

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 1999
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BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604706F Life Support Systems
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COST (\$ In Thousands)	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	4,155	6,108	6,135	8,388	4,740	641	0	0	0	58,915
4803 Ejection Seat*	967	0	0	0	0	0	0	0	0	967
412A Life Support Systems**	3,188	6,108	6,135	8,388	4,740	641	0	0	0	57,948
Quantity of RDT&E Articles	48/571K***	0	0	0	0	0	0	0	0	101

* FY 98: \$ 1M Congressional Add for the enhancement of ejection seat technology erroneously directed to this PE. BPAC created for special S&T effort in conjunction with the Crew Systems and Personnel Protection Program. \$ 1M reduced by congressional adjustments.

** FY99: \$2.5M Congressional Add only for engineering and manufacturing development (EMD) efforts to incorporate inflatable restraints. Total Cost includes funding prior to FY1998.

*** FY 98: (45) Advanced Technology Anti-Gravity Suit (ATAGS) at \$ 6K per item. (3) Advanced Concept Ejection Seat (ACES) II at \$ 100.4K per item (full-scale configuration).

(U) A. Mission Description:

This program provides for Engineering and Manufacturing Development (EMD) of life support equipment and subsystems to satisfy operational command requirements for improved life support equipment. There are three main projects in this PE. The Advanced Concept Ejection Seat (ACES) II Cooperative Improvement Program develops modifications for ACES II to accommodate lightweight aircrew members and high speed ejection. The Advanced Technology Anti-Gravity Suit (ATAGS) replaces the current G-suit, enabling aircrew members to endure the high G-forces of modern aircraft. The Laser Eye Protection project that will provide aircrews with eye protection against a variety of laser devices which could cause a permanent loss of vision. This PE also provides for the continuing development of life support items and subsystems such as the following: flight helmets, oxygen breathing equipment for aviators, survival radios, night vision devices, active/passive noise reduction devices, and parachute releases. Program management support includes tasks to assess deficiencies of currently fielded equipment, provide for the transition of new technology into EMD, and to support all current life support projects.

(U) B. Budget Activity Justification:

Program is in Budget Activity 5 because several projects are in Acquisition Phase II, EMD

UNCLASSIFIED

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(U) C. Program Change Summary (\$ in Thousands)

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
(U) Previous President's Budget (FY 1999 PB)	4,301	3,744	3,747	3,848	44,925
(U) Appropriated Value	4,726	6,244			
(U) Adjustments to Appropriated Value					
a. Congressional /General Reduction	-330	-136			
b. Small Business Innovative Research (SBIR)	-96				
c. Omnibus & Other Above Threshold Reprogramming	-54				
d. Below Threshold Reprogramming (BTR)	-91				
(U) Adjustments to Budget Years since FY 1999 PB			2,388	4,540	
(U) Current Budget Submit/FY 2000 PB	4,155	6,108	6,135	8,388	58,915

FY 1999 \$132 identified as a source for SBIR.

(U) Significant Program Changes:

FY 1998 Congress added \$1M to this Program Element for the enhancement of ejection seat research.
 FY 1999 Congress added \$2.5M to this Program Element only for the EMD of ejection seat inflatable restraints.
 FY 1999 NATO Cooperative R&D, PE 0603790, funds transferred to Life Support Systems for ACES II CIP, \$388 FY00, \$1.34M FY01
 FY 2000 Initiate Laser Eye Protection EMD phase of the Laser Eye Protection effort.

