DCN 191

U. S. AIR FORCE LABORATORIES

BOOK NUMBER 2 OF 3

J. Wright Laboratory, Wright-Patterson AFB
K. Wright Laboratory, Eglin AFB
L. Electronic Systems Center, Hanscom AFB
M. Rome Laboratory, Hanscom AFB

WRIGHT LABORATORY
WRIGHT-PATTERSON AFB, OHIO
DATA INPUT TO THE
"LAB" JOINT CROSS-SERVICE GROUP GUIDANCE PACKAGE

Section II: Capacity of DOD Components - **Wright Laboratory Input dated 20 Jun 94**
2.1 Workload
2.2 Excess Capacity

Section III: Capability of Activities to Perform Common Support Functions - **Wright Laboratory Input dated 20 Jun 94**
3.0 Mission
3.1 Location
3.2 Personnel
3.3 Workload
3.4 Facilities & Equipment
3.5 Expansion Potential

Section IV: Appendices
A. Macro Process/Schedule
B. List of Activities
C. Common Support Functions

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.4.1 -- Wright Labs, Wright Patterson AFB response to the LJCSG guidance package. The existing 10 Aug 94 submission states that there were 38 disclosures for advanced materials in the table, yet the listing of patent disclosures contained only 37 titles. Correct or clarify this difference. In addition, since patents awarded are based on disclosures, explain why the number of patents awarded for advanced materials (59) is greater than the number of patent disclosures (37 or 38)

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: (Concurs) Does not concur (explain:)

SEE BASE Activity RESPONSE

14 AUGUST 1994

MAJCOM REVIEWER: TIMOTHY L DUES, GM-15, AFMC/SIT, DSN 787-7800
(print name, organization, DSN)

BASE: (Concurs) Does not concur (explain:)

1. ONE DISCLOSURE ("IN SITU MOLECULAR COMPOSITES BASED ON RIGID-ROD POLYMIDES") LEFT OFF LONG SUBMITTAL - NOW INCLUDED ON MID-PAGE. THE PROPER COUNT IS 38 (SEE ATTACHMENT)
2. SINCE A PATENT DISCLOSURE PRECEEDS A PATENT AWARD, MANY OF THE 59 AWARDS WERE BASED ON DISCLOSURES SUBMITTED PRIOR TO THE REPORTING PERIOD (PRE-FY90)

BASE REVIEWER: 13Aug94 JOHN J. FEOON
(print name, organization, DSN) WL/POME, 785-4013

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing .Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

60

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.4.1 Major Equipment and Facilities of the Wright Lab, Wright Patterson AFB response to the LICSG guidance package. The existing response indicates that there is no sharing of equipment or facilities with other than common (as defined in appendix C) or unique support functions. Confirm this is correct. If anything is shared within the activity, indicate the other function(s) and the percentage of time the other function(s) uses the equipment or facility. Additionally, complete the matrix box for major equipment and facilities. The 10 Aug 94 version contains text only.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LICSG Guidance Package instructions

MAJCOM: (Concur) Does not concur (explain:)

SEE BASE ACTIVITY RESPONSE

NO ATTACHMENTS PROVIDED, i.e. DATA SHEETS

IF REQ'D THEY WILL BE UPDATED AND PROVIDED

24 Aug 94 OK See Attachments

14 AUGUST 1994

MAJCOM REVIEWER: TIMOTHY L. DUES, GM-15, AFMC/STP, DSN 787-7850
(print name, organization, DSN)

BASE: (Concur) Does not concur (explain:)

ALL FACILITIES LISTED IN THE WRIGHT LABORATORY RESPONSE TO QUESTION 3.4.1, ARE UTILIZED 100% FOR THE CSP THAT ARE REPORTED UNDER MODIFICATIONS TO FACILITY DESCRIPTIONS TO INCLUDE ORGANIZATIONS REQUESTING/RECEIVING SUPPORT

24 Aug 94

BASE REVIEWER: 13 Aug 94 David J. Fecon
(print name, organization, DSN) WL/PMC, 785-4013

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

61

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.3 Experience – Wright Labs, Wright Patterson AFB response to the LJCSG guidance package. The existing 10 Aug 94 response does not report by common support function (CSF) as defined in appendix C of the LJCSG guidance. Report this data at the CSF level!

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: (Concur) Does not concur (explain:)

SEE BASE ACTIVITY RESPONSE.

14 AUGUST 1994

MAJCOM REVIEWER: TIMOTHY L. DUES, GM-15, AFMC/XPTP, DSN-787-7850
(print name, organization, DSN)

BASE: (Concur) Does not concur (explain:)

ALTHOUGH QUESTION 3.2.3 DOES NOT EXPLICITLY REQUIRE BREAKOUT BY CSF (AS DO ALMOST ALL THE OTHER SECTION 3 QUESTIONS), THE ATTACHED ADDITIONAL INFORMATION IS PROVIDED.

BASE REVIEWER: 13 Aug 94 JOHN J. FOON
(print name, organization, DSN) WL/DOME 785-4013

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

08/13/94 19:48 ☎513 255 1759 WL/POMX,WPAFB OH

CONTROL NUMBER: LJCSWG-AF 005

PURPOSE: To provide SAF/AQX staff corrected answers to Questions 3.2.2, Education and 3.2.3, Experience, for Wright Laboratories, WPAFB response to the Laboratory JCSG guidance package. The 15 Aug 94 response provided the data necessary; however we do not understand the note above the tables that states "Does not represent all WL manpower at Wright-Patterson." The government numbers in Questions 3.2.1, 3.2.2, 3.2.3, and 3.3.1.1 all correlate. Who did you not include and why?

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: (Concur) Does not concur (explain:)

See Attached Revision

MAJCOM REVIEWER: [signature]
(print name, organization, DSN)
Evans C Kang, Maj, HQ AFMC/LST, 787-5368

BASE: (Concur) Does not concur (explain:)

REVISIONS TO QUESTIONS 3.2.2 & 3.2.3 ATTACHED. INCLUDED ARE FOOTNOTES DESCRIBING EXCLUDED PERSONNEL. REVISIONS TO QUESTIONS 2.1, 2.2 & 3.2.1 RESULTED FROM THIS CORRECTION.

BASE REVIEWER: [signature] John J. Fedon WL/PAME
(print name, organization, DSN)
24 Aug 94 DSN 785-4013

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.2 Education -- Wright Labs, Wright Patterson AFB response to the LJCSG guidance package. The existing 10 Aug 94 response does not report by common support function (CSF) as defined in appendix C of the LJCSG guidance. Report this data at the CSF level!

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: (Concurs) Does not concur (explain:)

SEE BASE ACTIVITY RESPONSE.

14 AUGUST 1994.

MAJCOM REVIEWER: TIMOTHY L. DUES GM-15, AFMC/STP DSN-787-7850
(print name, organization, DSN)

BASE: (Concurs) Does not concur (explain:)

ALTHOUGH QUESTION 3.2.2 DOES NOT EXPLICITLY REQUIRE BREAKOUT BY CSF (AS ALMOST ALL THE OTHER SECTION 3 QUESTIONS DO), THE ATTACHED ADDITIONAL INFORMATION IS PROVIDED

BASE REVIEWER: 13 AUG 94 JOHN J. FEDON
(print name, organization, DSN) WL/PAME 785-4013

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

08/13/94 19:45 513 255 1759 WL/POMX,WPAFB OH

Question 3.1.2 **Wright Laboratory Air Emission Permits**

Common Support Function	Permit Number	Organization	Facility	Source Category
ADVANCED MATERIALS				
AM	700438K001	WL/MN	20655	Surf. Coat.
AM	700438T001	WL/MN	20655	Underground Tank
AM	700516T001	WL/ML	20654	Underground Tank
AM	700536T001	WL/ML	20652	Underground Tank
AIR VEHICLES - FIXED- AVIONICS				
AVFA	NONE	WL/AA	20620	General Solvent Usage
AVFA	NONE	WL/AA	20620	Underground Tank
AVFA	NONE	WL/AA	20620	Underground Tank
AVFA	NONE	WL/AAR	20023	Wastewater Treatment
AIR VEHICLES - FIXED- FLIGHT SUBSYSTEMS				
AVFF	700260P001	WL/FIVS	20191	Gen. Process
AVFF	700260P002	WL/FIV	20094	Gen. Process
AVFF	700260P002	WL/FIVS	20094	Gen. Process
AVFF	700260T001	WL/FIV	20094	Underground Tank
AVFF	700260T001	WL/FIVS	20094	Underground Tank
AVFF	700518T001	WL/FIVS	20100	Underground Tank
AVFF	NONE	WL/FIV	20094	Aboveground Tank
AVFF	NONE	WL/FIV	20094	Aboveground Tank
AVFF	NONE	WL/FIV	20094	Aboveground Tank
AVFF	NONE	WL/FIV	20094	Aboveground Tank
AVFF	NONE	WL/FIV	20094	Aboveground Tank
AVFF	NONE	WL/FIV	20094	Aboveground Tank
AVFF	NONE	WL/FIVS	20098	Jet Eng. Test
AVFF	NONE	WL/FIVS	20094	Aboveground Tank
AVFF	NONE	WL/FIVS	20094	Aboveground Tank
AVFF	NONE	WL/FIVS	20094	Aboveground Tank
AVFF	NONE	WL/FIVS	20094	Aboveground Tank
AVFF	NONE	WL/FIVS	20094	Aboveground Tank

AVFF AIR VEHICLES - FIXED - PROPULSION	NONE	WL/FIVS	20094	Aboveground Tank
AVFP	700195T004	WL/PO	20018	Underground Tank
AVFP	700195T005	WL/PO	20018	Underground Tank
AVFP	700311T005	WL/POM	20021	Underground Tank
AVFP	700311T006	WL/POM	20021	Underground Tank
AVFP	700311T007	WL/POM	20021	Underground Tank
AVFP	700311T008	WL/POM	20021	Underground Tank
AVFP	700311T009	WL/POM	20021	Underground Tank
AVFP	700311T010	WL/POM	20021	Underground Tank
AVFP	700311T011	WL/POM	20021	Underground Tank
AVFP	700311T012	WL/POM	20021	Underground Tank
AVFP	700311T013	WL/POM	20021	Underground Tank
AVFP	700311T014	WL/POM	20021	Underground Tank
AVFP	700311T015	WL/POM	20021	Underground Tank
AVFP	700311T016	WL/POM	20021	Underground Tank
AVFP	700311T017	WL/POM	20021	Underground Tank
AVFP	700311T018	WL/POM	20021	Underground Tank
AVFP	700311T019	WL/POM	20021	Underground Tank
AVFP	700311T020	WL/POM	20021	Underground Tank
AVFP	700311T021	WL/POM	20021	Underground Tank
AVFP	700311T022	WL/POM	20021	Underground Tank
AVFP	700311T023	WL/POM	20021	Underground Tank
AVFP	700311T024	WL/POM	20021	Underground Tank
AVFP	700311T025	WL/POM	20021	Underground Tank
AVFP	700311T026	WL/POM	20021	Underground Tank
AVFP	700311T027	WL/POM	20021	Underground Tank
AVFP	700311T028	WL/POM	20021	Underground Tank
AVFP	700311T029	WL/POM	20021	Underground Tank
AVFP	700347T001	WL/POS	20490	Underground Tank
AVFP	700347T002	WL/POS	20490	Underground Tank
AVFP	700347T003	WL/POS	20490	Underground Tank
AVFP	700347T004	WL/POS	20490	Underground Tank
AVFP	700347T005	WL/POS	20490	Underground Tank
AVFP	700347T006	WL/POS	20490	Underground Tank
AVFP	700347T006	WL/POS	20490	Underground Tank
AVFP	700347T007	WL/POS	20490	Underground Tank
AVFP	700347T008	WL/POS	20490	Underground Tank
AVFP	700347T009	WL/POS	20490	Underground Tank
AVFP	700347T010	WL/POS	20490	Underground Tank

AVFP	700347T011	WL/POS	20490	Underground Tank
AVFP	700347T012	WL/POS	20490	Underground Tank
AVFP	700347T013	WL/POS	20490	Underground Tank
AVFP	700347T014	WL/POS	20490	Underground Tank
AVFP	700347T015	WL/POS	20490	Underground Tank
AVFP	700347T016	WL/POS	20490	Underground Tank
AVFP	700347T017	WL/POS	20490	Underground Tank
AVFP	700347T018	WL/POS	20490	Underground Tank
AVFP	700347T019	WL/POS	20490	Underground Tank
AVFP	700387T001	WL/POM	20252	Underground Tank
AVFP	770912T026	WL/POS	20490	Underground Tank
AVFP	771912P001	WL/POS	20490	Unserground Tank
AVFP	771912T021	WL/POS	20490	Underground Tank
AVFP	771912T022	WL/POS	20490	Underground Tank
AVFP	771912T024	WL/POS	20490	Underground Tank
AVFP	771912T025	WL/POS	20490	Underground Tank
AVFP	771912T027	WL/POS	20490	Underground Tank
AVFP	NONE	WL/PO	21601	Aboveground Tank
AVFP	NONE	WL.PO	20018	Aboveground Tank
AVFP	NONE	WL.PO	20018	Aboveground Tank
AIR VEHICLES - FIXED - STRUCTURE				
AVFS	700425P001	WL/FIB	20065	Gen. Process
AVFS	NONE	WL/FIM	20451	Underground Tank

Question 3.1.2 **WRIGHT LABORATORY PERMITTED HAZARDOUS WASTE SATELLITE/ACCUMULATION SITES**

Common Support Function	Permit Number	Organization	Facility	Room/Location
ADVANCED MATERIALS				
AM	BS-021	WL/MLPJ	20651	163
AM	BS-021	WL/MLPT	20651	162
AM	BS-040	WL/MLI	20654	CHEM STOR TRAIL
AM	BS-044	WL/MLBP	20654	304
AM	BS-045	WL/MLBP	20654	333
AM	BS-046	WL/MLBP	20654	303
AM	BS-047	WL/MLBP	20654	302
AM	BS-048	WL/MLBP	20654	332
AM	BS-049	WL/MLBP	20654	301
AM	BS-050	WL/MLBP	20654	325
AM	BS-051	WL/MLBP	20654	326
AM	BS-052	WL/MLBP	20654	331
AM	BS-053	WL/MLBP	20654	323/324
AM	BS-054	WL/MLBP	20654	350
AM	BS-058	WL/MLPJ	20651	163
AM	BS-059	WL/MLPJ	20651	183
AM	BS-060	WL/MLPJ	20651	190
AM	BS-061	WL/MLPJ	20651	192
AM	BS-062	WL/MLPO	20651	260
AM	BS-063	WL/MLBP	20654	349A
AM	BS-064	WL/MLBP	20654	334
AM	BS-065	WL/MLPO	20651	244
AM	BS-066	WL/MLBM	20652	135
AM	BS-067	WL/MLPO	20651	261
AM	BS-068	WL/MLBM	20652	127
AM	BS-076	WL/MLBT	20654	149
AM	BS-077	WL/MLBT	20654	152
AM	BS-078	WL/MLBT	20654	101
AM	BS-079	WL/MLBT	20654	133B
AM	BS-087	WL/MLPJ	20071A	A-BAY #71A-A-1
AM	BS-092	WL/MLSE	20652	G-17
AM	BS-093	WL/MLSE	20652	145
AM	BS-094	WL/MLLM	20655	83C/85C
AM	BS-095	WL/MLLM	20655	185

