

TRAINING & PERSONNEL SYSTEMS TECHNOLOGY

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R&D PROGRAM DESCRIPTION

FY 87 - 88 - 89

UNCLASSIFIED/UNLIMITED

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I. INTRODUCTION

This reference document presents a comprehensive overview of the Manpower, Personnel and Training (MPT) Technology Area for FY 87 and FY 88, summarizing the R&D Program, Basic Research through to Development (6.1-6.4). It consolidates Program Element and Project information and serves as a management tool for laboratory managers and planners and headquarters personnel in the Services and OSD.

This document integrates summaries of the work being conducted by the laboratories and associated funding in the form of narratives, tables, and listings. Comprehensive in nature and using a variety of formats, it allows the user to view, extract, and aggregate vital information for decision-making and resource commitment.

Some manpower-related work outside of the OUSD(R&E) MPT program, conducted by OASD(FM&P), is also included in this book because of the need for close coordination between the two programs.

This document contains:

Fiscal tables and graphs (Section II)

This section encompasses a series of cross-tabulations featuring FY 87 and FY 88 funding figures by Congressional Categories, DoD organizations, Budget Categories, and MPT Goals.

Graphic formats display data for:

- (A) A comparison of estimated vs. actual total MPT R&D funding for President's Budget 1983-1986, and
- (B) Breakdowns of total MPT Program funding by Budget Category, Congressional Category and Service for FY87 and FY86.

Program Element and Project synopses (Section III)

This section presents synopses of each Program Element and its associated projects, sorted by DoD organization, including the products and payoffs of that work.

Overall synopses and Project listings (Section IV)

This section summarizes the work being conducted by each Service within each Congressional Category. Listings specify the Projects that fall within each Congressional Category for each Service and within each MPT Goal for each Service.

Manpower, Personnel and Training studies (Section V)

This section lists the OASD(FM&P)-sponsored studies. The listings are organized by Program Element, Congressional Category, and Goal.

Appendices (Section VI)

This section contains: (a) a list of the Congressional Categories and sub-Categories, (b) a list of the Goals used for this edition of this work, (c) a list of the Projects completed in FY 87, (d) a list of the Projects to be initiated in FY 88, and (e) a selection of policy-level memoranda that impact the MPT program.

REPORT DOCUMENTATION PAGE

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19. ABSTRACT (Continue on reverse if necessary and identify by block number) This notebook provides an overview of the Manpower, Personnel and Training (MPT) Program for FY87 and FY88/89. It has been assembled for use of laboratory planners and managers and headquarters personnel in the Services and OSD.			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION	
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How to Use This Book

This document can be used in a variety of ways, depending upon the reader's needs. This discussion about how the book can be used is not intended to be comprehensive, but rather suggestive of some of these ways through the use of several examples.

Let us look at how a reader might approach several different areas of interest using this MPT Program Description.

1. Work being done in the area of Simulation and Training

One can begin with a brief overview of the area by turning to Section IV-A, pp. 4, 8, and 12, and seeing what each of the Services is doing in the area. A reader less familiar with the MPT Program can read the brief narrative associated with that Congressional Category for each Service. The pages following each such narrative contain listings of all the Projects under which work in Simulation and Training is being carried out. The Projects are sorted by Program Element.

It might also pay to glance at Appendix A, which contains a brief list of the Congressional Categories and subcategories.

Having gotten an overview, one can turn to several sections. Using the lists of relevant Program Elements and Projects for each Service, the reader can flip to Section III-A, B and C (Army, Navy, and Air Force, respectively) and scan the appropriate Program Element and, particularly, Project synopses to get a more detailed view of the objectives, plans, payoffs, and accomplishments of the work being carried out in the area. Within each Service subsection, the synopses are in order of Program Element, and within that by Project.

Finally, one can turn to the funding cross-tabulations in Section II, to gain a better analytic understanding of funding apportionment. Tables in subsections 2, 3, 4, 8, 9, 11, 12 all offer detailed information about how funding for Simulation and Training is allocated by Service, Budget Category, DoD Goal, and by Program Element. This way one can gain a feel of the relative weight (in terms of funding) being assigned to various areas.

Note: a similar "strategy" could be carried out to gain an overview of some MPT Goal (e.g., Goal 4, Designing for System Readiness) by: (a) starting out with Appendix B to look at the overall Goal structure, (b) turning to Section IV-B to locate the Program Elements and Projects involved with particular Goals, (c) scanning the relevant Program Element and Project summaries in Section III, and (d) examining the tables in the Goal-relevant subsections of Section II.

2. How do the Services' funding compare in FY 1987 and FY 1988?

The fiscal tables in Section II are most directly relevant for this. Tables in subsection II-1 provide a quick overview, breaking down the Services' funding by Budget Category and by Congressional Category for FY 1987 and FY 1988, respectively. Thus, one can compare the Services' funding with each other and determine where the emphases lie for each Service and the overall MPT program. By glancing back and forth at the top and bottom charts on the two pages, funding for the two fiscal years can be compared.

Page III-i in the beginning of Section III shows actual and planned funding for the fiscal years 1985-1988 for each Program Element, sorted and totaled by Service.

Further detail in these categories and others can also be gained by turning to tables in subsections II-4 and -5 (Budget Category by Congressional Category cross-tabulations, overall (4) and by Service (5) for FY 1987 and 1988), II-6 and -7 (Budget Category by MPT Goal cross-tabulations, overall (6) and by Service (7) for FY 1987 and 1988), etc.

3. What new research Projects will begin in FY 1988?

Turn to Appendix E. For greater detail, turn to the relevant synopses in Section II.

4. Which Projects will be completed in FY 1987?

Turn to Appendix C. For greater detail, turn to the relevant synopses in Section II.

5. What work is planned in FY 1987 in MPT Basic Research?

Basic research is Budget Category 6.1. Plans for research in FY 1987 (and 1988/89) are contained in the narrative section (Section III) in the "Synopsis" portion of each Program Element and Project. Because the first two digits of each Program Element reflect the Budget Category it is in, and the Program Elements are in Program Element order, the 6.1 Program Elements and Projects can be easily located at the beginning of the narrative section for each Service.

Note: Plans for work beyond FY 1990 can be located in the "Future Directions" portion of each Program Element narrative.

6. What was accomplished in FY 1986 in Navy Human Factors work?

The past year's (FY 1986) accomplishments for each effort are located in the "Payoff/Utilization" portion of each Program Element and Project narrative in Section III. There are two ways of locating the Navy Human Factors efforts.

First, one could simply flip through the pages of subsection III-B (Navy narratives) and stop at each effort for which the Congressional Category is listed as "Human Factors".

Alternatively, as in Question 1 above, turn to subsection IV-A-5 and obtain the lists of Navy Human Factors Program Elements and Projects and then turn directly to the relevant narratives in subsection III-B.

Further Information

This document has been prepared by the Defense Technical Information Center, Manpower and Training Research Information System (MATRIS) Office, in San Diego. It is based on current Program Element and Project records in the MATRIS database, updated with the FY 88/89 President's Budget submission.

The MATRIS database covers the MPT R&D Program at the Program Element, Project, and Work Unit levels. Further information about the MPT Program at any of these levels can be obtained by contacting:

MATRIS User Services
Defense Technical Information Center, DTIC-DMA
San Diego, CA 92152-6800

Phone: (619) 225-2056

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SUGGESTIONS and COMMENTS

This document offers an overview of the MPT Program based on the latest President's Budget. It is intended to be informative and to provide a wide variety of information.

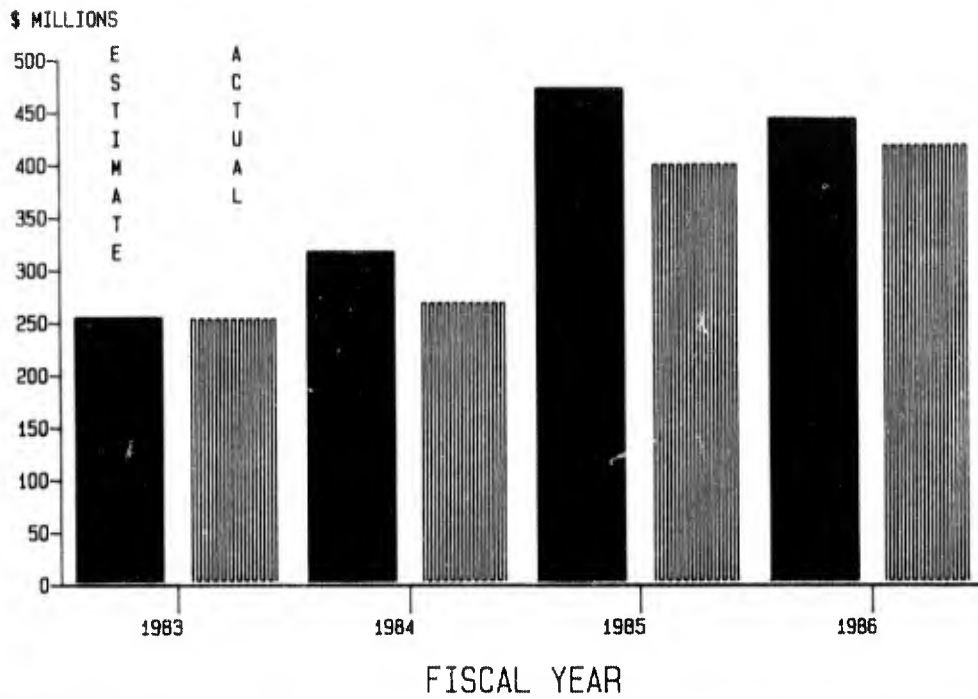
MATRIS, as the agency responsible for the production of this document, welcomes any suggestions for improving either the content, the presentation, or the timeliness of the MPT Program Description. If you have any suggestions or criticism which could help in improving the document, we would like to hear from you. This page of the Program Description has been included for your comments.

Please mail your comments and suggestions to:

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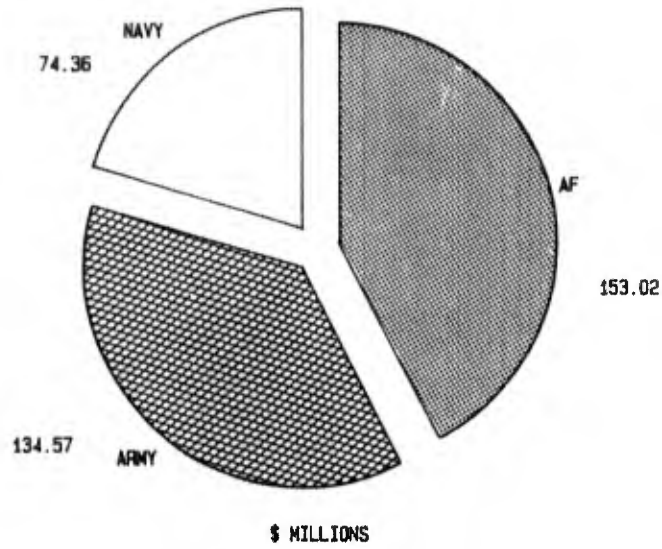
MPT FUNDING SUMMARY*

ESTIMATED VS ACTUAL

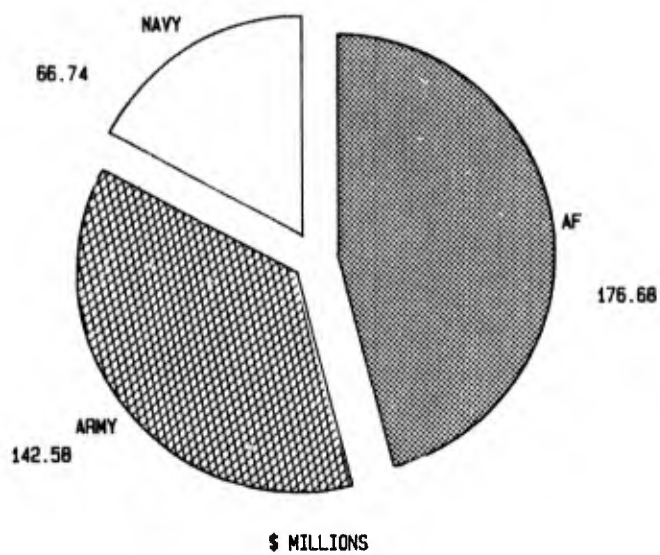


* SOURCE: PRESIDENT'S BUDGETS FY85-88/89

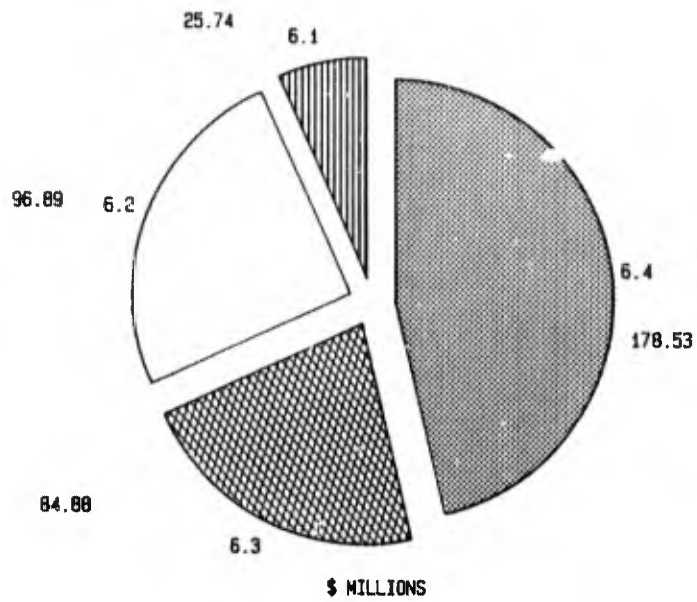
MPT PROGRAM FUNDING IN 1987
BASED ON THE FY88/89 PRESIDENT'S BUDGET
BY DOD ORGANIZATION



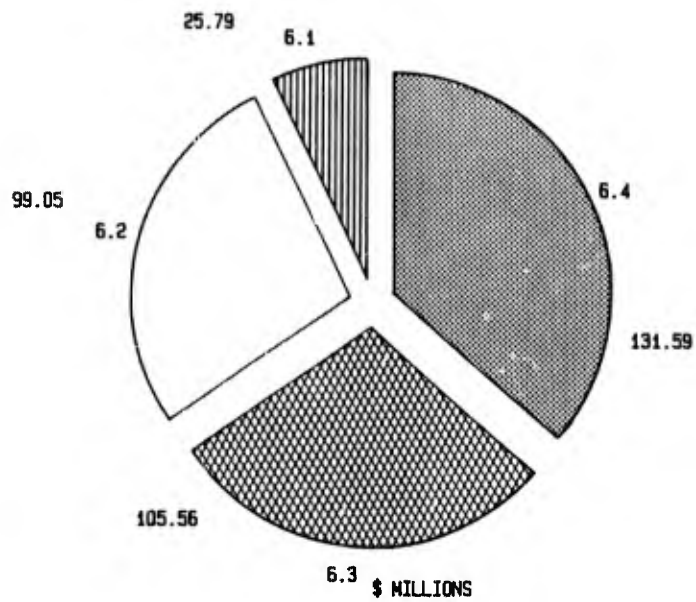
MPT PROGRAM FUNDING IN 1988
BASED ON THE FY88/89 PRESIDENT'S BUDGET
BY DOD ORGANIZATION



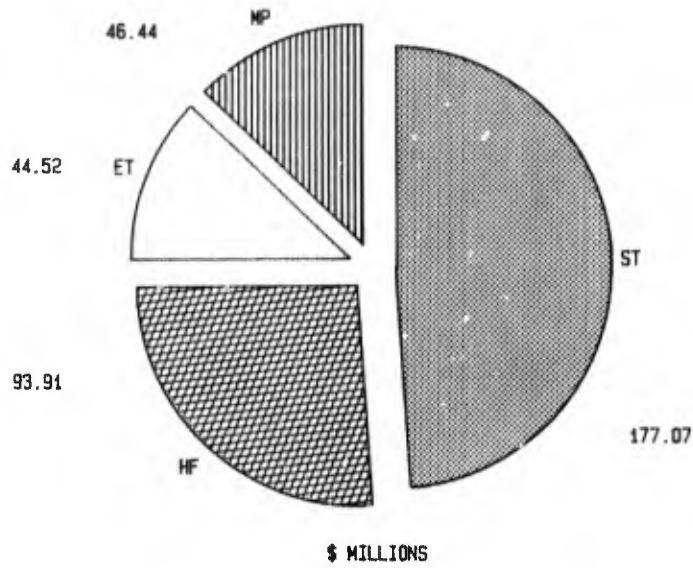
MPT PROGRAM FUNDING IN 1987
BASED ON THE FY88/89 PRESIDENT'S BUDGET
BY BUDGET CATEGORY



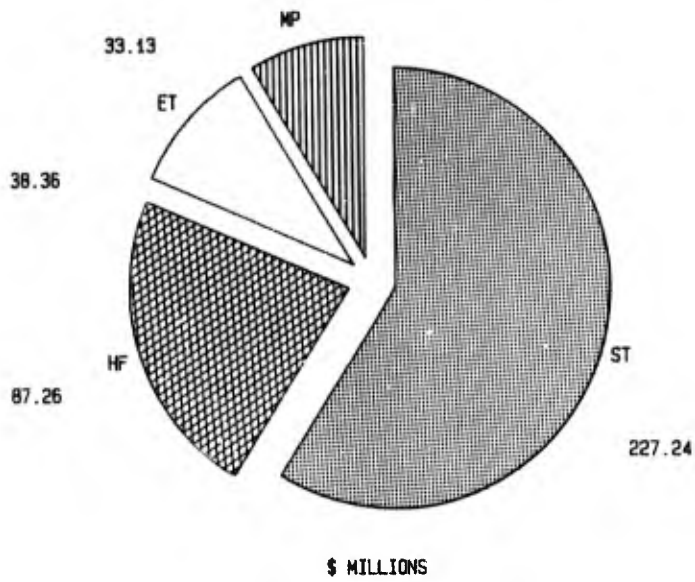
MPT PROGRAM FUNDING IN 1988
BASED ON THE FY88/89 PRESIDENT'S BUDGET
BY BUDGET CATEGORY



MPT PROGRAM FUNDING IN 1987
BASED ON THE FY88/89 PRESIDENT'S BUDGET
BY CONGRESSIONAL CATEGORY



MPT PROGRAM FUNDING IN 1988
BASED ON THE FY88/89 PRESIDENT'S BUDGET
BY CONGRESSIONAL CATEGORY



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NOTE: The percentages shown in each table may not total correctly due to rounding.

LIST OF ABBREVIATIONS USED IN FISCAL TABLES

<u>Variable Name</u>	<u>Abbreviation</u>	<u>Used For</u>
CONGRESSIONAL CATEGORY	ET HF MP ST	Education and Training Human Factors Manpower and Personnel Simulation and Training Devices
DoD GOAL	1 2 3 4 5 6 VAR	Management Trade-offs Accession and Retention Unit Productivity Designing for System Readiness Improved Sustainability Training Systems Various (i.e., project applies to more than one goal)
BUDGET CATEGORY	6.1 6.2 6.3 6.4 6.5 9.2	Basic Research Exporatory Development Advanced Development Engineering Development Management and Support Headquarters Management
DoD ORGANIZATION	FM&P ARMY NAVY AF	Force Management and Personnel Army Navy and Marine Corps Air Force

TABLE II-1

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 BUDGET CATEGORY BY DOD ORGANIZATION
 1987 (\$MILLIONS)

DOD ORGANIZATION	BUDGET CATEGORY						TOTAL
	6.1	6.2	6.3	6.4	6.5	9.2	
FM&P (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	4.36 (84)	0.83 (16)	5.19 (100)
ARMY (ROW%)	6.46 (5)	36.81 (26)	41.58 (29)	57.74 (40)	0.00 (0)	0.00 (0)	142.59 (100)
NAVY (ROW%)	11.69 (18)	12.39 (19)	18.29 (27)	24.36 (37)	0.00 (0)	0.00 (0)	66.73 (100)
AF (ROW%)	7.59 (4)	47.69 (27)	25.02 (14)	96.42 (55)	0.00 (0)	0.00 (0)	176.71 (100)
TOTAL (ROW%)	25.74 (7)	96.89 (25)	84.88 (22)	178.53 (46)	4.36 (1)	0.83 (0)	391.23 (100)

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 BUDGET CATEGORY BY DOD ORGANIZATION
 1988 (\$MILLIONS)

DOD ORGANIZATION	BUDGET CATEGORY						TOTAL
	6.1	6.2	6.3	6.4	6.5	9.2	
ARMY (ROW%)	7.03 (5)	34.97 (26)	44.95 (33)	47.64 (35)	0.00 (0)	0.00 (0)	134.59 (100)
NAVY (ROW%)	10.23 (14)	12.72 (17)	29.17 (39)	22.24 (30)	0.00 (0)	0.00 (0)	74.35 (100)
AF (ROW%)	8.52 (6)	51.36 (34)	31.45 (21)	61.71 (40)	0.00 (0)	0.00 (0)	153.04 (100)
TOTAL (ROW%)	25.79 (7)	99.05 (27)	105.56 (29)	131.59 (36)	0.00 (0)	0.00 (0)	361.99 (100)

TABLE II-2

MPT PROGRAM FUDING IN 1987
BASED ON FY88 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION

1987 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
FM&P (ROW%)	0.53 (10)	0.00 (0)	4.65 (90)	0.00 (0)	5.18 (100)
ARMY (ROW%)	14.57 (10)	33.73 (24)	13.04 (9)	81.25 (57)	142.58 (100)
NAVY (ROW%)	13.29 (20)	8.47 (13)	11.68 (18)	33.29 (50)	66.72 (100)
AF (ROW%)	10.50 (6)	45.07 (26)	8.42 (5)	112.70 (64)	176.68 (100)
TOTAL (ROW%)	38.88 (10)	87.26 (22)	37.78 (10)	227.24 (58)	391.16 (100)

MPT PROGRAM FUDING IN 1988
BASED ON FY88 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION

1988 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
ARMY (ROW%)	17.90 (13)	32.47 (24)	21.17 (16)	63.03 (47)	134.57 (100)
NAVY (ROW%)	15.50 (21)	11.69 (16)	16.11 (22)	31.05 (42)	74.34 (100)
AF (ROW%)	11.12 (7)	49.76 (33)	9.15 (6)	82.99 (54)	153.02 (100)
TOTAL (ROW%)	44.51 (12)	93.91 (26)	46.44 (13)	177.07 (49)	361.94 (100)

TABLE II-3

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT
 WITHIN DOD ORGANIZATION

1987 (\$MILLIONS)

DOD ORGANIZATION		CONGRESSIONAL CATEGORY				
PROGRAM ELEMENT	ET	HF	MP	ST	TOTAL	
	-----	-----	-----	-----	-----	
FM&P						
65109D (ROW%)	0.28 (14)	0.00 (0)	1.74 (86)	0.00 (0)	2.02 (100)	
65112D (ROW%)	0.25 (11)	0.00 (0)	2.10 (89)	0.00 (0)	2.35 (100)	
92198D (ROW%)	0.00 (0)	0.00 (0)	0.83 (100)	0.00 (0)	0.83 (100)	
FM&P						
TOTAL (ROW%)	0.53 (10)	0.00 (0)	4.67 (90)	0.00 (0)	5.20 (100)	

II-3-1

TABLE II-3

MPT PROGRAM FUNDING IN 1987
BASED ON FY88 PRESIDENT'S BUDGETCONGRESSIONAL CATEGORY BY PROGRAM ELEMENT
WITHIN DOD ORGANIZATION

DOD ORGANIZATION PROGRAM ELEMENT		1987 (\$MILLIONS)				TOTAL
		CONGRESSIONAL CATEGORY				
		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
ARMY						
61102A		1.04	3.70	0.62	1.12	6.47
	(ROW%)	(16)	(57)	(10)	(17)	(100)
62716A		0.00	17.36	0.00	0.00	17.36
	(ROW%)	(0)	(100)	(0)	(0)	(100)
62727A		0.00	0.00	0.00	4.23	4.23
	(ROW%)	(0)	(0)	(0)	(100)	(100)
62785A		2.56	4.98	4.73	2.95	15.22
	(ROW%)	(17)	(33)	(31)	(19)	(100)
63003A		0.00	0.00	0.00	10.70	10.70
	(ROW%)	(0)	(0)	(0)	(100)	(100)
63007A		6.76	7.69	7.69	5.00	27.15
	(ROW%)	(25)	(28)	(28)	(18)	(100)
63738A		0.00	0.00	0.00	3.72	3.72
	(ROW%)	(0)	(0)	(0)	(100)	(100)
64715A		0.00	0.00	0.00	44.21	44.21
	(ROW%)	(0)	(0)	(0)	(100)	(100)
64722A		4.21	0.00	0.00	0.00	4.21
	(ROW%)	(100)	(0)	(0)	(0)	(100)
64801A		0.00	0.00	0.00	9.32	9.32
	(ROW%)	(0)	(0)	(0)	(100)	(100)
ARMY	TOTAL	-----	-----	-----	-----	-----
	(ROW%)	14.58	33.73	13.04	81.26	142.60
		(10)	(24)	(9)	(57)	(100)

TABLE II-3

MPT PROGRAM FUNDING IN 1987
BASED ON FY88 PRESIDENT'S BUDGETCONGRESSIONAL CATEGORY BY PROGRAM ELEMENT
WITHIN DOD ORGANIZATION

1987 (\$MILLIONS)

DOD ORGANIZATION PROGRAM ELEMENT	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
	-----	-----	-----	-----	-----
NAVY					
61153N (ROW%)	6.43 (55)	2.46 (21)	2.81 (24)	0.00 (0)	11.70 (100)
62131M (ROW%)	0.30 (48)	0.00 (0)	0.32 (52)	0.00 (0)	0.63 (100)
62233N (ROW%)	1.81 (22)	0.00 (0)	2.96 (36)	3.41 (42)	8.18 (100)
62234N (ROW%)	0.00 (0)	3.59 (100)	0.00 (0)	0.00 (0)	3.59 (100)
63701N (ROW%)	0.00 (0)	2.43 (100)	0.00 (0)	0.00 (0)	2.43 (100)
63707N (ROW%)	0.00 (0)	0.00 (0)	2.86 (100)	0.00 (0)	2.86 (100)
63720N (ROW%)	4.76 (100)	0.00 (0)	0.00 (0)	0.00 (0)	4.76 (100)
63732M (ROW%)	0.00 (0)	0.00 (0)	1.78 (100)	0.00 (0)	1.78 (100)
63733N (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	6.47 (100)	6.47 (100)
64703M (ROW%)	0.00 (0)	0.00 (0)	0.95 (100)	0.00 (0)	0.95 (100)
64715N (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	23.41 (100)	23.41 (100)
NAVY TOTAL (ROW%)	13.30 (20)	8.47 (13)	11.69 (18)	33.29 (50)	66.74 (100)

II-3-3

TABLE II-3

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION PROGRAM ELEMENT		1987 (\$MILLIONS)				TOTAL
		CONGRESSIONAL CATEGORY				
		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
AF						
	61102F (ROW%)	0.00 (0)	6.70 (88)	0.89 (12)	0.00 (0)	7.59 (100)
	62202F (ROW%)	0.00 (0)	15.20 (100)	0.00 (0)	0.00 (0)	15.20 (100)
	62205F (ROW%)	9.42 (29)	5.63 (17)	6.75 (21)	10.68 (33)	32.48 (100)
	63106F (ROW%)	0.00 (0)	10.74 (100)	0.00 (0)	0.00 (0)	10.74 (100)
	63227F (ROW%)	1.08 (14)	0.00 (0)	0.78 (10)	5.62 (75)	7.48 (100)
	63231F (ROW%)	0.00 (0)	6.80 (100)	0.00 (0)	0.00 (0)	6.80 (100)
	64227F (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	96.42 (100)	96.42 (100)
AF	TOTAL (ROW%)	10.50 (6)	45.08 (26)	8.43 (5)	112.72 (64)	176.71 (100)
DOD TOTAL	(ROW%)	38.90 (10)	87.27 (22)	37.81 (10)	227.26 (58)	391.23 (100)

II-3-4

TABLE II-3

MPT PROGRAM FUNDING IN 1988
BASED ON FY88 PRESIDENT'S BUDGETCONGRESSIONAL CATEGORY BY PROGRAM ELEMENT
WITHIN DOD ORGANIZATION

DOD ORGANIZATION PROGRAM ELEMENT		1988 (\$MILLIONS)				TOTAL
		CONGRESSIONAL CATEGORY				
		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
ARMY						
61102A		0.94	4.32	0.67	1.11	7.03
	(ROW%)	(13)	(61)	(9)	(16)	(100)
62716A		0.00	15.37	0.00	0.00	15.37
	(ROW%)	(0)	(100)	(0)	(0)	(100)
62727A		0.00	0.00	0.00	4.01	4.01
	(ROW%)	(0)	(0)	(0)	(100)	(100)
62785A		2.66	4.57	5.19	3.16	15.59
	(ROW%)	(17)	(29)	(33)	(20)	(100)
63003A		0.00	0.00	0.00	6.78	6.78
	(ROW%)	(0)	(0)	(0)	(100)	(100)
63007A		8.85	8.22	15.32	5.77	38.17
	(ROW%)	(23)	(22)	(40)	(15)	(100)
64715A		0.00	0.00	0.00	32.54	32.54
	(ROW%)	(0)	(0)	(0)	(100)	(100)
64722A		5.45	0.00	0.00	0.00	5.45
	(ROW%)	(100)	(0)	(0)	(0)	(100)
64801A		0.00	0.00	0.00	9.65	9.65
	(ROW%)	(0)	(0)	(0)	(100)	(100)
ARMY	TOTAL	17.91	32.48	21.18	63.04	134.59
	(ROW%)	(13)	(24)	(16)	(47)	(100)

TABLE II-3

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1988 (\$MILLIONS)				TOTAL
		CONGRESSIONAL CATEGORY				
PROGRAM ELEMENT		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
NAVY						
61153N		5.63	2.15	2.46	0.00	10.24
	(ROW%)	(55)	(21)	(24)	(0)	(100)
62131M		0.23	0.00	0.25	0.00	0.48
	(ROW%)	(48)	(0)	(52)	(0)	(100)
62233N		1.94	0.00	3.07	3.46	8.47
	(ROW%)	(23)	(0)	(36)	(41)	(100)
62234N		0.00	3.77	0.00	0.00	3.77
	(ROW%)	(0)	(100)	(0)	(0)	(100)
63701N		0.00	4.80	0.00	0.00	4.80
	(ROW%)	(0)	(100)	(0)	(0)	(100)
63707N		0.00	0.00	4.02	0.00	4.02
	(ROW%)	(0)	(0)	(100)	(0)	(100)
63720N		7.70	0.00	0.00	0.00	7.70
	(ROW%)	(100)	(0)	(0)	(0)	(100)
63732M		0.00	0.00	3.21	0.00	3.21
	(ROW%)	(0)	(0)	(100)	(0)	(100)
63733N		0.00	0.00	0.00	8.46	8.46
	(ROW%)	(0)	(0)	(0)	(100)	(100)
63739N		0.00	0.98	0.00	0.00	0.98
	(ROW%)	(0)	(100)	(0)	(0)	(100)
64703N		0.00	0.00	3.11	0.00	3.11
	(ROW%)	(0)	(0)	(100)	(0)	(100)
64714N		0.00	0.00	0.00	1.93	1.93
	(ROW%)	(0)	(0)	(0)	(100)	(100)
64715N		0.00	0.00	0.00	17.20	17.20
	(ROW%)	(0)	(0)	(0)	(100)	(100)
NAVY	TOTAL	-----	-----	-----	-----	-----
	(ROW%)	15.50	11.70	16.12	31.06	74.36
		(21)	(16)	(22)	(42)	(100)

TABLE II-3

MPT PROGRAM FUNDING IN 1988
BASED ON FY88 PRESIDENT'S BUDGETCONGRESSIONAL CATEGORY BY PROGRAM ELEMENT
WITHIN DOD ORGANIZATION

DOD ORGANIZATION PROGRAM ELEMENT		1988 (\$MILLIONS)				TOTAL
		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
AF						
	61102F (ROW%)	0.00 (0)	7.64 (90)	0.89 (10)	0.00 (0)	8.53 (100)
	62202F (ROW%)	0.00 (0)	15.42 (100)	0.00 (0)	0.00 (0)	15.42 (100)
	62205F (ROW%)	9.92 (28)	6.44 (18)	7.44 (21)	12.15 (34)	35.94 (100)
	63106F (ROW%)	0.00 (0)	12.75 (100)	0.00 (0)	0.00 (0)	12.75 (100)
	63227F (ROW%)	1.20 (11)	0.00 (0)	0.83 (8)	8.88 (81)	10.91 (100)
	63231F (ROW%)	0.00 (0)	7.52 (100)	0.00 (0)	0.00 (0)	7.52 (100)
	63751F (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.28 (100)	0.28 (100)
	64227F (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	61.71 (100)	61.71 (100)
AF	TOTAL (ROW%)	11.12 (7)	49.77 (33)	9.16 (6)	83.01 (54)	153.05 (100)
DOD	TOTAL (ROW%)	44.53 (12)	93.93 (26)	46.45 (13)	177.09 (49)	361.99 (100)

TABLE II-4

MPT PROGRAM FUNDING IN 1987
BASED ON FY88 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY

1987 (\$MILLIONS)

BUDGET CATEGORY	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
6.1 (ROW%)	7.47 (29)	12.85 (50)	4.30 (17)	1.11 (4)	25.73 (100)
6.2 (ROW%)	14.08 (15)	46.75 (48)	14.77 (15)	21.27 (22)	96.87 (100)
6.3 (ROW%)	12.60 (15)	27.65 (33)	13.11 (15)	31.50 (37)	84.87 (100)
6.4 (ROW%)	4.21 (2)	0.00 (0)	0.95 (1)	173.35 (97)	178.51 (100)
6.5 (ROW%)	0.52 (12)	0.00 (0)	3.82 (88)	0.00 (0)	4.34 (100)
9.2 (ROW%)	0.00 (0)	0.00 (0)	0.83 (100)	0.00 (0)	0.83 (100)
TOTAL (ROW%)	38.88 (10)	87.26 (22)	37.78 (10)	227.24 (58)	391.16 (100)

MPT PROGRAM FUNDING IN 1988
BASED ON FY88 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY

BUDGET CATEGORY	CATEGORY			TOTAL	
	P	ST			
6.1 (ROW%)	6.57 (25)	4.00 (16)	1.11 (4)	25.78 (100)	
6.2 (ROW%)	14.75 (15)	45.56 (46)	15.94 (16)	22.78 (23)	99.04 (100)
6.3 (ROW%)	17.75 (17)	34.25 (32)	23.39 (22)	30.16 (29)	105.55 (100)
6.4 (ROW%)	5.45 (4)	0.00 (0)	3.11 (2)	123.02 (93)	131.57 (100)
TOTAL (ROW%)	44.51 (12)	93.91 (26)	46.44 (13)	177.07 (49)	361.94 (100)

TABLE II-5

MPT PROGRAM FUNDING IN 1987
BASED ON FY88 PRESIDENT'S BUDGETCONGRESSIONAL CATEGORY BY BUDGET CATEGORY
WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY		1987 (\$MILLIONS)				TOTAL
		CONGRESSIONAL CATEGORY				
		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
FM&P						
6.5	(ROW%)	0.53 (12)	0.00 (0)	3.82 (88)	0.00 (0)	4.35 (100)
9.2	(ROW%)	0.00 (0)	0.00 (0)	0.83 (100)	0.00 (0)	0.83 (100)
FM&P	TOTAL (ROW%)	0.53 (10)	0.00 (0)	4.65 (90)	0.00 (0)	5.18 (100)

II-5-1

TABLE II-5

MPT PROGRAM FUNDING IN 1987
BASED ON FY88 PRESIDENT'S BUDGETCONGRESSIONAL CATEGORY BY BUDGET CATEGORY
WITHIN DOD ORGANIZATION

1987 (\$MILLIONS)

DOD ORGANIZATION		CONGRESSIONAL CATEGORY				TOTAL
BUDGET CATEGORY	ET	HF	MP	ST		
ARMY						
6.1	1.04	3.70	0.61	1.11	6.46	
(ROW%)	(16)	(57)	(9)	(17)	(100)	
6.2	2.56	22.34	4.73	7.18	36.81	
(ROW%)	(7)	(61)	(13)	(20)	(100)	
6.3	6.76	7.69	7.69	19.42	41.57	
(ROW%)	(16)	(19)	(19)	(47)	(100)	
6.4	4.21	0.00	0.00	53.53	57.74	
(ROW%)	(7)	(0)	(0)	(93)	(100)	
ARMY TOTAL						
(ROW%)	14.57	33.73	13.04	81.25	142.58	
	(10)	(24)	(9)	(57)	(100)	

II-5-2

TABLE II-5

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY		1987 (\$MILLIONS)				TOTAL
		CONGRESSIONAL CATEGORY				
		ET	HF	MP	ST	
NAVY		-----	-----	-----	-----	-----
6.1	(ROW%)	6.43 (55)	2.45 (21)	2.81 (24)	0.00 (0)	11.69 (100)
6.2	(ROW%)	2.11 (17)	3.59 (29)	3.29 (27)	3.41 (28)	12.39 (100)
6.3	(ROW%)	4.76 (26)	2.42 (13)	4.64 (25)	6.47 (35)	18.29 (100)
6.4	(ROW%)	0.00 (0)	0.00 (0)	0.95 (4)	23.41 (96)	24.36 (100)
NAVY	TOTAL (ROW%)	13.29 (20)	8.47 (13)	11.68 (18)	33.29 (50)	66.72 (100)

II-5-3

TABLE II-5

MPT PROGRAM FUNDING IN 1987
BASED ON FY88 PRESIDENT'S BUDGETCONGRESSIONAL CATEGORY BY BUDGET CATEGORY
WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY		1987 (\$MILLIONS)				TOTAL
		ET	HF	MP	ST	
AF						
6.1	(ROW%)	0.00 (0)	6.70 (88)	0.88 (12)	0.00 (0)	7.58 (100)
6.2	(ROW%)	9.41 (20)	20.83 (44)	6.75 (14)	10.68 (22)	47.68 (100)
6.3	(ROW%)	1.08 (4)	17.53 (70)	0.78 (3)	5.62 (22)	25.01 (100)
6.4	(ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	96.41 (100)	96.41 (100)
AF	TOTAL (ROW%)	10.49 (6)	45.07 (26)	8.42 (5)	112.70 (64)	176.68 (100)
DOD	TOTAL (ROW%)	38.88 (10)	87.26 (22)	37.78 (10)	227.24 (58)	391.16 (100)

II-5-4

TABLE II-5

MPT PROGRAM FUNDING IN 1988
BASED ON FY88 PRESIDENT'S BUDGETCONGRESSIONAL CATEGORY BY BUDGET CATEGORY
WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY		1988 (\$MILLIONS)				TOTAL
		CONGRESSIONAL CATEGORY				
		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
ARMY						
6.1	(ROW%)	0.94 (13)	4.32 (61)	0.66 (9)	1.11 (16)	7.03 (100)
6.2	(ROW%)	2.66 (8)	19.94 (57)	5.19 (15)	7.17 (21)	34.96 (100)
6.3	(ROW%)	8.85 (20)	8.22 (18)	15.32 (34)	12.55 (28)	44.94 (100)
6.4	(ROW%)	5.45 (11)	0.00 (0)	0.00 (0)	42.19 (89)	47.64 (100)
ARMY	TOTAL (ROW%)	17.90 (13)	32.47 (24)	21.17 (16)	63.03 (47)	134.57 (100)

II-5-5

TABLE II-5

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

1988 (\$MILLIONS)

DOD ORGANIZATION BUDGET CATEGORY		CONGRESSIONAL CATEGORY				TOTAL
		ET	HF	MP	ST	
NAVY						
6.1	(ROW%)	5.63 (55)	2.15 (21)	2.46 (24)	0.00 (0)	10.23 (100)
6.2	(ROW%)	2.17 (17)	3.77 (30)	3.32 (26)	3.46 (27)	12.71 (100)
6.3	(ROW%)	7.70 (26)	5.78 (20)	7.23 (25)	8.46 (29)	29.16 (100)
6.4	(ROW%)	0.00 (0)	0.00 (0)	3.11 (14)	19.13 (86)	22.23 (100)
NAVY	TOTAL (ROW%)	15.50 (21)	11.69 (16)	16.11 (22)	31.05 (42)	74.34 (100)

II-5-6

TABLE II-5

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1988 (\$MILLIONS)				
		CONGRESSIONAL CATEGORY				
BUDGET CATEGORY		ET	HF	MP	ST	TOTAL
		-----	-----	-----	-----	-----
AF						
6.1	(ROW%)	0.00 (0)	7.64 (90)	0.88 (10)	0.00 (0)	8.52 (100)
6.2	(ROW%)	9.92 (19)	21.86 (43)	7.44 (14)	12.14 (24)	51.36 (100)
6.3	(ROW%)	1.20 (4)	20.26 (64)	0.83 (3)	9.15 (29)	31.44 (100)
6.4	(ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	61.76 (100)	61.70 (100)
AF	TOTAL (ROW%)	11.11 (7)	49.76 (33)	9.15 (6)	83.00 (54)	153.02 (100)
DOD	TOTAL (ROW%)	44.51 (12)	93.91 (26)	46.44 (13)	177.07 (49)	361.94 (100)

11-5-7

TABLE II-6

MPT PROGRAM FUNDING IN 1987
BASED ON FY88 PRESIDENT'S BUDGET

DOD GOAL BY BUDGET CATEGORY

1987 (\$MILLIONS)

BUDGET CATEGORY	DOD GOAL						VAR	TOTAL
	1	2	3	4	5	6		
6.1 (ROW%)	0.00 (0)	0.88 (3)	3.84 (15)	13.46 (52)	0.00 (0)	7.54 (29)	0.00 (0)	25.73 (100)
6.2 (ROW%)	0.00 (0)	9.37 (10)	1.06 (1)	37.81 (39)	0.00 (0)	25.74 (27)	22.88 (24)	96.87 (100)
6.3 (ROW%)	1.78 (2)	11.33 (13)	0.00 (0)	27.65 (33)	0.00 (0)	44.11 (52)	0.00 (0)	84.87 (100)
6.4 (ROW%)	0.00 (0)	0.95 (1)	0.00 (0)	0.00 (0)	0.00 (0)	177.56 (99)	0.00 (0)	178.51 (100)
6.5 (ROW%)	3.05 (70)	0.68 (16)	0.00 (0)	0.13 (3)	0.10 (2)	0.40 (9)	0.00 (0)	4.34 (100)
9.2 (ROW%)	0.71 (85)	0.13 (15)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.83 (100)
TOTAL (ROW%)	5.53 (1)	23.34 (6)	4.90 (1)	79.05 (20)	0.10 (0)	255.35 (65)	22.88 (6)	391.16 (100)

MPT PROGRAM FUNDING IN 1988
BASED ON FY88 PRESIDENT'S BUDGET

DOD GOAL BY BUDGET CATEGORY

1988 (\$MILLIONS)

BUDGET CATEGORY	DOD GOAL						VAR	TOTAL
	1	2	3	4	5	6		
6.1 (ROW%)	0.00 (0)	0.88 (3)	3.40 (13)	14.76 (57)	0.00 (0)	6.74 (26)	0.00 (0)	25.78 (100)
6.2 (ROW%)	0.00 (0)	10.27 (10)	1.33 (1)	36.31 (37)	0.00 (0)	27.95 (28)	23.17 (23)	99.04 (100)
6.3 (ROW%)	3.21 (3)	20.18 (19)	0.98 (1)	33.27 (32)	0.00 (0)	47.91 (45)	0.00 (0)	105.55 (100)
6.4 (ROW%)	0.00 (0)	3.11 (2)	0.00 (0)	0.00 (0)	0.00 (0)	128.47 (98)	0.00 (0)	131.57 (100)
TOTAL (ROW%)	3.21 (1)	34.44 (10)	5.71 (2)	84.35 (23)	0.00 (0)	211.06 (58)	23.17 (6)	361.94 (100)

TABLE II-7

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1987 (\$MILLIONS)							
BUDGET CATEGORY	DOD GOAL						VAR	TOTAL	
	1	2	3	4	5	6			
	-----	-----	-----	-----	-----	-----	-----	-----	
FM&P									
6.5	3.05	0.68	0.00	0.13	0.10	0.40	0.00	4.36	
(ROW%)	(70)	(16)	(0)	(3)	(2)	(9)	(0)	(100)	
9.2	0.71	0.13	0.00	0.00	0.00	0.00	0.00	0.83	
(ROW%)	(85)	(15)	(0)	(0)	(0)	(0)	(0)	(100)	
FM&P TOTAL	-----	-----	-----	-----	-----	-----	-----	-----	
	3.76	0.80	0.00	0.13	0.10	0.40	0.00	5.19	
(ROW%)	(72)	(15)	(0)	(2)	(2)	(8)	(0)	(100)	

II-7-1

TABLE II-7

MPT PROGRAM FUNDING IN 1987
BASED ON FY88 PRESIDENT'S BUDGETDOD GOAL BY BUDGET CATEGORY
WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
ARMY								
6.1	0.00	0.00	1.04	4.31	0.00	1.11	0.00	6.46
(ROW%)	(0)	(0)	(16)	(67)	(0)	(17)	(0)	(100)
6.2	0.00	2.54	0.00	14.92	0.00	7.19	12.17	36.81
(ROW%)	(0)	(7)	(0)	(41)	(0)	(20)	(33)	(100)
6.3	0.00	7.69	0.00	7.69	0.00	26.19	0.00	41.58
(ROW%)	(0)	(19)	(0)	(19)	(0)	(63)	(0)	(100)
6.4	0.00	0.00	0.00	0.00	0.00	57.74	0.00	57.74
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)
ARMY TOTAL	0.00	10.23	1.04	26.92	0.00	92.23	12.17	142.59
(ROW%)	(0)	(7)	(1)	(19)	(0)	(65)	(9)	(100)

II-7-2

TABLE II-7

MPT PROGRAM FUNDING IN 1987
BASED ON FY88 PRESIDENT'S BUDGETDOD GOAL BY BUDGET CATEGORY
WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
NAVY								
6.1 (ROW%)	0.00 (0)	0.00 (0)	2.81 (24)	2.46 (21)	0.00 (0)	6.43 (55)	0.00 (0)	11.69 (100)
6.2 (ROW%)	0.00 (0)	3.29 (27)	0.00 (0)	3.89 (31)	0.00 (0)	5.22 (42)	0.00 (0)	12.39 (100)
6.3 (ROW%)	1.78 (10)	2.86 (16)	0.00 (0)	2.43 (13)	0.00 (0)	11.23 (61)	0.00 (0)	18.29 (100)
6.4 (ROW%)	0.00 (0)	0.95 (4)	0.00 (0)	0.00 (0)	0.00 (0)	23.41 (96)	0.00 (0)	24.36 (100)
NAVY TOTAL (ROW%)	1.78 (3)	7.09 (11)	2.81 (4)	8.77 (13)	0.00 (0)	46.28 (69)	0.00 (0)	66.73 (100)

II-7-3

TABLE II-7

MPT PROGRAM FUNDING IN 1987
BASED ON FY88 PRESIDENT'S BUDGETDOD GOAL BY BUDGET CATEGORY
WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	DOD GOAL							
	1	2	3	4	5	6		
AF								
6.1	0.00	0.89	0.00	6.70	0.00	0.00	0.00	7.59
(ROW%)	(0)	(12)	(0)	(88)	(0)	(0)	(0)	(100)
6.2	0.00	3.55	1.06	19.01	0.00	13.34	10.72	47.69
(ROW%)	(0)	(7)	(2)	(40)	(0)	(28)	(22)	(100)
6.3	0.00	0.78	0.00	17.54	0.00	6.70	0.00	25.02
(ROW%)	(0)	(3)	(0)	(70)	(0)	(27)	(0)	(100)
6.4	0.00	0.00	0.00	0.00	0.00	96.42	0.00	96.42
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)
AF TOTAL	0.00	5.22	1.06	43.25	0.00	116.46	10.72	176.71
(ROW%)	(0)	(3)	(1)	(24)	(0)	(66)	(6)	(100)
DOD TOTAL	5.55	23.34	4.91	79.07	0.10	255.38	22.89	391.23
(ROW%)	(1)	(6)	(1)	(20)	(0)	(65)	(6)	(100)

II-7-4

TABLE II-7

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

1988 (\$MILLIONS)

DOD ORGANIZATION BUDGET CATEGORY	DOD GOAL						VAR	TOTAL
	1	2	3	4	5	6		
ARMY								
6.1 (ROW%)	0.00 (0)	0.00 (0)	0.94 (13)	4.98 (71)	0.00 (0)	1.11 (16)	0.00 (0)	7.03 (100)
6.2 (ROW%)	0.00 (0)	3.06 (9)	0.00 (0)	12.34 (35)	0.00 (0)	7.45 (21)	12.12 (35)	34.97 (100)
6.3 (ROW%)	0.00 (0)	15.32 (34)	0.00 (0)	8.22 (18)	0.00 (0)	21.41 (48)	0.00 (0)	44.95 (100)
6.4 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	47.64 (100)	0.00 (0)	47.64 (100)
ARMY TOTAL (ROW%)	0.00 (0)	18.38 (14)	0.94 (1)	25.54 (19)	0.00 (0)	77.61 (58)	12.12 (9)	134.59 (100)

II-7-5

TABLE II-7

MPT PROGRAM FUNDING IN 1988
BASED ON FY88 PRESIDENT'S BUDGETDOD GOAL BY BUDGET CATEGORY
WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1988 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
NAVY								
6.1 (ROW%)	0.00 (0)	0.00 (0)	2.46 (24)	2.15 (21)	0.00 (0)	5.63 (55)	0.00 (0)	10.23 (100)
6.2 (ROW%)	0.00 (0)	3.32 (26)	0.00 (0)	4.00 (31)	0.00 (0)	5.40 (42)	0.00 (0)	12.72 (100)
6.3 (ROW%)	3.21 (11)	4.02 (14)	0.98 (3)	4.80 (16)	0.00 (0)	16.16 (55)	0.00 (0)	29.17 (100)
6.4 (ROW%)	0.00 (0)	3.11 (14)	0.00 (0)	0.00 (0)	0.00 (0)	19.13 (86)	0.00 (0)	22.24 (100)
NAVY TOTAL (ROW%)	3.21 (4)	10.44 (14)	3.44 (5)	10.94 (15)	0.00 (0)	46.32 (62)	0.00 (0)	74.35 (100)

II-7-6

TABLE II-7

MPT PROGRAM FUNDING IN 1988
BASED ON FY88 PRESIDENT'S BUDGETDOD GOAL BY BUDGET CATEGORY
WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1988 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
AF								
6.1 (ROW%)	0.00 (0)	0.89 (10)	0.00 (0)	7.64 (90)	0.00 (0)	0.00 (0)	0.00 (0)	8.52 (100)
6.2 (ROW%)	0.00 (0)	3.89 (8)	1.33 (3)	19.98 (39)	0.00 (0)	15.10 (29)	11.06 (22)	51.36 (100)
6.3 (ROW%)	0.00 (0)	0.83 (3)	0.00 (0)	20.27 (64)	0.00 (0)	10.35 (33)	0.00 (0)	31.45 (100)
6.4 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	61.71 (100)	0.00 (0)	61.71 (100)
AF TOTAL (ROW%)	0.00 (0)	5.61 (4)	1.33 (1)	47.88 (31)	0.00 (0)	87.16 (57)	11.06 (7)	153.04 (100)
DOD TOTAL (ROW%)	3.21 (1)	34.44 (10)	5.71 (2)	84.36 (23)	0.00 (0)	211.08 (58)	23.18 (6)	361.99 (100)

II-7-7

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - ET

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
FM&P								
6.5 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.13 (24)	0.00 (0)	0.40 (76)	0.00 (0)	0.53 (100)
FM&P TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.13 (24)	0.00 (0)	0.40 (76)	0.00 (0)	0.53 (100)

II-8-1

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY = ET

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
ARMY								
6.1 (ROW%)	0.00 (0)	0.00 (0)	1.04 (100)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	1.04 (100)
6.2 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	1.37 (54)	1.19 (46)	2.56 (100)
6.3 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	6.76 (100)	0.00 (0)	6.76 (100)
6.4 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	4.21 (100)	0.00 (0)	4.21 (100)
ARMY TOTAL (ROW%)	0.00 (0)	0.00 (0)	1.04 (7)	0.00 (0)	0.00 (0)	12.35 (85)	1.19 (8)	14.57 (100)

II-8-2

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY = ET

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	DOD GOAL							
	1	2	3	4	5	6		
NAVY								
6.1	0.00	0.00	0.00	0.00	0.00	6.43	0.00	6.43
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)
6.2	0.00	0.00	0.00	0.30	0.00	1.81	0.00	2.11
(ROW%)	(0)	(0)	(0)	(14)	(0)	(86)	(0)	(100)
6.3	0.00	0.00	0.00	0.00	0.00	4.76	0.00	4.76
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)
NAVY TOTAL	0.00	0.00	0.00	0.30	0.00	12.99	0.00	13.30
(ROW%)	(0)	(0)	(0)	(2)	(0)	(98)	(0)	(100)

II-8-3

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - ET

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

1987 (\$MILLIONS)

DOD ORGANIZATION BUDGET CATEGORY	DOD GOAL						VAR	TOTAL
	1	2	3	4	5	6		
AF								
6.2 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	6.20 (66)	3.22 (34)	9.42 (100)
6.3 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	1.08 (100)	0.00 (0)	1.08 (100)
AF TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	7.28 (69)	3.22 (31)	10.50 (100)
DOD TOTAL (ROW%)	0.00 (0)	0.00 (0)	1.04 (3)	0.43 (1)	0.00 (0)	33.03 (85)	4.40 (11)	38.89 (100)

II-8-4

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - HF

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
ARMY								
6.1 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	3.70 (100)	0.00 (0)	0.00 (0)	0.00 (0)	3.70 (100)
6.2 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	14.92 (67)	0.00 (0)	0.00 (0)	7.42 (33)	22.34 (100)
6.3 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	7.69 (100)	0.00 (0)	0.00 (0)	0.00 (0)	7.69 (100)
ARMY TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	26.31 (78)	0.00 (0)	0.00 (0)	7.42 (22)	33.73 (100)

II-8-5

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - HF

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1987 (\$MILLIONS)							
BUDGET CATEGORY	DOD GOAL						VAR	TOTAL	
	1	2	3	4	5	6			
NAVY									
6.1	0.00	0.00	0.00	2.46	0.00	0.00	0.00	2.46	
(ROW%)	(0)	(0)	(0)	(100)	(0)	(0)	(0)	(100)	
6.2	0.00	0.00	0.00	3.59	0.00	0.00	0.00	3.59	
(ROW%)	(0)	(0)	(0)	(100)	(0)	(0)	(0)	(100)	
6.3	0.00	0.00	0.00	2.43	0.00	0.00	0.00	2.43	
(ROW%)	(0)	(0)	(0)	(100)	(0)	(0)	(0)	(100)	
NAVY TOTAL	0.00	0.00	0.00	8.47	0.00	0.00	0.00	8.47	
(ROW%)	(0)	(0)	(0)	(100)	(0)	(0)	(0)	(100)	

II-8-6

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY = HF

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

1987 (\$MILLIONS)

DOD ORGANIZATION BUDGET CATEGORY	DOD GOAL						VAR	TOTAL
	1	2	3	4	5	6		
AF								
6.1 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	6.70 (100)	0.00 (0)	0.00 (0)	0.00 (0)	6.70 (100)
6.2 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	19.01 (91)	0.00 (0)	0.00 (0)	1.82 (9)	20.84 (100)
6.3 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	17.54 (100)	0.00 (0)	0.00 (0)	0.00 (0)	17.54 (100)
AF TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	43.25 (96)	0.00 (0)	0.00 (0)	1.82 (4)	45.07 (100)
DOD TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	78.03 (89)	0.00 (0)	0.00 (0)	9.24 (11)	87.27 (100)

II-8-7

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - MP

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
FM&P								
6.5 (ROW%)	3.05 (80)	0.68 (18)	0.00 (0)	0.00 (0)	0.10 (3)	0.00 (0)	0.00 (0)	3.83 (100)
9.2 (ROW%)	0.71 (85)	0.13 (15)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.83 (100)
FM&P TOTAL (ROW%)	3.76 (81)	0.80 (17)	0.00 (0)	0.00 (0)	0.10 (2)	0.00 (0)	0.00 (0)	4.67 (100)

II-8-8

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - MP

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
ARMY								
6.1 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.61 (100)	0.00 (0)	0.00 (0)	0.00 (0)	0.61 (100)
6.2 (ROW%)	0.00 (0)	2.54 (54)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	2.19 (46)	4.73 (100)
6.3 (ROW%)	0.00 (0)	7.69 (100)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	7.69 (100)
ARMY TOTAL (ROW%)	0.00 (0)	10.23 (78)	0.00 (0)	0.61 (5)	0.00 (0)	0.00 (0)	2.19 (17)	13.04 (100)

II-8-9

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY = MP

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	DOD GOAL							
	1	2	3	4	5	6		
NAVY								
6.1	0.00	0.00	2.81	0.00	0.00	0.00	0.00	2.81
(ROW%)	(0)	(0)	(100)	(0)	(0)	(0)	(0)	(100)
6.2	0.00	3.29	0.00	0.00	0.00	0.00	0.00	3.29
(ROW%)	(0)	(100)	(0)	(0)	(0)	(0)	(0)	(100)
6.3	1.78	2.86	0.00	0.00	0.00	0.00	0.00	4.64
(ROW%)	(38)	(62)	(0)	(0)	(0)	(0)	(0)	(100)
6.4	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.95
(ROW%)	(0)	(100)	(0)	(0)	(0)	(0)	(0)	(100)
NAVY TOTAL	1.78	7.09	2.81	0.00	0.00	0.00	0.00	11.68
(ROW%)	(15)	(61)	(24)	(0)	(0)	(0)	(0)	(100)

II-8-10

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - MP

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
AF								
6.1	0.00	0.89	0.00	0.00	0.00	0.00	0.00	0.89
(ROW%)	(0)	(100)	(0)	(0)	(0)	(0)	(0)	(100)
6.2	0.00	3.55	1.06	0.00	0.00	0.00	2.14	6.75
(ROW%)	(0)	(53)	(16)	(0)	(0)	(0)	(32)	(100)
6.3	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.78
(ROW%)	(0)	(100)	(0)	(0)	(0)	(0)	(0)	(100)
AF TOTAL	0.00	5.22	1.06	0.00	0.00	0.00	2.14	8.42
(ROW%)	(0)	(62)	(13)	(0)	(0)	(0)	(25)	(100)
DOD TOTAL	5.55	23.34	3.87	0.61	0.10	0.00	4.34	37.81
(ROW%)	(15)	(62)	(10)	(2)	(0)	(0)	(11)	(100)

II-8-11

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET;
 FOR CONGRESSIONAL CATEGORY - ST

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
ARMY								
6.1 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	1.11 (100)	0.00 (0)	1.11 (100)
6.2 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	5.81 (81)	1.37 (19)	7.18 (100)
6.3 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	19.43 (100)	0.00 (0)	19.43 (100)
6.4 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	53.53 (100)	0.00 (0)	53.53 (100)
ARMY TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	79.88 (98)	1.37 (2)	81.25 (100)

II-8-12

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - ST

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
NAVY								
6.2	0.00	0.00	0.00	0.00	0.00	3.41	0.00	3.41
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)
6.3	0.00	0.00	0.00	0.00	0.00	6.47	0.00	6.47
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)
6.4	0.00	0.00	0.00	0.00	0.00	23.41	0.00	23.41
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)
NAVY TOTAL	0.00	0.00	0.00	0.00	0.00	33.29	0.00	33.29
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)

II-8-13

TABLE II-8

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY = ST

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1987 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
AF								
6.2 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	7.14 (67)	3.54 (33)	10.68 (100)
6.3 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	5.62 (100)	0.00 (0)	5.62 (100)
6.4 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	96.42 (100)	0.00 (0)	96.42 (100)
AF TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	109.18 (97)	3.54 (3)	112.72 (100)
DOD TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	222.35 (98)	4.91 (2)	227.26 (100)

II-8-14

TABLE II-8

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - ET

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1988 (\$MILLIONS)						VAR	TOTAL
	DOD GOAL							
	1	2	3	4	5	6		
ARMY								
6.1 (ROW%)	0.00 (0)	0.00 (0)	0.94 (100)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.94 (100)
6.2 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	1.57 (59)	1.09 (41)	2.66 (100)
6.3 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	8.85 (100)	0.00 (0)	8.85 (100)
6.4 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	5.45 (100)	0.00 (0)	5.45 (100)
ARMY TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.94 (5)	0.00 (0)	0.00 (0)	15.87 (89)	1.09 (6)	17.91 (100)

II-8-15

TABLE II-8

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - ET

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

1988 (\$MILLIONS)

DOD ORGANIZATION BUDGET CATEGORY	DOD GOAL						VAR	TOTAL
	1	2	3	4	5	6		
NAVY								
6.1 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	5.63 (100)	0.00 (0)	5.63 (100)
6.2 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.23 (11)	0.00 (0)	1.94 (89)	0.00 (0)	2.17 (100)
6.3 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	7.70 (100)	0.00 (0)	7.70 (100)
NAVY TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.23 (1)	0.00 (0)	15.27 (99)	0.00 (0)	15.50 (100)

II-8-16

TABLE II-8

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - ET

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1988 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
AF								
6.2 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	6.60 (67)	3.32 (33)	9.92 (100)
6.3 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	1.20 (100)	0.00 (0)	1.20 (100)
AF TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	7.80 (70)	3.32 (30)	11.12 (100)
DOD TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.94 (2)	0.23 (1)	0.00 (0)	38.94 (87)	4.41 (10)	44.52 (100)

II-8-17

TABLE II-8

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY = HF

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1988 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
ARMY								
6.1 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	4.32 (100)	0.00 (0)	0.00 (0)	0.00 (0)	4.32 (100)
6.2 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	12.34 (62)	0.00 (0)	0.00 (0)	7.60 (38)	19.94 (100)
6.3 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	8.22 (100)	0.00 (0)	0.00 (0)	0.00 (0)	8.22 (100)
ARMY TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	24.88 (77)	0.00 (0)	0.00 (0)	7.60 (23)	32.47 (100)

II-8-18

TABLE II-8

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - HF

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1988 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
NAVY								
6.1 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	2.15 (100)	0.00 (0)	0.00 (0)	0.00 (0)	2.15 (100)
6.2 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	3.77 (100)	0.00 (0)	0.00 (0)	0.00 (0)	3.77 (100)
6.3 (ROW%)	0.00 (0)	0.00 (0)	0.98 (17)	4.80 (83)	0.00 (0)	0.00 (0)	0.00 (0)	5.78 (100)
NAVY TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.98 (8)	10.71 (92)	0.00 (0)	0.00 (0)	0.00 (0)	11.69 (100)

II-8-19

TABLE II-8

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY = HF

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1988 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
AF								
6.1 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	7.64 (100)	0.00 (0)	0.00 (0)	0.00 (0)	7.64 (100)
6.2 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	19.98 (91)	0.00 (0)	3.00 (0)	1.88 (9)	21.86 (100)
6.3 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	20.27 (100)	0.00 (0)	0.00 (0)	0.00 (0)	20.27 (100)
AF TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	47.88 (96)	0.00 (0)	0.00 (0)	1.88 (4)	49.76 (100)
DOD TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.98 (1)	83.47 (89)	0.00 (0)	0.00 (0)	9.48 (10)	93.93 (100)

II-8-20

TABLE II-8

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY = MP

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1988 (\$MILLIONS)							
BUDGET CATEGORY	DOD GOAL						VAR	TOTAL	
	1	2	3	4	5	6			
ARMY									
6.1	0.00	0.00	0.00	0.66	0.00	0.00	0.00	0.66	
(ROW%)	(0)	(0)	(0)	(100)	(0)	(0)	(0)	(100)	
6.2	0.00	3.06	0.00	0.00	0.00	0.00	2.13	5.19	
(ROW%)	(0)	(59)	(0)	(0)	(0)	(0)	(41)	(100)	
6.3	0.00	15.32	0.00	0.00	0.00	0.00	0.00	15.32	
(ROW%)	(0)	(100)	(0)	(0)	(0)	(0)	(0)	(100)	
ARMY TOTAL	0.00	18.38	0.00	0.66	0.00	0.00	2.13	21.17	
(ROW%)	(0)	(87)	(0)	(3)	(0)	(0)	(10)	(100)	

11-8-21

TABLE II-8

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY = MP

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1988 (\$MILLIONS)						VAR	TOTAL
	DOD GOAL							
	1	2	3	4	5	6		
NAVY								
6.1 (ROW%)	0.00 (0)	0.00 (0)	2.46 (100)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	2.46 (100)
6.2 (ROW%)	0.00 (0)	3.32 (100)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	3.32 (100)
6.3 (ROW%)	3.21 (44)	4.02 (56)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	7.23 (100)
6.4 (ROW%)	0.00 (0)	3.11 (100)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	3.11 (100)
NAVY TOTAL (ROW%)	3.21 (20)	10.44 (65)	2.46 (15)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	16.11 (100)

II-8-22

TABLE II-8

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - MP

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1988 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
AF								
6.1 (ROW%)	0.00 (0)	0.89 (100)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.89 (100)
6.2 (ROW%)	0.00 (0)	3.89 (52)	1.33 (18)	0.00 (0)	0.00 (0)	0.00 (0)	2.21 (30)	7.44 (100)
6.3 (ROW%)	0.00 (0)	0.83 (100)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.83 (100)
AF TOTAL (ROW%)	0.00 (0)	5.61 (61)	1.33 (15)	0.00 (0)	0.00 (0)	0.00 (0)	2.21 (24)	9.16 (100)
DOD TOTAL (ROW%)	3.21 (7)	34.44 (74)	3.79 (8)	0.66 (1)	0.00 (0)	0.00 (0)	4.34 (9)	46.45 (100)