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)								DATE February 1999		
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development					PE NUMBER AND TITLE 0604706F Life Support Systems				PROJECT 4803	
<i>COST (\$ In Thousands)</i>	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
4803 Ejection Seat*	967	0	0	0	0	0	0	0	0	967
<p>* FY 98: \$ 1M Congressional Add for the enhancement of ejection seat technology erroneously directed to this PE. BPAC created for special S&T effort in conjunction with the Crew Systems and Personnel Protection Program. \$ 1M reduced by congressional adjustments.</p> <p>(U) A. <u>Mission Description:</u></p> <p>This project made use of a congressional add of \$1M in FY98 to enhance ejection seat research. A special Science and Technology effort was made to research the technologies needed to enhance US ejection seats and evaluates and integrates Russian K-36 ejection seat technology.</p> <p>(U) <u>FY 1998 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> - (U) \$967 Reduced the technical risks associated with adapting the lightweight Russian ejection seat technologies to U.S. aircraft. <ul style="list-style-type: none"> - Assessed ejection seat interfaces with aircraft cockpits. - Verified compatibility with current Air Force/Navy personal equipment. - Explored low-cost ballistic cartridges and propulsion systems as a joint effort with the U.S. Navy. - Analyzed life cycle and logistics support concept improvements. - Defined manufacturing concepts and technologies for production in the U.S. - (U) \$967 Total 										
Project 4803			<i>Page 3 of 10 Pages</i>				Exhibit R-2A (PE 0604706F)			

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)								DATE February 1999		
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development				PE NUMBER AND TITLE 0604706F Life Support Systems				PROJECT 412A		
<i>COST (\$ In Thousands)</i>	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
412A Life Support Systems**	3,188	6,108	6,135	8,388	4,740	641	0	0	0	57,948
<p>** FY99: \$2.5M Congressional Add only for engineering and manufacturing development (EMD) efforts to incorporate inflatable restraints. Total Cost includes funding prior to FY1998.</p> <p>(U) A. <u>Mission Description</u> This program provides for Engineering and Manufacturing Development (EMD) of life support equipment and subsystems to satisfy operational command requirements for improved life support equipment. There are three main projects in this PE. The Advanced Concept Ejection Seat (ACES) II Cooperative Improvement Program develops modifications for ACES II to accommodate lightweight aircrew members and high speed ejection. The Advanced Technology Anti-Gravity Suit (ATAGS) replaces the current G-suit, enabling aircrew members to endure the high G-forces of modern aircraft. The Laser Eye Protection project that will provide aircrews with eye protection against a variety of laser devices which could cause a permanent loss of vision. This PE also provides for the continuing development of life support items and subsystems such as the following: flight helmets, oxygen breathing equipment for aviators, survival radios, night vision devices, active/passive noise reduction devices, and parachute releases. Program management support includes tasks to assess deficiencies of currently fielded equipment, provide for the transition of new technology into EMD, and to support all current life support projects.</p> <p>(U) <u>FY 1998 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> - (U) \$629 Continued F-22 Life Support Equipment Integration Evaluation - (U) \$312 Completed Night Vision Systems (NVS) EMD contract, DT&E (combined with IOT&E) and product support costs. - (U) \$1,216 Initiated Air Force funded EMD program to continue development for Advanced Concept Ejection Seat (ACES) II Cooperative Improvement Program (CIP) - follow-on work to FY97 Congressional Add - (U) \$602 Continued Advanced Technology Anti-G Suit (ATAGS) EMD - (U) \$429 Program Management/Technical Support/Travel/Test & Evaluation potential AF Life Support Systems including, but not limited to: MAC 10/100 Anti-Exposure Suit, Joint Strike Fighter (JSF) program, Oxygen Generating Systems (OGS), Panoramic Night Vision Goggles (PNVGs), Joint Helmet Mounting Cueing System (JHMCS), Integrated Chin-Nape Strap (ICNS), Active Noise Reduction (ANR), Universal Water Activated Release Systems (UWARS), Low Profile Parachute (LPP), Female Aircrew Member Bladder Relief Capability (FAMBRC), Combat Survivor Evader Locator (CSEL), Automatic Life Preserver, Joint Aircrew Survival Vest (AIRSAVE), Visually Coupled Targeting and Acquisition System (VCATS), HGU-55P Lightweight Helmet, Laser Eye Protection (LEP), Advanced Recovery Sequencer (ARS) - (U) \$3,188 Total 										
Project 412A			Page 4 of 10 Pages				Exhibit R-2A (PE 0604706F)			