AM	BS-096	WL/MLLM	20655	183
AM	BS-097	WL/MLBC	20654	249
AM	BS-098	WL/MLSA	20652	39
AM	BS-099	WL/MLSA	20652	50
AM	BS-100	WL/MLPJ	20651	161
AM	BS-125	WL/MLLN	20655	035
AM	BS-142	WL/MLPO	651	174
AM	BS-143	WL/MLSE	654	132
AM	BS-144	WL/MLSE	652	118
AIR VEHICLES - FIXED- FLIGHT SUBSYSTEMS				
AVFF	BS-010	WL/FIVS	20094	CENTER PAD
AVFF	BS-020	WL/FIP	20146	122
AVFF	BS-025	WL/FIGL	20146	217
AVFF	BS-026	WL/FIGL	20146	113
AVFF	BS-028	WL/FIGL	20145	273
AVFF	BS-108	WL/FIME	20025B	NW CORNER
AVFF	BS-136	WL/FIVMA	20031	LOCKER 3
AIR VEHICLES - FIXED - PROPULSION				
AVFP	BA-002	WL/DOSH	20092	None
AVFP	BS-001	WL/POS	20490	RM 122
AVFP	BS-022	WL/POOS-3	20018G	42
AVFP	BS-073	WL/POSL	20490	235
AVFP	BS-074	WL/POSL	20490	228
AVFP	BS-080	WL/POS	20490	206 F31
AVFP	BS-090	WL/POOS-2	20018G	30
AVFP	BS-102	WL/POT	20020A	143
AVFP	BS-104	WL/POME	20059B	SOUTH END
AVFP	BS-105	WL/POME	20062	NE CORNER
AVFP	BS-106	WL/POME	20435	117
AVFP	BS-126	WL/POOX-2	20450	B023
AVFP	BS-146	WL/POOC-3	450	D127
AVFP	BS-147	WL/POOC-2	18B	16
AIR VEHICLES - FIXED - STRUCTURE				
AVFS	BA-070	WL/FIBT	20065	STORAGE SHED SE
AVFS	BS-071	WL/FIBT	20065	MEZZANINE EAST

ELECTRONIC DEVICES				
ED	BS-009	WL/ELR	20620	SE CORNER HSTOR
ED	BS-019	WL/ELO	20022B	C-135 CARGO BAY

WRIGHT LABORATORY RADIATION PRODUCING DEVICES

Question 3.1.2

Common Support Function	Permit Number	Organization	Emitter
ADVANCED MATERIALS			
AM	89-008	WL/MLBM	X-RAY DIFFRACTION UNIT
AM	89-009	WL/MLBM	ION MASS SPECTROMETER (SIMS)
AM	89-011	WL/MLBM	SCANNING AUGER MICROPROBED
AM	89-012	WL/MLBM	AES/XPS SYSTEM X-RAY SOURCE
AM	89-014	WL/MLSA	X-RAY FLUORESCENCE UNIT
AM	89-015	WL/MLSA	SCANNING ELECTRON MICROSCOPE
AM	89-016	WL/MLSA	SCANNING ELECTRON MICROSCOPE
AM	89-017	WL/MLSA	X-RAY DIFFRACTOMETER
AM	89-019	WL/MLSA	NONDESTRUCTIVE INSPECTION X-RAY
AM	89-020	WL/MLSA	NONDESTRUCTIVE INSPECTION X-RAY
AM	89-021	WL/MLSA	NONDESTRUCTIVE INSPECTION X-RAY
AM	89-035	WL/MLBM	VSW X-RAY GUN
AM	89-047	WL/MLBP	ROTATIING ANODE DIFFRACTION
AM	89-048	WL/MLBP	X-RAY DIFFRACTION UNIT
AM	89-049	WL/MLBP	ROTATING ANODE DIFFRACTION
AM	89-050	WL/MLBP	SCANNING ELECTRON MICROSCOPE
AM	89-051	WL/MLBP	ROTATING ANODE DIFFRACTION
AM	89-052	WL/MLBP	SINGLE CRYSTAL DIFFRACTOMETER
AM	89-053	WL/MLLM	SCANNING ELECTRON MICROSCOPE
AM	89-054	WL/MLLM	X-RAY DIFFRACTOMETER
AM	89-055	WL/MLLM	X-RAY DIFFRACTOMETER
AM	89-058	WL/MLLP	LAMDE TOMOGRAPHY UNIT
AM	89-060	WL/MLLM	SCANNING ELECTRON MICROSCOPE
AM	89-061	WL/MLLM	SCANNING ELECTRON MICROSCOPE
AM	89-062	WL/MLLM	SCANNING ELECTRON MICROSCOPE
AM	89-063	WL/MLLM	SCANNING ELECTRON MICROSCOPE
AM	89-064	WL/MLLM	TRANSMISSION ELEC. MICROSCOPE
AM	90-006	WL/MLBM	SCANNING AUGER SYSTEM (X-RAY)
AM	90-009	WL/MLBT	X-S INSTRUMENT (ELECTRON BEAM GUN)

AM	90-010	WL/MLSA	REAL-TIME X-RAY UNIT
AM	90-013	WL/MLLM	ION MILL
AM	90-014	WL/MLLM	TRANSMISSION ELEC. MICROSCOPE
AM	90-015	WL/MLLM	SCANNING ELECTRON MICROSCOPE
AM	90-016	WL/MLLM	ION MILL
AM	91-007	WL/MLLP	MICRO-FOCUS TOMOGRAPHY UNIT
AM	91-008	WL/MLLM	PARTICLE SIZE ANALYZER
AM	91-009	WL/MLLM	PRECISION ION MILLING SYSTEM
AM	92-008	WL/MLSA	X-RAY FLUORESCENCE UNIT
AM	93-001	WL/MLBT	XPS INSTRUMENT (ELECTRON BEAM GUN)
AM	93-004	WL/MLLM	SCANNING ELECTRON MICROSCOPE
AM	94-003	WL/MLBM	DIFFRACTOMETER
AM	94-004	WL/MLSA	SCANNING ELECTRON MICROSCOPE
AM	IN OP	WL/MLLM	ION MASS SPECTROMETER
AM	LOW KV	WL/MLBM	SURFACE ANALYZER
AM	LOW KV	WL/MLBM	SCANNING AUGER SYS (ELECTRON BEAM)
AM	LOW KV	WL/MLBM	10 KV RHEED ELECTRON BEAM GUN
AM	LOW KV	WL/MLBM	ION MASS SPECTROMETER (SIMS)
AM	LOW KV	WL/MLBM	AES/XPS SYSTEM ION GUN
AM	LOW KV	WL/MLBM	AES/XPS SYSTEM ELECTRON GUM
AM	LOW KV	WL/MLBM	SCANNING AUGER SYSTEM (ION)
AM	LOW KV	WL/MLBM	SCANNING AUGER SYSTEM
AIR VEHICLES - FIXED-AVIONICS			
AVFA	89-022	WL/AAWP-2	FAXITRON CABINET X-RAY SYSTEM
AIR VEHICLES - FIXED- FLIGHT SUBSYSTEMS			
AVFF	89-003	WL/FIVSA	FLASH X-RAY UNIT
AVFF	89-040	WL/POOC-2	SCANNING ELECTRON MICROSCOPE
AVFF	92-007	WL/FIVSA	FLASH X-RAY UNIT
AVFF	LOW KV	WL/POOC-2	VARIABLE GAP DIODE
AVFF	LOW KV	WL/POOC-3	ELECTRON BEAM GUN (60KVP)
AVFF	LOW KV	WL/POOC-3	PLASMA ELECTRON BEAM GUN
AVFF	LOW KV	WL/POOC-3	ELECTRON BEAM GUN PULSER
AIR VEHICLES - FIXED - PROPULSION			
AVFP	89-037	WL/POSL	SCANNING ELECTRON MICROSCOPE

AIR VEHICLES - FIXED - STRUCTURE			
AVFS	90-007	WL/FIMN	ELECTRON BEAM GUN
ELECTRONIC DEVICES			
ED	89-023	WL/ELR	ION IMPLANTER
ED	89-024	WL/ELR	SCANNING ELECTRON MICROSCOPE
ED	89-025	WL/ELR	SCANNING ELECTRON MICROSCOPE
ED	89-026	WL/ELR	ELECTRON BEAM LITHOGRAPHY SYSTEM
ED	89-027	WL/ELR	AUGER SYS ELECTRON BEAM GUN
ED	89-028	WL/ELR	ELECTRON BEAM EVAPORATOR
ED	89-030	WL/ELR	RHEED ELECTRON BEAM GUN
ED	89-031	WL/ELR	GEN II RHEED ELCTRON BEAM GUN
ED	91-003	WL/ELR	RHEED ELECTRON BEAM GUN
ED	94-005	WL/ELR	ELECTRON BEAM EVAPORATOR
ED	LOW KV	WL/ELR	SIX (6) ION PUMPS

Wright Laboratory: Laser Permits

Question 3.1.2

Common Support Function	Permit Number	Organization	Facility	Laser Class
ADVANCED MATERIALS				
AM	92L995	WL/MLBC	20654	3B
AM	92L984	WL/MLBC	20654	2
AM	92L989	WL/MLPJ	20071A	4
AM	92L996	WL/MLBC	20654	2
AM	92L998	WL/MLPJ	20651	2
AM	92L999	WL/MLPJ	20651	2
AM	93L003	WL/MLPJ	20071A	3B
AM	93L014	WL/MLSE	20652	2
AM	93L015	WL/MLSE	20652	2
AM	93L024	WL/MLLP	20655	3A
AM	93L044	WL/MLSA	20450	1
AM	93L050	WL/MLLN	20655	3A
AM	93L051	WL/MLLN	20655	2
AM	93L064	WL/MLBT	20654	3A
AM	93LO49	WL/MLBC	20654	3B
AM	94L009	WL/MLPJ	20651	3B
AM	94L010	WL/MLPJ	20651	3B
AM	94L011	WL/MLLN	20655	3A
AM	94L015	WL/MLLP	20655	3A
AM	94L016	WL/MLLP	20655	4
AM	94L017	WL/MLLP	20655	4
AIR VEHICLES - FIXED-AVIONICS				
AVFA	92L969	WL/AARI-2	20622	2
AVFA	92L972	WL/AARI-2	20622	2
AVFA	92L975	WL/XPN	20254	4
AVFA	92L976	WL/XPN	20254	3B
AVFA	92L978	WL/AARI-2	20622	2
AVFA	92L979	WL/AARF	20023	2
AVFA	92L980	WL/AARF	20023	2

AVFA	92L988	WL/AARI-2	20622	3B
AVFA	92L992	WL/AAWD-2	20620	3A
AVFA	93L001	WL/XPN	20254	2
AVFA	93L004	WL/AARI-3	20622	3A
AVFA	93L036A	WL/AAAI-2	20620	3B
AVFA	93L036B	WL/AAAI-2	20620	3B
AVFA	93L036C	WL/AAAI-2	20620	3B
AVFA	93L036D	WL/AAAI-2	20620	3B
AVFA	93L036E	WL/AAAI-2	20620	3B
AVFA	93L036F	WL/AAAI-2	20620	3B
AVFA	93L036G	WL/AAAI-2	20620	3B
AVFA	93L036H	WL/AAAI-2	20620	3B
AVFA	93L047	WL/AARI-2	20622	4
AVFA	93L053	WL/AAWD-2	20620	4
AVFA	93L054	WL/AAWW-3	20620	2
AVFA	93L056	WL/AARI-2	20622	
AVFA	94L019	WL/AARF	20023	3B
AIR VEHICLES - FIXED-FLIGHT SUBSYSTEMS				
AVFF	92L967	WL/FIME	20024C	3B
AVFF	92L968	WL/FIME	20024C	3B
AVFF	92L973	WL/POOS-3	20018G	4
AVFF	92L974	WL/FIME	20025B	4
AVFF	92L997	WL/POOS-3	20018G	3B
AVFF	93L002	WL/FIME	20024C	4
AVFF	93L007	WL/FIME	20024C	4
AVFF	93L008	WL/FIME	20024C	3A
AVFF	93L023	WL/FIVRA	20255	4
AVFF	93L029	WL/POOC-3	20450	4
AVFF	93L030	WL/POOC-3	20450	3B
AVFF	93L031	WL/POOC-3	20450	4

AVFF	93L032	WL/POOC-3	20450	4
AVFF	93L033	WL/POOC-3	20450	4
AVFF	93L034	WL/POOC-3	20450	4
AVFF	93L035	WL/POOC-3	20450	3B
AVFF	93L040	WL/FIGS-1	20146	1
AVFF	93L043	WL/POOC-3	20450	2
AVFF	93L060	WL/POOS-3	20018G	2
AVFF	93LO52	WL/FIVEC	20045	4
AVFF	94L014	WL/POOC	20450	2
AIR VEHICLES - FIXED - PROPULSION				
AVFP	92L982	WL/POSF-2	20490	4
AVFP	92L983	WL/POSF-2	20490	4
AVFP	92L987	WL/POPT	20018C	4
AVFP	93L009	WL/POSF	20490	3B
AVFP	93L026	WL/POSF	20490	4
AVFP	93L037	WL/POSF	20490	3B
AVFP	93L058	WL/POSF	20450	4
AVFP	94L013	WL/POSF-2	20450	4
AVFP	94L018	WL/POSF	20490	4
AIR VEHICLES - FIXED - STRUCTURE				
AVFS	93L067	WL/FIBEC	20065	1
AVFS	94L004	WL/FIME	20026	3B
ELECTRONIC DEVICES				
ED	92L986	WL/DOMS	20093	2
ED	93L012	WL/ELO	20022B	4
ED	93L061	WL/ELOS	20022B	4
ED	93L062	WL/ELOS	20022B	3B
ED	93L070	WL/ELO	20620	3A
ED	94L001	WL/ELOT	20022B	2
ED	94L002	WL/ELO	20620	3B

