specific prototype in 1997 aimed at later Honeywell fabrication.

Basis of Estimate: Vendor quotation

Details of Estimate: This is a wafer scale submission via MOSIS in the HP 0.8 micron process of the first ATLAS specific prototype in 1997 aimed at later Honeywell fabrication. The cost of the HP MOSIS submission is taken to be \$100K including overhead.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

WBS Number: 1.1.1.3.2.1.5 **Description:** ATLAS2 prototypes

Institution : LBNL/UC- Senior

Contact:

We assume 2nd generation prototypes will only be done in rad-hard process.

Details of Estimate: We assume 2nd generation prototypes will only be done in rad-hard process.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	1	0	0	0

WBS Number: 1.1.1.3.2.2

Description: Rad-hard prototypes

Institution :

Contact:

This includes rad-hard prototype fabrication.

Details of Estimate: This includes rad-hard prototype fabrication.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	305	78	26	382	0	0	0	305	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	246	0	0	0	0	0.0	304.543
	246	0	0	0	0	0.0	304.543

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	305	0	0	0	0	0	305

WBS Number: 1.1.1.3.2.2.1 **Description:** Front-end test chips

Institution : LBNL/UC- Senior

Contact:

We have made a shared Honeywell rad-hard run (with SVX3) in Feb. 1997. Additional rad-hard submissions of front-end test chips would be included in the ATLAS1 and ATLAS2 array prototype runs.

Basis of Estimate: Actual price

Details of Estimate: We have made a shared Honeywell rad-hard run (with SVX3) in Feb. 1997 supported by LBNL internal funds. A submission was also made in early 1998 to Honeywell Sol. Additional rad-hard submissions of front-end test chips would be included in the ATLAS1 and ATLAS2 array prototype runs.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	82	0	0	82	0	0	0	82	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	56	0	0	0	0	0.0	81.760
	56	0	0	0	0	0.0	81.760

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	82	0	0	0	0	0	82

WBS Number: 1.1.1.3.2.2.1.1 **Description:** Front-end test chips-LBL

Institution : LBNL/UC- Senior

Contact: Not available

We have made a shared Honeywell rad-hard run (with SVX3) in Feb. 1997. Additional rad-hard submissions of front-end test chips would be included in the ATLAS1 and ATLAS2 array prototype runs.

Basis of Estimate: Actual price

Details of Estimate: We have made a shared Honeywell rad-hard run (with SVX3) in Feb. 1997 supported by LBNL internal funds. A submission was also made in early 1998 to Honeywell Sol. Additional rad-hard submissions of front-end test chips would be included in the ATLAS1 and ATLAS2 array prototype runs.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i g n	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

WBS Number: 1.1.1.3.2.2.1.2 **Description:** Front-end test chips - OSU

Institution : Ohio State U.

Contact: Not available

Funding provided thru OSU to Honeywell

Basis of Estimate: Vendor quotation

Details of Estimate: Vendor quotes. Fixed contribution from project

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	82	0	0	82	0	0	0	82	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	56	0	0	0	0	0.0	81.760
	56	0	0	0	0	0.0	81.760

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	82	0	0	0	0	0	82

WBS Number: 1.1.1.3.2.2.2 **Description:** Digital test chips

Institution : LBNL/UC- Senior

Contact:

Digital rad-hard test chips would be included in the ATLAS1 and ATLAS2 rad-hard array prototype runs.

Details of Estimate: Digital rad-hard test chips would be included in the ATLAS1 and ATLAS2 rad-hard array prototype runs.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	1	0	0	0

WBS Number: 1.1.1.3.2.2.3 **Description:** ATLAS1 prototypes

Institution : LBNL/UC- Senior

Contact:

This includes the US fraction of the cost of the ATLAS1 rad-hard prototypes in the Honeywell and TEMIC technologies.