II-8-23

TABLE II-8

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - ST

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1988 (\$MILLIONS)						VAR	TOTAL
	1	2	3	4	5	6		
ARMY								
6.1 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	1.11 (100)	0.00 (0)	1.11 (100)
6.2 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	5.88 (82)	1.30 (18)	7.18 (100)
6.3 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	12.55 (100)	0.00 (0)	12.55 (100)
6.4 (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	42.19 (100)	0.00 (0)	42.19 (100)
ARMY TOTAL (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	61.74 (98)	1.30 (2)	63.03 (100)

II-8-24

TABLE II-8

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY - ST

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION BUDGET CATEGORY	1988 (\$MILLIONS)						VAR	TOTAL
	DOD GOAL							
	1	2	3	4	5	6		
NAVY								
6.2	0.00	0.00	0.00	0.00	0.00	3.46	0.00	3.46
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)
6.3	0.00	0.00	0.00	0.00	0.00	8.46	0.00	8.46
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)
6.4	0.00	0.00	0.00	0.00	0.00	19.13	0.00	19.13
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)
NAVY TOTAL	0.00	0.00	0.00	0.00	0.00	31.05	0.00	31.05
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)

II-8-25

TABLE II-8

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR CONGRESSIONAL CATEGORY = ST

DOD GOAL BY BUDGET CATEGORY
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1988 (\$MILLIONS)							
BUDGET CATEGORY	DCD GOAL						VAR	TOTAL	
	1	2	3	4	5	6			
AF									
6.2	0.00	0.00	0.00	0.00	0.00	8.50	3.65	12.15	
(ROW%)	(0)	(0)	(0)	(0)	(0)	(70)	(30)	(100)	
6.3	0.00	0.00	0.00	0.00	0.00	9.15	0.00	9.15	
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)	
6.4	0.00	0.00	0.00	0.00	0.00	61.71	0.00	61.71	
(ROW%)	(0)	(0)	(0)	(0)	(0)	(100)	(0)	(100)	
AF TOTAL	0.00	0.00	0.00	0.00	0.00	79.36	3.65	83.01	
(ROW%)	(0)	(0)	(0)	(0)	(0)	(96)	(4)	(100)	
DOD TOTAL	0.00	0.00	0.00	0.00	0.00	172.14	4.95	177.09	
(ROW%)	(0)	(0)	(0)	(0)	(0)	(97)	(3)	(100)	

II-8-26

TABLE II-9

MPT PROGRAM FUNDING IN 1987
BASED ON FY88 PRESIDENT'S BUDGET

DOD GOAL BY CONGRESSIONAL CATEGORY

1987 (\$MILLIONS)

CONGRESSIONAL CATEGORY	DOD GOAL						VAR	TOTAL
	1	2	3	4	5	6		
ET (ROW%)	0.00 (0)	0.00 (0)	1.04 (3)	0.43 (1)	0.00 (0)	33.02 (85)	4.40 (11)	38.88 (100)
HF (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	78.02 (89)	0.00 (0)	0.00 (0)	9.24 (11)	87.26 (100)
MP (ROW%)	5.53 (15)	23.34 (62)	3.87 (10)	0.61 (2)	0.10 (0)	0.00 (0)	4.34 (11)	37.78 (100)
ST (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	222.33 (98)	4.91 (2)	227.24 (100)
TOTAL (ROW%)	5.53 (1)	23.34 (6)	4.90 (1)	79.05 (20)	0.10 (0)	255.35 (65)	22.88 (6)	391.16 (100)

MPT PROGRAM FUNDING IN 1988
BASED ON FY88 PRESIDENT'S BUDGET

DOD GOAL BY CONGRESSIONAL CATEGORY

1988 (\$MILLIONS)

CONGRESSIONAL CATEGORY	DOD GOAL						VAR	TOTAL
	1	2	3	4	5	6		
ET (ROW%)	0.00 (0)	0.00 (0)	0.94 (2)	0.23 (1)	0.00 (0)	38.93 (87)	4.41 (10)	44.51 (100)
HF (ROW%)	0.00 (0)	0.00 (0)	0.98 (1)	83.46 (89)	0.00 (0)	0.00 (0)	9.48 (10)	93.91 (100)
MP (ROW%)	3.21 (7)	34.44 (74)	3.79 (8)	0.66 (1)	0.00 (0)	0.00 (0)	4.34 (9)	46.44 (100)
ST (ROW%)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	172.12 (97)	4.95 (3)	177.07 (100)
TOTAL (ROW%)	3.21 (1)	34.44 (10)	5.71 (2)	84.35 (23)	0.00 (0)	211.06 (58)	23.17 (6)	361.94 (100)

TABLE II-10

MPT PROGRAM FUNDING IN 1987
BASED ON FY88 PRESIDENT'S BUDGET

DOD GOAL BY DOD ORGANIZATION

1987 (\$MILLIONS)

DOD ORGANIZATION	DOD GOAL						VAR	TOTAL
	1	2	3	4	5	6		
FM&P (ROW%)	3.75 (72)	0.80 (15)	0.00 (0)	0.13 (2)	0.10 (2)	0.40 (8)	0.00 (0)	5.18 (100)
ARMY (ROW%)	0.00 (0)	10.23 (7)	1.04 (1)	26.92 (19)	0.00 (0)	92.22 (65)	12.17 (9)	142.58 (100)
NAVY (ROW%)	1.78 (3)	7.09 (11)	2.81 (4)	8.77 (13)	0.00 (0)	46.28 (69)	0.00 (0)	66.72 (100)
AF (ROW%)	0.00 (0)	5.22 (3)	1.06 (1)	43.24 (24)	0.00 (0)	116.45 (66)	10.72 (6)	176.68 (100)
TOTAL (ROW%)	5.53 (1)	23.34 (6)	4.90 (1)	79.05 (20)	0.10 (0)	255.35 (65)	22.88 (6)	391.16 (100)

MPT PROGRAM FUNDING IN 1988
BASED ON FY88 PRESIDENT'S BUDGET

DOD GOAL BY DOD ORGANIZATION

1988 (\$MILLIONS)

DOD ORGANIZATION	DOD GOAL						VAR	TOTAL
	1	2	3	4	5	6		
ARMY (ROW%)	0.00 (0)	18.38 (14)	0.94 (1)	25.53 (19)	0.00 (0)	77.60 (58)	12.12 (9)	134.57 (100)
NAVY (ROW%)	3.21 (4)	10.44 (14)	3.44 (5)	10.94 (15)	0.00 (0)	46.31 (62)	0.00 (0)	74.34 (100)
AF (ROW%)	0.00 (0)	5.61 (4)	1.33 (1)	47.88 (31)	0.00 (0)	87.14 (57)	11.06 (7)	153.02 (100)
TOTAL (ROW%)	3.21 (1)	34.44 (10)	5.71 (2)	84.35 (23)	0.00 (0)	211.06 (58)	23.17 (6)	361.94 (100)

TABLE II-11

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR BUDGET CATEGORY = 6.1,6.2

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION
 1987 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
ARMY (ROW%)	3.59 (8)	26.03 (60)	5.34 (12)	8.30 (19)	43.26 (100)
NAVY (ROW%)	8.53 (35)	6.04 (25)	6.09 (25)	3.41 (14)	24.08 (100)
AF (ROW%)	9.41 (17)	27.53 (50)	7.64 (14)	10.68 (19)	55.26 (100)
TOTAL (ROW%)	21.54 (18)	59.60 (49)	19.07 (16)	22.38 (0)	122.60 (100)

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR BUDGET CATEGORY = 6.1,6.2

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION
 1988 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
ARMY (ROW%)	3.60 (9)	24.25 (58)	5.85 (14)	8.28 (20)	41.99 (100)
NAVY (ROW%)	7.80 (34)	5.91 (26)	5.77 (25)	3.46 (15)	22.95 (100)
AF (ROW%)	9.92 (17)	29.49 (49)	8.32 (14)	12.14 (20)	59.88 (100)
TOTAL (ROW%)	21.32 (17)	59.66 (48)	19.94 (16)	23.89 (0)	124.81 (100)

TABLE II-12

MPT PROGRAM FUNDING IN 1987
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR BUDGET CATEGORY = 6.1,6.2,6.3

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION

1987 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
ARMY (ROW%)	10.36 (12)	33.73 (40)	13.04 (15)	27.72 (33)	84.84 (100)
NAVY (ROW%)	13.29 (31)	8.47 (20)	10.73 (25)	9.87 (23)	42.36 (100)
AF (ROW%)	10.50 (13)	45.07 (56)	8.42 (10)	16.29 (20)	80.27 (100)
TOTAL (ROW%)	34.15 (16)	87.26 (42)	32.18 (16)	53.88 (26)	207.47 (100)

MPT PROGRAM FUNDING IN 1988
 BASED ON FY88 PRESIDENT'S BUDGET
 FOR BUDGET CATEGORY = 6.1,6.2,6.3

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION

1988 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
ARMY (ROW%)	12.46 (14)	32.47 (37)	21.17 (24)	20.84 (24)	86.93 (100)
NAVY (ROW%)	15.50 (30)	11.69 (22)	13.00 (25)	11.92 (23)	52.11 (100)
AF (ROW%)	11.12 (12)	49.76 (54)	9.15 (10)	21.29 (23)	91.32 (100)
TOTAL (ROW%)	39.07 (17)	93.91 (41)	43.33 (19)	54.05 (23)	230.36 (100)

II-12-1

III. PROGRAM ELEMENT AND PROJECT SYNOPSES

MANPOWER, PERSONNEL AND TRAINING
PROGRAM FUNDING BY SERVICE - JAN 1987

PE	TITLE	(\$ MILLIONS)			
		FY85	FY86	FY87	FY88

ARMY					

61102A	DEFENSE RESEARCH SCIENCES	7.1	7.4	6.5	7.1
62716A	HUMAN FACTORS ENGINEERING TECHNOLOGY	11.0	12.3	17.4	15.4
62717A	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION	5.2	0.0	0.0	0.0
62722A	MANPOWER, PERSONNEL AND TRAINING	6.8	0.0	0.0	0.0
62727A	NON-SYSTEM TRAINING DEVICES (NSTD) TECHNOLOGY	5.2	2.9	4.3	4.1
62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY	0.0	11.8	15.3	15.6
63003A	AVIATION ADVANCED TECHNOLOGY	0.0	12.0	10.8	6.8
63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY	11.4	36.6	27.2	38.2
63216A	SYNTHETIC FLIGHT SIMULATOR DEVELOPMENT	9.2	0.0	0.0	0.0
63731A	MANPOWER AND PERSONNEL	11.4	0.1	0.1	0.0
63736A	HUMAN FACTORS ENGINEERING APPLICATIONS	0.1	0.1	0.1	0.1
63738A	NON-SYSTEM TRAINING DEVICES (NSTD) ADVANCED DEVELOPMENT	1.9	1.9	3.8	0.1
63739A	HUMAN FACTORS IN TRAINING AND OPERATIONAL EFFECTIVENESS	9.7	0.0	0.0	0.0
63743A	EDUCATION AND TRAINING	10.1	0.0	0.0	0.0
63744A	TRAINING SIMULATION	7.7	0.0	0.0	0.0
64217A	SYNTHETIC FLIGHT TRAINING SYSTEMS	17.3	0.0	0.0	0.0
64715A	NON-SYSTEM TRAINING DEVICES (NSTD) ENGINEERING DEVELOPMENT	33.0	41.2	44.3	32.6
64722A	EDUCATION AND TRAINING SYSTEMS DEVELOPMENT	6.9	8.4	4.3	5.5
64801A	AVIATION ENGINEERING DEVELOPMENT	0.0	5.5	9.4	9.7

		SUBTOTAL - ARMY: 153.3 139.6 142.6 134.6			
NAVY					

61153N	DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: BEHAVIORAL AND ORGANIZATIONAL SCIENCES	12.5	12.1	11.7	10.3
62131M	MARINE CORPS LANDING FORCE TECHNOLOGY	0.9	0.5	0.7	0.5
62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA	7.3	7.7	8.2	8.5
62234N	SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA	3.3	4.1	3.6	3.8
62744N	MARINE CORPS AIR-GROUND TECHNOLOGY	0.0	0.0	0.0	0.0
62757N	HUMAN FACTORS AND SIMULATION TECHNOLOGY	0.0	0.0	0.0	0.0
62763N	PERSONNEL AND TRAINING TECHNOLOGY	0.0	0.0	0.0	0.0
63701N	HUMAN FACTORS ENGINEERING DEVELOPMENT	1.9	2.1	2.5	4.8
63707N	MANPOWER AND PERSONNEL SYSTEMS DEVELOPMENT	2.7	3.3	2.9	4.1
63710N	MAN-MACHINE TECHNOLOGY	0.0	0.0	0.0	0.0
63720N	EDUCATION AND TRAINING	3.5	3.0	4.8	7.7
63727N	ADVANCED TECHNOLOGY FOR LOGISTICS INFORMATION	0.0	0.0	0.0	0.0
63732M	ADVANCED MANPOWER/TRAINING SYSTEMS	2.9	2.2	1.8	3.3
63733N	SIMULATION AND TRAINING DEVICES	7.3	6.9	6.5	8.5
63739N	NAVY LOGISTICS PRODUCTIVITY	0.1	0.8	0.1	1.0
64703N	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS	5.1	5.3	1.0	3.2
64709N	JOINT SERVICE MANPOWER/PERSONNEL PROTOTYPES	0.0	0.0	0.0	0.0
64714N	AIR WARFARE TRAINING DEVICES	1.6	0.1	0.1	2.0
64715N	SURFACE WARFARE TRAINING DEVICES	24.6	18.7	23.5	17.2
64716N	SUBMARINE WARFARE TRAINING DEVICES	0.0	0.0	0.0	0.0

		SUBTOTAL - NAVY: 73.0 66.0 66.7 74.3			

MANPOWER, PERSONNEL AND TRAINING
PROGRAM FUNDING BY SERVICE - JAN 1987

PE	TITLE	(\$ MILLIONS)			
		FY85	FY86	FY87	FY88

AIR FORCE					

61102F	DEFENSE RESEARCH SCIENCES	6.2	6.7	7.6	8.6
62202F	AEROSPACE BIOTECHNOLOGY	10.7	10.6	15.3	15.5
62205F	PERSONNEL, TRAINING, AND SIMULATION	22.8	31.3	32.5	36.0
62703F	PERSONNEL UTILIZATION TECHNOLOGY	8.0	0.0	0.0	0.0
63106F	LOGISTICS SYSTEMS TECHNOLOGY	0.0	6.5	10.8	12.8
63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY	7.0	8.1	7.5	11.0
63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY	4.0	4.4	6.8	7.6
63365F	SPACE BIOTECHNOLOGY	0.0	0.0	0.0	0.0
63704F	MANPOWER AND PERSONNEL SYSTEMS TECHNOLOGY	2.0	0.0	0.0	0.0
63751F	TRAINING SYSTEMS TECHNOLOGY	5.3	0.1	0.1	0.3
64227F	FLIGHT SIMULATOR DEVELOPMENT	126.3	111.6	96.5	61.8

SUBTOTAL - AIR FORCE:		191.9	178.8	176.7	153.0

TOTAL:		418.1	384.5	386.0	361.9

TRAINING AND PERSONNEL TECHNOLOGY
RESEARCH ORGANIZATIONS

ARMY

AVRADCOM Army Aviation Research and Development Center
ARI Army Research Institute
HEL Army Human Engineering Laboratory
PMTRADE Project Manager for Training Devices

NAVY

HQMC Headquarters, US Marine Corps
NADC Naval Air Development Center
NAMRL Naval Aerospace Medical Research Laboratory
NAVAIR Naval Air Systems Command
NAVELEX Naval Electronic Systems Command
NAVSEA Naval Sea Systems Command
NOSC Naval Ocean Systems Center
NPRDC Navy Personnel Research and Development Center
NSRDC Naval Ship Research and Development Center
NSWC Naval Surface Weapons Center
NTSC Naval Training Systems Center
ONR Office of Naval Research

AIR FORCE

AFAMRL Air Force Aerospace Medical Research Laboratory
AFHRL Air Force Human Resources Laboratory
AFOSR Air Force Office of Scientific Research
AMD Aerospace Medical Division
SIMSPO Simulation Systems Project Office

III.A. ARMY PROGRAM ELEMENT AND PROJECT SYNOPSES

PE	TITLE	PAGE
61102A	DEFENSE RESEARCH SCIENCES	III-A-1
62716A	HUMAN FACTORS ENGINEERING SYSTEM DEVELOPMENT	III-A-11
62727A	NON-SYSTEM TRAINING DEVICES TECHNOLOGY	III-A-16
62785A	MANPOWER, PERSONNEL AND TRAINING TECHNOLOGY	III-A-20
63003A	AVAIATION ADVANCED TECHNOLOGY	III-A-32
63731A	HUMAN, FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY	III-A-36
63738A	NON-SYSTEM TRAINING DEVICES (NSTD) ADVANCED DEVELOPMENT	III-A-45
64715A	NON-SYSTEM TRAINING DEVICES ENGINEERING	III-A-47
64722A	EDUCATION AND TRAINING SYSTEMS	III-A-52
64801A	AVIATION ENGINEERING DEVELOPMENT	III-A-56

Table III-A-1: Listing of Projects - Lists projects for each ARMY program element. Lists contain performing organization, funding, Congressional Category and goal information.

III-A-i

PROGRAM ELEMENT OVERVIEW

PE: 61102A DEFENSE RESEARCH SCIENCES

CONGRESSIONAL CATEGORY: EDUCATION & TRAINING
HUMAN FACTORS
MANPOWER & PERSONNEL
SIMULATION & TRAINING DEVICES

DoD ORGANIZATION: ARMY

FUNDING: FY87 \$ 6.5M (FY88 PRESIDENT'S BUDGET)
FY88 \$ 7.0M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of the Manpower, Personnel and Training (MPT) portion of this Program Element is to produce data, concepts, and technology needed to support applied R&D advances in MPT.

To accomplish this objective, the research will: (a) capitalize on relevant new behavioral technological opportunities that have potential for increasing future operational Army personnel performance, (b) involve innovative civilian sector (university and industry) scientists in the discovery and adaptation of new technology to Army needs, and (c) form the behavioral science base to build new technologies for soldier and system effectiveness.

This effort includes the theoretical and experimental research to provide techniques to develop skills for the individual soldier, to improve soldier interactions with equipment, and to improve the soldier's performance in the combat environment.

In FY 87, the research focussed on new priorities which include: (a) planning, problem solving, and decision making, (b) unit performance, (c) skill building technology, and (d) designing systems for people. Planned Project emphasis on integration of human operators in systems design, Army unit performance, and organization and decision making could not be intensified because of late funding decrements.

The funding decrease for FY 88 reduces resources to meet an urgent requirement to develop tools to produce general officers and senior executive service leadership and to investigate, identify, and adapt unconventional techniques to enhance soldier capabilities in training, in operations, and under the stress that will be present on tomorrow's battlefields. To this end, project efforts to include research on accelerated learning, resistance to stress, and improved sustained operations techniques could only be achieved at the cost of reducing research efforts in leadership.

This program sustains the U.S. Army science and engineering base required to exploit new opportunities in rapidly advancing technological fields. The program supports theoretical and experimental research in the physical, mathematical, biological/medical, engineering, environmental, terrestrial and behavioral/social sciences. This research is focussed on the Army's key goals for effectiveness in the airland battle environment and the Army 21 concept to provide a lethal, integrated, supportable, highly mobile force with enhanced soldier effectiveness.

PAYOFF/UTILIZATION:

The payoff of the MPT portion of this Program Element is a behavioral science base on which to build new technologies to improve the effectiveness of soldiers and systems.

This basic research's contribution to the Army lies substantially in seeding

new exploratory and advanced development to enhance soldier performance and behavior, and in enlisting civilian scientific skills and facilities (university and industry) to cooperatively address Army needs to explore and transition new technologies into application to solve Army personnel problems.

Research in FY 86 fell into the four categories identified in the Synopsis above and included: (a) data and findings from the investigations of high stress materialistic settings point the way to develop Army decision aids and training for leaders in command and control, to enhance both individual and group decision making under extreme conditions, (b) transition of Stratified Systems Theory to application in ODCSPER organizational design, and (c) successful demonstration of prediction instruments to select, assign, and train on the basis of non-academic abilities or practical versus academic knowledge.

FUTURE DIRECTIONS:

In FY 89 and beyond, plans include research to support soldier performance in the areas of soldier/machine interface, individual soldier performance, and soldier protection as represented by the following efforts: (a) research to focus on filling soldier performance knowledge voids for improved human data processing in tactical environments, and the effects of stress and high mental workload imposed by high technology weapons systems, and (b) determine leadership qualities and evaluate leadership performance required for the distributed battlefield of the future.

PROJECT OVERVIEW

		87	88
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PROJECT: B74A	HUMAN ENGINEERING	\$ 2.4M	\$ 3.0M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY HUMAN ENGINEERING LABORATORY		

PROJECT SYNOPSIS:

The objective of this Project is to support human factors engineering by generating soldier performance data to develop better engineering design principles.

New information is needed on the capabilities and limitations of men and women so predictions can be made about soldier performance when using military equipment under all field conditions in all environments. Findings are used in the design of displays, controls, workspaces, and complex equipment such as command and control facilities. This effort will support fundamental research to stimulate scientific progress and novel human engineering concepts to provide options for future Army technology and to ensure against surprises in the operational capability of potential adversaries. The use of scientific results in Army applications, in exploiting novel concepts, and in efficiently transferring programs into exploratory development programs should maintain or increase the U.S. lead in critical areas of military technology.

In FY 87, it is planned to: (a) evaluate optimum visual displays of graphic data and auditory responses to alarms and signals to increase the performance of soldiers at command and control computer displays, (b) focus research on the integration of human operators in systems design, (c) develop a display assessment technology to evaluate allocation of attention resources and assess helicopter pilot performance and workload, (d) explore interactive effects on noise and hearing to include mathematical modeling of the inner, middle and outer ear processes and evaluations with intense/complex impulse characteristics of Army equipment, and (e) continue research to determine the reliability of brain response measures in predicting performance under high mental workloads.

Also in FY 87, the program will: (a) concentrate research in skill technologies on unconventional techniques to enhance soldier performance, including accelerated learning, resistance to stress, and improved sustained operations techniques, (b) concentrate research in unit performance on techniques for general officer leadership development, and (c) explore the implications of hearing hazard in an effort to clip certain spectral sound frequencies of small arms rounds as a means of reducing hearing loss without reducing weapon performance.

In FY 88, research efforts will fill soldier performance knowledge voids relative to: (a) improved human data processing in tactical environments, (b) the effects of stress and high mental workloads imposed by high technology weapon systems, and (c) the adverse characteristics of the battlefield environment.

Also in FY 88, it is planned to: (a) initiate a joint program between HEL, NVEOC, and TACOM utilizing the HEL oculometer research system to assess detection and recognition features of US armored combat vehicles through foreign sensor imaging, (b) investigate the physiological and psychological mechanisms of stress and develop a model of stress susceptibility, and (c)

continue to explore the implications of hearing hazard.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) the enhancement of the soldier-machine interface, to increase the soldier's ability to operate and maintain Army materiel, and (b) reduction of the manpower required to accomplish Army missions.

By fully understanding the soldier's physical and mental capabilities and limitations designers will be able to develop equipment that achieves the optimum man-machine interface and increases battlefield effectiveness. This would greatly improve operational readiness, combat effectiveness and sustainability in all mission crews.

In FY 86, accomplishments included: (a) establishment of a technique relating brain activity to performance during intense stimulation (light and sound) and high workloads which will permit careful evaluation of performance under stress, (b) development of a mathematical model to facilitate predictions of noise detectability at a distance from measures made close to the equipment, and (c) validation, by comparing infantrymen performance and inexperienced ROTC students in the simulation with live fire in the field, a testbed capable of supporting research involving rifle marksmanship. It was demonstrated that men with no previous experience in firing rifles were able to perform as well on live field fire as experienced infantrymen after receiving one week of training on the testbed. The research results have validated that the testbed will permit us to define, in a laboratory setting, the most effective and efficient training system to teach rifle marksmanship.

PROJECT OVERVIEW

		87	88
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PROJECT: B74F-1	PLANNING, PROBLEM SOLVING AND DECISION MAKING	\$ 0.6M	\$ 0.7M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

PROJECT SYNOPSIS:

The objective of this Task is to understand the biases and logical fallacies in human judgement, reasoning, and decision making, and to discover what can be done to compensate for these limitations.

As a result of larger, more rapid, and increasingly sophisticated computer-driven Army systems, decision-makers must function under conditions of extreme time stress and potential information overload. In numerous problem-solving situations, people perform more poorly than would be predicted on the basis of their existing knowledge or performance on related problems. They often do not use the knowledge they have, or are fixed in their approach to problems. Research is needed that will help: (a) to understand the process of knowledge access, cognitive flexibility, and generation of multiple and conflicting hypothesis, and (b) to design problem solving or planning aids to overcome these limitations.

Traditionally, decision research has relied on analysis of utilities, costs, and benefits, yielding decision support systems that quantify these factors and produce decision recommendations. However, recent efforts show that people do not use information as these models imply. Moreover, in real decision situations, available data may be incomplete or questionable. The psychology of decision-making and how intelligent computer systems could aid this process in a manner compatible with human thought processes needs to be investigated so that compatible systems can be designed. The relationship between decision making, planning, and problem-solving by individuals and group also needs to be addressed.

The development of computerized aids for problem-solving is of great interest to the Army. Methods and procedures used to solve problems include: (a) procedures of interactive branching techniques used in heuristic problem-solving, (b) rule-based problem-solving, (c) goal-directed problem-solving, (d) the nonlinear approach often used by experts, and (e) the inductive approach whereby individuals reason backward from fragmentary, less-than-perfect pieces of evidence to determine an underlying scheme, purpose, or reason. It is anticipated that, in the future, some Army problems will require rapid solutions from two or more individuals physically removed from each other who may not have access to identical databases. Types of network controls and mechanisms are necessary for such distributed group problem-solving and the extent of data based redundancy required in such situations is of concern.

Research is underway in the area of structured planning, particularly into the rules and procedures used to plan for ill-defined future scenarios. ARI supports research on how planners generate new goals, modify goals, and create alternate goals. Most current planning systems are limited in that they incorporate fixed goals which are incapable of changing. This research aims at providing more adaptive planning systems in the future. Experienced planners or decision makers often incorporate subjective value judgements

into their planning and decision-making processes which they cannot verbalize but which often turn out to be valid. ARI also supports research to develop methods for incorporating the user's value judgement into machine systems planning operations.

Research is also needed on constraint modification and development of alternatives. Current planning systems have constraints built into them when they are initiated. However, constraints often differ according to level of importance, and some may be modified by human users during operation. Additional areas of support include: (a) distributive planning, in which experts in different subject matter areas are geographically removed from each other, (b) generic planning, to develop systems capable of producing plans for different subsets of related areas or situations, and (c) meta-planning, or planning for planning.

In FY 87, decision making research will address the effects of long-range consequences and will analyze naturalistic decision making.

In FY 88, message filtering research will incorporate the use of paragraph-form intelligence summaries to supplement the processing done with the abbreviated text associated with tactical messages. This filtering will obviate large volumes of message traffic which have become less time-critical.

PAYOFF/UTILIZATION:

The payoffs of this Task include: (a) providing the basis for designing planning and decision aids that can organize, analyze, and synthesize data in ways which will be maximally useful in C3I contexts, and (b) enabling the Army to more effectively aid and train its leaders to make decisions.

In FY 86, specific accomplishments include: (a) research that identified "tacit knowledge" as an important factor in practical intelligence, with the results being used to develop new methods of predicting job performance in specific jobs and improved methods to train people to obtain better performance, (b) developed and tested a leadership model which specifies the conditions under which the leader's and the group members' intellectual abilities contribute to effective group performance, (c) developed techniques relating brain activity to personality and performance during intense stimulation and high workloads, with the results permitting careful evaluation of individual differences in performance under stress, and (d) completed research that has shown that spatial skills are critical for people to effectively operate computers, indicating both the importance of new methods for training computer users and the optimal structure for the design of user aids.

PROJECT OVERVIEW

PROJECT: B74F-2	UNIT PERFORMANCE	87	88
PE: 61102A	DEFENSE RESEARCH SCIENCES	\$ 1.0M	\$ 0.9M
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

PROJECT SYNOPSIS:

The objective of this Task is to develop methods and systems which will provide more rapid, efficient measures for training units.

Most Army training focuses on the individual, whether enlisted or officer; however, the Army typically fights and operates in units. As few methods exist for characterizing the adequacy group performance or for measuring improvement in group functions as a result of group or individual training, research is needed on tasks where responsibility is distributed.

Basic to functioning of the Army is the structure of the organization, and the need to know more about how people behave in organizations. Another focus is to find improved methods to measure leadership, cohesion, organizational dynamics, and job satisfaction. Additionally, the Army needs a model of unit performance to help guide researchers in the most productive areas of research on unit performance.

PAYOFF/UTILIZATION:

The payoffs of this Task include: (a) training cost reductions, (b) more effective unit training and performance, and (c) provision of a force multiplier effect.

PROJECT OVERVIEW

		87	88
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PROJECT: B74F-3	SKILL BUILDING TECHNOLOGIES	\$ 1.1M	\$ 1.1M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

PROJECT SYNOPSIS:

The objective of this Task is to apply new techniques and technologies in intelligent and robotic computers to aid personnel and train them faster in the full use of their increased weapons and information capabilities.

With advancing weapons and communication technology, the quantity and complexity of information to be dealt with by officers and enlisted personnel have increased by orders of magnitude. This research will access and evaluate technologies underlying reports concerning unconventional human technologies for enhancing performance. These technologies may provide the means for accelerating learning, increasing attention, and providing for increased mental and physical peak performance to sustain troops under combat conditions. This research will investigate whether these technologies may also provide improved methods for job classification and assignment.

One of the major problems of many large-scale systems is determining how to collate and organize information for future use and the appropriate categories and mechanisms for retrieving it at the needed time. Research on human knowledge has resulted in a variety of knowledge structures: hierarchies, networks, schematic representation, prototypes, and decision rules. A critical issue is what kinds of representations are most appropriate for various knowledge domains and purposes. Research is needed on methods of knowledge transfer, from one expert or a variety of sources, into a comprehensive system. Methods of coding, collating, organizing, storing, and retrieving need to be developed. Research is also needed on flexibility of knowledge representations, representing dynamic information, and inclusion of value information or weighting in knowledge bases.

Research on development of expertise in complex task domains is critical in order to design effective instructional and training systems. Practically no research has addressed the perceptual reorganization that occurs when one advances from the journeyman to expert level of functioning. The Army needs to examine the fundamental mechanisms of learning in a cognitive science framework that lead to the development or reorganization of knowledge schemata, and subsequently conduct research on how to structure the learning environment to enhance such learning.

Much training has been based on superficial task analyses, yet areas in which significant training improvements have been made have resulted from a deeper understanding of the cognitive and contextual factors involved in performance. These analyses have resulted in descriptions of the users' "mental models" which are the critical intermediaries of performance. Research is needed on how people develop and structure mental models in several complex task areas, particularly where transfer or generalization of learned skills has been poor, or where retention or updating of skills is a serious issue.

A primary focus of research within the area of learning is methods for initially creating new databases from discrete information and for

incorporating new information into an existing database. This latter topic applies both to information from the outside environment and to internally generated input based on the experience of an individual user of the system itself. Finally, although it is well known that new tasks often are learned by extrapolation from previous learning experiences or through analogies, basic research is needed to explore the mechanisms by which humans accomplish this kind of learning and how these mechanisms could be incorporated into machine programs.

Specific plans for FY 87 include evaluation of optimum visual displays of graphic data and auditory responses to alarms and signals to increase the performance of soldiers with command and control computer displays.

PAYOFF/UTILIZATION:

The payoffs of this Task include the necessary knowledge to develop more effective Army systems by improving both the skills of the soldiers who operate the systems and by reducing the apparent complexity and difficulty of equipment operation itself.

In FY 86, accomplishments include: (a) development of a software tool to facilitate the man-machine interface between an expert level intelligence analyst and an automated message fusion process, and (b) demonstrated in non-monotonic logic interval based probability the adverse impact of inverse reasoning because a computer must excessively rely upon its models, creating a bias which discourages recognition of novel battlefield deployments.

PROJECT OVERVIEW

		87	88
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PROJECT: B74F-4	DESIGNING SYSTEMS FOR PEOPLE	\$ 1.3M	\$ 1.3M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

PROJECT SYNOPSIS:

The objective of this Task is to provide the human capabilities and skills data to design more easily trained and more effectively used equipment systems.

More data are required by designers on the skills and capabilities of Army personnel if they are to successfully design optimally useable equipment. This need is particularly evident in the area of human interaction with complex equipment or where training cannot cover all anticipated conditions. There is also a less evident need for additional research in the more traditional areas of human factors because of the continuing development of new sensors, displays, and response devices.

Designers need convenient procedures, aids, or devices in order to incorporate data on human capabilities and skills in their designs. Better methods of information transfer and utilization are required if the human factors discipline expects its findings to be applied to real-world problems.

In FY 87, research will: (a) be completed describing the theory for combining diverse forms of sensor inputs, where each sensor is subject to its own type of resolution error, (b) be initiated focusing on coping with unanticipated situations during message-driven intelligence products, and (c) examine human computer interfaces and advanced methods for weapons systems design to support the MANPRINT (manpower integration) initiative.

PAYOFF/UTILIZATION:

The payoff of this Task includes better and more effectively utilized manpower, personnel, and training data, resulting in equipment that can be more mission-effective and easier to train and maintain.

In FY 86, accomplishments include: (a) development of a new spatial representation and problem solver for intelligence fusion threat assessment use, and (b) since assessment methods are robust and are not peculiar to a specific geography nor variety of opposing forces, research will support the development of an intelligence threat assessment system which may be used within any tactical environment and against a wide variety of forces.

PROGRAM ELEMENT OVERVIEW

PE: 62716A HUMAN FACTORS ENGINEERING TECHNOLOGY
 CONGRESSIONAL CATEGORY: HUMAN FACTORS
 DoD ORGANIZATION: ARMY
 FUNDING: FY87 \$ 17.4M (FY88 PRESIDENT'S BUDGET)
 FY88 \$ 15.4M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to generate data about human performance and apply it to the materiel acquisition process in areas such as extended operations in an NBC environment, enhanced helicopter control system using voice recognition and display technology, and reduced human workload due to robotic aids.

This human performance data and technology is responsive to and supports all mission areas and commodities. The data is gathered through both laboratory and field investigations. The insertion of this human performance data into the materiel acquisition process is accomplished by Human Factors Engineering (HFE) specialists located at major subordinate commands of the Army Materiel Command and at centers and schools of the Army's Training and Doctrine Command. The large amount of equipment and systems under development, combined with rapid changes in technology and the Army's increased emphasis on ensuring that equipment can be operated and maintained to its maximum by soldiers in the field, have resulted in increased demands for HFE data and expertise.

The Human Engineering Laboratory (HEL) is a leader in joint-Service coordination for the DoD Human Factors Technology Advisory Group. HEL: (a) participates in an HFE standardization subcommittee and the human factors test and evaluation subcommittee, (b) assembles all appropriate data and is responsible for all Army and DoD HFE design standards and HFE design handbooks, (c) chairs two North Atlantic Treaty Organization (NATO) research and development committees (and also serves on other international committees), and (d) performs HFE analyses on all major Army materiel systems.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include technologies, designs, data, and procedures that: (a) reduce workload, errors, and time to accomplish tasks, (b) increase soldier protection and soldier equipment compatibility for individual and crew weapons in aviation, armor, artillery, and air defense, and (c) enhance particular individual items of equipment, information displays, operating controls, computer programs, and crew working environments.

FUTURE DIRECTIONS:

Future thrusts include plans to develop and exploit state-of-the-art technologies such as artificial intelligence and expert systems for application to battlefield robotics, supply and materiel handling and management, next-generation armor and artillery systems, small arms and antiarmor weapons, soldier tasks/loads, soldier protection, aviation and air defense control/display systems, and future hybrid/multiple integrated weapons and defense systems.

PROJECT OVERVIEW

		87	88
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PROJECT: AIQL	ADMINISTRATION AND MANAGEMENT - HUMAN ENGINEERING LAB (HEL)	\$ 5.1M	\$ 5.7M
PE: 62716A	HUMAN FACTORS ENGINEERING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY HUMAN ENGINEERING LABORATORY		

PROJECT SYNOPSIS:

The objective of this Project is to program costs associated with overall management and administration of RDTE,A laboratories in separately identified R&D Laboratory projects.

These costs include pay, travel, and general support costs of civilian management personnel and their administrative support staff. Prior to FY 87, RDTE funds to finance overall management and administration of RDTE,A laboratories were prorated to R&D research, systems development projects, and other Army customers. Adjustments were made on a zero-sum basis within Army appropriations.

PAYOFF/UTILIZATION:

The payoff of this Project is improved resource management for the Army.

PROJECT OVERVIEW

		87	88
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PROJECT: AH70	HUMAN FACTORS ENGINEERING SYSTEM DEVELOPMENT	\$12.3M	\$ 9.7M
PE: 62716A	HUMAN FACTORS ENGINEERING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY HUMAN ENGINEERING LABORATORY		

PROJECT SYNOPSIS:

The objectives of this Project are to: (a) generate data on soldier-system interfaces, soldier-system performance, and the capabilities and limitations of soldiers, and (b) provide for the application of these data throughout the Army materiel development process.

Human engineering acquires human performance data and provides design guidance for all types of equipment that are worn, operated, or maintained by soldiers. Specific and precise information is also developed on soldiers' physical and psychological capabilities and limitations, so that Army materiel systems will be designed for maximum field effectiveness in the hands of the soldier. This is increasingly important as weapon systems and materiel become more sophisticated.

In FY 87, it is planned to: (a) conduct helicopter navigation and target acquisition investigations to develop integrated controls and displays for an efficient cockpit workstation that will contribute to enhanced pilot performance and increased mission effectiveness, (b) conduct field evaluations with the Forward Area Air Defense test bed and/or a pedestal-mounted Stinger air defense missile, to measure fire unit crew performance and develop essential soldier-machine interface design parameters for guiding full scale systems development, (c) evaluate the development of decision aid concepts and control and display designs for use in Forward Air Defense command posts (i.e., the Air Battle Management Operations Center), (d) continue applying human factors engineering (HFE) to small arms weapons development and redesign programs, (e) conduct field evaluations of the modifications made to the current M16A2 rifle design, (f) conduct an investigation using a simulator which will define the human interactions and interfaces needed to support the Army's concept of tactics for the 21st century (it will have its basis in the MX Missile Battlefield Management System operational and organizational concept, and the Close Support Study Group III, as well as knowledge of the emerging Advanced Field Artillery Tactical and Data System), (g) define operational requirements to include data needs, preferred format, and processing capabilities for the low echelon maneuver command and control system, (h) design an exercise management system for data collection with key emphasis placed on optimizing battlefield information for combat effectiveness, (i) continue research on user-computer interface topics such as screen size, computer program menu design, and keyboard layout, and use the data to revise MIL HDBK 761 and related military standards, (j) conduct investigations of soldier performance in military operations in urban terrain, (k) initiate phase II of the Joint-Service Weapons Evaluation Program, (l) develop key technology demonstrators of robotics and advanced logistics concepts, (m) continue software development efforts in support of the robotic material handler, which will demonstrate high speed sensor-driven acquisition and rapid handling of 4000 pound pallets, (n) continue development of Soldier Machine Interface (SMI) concepts and improved methods, procedures, and designs to increase crew survivability in an NBC environment (these efforts support such systems as the Advanced

Field Artillery System, Future Family of Vehicles, and Armored Family of Vehicles), and (o) continue direct HFE support to materiel systems under development, as part of the Manpower and Personnel Integration (MANPRINT) process.

In FYs 88/89, it is planned to: (a) develop and exploit technology such as artificial intelligence and expert systems for ammunition management, (b) investigate SMI concepts for teleoperated, supervisory, and fully autonomous operations in connection with the materiel handling robot, the soldier-robot interface, and advanced manipulator demonstrations (these advanced demonstrations integrate technology capabilities of laboratories with technology transfer from premier national labs and leading industries and will demonstrate potential application to a wide variety of emerging vehicle requirements), (c) conduct a field evaluation of an artificial intelligence planning, forecasting, and scheduling system for distribution of critical supplies (this is essential for next generation armor and artillery systems), (d) continue applying HFE expertise to small arms and antiarmor weapons programs to ensure that critical human factors issues are addressed in development, (e) conduct assessments of metabolic costs of soldier tasks and the loads and equipment which must be carried, (f) continue analyses of high-technology materials for clothing ensembles and ancillary equipment designed to improve soldier protection in all environments while maintaining the required level of performance, (g) continue with evaluations of the effects of NBC environments and extended operations on soldiers and crews, (h) investigate techniques for dispensing new decontaminants so that the soldier is not put at risk, (i) conduct armor and artillery crew task analyses and workload simulations to examine crew size and work reduction techniques without jeopardizing mission needs and operational effectiveness, (j) conduct a technology demonstration of the integrated human factors howitzer simulator, which will demonstrate SMI concepts for continuous firing battery operations in an NBC environment, (k) evaluate alternate means of soldier protection, cooling, feeding, waste elimination, entry and exit, and contamination avoidance as well as autonomous howitzer operations, improved command and control, land navigation gun pointing, howitzer self-protection, and operator interface with on-board systems (these efforts will support future vehicle and weapon system developments by contributing to technology improvements in the critical areas of operational performance, responsiveness, and survivability), (l) continue aviation-related investigations pertaining to the application of voice technology, (m) continue efforts toward the development of workload measurement methodologies in order to enhance performance, reduce crew size, and determine the optimum aircrew interface with state-of-the-art controls and displays, and (n) conduct SMI lab and field studies of improved control and display configurations, decision-aid concepts, operator performance in message composition, and automatic cueing techniques for Forward Area Air Defense Command posts (data will contribute to HF applications in future hybrid and integrated weapons and indirect fire air defense systems).

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) human performance data and design guidance for equipment worn, operated, or maintained by soldiers, and (b) specific, precise information on soldiers' physical and psychological capabilities and limitations so that sophisticated Army materiel systems will be designed for maximum field effectiveness.

In FY 86, Project efforts were focused in 5 primary areas: (a) the effects of NBC environments and extended operations on crews, military operations, robotics, and field logistics operations, (b) Military Operations in Urban Terrain (MOUT), (c) battlefield robotics, (d) control/display design enhancements for aviation and air defense systems, and (e) MANPRINT. Specific accomplishments are as follows: (a) conducted the IRON MAN I investigation, focusing on combat vehicle crew performance during sustained operations in a simulated NBC environment, (b) based on the findings that motivation and crew cohesion were key factors in the duration of effective performance, initiated efforts to develop ways to maintain motivation and cohesion levels and planned IRON MAN II (which will identify equipment modifications for

improving crew and vehicle endurance, performance, and survivability), (c) through a multi-Service, multi-industry effort, jointly developed an NBC-protected Command Post Vehicle (CPV) which accommodates crews in operation for at least 72 hours in an NBC environment, (d) developed a lightweight, low-bulk, low-cost, chemical, biological, radiological protective hood and mask, (e) initiated a joint-Services evaluation of the current arsenal of weapons for use in MOU, (f) completed detailed engineering of the field materiel-handling robotics (FMR), for ammunition packaging and handling and movement of 2-ton materiel-loaded pallets, (g) developed design criteria for Forward Area Air Defense Command and Control fire displays, and (h) as part of MANPRINT considerations, provided direct human factors engineering support to just under 300 systems in development.

PROGRAM ELEMENT OVERVIEW

PE: 62727A NON-SYSTEM TRAINING DEVICES (NSTD) TECHNOLOGY
 CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES
 DoD ORGANIZATION: ARMY
 FUNDING: FY87 \$ 4.2M (FY88 PRESIDENT'S BUDGET)
 FY88 \$ 4.0M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to increase overall combat effectiveness while reducing training cost to the Army.

This exploratory development program develops the latest state-of-the-art generic training methods and equipment. Arrival of sophisticated, high-technology equipment and their complex relations to each other, coupled with increased constraints on personnel, money, and time in the field training environment makes this effort critical to the overall success of the Army. These non-system specific training devices will provide both individual and unit general military training on more than one item or system.

Non-system training device requirements vary in scope and complexity. They include simulations to support force-on-force engagement simulation training and collective training of crews and units, as well as individual basic skills, integration and sustainment training. Additionally, (although not completely driven by formal requirements) major initiatives are undertaken to seek solutions to technical issues having general application to the design of simulators and training devices and to optimize the Army's large investment in training systems. Results of technology base efforts are inserted directly into advanced simulator designs or transitioned to a product-oriented feasibility demonstration or directly into production.

Technology devices developed within this program normally move to advanced development under Program Element 63738A (Non-System Training Devices (NSTD) Development) or to engineering development under Program Element 64715A (Non-System Training Devices (NSTD) Engineering). Duplication of effort is avoided through close coordination with other Services and industries through: (a) Training and Personnel Technology conferences, (b) the Joint Service Technical Coordinating Group, (c) worldwide staffing of training device requirements, and (d) the collocation of the Office of the Army Project Manager for Training Devices (PMTRADE), the Naval Training Systems Center (NTSC), and the Defense Training and Performance Data Center (TPDC).

PAYOFF/UTILIZATION:

The payoff of this Program Element includes support for the development of technology for training devices that ties together battlefield weapon systems, mobility, and command, control, communications, and transfers this training to real-world combat effectiveness.

Previously, this program supported exploratory development which resulted in, for example, a Multiple Integrated Laser Engagement Simulation System (MILES) gas-operated cannon simulator for 20mm, 25mm, and 30mm ammunition which eliminated the need to develop and produce blank rounds, resulting in peacetime savings per year of over \$10 million.

FUTURE DIRECTIONS:

In FY 90, work includes: (a) continuation of the development and validation of embedded training models and guidelines for field use with Army Research

Institute (ARI), (b) continuation of simulation complexity test bed experiments (ARI), (c) initiation of the hostile environment simulation experiments (HEL), and (d) initiation of a Multiple Integrated Laser Engagement System (MILES) adaptation for Military Operations in Urban Terrain (MOUT). Beyond FY 90 the major thrusts will include quantification of the future battlefield to define training needs associated with high risk/high payoff components, advancement of Army embedded training, and development of technologies and techniques which will permit more effective and efficient instruction with Army units.

PROJECT OVERVIEW

		87	88
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PROJECT: A230	NON-SYSTEM TRAINING DEVICES	\$ 4.2M	\$ 4.0M
PE: 62727A	NON-SYSTEM TRAINING DEVICES (NSTD) TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PROJECT MANAGER FOR TRAINING DEVICES		

PROJECT SYNOPSIS:

The objective of this Project is to provide for the exploratory development of training devices technology that supports general military training and training on more than one item or system.

This program provides the necessary front end analytical effort needed to transition suitable developments into full-scale development.

In FY 87, it is planned to: (a) continue the future generation engagement simulation concept definition with Jet Propulsion Laboratory, (b) continue the embedded training effort with equipment-specific exemplar configuration development with Army Research Institute (ARI), (c) complete an initial training system model and initiate database development to optimize simulation-based training systems to train to combat standards at minimum cost (ARI), (d) develop a prototype artificial intelligence expert system for teaching marksmanship and gunnery skills, (e) complete ANTESS/CBI test bed experiments with guidelines to future maintenance trainer designs (ARI), (f) continue the combat vehicle identification computer image generation effort with modeling and software demonstrations, (g) develop a reflective thermal target with thermal sights for laser gunnery training, (h) develop improved firing range targets with enhanced capabilities to assess gunner performance, and (i) explore techniques to rapidly reconfigure simulation databases for pre-mission training.

In FY 88, it is planned to: (a) complete the future generation simulation concept definition, (b) publish initial generic specifications for embedded training and continue validation of embedded training models (ARI), (c) complete the initial training system database (ARI), (d) test and validate the artificial intelligence expert system for marksmanship and gunnery training, (e) initiate the simulation complexity test bed experimentation (ARI), (f) initiate the hostile environment simulation test bed to develop ways to reduce the negative effects of battlefield stress on soldier performance (HEL), (g) complete the combat vehicle identification computer image generation effort with delivery of a software package to generate threat target images in tactical scenarios, and (h) select the best technical approach for rapidly reconfigurable databases.

In FY 89, it is planned to: (a) continue iterative development and validation of embedded training models and guidelines for field use, (b) continue simulation complexity test bed experiments (ARI), (c) continue the hostile environment simulation test bed validation (HEL), and (d) complete the combat vehicle identification computer generation effort with delivery of a prototype system for field use.

PAYOFF/UTILIZATION:

The payoff of this Project includes a variety of exploratory development efforts in training devices technology to support general military training

and training on more than one item or system.

Non-system training device requirements vary in scope and complexity and include simulations to support force-on-force engagement simulation training, collective training of crews and units (as well as individual basic skills) and integration and sustainment training. Results of this Project's technology base efforts are inserted directly into advanced simulator designs or transitioned to a product-oriented demonstration or directly into production.

PROGRAM ELEMENT OVERVIEW

PE: 62785A

MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY

CONGRESSIONAL CATEGORY:

HUMAN FACTORS
SIMULATION & TRAINING DEVICES
EDUCATION & TRAINING
MANPOWER & PERSONNEL

DoD ORGANIZATION:

ARMY

FUNDING:

FY87 \$ 15.2M (FY88 PRESIDENT'S BUDGET)
FY88 \$ 15.6M (FY88 PRESIDENT'S BUDGET)-----
PE SYNOPSIS:

The objective of this Program Element is to provide: (a) a scientifically sound technology base to support the development of engineering designs for new systems so that strengths and limitations of operators and maintainers are appropriately utilized or compensated for, (b) improved methods for attracting, selecting, assigning, and retaining quality soldiers, and (c) methods for improving individual and collective (unit) training.

The technology that this Exploratory Development program develops addresses research from five perspectives: (a) how to shift the workload from the "head to the hardware" by designing weapons systems that will exploit technology to assist the human operator, (b) what principles of equipment design will maximize the personnel performance in command, control, communication and intelligence (C3I) systems so that the eventual design of such systems capitalizes on the human component, (c) what design features are necessary to ensure effective training while minimizing cost for simulators and training devices, (d) how modern technology can best be exploited to automate the design and development of "courseware" to improve Army training, and (e) how the Army can improve its ability to deal with the life cycle events of recruiting, selecting, training, and utilizing soldiers in this high technology environment.

Projects A2AL and A790 have been restructured from Program Element (PE) 62717A (Human Performance Effectiveness and Simulation); Project A791 has been restructured from PE 62722A (Manpower, Personnel and Training); results of exploratory developments formerly in PEs 62717A and 62722A will transition into Advanced Development in Program Element #63007A (Human Factors, Personnel, and Training Advanced Technology).

PAYOFF/UTILIZATION:

The payoffs of this Program Element include a scientifically sound technology base to support the development of: (a) engineering designs for new systems so that strengths and limitations of operators and maintainers are appropriately utilized or compensated for, (b) improved methods for attracting, selecting, assigning, and retaining quality soldiers, and (c) methods for improving individual and collective (unit) training.

FUTURE DIRECTIONS:

Future plans include continuing efforts to: (a) achieve a better understanding of the optimal interface and division of labor between man and machine, as well as of how human factors, manpower, personnel, and training information are considered in new weapon systems, (b) improve decision-making in command and control operations, (c) ensure the most cost-effective soldier selection and assignment, (d) target enlistee training requirements more precisely, and (e) focus on new personnel selection and training issues.

PROJECT OVERVIEW

	87	88
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PROJECT: A2AL-1	\$ 2.3M	\$ 1.9M
ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)		
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	ARMY	
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE	

PROJECT SYNOPSIS:

The objective of this Project is to program costs associated with overall management and administration of RDTE,A laboratories in separately identified R&D Laboratory projects.

These costs include pay, travel, and general support costs of civilian management personnel and their administrative support staff. Prior to FY 87, RDTE funds to finance overall management and administration of RDTE,A laboratories were prorated to research, systems development projects, and other Army customers. Adjustments were made on a zero-sum basis within Army appropriations.

This Project was transferred from PE 62717A, effective FY 88.

PAYOFF/UTILIZATION:

The payoff of this Project is improved resource management for the Army.

PROJECT OVERVIEW

	87	88
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PROJECT: A2AL-2	\$ 1.4M	\$ 1.3M
ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)		
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	ARMY	
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE	

PROJECT SYNOPSIS:

The objective of this Project is to program costs associated with overall management and administration of RDTE,A laboratories in separately identified R&D Laboratory projects.

These costs include pay, travel, and general support costs of civilian management personnel and their administrative support staff. Prior to FY 87, RDTE funds to finance overall management and administration of RDTE,A laboratories were prorated to research, systems development projects, and other Army customers. Adjustments were made on a zero-sum basis within Army appropriations.

This Project was transferred from PE 62717A, effective FY 88.

PAYOFF/UTILIZATION:

The payoff of this Project is improved resource management for the Army.

PROJECT OVERVIEW

	87	88
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PROJECT: A2AL-3	\$ 2.2M	\$ 2.1M
ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)		
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY	
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL	
DoD ORGANIZATION:	ARMY	
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE	

PROJECT SYNOPSIS:

The objective of this Project is to program costs associated with overall management and administration of RDTE,A laboratories in separately identified R&D Laboratory projects.

These costs include pay, travel, and general support costs of civilian management personnel and their administrative support staff. Prior to FY 87, RDTE funds to finance overall management and administration of RDTE,A laboratories were prorated to research, systems development projects, and other Army customers. Adjustments were made on a zero-sum basis within Army appropriations.

This new Project was created with the restructuring and transfer of Projects from PE 62717A, effective FY 88.

PAYOFF/UTILIZATION:

The payoff of this Project is improved resource management for the Army.

PROJECT OVERVIEW

	87	88
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PROJECT: A2AL-4	\$ 1.2M	\$ 1.1M
ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)		
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY	
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING	
DoD ORGANIZATION:	ARMY	
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE	

PROJECT SYNOPSIS:

The objective of this Project is to program costs associated with overall management and administration of RDTE,A laboratories in separately identified R&D Laboratory projects.

These costs include pay, travel, and general support costs of civilian management personnel and their administrative support staff. Prior to FY 87, RDTE funds to finance overall management and administration of RDTE,A laboratories were prorated to research, systems development projects, and other Army customers. Adjustments were made on a zero-sum basis within Army appropriations.

This new Project was created with the restructuring and transfer of Projects from PE 62717A, effective FY 88.

PAYOFF/UTILIZATION:

The payoff of this Project is improved resource management for the Army.

PROJECT OVERVIEW

		87	88
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PROJECT: A790-1	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION	\$ 2.7M	\$ 2.7M
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

PROJECT SYNOPSIS:

The objective of this Project is to increase our understanding of how human capabilities and modern technology may jointly be exploited in the design of new systems to ensure their total effectiveness on the battlefield.

The battlefield of the future will place greater demands on soldiers and leaders alike; the tactical employment of more sophisticated, more lethal weapons systems, and the operation of automated command, control, communication and intelligence (C3I) systems will require quick reactions and confident decisions.

Research for this Project falls into three areas: (a) determining the most effective role for the human operator in future systems through the use of realistic mock-ups and simulators, (b) determining the proper roles for human operators and tactical decision makers in future C3I systems, and (c) establishing how system designers should use technical information to design more human-compatible systems.

In FY 87, it is planned to: (a) continue efforts to identify and control excessive operator workload in modern weapons systems that results in decreased operational capability and reduced decision-making time, and (b) establish a new effort to examine the use of human factors, manpower, personnel, and training information within the weapon system design process and how the weapon system designer can be assisted with improved human factors, manpower, personnel, and training design tools.

In FYs 88 and 89, it is planned to: (a) focus efforts on the identification of methods for control of excessive operator workload in modern weapon systems (that would otherwise result in decreased operational capability and increased decision-making time), (b) continue efforts on methods to improve decision-making in command and control operations, ensuring that technological innovations will support rather than overwhelm the tactical command group, (c) develop and demonstrate in the laboratory concepts for effective exploitation of advanced software and microprocessor-based technologies to aid human decision making and to provide the basis for low-cost simulators, so that the methods showing the most potential can be adapted for application in operational situations, (d) continue work to aid the system designer in the man/machine task allocation process, and (e) continue work toward developing a better understanding of how human factors, manpower, personnel, and training information are considered in the weapon system design process, and how this process can be enhanced through the introduction of advanced design tools.

This Project was transferred from PE 62717A, effective FY 88.

PAYOFF/UTILIZATION:

The payoffs of this Project include improved use of human capabilities and modern technology in the design of new systems to ensure greater effectiveness in the battlefield.

In FY 86, accomplishments included: (a) development, in conjunction with the Project Manager for Training Devices (PMTRADE), the Army Training and Doctrine Command (TRADOC), and selected weapon system program management offices, of conceptual design guidelines to address technologies to support embedded training, thereby addressing implementation procedures for establishing system-specific embedded training requirements and guidance concerning when to integrate embedded training considerations into the system acquisition process, (b) completion of embedded training definitions for the M-109E5 Howitzer Improvement Program and the Maneuver Control System-2 implementation, (c) coordination of procedures for Army-wide use of these guidelines among the PMTRADE and selected weapon systems project managers within the Army Materiel Command, and (d) initiation of work for the development of automated job aids to enhance the capability of instructional program developers, in conjunction with the Naval Training Systems Center (NTSC) and Air Force Human Resources Laboratory (AFHRL), and aimed at significantly reducing the 150 hours currently needed for the development of one hour of computer-based instruction, thus increasing the likelihood that more technology-based training can be implemented, providing opportunities to train tasks which were otherwise too time-consuming or difficult to be trained.

PROJECT OVERVIEW

	87	88
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PROJECT: A790-2	\$ 1.6M	\$ 1.9M
PE: 62785A	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION	
CONGRESSIONAL CATEGORY:	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY	
DoD ORGANIZATION:	SIMULATION & TRAINING DEVICES	
RESPONSIBLE ORGANIZATION:	ARMY	
	ARMY RESEARCH INSTITUTE	

PROJECT SYNOPSIS:

The objectives of this Project are to: (a) determine the requirements for simulators and training devices that will achieve effective training at the least cost in new battlefield systems, and (b) use simulator technology to increase our understanding of how human capabilities and modern technology may jointly be exploited in the design of these new systems.

The battlefield of the future will place greater demands on soldiers and leaders alike. The tactical employment of more sophisticated, more lethal weapons systems, and the operation of automated command, control, communication and intelligence (C3I) systems will require quick reactions and confident decisions. Effective training is one way of achieving this.

Research for this project focuses on determining the minimum requirements for simulators and training devices that will achieve effective training at the least cost.

In FY 87, it is planned to: (a) continue efforts to identify effective design strategies for ensuring that automated decision support systems are consistent with the training, experience, and expertise of the soldier-user, (b) establish a new effort to examine the use of human factors, manpower, personnel, and training information within the weapon system design process and how the weapon system designer can be assisted with improved human factors, manpower, personnel, and training design tools, and (c) continue work on computer-aided maintenance training development technologies, as well as work to develop job aids for computer-based instruction designers, developing software for maintenance training devices and breadboard software for simulations of automated procedures for test and further development.

In FYs 88 and 89, it is planned to: (a) develop and demonstrate in the laboratory concepts for effective exploitation of advanced software and microprocessor-based technologies to aid human decision making and to provide the basis for low-cost simulators, so that the methods showing the most potential can be adapted for application in operational situations, and (b) continue work toward developing a better understanding of how human factors, manpower, personnel, and training information are considered in the weapon system design process and how this process can be enhanced through the introduction of advanced design tools.

This Project was transferred from PE 62717A, effective FY 88.

PAYOFF/UTILIZATION:

The payoffs of this Project include cost-effective training by determining: (a) the minimum design requirements for simulators and training devices that will achieve effective training at the least cost, and (b) the requirements for automating maintenance training "courseware" development.

In FY 86, accomplishments included: (a) development, in conjunction with the Project Manager for Training Devices (PMTRADE), the Army Training and Doctrine Command (TRADOC), and selected weapon system program management offices, of conceptual design guidelines to address technologies to support embedded training, thereby addressing implementation procedures for establishing system-specific embedded training requirements and guidance concerning when to integrate embedded training considerations into the system acquisition process, (b) completion of embedded training definitions for the M-109E5 Howitzer Improvement Program and the Maneuver Control System-2 implementation, (c) coordination of procedures for Army-wide use of these guidelines among the PMTRADE and selected weapon systems project managers within the Army Materiel Command, and (d) initiation of work for the development of automated job aids to enhance the capability of instructional program developers, in conjunction with the Naval Training Systems Center (NTSC) and Air Force Human Resources Laboratory (AFHRL), and aimed at significantly reducing the 150 hours currently needed for the development of one hour of computer-based instruction, thus increasing the likelihood that more technology-based training can be implemented, providing opportunities to train tasks which were otherwise too time-consuming or difficult to be trained.

PROJECT OVERVIEW

	87	88
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PROJECT: A791-1	MANPOWER, PERSONNEL AND TRAINING \$ 2.5M	\$ 3.1M
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY	
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL	
DoD ORGANIZATION:	ARMY	
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE	

PROJECT SYNOPSIS:

The objective of this Project is to provide the scientific basis for the later development of: (a) improved selection tests that are computer-based and which incorporate new variables such as pre-service experiences, eye-hand coordination and mechanical aptitude, (b) training methods that will cost-effectively provide needed high-technology skills for the Active Army and the Reserve Component, (c) methodologies for determining aggregated manpower requirements of future new systems and new force structures, and (d) methods for assessing crew and unit performance.

To meet future demands for recruiting, selecting, assigning, training, and effectively utilizing personnel in the face of a dwindling supply of young adults, and competition from the private sector, the Army needs to improve the methods for carrying out these functions.

In FY 87, it is planned to: (a) continue design of procedures for estimating manpower requirements (taking into account varying levels of skills, aptitude, and knowledge), (b) continue research to improve Army selection and assignment procedures to link soldier selection to job performance, including eye-hand coordination testing and cost-effective methods for determining the usefulness of new tests, (c) continue exploratory development to improve present combat process models (which do not adequately take into account human performance variables) by providing models that can predict combat outcomes and can effectively identify needs for improved weapon systems design, organizational restructuring, or doctrinal changes, and (d) initiate significant investigations of new econometric models for Army compensation, and efforts to develop a framework for analyzing team performance and team training requirements.

In FYs 88 and 89, it is planned to continue work in manpower, personnel, and training that will enable the Army to continue to improve the procedures it uses to select, train, and retain the most qualified soldiers, including efforts applying the most modern technology to improve unit operations and to improve the training for effective command staff operations of the future.

This Project was transferred from PE 62722A, effective FY 88.

PAYOFF/UTILIZATION:

The payoff of this Project includes improved methods for meeting future demands for recruiting, selecting, assigning, training, and effectively utilizing personnel.

In FY 86, accomplishments included: (a) linking entrance scores on the Armed Services Vocational Aptitude Battery (ASVAB) to soldier performance in units, (b) development of new methods for predicting job performance (to be included in a future ASVAB), (c) validation of a generalized model for linking predictor measures and performance on the job, (d) identification of

preliminary methods for combining predictions, and (e) obtaining preliminary information on the relationships between in-service influences and quality of life in units, ASVAB scores, and soldier performance.

PROJECT OVERVIEW

	87	88
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PROJECT: A791-2	MANPOWER, PERSONNEL AND \$ 1.4M	\$ 1.6M
	TRAINING	
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY	
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING	
DoD ORGANIZATION:	ARMY	
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE	

PROJECT SYNOPSIS:

The objective of this Project is to provide the scientific basis for the later development of: (a) improved selection tests that are computer-based and which incorporate new variables such as pre-service experiences, eye-hand coordination and mechanical aptitude, (b) training methods that will cost-effectively provide needed high-technology skills for the Active Army and the Reserve Component, and (c) methodologies for determining aggregated manpower requirements of future new systems and new force structures, and (d) methods for assessing crew and unit performance.

To meet future demands for recruiting, selecting, assigning, training, and effectively utilizing personnel in the face of a dwindling supply of young adults, and competition from the private sector, the Army needs to improve the methods for carrying out these functions.

In FY 87, it is planned to initiate significant investigations of new econometric models for Army compensation, and efforts to develop a framework for analyzing team performance and team training requirements.

In FYs 88 and 89, it is planned to: (a) continue work in manpower, personnel, and training that will enable the Army to continue to improve the procedures it uses to select, train, and retain the most qualified soldiers, and (b) apply the most modern technology to improve unit operations and to improve the training for effective command staff operations of the future.

This Project was transferred from PE 62722A, effective FY 88.

PAYOFF/UTILIZATION:

The payoff of this Project includes improved methods for meeting future demands for recruiting, selecting, assigning, training, and effectively utilizing personnel.

In FY 86, accomplishments included: (a) completion of guidelines for computer-based instruction of M1 Tank maintenance skills, and (b) transition of the results of exploratory developments on knowledge requirements, presentation formats, and training methods necessary to sustain skills over the long periods between Reserve Component training sessions to Program Element 63007A (Human Factors, Personnel, and Training Advanced Technology) for advanced development.

PROGRAM ELEMENT OVERVIEW

PE: 63003A AVIATION ADVANCED TECHNOLOGY
 CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES
 DoD ORGANIZATION: ARMY
 FUNDING: FY87 \$ 10.7M (FY88 PRESIDENT'S BUDGET)
 FY88 \$ 6.8M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to provide for the advanced development of full-scale components and subsystems.