ED	94L003	WL/ELO	20022B	2
ED	94L007	WL/ELOS	20022B	3A
ED	94L008	WL/ELOS	20022B	3A

Wright Laboratory: Laser Permits

Question 3.1.2

Common Support Function	Permit Number	Organization	Facility	Laser Class
ADVANCED MATERIALS				
AM	90L835	WL/MLPO	20651	3A
AM	90L836	WL/MLPO	20651	2
AM	90L837	WL/MLPO	20651	3A
AM	90L838	WL/MPBT	20654	4
AM	90L839	WL/MLBT	20654	3A
AM	90L840	WL/MLBT	20654	4
AM	90L842	WL/MLLM	20655	3A
AM	90L846	WL/MLBT	20654	4
AM	90L869	WL/MLPJ	20653	2
AM	90L871	WL/MLPO	20651	3A
AM	90L880	WL/MLPJ	20651	3B
AM	90L881	WL/MLPJ	20651	2
AM	90L902	WL/MLPO	20651	4
AM	90L909	WL/MLPJ	20071A	3B
AM	90L910	WL/MLPJ	20071A	3B
AM	90L911	WL/MLPJ	20071A	3B
AM	90L912	WL/MLPJ	20071A	3B
AM	90L913	WL/MLPJ	20071A	3A
AM	91L915	WL/MLPJ	20071A	4
AM	91L918	WL/MLPJ	20071A	3B
AM	91L925	WL/MLLP	20655	3B
AM	91L928	WL/MLBP	20654	3A
AM	91L929	WL/MLBP	20654	3A
AM	91L930	WL/MLBP	20654	2
AM	91L938	WL/MLLP	20655	2
AM	91L945	WL/MLBP	20654	1
AM	91L946	WL/MLBT	20654	3A
AM	91L949	WL/MLPJ	20651	2
AM	91L956	WL/MLPO	20651	4
AM	92L001	WL/MLPJ	20651	2
AM	92L005	WL/MLPJ	20651	3A

AM	92L009	WL/MLPJ	20651	2
AM	92L010	WL/MLPJ	20651	2
AM	92L011	WL/MLPJ	20651	2
AM	92L012A	WL/MLBT	20651	3B
AM	92L012B	WL/MLBT	20651	3B
AM	92L013A	WL/MLBT	20651	3A
AM	92L013B	WL/MLBT	20651	4
AM	92L014	WL/MLBT	20651	3B
AM	92L015	WL/MLBT	20651	2
AM	92L016	WL/MLBT	20651	2
AM	92L017	WL/MLBT	20651	2
AM	92L018	WL/MLBT	20651	3A
AM	92L026	WL/MLBP	20654	3A
AM	92L027	WL/MLBT	20654	3A
AM	92L028	WL/MLBP	20654	3B
AM	92L029	WL/MLBP	20654	3B
AM	92L030	WL/MLPO	20651	3A
AM	92L031	WL/MLPO	20651	2
AM	92L038	WL/MLPJ	200651	4
AIR VEHICLES - FIXED-AVIONICS				
AVFA	90L834	WL/AARI-2	20622	3B
AVFA	90L851	WL/AAAI-2	20356	3B
AVFA	90L852	WL/AAAI-2	20356	3B
AVFA	90L857	WL/AAWW -4	20620	3
AVFA	90L872	WL/AAWP-3	20004B	3B
AVFA	90L873	WL/AARI-2	20622	3B
AVFA	90L889	WL/AAAI-2	20620	2
AVFA	90L890	WL/AARI-4	20022	2
AVFA	90L891	WL/AARI-3	20022	2
AVFA	90L892	WL/AARI-2	20622	2
AVFA	90L893	WL/AARI-2	20622	2
AVFA	90L894	WL/AARI-1	20022	2
AVFA	90L895	WL/AARI	20622	2
AVFA	90L899	WL/AARI-2	20622	3B
AVFA	90L900	WL/AARI-2	20622	3A
AVFA	90L901	WL/AARI-2	20622	3A

AVFA	91L916	WL/AARF	20023	3A
AVFA	91L923	WL/AARI-2	20622	3A
AVFA	91L931	WL/AAWP-3	20004B	4
AVFA	91L947	WL/AARI-2	20622	4
AVFA	91L959	WL/AARI-2	20622	2
AVFA	92L003	WL/AAWW-3	20620	3A
AVFA	92L004	WL/AAWW-3	20620	4
AVFA	92L032	WL/AAWD-2	20620	3B
AVFA	92L963	WL/AARI-2	20622	3B
AVFA	92L964	WL/AAWD-2	20620	4
AVFA	92L965	WL/AARI-2	20622	3B
AIR VEHICLES - FIXED-FLIGHT SUBSYSTEMS				
AVFF	90L841	WL/FIGDB	20145	3A
AVFF	90L843	WL/POOC-3	20450	4
AVFF	90L858	WL/POOC-3	20450	4
AVFF	90L884	WL/AAAT-3	20146	4
AVFF	90L896	WL/POOS-3	20071B	4
AVFF	91L920	WL/FIVSA	20094	2
AVFF	91L926	WL/POOC-3	20450	3A
AVFF	91L927	WL/POOC-3	20450	3A
AVFF	91L940	WL/POOC-2	20018G	1
AVFF	91L950	WL/FIME	20024C	4
AVFF	91L951	WL/FIME	20024C	4
AVFF	91L952	WL/FIME	20024C	4
AVFF	91L953	WL/FIME	20024C	4
AVFF	92L008	WL/FIME	20025B	2

AVFF	92L019	WL/AAA-2	20146	3A
AVFF	92L021	WL/FIME	20024C	4
AVFF	92L022	WL/FIME	20024C	2
AVFF	92L960	WL/AAAT-3	20146	3A
AVFF	92L966	WL/FIME	20024C	3B
AIR VEHICLES - FIXED - PROPULSION				
AVFP	90L862	WL/POE	20018	2
AVFP	90L864	WL/AAAS-2	20620	2
AVFP	90L874	WL/POSF	20490	4
AVFP	90L877	WL/POM	20435	2
AVFP	90L878	WL/POMO	20435	2
AVFP	92L002	WL/POTC	20018C	4
AVFP	92L007	WL/POSF	20490	1
AIR VEHICLES - FIXED - STRUCTURE				
AVFS	90L898	WL/FIBEC	20065	1
AVFS	92L020	WL/FIBEC	20065	1
ELECTRONIC DEVICES				
ED	90L844	WL/ELO	20022B	3B
ED	90L845	WL/ELO	20620	3A
ED	90L848	WL/ELO	20022B	4
ED	90L856	WL/ELOT	20022B	4
ED	90L868	WL/ELO	20022B	2
ED	91L932	WL/ELR	20620	3B
ED	91L934	WL/ELOS	20022B	4
ED	91L939	WL/ELO	20022B	4
ED	91L941	WL/ELO	20022B	4

Wright Laboratory: Laser Permits

Question 3.1.2

Common Support Function	Permit Number	Organization	Facility	Laser Class
ADVANCED MATERIALS				
AM	81L145	WL/MLPJ	20651	4
AM	81L165	WL/MLLN	20655	3A
AM	81L168	WL/MLSA	20652	2
AM	81L181	WL/MLPJ	20651	4
AM	81L194	WL/MLBP	20654	2
AM	81L345	WL/MLPJ	20071A	3B
AM	82L405	WL/MLLP	20655	3A
AM	82L418	WL/MLPN	20071A	3A
AM	82L425	WL/MLPO	20651	3A
AIR VEHICLES - FIXED-AVIONICS				
AVFA	80L050	WL/AAWP-3	20004B	2
AVFA	80L064	WL/AAWP-3	20004B	4
AVFA	80L075	WL/AAWW	20620	3B
AVFA	80L076	WL/AAWW	20620	2
AVFA	81L137	WL/AARI-2	20622	4
AVFA	81L207	WL/AAWP-3	20004B	3B
AVFA	81L295	WL/AAAI	20620	3A
AVFA	81L299	WL/AAWP-3	20004B	3A
AVFA	81L300	WL/AAWP-3	20004B	3B
AVFA	81L302	WL/AAWP-3	20004B	3B
AVFA	81L303	WL/AAWP-3	20004B	3B
AVFA	81L304	WL/AAWP-3	20004B	3B
AVFA	81L305	WL/AAWP-3	20004B	3B
AVFA	81L306	WL/AAWP-3	20004B	4
AVFA	81L308	WL/AAWP-3	20004B	4
AVFA	81L309	WL/AAWP-3	20004B	3B
AVFA	81L311	WL/XPN	20254	3B
AVFA	81L315	WL/AARI-2	20622	3A
AVFA	81L319	WL/AARI-2	20622	3A
AVFA	82L419	WL/AAWP-3	20004B	4

AIR VEHICLES - FIXED- FLIGHT SUBSYSTEMS				
AVFF	81L359	WL/POOC-3	20450	3A
AVFF	81L360	WL/POOC-3	20450	3A
AVFF	81L361	WL/POOC-3	20450	3B
AVFF	81L363	WL/POOC-3	20450	4
AVFF	81L366	WL/POOC-3	20450	4
AVFF	81L367	WL/POOC-3	20450	4
AVFF	81L374	WL/POOC-3	20450	4
AVFF	81L392	WL/FIVMA	20031	2
AVFF	81L393	WL/FIGS-4	20145	2
AVFF	82L403	WL/FIESE	20191	2
AIR VEHICLES - FIXED - PROPULSION				
AVFP	79L006	WL/POPT	20018C	4
AVFP	79L011	WL/POSF	20018C	4
AVFP	80L073	WL/POTX	20071A	4
AVFP	81L123	WL/POTX	20071A	4
AVFP	81L127	WL/POTX	18E/20	4
AVFP	81L340	WL/POSF	20018C	3A
AVFP	81L342	WL/POSF	20490	4
AVFP	81L343	WL/POTC	20018C	4
AVFP	81L344	WL/POTX	20071A	3B
AVFP	81L347	WL/POTX	20071A	2
AVFP	81L391	WL/POPT	20018C	3B
AIR VEHICLES - FIXED - STRUCTURE				
AVFS	81L264	WL/FIME	20024C	3A
AVFS	79L029	WL/FIBGB	20045	4
AVFS	81L253	WL/FIBGB	20045	3A
AVFS	81L258	WL/FIME	20024C	4
AVFS	81L259	WL/FIME	20024C	4
AVFS	81L262	WL/FIME	20024C	4
AVFS	81L266	WL/FIME	20024C	3A
AVFS	81L267	WL/FIME	20024C	3B
AVFS	81L268	WL/FIME	20024C	4
AVFS	82L421	WL/FIME	20025C	4

ELECTRONIC DEVICES				
ED	79L032	WL/ELO	20022B	3A
ED	79L034	WL/ELO	20022B	3A
ED	80L077	WL/ELR	20620	3A
ED	81L139	WL/ELR	20620	4
ED	81L140	WL/ELR	20620	2
ED	81L198	WL/ELO	20022B	3A
ED	81L199	WL/ELO	20022B	3A
ED	81L203	WL/ELO	20022B	3A
ED	81L209	WL/ELO	20620	3A
ED	81L213	WL/ELR	20620	4
ED	81L214	WL/ELO	20022B	3A
ED	81L216	WL/ELO	20022B	3B
ED	81L217	WL/ELO	20022B	3B
ED	81L221	WL/ELO	20022B	3A
ED	81L227	WL/ELO	20022B	3A
ED	81L228	WL/ELO	20022B	3A
ED	81L229	WL/ELO	20022B	3A
ED	81L230	WL/ELO	20022B	3A
ED	81L232	WL/ELO	20022B	3B
ED	81L233	WL/ELO	20022B	3B
ED	81L234	WL/ELO	20022B	3B
ED	81L235	WL/ELO	20022B	3B
ED	81L236	WL/ELO	20022B	3B
ED	81L237	WL/ELO	20022B	4
ED	81L238	WL/ELO	20022B	3B
ED	81L240	WL/ELR	20620	3B
ED	81L244	WL/ELO	20022B	3B
ED	81L245	WL/ELO	20022B	3A
ED	81L249	WL/ELO	20022B	4
ED	81L250	WL/ELO	20022B	3B
ED	81L272	WL/ELR	20620	3A
ED	81L274	WL/ELR	20620	4
ED	81L276	WL/ELR	20620	3A
ED	81L279	WL/ELR	20620	4

Wright Laboratory Laser Permits

Question 3.1.2

Common Support Function	Permit Number	Organization	Facility	Laser Class

ADVANCED MATERIALS				
AM	82L426	WL/MLPO	20651	3A
AM	82L427	WL/MLPO	20651	4
AM	83L464	WL/MLPO	20651	2
AM	83L480	WL/MLPJ	20651	2
AM	83L487T	WL/MLPJ	20071A	4
AM	85L548	WL/MLPJ	20651	2
AM	85L552	WL/MLPJ	20651	3A
AM	85L566	WL/MLBT	20654	2
AM	85L567A	WL/MLLN	20655	3A
AM	85L575	WL/POPT	2001BC	4
AM	85L581A	WL/MLBP	20654	1
AM	85L581B	WL/MLBP	20654	1
AM	86L586	WL/MLPO	20651	4
AM	86L587A	WL/MLPO	20651	2
AM	86L587B	WL/MLPO	20651	2
AIR VEHICLES - FIXED-AVIONICS				
AVFA	82L429	WL/AAWW	20620	3A
AVFA	83L457	WL/XPN	20254	4
AVFA	83L461	WL/AAWP-3	20004B	4
AVFA	85L527	WL/AAWW-4	20620	2
AVFA	85L576	WL/AARI-2	20622	3A
AVFA	85L577	WL/AARI-2	20622	2
AVFA	86L582	WL/AAW	20620	2
AVFA	86L593	WL/AAWP-3	20004B	3B
AIR VEHICLES - FIXED- FLIGHT SUBSYSTEMS				
AVFF	82L432	WL/POOC-3	20450	4
AVFF	83L468	WL/AAI	20620	3B
AVFF	83L471	WL/POOC-3	20450	4
AVFF	83L475	WL/AAAT-3	20146	3A
AVFF	83L483	WL/AAAT-3	20146	3B
AVFF	85L535	WL/POOS-2	20018A	2
AVFF	85L538	WL/POOC-3	20450	4
AVFF	85L539	WL/POOC-3	20450	4
AVFF	85L541	WL/POOC-3	20450	4
AVFF	85L542	WL/POOC-3	20450	4
AVFF	85L555	WL/POSF	20018C	4

AIR VEHICLES - FIXED - PROPULSION				
AVFP	83L472	WL/POSF	20490	4
AIR VEHICLES - FIXED - STRUCTURE				
AVFS	85L564	WL/FIME	20024C	2
AVFS	85L565	WL/FIME	20455	4
ELECTRONIC DEVICES				
ED	82L452	WL/ELR	20620	3A
ED	83L465	WL/ELO	20022B	2
ED	83L466	WL/ELO	20022B	2
ED	83L467	ELO	20022B	2
ED	85L543	WL/ELO	20022B	4
ED	85L550	WL/ELR	20620	4
ED	85L559	WL/ELO	20022B	3A
ED	85L560	WL/ELO	20022B	3B
ED	85L562	WL/ELO	20620	3A
ED	86L584	WL/ELO	20022B	4
ED	86L585	WL/ELR	20620	2

