

# TRAINING & PERSONNEL SYSTEMS

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## I. INTRODUCTION

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This reference document presents a comprehensive overview of the Training and Personnel Systems (TPST) Technology area, which includes (1) Manpower and Personnel (2) Education and Training (3) Simulation and Training Devices and (4) Human Factors for FY91 and FY92, 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, 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.

This document contains:

Fiscal tables and graphs (Section II)

This section encompasses a series of cross-tabulations featuring FY91 and FY92 funding figures by Congressional Categories, DoD Organizations, and Budget Categories.

Graphic formats display data for:

- (A) A comparison of estimated vs. actual total TPST R&D funding for President's Budget 1985-1991.
- (B) Breakdowns of total TPST Program funding by Budget Category, and Service for FY91 and FY92.

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.

## 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, through the use of several examples.

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

1. How do the Services' funding compare in FY91 and FY92?

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 FY91 and FY92, respectively. One can compare the Services' funding with each other and see where the emphases lie for each Service and the overall TPST program. These charts are representative for FY91 and FY92.

Page III-ii in the beginning of Section III shows actual for FY89 and FY90, adjusted for FY91 and requested funding for FY92 for each Program Element, sorted and totaled by Service.

Further detail in these categories and others can also be gained by turning to the tables in subsections II-4 and -5 (Budget Category by Congressional Category cross-tabulations, overall (4) and by Service (5) for FY90 and FY91).

2. What work is planned for FY92 in TPST Basic Research?

Basic research is Budget Category 6.1. Plans for research in FY91 and FY92 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 and the summaries 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.

3. What was accomplished by FY90 in Navy Human Factors work?

The past year's (FY90) accomplishments for each effort are located in the "Payoff/Utilization" portion of each Program Element and Project narrative in Section III. Select the Program Element and/or Project you are interested in reviewing and locate that narrative within the Navy Synopsis section.

### 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 FY92/93 President's Budget submission.

The MATRIS database covers the TPST R&D Program at the Program Element, Project, Work Unit and Studies and Analysis levels. Further information about the TPST 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) 553-7000      DSN: 553-7000



## SUGGESTIONS and COMMENTS

This document offers an overview of the TPST Program based on the latest annual 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 TPST 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:

Defense Technical Information Center, DTIC-DMA  
MATRIS Office, San Diego  
San Diego, CA 92152-6800  
FAX (619) 553-7053 DSN 553-7053

## II. FISCAL TABLES

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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

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Variable Name	Abbreviation	Used For
-----	-----	-----
CONGRESSIONAL CATEGORY	ET	Education and Training
	HF	Human Factors
	MP	Manpower and Personnel
	ST	Simulation and Training Devices
BUDGET CATEGORY	6.1	Basic Research
	6.2	Exploratory Development
	6.3	Advanced Development
	6.4	Engineering Development
DoD ORGANIZATION	ARMY	Army
	NAVY	Navy and Marine Corps
	AF	Air Force
	DLA	Defense Logistics Agency

TABLE II-1

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY92 PRESIDENT'S BUDGET

BUDGET CATEGORY BY DOD ORGANIZATION  
 1991 (\$MILLIONS)

DOD ORGANIZATION	BUDGET CATEGORY				TOTAL
	6.1	6.2	6.3	6.4	
ARMY	6.15	31.27	22.60	41.84	101.86
(ROW%)	( 5)	( 31)	( 22)	( 41)	(100)
NAVY	13.50	15.18	20.22	13.43	62.33
(ROW%)	( 22)	( 24)	( 32)	( 22)	(100)
AF	11.09	46.21	29.88	44.72	131.90
(ROW%)	( 8)	( 35)	( 23)	( 34)	(100)
DLA	0.00	0.00	0.00	4.98	4.98
(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
TOTAL	30.74	92.66	72.69	104.97	301.07
(ROW%)	( 10)	( 31)	( 24)	( 35)	(100)

TPST PROGRAM FUNDING IN 1992  
 BASED ON FY92 PRESIDENT'S BUDGET

BUDGET CATEGORY BY DOD ORGANIZATION

1992 (\$MILLIONS)

DOD ORGANIZATION	BUDGET CATEGORY				TOTAL
	6.1	6.2	6.3	6.4	
ARMY	5.96	29.89	18.56	54.17	108.58
(ROW%)	( 5)	( 28)	( 17)	( 50)	(100)
NAVY	12.35	15.79	20.70	12.49	61.33
(ROW%)	( 20)	( 26)	( 34)	( 20)	(100)
AF	11.51	47.55	34.19	55.74	148.99
(ROW%)	( 8)	( 32)	( 23)	( 37)	(100)
TOTAL	29.82	93.22	73.45	122.41	318.90
(ROW%)	( 9)	( 29)	( 23)	( 38)	(100)

TABLE II-2

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION

1991 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
ARMY (ROW%)	10.57 ( 10)	20.88 ( 21)	11.06 ( 11)	59.33 ( 58)	101.84 (100)
NAVY (ROW%)	14.78 ( 24)	11.81 ( 19)	14.13 ( 23)	21.60 ( 35)	62.32 (100)
AF (ROW%)	46.79 ( 35)	54.53 ( 41)	11.21 ( 9)	19.35 ( 15)	131.88 (100)
TOTAL (ROW%)	72.14 ( 24)	87.22 ( 29)	36.40 ( 12)	100.28 ( 34)	296.05 (100)

TPST PROGRAM FUNDING IN 1992  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION

1992 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
ARMY (ROW%)	9.34 ( 9)	23.87 ( 22)	8.64 ( 8)	66.73 ( 61)	108.57 (100)
NAVY (ROW%)	14.10 ( 23)	11.94 ( 19)	15.12 ( 25)	20.16 ( 33)	61.32 (100)
AF (ROW%)	34.34 ( 23)	58.71 ( 39)	9.52 ( 6)	46.41 ( 31)	148.97 (100)
TOTAL (ROW%)	57.78 ( 18)	94.52 ( 30)	33.28 ( 10)	133.29 ( 42)	318.87 (100)

TABLE II-3

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION PROGRAM ELEMENT		1991 (\$MILLIONS)				
		CONGRESSIONAL CATEGORY				
		ET	HF	MP	ST	TOTAL
		-----	-----	-----	-----	-----
ARMY						
61102A		0.62	3.78	0.72	1.02	6.15
	(ROW%)	( 10)	( 62)	( 12)	( 17)	(100)
62716A		0.00	8.01	0.00	0.00	8.01
	(ROW%)	( 0)	(100)	( 0)	( 0)	(100)
62727A		0.00	0.00	0.00	6.03	6.03
	(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
62785A		4.70	3.87	4.42	4.25	17.23
	(ROW%)	( 27)	( 22)	( 26)	( 25)	(100)
63003A		0.00	0.00	0.00	3.82	3.82
	(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
63007A		3.75	6.51	5.73	2.79	18.77
	(ROW%)	( 20)	( 35)	( 31)	( 15)	(100)
64715A		0.00	0.00	0.00	27.76	27.76
	(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
64801A		0.00	0.00	0.00	14.08	14.08
	(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
ARMY	TOTAL	9.07	22.16	10.87	59.76	101.86
	(ROW%)	( 9)	( 22)	( 11)	( 59)	(100)

TABLE II-3

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

1991 (\$MILLIONS)

## DOD ORGANIZATION

PROGRAM ELEMENT	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
	-----	-----	-----	-----	-----
NAVY					
61153N	7.43	2.84	3.24	0.00	13.50
(ROW%)	( 55)	( 21)	( 24)	( 0)	(100)
62131M	0.00	0.00	0.55	0.00	0.55
(ROW%)	( 0)	( 0)	(100)	( 0)	(100)
62233N	1.37	1.87	2.96	4.20	10.41
(ROW%)	( 13)	( 18)	( 28)	( 40)	(100)
62234N	0.00	4.22	0.00	0.00	4.22
(ROW%)	( 0)	(100)	( 0)	( 0)	(100)
63701N	0.00	2.88	0.00	0.00	2.88
(ROW%)	( 0)	(100)	( 0)	( 0)	(100)
63707N	0.00	0.00	3.20	0.00	3.20
(ROW%)	( 0)	( 0)	(100)	( 0)	(100)
63720N	5.98	0.00	0.00	0.00	5.98
(ROW%)	(100)	( 0)	( 0)	( 0)	(100)
63732M	0.00	0.00	3.11	0.00	3.11
(ROW%)	( 0)	( 0)	(100)	( 0)	(100)
63733N	0.00	0.00	0.00	5.04	5.04
(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
64703N	0.00	0.00	1.07	0.00	1.07
(ROW%)	( 0)	( 0)	(100)	( 0)	(100)
64715N	0.00	0.00	0.00	12.36	12.36
(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
NAVY	-----	-----	-----	-----	-----
TOTAL	14.78	11.81	14.13	21.60	62.33
(ROW%)	( 24)	( 19)	( 23)	( 35)	(100)

TABLE II-3

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1991 (\$MILLIONS)				
		CONGRESSIONAL CATEGORY				
PROGRAM ELEMENT	ET	HF	MP	ST	TOTAL	
	-----	-----	-----	-----	-----	
AF						
61102F	0.00	11.09	0.00	0.00	11.09	
(ROW%)	( 0)	(100)	( 0)	( 0)	(100)	
62202F	0.00	15.72	0.00	0.00	15.72	
(ROW%)	( 0)	(100)	( 0)	( 0)	(100)	
62205F	14.41	6.05	6.63	3.40	30.49	
(ROW%)	( 47)	( 20)	( 22)	( 11)	(100)	
63106F	0.00	11.76	0.00	0.00	11.76	
(ROW%)	( 0)	(100)	( 0)	( 0)	(100)	
63227F	2.39	0.00	1.38	4.43	8.20	
(ROW%)	( 29)	( 0)	( 17)	( 54)	(100)	
63231F	0.00	9.92	0.00	0.00	9.92	
(ROW%)	( 0)	(100)	( 0)	( 0)	(100)	
64227F	29.30	0.00	0.40	11.52	41.22	
(ROW%)	( 71)	( 0)	( 1)	( 28)	(100)	
64243F	0.70	0.00	2.80	0.00	3.50	
(ROW%)	( 20)	( 0)	( 80)	( 0)	(100)	
AF						
TOTAL	46.80	54.54	11.21	19.35	131.90	
(ROW%)	( 35)	( 41)	( 9)	( 15)	(100)	



TABLE II-3

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION PROGRAM ELEMENT		1991 (\$MILLIONS)				
		CONGRESSIONAL CATEGORY				
		ET	HF	MP	ST	TOTAL
		-----	-----	-----	-----	-----
DLA						
	64722S	4.98	0.00	0.00	0.00	4.98
	(ROW%)	(100)	( 0)	( 0)	( 0)	(100)
DLA	TOTAL	4.98	0.00	0.00	0.00	4.98
	(ROW%)	(100)	( 0)	( 0)	( 0)	(100)
DOD TOTAL		75.64	88.51	36.21	100.71	301.07
	(ROW%)	( 25)	( 29)	( 12)	( 33)	(100)

TABLE II-3

TPST PROGRAM FUNDING IN 1992  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1992 (\$MILLIONS)				
PROGRAM ELEMENT		CONGRESSIONAL CATEGORY				TOTAL
		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
ARMY						
61102A		0.67	3.43	0.77	1.09	5.96
	(ROW%)	( 11)	( 58)	( 13)	( 18)	(100)
62716A		0.00	10.37	0.00	0.00	10.37
	(ROW%)	( 0)	(100)	( 0)	( 0)	(100)
62727A		0.00	0.00	0.00	3.50	3.50
	(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
62785A		4.03	4.02	3.98	3.99	16.02
	(ROW%)	( 25)	( 25)	( 25)	( 25)	(100)
63003A		0.00	0.00	0.00	2.89	2.89
	(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
63007A		2.84	7.64	3.81	1.39	15.67
	(ROW%)	( 18)	( 49)	( 24)	( 9)	(100)
64715A		0.00	0.00	0.00	51.27	51.27
	(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
64801A		0.00	0.00	0.00	2.91	2.91
	(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
ARMY TOTAL						
		7.53	25.46	8.57	67.02	108.58
	(ROW%)	( 7)	( 23)	( 8)	( 62)	(100)

TABLE II-3

TPST PROGRAM FUNDING IN 1992  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

1992 (\$MILLIONS)

## DOD ORGANIZATION

PROGRAM ELEMENT	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
	-----	-----	-----	-----	-----
NAVY					
61153N	6.62	2.72	3.01	0.00	12.35
(ROW%)	( 54)	( 22)	( 24)	( 0)	(100)
62131M	0.00	0.00	0.58	0.00	0.58
(ROW%)	( 0)	( 0)	(100)	( 0)	(100)
62233N	1.39	2.04	3.10	4.43	10.96
(ROW%)	( 13)	( 19)	( 28)	( 40)	(100)
62234N	0.00	4.25	0.00	0.00	4.25
(ROW%)	( 0)	(100)	( 0)	( 0)	(100)
63701N	0.00	2.93	0.00	0.00	2.93
(ROW%)	( 0)	(100)	( 0)	( 0)	(100)
63707N	0.00	0.00	3.26	0.00	3.26
(ROW%)	( 0)	( 0)	(100)	( 0)	(100)
63720N	6.09	0.00	0.00	0.00	6.09
(ROW%)	(100)	( 0)	( 0)	( 0)	(100)
63732M	0.00	0.00	3.29	0.00	3.29
(ROW%)	( 0)	( 0)	(100)	( 0)	(100)
63733N	0.00	0.00	0.00	5.13	5.13
(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
64703N	0.00	0.00	1.89	0.00	1.89
(ROW%)	( 0)	( 0)	(100)	( 0)	(100)
64715N	0.00	0.00	0.00	10.60	10.60
(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
NAVY	-----	-----	-----	-----	-----
TOTAL	14.10	11.94	15.12	20.16	61.33
(ROW%)	( 23)	( 19)	( 25)	( 33)	(100)

TABLE II-3

TPST PROGRAM FUNDING IN 1992  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1992 (\$MILLIONS)				
		CONGRESSIONAL CATEGORY				
PROGRAM ELEMENT	ET	HF	MP	ST	TOTAL	
	-----	-----	-----	-----	-----	
AF						
61102F	0.00	11.51	0.00	0.00	11.51	
(ROW%)	( 0)	(100)	( 0)	( 0)	(100)	
62202F	0.00	16.73	0.00	0.00	16.73	
(ROW%)	( 0)	(100)	( 0)	( 0)	(100)	
62205F	15.03	5.68	6.80	3.30	30.82	
(ROW%)	( 49)	( 18)	( 22)	( 11)	(100)	
63106F	0.00	14.72	0.00	0.00	14.72	
(ROW%)	( 0)	(100)	( 0)	( 0)	(100)	
63227F	2.06	0.00	1.77	5.72	9.55	
(ROW%)	( 22)	( 0)	( 19)	( 60)	(100)	
63231F	0.00	9.91	0.00	0.00	9.91	
(ROW%)	( 0)	(100)	( 0)	( 0)	(100)	
64227F	14.07	0.00	0.70	37.39	52.16	
(ROW%)	( 27)	( 0)	( 1)	( 72)	(100)	
64243F	3.18	0.15	0.26	0.00	3.58	
(ROW%)	( 89)	( 4)	( 7)	( 0)	(100)	
AF						
TOTAL	34.34	58.71	9.53	46.41	148.99	
(ROW%)	( 23)	( 39)	( 6)	( 31)	(100)	
DOD TOTAL	55.98	96.11	33.22	133.59	318.90	
(ROW%)	( 18)	( 30)	( 10)	( 42)	(100)	

TABLE II-4

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY92 PRESIDENT'S BUDGET  
 CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 1991 (\$MILLIONS)

BUDGET CATEGORY	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
	-----	-----	-----	-----	-----
6.1	8.05	17.70	3.96	1.02	30.73
(ROW%)	( 26)	( 58)	( 13)	( 3)	(100)
6.2	20.48	39.73	14.56	17.88	92.65
(ROW%)	( 22)	( 43)	( 16)	( 19)	(100)
6.3	12.12	31.06	13.42	16.08	72.68
(ROW%)	( 17)	( 43)	( 18)	( 22)	(100)
6.4	34.98	0.00	4.27	65.72	104.96
(ROW%)	( 33)	( 0)	( 4)	( 63)	(100)
TOTAL	75.63	88.50	36.21	100.70	301.03
(ROW%)	( 25)	( 29)	( 12)	( 33)	(100)

TPST PROGRAM FUNDING IN 1992  
 BASED ON FY92 PRESIDENT'S BUDGET  
 CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 1992 (\$MILLIONS)

BUDGET CATEGORY	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
	-----	-----	-----	-----	-----
6.1	7.29	17.66	3.78	1.09	29.82
(ROW%)	( 24)	( 59)	( 13)	( 4)	(100)
6.2	20.45	43.08	14.46	15.22	93.21
(ROW%)	( 22)	( 46)	( 16)	( 16)	(100)
6.3	10.98	35.20	12.13	15.13	73.44
(ROW%)	( 15)	( 48)	( 17)	( 21)	(100)
6.4	17.25	0.15	2.84	102.15	122.40
(ROW%)	( 14)	( 0)	( 2)	( 83)	(100)
TOTAL	55.97	96.10	33.21	133.58	318.86
(ROW%)	( 18)	( 30)	( 10)	( 42)	(100)

TABLE II-5

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

1991 (\$MILLIONS)

DOD ORGANIZATION		CONGRESSIONAL CATEGORY				
		ET	HF	MP	ST	TOTAL
BUDGET CATEGORY		-----	-----	-----	-----	-----
ARMY						
6.1	(ROW%)	0.62 ( 10)	3.78 ( 62)	0.72 ( 12)	1.02 ( 17)	6.15 (100)
6.2	(ROW%)	4.70 ( 15)	11.87 ( 38)	4.42 ( 14)	10.28 ( 33)	31.26 (100)
6.3	(ROW%)	3.75 ( 17)	6.50 ( 29)	5.73 ( 25)	6.61 ( 29)	22.59 (100)
6.4	(ROW%)	0.00 ( 0)	0.00 ( 0)	0.00 ( 0)	41.84 (100)	41.84 (100)
ARMY	TOTAL (ROW%)	----- 9.07 ( 9)	----- 22.16 ( 22)	----- 10.87 ( 11)	----- 59.75 ( 59)	----- 101.84 (100)

TABLE II-5

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1991 (\$MILLIONS)				
		CONGRESSIONAL CATEGORY				
BUDGET		ET	HF	MP	ST	TOTAL
CATEGORY		-----	-----	-----	-----	-----
NAVY						
6.1		7.43	2.84	3.24	0.00	13.50
	(ROW%)	( 55)	( 21)	( 24)	( 0)	(100)
6.2		1.37	6.09	3.51	4.20	15.18
	(ROW%)	( 9)	( 40)	( 23)	( 28)	(100)
6.3		5.98	2.88	6.31	5.04	20.22
	(ROW%)	( 30)	( 14)	( 31)	( 25)	(100)
6.4		0.00	0.00	1.07	12.36	13.43
	(ROW%)	( 0)	( 0)	( 8)	( 92)	(100)
NAVY	TOTAL	-----	-----	-----	-----	-----
	(ROW%)	14.78	11.81	14.13	21.60	62.32
		( 24)	( 19)	( 23)	( 35)	(100)

TABLE II-5

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

1991 (\$MILLIONS)

DOD ORGANIZATION		CONGRESSIONAL CATEGORY				
BUDGET CATEGORY		ET	HF	MP	ST	TOTAL
		-----	-----	-----	-----	-----
AF						
6.1	(ROW%)	0.00 ( 0)	11.09 (100)	0.00 ( 0)	0.00 ( 0)	11.09 (100)
6.2	(ROW%)	14.41 ( 31)	21.77 ( 47)	6.63 ( 14)	3.40 ( 7)	46.21 (100)
6.3	(ROW%)	2.39 ( 8)	21.68 ( 73)	1.38 ( 5)	4.43 ( 15)	29.87 (100)
6.4	(ROW%)	30.00 ( 67)	0.00 ( 0)	3.20 ( 7)	11.52 ( 26)	44.71 (100)
AF	TOTAL (ROW%)	46.79 ( 35)	54.53 ( 41)	11.21 ( 9)	19.35 ( 15)	131.88 (100)



TABLE II-5

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

1991 (\$MILLIONS)

DOD ORGANIZATION BUDGET CATEGORY		CONGRESSIONAL CATEGORY				
		ET	HF	MP	ST	TOTAL
DLA		-----	-----	-----	-----	-----
6.4	(ROW%)	4.98 (100)	0.00 ( 0)	0.00 ( 0)	0.00 ( 0)	4.98 (100)
DLA TOTAL		-----	-----	-----	-----	-----
	(ROW%)	4.98 (100)	0.00 ( 0)	0.00 ( 0)	0.00 ( 0)	4.98 (100)
DOD TOTAL		-----	-----	-----	-----	-----
	(ROW%)	75.63 ( 25)	88.50 ( 29)	36.21 ( 12)	100.70 ( 33)	301.03 (100)

TABLE II-5

TPST PROGRAM FUNDING IN 1992  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

1992 (\$MILLIONS)

DOD ORGANIZATION		CONGRESSIONAL CATEGORY				
BUDGET CATEGORY		ET	HF	MP	ST	TOTAL
		-----	-----	-----	-----	-----
ARMY						
6.1		0.67	3.43	0.77	1.09	5.95
	(ROW%)	( 11)	( 58)	( 13)	( 18)	(100)
6.2		4.03	14.39	3.98	7.49	29.89
	(ROW%)	( 13)	( 48)	( 13)	( 25)	(100)
6.3		2.84	7.63	3.81	4.28	18.56
	(ROW%)	( 15)	( 41)	( 21)	( 23)	(100)
6.4		0.00	0.00	0.00	54.17	54.17
	(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
ARMY	TOTAL	7.53	25.45	8.57	67.02	108.57
	(ROW%)	( 7)	( 23)	( 8)	( 62)	(100)

TABLE II-5

TPST PROGRAM FUNDING IN 1992  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

1992 (\$MILLIONS)

DOD ORGANIZATION		CONGRESSIONAL CATEGORY				
BUDGET CATEGORY		ET	HF	MP	ST	TOTAL
		-----	-----	-----	-----	-----
NAVY						
6.1		6.62	2.72	3.01	0.00	12.35
	(ROW%)	( 54)	( 22)	( 24)	( 0)	(100)
6.2		1.39	6.28	3.68	4.43	15.78
	(ROW%)	( 9)	( 40)	( 23)	( 28)	(100)
6.3		6.09	2.93	6.55	5.13	20.70
	(ROW%)	( 29)	( 14)	( 32)	( 25)	(100)
6.4		0.00	0.00	1.89	10.60	12.49
	(ROW%)	( 0)	( 0)	( 15)	( 85)	(100)
NAVY	TOTAL	-----	-----	-----	-----	-----
	(ROW%)	14.10	11.94	15.12	20.16	61.32
		( 23)	( 19)	( 25)	( 33)	(100)

TABLE II-5

TPST PROGRAM FUNDING IN 1992  
 BASED ON FY92 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

1992 (\$MILLIONS)

DOD ORGANIZATION		CONGRESSIONAL CATEGORY				
BUDGET CATEGORY		ET	HF	MP	ST	TOTAL
		-----	-----	-----	-----	-----
AF						
6.1	(ROW%)	0.00 ( 0)	11.51 (100)	0.00 ( 0)	0.00 ( 0)	11.51 (100)
6.2	(ROW%)	15.03 ( 32)	22.41 ( 47)	6.80 ( 14)	3.30 ( 7)	47.54 (100)
6.3	(ROW%)	2.06 ( 6)	24.64 ( 72)	1.77 ( 5)	5.72 ( 17)	34.18 (100)
6.4	(ROW%)	17.25 ( 31)	0.15 ( 0)	0.95 ( 2)	37.38 ( 67)	55.74 (100)
AF	TOTAL (ROW%)	34.34 ( 23)	58.71 ( 39)	9.52 ( 6)	46.41 ( 31)	148.97 (100)
DOD	TOTAL (ROW%)	55.97 ( 18)	96.10 ( 30)	33.21 ( 10)	133.58 ( 42)	318.86 (100)

TABLE II-6

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY92 PRESIDENT'S BUDGET  
 FOR BUDGET CATEGORY = 6.1,6.2

## CONGRESSIONAL CATEGORY BY DOD ORGANIZATION

1991 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
ARMY (ROW%)	5.32 ( 14)	15.65 ( 42)	5.14 ( 14)	11.30 ( 30)	37.41 (100)
NAVY (ROW%)	8.80 ( 31)	8.93 ( 31)	6.75 ( 24)	4.20 ( 15)	28.68 (100)
AF (ROW%)	14.41 ( 25)	32.85 ( 57)	6.63 ( 12)	3.40 ( 6)	57.30 (100)
TOTAL (ROW%)	28.53 ( 23)	57.43 ( 47)	18.52 ( 15)	18.90 ( 0)	123.38 (100)

TPST PROGRAM FUNDING IN 1992  
 BASED ON FY92 PRESIDENT'S BUDGET  
 FOR BUDGET CATEGORY = 6.1,6.2

## CONGRESSIONAL CATEGORY BY DOD ORGANIZATION

1992 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
ARMY (ROW%)	4.69 ( 13)	17.82 ( 50)	4.75 ( 13)	8.57 ( 24)	35.84 (100)
NAVY (ROW%)	8.01 ( 28)	9.01 ( 32)	6.69 ( 24)	4.43 ( 16)	28.13 (100)
AF (ROW%)	15.03 ( 25)	33.92 ( 57)	6.80 ( 12)	3.30 ( 6)	59.05 (100)
TOTAL (ROW%)	27.74 ( 23)	60.74 ( 49)	18.24 ( 15)	16.30 ( 0)	123.03 (100)

TABLE II-7

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY92 PRESIDENT'S BUDGET  
 FOR BUDGET CATEGORY = 6.1,6.2,6.3

## CONGRESSIONAL CATEGORY BY DOD ORGANIZATION

1991 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
ARMY (ROW%)	9.07 ( 15)	22.16 ( 37)	10.87 ( 18)	17.91 ( 30)	60.00 (100)
NAVY (ROW%)	14.78 ( 30)	11.81 ( 24)	13.06 ( 27)	9.24 ( 19)	48.90 (100)
AF (ROW%)	16.80 ( 19)	54.53 ( 63)	8.01 ( 9)	7.83 ( 9)	87.17 (100)
TOTAL (ROW%)	40.65 ( 21)	88.50 ( 45)	31.94 ( 16)	34.98 ( 18)	196.07 (100)

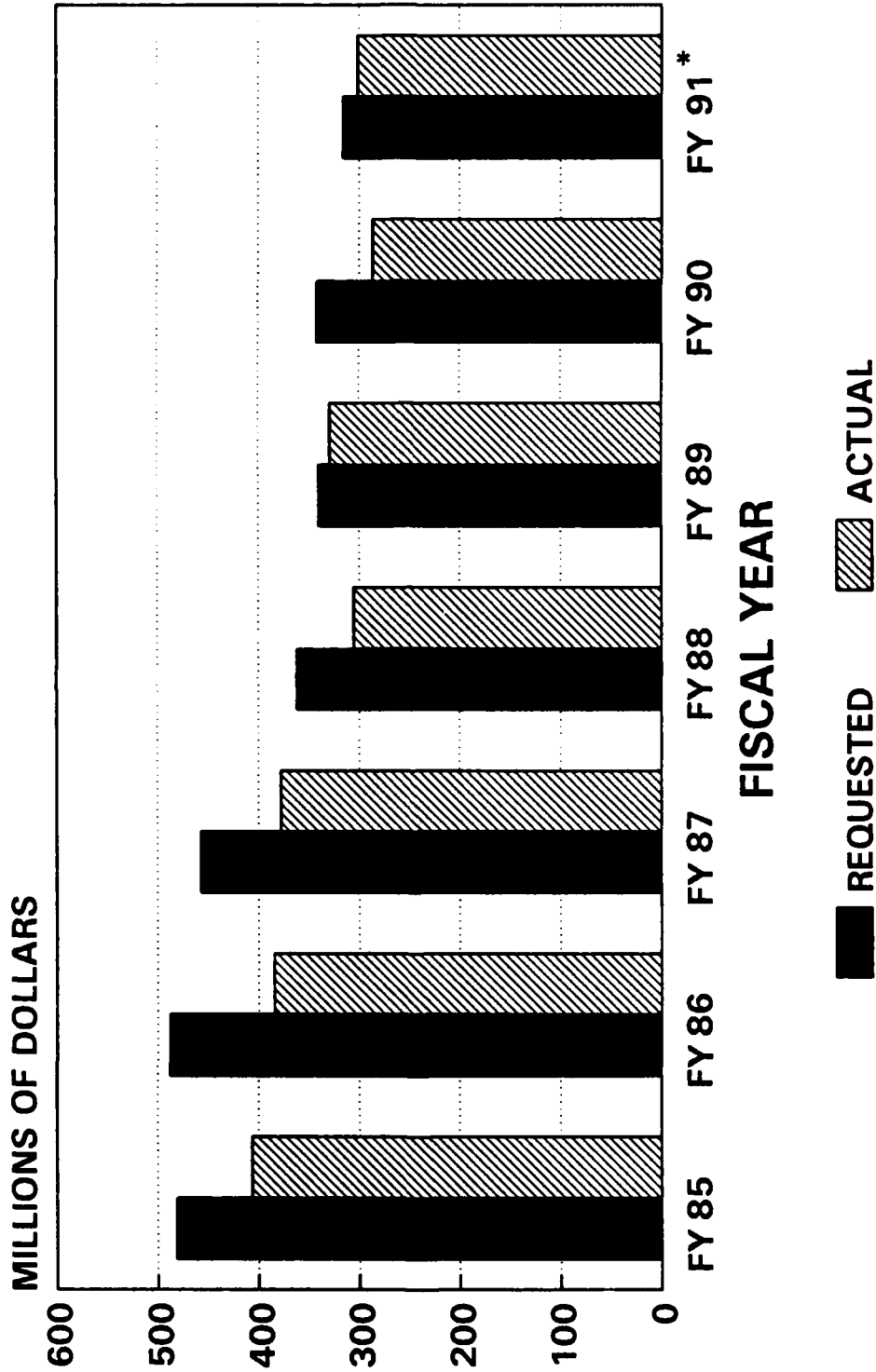
TPST PROGRAM FUNDING IN 1992  
 BASED ON FY92 PRESIDENT'S BUDGET  
 FOR BUDGET CATEGORY = 6.1,6.2,6.3