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE February 1999
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604706F Life Support Systems	PROJECT 412A
(U) <u>FY 1999 (\$ in Thousands):</u>		
– (U) \$3,511	Continue Advanced Concept Ejection Seat (ACES) II Cooperative Improvement Program (CIP) Engineering and Manufacturing Development	
– (U) \$2,392	Congressional add for EMD of ejection seat inflatable restraints	
– (U) \$ 132	Identified as a source for SBIR	
– (U) \$43	Complete Advanced Technology Anti-G Suit (ATAGS) EMD and production support costs	
– (U) \$30	Program Management/Technical Support/Travel/Test & Evaluation in support of potential AF Life Support Systems including, but not limited to: Anti-Exposure Suit, Joint Strike Fighter (JSF) program, Oxygen Generating Systems (OGS), Panoramic Night Vision Goggles (PNVGs), Joint Helmet Mounting Cueing System (JHMCS), Integrated Chin-Nape Strap (ICNS), Low Profile Parachute (LPP), Female Aircrew Accommodations, Automatic Life Preserver, F-22 Integration of Current Life Support Systems Evaluation, Joint Aircrew Survival Vest (AIRSAVE), Visually Coupled Targeting and Acquisition System (VCATS), HGU-55P Lightweight Helmet, Laser Eye Protection (LEP)	
– (U) \$6,108	Total	
(U) <u>FY 2000 (\$ in Thousands):</u>		
– (U) \$1,961	Initiate Laser Eye Protection EMD	
– (U) \$4,152	Continue ACES II CIP EMD	
– (U) \$22	Program Management/Technical Support/Travel/Test & Evaluation in support of potential AF Life Support Systems including, but not limited to: Anti-Exposure Suit, Joint Strike Fighter (JSF) program, Oxygen Generating Systems (OGS), Panoramic Night Vision Goggles (PNVGs), Joint Helmet Mounting Cueing System (JHMCS), Integrated Chin-Nape Strap (ICNS), Low Profile Parachute (LPP), Female Aircrew Accommodations, Automatic Life Preserver, F-22 Integration of Current Life Support Systems Evaluation, Joint Aircrew Survival Vest (AIRSAVE), Visually Coupled Targeting and Acquisition System (VCATS), HGU-55P Lightweight Helmet	
– (U) \$6,135	Total	
(U) <u>FY 2001 (\$ in Thousands):</u>		
– (U) \$3,127	Continue Laser Eye Protection EMD	
– (U) \$5,246	Complete ACES II CIP EMD	
– (U) \$15	Program Management/Technical Support/Travel/Test & Evaluation in support of potential AF Life Support Systems including, but not limited to: Anti-Exposure Suit, Joint Strike Fighter (JSF) program, Oxygen Generating Systems (OGS), Panoramic Night Vision Goggles (PNVGs), Joint Helmet Mounting Cueing System (JHMCS), Integrated Chin-Nape Strap (ICNS), Low Profile Parachute (LPP), Female Aircrew Accommodations, Automatic Life Preserver, F-22 Integration of Current Life Support Systems Evaluation, Joint Aircrew Survival Vest (AIRSAVE), Visually Coupled Targeting and Acquisition System (VCATS), HGU-55P Lightweight Helmet	
– (U) \$8,388	Total	
Project 412A	Page 5 of 10 Pages	Exhibit R-2A (PE 0604706F)

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)	DATE February 1999
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BUDGET ACTIVITY 5 - Engineering and Manufacturing Development	PE NUMBER AND TITLE 0604706F Life Support Systems	PROJECT 412A
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(U) **B. Project Change Summary - Description of Significant Changes:** Not Applicable