Wright Laboratory: **Laser Permits**

Question 3.1.2

Common Support Function	Permit Number	Organization	Facility	Laser Class
ADVANCED MATERIALS				
AM	86L598	WL/MLPJ	20651	3A
AM	86L612	WL/MLPO	20651	2
AM	87L632	WL/MLBT	20654	2
AM	87L639A	WL/MLPJ	20651	3A
AM	87L639D	WL/MLPJ	20071A	3A
AM	87L649	WL/MLPO	20651	4
AM	87L650	WL/MLPO	20651	4
AM	87L657	WL/MLLP	20655	4
AM	88L665	WL/MLPJ	20651	4
AM	88L677	WL/MLBT	20654	1
AM	88L678	WL/MLPJ	20071A	3A
AM	88L681A	WL/MLLN	20655	3A
AM	88L681B	WL/MLLN	20655	3A
AM	88L682	WL/MLLM	20655	1
AM	89L718	WL/MLLN	20655	3A
AM	89L719	WL/MLLN	20655	3A
AM	89L721	WL/MLPJ	20651	4
AM	89L722	WL/MLPJ	20651	3B
AM	89L724	WL/MLPJ	20651	2
AM	89L725	WL/MLPJ	20651	2
AM	89L726	WL/MLPJ	20651	3A
AM	89L727	WL/MLPJ	20651	3B
AM	89L728	WL/MLPO	20651	4
AM	89L730	WL/MLPO	20651	2
AIR VEHICLES - FIXED-AVIONICS				
AVFA	87L644	WL/AAWP-3	20004B	4
AVFA	87L652	WL/AARI-2	20622	4
AVFA	87L655	WL/AAWW	20620	3B
AVFA	88L670	WL/AAAI	20620	2
AVFA	88L673	WL/AARI	20622	3A
AVFA	88L674	WL/AARI	20622	3A
AVFA	88L696	WL/AAWP-3	2000FB	3A

AVFA	88L697	WL/AAWP-3	20004B	3B
AVFA	89L715	WL/AAWP-3	20004B	4
AVFA	89L734	WL/AAWP-3	20004B	3B
AVFA	89L735	WL/AAWP-3	20004B	2
AIR VEHICLES - FIXED- FLIGHT SUBSYSTEMS				
AVFF	86L615	WL/POOC	20450	4
AVFF	86L620	WL/POOC	20450	4
AVFF	86L627	WL/POOC-3	20450	4
AVFF	86L628	WL/POOC-3	20450	4
AVFF	88L669	WL/AAAT-3	20146	3B
AVFF	88L683	WL/POOC-3	20450	4
AVFF	88L691	WL/FIMEB	20024C	3A
AVFF	88L707	WL/FIGD	20145	1
AVFF	89L717	WL/AAAT-3	20146	3B
AVFF	89L732	WL/POOC-3	20450	2
AVFF	89L733	WL/POOC-3	20450	4
AIR VEHICLES - FIXED - PROPULSION				
AVFP	86L625	WL/POTC	20018C	4
AVFP	86L626	WL/POTC	20018C	4
AVFP	87L660	WL/POTX	18E/20A	4
AVFP	88L690	WL/POSF	20071B	3B
AVFP	89L731	WL/POPT	20018C	3B
AVFP	88L702	WL/FIVMA	20031	1
AIR VEHICLES - FIXED - STRUCTURE				
AVFS	87L659	WL/FIBGB	20045	3A
ELECTRONIC DEVICES				
ED	87L634	WL/ELO	20022B	3B
ED	87L635	WL/ELO	20022B	4
ED	87L636	WL/ELO	20022B	3A
ED	87L637	WL/ELO	20620	3A
ED	87L647	WL/ELR	20620	4
ED	87L648	WL/ELR	20620	4
ED	87L654	WL/ELR	20620	3A
ED	88L661	WL/ELO	20022B	4
ED	88L662	WL/ELO	20022B	3B

ED	88L666	WL/ELR	20620	4
ED	88L667	WL/ELR	20620	4
ED	88L668	WL/ELR	20620	2
ED	88L687	WL/ELO	20022B	2
ED	88L699	WL/ELO	20022B	4
	88L695	WL/AAWP-3	20004B	3B

Wright Laboratory Laser Permits

Question 3.1.2

Common Support Function	Permit Number	Organization	Facility	Laser Class
ADVANCED MATERIALS				
AM	89L737	WL/MLPJ	20651	4
AM	89L738	WL/MLPJ	20651	2
AM	89L739	WL/MLPJ	20651	2
AM	89L740	WL/MLPO	20651	3b
AM	89L741	WL/MLPO	20651	2
AM	89L742	WL/MLPO	20651	2
AM	89L743	WL/MLPO	20651	3a
AM	89L746	WL/MLPJ	20561	4
AM	89L748	WL/MLPJ	20651	2
AM	89L749	WL/MLPJ	20651	2
AM	89L750	WL/ELR	20620	4
AM	89L754	WL/MLLN	20655	2
AM	89L758	WL/MLPO	20651	4
AM	89L769	WL/MLPJ	20071A	4
AM	89L773	WL/MLPO	20651	3b
AM	89L774	WL/MLPO	20651	3b
AM	89L775	WL/MLPJ	20651	2
AM	89L776	WL/MLPJ	20651	2
AM	89L781	WL/MLBT	20654	4
AM	89L784	WL/MLPJ	20651	4
AM	89L785	WL/MLPJ	20071A	3a
AM	89L788	WL/MLPJ	20651	3a
AM	89L789	WL/MLPJ	20651	3a
AM	90L795	WL/MLPJ	20651	3b
AM	90L796	WL/MLPJ	20651	3b
AM	90L797	WL/MLPJ	20651	2
AM	90L798	WL/MLPJ	20651	3a
AM	90L799	WL/MLPO	20651	4
AM	90L800	WL/MLPO	20651	1
AM	90L803	WL/MLPJ	20651	1
AM	90L807	WL/MLPJ	20651	2
AM	90L808	WL/MLPJ	20651	2
AM	90L817	WL/MLPO	20651	4
AM	90L818	WL/MLPJ	20651	2

AM	90L831	WL/MLBT	20654	1
AM	90L832	WL/MLLM	20655	1
AIR VEHICLES - FIXED-AVIONICS				
AVFA	89L760A	WL/AAAI-2	20620	3b
AVFA	89L760B	WL/AAAI-2	20620	3b
AVFA	89L767	WL/AARF	20023	3a
AVFA	89L770	WL/AAWP-3	20004B	4
AVFA	89L778	WL/XPN	20254	4
AVFA	90L821	WL/AARI-2	20622	4
AVFA	90L822	WL/AARI-2	20622	3a
AIR VEHICLES - FIXED- FLIGHT SUBSYSTEMS				
AVFF	89L756	WL/AAAT-3	20146	2
AVFF	89L780	WL/FIME	20024C	2
AVFF	90L793	WL/FIVSA	20191	3a
AVFF	90L802	WL/FIVEC	20045	3b
AVFF	90L815	WL/POOC-3	20450	4
AVFF	90L816	WL/POOC-3	20450	4
AVFF	90L823	WL/POTC	20018C	3a
AVFF	90L830	WL/POOC-3	20450	2
AIR VEHICLES - FIXED - PROPULSION				
AVFP	90L810	WL/POTX	20018E	4
AVFP	90L811	WL/POTX	20071A	3b
AVFP	90L812	WL/POTX	20071A	3b
AVFP	90L813	WL/POTX	20071A	3b
AVFP	90L814	WL/POTX	20071A	3b
AVFP	90L824	WL/POTC	20018C	3b
AVFP	90L827	WL/POPT	20018C	4
AVFP	90L828	WL/POPT	20018C	4
AVFP	90L829	WL/POPT	20018C	4
AIR VEHICLES - FIXED - STRUCTURE				
AVFS	89L786	WL/FIBEC	20065	3b
AVFS	90L794	WL/FIBGB	20045	3b
ELECTRONIC DEVICES				
ED	89L736	WL/ELO	20022B	3b

ED	89L751	WL/ELO	2022B	3b
ED	89L752	WL/ELO	20620	3b
ED	89L763	WL/ELO	20022B	3a
ED	89L766	WL/ELO	20022B	3a
ED	90L805	WL/ELR	20620	3b
ED	90L806	WL/ELR	20620	4
ED	90L819	WL/ELO	20022B	4

Wright Laboratory: Safety

Question 3.1.2

Common Support Function	Permit Number	Organization	Facility	Titl
ADVANCED MATERIALS				
AM	ML654-20	WL/MLBT	654/152	FLUID AND LUBRICA
AM	ML654-21	WL/MLBT	654/122	FLUID AND LUBRICA
AM	ML654-22	WL/MLBT	654/121	LUBRICANT EVALUA
AM	ML654-23	WL/MLBT	654/124	FLUID AND LUBRICA
AM	ML654-24	WL/MLBT	654/123	FLUID AND LUBRICA
AM	ML654-25	WL/MLBT	654/131	FLUID ANALYSIS
AM	ML654-26	WL/MLBT	654/133	ELASTOMERIC SEAL
AM	ML654-27	WL/MLBT	654/134	MATERIALS RESEAR(
AM	ML654-28	WL/MLBT	654/148	TRIBOLOGICAL MAT. DEPOSITION AND EV
AM	ML654-5	WL/MLBT	654/31C	HYDRAULIC FLUID A EVALUTION
AM	ML654-3	WL/MLBT	654/31A	HYDRAULIC FLUID E
AM	ML654-2	WL/MLBT	654/31	HYDRAULIC FLUID E
AM	ML654-1	WL/MLBT	654/35	SAMPLE PREPARATI(
AM	ML654-4	WL/MLBT	654/31B	HYDRAULIC FLUID E
AM	ML654-6	WL/MLBT	654/119	LUBRICANT EVALUA
AM	ML654-7	WL/MLBT	654/147A,147B	LUBRICANT EVALUA LAB
AM	ML654-8	WL/MLBT	654/120	LUBRCANT EVALUA'
AM	ML654-9	WL/MLBT	654/03	TESTING, COMPOUNI ON ELASTOMERS
AM	ML654-10	WL/MLBT	654/04	TESTING COMPOUNI ON ELASTOMERS
AM	ML654-12	WL/MLBT	654/32	TESTING, COMPOUNI EVALUATION ON EL/
AM	ML654-12	WL/MLBT	654/33	TESTING, COMPOUNI EVALUATION ON EL/
AM	ML654-13	WL/MLBT	654/14	FLUID ANALYSIS
AM	ML654-14	WL/MLBT	654/102	FLUID ANALYSIS
AM	ML654-15	WL/MLBT	654/103	ELASTOMER SEAL TI
AM	ML654-16	WL/MLBT	654/104	SPACE COMBINED EF TEST & RESEARCH E(

AM	ML654-17	WL/MLBT	654/149	FLUID CONTACTS
AM	ML654-18	WL/MLBT	654/150	FLUID ANALYSIS
AM	ML654-151	WL/MLBT	654/151	FLUID AND LUBRICA
AM	ML5-02	WL/MLLP	655/167	LASER INTERFEROM
AM	ML5-01	WL/MLLP	655/159	ULTRAFAST LASER-(ULTRASOUND LAB
AM		WL/MLLM	655/193	REACTIVE SINTERIN(
AM	MX-6700	WRDC/MLLN	655/024,026,028,030,034,036,038,040, 134	FATIGUE LABORATO
AM	MX-6681	WL/MLSE	653/5	CYLINDER STORAGE
AM		WL/MLPJ	651/183,184	FABRICATION AND D LABORATORY
AM	MX-6640	WL/MLLS	32	HIGH TEMPERATURE
AM	MX-6580D	WL/MLSA	450/021	EMISSION SPECTROS LABORATORY
AM	MX-6580E	WL/MLSA	450/021	NFARED SPECTROSC(
AM	MX-6580F	WL/MLSA	450/021	ASSORPTION LABOR. PREPARATION AREA
AM	MX-6580G	WL/MLSA	450/021	MRF & FTIR LABORA'
AM	MX-5679	WL/MLSA	652/117,145	COMPOSITES LABOR.
AM	MX-6516	WL/MLSA	652/G13, G17, G19	ENGINEERING DESIG
AM	MX-6580G	WL/MLSA	450	XRF AND FTIR LABOI
AM	MX-6580A	WL/MLSA	450	INTERSTITIAL GAS A LABORATORY
AM	MX-6580C	WL/MLSA	450	ANALYTICAL LABOR
AM	MX-6580	WL/MLSA	450/021	CHEMICAL IONIZATI(SPECTROMETER LAB
AM	MX-6580B	WL/MLSA	450	ANALYSIS LABORAT'
AM	MX-6580D	WL/MLSA	450	EMISSION SPECTROS LABORATORY
AM	MX-6580E	WL/MLSA	450	C.H.N. ANALYSIS LAI
AM	MX-6580F	WL/MLSA	450	SAMPLE PREPARATI(
AM	MX-6611	WL/MLSA	652/17, 47, 48	ELECTRONIC FAILUR
AM	MX-6509	WL/MLSA	652/38, 27	ULTASONIC AND EDI
AM	MX-6510	WL/MLSA	652/39	PENETRATE AND MA
AM	MX-6511	WL/MLSA	652/40	RADIOGRAPHY
AM	MX-6507	WL/MLSA	652/18, 49	CORROSION LABORA
AM	MX-6508	WL/MLSA	652/19, 20, 50	COATINGS AND TEST
AM	MX-6537	WL/MLLM	450/B011	CREEP TEST FACILIT