## CONGRESSIONAL CATEGORY BY DOD ORGANIZATION

1992 (\$MILLIONS)

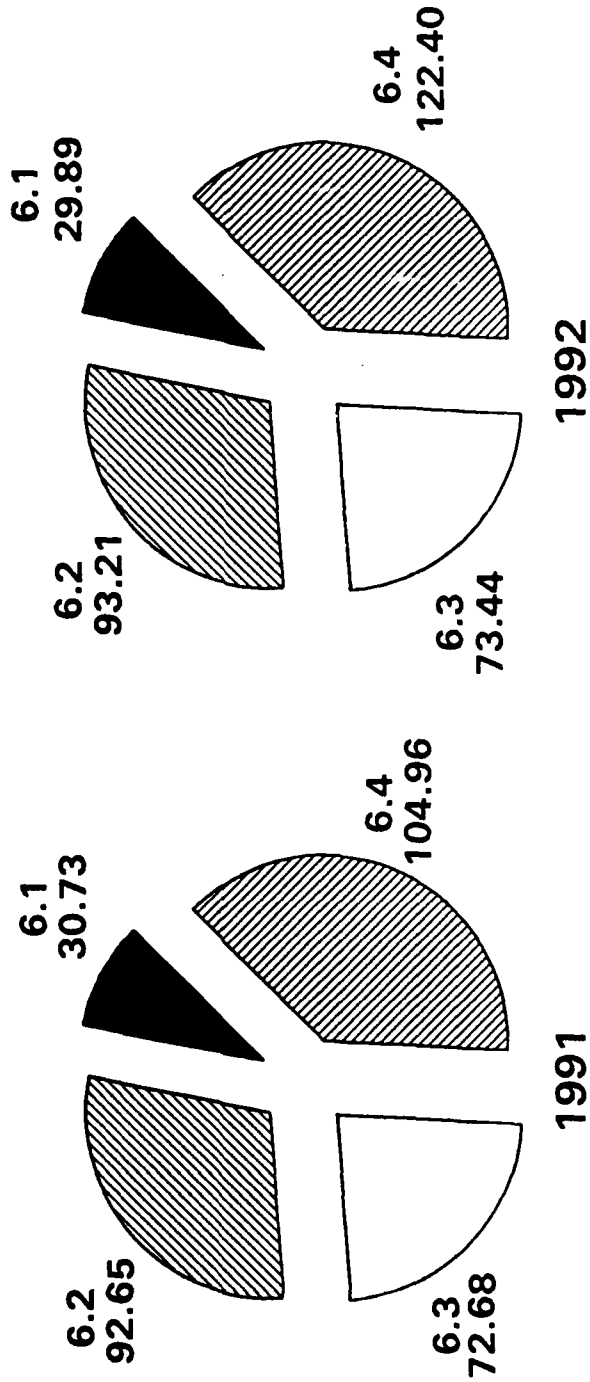
DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
ARMY (ROW%)	7.53 ( 14)	25.45 ( 47)	8.57 ( 16)	12.85 ( 24)	54.40 (100)
NAVY (ROW%)	14.10 ( 29)	11.94 ( 24)	13.23 ( 27)	9.56 ( 20)	48.83 (100)
AF (ROW%)	17.09 ( 18)	58.56 ( 63)	8.57 ( 9)	9.02 ( 10)	93.23 (100)
TOTAL (ROW%)	38.72 ( 20)	95.95 ( 49)	30.37 ( 15)	31.43 ( 16)	196.47 (100)

# REQUESTED VS ACTUAL PROGRAM FUNDING BASED ON THE PRESIDENT'S BUDGET



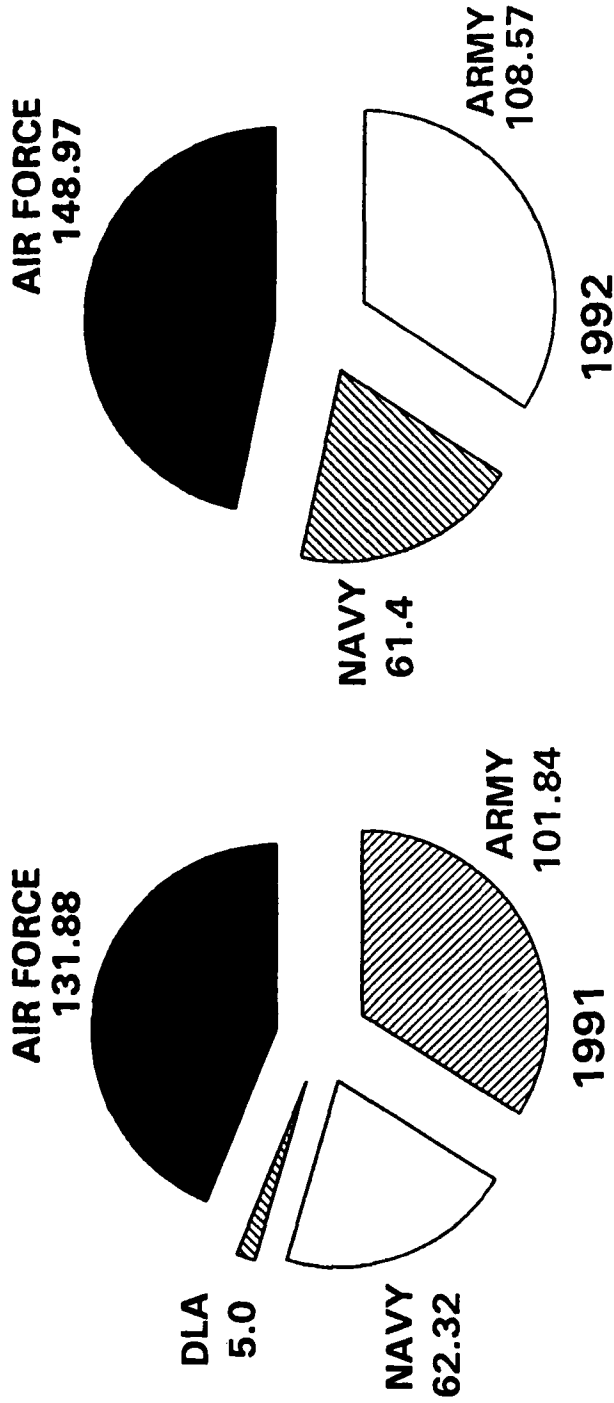
\*ADJUSTED

**TPST PROGRAM FUNDING BASED ON  
THE FY92 PRESIDENT'S BUDGET  
BY BUDGET CATEGORY**





**TPST PROGRAM FUNDING BASED ON  
THE FY92 PRESIDENT'S BUDGET  
BY SERVICE**



III. PROGRAM ELEMENT AND PROJECT SYNOPSES

TRAINING AND PERSONNEL SYSTEMS TECHNOLOGY  
PROGRAM FUNDING BY SERVICE - JAN 91

PE	TITLE	(\$ MILLIONS)				
		FY89	FY90	FY91	FY92	
-----						
ARMY						
-----						
61102A	DEFENSE RESEARCH SCIENCES	6.8	5.9	6.2	6.0	
62716A	HUMAN FACTORS ENGINEERING TECHNOLOGY	18.1	11.7	8.1	10.4	
62717A	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION	0.0	0.0	0.0	0.0	
62722A	MANPOWER, PERSONNEL AND TRAINING	0.0	0.0	0.0	0.0	
62727A	NON-SYSTEM TRAINING DEVICE TECHNOLOGY	3.7	5.0	6.1	3.5	
62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY	17.4	17.4	17.3	16.1	
63003A	AVIATION ADVANCED TECHNOLOGY	4.7	1.9	3.9	2.9	
63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY	28.7	18.1	18.8	15.7	
63216A	SYNTHETIC FLIGHT SIMULATOR DEVELOPMENT	0.0	0.0	0.0	0.0	
63731A	MANPOWER AND PERSONNEL	0.0	0.0	0.0	0.0	
63736A	HUMAN FACTORS ENGINEERING APPLICATIONS	0.0	0.0	0.0	0.0	
63738A	NON-SYSTEM TRAINING DEVICES (NSTD) ADVANCED DEVELOPMENT	0.0	0.0	0.0	0.0	
63739A	HUMAN FACTORS IN TRAINING AND OPERATIONAL EFFECTIVENESS	0.0	0.0	0.0	0.0	
63743A	EDUCATION AND TRAINING	0.0	0.0	0.0	0.0	
63744A	TRAINING SIMULATION	0.0	0.0	0.0	0.0	
64217A	SYNTHETIC FLIGHT TRAINING SYSTEMS	0.0	0.0	0.0	0.0	
64715A	NON-SYSTEM TRAINING DEVICES - ENGINEERING DEVELOPMENT	22.3	19.7	27.8	51.3	
64722A	EDUCATION AND TRAINING SYSTEMS DEVELOPMENT	6.8	0.0	0.0	0.0	
64801A	AVIATION-ENGINEERING DEVELOPMENT	4.4	6.5	14.1	3.0	
-----						
	SUBTOTAL - ARMY	:	112.5	85.9	101.8	108.6
NAVY						
-----						
61153N	DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: COGNITIVE AND NEURAL SCIENCES	11.7	12.6	13.6	12.5	
62131M	MARINE CORPS LANDING FORCE TECHNOLOGY	0.5	0.6	0.6	0.6	
62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA	6.8	8.4	10.5	11.0	
62234N	SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA	4.2	4.4	4.3	4.3	
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	2.5	2.5	2.9	3.0	
63707N	MANPOWER AND PERSONNEL SYSTEMS	3.2	3.1	3.3	3.3	
63710N	MAN-MACHINE TECHNOLOGY	0.0	0.0	0.0	0.0	
63720N	EDUCATION AND TRAINING	5.3	5.2	6.0	6.1	
63727N	ADVANCED TECHNOLOGY FOR LOGISTICS INFORMATION	0.0	0.0	0.0	0.0	

TRAINING AND PERSONNEL SYSTEMS TECHNOLOGY  
PROGRAM FUNDING BY SERVICE - JAN 1991

(\$ MILLIONS)

PE	TITLE	FY89	FY90	FY91	FY92
63732M	MARINE CORPS ADVANCED MANPOWER/TRAINING SYSTEMS	3.1	4.0	3.2	3.3
63733N	SIMULATION AND TRAINING DEVICE TECHNOLOGY	6.3	1.8	5.1	5.2
63739N	NAVY LOGISTICS PRODUCTIVITY	0.0	0.0	0.0	0.0
64703N	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS	1.1	1.0	1.1	1.9
64709N	JOINT SERVICE MANPOWER/PERSONNEL PROTOTYPES	0.0	0.0	0.0	0.0
64714N	AIR WARFARE TRAINING DEVICES	0.0	0.0	0.0	0.0
64715N	SURFACE WARFARE TRAINING DEVICES	18.4	17.0	12.4	10.7
64716N	SUBMARINE WARFARE TRAINING DEVICES	0.0	0.0	0.0	0.0
SUBTOTAL - NAVY		62.5	60.0	62.3	61.4
AIR FORCE					
61102F	DEFENSE RESEARCH SCIENCES	9.2	10.0	11.1	11.6
62202F	HUMAN SYSTEMS TECHNOLOGY	11.4	16.6	15.8	16.8
62205F	PERSONNEL, TRAINING, AND SIMULATION	32.7	27.6	30.5	30.9
62703F	PERSONNEL UTILIZATION TECHNOLOGY	0.0	0.0	0.0	0.0
63106F	LOGISTICS SYSTEMS TECHNOLOGY	13.7	8.9	11.8	14.8
63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY	8.3	7.2	8.2	9.6
63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY	5.7	9.9	10.0	10.0
63365F	SPACE BIOTECHNOLOGY	0.0	0.0	0.0	0.0
63704F	MANPOWER AND PERSONNEL SYSTEMS TECHNOLOGY	0.0	0.0	0.0	0.0
63751F	TRAINING SYSTEMS TECHNOLOGY	0.0	0.0	0.0	0.0
64227F	TRAINING SYSTEMS DEVELOPMENT	63.0	51.4	41.3	52.2
64243F	MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT	0.1	4.4	3.5	3.6
SUBTOTAL - AIR FORCE:		143.7	135.6	131.9	149.0
DLA					
64722S	DOD SUPPORT ACTIVITIES	9.8	5.1	5.0	0.1
SUBTOTAL - DLA		9.8	5.0	5.0	0.0
TOTAL:		328.5	286.4	301.0	318.9

TRAINING AND PERSONNEL TECHNOLOGY  
RESEARCH ORGANIZATIONS

ARMY

-----

AVSCOM	Army Aviation Systems 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
NAVSEA	Naval Sea Systems Command
NOSC	Naval Ocean Systems Center
NPRDC	Navy Personnel Research and Development Center
NSWC	Naval Surface Weapons Center
NTSC	Naval Training Systems Center
ONR	Office of Naval Research

AIR FORCE

-----

AAMRL	Armstrong Aerospace Medical Research Laboratory
AFHRL	Air Force Human Resources Laboratory
AFOSR	Air Force Office of Scientific Research
AMD	Aerospace Medical Division
TS SPO	Deputy for Training Systems
HSD	Human Systems Division

DLA

-----

DLA	Defense Logistics Agency
TPDC	Training Performance Data Center
FM&P	Force Management & Personnel

### III.A. ARMY PROGRAM ELEMENT AND PROJECT SYNOPSES

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PE	TITLE	PAGE
61102A	DEFENSE RESEARCH SCIENCES	III-A-1
62716A	HUMAN FACTORS ENGINEERING TECHNOLOGY	III-A-11
62727A	NON-SYSTEM TRAINING DEVICES TECHNOLOGY	III-A-15
62785A	MANPOWER, PERSONNEL AND TRAINING TECHNOLOGY	III-A-20
63003A	AVIATION ADVANCED TECHNOLOGY	III-A-32
63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY	III-A-37
64715A	NON-SYSTEM TRAINING DEVICES-ENGINEERING DEVELOPMENT	III-A-49
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.

## PROGRAM ELEMENT OVERVIEW

PE: 61102A                   DEFENSE RESEARCH SCIENCES

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

DoD ORGANIZATION:           ARMY

FUNDING:                    FY91 \$ 6.2M (FY92 PRESIDENT'S BUDGET)  
                                  FY92 \$ 6.0M (FY92 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.

This is the U.S. Army core research program to sustain the 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, environmental, terrestrial and behavioral sciences. This research is focused on the Army's key goals for effectiveness in the air-land battle environment and the Army 21 concept to provide a lethal, integrated, supportable, highly mobile force with enhanced soldier effectiveness. Research areas are determined and prioritized in order to meet Army needs as stated in mission area analyses and in Army 21, and to exploit scientific opportunities. This core research program is complemented by the inter-disciplinary research performed under the University Research Initiative (URI) program.

The work in this Program Element is consistent with the resource constrained Army Technology Base Master Plan, Science and Technology Objectives (STOs) milestones for the Army's key emerging technologies, and force modernization plans.

There are 33 Army laboratories and activities responsible for this program.

**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 seeking 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 applications to solve Army personnel problems.

**FUTURE DIRECTIONS:**

Beyond FY92, plans for the MPT portion of this Program Element include: (a) extending previous soldier visual performance research on the allocation of visual attention in displayed scenes and developing a model of visual search and target acquisition performance in static scenes, (b) continuing soldier acoustic research efforts extending current theories of signal detection to the detection of complex transient sound, (c) continuing soldier performance research efforts to provide information and models critical to the development of information and video display systems for the navigation of teleoperated military vehicles by soldiers, (d) conducting research on human communicative processes for spatially-separated but electronically-linked individuals and groups, (e) investigating the role of time-of-day factors with respect to irregular work schedules, accidents and human performance error, and task-execution after rapid time-zone change, (f) developing a theoretical understanding of personality factors that lead to enhanced job motivation, performance under stress, and performance in irregular work schedules, and (g) exploring cultural variables as factors in performance effectiveness of individuals and groups.



## PROJECT OVERVIEW

		91	92
		-----	-----
PROJECT: B74A	HUMAN ENGINEERING	\$ 2.9M	\$ 2.5M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY HUMAN ENGINEERING LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to support research in soldier performance, sensor/information processing and other elements of soldier-machine interface critical to the design of Army weapons systems.

In FY91, plans include: (a) continuing efforts to develop a metric to assess acute combat-like stress in a variety of military operations and settings, (b) expanding research efforts in visual detection and recognition to further develop the visual application to aided target recognition systems, (c) based on previous intelligibility studies, developing a metric to be used in evaluating the effect of speech intelligibility on crew performance for application in combined arms operations, and (d) conducting research on the quality and quantity of visual information required for soldiers to effectively employ teleoperated systems which rely on indirect, processed or other mission critical functions.

In FY92, plans include: (a) continuing soldier visual performance research to determine the allocation of visual attention in various displayed scenes and identify the effects of various visual target characteristics on aided target detection and acquisition, (b) continuing to determine and exploit basic soldier-machine acoustic phenomena to apply to the design of communication equipment so that it is more effective in high noise level operational contexts; expanding research into the basic psychoacoustic and interpretive processes associated with the detection, identification and localization of complex sounds in time-varying backgrounds, (c) completing development of a metric to assess acute soldier combat-like stress in a variety of military operations and settings; determining a measure, valid across different settings, to (1) predict soldier/system performance under stress, (2) measure

stress, and (3) provide direct input into the development of design guidelines for crew-served weapons, and (d) continuing soldier performance research efforts to provide information and models critical to the development of information and video display systems for the navigation of teleoperated military vehicles by soldiers; determining pixels and grey levels required for recognition of obstacles and perceptibility of landmark cues as a function of resolution.

#### 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.

In FY90, specific accomplishments included: (a) development and provision to the Tank Automotive Command (TACOM) of preliminary combat vehicle design information with respect to non-detectability of U.S. armor vehicles and systems, (b) expansion of communication studies to further establish the impact of high noise levels on speech intelligibility and crew performance in combat operations; specific crew performance measures were related to different intensities of noise in combat-like scenarios using Bradley Fighting Vehicle crews in a simulated environment; new noise canceling communication technology was investigated for insertion in vehicle communication systems; this promising technology offers substantial intelligibility improvements and findings have transitioned to the user, and (c) development of a metric to measure hit probability and soldier marksmanship performance when subjected to combat-like stresses; this methodology has been transitioned to Army analysis and design and also has been provided to the Armament Research, Development and Engineering Center (ARDEC) as well as the Infantry School for incorporation into Advanced Combat Rifle Technology assessments.

## PROJECT OVERVIEW

		91	92
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PROJECT: B74F-ET	PERSONNEL PERFORMANCE AND TRAINING	\$ 0.7M	\$ 0.7M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objective of this Project is to conduct behavioral science research in the following areas of human performance: (a) variables and processes determining effective group functioning, leader-group interaction, and decision-making, (b) factors that determine effective, low error human performance in decision-making and complex equipment operation in stressful military environments, and (c) principles for technology-based instructional methods that promote the learning of cognitive, perceptual-motor, and unit-performance tasks by individuals and groups.

This Task supports the Education and Training (ET) portion of this Project.

In FY91, plans include: (a) identifying relevant variables and individual-organizational relationships that determine successful decision-making and problem-solving in hierarchical organizations with particular attention to crisis situations, and (b) determining learning and reasoning principles that are central to such high level activities as formation of complex concepts, automatic performance of high mental workload tasks, and long term skill retention.

In FY92, plans include determining how human communication processes influence group problem-solving and decision-making in realistic environments.

**PAYOFF/UTILIZATION:**

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

In FY90, specific accomplishments included completion of landmark research on decision making in complex, "real world" environments.

## PROJECT OVERVIEW

		91	92
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PROJECT: B74F-HF	PERSONNEL PERFORMANCE AND TRAINING	\$ 1.0M	\$ 1.0M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objective of this Project is to conduct behavioral science research in the following areas of human performance: (a) variables and processes determining effective group functioning, leader-group interaction, and decision-making, (b) factors that determine effective, low error human performance in decision-making and complex equipment operation in stressful military environments, and (c) principles for technology-based instructional methods that promote the learning of cognitive, perceptual-motor, and unit-performance tasks by individuals and groups.

This Task supports the Human Factors (HF) portion of this Project.

In FY91/92, plans include determining separate and combined effects of personality, motivation and time-of-day factors on the performance of cognitive tasks.

## PAYOFF/UTILIZATION:

The payoff of this Project 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 FY90, specific accomplishments included quantification of the increase in soldier motivation to endure stressful tasks that accompany provision of information about expected duration of these tasks.

## PROJECT OVERVIEW

		91	92
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PROJECT: B74F-MP	PERSONNEL PERFORMANCE AND TRAINING	\$ 0.8M	\$ 0.8M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objective of this Project is to conduct behavioral science research in the following areas of human performance: (a) variables and processes determining effective group functioning, leader-group interaction, and decision-making, (b) factors that determine effective, low error human performance in decision-making and complex equipment operation in stressful military environments, and (c) principles for technology-based instructional methods that promote the learning of cognitive, perceptual-motor, and unit-performance tasks by individuals and groups.

This Task supports the Manpower and Personnel (MP) portion of this Project.

In FY91, plans include: (a) empirically determining the role of individual differences in performance under stress, and (b) defining research methods and concepts related to the military sociology of the American soldier, focusing on the non-commissioned officer.

In FY92, plans include: (a) identifying key variables responsible for the motivation of group performance, and (b) further defining procedures for predicting human sensitivity to stress and developing hypotheses for maximizing resistance to it.

**PAYOFF/UTILIZATION:**

In FY90, specific accomplishments included: (a) quantification of the relationship between military trainee job performance and factors of leadership support, stress, and job satisfaction, and determination of aspects of supervisory behavior that contribute most to stress levels on the job, and (b) development of a theory and methodology for making inferences from qualitative data and demonstration of its utility for identifying criminals and its potential for detecting terrorists.

## PROJECT OVERVIEW

		91	92
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PROJECT: B74F-ST	PERSONNEL PERFORMANCE AND TRAINING	\$ 1.1M	\$ 1.1M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objective of this Project is to conduct behavioral science research in the following areas of human performance: (a) variables and processes determining effective group functioning, leader-group interaction, and decision-making, (b) factors that determine effective, low error human performance in decision-making and complex equipment operation in stressful military environments, and (c) principles for technology-based instructional methods that promote the learning of cognitive, perceptual-motor, and unit-performance tasks by individuals and groups.

This Task supports the Simulation and Training (ST) portion of this Project.

In FY91/92, plans include studying techniques to enhance human performance, and perceptual learning in the acquisition of flight skills.

## 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.



## PROGRAM ELEMENT OVERVIEW

PE: 62716A HUMAN FACTORS ENGINEERING TECHNOLOGY  
CONGRESSIONAL CATEGORY: HUMAN FACTORS  
DoD ORGANIZATION: ARMY  
FUNDING: FY91 \$ 8.1M (FY92 PRESIDENT'S BUDGET)  
FY92 \$10.4M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to maximize the effectiveness of the soldier and his materiel in order to survive and prevail on the battlefield.

For materiel to be most effectively used by soldiers, it must be designed specifically for soldiers. The rapid changes in technology and the ever-increasing emphasis on soldier and equipment performance provides the driver for this effort. Specialized laboratory studies and field evaluations are conducted to collect performance data on the capabilities and limitations of soldiers, with particular attention on soldier and equipment interaction. The resulting data are the basis for weapon systems and equipment design standards, guidelines, handbooks, and soldier training requirements to improve equipment operation and maintenance. The application yields reduced workload, fewer errors, enhanced soldier protection, user acceptance, and allows the soldier to extract the maximum performance from his system. Experimentation of Aided Target Recognition (ATR) as it interfaces with the soldier is critical to the development of ATR devices and their applications.

The work in this Program Element is consistent with the resource-constrained Army Technology Base Master Plan, Science and Technology Objectives (STOs) milestones for the Army's key emerging technologies therein, and Army force modernization plans.

The in-house developing organization responsible for this program is the U.S. Army Human Engineering Laboratory (HEL).

**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:**

Beyond FY92, plans for this Program Element include: (a) developing and demonstrating a Global Positioning System (GPS) fuze for artillery registration rounds to improve the effectiveness of artillery fire support, (b) developing an operational prototype of a knowledge-based decision support system for Corps-level baseline and contingency supply distribution and inventory planning, and (c) conducting human factors experimentation in Aided Target Recognition (ATR), and developing a comprehensive human factors database to ensure the soldier-ATR interface is effectively designed and integrated into the development of ATR devices.

## PROJECT OVERVIEW

		91	92
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PROJECT: AH70	HUMAN FACTORS ENGINEERING SYSTEMS DEVELOPMENT	\$ 8.1M	\$10.4M
PE: 62716A	HUMAN FACTORS ENGINEERING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY HUMAN ENGINEERING LABORATORY		

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PROJECT SYNOPSIS:

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

In FY91, plans include: (a) conducting field evaluations of new command and control displays and automated tactical operation center concepts to improve the soldier-Command-Control-Communication (C<sup>3</sup>) interface in a combined arms, forward area air defense battlefield situation; transitioning the results to the Air Defense School, Air Defense Program Executive Officers/Project Managers (PEOs/PMs) and Command and Control PEOs/PMs, (b) continuing laboratory technology developments in expert systems to determine the feasibility of the knowledge-based logistics planning shell for tactical ammunition management developed in FY89; research and development is aimed at improving logistics planning capabilities under battlefield conditions, and (c) conducting and completing an evaluation of field artillery battlefield decision-making in conjunction with the Field Artillery School; allocation and positioning of units as well as coordination and distribution of fires will be evaluated in order to develop a comprehensive fire support decision aid for battlefield application.

In FY92, plans include: (a) completing and transitioning to the Air Defense School, Air Defense PEOs/PMs and Command and Control PEOs/PMs human factors engineering design guidelines for air defense command and control and weapon system components, (b) establishing human factors engineering design guidance for individual soldier small arms and antitank weapons that will permit

improved hit probability, user interface, portage and enhanced survivability on the battlefield; transitioning to the Infantry School and Troop Support PEOs/PMs, (c) determining the total performance requirements of a four-man main battle tank and, with the aid of new automation technologies, redistributing those performance tasks to a two-man crew; performing analyses and simulations to determine the performance capabilities of the reduced crew concept and transitioning preliminary crewstation designs to the Tank Automotive Command, and (d) conducting human factors experimentation to establish relationships between spatial resolution, temporal resolution, and human contrast sensitivity, and developing image resolution algorithms to improve soldier capabilities in target recognition.

#### 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 FY90, specific accomplishments included: (a) the conducting of research to quantify the portability and physiological energy cost of carrying various infantry equipment loads under simulated battlefield conditions; data will assist materiel developers in efforts to lighten the soldier's load, (b) completion of a combat vehicle design handbook to assist materiel developers in crew area noise reduction for future armored vehicles, (c) the conducting of Human Factors Engineering (HFE) evaluations of future combat rifles, focusing on such issues as round-to-round dispersion and reliability in order to improve overall performance, and (d) the continuing of direct HFE support to systems under development and conducting Human Factors Engineering Analyses (HFEAs) for combat and materiel developers as part of the Manpower and Personnel Integration (MANPRINT) process.

## PROGRAM ELEMENT OVERVIEW

PE: 62727A                   NON-SYSTEM TRAINING DEVICE TECHNOLOGY  
CONGRESSIONAL CATEGORY:   SIMULATION & TRAINING DEVICES  
DoD ORGANIZATION:         ARMY  
  
FUNDING:                    FY91 \$ 6.1M (FY92 PRESIDENT'S BUDGET)  
                              FY92 \$ 3.5M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to provide exploratory development of state-of-the-art generic training methods and equipment to increase overall combat effectiveness while reducing Army training costs. This program also provides enabling technologies for advancing simulation networking capabilities and simulated representations of battlefield environments needed for training active and Reserve Component forces in an era of reduced Operating Tempo (OPTEMPO) and range availability.