Basis of Estimate: Parametric estimate

Details of Estimate: This includes the US fraction of the cost of the ATLAS1 rad-hard prototypes in the Honeywell and TEMIC technologies. Our present estimates for 10 wafer prototype runs are \$107K for 10 4" wafers from Honeywell (based on a recent FNAL purchase order). We would contribute a total of \$100K including overhead to the total purchase from both vendors.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	123	64	52	186	0	0	0	123	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	100	0	0	0	0	0.0	122.613
	100	0	0	0	0	0.0	122.613

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	123	0	0	0	0	0	123

WBS Number: 1.1.1.3.2.2.3.1 **Description:** ATLAS1 prototypes-Albany

Institution : SUNY at Albany

Contact: Not available

Contribution to ATLAS1 rad-hard prototypes from Albany

Basis of Estimate: Actual price

Details of Estimate: Fixed contribution from project funds

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	35	18	52	53	0	0	0	35	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	35	0	0	0	0	0.0	35.000
	35	0	0	0	0	0.0	35.000

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	12	8	16	16	1	1	1	52

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	35	0	0	0	0	0	35

WBS Number: 1.1.1.3.2.2.3.2 **Description:** ATLAS1 prototypes - Ohio State

Institution : Ohio State U.

Contact: Not available

Contribution to ATLAS1 rad-hard prototypes

Basis of Estimate: Parametric estimate

Details of Estimate: Estimates from previous projects

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	64	33	52	98	0	0	0	64	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	44	0	0	0	0	0.0	64.240
	44	0	0	0	0	0.0	64.240

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	12	8	16	16	1	1	1	52

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	64	0	0	0	0	0	64

WBS Number: 1.1.1.3.2.2.3.3 **Description:** ATLAS1 prototypes - LBNL

Institution : LBNL/UC- Senior

Contact: Not available

Contribution to ATLAS1 prototypes from LBNL

Basis of Estimate: Parametric estimate

Details of Estimate: Based on previous estimates

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	23	12	52	36	0	0	0	23	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	21	0	0	0	0	0.0	23.373
	21	0	0	0	0	0.0	23.373

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	12	8	16	16	1	1	1	52

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	23	0	0	0	0	0	23

WBS Number: 1.1.1.3.2.2.4 **Description:** ATLAS2 prototypes

Institution : LBNL/UC- Senior

Contact:

This includes the US fraction of the cost of the ATLAS2 rad-hard prototypes in the Honeywell and DMILL technologies.

Basis of Estimate: Physicist estimate

Details of Estimate: This includes the US fraction of the cost of the ATLAS2 rad-hard prototypes in the Honeywell and DMILL technologies. For this cycle, Honeywell would be producing 6" wafers, whose cost we estimate to be about \$15K/wafer. We estimate the US share of these submissions to be \$100K, or about 25% of the total cost. We take the contingency to be 25%. ATLAS funds at LBL.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	100	14	14	114	0	0	0	100	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	90	0	0	0	0	0.0	100.170
	90	0	0	0	0	0.0	100.170

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	2	2	8	0	2	1	1	14

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	100	0	0	0	0	0	100

WBS Number: 1.1.1.3.2.3

Description: Test Equipment/Hardware/Software

Institution :

Contact:

This covers test equipment during the prototype and preproduction phase. Logic analyzers, manual probe stations, automated probe stations and other standard laboratory test equipment already exists or will be provided by LBNL. Funds are needed for test board fabrication, probe cards, misc. hardware and misc. software.

Details of Estimate: This covers test equipment during the prototype and preproduction phase. Logic analyzers, manual probe stations, automated probe stations and other standard laboratory test equipment already exists or will be provided by LBNL. Funds are needed for test board fabrication, probe cards, misc. hardware and misc. software.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	131	33	25	164	0	0	0	131	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	118	0	0	0	0	0.0	131.222
	118	0	0	0	0	0.0	131.222

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	131	0	0	0	0	0	131

WBS Number: 1.1.1.3.2.3.1 **Description:** Equipment/Test Boards

Institution : LBNL/UC- Senior **Contact:**

Testing equipment and test boards

Basis of Estimate: Physicist estimate

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	127	31	24	158	0	0	0	127	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	115	0	0	0	0	0.0	127.438
	115	0	0	0	0	0.0	127.438

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	4	4	8	4	2	1	1	24

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	127	0	0	0	0	0	127

WBS Number: 1.1.1.3.2.3.2 **Description:** Misc. hardware

Institution : LBNL/UC- Senior

Contact:

This covers misc. cables, connectors, etc.