AM	MX-6501	AFWAL/MLPJ	71A/B-BAY	LASER HARDENED M EVALUATION (LHME
AM	MX-6681	WL/MLI	653/10A	CHEMICAL/HAZARD(ROOM
AM		WL/MLSE	652/146	FLUID ANALYSIS
AM		WL/MLSE	652/118	FLUID ANALYSIS
AM	MX-6603	WL/MLPO	651/261, 262	OPTICAL EVALUATIC CHARACTERIZATION WINDOW AND IR TR/ MATERIALS
AM	MX-6514	WL/MLSA	20A	RAIN EROSION RESIS MATERIALS
AM	MX-6506	WL/MLSA	652/28, 30, 31	METALS PREPARATI(ANALYSIS)
AM	MX-6603	AFWAL/MLPO	651/262, 261	OPTICAL EVALUATIC CHARACTERIZATION WINDOW AND IR TR/ MATERIALS
AM	MX-6504	AFWAL/MLPO	651/192, 173, 174	ELECTRO-OPTICAL M
AM	MX-6680	WL/MLI	653/11A	CHEMICAL STORAGE
AM	MX-6622	WL/MLIF	653/12	MAINTENANCE SHOI
AM	MX-6623	WL/MLIF	655/104, 137, 139	PME/INSTRUMENTA1
AM	MW-6621	WL/MLIF	655/104, 137, 139	PME/INSTRUMENTA1
AM	MX-6622	WL/MLSF	653	MAINTENANCE SHOI
AM	MX-6680	WL/MLS	653/6	CHEMICAL STORAGE
AM	MX-6681	WL/MLS	653/6	VENDOR STORAGE R
AM	MX-6611	WL/MLSA	652/17, 47, 48	FAILURE ANALYSIS
	MX-5616	WL/MLSE	652/G13, G17, G18	ENGINEERING AND I
	MX-6573	WL/MLSE	652/117, 145	COMPOSITES LABOR
	MX-6611	WL/MLSA	652	ELECTRONIC FAILUR
	MX-6624	WL/MLSE	652/28, 30, 31	METALS PREPERATI(ANALYSIS)
	MX-6507	WL/MLSA	652/18, 49 .	CORROSION LABORA
	MX-6668	WL/MLSA	652/19, 20, 50	COATING AND TESTI
	MX-6509	WL/MLSA	652/38, 27	ULTRASONICS AND I
	MX-6519	WL/MLSA	652/39	PENETRANT AND EL1 PARTICLE
	MX-6511	WL/MLSA	652/40	RADIOGRAPHY
	MX-6589	WL/MLSA	450/B021	CHEMICAL TONIZAT1 SPECTOMETER LABC
	MX-6580A	WL/MLSA	450/B021	CAN'T READ

MX-6580B	WL/MLSA	450/B021	MICRO ELEMENTAL LABORATORY
MX-6580C	WL/MLSA	450/B021	ANALYTICAL LABOR

Wright Laboratory: Safety

Common Support Function	Permit Number	Organization	Facility	Titl
AIR VEHICLES - FIXED-AVIONICS				
AVFA	AAA-01	WL/AAAI-2	356	LASER COMMUNICA
AVFA	AAA-02	WL/AAAI-4	620/S3P35	COMMUNICATION S
AVFA	AAA-03	WLAAAF-1	620/S3M56	EMBEDDED COMPUT
AVFA	AAA-04	WL/AAAS-2	620/S3P66	VHSIC AVIONIC MOD
AVFA	AAA-05	WL/AAAS-2	620/S3M60	HARRIS H/W & S/W M
AVFA	AAA-06	WL/AAAF-1	620/S3M54	NON-REAL TIME SOF
AVFA	AAA-08	WL/AAAI-2	12TH FLOOR/C1V72	LASER COMMUNICA
AVFA	AAA-11	WL/AAA-1	110 & 450 & 620	SATELLITE COMMUN
AVFA	AAA-12	WL/AAAS-2	620/S3N68	INTEGRATED TEST B
AVFA	AAA-14	WL/AAAT	620/S3M37 &S3M43	INFORMATION PROC
AVFA	AAAW-03	WL/AAWD-2	620/10TH FLOOR	ADVANCED IR SEEKI
AVFA	AAAW-04	WL/AAWP-3	EO MEASUREMENT FACILITY	ELECTRO-OPTICAL M
AVFA	AAR-01	WL/AARM	22/H104	RADAR ANALYSIS &
AVFA	AAR-02	WL/AARF-2	23/208	SENSOR MODELING,
AVFA	AAR-03	WL/AARF-2	18F MEZZANINE	THERMOTRON ENVI
AVFA	AAR-04	WL/AARI-2	622/127 &110	ELECTRO-OPTICAL S
AVFA	AAR-05	WL/AARI-2	OPTICAL RESEARCH LABORATORY	BEAM AGILITY TECH
AVFA	AAR-06	WL/AARF	23/119	AVIONICS SENSORS I
AVFA	AAR-07	WL/AART	22/H-107	
AVFA	AAR-08	WL/AARI-3	EQ SENSOR EVALUATION MOBILE & TOWER TEST FACILITIES	SENSOR PERFORMAN
AVFA	AAR-09	WL/AARF-2	DYNAMIC ANALYZER - TESTING CHAMBER	
AVFA	AAR-10	WL/AARI-2	100 INCH COLLIMATOR FACILITY	BEAM AGILITY TECH

AVFA	AAR-11	WL/AARF-3	3-D SCANNER	3-D SCANNING OF M(
AVFA	AAR-14	WL/AARA	123/218	SEQAL I VAX COMUT
AVFA	AAR-15	WL/AARA	23/224	SEQAL II VAX COMPU
AVFA	AAR-16	WLAARI-2	622/126A	LASER TEST BED
AVFA	AAR-17	WL/AARI-3	VARIABLE PARAMETER FLIR LABORATORY	ADVANCED FLIR SYS
AVFA	AAW-01	WL/AAWW-2	EWAC	EWAC TECHNIQUES I
AVFA	AAW-02	WL/AAWP-3	AREA C	TURNTABLE LASER (
AVFA	AAW-05	WL/AAWP-2	HANGAR 4F	ELECTRONICS DEVE
AVFA	AAW-06	WL/AAWW-2	EWAC	SADS-VI/MONOPULS
AVFA	AAW-07	WL/AAWP-3	HANGER 4B	IR WARNING RECEIV
AVFA	AAW-08	WL/AAWA-2	620/S1D34	ELECTRONIC DEFEN
AVFA	AAW-09	WL/AAWA-2	620/S1D34	DYNAMIC ELECTRO
AVFA	AAW-10	WL/AAWA-1	620	ELECTRONIC WARFA
AVFA	AAW-11	WL/AAWA-1	620	ELECTRONIC COMBA
AVFA	AAW-12	WL/AAWP-1	620/S2D22	ESM PROCESSING TE
AVFA	AAW-13	WL/AAWW-3	620/S2F13	E-O IN-HOUSE SUPPC
AVFA	AAW-17	WL/AAWP-1	620/S2F31	RECEIVERS CONCEP
AVFA	AAW-19	WL/AAW-19	AAD	TEST & EVALUATIO SYSTEM
AVFA	AAW-20	WL/AAWP-2	HANGAR 4B TEST FACILITY	RADAR & MICROWA
AVFA	AAW-21	WL/AAWA-2	620/S1D12	INTEGRATED DEFEN
AVFA	AAW-22	WL/AAWP-2	HANGAR 4A	INTEGRATED CIRCU
AVFA	AAW-23	WL/AAWP-2	HANGAR 4A	FABRICATION SHOP
AVFA	AAW-24	WL/AAWW-2	620/S1Z22	DIGITAL RF MEMOR
AVFA	AAW-25	WL/AAWW-2	620/VAULT 3.5	SPREAD SPECTRUM (
AVFA	AAW-26	WL/AAWW-1	620/S1Z22	ADVANCED RF COU
AVFA	AAW-28	WL/AAWW-3	S2F9	EOSAS TEST FACILIT
AVFA	AAW-29	WL/AAWA-1	620/V1.6	EWSAF
AVFA	XPN-03	WL/XPN	254	IR MEASUREMENTS
AIR VEHICLES - FIXED- FLIGHT SUBSYSTEMS				
AVFF	86-43	WL/POOC-3	450/D109	MICROWAVE EXITA
AVFF	APL 86-54	WL/POOC-3	450/D120	PLASMA/FLAME DIA
AVFF	APL 87-22	WL/POOS-2	18/14	CYCLE-LIFE EVALUA
AVFF	APPD 85-37	WL/POOC-3	450/D06	ELECTRON IMPACT (
AVFF	APPD 86-24	WL/POOC-3	450/D111,D113	INFRARED SPECTRO
AVFF	APPD 86-28	WL/POSF	450/E130	ADVANCED OPTICAL
AVFF	APPD 86-29	WL/POOC-3	450/D011,123	SPECTROSCOPY OF B

AVFF	APPD 86-46	WL/POOC-3	450/D104	DRIFT TUBE EXPERI
AVFF	APPD 87-26	WL/POOC-3	450/B025G	ELECTRON BEAM DI
AVFF	APPD 88-2	WL/POOC-3	450/D001,D121	ENERGY CONVERSIC
AVFF	APPD 89-1	WL/POOX-2	450	HIGH VOLTAGE DIEL
AVFF	APPD 89-2	WL/POOX-2	450	HIGH ENERGY PULSI
AVFF	APPD 89-3	WL/POOX-3	450	HIGH ENERGY PULSI
AVFF	APPD 89-4	WL/POOX-2	450	PULSED CAPACITOR
AVFF	APPD 90-11	WL/POOC-3	450/D107	DIAMOND THIN FILM
AVFF	APPD 91-8	WL/POOX	450/BASEMENT	PARTIAL DISCHARGI
AVFF	APPD 92-5	WL/POOS-3	71B/H-BAY	AIRCRAFT ENVIRONI
AVFF	APPD 93-3	WL/POOC-1	18B/13,15 &15A	ELECTRICAL LABOR
AVFF	APPD 93-8	WL/POOS-3	18G/042	THERMAL LAB
AVFF	APPL 86-24	WL/POOC-3	450/D111,D111A	HIGH RESOLUTION I
AVFF	APPL 87-18	WL/POOC-3	450/D106	ELECTRON GUN TES
AVFF	APPL 87-30	WL/POOC-3	450/115,116,D-WING	HIGH RESOLUTION M
AVFF	APPL 87-33	WL/POOC-2	18B/16	THERMIONICS, DIAM
AVFF	APPL 87-34	WL/POOC-3	450/D103	HIGH POWER SOURC
AVFF	APPL 89-6	WL/POOC-4	450//B08,B019,B020	SUPERCONDUCTING
AVFF	APPL 90-14	WL/POOC-3	71B/H-BAY	AMMONIA (NH3) HE
AVFF	D05	WL/FIGD	145	FIGHTER-BOMBER SI
AVFF	D05	WL/FIGD	145	FIGHTER-BOMBER SI
AVFF	FI--VST01	WL/FIVST	255	VALIDATION PROCE
AVFF	FIG-D02	WL/FIGD	145	MULTI-CREW SIMUL
AVFF	FIG-D06	WL/FIGD	145	SIMULATION FOR PA
AVFF	FIG-L01	WL/FIGL	JEFFERSON,IN	PREFLIGHT & FLIGH
AVFF	FIG-L02	WL/FIGL	145	
AVFF	FIP-01	WL/FIP	INTEG LAB	COCKPIT CONCEPT E
AVFF	FIP-02	WL/AAA-2	DISPLAY TEST & EVAL LAB	DISPLAY TEST & EV
AVFF	FIP-03	WL/AAA-2	LASER OPTS FACILITY	LASER-BASED DISPL
AVFF	FIV-M01	WL/FIEMB	MOBILITY DEVELOPMENT LABORATORY	ALL TERRAIN CRASH
AVFF	GD-06	WL/FIGD	145	MISSION SIMULATOR
AVFF	LXS-423	WL/FIGD	145	LAMARS (LARGE AM
AVFF	MS-03	WL/FIVST	AIRCRAFT SURVIVABILITY RESEARCH FACILITY	RANGE 3 VERTICAL

AVFF	MS-04	WL/FIVST	AIRCRAFT SURVIVABILITY RESEARCH FACILITY	RANGE 4 HYPERVEL(
AVFF	NEW4	WL/FIVRA	HYDRAULIC SIMULATOR	N/A
AVFF	VE-01	WL/FIVEC	45	ENVIROMENTAL REI
AVFF	VE-03	WL/FIVE	45 ANNEX	THERMAL & VIBRAT
AVFF	VE-04	WL/FIVEA	45 ANNEX, TAVLAB	MICROENCAPSULAT.
AVFF	VE-12	WL/FIVEA	TAVLAB	HELICAL COIL PHYS]
AVFF	VM01-1	WL/FIVMA	LANDING GEAR TEST FACILITY	DROP TEST MACHINI
AVFF	VM01-2	WL/FIMMA	LANDING GEAR TEST FACILITY	DROP TEST MACHINI
AVFF	VM01-3	WL/FIVMA	LANDING GEAR TEST FACILITY	DROP TEST MACHINI
AVFF	VM01-4	WL/FIVMA	LANDING GEAR TEST FACILITY	DROP TEST MACHINI
AVFF	VM02	WL/FIVMA	LANDING GEAR TEST FACILITY	DROP TEST MACHINI
AVFF	VM03	WL/FIVMA	LANDING GEAR TEST FACILITY	FLAT SURFACE TIRE
AVFF	VM04	WL/FIVMA	LANDING GEAR TEST FACILITY	PREROTATION DEVI(
AVFF	VM05	WL/FIVMA	LANDING GEAR TEST FACILITY	LANDING GEAR TES]
AVFF	VM06	WL/FIVMA	LANDING GEAR TEST FACILITY	HD KK160 TIRE ANAI
AVFF	VM07-1	WL/FIMVA	LANDING GEAR TEST FACILITY	VARIABLE INERTIA I
AVFF	VM07-2	WL/FIMVA	LANDING GEAR TEST FACILITY	VARIABLE INERTIA I
AVFF	VM07-3	WL/FIMVA	LANDING GEAR TEST FACILITY	VARIABLE INERTIA I
AVFF	VM08	WL/FIMVA	LANDING GEAR TEST FACILITY	84" VARIABLE INERT
AVFF	VM09	WL/FIMVA	LANDING GEAR TEST FACILITY	MTS HYDRAULIC SH.
AVFF	VR-01	WL/FIVR	COUPON TEST FACILITY	MISSION INTEGRATE WINDOW STUDY