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. As an example, support from this program resulted in a Multiple Integrated Laser Engagement Simulation System (MILES).

The work in this Program Element is consistent with the resource-constrained Army Technology Base Master Plan, Science and Technology Objectives (STOs) milestones for the Army's key emerging technologies therein, and Army force modernization plans.

The in-house developing organizations responsible for this program are the Project Manager for Training Devices (PM TRADE), and the Army Research Institute for the Behavioral and Social Sciences (ARI).

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, MILES.

FUTURE DIRECTIONS:

Beyond FY92, plans for this Program Element include: (a) enhancing simulations of intelligent opposing and adjacent friendly forces to accurately reflect current battlefield doctrine, (b) developing practical, effective approaches for linking different simulation environments together to provide a seamless joining of live field exercises and simulated battles, and (c) publishing validation and accreditation methodologies developed for Battlefield Distributed Simulation-Developmental Advanced Technology Transition Demonstration (BDS-D ATTD).

## PROJECT OVERVIEW

		91	92
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PROJECT: A230	NON-SYSTEM TRAINING DEVICES	\$ 6.1M	\$ 3.5M
PE: 62727A	NON-SYSTEM TRAINING DEVICE TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PM TRADE		

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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 FY91, plans include: (a) completing and transitioning successful findings from National Training Center (NTC) concept exploratory studies into ongoing developmental efforts and acquisition of simulation software and simulators to expand from battalion-size to brigade-size training capability, (b) implementing Modular Simulator Design Standards, (c) demonstrating the feasibility of improved the Multiple Integrated Laser Engagement Simulation (MILES) laser system to shoot through smokes and obscurants to allow training with operational thermal sights, (d) initiating Training Effectiveness Evaluation of New Emerging Simulation Technologies that have been investigated by the Institute for Simulation and Training, (e) completing beta site testing of automated, rule-based system engineering design and evaluation tools for optimizing simulator and training device effectiveness, and (f) conducting technology integration and feasibility studies for linking emerging simulation capabilities into the Battlefield Distributed Simulation-Developmental Advanced Technology Transition Demonstration (BDS-D ATTD) program, in support of Guard/Reserve and combat training devices, and materiel developer distributed simulation requirements.

In FY92, plans include: (a) demonstrating Artificial Intelligence (AI)

techniques to augment use of computer simulations supporting training at the Combat Training Centers, (b) demonstrating an embedded intelligent training system for the Air-Land Battle Management (ALBM) maneuver course of action planning and decision-making, (c) demonstrating visual system dynamic databases and display technologies, (d) expanding participation of university, government, and industry laboratories in the integration and development of simulation technology in BDS-D, (e) completing beta site testing of automated tools for optimizing simulator and training device effectiveness, (f) demonstrating leader-follower technologies for a robotic convoy capability to replicate second echelon opposing forces at the Combat Training Centers with significantly reduced crews, and (g) continuing transition of BDS-D technology to Guard/Reserve and combat training devices, and materiel developers' simulators.

#### 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.

In FY90, specific accomplishments included: (a) demonstration of the feasibility of simulating Intelligence/Electronic Warfare systems with real-time, non-emitting, simulated threat emission signatures for training at NTC and in field units, (b) publication of modular simulator design standards as part of the tri-Service/industry Joint Technical Coordinating Group for Training Systems and Devices program, (c) with simulation network research facilities, the conducting of evaluations of new, emerging tactics, doctrine and weapons systems including air defense, laser weapons and command and control systems, (d) initiation of development of advanced real-time rotorcraft blade element simulation models required for the next generation of Army flight simulators, (e) initiation of investigations of an embedded intelligent training system for ALBM maneuver course of action planning and decision-making, (f) completion of a study of reduced crew for opposing forces at the NTC, (g) the conducting of a demonstration of an AI application



to role player assist for battle simulation, and (h) initiation of an investigation of visual system dynamic databases and display technologies.

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:                      FY91 \$17.3M (FY92 PRESIDENT'S BUDGET)  
                                 FY92 \$16.1M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to provide a scientifically sound basis for maximizing soldier and unit performance by empirically determining: (a) how the soldier's workload can be "shifted from the head to the hardware" in the design of new weapon systems, (b) what information must be available to system designers to ensure compatible man-machine systems, (c) what simulator and training device design features are necessary to ensure effective training at minimal cost, (d) how individuals and units acquire and retain complex skills, (e) how to substitute "intelligent" automated tutoring technologies for rapidly diminishing training resources, and (f) how behavioral science methods can be used to improve the recruiting, selection, and retention of quality soldiers.

Accomplishments are transitioned to Program Element 63007A for advanced technology development.

The work in this Program Element is consistent with the resource-constrained Army Technology Base Master Plan, Science and Technology Objective (STO) milestones for the Army's key emerging technologies, and Army force modernization plans.

The in-house developing organization responsible for this Program Element is the U.S. Army Research Institute for the Behavioral and Social Sciences.

PAYOFF/UTILIZATION:

The payoff of this Program Element includes providing a scientifically sound technology base for maximizing soldier and unit performance.

FUTURE DIRECTIONS:

Beyond FY92, plans for the Human Performance Effectiveness and Simulation Project (A790) of this Program Element include: (a) experimentally determining minimum visual fidelity requirements for different pilot tasks for effective flight simulator training, (b) developing preliminary individual and unit performance assessment methods for use in simulated "virtual reality" environments, and (c) determining cognitive job-aiding tools required to improve command and control situation assessment skills.

Plans for the Manpower, Personnel and Training Project (A791) include: (a) developing training strategies for sustaining command and control skills, (b) refining collective skill acquisition and retention models to provide more accurate prediction of needed frequency of refresher training, (c) designing a knowledge base for an expert system that will aid training developers in selecting training strategies, (d) facilitating officer personnel management by developing a preliminary model of the multiple factors and their weights that affect officer career progression, and (e) developing experimental methods for the most effective utilization of soldiers of various aptitude levels.

## PROJECT OVERVIEW

		91	92
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PROJECT: A790-HF	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION	\$ 2.6M	\$ 2.7M
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objectives of the Human Factors portion of this Project are to determine: (a) the most effective means of integrating human decision makers and automated information technology in new Army systems, (b) the relative contributions of human factors engineering, manpower, personnel, and training variables to weapon system performance and unit effectiveness, and (c) Artificial Intelligence (AI)-based technologies to deliver more effective training and job aiding.

Increase in funding from FY91 to FY92 is caused by a zero-sum transfer from Project A791 to reflect the application of revised DoD definitions for distribution of overhead costs.

In FY91, plans include: (a) developing prototype methods for predicting weapon system and unit performance degradation due to soldier stress, sleep loss and fatigue, crew turnover, and levels of personnel experience, (b) determining if crew selection procedures can reduce Army aviation accidents caused by human error, (c) determining collective staff skill requirements for the Army Tactical Command and Control System, and (d) testing and refining a prototype AI technology for language training.

In FY92, plans include: (a) experimentally determining instructional strategies for use by AI tutors, (b) developing a behavioral taxonomy to evaluate Military Intelligence (MI) performance and to characterize the complex MI decision-making process, and (c) developing a prototype aviator performance tracking system.

**PAYOFF/UTILIZATION:**

In FY90, specific accomplishments for the Human Factors portion of this Project included: (a) improved prospective exchange of tactical planning data within a command and control system through use of graphics, and (b) development of prototype AI-based techniques for training military linguists.

## PROJECT OVERVIEW

		91	92
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PROJECT: A790-ST	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION	\$ 4.3M	\$ 4.0M
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objective of the Simulation and Training Devices portion of this Project is to experimentally and empirically determine the minimum design requirements for simulators/training devices that will achieve effective training at the lowest cost.

Increase in funding from FY91 to FY92 is caused by a zero-sum transfer from Project A791 to reflect the application of revised DoD definitions for distribution of overhead costs.

In FY91, plans include: (a) completing development of a joint U.S./Canada flight training simulator testbed, (b) establishing a joint Defense Advanced Research Project Agency (DARPA)/Project Manager for Training Devices (PM TRADE)/Army Research Institute (ARI) testbed for research on individual training using simulated environments (i.e. "virtual reality"), and (c) developing concepts for training feedback in networked simulators.

In FY92, plans include: (a) developing experimentally-based rules for determining visual scene contents in low-cost training simulators, and (b) testing a preliminary methodology for selecting tasks for training using "virtual reality" simulated environments.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments for the Simulation and Training Devices portion of this Project included the development of: (a) a prototype risk-awareness estimation techniques for reducing accidents in "live fire" artillery training exercises, (b) an improved prototype tactical battle staff training technology, (c) prototype performance measurement and training management methodologies for networked simulators, (d) a method to determine which collective (i.e. multi-person) tasks could be trained most effectively in networked simulators, and (e) a prototype live-fire and simulator tank gunnery proficiency measurement methodology.

## PROJECT OVERVIEW

		91	92
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PROJECT: A791-ET	MANPOWER, PERSONNEL AND TRAINING	\$ 4.7M	\$ 4.1M
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objectives of the Education and Training portion of this Project are to provide the scientific basis for: (a) improved efficiency, timeliness, and relevance of training material development, and (b) improved individual and unit skill acquisition, retention, and performance.

Decrease in funding from FY91 to FY92 is caused by a zero-sum transfer to Project A790 to reflect the application of revised DoD definitions for distribution of overhead costs.

In FY91, plans include: (a) developing methods for estimating the required frequency of refresher training in units, by type of task, to assure skill retention, and (b) testing and refining automated test development and training development tools.

In FY92, plans include: (a) developing a prototype crew-level training program for improving safety within operational aviation units, (b) refining acquisition and retention models for complex skills, and (c) designing and developing an automated tool for deriving training requirements for collective tasks.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments for the Education and Training portion of this Project included: (a) design of automated tools to aid training program



developers to prepare proficiency tests, (b) development of preliminary models of skill acquisition and retention for complex cognitive tasks, and (c) development of a technique for systematically eliciting knowledge from subject-matter experts for use in training development.

## PROJECT OVERVIEW

		91	92
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PROJECT: A791-HF	MANPOWER, PERSONNEL AND TRAINING	\$ 1.3M	\$ 1.5M
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) improve methods for battle command training, and (b) improve crew and team level performance in aviation and ground operations.

In FY91, plans are to develop and test models for predicting the acquisition and retention rates of complex skills.

In FY92, plans include to: (a) validate collective skill retention model with different types of tasks and teams, and (b) experimentally determine how to enhance unaided day and night visual performance on the battlefield.

## PAYOFF/UTILIZATION:

Specific accomplishments in FY90 include developing a model of collective (i.e. team) skill acquisition and retention, based on task characteristics and performance requirements.

## PROJECT OVERVIEW

		91	92
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PROJECT: A791-MP	MANPOWER, PERSONNEL AND TRAINING	\$ 4.5M	\$ 4.0M
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objectives of the Manpower and Personnel portion of this Project are to provide the scientific basis for: (a) improved methods of force structure planning, selection testing, and leader development, and (b) improved methods for estimating manpower levels and soldier skills required by new Army weapon systems in development.

Decrease in funding from FY91 to FY92 is caused by a zero-sum transfer to Project A790 to reflect the application of revised DoD definitions for distribution of overhead costs.

In FY91, plans include: (a) developing the methodology to generate job performance prediction equations, and (b) validating a preliminary model for estimating costs of alternative enlisted force structures for different contingency missions.

In FY92, plans include: (a) developing preliminary strategies to motivate the recruitment of physicians and other critical-need medical personnel, and (b) identifying variables for predicting performance of low-aptitude soldiers and identification of jobs that they can perform most effectively in event of mobilization.

PAYOFF/UTILIZATION:

In FY90, specific accomplishments for the Manpower and Personnel portion of this Project included: (a) development of a preliminary model for determining the quality mix of enlisted accessions necessary to maximize cost effectiveness for a given force structure, and (b) conducting a preliminary test of a model for determining relationships among officer career intentions, branch dissatisfaction, and Army needs during "downsizing."

## PROGRAM ELEMENT OVERVIEW

PE: 63003A AVIATION ADVANCED TECHNOLOGY  
CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES  
DoD ORGANIZATION: ARMY  
FUNDING: FY91 \$ 3.9M (FY92 PRESIDENT'S BUDGET)  
FY92 \$ 2.9M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of the Manpower, Personnel, and Training (MPT) portion of this Program Element is to provide for the integration and demonstration of advanced technology components and subsystems.

Modern Army aircraft will be required to support the Army's global mission, and, as such, face an awesome array of air defense threats which include: (a) optically and radar-equipped 23mm and 30mm air defense guns, (b) SA-11, -13, and -14 infrared and radar-guided missiles, and (c) potential nuclear/biological/chemical and laser threats directed and delivered both from the ground and from 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 fiber-optic technology, advanced power train technology, integration of advanced weapons and fire control, advanced simulation technology, artificial intelligence, and advanced avionics are the keys to providing reliable, survivable Army aircraft essential to the future integrated battlefield. Emphasis is placed on: (a) ballistically tolerant material, (b) avionics to enable day/night, adverse weather nap-of-the-earth operations, (c) advanced propulsion systems (engine and drive train) for improved mobility, agility, reduced weight/cost and fuel consumption, (d) advanced flight controls for reduced weight and cost, (e) advanced weapons integration, (f) improved survivability, reliability, and maintainability, and (g) reduced pilot workload/training requirements. In addition, this Program Element standardizes synthetic flight simulator component interfaces to facilitate system growth in terms of full mission simulation performance. A rapidly configurable database is integrated to provide nap-of-the-earth resolutions for Army pre-mission planning and training. A crew station full-mission simulator demonstrates future aircraft man-machine interaction

and performance. The technology is applicable for the next generation Army aircraft of the mid-to-late 1990s and beyond, as well as for block improvements to existing aircraft.

The work in this Program Element is consistent with the Army's resource-constrained Army Technology Base Master Plan (ATBMP) and the Army Aviation Modernization Plan, and addresses Science and Technology Objectives (STOs) milestones for the Army's key emerging technologies in the ATBMP.

The in-house organizations responsible for this program are Project Manager for Training Devices (PM TRADE); U.S. Army Aviation Systems Command (AVSCOM); Avionics R&D Activity; Aerostructures Directorate, NASA Langley Research Center; Aeroflightdynamics Directorate, NASA Ames Research Center; Propulsion Directorate, NASA Lewis Research Center; and Aviation Applied Technology Directorate. Related activities are performed by the National Aeronautics and Space Administration (NASA).

#### 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. The application of fiber-optic technology to flight control components, and advanced rotor technology to existing and proposed rotor systems, as well as the development of advanced weapons and fire control, advanced engines and drive trains, advanced simulation technology and advanced avionics are the keys to providing reliable, survivable Army aircraft essential to the future integrated battlefield.

#### FUTURE DIRECTIONS:

Beyond FY92, plans for the Flight Simulator Components Project (DB39) include the demonstration of advanced flight simulation techniques and components for incorporation into the design of future simulators and for improving training capabilities of current training simulators.

## PROJECT OVERVIEW

		91	92
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PROJECT: DB34	ROTORCRAFT SYSTEM INTEGRATION SIMULATOR (RSIS)	\$ 3.0M	\$ 0.1M
PE: 63003A	AVIATION ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY AVIATION SYSTEMS COMMAND		

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PROJECT SYNOPSIS:

The objective of this Project is to develop an advanced rotorcraft simulator facility by expanding the National Aeronautics and Space Administration's (NASA's) Vertical Motion Simulator (VMS). This Project provides for in-house support of RSIS. This joint Army/NASA effort minimizes facility development and integration costs. Once developed, the simulator will support an integrated approach to the design and demonstration of Army aircraft and rotorcraft technology in handling qualities and man-machine integration.

In FY91, plans include providing in-house support to complete technical efforts and close-out the Project.

## PAYOFF/UTILIZATION:

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

In FY90, specific accomplishments included completion of the enhancement of the attack helicopter high-fidelity simulation capability.

## PROJECT OVERVIEW

		91	92
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PROJECT: DB39	FLIGHT SIMULATOR COMPONENTS	\$ 0.9M	\$ 2.9M
PE: 63003A	AVIATION ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PROJECT MANAGER FOR TRAINING DEVICES		

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PROJECT SYNOPSIS:

The objective of this Project is to demonstrate advanced flight simulation techniques and components for incorporation into the design of future simulators and for improving training capabilities of current simulators. These future simulators and capabilities will aid in the evaluation of force effectiveness and new weapon systems concepts in the context of a free-play, simulated combined arms battlefield environment. In addition, this simulation capability will be used for demonstrating and assessing advancements in distributed large-scale, networked real-time, man-in-the-loop, upward-compatible simulation architectures, and emerging tri-Service/industry standards and methods, for representing battlefield behaviors through the use of selective levels of simulation fidelity and networks participation.

In FY91, plans include: (a) establishing an initial Rapid Reconfigurable Data Base (RRDB) capability, together with standard transform, enabling users to access a tri-Service standard simulator database, and (b) completing incorporation and demonstration of Ada computer language in Army flight simulators.

In FY92, plans include: (a) completing the Exemplar photographic database for mission planning rehearsal, (b) developing cost/labor-reduction capabilities to optimize database development, (c) continuing development of standards related to communications protocol and architecture, (d) increasing battlefield representation capability, (e) defining the architecture and implementation methods for Semi-Automated Forces (SAFOR) capability in follow-on simulated battlefields, and (f) initiating Battlefield Distributed Simulation-Developmental (BDS-D) ATTD.



**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 FY90, specific accomplishments included: (a) initiation of technology demonstration for a system to rapidly reconfigure computer-generated imagery for mission planning and rehearsal, and (b) continued incorporation of the Ada computer language in Army flight simulators.

## 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: FY91 \$18.8M (FY92 PRESIDENT'S BUDGET)  
FY92 \$15.7M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objectives of this Program Element are to develop and demonstrate "people" technologies that include: (a) theory-based training strategies which exploit modern computers, (b) design alternatives for lower cost, less complex simulators and training devices that still achieve training objectives, (c) improved methods for recruiting, selecting, and retaining quality soldiers, and (d) human factors/soldier-machine interface design alternatives to ensure total system operational effectiveness.

This is the Army's advanced development program in Soldier-Oriented R&D in personnel, training, and human factors engineering. Personnel and personnel-related costs account for more than 60% of the Army budget today. As the Army force structure reduces, it is critical to be able to ensure that: (a) the best match is obtained between the quality soldier and his/her job, (b) individuals and units are fully trained to execute their missions, and (c) human performance in systems is maximized.

The reduction in FY92/93 results from an OSD-recommended zero-sum transfer to PE 0605803A, Project D730.

The in-house developing organization responsible for Projects A792, A793, A794, and A795 is the Army Research Institute for the Behavioral and Social Sciences (ARI), and for Project A796 is the Army Human Engineering Laboratory (HEL).

**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, less expensive, and less complex, and (e) simulators and trainers will be developed.

**FUTURE DIRECTIONS:**

Beyond FY92, plans for this Program Element include continuing progress in: (a) developing technology for improving methods of attracting, selecting and assigning the most qualified personnel, and retaining the best performers, (b) developing improved methods for estimating requirements and assessing the impact of Human Factors, Manpower, Personnel and Training (HMPT) in combat development, and weapon system design, operability and maintainability, (c) investigating alternative methods for cost-effective application of computers and related electronic technology to training, (d) designing lower-cost, lower-complexity simulators and training devices, (e) capitalizing on the results of human factors engineering exploratory development efforts by transitioning the efforts into the development of, and proof of concept for, methods, models, analysis tools, techniques, design guidelines, and non-system-specific technology demonstrators for human factors engineering integration throughout the combat development and weapon system design phases.

## PROJECT OVERVIEW

		91	92
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PROJECT: A792	MANPOWER AND PERSONNEL	\$ 5.8M	\$ 3.9M
PE: 63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objectives of this Project include developing and evaluating methods of: (a) attracting personnel, (b) selecting the most qualified, (c) assigning them to Military Occupational Specialties (MOS) that capitalize on their aptitudes and vocational interests, and (d) retaining the best performers. The Project also includes major research and development (R&D) efforts to quantify the effect of family factors on readiness and retention, and build a technology for the development of executive-level Army leaders.

In FY91, plans include: (a) developing and validating the Life Cycle Army Manpower Cost Model for manpower costing for weapon systems, (b) identifying psychosocial and demographic variables that best predict retention of high-quality officer and enlisted personnel, (c) conducting a small-scale field test of an alternative selection and classification system, and (d) validating predictors of successful completion of the JFK Special Warfare Center and Qualifications Course.

In FY92, plans include: (a) evaluating the contribution of psychomotor and spatial tests to computerized selection and classification, (b) validating an optimal selection and classification battery for predicting first tour performance, (c) developing and testing a new methodology for selecting Ranger and Special Forces candidates and (d) developing a methodology for identifying needs for additional or replacement selection and classification tests to support changes in Army Military Occupational Specialties (MOSs).

**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 (MOSs) 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 FY90, specific accomplishments included: (a) demonstration of a new selection test to screen out applicants with high potential for attrition and indiscipline, (b) design/development for an experimental alternative selection and classification system, (c) development of models for predicting effects of force restructuring on Army career decisions, and for simulating the impact of alternative personnel policies on the total Army budget, and (d) development of Department of Army civilian supervisor selection instruments.

## PROJECT OVERVIEW

		91	92
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PROJECT: A793	HUMAN FACTORS IN TRAINING AND OPERATIONAL EFFECTIVENESS	\$ 5.8M	\$ 6.7M
PE: 63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objectives of this Project are to develop and evaluate: (a) improved methods for estimating Human Factors, Manpower, Personnel, and Training (HMPT) requirements early in the combat development and weapon system development process, (b) improved, empirically-based methods for assessing the impact of HMPT variables on weapon system operability and maintainability, and (c) prototype technologies for integrating soldiers into complex, information-based weapon systems and Command, Control, Communications, and Intelligence (C3I) systems.

As modern weapon systems become more lethal, they also become more complex to operate and maintain on the battlefield. As such, the soldier must be systematically considered throughout the weapon system development and acquisition process.

In FY91, plans include: (a) developing an empirical method for making cost-benefit trade-offs among performance requirements, personnel availability, training requirements, and equipment design, (b) determining the validity of operator/maintainer workload predictors for artillery, air defense, and target handoff systems, (c) evaluating the impact on personnel and training of different maintenance concepts for field artillery and non-line-of-site components of air defense systems, (d) developing empirically-based, Manpower and Personnel Integration (MANPRINT) methods for improved Reliability, Availability and Maintainability (RAM) analyses, battle damage assessments, and accident prevention, (e) developing a field artillery automated battle simulation facility, (f) developing the Field Training

Exercise (FTX) "lessons learned" database for the Battle Command Training Program, and (g) determining quantitative relationships among weapon system design characteristics, personnel performance, and unit performance effectiveness.

In FY92, plans include: (a) developing a behavioral model for determining future Military Intelligence manpower, personnel, and training requirements, and (b) determining the factors which affect the reliability of information flow and decision making in field artillery systems.

PAYOFF/UTILIZATION:

The payoffs of this Project include improved training and operational effectiveness of weapon systems.

In FY90, specific accomplishments included: (a) development of new crew performance standards for Forward Area Air Defense systems, (b) development of a methodology for including soldier performance issues in weapon system requirements emerging from the Army's Concept Based Requirements System (CBRS), (c) integration of the Manpower, Personnel, and Training (MPT) requirements estimation method with logistics models, (d) development of methods for crew coordination training and mission assignment to reduce aviation and ground accidents, and (e) development of tactical planning graphics formats for improved C3I system performance.

## PROJECT OVERVIEW

		91	92
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PROJECT: A794	EDUCATION AND TRAINING	\$ 3.8M	\$ 2.9M
PE: 63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objective of this Project is to lead to theory-based training methods that produce more proficient soldiers without an increase in training resources (instructors, time, facilities, and travel).

This Project will experimentally investigate alternative methods for the cost-effective application of computers and related electronic technology to the training of: (a) individual combat, technical, and maintenance skills, and (b) crew, team, and unit training; and will investigate methods for enhancing unit cohesion.

In FY91, plans include: (a) developing methods for use by the Army Training and Doctrine Command (TRADOC) to derive "lessons learned" from Joint Readiness Training Center (JRTC) data, (b) empirically determining the relationships of home station training, leadership, and cohesion, to improved unit performance in realistic simulated combat exercises at Combat Training Centers (CTCs), (c) developing techniques to obtain an objective measurement of unit performance at the JRTC, (d) developing theory-based instructions for improving National Training Center after-action reports and take-home unit training, and (e) empirically testing prototype tank gunnery training strategies, incorporating crew and platoon training devices to maximize training effectiveness.

In FY92, plans include: (a) determining the effectiveness of home station innovations by assessing their impact on CTC performance, (b) developing and testing alternative training strategies for Reserve Component combat skills,



(c) developing prototype unit training strategies incorporating various combinations of networked combined arms simulations and field training at CTC, and (d) developing tank gunnery training strategies involving elements of simulation, live fire, and individual soldier part-task training.

PAYOFF/UTILIZATION:

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

In FY90, specific accomplishments included: (a) completing the validation of asynchronous computer teleconferencing as a cost effective training technology for Reserve Component training and education, (b) development of a prototype CTC Combat Operations Research Facility, and (c) development of a methodology for linking ground Operations Tempo (OPTEMPO) levels to unit combat proficiency as measured at CTCs.

## PROJECT OVERVIEW

		91	92
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PROJECT: A795	TRAINING SIMULATION	\$ 2.8M	\$ 1.4M
PE: 63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objective of this Project is to provide the United States Army Training and Doctrine Command (TRADOC) and the Project Manager for Training Devices (PM TRADE) with scientifically-based recommendations for the design of lower-cost, lower-complexity simulators and training devices, focusing on aviation and armor.

The need for effective simulators and training devices in aviation and armor units is increasing in order to avoid the high cost of using actual equipment for training and to enable the Army to "train as it will fight."

In FY91, plans include: (a) developing guidelines for using the armor Simulation Network-Development (SIMNET-D) to evaluate soldier-system and small unit performance in future system designs, (b) developing strategies for applying expert systems-based instruction to maintenance skills training, and (c) developing strategies for conducting interoperability and soldier-in-the-loop simulations with NATO allies.

In FY92, plans include: (a) refining computer-based design aids for simulator and training device designers, and (b) developing a prototype computer-based decision aid for advanced communications equipment operators and maintainers.

PAYOFF/UTILIZATION:

The payoffs of this Project include to: (a) develop 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) give guidance to TRADOC and PM TRADE on their design of more cost-effective simulators and training devices, and (c) develop alternatives to high-cost, operational systems for training and maintaining the skills of a combat-ready force.

In FY90, specific accomplishments included: (a) design and development of a prototype night vision goggle training system for aviation units, and (b) development of computer-based tools to aid training device designers in the design of training-effective simulators/training devices at low cost.

## PROJECT OVERVIEW

		91	92
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PROJECT: A796	HUMAN FACTORS ENGINEERING IN SYSTEMS DESIGN	\$ 0.8M	\$ 1.1M
PE: 63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY HUMAN ENGINEERING LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to capitalize on the results of Human Factors Engineering (HFE) exploratory development efforts by transitioning into the development of methods, models, analysis tools, techniques, design guidelines, and non-system-specific technology demonstrators for HFE integration throughout the combat development and weapon system design process.

Rapid changes in technology, combined with increased emphasis on the soldier-machine interface, have resulted in increasing demands for HFE expertise and the transfer of technology information into the materiel development and acquisition process.

In FY91, plans include: (a) refining the expert system development and expanding the application of the HFE knowledge-based system to other Army materiel development programs, (b) expanding the system to include the MANPRINT domains of manpower, personnel, training, health hazards, and safety; and coordinate application with Navy and Air Force human factors elements, and (c) adding joint motion and strength to the man-model for use in evaluating the soldier-machine interface in Computer-Aided Design (CAD).

In FY92, plans include: (a) continuing efforts to expand expert system applications to include all domains of MANPRINT, tri-Service coordination, and demonstrations in all Army systems under development, and (b) adding torso rotation function, and standing mobility and surface mapping (simulated

uniforms and equipment) to the man-model.

**PAYOFF/UTILIZATION:**

The payoff of this Project includes the support of all mission areas, and is focused primarily on addressing soldier-machine interactions.

In FY90, specific accomplishments included: (a) development of a HFE knowledge-based expert system to assist human factors engineers in generating program requirements for system specifications, statements of work, data item descriptions, and contract data requirements, (b) demonstration of the application of a HFE knowledge-based expert system to the Army missile system development program, and (c) completion of necessary software development for adding body contour features to a man-model for use in computer-aided, soldier-machine interface design.