The work supported by this Program Element directly addresses those critical needs essential to future operational effectiveness through full-scale flight testing and demonstration of advanced technology components and subsystems, placing emphasis on: (a) advanced composite rotary-wing structures to achieve 20 to 30 percent lower weight, 20 percent lower costs, unlimited fatigue life, and improved survivability, (b) advanced rotors for improved performance and ballistically-tolerant material requirements, (c) electronic hardware to enable day/night, adverse weather aviation operations (avionics), and (d) advanced flight controls for reduced weight and cost, improved survivability, and reduced pilot workload and initial training requirements. Selected near-term advances may be applied to aircraft such as the UH-60 Blackhawk and AH-64 Apache as block improvements.

Modern Army aircraft will face an awesome array of air defense threat systems to include: (a) optically and radar-guided 23mm, 30mm, and 57mm weapons, (b) SA-6, 7, and 9 infrared and radar-guided missiles, and (c) potential nuclear/biological/chemical and laser threats directed and delivered both from the ground and air vehicles. As a result, the aircraft must possess improved mobility, agility, firepower, and inherent features to include durability and sustainability for extended periods of combat at an affordable cost. Army aircraft must be durable, damage tolerant, easy to repair and maintain, and possess the highest level of availability possible. The application of composite materials to primary aircraft structures, advanced weapons and fire control, fiber-optic technology to flight controls, advanced engines and drive trains, advanced simulation technology, advanced avionics, and advanced rotor technology to existing and proposed rotor systems is the key to providing reliable, survivable Army aircraft essential to the future integrated battlefield. These demonstration programs represent investments in technology to maximize Army aviation's future capability to perform its combat mission.

This program is a new Program Element which combines the Projects formerly reported under six Program Elements: 63201A (Aircraft Power Plants & Propulsion), 63206A (Aircraft Weapons), 63207A (Aircraft Avionics Equipment), 63211A (Rotary Wing Controls, Rotors and Structures), 63216A (Synthetic Flight Simulators), and 63221A (NOE Avionics and Navigation Equipment), all of which are used to demonstrate Army aircraft technology.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include improved aircraft mobility, agility, firepower, and inherent features to include durability and sustainability for extended periods of combat at an affordable cost.

Army aircraft will be durable, damage tolerant, easy to repair and maintain, and possess the highest level of availability possible.

FUTURE DIRECTIONS:

The efforts to be accomplished under this Program Element will be a significant part of the technology base for the next-generation Army aircraft of the mid-to-late 1990s. This program funds technology thrusts that are essential if Army aviation is to effectively contribute to the Air-Land Battle of the 1990s and into the 21st century as it does to the current Army combined arms team.

Failure to fund these efforts will preclude the development of: (a) critical optical components for use in advanced flight control systems, (b) advanced avionics, (c) advanced composite aircraft structures, and (d) advanced power plants and advanced rotor hubs, all of which are required to improve aircraft effectiveness and survivability.

PROJECT OVERVIEW

		87	88
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PROJECT: DB34	ROTORCRAFT SYSTEM INTEGRATION SIMULATOR (RSIS)	\$ 5.2M	\$ 5.1M
PE: 63003A	AVIATION ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	AVSCOM		

PROJECT SYNOPSIS:

The objective of this Project is to develop the Rotor System Integration Simulator (RSIS) by expanding the capabilities of the National Aeronautics and Space Administration's (NASA's) Vertical Motion Simulator (under a joint Army-NASA agreement).

Numerous studies, including those by the Army Scientific Advisory Panel (ASAP), an ad hoc working group on research facility requirements for nap-of-the-earth (NOE) day/night visual flight studies, recommended that the Army, as the lead Service for helicopter R&D, place increased emphasis on R&D in helicopter flying qualities using ground-based simulation. The Army-NASA agreement minimizes costs of a high-fidelity simulator, and allows for increased technical expertise in the development of this Aeronautical Engineering Research Facility.

In FY 87, it is planned to continue to evaluate concepts in the crew station R&D program to determine what technology is required for a single pilot LHX helicopter.

In FY 88, it is planned to award contracts to upgrade RSIS to include an air combat simulation capability.

This project was transferred from PE 63216A, effective FY 88.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) more detailed evaluation of engineering concepts before a commitment to aircraft hardware, (b) compressed development time, and (c) reduced cost.

In FY 86, efforts included evaluation of concepts in the crew station R&D program to determine what technology was required for a single pilot LHX helicopter.

PROJECT OVERVIEW

		87	88
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PROJECT: DB39	FLIGHT SIMULATOR COMPONENTS	\$ 5.5M	\$ 1.7M
PE: 63003A	AVIATION ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PROJECT MANAGER FOR TRAINING DEVICES		

PROJECT SYNOPSIS:

The objective of this Project is to develop and demonstrate advanced flight simulation techniques and components for incorporation into the design of future simulators and for improving training capabilities of current simulators.

This effort is being accomplished through cooperative development with Navy and Air Force laboratories. Efforts are directed to developing visual simulation components designed to provide full mission training capability for nap-of-the-earth (NOE) flight, navigation, gunnery, and survivability in a combat environment. The current program includes preliminary design studies and brassboard demonstration for the development of wide-angle, high resolution, high-pictorial-detail visual simulation techniques that provide large frontal and downward angle viewing for NOE flight. These techniques will also integrate multiple viewpoint sensor displays which are vitally needed for simulating weapon systems tactical missions and crew integration training. Technology includes computer-generated image (CGI) edge management techniques for full mission simulation.

In FY 87, it is planned to: (a) demonstrate and evaluate ADA applications to Army flight simulators, and (b) begin a modular cockpit design effort to reduce flight simulator procurement and maintenance costs through standardization of hardware and software component interfaces.

In FYs 88/89, it is planned to continue work on incorporation of ADA computer language, and modular cockpit design.

This project was transferred from PE 63216A, effective FY 88.

PAYOFF/UTILIZATION:

The payoff of this Project includes development of visual simulation components designed to provide full mission training capability for NOE flight, navigation, gunnery, and survivability in a combat environment.

These devices will enhance the navigational and target recognition and acquisition skills of rotorcraft system crews, increasing Army aviation combat readiness and proficiency. Visual technology developed in this program will be applied to all air and ground based simulators to improve training quality and reduce training and acquisition costs.

In FY 86, initiated development of the VSCDP program under a rescoped contract.

PROGRAM ELEMENT OVERVIEW

PE: 63007A HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY

CONGRESSIONAL CATEGORY: MANPOWER & PERSONNEL
HUMAN FACTORS
EDUCATION & TRAINING
SIMULATION & TRAINING DEVICES

DoD ORGANIZATION: ARMY

FUNDING: FY87 \$ 27.2M (FY88 PRESIDENT'S BUDGET)
FY88 \$ 38.2M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to perform advanced technology development focusing on four areas of soldier performance issues: (a) methods for better matching of manpower and personnel supply and demand, (b) human factors concerns in the design of new systems, (c) technology-based education and training, and (d) the development of lower-cost and less complex simulators and training devices.

This Program Element is, in part, the Army's response to a Congressional requirement for a Department of Defense-wide effort to relate selection tests and retention criteria to successful job performance. This work is also responsive to the increasingly important need to specify personnel requirements, training requirements, and skill mixes early in weapon system development, and to relate them to the country's available pool of manpower.

This is the Army's concept of Manpower and Personnel Integration (MANPRINT). Human factors development will examine electronic technology for use in the design of soldier-friendly interfaces between the soldier and the sophisticated equipment he or she must operate and maintain.

This Program Element resulted from the consolidation of Program Elements 63731A, 63739A, 63743A, and 63744A, and the restructuring of their Projects into this Program Element, effective FY 88.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include advances in all four areas of soldier performance: (a) manpower supply will be better matched to demand, (b) new system designs will incorporate human factors considerations, (c) education and training will become more technology-based, and (d) less expensive, less complex simulators and trainers will be developed.

Efforts to improve MANPRINT estimation methods will permit more accurate and timely estimations. This program will further develop expanded application of electronic technology to reduce the cost of training while increasing soldier proficiency. A specific effort on integrating simulator needs with overall training will provide scientific bases for the design of lower cost and less complex simulators for use in military units and will answer a 1984 Congressional concern.

FUTURE DIRECTIONS:

Beyond FY 89, it is planned to continue efforts to develop training methods, techniques, and systems to reduce training time and costs and personnel, while improving job performance and training management. Simulator "test beds" will also continue to be used to design lower-cost, less complex simulators and training devices for use in units.

PROJECT OVERVIEW

	87	88
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PROJECT: A792	MANPOWER AND PERSONNEL	\$ 7.7M \$15.3M
PE: 63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY	
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL	
DoD ORGANIZATION:	ARMY	
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE	

PROJECT SYNOPSIS:

The objectives of this Project are to develop and evaluate: (a) methods to attract needed personnel to the Army, to select the most qualified, and to assign them to jobs (Military Occupational Specialties) that capitalize on their aptitudes and vocational interests, (b) programs to retain highly qualified personnel, (c) programs to develop cohesive units and leaders needed to assure combat readiness in the high-technology Army environment, and (d) computer-based analytic tools to identify aggregated future manpower and personnel needs.

Approaching the year 2000, the number of military-age people in the population will be 20 percent fewer than now. There will also be fewer high school graduates, who are the highest performers and have the lowest attrition rates. The Army must develop ways to attract larger proportions of these high-quality individuals and must improve procedures for their selection and job utilization.

In FY 87, it is planned to continue developing techniques for enhanced retention through improved quality of Army family life. It is planned to identify methods for the Army to promote "healthy" families, and to make preliminary recommendations for policy changes on assignments for dual military career couples.

Efforts will continue to advance Army senior leadership development. For junior leaders, leadership performance measures will be developed and validated at the levels of the Officer Basic Course, the Officer Advanced Course, and at the National Training Center under conditions similar to combat stress.

Also in FY 87, work will continue to relate selection criteria to job performance. A computerized testing system is being developed to replace the current paper-and-pencil version of the entrance test battery. It will improve the quality and ease of administration, provide immediate calculation and interpretation of test results, and could be adopted to incorporate measurement of qualities not now measured, for example, visual and coordination abilities.

In FY 88, it is planned to expand the scope of the program to increase unit productivity by developing techniques that will lead to more cohesive units (that will help overcome the effects of isolation and stress on the distributed battlefield).

The program to foster strong Army families will continue. It will focus on needed policy changes to reduce any negative influences of Army family life on retention and readiness. The program will explore spouse employment factors and the need for community support systems.

Efforts will continue to validate the entrance test battery against soldier performance and to determine the comparability of computer-based

administration of the battery. Work will continue on developing methods of determining manpower and personnel requirements against system design alternatives early in weapon system development. Techniques for predicting officer and NCO (Non-Commissioned Officer) success will be developed that can be used to yield improved leadership in the Army. Development of improved techniques for Army civilian personnel management will continue that will improve the use of the current civilian personnel performance appraisal and reward system.

In FY 89, work to provide detailed information on soldier performance capabilities will yield soldier performance guidelines for incorporation into Army Mission Area Analysis (MAA) decisions. By matching system performance requirements with soldier performance capabilities in the MAA process, the Army should realize improved systems that maximize both the capabilities of the system and the soldier.

Efforts will also develop a soldier performance database for Combat Mission Area Analysts and Combat Developers. Modeling efforts will continue to help Army manpower planners avoid imbalance between manpower requirements and personnel supply. Work will also focus on being able to predict the effect on retention and force structure of proposed changes to the current compensation package. Other efforts will develop needed forecasting methodologies to project future enlistments and alternative personnel structures under varying economic and total manpower cost scenarios.

The program to provide Army leadership and management with the knowledge, instruments, and methodologies that will enhance the development of unit cohesion and commitment known to be crucial in combat will continue with development of a model to quantify relationships between the levels of cohesion prevailing in units and the performance of these units.

This Project was transferred from PE 63731A, effective FY 88.

PAYOFF/UTILIZATION:

The payoffs of this Project include improved methods and programs to: (a) attract, select, and retain the most qualified personnel for the Army, (b) assign them to military occupational specialties (MOS) best using their aptitudes and vocational interests, (c) develop the cohesive units and leaders required for combat readiness in the high-technology Army, and (d) identify aggregated future manpower and personnel needs.

In FY 86, accomplishments included: (a) initiated a major program to define relationships between Army family factors and soldier retention and readiness, and (b) developed a family-based soldier retention model which will quantify and be used to validate the influence of changes which enhance retention through improved satisfaction with Army life, commitment to an Army career, and a sense of identity with, and participation in, Army community life. This model was built on an analysis of career intentions of U.S. Army Military Academy graduates and Reserve Officer Training Corps officers, a survey of single parent soldiers, and analyses of dual military career couples.

The initial concept and design for an executive development program was completed as part of a program to improve the development of Army executives. Objectives of this program are to provide methods and doctrine to develop and best use the executive talents of senior military and civilian personnel. Periodic assessment of leaders in their middle years is conducted that will enable them to achieve their potential.

Work continued in the correlation of soldier selection measures to job performance with extensive field data collection efforts on both selection measurement techniques and performance criteria.

PROJECT OVERVIEW

	87	88
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PROJECT: A793	\$ 7.7M	\$ 8.2M
PE: 63007A		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	ARMY	
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE	

PROJECT SYNOPSIS:

The objectives of this Project are to develop and evaluate: (a) improved methods for identifying human factors, manpower, personnel, and training (HMPT) requirements early in the weapon system development process, (b) appropriate allocation of tasks among soldiers and machines, (c) procedures for introducing new weapon systems and equipment into operational combat units in a manner which achieves the full system performance potential and maintains a high level of unit readiness, and (d) methods for assessing the effects of new weapon systems and equipment on both individual and unit level combat effectiveness.

Modern weapon systems are becoming both more sophisticated and more lethal. Future battlefields will also be more tactically complex and will place greater demands on the soldier for information processing and decision making. To realize the full potential offered by modern weapons technology, the special capabilities and limitations of the soldier must be systematically considered early in the weapon system development process. Proper consideration of HMPT trade-offs involves relating these factors to combat effectiveness.

In FY 87, the weapon crew and small unit design and assessment methodology will be expanded to address larger units and different missions. Initial steps will integrate the artificial intelligence prototype for armor operations into the Army's Land Battle Test Bed facility.

The Army Research Institute will expand its program to support the Army's intelligence community to include: (a) the development of measurement criteria for assessing the information value of specific intelligence products, (b) the identification of specific decision making styles, and (c) the analysis of training requirements and decision support needs for conducting tactical deception operations.

In FYs 88/89, research in support of Army intelligence will continue. Additionally, in support of the Army's MANPRINT (Manpower and Personnel Integration) Program, a major thrust will be the development of high-technology analytic tools for estimating personnel and training requirements of alternative system designs, while still in the conceptual stages when changes can be made more easily.

This Project transferred from PE 63739A, effective FY 88.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) methods to recognize and account for the special capabilities and limitations of soldiers early in system design, and thus improve combat capability, (b) improved design of soldier-machine

interfaces through appropriate allocation of tasks between soldier and machine in both weapon systems and command and control systems, and (c) decreased disruption of unit readiness with the introduction of new equipment.

In FY 86, accomplishments included development of techniques for the design and assessment of weapon crews and small tactical units. These will provide an improved capability for estimating the numbers and types of personnel and equipment required under different operational conditions. This methodology improves on existing estimation approaches because it provides a transition of unit functional requirements into manpower and materiel asset requirements and appropriate control mechanisms, plus a framework for evaluating the resulting organizational structures.

In a second area, the Army Research Institute developed a prototype artificial intelligence system interface for planning small unit armor operations. Using advanced computing methods for capturing the operational expertise of armor unit commanders, this prototype system provides the capability for rapid generation, evaluation, and display of movement options for conducting offensive and defensive combat operations within a time-constrained and dynamic battlefield. Demonstration of this soldier-machine technology within the armor community also provides the basis for transfer of this technology to other combat and combat support systems.

PROJECT OVERVIEW

	87	88
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PROJECT: A794	EDUCATION AND TRAINING	\$ 6.8M \$ 8.9M
PE: 63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY	
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING	
DoD ORGANIZATION:	ARMY	
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE	

PROJECT SYNOPSIS:

The objective of this Project is to investigate, in close association with the intended Army operational user, the cost-effective application of computers and related electronic technology to training.

Specific training areas include: (a) basic job skills training to prepare the educationally disadvantaged to succeed in Army jobs, (b) job-specific military occupational specialty (MOS) skills (with special emphasis on maintenance, combat, and aviator skills), (c) collective (crew, team, and unit) training for the combat arms, (d) training for the Reserve Component (recognizing its special training constraints of only 39 days per year), (e) techniques for objectively measuring individual and unit performance, and (f) techniques for more effective training management, with special emphasis on units.

In FY 87, a continuing effort to improve basic skills education will conclude with a quality control system for the Army Continuing Education System (ACES) and evaluation of the Job Skills Education Program (JSEP). Research will also improve the marksmanship of soldiers with small arms weapons by adding a training capability for three more weapons to the Multipurpose Arcade Combat Simulator (MACS).

Land navigation training research will: (a) modify the Marine Corps Infantry Map Interpretation and Terrain Analysis Course (MITAC) handbook, and (b) provide a standardized program of phased instruction in land navigation along with a unit training guide.

Development will continue on computer-based instruction for improved aviation, armor and logistics skills training. Automated courseware will be available at the appropriate school to improve helicopter tactical flight training, flight line training, and maintenance performance.

The Computerized ARTEP Production System prototype will be evaluated and modified as necessary. Application of computer-based training technology to the dispersed Reserve Component unit training activities will be evaluated at a representative Reserve Component Training site.

Work will continue on the determinants of effective unit performance at the National Training Center (NTC), to include the effects of leadership, cohesion, and training. Work will begin on the training needs of Light Force Units, drawing on lessons learned at the NTC.

In FYs 88/89, investigation will continue on the use of computer-based training to improve the analytic thinking of armor officers, and land navigation training will conclude with an integrated training and assessment program using Army, Navy, and Marine Corps developed components. This activity will greatly improve map reading and land navigation performance and result in improved combat effectiveness of the individual soldier and small unit levels.

Language training programs for military intelligence linguists will be developed that will increase the initial proficiency of linguists as well as maintain language proficiency in units. One technology-based training development program will produce prototype training packages for Basic Armor Training, Advanced Armor NCO (Non-Commissioned Officer) Course, and the Armor Officer Basic Course in conjunction with the U.S. Army Armor Center, Fort Knox, Kentucky. Similar work will produce technology-based training support for the U.S. Army Aviation Center at Fort Rucker, Alabama.

The work will develop a computer model of the AH-1S (Cobra) Aviator Qualification Course which will be used as a test bed to evaluate new training technologies and to assess the potential for increased training effectiveness. Results will then be applied to aviator training for the AH-64 (Apache) and the UH-60 (Blackhawk).

Technology-based training development will also apply computer-based instruction techniques to Advanced Individual Training for the Equipment and Parts Specialist course at the U.S. Army Quartermaster School, Fort Lee, Virginia. It will overcome present deficiencies in the performance of the Army's Equipment and Parts Specialists, resulting in improved job performance which, in turn, should lead to supply system economies, increased equipment availability, and improved unit readiness.

Work will continue on techniques to improve the training of Light Forces Units, improvement in understanding the determinants of battalion performance, and improved effectiveness in unit engagements of the National Training Center. Technological advances for Reserve Component training developed in Program Element 62785A will transition to this Program Element, and prototype technology-based training configurations and strategies will be designed, particularly for dispersed locations.

This Project was transferred from PE 63743A, effective FY 88.

PAYOFF/UTILIZATION:

The payoffs of this Project include reductions in training time, costs, facilities and travel while providing equally or more highly proficient soldiers.

In FY 86, efforts included: (a) improved the Army's ability to train soldiers to fire small arms by developing diagnostic and remedial training programs for the Multipurpose Arcade Combat Simulator (MACS), an inherently interesting arcade game with high training transfer value, (b) validated the training effectiveness of feedback on advanced "location of miss and hit," demonstrating that such feedback greatly increased the marksmanship skills of small arms units using MACS or live fire exercises, (c) validated methods for assessing navigation performance, and (d) conducted (with U.S. Army Infantry Center and School) a field test that demonstrated that a lightweight, man-portable telemetry system, Tracer, could track soldier's routes and provide feedback on the quality of performance and provide the basis for remedial training.

Other work developed instructional materials for the Surface Navigation and Operation Trainer and evaluated computer-based training systems for improving armor, aviation, supply, maintenance, and logistics training in Army schools.

Work continued on improving the Army's ability to evaluate the readiness and training status of units. To that end, a prototype computerized Army Training and Evaluation Program (ARTEP) system was developed, and work continues to automate procedures for managing unit training. A guidebook was published to help data analysis of battalion performance at the National Training Center. Reserve component products completed include guidelines to courseware design, a training management plan, and design requirements for computerized group training.

PROJECT OVERVIEW

		87	88
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PROJECT: A795	TRAINING SIMULATION	\$ 5.0M	\$ 5.8M
PE: 63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

PROJECT SYNOPSIS:

The objective of this Project is to provide the Army's Training and Doctrine Command (TRADOC) and the Project Manager for Training Devices (PMTRADE) with scientifically-based recommendations for the design of lower-cost, lower-complexity simulators and training devices.

The need for effective simulators and training devices is increasing in order to reduce the high cost of using actual equipment for training. Work will focus on simulator and training device design for aviator, armor, maintenance, and command staff training.

In FY 87, it is planned to: (a) conclude research in the Combat Vehicle Identification (CVI) program with CVI procedures developed for air-to-ground applications in Army helicopters and Air Force A-10 pilot training, (b) develop a "smart tutor" for the HAWK Missile System using artificial intelligence and cognitive science techniques, (c) use the Unit Conduct of Fire Trainer (UCOFT) to evaluate the effectiveness of revised gunnery trainers and training procedures and begin initial evaluation of the concept of simulation for small unit armor training at the Armor School, Fort Knox, Kentucky, and (d) conduct research to provide low-complexity simulation training for aviation tactical superiority, which will be used to evaluate an attack pilot and copilot-gunner simulator at the Aviation School, Fort Rucker, Alabama.

In FYs 88/89, plans include: (a) field test the "smart tutor" for the HAWK Missile System, HAWK MACH III, with the U.S. Army Air Defense Artillery School, Fort Bliss, Texas, (b) develop combined arms training procedures for leaders of platoons and company teams using simulators, exploiting breakthroughs in computer-generated imagery and local area network technologies, and (c) develop training exercises and performance evaluation methods to provide practice on missions and tasks for company teams in balanced, tank-heavy, and infantry-heavy configurations.

More effective combined arms training, which emphasizes collective skills using networked simulators, will be field-tested with distributed site networks. This system permits small infantry and armor units to train as they expect to fight, and will help small unit leaders develop the skills to meet the complex demands of operations on a dynamic, high-intensity battlefield. Support element training will then be integrated into battalion level simulation networks.

Efforts to apply simulation capabilities in the development of training for conditions likely to be encountered on the future battlefield (e.g., Nuclear, Biological, and Chemical Warfare and Electronic Warfare) will be directed at determining the degradation in soldier/operator performance imposed by specific threat weapons. Following the problem identification phase, emphasis will be placed on developing task performance standards for degraded conditions, determining which tasks can be trained best by which devices and then specifying the most appropriate training method for negating the effects

of particular threat weapons.

This Project was transferred from PE 63744A, effective FY 88.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) development of modern simulation and training technologies which can result in significant savings and improvements in flight, maintenance, and tactical training for units in the field, (b) guidance to TRADOC and PMTRADE on their design of more cost-effective simulators and training devices, and (c) development of alternatives to high-cost, operational systems for training and maintaining the skills of a combat-ready force.

In FY 86, techniques were diagnostically evaluated for automating controller functions in computer-based battle simulations to improve methods for command group training. It was found that, in addition to reducing the workload of the controllers in a command group exercise, better diagnostic feedback can be provided to participants about their performance.

Efforts in the Combat Vehicle Identification (CVI) program developed training in thermal sight adjustment for aviators. It was found that the CVI program improved identification performance from 400 to 800 percent using the basic program and up to 650 percent using the thermal program identification program.

Other efforts included: (a) continued work on trainers to improve procedures for modern Army fighting vehicles, (b) developed performance aids to improve gunnery crew procedures and improve night and obscured vision operations, (c) evaluated the use of scale models of operational fighting vehicles for training use, (d) used UCFT to assess changes in soldier performance under different simulated Nuclear, Biological, and Chemical scenarios, and (e) began work on interactive war games and simulators for company-level units to provide operationally realistic combined arms training.

PROGRAM ELEMENT OVERVIEW

PE: 63738A NON-SYSTEM TRAINING DEVICES (NSTD) ADVANCED DEVELOPMENT

CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES

DoD ORGANIZATION: ARMY

FUNDING: FY87 \$ 3.7M (FY88 PRESIDENT'S BUDGET)
FY88 \$ 0.0M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to provide for the advanced development of Non-System Training Devices (NSTD), used to support general military training and training on more than one item or system (in contrast to system devices that support a specific item or system).

The combat effectiveness of Army personnel is the key to both compensating for the numerical superiority of opposing forces and for maintaining a ready force. Training devices and training simulation provide soldiers with opportunities for realistic, meaningful training without prohibitive costs. Improved training devices, now available through modern technology, must continue to be developed to provide the training required to prepare U.S. soldiers to fight and defeat a numerically superior adversary.

Close coordination is maintained with other Services through: (a) Training and Personnel Technology Conferences, (b) a Joint Service Technical Coordinating Group, (c) worldwide staffing of training device requirements, (d) the collocation of the office of the Project Manager for Training Devices (PMTRADE), the Naval Training Systems Center (NTSC), and the Defense Training and Performance Data Center (TPDC) in Orlando, Florida. This coordination is designed to preclude duplication of effort.

The devices contained in this program have normally progressed to Advanced Development from related Program Element 62727A (Non-System Training Devices), and normally continue development in Program Element 64715A (Non-System Training Devices Engineering).

PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) improved combat effectiveness through the development and use of more realistic, meaningful combat scenarios during training, (b) a well-trained, ready force prepared to fight and defeat a numerically superior adversary, and (c) reduced training costs.

Modern weapons systems are being integrated into the force at unprecedented rates. Arrival of this sophisticated, complex equipment coincides with increased constraints on people, dollars, and time in a training environment where ammunition and fuel costs continue to rise. Training devices and training simulations help maximize the transfer of knowledge, skills, and experience from the training situation to the combat situation.

FUTURE DIRECTIONS:

In the future, this Program Element will continue to provide advanced development for non-system training devices to improve training realism and reduce training costs.

PROJECT OVERVIEW

	87	88
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PROJECT: D335	COMMUNICATIVE NON-SYSTEM TRAINING DEVICES (NSTD) \$ 3.7M	\$ 0.0M
PE: 63738A	NON-SYSTEM TRAINING DEVICES (NSTD) ADVANCED DEVELOPMENT	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	ARMY	
RESPONSIBLE ORGANIZATION:	PROJECT MANAGER FOR TRAINING DEVICES	

PROJECT SYNOPSIS:

The objective of this Project is to develop general purpose information delivery systems.

These systems will provide efficient, cost-effective, and timely delivery of training information to soldiers in the schoolhouse or at their places of work, while significantly decreasing the present need for voluminous documentation storage. This Project continues a phased evolution of electronic training and technical documentation systems into the Army.

In FY 87, the MEIDS (Militarized Electronic Information Delivery System) advanced development contract will be awarded. MEIDS will be a hand-held, self-contained, electronic job performance aid/refresher trainer to use at the point of application for maintenance diagnosis and troubleshooting and hands-on training. Also, an advanced development contract will be awarded for the Automated Army Authoring System. This system will automate the conversion of existing paper documentation to software, and provide new software for the information delivery systems.

In FY 88, this program is unfunded.

In FY 89, advanced development of various commu will be initiated.

PAYOFF/UTILIZATION:

The payoff of this Project includes more efficient, information delivery of training information to soldiers in school or at their places of work, while significantly decreasing the present need for voluminous documentation storage.

The Militarized Electronic Information Delivery System (MEIDS) is an electronic job performance aid/refresher trainer which will improve maintenance diagnosis and troubleshooting as well as hands-on training. The Automated Army Authoring System will automate the conversion of existing paper documentation to software, and will develop new software for information delivery systems.

In FY 86, concept definition of the MEIDS was conducted.

PROGRAM ELEMENT OVERVIEW

PE: 64715A NON-SYSTEM TRAINING DEVICES (NSTD) ENGINEERING DEVELOPMENT

CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES

DoD ORGANIZATION: ARMY

FUNDING: FY87 \$ 44.2M (FY88 PRESIDENT'S BUDGET)
FY88 \$ 32.5M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to provide for the full-scale development of various Non-System Training Devices (NSTD).

NSTD are developed to support general military training and training on more than one item or system, rather than a single item or system. Training devices and training simulation provide soldiers with realistic and meaningful training opportunities without prohibitive costs. Improved training devices, now available through modern technology, must continue to be developed to provide the training required to prepare U.S. soldiers to fight and defeat a numerically superior adversary.

The Projects within this Program Element have been restructured in FY 87 to reflect the close interrelationship between the efforts involved in the work of these Projects. Work previously planned to be associated with Projects D237 (NTSD - Artillery/Air Defense/Engineer), D239 (NSTD - Infantry), and D572 (NTSD - Armor/Antiarmor) have been combined with work planned under Project D241 (NSTD - Combined Arms) where all future work necessary will be funded. This restructuring reflects the true purpose of the NSTD program which is to develop combined arms/multiple system training systems that are concerned with the collective unit mission proficiency, as opposed to system training devices which are concerned with developing individual proficiency in the operation and maintenance of specific systems.

Close coordination is maintained with other Services through Training and Personnel Technology Conferences, a Joint Service Technical Coordinating Group, worldwide staffing of training device requirements, and the collocation of the Office of the Project Manager for Training Devices (PMTRADE), the Naval Training Systems Center (NTSC) and the Defense Training and Performance Data Center (TPDC) in Orlando, Florida. This coordination is designed to preclude duplication of effort. The devices contained in this program have normally progressed to Engineering Development from related Program Element 63738A (Non-System Training Devices (NSTD) Development) and/or Program Element 62727A (Non-System Training Devices (NSTD) Technology). This program also funds an Inter-Service Support Agreement that makes available for Army use the resources of the Naval Training Systems Center (NTSC), which is collocated with Project Manager for Training Devices (PMTRADE).

PAYOFF/UTILIZATION:

The payoffs of this Program Element include engineering development efforts for a variety of training devices and battle simulation systems which will provide realistic, effective, and economical training in marksmanship, gunnery, air defense, and nuclear, biological, and chemical (NBC) warfare.

In FY 86, some major accomplishments for Projects within this Program Element included: (a) development of the Air-Ground Engagement System/Air Defense (AGES/AD II) tactical engagement system and the Simulation of Area Weapons Effects-Indirect Area Fire (SAWE-IAF) training device, (b) testing leading to a non-development acquisition program for the Tank Weapons Gunnery Simulation

System (TWGSS), (c) development of the Signal Intelligence/Electronic Warfare (SIGINT/EW) Equipment Operator Simulator, (d) development of the Mine Effects Simulator, (e) full-scale development of the Main Tank Gun Weapons Effects Simulator (MTG-WES), (f) continuing system integration efforts to support the non-development item acquisition of the Multiple Object Location System (MOLS), and (g) design and development of the Guard Unit Armory Device Full-Crew Interactive Simulator Trainer (GUARD FIST).

FUTURE DIRECTIONS:

In FY 1990 and beyond, planned efforts include taking advantage of current technology and pressing the research of emerging technologies to develop training devices and simulators that make training more efficient and effective for both the active and Reserve Components of the Army.

These efforts are being pursued in accordance with the Secretary of Defense guidance to the Service Secretaries to increase funding on development of training technology and accelerate efforts to apply technology to solving training problems.

PROJECT OVERVIEW

	87	88
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PROJECT: D241	NON-SYSTEM TRAINING DEVICES - COMBINED ARMS	\$38.1M \$24.5M
PE: 64715A	NON-SYSTEM TRAINING DEVICES (NSTD) ENGINEERING DEVELOPMENT	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	ARMY	
RESPONSIBLE ORGANIZATION:	PROJECT MANAGER FOR TRAINING DEVICES	

PROJECT SYNOPSIS:

The objective of this Project is to develop prototype training devices to support combined arms (Infantry, Armor, Aviation, Air Defense, Artillery, Engineer, Chemical, and support troops) training and multisystem training within the Army, including the Reserve Components.

The purpose of this Project is to improve the effectiveness and efficiency of Army training. This is done by developing training devices which facilitate the transfer to trainees of the knowledge, ability, and experience required to fight outnumbered and win on the modern battlefield. These devices will enable the Army to train the collective unit to obtain the synergistic results which occur when a unit's weapons and support systems are employed in their respective battlefield roles. Utilizing modern technology, these devices will enhance training effectiveness while minimizing the requirements for scarce resources.

In FY 87, it is planned to continue the engineering development (ED) of those efforts previously undertaken, including: (a) the GUARD FIST gunnery skills trainer for M-60A3 and M-1 tanks, and (b) completing the development and operational testing of the Air Ground Engagement System/Air Defense (AGES/AD II) tactical engagement system and MTG WES.

In FY 88, it is planned to complete development and operational testing of: (a) the Main Tank Gun Weapons Effects Simulator, (b) the Mine Effects Simulator, (c) the Multiple Object Location System (MOLS), (d) the Signal Intelligence/Electronic Warfare (SIGINT/EW) Equipment Operator Simulator, and (e) the Guard Unit Armory Device Full-Crew Interactive Simulator Trainer (GUARD FIST). ED Conducted will include design and fabrication of prototype for testing of MILES-NBC I; the Simulation of Area Weapons Effects-Indirect Area Fire (SAWE-IAF); computer assisted health services simulator; and SIGINT/EW maintenance trainer. ED will begin on Deep Battle Simulation and Division Simulation. These war gaming simulation systems will provide command and control training on combat operations to numerous echelons of commanders and staffs. There will be a version to provide training to Division commanders and staffs.

In FY 89, this program will include: (a) the continuation of SAWE-IAF, (b) Deep Battle Simulation, (c) computer-assisted health services simulator and (d) the SIGINT/EW maintenance trainer. This program will also complete engineering development and operational testing of MILES-NBC I.

PAYOFF/UTILIZATION:

The payoffs for this Project include: (a) more realistic and meaningful training opportunities with less cost, (b) safer training conditions, while still providing high transfer of training to combat situations, and (c) increased ability to fight and defeat a numerically superior adversary.

In FY 86, accomplishments included: (a) development of the AGES/AD II tactical engagement system, which provides MILES battlefield force-on-force real-time casualty simulation training capability to the AH-64, 'H-60, and CH-47 during tactics training exercises, (b) development of the Mine Effects Simulator, which provides realistic mine casualty assessment during MILES tactical engagement exercises, (c) development of the SAWE-IAF, which provides MILES-compatible simulation of the casualty-producing effects of field artillery cannon fire on the battlefield, and (d) development of the SIGINT/EW Equipment Operator Simulator, which will simulate and integrate the operational characteristics of numerous tactical intelligence hardware systems for training at the schoolhouse without having to tie up actual tactical equipment. The MTG-WES will be used on tanks equipped with MILES to provide the cues needed to train detection of opposing weapons fire. MTG-WES will replace the existing tank gun simulator which uses blank training ammunition costing seven dollars per shot with one that will cost a few cents per shot. FY 86 efforts also include conducting necessary testing leading to a non-development acquisition program for the TWGSS. TWGSS will provide precision laser gunnery capability for tank gunnery training during portions of annual tank gunnery training at ranges and during force-on-force engagement exercises. Efforts are continuing to support the non-development item acquisition of the MOLS, which transitioned from the Training and Doctrine Command's concept exploration program. MOLS will be used for range management, soldier position measurement, safety, and unit performance feedback on the Multipurpose Range Complex. Engineering development efforts in FY 86 included initiating Interactive Simulator Trainer (GUARD FIST). This is a Reserve Component-unique family of low cost training devices for use at Armories and Reserve Centers. GUARD FIST can be configured to train tank crews, or field artillery crews/forward observers, or air defense soldiers as required.

PROJECT OVERVIEW

		87	88
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PROJECT: D573	PMTRADE AND NTSC SUPPORT	\$ 6.2M	\$ 8.1M
PE: 64715A	NON-SYSTEM TRAINING DEVICES (NSTD) ENGINEERING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PROJECT MANAGER FOR TRAINING DEVICES		

PROJECT SYNOPSIS:

The objective of this Project is to fund the support of Project Manager for Training Devices (PMTRADE) personnel and to fund a proportionate Army share of the operating costs of the Naval Training Systems Center (NTSC).

This Project provides the Army with a unique and specialized capability in all phases of research and development of cost-effective simulators for use as training devices to assure safe, economical, and effective training in establishing and maintaining the highest attainable degree of operational readiness. This arrangement is the result of an Inter-Service Support Agreement that is reviewed annually.

PAYOFF/UTILIZATION:

The payoff of this Project is that this arrangement makes available all Naval Training Systems Center (NTSC) resources for Army use.

These resources include: (a) over 800 civilian employees, of which almost 40 percent are professional personnel specializing in research, development, and training technology, and (b) extensive simulation facilities, including laboratories in areas such as physical sciences, electronics, visual simulation, computers, and human factors. Thus, the PMTRADE, collocated at NTSC, with a limited number of Army personnel, performs a mission for the Army in the training area similar to those of development commands in other areas. Also, it includes contractual services for support which NTSC cannot provide due to manpower constraints.

PROGRAM ELEMENT OVERVIEW

PE: 64722A	EDUCATION AND TRAINING SYSTEMS DEVELOPMENT
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING
DoD ORGANIZATION:	ARMY
FUNDING:	FY87 \$ 4.2M (FY88 PRESIDENT'S BUDGET) FY88 \$ 5.5M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to demonstrate the joint Service effectiveness of advanced technology in education and training.

This Program Element responds to Congressional and Department of Defense (DoD) mandates for joint-Service demonstration and acquisition of emerging technologies that can be quickly prototyped and offered to the Services for education and training uses. This Joint Service Manpower and Training Technology Development (JSMTT) program competitively selects Service and industry laboratory efforts of high potential for Service as well as other public and private sector implementation. This selection process enables the early identification of useful education and training technologies emerging from the service R&D programs, aligns them with Service requirements and needs, and accelerates their demonstration and evaluation in both operational and institutional environments.

This Program Element has eight products at various stages of development: (a) a Personalized Electronic Aid for Maintenance (PEAM), which is an attache case-size, artificial intelligence-based device that is designed to aid technicians in troubleshooting and checkout tasks, (b) the Computerized Hand-held Instructional Prototype, (CHIP), a hand-held interactive device that facilitates individual, initial, remedial, and refresher training, (c) the Intelligent Conduct of Fire Trainer (INCOFT), which is an interactive trainer designed for initial and update training for the Patriot Missile Fire Control Officer, using a simulation of the operational setting, (d) the Joint Service Multipurpose Arcade Simulator (JMACS), which is a low-cost marksmanship trainer for individual and crew weapons which simulates the weapon firing experience through the use of fiber optic technology and a target generator presenting targets in a cathode ray tube, (e) the Automated Performance and Readiness Training System (APARTS), which is a computer software system which facilitates training management through the collection, analyses, and presentation of data on trainee performance, (f) the Automated Simulator Test and Assessment Routine (ASTAR), which is a computer software system designed to forecast the probable effectiveness of simulator or training device-based training before actual development of the simulator or training device, (g) the Intelligent Air Attack System (IAAS), which is a rule-based artificial intelligence system that interacts with aircrews in an effort to reduce cockpit workload without usurping the aircrew's decision-making prerogatives, and (h) the Interactive Management Game (IMAGE), which is a dynamic manpower management training simulation that portrays effects of changing variables (numbers, types, scales, levels, availability and time, etc.) on a typical large-scale manpower system, enabling service manpower managers to learn quickly the effects of proposed changes in the system.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) improved skill levels of maintenance personnel, (b) reduced burden for Service training, (c) reduced training costs, and (d) significant cost savings through implementation of developments from this Program Element by multiple Services, eliminating parallel developments and achieving economies of scale through joint-Service

procurement of hardware and software training support.

Advanced training methods, simulators and training devices using state-of-the-art information technology reduce the heavy personnel requirements of Service training, while maintaining or increasing the effectiveness of training. PEAM, for example, is expected to reduce errors in field maintenance tasks by 20 percent and will completely replace paper-based organizational maintenance manuals. CHIP can be used in units for training in procedural skills in a variety of Military Occupational Specialties (MOSs), and it will enable training to be completely personalized and self-paced.

FUTURE DIRECTIONS:

Beyond FY 89, engineering changes will be incorporated into the technical data package for each developmental item, which will then transition to the U.S. Army Project Manager for Training Devices (PMTRADE), Orlando, Florida, for joint Service procurement.

PROJECT OVERVIEW

	87	88
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PROJECT: D750	EDUCATION AND TRAINING SYSTEM \$ 4.2M	\$ 5.5M
PE: 64722A	EDUCATION AND TRAINING SYSTEMS DEVELOPMENT	
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING	
DoD ORGANIZATION:	ARMY	
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE	

PROJECT SYNOPSIS:

The objective of this Project is to provide demonstrations of joint Army, Navy, Air Force, and Marine Corps prototype, technology-based, training and job-aiding devices that will meet the Services' most pressing training problems.

The Services must deal with training problems due to fewer available personnel, lower verbal and mathematical skills of entry-level personnel, more numerous and complex weapon systems, and rapidly increasing training costs. The House Armed Services Committee requested that the Services apply more research and development funds to joint-Service developmental and demonstration projects. In October 1981, a Program Decision Memorandum from the Office of the Secretary of Defense directed the Army to establish a joint-Service program to identify high-payoff, technology-based instructional methods resulting from defense and civilian research and development, and to demonstrate their use in full-scale prototypes for training, education areas, and job performance aids.

The first three engineering developments undertaken have been a Personal Electronic Aid for Maintenance (PEAM), an integrated, computer-based instructional system (TRIADS), and a Computerized Hand-Held Instructional Prototype (CHIP), an interactive training device in field-useable form. The PEAM effort uses portable delivery systems to electronically present maintenance information to field technicians and a supporting maintenance information authoring and management system. The TRIADS effort integrates software and hardware for computer-based instruction separately developed by the Services. CHIP is a battery-powered training aid which weighs under four pounds, is notebook-sized, and features computerized speech as an instructional and feedback medium with replaceable memory cartridges. It can be used in units for training in procedural skills in a variety of Military Occupational Specialties (MOSs). CHIP can maximize training in field exercises and in nontraditional environments such as motor pools, dayrooms, and living areas.

In FY 87, it is planned to: (a) subject PEAM to modified user training with the Navy, (b) transition the Army testing of PEAM to PMTRADE (Project Manager for Training Devices), which will produce functional specifications, and (c) test the CHIP to meet the Services' needs, including Army Chapparal crewman and vehicle recovery specialist, Navy Quartermaster School applications, Air Force M-60 Machine Gunner and base defense applications, and an interservice application in Explosive Ordnance Disposal (EOD) area.

Other efforts include: (a) develop a program of instruction using the Intelligent Conduct of Fire Trainer (INCOFT) for supplemental training in air defense artillery air control systems (the Navy will evaluate INCOFT for use as a training device for Radar Intercept Operators in the instruction, operation, and debriefing modes at the Oceana Naval Air Station, Virginia Beach, Virginia), (b) complete a Test and Evaluation Master Plan (TEMP) for the Joint Service Multipurpose Arcade Combat Simulator (JMACS), (c) complete

the engineering development phase of APARTS (Automated Performance Assessment and Remedial Training System), (d) begin developing the Automated Simulator Test and Assessment routine (ASTAR), and (e) complete the engineering development on CHIP and deliver a technical data package for acquisition of the device by the Services.

In FYs 88/89, the engineering development will conclude on the INCOFT. INCOFT will monitor the student's decision making during an engagement scenario, construct a file of each student's knowledge base, analyze misconceptions and areas of faulty responses, and then devise an instructional strategy that optimizes the transition from novice to expert.

Other efforts will conclude the test and evaluation of INCOFT at the U.S. Army Air Defense Artillery School, Fort Bliss, Texas. INCOFT will then be added into the program of instruction for Antiair Artillery training in the Army and training programs for F-14 Radar Intercept Operators in the Navy.

Plans also include: (a) conclude testing and evaluation on the JMACS, (b) complete development of ASTAR and begin testing in preparation for its transition to the user, and (c) have two to three new developmental initiatives enter the program as directed by the OSD (Office of the Secretary of Defense) Subcommittee.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) more effective military job performance, (b) less reliance on institutional training, (c) reduced requirements for training support personnel, and (d) more efficient and effective production, delivery, and management of computer-based training materials for all the Services.

PEAM is expected to reduce errors in field maintenance tasks by 20 percent, thus reducing spare parts inventories. TRIADS will integrate software and hardware for computer-based instruction developed separately by the Services. CHIP will convert equipment down-time into training time. CHIP can be integrated into many programs of instruction and can be used for initial, refresher, and cross-training.

In FY 86, accomplishments included: (a) began work to develop the INCOFT, a device capable of interacting with students to point out errors, provide immediate feedback, and guide them to develop the expert skills needed to use complex weaponry, (b) modified existing artificial intelligence software and hardware developed for training Navy F-14 Radar Intercept Operators (TRIO) to add artificial intelligence to an existing conduct-of-fire trainer developed for the Patriot weapon system, and (c) completed functional specifications and a feasibility model of CHIP.

Other efforts included beginning engineering development on the JMACS that includes a small, optically enhanced light pen which can be attached to various small caliber individual and crew-served weapons for diagnosis and feedback of marksmanship training. JMACS will modify the existing MACS by reducing its size, improving the light pen, and adapting it for use as a handgun trainer as part of counter-terrorism training in the Navy and by the Air Force for base security training. A field test of PEAM at Fort Knox was begun.

PROGRAM ELEMENT OVERVIEW

PE: 64801A AVIATION ENGINEERING DEVELOPMENT
 CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES
 DoD ORGANIZATION: ARMY
 FUNDING: FY87 \$ 9.3M (FY88 PRESIDENT'S BUDGET)
 FY88 \$ 9.7M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to support the aviation engineering development for Ground Support Equipment (GSE), Aviation Life Support Equipment (ALSE), and high-fidelity operational flight, weapon, and combat mission rotorcraft simulation to support initial entry, rotary-wing training and combat operational training.

Specifically, the GSE is needed to reduce the number of obsolete, single-purpose GSE items currently used, shorten maintenance time and increase mission readiness for both existing and projected aircraft. ALSE enhances aircrew and support personnel survivability and effectiveness in emergency and hostile situations. The simulator development provides realistic and cost-effective training by replicating the combat environment for tactical flight, to include nap-of-the-earth, weapons engagement, and enemy interaction.

The Combat Mission Simulator being developed for the AH-64 Attack Helicopter is being accomplished by extending the technology achieved in the previous development of the UH-1, CH-47, AH-1, and UH-60 helicopter simulators. In FY 89, the Synthetic Flight Training Systems block improvement program will begin. It is expected that computers will be replaced and visual system development will be included to enhance training.

This Program Element was transferred from PE 64217A, effective FY 88.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) a reduction in operations and support cost, and (b) a better trained pilot.

The simulators are used to complement the training accomplished in actual aircraft during formal courses of instruction and for maintenance of combat readiness by rated aviators. Each hour flown in a simulator offsets an hour which would have been flown in an aircraft. An hour in an AH-64 aircraft will cost approximately \$3000, while the simulator will cost less than \$600 per hour. Each simulator will be used 3645 hours per year, and therefore, each simulator reduces annual operations and support cost by \$8,748,000 (3000-600=2400x3645), while concurrently providing a better trained pilot. The reduction in operations and support cost is included in the Army's flying hour program request.

FUTURE DIRECTIONS:

Beyond FY 88, the Aviation Non-Systems Training Devices project will complete prototype development and testing, transition to production and complete fielding. The ACATT program is scheduled for completion in 1991.

PROJECT OVERVIEW

	87	88
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PROJECT: DE70	\$ 9.3M	\$ 9.7M
PE: 64801A		
CONGRESSIONAL CATEGORY:		
DoD ORGANIZATION:		
RESPONSIBLE ORGANIZATION:		

AVIATION NON-SYSTEM
TRAINING DEVICES

AVIATION ENGINEERING DEVELOPMENT

SIMULATION & TRAINING DEVICES

ARMY

PROJECT MANAGER FOR TRAINING DEVICES

PROJECT SYNOPSIS:

The objective of this Project is to develop aviation training devices that are applicable to more than one aviation system or are applicable to no major aircraft or aviation system.

In FY 87, it is planned to conduct a concept formulation effort to determine the best technical approach to be taken in development of the Combined Arms Team Trainer (ACATT). The ACATT is required to collectively train Scout and Attack aircrews in combined arms operations. The program develops Scout modules (OH-58 A/C and AHIP), Attack modules (AH-1S and AH-64), a Battle Captain module (Scout configuration), and instructor station. Each of these modules will be capable of interacting with one another, thereby providing a team training capability. The ACATT will be used for team training both in the field and at the institution. At the institution, it will be used for team training and to support the AHIP Aircrew Qualification Course (ACQ)/Instructor Course (IPC), the AH-64 AQC/IPC, and the AH-1S(FM) AQC/IPC. In the field, the ACATT will be used primarily to train Scout and Attack team tasks in combined arms operations while augmenting individual aircraft skills learned via other training devices.

In FY 88, it is planned to develop the ACATT, including initiation of the work package for nonrecurring design, assembly, integration, test, delivery and initial support for a development prototype. Also, Integrated Logistics Systems Management, Cost and Schedule Performance Management, Contract Management and Contract Work Breakdown Structures Management will be initiated.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) an improved team training capability, and (b) growth capabilities for future weapons systems as a result of using a modular approach in development.

The ACATT will also be capable of simulating full combat mission and combat integration of Scout and Attack aircrews under all environmental conditions (i.e., day, night, adverse weather, full weapons effects and nap-of-the-earth flight).

(CONTINUATION)

III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
62716A						HUMAN FACTORS ENGINEERING TECHNOLOGY
A1QL	HEL	5.111	5.723	HF	V A R	ADMINISTRATION AND MANAGEMENT - HUMAN ENGINEERING LAB (HEL)
AH70	HEL	12.248	9.649	HF	4	HUMAN FACTORS ENGINEERING SYSTEM DEVELOPMENT
		----- 17.360	----- 15.373			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62716A :						
						FY87

THE PRESIDENT'S BUDGET, JANUARY 1987						17.359

						FY88

						15.372

(CONTINUED)

(CONTINUATION)

III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62727A						NON-SYSTEM TRAINING DEVICES (NSTD) TECHNOLOGY
A230	PMTRADE	4.230	4.011	ST	6	NON-SYSTEM TRAINING DEVICES
		<u>4.231</u>	<u>4.012</u>			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62727A :						
						FY87
						<u>FY88</u>
						4.230
						<u>4.011</u>

(CONTINUED)

(CONTINUATION)

III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A2AL-1	ARI	2.307	1.873	HF	V A R	ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)
A2AL-2	ARI	1.369	1.298	ST	V A R	ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)
A2AL-3	ARI	2.194	2.129	MP	V A R	ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)
A2AL-4	ARI	1.185	1.093	ET	V A R	ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)
A790-1	ARI	2.669	2.692	HF	4	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION
A790-2	ARI	1.583	1.865	ST	6	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION
A791-1	ARI	2.538	3.060	MP	2	MANPOWER, PERSONNEL AND TRAINING
A791-2	ARI	1.371	1.571	ET	6	MANPOWER, PERSONNEL AND TRAINING
		<u>15.217</u>	<u>15.582</u>			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62785A :						
						FY87
						<u>15.216</u>
						FY88
						<u>15.581</u>

(CONTINUED)

(CONTINUATION)

III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63003A						AVIATION ADVANCED TECHNOLOGY
DB34	AVSCOM	5.225	5.057	ST	6	ROTORCRAFT SYSTEM INTEGRATION SIMULATOR (RSIS)
DB39	PMTRADE	5.476	1.723	ST	6	FLIGHT SIMULATOR COMPONENTS
		-----	-----			
		10.701	6.781			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63003A :						
						FY87

						10.701
						FY88

						6.780

(CONTINUED)

(CONTINUATION)

III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
63007A						HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
A792	ARI	7.693	15.323	MP	2	MANPOWER AND PERSONNEL
A793	ARI	7.693	8.215	HF	4	HUMAN FACTORS IN TRAINING AND OPERATIONAL EFFECTIVENESS
A794	ARI	6.764	8.853	ET	6	EDUCATION AND TRAINING
A795	ARI	5.001	5.773	ST	6	TRAINING SIMULATION
		<u>27.151</u>	<u>38.164</u>			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63007A :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	<u>27.151</u>	<u>38.164</u>

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(CONTINUATION)

III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
63738A						NON-SYSTEM TRAINING DEVICES (NSTD) ADVANCED DEVELOPMENT
D335	PMTRADE	3.722	0.000	ST	6	COMMUNICATIVE NON-SYSTEM TRAINING DEVICES (NSTD)
		<u>3.722</u>	<u>0.000</u>			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63738A :						
	THE PRESIDENT'S BUDGET, JANUARY 1987	<u>3.722</u>	<u>0.000</u>			

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III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64715A						NON-SYSTEM TRAINING DEVICES (NSTD) ENGINEERING DEVELOPMENT
D241	PMTRADE	38.062	24.459	ST	6	NON-SYSTEM TRAINING DEVICES - COMBINED ARMS
D573	PMTRADE	6.149	8.080	ST	6B	PMTRADE AND NTSC SUPPORT
		<u>44.212</u>	<u>32.540</u>			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 64715A :						
						FY87
						<u>FY88</u>
						THE PRESIDENT'S BUDGET, JANUARY 1987
						44.211
						<u>32.539</u>

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III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64722A						EDUCATION AND TRAINING SYSTEMS DEVELOPMENT
D750	ARI	4.211	5.447	ET	6	EDUCATION AND TRAINING SYSTEM
		-----	-----			
		4.212	5.448			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 64722A :						
						FY87

						4.211
						FY88

						5.447

(CONTINUED)

(CONTINUATION)

III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES	
64801A						AVIATION ENGINEERING DEVELOPMENT	
DE70	PMTRADE	9.317	9.654	ST	6D	AVIATION NON-SYSTEM TRAINING DEVICES	
		-----	-----				
		9.318	9.655			TOTAL IN PE	
TOTAL FUNDING IN PROGRAM ELEMENT 64801A :							
						FY87	FY88
						-----	-----
						9.317	9.654

III.B. NAVY PROGRAM ELEMENT AND PROJECT SYNOPSIS

PE	TITLE	PAGE
61153N	DEFENSE RESEARCH SCIENCES	III-B-1
62131M	MARINE CORPS LANDING FORCE TECHNOLOGY	III-B-7
62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA	III-B-11
62234N	SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA	III-B-16
63701N	HUMAN FACTORS ENGINEERING DEVELOPMENT	III-B-19
63707N	MANPOWER AND PERSONNEL SYSTEMS DEVELOPMENT	III-B-23
63720N	EDUCATION AND TRAINING	III-B-27
63732M	MARINE CORPS ADVANCED MANPOWER TRAINING SYSTEMS	III-B-30
63733N	TRAINING DEVICES TECHNOLOGY	III-B-33
63739N	NAVY LOGISTICS PRODUCTIVITY	III-B-36
64703N	TRAINING AND PERSONNEL SYSTEM DEVELOPMENT	III-B-42
64714N	AIR WARFARE TRAINING DEVICES	III-B-44
64715N	SURFACE WARFARE TRAINING DEVICES	III-B-46

Table III-B-1: Listing of Projects - Lists projects for each NAVY program element. Lists contain performing organization, funding, Congressional Category and goal information.

III-B-i

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PROGRAM ELEMENT OVERVIEW

PE: 61153N DEFENSE RESEARCH SCIENCES, SUBELEMENT 42:
BEHAVIORAL AND ORGANIZATIONAL SCIENCES

CONGRESSIONAL CATEGORY: EDUCATION & TRAINING
HUMAN FACTORS
MANPOWER & PERSONNEL

DoD ORGANIZATION: NAVY

FUNDING: FY87 \$ 11.7M (FY88 PRESIDENT'S BUDGET)
FY88 \$ 10.2M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to sustain U.S. Naval scientific and technological superiority and to be a source of new concepts and technological options for the maintenance of naval power and national security.

The objectives of the MPT Subelement are to develop fundamental knowledge about human capabilities and characteristics which support and guide Navy and Marine Corps efforts to improve: (a) personnel selection and classification, (b) training, (c) equipment design for ease of human use and maintenance, (d) team composition, (e) leadership, and (f) group decision-making procedures.

Major areas are: (a) Personnel and Training, which includes research on: (1) psychological measurement for selection, classification, and training, (2) human learning and instructional processes, and (3) the cognitive and neural bases of skill and knowledge acquisition, (b) Engineering Psychology, which covers research on basic human performance (such as inference, judgment, decision-making, auditory and visual perception, and system control) and on factors underlying the design of human-compatible interfaces in high technology systems, and (c) Group Psychology, which focuses on group processes, group behavior, leadership, and other factors that determine the productivity, morale, and retention of personnel. Research approaches include theoretical formulations, laboratory and simulator experimentation, mathematical modeling, correlational analyses, and observation and measurement in operational settings.

Research results from the program impact design of Navy systems such as the Computerized Adaptive Testing version of the Armed Services Vocational Aptitude Battery; classroom training programs that incorporate intelligent automated tutors; input/output interfaces between men and machines that include automated speech recognition systems; programs for supervisory control of remotely operated underwater vehicles and manipulators; and organizational arrangements and decision protocols for future command and control systems.

This Subelement coordinates within ONR with Biological Sciences, Information Sciences, and Mathematics Divisions in several interdisciplinary programs. Coordination with basic research sponsoring agencies within DoD is maintained through reviews for the Office of the Undersecretary of Defense for Research and Engineering, through joint-Service Technical Advisory Groups and through the NRC Committee on Human Factors sponsored by elements of Army, Navy, Air Force, NASA and NSF. International coordination is effected through NATO panels and the Technical Cooperation Program.

PAYOFF/UTILIZATION:

The payoffs of this Subelement include research support for: (a) advanced training technology by the Navy training community, (b) operational man-machine systems, and (c) manpower and personnel policies and practices

which affect recruitment, retention, and productivity.

This research effort is the primary means for determining scientific understanding and the needed technologies underlying improvements in Navy capabilities and operations. Increased research is needed to reach technological parity in some areas and gain/maintain superiority in others. Research is directed to search out, assess, and exploit potential solutions to naval problems.

Progress made in the areas of personnel and training research, engineering psychology, and group psychology include: (a) development of methods of modeling human performance on psychological tests that will reduce the cost and improve the quality of test calibration, (b) the discovery of differences in problem-solving strategies of low- and high-spatial ability persons, enabling the design of better aptitude tests, (c) improved understanding of observer judgments of object orientation and directionality in 3-D space, (d) development of a new metric for describing color space which will improve the design of multicolor displays, (e) development of an innovative conceptualization of the processes and contexts which determine the effectiveness of industrial, commercial, and government organizations, and (f) creation of a theoretical framework for understanding the processes whereby high school students learn to adapt, or fail to adapt, to school requirements and to work rules after leaving school (including military service).

FUTURE DIRECTIONS:

The FY 89 Program will tie all research in psychological processes more strongly to appropriate areas of neuroscience, particularly to the areas of attentional, perceptual, and cognitive processes.

PROJECT OVERVIEW

		87	88
		----	----
PROJECT: RR04206	PERSONNEL AND TRAINING	\$ 6.4M	\$ 5.6M
PE: 61153N	DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: BEHAVIORAL AND ORGANIZATIONAL SCIENCES		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	OFFICE OF NAVAL RESEARCH		

PROJECT SYNOPSIS:

The objective of this Project is to begin theoretical work toward estimating complex abilities from multidimensional tests.

Cognitive processes research will emphasize dynamic changes in knowledge representation as a novice learner progresses toward expert level skill, and learning and training research will begin to include social and motivational factors in transitioning from traditional classroom instruction to learning environments with advanced technologies such as intelligent tutor systems.

In FY 87, it is planned that: (a) research in personnel measurement will continue to explore multidimensional trait estimation using non-parametric estimation methods, (b) cognitive processes research will be directed toward development of a formal theory of transition from novice to expert states of knowledge, and (c) research in learning and training will emphasize development of a theory for intelligent tutorial systems of instruction, and will be integrated with research in cognitive processes.

In FY 88, it is planned to: (a) continue with research concerned with instructional theory to investigate the scientific issues underlying intelligent computer-assisted instruction, especially in the acquisition of complex skills, (b) pay special attention to the representation of knowledge during intermediate stages of learning because of its important role in the transition from novice to expert, (c) compare data on the memory, learning, and performance skills of brain-damaged individuals to those of normal individuals, to provide a deeper level of understanding of the organization of functional mechanisms involved, and (d) continue investigation, in personnel measurement research, of response models for test items that measure multiple ability dimensions, but shift emphasis from traditional verbally presented tests to the measurement of abilities on more complex performance tasks, and on sequential tasks in which significant dependencies exist between responses.

PAYOFF/UTILIZATION:

The payoff of this Project includes the solution of many training problems in the Navy through the introduction of more individualized, automated, and simulator-based instruction.

In FY 86, representative accomplishments include: (a) personnel measurement research developed robust methods for estimating abilities from a very few test items, (b) initiated new theoretical work towards estimating complex abilities from multidimensional tests, (c) cognitive processes research was expanded to include both psychological and neurophysiological approaches, (d) learning and training research developed models of knowledge and strategies used by expert troubleshooters of marine power plants as a basis for instructional system innovations, and (e) began new efforts to investigate social and motivational factors in transitioning from traditional classroom

instruction to learning environments with advanced technologies such as intelligent tutorial systems.

PROJECT OVERVIEW

		87	88
		----	----
PROJECT: RR04208	GROUP PSYCHOLOGY	\$ 2.8M	\$ 2.5M
PE: 61153N	DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: BEHAVIORAL AND ORGANIZATIONAL SCIENCES		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	OFFICE OF NAVAL RESEARCH		

PROJECT SYNOPSIS:

The objective of this Project is to increase understanding of the psychological and organizational variables that determine the performance of individuals, groups, teams, and units in the Navy and Marine Corps.

In FY 87, research in group psychology will continue formal model development and theory-guided experimentation on performance in small groups, particularly those which perform under stressful conditions.

In FY 88, research will continue the development of rigorous methodology and quantitative models of small group performance, and will extend these methods and models into the area of team performance and team training.

PAYOFF/UTILIZATION:

The payoffs of this Project include improved quality of Navy and Marine Corps personnel, reduction of personnel attrition and losses of Petty Officers in shortage categories, and enhanced effectiveness of military and civilian employees.

In FY 86, representative accomplishments include the initiation of development of theories and models for small, task-oriented team performance, which will build around major themes of cohesion, decision-making and information processing, incentive and reward systems, productivity and resistance to stress.

PROJECT OVERVIEW

	87	88
	-----	-----
PROJECT: RR04209	ENGINEERING PSYCHOLOGY	\$ 2.5M \$ 2.2M
PE: 61153N	DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: BEHAVIORAL AND ORGANIZATIONAL SCIENCES	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	OFFICE OF NAVAL RESEARCH	

PROJECT SYNOPSIS:

The objective of this Project is the development of enhanced group decision-making procedures.

In FY 87, it is planned that: (a) research in decision-making will continue to emphasize coordinated development of formal models and behavioral data in distributed decision-making architectures, (b) perception research will expand in vision, touch and auditory pattern recognition, with animal models being emphasized in all three sensory processing modalities, and (c) research in human-computer integration will include experiments to test formal models for optimizing human-algorithm interactions in image processing.

In FY 88, engineering psychology plans include: (a) research on computational and neurological theory as a basis for understanding visual perception, and extend to include other perceptual areas such as audition, kinesthesia and touch, (b) in addition to this feature-based, or "bottoms-up" approach to perception, research will be initiated to investigate the "top-down" mechanisms by which previous experience and learning influence the perceptual processes, and (c) beginning multi-model studies to integrate touch, vision and motor control.

PAYOFF/UTILIZATION:

The payoff of this Project will be improved human performance in high technology systems to meet Navy and Marine Corps operational requirements.

In FY 86, representative accomplishments include: (a) decision-making research that included experiments to test predictions from recently developed models of risk attitude, while other research tested hypotheses about how decision problem conditions determine the choice heuristic human will employ, (b) multi-person, distributed decision-making research tested model predictions about relative effectiveness of different structural architectures, (c) the consequences of various mixes of expertise in command systems will generate new work, (d) continued perception research to emphasize computational approaches and added new work in primate neurophysiology and anatomy to develop neural models of processing architecture for vision, and (e) initiated new projects in pattern recognition in touch and in audition; these projects include primate studies of neural processing of touch information in object discrimination, and studies of neural processing of auditory information in target recognition.

PROGRAM ELEMENT OVERVIEW

PE: 62131M MARINE CORPS LANDING FORCE TECHNOLOGY
 CONGRESSIONAL CATEGORY: MANPOWER & PERSONNEL
 EDUCATION & TRAINING
 DoD ORGANIZATION: MC
 FUNDING: FY87 \$ 0.6M (FY88 PRESIDENT'S BUDGET)
 FY88 \$ 0.5M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of the Manpower, Personnel and Training (MPT) portion of this Program Element (PE) is to develop managerial and statistical concepts and techniques that will lead to more cost-effective personnel and training management policies and procedures.

Efforts will focus on: (a) developing faster, more accurate assessment of individual aptitudes and abilities, (b) improving personnel retention, (c) reducing short-term personnel transfers, (d) developing low-cost training simulators, (e) developing training standards for all unit levels, and (f) developing an improved, less manpower-intensive procedure to match training to job requirements.