AVFF	VS-06	WL/FIVS	AIRCRAFT ENGINE NACELLE FIRE TEST SIMULTOR (AENFTS)	HALON REPLACEME
AVFF		WL/POOS-3	18G/044	JET IMPINGEMENT/S
AVFF		WL/POOS	18G/041-046	THERMAL ENERGY S
AVFF		WL/FIVEA	45 ANNEX	ADVANCED HEAT EX
AVFF		WL/FIVSA	AIRCRAFT SURVIVABILITY RESEARCH FACILITY	RANGE 1 CIMULATIC
AIR VEHICLES - FIXED - PROPULSION				
AVFP	APL 86-42	WL/POTX	450/C-012,C013	TURBOMACHINERY I
AVFP	APL 86-52	WL/POSF	490/154	HYDROGENATION RI
AVFP	APL 86-61	WL/POSL	490/222,232,234,235	TURBINE ENGINE LU
AVFP	APL 86-62	WL/POSL	490/227-230	TURBINE ENGINE LU
AVFP	APL 86-63	WL/POSL	490/225,226,232,233	TURBINE ENGINE LU
AVFP	APL 87-12	WL/POPT	18E/23	FLOW VISUALIZATIC
AVFP	APL 87-25	WL/POSL	490/127	30,000 RPM BEARING
AVFP	APL 87-7	WL/POSF	490/204	CHEMICAL AND SOL
AVFP	APL 88-3	WL/POSF	71B/H/I-BAY	COMBUSTION RESEA
AVFP	APPD	WL/POSF	490/151	NOX SAMNIING OF H
AVFP	APPD 87-14	WL/POSF	18C/20	SPRAY/COMBUSTION
AVFP	APPD 86-52	WL/POSF	490/154	SINGLE TUBE HEAT I
AVFP	APPD 86-53	WL/POSF	490	REDUCED SCALE FUI
AVFP	APPD 86-56	WL/POTC	18C/21	FREE JET HEAT TRAN
AVFP	APPD 86-57	WL/POTX		CRF OPERATIONS
AVFP	APPD 87-10	WL/POSF	490/206	FUEL EVALUATION /
AVFP	APPD 87-13	WL/POSF	450/B034	ADVANCED LASER D
AVFP	APPD 87-23	WL/POSF	490/148	FUEL/FILTERING/CL/
AVFP	APPD 87-28	WL/POTX	71A/A-3	CRF STRUCTURES LA
AVFP	APPD 87-3	WL/POSF	490/137	FUEL EVALUATION /
AVFP	APPD 87-32	WL/POSF	490/160	ACCELERATED FUEL
AVFP	APPD 87-9	WL/POSF	490/122	HAZARDOUS WASTE LAB"
AVFP	APPD 88-3	WL/POSF	71B/I203	COMBUSTION RESEA
AVFP	APPD 90-13	WL/POSF	490/152	FUEL THERMAL STA
AVFP	APPD 90-5	WL/POTC	20A	GE 90 BLADE IMPAC

AVFP	APPD 91-1	WL/POSX	92	FUELS & LUBRICANT
AVFP	APPD 91-2	WL/POSF	352	RESEARCH & DEVEL
AVFP	APPD 91-5	WL/POSL	490/129	HIGH SPEED/HIGH TE
AVFP	APPD 91-6	WL/POSF	490/108	JP-7 ENDOTHERMIC (
AVFP	APPD 91-6	WL/POSF	490/108	JP-7 ENDOTHERMIC (
AVFP	APPD 91-7	WL/POPT	18E/CELL 22	HYDROGEN FUELED
AVFP	APPD 92-1	WL/POSF	490/208	(1)FALEX ISOTHERM SPECTROPHOTOMET
AVFP	APPD 92-10	WL/POME	20A	WIND TUNNEL BLAD
AVFP	APPD 92-3	WL/POSL	490/231	TURBINE ENGINE LU
AVFP	APPD 92-6	WL/POSL	490/147	T-63 TURBOSHAFT SI
AVFP	APPD 92-7	WL/POPT	18C/19	SUPERSONIC COMBU
AVFP	APPD 92-8	WL/POSF	490/145	LOW TEMP FUEL TAN
AVFP	APPD 92-8	WL/POSF	490/151	HALON COMBUSTIO
AVFP	APPD 92-9	WL/POSF	490/207	NICOLET FTIR
AVFP	APPD 93-1	WL/POTC	71B/J-BAY	ADVANCED TURBINE
AVFP	APPD 93-2	WL/POSF	490/105	OPTICAL CELL/THER
AVFP	APPD 93-3	WL/POSF	490/152	STUDIES OF THE VER
AVFP	APPD 93-5	WL/POSL	490/134	T63 OVERHAUL/PART
AVFP	APPD 93-6	WL/POSL	490/133	FACILITY EQUIPMEN
AVFP	APPD 93-7	WL/POTC	252	COUNTER ROTATING
AVFP	APPD 94-1	WL/POSF	490/108	ADVANCED DIAGNO
AVFP	APPL 86-22	WL/POPT	18C/18	ADVANCED AIR BRE
AVFP	APPL 86-34	WL/POSL	490/136	HIGH PRESSURE VIS(
AVFP	APPL 86-35	WL/POSL	490/133	OPTICAL EHD RIG
AVFP	APPL 86-40	WL/POSL	490/131	AUTOMATED J57 EN(
AVFP	APPL 86-64	WL/POTX	18E/24	TEST ANALYSIS TEC
AVFP	APPL 87-5	WL/POSF	490/236	FUEL EVALUATION &
AVFP	APPL 87-8	WL/POSF	490/205	FUEL EVALUATION /
AVFP	APPL 90-1	WL/POSL	49/124	1)BALL-ROD ROLLIN TESTS
AVFP	APPL 90-15	WL/POPT	18C/TEST CELL 18	RAMJET COMPONENT
AVFP	APPL 90-2	WL/POSL	490/128	BALL-ROD HIGH TEM
AVFP		WL/POSL	490/125	HIGH TEMPERATURE
AIR VEHICLES - FIXED - STRUCTURE				
AVFS	BE-01	WL/FIBEC	65	GENERAL OPERATIO
AVFS	BE-02	WL/FIBEC	65/107B	FIBER OPTIC SENSOR
AVFS	BG-01	WL/FIBG	461	
AVFS	BG-02	WL/FIBG	461	HIGH TEMPERATURE
AVFS	BG-03	WL/FIBG	461	NASP NATIONAL AE

AVFS	BG-03	WL/FIBG	461	"CANT READ"
AVFS	BG-04	WL/FIBGC	24B	MODAL TEST AND ID
AVFS	BG-05	WL/FIBGB	461	NASP NATIONAL AEI
AVFS	BG-06	WL/FIBG	461	DATA ACQUISITION '
AVFS	BG-07	WL/FIBG	461	MOBILE DATA ACQU
AVFS	BG-09	WL/FIBG	461	NASP DYNAMIC TES'
AVFS	BT-01	WL/FIBT	65	F-15 WING & AILERO
AVFS	BT-03	WL/FIBT	65	NASP SPECIMEN TES'
AVFS	BT-05	WL/FIBTA	65	HIGH TEMPERATURE
AVFS	BT-07	WL/FIBTC	65	LASER ENERGY SIMU
AVFS	BT-08	WL/FIBT	65	INTEGRAL FUEL TAN
AVFS	BT-10	WL/FIBT	65	LOAD ONLY STATIC
AVFS	BT-18	WL/FIBT	65	C-135 RADOME (MILS
AVFS	BT-19	WL/FIBT	65/4TH FL NE	39,000 PSI NASP PRES
AVFS	BT-20	WL/FIBT	65	NASP SUBELEMENT (
AVFS	FIB-G07	WL/FIBG	461	F-15 WING TEST
AVFS	FIB-T02	WL/FIBTB	65	6" X 6" ACTIVELY CO
AVFS	FIB-T09	WL/FIBT	65	HAVE WORK
AVFS	FIB-T11	WL/FIBTB	65	BOEING HOT STRUCT
AVFS	FIB-T12	WL/FIBTB	65	B-1B TRANSPARENC'
AVFS	FIB-T13	WL/FIBT	65	LEADING EDGE HEA'
AVFS	FIB-T14	WL/FIBT	65	HYDROSTATIC TEST
AVFS	FIM-G01	WL/FIME	450	WIND TUNNEL TEST
AVFS	FIM-G02	WL/FIMG	450	WIND TUNNEL TEST
AVFS	FIM-G03	WL/FIMG	450	100 PSIA AIR SUPPLY
AVFS	FIM-G04	WL/FIMG	451	HIGH PRESSURE AIR
AVFS	FIM-G05	WL/FIMG	456	WIND TUNNEL TEST
AVFS	FIM-G06	WL/FIME	456	WIND TUNNEL TEST
AVFS	FIM-N02	WL/FIMN	25B	FLOW VISUALIZATIC
AVFS	LXS-058	WL/FIBT	65	HYPERSONIC VEHICI
AVFS	LXS-159	WL/FIBTB	65	F-15 FUSELAGE FUEL
AVFS	MN-03	WL/FIMN	25B	"CANT READ"
AVFS	MN-06	WL/FIME	456	NORMAL OPERATION
AVFS	NEW1	WL/FIME	25A	HIGH PRESSURE AIR/
AVFS	NEW2	WL/FIME	24C	EMERGENCY ELECTI
AVFS	NEW3	WL/FIME	24C	LOW PRESSURE AIR S
AVFS	T-06	WL/FIBT	65	HIGH TEMPERATURE
AVFS	T11.1	WL/FIBT	65	TMC PANELS TESTS
ELECTRONIC DEVICES				
ED	ELE-02	WL/ELE	620/S2N-46	CAD FACILITIES
ED	ELE-03	WL/ELE	620/S2U57	TESTING OF GALLIU
ED	ELE-04	WL/ELE	620/S2N57	

ED	ELM-01	WL/ELM	S2M46	MILLIMETER WAVE '
ED	ELM-02	WL/ELM	S2M56	NETWORK ANALYZE
ED	ELM-03	WL/ELM	S2F56	MICROWAVE TEST F.
ED	ELO-01	WL/ELO	22B/C104,105.107, 109&110	E-O COMPONENTS &
ED	ELO-02	WL/ELO	620/NE2J8	UV/VISIBLE DETECT(
ED	ELO-03	WL/ELO	22B/C123	SOLID STATE LASER:
ED	ELO-04		22B/C134,B127,C117	CRYSTAL SLICING &
ED	ELO-05	WL/ELO	22B/B125,B127A,B128	LASER MATERIALS A
ED	ELO-06	WL/ELO	22B/A113A,B,A114	OPTICAL FOURIER TI
ED	ELO-07	WL/ELO	620/NE2C19	SURFACE ANALYSIS
ED	ELO-08	WL/ELOS	22B/C217	SPECTROPHOTOMET
ED	ELO-11	WL/ELO	620	IR DETECTOR CHARA
ED	ELR-01	WL/ELR	620/SE2	RAPID THERMAL AN
ED	ELR-02	WL/ELR	620/SE2	ELECTROCHEMICAL
ED	ELR-03	WL/ELR	620/NER27	PRODUCTION & DIST

SECTION II: CAPACITY OF DOD COMPONENTS - WRIGHT LABORATORY

2.1 **Workload.** Use the following table to describe historic and projected workload at each activity in terms of funding and workyears. Assume previous BRAC closures and realignments are implemented on schedule. Projected funding will be derived from FY95 President's Budget Submission (Then year dollars). Past fiscal year data shall begin with FY86 or at the inception of the activity as it existed on 1 Oct 93. (BRAC Criteria I & IV)

Information Required	Fiscal Years											
	86	87	88	89	90	91	92	93	94	95	96	97
Total Funds Programmed ($M) *	924	947	960	910	909	849	843	942	787	709	708	735
Total Actual Funds ($M)	924	947	960	910	909	849	843	942				
Programmed Workyears **	2781	2752	2781	2678	2692	2688	2509	2601	2514	2460	2439	2390
Actual Workyears ***	2727 652 3379	2800 715 3515	2698 740 3438	2732 686 3418	2777 842 3619	2696 875 3571	2596 929 3525	2391 952 3343				

- Budgeted workyears are the selected indicator of the "lab" infrastructure's capacity at an aggregate level for each Military Department. They include both workyears funded directly by the Military Department and the workyears funded from organizations outside the Military Department.

Workyears = government personnel and on-site FFRDCs and SETAs

*** President's Budget programming documents reflecting FY86 through FY93 are not available from WL/XPR or WL/FM. FY86 through FY93 Programmed dollars are listed the same as Total Actual per ASC/FMBM guidance.**

**** Since Wright Laboratory does not utilize "formal" FFRDC or SETA contracts, but rather on-site, level of effort or task order Research and Development (R&D) and R&D Support contracts, the workyears of contracted effort are not programmed. Therefore, this entry only contains government personnel data. FY94 to FY97 on-site contract workyears are estimated to decline by 2% per year, reaching a FY97 level of 878 on-site contract workyears.**

***** The top number in each fiscal year entry represents the Actual Workyears for Government (Military and Civilian) personnel. The second entry in each fiscal year represents actual Workyears for R&D and R&D Support contract personnel. The final number in this row is the total of Government and on-site contract workyears.**

2.2 Excess "Lab" Capacity -- Measured at the DOD Component Level

- Excess "Lab" Capacity = Sum of the Peak Workyears - Sum of the Projected Workyears
  - Peak at each activity = Highest value between FY86 (or since inception of organization) and FY93
  - Projected at each activity = Estimated at FY97

The calculations for Excess "Lab" Capacity are presented here in two ways:

1. Calculation Based on <u>Government (Military and Civilian) Only</u>

The peak activity year at Wright Laboratory, Wright-Patterson AFB, occurred in FY90 at a workyear level of 2,777

The FY97 workyear level is projected to be 2,390

The estimated excess "Lab" capacity based on Government Personnel is then,

2,777 - 2,390 = 487

2. Calculation Based on <u>Government and On-Site R&D Contractors</u>

The peak activity year at Wright Laboratory, Wright-Patterson AFB, occurred in FY90 at a workyear level of 3,619.