(U) **C. Other Program Funding Summary (\$ in Thousands)**

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>To Compl</u>	<u>Total Cost</u>
NATO Cooperative R&D PE 0603790D (OSD funded) ACES II CIP	500	0	0	0	0	0	0	0	0	500
NATO Cooperative R&D PE 0603790F (AF funded) ACES II CIP	0	1000	0	0	0	0	0	0	0	1000
Item Less Than \$5M (Safety Equipment) BPAC 842990, P-1 Line 86 Advanced Technology Anti-G Suit (ATAGS) FY99 Laser Eye Protection (LEP) FY02 - FY05	0	0	500	0	300	2620	3320	1400	0	8140

(U) **D. Acquisition Strategy:** Acquisition strategy is carried out at the project level. Advanced Concept Ejection Seat (ACES) II is a joint project with Japan, who is responsible for improved limb restraints and accommodations for lightweight aircrew and the US is responsible for improved seat stability. The US contracts are Sole Source with the Enhanced Drogue Chute and seat modifications engineered by MDA through a Cost Plus Fixed Fee Contract. The Engineering and Manufacturing Development (EMD) effort is to be performed by Boeing through a Cost Plus Fixed Fee contract and Cost Plus Incentive Fee Contract. The ATAGS project consists of three Sole Source contracts with KRUG, Mustang, and SRL, respectively. The first two are Firm Fixed Price contracts with a Cost Plus Fixed Fee contract for SRL to conduct Direct Testing and Evaluation (DT&E) Support.

UNCLASSIFIED

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BUDGET ACTIVITY 5 - Engineering and Manufacturing Development						PE NUMBER AND TITLE 0604706F Life Support Systems						PROJECT 412A							
(U) E. <u>Schedule Profile</u>																			
		<u>FY1998</u>					<u>FY1999</u>					<u>FY 2000</u>					<u>FY 2001</u>		
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4			
(U) NVS Completed Government Conducted DT&E / IOT&E	*																		
(U) NVS Completed contract, May 98		*																	
(U) ACES II Started Pre-EMD		*																	
(U) ACES II CIP EMD award					X														
(U) ACES II Complete detail design						X													
(U) ACES II Sled Test Completion														X					
(U) ACES II OT&E Completed																X			
(U) ATAGS Complete IOT&E						X													
(U) ATAGS Production Award								X											
(U) ATAGS First Production Delivery										X									
(U) LEP EMD Contract Award										X									
(U) LEP CDR													X						
(U) LEP Complete DT&E																X			
(U) LEP Begin IOT&E																X			
* = completed event																			
X = planned event																			

UNCLASSIFIED

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)							DATE February 1999				
BUDGET ACTIVITY				PE NUMBER AND TITLE				PROJECT			
5 - Engineering and Manufacturing Development				0604706F Life Support Systems				412A			
(U) A. <u>Project Cost Breakdown (\$ in Thousands)</u>											
				<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>				
(U) Contracts				1,121	1,962	3,729	4,582				
(U) Technical Engineering Support				498	964	1,491	1,933				
(U) Travel				234	99	140	117				
(U) Government Testing				1,544	298	399	1,352				
(U) Program Management/Technical Support and Misc.				758	261	376	398				
(U) Government Furnished Property				0	0	0	6				
(U) Congressional Add				0	2,392	0	0				
(U) Identified as a source for SBIR				0	132	0	0				
(U) Total				4,155	6,108	6,135	8,388				
(U) B. <u>Budget Acquisition History and Planning Information (\$ in Thousands)</u>											
Performing Organizations:											
Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1998	<u>FY 1998</u>	<u>FY 1999</u>	<u>Budget FY 2000</u>	<u>Budget FY 2001</u>	<u>Budget to Complete</u>	<u>Total Program</u>
Identified as source for SBIR							132				132
<u>Product Development Organizations</u>											
ITT-NVS	C/CPIF	18 Jan 93	14,081	14,081	13,900	181	0	0	0	0	14,081
KRUG-ATAGS	SS/FFP	7 July 97	424	424	424	0	0	0	0	0	424
Mustang-ATAGS	SS/FFP	Aug 97	499	499	271	228	0	0	0	0	499
LEP - (AL/Navy)	C/CPFF	Jun 97	4,552	4,552	4,552	0	0	0	0	0	4,552
MDA-Enhanced Drogue	SS/CPFF	Jun 97	1,130	1,130	1,130	0	0	0	0	0	1,130
MDA-ACES II Seats	SS/FFP	Sept 97	150	150	0	150	0	0	0	0	150
Project 412A											
Page 8 of 10 Pages											
Exhibit R-3 (PE 0604706F)											