Basis of Estimate: Physicist estimate

Details of Estimate: This covers misc. cables, connectors, etc. We estimate \$1K, with contingency of 50%. ATLAS funds at LBL.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	2	1	52	2	0	0	0	2	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	1	0	0	0	0	0.0	1.558
	1	0	0	0	0	0.0	1.558

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	12	8	8	12	2	1	1	52

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	2	0	0	0	0	0	2

WBS Number: 1.1.1.3.2.3.3 **Description:** Misc. software

Institution : LBNL/UC- Senior

Contact:

This covers miscellaneous software needed for the test system (compilers, etc.).

Basis of Estimate: Physicist estimate

Details of Estimate: This covers miscellaneous software needed for the test system (compilers, etc.). We estimate \$2K, with contingency of 50%. ATLAS funds at LBL.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	2	1	52	3	0	0	0	2	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	2	0	0	0	0	0.0	2.226
	2	0	0	0	0	0.0	2.226

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	12	8	8	12	2	1	1	52

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	2	0	0	0	0	0	2

WBS Number: 1.1.1.3.3

Description: Production

Institution :

Contact: Not available

Front-end IC and optoelectronics preproduction and production and associated testing.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	2125	1588	75	3712	0	73	0	2052	2.0	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	0	0	0	3056	0	0	480	72.988
	0	0	0	0	0	0	0	0	3056	0	0	480	72.988

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	30	0	0	0	0	1905.1	2051.660
	30	0	0	0	0	1905.1	2051.660

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	733	1392	0	0	0	2125

WBS Number: 1.1.1.3.3.1

Description: Front-end ICs

Institution :

Contact: Not available

Preproduction and production and associated testing of front-end ICs

COST SUMMARY:	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
(Project)	2027	1576	78	3603	0	67	0	1959	1.7	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	0	0	0	3056	0	0	0	67.417
	0	0	0	0	0	0	0	0	3056	0	0	0	67.417

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	12	0	0	0	0	1839.1	1959.113
	12	0	0	0	0	1839.1	1959.113

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	650	1376	0	0	0	2027

WBS Number: 1.1.1.3.3.1.1 **Description:** Layers 1/2 and Disks

Institution : **Contact:** Not available

Preproduction and production costs of Layer 1/2 and disk front-end ICs

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	1483	1380	93	2863	0	0	0	1483	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	1401.4	1482.670
	0	0	0	0	0	1401.4	1482.670

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	563	920	0	0	0	1483

WBS Number: 1.1.1.3.3.1.1.1 **Description:** Preproduction

Institution : LBNL/UC- Senior

Contact: Not available

Preproduction costs for Layers 1/2 and disks

Basis of Estimate: Vendor quotation

Details of Estimate: We estimate the preproduction cost assuming ICs from Temic. We assume two lots(40 wafers minimum) of preproduction wafers at a cost of \$236,667 per lot for a total cost of \$473,333. The US will provide \$97,033. We take a contingency of 0%, assuming the production contingency will cover additional lots, if needed. This occurs in FY01.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	103	0	0	103	0	0	0	103	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	97.0	102.661
	0	0	0	0	0	97.0	102.661

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	103	0	0	0	0	103

WBS Number: 1.1.1.3.3.1.1.2 **Description:** Production

Institution : LBNL/UC- Senior

Contact: Not available

Production costs for Layer 1/2 and disks

Basis of Estimate: Vendor quotation

Details of Estimate: We estimate the production cost assuming ICs from Temic. Costs per wafer were provided by Temic under the auspices of the Frame Contract. Following our yield model, we assume 1307 wafer are required. The cost per wafer is estimated to be \$4867 in FY01(Temic provided a cost as a function of year). We have chosen not to deflate to FY00 costs at this time. The US will provide funds for 268 wafers or \$1,017,203. One-third in FY01(434742) and remainder in FY02(869,614). If Honeywell Sol had to be used, and the scope remains the same, then the cost would increase by about 70% according to Frame contract numbers of Jan. 1999. However, yields are uncertain, so we fix the contingency at 100%.