## PROGRAM ELEMENT OVERVIEW

PE: 64715A                   NON-SYSTEM TRAINING DEVICES - ENGINEERING  
                                  DEVELOPMENT

CONGRESSIONAL CATEGORY:   SIMULATION & TRAINING DEVICES

DoD ORGANIZATION:         ARMY

FUNDING:                    FY91 \$27.8M (FY92 PRESIDENT'S BUDGET)  
                                  FY92 \$51.3M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to provide for engineering development of Non-System Training Devices to support general military training and training on more than one item/system, as compared with system devices that are developed in support of a specific item/system.

Modern weapon systems are being integrated into the force at unprecedented rates, and the Army is faced with increased constraints on people, dollars, time, and real estate in a training environment where ammunition and fuel costs continue to rise. Training devices and training simulation provide force multipliers that can improve combat effectiveness by providing realistic training scenarios while helping to control rapidly escalating costs. Maintaining the combat effectiveness of Army personnel is the key to maintaining a ready force. This combat effectiveness can best be achieved by innovative, efficient, and results-oriented training. The major thrust in development of new training devices is to maximize the transfer of knowledge, skills, and experience from the training situation to a combat situation. Improved training devices, 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.

Beginning in FY92, development of Combat Training Center (CTC) unique training devices, simulators, simulations and instrumentation is included in this Program Element. Force-on-force training at the National Training Center (NTC), Ft. Irwin, CA, the Joint Readiness Training Center (JRTC), Ft. Chaffee, AR, and the Combat Maneuver Training Center (CMTC), Hohenfels, West Germany will provide increased combat readiness through realistic collective training in low, mid and high intensity scenarios.

Project D241, Non-System Training Devices - Combined Arms, develops devices for Army-wide use, including the CTCs. Project D573, Project Manager for Training Devices (PM TRADE)/Naval Training Systems Center (NTSC) Support, provides for in-house salaries and support of PM TRADE and NTSC personnel. Project D574, Combined Arms Tactical Trainer (CATT), projects a family of devices based on the Simulation Networking (SIMNET) concept, including the Close Combat Tactical Trainer (CCTT).

The in-house organizations responsible for this program are the Project Manager for Training Devices and the Naval Training System Center.

#### 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.

#### FUTURE DIRECTIONS:

Beyond FY92, plans for this Program Element include: (a) continuing funding PM TRADE personnel and NTSC support, (b) completing development of the Signal Intelligence/Electronic Warfare Tactical Proficiency Trainer, (c) continuing development of the Combat Service Support Training Simulation System, (d) continuing development of devices, simulators and simulations to support training at the National Training Center, Joint Readiness Training Center, and the Combat Maneuver Training Complex, (e) initiating development of Chemical Simulations, and (f) continuing development of the Close Combat Tactical Trainer (CCTT).

## PROJECT OVERVIEW

		91	92
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PROJECT: D241	NON-SYSTEM TRAINING DEVICES COMBINED ARMS	\$11.5M	\$25.5M
PE: 64715A	NON-SYSTEM TRAINING DEVICES - ENGINEERING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PM TRADE		

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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 transfer to trainees the knowledge, ability, and experience required to fight outnumbered and win on the modern battlefield (e.g., the Corps Battle Simulation is a command and control system used to train corps commanders, major subordinate commanders, and major subordinate elements in the conduct of deep operations/air-land battle operations; and Simulated Area Weapons Effects for Nuclear, Biological and Chemical (NBC) which provides a tactical engagement interface with the Multiple Integrated Laser Engagement Simulation (MILES), and individual and unit training in various NBC-type environments). Additionally, this Project provides for the development of maintenance simulators for many Army weapon systems.

Beginning in FY92, this Project funds the development of training devices, simulators, simulations and instrumentation for the Combat Training Centers. Included are Shoot Through Obscuration MILES (STOM), Artificial Intelligence (AI)/robotics, computer simulations, instrumentation upgrades, and the Battle Command Training Program (BCTP).



Devices developed under this Project 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 and simulations will enhance training effectiveness while minimizing the requirements for scarce resources.

In FY91, plans include: (a) completing development of the Guard Unit Armory Device for Full Crew Interactive Simulation-Armor (GUARDFIST I), (b) completing development of the Simulated Area Weapons Effects for Indirect Fire - Global Positioning System, (c) completing development of the interim Corps Battle System Deep Battle Integration Training (1.3), and (d) initiating development of the Persistent Chemical Agent Simulant/Chemical Agent Disclosure Solution.

In FY92, plans include: (a) funding for the continued development of devices, simulators and simulations to support the National Training Center, the Joint Readiness Training Center and the Combat Maneuver Training Complex transferred to Project D241 in FY 1992/1993 from Program Element 0605603/992, (b) completing development of the Air-Ground Engagement System (AGES II) for the AH-64 and the Armed OH-58, (c) completing development of the Persistent Chemical Agent Simulant/Chemical Agent Disclosure Solution, (d) initiating development of the Combat Service Support Training Simulation System, and (e) initiating development of the Signal Intelligence/Electronic Warfare Tactical Proficiency Trainer.

#### PAYOFF/UTILIZATION:

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

In FY90, specific accomplishments included: (a) completion of the development of AGES II for the UH-60, the CH-47, and the OH-58, (b) completion of the development of the Guard Unit Armory Device for Full Crew Interactive Simulation-Artillery (GUARDFIST II), (c) continued development of the AGES II for the AH-64 and the Armed OH-58, (d) continued development of the Simulated Area Weapons Effects for the Indirect Fire - Global Positioning System, and (e) continued development of the interim Corps Battle System Deep Battle Integration Training (1.3).

## PROJECT OVERVIEW

		91	92
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PROJECT: D573	PROJECT MANAGER FOR TRAINING DEVICES AND NAVAL TRAINING SYSTEMS CENTER SUPPORT	\$ 9.0M	\$ 9.3M

PE: 64715A

CONGRESSIONAL CATEGORY: SIMULATION &amp; TRAINING DEVICES

DoD ORGANIZATION: ARMY

RESPONSIBLE ORGANIZATION: PM TRADE

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PROJECT SYNOPSIS:

The objective of this Project is to fund the support of the Project Manager for Training Devices (PM TRADE) personnel and to fund a proportionate Army share of the operating costs of the Naval Training Systems Center (NTSC) through an Inter-Service Support Agreement which is reviewed annually.

In FY91/92, plans include continuing funding PM TRADE personnel and NTSC support.

## PAYOFF/UTILIZATION:

The payoff of this Project is an arrangement which makes available all 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 PM TRADE, 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.

In FY90, accomplishments included funding support of PM TRADE personnel and a proportionate Army share of the operating costs of NTSC.

## PROJECT OVERVIEW

		91	92
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PROJECT: D574	COMBINED ARMS TACTICAL TRAINER (CATT)	\$ 7.5M	\$16.7M
PE: 64715A			
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PM TRADE		

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PROJECT SYNOPSIS:

The objective of this Project is to develop a series of trainers based on the Combined Arms Tactical Trainer (CATT) concept which envisions a training environment where all of the elements of the combined arms battlefield can be simulated and exercised at one time. The simulated environment selectively emulates equipment capabilities and establishes an environment which gives maneuver forces the opportunity to practice the art of synchronizing all applications of combat power without regard for peacetime restrictions of environment, economics or safety. It further envisions a training strategy in which units can conduct training at the home station between field exercises.

The Army will not buy CATT, but rather will buy a family of stand-alone trainers based on proponent requirements. The common element will be interoperability on the network and database. Thus, helicopter modules at Fort Rucker will be able to operate, via long-haul network, with tank and Bradley modules at Fort Knox or Grafenwoehr. These trainers will allow soldiers to practice repetitively, techniques which, if performed on real equipment, would be too hazardous, time-consuming, and expensive. These trainers enhance training realism and allow soldiers and units to learn tactical combat lessons on maneuver, command and control, and how to shoot without being killed; lessons heretofore learned only at the cost of soldiers' lives.

The first two trainers in the CATT series are the Close Combat Tactical Trainer (CCTT) and the Aviation Combined Arms Tactical Trainer (AVCATT). Others will be added as proponents define their requirements.

In FY91, plans include conducting the Army Systems Acquisition Review Council (ASARC) Milestone (MS) I/II.

In FY92, plans include initiating full-scale engineering development of CCTT.

**PAYOFF/UTILIZATION:**

In FY90, accomplishments included the performance of an in-house effort leading to a full-scale engineering development contract award in FY91 (funded in Project D573).

## PROGRAM ELEMENT OVERVIEW

PE: 64801A AVIATION-ENGINEERING DEVELOPMENT  
CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES  
DoD ORGANIZATION: ARMY  
FUNDING: FY91 \$14.1M (FY92 PRESIDENT'S BUDGET)  
FY92 \$ 3.0M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to fund engineering development of programs associated with Synthetic Flight Training Systems (SFTS), Aviation Life Support Equipment (ALSE), and Aviation Non-Systems Training Devices.

SFTS (Project D275) is a project that supports development of a family of high-fidelity flight, weapon, and mission helicopter simulators to support initial entry helicopter pilot training, transition training, and combat operational training.

ALSE (Project DC45) makes the integrated battlefield survivability possible, and emphasizes enhancing the air crews' ability to return to fight again through new protective clothing ensembles, aviator protective masks, laser protective visors, survival kits, restraint systems, integrated flight helmets, and microclimate cooling devices.

The Aviation Non-System Training Devices (Project DE70) supports development of aviation training devices that are applicable to more than one aviation system.

The in-house organizations responsible for this program are the Project Manager for Training Devices (PM TRADE), Naval Training Systems Center (NTSC), and the Defense Advanced Research Projects Agency (DARPA).

**PAYOFF/UTILIZATION:**

The payoffs of the Training portion 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.

**FUTURE DIRECTIONS:**

Beyond FY92, plans for the Synthetic Flight Training System Project include: (a) conducting a Block Update Configuration (BUC IV-A) for the Longbow for the Apache AH-64 Combat Mission Simulator, and (b) conducting flight simulator upgrades to ensure the same configuration as the operational aircraft. Plans for the Aviation Non-System Training Devices Project include: (a) initiating full-scale engineering development of the Aviation Combined Arms Tactical Trainer (AVCATT), (b) conducting preliminary design reviews of AVCATT, and (c) monitoring contractual progress via on-site program reviews.

## PROJECT OVERVIEW

		91	92
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PROJECT: D275	SYNTHETIC FLIGHT TRAINING SYSTEM	\$ 3.9M	\$ 0.1M
PE: 64801A	AVIATION-ENGINEERING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PM TRADE		

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PROJECT SYNOPSIS:

The objective of this Project is to support development of a family of high-fidelity flight, weapon and mission helicopter simulators to support initial entry helicopter pilot training, transition training, and combat operational training.

In FY91, plans include continuing flight simulator upgrades to ensure the same configuration as the operational aircraft (UH-60 Flight Simulator).

In FY92, this Project is not funded.

## PAYOFF/UTILIZATION:

The payoff of this Project is considerable cost savings utilizing a family of high-fidelity flight and helicopter simulators.

In FY90, specific accomplishments included the continuing of flight simulator upgrades to ensure the same configuration as the operational aircraft (UH-1 Computer Upgrade).

## PROJECT OVERVIEW

		91	92
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PROJECT: DE70	AVIATION NON-SYSTEM TRAINING DEVICES	\$10.3M	\$ 3.0M
PE: 64801A	AVIATION-ENGINEERING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PM TRADE		

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PROJECT SYNOPSIS:

The objective of this Project is to develop aviation training devices that are applicable to more than one aviation system (i.e., AH-1, AH-64, etc.).

Development of the Aviation Network (AIRNET) project will be completed in FY92. AIRNET is the Defense Advanced Research Projects Agency (DARPA) "proof-of-principle" project which provides the framework for the objective system called Aviation Combined Arms Tactical Trainer (AVCATT). AIRNET is a viable developmental tool and test vehicle which will provide the means to explore and emulate new and desired systems or evaluate and adapt current and future doctrine to meet an ever-changing threat environment. AVCATT is a man-in-the-loop tactical fighting simulator system that supports realistic force-on-force combat training. Currently available training resources do not enable cavalry and attack helicopter units to train collectively or maintain proficiency under task-loaded conditions. AVCATT will provide this training for both scout (OH-58 and AHIP) and attack (AH-1 and AH-54) modules in a realistic, stressful simulated tactical aviation environment. With continued flying hours, ammo and Operations Tempo (OPTEMPO) reductions, AVCATT is essential to maintain individual and collective task training proficiency.

In FY91, plans include continuing full-scale engineering development of AIRNET under the Advance Distributed Simulator Training (ADST) for two reconfigurable rotary wing aircraft devices.

In FY92, plans include: (a) completing development of AIRNET with additional reconfigurable modules, and (b) conducting the Milestone I/II review for



AVCATT.

PAYOFF/UTILIZATION:

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

In FY90, specific accomplishments included continued full-scale engineering development of AIRNET.



PE/PROJECT	PERFORMING ORGANIZ.	FY91 (\$M)	FY92 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62727A						NON-SYSTEM TRAINING DEVICE TECHNOLOGY
A230	PM TRADE	6.031	3.500	ST	6	NON-SYSTEM TRAINING DEVICES
		-----	-----			
		6.032	3.500			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 62727A :	FY91	FY92
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THE PRESIDENT'S BUDGET, JANUARY 1991	6.031	3.500

62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A790-HF	ARI	2.586	2.613	HF	4	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION
A790-ST	ARI	4.251	3.985	ST	6	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION
A791-ET	ARI	4.695	4.029	ET	6	MANPOWER, PERSONNEL AND TRAINING
A791-HF	ARI	1.278	1.404	HF	6	MANPOWER, PERSONNEL AND TRAINING
A791-MP	ARI	4.417	3.983	MP	2	MANPOWER, PERSONNEL AND TRAINING
		-----	-----			
		17.228	16.015			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 62785A :	FY91	FY92
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THE PRESIDENT'S BUDGET, JANUARY 1991	17.227	16.014

PE/PROJECT	PERFORMING ORGANIZ.	FY91 (\$M)	FY92 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
63003A						AVIATION ADVANCED TECHNOLOGY
DB34	AVSCOM	2.967	0.000	ST	6	ROTORCRAFT SYSTEM INTEGRATION SIMULATOR (RSIS)
DB39	PMTRADE	0.855	2.888	ST	6	FLIGHT SIMULATOR COMPONENTS
		<hr style="width: 10%; margin: 0 auto;"/> 3.822	<hr style="width: 10%; margin: 0 auto;"/> 2.888			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63003A :	FY91	FY92
THE PRESIDENT'S BUDGET, JANUARY 1991	<hr style="width: 10%; margin: 0 auto;"/> 3.822	<hr style="width: 10%; margin: 0 auto;"/> 2.888

63007A						HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
A792	ARI	5.726	3.813	MP	2	MANPOWER AND PERSONNEL
A793	ARI	5.746	6.631	HF	4	HUMAN FACTORS IN TRAINING AND OPERATIONAL EFFECTIVENESS
A794	ARI	3.752	2.838	ET	6	EDUCATION AND TRAINING
A795	ARI	2.787	1.387	ST	6	TRAINING SIMULATION
A796	HEL	0.759	1.003	HF	4	HUMAN FACTORS ENGINEERING IN SYSTEMS DESIGN
		<hr style="width: 10%; margin: 0 auto;"/> 18.771	<hr style="width: 10%; margin: 0 auto;"/> 15.673			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63007A :	FY91	FY92
THE PRESIDENT'S BUDGET, JANUARY 1991	<hr style="width: 10%; margin: 0 auto;"/> 18.770	<hr style="width: 10%; margin: 0 auto;"/> 15.672

PE/PROJECT	PERFORMING ORGANIZ.	FY91 (\$M)	FY92 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
64715A						NON-SYSTEM TRAINING DEVICES - ENGINEERING DEVELOPMENT
D241	PM TRADE	11.436	25.402	ST	6	NON-SYSTEM TRAINING DEVICES COMBINED ARMS
D573	PM TRADE	8.917	9.228	ST	6B	PROJECT MANAGER FOR TRAINING DEVICES AND NAVAL TRAINING SYSTEMS CENTER SUPPORT
D574	PM TRADE	7.406	16.636	ST	6F	COMBINED ARMS TACTICAL TRAINER (CATT)
		-----	-----			
		27.760	51.267			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 64715A :	FY91	FY92
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1991	27.759	51.266

64801A						AVIATION-ENGINEERING DEVELOPMENT
D275	PM TRADE	3.878	0.000	ST	6D	SYNTHETIC FLIGHT TRAINING SYSTEM
DE70	PM TRADE	10.204	2.905	ST	6D	AVIATION NON-SYSTEM TRAINING DEVICES
		-----	-----			
		14.083	2.905			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 64801A :	FY91	FY92
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THE PRESIDENT'S BUDGET, JANUARY 1991	14.082	2.905

III.B. NAVY PROGRAM ELEMENT AND PROJECT SYNOPSES

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PE	TITLE	PAGE
61153N	DEFENSE RESEARCH SCIENCES	III-B-1
62131M	MARINE CORPS LANDING FORCE TECHNOLOGY	III-B-6
62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA	III-B-9
62234N	SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA	III-B-25
63701N	HUMAN FACTORS ENGINEERING DEVELOPMENT	III-B-31
63707N	MANPOWER AND PERSONNEL SYSTEMS	III-B-37
63720N	EDUCATION AND TRAINING	III-B-41
63732M	ADVANCED MANPOWER TRAINING SYSTEMS	III-B-44
63733N	SIMULATION AND TRAINING DEVICES TECHNOLOGY	III-B-46
64703N	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS	III-B-50
64715N	SURFACE WARFARE TRAINING	III-B-52

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

## PROGRAM ELEMENT OVERVIEW

PE: 61153N                    DEFENSE RESEARCH SCIENCES, SUBELEMENT 42:  
                                 COGNITIVE AND NEURAL SCIENCES

CONGRESSIONAL CATEGORY:    EDUCATION & TRAINING  
                                 HUMAN FACTORS  
                                 MANPOWER & PERSONNEL

DoD ORGANIZATION:            NAVY

FUNDING:                        FY91 \$13.6M (FY92 PRESIDENT'S BUDGET)  
                                 FY92 \$12.5M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

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

The program includes theoretical and experimental research in selected areas of the physical, mathematical, engineering, environmental, behavioral and life sciences.

The objective of the MPT Subelement is 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.

This Program continues to support: (a) the ONR Graduate Fellowship Program, (b) the ONR High School Apprenticeship Program, (c) the Historically Black Colleges/Universities Program, (d) programs designed to increase scientific manpower trained in areas critical to Naval research, and (e) the Summer Faculty Program, which brings academic scientists into Navy laboratories to better couple Navy laboratory and university research.

**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.

**FUTURE DIRECTIONS:**

This is a continuing Program.



PROJECT OVERVIEW

		91	92
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PROJECT: RR04206	PERSONNEL AND TRAINING	\$ 7.5M	\$ 6.7M
PE: 61153N	DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: COGNITIVE AND NEURAL SCIENCES		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	OFFICE OF NAVAL RESEARCH		

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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.

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.

PROJECT OVERVIEW

		91	92
		-----	-----
PROJECT: RR04208	GROUP PSYCHOLOGY	\$ 3.3M	\$ 3.1M
PE: 61153N	DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: COGNITIVE AND NEURAL SCIENCES		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	OFFICE OF NAVAL RESEARCH		

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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.

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.

## PROJECT OVERVIEW

		91	92
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PROJECT: RR04209	ENGINEERING PSYCHOLOGY	\$ 2.9M	\$ 2.8M
PE: 61153N	DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: COGNITIVE AND NEURAL SCIENCES		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	OFFICE OF NAVAL RESEARCH		

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PROJECT SYNOPSIS:

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

## PAYOFF/UTILIZATION:

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

## PROGRAM ELEMENT OVERVIEW

PE: 62131M                    MARINE CORPS LANDING FORCE TECHNOLOGY  
CONGRESSIONAL CATEGORY:    MANPOWER & PERSONNEL  
DoD ORGANIZATION:           MC  
  
FUNDING:                    FY91 \$ 0.6M (FY92 PRESIDENT'S BUDGET)  
                              FY92 \$ 0.6M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element, a portion of which is dedicated to Manpower, Personnel and Training, is to develop the technologies needed to support unique USMC expeditionary forces' warfighting requirements. This is the only DoD 6.2 program that addresses this issue.

Mission needs are derived from specific threat capabilities and the requirement to operate in tactical scenarios worldwide, conducting amphibious, contingency, and Special Operations in LIC.

Specific requirements documents are the Marine Air Ground Task Force Master Plan, the Marine Corps Long Range Plan, the Marine Corps Campaign Plan, and the Marine Corps POM-90 Needs input to the Navy Needs Statement. This Program Element contains multiple projects in various disciplines. All are continuous as projects, but vary internally to address emerging requirements with evolving technology. This Program Element supports 11 of the DoD Critical Technologies, the primary ones being: Robotics, Passive Sensors, Signal Processing, Data Fusion, and Composite Materials.

The in-house organizations responsible for this program are the Naval Ocean Systems Center, Naval Coastal Systems Center, Naval Surface Warfare Center, David Taylor Research Center, Naval Civil Engineering Laboratory, Naval Weapons Center, Navy Personnel Research and Development Center, Naval Research Laboratory, Motivation and Training Laboratory, Harry Diamond Laboratories, Department of Energy, MCRDAC, MTL, AND LANL.

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.

FUTURE DIRECTIONS:

Beyond FY92, plans are to continue to pursue manpower management and forecasting technology.

## PROJECT OVERVIEW

		91	92
		-----	-----
PROJECT: CF31P14	MARINE CORPS MANPOWER & TRAINING TECHNOLOGY	\$ 0.6M	\$ 0.6M
PE: 62131M	MARINE CORPS LANDING FORCE TECHNOLOGY		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	MC		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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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.

In FY91, plans include: (a) continuing acceptance testing of the tour optimization system, and (b) begin assessment of technology to develop a force manpower management and personnel forecasting system.

In FY92 plans are to continue to pursue the manpower management and forecasting technology.

## 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.

## PROGRAM ELEMENT OVERVIEW

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

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

DoD ORGANIZATION:            NAVY

FUNDING:                      FY91 \$10.5M (FY92 PRESIDENT'S BUDGET)  
FY92 \$11.0M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to provide mission support technologies essential for all Naval operations.

The Office of Naval Technology mission area for training systems is concerned with improving the training effectiveness of Navy training devices, lowering their costs, and extending training device applicability into more training domains. The technology that is being developed will enhance visual and sensor simulation capabilities, provide advanced computer hardware and software concepts for greater real-time simulation capabilities, improve the instructional value of simulation systems, and define the necessary functional characteristics of training devices.

The technology developed under the mission area for personnel and training will maximize the performance of the Navy's weapons and support systems while managing the human resources required to operate and maintain them. The Manpower, Personnel, and Training Technology Project responds to requirements in the FY91/POM92 Mission Area Strategy for Mission Support Technology and System Support Technology.

Personnel and training technologies enhance the Navy's ability to select, assign and train people for highly demanding jobs. Biomedical technologies improve the medical care delivery system and enhance performance capabilities under adverse conditions. Logistics technologies increase operational readiness through effective management and movement of supplies ashore and at

sea, improve fuel procurement specifications, and advance techniques for more cost effective construction and maintenance of shore and off-shore facilities. Environmental protection technologies will improve Navy-unique capabilities to meet air- and water-quality regulatory standards and to reduce toxic waste generation. Chemical and Biological Defense (CBD) technologies improve the ability to respond to existing and future CBD threats.

This Element supports the following six Critical Technologies: Parallel Computer Architectures, Simulation and Modeling, Photonics, Weapon System Environment, Superconductivity, and Biotechnology.

The in-house developing organizations responsible for this program are the Naval Air Propulsion Center, Naval Coastal Systems Center, Navy Personnel Research and Development Center, Naval Training Systems Center, Naval Medical Research and Development Command Laboratories, Naval Air Development Center, David Taylor Research Center, Naval Civil Engineering Laboratory, Naval Surface Warfare Center, Naval Research Laboratory, and the Naval Ocean Systems Center.

Funding and Project information indicated includes only the Manpower, Personnel, and Training portion of this Program Element.

**PAYOFF/UTILIZATION:**

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

**FUTURE DIRECTIONS:**

Beyond FY92, plans for the Manpower, Personnel, and Training portion of this Program Element include: (a) completing development and evaluation of advanced concepts for graphics displays to improve maintenance training and job-aiding, (b) completing evaluation of advanced video and computer-graphic applications to Navy instruction, and (c) completing development of methods for estimating the optimal allocation of recruiting resources.



## PROJECT OVERVIEW

		91	92
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PROJECT: RM33D40	TACTICAL DECISION-MAKING UNDER STRESS (TADMUS)	\$ 1.9M	\$ 2.1M
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		

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PROJECT SYNOPSIS:

The objective of the Tactical Decision-Making Under Stress (TADMUS) program is to apply recent developments in decision theory, individual and team training, and information display to the problem of enhancing tactical decision quality under conditions of stress.

This will be accomplished by a cooperative program in human factors and training involving two principal laboratories (NOSC and NTSC), as well as other Navy, industrial, and academic organizations. The technology will be demonstrated and evaluated in the context of anti-air scenarios, and general principles will be developed that will be applicable to other warfare areas.

There are two Projects within the program, one for each of the principal laboratories.

The program is comprised of five tasks. (a) Task Definition and Measurement: define the operational tasks, set up laboratories in which to study those tasks, develop a strong performance measurement capability, and develop knowledge of the decision-making processes for that operational environment. (b) Examination of Stress Effects on Decision-Making: select a number of stressors for investigation, determine which stressors should be used as approximations to actual combat stress, and determine how to quantify their effects. (c) Development of Decision Support Principles: produce an experimental decision support system, and evaluate the prototype in simulated tactical environments, initially in laboratory settings and later during

at-sea exercises. Additional products of this task will be general principles for advanced decision support systems to enhance human performance under stress. (d) Development of Training and Simulation Principles: develop and demonstrate a variety of individual and team training strategies and techniques to minimize the adverse effects of stress. Products of this task will include principles for overtraining decision-making skills, training decision makers in pattern recognition, training interventions that will attenuate the effects of stress on team performance, training leadership skills, and inducing stress during training. (e) Development of Display Principles: examine man-machine interface concepts which maximize the effectiveness of tactical decision aids under stressful conditions. Products of this task will include display principles for predictive displays, situation assessment, option generation, resolution of conflicting or ambiguous information, and cognitive consistency among team members.

The Naval Ocean Systems Center and the Naval Training Systems Center will accomplish the tasks cooperatively, with both laboratories involved in all of the tasks to some extent.

This Project will be managed by the Naval Training Systems Center and is principally concerned with development of training and simulation principles to counteract stress.

In FY91, plans include conducting a performance study incorporating motion-induced stress on A-6 aircrew long-range scenarios.

In FY92, plans include beginning evaluation of training strategies, decision-support concepts, and displays for improving individual and team tactical decision-making under stress.

#### PAYOFF/UTILIZATION:

The payoff of this Project is the enhancement of tactical decision quality under conditions of stress through the application of recent developments in decision theory, individual and team training, and information display.

This Project was a new start in FY90. In FY90, specific accomplishments included: (a) initiation of the development of performance measures for both individual and team performance; both process and outcome measures are being

developed to provide a basis for deriving descriptive and explanatory models of decision behavior, (b) conducting a comprehensive survey and assessment of military simulation and laboratory facilities in order to select a laboratory testbed, (c) completion of a series of structured interviews with over 50 senior Naval officers and technical staff members at operational and training commands to obtain the fleet's perspective on tactical decision-making under stress, (d) formulation of a preliminary architecture and structure for an advanced experimental decision support system, and (e) establishment of a Program Advisory Board.

## PROJECT OVERVIEW

		91	92
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PROJECT: RM33D60	TACTICAL DECISION-MAKING UNDER STRESS (TADMUS)	\$ 1.9M	\$ 2.1M
PE: 62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL OCEAN SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objective of the Tactical Decision-Making Under Stress (TADMUS) program is to apply recent developments in decision theory, individual and team training, and information display to the problem of enhancing tactical decision quality under conditions of stress.

This will be accomplished by a cooperative program in human factors and training involving two principal laboratories (NOSC and NTSC), as well as other Navy, industrial, and academic organizations. The technology will be demonstrated and evaluated in the context of anti-air scenarios, and general principles will be developed that will be applicable to other warfare areas.

There are two Projects within the program, one for each of the principal laboratories.

The program is comprised of five tasks. (a) Task Definition and Measurement: define the operational tasks, set up laboratories in which to study those tasks, develop a strong performance measurement capability, and develop knowledge of the decision-making processes for that operational environment. (b) Examination of Stress Effects on Decision Making: select a number of stressors for investigation, determine which stressors should be used as approximations to actual combat stress, and determine how to quantify their effects. (c) Development of Decision-Support Principles: produce an experimental decision support system and evaluate the prototype in simulated tactical environments, initially in laboratory settings and later during

at-sea exercises. Additional products of this task will be general principles for advanced decision-support systems to enhance human performance under stress. (d) Development of Training and Simulation Principles: develop and demonstrate a variety of individual and team training strategies and techniques to minimize the adverse effects of stress. Products of this task will include principles for overtraining decision-making skills, training decision makers in pattern recognition, training interventions that will attenuate the effects of stress on team performance, training leadership skills, and inducing stress during training. (e) Development of Display Principles: examine man-machine interface concepts which maximize the effectiveness of tactical decision aids under stressful conditions. Products of this task will include display principles for predictive displays, situation assessment, option generation, resolution of conflicting or ambiguous information, and cognitive consistency among team members.