UNCLASSIFIED

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)										DATE February 1999	
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development					PE NUMBER AND TITLE 0604706F Life Support Systems					PROJECT 412A	
Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1998	FY 1998	FY 1999	Budget FY 2000	Budget FY 2001	Budget to Complete	Total Program
SRL-ATAGS	SS/CPFF	Dec 97	150	150	150	0	0	0	0	0	150
DT&E Support											
Boeing-ACES II Pre-EMD	SS/CPFF	Feb 98	250	250	0	250	0	0	0	0	250
Brooks AFB, Supply	Supply Reqt	Feb 98	301	301	0	301	0	0	0	0	301
Contax	SS/FFP	Apr 98	11	11	0	11	0	0	0	0	11
Boeing-ACES II EMD	SS/CPIF	Nov 98	6,608	6,608	0	0	1,962	2,108	2,538	0	6,608
Dayton T Brown	TBD	Dec 99	29	29	0	0	0	29	0	0	29
Pax River	AF 185	Nov 99	33	33	0	0	0	33	0	0	33
Holloman AFB	AF 185	Nov 99	75	75	0	0	0	75	0	0	75
EME Corp	FFP	Nov 99	100	100	0	0	0	100	0	0	100
LEP, TBD	C/CPFF	Jan 00	6,355	6,355	0	0	0	1,384	2,044	2,927	6,355

UNCLASSIFIED

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)										DATE February 1999	
BUDGET ACTIVITY 5 - Engineering and Manufacturing Development					PE NUMBER AND TITLE 0604706F Life Support Systems					PROJECT 412A	
Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1998	FY 1998	FY 1999	Budget FY 2000	Budget FY 2001	Budget to Complete	Total Program
<u>Support and Management Organizations</u>											
Program Management Support			4,273	4,273	2,132	758	261	376	398	348	4,273
Travel			1,100	1,100	347	234	99	140	117	163	1,100
Tech Eng & Acq			8,833	8,833	2,560	498	964	1,491	1,933	1,387	8,833
<u>Test and Evaluation Organizations</u>											
AFFTC		Proj Ord-Variou	3,146	3,146	3,103	43	0	0	0	0	3,146
AL/CF		Variou	179	179	179	0	0	0	0	0	179
Holloman		Variou	2,763	2,763	0	164	298	399	1,352	550	2,763
AFRL (incl. Ejection Seat Effort)		Variou	1,337	1,337	0	1,337	0	0	0	0	1,337
(U) B. Budget Acquisition History and Planning Information Continued (\$ in Thousands)											
Government Furnished Property:											
LEP		TBD	12	12	0	0	0	0	6	6	12
Congressional Add		TBD	0	0	0	0	2,392	0	0	0	2,392
Identified as a source for SBIR											
Subtotal Product Development			34,748	34,748	20,427	1,121	1,962	3,729	4,582	2,927	34,748
Subtotal Support and Management			14,206	14,206	5,039	1,490	1,324	2,007	2,448	1,898	14,206
Subtotal Test and Evaluation			7,425	7,425	3,282	1,544	298	399	1,352	550	7,425
Government Furnished Property			12	12	0	0	0	0	6	6	12
Congressional Add			0	0	0	0	2,392	0	0	0	2,392
Total Project			56,391	56,391	28,748	4,155	6,108	6,135	8,388	5,381	58,915
Project 412A			Page 10 of 10 Pages					Exhibit R-3 (PE 0604706F)			