COST SUMMARY:	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
(Project)	1380	1380	100	2760	0	0	0	1380	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	1304.4	1380.009
	0	0	0	0	0	1304.4	1380.009

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	10	15	15	15	4	2	1	100

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	460	920	0	0	0	1380

WBS Number: 1.1.1.3.3.1.2

Description: B-layer

Institution :

Contact: Not available

Preproduction and production fabrication and associated tests of B-layer front-end ICs

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	463	177	38	640	0	0	0	463	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	437.7	463.087
	0	0	0	0	0	437.7	463.087

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	52	411	0	0	0	463

WBS Number: 1.1.1.3.3.1.2.1 **Description:** Preproduction

Institution : LBNL/UC- Senior

Contact: Not available

Preproduction costs for B-Layer

Basis of Estimate: Vendor quotation

Details of Estimate: We estimate the preproduction cost assuming ICs from Honeywell. We assume one lot(20 wafers minimum) of preproduction wafers at a cost of \$240,000 per lot for a total cost of \$240,000. The US will provide \$49,200. We take a contingency of 0%, assuming the production contingency will cover additional lots, if needed. This occurs in FY01.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	52	0	0	52	0	0	0	52	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	49.2	52.054
	0	0	0	0	0	49.2	52.054

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	52	0	0	0	0	52

WBS Number: 1.1.1.3.3.1.2.2 **Description:** Production

Institution : LBNL/UC- Senior

Contact: Not available

Production costs for B-layer

Basis of Estimate: Vendor quotation

Details of Estimate: We estimate the production cost assuming ICs from Honeywell. Costs per wafer were provided by Honeywell under the auspices of the Frame Contract. Following our yield model, we assume 180 wafer are required. The cost per wafer is estimated to be \$10,500 in FY01(Honeywell provided a cost as a function of year). We have chosen not to deflate to FY00 costs at this time. The US will provide funds for 37 wafers or \$388500. The contingency is currently estimated to be 43% based on yield guarantees in the Frame Contract, in which lots/shipments may be rejected if the yield falls below 70% of the target yield and uncertainties in the IC and other yields. This occurs in FY02.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	411	177	43	588	0	0	0	411	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	388.5	411.033
	0	0	0	0	0	388.5	411.033

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	5	8	8	7	4	1	1	43

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	0	411	0	0	0	411

WBS Number: 1.1.1.3.3.1.3 **Description:** Testing

Institution : LBNL/UC- Senior

Contact: Not available

Equipment and layer for testing all front-end ICs.

Basis of Estimate: Physicist estimate

Details of Estimate: Equipment, Materials and Supplies

Test equipment for production testing will largely be in hand at the end of the development period(end FY00). However, some additional items will be required. Estimates are based on previous experience. Contingency is estimated to be about 25%(whatever falls out of formula). This occurs in FY01.

- ⌘ Wafer storage in production, \$2,000
- ⌘ Probe station shielding/environmental control, \$3,000
- ⌘ Probe station maintenance, \$2,000
- ⌘ Spare probe card, \$1,000
- ⌘ Miscellaneous supplies, \$2,000
- ⌘ Database licenses \$2,000
- ⌘ Total, \$12,000

Labor

Testing labor will be provided by temporary personnel supervised by physicists and postdocs. We assume that the US will test one-third of all wafers, or a total of 382 wafers. We assume a rate of one wafer per day, or about 3 mins per die on average. A total of 3056 hours is required. One-third occurs in FY01(1018 hrs) and the remainder in FY02(2038).