The estimated FY97 workyear level is 3,268 (2,390 Gov't plus 878 on-site contract)

The estimated excess "Lab" capacity is then,

3,619 - 3,268 = 351

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs) - WRIGHT LABORATORY DATA: Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

AIR VEHICLE - FIXED - STRUCTURES, PROPULSION, AVIONICS, FLIGHT SUBSYSTEMS

Wright Laboratory

- Plans, formulates and executes USAF basic research, exploratory development and advanced development programs for aerospace avionics, propulsion, flight subsystems and structures.
- Provides policy, guidance and recommendations for AFMC investment strategy
- Identifies user deficiencies and technology needs in conjunction with the Technology Program Integrated Product Teams (TPIPTs) for AFMC program development
- Formulates multi-disciplinary technology efforts to respond to system specific needs
- Manages system and subsystem level integration for Air Force vehicles
    - Propulsion systems
    - Avionics systems
    - Structures
    - Flight subsystems
- Manages the technology transition process and advocates technology to hardware and/or system applications
- Plans and manages balanced signature reduction capability technology program to detect, defeat and counter low observability adversaries
- Plans and integrates research activities for cockpit technologies to address all aspects of Air Force mission oriented cockpit needs

WEAPONS (Reported as a separate data call input as Wright Laboratory's Armament Directorate, Eglin AFB) - CONVENTIONAL MISSILES/ROCKETS, CRUISE MISSILES, GUIDED PROJECTILES, BOMBS, GUNS AND AMMUNITION

Wright Laboratory

- Plans, formulates and executes USAF basic research, exploratory development and advanced development programs for conventional armament technology
- Provides policy, guidance and recommendations for AFMC investment strategy

- Identifies user deficiencies and technology needs in conjunction with the TPIPTs for AFMC program development

Answer to Question 3.0 Continued

- Formulates multi-disciplinary technology efforts to respond to system specific needs
- Manages technology integration of weapons into Air Force aeronautical systems
  - Conventional missiles/rockets
  - Cruise missiles
  - Guided projectiles
  - Bombs
  - Guns and ammunition

SPACE SYSTEMS - LAUNCH VEHICLES, SATELLITES, GROUND CONTROL SYSTEMS

Wright Laboratory

- Provides support to SSC TPIPTs for technology solutions to technical needs falling within our technical disciplines

C4I SYSTEMS

Wright Laboratory

- Provides support to ESC TPIPTs for technology solutions to technical needs falling within several of our technical disciplines
- Manages technology integration of Air Force aeronautical systems with C4I systems

PERVASIVE FUNCTIONS - Electronic Devices and Advanced Materials

Wright Laboratory

- Plans, formulates and executes USAF basic research, exploratory development and advanced development programs for electronic devices and advanced materials.
- Provides policy, guidance and recommendations for investment strategy for the Air Force in these CSFs
- Manages system and subsystem technology integration of these CSFs
- Identifies user deficiencies and technology needs in conjunction with the TPIPTs for AFMC program development for these CSFs
- Formulates multi-disciplinary technology efforts to respond to system specific needs
- Manages the technology transition process and advocates technology to hardware and/or system applications

Wright Laboratory also

- Plans, formulates and executes the USAF manufacturing S&T program
- Coordinates with Armstrong Laboratory to establish human system requirements for cockpit related mission

3.1 Location

3.1.1 **Geographic/Climatological Features:** Describe any geographic/climatological features in and around your activity that are relevant to each CSF. Indicate and justify those that are required versus those that just serve to enhance accomplishing the mission of the activity. For example, clear air at high altitude that increases quality of atmospheric, ground-based laser experiments in support of the weapons CSF. (BRAC Criteria I)

AIR VEHICLES, FIXED, AVIONICS -
Wright-Patterson AFB has the climatological conditions that are perfect for research on remote sensing devices at various stages of development. The local temperature varies from arctic conditions in the winter to near tropical levels in the summer, and the humidity levels follow. The climate is very similar to Southeast Asia and many locations in continental Europe. The terrain and natural vegetation are also very similar, which is an important factor in background to target distinction.
The conditions here are not perfect year round, this is a positive factor, since most atmospheric conditions can be approximated at some time during a year. There are many days where the sky is overcast, especially in the summer months, and therefore tends to attenuate signals for sensor reception. While these may appear to be drawbacks for this CSF, these conditions are actually necessary for valid research. If we only perform research in good weather, we can only fight in good weather. To truly evaluate avionics systems, we must do so in a similar environment to where it must operate. In most cases, Wright-Patterson AFB offers those climatological features.

For the remaining Air Vehicle - Fixed Product and Pervasive Functions within Wright Laboratory at Wright-Patterson AFB, there are no positive or negative climatological features which enhance or detract from the activity's mission.

3.1.2 **Licenses & permits:** Describe and list the licenses or permits (e.g., environmental, safety, etc.) that your activity currently holds and justify why they are required to allow tests, experiments, or other special capabilities at your location for each CSF. For example, permit to store and use high explosives. (BRAC Criteria I)

Wright Laboratory has 87 regulated sources of air emissions (see next pages). Permits to Operate have been issued by the State of Ohio, in accordance with federal and state Clean Air Acts.

Wright Laboratory has 68 permits to operate Hazardous Waste Satellite Accumulation Sites (see next pages). These sites are used as temporary collection points, for a limited quantity of hazardous waste, until pick-up and delivery to the Base long-term, central accumulation site.

Wright Laboratory has three licenses for the use and storage of explosives outside the Base munitions storage area, issued in accordance with AFR 127-00, Explosives Safety Standards (see next pages).

All research facilities at Wright Laboratory, Wright-Patterson AFB, (see list in answer to question 3.4.1) are required to have an approved and posted "Safety Permit/Request" which includes an appropriate level of System Safety Hazard Analysis. 349 Safety Permits are approved within Wright Laboratory (see next pages). Safety permits are required by WLR 127-1, Laboratory System Safety Program, which complements AFMCR 127-8, Test Safety Review Process.

In addition, those facilities utilizing lasers require Laser Permits, as required by AFOSH Std 161-10, Health Hazards Control for Laser Radiation, complemented by WPAFBR 161-2, Laser Hazard Control Program. 486 Laser Permits have been issued to Wright Laboratory facilities (see next pages).

Wright Laboratory also has several facilities containing radioactive or radiation producing devices. For radioactive materials, one Wright Laboratory facility has been issued a radioactive material permits by the USAF Radioisotope Committee, in accordance with the Nuclear Regulatory Commission master material license issued to the Air Force. The radiation producing devices are tracked according to AFR 161-8, Control and Recording Procedures - Occupational Exposure to Ionizing Radiation, complemented by WPAFBR 19-1, Ionizing Radiation Safety Program. There are 72 permits for ionizing radiation producing devices issued to Wright Laboratory facilities (see next pages).

3.1.3 **Environmental constraints:** Describe and list the environmental or land use constraints present at your activity which limit or restrict your current scope for each CSF, i.e., would not allow increased "volume" or "spectrum" for the CSF. Example -- Volume: frequency of a type of experiment. Example -- Spectrum: Current permit to detonate high explosives will not allow detonation or storage of increased quantity of explosives without legal waiver (state law) or relocation of surrounding (non-govt) buildings. (BRAC Criteria II)

All facilities on Wright-Patterson AFB, including Wright Laboratory, which discharge to the City of Dayton Wastewater Treatment Plant are required to comply with constraints as listed in the City Sewer Use Ordinance. This ordinance prohibits or limits the discharge of specified substances, materials, waters or wastes into the City Sewer systems. Elimination of these substances, or separation and/or pre-treatment of the waste stream (as appropriate) is required to meet the City Ordinance.

All on-base facilities must incorporate Best Management Practices (BMP) to prevent any pollutants from entering the storm sewer system, as required by the Clean Water Act.

Wright-Patterson AFB is located within a non attainment area for ozone. Any new or modified source which emits high levels of volatile organic or nitrogen oxide compounds will have greater restrictions placed upon it.

In Area B of Wright-Patterson AFB (the area wherein most of Wright Laboratory is located), there is one location that restricts future facility development. This is applicable to the Air Vehicle, Fixed, Flight Subsystems CSF. Bldg 100 is a Wright Laboratory facility that is sited for 70 pounds of Class 1.1 explosives. The construction and facility placement in a revetment allows an explosion's force to be directed straight up. The facility has an established explosive clear zone of 200 feet. There are no other restricted locations in Area B due to explosive detonations/activities.
SEE PAGES 48A & 48B

3.1.4 **Special Support Infrastructure:** List and describe the importance of any mission related special support infrastructure (e.g. utilities) present at your location for your activity. (BRAC Criteria I)

Wright Laboratory utilizes approximately 30% of Wright-Patterson total peak electrical power load, and 20% of Wright-Patterson annual heating load for special research process loads (this includes requirements in the summer months).

Approximately 2,800 feet of railroad tracks are required in Area B for mission support of Wright Laboratory equipment in the Propulsion CSF. Connection to an active commercial rail system is also required.

WL-WPAFB

85

CONTROL NUMBER: LJCSWG-AF 015 015

PURPOSE: To provide SAF/AQX staff clarified answers to Question 3.1.3. of the (see Distribution List) response to the Laboratory Joint Data Call. The response indicated you were in a non-attainment area.

1. Can you return to the Peak Programmed Workyears level (Question 2.1 response) without either a Permit modification or a new Permit? YES, BUT AS NOTED, ANY FACILITY (SOURCE) WHICH EMITS HIGH LEVEL OF VOLATILE ORGANIC OR NITROGEN OXIDE COMPOUNDS WOULD HAVE RESTRICTIONS e.g. SCRUBBERS REQ'D, LIMITED HOURS OF OPERATION, ETC. MOST OPERATIONS, TO REACH PEAK PROGRAMMED WORKYEARS AND ABOVE, WOULD BE UNAFFECTED BY THIS CONSTRAINT

2. If a Permit modification or a new Permit is required, will mitigation be required?

2a. If mitigation is required, describe the nature of the mitigation required.

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain)

See WL's comment above.

9 SEP 1994

MAJCOM REVIEWER: _____
(print name, organization, DSN)
CHUNG C KANG, MAJ, HQ AFMC/ST, 787-5368

BASE: Concurs Does not concur (explain)

BASE REVIEWER: _____ JOHN J. FEDOR
(print name, organization, DSN) WL/PGMG 785-4013

I certify the information above is accurate and complete to the best of my knowledge and belief.

94-09-21 11:24 RCVD

CONTROL NUMBER: LJCSWG-AF 019

PURPOSE: To provide SAF/AQX staff a clarified answer to Question 3.1.3. (Environmental Constraints) for Wright Laboratory, Wright-Patterson AFB's response to the Laboratory Joint Data Call. The response indicated you may have a potential Wastewater Discharge limitation with respect to the City Sewer system.

1. Can you return to the Peak Programmed Workyears level (Question 2.1 response) under your current limitations?

2. If a modification to your current limitations is required, will mitigation be required?

2a. If mitigation is required, describe the nature of the mitigation required.

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

WL-WPAFB
019

CONTROL NUMBER: LJCSWG-AF 019

PURPOSE: To provide SAF/AQX staff a clarified answer to Question 3.1.3. (Environmental Constraints) for Wright Laboratory, Wright-Patterson AFB's response to the Laboratory Joint Data Call. The response indicated you may have a potential Wastewater Discharge limitation with respect to the City Sewer system.

1. Can you return to the Peak Programmed Workyears level (Question 2.1 response) under your current limitations? YES, PAST TRANSITIONS TO ENVIRONMENTALLY BENIGN PROCESSES - SUCH AS SOLVENT & WATER TREATMENT REFRIGERANT EFFORTS - WOULD ALLOW A RETURN TO PEAK PROGRAMMED WORKYEARS, AND ABOVE (WL-WPAFB ANSWERS 3.5.1.4 3.5.1.2), LEVEL 3

2. If a modification to your current limitations is required, will mitigation be required?

2a. If mitigation is required, describe the nature of the mitigation required.

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

See DL's comment above

MAJCOM REVIEWER: _____ 9 SEP 1994
(print name, organization, DSN)
Chung C Kang, MAJ, HQ AFMC/ST, 787-5368

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____ John J. Fedon
(print name, organization, DSN) WL/PO/ME 785-4013

I certify the information above is accurate and complete to the best of my knowledge and belief.

Although the "raw" utilities are readily available for use by Wright Laboratory at Wright - Patterson AFB (see answer to Question 3.5.3), many of the conditions and states of these utilities have to be modified to meet R&D mission needs. While the equipment and capabilities to condition these utilities might be called "infrastructure", these systems are typically R&D equipment (i.e. not Real Property) as part of the research capability. The following list is indicative of the type of special "infrastructure" capabilities within Wright Laboratory.

Process Chilled Water - Nearly every Wright Laboratory facility (see answer to Question 3.4.1) requires year-round operation of process chilled water systems in order to provide cooling water for experiments. Cooling towers supporting the chillers include winterization protection capability to support operations during cold winter months.

Electricity - In particular, Wright Laboratory's Structures, Propulsion and Flight Subsytems facilties are very electrical power intensive. Specialized R&D equipment to supply, convert and modify this power include, but are not limited to:

- 44,000 HP Frequency Converter with motor generators
- 6 motor generators to provide speed control of up to 30,000 HP motor load
- 40,000 HP power distribution system and motor for subsonic aerodynamic R&D
- 8,500 HP drive system for trisonic gasdynamic R&D
- 1,000 HP drive system for the Vertical Wind Tunnel
- 1.5 MW electric heater, high pressure air and vacuum systems for wind tunnels
- 7 high pressure air compressors, 4 turbo-exhausters and 1 gas-fired air heater for altitude simulation supporting 7 propulsion component research cells
- Other "medium" sized facilities which require an average of 2MW per facility

NOTE: Electricity, water and other utilities are not metered at each building/facility. As such, an accounting of infrastructure/utility requirements by CSF cannot be determined.
Wright Laboratory's Propulsion, Avionics, Flight Subsystems, Advanced Materials and Electronic Devices facilities require fume hoods to exhaust vapors, products of combustion, etc. out of the room/facility where experiments are being conducted. Many of these fume hood systems require specialized filters or scrubbers.

Several of Wright Laboratory's Propulsion, Avionics, Flight Subsystems, Advanced Materials and Electronic Devices facilities require Clean Rooms to keep impurities away from and out of the experimental area. These are typically Class 100 clean rooms, or better. Many other facilities required special air filtration to minimize dust and dirt entry into the research area.

Eight of Wright Laboratory's Propulsion and two of Wright Laboratory's Flight Subsystems facilities require liquid fuel storage and delivery farms. The approximate total storage quantity is 500,000 gallons of various types and blends of jet fuels, as well as other fuel products.

3.1.5. **Proximity to Mission-Related organizations:** List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
Air Vehicles - Fixed - Structures	SAIC	Commercial	5 miles	44.5	43.4
	NAIC	Intelligence	.1 mile	0	Not Trackable
	Wright State University	University	.4 mile	0	1.3
	University of Dayton Research Institute	University	10 miles	3.6	3
Air Vehicles - Fixed - Propulsion	University of Dayton Research Institute	University	10 miles	0	26
	Universal Energy Systems, Inc.	Commercial	6 miles	0	12
	High Voltage Maintenance Corp.	Commercial	12 miles	0	18
	MFS, Inc.	Commercial	10 miles	0	21
	SelecTech Corp.	Commercial	12 miles	0	17
Air Vehicles - Fixed - Avionics					
	Macauley-Brown	Commercial	2.5 miles	15	35
	SAIC	Commercial	5 miles	9	39
	National Air Intelligence Center	Government	7 miles	7	9
	Wright State University	University	2 miles	9.1	3.9
	University of Dayton Research Institute	University	.0 miles	8.7	7

Answer to Question 3.1.5 Continued

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
Air Vehicles - Fixed - Flight Subsystems	Systems Research Laboratory (SRL)	Commercial	10 miles	5.5	10
	University of Dayton Research Institute	University	10 miles	2.2	2.4
	Universal Energy Systems, Inc.	Commercial	5 miles	.5	1.5
	Wright State University	University	2 miles	.5	1.3
	BFG, Inc.	Commercial		3	1
Electronic Devices	Wright State University	University	2 miles	1.6	11.7
	University of Dayton Research Institute	University	10 miles	0	2
	Technology Scientific Services, Inc.	Commercial	1 mile	0	15.7
	Air Force Institute of Technology	University	.25 mile	0	1
	University of Cincinnati	University	50 miles	0	2

DATE: 30 Aug 94

MEMORANDUM FOR RECORD, SAF/AQT

AIR STAFF CORRECTION WORKSHEET

PURPOSE: To provide corrected answer to Question Number 3.2.1 Total Personnel, Wright Laboratory, Wright-Patterson AFB, OH, Data Call.