To avoid duplication of work, close coordination is maintained with all the other Armed Services and selected DoD agencies, the National Aeronautics and Space Administration (NASA), and industrial research and development (IR&D) projects. The Marine Corps Manpower and Training Technology area includes: PE 62722A (Manpower, Personnel and Training), PE 63743A (Education and Training), PE 63732M (Marine Corps Manpower and Training Systems), Joint Service Job Performance Measurements Working Group, Computerized Adaptive Testing Interservice Coordinating Committee, and PE 62233N (Mission Support Technology).

In FYs 87/88, it is planned to: (a) complete developmental prototype of an information delivery system for the Personnel Cohorts Rates Task (transition to PE 63732M in FY 88), (b) validate the designed procedures for developing training standards for tasks performed by a combat service support group (transition Collective Training Standards task to PE 63732M in FY 88), (c) develop a neuroelectric and neuromagnetic recording capability for muscles, sensory-cognitive-motor relationships and stress tasks as part of the Biopsychometric Assessment task, and (d) begin Tour Systems Optimization Task.

This Technology Area subsumes efforts transferred from Program Element 62744N, under Projects F44-521 and F44-522.

PAYOFF/UTILIZATION:

The payoffs of the MPT portion of this Program Element are improved utilization and increased readiness of personnel through: (a) more accurate assessment of individual aptitudes and abilities, (b) improved personnel retention, (c) reduced short-term personnel transfers, (d) the development of low-cost training simulators, (e) better training standards from all unit levels, and (f) improved, less manpower-intensive procedures for matching training to job requirements.

In FY 86, accomplishments included: (a) completion of utility testing of the CAT-ASVAB, (b) determining the feasibility of using biopsychometric measures to improve personnel selection, classification, fitness, and performance prediction under fatigue and stress, and (c) a final report on Drill Instructor Stress Training.

FUTURE DIRECTIONS:

Plans for the future include: (a) testing results of individual biopsychometric assessments as a measure of successful school and stressful duty performance, (b) transition of new techniques for the Tour Systems Optimization model to PE 63732M, (c) transition of Biopsychometric Assessment task to PE 63732M (FY 90), and (d) start of development of new technology for the selection, classification, and assignment of personnel.

PROJECT OVERVIEW

	87	88
	-----	-----
PROJECT: CC31-521	MANPOWER TECHNOLOGY	\$ 0.3M \$ 0.3M
PE: 62131M	MARINE CORPS LANDING FORCE TECHNOLOGY	
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL	
DoD ORGANIZATION:	MC	
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER	

PROJECT SYNOPSIS:

The objective of this Subproject is to develop managerial and statistical concepts and techniques that will lead to more cost-effective personnel management policies and procedures through focusing on: (a) faster, more accurate assessment of individual aptitudes and abilities (a joint Services project), (b) improvement of personnel retention, and (c) reduction of short-term personnel transfers.

This Subproject was transferred in FY 85 from Program Element (PE) 62744N, Marine Corps Air-Ground Technology, to the current Program Element as part of the Marine Corps Manpower and Training technology area.

In FY 87, it is planned to: (a) complete developmental prototype of an information delivery system for the Personnel Cohort Rates project, allowing manpower analysts to access a variety of personnel statistics within 5-10 seconds, (b) develop neuroelectric and neuromagnetic recording capability for muscles, sensory-cognitive-motor relationships, and stress tasks as part of the Biopsychometric Assessment task, and (c) begin Tour Systems Optimization task, which will explore, develop, and test new techniques to solve large-scale integer problems with side constraints, to demonstrate the feasibility of using the techniques in Tour Systems Models.

In FY 88, it is planned to: (a) transition Personnel Cohort Rates task to PE 63732M, and (b) continue personnel testing and data assessment and validation process for the Biopsychometric Assessment task.

PAYOFF/UTILIZATION:

The payoff of this Subproject is improved utilization of personnel and thus increased readiness through: (a) more accurate assessment of individual aptitudes and abilities, (b) improved personnel retention, and (c) reduced short-term personnel transfers.

In FY 86, accomplishments included: (a) completion of utility testing of the Computerized Adaptive Test-Armed Services Vocational Aptitude Battery (CAT-ASVAB), and (b) determination of the feasibility of using biopsychometric measures to improve personnel selection, classification, fitness for duty, and performance prediction under baseline fatigue and stressful conditions.

PROJECT OVERVIEW

PROJECT: CC31-522	TRAINING TECHNOLOGY	87 ----- \$ 0.3M	88 ----- \$ 0.2M
PE: 62131M	MARINE CORPS LANDING FORCE TECHNOLOGY		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	MC		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

PROJECT SYNOPSIS:

The objective of this Subproject is to develop managerial and statistical concepts and techniques that will lead to more cost-effective training management policies and procedures through focusing on development of: (a) training standards for all unit levels, and (b) an improved, less manpower-intensive procedure for matching training to job requirements.

This Subproject was transferred in FY 85 from Program Element (PE) 62744N, Marine Corps Air-Ground Technology, to the current PE as part of the Marine Corps Manpower and Training technology area.

In FY 87, it is planned to complete validation of the procedures used in the development of collective training standards.

In FY 88, it is planned to transition the Collective Training Standards task to PE 63732M.

PAYOFF/UTILIZATION:

The payoff of this Subproject is increased readiness of personnel through improved training resulting from: (a) low-cost training simulators, (b) better training standards for all unit levels, and (c) improved, less manpower-intensive procedures for matching training to job requirements.

In FY 86, accomplishments included completing a final report on Drill Instructor Stress Training.

PROGRAM ELEMENT OVERVIEW

PE: 62233N MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING
AND SIMULATION TECHNOLOGY AREA

CONGRESSIONAL CATEGORY: MANPOWER & PERSONNEL
EDUCATION & TRAINING
SIMULATION & TRAINING DEVICES

DoD ORGANIZATION: NAVY

FUNDING: FY87 \$ 8.2M (FY88 PRESIDENT'S BUDGET)
FY88 \$ 8.5M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of the Manpower, Personnel and Training (MPT) portion of this Program Element is to provide mission support technologies essential for all naval operations, specifically through the support of effective recruitment, training, and retention of military personnel and the development of training device simulation technology.

This Technology Area subsumes Manpower and Personnel, and Education and Training Projects transferred from Program Element 62763N, and a Simulation and Training Project transferred from Program Element 62757N. Funding indicated includes only the MPT portion of this Program Element.

In FY 87, it is planned to: (a) complete development of tests of information processing to predict on-the-job performance in selected Navy occupational ratings, (b) complete evaluation of initial application of artificial intelligence to a maintenance training system (i.e., the SH-3H Helicopter Bladefold and Rotor Brake System Course, and (c) demonstrate a low-cost, passive acoustic analysis trainer using the Navy Standard Desktop Computer.

In FY 88, it is planned to: (a) complete analyses and policy recommendations for new assignment and career development programs designed to increase the performance and retention rates of naval officers, (b) complete design and evaluation of computer-based tools to support the construction of simulation models and intelligent instructional systems, (c) complete evaluation of embedded training technology for shipboard training and skill maintenance, and (d) complete evaluation of techniques for converting photographic data to an Inverse Synthetic Aperture Radar (ISAR) database for training ISAR recognition skills.

In FY 89, it is planned to: (a) complete development of long-range forecasting techniques to predict personnel loss and continuation rates, (b) complete development of an automated instructional system for teaching procedural skills, (c) complete demonstration and evaluation of a computer image generation database for sensor simulation, and (d) complete evaluations of training techniques and equipment for improving performance under chemical/biological warfare defense conditions.

PAYOFF/UTILIZATION:

The payoffs of the MPT portion of this Program Element are more effective recruitment, training, and retention of military personnel.

In FY 86, accomplishments included: (a) beginning development of an automated personnel assignment system, (b) design of a prototype system for teaching generic problem solving skills, and (c) beginning development of a prototype system to facilitate the transfer of knowledge from a subject matter expert to an intelligent training system.

FUTURE DIRECTIONS:

Beyond FY 89, it is planned to: (a) complete development of a computerized authoring system for integration into the Computerized Executive Networking Survey System (CENSUS), (b) complete the evaluation of a sensor emulator for use in aviation on-board training systems, and (c) complete development of an Integrated Officer Selection System.

PROJECT OVERVIEW

	87	88
	-----	-----
PROJECT: RR63-521	MANPOWER AND PERSONNEL \$ 3.0M	TECHNOLOGY \$ 3.1M
PE: 62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA	
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER	

PROJECT SYNOPSIS:

The objective of this Subproject is to support effective recruitment and retention of military personnel.

In FY 87, it is planned to complete development of tests of information processing to predict on-the-job performance in selected Navy occupational ratings.

In FY 88, it is planned to complete analyses and policy recommendations for new assignment and career development programs designed to increase the performance and retention rates of naval officers.

In FY 89, it is planned to complete development of long-range forecasting techniques to predict personnel loss and continuation rates.

This Subproject was transferred in FY 85 from Program Element 62763N, Project F63-521, to the current Program Element as part of the Personnel, Training and Simulation Technology Area.

PAYOFF/UTILIZATION:

The payoffs of this Subproject include improved recruitment and retention of military personnel.

In FY 86, the development of an automated personnel assignment system was initiated.

PROJECT OVERVIEW

	87	88
	-----	-----
PROJECT: RR63-522	EDUCATION AND TRAINING TECHNOLOGY	\$ 1.8M \$ 1.9M
PE: 62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA	
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER	

PROJECT SYNOPSIS:

The objective of this Subproject is to support effective training of military personnel.

In FY 87, it is planned to: (a) complete evaluation of initial application of artificial intelligence to a training system (i.e., the SH-3H Helicopter Bladefold and Rotor Brake System course).

In FY 88, it is planned to: (a) complete design and evaluation of computer-based tools to support the construction of simulation models and intelligent instructional systems, and (b) complete evaluation of embedded training technology for shipboard training and skill maintenance.

In FY 89 it is planned to: (a) complete development of an automated instructional system for teaching procedural skills, and (b) complete evaluations of training techniques and equipment for improving performance under chemical/biological warfare defense conditions.

This Subproject was transferred in FY 85 from Program Element 62763N, Project F63-522, to the current Program Element as part of the Personnel, Training and Simulation Technology Area.

PAYOFF/UTILIZATION:

The payoffs of this Subproject include more effective training of military personnel.

In FY 86, accomplishments included completing the design of a prototype system for teaching generic problem solving skills.

PROJECT OVERVIEW

	87	88
	-----	-----
PROJECT: RW57-526	SIMULATION AND TRAINING \$ 3.4M \$ 3.5M	
	DEVICE TECHNOLOGY	
PE: 62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER	

PROJECT SYNOPSIS:

The objective of this Subproject is to support effective training of military personnel through the development of training device simulation technology.

In FY 87, it is planned to demonstrate a low-cost, passive acoustic analysis trainer using the Navy Standard Desktop Computer.

In FY 88, it is planned to complete the evaluation of techniques for converting photographic data to an Inverse Synthetic Aperture Radar (ISAR) database for training ISAR recognition skills.

In FY 89, it is planned to complete the demonstration and evaluation of a computer image generation database for sensor simulation.

This Subproject was transferred in FY 85 from Program Element 62757N, Project F57-526, to the current Program Element as part of the Personnel, Training and Simulation Technology Area.

PAYOFF/UTILIZATION:

The payoffs of this Subproject include more effective training of military personnel through the provision of advanced training simulation devices.

In FY 86, accomplishments included the beginning development of a prototype system to facilitate the transfer of knowledge from a subject matter expert to an intelligent training system.

PROGRAM ELEMENT OVERVIEW

PE: 62234N	SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA
CONGRESSIONAL CATEGORY:	HUMAN FACTORS
DoD ORGANIZATION:	NAVY
FUNDING:	FY87 \$ 3.6M (FY88 PRESIDENT'S BUDGET) FY88 \$ 3.8M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of the Manpower, Personnel and Training (MPT) portion of this Program Element is to provide Navy systems developers with the resources and expertise to implement advanced concepts, specifically in the areas of man/machine interface, decision-making, and information transfer.

This Technology Area subsumes Human Factors Projects transferred from Program Element 62757N. Funding indicated includes only the MPT portion of this Program Element.

In FY 87, it is planned to: (a) complete development of engineering design aids for improved maintainability of electronic equipment, (b) complete demonstration of an adaptive expert system to reduce complexity of ship propulsion plant operation and maintenance, and (c) complete development and demonstration of a user interface to greatly improve the ability of afloat Battle Group Commanders to retrieve critical tactical decision-making information.

In FY 88, it is planned to: (a) complete development and evaluation of tracking and attack aid modules to improve airborne and surface ship ASW attack performance, (b) complete development and shipboard evaluation of intelligent decision-aiding technology with emphasis on air strike planning, and (c) initiate development of an advanced intelligent workstation for combat direction systems to improve the integration of Battle Force staffs and reduce command decision times.

In FY 89, it is planned to: (a) complete development of novel control and display concepts for semi-autonomous control of deep ocean search vehicles and remotely-controlled manipulators, (b) complete the integration of a voice recognition system into a prototype combat direction system to determine its ability to improve system effectiveness in a high-information environment, and (c) complete testing of the Aircrew Interface Module of an Intelligent Air Attack System to reduce pilot information overload during high-speed, low-altitude attacks.

PAYOFF/UTILIZATION:

The payoff of the MPT portion of this Program Element is the provision to Navy systems developers of resources and expertise in the areas of man/machine interface, decision-making, and information transfer, thus enabling improved system design with better utilization of the human component.

In FY 86, accomplishments included: (a) development of an ASW search pattern planning aid, which has improved search planning performance by 64 percent and has the potential for reducing ASW costs by \$40,000 per mission, (b) completion of the first module of an expert decision aid for air strike planning, which has the potential for reducing decision-aided strike planning by a factor of two, and (c) development of objective standards and improved methods for measuring EW operator performance. This methodology improves the Navy's ability to assess combat proficiency.

FUTURE DIRECTIONS:

Beyond FY 89, it is planned to: (a) complete development of improved human-computer interfaces to enhance the performance of surface ship combat direction systems, (b) complete development of operator performance measures for use in assessment of fleet ASW units and evaluation of fleet exercises, and (c) complete the identification and evaluation of improved command and control organizational structures.

PROJECT OVERVIEW

	87	88
	----	----
PROJECT: RS57-525	HUMAN FACTORS TECHNOLOGY \$ 3.6M \$ 3.8M	
PE: 62234N	SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER	

PROJECT SYNOPSIS:

The objective of this Subproject is to provide Navy systems developers with the resources and expertise to implement advanced concepts, by addressing technological opportunities in man/machine interface, decision-making, and information transfer.

This Subproject subsumes efforts transferred from Program Element 62757N, under Projects F57-242 and F57-525.

In FY 87, it is planned to: (a) complete development of engineering design aids for maintainability of electronic equipment, (b) complete demonstration of an adaptive expert system to reduce complexity of ship propulsion plant operation and maintenance, and (c) complete development and demonstration of a user interface to greatly improve the ability of afloat Battle Group Commanders to retrieve critical tactical decision making information.

In FY 88 it is planned to: (a) complete development and evaluation of tracking and attack aid modules to improve airborne and surface ship ASW attack performance, (b) complete development and shipboard evaluation of intelligent decision-aiding technology with emphasis on air strike planning, and (c) initiate development of an advanced intelligent workstation for combat direction systems to improve the integration of Battle Force staffs and reduce command decision times.

In FY 89, it is planned to: (a) complete development of novel control and display concepts for semi-autonomous control of deep ocean search vehicles and remotely-controlled manipulators, (b) complete the integration of a voice recognition system into a prototype combat direction system to determine its ability to improve system effectiveness in a high-information environment, and (c) complete testing of the Aircrew Interface Module of an Intelligent Air Attack System to reduce pilot information overload during high-speed, low-altitude attacks.

PAYOFF/UTILIZATION:

The payoff of this Subproject is the provision to Navy systems developers of resources and expertise in the areas of man/machine interface, decision-making, and information transfer, thus enabling improved system design with better utilization of the human component.

In FY 86, accomplishments included: (a) development of an ASW search pattern planning aid, which has improved search planning performance by 64 percent and has the potential for reducing ASW costs by \$40,000 per mission, (b) completion of the first module of an expert decision aid for air strike planning, which has the potential for reducing decision-aided strike planning by a factor of two, and (c) development of objective standards and improved methods for measuring EW operator performance. This methodology improves the Navy's ability to assess combat proficiency.

PROGRAM ELEMENT OVERVIEW

PE: 63701N HUMAN FACTORS ENGINEERING DEVELOPMENT
CONGRESSIONAL CATEGORY: HUMAN FACTORS
DoD ORGANIZATION: NAVY
FUNDING: FY87 \$ 2.4M (FY88 PRESIDENT'S BUDGET)
FY88 \$ 4.8M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objectives of this Program Element are to: (a) improve crew and work station design and evaluation methods to reduce errors and increase effectiveness of operation, (b) establish target acquisition and weapon system standards for displays people can understand, (c) develop human performance assessment techniques for air combat maneuvering to increase the number of enemy planes shot down, (d) provide initial human factors support for new systems, and (e) improve the integration between ships and their crews. This program also develops and evaluates new techniques for system design and seeks to improve fleet readiness through human factors technology.

Navy ships, aircraft, weapons, sensors, and command and control systems must be maintained and operated by Navy personnel. This program promotes a better fit among the operator, the equipment, and the mission so that hardware systems will operate with fewer human-induced errors and with greater safety and maintainability.

The Department of Defense Human Factors Engineering Technical Advisory Group is the forum for coordinating related efforts to integrate the human component into military systems.

PAYOFF/UTILIZATION:

The payoff of this Program Element is to assure a good fit among the operator, the equipment, and the mission in Navy systems. As a result, hardware systems operate more rapidly with fewer human-induced errors and with greater safety and maintainability. The development of these new human factors engineering technologies and their incorporation into the design of Navy systems will result in improved fleet performance.

FUTURE DIRECTIONS:

This Program Element will continue to ensure that appropriate human factors considerations are incorporated in the engineering design of Navy systems.

PROJECT OVERVIEW

	87	88
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PROJECT: R1771	GENERAL HUMAN FACTORS \$ 1.6M	ENGINEERING DEVELOPMENT \$ 3.1M
PE: 63701N	HUMAN FACTORS ENGINEERING DEVELOPMENT	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER	

PROJECT SYNOPSIS:

The objective of this Project is to use Human Factors Engineering (HFE) more effectively in the weapon system acquisition process to improve the performance of operators, maintainers, and decision makers in using our increasingly complex and sophisticated ship systems being built by the Navy.

This Project responds to critical reports by the Government Accounting Office (GAO), the Defense Science Board, and the Naval Research Advisory Committee. The Project will develop and evaluate human factors and organizational system technology to deal with such problem areas as: (a) information management and decision making under time-critical conditions, (b) multi-sensor integration and display of task pertinent information in performance enhancing formats, (c) battle force information management and command effectiveness, (d) combat system design/engineering for improved operability, (e) shipboard and shorebased administration and decision support systems, and (f) computer authoring and delivery of technical information for maintenance support. Technologies are transitioned into use by the material acquisition community.

In FY 87, it is planned to: (a) develop and examine technologies that can be used to improve the effectiveness of people using decision support systems, (b) determine human performance criteria that can be used in system design guidelines and specifications, (c) examine the critical man-computer interface issues affecting operability of systems, (d) select operator/team functions for simulation and measurement, (e) provide hardware acquisition program managers with specific guidance for key long-lead-time equipment acquisitions (i.e., multi-purpose counselor), (f) conduct pilot testing and field evaluations of select maintenance aids, (g) develop an information base which describes how battle groups manage information, and (h) design techniques to validate and verify a battle group information management database.

In FY 88, it is planned to: (a) test and evaluate a prototype information management decision support system, (b) conduct laboratory testing of candidate sensor data integration concepts, automation issues associated with similar source/disparate source information integration, and adaptive menu structures and control techniques, (c) field test a portable computer-based maintenance aid system, and (d) conduct experiments to specify connectivity of links and roles in battle group command structure.

In FY 89, it is planned to: (a) develop formatting concepts for a model of combat control decision process for subsurface systems, (b) complete design enhancements based on empirical tests, (c) complete the evaluation of small combatant combat system and develop generic man-machine interface concepts, and (d) evaluate alternative solutions for battle group organizational structure, authority relationships, networks, and expert support systems.

PAYOFF/UTILIZATION:

The payoffs of this Project are solutions to man-machine interface problems (especially related to operator error and overload) in the increasingly sophisticated ship systems being built by the Navy, through increased and more effective use of human factors engineering techniques in weapon system acquisition.

In FY 86, accomplishments included: (a) initiated study of man-machine integration issues for combat control, (b) conducted testing of design approaches and user interface features for a networked management information system, (c) addressed the use of color in complex information displays, (d) completed a simulation facility for performance measurement in combat system contexts, (e) developed a submarine combat commander model of decision processes for use in performance prediction, (f) identified subsurface combat functions that could benefit from decision aiding, (g) projected missions and combat functions to the year 2000 for small ASW combatants and critical man-machine integration issues, (h) developed standards for user-interface design of information management for ship/shore systems, and (i) initiated development of computer-based aids for electronic troubleshooting.

PROJECT OVERVIEW

	87	88
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PROJECT: W0542	AIR HUMAN FACTORS	\$ 0.8M \$ 1.7M
	ENGINEERING TECHNOLOGY	
PE: 63701N	HUMAN FACTORS ENGINEERING DEVELOPMENT	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVAL AIR DEVELOPMENT CENTER	

PROJECT SYNOPSIS:

The objective of this Project is to improve combat effectiveness and survivability through applications of man-machine integration methods in the design and update of airborne systems.

The primary goal of this effort is to improve Naval Air Warfare readiness through improved human factors technology, especially through: (a) an improved technology base necessary to make tradeoff decisions in complex man-machine systems, (b) enhanced human performance in aviation environments, and (c) reduced operator workload through improved information management and decision analytic techniques.

In FY 87, it is planned to: (a) incorporate the sonobuoy placement decision aid into the ASW module of the P-3C Avionics upgrade, (b) further develop a Real Time Advisory System (RTAS) for tactical decision making in E-2C squadrons, (c) develop "Rapid Prototyping" capability for design of tactical display devices (static phase), and (d) incorporate Pattern Analysis Decision Aid (PANDA) features in NAVOCEANO anti-submarine warfare algorithm.

In FY 88, it is planned to: (a) begin development of RTAS Interface guidelines (for ASW only), (b) integrate decision aids with countermeasures and threat evaluation displays, (c) evaluate interactive Rapid Prototyping for displays, and (d) begin development of energy management aids to improve combat maneuvering.

In FY 89, it is planned to: (a) conduct ASW RTAS interface experiments, (b) develop simulation of intelligent EW displays, and (c) begin fleet demonstrations of air combat tactical display improvements.

PAYOFF/UTILIZATION:

The payoff of this Project is improved aircrew performance in Naval aircraft systems for air combat and airborne command, control and communications. This will be accomplished by applying human factors engineering methods in the design and modification of airborne systems.

In FY 86, accomplishments included development of: (a) a concept for use of Expert Systems Technology in tactical decision making, (b) decision aids for placement of sonobuoys in antisubmarine warfare, (c) a test bed for information management for tactical decision making in airborne electronic warfare, (d) pilot performance and workload measurement devices for use during tactical air combat training, and (e) optimized F-14D tactical information displays.

PROGRAM ELEMENT OVERVIEW

PE: 63707N	MANPOWER AND PERSONNEL SYSTEMS DEVELOPMENT
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL
DoD ORGANIZATION:	NAVY
FUNDING:	FY87 \$ 2.9M (FY88 PRESIDENT'S BUDGET) FY88 \$ 4.0M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to address the need to produce required levels of personnel readiness, without increasing the cost of manpower, by exploiting emergent technologies. Computer-based measurement techniques will be used to verify job classification measures in terms of performance on the job (vice training performance).

Recent advances in mathematical optimization, computer technology, and advanced measurement techniques permit significant improvements in the utilization of personnel resources. The application of computer technology and advanced mathematical programming codes to personnel assignment will enable the Navy to maximize job fill, fleet needs, and individual preferences without increasing the cost of rotating personnel.

This effort responds to a Congressional mandate and DoD-wide joint-Service effort to establish and relate enlistment selection criteria to successful job performance.

While related in objective and approach to the research and development of the other Services, this Program Element is unique in that it is tailored to the organization and people of the Navy. To ensure that unnecessary duplication of work does not arise, extensive preliminary literature reviews are conducted, and liaison is maintained with the Office of the Under Secretary of Defense for Research and Engineering and with the Army and Air Force through program reviews, information exchanges, visits, and special briefings.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include improved accession and utilization of people resources through better classification, skill level assignments, productivity, and retention.

Specific payoffs include: (a) improved forecasts of manpower requirements, (b) better job performance measures, leading to enhanced recruitment and classification standards for accession of higher quality enlistees, (c) more accurate assignment of personnel, (d) better management of the Navy's enlisted and officer personnel, (e) more timely and appropriate understanding and meeting of concerns of military and civilian personnel, and thus, improved performance and retention.

FUTURE DIRECTIONS:

The future plans for this Program Element are to continue and complete development of civilian and military personnel management and utilization improvement efforts, including: (a) job performance tests for major Navy occupations, analyses relating performance data to existing enlistment classification standards, and methods to implement job performance tests for Navy enlistment and classification systems, (b) a military/civilian trade-off model to allocate shore-based manpower authorizations, (c) a comprehensive supply planning system addressing enlisted recruiting demographics by

regional area, (d) the Enlisted Personnel Assignment System, (e) the officer personnel assignment information and delivery system, and (f) systems to provide data and information to increase retention of Navy civilian personnel.

PROJECT OVERVIEW

	87	88
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PROJECT: R1770	MANPOWER AND PERSONNEL \$ 2.9M	DEVELOPMENT \$ 4.0M
PE: 63707M	MANPOWER AND PERSONNEL SYSTEMS DEVELOPMENT	
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER	

PROJECT SYNOPSIS:

The objective of this Project is to demonstrate the feasibility of using advances in computer technology, mathematical optimization, and measurement theory for: (a) making selection tests relevant to Navy jobs rather than Navy school performance, (b) optimizing the personnel assignment process to improve readiness and satisfaction of Navy needs and individual preferences without increases in the cost of rotating personnel, and (c) introducing better methods of force planning so that short-term readiness is not achieved at the expense of future personnel shortages and accelerated budgets.

This Project is divided into four major thrust areas: (a) Selection and Classification responds to a Congressional mandate and DoD-wide, joint-Service effort to relate enlistment selection criteria to successful job performance, (b) Personnel Assignment develops systems for optimal person-job matches based on cost, operational needs, and individual preferences using recent advances in mathematical optimization techniques, (c) Force Management determines how computer technologies and operations research techniques can improve personnel force planning and policy evaluation, with focus on the development of information delivery systems that allow force managers to rapidly and accurately evaluate alternative personnel plans to avoid cost errors and major readiness deficiencies, and (d) Career Development determines the sequence and type of jobs for military personnel careers that will maximize productivity and retention.

In FY 87, it is planned to: (a) develop a military/civilian trade-off model to allocate shore-based manpower in the most cost-effective manner, (b) implement the Manpower, Personnel and Training Assessment subsystem, (c) conduct a joint-Service analysis of relationships between entrance test scores and job-performance measures, (d) implement the Enlisted Personnel Assignment System to include eleven ratings in the administrative, deck, and supply communities, and expand the system to include "C" school trained personnel, (e) develop and implement strategies to increase the effectiveness of Family Service Centers, (f) complete a feasibility assessment and implementation plan for a computerized civilian survey system to provide rapid feedback to policy makers concerning policy changes impact on civilian work force, (g) expand officer retention forecasting model to include Restricted Line and Staff Communities, (h) investigate the feasibility of forecasting personnel inventories by various distributable strength categories (e.g., rating, paygrade, sea/shore, distributable, individuals, etc.), (i) install a new generation, computer-based Officer Manning Plan to provide an executable allocation plan for officer detailing, (j) design an enlisted Permanent Change of Station (PCS) Cost Management System to enhance management of PCS moves and associated costs, (k) initiate a longitudinal study of Hispanics and women in blue-collar jobs and investigate ethnic bias in the Office of Personnel Management clerk/typist test.

In FY 88, it is planned to: (a) complete and implement a support manpower trade-off feasibility assessment, (b) select enlisted job performance predictors, demonstrate usefulness of new predictors, and investigate

generalizability of findings, (c) expand the Enlisted Personnel Assignment System to include ratings with moderate numbers of Navy Enlisted Classifications (e.g., Machinist Mate and Boiler Technician), (d) design, develop and install an Officer Priority Requisition System to better balance officer assignments among Navy activities, (e) complete work on errors in EEO parity statistics and reasons for differential selection rates of Hispanic women, (f) implement a computerized civilian survey system in selected Navy civilian organizations and implement an enlisted version of the PCS Cost Management System, (g) develop estimation equations for enlisted nondistributable strength planning, and (h) implement an integrated data management system for forecasting active, reserve, enlisted, officer and civilian accessions through the year 2000.

In FY 89, it is planned to: (a) develop and implement a fleet support manpower forecasting system, (b) design and develop a prototype database that will contain job performance measures and prediction information, (c) complete the Enlisted Personnel Assignment System model development and implement for assignment of enlisted personnel, (d) develop personnel predictions for a computerized Civilian Survey System and evaluate the system, and complete investigation of Hispanics and women in blue-collar jobs and recommend appropriate interventions, (e) design, develop and implement officer PCS Cost Management System, (f) evaluate the Officer Personnel Assignment Nomination System prototype, finalize design and develop the operational software, (g) implement a prototype distribution inventory projection model, (h) complete the Enlisted Personnel Allocation and Nomination model development and implement it for assignment of enlisted personnel, and (i) develop long-range personnel supply projections (through the year 2000) of different categories of available civilian personnel interested in Navy military and civilian careers and determine the quality and quantity of those potential accessions.

PAYOFF/UTILIZATION:

The payoff of this Project is improved manpower utilization (i.e., requirements, recruitment and classification standards, assignment of personnel, management of personnel inventory, and increased retention and satisfaction of civilian and military personnel.

In FY 86, accomplishments included: (a) developing a manpower, personnel, and training assessment subsystem that compares manpower requirements with authorizations and personnel inventories by skill, function, and resource sponsor, thereby improving the manning of fleet support functions and enhancing fleet readiness, (b) expanding the Enlisted Personnel Assignment System to include "C" school trained personnel to effectively assign trained people to the fleet, (c) expanding the officer retention forecasting model to include Restricted Line and Staff Communities, and installing an Officer Personnel Information System in the Navy Military Personnel Command that will improve selectivity and assignment of officers, thereby enhancing warfighting capability, (d) administering prototype maintenance and operation "hands-on" tests in the Machinist Mate rating for a Congressionally-mandated effort to determine the relationship between job performance measures and the Armed Services Vocational Aptitude Battery, (e) developing and implementing communications and promotional strategies for Family Service Centers to determine the type of services needed to address concerns of service members and their families, (f) completing a feasibility assessment to develop a computerized civilian survey system to provide rapid feedback to policy makers concerning policy changes impacting on civilian workforce, and (g) administering a questionnaire to supervisors and managers concerning the Navy's EEO program and issues affecting women and minority employees.

PROGRAM ELEMENT OVERVIEW

PE: 63720N	EDUCATION AND TRAINING
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING
DoD ORGANIZATION:	NAVY
FUNDING:	FY87 \$ 4.8M (FY88 PRESIDENT'S BUDGET)
	FY88 \$ 7.7M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to respond directly to Congressional guidance and Department of Defense (DoD) directives to exploit current and emerging technologies to make training more efficient and effective and to apply technology to Naval Reserve training needs.

Advances in artificial intelligence and computer and training technologies afford opportunities to establish new capabilities in Navy training that respond to a wide range of requirements.

Applying artificial intelligence and video technologies will convert computer-based instruction to job-like training environments.

In FY 87, efforts will begin on systems such as: (a) propulsion engineering enhanced with videodisk and tutorial enhancements, (b) training resources management, (c) computer-based authoring aids, (d) computer-based simulation of troubleshooting skills, (e) artificial intelligence and expert systems for training, and (f) automated classroom instructor support system.

In FY 88/89, work will continue on the above efforts, taking the systems through conceptual development and feasibility demonstrations, initial testing, and possible development of prototypes of successful efforts.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include cost containment and increased personnel combat readiness through the application of technology advances that increase the effectiveness of individual, team, Naval Reserve, maintenance, operator, and on-the-job training.

The effort will improve instruction by applying artificial intelligence and expert systems, some of which learn by monitoring performance (i.e., the system learns, expands its intelligence and expertise, and becomes a more effective teaching mechanism). Computer technology is combined with operations research methods to allow the Navy to manage training resources better, including major changes in the way training pipelines are managed over entire Navy careers.

FUTURE DIRECTIONS:

Beyond FY 89, work will continue to develop, test and evaluate technology applications to training. Although the work goes on, emerging systems and other products will be transitioned immediately for engineering development (6.4) or, if ready, will be provided for immediate implementation.

PROJECT OVERVIEW

	87	88
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PROJECT: R1772	EDUCATION AND TRAINING \$ 4.8M	DEVELOPMENT \$ 7.7M
PE: 63720N	EDUCATION AND TRAINING	
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER	

PROJECT SYNOPSIS:

The objective of this Project is to determine and experimentally demonstrate in close coordination with intended Navy users (such as officer and enlisted schools, on-the-job trainers, and training policy makers) the feasibility of advances in artificial intelligence, cognitive science, computer and training technologies.

This Project includes four training technology areas: (a) Innovative Training Technology Applications determines to what extent advances in artificial intelligence (AI) and instructional, cognitive, and computer technologies can improve the instructional development and delivery processes. The focus is on development of authoring systems that will give subject matter experts the capability of designing, updating and producing standardized instructional materials of high quality tied directly to job performance requirements. (b) Artificial Intelligence Training (AIT) Initiatives provide concept demonstrations of a range of artificial intelligence technologies in Navy training environments. The focus of this effort is on complex, dynamic delivery systems using interactive, simulation-based instruction; some such systems are capable of learning by monitoring expert performance. Ship propulsion engineering is used as a technology demonstration context. (c) Training Evaluation Technology develops automated aids, software tools, and general procedures for developers of computer-based operator and maintenance performance tests. (d) Training Management Technology addresses issues involving both aggregate resource management and individual career training for both enlisted and officer training, shore-based and on-the-job.

In FY 87, the Project will: (a) test and evaluate videodisk and tutorial enhancements to artificial intelligence-based propulsion engineering training systems, (b) continue conceptual development of a training resources management system for allocating and coordinating fleet and school training responsibilities, (c) begin conceptual design of tools for forecasting effects of implementing new or improved training and career systems, (d) begin feasibility demonstration of computer-based authoring aids, (e) continue conceptual design of computer-based simulation systems for assessment of operator and troubleshooting skills, (f) begin conceptual development of artificial intelligence tools and expert systems for designing computer-based instruction and simulations, and (g) initiate design of an automated classroom instructor support system.

In FY 88, it is planned to: (a) complete concept feasibility demonstration of videodisk, graphic, and tutorial enhancements to the artificial intelligence-based propulsion engineering training system, (b) continue conceptual development of artificial intelligence tools and expert systems, (c) continue conceptual development of training resource management systems, (d) continue feasibility demonstration of computer-based authoring aids, (e) develop computer-based simulation systems for assessment of operator and troubleshooting skills, (f) continue design of an automated classroom

instructor support system, and (g) initiate conceptual design of an automated system for integrating and managing all types of shipboard training.

In FY 89, it is planned to: (a) begin development and feasibility testing of training resource management systems, (b) begin feasibility demonstrations of artificial intelligence tools and expert systems, (c) continue feasibility demonstrations of computer-based authoring aids, (d) begin developmental tests of computer-based simulation systems for assessment of operator and troubleshooting skills, and (e) develop prototype automated classroom instructor support system.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) training will be made more adaptable to the changing nature of Navy jobs, (b) training quality will be improved in the classroom, on-the-job, and for the Reserves, and (c) the instructional development process will be simplified and standardized.

In FY 86, accomplishments include: (a) completed concept feasibility demonstration of a method for deferring and distributing first enlistment technical training costs while assessing the new sailor's career potential, (b) added videodisk component and tutorial facilities to the artificial intelligence-based propulsion engineering training system, (c) continued development of computer-based authoring aids, and (d) continued development of a training resources management system for allocating and coordinating fleet and school training responsibilities.

PROGRAM ELEMENT OVERVIEW

PE: 63732M ADVANCED MANPOWER/TRAINING SYSTEMS
 CONGRESSIONAL CATEGORY: EDUCATION & TRAINING
 MANPOWER & PERSONNEL
 SIMULATION & TRAINING DEVICES
 DoD ORGANIZATION: MC
 FUNDING: FY87 \$ 1.8M (FY88 PRESIDENT'S BUDGET)
 FY88 \$ 3.2M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to provide the RDT&E funds for the advanced development of systems and equipment to improve the manpower and training readiness of the Fleet Marine Forces.

This objective will be met by work in the following areas: (a) human resources management and forecasting, (b) training devices and simulators, (c) Marine Corps training resources development and analysis, and (d) Marine Corps professional military education.

In FY 88 and outyears, Projects C0074 and C0867 of this Program Element will be consolidated with funding in C1443, Training Devices and Simulators Product Improvement in Program Element 26626M, Marine Corps Command, Control, and Communications Systems (Operational Systems).

PAYOFF/UTILIZATION:

The payoff of the Program Element will be enhanced fleet marine readiness due to improved manpower training, planning, and control.

Work under this Program Element will result in: (a) techniques and methods that advance the use and control of human resources in the Marine Corps, (b) development of training devices and simulators not developed in conjunction with a major end item, (c) methods and techniques to improve the effectiveness of training conducted throughout the Marine Corps, and (d) software enhancements to the instructional management system.

FUTURE DIRECTIONS:

Future directions for this Program Element include continued development of: (a) Officer Assignment Decision Support System, (b) enhancements to the Enlisted Planning System, (c) Enlisted Reserve Guarantee Model in support of the (d) Automated Recruit Management System, (e) Officer Planning and Utility System, (f) Performance Measurement Project, and (g) Computerized Adaptive Testing System.

PROJECT OVERVIEW

	87	88
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PROJECT: C0073	\$ 1.8M	\$ 3.2M
	HUMAN RESOURCES MANAGEMENT AND FORECASTING	
PE: 63732M	ADVANCED MANPOWER/TRAINING SYSTEMS	
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL	
DoD ORGANIZATION:	MC	
RESPONSIBLE ORGANIZATION:	HEADQUARTERS, USMC	

PROJECT SYNOPSIS:

The objective of this Project is to develop innovative techniques and methodologies that advance the use and control of human resources in the Marine Corps.

This joint-Service Project will replace the Armed Services Vocational Aptitude Battery as the mental qualifier for Service selection and classification.

In FY 87, the Project will continue development of: (a) the Officer Assignment Decision Support System, (b) the Automated Fitness Report System, (c) the Officer Planning and Utility System, (d) enhancements to the Enlisted Planning System, (e) the Infantry portion of the Job Performance Measurement Project, (e) the Enlisted Reserve Guarantee Model in support of the Automated Recruit Management System, (f) the Realtime Automated Personnel Identification System, (g) the Computerized Adaptive Testing System, (h) the Military Hardware/Manpower Integration System, and will (i) begin a system analysis of the information requirements of USMC recruiting, and design a prototype information system for field test.

In FY 88, it is planned to continue development of: (a) the Officer Assignment Decision Support System, (b) enhancements to the Enlisted Planning System, supporting validation and reestimation of parameters once the models are operational, and assisting in the development of a historical enlisted inventory and personnel flow database to support a series of manpower planning models, (c) the Enlisted Reserve Guarantee Model in support of the Automated Recruit Management System, (d) the Automated Fitness Report System, (e) the Officer Planning and Utility System, (f) the Job Performance Measurement Project, and (g) the Computerized Adaptive Testing System.

PAYOFF/UTILIZATION:

The payoffs of this Project include advanced system development for human resources management and forecasting to improve Marine readiness.

In FY 86, accomplishments included: (a) continued development of the Officer Assignment Decision Support System, (b) beginning development of enhancements of the Enlisted Planning System, (c) beginning development of the Enlisted Guarantee Model in support of the Automated Recruit Management System, (d) continued development of the Automated Fitness Report System, (e) continued development of the Officer Planning and Utility System, (f) beginning development of the Infantry portion of the Job Performance Measurement Project, (g) development of an enhancement to the Personnel Values Management Information System for recording retention survey results (Project completed; no further RDT&E funds will be needed), (h) continued development of the Computerized Adaptive Testing System, (i) beginning development of the Military Hardware/Manpower Integration System, and (j) beginning development of Realtime Automated Personnel Identification System for the Marine Corps.

PROGRAM ELEMENT OVERVIEW

PE: 63733N SIMULATION AND TRAINING DEVICES
CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES
DoD ORGANIZATION: NAVY
FUNDING: FY87 \$ 6.5M (FY88 PRESIDENT'S BUDGET)
FY88 \$ 8.5M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to develop and demonstrate new capabilities in training technology and equipment.

The principal focus of this effort is on proof-of-concept, reduction of risk, and cost effectiveness in training device acquisition. Current technical areas include advanced simulation of visual and sensor systems, part-task/low-cost training alternatives and expert systems. This Project provides the main developmental links between exploratory development work in simulation, training device and human factors technologies, and first-article procurement in aviation, surface, and subsurface systems. These technologies contribute to wa:fighting capability through improved training, greater affordability and increased safety.

In FY 84, Projects previously included in this Program Element were consolidated into a single Project (W1773) with six Subproject product areas to allow flexibility in structuring technology development to satisfy acquisition program needs. Subproject 62257N, Training Devices and Simulation, provides the principal technology base. Work is coordinated through a series of working groups, with: 62727A, Non-systems Training Devices Technology; 62205F, Training and Simulator Technology; 63216A, Synthetic Flight Simulator Development; 63227F, Advanced Simulator Technology; and Marine Corps elements 63732M and 64657M. Work directly supports 64703N, Personnel Training, Simulation and Human Factors, 64714N, Air Warfare Training Devices, and 64715N, Surface Warfare Training Devices. The success achieved from advanced development applications leads to prototype implementations or to first article procurement and to device acquisition.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include new capabilities in simulation training technology and equipment, with principal focus on proof-of-concept, reduction of risk, and cost effectiveness in training device acquisition. It is estimated that Millions of dollars could be saved as a result of the work done under this Program Element.

FUTURE DIRECTIONS:

Work for this Program Element will continue in the areas of advanced simulation of visual and sensor systems, part-task/low-cost training alternatives, and expert systems.

PROJECT OVERVIEW

	87	88
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PROJECT: W1773	SIMULATION AND TRAINING DEVICES \$ 6.5M	\$ 8.5M
PE: 63733N	SIMULATION AND TRAINING DEVICES	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER	

PROJECT SYNOPSIS:

The objective of this multi-platform, technology demonstration effort is to demonstrate the potential of new technological advances for increasing operational effectiveness without involving major subsystem hardware development.

The effort addresses needs in all warfare areas, targeting training deficiencies identified in Warfare Area Assessments, Fleet R&D Objectives, Operational Requirements, and Fleet endorsements. The threat being addressed is the potential inability to meet the enemy's warfighting capability if our force is inadequately trained. This Project interfaces with all weapon system trainers that are to be operational in 1987-1991, and thus the products must be available for integration by this 1987-1991 time frame. Specific components to be developed under this study include visual and sensor simulation, improved software techniques for simulation, instructional systems methods, part-task trainer designs and artificial-intelligence-based trainer designs. A special characteristic of this Project is that it is the Navy's entire 6.3 effort in simulation and training devices. The Army and Air Force, as well as the Naval Sea Systems Command, support and track this multi-platform effort.

In FY 87, it is planned to: (a) complete evaluation of the Helmet-Mounted Display and begin preparation of design guidelines, (b) develop intelligent adversary tactical training models, (c) continue development of ASW simulation, (d) develop command and combat capabilities for Warfare Operations Training and Effectiveness Evaluation System and begin Portable ASW integration, (e) complete energy maneuverability display for Tactical Air Command Training System, and (f) transition Portable Aircraft Trainer to engineering development.

In FY 88, it is planned to: (a) complete design guidelines for the Helmet-Mounted Display's integration into the F/A-18 Training System, (b) initiate development of a flight simulation capability for engagement training, (c) complete development of ASW simulation architecture, (d) complete program performance and interface design specifications for Battle Force Combat Systems Integrated Test and Training System, and complete computer program test plan, (e) complete program performance specification and computer program test plan for embedded intelligent training support system, and (f) transition Radar Systems Integrated Test and Training from exploratory development, initiate development of electronic warfare (EW) tactical simulation capability for aviation part-task trainers, and transition Onboard Simulation from exploratory development for application to airborne ASW-embedded training.

In FY 89, it is planned to: (a) complete system design and continue system development of Embedded Training for Airborne ASW, (b) complete development of functional specifications for a deployable Hands-on Throttle and Stick Trainer, (c) complete system design and continue system development of Radar Systems Integrated Test and Training, and demonstrate automated

instructional/evaluation system using ASW Simulation Architecture, (d) complete system delivery and integration/installation for Combat System Integrated Testing and Training at Battle Force level, and (e) complete development of instructor/computer interface for providing automated surface/multi-threat tactical adversaries.

PAYOFF/UTILIZATION:

The payoffs of this Project include improvements in: (a) visual, motion, sensor, weapons fire, and maintenance simulation components and capabilities, (b) software techniques for simulation, and (c) instructional-systems methods, part-task trainer designs, and trainer designs based on artificial intelligence. Major improvements in capability to be achieved are reduced trainer acquisition risk, decreased simulation design costs, 40-60 percent reduction in life-cycle cost, and 10 percent reduction in operational system utilization costs.

In FY 86, accomplishments included: (a) completion of design guidelines for the F/A-18 Training System Displays, (b) completion of engineering evaluation of the Helmet-Mounted Display model, (c) initial development of ASW architecture on the Warfare Operations Training and Effectiveness Evaluation System, (d) completion of Advanced Development Model design for standardization of simulator software, (e) assessment of user acceptance of the "expert system"-based Portable Aircraft Trainer for localization and attack phases of the Tactical Coordinator's mission, and (f) integration of Computer Generated Synthesized Imagery hardware into the Visual Technology Research Simulator.

PROGRAM ELEMENT OVERVIEW

PE: 63739N	NAVY LOGISTICS PRODUCTIVITY
CONGRESSIONAL CATEGORY:	HUMAN FACTORS
DoD ORGANIZATION:	NAVY
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER
FUNDING:	FY87 \$ 0.0M (FY88 PRESIDENT'S BUDGET) FY88 \$ 1.0M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to improve the quality and productivity of Navy logistics organizations, such as shipyards, air rework facilities, and other shore-based maintenance activities, through designing, implementing, and evaluating a wide range of industrial management techniques employed by successful private-sector manufacturing companies and partially explored in previous Navy research and development projects.

Techniques considered in this effort include: (a) process-oriented quality control, (b) enriching and redesigning jobs, (c) maximizing utilization of new technology, (d) improved organization and individual measurement systems, (e) revised organization structures that promote communication and participation among all levels, and (f) development of improved information management and decision support systems. Since these techniques have not been applied in any comprehensive way to the Navy's repair/overhaul organizations, they first will be tailored to meet the unique characteristics of these organizations.

Some of the characteristics typical of Navy repair/overhaul organizations include a hybrid military-civilian management structure, outdated facilities and technology, lack of acceptable performance measurement systems, a repair/overhaul mission driven by Fleet operational needs, a highly structured and multi-layered organization structure, and a reward system that emphasizes caution over risk-taking. The process of implementing the various productivity improvement techniques will be based on a research-generated model of introducing and sustaining beneficial change in organizations.

Each Project in this Program will address different combinations of productivity-enhancing and will build successively on knowledge gained in previous demonstrations. This synergistic approach to Project integration will result in efficient use of Program funds and participating organization resources. Policies, procedures, and practices will be changed to facilitate full implementation across all Navy shipyards, air rework facilities, and intermediate maintenance activities.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include improved quality and productivity of Navy maintenance and logistics systems, which will lead to lower costs and higher reliability and availability of Fleet weapon systems. This, in turn, means improved Fleet readiness and sustainability.

Work within Program Element 62233N and Program Element 63707N are related to this effort. In those efforts, management practices and work measurement systems in depot repair facilities were examined. Small groups of employees performing functions that varied from clerical to mechanical were exposed to experimental programs which increased individual and group productivity from 11 to 65 percent. These results, in addition to other more contemporary approaches developed in an organizational systems context, are the basis for the advanced development undertaken in Program Element 63739N. Work done under a sub-Project of this Program to improve utilization of new technology

will be used to support sub-Projects under Program Element 63712N, Generic Logistics R&D, which are developing new technologies for rapidly manufacturing small batches of unstocked parts, and new integrated system diagnostic techniques.

FUTURE DIRECTIONS:

Beyond FY 90, it is planned to continue designing, evaluating, and implementing various productivity improvement techniques, using a research-generated model of introducing and sustaining beneficial change in organizations.

PROJECT OVERVIEW

	87	88
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PROJECT: T1885	METHODS FOR MANAGING QUALITY IMPROVEMENT IN NAVY MAINTENANCE ACTIVITIES	\$ 0.0M \$ 0.6M
PE: 63739N	NAVY LOGISTICS PRODUCTIVITY	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER	

PROJECT SYNOPSIS:

The objective of this Project is to design, develop, test, and evaluate new process control techniques for improving the quality and productivity of the repair and overhaul of Navy ships and aircraft.

These include: (a) monitoring processes to keep them in control rather than relying primarily on final product inspection, (b) training management and workers alike in simple statistical methods, (c) establishing alternative management structures and practices to deal with continuous quality improvement, and (d) a completely revised quality audit approach.

Quality control techniques have been successfully adopted in private-sector manufacturing organizations and in foreign countries, most notably Japan. Many U.S. organizations have been unsuccessful in their attempts to implement and sustain them. Although these failed attempts have often been attributed to cultural differences between U.S. and Japanese firms, this does not account for the successful implementations.

A greater understanding of the factors underlying success and failure is needed in order to make wide-scale Navy application of these techniques possible. This project will examine the organizational, psychological and technical factors responsible for facilitating or inhibiting the full utilization of these techniques in a Navy maintenance and support environment. Initial emphasis will be on tailoring and introducing the quality management technique known as statistical process control, which was successfully introduced in Japan after World War II by W. Edward Deming and is largely responsible for that country's present world leadership in quality and productivity growth.

The first phase of the Project is directed at improving the quality of aircraft engine overhauls in a Naval Air Rework Facility (NARF). Organization structures, policies, and responsibilities will be modified to tailor the technique to the NARF. Jobs of overhaul mechanics will be redesigned using the mechanics themselves as the principle source of information for the redesign effort. Criteria and measures of key quality variances will be identified and incorporated in a new decision support system which will be used to monitor process quality. An evaluation will be conducted to determine the most effective combination of organization, technical and human resource factors contributing to successful implementation of the new process control technique. Information resulting from this evaluation will be used to facilitate the transfer of the techniques to other product lines and functions at the demonstration site. Lessons learned about the process of introducing and sustaining these techniques will be applied to other NARFs.

In FY 87, no program is planned.

In FY 88, it is planned to: (a) develop evaluation criteria and measures, (b)

collect baseline data on cost of quality, and (c) expand application of statistical process control throughout the test site.

In FY 89, it is planned to: (a) develop and deliver advanced statistical process control training, (b) develop a process-oriented quality audit plan, (c) collect data on cost savings and quality improvements, (d) analyze test data, and (e) report on progress and modify the implementation approach based on interim evaluation.

In FY 90, it is planned to: (a) conduct an activity-wide quality audit at the demonstration site, (b) evaluate progress in implementing total quality management at the demonstration site, (c) collect and analyze final test data, (d) evaluate demonstration, and (e) prepare guidelines for expansion to similar sites.

PAYOFF/UTILIZATION:

The payoffs of this Project are new process control techniques applied to Navy maintenance activities, which will lead to increased quality and productivity of the repair and overhaul of Navy ships and aircraft. This will offer increased product quality at much lower cost.

This Project was a new start in FY 86. In FY 86, accomplishments included: (a) conducted site preparation - management orientation and indoctrination, (b) conducted initial training on basic statistical methods, and (c) prepared pilot projects by selecting problems and applying process control techniques.

PROJECT OVERVIEW

	87	88
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PROJECT: T1886	EFFECTIVE IMPLEMENTATION \$ 0.0M	\$ 0.4M
	OF NEW TECHNOLOGY	
PE: 63739N	NAVY LOGISTICS PRODUCTIVITY	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER	

PROJECT SYNOPSIS:

The objective of this Project is to improve the process of identifying, applying, and evaluating new technology in Navy shore support activities.

This will be accomplished by: (a) developing and evaluating technology transfer and evaluation models, (b) identifying technology domains and boundary conditions related to application, (c) using technology transfer literature, case histories, and interventions to test models, concepts and specific techniques, (d) identifying and testing organizational, human resource and technological factors contributing to effective implementation and utilization, and (e) developing guidelines to identify emerging technologies, match them to problems, and implement and use the technologies effectively in operational settings.

A recent Congressional study concluded that technology utilization is less than 30 percent of capacity. This Project, accelerated to begin in FY 86, instead of FY 87, is in response to a Congressional request to conduct a three-year feasibility study of a concept to identify and apply state-of-the-art technology to critical repair, maintenance, and acquisition problems in DoD support functions.

In FY 87, no efforts are planned.

In FY 88, it is planned to: (a) evaluate a university-based technology transfer center concept, and (b) evaluate technological solutions.

In FY 89, it is planned to: (a) select emerging diagnostic and manufacturing technologies for a utilization demonstration, (b) develop an implementation and utilization demonstration plan, (c) select and prepare demonstration site(s), (d) identify evaluation criteria and measures, (e) collect baseline data, and (f) develop a full-scale operational utilization model for implementing emerging diagnostic and manufacturing technologies.

Beyond FY 89, plans include: (a) verify technology transfer concepts, models, and techniques through a series of demonstrations, (b) initiate implementation and transfer of new integrated diagnostic, spare parts batch manufacturing, and maintenance technologies based on the utilization model, (c) collect evaluation data, (d) conduct interim evaluation of the implementation process, and (e) develop guidelines for Navy-wide application of emerging logistics productivity-enhancing technology.

PAYOFF/UTILIZATION:

The payoff of this Project is more effective application of new technologies in Navy shore support activities, and thus increased productivity.

In FY 86, a program review allowed added tasks to be accomplished with FY 86 funding. These accomplishments included: (a) completed a university-based

technology transfer center plan, (b) selected a demonstration site, (c) selected the critical maintenance problems for technology application, (d) identified laser inspection and welding technology, (e) completed bench test of combined laser technology, (f) identified factors critical to successful transfer and utilization of new technology, (g) developed alternative technology transfer models, (h) demonstrated laser technology at the test site, and (i) evaluated success of laser technology on critical inspection and welding problem.

PROGRAM ELEMENT OVERVIEW

PE: 64703N PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS

CONGRESSIONAL CATEGORY: MANPOWER & PERSONNEL

DoD ORGANIZATION: NAVY

FUNDING: FY87 \$ 1.0M (FY88 PRESIDENT'S BUDGET)
 FY88 \$ 3.1M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to develop systems that are both innovative and cost effective to help ensure Fleet readiness.

Computer-based manpower and personnel systems ensure Navy combat readiness by raising the overall quality of manpower accessed into the Navy and assigned to the Fleet. The Computerized Adaptive Testing system for the Armed Services Vocational Aptitude Battery (CAT-ASVAB) will be much more cost-effective than the existing paper-and-pencil methods. A simulation of personnel inventory flows is required to analyze and adjust enlisted rotation patterns to maintain Fleet readiness by optimizing short-term savings in Permanent Change of Station costs versus long-term savings in retention costs.

In FY 87, it is planned to perform initial efforts in the development of the CAT-ASVAB and to develop models and supportive databases for the Sea/Shore Rotation Management System to model the effect of proposed policies, changing inventories, billet structure and costs.

In FYs 88/89, it is planned to build on earlier work on both major efforts and proceed to full-scale implementation plans for the CAT and complete the development of sea/shore rotation models for enlisted ratings.

PAYOFF/UTILIZATION:

The payoff of this Program Element is improvement in the overall quality of manpower accessed into the Navy and assigned to the Fleet.

The Computerized Adaptive Testing system for the Armed Services Vocational Aptitude Battery (CAT-ASVAB) will reduce administration time at Military Entrance Processing Stations, improve scoring accuracy, provide better security, and lend itself to quick, accurate, standardized revisions. This test-administration system will be far more cost-effective than the existing paper-and-pencil methods.

FUTURE DIRECTIONS:

Beyond FY 89, it is planned to continue development and implementation efforts for the CAT-ASVAB.

PROJECT OVERVIEW

		87	88
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PROJECT: R1822	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS	\$ 1.0M	\$ 3.1M
PE: 64703N	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

PROJECT SYNOPSIS:

The objective of this Project is to develop and evaluate systems to enhance the Navy's capabilities in recruitment, selection, assignment, attrition, retention, and personnel utilization.

When instructional technologies successfully complete advanced development (6.3), they are prepared for generalized and standardized use throughout the Navy. This Project responds to Congressional and DoD requirements to increase the use of technology to increase training efficiency and effectiveness and to improve training software transportability.

In FY 87 it is planned to: (a) complete 80 percent of computer software, (b) collect test data for score equating, (c) perform statistical analyses, and equate the CAT-ASVAB (computerized adaptive testing version of the Armed Services Vocational Aptitude Battery) to paper-and-pencil version of the ASVAB, (d) develop models and supportive databases for the Sea/Shore Rotation Management System to model the effect of proposed policies, changing inventories, billet structure and costs, and (e) begin initial evaluation of the CAT.

In FY 88, it is planned to: (a) collect CAT-ASVAB data for mental test item recalibration, (b) conduct a pre-operational check of test battery and delivery system, (c) begin initial test and evaluation of CAT, and (d) develop and evaluate prototype sea/shore management system.

In FY 89, it is planned to: (a) prepare full-scale implementation plan for CAT, (b) complete development of sea/shore rotation models for enlisted ratings, and (c) obtain approval for full-scale production of CAT.

PAYOFF/UTILIZATION:

The payoff of this Project is improved combat readiness by raising the overall quality of manpower assigned to the Fleet.

In FY 84, the program developed and evaluated three alternative prototype systems for use in military entrance processing stations to determine the best system for implementation.

In FY 85, this Project completed an evaluation of commercially available microcomputers for the Computer Adaptive Testing (CAT) system and demonstrated the feasibility and cost effectiveness of product engineering for a library of computer-based training software to include transportability, standardization, and thorough documentation.

In FY 86, test items for CAT-ASVAB were reviewed for quality and sensitivity.

PROGRAM ELEMENT OVERVIEW

PE: 64714N	AIR WARFARE TRAINING DEVICES
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES
DoD ORGANIZATION:	NAVY
FUNDING:	FY87 \$ 0.0M (FY88 PRESIDENT'S BUDGET) FY88 \$ 1.9M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to provide a portable/deployable training device to meet Fleet-identified requirements for recurrent training of sensor operators.

Operator analysis and interpretation of both acoustic and radar imagery are highly perishable skills. Operator ability to perform these tasks is directly related to weapon system success. This effort responds to an operational requirement for a deployable training device (OR #034-05-87).

Projects under this Program Element will develop and procure: (a) an Operational Flight Trainer which offers safe flight training, lower training time, and lower capital investment in operational aircraft used for training, (b) a Weapons Tactics Trainer for mission training of the air tactical officer and the sensor operator, and (c) a full set of maintenance trainers to teach troubleshooting and repair of the aircraft.

PE 63733N, Training Device Technology, has provided advanced development effort for acoustic signal modeling for training devices. Small Business Innovative Research contractor is performing comparable technology demonstration for modeling inverse synthetic aperture radar images on training devices. W1878 will result in transition from a technology base effort to a prototype trainer to satisfy validated Fleet requirement. Contractor-funded and Independent Research and Development efforts on acoustic sensor simulation have substantially reduced the technical risks associated with this project.

In the FY 87 budget, this Program Element's only Project is planned Project W1878, ASW Table Top Trainer; Project W1112, SH-60B Trainer, was terminated.

PAYOFF/UTILIZATION:

The payoffs for this Program Element include the provision of a training device that is the only training capability for the inverse synthetic aperture radar being installed on P-3, S-3, and A-6 aircraft.

PROJECT OVERVIEW

	87	88
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PROJECT: W1878	ASW TABLE TOP TRAINER	\$ 0.0M \$ 1.9M
PE: 64714N	AIR WARFARE TRAINING DEVICES	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER	

PROJECT SYNOPSIS:

The objective of this Project is to upgrade the operational capability of Navy Anti-Submarine Warfare (ASW) aircraft by introducing improved acoustic and non-acoustic sensors.

The AN/UYS-1 Advanced Signal Processor and AN/APS-137 Radar will provide sensor commonality in primary air ASW weapon systems.

In FY 87, this project was deferred due to elimination of funds by Congressional action.

In FY 88, it is planned to make contract awards for full-scale development of both training device and associated sensor simulation courseware.

In FY 89, it is planned to: (a) complete the system development, (b) conduct operational test and evaluation of both acoustic and inverse synthetic aperture radar training simulations to demonstrate training effectiveness, and (c) prepare for full production contracts to support various user weapon systems in FY 90 and beyond.

PAYOFF/UTILIZATION:

The payoffs of this Project include the upgrading of the operational capability of Navy ASW aircraft by the introduction of improved acoustic and non-acoustic sensors.

PROGRAM ELEMENT OVERVIEW

PE: 64715N SURFACE WARFARE TRAINING DEVICES
 CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES
 DoD ORGANIZATION: NAVY
 FUNDING: FY87 \$ 23.4M (FY88 PRESIDENT'S BUDGET)
 FY88 \$ 17.2M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to support the Chief of Naval Operations Surface Warfare Sponsor (OP-03) mission by improving readiness and training.

This Program Element was developed to satisfy the requirements of the Fleet and the Chief of Naval Education and Training for development of prototype surface warfare training devices to provide improved training, thereby improving operational readiness, efficiency, and safety while decreasing training time and cost. Specifically, this Program Element supports the development of prototype surface warfare training devices which are not developed as part of a parent weapon system development process or not characterized by emerging training device technology (and therefore included within Program Element 64703N, Training Device Prototype Development).

Program Element 64715N has four general areas of effort: (a) operator/team trainers in the area of electronic/acoustic surveillance in ASW (Anti-Submarine Warfare) operations for existing or planned operational equipment, (b) maintenance trainers for various electronic/acoustic devices and trainers in the operation of engine room equipment for existing and new development engineering equipment, (c) modification, update, consolidation, or replacement of existing training devices, and (d) other training problem areas which can benefit by the use of stimulation/simulation training device techniques.

In FYs 87/88, it is planned to: (a) continue establishing baseline and commence contractual competitive procurement for the Surface TOMAHAWK Trainer, and negotiate the contract and award for prototype development in January 87, (b) complete trainer capability tests and trainer course validations, and begin Navy support of the LAMPS MK III/SQQ-89 Training System, (c) modify the Tactical Advanced Combat Direction Electronic Warfare (TACDEW) by fabricating and assembling the hardware and software for the system, and install and deliver the Environmental Generation and Control System (EGCS), (d) continue design development, conduct a sponsor design review, continue fabrication for Surface Tactical Trainer 14A12, develop baseline and specification for Trainer 20A66, and issue a Request for Proposal (RFP) to industry, (e) continue analysis of selected surface warfare training system/device issues, continue providing Instructional System Development support, program definition and investigation of contractor capabilities, and coordinate and distribute analysis results as required, and (f) award contract, begin the design of the Landing Craft Air Cushion Operation Trainer (LCAC), develop software, and continue the design, fabrication, and assembly of the trainer in 1987.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) improved training, (b) reduced training costs, (c) safer training conditions, and (d) enhanced operational readiness.

The high cost of operational training exercises at sea continues to make it imperative to develop, improve, and make extensive use of alternative

shipboard methods for individual and team training. Although they are complex and continuously evolving, these training systems will provide realistic training at a fraction of the cost of the same training at sea. They also expose the trainees to a broad range of scenarios that could not be carried out in live situations. The end product is an enhancement of operational readiness.

FUTURE DIRECTIONS:

In the outyears it is planned to: (a) complete fabrication, conduct acceptance testing, and schedule initial operational capability for the Surface TOMAHAWK Trainer, (b) install and deliver the TACDEW, and schedule the initial operating capability, (c) complete fabrication of Surface Tactical Trainer 14A12, deliver to site and begin training, (d) award contract for Surface Tactical Trainer 20A66, and make initial delivery to planned site, and (e) continue work on the installation and testing of the LCAC.

PROJECT OVERVIEW

	87	88
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PROJECT: S1126	SURFACE TOMAHAWK TRAINER \$ 0.0M	\$ 4.5M
PE: 64715N	SURFACE WARFARE TRAINING DEVICES	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER	

PROJECT SYNOPSIS:

The objective of this Project is to design, develop, fabricate and install TOMAHAWK surface missile operator/subteam trainers.

The device will train personnel in the total over-the-horizon combat (defense/offense) operations of this weapon system. Four suites of the device will provide operator training starting with simple "knobology" and progressing through Tomahawk Weapons Control System subteam training. The operator consoles will consist of actual GFE-Operator Interactive Display Terminal (OIDT) consoles which provide the same controls and indicators for data entry, information display, system monitoring, and control of the OIDT as provided in the operational weapons system. Program functions and hardware reactions not present will be simulated in a simulation computer. Additionally, outside inputs such as satellite communication, OUTBOARD, ships navigation system and Link 11 inputs will be provided or simulated.

In FY 87, this Project was deferred.

In FY 88, it is planned to: (a) award the contract for the system design and development (January 88), and (b) procure additional GFE.

In FY 89, it is planned to continue design and development.

PAYOFF/UTILIZATION:

The payoffs of this Project include enhancement of the Navy's ability to train for battle, specifically, the ability to utilize the Tomahawk cruise missile in the anti-ship mode in both battle group and battle force operations.