The Naval Ocean Systems Center and the Naval Training Systems Center will accomplish the tasks cooperatively, with both laboratories involved in all of the tasks to some extent.

This Project will be managed by the Naval Ocean Systems Center and is principally concerned with development of decision-support principles and display principles for decision support systems.

In FY91, plans include conducting a performance study incorporating motion-induced stress on A-6 aircrew long-range scenarios.

In FY92, plans include beginning evaluation of training strategies, decision-support concepts, and displays for improving individual and team tactical decision-making under stress.

#### PAYOFF/UTILIZATION:

The payoff of this Project is the enhancement of tactical decision quality under conditions of stress through the application of recent developments in decision theory, individual and team training, and information display.

In FY90, specific accomplishments included: (a) initiation of the development of performance measures for both individual and team performance; both process and outcome measures are being developed to provide a basis for

deriving descriptive and explanatory models of decision behavior, (b) conducting a comprehensive survey and assessment of military simulation and laboratory facilities in order to select a laboratory testbed, (c) completion of a series of structured interviews with over 50 senior Naval officers and technical staff members at operational and training commands to obtain the fleet's perspective on tactical decision-making under stress, (d) formulation of a preliminary architecture and structure for an advanced experimental decision support system, and (e) establishment of a Program Advisory Board.

## PROJECT OVERVIEW

		91	92
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PROJECT: RM33M20	MANPOWER AND PERSONNEL TECHNOLOGY	\$ 3.0M	\$ 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		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) improve accessioning and recruiting techniques, (b) improve the quality and retention of personnel, (c) improve the fit between personnel and jobs, (d) enhance the motivation and productivity of personnel, and (e) increase the effectiveness of managers and policy makers by giving them better tools for measuring and predicting the consequences of their decisions.

This Project provides for the efficient means of locating, recruiting, assigning, and managing all manpower resources within the Navy. It includes research in recruiting strategies and techniques, personnel assessment procedures, assignment and retention systems, procedures to motivate and utilize personnel, management feedback systems, and new force management models. The performance gains from effectively selecting, assigning, and utilizing personnel are substantial when one considers that attrition costs the Navy tens of millions of dollars per year.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included the development of improved techniques for computer-administered testing to select and assign Naval applicants.

The Integrating Officer Selection Systems task was completed with the delivery of a weighted biographical questionnaire and a standardized

interview. Both products are being implemented by the Chief of Naval Education and Training for selection of NROTC candidates, and are being evaluated by the Naval Academy for use by Blue and Gold recruiters to select midshipmen. These technologies will be used in the selection of nearly every Navy officer. For the Advances in Military Personnel Forecasting task, a statistical rule-based system for producing personnel flow (e.g., loss) forecasts was developed and validated, proving to be 30-40 percent more accurate, on a limited database, than all previous Navy enlisted loss forecasting methods. When applied in an operational setting, these improvements are expected to yield considerably more accurate, executable personnel strength plans, reduce the need for catastrophic policy actions, and prevent manpower appropriation overruns.



## PROJECT OVERVIEW

		91	92
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PROJECT: RM33T21	INSTRUCTIONAL TECHNOLOGY	\$ 1.2M	\$ 1.2M
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		

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PROJECT SYNOPSIS:

The objective of this Project is to improve the Navy's ability to train personnel effectively, rapidly, and economically.

This objective corresponds to training systems technology goals, as stated in the FY91/POM92 Mission Area Strategy for Mission Support, such as reducing shore-based training time, improving proficiency levels of personnel during deployment, and reducing instructor manning requirements with the aid of expert systems. Tasks supporting these objectives follow. (a) Radio Instruments Orientation Trainer: develop microcomputer-based real-time simulation technology which will be used to teach students in Navy primary flight school the cognitive skills necessary to navigate using only the aircraft's radio instruments. The task will develop methods to reduce instructor workload and guidelines applicable to other part-task trainer developments. (b) Aircrew Coordination: define and assess aircrew coordination training technology, and develop instructional concepts, tools, and procedures to improve aircrew coordination training. (c) Maintenance Technology: provide an understanding of the processes underlying the use of graphical information in maintenance problem solving, assess the impact of alternative presentation methods, and provide research results that can be used as guidance on presentation of graphical information to maintainers. (d) Embedded Training Technology: provide research data that will advance the understanding of requirements for embedded operator and tactical team training systems, and also suggest immediate improvements that can be incorporated into embedded training. (e) Aircrew Instructional Systems: demonstrate the capability to generate and utilize graphic real-time reenactments of the Navy's Tactical Aircrew Combat Training System exercises on a personal computer, and use these capabilities to identify and validate

the essential characteristics of a debrief station. (f) Reusable Instructional Support System: provide research data that can be used to standardize and improve instructional support in training systems through a modular, reusable instructional support system.

In FY91, plans include beginning final development of software to optimize Naval enlisted personnel assignment decisions.

In FY92, plans include a complete evaluation of techniques to improve individual and unit productivity in the Navy civilian workforce.

**PAYOFF/UTILIZATION:**

In FY90, specific accomplishments included the completion of an evaluation of a prototype network for training personnel who are remote from instructional facilities.

Extensive refinements of the Aircrew Instructional System (AIS), including graphic and alphanumeric displays on separate monitors and voice playback, were completed. Successful implementation of AIS will reduce the cost of debrief and analysis systems from \$1M to \$20K, and will afford availability of systems throughout the Navy and Air Force where none currently exist. Research under the Chemical Warfare Defense Training task developed seven fully interactive sample scenarios for the damage control assistant decision training aid (DECAID) and delivered them to the Surface Warfare Officers School. Improved training, based on scenarios such as these, fills an important gap and will lead to improved safety and enhanced mission accomplishment.

## PROJECT OVERVIEW

		91	92
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PROJECT: RM33T23	TRAINING SYSTEMS TECHNOLOGY	\$ 1.4M	\$ 1.4M
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		

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PROJECT SYNOPSIS:

The objective of this Project is to provide for effective and efficient means of conducting initial, technical, and refresher training for Navy personnel.

The Project explores technologies to reduce the personnel-and-paper-intensive nature of Navy training. The goal is to raise training productivity by using computer-controlled video and graphic interfaces, hypermedia, televideo networking, and student flow modeling.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included the completion of the development of design guidance to build Tactical Air Combat Training System ranges in deep ocean areas.

For the Communication Networks in Training task, a field test of video teletraining, using a 2-way link between the Fleet Combat Training Center, Pacific and the Naval Technical Training Center, Treasure Island, was successfully completed. This effort has the strong support of COMTRAPAC because of the large potential cost-saving (30-70 percent) reduction in TDY expenses.

For the VideoGraphic Interface Technology task, two systems for testing video/graphics interfaces were developed: (a) a PC-based system consisting of

image-capture devices, image-processing computers, and image and motion databases, and (b) a MacIntosh-based system used to investigate aids to cinematography. The final video/graphic technology will be used in developing advanced training by Navy engineers and trainers who have limited experience in video production.

## PROJECT OVERVIEW

		91	92
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PROJECT: RM33T24	SIMULATION TECHNOLOGY	\$ 1.3M	\$ 1.3M
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		

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PROJECT SYNOPSIS:

The objectives of this Project are to develop and demonstrate the feasibility of technologies for improving the training effectiveness and reducing the cost of simulation systems in training devices.

These objectives correspond to training system technology goals, as stated in the FY91/POM92 Mission Area Strategy for Mission Support, such as simulating advanced sensor system displays and ASW simulation. Tasks supporting these objectives follow. (a) Simulation of Advanced Sensors: develop a broad spectrum of alternative solutions to the problem of sensor simulation and coordination. (b) CIG/Cost Performance Enhancement: develop techniques which will reduce the cost of CIG visual simulation systems while maintaining or improving performance. (c) Synthesis of Active Acoustic Signals and Displays for Training: address the synthesis of high-fidelity active sonar displays for use in tactics training within the limits of microcomputers. (d) Weapons Team Engagement Simulation: develop technology to support interactive, simulated weapon fire to train Navy assault and anti-terrorist teams. (e) Crystal Target Projector: develop and test color video projectors using single-crystal faceplate technology to reduce the cost of visual simulation systems. (f) Tactical Training Instructor Components: demonstrate the technology to automate selected labor-intensive instructor functions and training features, utilizing a user-friendly man-machine interface for tactical training systems. (g) Personal Computer-Based Radar Simulation: determine the feasibility of providing a low-cost, interactive training aid for teaching surface radar navigation skills.

In FY92, plans include beginning development of simulation technology for

deployable, low-cost systems to maintain/enhance operator skills.

**PAYOFF/UTILIZATION:**

In FY90, specific accomplishments for the Simulation of Advanced Sensors task included transitioning the ISAR scenarios developed to the Naval Weapons Center Multi-Sensor Auto Classification program. The ISAR simulation for radar operator training, using synthetic targets, provides a much greater flexibility for training, vice using real, taped images.

For the Weapons Team Engagement Simulation task, two patent applications have been submitted disclosing system components invented and developed. These included a method for having the screen engage the trainee, and circuitry for the shootback portion of the trainer, greatly reducing technical risks and permitting the development of multiple-player, interactive weapons training systems through realistic simulation of adversary and target behavior. Funding has been approved for the development of a variation of the Weapons Team Engagement Simulation by the DoD Joint-Services Manpower and Training Technology Development Program (PE 64722A) beginning in FY91.

## PROGRAM ELEMENT OVERVIEW

PE: 62234N                    SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS  
                                  TECHNOLOGY AREA

CONGRESSIONAL CATEGORY:    HUMAN FACTORS

DoD ORGANIZATION:          NAVY

FUNDING:                      FY91 \$ 4.3M (FY92 PRESIDENT'S BUDGET)  
                                  FY92 \$ 4.3M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to provide the Navy with the capability, resources, and expertise to implement advanced weapon and platform system concepts.

Materials and electronic devices are enabling technologies addressing fundamental systems limitations in performance, reliability, and cost. Computer Technology includes hardware, software, machine intelligence, and software systems engineering. The Human Factors topic addresses high-payoff technological opportunities in man-machine interfaces, decision making, and information transfer.

This Program Element supports 16 of the DoD Critical Technologies, the primary ones being: Microelectronics, Software, Simulation and Modeling, Photonics, Sensitive Radars, Passive Sensors, Signature Control, Data Fusion, Composite Materials, Superconductivity, and Biotechnology.

The in-house developing organizations responsible for this program are the Naval Civil Engineering Lab, David Taylor Research Center, Naval Air Development Center, Naval Underwater Systems Center, Naval Ocean Systems Center, Naval Research Lab, Naval Surface Warfare Center, Naval Weapons Center, and Naval Avionics Center.

Funding and Project information indicated includes only that portion of the Program Element which refers to Manpower, Personnel, and Training.

**PAYOFF/UTILIZATION:**

The payoffs of the Manpower, Personnel, and Training portion of this Program Element is the provision to Navy system developers of resources and expertise in the areas of man-machine interface, decision-making, and the development of training and simulation principles, thus enabling improved system design with better utilization of the human component.

**FUTURE DIRECTIONS:**

Beyond FY92, plans for the Manpower, Personnel, and Training portion of this Program Element include: (a) continuation of efforts in the development of decision support principles, (b) continuation of efforts in the development of training and simulation principles, and (c) performance of validation of biopsychometric technology in operational or quasi-operational environments.



## PROJECT OVERVIEW

		91	92
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PROJECT: RS34H20	HUMAN FACTORS TECHNOLOGY	\$ 3.7M	\$ 3.8M
PE: 62234N	SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL OCEAN SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objectives of this Project are to maximize the effectiveness of commanders and operators, improve the Fleet's ability to process information quickly and accurately, reduce the requirements for manpower and training, and lower the frequency and cost of accidents.

Human Factors technology is the application of behavioral science (including human cognition, perception, and anthropometry) to the design and engineering of manned systems with precisely these goals in mind. No other technology addresses the critical interface between man and machine where significant progress toward these specific goals can be achieved.

Human Factors technology includes the development of Man-Machine Interface (MMI) principles, methodologies, system concepts, and facilities which permit the guidance, analysis, and evaluation of system designs or procedures which directly support the operational user.

Advanced MMI for Ashore Command Systems, an FY90 new start, will be terminated at the end of FY90 due to a reduction in Project funding. This Project was designed to support Navy developments in Ashore Command Centers, as well as the Fleet Combat Center Battle Management Program (FCCBMP) and the Operations Support System (OSS). Each of these acquisition programs has identified advanced, user-friendly man-machine interfaces as priority objectives in the system design, although there are extremely few MMI principles or design requirements available for these command-level systems. Initial methods for testing and evaluating the MMI objectives for these types

of systems were generated and tested using field studies and a laboratory database query experiment. Enough interest was generated within the OSS Program during FY90 that the Program will provide funding to continue much of this work. Two tasks discussed in the FY90 Human Factors Project Plan have been reorganized for FY91 as the result of direction by ONT Mission Area Guidance. Specifically, Task 4 (Decision Modeling for Command and Control) and Task 9 (Teleoperator and Robotic Technologies) have been combined under a new ONR Task 4 (ONR Human Factors Technology Program).

Next-generation decision-aiding technology will provide users, ranging from console operators to fleet commanders, the capacity to process and utilize large amounts of information easily and effectively. This technology will permit significant improvements in decision-making quality and timeliness under conditions which currently overload operational combat teams. At the same time, manning reductions will be possible through the elimination of manual data processing requirements. The uniqueness of this thrust is that it is oriented toward the generic Navy user, rather than the computer-literate, operational expert. Our vision of this future is that the decision maker will interact with decision support systems as he would interact with other people - no specialized training for each system, learning idiosyncrasies as you go, natural language voice interaction, needs anticipated, etc. In order to realize these potentials, this thrust includes tasks aimed at understanding human decision-making processes in operational environments, as well as tasks that use this information to develop both optimal display/control interfaces and the decision aids themselves.

#### PAYOFF/UTILIZATION:

The payoffs of this Project include new information about human detection and decision-making performance across a wide range of Navy missions (e.g., sonar detection, air-to-ground attack, battle group force coordination, etc.), with the data being integrated into innovative display systems for submarines, aircraft cockpits, ship CICs, and ashore surveillance systems.

In FY90, specific accomplishments included: (a) experimental performance data obtained and analyzed to validate a new decision aid for submarine Approach Officers (Task 1), (b) development of an upgraded simulation facility for testing and evaluating submarine attack decision aids (Task 1), (c) integration of a fully functioning interface for an attack planning decision aid into the NUSC Combat System Evaluation and Analysis Laboratory (CSEAL) for further experimental development (Task 1), (d) development of a simulation facility and experimental test program for designing, testing, and

evaluating adaptive function allocation systems for intelligent cockpits (Task 2), (e) completion of both field and laboratory studies which evaluated user interface designs for the complex databases used in ashore C2 systems (results and elements of the planned work transitioned to the SPAWARSYCOM Operations Support System (OSS) Program) (Task 3), (f) development and testing of a new computer simulation model which emulates human sensing, navigation, and decision-making performance in underwater environments - a significant new tool for the technical development of autonomous and semi-autonomous vehicles (Task 4), (g) development of software to create 3-D and stereoscopic surveillance displays (Task 5), (h) provision of information display and management principles to several Navy programs which develop displays for the AEGIS operators (Task 6), (i) implementation and testing of new signal analysis and display techniques to improve human sonar detection performance (Task 7), (j) obtaining a specified system to generate a virtual 3-D aural environment for performance testing with sonar operators (Task 7), (k) generation of new performance research data for target detection performance, using FLIR, automatic target recognition systems, and new data fusion display formats (Task 8), and (l) completion of three major studies which examined the effects of information flow on composite warfare commanders' decision-making performance during outer air battles (results to form a basis for a model of warfare command decision-making (Task 9).

## PROJECT OVERVIEW

		91	92
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PROJECT: RS34H21	BIOPSYCHOMETRIC ASSESSMENT	\$ 0.7M	\$ 0.5M
PE: 62234N	SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to provide improved personnel readiness assessment using psychophysiological techniques, and develop techniques for maintaining and enhancing performance under sustained operations. The approach is to develop measures of Event-Related Potentials (ERP) that can aid in monitoring the cognitive functions of individual military personnel. Ultimately, such ERP measures may be used in real-time as feedback or control signals in operational environments and classrooms. These measures may also be used in controlled settings as aids for the design and evaluation of complex systems, work schedules, and drug effects.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) improved assessment of the combat readiness of system operators, and (b) enhanced system operators' performance in real-time.

In FY90, specific accomplishments included: (a) auditory and visual monitoring task results which appear to have produced a good predictor of reaction time on a vigilance task, and (b) sustained operations task results which reliably predicted increases in errors.

## PROGRAM ELEMENT OVERVIEW

PE: 63701N HUMAN FACTORS ENGINEERING DEVELOPMENT  
CONGRESSIONAL CATEGORY: HUMAN FACTORS  
DoD ORGANIZATION: NAVY  
FUNDING: FY91 \$ 2.9M (FY92 PRESIDENT'S BUDGET)  
FY92 \$ 3.0M (FY92 PRESIDENT'S BUDGET)

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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 operations, (b) establish target acquisition and weapon system standards for displays people can understand, (c) develop airborne tactical decision aids for fleet air defense, Anti-Submarine Warfare (ASW), and strike missions, (d) provide initial human factors support for new systems, (e) improve the integration between ships and their crews, and (f) reduce training time and costs.

The program also develops and evaluates new techniques for human factors-based system design. This Program Element improves fleet readiness through human factors technology. It provides a better fit between the operator, equipment, and mission, so that hardware systems will be operated with fewer human-induced errors and with greater safety and maintainability.

The in-house organization responsible for this program is Naval Ocean Systems Center.

## PAYOFF/UTILIZATION:

The payoff of this Program Element is improved fleet readiness through human factors technology.

FUTURE DIRECTIONS:

Beyond FY92, plans for this Program Element include, for the Air Human Factors Engineering Project (W0542): (a) completing development/demonstration tools for aircrew workload analysis and tactical decision support, and (b) continuing development of tools for night vision systems and design for maintainability. For the Ship Human Factors Engineering Project (R1771) plans include: (a) developing the prototype tactical display for submarine approach officers, (b) prototype testing of the MILSTAR operator aid, and (c) detailing specifications for the air and submarine display format designs.

## PROJECT OVERVIEW

		91	92
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PROJECT: R1771	SHIP HUMAN FACTORS ENGINEERING	\$ 1.9M	\$ 2.0M
PE: 63701N	HUMAN FACTORS ENGINEERING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL OCEAN SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objective of this Project, which responds to recommendations by the Government Accounting Office (GAO), the Defense Science Board, and the Naval Research Advisory Committee, is to improve shipboard performance by incorporating human factors engineering during system acquisition.

Thrust areas of this Project include: (a) tactical information management and decision-making, (b) battle force information management, (c) multisensor integration and data display, (d) combat system design, and (e) computer-based operator aids.

In FY91, plans include: (a) developing adaptive tactical displays for enhanced situation assessment, (b) identifying algorithms and displays needed to fuse Anti-Submarine Warfare (ASW) data, (c) completing the construction of the prototype MILSTAR operator aid, and (d) conducting sonar format simulation and assessment for surface ship application and developing recommendations for AN/SQQ-89(I) sonar use.

In FY92, plans include: (a) evaluating an adaptive tactical display for submarine approach officers, (b) testing algorithms and display designs for ASW data fusion, (c) evaluating the MILSTAR operator aid and development of operational specifications, and (d) developing a surface ship sonar format design specification.

PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) completion of the Submarine Combat System Operability Evaluation Facility and conducting two studies to evaluate a Torpedo Employment Aide, (b) transition of the Assessment/Force Accounting Database (AFAD) on all Navy ships, aircraft, and major weapons systems, (c) development of designs for the MILSTAR Operational Requirements Aid (MORA) to allot MILSTAR resources without added training or manpower, (d) completion of the electronic conversion of prototype integrated sonar display formats for surface combatants, and (e) conducting of a human engineering assessment of the AN/SLQ-32 electronic warfare system.



## PROJECT OVERVIEW

		91	92
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PROJECT: W0542	AIR HUMAN FACTORS ENGINEERING	\$ 1.1M	\$ 1.1M
PE: 63701N	HUMAN FACTORS ENGINEERING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL AIR DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to develop/demonstrate Human Factors Engineering (HFE) technology for: (a) establishing human factors requirements for new systems, and (b) evaluating the impact of human factors on effectiveness of systems in development or test and evaluation.

In FY91, plans include: (a) completing development/demonstration/transition of HFE Design, Test and Evaluation (DT&E) tools to the Air Combat Environment Test Evaluation Facility (ACETEF) 6.4 program, (b) completing development/demonstration/transition of the Multi-Sensor Correlation (MSC) decision aid to the F-14D/F-18A, (c) continuing development of HFE design requirements analysis tools, and (d) initiating development of HFE tools for operational T&E (OT&E).

In FY92, plans include: (a) initiating development of HFE DT&E tools and requirements analysis tools for: (1) night vision systems, (2) design for maintainability, (3) aircrew workload analysis, and (4) tactical decision support, and (b) continuing development of HFE tools for OT&E.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) initiation of the integrated MSC decision aid development for fighter aircraft, (b) delivery of the HFE DT&E tools for aircraft flying qualities evaluations, systems performance analysis, and crew coordination performance evaluations, (c) initiation of HFE design/requirements analysis tool developments, and (d) continuation of

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substantial interagency (DoD, Department of Transportation, and Department of Energy) HFE coordination.

III-B-36

## PROGRAM ELEMENT OVERVIEW

PE: 63707N                    MANPOWER AND PERSONNEL SYSTEMS  
CONGRESSIONAL CATEGORY:    MANPOWER & PERSONNEL  
DoD ORGANIZATION:         NAVY  
  
FUNDING:                    FY91 \$ 3.3M (FY92 PRESIDENT'S BUDGET)  
                              FY92 \$ 3.3M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to improve the utilization and allocation of Navy personnel.

Specifically, systems and models are designed and developed to improve personnel assignment, retention, and job performance. Models are also used to reduce cost and improve effectiveness through better prediction and management of personnel inventory changes. Supporting technology for model development includes mathematical optimization, information systems technology, statistical/econometric forecasting, and human performance and attitude measurement.

The in-house organization responsible for this program is the Navy Personnel Research and Development Center.

## 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) established quality selection standards for major enlisted job categories, (b) a validated inventory forecasting model for new enlisted skill classifications, (c) testing/evaluating of an optimal assignment system for 50% of enlisteds, (c) validated selection standards for electrical jobs, (d) a developed recruiting resource decision support system, and (e) a developed/tested paperless survey system.

FUTURE DIRECTIONS:

Beyond FY92, plans for this Program Element include: (a) developing a method for gauging personnel system impacts (e.g., promotions, recruiting) of smaller force structures and reduced missions, and (b) test models to allocate recruiting resources among geographic subdivisions.

## PROJECT OVERVIEW

		91	92
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PROJECT: R1770	MANPOWER AND PERSONNEL SYSTEMS	\$ 3.3M	\$ 3.3M
PE: 63707N	MANPOWER AND PERSONNEL SYSTEMS		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to improve the utilization and allocation of Navy personnel.

Specifically, systems and models are designed and developed to improve personnel assignment, retention, and job performance. Models are also used to reduce cost and improve effectiveness through better prediction and management of personnel inventory changes.

In FY91, plans include: (a) establishing quality selection standards for major enlisted job categories, (b) testing an optimal assignment system using Permanent Change of Station (PCS) and school constraints, and (c) testing the enlisted/civilian resource trade-off model.

In FY92, plans include: (a) validating the inventory forecasting model for new enlisted skill classifications, (b) testing a system that deploys recruiting incentives to maximize high quality contracts, and (c) developing the comprehensive retention decision model.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) testing and evaluation of the optimal assignment system for 50% of the enlisteds, (b) validation of selection standards for electrical jobs, (c) development of a recruiting resource decision support system, and (d) development and testing of a

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paperless survey system.

III-B-40

PROGRAM ELEMENT OVERVIEW

PE: 63720N                    EDUCATION AND TRAINING  
CONGRESSIONAL CATEGORY:    EDUCATION & TRAINING  
DoD ORGANIZATION:         NAVY  
  
FUNDING:                    FY91 \$ 6.0M (FY92 PRESIDENT'S BUDGET)  
                              FY92 \$ 6.1M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to apply automation and expert systems to the development, presentation, management, and evaluation of Navy training.

Technology areas include artificial intelligence, training aids, automated performance testing, and computerized delivery systems.

The in-house organization responsible for this program is the Navy Personnel Research and Development Center, San Diego, CA.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) testing of a computerized system to help technical experts author instructional materials for new/revised training, (b) delivering of a low-cost, computer-based, graphically enriched 1200 PSI propulsion trainer to Naval Reserve sites, and (c) delivering of a desk-top computer-based educational software system to develop curriculum and performance tests.

FUTURE DIRECTIONS:

Beyond FY92, plans for this Program Element include: (a) applying artificial intelligence tutoring to computer-based instructional systems, and (b) developing a method to link training resource allocation to operational readiness.

## PROJECT OVERVIEW

		91	92
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PROJECT: R1772	EDUCATION AND TRAINING DEVELOPMENT	\$ 6.0M	\$ 6.1M
PE: 63720N	EDUCATION AND TRAINING		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to apply automation and expert systems to the development, presentation, management, and evaluation of Navy training.

Technology areas include artificial intelligence, expert systems, performance training aids, automated performance testing and training evaluation.

In FY91, plans include: (a) accelerating a remedial skill enhancement program, (b) developing a curriculum to train AN/SLQ-32 Electronic Warfare (EW) operators to overcome information overload to rapidly identify threat signals, (c) delivering expert systems to enhance allocation and coordination of fleet and shore training resources, and continuing to prototype a career development training management system, and (d) developing training methods to reduce shipboard accidents.

In FY92, plans include: (a) applying individual skill training technologies to team training, and (b) testing automated training materials development tools on technical manual development.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) testing of a computerized system to help technical experts author instructional materials for new/revised training, (b) delivery of a low-cost, computer-based, graphically enriched 1200 PSI propulsion trainer to Naval Reserve sites, and (c) delivery



of a desk-top computer-based educational software system to develop curriculum and performance tests.

PROGRAM ELEMENT OVERVIEW

PE: 63732M MARINE CORPS ADVANCED MANPOWER/TRAINING SYSTEMS  
CONGRESSIONAL CATEGORY: MANPOWER & PERSONNEL  
DoD ORGANIZATION: MC  
FUNDING: FY91 \$ 3.2M (FY92 PRESIDENT'S BUDGET)  
FY92 \$ 3.3M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to provide funds for the advanced development of systems and equipment to improve the manpower readiness of the Fleet Marine Force and to develop techniques and methods that advance the use and control of human resources in the Marine Corps.

The in-house organizations responsible for this program are the Navy Personnel Research and Development Center and the Naval Postgraduate School.

PAYOFF/UTILIZATION:

The payoff of this Program Element (PE) will be enhanced Fleet Marine Force readiness through improved use and control of human resources in the Marine Corps.

In FY90, specific accomplishments included the completion of the Officer Planning and Utility System and the Woman Marine Model.

FUTURE DIRECTIONS:

Beyond FY92, plans for this Program Element include: (a) continuing systems development, and (b) conducting test development for the Clerical/Administrative composite of the Armed Services Vocational Aptitude Battery (ASVAB).

## PROJECT OVERVIEW

		91	92
		-----	-----
PROJECT: C0073	HUMAN RESOURCES MANAGEMENT	\$ 3.2M	\$ 3.3M
PE: 63732M	MARINE CORPS ADVANCED MANPOWER/TRAINING SYSTEMS		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	MC		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) develop systems and equipment to improve the manpower readiness of the Fleet Marine Force, and (b) develop techniques and methods which advance the use and control of human resources in the Marine Corps.

In FY91, plans include: (a) continuing systems development, and (b) completing test development for the electronics repair composite of Armed Services Vocational Aptitude Battery (ASVAB).

In FY92, plans include: (a) continuing systems development, (b) conducting test development for electronics repair composite at Fleet Marine Force Commands, and (c) completing Manpower Management Records Branch digital imaging prototype.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included completion of the Officer Planning and Utility System and the Woman Marine Model.

PROGRAM ELEMENT OVERVIEW

PE: 63733N                                  SIMULATION AND TRAINING DEVICE TECHNOLOGY  
CONGRESSIONAL CATEGORY:                  SIMULATION & TRAINING DEVICES  
DoD ORGANIZATION:                                  NAVY  
  
FUNDING:    FY91 \$ 5.1M (FY92 PRESIDENT'S BUDGET)  
    FY92 \$ 5.2M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to conduct: (a) proof-of-concept demonstration, (b) risk reduction developments, and (c) cost-effectiveness investigations in simulator and training technology.