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	81	19	24	100	0	67	0	13	1.7	0.0

MANPOWER SUMMARY:	S.W.		Admin.					Contract		Tech.		Total w/ overhead (k\$)	
	Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Super. (hrs)	Admin. (hrs)	Labor (hrs)	Shops (hrs)	Serv. (hrs)	Student (hrs)	
MFG P	0	0	0	0	0	0	0	0	3056	0	0	0	67.417
	0	0	0	0	0	0	0	0	3056	0	0	0	67.417

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	12	0	0	0	0	0.0	13.356
	12	0	0	0	0	0.0	13.356

CONTINGENCY FACTORS:	Risk				Weight			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	4	4	8	4	2	1	1	24

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	36	45	0	0	0	81

WBS Number: 1.1.1.3.3.2

Description: Optoelectronics

Institution :

Contact: Not available

Preproduction and production and associated testing of ICs for optoelectronics

COST SUMMARY:	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
(Project)	98	12	12	110	0	6	0	93	0.3	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)	EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	0	0	0	0	0	0	480	5.571
	0	0	0	0	0	0	0	0	0	0	0	480	5.571

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	18	0	0	0	0	66.0	92.547
	18	0	0	0	0	66.0	92.547

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	82	16	0	0	0	98

WBS Number: 1.1.1.3.3.2.1 **Description:** Preproduction

Institution : Ohio State U.

Contact: Not available

Preproduction fabrication costs

Details of Estimate: We assume that preproduction quantities of the optoelectronics have been produced during the development period(FY00).

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	0	0	0	0	0	0	0	0	0.0	0.0

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

WBS Number: 1.1.1.3.3.2.2 **Description:** Production

Institution : Ohio State U.

Contact: Not available

Optoelectronics production fabrication costs.

Details of Estimate: We assume the production optoelectronics is produced in dedicated runs, not shared with other ICs.

A total of three wafers is needed in production. We assume this is done by Temic. The cost is taken to be the minimum engineering run of 8 wafers minimum for \$131,950. The US will provide \$65,975. The contingency is taken to be 0%, given that 8 wafers is more than twice the required number. This occurs in FY01.

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	66	0	0	66	0	0	0	66	0.0	0.0

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	66.0	65.975
	0	0	0	0	0	66.0	65.975

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	C o s t	Schedule	Des i gn	Technical	C o s t	Schedule	
	0	0	0	0	0	0	0	0

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	66	0	0	0	0	66

WBS Number: 1.1.1.3.3.2.3

Description: Testing

Institution : Ohio State U.

Contact: Not available

Equipment and labor for testing preproduction and production optoelectronics ICs

Basis of Estimate: Physicist estimate

Details of Estimate: The testing costs are detailed in the supporting material.

Material costs are 18,200

Labor hours are taken to be 480

COST SUMMARY: (Project)	Base Cost (k\$)	Cont Cost (k\$)	Cont %	Total Cost (k\$)	EDIA Labor (k\$)	Mfg Labor (k\$)	EDIA Matls (k\$)	Mfg Matls (k\$)	FTEs Project	FTEs Other
	32	12	36	44	0	6	0	27	0.3	0.0

MANPOWER SUMMARY:	S.W. Prof (hrs)		EE (hrs)	ME (hrs)	Design (hrs)	ET (hrs)	MT (hrs)	Admin. Super. (hrs)	Other Admin. (hrs)	Contract Labor (hrs)	Shops (hrs)	Tech. Serv. (hrs)	Student (hrs)	Total w/ overhead (k\$)
MFG P	0	0	0	0	0	0	0	0	0	0	0	0	480	5.571
	0	0	0	0	0	0	0	0	0	0	0	0	480	5.571

MATERIAL SUMMARY:	Pur. Mat. (k\$)	Stores (k\$)	Travel (k\$)	Low Level (k\$)	R + D (k\$)	High Level (k\$)	Total w/ overhead (k\$)
MFG P	18	0	0	0	0	0.0	26.572
	18	0	0	0	0	0.0	26.572

CONTINGENCY FACTORS:	<i>Risk</i>				<i>Weight</i>			Cont %
	Technical	Cost	Schedule	Design	Technical	Cost	Schedule	
	8	4	8	8	2	1	1	36

PROFILE SUMMARY:	FY 96 (k\$)	FY 97 (k\$)	FY 98 (k\$)	FY 99 (k\$)	FY 00 (k\$)	FY 01 (k\$)	FY 02 (k\$)	FY 03 (k\$)	FY 04 (k\$)	FY 05 (k\$)	Total (k\$)
	0	0	0	0	0	16	16	0	0	0	32