FY86 accomplishments included: (a) commencing the establishment of a functional baseline, and (b) contractual competitive procurement.

PROJECT OVERVIEW

	87	88
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PROJECT: S1140	TACTICAL ADVANCED COMBAT \$ 1.3M	\$ 3.4M
	DIRECTION ELECTRONIC	
	WARFARE (TACDEW)	
	MODIFICATIONS	
PE: 64715N	SURFACE WARFARE TRAINING DEVICES	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER	

PROJECT SYNOPSIS:

The objective of this Project is to achieve a progressive redesign of the environment generation/control system and control systems of the Tactical Advanced Combat Direction and Electronic Warfare (TACDEW) device.

The TACDEW training complexes located at Fleet Combat Training Centers Atlantic and Pacific are a vital link in the training chain for integrated combat system team training. This training system will have a direct impact on the Navy's ability to train for battle, specifically, the Navy's capability for integrating combat systems and weapon system trainers in multi-threat/multi-team exercises for both battle group and battle force training which will represent actual operational situations in any area of the world. During the operational life of these complexes, numerous add-on capabilities have been incorporated and frequent changes have been made to the Master Simulation Program to maintain currency with fleet training requirements. This continued expansion of the complexes, coupled with obsolescence of the computer system originally installed in TACDEW, have negated the potential for further growth to accommodate training for emerging combat system capabilities identified through the Navy Training Plan process. The project will include: (a) replacement of the obsolescent computer system with modern computational capabilities, (b) redesign of the Master Simulation Program, (c) substitution of the Generic Radar Display System subsystem to provide capabilities representative of modern radar equipment, and (d) incorporation of a state-of-the-art problem control and evaluation subsystem. The modified TACDEW system will support combat system operational training at all required levels, including individual operator, subteam, and combat system through 1995.

In FY 87, it is planned to: (a) design Operating System, Environment, Problem Control and Evaluation, Warfare Functions, Trainer/System Interfaces, Data Links, and Diagnostics software modules for Phase III, and (b) procure basic hardware elements of the system.

In FY 88, it is planned to: (a) write/test the software designed in FY 87, (b) integrate the software into the TACDEW System, and (c) procure and install remaining hardware at the development site.

In FY 89, it is planned to: (a) complete full system integration, and (b) conduct Government Acceptance Testing.

Beginning in FY 88, the Project number for this effort changes from R1140 to S1140.

PAYOFF/UTILIZATION:

The payoffs of this Project include improvement of the Navy's ability to train for battle, specifically, the Navy's capability for integrating combat systems and weapon system trainers in multi-threat/multi-team exercises for both battle group and battle force training which will represent actual operational situations in any area of the world.

In FY 86, accomplishments included: (a) continued fabrication and assembly of environmental generation and control system (EGGS), and (b) completion of the second phase of this developmental effort.

PROJECT OVERVIEW

	87	88
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PROJECT: S1427	\$ 9.6M	\$ 5.6M
PE: 64715N		
CONGRESSIONAL CATEGORY:		
DoD ORGANIZATION:		
RESPONSIBLE ORGANIZATION:		

SURFACE TACTICAL TEAM TRAINERS

SURFACE WARFARE TRAINING DEVICES

SIMULATION & TRAINING DEVICES

NAVY

NAVAL TRAINING SYSTEMS CENTER

PROJECT SYNOPSIS:

The objective of this Project is to develop a generic training system which will replace obsolete/obsolescent devices to provide team procedural and tactical training/evaluation in a multi-threat environment for conventional and tactical data-equipped ships.

The first device to be developed, Device 14A12, will replace the obsolete devices currently used to provide Anti-Submarine Warfare (ASW) team training. The 14A12 will have the capability to exercise the essential procedures of an ASW engagement and will simulate current and future emerging passive and active sensors operating in a common ocean model. A natural progression of Device 14A12, Device 20A66, is planned to replace the ASW Coordinated Tactics Trainers, Devices X14A6 and 14A6, built in the 1960s. The 20A66 trainer will provide multiple platform/multi-threat procedural, tactical, and decision-making training for single units up to battle group size. Each trainer will be composed of multiple ship, submarine, and aircraft "command centers" configured with multi-purpose equipment which will simulate the sensor, weapon, and communication capabilities of the platforms represented.

In FY 87, it is planned to: (a) continue fabrication of Device 14A12 and begin software development; (b) conduct critical design review which will culminate requirements revalidation; and (c) begin definition of AN/SQQ-89 (V4) requirements.

In FY 88, it is planned to: (a) complete fabrication of Device 14A12, and begin software integration; (b) define AN/SQQ-89 (V4) design; and (c) conduct Navy Preliminary Evaluation (NPE) prior to system testing.

In FY 89, it is planned to: (a) complete hardware/software integration and DT&E for Device 14A12, (b) conduct government preliminary inspection for Device 14A12, (c) deliver 14A12 system to ASW School, San Diego, CA, (d) award contract for RDT&E Prototype, Unit 1, Lot 1, for Device 20A66, and (e) commence development of 20A66 trainer, computer, control and data system, and prototype lot with 6 surface and 3 aircraft modules.

Beginning in FY 88, the Project number for this effort changes from R1427 to S1427.

PAYOFF/UTILIZATION:

The payoff of this Project includes improvement of the Navy's ability to train for battle; specifically, the 14A12 and 20A66 will provide greater capability for existing and emergent surface combatants to conduct multi-platform ASW operations against submarine threats and also comply with the reduced OPTEMPO/Fuel constraints.

In FY 86, accomplishments included: (a) continuation of design, development, and fabrication of device 14A12, and (b) development of functional baseline

for Device 20A66.

PROJECT OVERVIEW

	87	88
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PROJECT: S1436	SURFACE WARFARE TRAINING \$ 1.7M \$ 0.5M ANALYSIS	
PE: 64715N	SURFACE WARFARE TRAINING DEVICES	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER	

PROJECT SYNOPSIS:

The objectives of this Project are: (a) to conduct front-end analysis of specific training problems to include definition of requirements/shortfalls, training objectives, and student loading, and (b) to identify alternate solutions with related cost/training effectiveness trade-offs.

The HARDMAN study continues to develop training requirements for the Surface Warfare Community by analyzing and identifying present and future training needs and manpower requirements for major system acquisitions. To respond to those requirements, individually tailored, detailed trainer/training systems selection procedures must be developed.

Instructional System Development (ISD) analysis methods are used to produce an appropriate functional specification for each trainer/training system. Some of these analyses are: (a) determination of specific training objectives, (b) determination of alternative solutions to the training needs/requirements, and (c) cost/training effectiveness studies. This effort extends beyond the HARDMAN program since functional specifications must be developed and tailored to individual training systems/devices before contracts are awarded. This front-end analysis effort includes those parts of the ISD methods used: (a) to tailor the device or system to specific training objectives, (b) to ensure inclusion of latest technology, and (c) to avoid "gold plating" by cost/training effectiveness trade-offs. Thus, the individual elements of the specific training system will most effectively reflect the requirements and needs identified by the HARDMAN program.

In FY 87, it is planned to: (a) conduct analyses in support of trainer acquisitions, on impact of new technology, and on training requirements of new equipment, including: (a) 20A66 streamlining traceability matrix, (b) embedded/organic training radar stimulation/simulation matrix, (c) 20B5 expansion analysis for adding DD-963, CG-47, DDG-51, (d) BFTT training objectives analysis, and (e) LCAC training Requirements Analysis.

In FY 88, it is planned to continue investigation of new training technologies and combat system developments, and update documentation supporting trainer enhancements, including: (a) DV 20G6 automated Performance Monitoring capability, (b) TACDEW analysis to update trainer, (c) PXM (new ship class) support to update military characteristics, (d) Surface Warfare Officers' School curriculum media-mix analysis, (e) Artificial Intelligence applicability to training, (f) LCX training analysis, and (g) update embedded-training equipment inventory and master plan.

In FY 89, it is planned to: (a) update TACDEW military characteristics, (b) conduct embedded-training benefits analysis, (c) conduct LCAC block-upgrade analysis, (d) execute DDG-51 simulation/update for Propulsion Console, (e) provide SWDS curriculum support, (f) conduct portable training aids analysis, (g) conduct Warfare Continuum analysis, and (h) restructure AWTT requirements.

Beginning in FY 88, the Project number for this effort changes from R1436 to

S1436.

PAYOFF/UTILIZATION:

The payoffs of this Project include the identification of alternate solutions to specific training problems, with related cost/training effectiveness trade-offs, through conducting a front-end analysis of problems to include definition of requirements/shortfalls, training objectives, and student loading.

In FY 86, accomplishments included: (a) training analysis and Instructional System Development support to the Chief of Naval Operations, COMNAVSEASYSOM, the Chief of Naval Education and Training, and the Surface Warfare Training Group in Surface Warfare planning and programming, and (b) these products: the Oxygen Breathing Apparatus Trainer and Training Device Requirement Documents, and Military Characteristics for the Command Tactical Trainer and the Amphibious Warfare Tactical Trainer.

PROJECT OVERVIEW

	87	88
	-----	-----
PROJECT: S1834	LANDING CRAFT AIR CUSHION (LCAC) OPERATOR TRAINER	\$10.9M \$ 3.2M
PE: 64715N	SURFACE WARFARE TRAINING DEVICES	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER	

PROJECT SYNOPSIS:

The objective of this Project is to provide a Landing Craft Air Cushion (LCAC) operation trainer for personnel assigned to Landing Craft, Air Cushion Vehicles.

Training will include normal and abnormal/emergency procedures and proficiency. Training exercises under instructor and computer software control will depict the operational characteristics of the LCAC and will provide trainees a dynamic environment within which to learn the skills and maintain proficiency to safely operate and control the LCAC.

In FY 87, it is planned to: (a) accomplish system-level design, (b) install main computational system and begin software coding and documentation, (c) manufacture, fabricate and test visual simulation, motion, and motion vibration simulation systems, and (d) manufacture, fabricate, test and install digital radar landmass simulation system.

In FY 88, it is planned to: (a) continue software detailed design and coding, (b) prepare and present Critical Design (hardware and software), (c) fabricate LCAC cockpit module, instructor consoles, and trainer student station, (d) ship and deliver visual and motion simulation systems to prime contractor facilities, and (e) complete main trainer fabrication, and begin hardware/software integration and test.

In FY 89, it is planned to: (a) complete hardware/software integration and overall trainer contractor and Government testing at contractor's facilities, (b) install system in the LCAC Applied Instruction Building, Naval Amphibious Base, Coronado, San Diego, CA, (c) final on-site contractor and Government testing and physical delivery acceptance of the trainer, and (d) begin Navy instructor personnel training and establish initial student training dates.

Beginning in FY 88, the Project number for this effort changes from R1834 to S1834.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) development of a LCAC operation trainer that will provide LCAC crews (Craftmaster, Engineer, Navigator and Group Commander) training in the skills, procedures, and techniques required to operate the LCAC in its operational environment, and (b) enhanced ability of the Navy to train for battle, specifically, more flexible and versatile training in preparing LCAC crews in all phases of craft operations, and at a significant cost reduction (e.g., fuel, craft maintenance) over use of actual craft for training.

In FY 86, accomplishments included: (a) awarding of the contract in July, and (b) the start of trainer design and software development.

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62131M						MARINE CORPS LANDING FORCE TECHNOLOGY
CC31-521	NPRDC	0.324	0.246	MP	2	MANPOWER TECHNOLOGY
CC31-522	NPRDC	0.301	0.231	ET	4	TRAINING TECHNOLOGY
		<u>0.626</u>	<u>0.478</u>			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 62131M :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	<u>0.625</u>	<u>0.477</u>

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
62233N						MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION
RR63-521	NPRDC	2.962	3.069	MP	2	MANPOWER AND PERSONNEL TECHNOLOGY
RR63-522	NPRDC	1.805	1.939	ET	6	EDUCATION AND TRAINING TECHNOLOGY
RW57-526	NTSC	3.409	3.464	ST	6	SIMULATION AND TRAINING DEVICE TECHNOLOGY
		-----	-----			
		8.177	8.472			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62233N :						
						FY87

						8.176
						FY88

						8.472

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62234N						SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA
RS57-525	NPRDC	3.585	3.765	HF	4	HUMAN FACTORS TECHNOLOGY
		<u>3.586</u>	<u>3.766</u>			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62234N :						
						FY87
						<u>3.585</u>
						FY88
						<u>3.765</u>

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63701N						HUMAN FACTORS ENGINEERING DEVELOPMENT
R1771	NPRDC	1.615	3.144	HF	4	GENERAL HUMAN FACTORS ENGINEERING DEVELOPMENT
W0542	NADC	0.810	1.650	HF	4	AIR HUMAN FACTORS ENGINEERING TECHNOLOGY
		-----	-----			TOTAL IN PE
		2.425	4.795			

TOTAL FUNDING IN PROGRAM ELEMENT 63701N :

	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	----- 2.425	----- 4.794

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63707N						MANPOWER AND PERSONNEL SYSTEMS DEVELOPMENT
R1770	NPRDC	2.855	4.019	MP	2	MANPOWER AND PERSONNEL DEVELOPMENT
		-----	-----			
		2.855	4.020			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63707N :						
						FY87

						2.855
						FY88

						4.019

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63720N						EDUCATION AND TRAINING
R1772	NPRDC	4.759	7.699	ET	6	EDUCATION AND TRAINING DEVELOPMENT
		<u>4.760</u>	<u>7.700</u>			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63720N :						
						FY87
						<u>4.759</u>
						FY88
						<u>7.699</u>

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63732M						ADVANCED MANPOWER/TRAINING SYSTEMS
C0073	HQMC	1.782	3.214	MP	1A	HUMAN RESOURCES MANAGEMENT AND FORECASTING
		-----	-----			
		1.782	3.214			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63732M :						
						FY87

						1.782
						FY88

						3.214

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63733N						SIMULATION AND TRAINING DEVICES
W1773	NTSC	6.465	8.457	ST	6	SIMULATION AND TRAINING DEVICES
		<u>6.466</u>	<u>8.457</u>			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63733N :						
						FY87
						<u>6.465</u>
						FY88
						<u>8.457</u>

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63739N						NAVY LOGISTICS PRODUCTIVITY
T1885	NPRDC	0.000	0.589	HF	3	METHODS FOR MANAGING QUALITY IMPROVEMENT IN NAVY MAINTENANCE ACTIVITIES
T1886	NPRDC	0.000	0.392	HF	3	EFFECTIVE IMPLEMENTATION OF NEW TECHNOLOGY
		-----	-----			TOTAL IN PE
		0.000	0.982			
TOTAL FUNDING IN PROGRAM ELEMENT 63739N :						
						FY87

						0.000
						FY88

						0.981

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64703N						PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS
R1822	NPRDC	0.950	3.107	MP	2	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS
		-----	-----			
		0.951	3.108			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 64703N :						
						FY87 FY88
						----- -----
						0.950 3.107

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64714N						AIR WARFARE TRAINING DEVICES
W1878	NTSC	0.000	1.927	ST	6	ASW TABLE TOP TRAINER
		0.000	1.928			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 64714N :						
						FY87
						FY88

						0.000
						1.927

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64715N						SURFACE WARFARE TRAINING DEVICES
S1126	NTSC	0.000	4.524	ST	6	SURFACE TOMAHAWK TRAINER
S1140	NTSC	1.274	3.397	ST	6	TACTICAL ADVANCED COMBAT DIRECTION ELECTRONIC WARFARE (TACDEW) MODIFICATIONS
S1427	NTSC	9.548	5.619	ST	6	SURFACE TACTICAL TEAM TRAINERS
S1436	NTSC	1.663	0.485	ST	6	SURFACE WARFARE TRAINING ANALYSIS
S1834	NTSC	10.927	3.173	ST	6	LANDING CRAFT AIR CUSHION (LCAC) OPERATOR TRAINER
		----- 23.413	----- 17.198			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 64715N :

	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	----- 23.412	----- 17.198

III.C. AIR FORCE PROGRAM ELEMENT AND PROJECT SYNOPSES

PE	TITLE	PAGE
61102F	DEFENSE RESEARCH SCIENCES	III-C-1
62202F	AEROSPACE BIOTECHNOLOGY	III-C-12
62205F	PERSONNEL, TRAINING AND SIMULATION	III-C-17
63106F	LOGISTICS SYSTEMS TECHNOLOGY	III-C-37
63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY	III-C-45
63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY	III-C-59
63751F	TRAINING SYSTEMS TECHNOLOGY	III-C-65
64227F	FLIGHT SIMULATOR DEVELOPMENT	III-C-67

Table III-C-1: Listing of Projects - Lists projects for each AIR FORCE program element. Lists contain performing organization, funding, Congressional Category and goal information.

III-C-i

PROGRAM ELEMENT OVERVIEW

PE: 61102F DEFENSE RESEARCH SCIENCES
 CONGRESSIONAL CATEGORY: HUMAN FACTORS
 MANPOWER & PERSONNEL
 DoD ORGANIZATION: AF
 FUNDING: FY87 \$ 7.6M (FY88 PRESIDENT'S BUDGET)
 FY88 \$ 8.5M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objectives of the Manpower, Personnel and Training (MPT) portion of this Program Element are to: (a) improve selection of personnel for appropriate jobs on the basis of measured mental abilities and sensory-motor skills, (b) design equipment to optimally match human information processing characteristics, and (c) monitor human workload and performance.

This program provides the knowledge required to ensure that Air Force personnel can operate, maintain, and manage complex equipment systems in demanding environments.

In FY 87, an initiative in Cognitive Aspects of Human Performance will start. Air Force equipment systems have become so complex and the flow of information in tactical situations so rapid that the operator's ability to process information, make appropriate decisions, and act quickly is overwhelmed. Better ways to organize and present information from the equipment display to the human operator are urgently needed.

One element of this program will examine the ways in which skilled individuals, such as pilots, process information and make decisions under heavy workload. Mechanisms of attention, multiple-task performance, and memory will be studied. Another element of this new program will examine individual differences in these mechanisms to develop better tests of learning abilities. Air Force recruits are assigned to military occupational specialties partly on the basis of their scores on aptitude tests. Existing tests have limited power to predict aptitude for real-world jobs, but research in this field has not advanced dramatically until recently. This situation is now changing because of recent advances in our understanding of cognitive functions and through the use of computer terminals to allow adaptive testing of individuals rather than traditional paper and pencil tests. This initiative will support research collaborations between leading university scientists and the Air Force Human Resources Laboratory, at which a major computer facility for aptitude testing has been developed.

The new program in auditory pattern recognition will reach full size, continuing its emphasis on the mechanisms by which humans recognize complex auditory patterns. The vision research effort will continue to study the mechanisms by which humans recognize objects, determine position and velocity of moving objects, and guide their own movements through the environment. Besides improving our understanding of human performance, these studies will open up ways to design machines capable of recognizing images and responding to speech.

In FY 88, the initiative in Cognitive Aspects of Human Performance will reach full scale. The Armstrong Aerospace Medical Research Laboratory and the Air Force Human Resources Laboratory will begin collaborative research as part of this initiative, examining how humans allocate mental resources to perform complex tasks in which several things must be accomplished in the same time frame. The extramural part of the program will be expanded to examine fundamental aspects of thinking, problem-solving, judgement, and decision-making in conditions of uncertainty.

The vision research and auditory research programs will continue to study how sensory mechanisms allow humans to extract and analyze information from the environment and use that information to guide their actions.

PAYOFF/UTILIZATION:

The payoff of the MPT portion of this Program Element is enhanced knowledge which can: (a) help in the development of new training devices, (b) improve the methods of assessment and prediction of human abilities for better selection and training, and (c) enhance the design of manned weapons systems.

Specific accomplishments for FY 86 include: (a) proposal of a new theory for the early stages of human visual processing, and (b) development of an innovative method to record and analyze electrical activity of the human brain.

Scientists in many disciplines are interested in early processing because it underlies the human ability to visually recognize everyday objects and because it can help the development of computer vision. Early processing includes the many transformations of retinal images occurring in sensory pathways to the brain and in the brain itself. This new theory is important because, among other features, it explains how early processing could generate perceived contours that define boundaries among objects, an essential step preceding recognition of the objects. Some contours are easily defined, e.g., large differences in brightness or color. Many important contours in an image, however, are more complex and cannot be described this way. The theory describes two mechanisms in early sensory processing that may explain the human ability to perceive simple and complex contours. It includes a mathematical model of neural circuits that can perform the necessary computations on an image. This research is stimulating interaction among neuroscientists, perceptual psychologists, and computer scientists concerned with visual processing and developing machines capable of recognizing images.

Recordings are made from as many as 60 electrodes around the scalp as subjects perform visual and motor tasks. A long-standing problem, determining the exact region of the brain probed by the scalp electrodes, was solved by making nuclear magnetic resonance scans of each subject. A new mathematical algorithm was developed to analyze the data from the electrodes. The first results suggest, somewhat surprisingly, that for subjects to perform even quite simple tasks requires coordinated activity of widespread regions of the brain. This research may lead to methods of monitoring human performance of tasks such as flying combat missions and ways to couple to expert machine systems that will assist the pilot.

FUTURE DIRECTIONS:

Major thrusts for several years will continue in the areas of: (a) visual information processing, (b) development of new workload metrics based on researching new biocybernetics techniques, and (c) performance prediction based on systematic investigation of parameters of learning ability. Several reviews of contract and in-house work are held each year in the thrust areas. These are a valuable source of information exchange since representatives of other military services and agencies are invited to participate.

PROJECT OVERVIEW

PROJECT: 2313-A4	COGNITIVE SCIENCE	87	88
PE: 61102F	DEFENSE RESEARCH SCIENCES	\$ 1.8M	\$ 2.5M
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE OFFICE OF SCIENTIFIC RESEARCH		

PROJECT SYNOPSIS:

The objective of this Task is to support basic research in cognitive science.

This research program will support basic theoretical and experimental work on human cognitive processing, including areas such as representation and utilization of perceptual knowledge, attention, memory representation, and the structure of knowledge. Both behavioral and biological approaches will be considered, and other topics may also be included as the program develops.

A portion of this new program will provide awards to scientists at the Air Force Human Resources Laboratory, where a large test facility has been built for research on human learning abilities. This unique facility includes 30 testing stations with microcomputers and associated equipment and a mainframe computer for reducing data. Several hundred new subjects are available for testing each week. A current research project is measuring individual differences in processing speed and working memory capacity to predict learning performance; however, many other studies are planned. Awards will support visits to this facility for collaborative research.

PAYOFF/UTILIZATION:

The payoff of this Task will be improved understanding of human cognitive processing.

PROJECT OVERVIEW

		87	88
		----	----
PROJECT: 2313-A5	VISUAL INFORMATION PROCESSING	\$ 2.9M	\$ 3.0M
PE: 61102F	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE OFFICE OF SCIENTIFIC RESEARCH		

PROJECT SYNOPSIS:

The objective of this Task is to describe, quantitatively, the capabilities and limits of visual information processing in complex, dynamic environments.

Psychophysiological and neurophysiological procedures will be used to isolate and specify stimulus requirements, to discover underlying neural mechanisms, and to quantitatively describe human visual processing. Essential individual factors to be considered include spatial and temporal interactions, perception of patterns, and the effects on visual perception of memory, attention, expectations, the other senses, and eye movements. Formal analysis procedures will be used to develop models of the human visual system as it functions under real world conditions. Such mathematical descriptions of human visual processing will be adapted to develop nonbiological image understanding systems.

PAYOFF/UTILIZATION:

The payoff of this Task includes improved weapon systems design through the development of quantitative models of human vision.

Results suggest that specific visual-motor training procedures can measure the speed and accuracy of the operator's ability to detect, identify, and respond to visual information. Pilots trained by such procedures will have the advantage of recognizing the enemy much earlier than pilots who do not have this training. Specific findings include: (a) the discovery that the addition of texture to visual targets does not improve perception of motion-in-depth, i.e., the pilot's ability to compute direction in time to impact with an oncoming object, and (b) evidence that pre-programmed habitual eye movement patterns are used to scan visual displays.

A specific accomplishment in FY 86 includes the proposal of a new theory for the early stages of human visual processing.

PROJECT OVERVIEW

PROJECT: 2313-A6	AUDITORY PATTERN RECOGNITION	87 ----- \$ 1.2M	88 ----- \$ 1.3M
PE: 61102F	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE OFFICE OF SCIENTIFIC RESEARCH		

PROJECT SYNOPSIS:

The objective of this Task is to develop quantitative models of the human sensory processes responsible for recognizing complex sounds.

Such models are expected to be useful for: (a) describing human performance in complex tasks, (b) providing the proper management of acoustic signals presented to human operators, (c) providing a rationale for tests used in audiology, and (d) guiding the development of algorithms to be used in machine recognition of speech. Psychophysical approaches will be heavily emphasized, although other approaches that provide converging evidence will be considered. The psychophysical approaches will include presentation of known complex sounds to human listeners and measurement of the accuracy or speed of identification, recognition, discrimination or audibility.

Emphasis will be placed on work that involves quantitative descriptions of these responses within the framework of models of sensory processing. Development and testing of such models is the objective of this approach. Models will be encouraged whose scope permits application to a wide variety of complex sounds and not to just a limited domain of complex sounds such as speech. Models will also be encouraged that address the interaction of sensory processing with memory processing. One goal is understanding ways that memory might cooperate in human sensory processing.

PAYOFF/UTILIZATION:

The payoffs of this Task include a better understanding of: (a) auditory aspects of human factors design, (b) intelligibility of sounds in noisy or data-compression environments, (c) individual differences in auditory performance, and (d) human cognitive performance and decision-making. Work will also provide a guide to the development of algorithms for machine recognition of speech.

PROJECT OVERVIEW

		87	88
		----	----
PROJECT: 2313-T1	LEARNING ABILITIES MEASUREMENT PROGRAM	\$ 0.9M	\$ 0.9M
PE: 61102F	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

PROJECT SYNOPSIS:

The objective of this Task is to develop a theory-based system of ability measurement that will account for individual differences in skill/knowledge acquisition rates and performance levels.

New techniques are needed for evaluating the fundamental parameters of processing speed, working memory capacity, and knowledge bases which determine individual learning and performance behaviors. Advances in cognitive psychology and other measurement devices make a breakthrough possible in ability measurement. Advances in ability measurement depend upon the availability of reliable and valid indicators of learning and performance proficiency. Basic research is needed to develop and test alternative ways of evaluating learning rates and performance capabilities.

Studies in the skill acquisition area will be conducted to identify and measure individual difference parameters relating to procedural and factual knowledge bases, working memory capacity, and information processing speed. A primary goal is to determine how such parameters interact to account for individual differences in learning and performance behaviors. Studies will be conducted to determine the role of processing speed to model learning and performance in high information flow environments.

A second area of research will identify and measure working memory capacity. The approach will be to model latencies and errors (memory failures) involving various combinations of memory storage and processing requirements. Additional research in skill acquisition will address individual differences in the attainment and maintenance of automaticity in the numerical, verbal, and spatial domains, and will support program and system analysis for development of specialized tests.

Research in performance assessment will try to determine how various measures of learning behavior can be combined into the most meaningful indicators of learning performance. Such performance scores will be modeled using knowledge, capacity, and processing speed parameters. In addition, the principles of artificial intelligence (AI) will be applied to develop intelligent tutors in the areas of programming and electronic troubleshooting. The goal of the research is to develop two seven-day courses which can be used to collect learning performance criteria to be modeled using ability parameters.

PAYOFF/UTILIZATION:

The payoffs of this Task include: (a) provision of a theory-based system of ability measurement which will lead to an improved Air Force personnel selection and classification program, (b) development of new methods for evaluating individual differences in learning and performance that can be used for early validation of ability measures, and (c) provision of a model of the ways in which learned capabilities develop.

PROJECT OVERVIEW

		87	88
		----	----
PROJECT: 2313-T3	PERCEPTUAL AND COGNITIVE DIMENSIONS OF PILOT BEHAVIOR	\$ 0.2M	\$ 0.2M
PE: 61102F	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

PROJECT SYNOPSIS:

The objectives of this Task are to: (a) establish the relationship between stimulus properties and their encoding by basic sensory mechanisms, and (b) determine the limits/capabilities of human visual attention and develop a predictive model of those effects.

Specific research will include: (a) measuring the interaction of stimulus size, location, spatial frequency and temporal frequency on the discrimination of visual motion effects, (b) measuring spatial summation effects in short wavelength receptor mechanisms and compare these effects with alternative theoretical predictions, (c) determining the directional sensitivity of short wavelength mechanisms utilizing a stimulus matching technique, and (d) comparing dynamic transformations in spatial contours in terms of their effects on perceptual constancies.

Additional research is planned to: (a) measure the speed of voluntary and involuntary attentional switches for highly practiced visual tasks, (b) determine to what extent improvements in voluntary attentional speed for single stimuli generalize to multiple stimuli and locations, (c) develop and refine an artificial intelligence-based model of visual attention, and (d) test predictions of the artificial intelligence model for fixation sequences in a visual scanning task.

PAYOFF/UTILIZATION:

The payoffs of this Task include: (a) provision of basic information on sensory and perceptual processes which can affect the design of training systems for Air Force pilots, and (b) establishment of a basis for the prediction, measurement, and correction of attentional errors during the training of advanced cockpit piloting tasks.

PROJECT OVERVIEW

	87	88
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PROJECT: 2313-V1	\$ 0.3M	\$ 0.3M
	ELECTROENCEPHALOGRAPHIC AND MAGNETENCEPHALOGRAPHIC INDICANTS OF COGNITIVE FUNCTION	
PE: 61102F	DEFENSE RESEARCH SCIENCES	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE AEROSPACE MEDICAL RESEARCH LABORATORY	

PROJECT SYNOPSIS:

The objective of this Task is to develop mapping of brain activity that can be demonstrated to be associated with cognitive processing.

Evoked brain activity, both steady state and transient, will be recorded to determine the origin(s) and information content of the brain activity responses. This research will be using a combined and complementary mix of electrophysiological, magnetophysiological, and behavioral measurements.

The evoked response to a target event embedded in a series of similar events is a larger, long latency positive component, which has been shown (through EEG recordings) to be largest over the parietal region of the brain. Magnetic recordings (MEG) will be obtained over a grid pattern, with recordings being used to identify the largest amplitude positions and positions that are 180 degrees out of phase. The location of the positions can be used to determine the location and depth of the source of activity. In order to use the MEG's localizing capability, two situations will be used: one will produce the P3a, the other will produce the P3b. In order to verify that each situation does produce the desired P3, simultaneous electrical recordings will be obtained. A grid system of recording will be used to map the temporal and occipital regions of the brain in order to determine the depth and location of the generation of these two different types of P3.

The steady state evoked response is a measure of the brain's cyclical response to a flickering light stimulus. If unpatterned flickering fields are used, four different frequency ranges of flickering stimuli can be identified that elicit relatively large brain responses. The back of the subject's head will be mapped while half-field stimuli flickering at one frequency is presented. This will be done for each of the three frequency ranges. The resulting contour map for each frequency range will be compared to determine the number and location of cortical generators.

PAYOFF/UTILIZATION:

The payoffs of this Task include: (a) the purchase of new and sophisticated equipment for data collection, improvement of quality and quantity of that data, and improved ability to understand and record brain activities, (b) increased numbers of professional personnel to improve operations and maintenance, (c) improved methods to make the best use of available data to reduce subject exposure, (d) improved methods for isolating neural sources and procedures, (e) improved understanding of cognitive processes, (f) development of experiments to establish functional relationships between observable behavior and neurophysiological response, and (g) development of models of cognition.

A specific accomplishment in FY 86 included the development of an innovative method to record and analyze the electrical activity of the brain while the subject was performing visual and motor tasks.

PROJECT OVERVIEW

	87	88
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PROJECT: 2313-V2	BASIC VISION RESEARCH	\$ 0.3M \$ 0.3M
PE: 61102F	DEFENSE RESEARCH SCIENCES	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE AEROSPACE MEDICAL RESEARCH LABORATORY	

PROJECT SYNOPSIS:

The objectives of this Task are to: (a) develop a foveal and peripheral contrast response characteristics model, a model that can describe the contrast detection threshold and contrast sensation levels for objects of arbitrary shape and contrast anywhere in the visual field, (b) map the names by deriving areas on the CIE chromaticity diagram which correspond with specific, commonly used hue names, and (c) map Iso-Hue and Iso-Saturation by deriving lines of constant hue and constant saturation on the CIE chromaticity diagram.

Psychophysical experiments involving magnitude estimation and forced-choice threshold measurements will be conducted to quantify threshold detection and suprathreshold contrast perception for spatially limited patches of sine wave grating stimuli. Variation in size, spatial frequency, contrast, duration, and eccentricity of these stimuli should provide sufficient information to describe non-linear mechanisms responsible for contrast detection and perception over most of the visual field. A model will be developed from these data to account for both the non-linear suprathreshold response and the non-uniformity in distribution of spatial frequency sensitive mechanisms over the peripheral visual field. When fully developed, the model will allow predictions of both detection and perception for objects of arbitrary size and shape at arbitrary positions in the visual field.

In the Hue-Name mapping effort, the areas' boundaries will be defined probabilistically and will delineate, for example, the region of chromaticities which a color-normal observer will call "green" with 95 percent probability or greater, given specific viewing conditions. The major parameters to be explored include the desired confidence level, the luminance, shape, and area of the stimulus, and the background's color and area.

In the Iso-Hue and Iso-Saturation effort, approximately five hues and five levels of saturation will be studied. For each hue, the saturation will be varied and the subject will then make adjustments so as to hold the perceived hue constant. Similarly, for each saturation level, hue will be varied and the subject will make adjustments which hold the perceived saturation constant. These experiments will be replicated at luminances that encompass those which can be expected from airborne electronic displays.

PAYOFF/UTILIZATION:

The payoffs of this Task include: (a) provision of a tool for designing cockpit displays and instruments with desired visibility at any eccentricity in the visual field, (b) provision of a tool for evaluating visibility of eccentrically displayed imagery or instrumentation in existing cockpits and simulators, (c) provision of a sound empirical basis for selecting and specifying color tolerances for color-coding purposes, and (d) provision of fundamental data to help develop perceptually uniform color spaces and color-contrast metrics, which can be used to extend contemporary models of

spatio temporal contrast perception to encompass chromatic contrast and predict pilot visual performance more accurately.

PROGRAM ELEMENT OVERVIEW

PE: 62202F AEROSPACE BIOTECHNOLOGY
CONGRESS/JNAI CATEGORY: HUMAN FACTORS
DoD ORGANIZATION: AF
FUNDING: FY87 \$ 15.2M (FY88 PRESIDENT'S BUDGET)
FY88 \$ 15.4M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objectives of the Manpower, Personnel and Training (MPT) portions of this Program Element are to: (a) improve human performance in weapon systems and operations by refining crew selection, maintenance, and crew protection, and man-machine integration, (b) improve safety and protect Air Force personnel from radiation, chemical, and mechanical forces, (c) use our understanding of human factors to invent threats and countermeasures effective against Soviet weapon system operators, (d) develop chemical defense measures for air base operations, casualty care evacuation, and personal protective equipment, and (e) exploit and optimize man's utility in military space systems.

Man is a key element in every military operation. Changing operational requirements, new technologies, and increasingly sophisticated and complex weaponry place continually greater demands on system operators and maintainers. Therefore, the Biotechnology Program explicitly addresses the utilization of man in accomplishing the various Air Force missions, and focuses on research and development which will result in the optimal utilization of Air Force personnel within a complex technological environment.

Aerospace Biotechnology is the core Air Force technology base program to optimize the role of the human operator in the design, development, and operation of increasingly complex and technologically sophisticated weapon systems. The Biotechnology Program is formally coordinated with the Army, the Navy, and the National Aeronautical and Space Administration through a variety of mechanisms, including the Joint-Service Aeromedical Research Panel and the Human Factors Engineering Technical Advisory Group.

The Biotechnology Program is conducted by the Aerospace Medical Division, Brooks Air Force Base, Texas, and Wright-Patterson Air Force Base, Ohio.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) the design of more effective weapon systems which capitalize on advanced human engineering concepts and techniques, (b) the development of technologies to assess human performance on space flights, (c) the development of command, control and communications (C3) simulation systems for interactive testing, (d) the development of advanced display and simulation technology for tactical aircraft systems, and (e) the development of systems to maximize human operator efficiency.

FUTURE DIRECTIONS:

Future directions of this Program Element include continued efforts to develop technologies to determine utilization capabilities and opportunities of man in space and to direct research toward a broader application in the areas of aircraft survivability assessment and the design of effective manned weapon systems.

Long-range goals for the MPT portion of this Program Element include the development of dynamic models to predict operator stress limits and performance effectiveness, the development of design criteria and mission

planning guides to reduce operator overload and optimize man-machine integration, and the design and development of integrated display/control systems for airborne and aerospace missions.

PROJECT OVERVIEW

PROJECT: 06MD	AEROSPACE MEDICAL DIVISION LABORATORY OPERATIONS	87 ----- \$ 7.9M	88 ----- \$ 7.5M
PE: 62202F	AEROSPACE BIOTECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AEROSPACE MEDICAL DIVISION		

PROJECT SYNOPSIS:

The objective of the Manpower, Personnel and Training (MPT) portion of this Project is to provide the resources to conduct MPT in-house research and development activities of the Aerospace Medical Division (AMD) research laboratories.

The laboratories are designed to specifically define man's limits with regard to adaptability, survivability, and performance capabilities within his operational environment. The Project includes pay and related costs for civilian employees, travel, transportation, rent, communications, utilities, lab supplies and equipment, and other related materials and services needed by specialized scientific teams using complex, unique research facilities and devices to conduct biotechnology research and exploratory development. This Project also funds salary, travel and equipment for personnel at the Aeronautical Systems Division to provide procurement support to the Aerospace Medical Division.

Funding indicated includes only the MPT portion of this Project.

PAYOFF/UTILIZATION:

The payoff of the MPT portion of this Project includes the provision of resources to enable the in-house MPT research and development activities of AMD and its laboratories to be conducted.

This Project allows and facilitates the research efforts of the Aerospace Biotechnology Program (the core Air Force technology base program) to optimize the role of the human operator in the design, development, and operation of increasingly complex and technologically sophisticated weapon systems.

PROJECT OVERVIEW

	87	88
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PROJECT: 6893	\$ 1.4M	\$ 1.6M
PE: 62202F		
CONGRESSIONAL CATEGORY:		
DoD ORGANIZATION:		
RESPONSIBLE ORGANIZATION:		

MANNED WEAPON SYSTEMS
EFFECTIVENESS

AEROSPACE BIOTECHNOLOGY

HUMAN FACTORS

AF

AEROSPACE MEDICAL DIVISION

PROJECT SYNOPSIS:

The objective of this Project is to develop techniques to deceive the operators of enemy air-to-ground and ground-to-air systems.

Visual camouflage, optical countermeasures and techniques to fool infrared and radar sensors are developed, simulated in the lab, and field tested. A variety of studies of human visual capacities are also performed. Measurement of enemy antiaircraft operator performance is accomplished with simulation and flight test. Blue forces countermeasures are being developed and transitioned. The need for motion in both engineering and training simulation is being explored, including the modeling of visual/motion effects on operator performance.

In FY 87, it is planned to: (a) measure the effects of ground-to-air and air-to-air laser weapons on the human visual system, (b) complete flight testing of airfield visual deception system, (c) quantify the effect of attack aircraft tactics on enemy system and aircraft operator visual tracking performance, (d) evaluate low cost simulator motion systems relative to their effect on operator performance and transfer of training, and (e) quantify blue force crew performance in the optical acquisition and tracking of air-to-ground and air-to-air targets.

In FY 88, it is planned to include the development of an enhanced, optically-based, passive terrain avoidance system.

In FY 89, it is planned to develop a night side space visual performance system, and initiate a man-in-the-loop strategic threat adversary system simulation.

In FY's 87, 88, and 89, efforts will continue to specify: (a) high payoff roles for military personnel in space, including a definitive assessment of a person's space-to-ground visual capability, and (b) the technical basis and evaluation criteria for target masking and camouflage techniques based on human visual and cognitive processing.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) improved survivability against enemy threat systems, (b) validated criteria for simulator design, and (c) increased knowledge of manned threat system capabilities and vulnerabilities.

In FY 86, accomplishments included: (a) successful flight test of a night vision heads-up display, (b) determination that progressive myopia significantly reduces the percentage of Air Force Academy graduates who are qualified for flying training, and (c) qualitative assessment that pneumatic/hydraulic cushions adequately simulate gravity forces for simulator use.

PROJECT OVERVIEW

	87	88
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PROJECT: 7184	MAN-MACHINE INTEGRATION TECHNOLOGY	\$ 5.9M \$ 6.4M
PE: 62202F	AEROSPACE BIOTECHNOLOGY	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AEROSPACE MEDICAL DIVISION	

PROJECT SYNOPSIS:

The objective of this Project is to develop procedures and technologies to maximize the efficiency and effectiveness of the human operator interface with electronic/mechanical systems.

This Project will develop basic information on the perceptual, cognitive and response characteristics of human operators within mission-specific scenarios to use as design point data for system control and display development. It will also develop standardized methodologies to assess the improvement in weapon system performance due to optimized man-machine coupling.

In FY 87, it is planned to: (a) design the B-52 crew station with night vision system compatibility, (b) develop windscreen distortion criteria for the B-1B to guide maintenance, (c) conduct assessment of B-1B crew interaction during simulated low level relocatable target attack, (d) complete wide, field-of-view, helmet-mounted display technology demonstration for the Light Helicopter Family (LHX) program, (e) conduct tactical air-to-air utility simulation of a helmet-mounted display, (f) complete transition of prototype command, control and communications workstation to NORAD, (g) publish a comprehensive air vehicle crew station guide, and (h) develop an advanced night vision goggle heads-up display.

In FY 88, it is planned to produce a B-1B defensive system display design, a prototype human engineering workstation incorporating practical artificial intelligence, and an on-line analysis system for crew station ergonomics.

In FY 89, it is planned to complete a virtual terminal for fighter battle simulation, a brassboard wide field-of-view Super Cockpit display system, and a computer-aided maintenance design system.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) the improvement of weapon system performance by optimizing man-machine coupling, and (b) the development of methodologies and technologies to maximize the efficiency and effectiveness of the human operator interfacing with Air Force systems.

In FY 86, accomplishments included development of: (a) a prototype command, control and communications crew station, which has been optimized for human performance characteristics, (b) a one-fourth inch diameter cathode ray tube for use in helmet-mounted display systems, and (c) a B-1B simulator to be used in-house for engineering design research and by Strategic Air Command for training.

PROGRAM ELEMENT OVERVIEW

PE: 62205F PERSONNEL, TRAINING, AND SIMULATION
 CONGRESSIONAL CATEGORY: EDUCATION & TRAINING
 HUMAN FACTORS
 SIMULATION & TRAINING DEVICES
 MANPOWER & PERSONNEL
 DoD ORGANIZATION: AF
 FUNDING: FY87 \$ 32.5M (FY88 PRESIDENT'S BUDGET)
 FY88 \$ 35.9M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element (PE) is to improve operational readiness through more effective training, selection, assignment, and retention of personnel, and increased weapon system supportability.

A major research area concerning flight simulation uses various simulation devices at the Training Effectiveness Research Facility at Williams AFB, Arizona. These devices are used to conduct research to develop innovative methods for flight simulator training, to define simulator training effectiveness requirements, and to develop innovative techniques for training tactics used in air-to-ground and air-to-air combat.

Other research areas develop improved individual and unit training methods, instructional and learning strategies, and training design and evaluation technologies. Specific technical programs include development and demonstration of: (a) personnel testing procedures, (b) methods to determine Air Force job requirements, (c) processes for matching individuals to jobs, (d) models and strategies to improve retention, (e) the means to measure and evaluate performance in order to link enlistment standards to on-the-job performance, (f) models for integrating manpower, personnel, and training decisions, (g) computer modeling to address fundamental training management issues, (h) tools for computer-based training, (i) maintenance training simulators, and (j) artificial intelligence applications to training.

Another major research area concerns the logistics support of weapon systems and improvements that can be made by specifying the interactions between the human elements of the logistics and maintenance systems, and the associated characteristics of weapon systems.

Formal agreements exist which specify support to be provided by the Air Force Human Resources Laboratory (AFHRL) and other agencies, including cooperative agreements with the Navy and Army on work related to such efforts as: (a) visual display and advanced computer image generation technology development, (b) flying training research and development, (c) the development of flight training schedules using Advanced Instructional System software, (d) simulator research and development, (e) development of a computerized instructional system, and (f) research on command and control systems.

In FYs 87-89, work under this Program Element will include: (a) continued provision for part of the management and support of the Air Force Human Resources Laboratory (AFHRL), (b) enhancements in instructional strategies and training delivery, which will result in improved methods for individual and unit training that is both job relevant and cost effective, (c) application of new methods and devices to flying training and aircrew performance assessment, with an emphasis on increased flying proficiency and improved transition to combat aircraft, (d) support for the operation, maintenance, and modification of simulation equipment and software that is the foundation for research on training effectiveness and flight simulator engineering R&D, (e) development of new technologies to improve the logistics support of Air Force combat operations, (f) development of technology and

application programs to determine training requirements, analyze wartime job requirements and performance standards, determination of training requirements, identification and modeling of the impacts of automation on command and control (C2) operators, analysis of combat decision making, and development of new technology for training devices, (g) development of efficient and effective simulation hardware technology for future aircrew training systems, (h) development of personnel qualification and aptitude tests, job specification standards, and manpower and personnel models, and (i) development of methodologies for assessing individual performance on the job and for predicting effective job performance.

The Projects under this PE are consolidated from PE 62205F and PE 62703F.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) development of improved flight simulator hardware which will improve training and reduce training costs, (b) design and development of better simulators for maintenance training, which will reduce training costs by eliminating the need for expensive operational equipment, (c) design and development of computer-based instructional technologies for technical and flight training, (d) development of improved courseware, training delivery options, training aids, and related products, (e) development of technology and programs to train, assess and aid command and control (C2) operators, especially in combat-related activities, (f) development of new training technologies and logistics support methods which are expected to increase the productivity of Air Force personnel, improve the cost-effectiveness of technical and flight training, and result in enhanced operational readiness, (g) development of methods to ensure that the best qualified individuals are recruited, selected, classified, and assigned, and (h) development of improved measurement techniques for assessing individual performance on the job and for predicting job performance, thereby enhancing individual performance and unit effectiveness at all organizational levels.

FUTURE DIRECTIONS:

Future work under this Program Element will continue to focus on the design, development and evaluation of new technologies in: (a) aircrew training research, (b) improved individual and unit training methods, (c) instructional and learning strategies, (d) training design and evaluation technologies, and (e) logistics support of weapons systems.

Specific efforts for FY 90 and beyond include: (a) development of a variable acuity visual system and incorporation into the F-15 simulator network, and (b) continued development of job performance measures.

PROJECT OVERVIEW

		87	88
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PROJECT: 06HT-1	LABORATORY SUPPORT	\$ 3.2M	\$ 3.3M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

PROJECT SYNOPSIS:

The objective of this Project is to provide for part of the operation of the Air Force Human Resources Laboratory (AFHRL) at Brooks Air Force Base, Texas, including pay and related costs of civilian scientists and support personnel, travel, transportation, rent, communications, maintenance, procurement of supplies and equipment, and contractor support services.

It also funds civilian salaries, travel, and supplies for personnel at the Aeronautical Systems Division (ASD), Wright-Patterson AFB, Ohio, who provide procurement support to AFHRL. The laboratory performs research and development in manpower and force management, weapon systems logistics, maintenance and technical training, and air combat tactics and flying training in support of immediate or potential needs of Air Force operational systems.

This Project supports and complements all Projects within Program Element 62205F.

PAYOFF/UTILIZATION:

The payoff of this Project includes enabling the many and varied research tasks of AFHRL at Brooks Air Force Base, Texas, to be accomplished by handling the support functions of the lab such as travel, transportation, communications, maintenance, procurement of supplies and equipment, etc.

PROJECT OVERVIEW

PROJECT: 06HT-2	LABORATORY SUPPORT	87	88
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION	\$ 3.5M	\$ 3.7M
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

PROJECT SYNOPSIS:

The objective of this Project is to provide for part of the operation of the Air Force Human Resources Laboratory (AFHRL) at Brooks Air Force Base, Texas, including pay and related costs of civilian scientists and support personnel, travel, transportation, rent, communications, maintenance, procurement of supplies and equipment, and contractor support services.

It also funds civilian salaries, travel, and supplies for personnel at the Aeronautical Systems Division (ASD), Wright-Patterson AFB, Ohio, who provide procurement support to AFHRL. The laboratory performs research and development in manpower and force management, weapon systems logistics, maintenance and technical training, and air combat tactics and flying training in support of immediate or potential needs of Air Force operational systems.

This Project supports and complements all Projects within Program Element 62205F.

PAYOFF/UTILIZATION:

The payoff of this Project includes enabling the many and varied research tasks of AFHRL at Brooks Air Force Base, Texas to be accomplished by handling the support functions of the lab such as travel, transportation, communications, maintenance, procurement of supplies and equipment, etc.

PROJECT OVERVIEW

PROJECT: 06HT-3	LABORATORY SUPPORT	87	88
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION	\$ 1.8M	\$ 1.9M
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

PROJECT SYNOPSIS:

The objective of this Project is to provide for part of the operation of the Air Force Human Resources Laboratory (AFHRL) at Brooks Air Force Base, Texas, including pay and related costs of civilian scientists and support personnel, travel, transportation, rent, communications, maintenance, procurement of supplies and equipment, and contractor support services.

It also funds civilian salaries, travel, and supplies for personnel at the Aeronautical Systems Division (ASD), Wright-Patterson AFB, Ohio, who provide procurement support to AFHRL. The laboratory performs research and development in manpower and force management, weapon systems logistics, maintenance and technical training, and air combat tactics and flying training in support of immediate or potential needs of Air Force operational systems.

This Project supports and complements all Projects within Program Element 62205F.

PAYOFF/UTILIZATION:

The payoff of this Project includes enabling the many and varied research tasks of AFHRL at Brooks Air Force Base, Texas to be accomplished by handling the support functions of the lab such as travel, transportation, communications, maintenance, procurement of supplies and equipment, etc.

PROJECT OVERVIEW

	87	88
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PROJECT: 06HT-4	LABORATORY SUPPORT	\$ 2.1M \$ 2.2M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION	
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objective of this Project is to provide for part of the operation of the Air Force Human Resources Laboratory (AFHRL) at Brooks Air Force Base, Texas, including pay and related costs of civilian scientists and support personnel, travel, transportation, rent, communications, maintenance, procurement of supplies and equipment, and contractor support services.

It also funds civilian salaries, travel, and supplies for personnel at the Aeronautical Systems Division (ASD), Wright-Patterson AFB, Ohio, who provide procurement support to AFHRL. The laboratory performs research and development in manpower and force management, weapon systems logistics, maintenance and technical training, and air combat tactics and flying training in support of immediate or potential needs of Air Force operational systems.

This Project supports and complements all Projects within Program Element 62205F.

PAYOFF/UTILIZATION:

The payoff of this Project includes enabling the many and varied research tasks of AFHRL at Brooks Air Force Base, Texas to be accomplished by handling the support functions of the lab such as travel, transportation, communications, maintenance, procurement of supplies and equipment, etc.

PROJECT OVERVIEW

	87	88
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PROJECT: 1121	TECHNICAL TRAINING DEVELOPMENT	\$ 1.9M \$ 2.1M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION	
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objective of this Project is to enhance and develop training technologies that will result in improved methods for individual skills development and better job performance through enhanced individual and unit training.

Primary areas of interest include: (a) using computers to investigate and measure job performance, (b) developing computer-based training (CBT) delivery, management, and evaluation systems, and (c) investigating and demonstrating artificial intelligence (AI) applications for training.

In FY 87, work includes: (a) additional Instructional Support System (ISS) implementations and upgrades, including integration into the Air Force Advanced On-the-Job Training System and Air Training Command's Advanced Training System, (b) building intelligent authoring aids for training development and designing/developing knowledge bases for multiple AI applications in a joint effort with the Army Research Institute and the Naval Training Systems Center, (c) completing development of a prototype student knowledge base system on a joint-Service contract, (d) continued development of an intelligent tutoring system based on a previously developed intelligent maintenance aid, (e) development of intelligent coaching systems for the Ada and Prolog computer programming languages, (f) development of an ISS microcomputer implementation and networking system, and (g) beginning work on computerized performance measurement and a generic embedded intelligent tutor which will be available at the job sight via workplace computerized equipment.

In FY 88, it is planned to: (a) conduct research to create effective computer-based training (CBT) development and evaluation tools to make CBT a more effective delivery media and decrease the costly front-end CBT investment for trainers, (b) complete a demonstration of on-line, computer-based job performance tests for an Air Force specialty, (c) continue development efforts on the intelligent tutorial system and the use of natural language (speech) processing to enhance the human-computer interface, and (d) begin efforts to determine the feasibility and effectiveness of using intelligent tutorial systems to increase learning and job competency.

In FY 89, it is planned to: (a) in a joint-Service effort, complete development of software tools for use by courseware authors (designed for use by subject matter experts without the need for extensive training or background in instructional design or computer programming) in developing intelligent training systems, with specific demonstrations to take place in space operations training at the Undergraduate Space Training School, (b) field test the computerized job performance measurement system developed in FY 88 and evaluate its potential for further development in Air Force specialties, and (c) develop an intelligent instructional design for the space environment.

PAYOFF/UTILIZATION:

The payoffs of this Project are improved individual skills development and job performance through development of training technology to enhance individual and unit training.

Efforts to improve training delivery, development, and effectiveness must be maintained to stay abreast of Air Force training requirements and ensure that training produced is cost-effective and mission-relevant.

In FY 86, accomplishments included: (a) demonstration of a portable, computerized expert system for maintenance technicians which integrates training and job-aiding, and also provides technicians with training simulation for fault isolation, troubleshooting techniques and information on how to perform maintenance tests, and the capability to diagnose shortcuts in troubleshooting, and (b) development of interface specifications which enable the use of videodisk technology using the ISS for training delivery. The ISS currently supports multiple users, among them the Air Force Academy, Air Force Institute of Technology, and the National Aeronautics and Space Administration.

PROJECT OVERVIEW

		87	88
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PROJECT: 1123	FLYING TRAINING DEVELOPMENT	\$ 3.0M	\$ 3.0M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

PROJECT SYNOPSIS:

The objective of this Project is to apply new methods, techniques, and devices to flying training and aircrew performance assessment to increase proficiency during flying training and in combat aircraft.

In FY 87, a number of efforts began which included: (a) developing specifications for the design of Total Training Systems to provide the most cost-effective training for a weapon system, (b) investigating the degree to which simulator training in simulated combat conditions increases performance in high workload conditions in aircraft, and (c) development of an artificial intelligence (AI) model of pilot knowledge structures for use in training and evaluating combat decision-making strategies. Also, in FYs 87/88, work will continue on preparing a handbook to assist in the design of better, more cost- and training-effective special function trainers.

Planned FY 88 new starts include: (a) research on critical visual cues for low-level flight to establish guidelines for visual modeling of low-level environments in flight simulators and part-task trainers, (b) development of a modular threat simulation system to support the development and evaluation of an integrated full mission electronic combat training program, and (c) development of AI software to allow aircrew training operators to efficiently design and interact with part-task trainers.

Plans for FY 89 include: (a) making recommendations for use of color in flight simulators, based on comparisons of low-altitude flight task performance with color and monochrome imagery, (b) continued studies to identify visual scene fidelity requirements definition for Air Force simulator acquisitions, (c) development of integrated electronic combat training media guidelines, (d) development of a training program to optimize pilot workload during low-level flight, and (e) studies of aircrew performance measurement systems. One study will develop and validate plans for a stand alone performance measurement system capable of acquiring data from the Simulator for Air-to-Air Combat as well as Air Combat Maneuvering Instrumentation ranges. A second study will identify and quantify relevant pilot behaviors required to detect threats and to accomplish mission objectives in surface attack maneuvers.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) reduced costs for all types of flying training, (b) improved ability to effectively train aircrew personnel, (c) new instructional methods, techniques, and devices for training and assessing pilot and navigator performance at both undergraduate and combat crew levels, (d) increased student and aircrew proficiency, (e) increased survivability and mission effectiveness, (f) development of effective visual simulation requirements, (g) improved use of simulators, and h) improved simulator displays.

In FY 86, accomplishments included: (a) increased efforts on simulator training effectiveness requirements using the advanced image generation and display hardware developed in Program Element 63227F, (b) testing of advanced radar and other sensor simulation system displays for aircrew training, (c) development of a simulator instructor/operator station (IOS) design guide which will be used to develop multi-cockpit IOS design guides and modular IOS software, (d) evaluation of special-function part-task trainers for electronic combat for integration into a Tactical Air Command Training program, and (e) completion of a behavioral performance measurement system design for use with the F-15.

PROJECT OVERVIEW

	87	88
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PROJECT: 1192	ADVANCED SIMULATION FOR \$ 5.4M	\$ 5.5M
	PILOT TRAINING	
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objective of this Project is to support the operation, maintenance and modification of simulation equipment used for training effectiveness and simulator engineering research and development.

This includes dome, dodecahedron, and helmet-mounted visual displays, computer image generation systems, and related research equipment. These simulation systems support most research conducted under Project 1123, Flying Training Development, and Project 6114, Flight Simulator Technology, as well as research conducted under Program Element (PE) 63227F, Advanced Simulator Technology, and thus provide the primary simulation capabilities for implementing, demonstrating, and testing training technology and simulation hardware developments. These capabilities are also used for demonstrating and testing engineering and training simulation technology advances developed under related Aeronautical Systems Division and joint-Service Program Elements. Research and development efforts supported by this Project are discussed in more detail under Projects 1123 and 6114.

In FY 87, efforts include: (a) beginning development of a functionally distributed parallel microprocessing capability, (b) continued work on enhancements to the existing F-16A and A-10 instructor/operator stations to allow improved instructor/operator and student/pilot interaction, and (c) completion of hardware integration and software development for the new basic side (non-visual) control computer.

In FYs 88/89, support will continue for operation and maintenance of all major simulator systems, including the Advanced Visual Technology System image generator (Project 2363, PE 63227F). Simulation support for related research projects will also continue, including training effectiveness and transfer of training studies, visual and sensor systems requirements studies, and tactical combat mission simulation studies.

PAYOFF/UTILIZATION:

The payoffs of this Project include the advancement of simulation concepts and technology, particularly in regard to the ASPT, the Combat Mission Trainer, and the Advanced Visual Technology System.

These and related devices are central to research and development work of other Projects, and thus play a vital role in advancing the state of training systems in general and contributing to knowledge on transfer of training and the generalizability of skill acquisition. These are significant training issues across the Services, as cost-effectiveness and training efficacy become increasingly important in a technologically sophisticated military environment.

In FY 86, accomplishments included: (a) update of the F-16A simulator, (b) initiation of R&D simulation software configuration and conversion to the new

DoD standard programming language, Ada, and (c) delivery and start of installation/integration of a new basic-side (non-visual) control computer with much higher processing rates, capable of matching the characteristics of current state-of-the-art tactical aircraft.

PROJECT OVERVIEW

		87	88
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PROJECT: 1710	LOGISTICS AND MAINTENANCE TECHNOLOGY	\$ 3.8M	\$ 4.6M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

PROJECT SYNOPSIS:

The objective of this Project is to develop technologies to improve the logistics support of Air Force combat operations.

In FY 87, it is planned to: (a) identify personnel, job aids and support equipment tradeoffs to minimize the manpower and equipment required to perform aircraft maintenance in dispersed locations, (b) continue development on a task assignment methodology for identifying/selecting combat maintenance personnel and evaluating options available to fulfill the task performance requirements, (c) complete the analysis and testing to determine if maintenance tasks can be completed by maintenance personnel wearing chemical/biological warfare protective clothing, (d) refine and interface a computer graphics model of maintenance technician physical characteristics (reach, grip, hand motions, etc.), for use in designing human factors into equipment, with a commercial computer-aided design package for transition to government and industry users, and (e) begin development of a computer "super" model to assess theater-wide combat logistics system resources and requirements using an operations model as a core. Planning, logistics assessment, and susceptibility models will be used as modules to provide more realistic computation of wartime logistics capabilities.

In FY 88, efforts will continue on the theater-wide logistics resources and requirements assessment model. An FY 88 new start will evaluate the use of advanced graphic techniques to integrate reliability and maintainability information into computer-aided design.

In FY 89, planned efforts include: (a) continued effort on the theater-wide logistics model, (b) development of decision aids for the acquisition logistics process, and (c) completion of a model for forecasting wartime logistics requirements and collection of historical combat data to validate the model.

PAYOFF/UTILIZATION:

The payoffs of this Project are to develop technologies for improving the logistics support of Air Force combat units. Acquisition of weapon systems that are logistically supportable, sustainable, and cost-effective is being emphasized by all levels of the Air Force and DoD. Military systems must be durable, easily maintained/repared in the field, and require little or no support equipment.

In FY 86, accomplishments included: (a) conducting a study on maintenance and logistics factors that impact combat capability, which provided data for a computerized model to generate wartime demand rates for aircraft countermeasures equipment under combat conditions, as well as recommendations to improve weapon systems equipment design, and (b) development of a methodology to measure the capability of a peacetime unit to successfully perform maintenance or logistics support in a wartime environment.

PROJECT OVERVIEW

	87	88
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PROJECT: 3017	COMMAND AND CONTROL TRAINING	\$ 1.3M \$ 1.6M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION	
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objectives of this Project are to develop command and control (C2) technology and application programs to: (a) determine training requirements, (b) analyze wartime job requirements and performance standards, (c) identify and model the effects of automation on C2 operators, (d) analyze combat decision making, and (e) develop advanced technology training devices.

Combat readiness of personnel assigned to man tactical C2 systems is directly related to their ability to operate smoothly and efficiently in a rapidly changing tactical environment. The failure of C2 systems is often due to inadequate attention being placed on personnel training requirements and other human factors considerations during the design and development phases of new systems. There is a recognized need for improvements in C2 training for Tactical Air Force Battle staff personnel.

Until FY 85, the efforts in this Project were a part of and funded under Project 1121, Technical Training Development. Since this work is being conducted at a separate Air Force Human Resources Laboratory (AFHRL) division, and since C2 battle staff training is significantly different from maintenance and general technical training, a new Project was needed. This Project meets the need for improvements in C2 training for Tactical Air Force Battle staff personnel.

In FY 87, it is planned to: (a) continue efforts to develop a prototype special simulation device for training combat mission planners, (b) develop and test an automated method for ongoing dynamic update of a worldwide C2 training requirements baseline, (c) explore computer-aided concepts to provide more precise threat avoidance information for mission planning, and (d) begin work on methods to simulate the impact of automating previously manual C2 functions.

In FY 88, it is planned to: (a) develop knowledge-based training system concepts for combat operations functions, (b) begin exploratory work on a microcomputer-based desktop trainer for ground-based operators of space-based systems, and (c) begin work on the information/decision analysis for a functionally distributed tactical C2 architecture in development at the Rome Air Development Center.

In FY 89, it is planned to: (a) test the prototype knowledge-based training system for tactical combat operations, (b) test the architectural concepts of functionally distributed C2 at multiple locations, and (c) demonstrate simulation methods for evaluating the impact of automation on manual C2 processes.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) an improved ability to analyze wartime job requirements and performance standards, (b) a determination of

training requirements for command and control (C2) operators, (c) identification and modeling of the effects of automation on operators, (d) an analysis of combat decision making, and (e) development of advanced technology training devices. It is anticipated that this technology development effort will also identify many research issues for further investigation, particularly in training and evaluation technology. These programs will result in a higher probability that the air battle managers who operate these tactical C2 systems will know their combat jobs and that new tactical C2 systems will support this performance.

In FY 86, accomplishments included: (a) continued work to improve combat readiness of tactical C2 personnel in the areas of team training assessment, decision aiding, and operator/system interaction, and (b) completing a Logistics Readiness Center Training module.

PROJECT OVERVIEW

		87	88
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PROJECT: 6114	FLIGHT SIMULATOR TECHNOLOGY	\$ 1.8M	\$ 3.0M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

PROJECT SYNOPSIS:

The objective of this Project is to develop efficient and effective simulation hardware technology for future training systems to provide sufficient mission realism for aircrew training and weapon system exercise and assessment.

In FY 87, it is planned to continue: (a) upgrading the Advanced Visual Technology System (AVTS) infrared image capability through feature texturing, (b) further exploration on the feasibility of using a low-cost image generation architecture for producing a simulated real-beam radar scene from a common Defense Mapping Agency compressed database, and (c) working on component technology in support of low cost networked simulators.

In FY 88, it is planned to complete a small dome visual display system, which exploits an opportunity to apply variable-acuity display technology to Fighter Lead-In Training. In addition to meeting a TAC need for simulation in this area, it will also provide training effectiveness data for other simulation applications. Emphasis will be on visual systems comprised of electro-optical displays and microprocessor-based computer image generators. This work will continue through FY 89.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) improved quality and cost-effectiveness of training through determination of what types of simulator technology are most effective for specific training requirements, (b) simulation techniques which capitalize on human characteristics to provide cost-effective training devices, and (c) development of system definitions for future fully-capable, complex combat mission trainers for the tactical Air Force.

In FY 86, accomplishments included: (a) development of an off-line software program which automates the creation of infrared computer-generated imagery on the Advanced Visual Technology (AVTS), and (b) start of an effort to explore the feasibility of using a low-cost image generation architecture for producing a simulated real-beam radar scene from a common Defense Mapping Agency compressed database.

PROJECT OVERVIEW

		87	88
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PROJECT: 7719	FORCE ACQUISITION AND DISTRIBUTION SYSTEM	\$ 3.6M	\$ 3.9M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

PROJECT SYNOPSIS:

The objectives of this Project are research and development of personnel qualification and aptitude tests, job specification standards, and manpower and personnel models in order to provide the Air Force with methods to ensure that the Air Force recruits, selects, classifies, and assigns the best qualified individuals.