This Program Element: (a) links exploratory development efforts and engineering prototypes, and (b) applies advanced technology to provide improved hands-on training in Anti-Submarine Warfare (ASW), Anti-Surface Warfare (ASUW), Anti-Air Warfare (AAW), Strike Warfare (STW), and Electronic Warfare (EW) for all Navy platforms.

The in-house organization responsible for this program is the Naval Training Systems Center.

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. Application of advanced technology provides improved hands-on training in ASW, ASUW, AAW, STW, and EW for all Navy platforms.

FUTURE DIRECTIONS:

Beyond FY92, plans for this Program Element include: (a) evaluating the simulator-based mission rehearsal capability of the Carrier-Based Weapons

System Trainer (CT-WST) simulator architecture, (b) conducting the operational test of the under-ice piloting trainer and the low-cost submarine team trainer, and (c) delivering the flight crew coordination training package and the start of surface battle station crew coordination training.

## PROJECT OVERVIEW

		91	92
		-----	-----
PROJECT: W1773	SIMULATION AND TRAINING DEVICES	\$ 5.1M	\$ 5.2M
PF: 63733N	SIMULATION AND TRAINING DEVICE TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to conduct: (a) proof-of-concept demonstration, (b) risk reduction developments, and (c) cost-effectiveness investigations in simulator and training technology.

This Project: (a) links exploratory development and engineering prototypes, and (b) applies advanced technology to provide improved hands-on training in Anti-Submarine (ASW), Anti-Surface Warfare (ASUW), Anti-Air Warfare (AAW), Strike Warfare (STW), and Electronic Warfare (EW) for all Navy platforms.

In FY91, plans include: (a) demonstrating the interface of three Carrier-Based Weapons System Trainer (CB-WST) projects and developing expert systems to support air warfare decision-making, (b) re-starting work on the low-cost submarine team trainer, and completion of the ASW simulation architecture software development, (c) beginning the flight-crew coordination safety training and the under-ice submarine piloting trainer, and (d) designing and developing field test performance measurement criteria for battle force Command, Control, and Communication (C3) team training.

In FY92, plans include: (a) evaluating the effectiveness of three CB-WST simulator components for F/A-18 strike missions and testing of the air warfare threat expert system, (b) testing and demonstrating the low-cost submarine team trainer, (c) continuing development of the flight crew coordination training and under-ice piloting training, and (d) starting of the experiment using battle force hardware and performance measurement criteria on surface-to-air tactical scenarios for embedded training.

PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) support for the development of carrier-based mission rehearsal trainer technology with three projects (Photo-Databased Projection, Hands-On-Throttle-And-Stick [HOTAS], and Carrier-Based Weapons System Trainer [CB-WST]), and (b) demonstration of improved helmet displays and advanced-threat prototypes in the reconfigurable F/A-18 simulator.

PROGRAM ELEMENT OVERVIEW

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

CONGRESSIONAL CATEGORY: MANPOWER & PERSONNEL

DoD ORGANIZATION: NAVY

FUNDING: FY91 \$ 1.1M (FY92 PRESIDENT'S BUDGET)  
FY92 \$ 1.9M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to apply advanced technologies to operational requirements in manpower, personnel, training, and human factors.

This Program Element focuses on adaptive testing, math optimization, statistical/econometric forecasting, computer-based simulation, and decision support systems. This effort will improve the alignment of personnel inventory with authorizations, which will contribute to personnel readiness.

The in-house organization performing this work is the Navy Personnel Research and Development Center.

PAYOFF/UTILIZATION:

The payoff of this Program Element is improved personnel readiness through improved alignment of personnel inventory with authorizations.

FUTURE DIRECTIONS:

Beyond FY92, plans for this Program Element include development of an enlisted cost/performance trade-off model.



## PROJECT OVERVIEW

		91	92
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PROJECT: R1822	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS	\$ 1.1M	\$ 1.9M
PE: 64703N	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to apply advanced technologies to operational requirements in manpower, personnel, training, and human factors. It focuses on adaptive testing, math optimization, statistical/econometric forecasting, computer-based simulation, and decision support systems.

In FY91, plans include: (a) analyzing the Computerized Adaptive Test-Armed Services Vocational Aptitude Battery (CAT-ASVAB) score-equating verification data, and (b) testing/implementating the sea/shore rotation system.

In FY92, plans include: (a) validating methods to determine the required enlisted personnel quality mix, and (b) exploiting market research methods to develop alternative recruiting incentives to attract high-quality recruits.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) initiation of score-equating verification for the CAT-ASVAB, and (b) development of the sea/shore rotation policy analysis model.

PROGRAM ELEMENT OVERVIEW

PE: 64715N SURFACE WARFARE TRAINING DEVICES  
CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES  
DoD ORGANIZATION: NAVY  
FUNDING: FY91 \$12.4M (FY92 PRESIDENT'S BUDGET)  
FY92 \$10.7M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to support the mission of the Deputy Chief of Naval Operations Surface Warfare Sponsor by improving readiness and training.

This Program Element addresses the requirements of the Fleet and the Chief of Naval Education and Training for development of prototype surface warfare training devices to: (a) improve training, (b) improve operational readiness, (c) improve efficiency and safety, and (d) reduce training time and costs.

The in-house organization responsible for this work is the Naval Training Systems Center.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include improved training, operational readiness, efficiency and safety, and reduced training time and costs through the development of prototype surface warfare training devices.

The Tactical Advanced Combat Direction Electronic Warfare Modification Project (S1140) was completed in FY90.

**FUTURE DIRECTIONS:**

Beyond FY92, plans for this Program Element include completing the final acceptance testing for the Surface Tactical Team Trainer Project (S1427).

## PROJECT OVERVIEW

		91	92
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PROJECT: S1427	SURFACE TACTICAL TEAM TRAINER	\$11.1M	\$10.7M
PE: 64715N	SURFACE WARFARE TRAINING DEVICES		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to develop a generic training system which will: (a) replace obsolete devices, and (b) provide team procedural and tactical training/evaluation in a multi-threat environment for conventional and tactical data-equipped ships. These devices will have a direct impact on the Navy's ability to train for battle.

The 20A66 Anti-Submarine Warfare (ASW) Tactical Team Trainer will replace the ASW Coordinated Tactics Trainers (X14A6 and 14A6) built in the 1960s, and 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 surface ship, submarine, and aircraft "command centers" configured with multi-purpose equipment which will simulate the sensor, weapon, and communication capabilities of the platforms represented, and will train up to 300 people per year in coordinated ASW battle group operations.

In FY91, plans include: (a) continuing 20A66 Lot I development with emphasis on software development and initial hardware interfacing, and (b) completing Device 20A66 Critical Design Review (Dec 90).

In FY92, plans include continuing hardware/software integration and beginning in-plant system testing.

PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) completion of the hardware design, and (b) commencement of Device 20A66 development and procurement of preliminary Lot I hardware for the Fleet Anti-Submarine Training Center, Pacific (FLEASWTRACENPAC), San Diego.

## PROJECT OVERVIEW

		91	92
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PROJECT: S1834	LANDING CRAFT AIR CUSHION (LCAC) OPERATOR TRAINER	\$ 1.4M	\$ 0.1M
PE: 64715N	SURFACE WARFARE TRAINING DEVICES		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to develop an operator trainer for Landing Craft, Air Cushion (LCAC) vehicles.

The LCAC Full Mission Trainer, Device 20G6, provides crew operator training (craftmaster, engineer, navigator, and group commander) in a dynamic environment addressing all phases of craft operations at significantly reduced costs over the use of actual craft.

In FY91, plans include: (a) conducting test and evaluation, and trainer acceptance, and (b) completing the program.

This Project is scheduled for completion in FY91.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) completion of the software integration, and (b) system installation.



PE/PROJECT	PERFORMING ORGANIZ.	FY91 (\$M)	FY92 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62233N						MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION
RM33D40	NTSC	1.871	2.035	ST	6A	TACTICAL DECISION-MAKING UNDER STRESS (TADMUS)
RM33D60	NOSC	1.871	2.035	HF	4B	TACTICAL DECISION-MAKING UNDER STRESS (TADMUS)
RM33M20	NPRDC	2.960	3.100	MP	2	MANPOWER AND PERSONNEL TECHNOLOGY
RM33T21	NTSC	1.126	1.163	ST	6F	INSTRUCTIONAL TECHNOLOGY
RM33T23	NPRDC	1.373	1.391	ET	6	TRAINING SYSTEMS TECHNOLOGY
RM33T24	NTSC	1.204	1.231	ST	6	SIMULATION TECHNOLOGY
		10.406	10.955			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 62233N :	FY91	FY92
THE PRESIDENT'S BUDGET, JANUARY 1991	10.405	10.955

PE/PROJECT	PERFORMING ORGANIZ.	FY91 (\$M)	FY92 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62234N						SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA
RS34H20	NOSC	3.622	3.799	HF	4	HUMAN FACTORS TECHNOLOGY
RS34H21	NPRDC	0.600	0.450	HF	5A	BIOPSYCHOMETRIC ASSESSMENT
		4.223	4.250			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 62234N :	FY91	FY92
THE PRESIDENT'S BUDGET, JANUARY 1991	4.222	4.249



PE/PROJECT	PERFORMING ORGANIZ.	FY91 (\$M)	FY92 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63701N						HUMAN FACTORS ENGINEERING DEVELOPMENT
R1771	NOSC	1.881	1.914	HF	4	SHIP HUMAN FACTORS ENGINEERING
W0542	NADC	1.002	1.020	HF	4	AIR HUMAN FACTORS ENGINEERING
		-----	-----			
		2.884	2.934			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63701N :	FY91	FY92
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THE PRESIDENT'S BUDGET, JANUARY 1991	2.883	2.934

63707N						MANPOWER AND PERSONNEL SYSTEMS
R1770	NPRDC	3.200	3.256	MP	2	MANPOWER AND PERSONNEL SYSTEMS
		-----	-----			
		3.201	3.257			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63707N :	FY91	FY92
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1991	3.200	3.256

63720N						EDUCATION AND TRAINING
R1772	NPRDC	5.983	6.088	ET	6	EDUCATION AND TRAINING DEVELOPMENT
		-----	-----			
		5.984	6.089			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63720N :	FY91	FY92
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1991	5.983	6.088

PE/PROJECT	PERFORMING ORGANIZ.	FY91 (\$M)	FY92 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63732M						MARINE CORPS ADVANCED MANPOWER/TRAINING SYSTEMS
C0073	NPRDC	3.110	3 290	MP	1A	HUMAN RESOURCES MANAGEMENT
		3.110	3.290			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63732M :	FY91	FY92
THE PRESIDENT'S BUDGET, JANUARY 1991	3.110	3.290

63733N						SIMULATION AND TRAINING DEVICE TECHNOLOGY
W1773	NTSC	5.042	5.131	ST	6	SIMULATION AND TRAINING DEVICES
		5.043	5.132			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63733N :	FY91	FY92
THE PRESIDENT'S BUDGET, JANUARY 1991	5.042	5.131

64703N						PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS
R1822	NPRDC	1.069	1.888	MP	2	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS
		1.069	1.888			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 64703N :	FY91	FY92
THE PRESIDENT'S BUDGET, JANUARY 1991	1.069	1.888

PE/PROJECT	PERFORMING ORGANIZ.	FY91 (\$M)	FY92 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64715N						SURFACE WARFARE TRAINING DEVICES
S1427	NTSC	11.025	10.600	ST	6	SURFACE TACTICAL TEAM TRAINER
S1834	NTSC	1.332	0.000	ST	6	LANDING CRAFT AIR CUSHION (LLAC) OPERATOR TRAINER
		-----	-----			
		12.357	10.601			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 64715N :

	FY91	FY92
THE PRESIDENT'S BUDGET, JANUARY 1991	----- 12.357	----- 10.600

### III.C. AIR FORCE PROGRAM ELEMENT AND PROJECT SYNOPSES

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PE	TITLE	PAGE
61102F	DEFENSE RESEARCH SCIENCES	III-C-1
62202F	HUMAN SYSTEMS TECHNOLOGY	III-C-5
62205F	PERSONNEL, TRAINING AND SIMULATION	III-C-13
63106F	LOGISTICS SYSTEMS TECHNOLOGY	III-C-30
63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY	III-C-37
63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY	III-C-45
64227F	FLIGHT SIMULATOR DEVELOPMENT	III-C-52
64243F	MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT	III-C-69

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.

## PROGRAM ELEMENT OVERVIEW

PE: 61102F                      DEFENSE RESEARCH SCIENCES  
CONGRESSIONAL CATEGORY:      HUMAN FACTORS  
DoD ORGANIZATION:              AF  
  
FUNDING:                      FY91 \$11.1M (FY92 PRESIDENT'S BUDGET)  
                                    FY92 \$11.6M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objectives of the Manpower, Personnel, Training and Safety (MPTS) portion of this Program Element (PE) are to: (a) develop better ways to select individuals for jobs on the basis of their mental and physical skills, (b) train them to do those jobs well, and (c) design tasks and equipment to optimally match capabilities and characteristics.

This Science and Technology Based Program Element, managed by the Air Force Office of Scientific Research (AFOSR), supports Air Force research efforts comprised of in-house investigations in Air Force laboratories and extramural activities in academia and industry. This Program Element funds broad-based scientific and engineering basic research in technologies critical to the Air Force mission and in the search for future critical technologies. These technologies include: (a) aerospace structures, (b) aerodynamics, (c) materials, (d) propulsion, (e) power, (f) electronics, (g) computer science, (h) directed energy, (i) conventional weapons, (j) life sciences, (k) terrestrial sciences, (l) atmospheric sciences, and (m) space sciences. This technology base is broadened through a number of programs including a summer faculty and graduate student program wherein university researchers spend ten weeks during the summer working at an Air Force lab; a resident research associateship and university resident research program wherein researchers can spend up to one year at an Air Force lab; and several graduate assistantships and laboratory graduate fellowship programs in technology areas of critical interest to the Air Force.

The in-house organizations responsible for this program are the Air Force Human Resources Laboratory (AFHRL), the Armstrong Aerospace Medical Research Laboratory (AAMRL), and the United States Air Force School of Aerospace Medicine (USAFSAM).

PAYOFF/UTILIZATION:

The payoff of the MPTS portion of this Program Element is to gain knowledge which can help Air Force personnel to: (a) skillfully perform difficult military tasks, and (b) use complex equipment systems effectively.

FUTURE DIRECTIONS:

Beyond FY92, plans for the MPTS portion of this Program Element include: (a) multi-sensory integration and control of responses to orienting stimuli which will provide the basis for improved understanding of spatial orientation; computational neuroscience research efforts will continue with an emphasis on modeling the information processing capabilities, and (b) a new research program will examine group decision-making processes in an effort to understand the psychological processes involved in communication fidelity and how best to structure command and control operations to improve the decision-making process of teams working together on critical Air Force Missions.

## PROJECT OVERVIEW

		91	92
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PROJECT: 2313	HUMAN RESOURCES	\$11.1M	\$11.6M
PE: 61102F	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE OFFICE OF SCIENTIFIC RESEARCH		

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PROJECT SYNOPSIS:

The objectives of this Project are to develop better ways to select individuals for jobs on the basis of their mental and physical skills, train them to do those jobs well, and design tasks and equipment to optimally match human capabilities and characteristics.

This program provides the knowledge required for Air Force personnel to skillfully perform difficult military tasks and use complex equipment systems effectively.

In FY91, plans include: (a) continuing the cognition program to examine the nature of mental functions such as attention, working memory, long-term memory, organization of knowledge, judgement, reasoning, and problem-solving, (b) beginning a new initiative on decision-making under stress which will begin to determine the processes involved in making critical decisions while under time-pressure, and (c) continuing research in understanding spatial orientation in humans in order to develop techniques to prevent the spatial disorientation experienced by pilots of high-performance aircraft who must make abrupt tactical maneuvers during high speed nap-of-the-earth missions.

In FY92, plans include: (a) conducting spatial orientation research on interactions between the visual, auditory, and vestibular systems in order to understand the multi-sensory integration involved in synthesizing sensory inputs and making the appropriate orienting responses, and (b) beginning a new program in behavioral analysis to provide techniques to analyze human performance, in situations in which large numbers of factors are changing rapidly, to help predict performance in rapidly changing environments, and to

assist in the design of workstations to provide for better man-machine interaction and improved system performance.

**PAYOFF/UTILIZATION:**

In FY90, specific accomplishments included: (a) development of a new robotic system capable of adaptive control of *multi-joint arms* and a new visual system capable of recognizing hand written numbers based on a theory of neural computing in biological systems, and (b) development of a new technique for image processing based on the functional neuroanatomy of the brain. New stereo matching algorithms are already in use to help align pairs of cameras in robotic systems for pin-point focusing on objects.



## PROGRAM ELEMENT OVERVIEW

PE: 62202F                    HUMAN SYSTEMS TECHNOLOGY  
CONGRESSIONAL CATEGORY:    HUMAN FACTORS  
DoD ORGANIZATION:         AF  
  
FUNDING:                    FY91 \$15.8M (FY92 PRESIDENT'S BUDGET)  
                              FY92 \$16.8M (FY92 PRESIDENT'S BUDGET)

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## PE SYNOPSIS:

The objective of the Science and Technology portion of this Program Element is to focus on human aspects of the man-machine interface with weapon systems.

Four key thrusts of the Science and Technology program are: (a) improvement of human performance in weapon system operations by refining crew selection, crew protection, and man-machine integration, (b) improvement of safety and protection of Air Force personnel from radiation, chemical, and mechanical forces, (c) use of our understanding of human factors to invent threats and countermeasures effective against enemy weapon system operators, and (d) development of defense measures for air base operations, casualty care and evacuation, and personal protective equipment.

New starts for FY91 include: (a) development of crew protection systems to provide a safe escape during hypervelocity flight, (b) development of improved aircrew laser eye protection, and (c) development of a methodology to determine the safe human exposure levels to chemicals, fuel, and materials used and considered for use in the Air Force operational environment.

The in-house developing organization responsible for this program is the Human Systems Division, through its two laboratories, the United States Air Force School of Aerospace Medicine (USAFSAM), and the Armstrong Aerospace Medical Research Laboratory (AAMRL).

Funding indicated includes only the MPTS portion of this Program Element.

**PAYOFF/UTILIZATION:**

The payoffs for the Manpower, Personnel, Training and Safety (MPTS) portion 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:**

Beyond FY93, plans for the Manned Weapon Systems Effectiveness Project (6893) include testing the "ideal" Camouflage, Concealment, and Deception (CC&D) pattern. For the Man-Machine Integration Technology Project (7184), plans include: (a) demonstrating Strategic Relocatable Target cockpit avionics, (b) developing a militarized helmet-mounted display connector harness, (c) demonstrating strategic force management simulation, using the SABER facility, and (d) developing an automatic sizing system for personal equipment development acquisition.

## PROJECT OVERVIEW

		91	92
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PROJECT: 06MD	HUMAN SYSTEMS DIVISION LABORATORY OPERATIONS	\$ 8.2M	\$ 9.2M
PE: 62202F	HUMAN SYSTEMS TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	HUMAN SYSTEMS DIVISION		

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PROJECT SYNOPSIS:

The objective of the Manpower, Personnel, and Training (MPT) portion of this Project is to support and complement all other Projects in this Program Element and provide for management, support and operation of the United States Air Force Human Systems Division. It provides for the pay and related costs of civilian physicians, scientists, engineers and support personnel, travel, transportation of equipment, rents, communications, utilities, laboratory supplies, unique equipment, and other related costs needed to conduct human systems technology research and exploratory development. It also funds salaries, travel, and equipment for personnel at Aeronautical Systems Division to assist in actions with the Human Systems Division.

Funding indicated includes only the MPT portion of this Project.

In FY91/92, plans include continued provision of operations support to the Project.

## PAYOFF/UTILIZATION:

The payoff of the Manpower, Personnel, and Training (MPT) portion of this Project includes the provision of resources to enable the in-house MPTS research and development activities of the Human Systems Division 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

		91	92
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PROJECT: 6893	MANNED WEAPON SYSTEMS EFFECTIVENESS	\$ 1.3M	\$ 1.3M
PE: 62202F	HUMAN SYSTEMS TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	HUMAN SYSTEMS DIVISION		

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PROJECT SYNOPSIS:

The objective of this Project is to develop mission-effective techniques to deceive the operators of enemy air-to-ground and ground-to-air systems, and to investigate the effects of vision and motion on aircrew performance.

Protect USAF resources through the development of visual camouflage, optical countermeasures and techniques to defeat infrared and radar sensors. Measurement of enemy anti-aircraft operator performance is accomplished with simulation and flight tests. Countermeasures are developed and delivered to the Tactical Air Command, and USAF Europe.

In FY91, plans include: (a) assessing a methodology to deceive infrared sensors and high-resolution detection techniques of new radar systems, and (b) testing man's capability to perform operationally oriented visual tasks while in orbit.

In FY92, plans include: (a) providing a thermally active silhouette decoy to TAC, and (b) modeling a three-dimensional dextrous hand for NASA.

## 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 FY90, specific accomplishments included: (a) determination of the effectiveness of optical countermeasures associated with F-15 and F-16 decoy flight tests, and (b) assessment of the threat from manned enemy systems to aircraft penetrating air base defenses.

## PROJECT OVERVIEW

		91	92
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PROJECT: 7184	MAN-MACHINE INTEGRATION TECHNOLOGY	\$ 6.4M	\$ 6.3M
PE: 62202F	HUMAN SYSTEMS TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	HUMAN SYSTEMS DIVISION		

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PROJECT SYNOPSIS:

The objective of this Project is to develop procedures and technologies to optimize the interface between Air Force personnel and the weapon systems they operate.

This Project will: (a) gather and analyze information about the characteristics of human operators to provide design data for system control and display development, and (b) develop methods for simulating man's interface to machines to measure the changes in weapon effectiveness as a result of changes in man-machine coupling.

In FY91, plans include: (a) developing a miniaturized helmet-mounted Cathode Ray Tube (CRT) display with full color imaging, and (b) producing a model of the human-visual display interface to assess speed and accuracy performance criteria.

In FY92, plans include: (a) integrating visual and audio display technologies as a precursor to Super Cockpit, (b) supporting the SAC Relocatable Target flight test, (c) demonstrating a man-in-loop Advanced Target Acquisition (ATAS) prototype, (d) developing a miniature color CRT for helmet-mounted display application, and (e) demonstrating a design procedure for integration of sensor displays for strategic bomber applications.

PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) design of display requirements for the first ejection-compatible tactical night vision system to improve night combat effectiveness, and (b) evaluation of the design of a strategic crew station intended to enhance information displays for crew members during combat.



## PROGRAM ELEMENT OVERVIEW

PE: 62205F PERSONNEL, TRAINING, AND SIMULATION

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

DoD ORGANIZATION: AF

FUNDING: FY91 \$30.5M (FY92 PRESIDENT'S BUDGET)  
FY92 \$30.9M (FY92 PRESIDENT'S BUDGET)

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 PE SYNOPSIS:

The objective of this Program Element is to increase operational readiness by developing technologies to: (a) enable more effective classification, assignment, training, and retention of personnel, (b) minimize the manpower and equipment necessary to conduct maintenance, and (c) increase weapons systems supportability to improve wartime logistics planning.

Research efforts for this Program Element consist of: (a) Training Development and Assessment Technology, (b) Aircrew Training Technology, (c) Logistics and Maintenance Technology, (d) Command and Control Training, and (e) Force Acquisition and Distribution Systems.

These technical programs include development and demonstration of improved: (a) quality and effectiveness of Air Force enlisted maintenance and support personnel, (b) methods and techniques for aircrew training, (c) Air Force combat and peacetime operations logistics support, (d) methods for analyzing peacetime/wartime command and control job performance and training requirements, and (e) methods to ensure that the best qualified individuals are selected, classified, and assigned.

This program also provides management and operational support for the Air Force Human Resources Laboratory, Brooks AFB, TX.

The in-house performing organization responsible for this program is the Air Force Human Resources Laboratory (AFHRL). Four laboratory divisions support

this Program Element: Training Systems Division, Operations Training Division, Logistics and Human Factors Division, and Manpower and Personnel Division.

#### PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) increased operational readiness by developing technologies to enable more effective classification, assignment, training and retention of personnel, (b) minimization of the manpower and equipment necessary to conduct maintenance, and (c) improved wartime logistics planning.

#### FUTURE DIRECTIONS:

Major thrusts for this Program Element in FY93 and beyond include continued funding of the Laboratory Support Project (J6HT) for the operation of the Air Force Human Resources Laboratory.

For the Training Development and Assessment Technology Project (1121), plans include: (a) completing a tutor technology demonstration for remediation of basic literacy skills required for job performance, (b) developing procedures for defining fundamental job skills and providing remedial instructions to offset changes in recruit qualifications, (c) developing methods to integrate training evaluation technologies into the instruction design process to provide early and ongoing training quality feedback, and (d) completing computer-based training selection methods and guidelines for use by the Air Training Command (ATC) in training acquisition.

For the Aircrew Technology Project (1123), plans include: (a) developing training system evaluation guidelines to assist in contract training or government training selection, (b) conducting a joint-Service Air-to-Air network training demonstration to evaluate joint-Service exercise value, and (c) developing Special Operations Forces (SOF) aircrew training guidelines that will aid SOF training requirements development.

For the Logistics and Maintenance Technology Project (1710), plans include: (a) developing a logistics simulation model environment for use by logistics analysts at all component levels, and (b) developing a space-based maintenance technician man-model to improve the maintainability of future space systems.

For the Command and Control Training Project (3017), plans include: (a) demonstrating high performance skills part-task trainers for AF Space Command classroom training, and (b) developing an operability testbed for integrated product development applications that allow for a wide variety of hardware/software combinations in systems development.

For the Force Acquisition and Distribution Systems Project (7719), plans include: (a) initiating OT&E for AFOQT Form Q, (b) delivering Assignment-Level Person Job Match capability to AFMPC for AF assignment system integration, (c) delivering initial neural network models for enhancing enlisted and officer force management, and (d) completing guidelines for implementation of cognitive task analysis technology in developing troubleshooting tutors.

## PROJECT OVERVIEW

		91	92
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PROJECT: 06HT-ET	LABORATORY SUPPORT	\$ 2.8M	\$ 2.8M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to fund 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.

This project supports and complements all Education and Training 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

		91	92
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PROJECT: 06HT-HF	LABORATORY SUPPORT	\$ 3.1M	\$ 3.1M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to fund the operation of the Air Force Human Resources Laboratory (AFHRL) at Brooks Air Force Base, Texas, including pay and related costs of civilian scientists, engineers, and support personnel, travel, rent, communications, maintenance, supplies and equipment.

This Project supports and complements all Human Factors 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, communications, maintenance, supplies and equipment, etc.

## PROJECT OVERVIEW

		91	92
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PROJECT: 06HT-MP	LABORATORY SUPPORT	\$ 3.9M	\$ 3.8M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to fund the operation of the Air Force Human Resources Laboratory (AFHRL) at Brooks Air Force Base, Texas, including pay and related costs of civilian scientists, engineers, and support personnel, travel, rent, communications, maintenance, supplies and equipment.

This Project supports and complements all Manpower and Personnel 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, communications, maintenance, supplies and equipment, etc.

## PROJECT OVERVIEW

		91	92
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PROJECT: 06HT-ST	LABORATORY SUPPORT	\$ 3.5M	\$ 3.4M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to fund the operation of the Air Force Human Resources Laboratory (AFHRL) at Brooks Air Force Base, Texas, including pay and related costs of civilian scientists, engineers, and support personnel, travel, rent, communications, maintenance, supplies and equipment.

This Project supports and complements all Simulation and Training Devices 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, communications, maintenance, supplies and equipment, etc.

## PROJECT OVERVIEW

		91	92
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PROJECT: 1121	TRAINING DEVELOPMENT AND ASSESSMENT TECHNOLOGY	\$ 2.7M	\$ 2.8M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) develop technology to accelerate learning, increase skill/knowledge retention, and improve job performance, (b) develop cost-effective methods for designing, delivering, and evaluating training, and (c) determine the most effective uses of computer technology for training.

The increased utilization of advanced technology, changes in the overall qualifications of the recruit pool, and budget constraints pose new challenges to the already demanding task of training Air Force recruits.

In FY91, plans include: (a) developing guidelines to assist engineering, authoring, and selecting cost-effective and training efficient courseware for computer-based training, (b) applying neural networks to train and control the student modeling component of intelligent tutors, and (c) determining the effectiveness of candidate instructional approaches in intelligent training systems to determine the most effective pedagogues.

In FY92, plans include: (a) developing methods to identify core Air Force technical training needs to guide training planning and development, (b) developing training evaluation information collection and feedback methods so the Air Training Command can assure training quality, (c) studying the application of virtual realities technology to the man-machine interface of intelligent tutoring systems, and (d) applying hypermedia to computer-based training systems to enhance their training capabilities.



PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) accelerated learning, increased skill/knowledge retention, and improved job performance, (b) development of cost-effective methods for designing, delivering, and evaluating training, and (c) determination of the most effective uses of computer technology for training.