Experimental test batteries will be developed in areas such as attention sharing, eye-hand coordination, information overload, self-confidence, and others.

As the DoD Executive Agent for the Armed Services Vocational Aptitude Battery (ASVAB), which is used by all the Services for selection and classification of enlisted members, the Air Force must provide the technology base for revising and updating this test.

In FY 87, efforts include: (a) continued consolidation of ongoing job requirements and modeling research and start of efforts to develop a Manpower, Personnel, and Training Integration System (MPTIS), which will provide tools such as models and databases for supporting system design, developing personnel and training pipeline and retraining requirements for fielding new weapon systems, and integrating the MPTIS decision process into existing systems, and (b) continued exploratory development on the Air Force Officer Qualifying Test and the ASVAB.

In FY 88, it is planned to: (a) implement three new additions of the ASVAB, (b) continue work to improve selection and classification methods through basic skills assessment research, MPTIS-related efforts, and testing research validation, (c) determine task demands in air combat, identify characteristics of successful fighter pilots, and validate specialized tests for classification of fighter attack-reconnaissance pilots, (d) develop a methodology for determining the value or cost of replacement of trained and experienced personnel, which is in direct response to the FY 1984 Authorization Bill language which directs the DoD to fund the development of models and procedures to enhance retention of personnel. The primary benefit of this costing methodology will be the establishment of the relative value of Air Force personnel with different levels and types of skills. This will enable Air Force managers and planners to respond in a more informed manner to dwindling manpower pools, decreased retention, budgetary constraints, and policy decisions.

In FY 89, it is planned to: (a) provide new, alternate, or replacement forms of tests to be used in the Air Force as well as the other Services and DoD sponsored high school testing programs, (b) develop valid measures of fighter aircrew performance and in-depth analyses of task/information processing demands, (c) provide, through research into the determination of valid entry level standards for specialties, information and technology in the basic skills requirements of Air Force jobs and functional skills (which will transition to the 6.3 basic skills project to develop basic job skills

training packages), and (d) completion of a final evaluation of the EURO-NATO Joint Jet Pilot Training Program.

This Project transferred from Program Element 62703F at the end of FY 87.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) improved selection techniques, (b) improved matching of Air Force personnel to jobs which most closely relate to their aptitudes, interests, and skills, with resultant benefits for both the Air Force and its personnel, (c) enhanced combat readiness by ensuring that Air Force personnel have the skills necessary to perform successfully in peacetime and combat, (d) improved air-combat performance, (e) improved pilot selection and specialized assignment placement, (f) reduced pilot training attrition, resulting in significant savings, and (g) establishment of the relative value of Air Force personnel with different levels and types of skills, thereby enabling Air Force managers and planners to respond in a more informed manner to dwindling manpower pools, decreased retention, budgetary constraints, and policy decisions.

In FY 86, accomplishments included: (a) start of a major effort to measure the basic skills requirements of Air Force jobs and functional skills of individuals. This data will be used to develop intelligent tutoring systems to train individuals deficient in critical job skills. Also in FY 86, the Weighted Airman Promotion System was completed.

PROJECT OVERVIEW

	87	88
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PROJECT: 7734	FORCE MANAGEMENT SYSTEM \$ 1.1M	\$ 1.3M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION	
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objectives of this Project are to: (a) provide research for developing a Training Decision System (TDS) for answering questions such as when and where personnel should be trained and on what tasks, and (b) develop methodologies for assessing individual performance on the job and identifying predictors of effective performance.

The TDS includes a more comprehensive and better unified database and decision modeling technologies than have been available for estimating the training cost, resources, and capacities associated with optional patterns of training and personnel utilization.

This Project is closely tied to a Congressional mandate to link selection procedures and enlistment standards to on-the-job performance measures. It involves development of on-the-job performance measures against which selection devices, such as the Armed Services Vocational Aptitude Battery, are to be validated. The Congressional direction to link enlistment standards to the on-the-job performance measures has resulted in close monitoring of this effort by the Office of the Assistant Secretary of Defense for Force Management and Personnel (OASD/FM&P).

In FY 87, work in this Project includes: (a) continuing job performance efforts to study global/general supervisory ratings and task-level ratings as effective job performance measures, and (b) using the TDS to integrate data from task analysis, training cost studies, and policy development models.

Plans for FY 88 include using the TDS to simulate and project consequences of user specified utilization and training options and to develop optional training designs.

In FY 89, it is planned to explore applying enlisted measurement procedures for assessing officer and civilian jobs.

This Project was transferred from Program Element 62205F at the end of FY 87.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) enhanced individual performance and unit effectiveness at all organizational levels through the use of improved performance measurement techniques and the linking of enlistment standards and selection procedures to these measures, (b) a Training Decision System to answer questions regarding personnel training, and (c) the development of optimal training designs through integration of data from task analysis, training cost studies, and policy development models.

In FY 86, accomplishments included: (a) completing a prototype job performance measurement system for jet engine mechanics, (b) completion of a conceptual study on the use of job performance as criteria for evaluating training effectiveness, and (c) submission of a plan for institutionalizing

job performance measurement technology to OASD/FM&P.

PROGRAM ELEMENT OVERVIEW

PE: 63106F LOGISTICS SYSTEMS TECHNOLOGY
 CONGRESSIONAL CATEGORY: HUMAN FACTORS
 DoD ORGANIZATION: AF
 FUNDING: FY87 \$ 10.7M (FY88 PRESIDENT'S BUDGET)
 FY88 \$ 12.8M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to develop, demonstrate, and validate information system technologies that will: (a) enable individual technicians to do a much wider range of maintenance tasks with the help of highly portable electronic job aids, (b) allow weapon system designers to "see" maintenance implications as they create system designs on computer terminals, (c) make essential weapon system design and system support information immediately available from multi-computer information networks, (d) rapidly determine the best balance of conflicting logistics, manufacturing, and performance requirements to design more sustainable and mission-suitable weapon systems, and (e) integrate combat experience into wartime logistics planning and capability assessment models.

The Air Force needs to improve the maintainability, combat supportability and reliability of Air Force weapon systems. DoD Defense Guidance, OSD funding initiatives, and the R&M 2000 Action Plan, endorsed by the Air Force Secretary and Chief of Staff, have emphasized this need.

In FY 87: (a) new Maintenance and Logistics in Computer-Aided Design (MLCAD) techniques will be developed and tested through their application to F-15E support equipment and procedures for munitions loading within the cramped space constraints of a hardened aircraft shelter, (b) a major contract will be awarded for integrating various electronic reliability design techniques into a single model, to be accessed through a computer-aided electronic design work station, (c) the Integrated Design Support (IDS) System program will begin a major technical advance to integrate multiple types of computers using B-1B aircraft structural component data as a test case, and (d) the Unified Data Base (UDB) will complete validation, verification, and documentation, and will enter certification for DoD-wide use.

In FY 88: (a) in MLCAD, development will continue on a generic artificial intelligence format for integrating new supportability techniques into the electronic design work station and MLCAD will be expanded to include a computerized anthropometric model incorporating size, strength, and mobility of Air Force maintenance technicians, (b) draft specifications and processes for incorporating MLCAD into contract requirements and using it to conduct design reviews will be developed, and (c) the IDS program will continue design and development efforts in preparation for demonstrations and testing.

In FY 89: (a) development will begin on a prototype Unified Life Cycle Engineering (ULCE) work station, along with the necessary models and software to integrate MLCAD and producibility models with standard performance engineering analyses, (b) further MLCAD enhancements will be developed to incorporate new knowledge about the effects of operating conditions (such as temperature, humidity, etc.) on components and their interconnections in various configurations, and (c) the IDS system will begin the prototype demonstration of the capability to integrate all the necessary data for structural design and logistics planning through distributed information networks comprised of many already installed computers of different design and manufacture.

The Israeli Air Force has agreed to provide classified combat logistics data on several aircraft to AFHRL for development of a combat database and

analysis system.

Project 2744, Unified Database for Acquisition Logistics, was integrated with Project 2940, Computer Technology for Systems Design and Maintenance, in FY 87. Project 3203, Integrated Maintenance Information System Diagnostic Tests, was integrated with Project 2950, Integrated Maintenance Information System, in FY 87.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include information systems and technology designed to: (a) accurately predict how many people and parts must be provided when tactical aircraft are deployed in wartime conditions, (b) permit fewer people to perform a wider range of maintenance tasks in the deployed tactical environment of the future, (c) develop computer-aided design methodology to be used in weapon system designs from the outset, thereby reducing expensive and time-consuming redesigns and modifications, and producing more supportable and operationally ready weapon systems, (d) develop user friendly decision aids necessary to integrate relevant performance, supportability, and producibility factors to wisely choose among system design alternatives, (e) facilitate exchange of technical information between the Air Force and prime contractors, and (f) allow the replacement of the current, manual, paper-based system for logistics support analysis data with automated electronic data processing capability.

In FY 86: (a) a Government-University-Industry MLCAD cooperative working group was established with the Institute for Defense Analysis as administrator, (b) a critical technical milestone of the IDS system was successfully accomplished with the demonstration of rapid access, through a single terminal and information control system, of all the essential engineering databases for a major structural repair and modification, (c) the primary contractor, Rockwell International, and a government-industry advisory group identified the key requirements and elements of an IDS-type system, and (d) the development of UDB software was completed.

FUTURE DIRECTIONS:

Work continuing past FY 89 emphasizes design, development and testing of the IDS prototype software and MLCAD techniques. The IDS results will provide the Air Force with the capability to access digital contractor engineering databases and to transfer data between design, manufacturing and logistics functions. These integration efforts will be completed in FY 92. Demonstrations of ULCE technology will continue through FY 94. Field demonstrations of the Integrated Maintenance Information System (IMIS) hardware, software, system architecture and equipment interfaces will culminate with transition into the Very High Speed Integrated Circuits (VHSIC) and advanced modular architecture insertion program in the early 1990s, and will become the standard for the Air Force Advanced Order System (ATOS). ATOS, together with IMIS, will permit rapid electronic updates of weapon system technical orders, thus eliminating time-consuming manual posting of technical order changes.

PROJECT OVERVIEW

	87	88
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PROJECT: 2745	LOGISTICS FOR COMBAT	\$ 0.7M \$ 0.1M
	READINESS MAINTENANCE	
PE: 63106F	LOGISTICS SYSTEMS TECHNOLOGY	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objective of this Project is to: (a) identify factors that drive demands for maintenance in combat by analyzing actual wartime data, (b) develop analytical methods that will generate valid inputs for predictive models to accurately determine resources needed under wartime conditions, and (c) develop databases derived from actual combat experience.

The Air Force needs to accurately predict how many people and parts must be provided when tactical aircraft are deployed in wartime conditions. At present there are no satisfactory analytical tools or procedures to determine the changes in demand for aircraft maintenance from peacetime to wartime. Aircraft battle damage and intense operational use of weapons delivery systems and electronic warfare systems create wartime demands for skills and levels of maintenance activity which are not seen in peacetime. Studies of wartime data from recent conflicts show that extrapolation from peacetime experience does not give realistic results.

In FY 87, it is planned to: (a) evaluate the capabilities of predictive models against historical combat logistics data, and (b) develop recommendations for realignment of maintenance career fields (this realignment, made possible by new maintenance aids to be developed under Project 2950, Integrated Maintenance Information System, will permit fewer, less specialized technicians to support dispersed, high-surge operations in combat).

In FY 88, work will begin to develop combat capability assessment and readiness planning methodologies which will address the benefits of new maintenance aids and the impact of the realignment of maintenance career fields. The methodologies will include new requirement prediction techniques, and methods for determining small unit manning requirements.

In FY 89, it is planned to: (a) test these new methodologies in the field at the small unit level, and (b) begin to develop decision aids to provide wing level staffs with logistics information vital to successful wartime operations.

PAYOFF/UTILIZATION:

The payoffs of this Project include databases derived from combat experience and analytical methods that will: (a) generate valid inputs for predictive models to accurately determine resources needed under wartime and peacetime conditions, and (b) develop recommendations for realignment of maintenance career fields which will permit fewer, less-specialized technicians to support dispersed, high-surge operations in combat.

In FY 86, work began on predictive models whose capabilities will be evaluated in FY 87 against historical combat logistics data.

PROJECT OVERVIEW

	87	88
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PROJECT: 2940	COMPUTER TECHNOLOGY FOR \$ 7.1M	\$ 6.0M
	SYSTEMS DESIGN AND	
	MAINTENANCE	
PE: 63106F	LOGISTICS SYSTEMS TECHNOLOGY	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objectives of this Project are to develop, demonstrate, validate, and specify computer technology to improve weapon system design and supportability so that the characteristics of reliability, maintainability, and testability are an integral part of Air Force systems.

The Project consists of three parallel, interrelated tasks: (a) developing the capability to apply decision aids, including expert systems, to design for supportability, (b) developing the capability to electronically access all weapon systems engineering data throughout the lifetime of the weapon, and (c) developing and testing an automated, interactive database for logistics support analysis data. These tasks will result in consistent specifications and standards needed for rapid electronic interchange of technical information.

The first task, Maintenance and Logistics in Computer-Aided Design (MLCAD), will develop computer-aided design methods to enable contractors to more effectively incorporate reliability, maintainability, and testability into weapon systems design from the outset. This task will also develop decision aids, in support of the Air Force's Unified Life Cycle Engineering (ULCE) initiative, which will allow designers and logisticians to evaluate tradeoffs and allocate requirements in a consistent information architecture analysis structure, throughout the total design and acquisition process.

The second task, Integrated Design Support (IDS) System, will provide specifications, standards, and software to enable the Air Force to electronically access contractors' weapon system technical information databases, and to facilitate exchange of technical information between prime contractors, subcontractors and the Air Force. This task defines the specific engineering database required by the Air Force and develops the software architecture needed for interactive communication of digitized engineering data.

The third task, the Unified Data Base (UDB), will provide current logistics planning data and accurate field operational experience on weapon system performance to both government and contractor engineers.

In FY 87, it is planned to: (a) continue to develop and test new MLCAD techniques by applying them to F-15E support equipment and procedures for munitions loading within the cramped space constraints of a hardened aircraft shelter, (b) award a major contract for integrating various electronic reliability design techniques into a single model, to be accessed through a computer-aided electronic design work station, (c) begin a major technical advance in the IDS program to integrate multiple types of computers using B-1B aircraft structural component data as a test case, and (d) complete validation, verification, and documentation of the UDB, which will then enter certification for DoD-wide use.

In FY 88, it is planned to: (a) continue the development of a generic artificial intelligence format for integrating new supportability techniques into the electronic design work station for MLCAD, (b) expand MLCAD to include a computerized anthropometric model incorporating size, strength, and mobility of Air Force maintenance technicians (this model, developed jointly under Program Elements 62205F, Training and Simulation Technology, and 62202F, Aerospace Biotechnology, will provide visual simulation of maintenance and component access problems directly to system designers on their CAD terminals), (c) make additional MLCAD enhancements to begin to allow designers to compare the time required for maintenance tasks on alternative weapon system designs (given the ability to consider accessibility and related human factors during initial design tradeoffs, engineers will be able to design weapon systems that people can quickly and easily maintain in the field), (d) develop draft specifications and processes for incorporating MLCAD into contract requirements and using it to conduct design reviews, and (e) continue design and development efforts in the IDS task to prepare for demonstrations and testing.

In FY 89, it is planned to: (a) begin developing a prototype ULCE work station along with the necessary models and software to integrate MLCAD and producibility models with standard performance engineering analyses, (b) develop further MLCAD enhancements to incorporate new knowledge about the effects of operating conditions (such as temperature, humidity, electro-magnetic pulse, and vibration) on components and their interconnections in various configurations, (c) continue testing, verification, and validation of prototype MLCAD software as the basis for the specification and standards development for use Air Force-wide, and (d) begin the prototype demonstration in the IDS of the capability to integrate all the necessary data for structural design and logistics planning through distributed information networks comprised of many already installed computers of different design and manufacture.

Work and funding for Project 2744, Unified Data Base for Acquisition Logistics, were integrated into this Project in FY 87.

PAYOFF/UTILIZATION:

The payoffs of this Project include consistent specifications and standards for rapid electronic interchange of technical information, achieved through 3 interrelated efforts: (a) Maintenance and Logistics in Computer-Aided Design (MLCAD), (b) the Integrated Design Support (IDS) System, and (c) the Unified Data Base (UDB).

MLCAD will: (a) reduce expensive and time-consuming redesigns and modifications, which will produce far more supportable and operationally ready weapon systems, (b) allow engineers to design reliable systems right the first time, and (c) support the Air Force's Unified Life Cycle Engineering (ULCE) initiative, which will include user-friendly decision aids necessary to integrate relevant performance, supportability, and producibility factors to rapidly consider and wisely choose among system design alternatives.

The IDS System will provide research and development support for the automation and integration of digital product definition information (industry has moved rapidly into computer-aided design systems, yet the Air Force cannot communicate directly with these data systems to review and evaluate weapon system designs, nor can the Air Force currently save this valuable data, except on paper or microfilm, for subsequent logistics, maintenance, remanufacturing or engineering needs).

The UDB will, for the first time, allow the replacement of the current, manual, paper-based system for logistics support analysis data with automated electronic data processing capability.

In FY 86, accomplishments included: (a) establishment of a Government-University-Industry MLCAD cooperative working group with the Institute for Defense Analysis as administrator, (b) accomplishment of a

critical technical milestone of the IDS System with the demonstration of rapid access, OLIVE through a single terminal and information control system, of all the essential engineering databases for a single major structural repair and modification, (c) identification of the key requirements and elements of an IDS-type system by the primary contractor, Rockwell International, and a government-industry advisory group, and (d) completion of UDB software development.

PROJECT OVERVIEW

	87	88
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PROJECT: 2950	INTEGRATED MAINTENANCE \$ 2.9M	INFORMATION SYSTEM \$ 6.7M
PE: 63106F	LOGISTICS SYSTEMS TECHNOLOGY	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objective of this Project is to develop IMIS, an Integrated Maintenance Information System.

IMIS will be a complete system for providing the maintenance technician on the flight line with automated maintenance instructions and fault diagnostic aids through a single, portable computer display. The user-friendly, stand-alone IMIS portable computer will allow maintenance technicians to work interactively with built-in test capabilities of the weapon system. IMIS's rapid automatic interrogation of supply status and automatic reporting with artificially intelligent analysis will allow managers to quickly pinpoint deficiencies in supply or maintenance procedures or training.

In FY 87, it is planned to: (a) test a relational authoring approach which creates electronic technical orders in the form of relational databases which require less computer storage space than fixed pages, and which allow screen displays to be tailored to the skill of the individual technician (this authoring approach will form the basis of the Army Job Performance Aid Production System (JPAPS) and become the standard for joint-Service use), and (b) conduct extensive diagnostic analysis and generic diagnostic system design for mechanical-pneudraulic and electronic subsystems using flight data from advanced designs such as the X-29 experimental fighter.

In FY 88, it is planned to: (a) develop software for the IMIS portable maintenance aid (to be field tested in FY 89 with the interactive diagnostics on an F-16 electronic subsystem), (b) conduct a joint test with the Navy on an F-18 electronic subsystem, (c) award a major development contract for an advanced voice-controllable miniaturized IMIS maintenance aid which will include a supply and reporting interface, simulation capability for training in the field, and full system integration of diagnostics for Very High Speed Integrated Circuits (VHSIC) and modular electronics architecture (this increased diagnostics capability will permit the maintenance technician to readily assess the condition of modern, modular, fault tolerant, reprogrammable, redundant electronic circuitry and determine if a partially degraded system can continue to support combat missions without downtime for repairs), and (d) continue developing and evaluating technologies such as display screens with low power requirements and voice recognition, applicable to rugged, portable, computerized maintenance aids.

In FY 89, it is planned to: (a) continue developing IMIS technology as well as demonstrating an F-16 test bed, (b) prepare software, interface, and detailed design documentation, (c) conduct detailed technical reviews to prepare for future validation and demonstration of system specifications and standards being developed under this project, and (d) transition initial IMIS results for use on the Advanced Tactical Fighter (ATF).

Work and funding for Project 3203, Integrated Maintenance Information Tests, were integrated into this Project in FY 87.

PAYOFF/UTILIZATION:

The payoff of this Project is: a user-friendly, stand-alone portable computer display which is a complete system for maintenance fault diagnosis and automated maintenance instructions, that will: (a) permit fewer people to perform a wider range of maintenance tasks in the deployed tactical environment of the future, and (b) allow managers to quickly pinpoint deficiencies in supply or maintenance procedures or training.

Additional products of this effort include specifications, joint-Service coordinated standards, and automatic authoring systems which will aid in preparing maintenance and diagnostic instructions for electronic screen display.

In FY 86, field-tested specifications for the electronic display of maintenance information were delivered.

PROGRAM ELEMENT OVERVIEW

PE: 63227F PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY
 CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES
 EDUCATION & TRAINING
 MANPOWER & PERSONNEL
 DoD ORGANIZATION: AF
 FUNDING: FY87 \$ 7.5M (FY88 PRESIDENT'S BUDGET)
 FY88 \$ 10.9M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to increase the Air Force's readiness and effectiveness by providing cost-effective solutions to problems of training, personnel acquisition and job assignment, manpower management, and human performance in weapon systems.

This Program Elements includes efforts to develop: (a) technologies for selecting, classifying, and assigning quality men and women for Air Force jobs, (b) advanced technical training systems to increase the efficiency and productivity of Air Force personnel, (c) technologies to estimate manpower, personnel and training requirements for weapon system design trade-off decisions and to enhance supportability of new weapon systems, and (d) technologies to improve aircrew combat skills training.

This Program Element includes the Air Force portion of funding for the joint-Service Defense Training and Performance Data Center in Orlando, Florida.

A special emphasis of this work is to develop and demonstrate improved flight simulator visual image generation and visual display technologies to provide more adequate visual scenes for combat mission training, a low-cost, highly transportable, combat mission trainer for use at the squadron level, and the technology to link numerous trainers at dispersed locations, to enable realistic, large-scale, joint-Service combat training exercises.

Technology development efforts also support in-aircraft combat training through the development of the Air combat assessment and debriefing system (ACADS), similar to that provided at the instrumented combat ranges, which will provide significant improvements in home base pilot training and performance.

This Program Element also responds to Congressional and Department of Defense (DoD) mandates to update and validate tests that screen and classify military recruits, including the advanced development of the Armed Services Vocational Aptitude Battery (ASVAB), the DoD selection and classification instrument for all enlisted applicants for the Armed Forces. Air Force efforts to improve the ASVAB and produce new forms of the ASVAB are directed, in part, by a joint-Service steering committee of General Officers. Similarly, efforts to develop computerized testing techniques, for eventual use at Military Enlistment Processing Stations, are coordinated with the other Services. Air Force responsibilities lie principally in developing test items suitable for computer implementation.

Increased complexity of Air Force systems and rapidly changing technology requires development and application of advanced training system technologies for maintenance and support personnel to ensure success in combat operations. Efforts will focus on applications of computers and artificial intelligence to training, performance measurement and job aiding, including development of intelligent computer-assisted training, performance measurement, and job aiding, including development of intelligent computer-assisted training and low-cost, stand-alone training devices to support tactical, strategic, and

space-related missions.

This consolidated Program Element, 63227F, consists of all Projects (except 3057, PE 63751F) formerly from Program Elements 63227F, 63704F, and 63751F. Consolidation of these formerly separate, but related, Program Elements has been accomplished to meet Congressional Direction to reduce the number of Program Elements.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) improved aircraft simulation image generation and display systems, (b) improved tests for selecting, classifying, and assigning quality personnel to jobs, (c) improved technical training systems to increase the efficiency and productivity of personnel, and (d) improved estimations of manpower, personnel, and training requirements for improved weapon system design and support.

Development of improved display technologies will provide more adequate visual scenes for combat mission training. Development of the combat mission trainer (CMT) will enable realistic, large-scale, joint-Service combat training exercises.

Development of ACADS will provide performance feedback similar to that provided at the instrumented combat ranges for all combat training profiles, without the restrictions or costs associated with the ranges.

Development and validation of selection and classification tests such as the ASVAB will lead to more accurate selection and classification of individuals and will ensure an improved match of individual aptitudes and job requirements.

FUTURE DIRECTIONS:

In the future, complex, multisensor, multicockpit, combat mission training flight simulators will be developed. These will then be refined into lower cost preproduction prototypes for use in operational training.

PROJECT OVERVIEW

		87	88
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PROJECT: 2363	ADVANCED VISUAL TECHNOLOGY SYSTEM	\$ 1.4M	\$ 2.2M
PE: 63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

PROJECT SYNOPSIS:

The objective of this Project is to develop technology to advance the state-of-the-art in visual simulation technology and demonstrate the utility of this technology for critical Tactical Air Force (TAF) training requirements.

The Advanced Visual Technology System (AVTS) represents a two-pronged approach toward this objective. One effort has developed an advanced 10-channel computer image generation (CIG) system with enhanced scene detail and complexity. Another effort will develop an advanced prototype, wide FOV, high-resolution, and high-brightness visual display. These capabilities are needed to enable detection and identification of tactical size targets at ranges sufficient for realistic training.

The combination of the advanced CIG and visual display systems will produce a research simulator which will be adequate to demonstrate and define behaviorally the TAF simulator design requirements. Some simulator visual design issues to be evaluated on both training and cost effectiveness are: edge and circle feature density and utilization, texturing, point feature density, object spacing and use, general database complexity and data requirements, maximum range for cue generation, shadows and brightness gradients, planar versus non-planar terrain, edge smoothing, area of interest implementation (for fine detail), display persistence, geometric distortion, inter-channel mismatch, and disparities between visual displays and other cockpit displays (e.g., sensor, radar, etc.).

In FY 87, the LFOV (limited field-of-view) dome display system will be equipped with an F-16A cockpit to produce a flight simulator for evaluating the training effectiveness of current technology. In FY 87 through FY 89, training effectiveness issues to investigate are: (a) simulator fidelity questions (such as the required field-of-view, display resolution, image brightness and image contrast), (b) image generator scene content, (c) gaming area data base accuracy requirements, (d) target model fidelity requirements, and (e) the most effective use of color in flight simulator training.

In FY 88, a major new hardware effort is the development of the next generation full field-of-view (FFOV) dome visual display system, a \$10 Million, three-year effort, jointly funded by the Aeronautical Systems Division (Project 2325, PE 64227F). Current FFOV dome displays suffer from limited resolution and brightness and use target tracked insets (a small, higher resolution area centered on the target which moves as the target moves). They are thus limited to simulating air-to-air combat. The object of this new development is to exploit current head- and eye-tracking techniques to project a high resolution area of interest inset wherever the pilot is looking within the dome. This will provide high detail scenes to the pilot which are suitable for both air-to-air and air-to-ground simulation, without generating false cues of target location, as occurs with target tracking insets.

The Advanced Visual Technology System (AVTS) image generator and the Fiber-Optics Helmet-Mounted Display (FOHMD) have been transferred to Project 2743, Aircrew Combat Mission Enhancement (ACME), for integration into the ACME testbed complex.

By FY 89, installation and integration of the FFOV dome will be completed, and training effectiveness evaluations will begin in FY 90.

PAYOFF/UTILIZATION:

The payoffs of this Project include advanced visual display technologies and capabilities to meet the very demanding simulator training requirements of the TAF.

This Project previously contained work on the demonstration and evaluation of an eye-slaved, high-resolution image inset capability for the fiber-optic, helmet-mounted display (FOHMD), as well as refinements to make the FOHMD lighter and stronger. It also developed and evaluated an advanced computer-image generation (CIG) system for the Advanced Simulator for Pilot Training (ASPT).

From 1981 to 1986, this Project has produced: (a) the country's most advanced computer image generator for flight simulation, which includes an advanced texturing capability (Cell Texturing) that significantly increases scene detail, complexity and realism, (b) a prototype Fiber-Optics Helmet-Mounted Display, which uses lightweight optics to present the computer-generated image on glass plates directly in front of the pilot's eyes, and (c) a 24-foot diameter limited field-of-view (LFOV) dome visual display system.

PROJECT OVERVIEW

	87	88
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PROJECT: 2364	TRAINING AND PERFORMANCE DATA CENTER \$ 0.4M \$ 0.4M	
PE: 63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY	
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objective of this Project is to provide the annual Air Force portion of the funding for the joint-Service, Defense Training and Performance Data Center (TPDC), formerly the Defense Training Data and Analysis Center (TDAC).

TPDC was established in FY 84 by the direction of the Office of the Secretary of Defense (OSD), as a result of the 1983 OSD Steering Committee on Training and Training Technology. TPDC is the OSD focal point for training technology and management information and will collect available training data to design, analyze, and integrate training data based in support of the entire Department of Defense training community.

PAYOFF/UTILIZATION:

The payoff of this Project is improved collection and availability of training data in the Department of Defense training community.

PROJECT OVERVIEW

	87	88
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PROJECT: 2557	ADVANCED ON-THE-JOB TRAINING SYSTEM (AOTS)	\$ 1.9M \$ 2.1M
PE: 63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objectives of this Project are to develop, implement and test a prototype state-of-the-art training system that integrates and effectively manages, evaluates, and automates job site training.

Approximately 70 percent of Air Force technical training is accomplished by on-the-job training (OJT). More than 50 percent of all enlisted members of the Air Force are undergoing OJT at any one time. However, the system has not been significantly changed since its inception almost 40 years ago. Currently, OJT is labor-intensive, limited by excessive administrative burdens, and is not responsive enough to unique job-site training requirements.

The Advanced On-the-Job Training System (AOTS) will be implemented and demonstrated for four Air Force specialties at Bergstrom AFB, TX in cooperation with Tactical Air Command (TAC). This program complements other Air Force maintenance and logistics automation initiatives.

In FY 87, the major part of the development for the AOTS subsystems will be completed, training requirements will be identified, and job/task data will be assessed. Master task lists for four Air Force specialties will be written and a methodology for third party performance evaluation, including criteria for task evaluation, will be developed.

In FY 88, efforts will focus on the integration of the AOTS subsystems, as well as the requirements associated with maintenance, reliability, logistics, and transition of the system. During the fourth quarter of FY 88, the operational test and evaluation (OT&E) will begin.

In FY 89, the OT&E will be completed and the prototype system will be transferred to the Tactical Air Command. Throughout AOTS development, incremental products will be provided to HQ USAF for evaluation and implementation Air Force-wide.

This Project was transferred from PE 63751F at the end of FY 87.

PAYOFF/UTILIZATION:

The payoffs of this Project include increased on-the-job (OJT) effectiveness and training quality, thereby increasing individual and unit productivity and readiness in peacetime and combat capability in wartime.

In FY 86, total system hardware and software specifications were developed and concurrent development of the AOTS subsystems began.

PROJECT OVERVIEW

	87	88
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PROJECT: 2743	\$ 2.4M	\$ 4.5M
	AIRCREW COMBAT MISSION ENHANCEMENT	
PE: 63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objective of this Project is to advance tactical flight simulation by demonstrating and evaluating technologies for realistic tactical combat mission training and combat mission planning and mission rehearsal.

These demonstrations and evaluations will help define simulator requirements to meet critical Tactical Air Force (TAF) needs. This effort has primarily used surplus simulation subcomponents from the Boeing B-52 Weapon System Trainer and visual display systems already at the Air Force Human Resources Laboratory, Operations Training Division (AFHRL/OT).

This Project will develop a test bed Combat Mission Trainer (CMT) to serve as the primary tool for aircrew combat mission training R&D and as a way to integrate future ACME (Aircrew Combat Mission Enhancement) components for evaluation. The test bed will be developed in three phases: (a) Phase I (FY 87-89) will develop a single ship combat mission trainer with full visual, but limited threat and sensor capability, (b) Phase II (FY 89-91) will add a second cockpit to provide a minimum two-ship capability, and (c) Phase III (FY 91-93) will add full multi-sensor (radar, infrared, and visual) and realistic threat and weapon simulations.

To support the development of the CMT test bed, the Advanced Visual Technology System (AVTS) image generator will be upgraded to provide full feature textured visual and sensor capabilities and a 60-Hertz update rate for two interactive cockpits. These upgrades began in FY 86 (in Project 2363) and will be completed in FY 89.

Beginning in FY 87, the instantaneous field-of-view for the Fiber Optic Helmet Mounted Display (FOHMD) will be increased to 180 degrees horizontally by 80 degrees vertically, providing a field-of-view similar to that available with current flight helmets. The upgraded FOHMD will be completed in FY 88, integrated into the Phase I CMT testbed and demonstrated in FY 89.

In FYs 87/88, a distributed microprocessor and instructor operator station will be developed as components of the CMT test bed. The distributed microprocessor will replace the super minicomputers now used to handle the host computer functions of the simulator, while the instructor operator station will provide the capability to manage two-ship tactical training in a multi-sensor, high threat environment.

In FY 87, a joint effort with the Defense Advance Research Projects Agency (DARPA) will develop the specifications for a network of low cost tactical flight simulators to allow realistic large scale force on-force combat tactical training (WARNET). WARNET will expand on the Army/DARPA SIMNET and AIRNET efforts, which are developing a similar network for the Army armor and helicopter simulators by adding Air Force tactical combat simulators to the network, allowing low-cost, realistic, joint-Service combat training exercises.

In FY 88, joint efforts with the Air Force Wright Aeronautical Laboratory's Avionics Laboratory (AFWAL/AA) will explore two alternative approaches to the development of a Miniaturized Real-Time Computational System (MRTCS) by modifying the Airborne Graphics Generator and/or the Common Signal Processor (which incorporates Very High Speed Integrated Circuit (VHSIC) technology) for use in ground-based flight simulators. The goal of the MRTCS effort is to develop a low-cost, 'filing cabinet drawer-sized,' single-channel, miniaturized image generator which would support squadron level combat mission flight training.

In FY 88, a joint effort with the Rome Air Development Center will determine the requirements for digital cartographic data to support combat mission rehearsal and mission planning.

In FY 89 and beyond, activities will focus on defining the relation between the training value and CMT complexity, as well as expanding simulation technology to directly address mission rehearsal and mission planning activities.

PAYOFF/UTILIZATION:

The payoff of this Project involves the advancement of flight simulation concepts through the development of advanced training technologies for tactical aircraft, using multisensor, multicockpit combat mission simulators with advanced display capabilities.

This application of advanced simulator technologies at both training center and operational unit levels will lead to improved sustained aircrew readiness. It will significantly extend the range of training tasks that can be successfully accomplished in simulators.

In FY 85, the helmet-mounted display work was transferred from this Project to Project 2363 to consolidate all of the display-related efforts. In FY 87, this effort was transferred back to Project 2743 for further development.

During FY 86, efforts included determining the engineering feasibility and the component requirements, and determining the development approach for the CMT.

PROJECT OVERVIEW

	87	88
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PROJECT: 2922	PERSONNEL ASSESSMENT SYSTEMS	\$ 0.8M \$ 0.8M
PE: 63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY	
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objectives of this Project are to: (a) provide technology to enable the Air Force to meet its manpower needs for combat readiness and sustainability, (b) develop systems to provide management information on individual job performance and requirements, (c) use task-level measures of on-the-job performance to develop criterion measures to validate selection, classification and promotion tests and assess training effectiveness (as mandated by Congress), and (d) revise tests such as the Air Force Officer Qualifying Test (AFOQT) and the Armed Services Vocational Aptitude Battery (ASVAB).

As the DoD Executive Agent for ASVAB development, the Air Force must update and revise the ASVAB to ensure that it meets the needs of all the Services.

In FYs 87/88, it is planned to: (a) analyze the job performance data collected on three job specialties: Air Traffic Controller, Avionic Communications Specialist, and Ground Radio Operator, (b) develop, test and analyze job performance measures for four additional specialties, and (c) continue developing new prototypes for both the enlisted and officer selection test batteries. Future efforts will explore possible computer-based, computer adaptive approaches to officer selection and classification. Development, evaluation, refinement, and application of performance measures will also continue, as well as their validation/evaluation and cost-benefit analyses.

In FY 89, a new system for selecting pilots for fighter/attack/reconnaissance or multi-engine heavy aircraft will be delivered for field use. Also, job performance measures will be developed for eight additional specialties.

This Project was transferred from PE 63704F at the end of FY 87.

PAYOFF/UTILIZATION:

The payoff of this Project is technology to enable the Air Force to meet its manpower needs for combat readiness and sustainability and to measure individual job performance through: (a) replacement of test batteries, thus avoiding obsolescence and test compromise, and incorporation of improvements identified in ongoing service test research programs, (b) continuation of test revisions (e.g., ASVAB) and validation against performance measures, as mandated by Congress, and (c) development of measures for validation of enlisted selection and promotion tests to reduce the risk of civilian class-action suits against the government, resulting in potential cost avoidance of approximately \$2.5 Million per year.

In FY 85, accomplishments included: (a) completion, evaluation, and field testing of a prototype job performance measurement system for one Air Force enlisted specialty, (b) initial development of additional enlisted specialty measures and modification of the measurement technology for use with officer

specialties, and (c) initial validation of the high school version of the ASVAB to provide data for counseling of high school seniors as potential recruits for the Armed Services.

In FY 86, job performance measures for four Air Force specialties were developed. The measures for Jet Engine Mechanics were tested and analyzed, and the data was transferred to the Navy and Marine Corps. Also, data collection began for three other specialties: Air Traffic Controller, Avionic Communications Specialist, and Ground Radio Operator.

PROJECT OVERVIEW

	87	88
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PROJECT: 2949	\$ 0.5M	\$ 0.6M
PE: 63227F		
CONGRESSIONAL CATEGORY:		
DoD ORGANIZATION:		
RESPONSIBLE ORGANIZATION:		

BASIC JOB SKILLS
ASSESSMENT AND
ENHANCEMENT

PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY

CONGRESSIONAL CATEGORY:

EDUCATION & TRAINING

DoD ORGANIZATION:

AF

RESPONSIBLE ORGANIZATION:

AIR FORCE HUMAN RESOURCES LABORATORY

PROJECT SYNOPSIS:

The objective of this Project is to develop and demonstrate an adaptive training system focusing on the basic functional and enabling job skills (the core knowledge content, such as literacy, arithmetic computation, dial and map reading) and associated thinking processes that enable early technical proficiency and thus bring the first-term airman to a functional level faster.

Of particular interest are the skills required in workplaces heavily influenced by technology. This training system, incorporating data collected in Program Element 62205F on the intellectual requirements of various jobs and workplaces.

Another effort within this Project will provide a top-down, structured approach to system redesign and reprogramming to make the Comprehensive Occupational Data Analysis Programs (CODAP) system more efficient, easier to maintain, and more user-friendly. CODAP, the primary operational Air Force occupational analysis tool, is rapidly becoming antiquated and difficult to maintain.

In FY 87, a series of advanced development tasks will begin to develop a prototype occupational measurement system with advanced task and job clustering capabilities and automated job typing procedures.

In FY 88, software development for the occupational measurement system will be completed. Work will begin on the development of training modules for 125 Air Force specialties, and specifications for training effectiveness evaluation and validation will be completed. Comprehensive training implementation plans will also be completed.

In FY 89, development of a basic job skills extended job family trainer for 12 Air Force Specialties will be completed and tested. Operational test and evaluation of the prototype occupational measurement system will begin.

This Project was transferred from PE 63704F at the end of FY 87.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) a reduction in the number of marginal performers, and (b) reduced overall on-the-job training time. Savings from reduced attrition could reach as much as \$10 Million per year.

Air Force decision makers will be provided with scientifically valid, job-oriented, measurement and training, to ensure that airmen possess the basic job knowledge and skills needed to perform and progress satisfactorily during the first term of enlistment.

The original CODAP system has resulted in an estimated cost avoidance of over

\$3 Million per year since its implementation in FY 68. Benefits of the updated CODAP include: (a) state-of-the-art analytical, statistical, and reporting procedures, (b) techniques for longitudinal analyses of job content, (c) techniques for developing more job-related enlisted promotion tests, and (d) techniques for matching weapon system acquisition tasks with related personnel skill requirements.

In FY 86, initial building of instructional modules for identified job prerequisites began, as did the development of specifications for evaluating training effectiveness which will be validated against job performance.

PROJECT OVERVIEW

	87	88
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PROJECT: 2951	TRAINING DECISIONS SYSTEM\$ 0.2M	\$ 0.2M
PE: 63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY	
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objective of this Project is to develop a computer-based system which will help optimize training decisions for Air Force specialties. It will establish the basis for management decisions on what to train, where to train, and when to train.

Because of the scope of Air Force technical training, many decisions with major impacts on training are made, to some extent independently and at different times, by management units responsible for different parts of the training and personnel systems. Coordinating such efforts is complex, and relevant data are not always available at key decision points when they are needed. For example, the content of resident technical school training is largely determined by predefined budgets; whatever content is not covered in the school is left to on-the-job training (OJT), without systematic appraisal of long-term costs or unit capacities for an increased loan on OJT resources.

In FY 87, design specifications will be completed.

In FY 88, advanced development of the Training Decisions System (TDS) will begin.

This Project was transferred from PE 63704F at the end of FY 87.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) reduced training costs, (b) improved allocations of training content and resources, (c) demonstrably better alignment of training content with job task requirements, and (d) reduced training workload on operational Air Force units. When operational, projected total savings plus cost avoidance are expected to be very high.

In FY 85, accomplishments included development of initial specifications for the advanced TDS, detailing the transition stages, operational resource requirements, and recommended delivery schedules, organizational lines of authority, and technical functions of the operating subsystems.

PROJECT OVERVIEW

	87	88
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PROJECT: 3056	AIR COMBAT ASSESSMENT AND DEBRIEFING SYSTEM \$ 0.0M \$ 0.0M	
PE: 63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

PROJECT SYNOPSIS:

The objective of this Project is to design, develop, demonstrate, and evaluate a prototype air-to-air and air-to-ground attack performance measurement and debriefing system for use at the squadron level.

The system will include a recording device to monitor and record flight parameters on-board the aircraft, a data link between aircraft to share positional and threat information, and a ground-based processing system for performance analysis and replay for training evaluation. This will enable the implementation of missile fly-out models for real-time kill assessment. This type of objective performance evaluation for flight operations is currently available only at a limited number of fixed dedicated ranges with instrumentation. Deployment to these ranges is costly and access is limited.

In FY 87, it is planned to begin developing a breadboard system for a flight of four F-16 aircraft.

In FY 88, it is planned to begin demonstrations and evaluations of the individual components, including the data recording capability and real-time performance assessment.

In FY 89, component integration and system testing will begin.

This Project was transferred from PE 63751F at the end of FY 87.

PAYOFF/UTILIZATION:

The payoff of this Project will be a prototype air-to-air, air-to-ground attack performance measurement and debriefing system to provide a training capability for routine local area training missions at considerably reduced costs to the Air Force.

PROGRAM ELEMENT OVERVIEW

PE: 63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY
CONGRESSIONAL CATEGORY:	HUMAN FACTORS
DoD ORGANIZATION:	AF
FUNDING:	FY87 \$ 6.8M (FY88 PRESIDENT'S BUDGET) FY88 \$ 7.5M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of the Manpower, Personnel and Training (MPT) portion of this Program Element is to provide advanced development and demonstration of concepts to protect and extend the performance of the crewmember in the hazardous aerospace environment.

Weapons system development has reached the point where the operator may become the limiting factor in total system performance and mission success. The performance envelope of the weapons system, extreme aerospace environments, and combat threats can exceed the protective capabilities of life support systems, limiting operations and placing severe physical demands on the operator. Information available concerning the status of the weapons system and mission is so complex and fluid that it can exceed the operator's ability to perceive, decide, and act upon the information. Modern aircraft tactics and mission scenarios continually place the operator in environments from which there is low probability of successfully ejecting in an emergency. Work under this Program Element will demonstrate the capability to operate and escape at the extremes of the performance envelope and will develop a methodology to maximize decision-making by the system operator. The program focus is on the crewmember in the cockpit or crew station but logically extends to other air and ground personnel conducting mission-essential operations and support. Recently incorporated efforts on chemical warfare defense ensure integrated consideration of this serious threat to the spectrum of aerospace operations. Supporting many system development programs and over fifteen formal Statements of Need on specific requirements from Headquarters Air Force and Major Commands, the emphasis of this Science and Technology effort remains on total personnel protection and improved performance of human-centered systems to support mission accomplishment.

These technology development programs have evolved out of exploratory development with Program Element 62202F (Aerospace Biotechnology) and represent a key link to the demonstration of technologies prior to full-scale development through Program Element 64706F (Life Support Systems), Program Element 64703F (Aeromedical/Chemical Defense Systems), Program Element 64601F (Chemical/Biological Defense Equipment) or engineering program offices. Products are provided to Aeronautical Systems Division, Aerospace Medical Division, Electronic Systems Division, Space Division, and other organizations in accordance with well-coordinated, signed technology transition agreements. Joint planning and participation in steering groups assure compatible phasing of total weapon system development goals.

Projects 2830 (Advanced Life Support Systems) and 2868 (Crew Escape Systems Technology), though still under this Program Element, are no longer considered to be within the Manpower, Personnel and Training Research and Development area. Project 2992 (Space Crew Enhancement), formerly under Program Element 63365F (Space Biotechnology), has been transferred to this effort in FY 86.

In FY 87, it is planned to: (a) focus core efforts in Cockpit Automation Technology (CAT) process development, and (b) develop human factors performance definitions and design criteria applicable to demonstrating military crew stations for advanced aerospace systems, such as the National Aerospace Plane (NASP).

In FY 88, it is planned to: (a) produce a fully-developed design process for CAT, a computer-aided system for real-time testing of new design concepts, and a fighter cockpit specification, (b) evaluate space suit modification contract, and (c) conduct aircraft tests of the visual acquisition and tracking system.

In FY 89, it is planned to: (a) continue system demonstration on the CAT, (b) demonstrate the visual acquisition tracking system and evaluate its utility in space operations, (c) continue to develop specifications and subsystems for military space suits, and (d) continue to incorporate crew station design criteria and advanced control/display technologies into required military-unique systems.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include advances in crew systems technology which will increase aircrew performance and protection in the hazardous aerospace environment.

Maximizing the decision-making ability and performance of, and sustaining and protecting, pilots and aircrews is vital for maintaining a combat-effective aeronautical force. The inability of the system operator to sufficiently perceive, decide, and act upon information and many other mental and physical demands may diminish aircrew performance, endanger aircrew safety, or decrease survivability. These limit, or preclude the successful use of, a pilot's tactical skills in combat situations and, ultimately, the potential for combat mission success. Work under this Program Element will result in the reduction or elimination of such threats and limits.

FUTURE DIRECTIONS:

Future work under this Program Element will lead to further development of needed tools and methodologies to extend air/aerospace crews' performance in hazardous and complex combat scenarios. The development and evaluation of advanced life support equipment, escape systems technology, and aircrew performance-extending technology, will continue towards the goal of assuring maximal air and aerospace crew survivability and combat mission success.

PROJECT OVERVIEW

		87	88
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PROJECT: 2829	COCKPIT AUTOMATION TECHNOLOGY (CAT)	\$ 6.2M	\$ 6.5M
PE: 63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AEROSPACE MEDICAL DIVISION		

PROJECT SYNOPSIS:

The objective of this Project is to develop and verify the necessary quantitative tools and procedures to permit the extensive application of human factors principles early in the development cycle of manned aerospace vehicles.

Currently, there is no structured process for allocating functions between the airborne crew members and the automated systems, the crew complement, the appropriate display of information for crew members, and solutions to control workload. This program aims to reduce system program costs and risks currently associated with numerous cockpit engineering change proposals and retrofits by setting up a coordinated weapon system design process which permits quantifiable trade-offs between airframe, avionics, and cockpit design in advance of full-scale development decisions and which provides insight into the consequences of potential subsequent modifications to avionics and weaponry.

Resultant military standards, design handbooks and computer-assisted procedures will be available to the military services, NASA and contractors.

In FY 87, it is planned to: (a) focus core efforts in CAT process development, (b) intensively evaluate analytical and empirical tools from Phase I and combine them into a structured process for crew station development, (c) develop a computer-aided design support system, and exercise the CAT methodology through designing a representative fighter cockpit, (d) define the baseline design, apply mission analyses, and evaluate automation concepts, (e) develop a design lessons-learned database, from which a complete audit trail of design decisions will evolve, (f) accomplish systems engineering, test planning, and transition preparation.

In FY 88, it is planned to: (a) complete Phase II, which will produce a fully developed design process, a computer-aided system for real-time testing of new design concepts, and a representative fighter aircraft cockpit specification, (b) perform analytical and part-task simulations to test measures of effectiveness for the designed cockpit, (c) conduct full-mission ground-based simulations, with participation by Air Force crews, to verify the design process while demonstrating adequacy of the representative cockpit design, (d) use a reconfigurable breadboard cockpit simulator for gathering empirical design data, and (e) begin work on concepts and quantitative methods for further design validation through the potential comparison of simulator results to crew/cockpit in-flight performance.

In FY 89, it is planned to: (a) continue Phase III, system demonstration, as the CAT design process is refined based on part-task and part-mission simulator tests, (b) revise and fully document software analysis programs into proposed automation design guides, (c) interface the breadboard cockpit simulator with the computer-aided design support system, and configure a full-mission simulator for validation testing, (d) begin transition training for DoD system acquisition personnel to use the developed process, and (e)

hold design reviews for data acquisition hardware appropriate for in-flight measurements to support the design process.

In accordance with signed agreements, CAT products and the fighter cockpit specification are provided to the Advanced Tactical Fighter System Program Office for ATF development, as well as the Aeronautical Systems Division Engineering for incorporation into the Air Force cockpit qualification process. A technology bonus has been the CAT mission scenarios, which have already been applied by more than twenty other joint-Service and government development programs.

PAYOFF/UTILIZATION:

The payoffs of this Project include the publication and distribution of military standards, design handbooks, and extensive computer-assisted procedures to the military services, National Aeronautics and Space Administration (NASA), and contractor for use early in the design process to determine the cost-effective design of aircrew training needs.

The early application of this crew system design process will reduce system program costs and risks associated with engineering change proposals and retrofits stemming from the limited design insight available from currently used techniques. For the first time, a coordinated weapon system design process which permits trade-offs between airframe, avionics, and cockpit design will be possible in advance of Full-Scale Development (FSD) decisions. It will also provide insight into the adequacy of the design after potential downstream avionics and weaponry modifications.

In FY 86, accomplishments included: (a) completing Phase I, system definition, (b) application of prototype design processes to an analysis of four automation concepts (e.g., automatic target designation) and evaluation using such measures as crew workload and simulated-combat performance with the CAT mission scenarios, (c) demonstrating analytical software for crew station architecture, man-machine function allocation, and task timeline analysis, (d) awarding of dual cost-share contracts for competitive 24-month efforts on program Phase II, design process development, and (e) providing detailed requirements for hardware and software.

PROJECT OVERVIEW

	87	88
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PROJECT: 2992	\$ 0.7M	\$ 1.0M
PE: 63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY	
CONGRESSIONAL CATEGORY:	HUMAN FACTORS	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AEROSPACE MEDICAL DIVISION	

PROJECT SYNOPSIS:

The objective of this Project is to address man-machine integration and crew protection systems needed to exploit or enhance man's ability to support traditional military missions from space.

This effort supports the Air Force policy to ensure that unique capabilities derived from man in space are used to enhance existing and future missions in the interests of national security objectives. To ensure effectiveness of military space-related systems, whether ground-based or space-based, human engineering concepts must be employed to optimize performance of the integrated man-machine system. This program will help define man's potential roles in military space systems, as well as quantify the trade-offs of manned versus unmanned space systems to support tasks such as logistics and surveillance. It will demonstrate concepts and technologies to ensure life support, crew performance, and crew protection in the complex and potentially hazardous environment unique to military space systems. A specific area of near-term interest includes technologies to support and enhance crew effectiveness in the development and deployment of a transatmospheric vehicle, which has potentially different launch and egress response times, flight durations, acceleration profiles, and performance characteristics, or operator workload and task requirements than the space shuttle.

In FY 87, it is planned to: (a) develop human factors performance definitions and design criteria applicable to demonstration of military crew stations for advanced aerospace systems, such as the National Aerospace Plane (NASP), (b) develop and demonstrate prototype pressure suit modifications, (c) coordinate with NASA on in-helmet displays, and begin work to define system specifications for enhanced radiation protection appropriate for polar orbit missions, and (d) evaluate the visual acquisition tracking system for further development and demonstration based on user requirements and priorities.

In FY 88, it is planned to: (a) evaluate transition products from the initial space suit modification contract, as concept studies are conducted for further modifications, (b) conduct initial aircraft tests of the visual acquisition tracking system, and (c) begin work on military-unique features of helmet-mounted displays for presenting logistics data to spacesuited crewmembers during extravehicular activity.

In FY 89, it is planned to: (a) demonstrate the visual acquisition tracking system, which will lead to an evaluation of its utility in space operations, (b) continue to develop specifications and subsystems for military space suits, to include provisions for shorter egress times, improved logistics supportability, advanced in-helmet displays and increased radiation protection, (c) continue to incorporate crew station design criteria and advanced control/display technologies into required military-unique systems, and (d) ensure clear definition of user requirements and well-coordinated product transitions.

This Project was transferred from Program Element 63365F (Space Biotechnology) to Program Element 63231F (Crew Systems Technology) in FY 86.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) a definition of man's potential roles in military space systems, including his ability to successfully perform projected military missions, (b) an analysis of the trade-offs of manned versus unmanned space systems, (c) technologies, in the near term, to support and enhance crew effectiveness in the development and deployment of a transatmospheric vehicle with potential different launch and egress response times, flight durations, acceleration profiles, performance characteristics, and operator workload and task requirements than the space shuttle, and (d) in the long term, the design of effective future systems, optimally utilizing man's abilities, and of subsystems to protect man and further extend the system's capabilities.

In FY 86, accomplishments included: (a) the collection of vision data under Program Element 62202F, Aerospace Biotechnology, which was used to evaluate the feasibility of an optical acquisition and tracking system for space-based surveillance, (b) identification of crew performance and protection concerns for the National Aerospace Plane (NASP), (c) initiation of a contracting effort in coordination with the National Aeronautics and Space Administration (NASA), to develop enhanced mobility modifications in an advanced near-space or transatmospheric pressure suit for non-extravehicular activity environments, (d) continued extensive government coordination, and forwarding of a report to Congress placing this Project within a crew systems technology context, and (e) coordination of user requirements and technology transition with the Space Command, Space Division, and the NASP Program Office.

PROGRAM ELEMENT OVERVIEW

PE: 63751F	TRAINING SYSTEMS TECHNOLOGY
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES
DoD ORGANIZATION:	AF
FUNDING:	FY87 \$ 0.0M (FY88 PRESIDENT'S BUDGET)
	FY88 \$ 0.3M (FY88 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to develop cost-effective advanced technical training systems to increase the efficiency and productivity of Air Force personnel.

The Air Force must continuously train large numbers of new and experienced personnel in a wide variety of skills to operate and maintain increasingly complex weapons and support systems. This places increasing demands on the training community for both formal school and on-the-job training (OJT).

Work under this Program Element will develop systems specifications for the Intelligent Computer-Assisted Training (ICAT) system for application to various training environments.

Projects 2362, 2557, and 3056 under this Program Element transferred to PE 63227F at the end of FY 87. Due to an administrative error, Project 3057 has not yet been transferred.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) reduced training workload, (b) increased effectiveness of instructional simulations, and (c) increased training performance without the need for increased manpower for training.

This methodology will be especially amenable to high-flow career fields, high technology environments, and the complex training requirements anticipated for space related technologies.

FUTURE DIRECTIONS:

In FY 90, full-scale development of the Intelligent Computer-Assisted Training (ICAT) system will begin, with demonstrations and evaluations beginning in FY 91.

PROJECT OVERVIEW

PROJECT: 3057	INTELLIGENT COMPUTER-ASSISTED TRAINING	87 ----- \$ 0.0M	88 ----- \$ 0.3M
PE: 63751F	TRAINING SYSTEMS TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

PROJECT SYNOPSIS:

The objective of this Project is to develop systems specifications for Intelligent Computer-Assisted Training (ICAT) in various training applications where payoff promises to be high, and to identify technology demonstrations for these applications.

ICAT differs from current conventional computer-assisted instruction in that the "intelligent" system makes judgments about what the student knows and how well he or she is progressing. It tests those judgments, and it provides appropriate instruction or assistance automatically, i.e., without the need for human instructor intervention. In effect, the training system acts as a tutor, not just a training delivery device.

Rapidly changing technology and the increasing complexity of weapon systems are vastly increasing Air Force training requirements while training resources remain relatively fixed. This requires the Air Force to rely more heavily upon on-the-job training and more efficient methods of training, such as computer-based training. This is especially true in areas that require high levels of training, such as space shuttle launch and control, space vehicle tracking, and space operations.

In FY 88, a comprehensive review and evaluation review of the status of ICAT technology and state-of-the-art microcomputer engineering will lay the foundation for training development and delivery.

In FY 89, the initial software design and development of specifications for the prototype test bed will begin. The design will include development of interactive design tools for course developers, and modeling to allow for adaptation of training delivery for multiple instructional environments, differences in student ability, differences in instructional presentation, and automated expertise capturing systems.

This Project was scheduled to transfer to PF 63227F at the end of FY 87; due to an administrative error, it has not yet been transferred.

PAYOFF/UTILIZATION:

The payoff of this Project is the reduction of training workload, an increase in the effectiveness of instructional simulations, and an increase in training performance, without the need for increased manpower for training.

When completed, this program will provide field demonstrations of intelligent computer-assisted training applications and guidelines for expanded use. This moderately high-risk, five-year program is designed to capitalize on the advances in intelligent computer-aided instruction and personal computer engineering. It will focus on cost effective, efficient delivery of training.

PROGRAM ELEMENT OVERVIEW

PE: 64227F

FLIGHT SIMULATOR DEVELOPMENT

CONGRESSIONAL CATEGORY:

SIMULATION & TRAINING DEVICES

DoD ORGANIZATION:

AF

FUNDING:

FY87 \$ 96.4M (FY88 PRESIDENT'S BUDGET)
FY88 \$ 61.7M (FY88 PRESIDENT'S BUDGET)-----
PE SYNOPSIS:

The objective of this Program Element is to provide for engineering development of aircrew flight simulator techniques and training devices.

This Program Element funds efforts to: (a) adapt flight simulation technology developed in the laboratories and industry for satisfying current training requirements, and (b) develop prototype training devices. Prototype training devices and subsystems developed under this Program Element will be evaluated for training effectiveness and supportability prior to follow-on production decisions and/or acquisition.

The FY 85 Budget was the first in which flight simulator programs were consolidated into this Program Element to enhance control and visibility within the Air Force, the Office of the Secretary of Defense (OSD), and Congress.

The Deputy for Simulators, Wright-Patterson Air Force Base, Ohio, is the in-house organization responsible for the majority of this Program Element. This Program Element (PE) relies heavily on the Air Force Human Resources Laboratory science and technology programs, including PE 62205F, Training and Simulation Technology, PE 63277F, Advanced Simulator Development, and PE 63751F, Innovations in Education and Training.

In FYs 87-89, work under this Program Element will include: (a) engineering development of training system technology techniques and preproduction of first article training devices to satisfy current and future training technologies, (b) updates to training systems to maintain and improve their supportability and effectiveness, (c) development of the GBU-15 Part Task Trainer, which is a low cost, ground-based device for training F-4E and F-111F Weapon System Operators in the GBU-15 and AGM-130 precision guided munitions, (d) development of the Low Altitude Navigation and Targeting Infrared System for Night (LANTIRN) simulator, (e) development of the LANTIRN Part Task Trainer, which will train pilots in LANTIRN (F-16, F-15E) switchology, modes of operation, and F-15E avionics, (f) development of a standard DoD digital database that uses Defense Mapping Agency data for displays for aircrew training, (g) development of training devices for B-1B crew members. (h) efforts in modular simulator design in order to deliver simulators to the field concurrently with the aircraft, (i) development of the KC-135 Operational Flight Trainer, which will accurately simulate the total aircraft flight envelope and meet Strategic Air Command's requirements for annual instrument evaluations, (j) development of the Advanced Training System, which will provide information presentation, demonstration, drill and practice, evaluation, feedback, and remedial training, (k) development of the Advanced Tactical Fighter training system, which will meet Manpower, Personnel and Training needs to support operations personnel assigned to the weapon system, and (l) development of the C-17 Aircrew training system, which will supply initial and continuation training for C-17 crew members.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) lower costs of training and greater training safety, efficiency, and effectiveness through adaptation of

flight simulation technology to today's complex aircraft (e.g., the F-4, F-15E, F-16, C-17, KC-135, C-130, and B-1B); (b) improved supportability and effectiveness of flight simulators in the field, (c) improved training for F-4E and F-111F Weapon System Operators on the electro-optical/infrared mission specifics, (d) reduced costs and improved deliverability of simulators through simulator modularity design and development of a Standard DoD simulator database that uses Defense Mapping Agency data for displays for aircrew training, (e) improved reliability and maintainability of both existing and planned flight simulators, (f) elimination of training deficiencies through provision of the Advanced Training System, and (g) improved support for operations personnel assigned to the Advanced Tactical Fighter (ATF) through the development of the ATF training system.

FUTURE DIRECTIONS:

This is a continuing Program Element for the development of aircrew flight simulator techniques and training devices.

Specific future efforts for FY 90 and beyond include: (a) attaining full operational status for the C-130 Aircrew Training System, (b) demonstration and validation of Modular Simulator Design, (c) integration of the LANTIRN with the F-16 Operational Flight Trainer, (d) exercising of production options for the remaining KC-135 Operational Flight Trainers, and (d) activation of the first site for the C-17 Aircrew Training System in FY 91, activation of the final site in FY 99, and contract termination in FY 2003.

PROJECT OVERVIEW

	87	88
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PROJECT: 2325	\$ 8.4M	\$ 6.9M
PE: 64227F	SIMULATOR DEVELOPMENT ACTIVITIES	
CONGRESSIONAL CATEGORY:	FLIGHT SIMULATOR DEVELOPMENT	
DoD ORGANIZATION:	SIMULATION & TRAINING DEVICES	
RESPONSIBLE ORGANIZATION:	AF	
	SIMULATION SYSTEM PROJECT OFFICE	

PROJECT SYNOPSIS:

The objective of this Project is to provide for the engineering development of training systems technology techniques and preproduction or first article training devices to satisfy current training requirements. It also: (a) addresses identified deficiencies in training capabilities, (b) improves concurrency between aircraft and flight simulators, and (c) reduces life cycle costs.

Approximately 40 unique tasks are being accomplished within this Project, including such efforts as: (a) radar sensor database development, (b) evaluation of the Synthetic Aperture Radar simulation application, (c) completion of engineering development and evaluation of a helmet-mounted visual display, (d) development of an authoring system for Computer-based Instructional Systems (CBI), (e) development of a generic trainer and other similar small part-task trainers as required, and (f) three promising applications to satisfy the requirement for a full field-of-view display system.

In FY 87, it is planned to: (a) continue development and evaluation of a user-friendly authoring language for the CBI, (b) conduct a visual sensor commonality study, (c) begin an evaluation of embedded training concepts for future programs, (d) evaluate state-of-the-art visual display systems for engineering acquisition specifications, and (f) evaluate an embedded training concept for future programs.

In FY 88, planned efforts include: (a) assessments of artificial intelligence (AI) for Instructor Operator Station (IOS) and CBI, (b) continued development of multi-cockpit IOS and initiation of multi-station IOS development, (c) continued evaluation of infrared and electronic combat simulation, and (d) beginning development of an embedded training prototype program for training/cost trade-offs analysis.

In FY 89, planned efforts are to: (a) continue AI research for IOS in support of complex tactical missions, (b) continue development of an embedded training prototype maintainability and reliability database, (c) complete the the full field-of-view visual system, (d) address a tactical simulator prototype for air-to-air/air-to-ground combat environments, and (e) begin development of a low cost image generator for sensor simulation.

Work tasks within this Project are based on Category II through IV cost estimates. It complies with Office of Secretary of Defense guidelines as follows: (a) provides data that will be used as generic building blocks in the development of new training devices, (b) develops sensor simulation for generic infrared and visual systems, and (c) is the only Project that addresses these requirements, and test and specification development, with an extensive framework developed for front-end analysis. The emphasis is on generic development for use on all simulator programs to reduce acquisition and life cycle costs, reduce acquisition time, and improve reliability, maintainability, and availability.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) lower costs and improved training effectiveness through the adaptation of flight simulation technology to today's complex aircraft, and (b) the flexibility to address generic technical problems to a wide range of simulator requirements and acquisition programs (i.e., database development, instructional systems, sensor simulation development, visual simulation development, handling qualities/training effectiveness, support, and configuration management).

In FY 86, accomplishments included: (a) completion of analysis of aircraft versus simulator handling qualities, (b) continued engineering development of a multiple IOS, (c) continued high resolution radar simulation development and advanced radar simulation test methodology, and (d) beginning development of a low cost visual system.

PROJECT OVERVIEW

	87	88
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PROJECT: 2632	B-52 OFFENSIVE AVIONICS STATION	\$ 5.0M \$ 0.0M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE	

PROJECT SYNOPSIS:

The objective of this Project is to support the development upgrade to incorporate various aircraft changes on the existing B-52 Weapon System Trainer Offensive Avionics Station (OAS).

This Project includes Block II updates of the on-board computer programs, strategic radar changes, the addition of the Common Strategic Rotary Launcher, as well as minor changes to the flight station.

The FY 85 Budget was the first in which flight simulator programs, including this Project, were consolidated into Program Element 64227F.

This is a category III cost estimate.

This Project was completed in FY 87.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) cost savings, (b) improved support abilities, and (c) improved effectiveness of B-52 flight training through an update to the B-52 Offensive Avionics Station.

PROJECT OVERVIEW

		87	88
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PROJECT: 2687	EF-111A OPERATIONAL FLIGHT TRAINER (OFT)	\$ 0.1M	\$ 0.0M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE		

PROJECT SYNOPSIS:

The objective of this Project is to develop an Operational Flight Trainer (OFT) for the Tactical Air Force to facilitate training of both pilots and electronic warfare officers in new missions and on unique equipment.