In FY90, specific accomplishments included: (a) determining the feasibility of using neural networks to enhance intelligent tutoring system performance, (b) investigating machine learning and knowledge-based instructional planning to determine their utility for intelligent tutor development, and (c) developing performance-based methods to determine the match between current training programs and actual job requirements to improve training program development.

## PROJECT OVERVIEW

		91	92
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PROJECT: 1123	AIRCREW TRAINING TECHNOLOGY	\$ 8.0M	\$ 8.3M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) develop new methods and techniques for aircrew training, (b) investigate the entire spectrum of aircrew training to determine the best ways of designing, delivering and assessing ground-based and aircraft training, and (c) develop flight simulator component technologies to reduce the cost of future aircrew training systems and provide new capabilities for realistic combat training.

In FY91, plans include: (a) developing a model incorporating visual training effectiveness data to optimize simulator fidelity variables for aircrew training and mission rehearsal, (b) demonstrating the addition of an air component to long-distance simulator networking to demonstrate simulator interconnection for a joint maneuver training exercise, and (c) exploring methods for training cockpit attention and task management to reduce pilot overload in low altitude and other high task environments.

In FY92, plans include: (a) developing a Visual System Design handbook to guide simulator visual system requirements development, (b) developing visual display and image generator fidelity requirements to enable lower cost systems, (c) developing low-cost, unit-level training technology, (d) developing training system guidelines to assist formal school training development, and (e) developing air-to-air multiship training guidelines for curriculum development.

PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) new methods and techniques for aircrew training, (b) better ways of designing, delivery and assessing ground-based and aircraft training, (c) reduced cost of future aircrew training systems, and (d) new capabilities for realistic combat training.

In FY90, specific accomplishments included: (a) demonstration of a stand alone aircrew performance measurement system that can be added to existing training simulators, (b) completion of the development of an artificial intelligence model of pilot knowledge structures to evaluate air combat decision-making strategies and develop improved training, and (c) definition of simulator display requirements for combat training with respect to color, scene content, and field-of-view to optimize aircrew training simulator fidelity variables.

## PROJECT OVERVIEW

		91	92
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PROJECT: 1710	LOGISTICS AND MAINTENANCE TECHNOLOGY	\$ 3.0M	\$ 2.7M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) develop new technologies to improve Air Force combat and peacetime operations logistics support, (b) develop improved logistics planning and assessment models for realistic computation of wartime logistics requirements and capabilities, (c) develop methods to identify trade-offs to minimize the manpower and equipment necessary to conduct aircraft maintenance in dispersed locations, and (d) develop software tools enabling the design-in of improved reliability, maintainability, supportability, and man-machine interfaces.

In FY91, plans include: (a) developing computer-aided design tools to incorporate data on human capabilities in space into the design of new systems, and (b) developing advanced models to predict the impact of operational scenarios on combat logistics requirements.

In FY92, plans include: (a) developing a maintenance task time estimate database to minimize costs of Manpower, Personnel, and Training (MPT) during the design process, (b) developing a man-model for maintainability analysis, and (c) developing a logistics simulation object database to improve information storage, retrieval, update, and display.

## PAYOFF/UTILIZATION:

The payoffs of this Project are to develop technologies for improving the logistics support of Air Force combat units.

In FY90, specific accomplishments included: (a) development of combat-portable maintenance aids to provide capabilities for in-field training and aircraft battle damage repair estimating, and (b) development of computer-aided design graphics that allow estimation of maintainability and system operation in early design stages.

## PROJECT OVERVIEW

		91	92
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PROJECT: 3017	COMMAND AND CONTROL TRAINING	\$ 1.1M	\$ 1.4M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) develop methods for analyzing peacetime/wartime Command and Control (C2) job performance and training requirements, and (b) develop new training and evaluation methods for complex C2 decision-making and team performance.

The combat readiness of personnel assigned to man Tactical C2 systems is directly related to their ability to operate in a rapidly changing tactical environment. Inadequate emphasis on personnel training requirements and human factors considerations during the design and development phases often causes C2 system failure.

In FY91, plans include: (a) developing an artificial intelligence-based embedded training program for Tactical Air Control Center training, and (b) developing improved training methods for individual and team battle management decision-making to more efficiently conduct an air battle operation.

In FY92, plans include: (a) developing advanced human performance process models capable of replicating human behavior to expedite effective decision-making in an information-isolated environment, and (b) developing artificial intelligence-based embedded training for Modular Control Element (MCE) teams that will support logistics, tactical, and space C2 training capabilities.

PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) the development of models to define and replicate tactical battle staff decision-making skills for staff training, and (b) the development of models to predict the impact of C2 system automation on training requirements and team performance to preclude information overload/saturation.

## PROJECT OVERVIEW

		91	92
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PROJECT: 7719	FORCE ACQUISITION AND DISTRIBUTION SYSTEM	\$ 2.8M	\$ 3.1M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to provide methods to ensure that the best qualified individuals are selected, classified, and assigned through the development of personnel qualification and aptitude measurement methods, job specification standards, and manpower and personnel models.

In FY91, plans include: (a) delivering pilot selection models to improve trainee quality, (b) delivering a pilot classification model to improve bomber/fighter and tanker/transport classification decisions, and (c) delivering second generation cognitive task analysis methods that specify unobservable problem-solving skills required in troubleshooting tasks.

In FY92, plans include: (a) completing a new enlisted occupational structure composite, (b) beginning development of advanced transferability skills models for Manpower, Personnel, and Training (MPT) application, (c) delivering optimal personnel retraining decision guidelines, and (d) delivering the Processing and Classification of Enlistees-Person Job Match (PACE-PJM) System to the Air Training Command (ATC) for optimal classification of trainees to jobs.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) development and field testing the Leadership Effectiveness Assessment Profile (LEAP) to enable selection and classification based on AF leadership potential, (b) completion of a



model to estimate the supply of civilians interested in and qualified for military service, and (c) development of top-level cognitive analysis methods for Basic Job Skills (BJS) to determine skill commonalities across jobs for job family tutor development.

PROGRAM ELEMENT OVERVIEW

PE: 63106F LOGISTICS SYSTEMS TECHNOLOGY  
CONGRESSIONAL CATEGORY: HUMAN FACTORS  
DoD ORGANIZATION: AF  
FUNDING: FY91 \$11.8M (FY92 PRESIDENT'S BUDGET)  
FY92 \$14.8M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to serve as the primary technology development effort in support of the DoD Computer-Aided Acquisition and Logistics Support (CALs) initiative. CALs will replace the current paper-based technical information system with efficient and easily updated electronic data management.

This Program Element will: (a) improve the way maintenance considerations are designed into weapons systems, (b) make engineering and maintenance data electronically available throughout the lifetime of weapons systems, (c) allow faster determination of the best balance of conflicting manufacturing and performance requirements for more reliable and supportable weapons systems, (d) provide more realistic computer-based logistics planning and combat capability assessment models, and (e) develop portable maintenance electronic job aids.

This Program Element provides critical support and enabling technology to the Air Force Logistics Command (AFLC) in the area of logistics systems technology applications to Air Logistics Centers (ALCs) and was identified by the AFLC Commander as a Program Element having "...the greatest potential in the immediate and near term time period."

The in-house organization responsible for this program is the Air Force Human Resources Laboratory, Logistics and Human Factors Division.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include Computer-Aided Acquisition and Logistics Support (CALS) systems and technologies that will: (a) ensure that weapon systems will perform as well in wartime as they do in peacetime, (b) prevent costly manufacturing rework and design flaws through better initial design, and (c) save hundreds of millions of dollars through the application of Integrated Maintenance Information System (IMIS) technologies.

FUTURE DIRECTIONS:

Beyond FY92, plans for this Program Element include: (a) developing test materials and criteria, and obtaining and coordinating facilities and manpower required to conduct an FY94 test of wartime impacts on Project 2950 technologies, (b) delivering integrated data exchange and control methods for the test within ALCs, and (c) conducting a base-level field test on the F-16 demonstrating and validating IMIS technology.

## PROJECT OVERVIEW

		91	92
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PROJECT: 2745	LOGISTICS FOR COMBAT READINESS MAINTENANCE	\$ 0.2M	\$ 0.6M
PE: 63106F	LOGISTICS SYSTEMS TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	Ar		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to develop computer models to predict requirements for people, spare parts, maintenance skills, and repair activity associated with deployment, battle damage, and wartime use of weapon systems.

In FY91/92, plans include initiating and continuing planning activities for a fully integrated test of the wartime capabilities of Project 2950 technologies.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included in-house support and planning.

## PROJECT OVERVIEW

		91	92
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PROJECT: 2940	COMPUTER TECHNOLOGY FOR SYSTEMS DESIGN	\$ 4.8M	\$ 6.9M
PE: 63106F	LOGISTICS SYSTEMS TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objectives of this Project are to develop new computer-based technologies that will enable design, procurement, repair, and modification of more supportable and affordable weapon systems and allow integration of design trade-off decisions involving operability, survivability, producibility, and supportability.

This is an Advanced Technology Transition Demonstration (ATTD) project.

In FY91, plans include: (a) expanding Air Logistic Center (ALC) access to technical databases and digitized design tools through a follow-on Oklahoma City, OK ALC demonstration, (b) demonstrating software for reliability and maintainability in mechanical (joint with Army), electrical, and structural design, and (c) demonstrating software tools to capture and trace user system requirements in design, resulting in affordable weapons systems that meet users requirements.

In FY92, plans include: (a) extending and demonstrating an anthropometric model of maintenance technicians to include assessment of task times, consideration of human factors design constraints, and integrated maintenance task activities, (b) delivering integrated data exchange and control methods for test within ALCs, and (c) developing better and lower cost methods to model the digital and paper-based information essential to weapons systems design and operation, allowing paperless system support.

## PAYOFF/UTILIZATION:

The payoffs of this Project include a 50-to-1 return on investment by preventing costly manufacturing rework and design flaws through better initial design, fifty percent reductions in retrofit costs for modifications, and large reductions in ALC support costs. In FY90, specific accomplishments included completing a successful joint technology demonstration with Program Element #0708011F, Manufacturing Technology (ManTech) at the OC-ALC of computer data control and exchange methodology.

## PROJECT OVERVIEW

		91	92
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PROJECT: 2950	INTEGRATED MAINTENANCE INFORMATION SYSTEM (IMIS)	\$ 7.0M	\$ 7.4M
PE: 63106F	LOGISTICS SYSTEMS TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to develop technology to digitally display instructions and fault diagnosis to flight line maintenance technicians, allowing replacement of the paper-based Technical Order system with a digital system.

The Integrated Maintenance Information System (IMIS) will link all technical order, diagnostic (including built-in weapon system tests), training, supply, and management information required by maintenance technicians to significantly increase combat maintenance and support.

This Advanced Technology Transition Demonstration (ATTD) project, IMIS, is coordinated with all three Services. Technologies demonstrated could be applied to many systems such as the F-16, F/A-18, B-2, Advanced Tactical Fighter (ATF), and A-12 aircraft.

In FY91, plans include: (a) conducting a joint Navy/Air Force base-level test on an F/A-18 of fully integrated diagnostics that are stored in a neutral, open-architecture database called Type C data, and (b) providing refined draft specifications for a procurement of Type C data to the ATF, Air Force Logistics Command (AFLC), other DoD agencies, and industry.

In FY92, plans include: (a) building the required hardware and software for an IMIS technology demonstration, (b) demonstrating IMIS technology applied to aircraft battle damage assessment and repair, and (c) conducting an

analysis to determine the payoff of IMIS for on-the-job training of maintenance technicians.

**PAYOFF/UTILIZATION:**

The payoff of this Project is an IMIS technology that digitally displays instructions and fault diagnosis to flight line maintenance technicians.

Estimated savings from the application of IMIS technologies are in the hundreds of millions of dollars for both operational commands and depot maintenance organizations.

In FY90, specific accomplishments included: (a) conducting a successful field test on an F-16 of integrated maintenance diagnostics using an in-house developed portable computer incorporating an electronic connection to the aircraft built-in-test, (b) provision to the ATF System Program Office (SPO) the draft DoD specifications for fully integrated digital technical information in a neutral, open architecture, and (c) completing a detailed description of IMIS user requirements.



## PROGRAM ELEMENT OVERVIEW

PE: 63227F PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY

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

DoD ORGANIZATION: AF

FUNDING: FY91 \$ 8.2M (FY92 PRESIDENT'S BUDGET)  
FY92 \$ 9.6M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to develop and demonstrate: (a) computer-based training, authoring, and delivery systems, (b) decision-aiding systems to optimize personnel use, (c) job performance measurement technologies, (d) analytical tools to improve consideration of manpower, personnel and training in the system design process and technologies to enable realistic, small or large scale aircrew combat training.

The in-house developing organization responsible for this program is the Air Force Human Resources Laboratory (AFHRL), and the following divisions of AFHRL: Manpower and Personnel Division and the Training Systems Division.

## 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.

## FUTURE DIRECTIONS:

Beyond FY92, plans for the Multi-Ship Training Research and Development Project (2743) include: (a) validating simulator-based air-to-ground training

technology, (b) developing air-to-ground simulation training guidelines to assist in requirements definition, (c) demonstrating networked trainers at the squadron level, (d) conducting operational evaluation of multiship air-to-ground simulation, and (e) demonstrating the low-cost color Liquid Crystal Display (LCD) helmet-coupled with the combat engagement trainer to produce a small, low-cost, high fidelity simulator for squadron-level training.

Plans for the Manpower and Force Management Project (2922) include: (a) integrating new and existing Manpower, Personnel and Training (MPT) tools, (b) developing an occupational analysis system for the USAF Occupational Measurement Center (USAFOMC), and (c) developing a productive capacity model for linking enlistment standards to job performance for AFMPC.

Plans for the Advanced Training Technologies Project (2949) include: (a) completing the evaluation of the Avionics Job Family Tutor, (b) initiating an evaluation of the Mechanical Job Family Tutor, (c) completing development of the Rapid Intelligent Tutoring Systems Development System, and (d) initiating a field demonstration, test, and evaluation of the Rapid Intelligent Tutoring Systems Development System.

## PROJECT OVERVIEW

		91	92
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PROJECT: 2743	TACTICAL MULTI-SHIP AIRCREW TRAINING RESEARCH	\$ 4.5M	\$ 5.8M
PE: 63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to develop, demonstrate, and evaluate simulator-based air combat training as an affordable, effective, and realistic adjunct to flight-based training.

This Project provides a testbed for examining aircrew skills, cognitive functions, behaviors, and instructional strategies that contribute to success in combat. Different levels of simulator fidelity will provide data to determine the most cost-effective levels for combat training. Long distance networking will enable joint-Service/combined arms training.

In FY91, plans include: (a) enhancing image resolution of the Fiber Optic Helmet-Mounted Display (FOHMD) to provide a high fidelity visual system for air-to-ground training, (b) demonstrating low-cost Helmet-Mounted Display (HMD) technology for application to squadron-level training, and (c) validating the full-field-of-view dome training technology.

In FY92, plans include: (a) demonstrating low-cost color Liquid Crystal Display (LCD) HMD technology for squadron-level training, (b) demonstrating eye tracking technology that can be retrofitted to existing simulators to provide high fidelity visual systems for air-to-ground training, (c) conducting an evaluation of multiship air-to-air simulation, and (d) demonstrating networked combat engagement trainers for low-cost, high fidelity air-to-air training.

PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) demonstration of long distance networking of air-intercept trainers for multiship, squadron-level, part-task training, (b) installation of a prototype full-field-of-view dome display system to increase visual system fidelity, and (c) evaluation of an eye-tracked system for the FOHMD to provide increased resolution.

## PROJECT OVERVIEW

		91	92
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PROJECT: 2922	MANPOWER AND FORCE MANAGEMENT	\$ 1.4M	\$ 1.8M
PE: 63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to develop technology and methods to enhance the consideration of Manpower, Personnel, and Training (MPT) early in the weapon system design and acquisition process to ensure these MPT requirements are supportable and affordable, and to enable trade-offs to accommodate MPT limitations and costs.

As mandated by Congress, cost-effective methodologies for task-level measurement of on-the-job performance will be developed to enable validation of enlistment selection and classification standards, and will relate those standards to job requirements. This Project will develop tools and methods to enhance the consideration of manpower, personnel, and training factors early in the system design and acquisition process.

In FY91, plans include: (a) determining and evaluating the Air Force enlisted classification structure, (b) developing and evaluating predictors of on-the-job performance as related to Air Force enlistment standards, and (c) developing guidelines and specifications for operational development of job performance measurement systems.

In FY92, plans include: (a) developing automated maintenance training, (b) completing Phase III of the Leadership Effectiveness Assessment Profile (LEAP): validation and analysis, and (c) establishing linkage of manpower, personnel and training (MPT) databases.

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.

In FY90, specific accomplishments included: (a) initiating development of automated procedures for clustering tasks into efficient jobs or training modules, (b) demonstrating the effectiveness of biographical data to augment current selection and classification measures, and (c) completing a front-ended analysis for the integrated MPT Analysis system.

## PROJECT OVERVIEW

		91	92
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PROJECT: 2949	ADVANCED TRAINING TECHNOLOGIES	\$ 2.4M	\$ 2.1M
PE: 63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objectives of this Project include: (a) development of computer-based training systems, (b) development of guidelines and specifications for the most cost-effective and efficient application to Air Force (AF) training environments, and (c) development and demonstration of software to enable AF training developers to rapidly and inexpensively build Intelligent Computer-Assisted Training (ICAT) systems which continually evaluate and interact with the student to deliver more individualized and effective training.

Modern high technology systems have relieved the human from performing many of the routine diagnostic and repair tasks, making it difficult to obtain necessary job experience for growth from novice to expert. Computer-based training systems developed by this Project will replace that lost experience.

In FY91, plans include: (a) determining hardware and software requirements for cost-effective and user-friendly ICAT development, (b) determining which instructional strategies provide the best training in ICAT applications, (c) demonstrating microcomputer authoring techniques for rapid development of intelligent tutors, and (d) initiating development of the Mechanical Job Family Tutor.

In FY92, plans include: (a) introducing the first version of the Rapid Intelligent Tutoring System (ITS) Development Systems (RIDES) software, (b) beginning evaluation of the Avionics Job Family Tutor, (c) beginning an in-house evaluation of RIDES, and (d) expanding the initial Mechanical Job Family Tutor.

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.

In FY90, specific accomplishments included: (a) initiation of development of automated procedures for clustering tasks into efficient job or training modules, (b) demonstration of the effectiveness of biographical data to augment current selection and classification measures, and (c) completion of a front-ended analysis for the integrated MPT Analysis System.



## PROGRAM ELEMENT OVERVIEW

PE: 63231F                    CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY  
CONGRESSIONAL CATEGORY:    HUMAN FACTORS  
DoD ORGANIZATION:           AF  
  
FUNDING:                    FY91 \$10.0M (FY92 PRESIDENT'S BUDGET)  
                              FY92 \$10.0M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to conduct advanced development of concepts, components, and systems to protect and extend the performance of Air Force personnel in hazardous wartime environments.

The program applies primarily to aircrews, but some applications extend to groundcrews conducting flightline operations. Goals include improving combat effectiveness and the protective features of air and groundcrew life support equipment by considering human factors in the design process of cockpits and life support equipment. All demonstrated concepts in this Program Element will feed into full-scale development programs to address fifteen documented needs from USAF commands which require specific warfighting capabilities.

Manpower, Personnel, and Training (MPT) research efforts for this Program Element consist of: (a) Crew-Centered Cockpit Design (2829), (b) Space Crew Enhancement (SPACE) (2992), and (c) Helmet-Mounted Systems Technology (3257).

The in-house organization responsible for this program is the Human Systems Division, Deputy Commander, Development and Acquisition (HSD/YA), with assistance from its laboratories, the United States Air Force School of Aerospace Medicine (USAFSAM), the Air Force Human Resources Laboratory (AFHRL) and the Armstrong Aerospace Medical Research Laboratory (AAMRL); and through memoranda of agreement with other laboratories, divisions and commands, Services and agencies.

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include advances in concepts, components, and systems to protect Air Force personnel in hazardous wartime environments.

## FUTURE DIRECTIONS:

Beyond FY92, plans for the Crew-Centered Cockpit Design Project (2829) of this Program Element include: (a) continuing validation and transition of the crew-centered design process, (b) beginning a test of inflight workload measurement hardware, and (c) hosting human performance databases in a Defense Logistics Agency information center. For the Space Crew Enhancement (SPACE) Project (2992): (a) continuing development of transatmospheric crew protection, (b) transitioning the telescope for SpaceCom operational experiments, and (c) continued development of the interface specification. For the Helmet-Mounted Systems Technology Project (3257): (a) beginning bench testing of the Helmet-Mounted Display/Sight (HMD/S) concepts and down select to one concept, and (b) completing the test documentation and Class II modification review.

## PROJECT OVERVIEW

		91	92
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PROJECT: 2829	CREW-CENTERED COCKPIT DESIGN	\$ 4.2M	\$ 4.3M
PE: 63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	HUMAN SYSTEMS DIVISION		

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PROJECT SYNOPSIS:

The objective of this Project is to develop a traceable crew system design and development process along with computer analysis, design, and test of software tools.

This Project: (a) integrates systems and human factors engineering principles early in the acquisition cycle for manned aerospace vehicles, and (b) predicts pilot performance and mission success as functions of automation as referenced to a well-understood baseline weapon system to quantify human/system trade-offs.

This work supports an Air Force Studies Board evaluation of automation in combat aircraft and an AF/CC letter on instrument flying standardization.

In FY91, plans include: (a) establishing a validation program for a crew-centered design process and perform field demonstrations, (b) transitioning validated Computer-Aided Engineering/Computer-Aided Design (CAE/CAD) tools to an information center, and (c) completing a test and demonstration of the rapid prototyping fixture.

In FY92, plans include: (a) continuing validation of processes and building databases and design guides, (b) beginning the development of performance/workload evaluation, and (c) demonstrating the process and tools on modifications to transport aircraft.

**PAYOFF/UTILIZATION:**

In FY90, specific accomplishments included integrating a breadboard cockpit simulator as the rapid prototyping test article for real-time cockpit evaluation.

## PROJECT OVERVIEW

		91	92
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PROJECT: 2992	SPACE CREW ENHANCEMENT (SPACE)	\$ 1.3M	\$ 0.9M
PE: 63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AEROSPACE MEDICAL LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to develop specialized crew protection and man-machine integration needed to support possible military missions from space.

The goal is to develop the database required to identify possible mission scenarios, crew capabilities, and crew requirements.

This work is a result of Secretary of the Air Force (SAF) direction and supports a DoD program.

In FY91, plans include: (a) identifying crew station design criteria and advanced technologies for manned military space systems, and (b) initiating development on ensemble subsystems (gloves and joints) for transatmospheric missions.

In FY92, plans include: (a) initiating studies to quantify human performance requirements for improved systems operation in a space asset interface, and (b) developing and starting ground tests of a stabilized shuttle telescope.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included an integrated telescope for shuttle flight test via the Space Test Program (Number 1 secondary payload).

## PROJECT OVERVIEW

		91	92
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PROJECT: 3257	HELMET-MOUNTED SYSTEMS TECHNOLOGY	\$ 4.7M	\$ 4.8M
PE: 63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	HUMAN SYSTEMS DIVISION		

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PROJECT SYNOPSIS:

The objective of this Project is to develop helmet-mounted systems technology for aircraft cockpits to significantly improve pilot situational awareness.

Helmet-mounted displays are sight and sound projections to help the pilot interact with the world in a natural, intuitive manner regardless of visibility beyond the cockpit. One specific goal is to develop an all-aspect, fire control system which will allow the pilot, by turning his head, to utilize the full off-axis/stand-off capability of air-to-air and air-to-surface weapons. This work supports a Tactical Air Force (TAF) requirement for an A-16 head-steered Forward-Looking Infrared (FLIR) and a Strategic Air Command (SAC) requirement for improved night vision goggles.

In FY91 plans include: (a) completing the flight demonstration of the integrated Helmet-Mounted Display/Sight (HMD/S) system, and (b) beginning development of an air-to-surface, binocular helmet-mounted display and an auditory display.

In FY92 plans include: (a) continuing development of integrated HMD/S for day and night operations, and (b) providing the critical design on two competitive HMD/S concepts.

PAYOFF/UTILIZATION:

The payoff of this Project is the development of helmet-mounted systems technology which will significantly improve pilot situational awareness.

In FY90, specific accomplishments included completion of concept evaluation of the integrated night vision goggle and HMD/S.

## PROGRAM ELEMENT OVERVIEW

PE: 64227F                    TRAINING SYSTEMS DEVELOPMENT

CONGRESSIONAL CATEGORY:    SIMULATION & TRAINING DEVICES  
                                 EDUCATION & TRAINING

DoD ORGANIZATION:            AF

FUNDING:                      FY91 \$41.3M (FY92 PRESIDENT'S BUDGET)  
                                 FY92 \$52.2M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objectives are to adapt simulation technology and standards developed in the laboratories and industry to satisfy training requirements, and to develop prototype training devices. This is a continuing Program Element for the development of aircrew and maintenance training techniques and devices.

The in-house developing organization responsible for this program is the Training Systems System Program Office (SPO): Aeronautical Systems Division (ASD), the Advanced Training Systems SPO, and the Deputy for Acquisition Logistics.

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) adapting flight simulation technology to today's training requirements, (b) transition of laboratory simulator developments into acquisition requirements, (c) improved supportability and effectiveness through simulator update development and simulator requirements definition, (d) development of a standard DoD Simulator Database and Common Transformation Program in order to minimize database redundancy among the Services and maximize database interoperability, (e) development of aircrew training devices for all B-1B crew members, (f) development of a Military Standard (MIL-STD) for flight simulator software modules to increase efficiency and simplify updating, (g) development of the Advanced Training System which will free instructors for individualized instruction, promote efficient training methods, and provide rapid course creation and updating, (h) provision of initial and continuation training for C-17 aircrew members, (i) development of the C-141 Aircrew Training System (ATS) for ground and flight simulation aircrew training programs, (j)



development of training courses for personnel who are involved in identifying requirements and constraints for new acquisitions or modifications, (k) development of the ground-based training portion of the Joint Primary Aircraft Training System (JPATS), and (k) replacement of outdated simulation devices that support Electronic Warfare Officer Training with the Simulator for Electronic Combat Training (SECT).

#### FUTURE DIRECTIONS:

Beyond FY92, efforts under this Program Element for the Simulator Development Activities Project (2325), will include: (a) completing work on the standard DoD universal threat simulator and (b) completing the visual system effectiveness study. For the Simulator Update Development/Simulator Requirements Definition Project (2769), (a) completing the European Low Altitude Training System (ELATS) demonstration/validation, (a) completing the Joint Combat Training System (JCATS) demonstration/validation, and (c) beginning work to incorporate mission rehearsal into existing training systems. For the Standard DoD Simulator Database/Common Transformation Program (3851), include completing the interface for generation capability. For the B-1B Weapon System Trainer Project (2901), (a) delivering the Block 4.5 Merge 3 update and (b) incorporating the defense stations update. For the Modular Simulator Design Project (2968), (a) developing a propulsion module, and (b) developing radar modules.

Plans for the Advanced Training System Project (3135), will include: (a) beginning development of the Schedule/Management Module and (b) completing the system test and evaluation. For the C-17 Aircrew Training System Project (3282), include developing and incorporating all outstanding (aircraft driven) training change requirements. For the C-141 Aircrew Training System Project (3772), (a) beginning training validation, and (b) continuing production. For the Manpower, Personnel and Training (MPT) Project (3775), (a) conducting MPT courses and seminars, (b) continue front-end analysis work, and (c) continuing work on analysis models and tools. For the Joint Primary Aircraft Training System (JPATS) Project (4033), (a) building the Request for Proposal (RFP) and (b) conducting source selection. For the Simulator for Electronic Combat Training (SECT) Project (4022), (a) delivering the system to Beale AFB and (b) completing acceptance testing.

## PROJECT OVERVIEW

		91	92
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PROJECT: 2325	SIMULATOR DEVELOPMENT ACTIVITIES	\$ 3.5M	\$ 3.5M
PE: 64227F	TRAINING SYSTEMS DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) provide funds to conduct engineering development of new aircrew/maintenance training technologies and standards, (b) fund the pre-production of first article training devices to satisfy the customer's training requirements, (c) identify and correct deficiencies in current training capabilities, and (c) develop tools that improve aircraft/simulator concurrence and reduce system life cycle costs. This continuing Project transitions laboratory developments into acquisition requirements.

In FY91, plans include: (a) determining flight simulator motion requirements and developing algorithms for the simulator drive mechanism, (b) completing development of the motion/force cuing module, (c) completing full field-of-view dome training effectiveness research tool development.

In FY92, plans include: (a) beginning a second generation, low-cost, lightweight helmet-coupled image generation and protection device, (b) beginning design of the Universal Threat Simulator System, and (c) continuing the training effectiveness study of visual systems.

## PAYOFF/UTILIZATION:

The payoffs of this Project include improved training capabilities through the development of tools that improve aircraft and simulator concurrency and reduce system life cycle costs.