The requirements for this equipment are dictated by the absence of available training ranges in the free world, crew coordination requirements in varying mission profiles, and restrictions on peacetime flight which preclude realistic operation of electronic warfare equipment.

The OFT consists of a two-place simulator which provides a training environment for the EF-111 mission, including the capability of simulating the central European radar environment and all aircraft flight profiles.

The FY 85 Budget was the first in which flight simulator programs, including this Project, were consolidated into Program Element 64227F to enhance control and visibility within the Air Force, OSD, and Congress.

In FY 86, it is planned to: (a) continue unit one in-plant test until second quarter while system deficiencies are being corrected, and (b) accomplish initial operational test and evaluation in-plant before shipping the prototype unit to Mountain Home AFB, Idaho. Acceptance is scheduled to occur in August, 86.

In FY 87, development of the data package to support competitive Contractor Logistics Support in the outyears will be completed. Unit two will be assembled on site, tested, and accepted at RAF Upper Heyford.

This Project is completed in FY 87.

PAYOFF/UTILIZATION:

The payoff for this Project includes improved training for both pilots and electronic warfare officers in new missions and on unique equipment.

In FY 84, accomplishments included: (a) completion of the Critical Design Review, and (b) initiation of hardware and software integration.

In FY 85, total system hardware/software integration was completed. The production option for the second OFT was exercised in December 84, and in-plant Air Force development test and evaluation began in August 85.

PROJECT OVERVIEW

		87	88
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PROJECT: 2769	SIMULATOR UPDATE DEVELOPMENT	\$ 3.0M	\$ 7.0M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE		

PROJECT SYNOPSIS:

The objective of this Project is to update training systems to maintain and improve their supportability and effectiveness.

As flight simulator systems age and technology changes, these systems become increasing costly and difficult to support, typically due to non-availability of analog and first generation digital spare parts. Updates to these systems include: (a) digitization and upgrade of the C-135 Operational Flight Trainer (OFT), (b) development of a C-130 Aircrew Training System, and (c) replacement of the logistically unsupportable terrain model board visual system on the UPT-IFS (Undergraduate Pilot Trainer-Instrument Flight Simulator) with a computer generated image visual system.

In FY 87, it is planned to: (a) complete fabrication and testing of the T-5 electronic warfare simulator upgrade, (b) conduct design reviews, complete prototype fabrication, and begin in-plant testing for the computer replacement for the F-4 OFT, (c) exercise production options for the F-4 OFTs and UPT-IFS visual system, and (d) conduct source selection and award the contract for the C-130 Aircrew Training System (ATS).

The C-130 ATS develops the courseware, scheduling management, and evaluation tools needed to integrate current facilities, training devices, and operational equipment into a state-of-the-art training system. System development includes initial and continuation courses at Little Rock AFB, Arkansas, with a remote continuation capability at main operating bases. The system includes: (a) proficiency-based syllabus development, (b) automated daily scheduling of students, instructor pilots, aircraft and simulators, emphasizing the most needed training, (c) automated record keeping and evaluation, (d) computer-based instruction, and (e) structuring of the program to allow the Air Force Systems Command to conduct generically based research and development studies. The contractor will guarantee fully-qualified students in all aircrew positions.

In FY 88, the contractor will begin phasing in the ATS to replace Air Force maintenance and instructor personnel.

In FY 89, development will be completed and the prototype implementation fielded. This Project complies with OSD guidelines because it is an ongoing Project that will address the development of Total Contract Training for C-130 crews using best commercial practices.

PAYOFF/UTILIZATION:

The payoffs of this Project include improved supportability and effectiveness off light simulators in the field.

PROJECT OVERVIEW

	87	88
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PROJECT: 2851	\$ 3.0M	\$ 3.0M
	STANDARD DEPARTMENT OF DEFENSE (DOD) SIMULATOR DATA BASE/COMMON TRANSFORMATION PROGRAM	
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE	

PROJECT SYNOPSIS:

The objective of this joint development Project, initiated through the Joint Logistics Commanders, is to develop a standard Defense Mapping Agency (DMA) database for simulator and common transformation programs, which are programs that convert standard digital DMA data into presentations for the aircrew (e.g., visual, radar, infrared).

This software will be provided as government furnished equipment (GFE) to simulator manufacturers, eliminating the cost associated with the current approach of developing a unique system for each simulator program that requires sensor simulation.

In FY 87, it is planned to begin task five, program development, which will develop the format and structure for a standard simulator database along with its update and maintenance structure. This task should be accomplished in FY 89. Task five will also develop a family of transformation programs to convert the data into simulator displays.

In FYs 88/89, it is planned to perform test, evaluation, and implementation of this program.

This Project complies with OSD guidelines by developing standard database and transformation programs for the application of generic sensor simulation on all training devices to reduce acquisition and life cycle costs.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) elimination of problems and expenses associated with the proliferation of unique transformation programs and periodic updates (due to specification and requirements changes) by developing a Defense Mapping Agency (DMA) database for transformation programs, (b) assistance in achieving transportability (e.g., transportable databases between trainers), and (c) reduced costs for future systems.

In FY 85, the first and second tasks (requirements evaluation and cost/benefit analysis) were completed. Also completed were: (a) task three, a transformation efficiency study, and (b) task four, a database requirements definition, which defines both database content and format requirements and the database generation concept.

PROJECT OVERVIEW

		87	88
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PROJECT: 2854/5	C-5/C-141 AERIAL REFUELING PART TASK TRAINER	\$ 0.2M	\$ 0.0M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE		

PROJECT SYNOPSIS:

The objective of this Project is to develop the C-5/C-141 Aerial Refueling Part Task Trainer (ARPTT).

Use of aircraft for Military Airlift Command (MAC) C-5 pilot air refueling (AR) training is expensive and requires dedicated support by the Strategic Air Command tanker force. Tanker support for training is limited, and MAC does not have aircrew training devices for AR qualification and continuation training. Even if C-5 flight simulators were adequately equipped, there is insufficient machine time available to satisfy AR training requirements. The ARPTT is a synthetic training device that provides the fundamental visual, audio, flight control, and buffet cues necessary for realistic AR training. It uses a common cockpit design for both the C-5 and C-141 and allows precontact through contact training with both KC-135 and KC-10 tankers.

The FY 85 Budget was the first in which flight simulator programs, including this Project, were consolidated into Program Element 64227F to enhance control and visibility within the Air Force, Office of the Secretary of Defense (OSD), and Congress.

This summary includes Project 2854, the C-5 ARPTT, and Project 2855, the C-141 ARPTT. Efforts are identical for their respective systems. A total of six production articles will be bought: three under Project 2854 and three under Project 2855.

This Project was completed in FY 87.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) improved and more realistic C-141 pilot air refueling training, and (b) the elimination of dependency on the Strategic Air Command tanker force for dedicated support in training.

PROJECT OVERVIEW

		87	88
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PROJECT: 2901	B-1B WEAPON SYSTEM TRAINER (WST)	\$13.7M	\$ 0.8M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE		

PROJECT SYNOPSIS:

The objective of this Project is to develop the training system that the Strategic Air Command requires to meet the training needs of all B-1B crew members.

Required training tasks include mission rehearsal training for takeoff and landing, navigation, air refueling, threat analysis/countermeasures, low level penetration, weapons delivery, and emergency procedures. Emphasis will be placed on training tasks that cannot be accomplished in the aircraft and on integrated crew training. These tasks include those related to flight safety, emergency procedures, emergency war order rehearsal, and others for which a suitable training environment does not exist.

The acquisition strategy involves two phases. In Phase I, the Air Force selected two contractors to complete the design through the Preliminary Design Review (PDR), at which point a single contractor was selected to complete the procurement in Phase II.

A total of five Weapon System Trainers (WSTs), each of which simulates all four crew positions, and two Mission Trainers (MTs), each of which simulates the offensive and defensive positions, and six Cockpit Procedures Trainers (CPTs), each of which simulates all four crew positions, will be procured. In the WST and the CPT, crews can be trained in either an integrated or independent mode. Trainers will be capable of providing emergency war order mission rehearsal. The B-1B WST development and production is based on a \$300 Million baseline program (FY 81 dollars).

In FY 87, it is planned to: (a) deliver six CPTs to the field, and (b) deliver the prototype WST.

In FY 88, it is planned to deliver the production WST units 1, 2, and 3.

In FY 89, it is planned to: (a) deliver MT units 1 and 2, and (b) deliver WST unit 4.

Because this Project was begun prior to FY 86, OSD guidelines do not apply.

PAYOFF/UTILIZATION:

The payoff of this Project includes the development of a training system to meet the training needs of all B-1B crew members. The training system will emphasize integrated crew training and training tasks that cannot be accomplished in an aircraft, such as flight safety, emergency procedures, and emergency war rehearsal.

In FY 86, accomplishments included: (a) completion of initial development, fabrication, and hardware/software integration of the prototype WST, (b) commencement of in-plant testing, and (c) exercising of the production option

for Lot II (two WSTs and two MTs).

PROJECT OVERVIEW

		87	88
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PROJECT: 2903	F-15/F-16 SIMULATOR FOR AIR-TO-AIR COMBAT (SAAC)	\$ 2.0M	\$ 0.0M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE		

PROJECT SYNOPSIS:

The objective of this Project is to reconfigure the Simulator for Air-to-Air Combat (SAAC).

The SAAC is the only Air Force air combat trainer with two full field-of-view visual systems, and it is used for Air Combat Engagement Simulation training, tactics development, training for instructor pilots/aggressors, and for research and development. The SAAC is presently configured with two F-4 cockpits. Since the F-4 has been replaced with the F-15 and F-16 aircraft, the SAAC cockpits need to be converted to an F-15 and F-16 configuration to permit training in these aircraft.

In FY 87, this Project was completed.

PAYOFF/UTILIZATION:

The payoff of this Project includes the provision of a training capability for both the F-15 and F-16 aircraft through the cockpit conversion of the Simulator for Air-to-Air Combat (SAAC).

The SAAC will be modified with both F-15 and F-16 cockpit configurations to provide air-to-air combat training for pilots, provide training for instructor pilots, allow more extensive tactics development for these aircraft, and allow further research and development.

In FY 84, the Request for Proposal was released, the contractor's proposal was evaluated, and the contract was awarded.

In FY 85, 'window three' of each existing visual display was returned to the contractor for reshaping to allow both F-15 and F-16 cockpits unobstructed dome ingress and egress. The design review was also accomplished and the first F-15 cockpit was designed, delivered, and is being integrated onsite. Also, required changes to the instructor station were made.

PROJECT OVERVIEW

	87	88
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PROJECT: 2968	MODULAR SIMULATOR DESIGN \$ 1.9M	\$ 3.5M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE	

PROJECT SYNOPSIS:

The objective of this Project is to assess, develop, and implement a modular systems design approach to the development of simulators.

A strong requirement exists to use a modular systems design approach to: (a) reduce simulator life cycle cost, (b) reduce development lead time, (c) improve the Air Force's ability to deliver simulators to the field concurrently with the aircraft (and to keep the configuration current with the system in the field and to update simulators as new and different sensors are needed for training), and (d) to increase the competitive contractor base.

This Joint Logistics Commanders (JLC)-sponsored program consists of three phases and is an attempt to make the pieces of a training device as interchangeable between systems as possible. Phase I was a Request for Information (RFI) from the simulator industry to assess, from an industry perspective, the feasibility of modular simulators, e.g., the advantages, disadvantages, cost, and potential impact on technology. Phase II was a competitive effort between two contractors to identify the tools needed to implement modularity, and to develop a suggested specification, statement of work, and implementing strategy. Analysis of these phases will lead to Phase III, development and validation, on an existing device, of the standards and tools necessary to achieve a modular simulator.

In FY 87, it is planned to award the contract in the second quarter.

In FY 88, it is planned to complete basic design and definition (in time to support the Advanced Tactical Fighter Aircrew Training System). The module design and definition will lay the foundation for the demonstration and validation phase in FYs 88/89.

This Project complies with OSD guidelines by reducing acquisition and life cycle costs by development of standard interfaces between simulator pieces using best commercial practices.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) reduced simulator life cycle cost, (b) reduced development lead time, (c) improved ability to deliver simulators to the field concurrently with the aircraft (and to keep the configuration current with the system in the field), and (d) an increased competitive contractor base, through a modular systems design approach to simulators.

In FY 85, the evaluation of Phase II was accomplished. This was a joint-Service, JLC-sponsored effort to analyze the contractors' approaches and to select, combine, and/or modify the approach to Phase II, given the technical, cost, and supportability considerations identified in the first two phases.

Accomplishments for FY 86 included developing the Request for Proposal and

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releasing it for Phase III.

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PROJECT OVERVIEW

	87	86
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PROJECT: 2997	GBU-15 PART TASK TRAINER \$ 8.8M	\$ 2.7M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE	

PROJECT SYNOPSIS:

The objective of this Project is to develop the GBU-15 Part Task Trainer, a low cost, ground-based device for training F-4E and F-111F Weapon System Operators (WSOs) to use the GBU-15 Precision Guided Munition (PGM).

Many of the primary skills required by aircrews cannot be routinely practiced in the aircraft due to operational constraints, signal radiation restrictions, and the high cost of training with live PGMs. The current Tactical Air Forces (TAF) simulators cannot train operators on the electro-optical/infrared mission specifics, and the costs to integrate this capability into the existing devices are prohibitive. The GBU-15 Part Task Trainer (PTT) will provide training in target acquisition and recognition, and in operation and guidance of target impact, and it will give WSOs the chance for hands-on systems operation during initial qualification training. It will also help maintain skill levels of qualified aircrews while saving valuable sorties and munitions resources.

A total of four (one development and three production) GBU-15 PTTs will be procured. Each will consist of a student station for the WSO, a limited instructor station, computational system, and an image generation system to provide the simulated video, visual environment effects, and required gaming area.

In FY 87, it is planned to complete the majority of the development effort (fabrication of the student, instructor, computational, and image generation subsystems).

Plans for FY 88 include exercising the option to produce follow-on units.

Plans for FY 89 include: (a) deployment of the production trainers, and (b) exercising the Contract Logistics Support options for each unit.

This is a category III estimate. This Project complies with OSD guidelines because the Part Task Trainer is being developed to satisfy the training requirement instead of a full mission trainer or a weapon system trainer.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) improved training for F-4E, F-15E, and F-111F Weapon System Operators in the employment of GBU-15 Precision Guided Munition, (b) better maintenance of skill levels of qualified aircrews, and (c) savings of sorties and munitions resources.

In June 82, the Tactical Air Force Statement of Need 301-82 was produced. In February 83, the requirement for the effort was validated.

In FY 86, accomplishments included: (a) contract award, and (b) exercising the development option for AGM-130.

PROJECT OVERVIEW

		87	88
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PROJECT: 2998	LANTIRN SIMULATOR	\$18.2M	\$ 7.7M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE		

PROJECT SYNOPSIS:

The objective of this Project is to develop a "core" LANTIRN simulator which, when integrated with an Operational Flight Trainer (OFT), provides a range of training to fully indoctrinate pilots in LANTIRN usage, including normal and emergency procedures, low level navigation, target recognition, and weapons delivery.

Tactical Air Command (TAC) needs a safe, efficient means of training aircrews to accomplish the LANTIRN mission in the high threat, real-time, heavily-loaded task environment that is encountered when employing this system. LANTIRN provides a day/night/under-the-weather capability to fly and navigate at low altitudes and to acquire, track, and destroy ground targets. Successful interdiction and close air support missions against the projected threat require accurate target acquisition and weapons delivery. The complexity and inherent danger of operating the LANTIRN system requires part task trainers (Project 2999, LANTIRN Part Task Trainer) for initial switchology training and F-16 and A-10 Operational Flight Trainers (OFTs) with LANTIRN simulation capability for full mission training.

The "core" LANTIRN simulator will include a computer image generation (CIG) system for the navigation pod and a higher resolution simulation capability for target recognition and weapons delivery tasks. An F-15E, F-16, and A-10 configured Part Task Trainer will be developed for switchology, modology, and symbology training at the combat crew training squadron.

The FY 85 Budget was the first in which flight simulator programs, including this Project, were consolidated into Program Element 64227F to enhance control and visibility within the Air Force, OSD, and Congress.

In FY 87, it is planned to: (a) complete the initial design, and (b) begin software development and fabrication of hardware subsystems (computational system, image generation system, host/simulator interface).

In FY 88, it is planned to: (a) integrate hardware and software, (b) conduct in-plant tests and government qualification tests, (c) integrate the LANTIRN simulator with the F-16 OFT, and (d) exercise production options for four F-16 LANTIRN simulators.

Plans for FY 89 include integration of the LANTIRN with the F-16 OFT.

PAYOFF/UTILIZATION:

The payoff of this Project includes safe, efficient training for aircrews to accomplish the LANTIRN mission in the high threat, real-time, heavily-loaded task environment that is encountered when employing the LANTIRN system.

In FY 84, accomplishments included: (a) development of an interim device for training A-10 and F-16 aircrews until the LANTIRN core device is fielded (results of effectiveness studies conducted on this device will be input to

the core system), and (b) initiation of an industry survey of emerging technologies to assess the best method of training aircrews in employment of infrared based weapon systems.

In FY 86, accomplishments included award of a development contract.

PROJECT OVERVIEW

	87	88
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PROJECT: 2999	LANTIRN PART TASK TRAINER\$ 6.7M	\$ 8.4M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE	

PROJECT SYNOPSIS:

The objective of this Project is to develop LANTIRN Part Task Trainers to effectively train pilots in LANTIRN (F-16, F-15E) switchology, modes of operation, symbology and F-15E avionics.

Tactical Air Command needs a safe, efficient means of training aircrews to accomplish the LANTIRN mission in the high threat, real-time, heavily loaded task environment that is encountered when employing this system. LANTIRN provides a day/night/under the weather capability to fly and navigate at low altitudes and to acquire, track, and destroy ground targets. The complexity and inherent danger of operating close to the ground in the night and adverse weather requires initial training that enhances safety and speeds understanding of system operation. These training devices will provide an accurate representation of the aircraft cockpit, including all functional controls and switch responses, to provide aircrews with the required familiarization training.

The LANTIRN system requires part task trainers for initial switchology training and Operational Flight Trainers (OFTs) with LANTIRN simulation capability (Project 2998, LANTIRN "Core" Simulator) for full mission training.

The FY 85 Budget was the first in which flight simulator programs, including this Project, were consolidated into Program Element 64227F to enhance control and visibility within the Air Force, OSD, and Congress.

In FY 87, it is planned to: (a) award a contract in the first quarter, with the initial development to be the F-15E PTT, and (b) design and the option to start F-16 PTT development.

In FY 88, production options will be exercised.

Because this Project was begun prior to FY 86, OSD guidelines do not apply.

PAYOFF/UTILIZATION:

The payoff of this Project includes safe, efficient training for aircrews to accomplish the LANTIRN mission in the high threat, real-time, heavily loaded task environment that is encountered when employing the LANTIRN system.

In FY 86, source selection activities began.

PROJECT OVERVIEW

		87	88
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PROJECT: 3000	KC-135 OPERATIONAL FLIGHT TRAINER	\$11.8M	\$ 6.4M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE		

PROJECT SYNOPSIS:

The objective of this Project is to update 18 trainers to the KC-135 Operational Flight Trainer (OFT) configuration.

To train its KC-135 crews, the Strategic Air Command (SAC) needs updated OFTs to refurbish and update the outdated and logistically unsupportable MB-26 trainers. The MB-26 is based on 25 year-old analog technology, is logistically unsupportable, and does not fully represent the current aircraft configuration because of the inability to add additional capabilities to this outdated device. These devices are expensive to maintain, achieve very low availability rates, and provide unrealistic training. In July 1981, the Aircraft Safety and Operations Review Board, after investigating several KC-135 accidents, highlighted the need for new simulators, particularly for engine out and emergency procedure training. Introduction of the KC-135R re-engining program emphasizes the need for this program.

The KC-135 OFT will realistically simulate the pilot and copilot stations, and incorporate an on-board instructor's station. A computer image generated four window visual system for takeoff/landing and engine out training will be provided with a night/dusk capability. An accurate simulation of the total aircraft flight envelope will be included, and instrument flight simulation will be certifiable to meet SAC requirements for annual instrument evaluations. A total of 18 trainers will be optioned for upgrade to the KC-135 OFT configuration (approximately eight in the KC-135A configuration, and ten in the KC-135R configuration).

The FY 85 Budget was the first in which flight simulator programs, including this Project, were consolidated into Program Element 64227F to enhance control and visibility within the Air Force, OSD, and Congress.

In FY 87, it is planned to: (a) collect flight data, (b) complete the initial design, and (c) begin hardware and software integration.

In FY 88, it is planned to conduct contractor in-plant testing and government qualification testing, followed by shipment to the field for final acceptance testing. Additionally, in FY 88 through FY 90, production options for the remaining devices will be exercised.

This is a Category I cost estimate.

Because this Project began prior to FY 86, OSD guidelines do not apply.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) improved training for KC-135 crews, particularly addressing engine out and emergency procedures training, (b) more realistic training through replacement of devices presently used that do not fully represent current aircraft configuration, and (c) cost savings,

resulting from replacement of outdated analog technology that is expensive to maintain and achieves very low availability rates.

In FY 86, accomplishments included start of the initial design and development of the KC-135R flight station, aerodynamics, student stations, instructor station, and computational system.

PROJECT OVERVIEW

		87	88
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PROJECT: 3105	F-15E WEAPON SYSTEM TRAINER (WST)	\$ 6.4M	\$ 0.2M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE		

PROJECT SYNOPSIS:

The objective of this Project is to develop the F-15E Weapon System Trainer (WST) to train both pilot and weapon system officers.

The Tactical Air Forces (TAF) requirement for a fighter that can conduct interdiction bombing as well as air-to-air missions must be supported by an aircrew training system that is capable of training all mission aspects. The F-15E WST will train both pilot and weapon system officers, and will include Low Altitude Navigation and Targeting Infrared System for Night (LANTIRN) simulation. The trainers will be a modification to the F-15 Operational Flight Trainer, being manufactured by Goodyear Aerospace Corporation. Six WSTs will be procured.

The FY 85 Budget was the first in which flight simulator programs, including this Project, were consolidated into Program Element 64227F.

In FY 87, it is planned to: (a) complete the basic design, (b) begin fabrication of cabling assemblies, (c) award the production contract, (d) continue with detailed design of the flight and instructor stations, computational system, and LANTIRN simulation, (e) complete the hardware/software integration and contractor in-plant tests, (f) begin government in-plant tests, and (g) exercise the production option for unit 2.

In FY 88, it is planned to: (a) accomplish combined government/contractor testing, and (b) deliver the first trainer.

In FY 89, it is planned to exercise the production option for unit 3.

Because this Project was begun prior to FY 86, OSD guidelines do not apply.

PAYOFF/UTILIZATION:

The payoff for this Project includes improved training of all mission aspects (including interdiction bombing and air-to-air missions) for Tactical Air Force F-15 pilots and weapon system officers.

PROJECT OVERVIEW

	87	88
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PROJECT: 3135	ADVANCED TRAINING SYSTEM \$ 2.6M \$ 2.2M	
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE	

PROJECT SYNOPSIS:

The objective of this Project is to provide a computer-based training system, the Advanced Training System (ATS), to alleviate various training deficiencies.

Changes to the Air Force training environment have resulted in increased training workload at the Air Training Command (ATC) Technical Training Centers. Greater equipment complexities have meant greater student instructional needs. While training requirements have increased, the number of experienced instructors has decreased. ATC is currently conducting little remedial or individualized instruction. This results in: (a) a greater number of personnel in the training pipeline, (b) increased attrition, (c) lower achievement, and (d) ultimately, reduced operational readiness. Military Airlift Command, Air Force Systems Command, and Strategic Air Command also have similar requirements to be supported by this Project.

The ATS is a three-phased program. Phase I is a contracted concept explanation and validation effort that was completed in September 1984 and was funded and managed by ATC. Phase II develops the prototype system for two courses at one ATC Technical Training Center. Phase III acquires systems for the other four centers.

ATS will provide information presentation, demonstration, drill and practice, evaluation, feedback, and remedial training. Its main goals are to free instructors for: (a) remedial instruction, (b) training complex tasks, (c) promoting efficient training methods, and (d) providing rapid course updating.

The ATS program responds to the Defense Science Board 1982 Summer Study on Technical Training which recommended improvements to the Air Force's training approach.

In FY 87, it is planned to conduct the initial computer hardware selection. Also in FY 87 through FY89, plans include: (a) complete development, and (b) award of a production contract.

Because this Project was begun prior to FY 86, OSD guidelines do not apply.

PAYOFF/UTILIZATION:

The payoffs for this Project include: (a) a remedial training capability, (b) more effective instruction, (c) decreased training time, (d) more effective use of instructors, (e) earlier detection of problems, (f) reduced student washbacks and eliminations, (g) cost savings, and (h) flexibility under surge.

Efforts in FY 86 included award of the development contract.

PROJECT OVERVIEW

PROJECT: 3143	ADVANCED TACTICAL FIGHTER (ATF)	87 ----- \$ 0.2M	88 ----- \$ 1.9M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE		

PROJECT SYNOPSIS:

The objective of this Project is to develop the Advanced Tactical Fighter (ATF) Training System to meet Manpower, Personnel and Training (MPT) needs to support operations personnel assigned to the weapon system.

The required training tasks include initial, continuation, upgrade, on-the-job training, and mission qualification levels which emphasize new job requirements. The Front-End Analysis (FEA) process will define all training requirements and integrate these findings into an ATF Total Training System. The defined training system will account for all operational, maintenance, and support personnel required by the weapon system and will integrate all MPT aspects of each job description and skill level to ensure full mission support.

The FEA is broken down into two activities. In Step 1, the prime weapon system contractors were required to accomplish an FEA concurrently with their weapon system design task. This process results in a description of a total training system to include impact of new technologies, as well as a definition and a functional description of all system elements. Step 2 will require an independent FEA specialist to integrate all of the individual contractor data, analyze the user training requirements, and present to the Air Force recommendations and alternatives for implementing, supporting, and operating the total system.

In FY 87, efforts for this Project include: (a) contract award in the first quarter, (b) accomplishing the midterm review of each ATF contractor, and (c) implementation of the FEA process required for the total ATF training system definition through an independent FEA contractor.

By late FY 88 or early FY 89, all ATF Training System FEA data will be analyzed and presented to the Air Force for implementation.

This Project complies with OSD guidelines by early consideration of training requirements to effect concurrent delivery in the most cost-effective manner.

PAYOFF/UTILIZATION:

The payoff for this Project will be the provision of an Advanced Tactical Fighter (ATF) Training System which will account for all personnel needed by the weapon system and will integrate all Manpower, Personnel, and Training aspects of each job description and skill level to ensure full mission support.

Accomplishments for FY 86 included start of the ATF Demonstration/Validation Source Selection.

PROJECT OVERVIEW

	87	88
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PROJECT: 3147	ADA SIMULATOR INSERTION	\$ 2.7M \$ 0.0M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE	

PROJECT SYNOPSIS:

The objective of this Project is to ensure an orderly transition to Ada, the programming environment for future training systems.

The Ada language is designed with three overriding concerns: (a) program reliability and maintenance, (b) programming as a human activity, and (c) system effectiveness. Ada should also assist in modularity. It is intended that the Ada language will be the standard for all training system new starts beginning with FY 87.

The proof of concept contract is scheduled for award in the first quarter of FY 86. A 24-month effort is scheduled, resulting in verification of Ada as a training system language.

This Project complies with OSD guidelines by reducing the life cycle cost through the successful demonstration of a common computer language and its use in all future training devices.

PAYOFF/UTILIZATION:

The payoff of this Project is an orderly transition to Ada, the programming environment for future training systems in the Department of Defense.

PROJECT OVERVIEW

	87	88
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PROJECT: 3282	C-17 AIRCREW TRAINING SYSTEM	\$ 1.9M \$11.1M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	SIMULATION SYSTEM PROJECT OFFICE	

PROJECT SYNOPSIS:

The objective of this Project is to design a C-17 Aircrew Training System (ATS) to meet the needs of the Military Airlift Command (MAC) and the Air Reserve Forces in supplying the initial and continuation training for C-17 crew members.

Training will be totally contractor administered and supported, with MAC evaluating the final product--a fully qualified aircrew member. There will be a main facility for initial through instructor training, learning centers at four main operating bases for continuation training, and two sites for the training of Guard and Reserve personnel. Emphasis will be on integrated crew training and training tasks that cannot be accomplished in aircraft, including those related to safety of flight, emergency procedures, and others for which a suitable flight training environment does not exist. The training system will be developed concurrently with the aircraft design effort, allowing a training system to be available at the formation of the first operational squadron.

Acquisition of the actual C-17 ATS has been divided into two phases to sustain competition as long as possible. Phase I will be a full and open competition to determine which company has the best capability to field and support an ATS. Two contractors will be chosen to provide detailed functional designs of their total systems. Phase II will begin after the selection of one of these contractors to complete the final design, development, testing, deployment, activation, and operation and support of the training system.

In FY 87, it is planned to: (a) award the contract for the C-17 ATS, and (b) subsequent to the contract award, select two contractors in a full and open competition to begin the detailed design of their systems.

In FY 88, it is planned to select one of the competing contractors to develop and produce the training system, with total control over courseware and instruction, full logistics support, total system management and operation, thus guaranteeing student throughput and instruction quality. The number and types of devices are not yet final, but estimates were arrived at by comparing the anticipated C-17 student throughput with that on the C-5 ATS contract. The estimate was formally accomplished in June 1986 and is currently being reviewed. Because data does not exist for the cost of a trained student (although the student is the final product), the estimate assumed that a reasonable and reliable cost estimate for an ATS could be arrived at by predicting the types and numbers of devices to be used by the contractor. Because of this approach, it is a Category IV cost estimate.

In FY 89, it is planned to: (a) continue to develop and produce a training system through preliminary design, critical design, and the beginning of hardware/software integration, and (b) define configuration control procedures, update management, course syllabus, and overall system management.

This Project complies with OSD guidelines through early consideration of training needs with the parent weapon system, and development of a training system using best commercial practices.

PAYOFF/UTILIZATION:

The payoff of this Project will be improved continuation training and mission/upgrade training for C-17 crew members through the development of a centralized training facility and development of learning centers at each of four operational wings and two reserve sites.

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
61102F						DEFENSE RESEARCH SCIENCES
2313-A4	AFOSR	1.758	2.500	HF	4	COGNITIVE SCIENCE
2313-A5	AFOSR	2.875	3.000	HF	4	VISUAL INFORMATION PROCESSING
2313-A6	AFOSR	1.229	1.300	HF	4	AUDITORY PATTERN RECOGNITION
2313-T1	AFHRL	0.885	0.885	MP	2	LEARNING ABILITIES MEASUREMENT PROGRAM
2313-T3	AFHRL	0.230	0.230	HF	4	PERCEPTUAL AND COGNITIVE DIMENSIONS OF PILOT BEHAVIOR
2313-V1	AFAMRL	0.265	0.265	HF	4	ELECTROENCEPHALOGRAPHIC AND MAGNETENCEPHALOGRAPHIC INDICANTS OF COGNITIVE FUNCTION
2313-V2	AFAMRL	0.340	0.340	HF	4	BASIC VISION RESEARCH
		7.583	8.521			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 61102F :	FY87	FY88
	7.582	8.520
THE PRESIDENT'S BUDGET, JANUARY 1987		

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(CONTINUATION)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62202F						AEROSPACE BIOTECHNOLOGY
06MD	AMD	7.876	7.520	HF	4	AEROSPACE MEDICAL DIVISION LABORATORY OPERATIONS
6893	AMD	1.435	1.550	HF	4	MANNED WEAPON SYSTEMS EFFECTIVENESS
7184	AMD	5.892	6.350	HF	4	MAN-MACHINE INTEGRATION TECHNOLOGY
		-----	-----			
		15.203	15.420			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 62202F :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	-----	-----
	15.203	15.420

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(CONTINUATION)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62205F						PERSONNEL, TRAINING, AND SIMULATION
06HT-1	AFHRL	3.215	3.317	ET	V A R	LABORATORY SUPPORT
06HT-2	AFHRL	3.537	3.649	ST	V A R	LABORATORY SUPPORT
06HT-3	AFHRL	1.822	1.880	HF	V A R	LABORATORY SUPPORT
06HT-4	AFHRL	2.143	2.212	MP	V A R	LABORATORY SUPPORT
1121	AFHRL	1.880	2.050	ET	6	TECHNICAL TRAINING DEVELOPMENT
1123	AFHRL	3.020	2.953	ET	6	FLYING TRAINING DEVELOPMENT
1192	AFHRL	5.390	5.525	ST	6	ADVANCED SIMULATION FOR PILOT TRAINING
1710	AFHRL	3.808	4.557	HF	4	LOGISTICS AND MAINTENANCE TECHNOLOGY
3017	AFHRL	1.300	1.600	ET	6	COMMAND AND CONTROL TRAINING
6114	AFHRL	1.750	2.970	ST	6	FLIGHT SIMULATOR TECHNOLOGY
7719	AFHRL	3.550	3.893	MP	2	FORCE ACQUISITION AND DISTRIBUTION SYSTEM
7734	AFHRL	1.060	1.331	MP	3	FORCE MANAGEMENT SYSTEM
		<u>32.476</u>	<u>35.938</u>			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62205F :						
	THE PRESIDENT'S BUDGET, JANUARY 1987					
		<u>32.475</u>	<u>35.937</u>			

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(CONTINUATION)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63106F						LOGISTICS SYSTEMS TECHNOLOGY
2745	AFHRL	0.655	0.075	HF	4A	LOGISTICS FOR COMBAT READINESS MAINTENANCE
2940	AFHRL	7.142	6.025	HF	4D	COMPUTER TECHNOLOGY FOR SYSTEMS DESIGN AND MAINTENANCE
2950	AFHRL	2.943	6.647	HF	4D	INTEGRATED MAINTENANCE INFORMATION SYSTEM
		-----	-----			
		10.741	12.748			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63106F :						
						FY87

						10.740
						FY88

						12.747

(CONTINUED)

(CONTINUATION)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
63227F						PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY
2363	AFHRL	1.385	2.215	ST	6	ADVANCED VISUAL TECHNOLOGY SYSTEM
2364	AFHRL	0.400	0.380	ET	6	TRAINING AND PERFORMANCE DATA CENTER
2557	AFHRL	1.848	2.101	ST	6	ADVANCED ON-THE-JOB TRAINING SYSTEM (AOTS)
2743	AFHRL	2.371	4.526	ST	6	AIRCREW COMBAT MISSION ENHANCEMENT
2922	AFHRL	0.780	0.833	MP	2	PERSONNEL ASSESSMENT SYSTEMS
2949	AFHRL	0.530	0.615	ET	6	BASIC JOB SKILLS ASSESSMENT AND ENHANCEMENT
2951	AFHRL	0.150	0.200	ET	6	TRAINING DECISIONS SYSTEM
3056	AFHRL	0.011	0.032	ST	6	AIR COMBAT ASSESSMENT AND DEBRIEFING SYSTEM
		7.476	10.902			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63227F :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	7.475	10.902

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(CONTINUATION)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63231F						CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY
2829	AMD	6.149	6.544	HF	4	COCKPIT AUTOMATION TECHNOLOGY (CAT)
2992	AMD	0.646	0.973	HF	4	SPACE CREW ENHANCEMENT
		<u>6.796</u>	<u>7.518</u>			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63231F :						
						FY87
						<u>6.795</u>
						FY88
						<u>7.517</u>

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(CONTINUATION)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63751F						TRAINING SYSTEMS TECHNOLOGY
3057	AFHRL	0.000	0.276	ST	6	INTELLIGENT COMPUTER-ASSISTED TRAINING
		-----	-----			
		0.000	0.277			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63751F :						
						FY87 FY88
						----- -----
						0.000 0.276

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(CONTINUATION)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64227F						FLIGHT SIMULATOR DEVELOPMENT
2325	SIMSP0	8.400	6.900	ST	6	SIMULATOR DEVELOPMENT ACTIVITIES
2632	SIMSP0	5.000	0.000	ST	6	B-52 OFFENSIVE AVIONICS STATION
2687	SIMSP0	0.098	0.000	ST	6	EF-111A OPERATIONAL FLIGHT TRAINER (OFT)
2769	SIMSP0	2.947	6.946	ST	6	SIMULATOR UPDATE DEVELOPMENT
2851	SIMSP0	2.947	3.000	ST	6	STANDARD DEPARTMENT OF DEFENSE (DOD) SIMULATOR DATA BASE/Common TRANSFORMATION PROGRAM
2854/5	SIMSP0	0.196	0.000	ST	6	C-5/C-141 AERIAL REFUELING PART TASK TRAINER
2901	SIMSP0	13.700	0.761	ST	6	B-1B WEAPON SYSTEM TRAINER (WST)
2903	SIMSP0	1.964	0.000	ST	6	F-15/F-16 SIMULATOR FOR AIR-TO-AIR COMBAT (SAAC)
2968	SIMSP0	1.909	3.500	ST	6	MODULAR SIMULATOR DESIGN
2997	SIMSP0	8.750	2.670	ST	6	GBU-15 PART TASK TRAINER
2998	SIMSP0	18.155	7.713	ST	6	LANTIRN SIMULATOR
2999	SIMSP0	6.720	8.375	ST	6	LANTIRN PART TASK TRAINER
3000	SIMSP0	11.838	6.433	ST	6	KC-135 OPERATIONAL FLIGHT TRAINER
3105	SIMSP0	6.400	0.196	ST	6	F-15E WEAPON SYSTEM TRAINER (WST)
3135	SIMSP0	2.588	2.188	ST	6	ADVANCED TRAINING SYSTEM
3143	SIMSP0	0.200	1.909	ST	6	ADVANCED TACTICAL FIGHTER (ATF)
3147	SIMSP0	2.700	0.000	ST	6	ADA SIMULATOR INSERTION

(CONTINUED)

(CONTINUATION WITHIN PE 64227F)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
3282	SIMSP0	1.900	11.110	ST	6	C-17 AIRCREW TRAINING SYSTEM
		-----	-----			
		96.412	61.701			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 64227F :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	-----	-----
	96.412	61.701

IV. OVERALL SYNOPSES AND PROJECT LISTINGS

IV.A. CONGRESSIONAL CATEGORY SYNOPSSES AND LISTINGS

	CONGRESSIONAL CATEGORY	PAGE
	-----	-----
ARMY	Education and Training	IV-A-1
	Human Factors	IV-A-2
	Manpower and Personnel	IV-A-3
	Simulation and Training Devices	IV-A-4
NAVY	Education and Training	IV-A-5
	Human Factors	IV-A-6
	Manpower and Personnel	IV-A-7
	Simulation and Training Devices	IV-A-8
AIR FORCE	Education and Training	IV-A-9
	Human Factors	IV-A-10
	Manpower and Personnel	IV-A-11
	Simulation and Training Devices	IV-A-12

Tables of project listings by Congressional Category follow each Congressional Category synopsis.

CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: EDUCATION & TRAINING
DoD ORGANIZATION: ARMY
CONTRIBUTING PROGRAM ELEMENTS: 61102A DEFENSE RESEARCH SCIENCES
62785A MANPOWER PERSONNEL, AND TRAINING TECHNOLOGY
63007A HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
64722A EDUCATION AND TRAINING SYSTEMS DEVELOPMENT

SYNOPSIS:

This work focuses on developing and evaluating improved, cost-effective education and training applications for areas such as combat arms readiness and maintenance, and pilot and leadership training for the Active Army and the Reserve Component. Work will expand the applications of artificial intelligence, computers, and other electronic technology for training individual, crew/team, and unit collective skills.

The Army needs to provide job skills training and compensatory training for educationally disadvantaged personnel. Training literacy skills, to tailor training to the maintain critical skills between Reserve Component training sessions. Specific job areas for attention include small arms training, navigation training, armor, aviation, supply maintenance, and logistics skill training.

Since the Army typically operates in units, it must know how people behave in organizations, how to evaluate group/unit performance and cohesion, and how to measure group improvement. Realistic battalion combat training is analyzed to determine the most effective methods for providing group performance feedback. Research will develop computer-based war games and simulators for company-level units to provide operationally realistic, inexpensive combined arms training.

Special attention is provided for combat service support training for battlefield maintenance tasks to assess and repair battle damage under difficult conditions, and to develop training programs for unconventional warfare.

At least three training products will be developed for use by more than one Service: (a) PEAM, a Portable Electronic Aid for Maintenance, (b) CHIP, the Computerized Hand-held Instructional Prototype, and (c) TRIADS, the Tri-Service Instructional Application Delivery System. Other efforts will establish a national manpower inventory to enable the Army to identify enlistee training needs more precisely.

(CONTINUATION)

IV-A-1 : LISTING OF ARMY IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A2AL-4	ARI	1.185	1.093	ET	V A R	ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)
A791-2	ARI	1.371	1.571	ET	6	MANPOWER, PERSONNEL AND TRAINING
TOTAL:		2.557	2.664			(EDUCATION AND TRAINING IN PE)
TOTAL FUNDING IN PROGRAM ELEMENT 62785A :						
						FY87 FY88
						----- THE PRESIDENT'S BUDGET, JANUARY 1987 15.216 15.581 -----

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(CONTINUATION)

IV-A-1 : LISTING OF ARMY IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63007A						HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
A794	ARI	6.764	8.853	ET	6	EDUCATION AND TRAINING
	TOTAL:	6.765	8.853			(EDUCATION AND TRAINING IN PE)
TOTAL FUNDING IN PROGRAM ELEMENT 63007A :						
						FY87 FY88
	THE PRESIDENT'S BUDGET, JANUARY 1987					27.151 38.164

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(CONTINUATION)

IV-A-1 : LISTING OF ARMY IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64722A						EDUCATION AND TRAINING SYSTEMS DEVELOPMENT
D750	ARI	4.211	5.447	ET	6	EDUCATION AND TRAINING SYSTEM
	TOTAL:	4.212	5.448	(EDUCATION AND TRAINING IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 64722A :						
						FY87
						FY88
THE PRESIDENT'S BUDGET, JANUARY 1987						4.211
						5.447

CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: HUMAN FACTORS

DoD ORGANIZATION: ARMY

CONTRIBUTING PROGRAM ELEMENTS:

- 61102A DEFENSE RESEARCH SCIENCES
- 62716A HUMAN FACTORS ENGINEERING TECHNOLOGY
- 62785A MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
- 63007A HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY

SYNOPSIS:

A principal objective of Army work in Human Factors is to ensure the operability, maintainability, sustainability, and survivability of systems in various stages of development and deployment. These systems can increase potential battlefield effectiveness, but they are often sophisticated and require complex skills, heavy operator workload, quick reactions, and confident and accurate decisions to operate and maintain.

Engineering options must be considered during the entire developmental cycle to balance the demands with projected availability of personnel who have appropriate skills. Some human operator competencies can be enhanced by task allocation methods or by system design. A major objective is to develop and evaluate methods to identify human factors, manpower, personnel, and training (HMPT) requirements early in system design. This includes methods to integrate new equipment into units in the field and embedding training in the design of new systems.

Research will use soldier performance data to: (a) develop better engineering design principles, (b) learn about the capabilities and limitations of men and women to improve performance predictions with equipment in field conditions, (c) apply the data throughout the Army materiel development process, (d) provide design guidance for all types of equipment that is worn, operated, or maintained by soldiers, and (e) determine which tasks are best performed by humans, which are best performed by robots and other hardware, and how to combine these components.

The Human Factors area investigates soldier-computer interfaces in systems such as C3I (Command, Control, Communications and Intelligence) systems. Other efforts in this area will exploit technology to support logistics systems analysis, ammunition supply systems, robotics, computer automation, and artificial intelligence as they relate to increased productivity.

(CONTINUATION)

IV-A-2 : LISTING OF ARMY IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62716A						HUMAN FACTORS ENGINEERING TECHNOLOGY
A1QL	HEL	5.111	5.723	HF	V A R	ADMINISTRATION AND MANAGEMENT - HUMAN ENGINEERING LAB (HEL)
AH70	HEL	12.248	9.649	HF	4	HUMAN FACTORS ENGINEERING SYSTEM DEVELOPMENT
	TOTAL:	17.360	15.373	(HUMAN FACTORS IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 62716A :						
	THE PRESIDENT'S BUDGET, JANUARY 1987					

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(CONTINUATION)

IV-A-2 : LISTING OF ARMY IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A2AL-1	ARI	2.307	1.873	HF	V A R	ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)
A790-1	ARI	2.669	2.692	HF	4	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION
TOTAL:		4.977	4.566			(HUMAN FACTORS IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 62785A :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	15.216	15.581

(CONTINUED)

(CONTINUATION)

IV-A-2 : LISTING OF ARMY IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63007A						HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
A793	ARI	7.693	8.215	HF	4	HUMAN FACTORS IN TRAINING AND OPERATIONAL EFFECTIVENESS
TOTAL:		7.694	8.215	(HUMAN FACTORS IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 63007A :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	27.151	38.164

CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: MANPOWER & PERSONNEL
DoD ORGANIZATION: ARMY
CONTRIBUTING PROGRAM ELEMENTS: 61102A DEFENSE RESEARCH SCIENCES
62785A MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
63007A HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
63731A MANPOWER AND PERSONNEL

SYNOPSIS:

The Army and the other Services will continue to share a dwindling supply of young adults while meeting demands for high technology skills to operate and maintain many complex weapon systems. The Army must effectively recruit, select, assign, utilize, and retain adequate numbers, and is pursuing a strategy that can ensure that the most advanced tools for doing so are in the hands leaders.

This research provides a scientific basis for the later development of: (a) improved, computer-based selection and assignment tests, especially procedures to link soldier selection to job performance, (b) methods to examine new variables such as pre-service experiences, (c) methods to assign recruits to jobs that capitalize on their aptitudes and vocational interests, (d) programs to develop cohesive units and leaders needed to assure combat readiness, (e) methods to increase satisfaction and identification with, and commitment to, Army life, (f) methods to research the effects of the family on soldier retention, (g) methods to increase enlistment and reenlistment rates and reduce attrition rates of highly qualified soldiers, (h) techniques to examine and improve Army civilian personnel performance and management, and (i) methods to determine aggregated future manpower requirements in view of new systems and force structures in the battlefield of the future.

Basic research work will investigate how decision-makers function in computer-driven, high-stress, problem-solving situations. Efforts will help develop computerized aids for problem-solving, planning, and decision-making to overcome these situational difficulties.

Some recent accomplishments include research on what motivates enlistment, and how the leader and the unit environment affect individual soldier performance. New methods were developed for predicting job performance, and a database was established for tracking men and women who enlisted and did not enlist, and their reasons for doing so. Work continues on systems such as HARDMAN (hardware vs. manpower) and MIST (Man Integrated Systems Technology) to help predict or determine manpower, personnel, and training requirements of developing systems and to correlate these needs with available resources.

IV-A-3 : LISTING OF ARMY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
61102A						DEFENSE RESEARCH SCIENCES
B74F-1	ARI	0.611	0.661	MP 4B		PLANNING, PROBLEM SOLVING AND DECISION MAKING
	TOTAL:	0.612	0.662	(MANPOWER AND PERSONNEL IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 61102A :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	6.460	7.026

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(CONTINUATION)

I/A-3 : LISTING OF ARMY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A2AL-3	ARI	2.194	2.129	MP	V A R	ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)
A791-1	ARI	2.538	3.060	MP	2	MANPOWER, PERSONNEL AND TRAINING
	TOTAL:	4.733	5.190			(MANPOWER AND PERSONNEL IN PE)
TOTAL FUNDING IN PROGRAM ELEMENT 62785A :						
						FY87
THE PRESIDENT'S BUDGET, JANUARY 1987						15.216
						FY88
						15.581

(CONTINUED)

(CONTINUATION)

IV-A-3 : LISTING OF ARMY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
63007A						HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
A792	ARI	7.693	15.323	MP	2	MANPOWER AND PERSONNEL
	TOTAL:	7.694	15.323	(MANPOWER AND PERSONNEL IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 63007A :						
						FY87
THE PRESIDENT'S BUDGET, JANUARY 1987						27.151
						FY88
						38.164

CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES
DoD ORGANIZATION: ARMY
CONTRIBUTING PROGRAM ELEMENTS:
61102A DEFENSE RESEARCH SCIENCES
62727A NON-SYSTEM TRAINING DEVICES (NSTD) TECHNOLOGY
62785A MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
63003A AVIATION ADVANCED TECHNOLOGY
63007A HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
63738A NON-SYSTEM TRAINING DEVICES (NSTD) ADVANCED DEVELOPMENT
64715A NON-SYSTEM TRAINING DEVICES (NSTD) ENGINEERING DEVELOPMENT
64801A AVIATION ENGINEERING DEVELOPMENT

SYNOPSIS:

simulation and training devices is combat readiness. Work focuses on high-fidelity devices which simulate realistic combat scenarios, yet remain relatively low in cost and lower in complexity than previous simulators.

A major requirement is to develop devices that apply new techniques and technologies in artificial intelligence, computer-aided instruction, and robotic computers to accelerate learning, increase attention and increase mental and physical peak performance to sustain troops in combat. Army embedded training and combined arms training efforts will also be advanced.

Work continues on developing techniques such as videodisks and laser-based weapon simulation for improved war game battle simulations, and for the development of technology for multi-purpose training devices.

The aim of simulation development is to improve pilot training and safety while reducing costs and supporting helicopter engineering development. Basic research includes investigating the nature of knowledge representation and transfer, the effects of expertise in complex task domains, and major objective is to continue research developing improved training systems such as: (a) low-cost flight simulators, (b) armor and anti-armor, artillery and infantry training, (c) training devices that tie together battlefield weapon systems, mobility, and command, control, communications, and intelligence, and (d) systems that provide full mission training capability in a combat environment. These training systems will provide effective, low-cost tactical training for both Active Army and Reserve Components, for both maintenance and combat service support personnel.

(CONTINUATION)

IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62727A						NON-SYSTEM TRAINING DEVICES (NSTD) TECHNOLOGY
A230	PMTRADE	4.230	4.011	ST	6	NON-SYSTEM TRAINING DEVICES
	TOTAL:	4.231	4.012	(SIMULATION AND TRAINING DEVICES IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 62727A :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	4.230	4.011

(CONTINUED)

(CONTINUATION)

IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A2AL-2	ARI	1.369	1.298	ST	V A R	ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)
A790-2	ARI	1.583	1.865	ST	6	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION
TOTAL:		2.953	3.164			(SIMULATION AND TRAINING DEVICES IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 62785A :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	15.216	15.581

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IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63003A						AVIATION ADVANCED TECHNOLOGY
DB34	AVSCOM	5.225	5.057	ST	6	ROTORCRAFT SYSTEM INTEGRATION SIMULATOR (RSIS)
DB39	PMTRADE	5.476	1.723	ST	6	FLIGHT SIMULATOR COMPONENTS
	TOTAL:	10.701	6.781			(SIMULATION AND TRAINING DEVICES IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 63003A :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	10.701	6.780

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(CONTINUATION)

IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63007A						HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
A795	ARI	5.001	5.773	ST	6	TRAINING SIMULATION
	TOTAL:	5.002	5.774	(SIMULATION AND TRAINING DEVICES IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 63007A :				FY87	FY88	
				27.151	38.164	

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(CONTINUATION)

IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
63738A						NON-SYSTEM TRAINING DEVICES (NSTD) ADVANCED DEVELOPMENT
D335	PMTRADE	3.722	0.000	ST	6	COMMUNICATIVE NON-SYSTEM TRAINING DEVICES (NSTD)
	TOTAL:	3.722	0.000	(SIMULATION AND TRAINING DEVICES IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 63738A :						
						FY87
THE PRESIDENT'S BUDGET, JANUARY 1987						3.722
						FY88
						0.000

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(CONTINUATION)

IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64715A						NON-SYSTEM TRAINING DEVICES (NSTD) ENGINEERING DEVELOPMENT
D241	PMTRADE	38.062	24.459	ST	6	NON-SYSTEM TRAINING DEVICES - COMBINED ARMS
D573	PMTRADE	6.149	8.080	ST	6B	PMTRADE AND NTSC SUPPORT
	TOTAL:	44.212	32.540			(SIMULATION AND TRAINING DEVICES IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 64715A :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	44.211	32.539

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IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64801A						AVIATION ENGINEERING DEVELOPMENT
DE70	PMTRADE	9.317	9.654	ST	6D	AVIATION NON-SYSTEM TRAINING DEVICES
	TOTAL:	9.318	9.655			(SIMULATION AND TRAINING DEVICES IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 64801A :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	9.317	9.654

CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: EDUCATION & TRAINING
DoD ORGANIZATION: NAVY
CONTRIBUTING PROGRAM ELEMENTS: 61153N DEFENSE RESEARCH SCIENCES,
SUBELEMENT 42: BEHAVIORAL AND ORGANIZATIONAL SCIENCES
62131M MARINE CORPS LANDING FORCE TECHNOLOGY
62233N MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA
63720N EDUCATION AND TRAINING
63732M ADVANCED MANPOWER/TRAINING SYSTEMS

SYNOPSIS:

The objective of the Navy effort in Education and Training is to support effective training of military personnel through advancement of training technology, development of training standards, and improvement of procedures for matching training to job requirements.

The major areas of activity for this effort include the systems, cognitive processes, automated instruction in formal schools, basic skills enhancement, individual and group performance measurement, individual and team training, Naval Reserve training, on-the-job training, weapon system operator/maintainer training, training materials development, resource management, Enlisted Personnel Individualized Career System (EPICS), leadership criteria development, recruit/post-recruit training personnel attrition, enhancement of generic problem-solving ability among Naval Officers, and development of training standards for collective tasks performed by combat service support groups.

The benefits of this effort include the following: (a) solution of many training problems in the Navy through the introduction of more individualized, automated, and simulator-based instruction, better training standards for all unit levels, and improved less manpower-intensive procedures for matching training to job requirements, (b) deferred and reduced shore-based training for first-term enlistees, with on-job effectiveness maintained through EPICS, (b) reduced costs of preparing instructional materials for critical programs through use of authoring instructional materials, (d) more lower-cost practice of critical skills through advanced computer-aided instruction, (e) reduced training time, improved student motivation, and increased ability to perform critical tasks through functional context training, (f) improved decision-making about the use of computer-based training technology, (g) reduced scheduling inefficiencies and improved training outcomes through training resource management, and (h) improved performance in multi-ship, multi-threat warfare through team training instructional system development.

(CONTINUATION)

IV-A-5 : LISTING OF NAVY IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES

62131M						MARINE CORPS LANDING FORCE TECHNOLOGY
CC31-522	NPRDC	0.301	0.231	ET	4	TRAINING TECHNOLOGY
	TOTAL:	0.301	0.231	(EDUCATION AND TRAINING IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 62131M :						
						FY87

THE PRESIDENT'S BUDGET, JANUARY 1987						0.625

						FY88

						0.477

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(CONTINUATION)

IV-A-5 : LISTING OF NAVY IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
62233N						MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION
RR63-522	NPRDC	1.805	1.939	ET	6	EDUCATION AND TRAINING TECHNOLOGY
	TOTAL:	1.806	1.939	(EDUCATION AND TRAINING IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 62233N :						
						FY87 FY88

						8.176 8.472

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(CONTINUATION)

IV-A-5 : LISTING OF NAVY IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63720N						EDUCATION AND TRAINING
R1772	NPRDC	4.759	7.699	ET	6	EDUCATION AND TRAINING DEVELOPMENT
	TOTAL:	4.760	7.700			(EDUCATION AND TRAINING IN PE)
TOTAL FUNDING IN PROGRAM ELEMENT 63720N :						
						FY87 FY88
	THE PRESIDENT'S BUDGET, JANUARY 1987					4.759 7.699

CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: HUMAN FACTORS
DoD ORGANIZATION: NAVY
CONTRIBUTING PROGRAM ELEMENTS: 61153N DEFENSE RESEARCH SCIENCES,
SUBELEMENT 42: BEHAVIORAL AND ORGANIZATIONAL SCIENCES
62234N SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA
63701N HUMAN FACTORS ENGINEERING DEVELOPMENT
63739N NAVY LOGISTICS PRODUCTIVITY

SYNOPSIS:

The objectives of the Navy effort in Human Factors are to: (a) develop enhanced group decision-making procedures through research in decision making, perception, and human-computer interaction, (b) develop technology to manage and present information for rapid and accurate assimilation, (c) develop a systems-oriented human performance database, the methods to define human functional capabilities, and the interface requirements in the context of aviation systems and missions, (d) provide Navy systems developers with the resources and expertise to implement advanced concepts, (e) improve combat effectiveness and survivability through applications of man-machine integration methods in the design and updating of airborne systems, (f) design, develop, test, and evaluate new process control techniques for improving the quality and productivity of the repair and overhaul of Navy ships and aircraft, (g) improve the process of identifying, applying, and evaluating new technology in Navy shore support activities, and (h) develop and utilize more human factors engineering (HFE) techniques to help solve man-machine interface problems.

Developmental efforts include: (a) systematic knowledge/technology bases and appropriate assessment methods for matching performance capabilities to system requirements, (b) adaptive interactive displays, expert systems, and computer-based aids for enhanced decision making, (c) improved systems design in combat/engineering systems, shipboard administration and logistical data processing, and electronic maintenance and troubleshooting, (d) quality control and productivity in the repair and overhaul of ships and aircraft, and (e) identification and application of state-of-the-art technology to critical repair, maintenance, and acquisition problems in support functions.

(CONTINUATION)

IV-A-6 : LISTING OF NAVY IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
62234N						SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA
RS57-525	NPRDC	3.585	3.765	HF 4		HUMAN FACTORS TECHNOLOGY
	TOTAL:	3.586	3.766	(HUMAN FACTORS IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 62234N :						
						FY87 FY88
	THE PRESIDENT'S BUDGET, JANUARY 1987					3.585 3.765

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(CONTINUATION)

IV-A-6 : LISTING OF NAVY IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63701M						HUMAN FACTORS ENGINEERING DEVELOPMENT
R1771	NPRDC	1.615	3.144	HF	4	GENERAL HUMAN FACTORS ENGINEERING DEVELOPMENT
W0542	NADC	0.810	1.650	HF	4	AIR HUMAN FACTORS ENGINEERING TECHNOLOGY
	TOTAL:	2.425	4.795			(HUMAN FACTORS IN PE)
TOTAL FUNDING IN PROGRAM ELEMENT 63701M :						
						FY87 FY88
	THE PRESIDENT'S BUDGET, JANUARY 1987					2.425 4.794

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(CONTINUATION)

IV-A-6 : LISTING OF NAVY IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63739N						NAVY LOGISTICS PRODUCTIVITY
T1885	NPRDC	0.000	0.589	HF	3	METHODS FOR MANAGING QUALITY IMPROVEMENT IN NAVY MAINTENANCE ACTIVITIES
T1886	NPRDC	0.000	0.392	HF	3	EFFECTIVE IMPLEMENTATION OF NEW TECHNOLOGY
TOTAL:		0.000	0.982	(HUMAN FACTORS IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 63739N :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	0.000	0.981

CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: MANPOWER & PERSONNEL
DoD ORGANIZATION: NAVY
CONTRIBUTING PROGRAM ELEMENTS: 61153N DEFENSE RESEARCH SCIENCES,
SUBELEMENT 42: BEHAVIORAL AND ORGANIZATIONAL SCIENCES
62131M MARINE CORPS LANDING FORCE TECHNOLOGY
62233N MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA
63707N MANPOWER AND PERSONNEL SYSTEMS DEVELOPMENT
63732M ADVANCED MANPOWER/TRAINING SYSTEMS
64703N PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS

SYNOPSIS:

The objectives of the Navy effort in Manpower and Personnel are to: (a) increase understanding of the psychological and organizational variables that determine the performance of individuals, groups, teams, and units, (b) develop and evaluate systems to improve manpower requirements determination and personnel utilization, and (c) develop managerial and statistical concepts and techniques that will lead to more cost-effective personnel management.

The major areas of activity for this effort include development of: (a) theories and models of small, task-oriented team performance, (b) a computerized adaptive testing (CAT) system to replace the Armed Services Vocational Aptitude Battery (ASVAB) for selection and classification, (c) a neuro-electric and neuro-magnetic recording capability as part of the biopsychometric measurement project, (d) user-friendly techniques to summarize and synthesize data to enhance manpower decision making and improve force management capabilities at reduced data management costs, (e) a methodology for developing reliable, valid, and useable job proficiency testing for Marine Corps enlisted personnel, (f) methods for improving the Navy selection/assignment process, recruiting techniques, retention of high-quality personnel, and personnel motivation and productivity, (g) enlistment selection criteria which is related to successful job performance, and (h) technology to increase training efficiency and effectiveness, and to improve training software transportability.

The benefit of the Navy efforts in this area will be improved personnel utilization and increased readiness through increased the ability to respond to a wide variety of manpower/personnel issues.

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IV-A-7 : LISTING OF NAVY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62131M						MARINE CORPS LANDING FORCE TECHNOLOGY
CC31-521	NPRDC	0.324	0.246	MP	2	MANPOWER TECHNOLOGY
	TOTAL:	0.325	0.247	(MANPOWER AND PERSONNEL IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 62131M :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	0.625	0.477

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(CONTINUATION)

IV-A-7 : LISTING OF NAVY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
62233N						MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION
RR63-521	NPRDC	2.962	3.069	MP	2	MANPOWER AND PERSONNEL TECHNOLOGY
	TOTAL:	2.963	3.069	(MANPOWER AND PERSONNEL IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 62233N :						
						FY87
THE PRESIDENT'S BUDGET, JANUARY 1987						8.176
						FY88
						8.472

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(CONTINUATION)

IV-A-7 : LISTING OF NAVY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63707N						MANPOWER AND PERSONNEL SYSTEMS DEVELOPMENT
R1770	NPRDC	2.855	4.019	MP	2	MANPOWER AND PERSONNEL DEVELOPMENT
	TOTAL:	2.855	4.020	(MANPOWER AND PERSONNEL IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 63707N :						
						FY87
						<u>2.855</u>
						FY88
						<u>4.019</u>

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(CONTINUATION)

IV-A-7 : LISTING OF NAVY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63732M						ADVANCED MANPOWER/TRAINING SYSTEMS
C0073	HQMC	1.782	3.214	MP	1A	HUMAN RESOURCES MANAGEMENT AND FORECASTING
	TOTAL:	1.782	3.214			(MANPOWER AND PERSONNEL IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 63732M :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	1.782	3.214

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IV-A-7 : LISTING OF NAVY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64703N						PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS
R1822	NPRDC	0.950	3.107	MP	2	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS
	TOTAL:	0.951	3.108			(MANPOWER AND PERSONNEL IN PE)
TOTAL FUNDING IN PROGRAM ELEMENT 64703N :						
						FY87 FY88
	THE PRESIDENT'S BUDGET, JANUARY 1987					0.950 3.107

CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES
DoD ORGANIZATION: NAVY
CONTRIBUTING PROGRAM ELEMENTS: 62233N MISSION SUPPORT TECHNOLOGY:
PERSONNEL, TRAINING AND
SIMULATION TECHNOLOGY AREA
63732M ADVANCED MANPOWER/TRAINING SYSTEMS
63733N SIMULATION AND TRAINING DEVICES
64714N AIR WARFARE TRAINING DEVICES
64715N SURFACE WARFARE TRAINING DEVICES

SYNOPSIS:

The objectives of the Navy effort in Simulation and Training Devices are to: (a) develop technology to improve the training effectiveness of existing Navy simulators and training devices, and to lower their costs, (b) develop new trainers for weapon system training, flight training, and maintenance training, (c) upgrade the operational capability of Navy ASW aircraft with improved acoustic and non-acoustic sensors, (d) develop a training system for specialized ships, (e) develop a generic training system to replace obsolete/obsolescent devices for team tactical training, and (f) conduct front-end analysis of specific training problems by defining requirements/shortfalls, training objectives, and student loading, and identifying alternate solutions with related cost/training effectiveness tradeoffs.

Developmental efforts include: (a) a prototype automated system to facilitate transfer of knowledge from a subject matter expert to an intelligent training system, (b) visual and sensor simulation for AI-based trainer designs, (c) realistic battle group-level training for senior Naval officers and their staffs, (d) a training device to provide individual and team training, (e) a training system to provide training in equipment operation, data acquisition/interpretation, and utilization in tactical combat exercises, (f) two trainers to meet the increasing need to train AIC and ASAC personnel, (g) a trainer for dynamic team training in skills essential to qualify enlisted ratings assigned to Combat Information Centers (CICs), (h) a modification of the TACDEW system to provide more modern radar capabilities, and incorporate a state-of-the-art problem control and evaluation subsystem, (i) training devices to replace the obsolete devices currently used to provide ASW team training, (j) operator/team trainers in electronic/acoustic surveillance in ASW operations, maintenance trainers for various electronic/acoustic devices and trainers, and other stimulation/simulation training device techniques, and (k) training requirements, through the HARDMAN study, for the Surface Warfare Community, and individually tailored, detailed trainer/training systems selection procedures.

(CONTINUATION)

IV-A-8 : LISTING OF NAVY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63733N						SIMULATION AND TRAINING DEVICES
W1773	NTSC	6.465	8.457	ST	6	SIMULATION AND TRAINING DEVICES
	TOTAL:	6.466	8.457			(SIMULATION AND TRAINING DEVICES IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 63733N :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	6.465	8.457

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(CONTINUATION)

IV-A-8 : LISTING OF NAVY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64714N						AIR WARFARE TRAINING DEVICES
W1878	NTSC	0.000	1.927	ST 6		ASW TABLE TOP TRAINER
	TOTAL:	0.000	1.928			(SIMULATION AND TRAINING DEVICES IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 64714N :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	0.000	1.927

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IV-A-8 : LISTING OF NAVY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
64715N						SURFACE WARFARE TRAINING DEVICES
S1126	NTSC	0.000	4.524	ST 6		SURFACE TOMAHAWK TRAINER
S1140	NTSC	1.274	3.397	ST 6		TACTICAL ADVANCED COMBAT DIRECTION ELECTRONIC WARFARE (TACDEW) MODIFICATIONS
S1427	NTSC	9.548	5.619	ST 6		SURFACE TACTICAL TEAM TRAINERS
S1436	NTSC	1.663	0.485	ST 6		SURFACE WARFARE TRAINING ANALYSIS
S1834	NTSC	10.927	3.173	ST 6		LANDING CRAFT AIR CUSHION (LCAC) OPERATOR TRAINER
TOTAL:		23.413	17.198			(SIMULATION AND TRAINING DEVICES IN PE)
TOTAL FUNDING IN PROGRAM ELEMENT 64715N :						
					FY87	FY88
					23.412	17.198

CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: EDUCATION & TRAINING

DoD ORGANIZATION: AIR FORCE

CONTRIBUTING
PROGRAM ELEMENTS: 62205F PERSONNEL, TRAINING, AND
SIMULATION

63227F PERSONNEL, TRAINING, AND
SIMULATION TECHNOLOGY

SYNOPSIS:

The objectives within this area include the: (a) development of flight simulator hardware which will improve training and reduce training costs, (b) design and development of better simulators for maintenance training to eliminate the need for expensive operational equipment, (c) design and development of computer-based instructional technologies for technical and flight training, (d) development of improved courseware, training delivery options, training aids, and related products, (e) development of technology and programs to train, assess and aid command and control operators, especially in combat-related activities, and (f) development of new training technologies and logistics support methods which are expected to increase the productivity of Air Force personnel, improve the cost-effectiveness of technical and flight training, and result in enhanced operational readiness.

Recently completed accomplishments include: (a) development and testing of Air Force officer and enlisted specialty performance measurement technology, (b) initiating validation of the high school version of the Armed Services Vocational Aptitude Battery (ASVAB), (c) completion of the improved user-friendly Comprehensive Occupational Data Analysis Program (CODAP) software system, (d) development of instructional modules for identified job prerequisites, (e) development of specifications for evaluation of training effectiveness, and (f) development of initial specifications for the advanced Training Decision System (TDS).

Future efforts will continue to focus on the design, development and evaluation of new technologies for training personnel in technical areas such as maintenance, command and control, and flight training. Software and hardware developments in the areas of training, training management and aircraft logistics support will be pursued to provide enhanced training capabilities, improved C2 and C3 systems, and resulting benefits to overall personnel utilization and productivity.

(CONTINUATION)

IV-A-9 : LISTING OF AF IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
63227F						PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY
2364	AFHRL	0.400	0.380	ET	6	TRAINING AND PERFORMANCE DATA CENTER
2949	AFHRL	0.530	0.615	ET	6	BASIC JOB SKILLS ASSESSMENT AND ENHANCEMENT
2951	AFHRL	0.150	0.200	ET	6	TRAINING DECISIONS SYSTEM
	TOTAL:	1.081	1.196	(EDUCATION AND TRAINING IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 63227F :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	7.475	10.902

CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: HUMAN FACTORS
DoD ORGANIZATION: AIR FORCE
CONTRIBUTING PROGRAM ELEMENTS: 61102F DEFENSE RESEARCH SCIENCES
62202F AEROSPACE BIOTECHNOLOGY
62205F PERSONNEL, TRAINING, AND SIMULATION
63106F LOGISTICS SYSTEMS TECHNOLOGY
63231F CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY

SYNOPSIS:

The overall goal of the Air Force efforts in Human Factors is support of the planning, design and procurement of new aerospace systems. The main criteria for systems design are operability and maintainability, with concern also focused on survivability in hostile combat environments.

The basic assumption is that systems can be designed to be compatible with human capabilities and limitations. Objectives are to: (a) improve selection of personnel for appropriate jobs on the basis of measured mental abilities and sensory-motor skills, (b) design equipment to optimally match human workload and performance, (c) improve human performance in weapon systems and operations by refining crew selection, (d) establish threat characterization and integration into military space systems, (e) provide advanced development and demonstration of concepts to extend the performance of the crewman in the aerospace environment, (f) respond to the requirements of optimally integrating man into future military space systems, and (g) develop better training technologies to increase efficiency and productivity of Air Force personnel.

Recently completed accomplishments include: (a) theoretical and experimental work on human performance that explains performance in terms of allocation of a fixed processing resource among two or more competing tasks, (b) empirically tested evidence for a theory of visual discrimination, (c) initial design efforts for a multi-sensor, multi-cockpit combat mission training capability, and (d) efforts to analyze existing NASA and DoD programs for impact on military space crew members.

Efforts will continue in the areas of: (a) visual information processing, (b) development of new workload metrics, (c) performance prediction based on systematic investigation of parameters of learning ability, (d) development of dynamic models to predict operator stress limits and performance effectiveness, (e) development of design criteria and mission planning guides to reduce operator overload and optimize man-machine integration, (f) design and development of integrated display/control systems for airborne and aerospace missions, (g) development of needed tools and methodologies to extend air/aerospace (h) development of human factors performance definitions and design criteria applicable to demonstration of military crew stations for advanced aerospace systems, and (i) pursue improvements and cost savings in training and management of personnel i.e., simulation technology and computer technology.

(CONTINUATION)

IV-A-10 : LISTING OF AF IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
62202F						AEROSPACE BIOTECHNOLOGY
06MD	AMD	7.876	7.520	HF	4	AEROSPACE MEDICAL DIVISION LABORATORY OPERATIONS
6893	AMD	1.435	1.550	HF	4	MANNED WEAPON SYSTEMS EFFECTIVENESS
7184	AMD	5.892	6.350	HF	4	MAN-MACHINE INTEGRATION TECHNOLOGY
TOTAL:		15.203	15.420	(HUMAN FACTORS IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 62202F :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	15.203	15.420

(CONTINUED)

(CONTINUATION)

IV-A-10 : LISTING OF AF IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
62205F						PERSONNEL, TRAINING, AND SIMULATION
06HT-3	AFHRL	1.822	1.880	HF	V A R	LABORATORY SUPPORT
1710	AFHRL	3.808	4.557	HF	4	LOGISTICS AND MAINTENANCE TECHNOLOGY
	TOTAL:	5.631	6.438	(HUMAN FACTORS IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 62205F :						
						FY87
THE PRESIDENT'S BUDGET, JANUARY 1987						32.475
						FY88
						35.937

(CONTINUED)

(CONTINUATION)

IV-A-10 : LISTING OF AF IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
63106F						LOGISTICS SYSTEMS TECHNOLOGY
2745	AFHRL	0.655	0.075	HF	4A	LOGISTICS FOR COMBAT READINESS MAINTENANCE
2940	AFHRL	7.142	6.025	HF	4D	COMPUTER TECHNOLOGY FOR SYSTEMS DESIGN AND MAINTENANCE
2950	AFHRL	2.943	6.647	HF	4D	INTEGRATED MAINTENANCE INFORMATION SYSTEM
	TOTAL:	10.741	12.748	(HUMAN FACTORS IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 63106F :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	10.740	12.747

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(CONTINUATION)

IV-A-10 : LISTING OF AF IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
63231F						CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY
2829	AMD	6.149	6.544	HF	4	COCKPIT AUTOMATION TECHNOLOGY (CAT)
2992	AMD	0.646	0.973	HF	4	SPACE CREW ENHANCEMENT
	TOTAL:	6.796	7.518	(HUMAN FACTORS IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 63231F :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	6.795	7.517

CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: MANPOWER & PERSONNEL
DoD ORGANIZATION: AIR FORCE
CONTRIBUTING PROGRAM ELEMENTS: 61102F DEFENSE RESEARCH SCIENCES
62205F PERSONNEL, TRAINING, AND SIMULATION
63227F PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY

SYNOPSIS:

The objective of work in the Manpower and Personnel area is to incorporate two interrelated streams of research designed to address the problems involved in acquiring and maintaining a quality force by developing the technology to enhance selection, assignment, training and retention of that force.

The Air Force efforts require a continuing supply of high-quality personnel who can operate and maintain sophisticated weapon and support systems. To this end, research efforts intend to: (a) develop and validate personnel testing procedures, (b) determine and measure specific requirements for Air Force jobs, (c) improve the process for matching individuals to jobs, (d) develop models and strategies to improve retention, (e) develop comprehensive skills management and reenlistment/career assignment programs, (f) measure and evaluate job performance and link enlistment standards to on-the-job performance, and (g) automate procedures to address fundamental training management issues.

Recent accomplishments include: (a) an integrated pilot selection system using perceptual and psychomotor measures, (b) completion of development of ninth and tenth grade norms for the Armed Services Vocational Aptitude Battery (ASVAB), (c) implementation of a new edition of the Air Force Officer Qualifying Test (AFOQT) and of a field-tested officer training school selection system, (d) completion of a model to select candidates for medical school scholarships and a database tracking system to provide long-term validity of the selection policy, and (e) completion of a model to determine both pre- and post-enlistment factors influencing career interests and actual separation or retention behavior.

Research efforts will continue to: (a) revise the AFOQT and subsets of the ASVAB, (b) develop, demonstrate and evaluate computer systems for use in selection and classification, (c) detail assessment of job specifications and skill requirements, (d) evaluate a variety of personnel assignment algorithms, and (e) improve and implement training decision systems.

(CONTINUATION)

IV-A-11 : LISTING OF AF IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
62205F						PERSONNEL, TRAINING, AND SIMULATION
06HT-4	AFHRL	2.143	2.212	MP	V A R	LABORATORY SUPPORT
7719	AFHRL	3.550	3.893	MP	2	FORCE ACQUISITION AND DISTRIBUTION SYSTEM
7734	AFHRL	1.060	1.331	MP	3	FORCE MANAGEMENT SYSTEM
	TOTAL:	<u>6.754</u>	<u>7.437</u>	(MANPOWER AND PERSONNEL IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 62205F :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	<u>32.475</u>	<u>35.937</u>

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(CONTINUATION)

IV-A-11 : LISTING OF AF IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
63227F						PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY
2922	AFHRL	0.780	0.833	MP	2	PERSONNEL ASSESSMENT SYSTEMS
	TOTAL:	0.780	0.834	(MANPOWER AND PERSONNEL IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 63227F :						
						FY87
THE PRESIDENT'S BUDGET, JANUARY 1987						7.475
						FY88
						10.902

CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES
DoD ORGANIZATION: AIR FORCE
CONTRIBUTING PROGRAM ELEMENTS: 62205F PERSONNEL, TRAINING, AND SIMULATION
63227F PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY
63751F TRAINING SYSTEMS TECHNOLOGY
64227F FLIGHT SIMULATOR DEVELOPMENT

SYNOPSIS:

The main objective in the Simulation and Training Devices area is the continuing development of aircrew flight simulator techniques and training devices. This work explores technologies such as computer image generation, holography, digital imaging, radar simulation, embedded training concepts, and infrared systems. Some visual simulation objectives include better image definition, color representation, and image dynamics, development of full field of view displays, and the accurate representation of special sensors.

While much of the focus is on pilot and navigator training, particularly in training and retraining of combat skills, attention is also being given to command and control and maintenance functions. Research efforts intend to: (a) upgrade trainers and simulators to provide greater realism and to improve the concurrency between changing aircraft features and flight simulators, (b) reduce life cycle costs, (c) integrate a variety of hardware and software systems, (d) improve the instructional features of equipment, (e) develop multi-task as well as part-task trainers, (f) develop computer-based systems for authoring of training, information presentation, drill and practice, testing and evaluation, and training management, (g) develop databases, including transportable databases, for simulation programs, (h) develop continuation training and mission/upgrade training, (i) develop integrated crew training, (j) develop simulated video, environmental effects and gaming scenarios, and (k) simulate day, night, under-the-weather conditions for training pilots and navigators.

Recent achievements within this category include the development of an operational flight trainer which provides a training environment for the EF-111 mission, including the capability of simulating the central European radar environment and all aircraft flight profiles.

(CONTINUATION)

IV-A-12 : LISTING OF AF IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63227F						PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY
2363	AFHRL	1.385	2.215	ST	6	ADVANCED VISUAL TECHNOLOGY SYSTEM
2557	AFHRL	1.848	2.101	ST	6	ADVANCED ON-THE-JOB TRAINING SYSTEM (AOTS)
2743	AFHRL	2.371	4.526	ST	6	AIRCREW COMBAT MISSION ENHANCEMENT
3056	AFHRL	0.011	0.032	ST	6	AIR COMBAT ASSESSMENT AND DEBRIEFING SYSTEM
	TOTAL:	5.616	8.874			(SIMULATION AND TRAINING DEVICES IN PE)
TOTAL FUNDING IN PROGRAM ELEMENT 63227F :						
						FY87 FY88
	THE PRESIDENT'S BUDGET, JANUARY 1987					7.475 10.902

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(CONTINUATION)

IV-A-12 : LISTING OF AF IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63751F						TRAINING SYSTEMS TECHNOLOGY
3057	AFHRL	0.000	0.276	ST	6	INTELLIGENT COMPUTER-ASSISTED TRAINING
	TOTAL:	0.000	0.277	(SIMULATION AND TRAINING DEVICES IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 63751F :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	0.000	0.276

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(CONTINUATION)

IV-A-12 : LISTING OF AF IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
64227F						FLIGHT SIMULATOR DEVELOPMENT
2325	SIMSP0	8.400	6.900	ST 6		SIMULATOR DEVELOPMENT ACTIVITIES
2632	SIMSP0	5.000	0.000	ST 6		B-52 OFFENSIVE AVIONICS STATION
2687	SIMSP0	0.098	0.000	ST 6		EF-111A OPERATIONAL FLIGHT TRAINER (OFT)
2769	SIMSP0	2.947	6.946	ST 6		SIMULATOR UPDATE DEVELOPMENT
2851	SIMSP0	2.947	3.000	ST 6		STANDARD DEPARTMENT OF DEFENSE (DOD) SIMULATOR DATA BASE/Common TRANSFORMATION PROGRAM
2854/5	SIMSP0	0.196	0.000	ST 6		C-5/C-141 AERIAL REFUELING PART TASK TRAINER
2901	SIMSP0	13.700	0.761	ST 6		B-1B WEAPON SYSTEM TRAINER (WST)
2903	SIMSP0	1.964	0.000	ST 6		F-15/F-16 SIMULATOR FOR AIR-TO-AIR COMBAT (SAAC)
2968	SIMSP0	1.909	3.500	ST 6		MODULAR SIMULATOR DESIGN
2997	SIMSP0	8.750	2.670	ST 6		GBU-15 PART TASK TRAINER
2998	SIMSP0	18.155	7.713	ST 6		LANTIRN SIMULATOR
2999	SIMSP0	6.720	8.375	ST 6		LANTIRN PART TASK TRAINER
3000	SIMSP0	11.838	6.433	ST 6		KC-135 OPERATIONAL FLIGHT TRAINER
3105	SIMSP0	6.400	0.196	ST 6		F-15E WEAPON SYSTEM TRAINER (WST)
3135	SIMSP0	2.588	2.188	ST 6		ADVANCED TRAINING SYSTEM
3143	SIMSP0	0.200	1.909	ST 6		ADVANCED TACTICAL FIGHTER (ATF)
3147	SIMSP0	2.700	0.000	ST 6		ADA SIMULATOR INSERTION
3282	SIMSP0	1.900	11.110	ST 6		C-17 AIRCREW TRAINING SYSTEM

(CONTINUED)

(CONTINUATION WITHIN PE 64227F)

IV-A-12 : LISTING OF AF IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
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TOTAL: ----- -----
 96.412 61.701 (SIMULATION AND TRAINING DEVICES IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 64227F :	<u>FY87</u>	<u>FY88</u>
THE PRESIDENT'S BUDGET, JANUARY 1987	96.412	61.701

IV.B. MANPOWER, PERSONNEL AND TRAINING PROGRAM
GOAL LISTINGS

GOALS AND SUB-GOALS	PAGE
1. Management Tradeoffs	IV-B-1
A. Manpower Models and Trade-Offs	
B. Compensation Issues	
C. Career Issues	
D. Reserve Issues	
E. Military-Civilian Issues	
F. Organizational Issues	
G. Mobilization Issues	
H. Equal Opportunity Issues	
I. National Trends	
J. Presidential and Congressional Issues	
K. Studies with Foreign Affairs/Policy Implications	
2. Accession and Retention	IV-B-2
A. Forecasting of Supply	
B. Skills and Specialties	
C. Recruiting System Issues	
D. Selection and Classification	
E. Reserve Manpower	
3. Unit Productivity	IV-B-3
A. Measurement/Prediction of Individual and Unit	
B. Enhancement of Individual and Unit	
C. Effectiveness/Analysis and Trade-offs of Methods and Processes	
4. Designing for System Readiness	IV-B-4
A. Front-end Analytical Techniques	
B. Human Capabilities and Design Criteria	
C. Techniques/Methods for Improved Operability	
D. Techniques/Methods for Improved Maintainability	
E. Test, Evaluation and Effectiveness Measurement Methods	

(continued on next page)

GOAL LISTINGS
(continued)

- | | |
|---|--------|
| 5. Improved Sustainability | IV-B-5 |
| A. Maintaining Individual and Unit Capabilities | |
| B. Improved Logistical Support | |
| C. Deficiency Measurement and Improvement | |
| D. Improved Technical Documentation | |
| E. Wartime Factors of Special Concern | |
| F. Routine Effectiveness Issues | |
| G. Combat Effectiveness Issues | |
| 6. Training Systems | IV-B-6 |
| A. Management Trade-offs | |
| B. Acquisition Issues | |
| C. Utilization Issues | |
| D. Cost-Effectiveness Issues | |
| E. Design and Analytical Issues and Methods | |
| F. Improved Instructional Strategies | |
| G. Critical Technologies | |
| H. Support System Issues | |
| Various | IV-B-7 |

(CONTINUATION)

IV-B-2 : LISTING OF ARMY IN GOAL 2 -- ACCESSION AND RETENTION

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63007A						HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
A792	ARI	7.693	15.323	MP	2	MANPOWER AND PERSONNEL
		<u>7.694</u>	<u>15.323</u>			TOTAL GOAL 2 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63007A :						
						FY87 FY88
						<u>27.151</u> <u>38.164</u>

(CONTINUED)

(CONTINUATION)

IV-B-2 : LISTING OF NAVY IN GOAL 2 -- ACCESSION AND RETENTION

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62131M						MARINE CORPS LANDING FORCE TECHNOLOGY
CC31-521	NPRDC	0.324	0.246	MP	2	MANPOWER TECHNOLOGY
		<u>0.325</u>	<u>0.247</u>			TOTAL GOAL 2 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62131M :						
						FY87 FY88
						<u>0.625</u> <u>0.477</u>

(CONTINUED)

(CONTINUATION)

IV-B-2 : LISTING OF NAVY IN GOAL 2 -- ACCESSION AND RETENTION

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62233N						MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA
RR63-521	NPRDC	2.962	3.069	MP	2	MANPOWER AND PERSONNEL TECHNOLOGY
		<u>2.963</u>	<u>3.069</u>			TOTAL GOAL 2 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62233N :						
						FY87
						<u>8.176</u>
THE PRESIDENT'S BUDGET, JANUARY 1987						FY88
						<u>8.472</u>

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(CONTINUATION)

IV-B-2 : LISTING OF NAVY IN GOAL 2 -- ACCESSION AND RETENTION

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63707N						MANPOWER AND PERSONNEL SYSTEMS DEVELOPMENT
R1770	NPRDC	2.855	4.019	MP	2	MANPOWER AND PERSONNEL DEVELOPMENT
		-----	-----			
		2.855	4.020			TOTAL GOAL 2 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63707N :						
						FY87 FY88

						2.855 4.019

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(CONTINUATION)

IV-B-2 : LISTING OF NAVY IN GOAL 2 -- ACCESSION AND RETENTION

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64703N						PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS
R1822	NPRDC	0.950	3.107	MP	2	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS
		-----	-----			
		0.951	3.108			TOTAL GOAL 2 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 64703N :						
						FY87

						0.950
						FY88

						3.107

(CONTINUED)

(CONTINUATION)

IV-B-2 : LISTING OF AF IN GOAL 2 -- ACCESSION AND RETENTION

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
61102F						DEFENSE RESEARCH SCIENCES
2313-T1	AFHRL	0.885	0.885	MP	2	LEARNING ABILITIES MEASUREMENT PROGRAM
		<u>0.886</u>	<u>0.886</u>			TOTAL GOAL 2 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 61102F :						
						FY87 FY88
						<u>7.582</u> <u>8.520</u>

(CONTINUED)

(CONTINUATION)

IV-B-2 : LISTING OF AF IN GOAL 2 -- ACCESSION AND RETENTION

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62205F						PERSONNEL, TRAINING, AND SIMULATION
7719	AFHRL	3.550	3.893	MP	2	FORCE ACQUISITION AND DISTRIBUTION SYSTEM
		-----	-----			
		3.550	3.894			TOTAL GOAL 2 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62205F :						
						FY87 FY88
						----- -----
	THE PRESIDENT'S BUDGET, JANUARY 1987					32.475 35.937

(CONTINUED)

(CONTINUATION)

IV-B-2 : LISTING OF AF IN GOAL 2 -- ACCESSION AND RETENTION

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES	
63227F						PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY	
2922	AFHRL	0.780	0.833	MP	2	PERSONNEL ASSESSMENT SYSTEMS	
		-----	-----				
		0.780	0.834			TOTAL GOAL 2 IN PE	
TOTAL FUNDING IN PROGRAM ELEMENT 63227F :							
						FY87	FY88
						-----	-----
						7.475	10.902

(CONTINUATION)

IV-B-3 : LISTING OF NAVY IN GOAL 3 -- UNIT PRODUCTIVITY

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
61153N						DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: BEHAVIORAL AND ORGANIZATIONAL SCIENCES
RR04208	ONR	2.806	2.456	MP	3	GROUP PSYCHOLOGY
		<u>2.806</u>	<u>2.457</u>			TOTAL GOAL 3 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 61153N :						
						FY87 FY88
						<u>11.690</u> <u>10.232</u>

(CONTINUED)

(CONTINUATION)

IV-B-3 : LISTING OF NAVY IN GOAL 3 -- UNIT PRODUCTIVITY

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63739N						NAVY LOGISTICS PRODUCTIVITY
T1885	NPRDC	0.000	0.589	HF	3	METHODS FOR MANAGING QUALITY IMPROVEMENT IN NAVY MAINTENANCE ACTIVITIES
T1886	NPRDC	0.000	0.392	HF	3	EFFECTIVE IMPLEMENTATION OF NEW TECHNOLOGY
		-----	-----			
		0.000	0.982			TOTAL GOAL 3 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63739N :						
						FY87

						0.000
						FY88

						0.981

(CONTINUED)

(CONTINUATION)

IV-B-3 : LISTING OF AF IN GOAL 3 -- UNIT PRODUCTIVITY

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62205F						PERSONNEL, TRAINING, AND SIMULATION
7734	AFHRL	1.060	1.331	MP	3	FORCE MANAGEMENT SYSTEM
		<u>1.060</u>	<u>1.331</u>			TOTAL GOAL 3 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62205F :						
						FY87 FY88
						<u>32.475</u> <u>35.937</u>

(CONTINUATION)

IV-B-4 : LISTING OF ARMY IN GOAL 4 -- DESIGNING FOR SYSTEM READINESS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62716A						HUMAN FACTORS ENGINEERING TECHNOLOGY
AH70	HEL	12.248	9.649	HF	4	HUMAN FACTORS ENGINEERING SYSTEM DEVELOPMENT
		-----	-----			
		12.248	9.649			TOTAL GOAL 4 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62716A :						
						FY87 FY88
						----- -----
						THE PRESIDENT'S BUDGET, JANUARY 1987 17.359 15.372

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(CONTINUATION)

IV-B-4 : LISTING OF ARMY IN GOAL 4 -- DESIGNING FOR SYSTEM READINESS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A790-1	ARI	2.669	2.692	HF	4	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION
		-----	-----			
		2.670	2.692			TOTAL GOAL 4 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62785A :						
						FY87 FY88
						----- -----
						THE PRESIDENT'S BUDGET, JANUARY 1987 15.216 15.581

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(CONTINUATION)

IV-B-4 : LISTING OF ARMY IN GOAL 4 -- DESIGNING FOR SYSTEM READINESS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63007A						HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
A793	ARI	7.693	8.215	HF	4	HUMAN FACTORS IN TRAINING AND OPERATIONAL EFFECTIVENESS
		-----	-----			
		7.694	8.215			TOTAL GOAL 4 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63007A :						
						FY87

						THE PRESIDENT'S BUDGET, JANUARY 1987
						27.151

						FY88

						38.164

(CONTINUED)

(CONTINUATION)

IV-B-4 : LISTING OF NAVY IN GOAL 4 -- DESIGNING FOR SYSTEM READINESS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
61153N						DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: BEHAVIORAL AND ORGANIZATIONAL SCIENCES
RR04209	ONR	2.455	2.149	HF	4	ENGINEERING PSYCHOLOGY
		2.455	2.149			TOTAL GOAL 4 IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 61153N :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	11.690	10.232

(CONTINUED)

(CONTINUATION)

IV-B-4 : LISTING OF NAVY IN GOAL 4 -- DESIGNING FOR SYSTEM READINESS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62131M						MARINE CORPS LANDING FORCE TECHNOLOGY
CC31-522	NPRDC	0.301	0.231	ET	4	TRAINING TECHNOLOGY
		<u>0.301</u>	<u>0.231</u>	TOTAL GOAL 4 IN PE		
TOTAL FUNDING IN PROGRAM ELEMENT 62131M :						
						FY87
THE PRESIDENT'S BUDGET, JANUARY 1987						<u>0.625</u>
						FY88
						<u>0.477</u>

(CONTINUED)

(CONTINUATION)

IV-B-4 : LISTING OF NAVY IN GOAL 4 -- DESIGNING FOR SYSTEM READINESS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62234N						SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA
RS57-525	NPRDC	3.585	3.765	HF	4	HUMAN FACTORS TECHNOLOGY
		<u>3.586</u>	<u>3.766</u>			TOTAL GOAL 4 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62234N :						
						FY87
						<u>3.585</u>
						FY88
						<u>3.765</u>

(CONTINUED)

(CONTINUATION)

IV-B-4 : LISTING OF NAVY IN GOAL 4 -- DESIGNING FOR SYSTEM READINESS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63701N						HUMAN FACTORS ENGINEERING DEVELOPMENT
R1771	NPRDC	1.615	3.144	HF	4	GENERAL HUMAN FACTORS ENGINEERING DEVELOPMENT
W0542	NADC	0.810	1.650	HF	4	AIR HUMAN FACTORS ENGINEERING TECHNOLOGY
		-----	-----			
		2.425	4.795			TOTAL GOAL 4 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63701N :						
						FY87

						THE PRESIDENT'S BUDGET, JANUARY 1987
						2.425

						FY88

						4.794

(CONTINUED)

(CONTINUATION)

IV-B-4 : LISTING OF AF IN GOAL 4 -- DESIGNING FOR SYSTEM READINESS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
61102F						DEFENSE RESEARCH SCIENCES
2313-A4	AFOSR	1.758	2.500	HF	4	COGNITIVE SCIENCE
2313-A5	AFOSR	2.875	3.000	HF	4	VISUAL INFORMATION PROCESSING
2313-A6	AFOSR	1.229	1.300	HF	4	AUDITORY PATTERN RECOGNITION
2313-T3	AFHRL	0.230	0.230	HF	4	PERCEPTUAL AND COGNITIVE DIMENSIONS OF PILOT BEHAVIOR
2313-V1	AFAMRL	0.265	0.265	HF	4	ELECTROENCEPHALOGRAPHIC AND MAGNETENCEPHALOGRAPHIC INDICANTS OF COGNITIVE FUNCTION
2313-V2	AFAMRL	0.340	0.340	HF	4	BASIC VISION RESEARCH
		<u>6.698</u>	<u>7.636</u>			TOTAL GOAL 4 IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 61102F :

	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	<u>7.582</u>	<u>8.520</u>

(CONTINUED)

(CONTINUATION)

IV-B-4 : LISTING OF AF IN GOAL 4 -- DESIGNING FOR SYSTEM READINESS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62202F						AEROSPACE BIOTECHNOLOGY
06MD	AMD	7.876	7.520	HF	4	AEROSPACE MEDICAL DIVISION LABORATORY OPERATIONS
6893	AMD	1.435	1.550	HF	4	MANNED WEAPON SYSTEMS EFFECTIVENESS
7184	AMD	5.892	6.350	HF	4	MAN-MACHINE INTEGRATION TECHNOLOGY
		-----	-----			
		15.203	15.420			TOTAL GOAL 4 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62202F :						
						FY87 FY88
						----- -----
						THE PRESIDENT'S BUDGET, JANUARY 1987 15.203 15.420

(CONTINUED)

(CONTINUATION)

IV-B-4 : LISTING OF AF IN GOAL 4 -- DESIGNING FOR SYSTEM READINESS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62205F						PERSONNEL, TRAINING, AND SIMULATION
1710	AFHRL	3.808	4.557	HF	4	LOGISTICS AND MAINTENANCE TECHNOLOGY
		-----	-----			
		3.809	4.558			TOTAL GOAL 4 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62205F :						
						FY87 FY88
						----- -----
						THE PRESIDENT'S BUDGET, JANUARY 1987 32.475 35.937

(CONTINUED)

(CONTINUATION)

IV-B-4 : LISTING OF AF IN GOAL 4 -- DESIGNING FOR SYSTEM READINESS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
63106F						LOGISTICS SYSTEMS TECHNOLOGY
2745	AFHRL	0.655	0.075	HF	4A	LOGISTICS FOR COMBAT READINESS MAINTENANCE
2940	AFHRL	7.142	6.025	HF	4D	COMPUTER TECHNOLOGY FOR SYSTEMS DESIGN AND MAINTENANCE
2950	AFHRL	2.943	6.647	HF	4D	INTEGRATED MAINTENANCE INFORMATION SYSTEM
		-----	-----			
		10.741	12.748			TOTAL GOAL 4 IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63106F :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	-----	-----
	10.740	12.747

(CONTINUED)

(CONTINUATION)

IV-B-4 : LISTING OF AF IN GOAL 4 -- DESIGNING FOR SYSTEM READINESS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63231F						CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY
2829	AMD	6.149	6.544	HF	4	COCKPIT AUTOMATION TECHNOLOGY (CAT)
2992	AMD	0.646	0.973	HF	4	SPACE CREW ENHANCEMENT
		<u>6.796</u>	<u>7.518</u>			TOTAL GOAL 4 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63231F :						
						FY87 FY88
						<u>6.795</u> <u>7.517</u>

(CONTINUATION)

IV-B-5 : LISTING OF ARMY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62727A						NON-SYSTEM TRAINING DEVICES (NSTD) TECHNOLOGY
A230	PMTRADE	4.230	4.011	ST	6	NON-SYSTEM TRAINING DEVICES
		-----	-----			
		4.231	4.012			TOTAL GOAL 6 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62727A :						
						FY87 FY88
						----- -----
	THE PRESIDENT'S BUDGET, JANUARY 1987					4.230 4.011

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF ARMY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A790-2	ARI	1.583	1.865	ST	6	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION
A791-2	ARI	1.371	1.571	ET	6	MANPOWER, PERSONNEL AND TRAINING
		-----	-----			
		2.955	3.437			TOTAL GOAL 6 IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 62785A :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	-----	-----
	15.216	15.581

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF ARMY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63003A						AVIATION ADVANCED TECHNOLOGY
DB34	AVSCOM	5.225	5.057	ST	6	ROTORCRAFT SYSTEM INTEGRATION SIMULATOR (RSIS)
DB39	PMTRADE	5.476	1.723	ST	6	FLIGHT SIMULATOR COMPONENTS
		-----	-----			
		10.701	6.781			TOTAL GOAL 6 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63003A :						
						FY87

						10.701
						FY88

						6.780

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF ARMY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT	TITLES	
63007A							HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY	
A794	ARI	6.764	8.853	ET	6		EDUCATION AND TRAINING	
A795	ARI	5.001	5.773	ST	6		TRAINING SIMULATION	
		<u>11.766</u>	<u>14.627</u>				TOTAL GOAL 6 IN PE	
TOTAL FUNDING IN PROGRAM ELEMENT 63007A :								
						FY87	FY88	
						<u>27.151</u>	<u>38.164</u>	
THE PRESIDENT'S BUDGET, JANUARY 1987								

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF ARMY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT	TITLES
63738A							NON-SYSTEM TRAINING DEVICES (NSTD) ADVANCED DEVELOPMENT
D335	PMTRADE	3.722	0.000	ST	6		COMMUNICATIVE NON-SYSTEM TRAINING DEVICES (NSTD)
		-----	-----				
		3.722	0.000				TOTAL GOAL 6 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63738A :							
						FY87	FY88
						-----	-----
						3.722	0.000

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF ARMY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64715A						NON-SYSTEM TRAINING DEVICES (NSTD) ENGINEERING DEVELOPMENT
D241	PMTRADE	38.062	24.459	ST	6	NON-SYSTEM TRAINING DEVICES - COMBINED ARMS
D573	PMTRADE	6.149	8.080	ST	6B	PMTRADE AND NTSC SUPPORT
		<u>44.212</u>	<u>32.540</u>			TOTAL GOAL 6 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 64715A :						
						FY87 FY88
	THE PRESIDENT'S BUDGET, JANUARY 1987					<u>44.211</u> <u>32.539</u>

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF ARMY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
64722A						EDUCATION AND TRAINING SYSTEMS DEVELOPMENT
D750	ARI	4.211	5.447	ET	6	EDUCATION AND TRAINING SYSTEM
		<u>4.212</u>	<u>5.448</u>	TOTAL GOAL 6 IN PE		
TOTAL FUNDING IN PROGRAM ELEMENT 64722A :						
	THE PRESIDENT'S BUDGET, JANUARY 1987	<u>4.211</u>	<u>5.447</u>			

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF ARMY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
64801A						AVIATION ENGINEERING DEVELOPMENT
DE70	PMTRADE	9.317	9.654	ST 6D		AVIATION NON-SYSTEM TRAINING DEVICES
		-----	-----			
		9.318	9.655			TOTAL GOAL 6 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 64801A :						
						FY87 FY88

						9.317 9.654

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF NAVY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES	
61153N						DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: BEHAVIORAL AND ORGANIZATIONAL SCIENCES	
RRO4206	ONR	6.429	5.627	ET	6	PERSONNEL AND TRAINING	
		6.430	5.628			TOTAL GOAL 6 IN PE	
TOTAL FUNDING IN PROGRAM ELEMENT 61153N :						FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987						11.690	10.232

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF NAVY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
62233N						MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA
RR63-522	NPRDC	1.805	1.939	ET	6	EDUCATION AND TRAINING TECHNOLOGY
RW57-526	NTSC	3.409	3.464	ST	6	SIMULATION AND TRAINING DEVICE TECHNOLOGY
		-----	-----			
		5.215	5.404			TOTAL GOAL 6 IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 62233N :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	-----	-----
	8.176	8.472

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF NAVY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63720N						EDUCATION AND TRAINING
R1772	NPRDC	4.759	7.699	ET	6	EDUCATION AND TRAINING DEVELOPMENT
		-----	-----			
		4.760	7.700			TOTAL GOAL 6 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63720N :						
						FY87

						THE PRESIDENT'S BUDGET, JANUARY 1987
						4.759

						FY88

						7.699

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF NAVY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63733N						SIMULATION AND TRAINING DEVICES
W1773	NTSC	6.465	8.457	ST	6	SIMULATION AND TRAINING DEVICES
		-----	-----			
		6.466	8.457			TOTAL GOAL 6 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63733N :						
						FY87 FY88
						----- -----
	THE PRESIDENT'S BUDGET, JANUARY 1987					6.465 8.457

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF NAVY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64714N						AIR WARFARE TRAINING DEVICES
W1878	NTSC	0.000	1.927	ST	6	ASW TABLE TOP TRAINER
		<u>0.000</u>	<u>1.928</u>			TOTAL GOAL 6 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 64714N :						
						FY87
						<u>FY88</u>
						0.000
						<u>1.927</u>

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF NAVY IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64715N						SURFACE WARFARE TRAINING DEVICES
S1126	NTSC	0.000	4.524	ST	6	SURFACE TOMAHAWK TRAINER
S1140	NTSC	1.274	3.397	ST	6	TACTICAL ADVANCED COMBAT DIRECTION ELECTRONIC WARFARE (TACDEW) MODIFICATIONS
S1427	NTSC	9.548	5.619	ST	6	SURFACE TACTICAL TEAM TRAINERS
S1436	NTSC	1.663	0.485	ST	6	SURFACE WARFARE TRAINING ANALYSIS
S1834	NTSC	10.927	3.173	ST	6	LANDING CRAFT AIR CUSHION (LCAC) OPERATOR TRAINER
		-----	-----			
		23.413	17.198			TOTAL GOAL 6 IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 64715N :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	-----	-----
	23.412	17.198

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF AF IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62205F						PERSONNEL, TRAINING, AND SIMULATION
1121	AFHRL	1.880	2.050	ET	6	TECHNICAL TRAINING DEVELOPMENT
1123	AFHRL	3.020	2.953	ET	6	FLYING TRAINING DEVELOPMENT
1192	AFHRL	5.390	5.525	ST	6	ADVANCED SIMULATION FOR PILOT TRAINING
3017	AFHRL	1.300	1.600	ET	6	COMMAND AND CONTROL TRAINING
6114	AFHRL	1.750	2.970	ST	6	FLIGHT SIMULATOR TECHNOLOGY
		-----	-----			
		13.340	15.099			TOTAL GOAL 6 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62205F :						
						FY87 FY88
						----- -----
						THE PRESIDENT'S BUDGET, JANUARY 1987 32.475 35.937

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF AF IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63227F						PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY
2363	AFHRL	1.385	2.215	ST	6	ADVANCED VISUAL TECHNOLOGY SYSTEM
2364	AFHRL	0.400	0.380	ET	6	TRAINING AND PERFORMANCE DATA CENTER
2557	AFHRL	1.848	2.101	ST	6	ADVANCED ON-THE-JOB TRAINING SYSTEM (AOTS)
2743	AFHRL	2.371	4.526	ST	6	AIRCREW COMBAT MISSION ENHANCEMENT
2949	AFHRL	0.530	0.615	ET	6	BASIC JOB SKILLS ASSESSMENT AND ENHANCEMENT
2951	AFHRL	0.150	0.200	ET	6	TRAINING DECISIONS SYSTEM
3056	AFHRL	0.011	0.032	ST	6	AIR COMBAT ASSESSMENT AND DEBRIEFING SYSTEM
		-----	-----			
		6.696	10.069			TOTAL GOAL 6 IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63227F :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	-----	-----
	7.475	10.902

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF AF IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63751F						TRAINING SYSTEMS TECHNOLOGY
3057	AFHRL	0.000	0.276	ST	6	INTELLIGENT COMPUTER-ASSISTED TRAINING
		-----	-----			
		0.000	0.277	TOTAL GOAL 6 IN PE		
TOTAL FUNDING IN PROGRAM ELEMENT 63751F :						
						FY87

						THE PRESIDENT'S BUDGET, JANUARY 1987
						0.000

						FY88

						0.276

(CONTINUED)

(CONTINUATION)

IV-B-5 : LISTING OF AF IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
64227F						FLIGHT SIMULATOR DEVELOPMENT
2325	SIMSP0	8.400	6.900	ST	6	SIMULATOR DEVELOPMENT ACTIVITIES
2632	SIMSP0	5.000	0.000	ST	6	B-52 OFFENSIVE AVIONICS STATION
2687	SIMSP0	0.098	0.000	ST	6	EF-111A OPERATIONAL FLIGHT TRAINER (OFT)
2769	SIMSP0	2.947	6.946	ST	6	SIMULATOR UPDATE DEVELOPMENT
2851	SIMSP0	2.947	3.000	ST	6	STANDARD DEPARTMENT OF DEFENSE (DOD) SIMULATOR DATA BASE/COMMON TRANSFORMATION PROGRAM
2854/5	SIMSP0	0.196	0.000	ST	6	C-5/C-141 AERIAL REFUELING PART TASK TRAINER
2901	SIMSP0	13.700	0.761	ST	6	B-1B WEAPON SYSTEM TRAINER (WST)
2903	SIMSP0	1.964	0.000	ST	6	F-15/F-16 SIMULATOR FOR AIR-TO-AIR COMBAT (SAAC)
2968	SIMSP0	1.909	3.500	ST	6	MODULAR SIMULATOR DESIGN
2997	SIMSP0	8.750	2.670	ST	6	GBU-15 PART TASK TRAINER
2998	SIMSP0	18.155	7.713	ST	6	LANTIRN SIMULATOR
2999	SIMSP0	6.720	8.375	ST	6	LANTIRN PART TASK TRAINER
3000	SIMSP0	11.838	6.433	ST	6	KC-135 OPERATIONAL FLIGHT TRAINER
3105	SIMSP0	6.400	0.196	ST	6	F-15E WEAPON SYSTEM TRAINER (WST)
3135	SIMSP0	2.588	2.188	ST	6	ADVANCED TRAINING SYSTEM
3143	SIMSP0	0.200	1.909	ST	6	ADVANCED TACTICAL FIGHTER (ATF)
3147	SIMSP0	2.700	0.000	ST	6	ADA SIMULATOR INSERTION
3282	SIMSP0	1.900	11.110	ST	6	C-17 AIRCREW TRAINING SYSTEM

(CONTINUED)

(CONTINUATION WITHIN PE 64227F)

IV-B-5 : LISTING OF AF IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
------------	---------------------	------------	-----------------	-----	------	-------------------

96.412 61.701 TOTAL GOAL 6 IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 64227F :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	96.412	61.701

(CONTINUATION)

IV-B-6 : LISTING OF ARMY IN GOAL VAR--VARIOUS GOAL AREAS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A2AL-1	ARI	2.307	1.873	HF	V A R	ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)
A2AL-2	ARI	1.369	1.298	ST	V A R	ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)
A2AL-3	ARI	2.194	2.129	MP	V A R	ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)
A2AL-4	ARI	1.185	1.093	ET	V A R	ADMINISTRATION AND MANAGEMENT - ARMY RESEARCH INSTITUTE (ARI)
		----- 7.056	----- 6.394			TOTAL GOAL VAR IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 62785A :

	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	----- 15.216	----- 15.581

(CONTINUED)

(CONTINUATION)

IV-B-6 : LISTING OF AF IN GOAL VAR--VARIOUS GOAL AREAS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
62205F						PERSONNEL, TRAINING, AND SIMULATION
06HT-1	AFHRL	3.215	3.317	ET	V A R	LABORATORY SUPPORT
06HT-2	AFHRL	3.537	3.649	ST	V A R	LABORATORY SUPPORT
06HT-3	AFHRL	1.822	1.880	HF	V A R	LABORATORY SUPPORT
06HT-4	AFHRL	2.143	2.212	MP	V A R	LABORATORY SUPPORT
		-----	-----			
		10.718	11.058			TOTAL GOAL VAR IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62205F :						
					FY87	FY88
					-----	-----
					32.475	35.937

THE PRESIDENT'S BUDGET, JANUARY 1987

V. MANPOWER, PERSONNEL AND TRAINING STUDIES
SPONSORED BY OASD(FM&P)

ITEM	TABLES
Projects Listed by Program Element	V-1
Projects Listed by Congressional Category within Program Element	V-2 thru V-3
Projects Listed by Goal within Program Element	V-4 thru V-8

(CONTINUATION WITHIN PE 651120)

V-1 : LISTING OF FM&P PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES

TOTAL FUNDING IN PROGRAM ELEMENT 65109D :						
						FY87
						FY88

						2.005
						0.000

(CONTINUED)

(CONTINUATION)

V-1 : LISTING OF FM&P PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
65112D						TECHNICAL ANALYTICAL SUPPORT FOR OSD/OJCS AND DEFENSE AGENCIES
FS701	FM&P	0.250	0.000	MP	1	EVALUATION OF TRANSFER OPTIONS AND COMPARABILITY STUDY FOR SECTION 6 SCHOOLS
MP503C	FM&P	0.125	0.000	MP	1	PERSONNEL POLICY, INVENTORY MANAGEMENT AND MANPOWER ANALYSIS
MP534C	FM&P	0.075	0.000	MP	1D	FORECASTING NON-PRIOR SERVICE RESERVE ACCESSIONS
MP601C	FM&P	0.210	0.000	MP	2A	CHANGING ECONOMIC STRUCTURE AND YOUTH LABOR MARKET
MP611C	FM&P	0.175	0.000	MP	2A	RECRUITER MANAGEMENT AND ENLISTMENT PROCESSING
MP617C	FM&P	0.250	0.000	ET	6F	ARMY COMMUNICATIONS TRAINING
MP702	FM&P	0.140	0.000	MP	2	COMPARATIVE COST EFFECTIVENESS OF RECRUITING RESOURCES
MP717	FM&P	0.140	0.000	MP	1A	ENLISTED FORCE MANAGEMENT TRENDS AND POLICY OPTIONS
MP721	FM&P	0.150	0.000	MP	2	RETENTION MODELING
RM515C	FM&P	0.050	0.000	MP	1	PERSONNEL FORCE COSTING
RM602C	FM&P	0.275	0.000	MP	1E	COST EFFECTIVENESS OF MILITARY, CIVIL SERVICE, AND CONTRACTOR PERSONNEL
RM613C	FM&P	0.045	0.000	MP	1	REVIEW OF MANPOWER CAPABILITIES MODELS
RM715	FM&P	0.080	0.000	MP	1	USING OVERTIME AND TEMPORARY/PART-TIME EMPLOYEES TO REDUCE MANPOWER REQUIREMENTS
RM717	FM&P	0.100	0.000	MP	5	EVALUATING MANPOWER READINESS AND

(CONTINUED)

(CONTINUATION WITHIN PE 65112D)

V-1 : LISTING OF FM&P PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES	
						SUSTAINABILITY	
RM719	FM&P	0.075	0.000	MP	1	MANPOWER AND THE ACQUISITION PROCESS	
RM720	FM&P	0.200	0.000	MP	1	MANPOWER REQUIREMENTS PROCESS	
		-----	-----				
		2.340	0.000			TOTAL IN PE	
TOTAL FUNDING IN PROGRAM ELEMENT 65112D :							
						FY87	FY88
						-----	-----
						2.340	0.000

(CONTINUED)

(CONTINUATION)

V-1 : LISTING OF FM&P PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
92198D						FM&P O&M MANAGEMENT STUDIES
CP603C	FM&P	0.100	0.000	MP	1	EXPERIMENTAL CIVILIAN PERSONNEL OFFICE PROJECT (EXPO)
FS708	FM&P	0.010	0.000	MP	1	SECRETARY OF DEFENSE SAFETY AND OCCUPATIONAL HEALTH AWARD
MP603C	FM&P	0.130	0.000	MP	1G	SUPPORT FOR 1986 MOBILIZATION MANPOWER ACQUISITION PROCESS EXERCISE
MP614C	FM&P	0.075	0.000	MP	2B	TECHNOLOGIES IMPACT ON SKILL AND TRAINING NEEDS
MP650	FM&P	0.125	0.000	MP	1B	ADEQUACY OF MILITARY COMPENSATION
MP718	FM&P	0.050	0.000	MP	2A	UPDATE AND APPLICATION OF ENLISTMENT SUPPLY PROJECTION (ESP) MODEL
MP722	FM&P	0.070	0.000	MP	1	COST COMPARISON OF THE DRAFT AND THE ALL VOLUNTEER FORCE
MR701	FM&P	0.150	0.000	MP	1G	CIVILIAN MOBILIZATION PREPAREDNESS IMPROVEMENT PROGRAM
MR702	FM&P	0.120	0.000	MP	1	VALIDATION AND ASSESSMENT OF SERVICE CASUALTY ESTIMATES
		----- 0.831	----- 0.000			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 92198D :

FY87

FY88

THE PRESIDENT'S BUDGET, JANUARY 1987

0.830

0.000



(CONTINUATION)

V-2 : LISTING OF FM&P IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
65112D						TECHNICAL ANALYTICAL SUPPORT FOR OSD/OJCS AND DEFENSE AGENCIES
MP617C	FM&P	0.250	0.000	ET	6F	ARMY COMMUNICATIONS TRAINING
	TOTAL:	0.250	0.000	(EDUCATION AND TRAINING IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 65112D :						
THE PRESIDENT'S BUDGET, JANUARY 1987						

FY87 FY88

2.340 0.000

V-3 : LISTING OF FM&P IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
65109D						PROGRAM-WIDE MANAGEMENT
CP701	FM&P	0.250	0.000	MP	1	ALTERNATIVE PERSONNEL SYSTEM PLAN
CP712	FM&P	0.075	0.000	MP	1H	SUPERVISOR/MANAGERIAL ACCOUNTABILITY FOR EQUAL EMPLOYMENT RESPONSIBILITIES
MP640C	FM&P	0.350	0.000	MP	1B	CONTRACT SUPPORT FOR THE 6TH QUADRENNIAL REVIEW OF MILITARY COMPENSATION
MP705	FM&P	0.125	0.000	MP	1	VARIABLE CONTINUATION RATES FOR ENLISTED FORCE PROJECTIONS
MP714	FM&P	0.175	0.000	MP	1B	ANALYSIS OF THE MILITARY PAYLINE FOR ENLISTED, OFFICER AND WARRANT OFFICER PERSONNEL
MR601C	FM&P	0.205	0.000	MP	1	TECHNICAL SUPPORT FOR THE WARTIME MANPOWER PLANNING SYSTEM (WARMAPS)
MR607C	FM&P	0.060	0.000	MP	1G	OSD MOBILIZATION EXERCISE PREPARATION AND EVALUATION
RM606C	FM&P	0.040	0.000	MP	1F	IMPROVING THE EFFECTIVENESS OF DOD QUALITY CIRCLES
RM718	FM&P	0.450	0.000	MP	1	GENERAL/FLAG OFFICER AND SES REQUIREMENTS STUDY
TOTAL:		1.730	0.000	(MANPOWER AND PERSONNEL IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 65109D :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	2.005	0.000

(CONTINUED)

(CONTINUATION)

V-3 : LISTING OF FM&P IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
651120						TECHNICAL ANALYTICAL SUPPORT FOR OSD/OJCS AND DEFENSE AGENCIES
FS701	FM&P	0.250	0.000	MP	1	EVALUATION OF TRANSFER OPTIONS AND COMPARABILITY STUDY FOR SECTION 6 SCHOOLS
MP503C	FM&P	0.125	0.000	MP	1	PERSONNEL POLICY, INVENTORY MANAGEMENT AND MANPOWER ANALYSIS
MP534C	FM&P	0.075	0.000	MP	1D	FORECASTING NON-PRIOR SERVICE RESERVE ACCESSIONS
MP601C	FM&P	0.210	0.000	MP	2A	CHANGING ECONOMIC STRUCTURE AND YOUTH LABOR MARKET
MP611C	FM&P	0.175	0.000	MP	2A	RECRUITER MANAGEMENT AND ENLISTMENT PROCESSING
MP702	FM&P	0.140	0.000	MP	2	COMPARATIVE COST EFFECTIVENESS OF RECRUITING RESOURCES
MP717	FM&P	0.140	0.000	MP	1A	ENLISTED FORCE MANAGEMENT TRENDS AND POLICY OPTIONS
MP721	FM&P	0.150	0.000	MP	2	RETENTION MODELING
RM515C	FM&P	0.050	0.000	MP	1	PERSONNEL FORCE COSTING
RM602C	FM&P	0.275	0.000	MP	1E	COST EFFECTIVENESS OF MILITARY, CIVIL SERVICE, AND CONTRACTOR PERSONNEL
RM613C	FM&P	0.045	0.000	MP	1	REVIEW OF MANPOWER CAPABILITIES MODELS
RM715	FM&P	0.080	0.000	MP	1	USING OVERTIME AND TEMPORARY/PART-TIME EMPLOYEES TO REDUCE MANPOWER REQUIREMENTS
RM717	FM&P	0.100	0.000	MP	5	EVALUATING MANPOWER READINESS AND SUSTAINABILITY
RM719	FM&P	0.075	0.000	MP	1	MANPOWER AND THE ACQUISITION PROCESS

(CONTINUED)

(CONTINUATION WITHIN PE 65112D)

V-3 : LISTING OF FM&P IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
RM720	FM&P	0.200	0.000	MP	1	MANPOWER REQUIREMENTS PROCESS
TOTAL:		2.090	0.000	(MANPOWER AND PERSONNEL IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 65112D :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	2.340	0.000

(CONTINUED)

(CONTINUATION)

V-3 : LISTING OF FM&P IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
92198D						FM&P O&M MANAGEMENT STUDIES
CP603C	FM&P	0.100	0.000	MP	1	EXPERIMENTAL CIVILIAN PERSONNEL OFFICE PROJECT (EXPO)
FS708	FM&P	0.010	0.000	MP	1	SECRETARY OF DEFENSE SAFETY AND OCCUPATIONAL HEALTH AWARD
MP603C	FM&P	0.130	0.000	MP	1G	SUPPORT FOR 1986 MOBILIZATION MANPOWER ACQUISITION PROCESS EXERCISE
MP614C	FM&P	0.075	0.000	MP	2B	TECHNOLOGIES IMPACT ON SKILL AND TRAINING NEEDS
MP650	FM&P	0.125	0.000	MP	1B	ADEQUACY OF MILITARY COMPENSATION
MP718	FM&P	0.050	0.000	MP	2A	UPDATE AND APPLICATION OF ENLISTMENT SUPPLY PROJECTION (ESP) MODEL
MP722	FM&P	0.070	0.000	MP	1	COST COMPARISON OF THE DRAFT AND THE ALL VOLUNTEER FORCE
MR701	FM&P	0.150	0.000	MP	1G	CIVILIAN MOBILIZATION PREPAREDNESS IMPROVEMENT PROGRAM
MR702	FM&P	0.120	0.000	MP	1	VALIDATION AND ASSESSMENT OF SERVICE CASUALTY ESTIMATES
TOTAL:		0.831	0.000	(MANPOWER AND PERSONNEL IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 92198D :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	0.830	0.000

(CONTINUATION)

V-4 : LISTING OF FM&P IN GOAL 1 -- MANAGEMENT TRADE-OFFS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
65112D						TECHNICAL ANALYTICAL SUPPORT FOR JSD/OJCS AND DEFENSE AGENCIES
FS701	FM&P	0.250	0.000	MP	1	EVALUATION OF TRANSFER OPTIONS AND COMPARABILITY STUDY FOR SECTION 6 SCHOOLS
MP503C	FM&P	0.125	0.000	MP	1	PERSONNEL POLICY, INVENTORY MANAGEMENT AND MANPOWER ANALYSIS
MP534C	FM&P	0.075	0.000	MP	1D	FORECASTING NON-PRIOR SERVICE RESERVE ACCESSIONS
MP717	FM&P	0.140	0.000	MP	1A	ENLISTED FORCE MANAGEMENT TRENDS AND POLICY OPTIONS
RM515C	FM&P	0.050	0.000	MP	1	PERSONNEL FORCE COSTING
RM602C	FM&P	0.275	0.000	MP	1E	COST EFFECTIVENESS OF MILITARY, CIVIL SERVICE, AND CONTRACTOR PERSONNEL
RM613C	FM&P	0.045	0.000	MP	1	REVIEW OF MANPOWER CAPABILITIES MODELS
RM715	FM&P	0.080	0.000	MP	1	USING OVERTIME AND TEMPORARY/PART-TIME EMPLOYEES TO REDUCE MANPOWER REQUIREMENTS
RM719	FM&P	0.075	0.000	MP	1	MANPOWER AND THE ACQUISITION PROCESS
RM720	FM&P	0.200	0.000	MP	1	MANPOWER REQUIREMENTS PROCESS
		-----	-----			
		1.316	0.000			TOTAL GOAL 1 IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 65112D :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	----- 2.340	----- 0.000

(CONTINUED)

(CONTINUATION)

V-4 : LISTING OF FM&P IN GOAL 1 -- MANAGEMENT TRADE-OFFS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
92198D						FM&P O&M MANAGEMENT STUDIES
CP603C	FM&P	0.100	0.000	MP	1	EXPERIMENTAL CIVILIAN PERSONNEL OFFICE PROJECT (EXPO)
FS708	FM&P	0.010	0.000	MP	1	SECRETARY OF DEFENSE SAFETY AND OCCUPATIONAL HEALTH AWARD
MP603C	FM&P	0.130	0.000	MP	1G	SUPPORT FOR 1986 MOBILIZATION MANPOWER ACQUISITION PROCESS EXERCISE
MP650	FM&P	0.125	0.000	MP	1B	ADEQUACY OF MILITARY COMPENSATION
MP722	FM&P	0.070	0.000	MP	1	COST COMPARISON OF THE DRAFT AND THE ALL VOLUNTEER FORCE
MR701	FM&P	0.150	0.000	MP	1G	CIVILIAN MOBILIZATION PREPAREDNESS IMPROVEMENT PROGRAM
MR702	FM&P	0.120	0.000	MP	1	VALIDATION AND ASSESSMENT OF SERVICE CASUALTY ESTIMATES
		0.706	0.000			TOTAL GOAL 1 IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 92198D :	FY87	FY88
THE PRESIDENT'S BUDGET, JANUARY 1987	0.830	0.000

(CONTINUATION)

V-8 : LISTING OF FM&P IN GOAL 6 -- TRAINING SYSTEMS

PE/PROJECT	PERFORMING ORGANIZ.	FY87 (\$M)	FY88 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
65112D						TECHNICAL ANALYTICAL SUPPORT FOR OSD/OJCS AND DEFENSE AGENCIES
MP617C	FM&P	0.250	0.000	ET	6F	ARMY COMMUNICATIONS TRAINING
		-----	-----			
		0.250	0.000			TOTAL GOAL 6 IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 65112D :						FY87 FY88
THE PRESIDENT'S BUDGET, JANUARY 1987						----- -----
						2.340 0.000

VI. APPENDIXES

APPENDIX A
CONGRESSIONAL CATEGORIES

ET EDUCATION AND TRAINING

ET1 -- Education and Training (6.1)
ET2 -- Curriculum Development
ET3 -- Methods and Media
ET4 -- Management Systems
ET5 -- Effectiveness Evaluation
ET6 -- Technology Transfer
ET7 -- Special Applications

HF HUMAN FACTORS

HF1 -- Human Factors (6.1)
HF2 -- Human Related Studies
HF3 -- Human-Machine Related Studies
HF4 -- Human-Machine-Mission Related Studies

MP MANPOWER AND PERSONNEL

MP1 -- Manpower and Personnel (6.1)
MP2 -- Occupational Requirements and Structures
MP3 -- Resources Management
MP4 -- Recruitment, Accession and Placement
MP5 -- Career Development
MP6 -- Productivity and Effectiveness
MP7 -- Civilian and Military Workforce Development

ST SIMULATION AND TRAINING DEVICES

ST1 -- Visual Simulation Technology (6.1)
ST2 -- Force/Motion Cue Simulation Technology
ST3 -- Sensor Simulation Technology
ST4 -- Instructional Features
ST5 -- Maintenance Training Simulation
ST6 -- Weapons Fire Simulation
ST7 -- Specialized Training Devices

APPENDIX B

MANPOWER, PERSONNEL AND TRAINING GOALS AND SUB-GOALS

1. Management Trade-offs
 - A. Manpower Models and Trade-Offs
 - B. Compensation Issues
 - C. Career Issues
 - D. Reserve Issues
 - E. Military-Civilian Issues
 - F. Organizational Issues
 - G. Mobilization Issues
 - H. Equal Opportunity Issues
 - I. National Trends
 - J. Presidential and Congressional Issues
 - K. Studies with Foreign Affairs/Policy Implications

2. Accession and Retention
 - A. Forecasting of Supply
 - B. Skills and Specialties
 - C. Recruiting System Issues
 - D. Selection and Classification
 - E. Reserve Manpower

3. Unit Productivity
 - A. Measurement/Prediction of Individual and Unit
 - B. Enhancement of Individual and Unit
 - C. Effectiveness/Analysis and Trade-offs of Methods and Processes

4. Designing for System Readiness
 - A. Front-end Analytical Techniques
 - B. Human Capabilities and Design Criteria
 - C. Techniques/Methods for Improved Operability
 - D. Techniques/Methods for Improved Maintainability
 - E. Test, Evaluation and Effectiveness Measurement Methods

(continued on next page)

GOALS AND SUB-GOALS
(continued)

5. Improved Sustainability
 - A. Maintaining Individual and Unit Capabilities
 - B. Improved Logistical Support
 - C. Deficiency Measurement and Improvement
 - D. Improved Technical Documentation
 - E. Wartime Factors of Special Concern
 - F. Routine Effectiveness Issues
 - G. Combat Effectiveness Issues

6. Training Systems
 - A. Management Trade-offs
 - B. Acquisition Issues
 - C. Utilization Issues
 - D. Cost-Effectiveness Issues
 - E. Design and Analytical Issues and Methods
 - F. Improved Instructional Strategies
 - G. Critical Technologies
 - H. Support System Issues

Various

APPENDIX C
 PROJECTS TO BE COMPLETED IN FY87
 (BY SERVICE)

PE	PROJ	FY87(\$M)	TITLE

ARMY			
63738A	D335	3.722	COMMUNICATIVE NON-SYSTEM TRAINING DEVICES (NSTD)

		3.722	TOTAL FOR ARMY
AIR FORCE			
64227F	2632	5.000	B-52 OFFENSIVE AVIONICS STATION
	2687	0.098	EF-111A OPERATIONAL FLIGHT TRAINER (OFT)
	2854/5	0.196	C-5/C-141 AERIAL REFUELING PART TASK TRAINER
	2903	1.964	F-15/F-16 SIMULATOR FOR AIR-TO-AIR COMBAT (SAAC)
	3147	2.700	ADA SIMULATOR INSERTION

		9.958	TOTAL FOR AIR FORCE

PROJECTS TO BE COMPLETED IN FY87
(BY CONGRESSIONAL CATEGORY)

PE	PROJ	FY87(\$M)	TITLE	

SIMULATION AND TRAINING DEVICES				
ARMY	63738A	D335	3.722	COMMUNICATIVE NON-SYSTEM TRAINING DEVICES (NSTD)
AF	64227F	2632	5.000	B-52 OFFENSIVE AVIONICS STATION
AF		2687	0.098	EF-111A OPERATIONAL FLIGHT TRAINER (OFT)
AF		2854/5	0.196	C-5/C-141 AERIAL REFUELING PART TASK TRAINER
AF		2903	1.964	F-15/F-16 SIMULATOR FOR AIR-TO-AIR COMBAT (SAAC)
AF		3147	2.700	ADA SIMULATOR INSERTION

			13.680	TOTAL FOR SIMULATION AND TRAINING DEVICES

APPENDIX D

PROJECTS TO BE INITIATED IN FY88
(BY SERVICE)

PE	PROJ	FY88(\$M)	TITLE

NAVY			

63739N	T1885	0.589	METHODS FOR MANAGING QUALITY IMPROVEMENT IN NAVY MAINTENANCE ACTIVITIES
	T1886	0.392	EFFECTIVE IMPLEMENTATION OF NEW TECHNOLOGY
64714N	W1878	1.927	ASW TABLE TOP TRAINER
64715N	S1126	4.524	SURFACE TOMAHAWK TRAINER

		7.432	TOTAL FOR NAVY
AIR FORCE			

63751F	3057	0.276	INTELLIGENT COMPUTER-ASSISTED TRAINING

		0.276	TOTAL FOR AIR FORCE

PROJECTS TO BE INITIATED IN FY88
(BY CONGRESSIONAL CATEGORY)

PE	PROJ	FY88(\$M)	TITLE	

HUMAN FACTORS				
NAVY	63739N	T1885	0.589	METHODS FOR MANAGING QUALITY IMPROVEMENT IN NAVY MAINTENANCE ACTIVITIES
NAVY		T1886	0.392	EFFECTIVE IMPLEMENTATION OF NEW TECHNOLOGY

			0.981	TOTAL FOR HUMAN FACTORS
SIMULATION AND TRAINING DEVICES				
NAVY	64714N	W1878	1.927	ASW TABLE TOP TRAINER
NAVY	64715N	S1126	4.524	SURFACE TOMAHAWK TRAINER
AF	63751F	3057	0.276	INTELLIGENT COMPUTER-ASSISTED TRAINING

			6.727	TOTAL FOR SIMULATION AND TRAINING DEVICES

APPENDIX E

RELEVANT POLICY-LEVEL MEMORANDUM

17 AUG 1978 Manpower and Logistics Concerns for New Major Systems

No Date Increased Emphasis on Training and Personnel Systems Technologies

23 JAN 1979 Establishment of DoD Technology Advisory/Coordination Groups

10 OCT 1979 Application of Emerging Training and Personnel Systems Technologies

19 OCT 1979 Coordination of People-Related R&D

30 OCT 1979 Simulation and Training Devices Technology

26 NOV 1979 Increasing Demands for Personnel and Training R&D

11 DEC 1979 Navy Manpower, Personnel and Training Research, Development and Studies Program (MPT RD&S)

29 JAN 1981 Effectiveness of U.S. Forces Can Be Increased Through Improved Weapon System Design

12 FEB 1981 The Research and Development Information System (RDIS)

26 AUG 1981 Contractor Incentives to Improve Reliability and Support

18 DEC 1981 Guidelines For Assessing Whether Human Factors Were Considered In The Weapon Systems Acquisition Process

02 MAR 1982 Personal Microprocessor-Based Job Aids

25 FEB 1983 Defense Science Board (DSB) Summer Study on Training and Training Technology

11 JUL 1984 Memorandum of Agreement: Defense Training Data and Analysis Center (TDAC)

05 OCT 1984 Training Simulator and Device Guidelines

03 JUN 1986 Defense Training Data and Analysis Center (TDAC) Review