In FY90, specific accomplishments included: (a) the conducting of the Front-End-Analysis (FEA) for the Universal Threat Simulator System, (b) the conducting of the FEA for the European Low Altitude Training System, (c) development of a standard format for technical and aircraft performance data for use in simulator development, and (d) identification of maintenance training requirements for selected systems.

## PROJECT OVERVIEW

		91	92
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PROJECT: 2769	SIMULATOR UPDATE DEVELOPMENT/SIMULATOR REQUIREMENTS DEFINITION	\$ 1.6M	\$ 3.4M
PE: 64227F	TRAINING SYSTEMS DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is to develop updates to training systems to maintain and improve their supportability and effectiveness.

Updates to these systems include courseware development for a C-130 Aircrew Training System (ATS). After the completion of the C-130 ATS in FY90, this Project will be used to: (a) define requirements for new training systems in the form of tasks to be trained (this supports a Milestone 0 decision), (b) develop options to meet the requirements (this supports a Milestone 1 decision), and (c) build a prototype of one or more of the options to evaluate the training effectiveness of those options.

In FY91, plans include: (a) conducting Joint Combat Training System (JCATS) training requirements analysis, and (b) developing and evaluating prototypes for the European Low Altitude Training System (ELATS).

In FY92, plans include: (a) completing ELATS analysis, (b) beginning development of ELATS, and (c) beginning development of JCATS.

## PAYOFF/UTILIZATION:

The payoffs of this Project include improved supportability and effectiveness of flight simulators.

In FY90, specific accomplishments included: (a) the conducting of the C-130 ATS summative evaluation, and (b) completion of the C-130 ATS readiness review (Aug 90).

## PROJECT OVERVIEW

		91	92
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PROJECT: 2851	STANDARD DOD SIMULATOR DATA BASE/Common Transformation Program	\$ 2.0M	\$ 3.5M
PE: 64227F	TRAINING SYSTEMS DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this joint-Service Project, conducted under the Joint Logistic Commanders, is to develop a standard DoD digital database library, enhancement and exchange standards, and a distribution system. This minimizes database redundancy among the Services and maximizes database interoperability. This Project is a critical element of the development of the Special Operations Force Aircrew Training and Mission Rehearsal System. This Project will also allow C-17 and C-141 Training Systems to share a common visual database.

In FY91, plans include: (a) completing rapid database generation capability, and (b) completing acceptance testing of the development system.

In FY92, plans include: (a) testing and accepting turn-key production capability, and (b) completing rapid database generation capability.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) minimized database redundancy among the Services, and (b) maximized database interoperability.

In FY90, specific accomplishments included: (a) completion of acceptance testing of the development system, (b) the beginning of interim production and exercise validation work, and (c) addition of rapid database generation capability to the system.

## PROJECT OVERVIEW

		91	92
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PROJECT: 2901	B-1B WEAPON SYSTEM TRAINER	\$ 3.4M	\$ 5.6M
PE: 64227F	TRAINING SYSTEMS DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is to develop aircrew training devices for all B-1B crew members to include mission rehearsal, takeoff and landing, navigation, air refueling, threat analysis/countermeasures, low-level penetration, weapons delivery, and emergency procedures.

In FY91, plans include: (a) delivering the final two Weapon System Trainers (WSTs) and two Mission Trainers (MTs), (b) developing aircraft generated modifications to trainers, and (c) delivering Version 3 software for the WSTs.

In FY 92, plans include: (a) completing testing on Version 3 software for WSTs, and (b) developing the Block 4.5 Merge 3 update.

## PAYOFF/UTILIZATION:

The payoff of this Project includes the development of training devices to meet the training needs of all B-1B crew members.

In FY90, specific accomplishments included: (a) the delivering of the updated instrument landing system and aerodynamics package for the Cockpit Procedures Trainer (CPT), and (b) the delivering of three WSTs.

## PROJECT OVERVIEW

		91	92
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PROJECT: 2968	MODULAR SIMULATOR DESIGN	\$ 1.0M	\$ 2.5M
PE: 64227F	TRAINING SYSTEMS DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is to develop a Military Standard (MIL-STD) for flight simulator software modules.

Standardizing the functions of each simulator module and its interfaces to all other modules (in the Ada programming language) will: (a) allow reuse of software from one simulator to the next, and (b) simplify the job of updating module software to maintain simulator concurrence with aircraft.

In FY91, plans include: (a) demonstrating the modular simulator architecture concept and validating it on the testbed simulator, and (b) publishing the modular standard and incorporate it in the testbed simulator and future acquisitions.

In FY92, plans include: (a) demonstrating network exercise capability, and (b) incorporating the DoD standard database into visual modules.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) the conducting of a Critical Design Review (CDR), (b) completion of a draft military standard for modular simulators, and (c) development of modular simulator software.



## PROJECT OVERVIEW

		91	92
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PROJECT: 3135	ADVANCED TRAINING SYSTEM (ATS)	\$ 8.3M	\$ 7.0M
PE: 64227F	TRAINING SYSTEMS DEVELOPMENT		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) free instructors for individualized instruction in complex, highly technical tasks, (b) promote efficient training methods, and (c) provide rapid course creation and updating.

Changes to the Air Force training environment have resulted in an increased training workload at the Air Training Command (ATC) Technical Training Centers. Increasing equipment complexity, together with greater student instructional needs, combine to heavily tax ATC's instructor resources. The manual ATC system is becoming increasingly inefficient and inflexible. The Advanced Training System (ATS) will support all the major functions in the Technical Training arena, e.g., instructional development, delivery, evaluation, and resource management.

In FY91, plans include performing a Critical Design Review (CDR) for the system architecture, courseware, and evaluation modules.

In FY92, plans include: (a) beginning development of courseware and evaluation modules, (b) performing a CDR for the Schedule/Management modules, and (c) starting the test and evaluation of the courseware and evaluation module.

**PAYOFF/UTILIZATION:**

In FY90, specific accomplishments included: (a) completion of the ATS Preliminary Design Review (PDR), (b) completion of the Software Specification Review, and (c) the updating of the life cycle cost estimate and cost/benefit analysis.

## PROJECT OVERVIEW

		91	92
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PROJECT: 3282	C-17 AIRCREW TRAINING SYSTEM (ATS)	\$ 8.2M	\$ 3.3M
PE: 64227F	TRAINING SYSTEMS DEVELOPMENT		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is to provide the initial and continuation training for C-17 aircrew members.

Training will be totally contractor administered and supported with the Military Airlift Command (MAC) evaluating the final product - a fully qualified aircrew member. The training system will be developed concurrently with the aircraft development and production efforts, allowing the first Main Operating Base (MOB) to be available for training at the initial squadron.

In FY91, plans include: (a) conducting the Critical Design Review (CDR), (b) beginning fabrication of training devices, and (c) continuing courseware development.

In FY92, plans include: (a) conducting the training readiness review at Charleston Air Force Base (AFB), (b) completing courseware development, (c) training initial squadron crews at Charleston AFB, and (d) continuing fabrication of training devices for Altus AFB.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) conducting the Preliminary Design Review (PDR), and (b) beginning the development of courseware.

## PROJECT OVERVIEW

		91	92
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PROJECT: 3772	C-141 AIRCREW TRAINING SYSTEM (ATS)	\$13.1M	\$ 4.0M
PE: 64227F	TRAINING SYSTEMS DEVELOPMENT		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is a totally contracted effort for the ground and flight simulation aircrew training programs, including initial qualification, upgrade and continuation training, for all HQ MAC (Headquarters, Military Airlift Command), HQ AFRES (Headquarters, Air Force Reserves), and ANG (Air National Guard) C-141 primary crew members. The system will also include the Basic Flight Engineer School at Altus AFB.

The contractor will also provide for the logistics support of all Aircrew Training System (ATS) associated training equipment, and operate a training management system to track student progress, update the training programs, and interface with the Air Force Operations Resource Management System. The ATS will include both active and Air Reserve Component C-141 operating locations.

In FY91, plans include: (a) beginning course readiness reviews, (b) delivering prototype training equipment, and (c) conducting training validation.

In FY92, plans include: (a) completing formal school development, (b) delivering computer-based training, and (c) beginning simulator production.

**PAYOFF/UTILIZATION:**

The payoff of this Project includes the development of training courses for both ground and flight crews, and a training management system to track student progress.

In FY90, specific accomplishments included: (a) the conducting of the Training System Review, (b) the beginning of courseware development, and (c) negotiation of a visual system engineering change proposal.

## PROJECT OVERVIEW

		91	92
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PROJECT: 3775	MANPOWER, PERSONNEL, AND TRAINING (MPT)	\$ 0.5M	\$ 0.8M
PE: 64227F	TRAINING SYSTEMS DEVELOPMENT		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is to develop training courses for personnel who are involved in identifying requirements and constraints for new acquisitions or modifications.

This Project sponsors research and development of Manpower, Personnel and Training (MPT) tools, models, and databases. It mandates early analysis and integration of human factors in system design and engineering, and emphasizes the most effective and efficient use of personnel to lower life-cycle costs.

In FY91, plans include: (a) developing a System Integration Specialist Course, (b) conducting front-end analysis/requirement identification, (c) developing an MPT integrated database, and (d) updating training courses.

In FY92, plans include: (a) completing development of the System Integration Specialist Course, (b) continuing front-end analysis/requirement identification, (c) completing the MPT integrated database, and (d) developing analysis models and tools.

## PAYOFF/UTILIZATION:

In FY90, specific accomplishments included: (a) development of the Senior Executive Seminar, (b) development of the Planning Team Handbook, (c) development of the Familiarization Course, and (d) the beginning of an MPT requirements identification process.

## PROJECT OVERVIEW

		91	92
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PROJECT: 4022	SIMULATOR FOR ELECTRONIC COMBAT TRAINING (SECT)	\$ 0.2M	\$17.8M
PE: 64227F	TRAINING SYSTEMS DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is to train United States Air Force (USAF), Canadian, and other allied officers in basic threat recognition and associated electronic combat procedures in a simulated airborne environment.

The Simulator for Electronic Combat Training (SECT) will replace outdated simulation devices that support Electronic Warfare Officer Training. This training is possible only with simulation due to environment, security, and range restrictions.

This Project is a new start in FY91.

In FY91, plans include: (a) completing a training requirements analysis, and (b) releasing the Request for Proposal (RFP).

In FY92, plans include: (a) awarding the contract, and (b) completing the Preliminary Design Review (PDR).

## PAYOFF/UTILIZATION:

The payoffs for this Project include provision of Electronic Warfare Officer Training using simulation in order to compensate for environment, security, and range restrictions.

## PROJECT OVERVIEW

		91	92
		-----	-----
PROJECT: 4033	JOINT PRIMARY AIRCRAFT TRAINING SYSTEM (JPATS)	\$ 0.1M	\$ 1.4M
PE: 64227F	TRAINING SYSTEMS DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is to provide the ground-based training portion of the Joint Primary Aircraft Training System (JPATS).

Pilot training is being modified from the current single-track system into a more specialized system. To do this, training will consist of a single track primary phase and a dual track advanced phase. The primary phase is the JPATS. This Project represents the ground-based training portion of the system.

This Project is a new start in FY92.

In FY92, plans include: (a) conducting a front end requirements analysis study, and (b) establishing the System Management Office.

## PAYOFF/UTILIZATION:

The payoff for this Project is to provide the Navy and the Air Force with the ground-based training portion of a jointly-acquired, integrated training system using similar hardware with like capabilities.



## PROGRAM ELEMENT OVERVIEW

PE: 64243F                      MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT

CONGRESSIONAL CATEGORY:      MANPOWER & PERSONNEL  
   EDUCATION & TRAINING  
   HUMAN FACTORS

DoD ORGANIZATION:              AF

FUNDING:                          FY91 \$ 3.5M (FY92 PRESIDENT'S BUDGET)  
   FY92 \$ 3.6M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to provide engineering development to Manpower, Personnel, and Training (MPT) technologies to improve the effectiveness of AF training development/delivery, performance assessment, personnel acquisition, job assignment, force management, and human performance in weapon systems.

A new effort, Manpower, Personnel and Training Integration, Project 3818 begins in FY92. This Project develops a better capability for incorporating MPT considerations into weapons system acquisition.

The in-house developing organization responsible for this program is the Human Systems Division.

## PAYOFF/UTILIZATION:

The payoffs anticipated from this Program Element include improved effectiveness of AF training development/delivery, performance assessment, personnel acquisition, job assignment, force management, and human performance in weapons systems.

FUTURE DIRECTIONS:

Beyond FY92, plans for this Program Element include: (a) beginning of production and fielding of an AF enlisted system, (b) continuing full-scale development of the Maintenance Skill Tutors, (c) evaluating alternative design concepts of a Manpower, Personnel, Training, and Safety (MPTS) system in terms of cost and effectiveness, and (d) developing specifications for full-scale development.

## PROJECT OVERVIEW

		91	92
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PROJECT: 3816	PILOT SELECTION AND CLASSIFICATION SYSTEM (PSACS)	\$ 2.8M	\$ 0.3M
PE: 64243F	MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	HUMAN SYSTEMS DIVISION		

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PROJECT SYNOPSIS:

The objective of this Project is to support the Air Training Command's (ATC) Specialized Undergraduate Pilot Training (SUPT) by developing and producing a specialized, computerized testing device and computer-based battery of tests designed to predict which pilot candidates will be successful in training and follow-on aircraft assignment.

The ATC needs the ability to select pilot candidates who have the best chance for completing pilot training. Small reductions in the attrition rate can save millions of dollars each year as well as increase the number of pilots. Further, an additional capability is needed to predict the probability of success in specific types of aircraft. This capability supports SUPT where basic pilot training will occur in T-37 aircraft and subsequent specialized training will occur in T-38 aircraft for fighter-bomber pilots and in business jet trainers for tanker-transport pilots.

In FY91, plans include: (a) producing 25 prototype test devices to verify if the new design provides valid predictions of success, (b) integrating a validated specialized pilot training predictor into the test battery, (c) conducting an operational testing and evaluation of the PSACS, (d) setting up an operational support center to maintain the system and provide software support, and (e) beginning production of the PSACS test devices for ATC.

In FY92, plans include: (a) completing production of the PSACS test devices, delivering 135 devices to the Air Training Command (ATC) with options for 115 additional devices, (b) providing options to continue operations support and

software maintenance for two years following delivery of prototypes, and (c) validating structured pilot interviews (non-computer-based) for ATC's enhancement of the pilot selection and classification process.

**PAYOFF/UTILIZATION:**

In FY90, specific accomplishments included: (a) the awarding of a contract for full-scale development of the PSCAS, and (b) the beginning of full scale development of the PSCAS and beginning of software coding.

## PROJECT OVERVIEW

		91	92
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PROJECT: 3817	FORCEWIDE TRAINING SYSTEMS	\$ 0.7M	\$ 3.2M
PE: 64243F	MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	HUMAN SYSTEMS DIVISION		

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PROJECT SYNOPSIS:

The objective of this Project is to respond to the strong demand to improve the overall management of the Air Force (AF) on-the-job-training process with the following two efforts: (a) the AF enlisted field training system, and (b) the Maintenance Skills Trainer (MST).

New and increasingly complex weapon systems and rapidly changing technology are vastly increasing Air Force training requirements, while training resources remain relatively fixed. To answer this demand, the field training system is a computerized management system for all AF on-the-job training. MST is a training delivery system that uses artificial intelligence to reduce training of complex maintenance troubleshooting skills. It can also train broadly applicable skills useful in many AF specialties. At the request of the Tactical Air Force (TAC), MSTs will be developed for three RIVET WORKFORCE maintenance specialties on the F-15 and F-16 aircraft. (RIVET WORKFORCE is an ongoing AF personnel initiative to consolidate AF specialties.)

In In FY91, it is planned to: (a) design and develop an AF enlisted field training system, (b) conduct development test and evaluation of the enlisted field training system, and (c) develop MST design options and specifications for full scale development.

In FY92, it is planned to: (a) perform operational test and evaluation of the AF enlisted field training system first site, and (b) begin full scale development of the first nine MSTs, which will be stand-alone tutors operating on standard AF training hardware being purchased by TAC for other

computer-based maintenance training.

**PAYOFF/UTILIZATION:**

In FY90, specific accomplishments for this Project included: (a) conclusion of the design and analysis of the system concept option of an AF enlisted field training system, and (b) analyses of operational and support requirements for computer-based MTSs.

## PROJECT OVERVIEW

		91	92
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PROJECT: 3818	MANPOWER, PERSONNEL AND TRAINING INTEGRATION	\$ 0.1M	\$ 0.2M
PE: 64243F	MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	HUMAN SYSTEMS DIVISION		

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PROJECT SYNOPSIS:

The objective of this Project is to develop an analytical system capable of systematically incorporating Manpower, Personnel, Training and Safety (MPTS) considerations early into weapons system design and development to ensure operability, supportability, safety and minimum life cycle costs.

MPTS factors account for over fifty percent of the life cycle costs of a typical weapons system. But most of these factors are dependent on the design and operational concept of a weapons system.

The analytical system will include computer systems, operational software, and training materials. This system will also provide the capability for early specification of MPTS requirement for a new weapons system so that the operating and support infrastructure can be established before the system is fielded.

This is a new Project start in FY92

In FY92, plans include: (a) analyzing and defining requirements for integrating MPTS considerations into the weapons system acquisition process, (b) evaluating applicable technologies for the Air Force and the Army, and (c) developing design concepts for an MPTS system of analytical tools and databases.

**PAYOFF/UTILIZATION:**

The payoff of this Project is improved operability, supportability, safety, as well as minimum life cycle costs through incorporating Manpower, Personnel, Training and Safety (MPTS) early consideration in weapons system design.





PE/PROJECT	PERFORMING ORGANIZ.	FY91 (\$M)	FY92 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62205F						PERSONNEL, TRAINING AND SIMULATION
06HT-ET	AFHRL	2.795	2.714	ET	V A R	LABORATORY SUPPORT
06HT-HF	AFHRL	3.097	3.009	HF	V A R	LABORATORY SUPPORT
06HT-MP	AFHRL	3.888	3.778	MP	V A R	LABORATORY SUPPORT
06HT-ST	AFHRL	3.400	3.303	ST	V A R	LABORATORY SUPPORT
1121	AFHRL	2.621	2.704	ET	6	TRAINING DEVELOPMENT AND ASSESSMENT TECHNOLOGY
1123	AFHRL	7.924	8.250	ET	6	AIRCREW TRAINING TECHNOLOGY
1710	AFHRL	2.950	2.674	HF	4	LOGISTICS AND MAINTENANCE TECHNOLOGY
3017	AFHRL	1.072	1.364	ET	6	COMMAND AND CONTROL TRAINING
7719	AFHRL	2.741	3.018	MP	2	FORCE ACQUISITION AND DISTRIBUTION SYSTEM
		----- 30.489	----- 30.815			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 62205F :

	FY91	FY92
THE PRESIDENT'S BUDGET, JANUARY 1991	----- 30.488	----- 30.814

PE/PROJECT	PERFORMING ORGANIZ.	FY91 (\$M)	FY92 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63106F						LOGISTICS SYSTEMS TECHNOLOGY
2745	AFHRL	0.100	0.500	HF	4A	LOGISTICS FOR COMBAT READINESS MAINTENANCE
2940	AFHRL	4.703	6.836	HF	4D	COMPUTER TECHNOLOGY FOR SYSTEMS DESIGN
2950	AFHRL	6.955	7.386	HF	4D	INTEGRATED MAINTENANCE INFORMATION SYSTEM (IMIS)
		-----	-----			
		11.759	14.722			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63106F :	FY91	FY92
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THE PRESIDENT'S BUDGET, JANUARY 1991	11.758	14.722

63227F						PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY
2743	AFHRL	4.430	5.719	ST	6	TACTICAL MULTI-SHIP AIRCREW TRAINING RESEARCH
2922	AFHRL	1.382	1.772	MP	2	MANPOWER AND FORCE MANAGEMENT
2949	AFHRL	2.386	2.057	ET	6	ADVANCED TRAINING TECHNOLOGIES
		-----	-----			
		8.198	9.548			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63227F :	FY91	FY92
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1991	8.198	9.548

PE/PROJECT	PERFORMING ORGANIZ.	FY91 (\$M)	FY92 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64227F						TRAINING SYSTEMS DEVELOPMENT
2325	TS SPO	3.500	3.500	ST	6	SIMULATOR DEVELOPMENT ACTIVITIES
2769	TS SPO	1.550	3.399	ST	6	SIMULATOR UPDATE DEVELOPMENT/SIMULATOR REQUIREMENTS DEFINITION
2851	TS SPO	2.000	3.500	ST	6	STANDARD DOD SIMULATOR DATA BASE/Common TRANSFORMATION PROGRAM
2901	TS SPO	3.370	5.517	ST	6	B-1B WEAPON SYSTEM TRAINER
2968	TS SPO	1.000	2.400	ST	6	MODULAR SIMULATOR DESIGN
3135	TS SPO	8.200	6.914	ET	6	ADVANCED TRAINING SYSTEM (ATS)
3282	TS SPO	8.100	3.246	ET	6	C-17 AIRCREW TRAINING SYSTEM (ATS)
3772	TS SPO	13.000	3.911	ET	6H	C-141 AIRCREW TRAINING SYSTEM (ATS)
3775	TS SPO	0.400	0.700	MP	2A	MANPOWER, PERSONNEL, AND TRAINING (MPT)
4022	TS SPO	0.100	17.730	ST	6	SIMULATOR FOR ELECTRONIC COMBAT TRAINING (SECT)
4033	TS SPO	0.000	1.337	ST	6	JOINT PRIMARY AIRCRAFT TRAINING SYSTEM (JPATS)
		41.221	52.155			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 64227F :

	FY91	FY92
THE PRESIDENT'S BUDGET, JANUARY 1991	41.220	52.154

PE/PROJECT	PERFORMING ORGANIZ.	FY91 (\$M)	FY92 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63231F						CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY
2829	HSD	4.100	4.256	HF	4	CREW-CENTERED COCKPIT DESIGN
2992	AL	1.200	0.865	HF	4	SPACE CREW ENHANCEMENT (SPACE)
3257	HSD	4.617	4.792	HF	4	HELMET-MOUNTED SYSTEMS TECHNOLOGY
		-----	-----			
		9.918	9.913			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63231F :	FY91	FY92
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THE PRESIDENT'S BUDGET, JANUARY 1991	9.917	9.913

PE/PROJECT	PERFORMING ORGANIZ.	FY91 (\$M)	FY92 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64243F						MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT
3816	HSD	2.799	0.255	MP	2D	PILOT SELECTION AND CLASSIFICATION SYSTEM (PSACS)
3817	HSD	0.695	3.178	ET	6F	FORCEWIDE TRAINING SYSTEMS
3818	HSD	0.000	0.150	HF	4A	MANPOWER, PERSONNEL AND TRAINING INTEGRATION
		3.494	3.584			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 64243F :

	FY91	FY92
THE PRESIDENT'S BUDGET, JANUARY 1991	3.494	3.583

III.D. DLA PROGRAM ELEMENT AND PROJECT SYNOPSES

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PE	TITLE	PAGE
64722S	JOINT SERVICE TRAINING SYSTEMS	III-D-1

Table III-D-1: Listing of Projects - Lists Projects for each DLA Program Element. Lists contain performing organization, funding, Congressional Category and goal information.

## PROGRAM ELEMENT OVERVIEW

PE: 64722S DOD SUPPORT ACTIVITIES  
CONGRESSIONAL CATEGORY: EDUCATION & TRAINING  
DoD ORGANIZATION: DLA  
FUNDING: FY91 \$ 5.0M (FY92 PRESIDENT'S BUDGET)  
FY92 \$ 0.0M (FY92 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to expedite the prototype development of new training technologies and joint-Service training data systems that improve training effectiveness and enhance the performance of the military forces.

The joint-Service programs in this Program Element were established by the Secretary of Defense to improve training, performance and readiness of the Military Departments and Reserve Components. This Program Element also saves DoD funds through the sharing of training and performance information as well as the transfer of emerging and innovative training technologies among the Services and private sector.

This Program Element is to transition to Program Element #0605798S and to combine with Program Elements #0605711D and #060580D in FY92 to provide funding for the DoD support activities.

## PAYOFF/UTILIZATION:

The payoff of this Program Element includes early identification of successful single-Service efforts that can be employed on a multi-Service/DoD-wide basis for improvement of military operations and training.



**FUTURE DIRECTIONS:**

In FY93, plans for the Joint Service Manpower and Training Systems Development Project within this transitioning Program Element, are to: (a) complete the integration of three unique systems to fully automate the Instructional System Design (ISD) process for future DoD weapon system acquisitions. This system will save time and money during the development of new training. (b) Test and transition a man-portable and deployable, universal laser-based engagement system for indirect first control training that can be used in existing training facilities, and (c) prototype a training simulation for Special Operations/Low Intensity Conflict mission rehearsal.

In FY93, plans for the Joint Service Training and Performance Data Systems Project are to: (a) complete and transition the integrated system for the Reserve Component training alternatives, (b) complete the integrated on-line Course Data Exchange System, and (c) prototype the capability to correlate operational equipment safety data with training activities and utilization of training devices.

## PROJECT OVERVIEW

		91	92
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PROJECT: 0001	JOINT SERVICE MANPOWER AND TRAINING SYSTEMS DEVELOPMENT	\$ 2.7M	\$ 0.0M
PE: 64722S	DOD SUPPORT ACTIVITIES		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	DLA		
RESPONSIBLE ORGANIZATION:	FORCE MANAGEMENT AND PERSONNEL		

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PROJECT SYNOPSIS:

The objective of this Project is to rapidly prototype, test, and evaluate those high payoff training technologies which can demonstrate increased effectiveness for multi-Service implementation. Emphasis is given to technologies and simulations that save DoD resources or can help reduce the environmental impact of training exercises.

In FY91 plans include to: (a) complete the prototype development of a portable aid for Explosive Ordnance Disposal (EOD) specialists which is designed for both classroom and field operation to assist EOD personnel in identifying and rendering all varieties of munitions "safe," (b) initiate the development of a system to analyze the effectiveness of the Joint Staff's Training Plan and provide alternatives for the optimum mix of training resources based on training exercises and operational lessons learned, (c) consolidate and integrate unique Service systems which automate requirements of the ISD process for use by all the Services, saving time and resources, and (d) complete the development of interface and software standards which enable portability of automated courseware to different types of operating systems and ADPE.

In FY92 plans include to: (a) test and transition a portable data collection, integration and communications device for evaluating the effectiveness of training exercises. This device will be used to capture, standardize, and transfer individual and unit performance data to higher echelons for evaluation and feedback, (b) prototype a system for internetting existing wargames and simulators to increase training realism while drastically reducing training costs. This capability will foster a greater joint-Service

capability for conducting Joint Task Force Exercises at theater and global levels, and (c) develop an interactive (friend/foe) team training which uses simulated live-fire exercises in ambush and hostage (anti-terrorist) situations.

**PAYOFF/UTILIZATION:**

The payoff of this Project is rapid prototyping, testing and evaluating of high payoff training technologies.

FY90, specific accomplishments included: (a) completing prototyping a system that integrates logistics support analysis data with an automated Instructional System Design (ISD) process which shortens the instructional development cycle, (b) began developing a high priority interface module that networks dissimilar wargames and simulators for OJCS, CINCS and Services, and (c) initiating development of an automated performance measurement aid for recording troop performance during field exercises.

## PROJECT OVERVIEW

		91	92
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PROJECT: 0002	JOINT SERVICE TRAINING AND PERFORMANCE DATA SYSTEMS	\$ 2.4M	\$ 0.0M
PE: 64722S	DOD SUPPORT ACTIVITIES		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	DLA		
RESPONSIBLE ORGANIZATION:	TRAINING PERFORMANCE DATA CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to develop multi-Service training and performance related tools, techniques, models, and data systems which support priority DoD needs.

This Project directly supports DoD training managers (OSD, Joint Staff, Unified Commands, and the Military Services) to promote more efficient and effective use of training resources, increase the effectiveness of military training and enhance the performance of the military forces. Products are developed in close coordination with end users to ensure transition to operational status.

In FY91 it is planned to: (a) develop an internetted system to track and process data on technological applications of training equipment to avoid unnecessary duplication in future equipment development, (b) develop an integrated on-line system to track and distribute Service training course data/information in a standardized format throughout DoD, thereby easing the sharing of information and reducing duplication, and (c) develop an integrated system for the Reserve Components that identifies existing training and vocational education capabilities within DoD and the private sector to efficiently accomplish their unique education and training requirements.

In FY92 it is planned to: (a) develop a system for integrating military occupation task data with training courses and performance information to improve the effectiveness and efficiency of future training system and course

development, and (b) prototype and validate a computerized system that links operational equipment, operator and maintenance occupations and the equipment specific training requirements.

**PAYOFF/UTILIZATION:**

The payoff of this Project is to support Service requirements to improve performance measures and the effectiveness and efficiency of military training.

In FY90, specific accomplishments included: (a) developing an integrated data system which processes and identifies the capabilities of all DoD ranges and training areas to promote more effective utilization of existing ranges depending on specific user needs, (b) prototyping an artificial intelligence based information processing capability to improve the tracking and reporting of lessons learned from training exercises in order to improve the effectiveness of future exercises.