SOURCE: Installation worksheets (John J. Fedon, WL/POME, DSN 785-4013).

METHOD: Review of Installation Worksheets (24 Aug 94) submitted for Air Force data call, telecon, and FAX communications with MAJCOM and Base POCs.

CONCLUSION: The correct personnel data is shown in attached table 3.2.1 Total Personnel. (See pages 59 and 60).

MAJCOM CONCURS: (See attached FAX copies)
Major Chung C. Kang, HQ AFMC/STC, Wright-Patterson AFB, DSN 787-5368.

BASE CONCURS: (See attached Installation Worksheets)
Mr. John J. Fedon, WL/POME, Wright-Patterson AFB, DSN 785-4013.

I certify that the above information is accurate and complete to the best of my knowledge and belief.

AIR STAFF REVIEWER: Paul D. Copp **DATE:** 30 Aug 94
Paul D. Copp, Lieutenant Colonel, USAF

CONTROL NUMBER: LJCSWG-AF 005

PURPOSE: To provide SAF/AQX staff corrected answers to Questions 3.2.2, Education and 3.2.3, Experience, for Wright Laboratories, WPAFB response to the Laboratory JCSG guidance package. The 18 Aug 94 response provided the data necessary; however we do not understand the note above the tables that states "Does not represent all WL manpower at Wright-Patterson." The government numbers in Questions 3.2.1, 3.2.2, 3.2.3, and 3.3.1.1 all correlate. Who did you not include and why?

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concur Does not concur (explain:)

See Attached Revision

MAJCOM REVIEWER: (print name, organization, DSN)
Gary C Kang, Maj, AFMC/ST, 787-5368

BASE: Concur Does not concur (explain:)

REVISIONS TO QUESTIONS 3.2.2 & 3.2.3 ATTACHED. INCLUDED ARE FOOTNOTES DESCRIBING EXCLUDED PERSONNEL. REVISIONS TO QUESTIONS 2.1, 2.2 & 3.2.1 RESULTED FROM THIS CORRECTION.

BASE REVIEWER: John J. Fedon WL/PAMB
24 Aug 94 (print name, organization, DSN) DSN 785-4013

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

Answer to Question 3.1.5 Continued

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
Advanced Materials	University of Dayton Research Institute	University	10 miles	52	65.1
	Universal Energy Systems, Inc.	Commercial	5 miles	7	27.7
	Systran, Corp.	Commercial	5 miles	10.5	28
	Lawrence Associates, Inc.	Commercial	10 miles	1.5	22
	Universal Technologies, Inc.	Commercial	2 miles	2	19.7

The mission related organizations listed above are local research and support organizations from both the public and private sectors. An extensive knowledge and experience base in Wright Laboratory mission areas resides with these organizations. The alliances with these organizations are largely a result of their close proximity to this installation. A substantial adverse impact would result if these organizations were not available to assist in the accomplishment fo the Wright Laboratory mission.

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.4.1 Major Equipment and Facilities of the Wright Lab, Wright Patterson AFB response to the LICSG guidance package. The existing response indicates that there is no sharing of equipment or facilities with other than common (as defined in appendix C) or unique support functions. Confirm this is correct. If anything is shared within the activity, indicate the other function(s) and the percentage of time the other function(s) uses the equipment or facility. Additionally, complete the matrix box for major equipment and facilities. The 10 Aug 94 version contains text only.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LICSG Guidance Package instructions

MAJCOM: (Concurs) Does not concur (explain:)

SEE BASE ACTIVITY RESPONSE
NO ATTACHMENTS PROVIDED, i.e. DATA SHEETS
IF REQ'D THEY WILL BE UPDATED AND PROVIDED
OK 24Aug94 See Attachments

14 AUGUST 1994

MAJCOM REVIEWER: TIMOTHY L. DUES, GM-15, AFMC/STP, DSN 787-7850
(print name, organization, DSN)

BASE: (Concurs) Does not concur (explain:)

ALL FACILITIES LISTED IN THE WRIGHT LABORATORY RESPONSE TO QUESTION 3.4.1, ARE UTILIZED 100% FOR THE CSP THEY ARE REPORTED UNDER. MODIFICATIONS TO FACILITY DESCRIPTIONS TO INCLUDE ORGANIZATIONS REQUESTING/RECEIVING SUPPORT

24Aug94

BASE REVIEWER: 13Aug94 Paul J. Fagan
(print name, organization, DSN) WLPMMC, 785-4013

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

61

3.2 Personnel:

3.2.1 **Total Personnel:** What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

Air Vehicles - Fixed - Structure Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA *
	Civilian	Military		
Technical	204	35	0	58
Management (Supv)	30	3	0	2.5
Other	45	6	0	4.5

CSF - Air Vehicles - Fixed - Propulsion Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA *
	Civilian	Military		
Technical	149	16	0	154.7
Management (Supv)	27	9	0	13
Other	46	0	0	0

CSF - Air Vehicles - Fixed - Avionics Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA *
	Civilian	Military		
Technical	298	62	0	180
Management (Supv)	66	5	0	17
Other	110	11	0	8

*** As noted in question 2.1, Wright Laboratory does not utilize "formal" SETA contracts. However, in accordance with Request for Clarification N-L-4, the contractors performing on-site R&D and R&D Support are quantified under this data heading. This methodology is applicable throughout the Wright Laboratory Data Call response.**

Answer to Question 3.2.1 Continued

CSF - Air Vehicles - Fixed - Flight Subsystems Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA *
	Civilian	Military		
Technical	206	51	0	140
Management (Supv)	49	9	0	5
Other	59	8	0	1

CSF - Electronic Devices Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA *
	Civilian	Military		
Technical	88	15	0	35
Management (Supv)	17	0	0	0
Other	13	1	0	0

CSF - Advanced Materials Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA *
	Civilian	Military		
Technical	156	30	0	289
Management (Supv)	45	4	0	16
Other	77	9	0	46

*** As noted in question 2.1, Wright Laboratory does not utilize "formal" SETA contracts. However, in accordance with Request for Clarification N-L-4, the contractors performing on-site R&D and R&D Support are quantified under this data heading. This methodology is applicable throughout the Wright Laboratory Data Call response.**

CONTROL NUMBER: LJCSWG-AF 005

PURPOSE: To provide SAF/AQX staff corrected answers to Questions 3.2.2, Education and 3.2.3, Experience, for Wright Laboratories, WPAFB response to the Laboratory JCSG guidance package. The 15 Aug 94 response provided the data necessary; however we do not understand the note above the tables that states "Does not represent all WL manpower at Wright-Patterson." The government numbers in Questions 3.2.1, 3.2.2, 3.2.3, and 3.3.1.1 all correlate. Who did you not include and why?

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF Date:
Manufacturing_Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
ssistant Secretary (Acquisition)
Base Closure Working Group

3.2.2 **Education:** What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

I. Wright Laboratory Total - Does not represent all WL manpower at Wright-Patterson. *

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	83	25	273
Associates	25	0	32
Bachelor	599	65	68
Masters	452	136	11
Doctorate (include Med/Vet/etc.)	151	38	1

II. Wright Laboratory by CSF

A. Air Vehicles - Fixed - Structures

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	15	3	35
Associates	5	0	4
Bachelor	110	8	11
Masters	82	17	1
Doctorate (include Med/Vet/etc.)	27	5	0

B. Air Vehicles - Fixed - Propulsion

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	11	3	33
Associates	3	0	4
Bachelor	76	9	8
Masters	56	19	1
Doctorate (include Med/V etc.)	19	5	0

C. Air Vehicles - Fixed - Avionics

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	23	7	87
Associates	6	0	10
Bachelor	165	17	19
Masters	125	37	4
Doctorate (include Med/Vet/etc.)	41	10	1

D. Air Vehicles - Fixed - Flight Subsystems

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	16	5	47
Associates	5	0	6
Bachelor	117	15	12
Masters	89	30	2
Doctorate (include Med/Vet/etc.)	30	8	0

E. Electronic Devices

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	6	2	10
Associates	2	0	1
Bachelor	47	4	3
Masters	36	8	0
Doctorate (include Med/Vet/etc.)	12	3	0

F. Advanced Materials

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	12	5	61
Associates	4	0	7
Bachelor	84	12	15
Masters	64	25	3
Doctorate (include Med/Vet/etc.)	22	7	0

* Exclusions to 3.2.2 Tables

The table below shows the groups/types of personnel that are not included in the summary table (I) or CSF breakout tables (II A-F) since they do not actively engage nor predominantly participate in any one CSF. Their work efforts are classed as overall management and/or operations across the spectrum of Wright Laboratory technologies (CSFs) and support functions.

The total number of Wright Laboratory personnel, as of 30 Sep 93, is 2,391 (see answer to Question 2.1).

The Manufacturing Technology Directorate (WL/MT) is not a CSF entity and is not reported in answers to any Section 3 question per response to WL/POME Request for Clarification (Control No. AFMC-L-042).

Since the education levels of Wright Laboratory personnel were extracted from personnel records as of 25 May 94, vacancies between 30 Sep 93 and 25 May 94 exist which can not be quantified by education level.

Function	Number of Personnel
Commander's Office	17
Centralized Plans & Programs Office (WL/XP)	96
Centralized Directorate of Operations (WL/DO)	174
Manufacturing Technology Directorate	94
Vacancies	51

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.2 Education – Wright Labs, Wright Patterson AFB response to the LJCSG guidance package. The existing 10 Aug 94 response does not report by common support function (CSF) as defined in appendix C of the LJCSG guidance. Report this data at the CSF level!

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF Date:
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

3.2.3 **Experience:** What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

I. Wright Laboratory Total- Does not represent all WL manpower at Wright-Patterson. *

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	77	433	278	155	365
Management (Supv)	0	7	30	53	175
Total **	77	440	308	208	540

** See table below with data to include "Other" category, as used in questions 3.2.1 and 3.2.2

"Other" not included in Table 3.2.3	3	207	83	39	54
Total with "Other"	80	647	391	247	594

II. Wright Laboratory by CSF

A. Air Vehicles - Fixed - Structures

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	16	71	40	29	83
Management (Supv)	0	2	5	2	24
Total **	16	73	45	31	107

** See table below with data to include "Other" category for Structures, as used in questions 3.2.1 and 3.2.2

"Other" not included in Table 3.2.3	0	30	9	6	6
Total with "Other"	16	103	54	37	113

B. Air Vehicles - Fixed - Propulsion

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	12	48	39	18	47
Management (Supv)	0	0	4	11	21
Total **	12	48	43	29	68

** See table below with data to include "Other" category for Propulsion, as used in questions 3.2.1 and 3.2.2

"Other" not included in Table 3.2.3	0	26	7	5	9
Total with "Other"	12	74	50	34	77

C. Air Vehicles - Fixed - Avionics

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	12	111	85	49	102
Management (Supv)	0	0	11	12	49
Total **	12	111	96	61	151

** See table below with data to include "Other" category for Avionics, as used in questions 3.2.1 and 3.2.2

"Other" not included in Table 3.2.3	2	68	28	6	17
Total with "Other"	14	179	124	67	168

D. Air Vehicles - Fixed - Flight Subsystems

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	18	95	54	23	67
Management (Supv)	0	2	7	9	40
Total **	18	97	61	32	107

** See table below with data to include "Other" category for Flight Subsystems, as used in questions 3.2.1 and 3.2.2

"Other" not included in Table 3.2.3	1	40	13	3	10
Total with "Other"	19	137	74	35	117

E. Electronic Devices

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	5	41	16	14	27
Management (Supv)	0	1	0	6	10
Total **	5	42	16	20	37

** See table below with data to include "Other" category for Electronic Devices, as used in questions 3.2.1 and 3.2.2

"Other" not included in Table 3.2.3	0	6	6	1	1
Total with "Other"	5	48	22	21	38

F. Advanced Materials

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	14	67	44	22	39
Management (Supv)	0	2	3	13	31
Total **	14	69	47	35	70

** See table below with data to include "Other" category for Advanced Materials, as used in questions 3.2.1 and 3.2.2

"Other" not included in Table 3.2.3	0	37	20	18	11
Total with "Other"	14	106	67	53	81

* Exclusions to 3.2.3 Tables

The table below shows the groups/types of personnel that are not included in the summary table (I) or CSF breakout tables (II A-F) since they do not actively engage nor predominantly participate in any one CSF. Their work efforts are classed as overall management and/or operations across the spectrum of Wright Laboratory technologies (CSFs) and support functions.

The total number of Wright Laboratory personnel, as of 30 Sep 93, is 2,391 (see answer to Question 2.1).

The Manufacturing Technology Directorate (WL/MT) is not a CSF entity and is not reported in answers to any Section 3 question per response to WL/POME Request for Clarification (Control No. AFMC-L-042).

Since the experience levels of Wright Laboratory personnel were extracted from personnel records as of 25 May 94, vacancies between 30 Sep 93 and 25 May 94 exist which can not be quantified by experience level.

Function	Number of Personnel
Commander's Office	17
Centralized Plans & Programs Office (WL/XP)	96
Centralized Directorate of Operations (WL/DO)	174
Manufacturing Technology Directorate	94
Vacancies	51

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.3 Experience -- Wright Labs, Wright Patterson AFB response to the LJCSG guidance package. The existing 10 Aug 94 response does not report by common support function (CSF) as defined in appendix C of the LJCSG guidance. Report this data at the CSF level!

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF Date:
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

3.2.4 **Accomplishments During FY91-93:** For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
Air Vehicles - Fixed - Structures	4	3	The complete listing of patent disclosures and awards (by CSF) is provided on pages 69 to 81
Air Vehicles - Fixed - Propulsion	10	3	
Air Vehicles - Fixed - Avionics	24	16	
Air Vehicles - Fixed - Flight Subsystems	23	14	
Electronic Devices	20	4	
Advanced Materials	38	59	
Total	119	99	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
Air Vehicles - Fixed - Structures	~~317~~ 314 calc	The complete listing of papers published (by CSF) is provided on pages 82 to 141
Air Vehicles - Fixed - Propulsion	~~280~~ 279 calc	
Air Vehicles - Fixed - Avionics	120	
Air Vehicles - Fixed - Flight Subsystems	~~209~~ 205 calc	
Electronic Devices	271	
Advanced Materials	~~414~~ 410 calc	
TOTAL	~~1611~~ 1599 calc	

Air Vehicles - Fixed - Structures **3.2.4.1 - Listing of Patent Disclosures**

Dual Cantilever Complex Modulus Apparatus
Forebody Nozzles For Aircraft Directional Control
Spray Manifold
Modified Methods To Produce Gamm Titanium Aluminide Articles Having Improved Properties by Thermomechanical

Air Vehicles - Fixed - Propulsion **3.2.4.1 - Listing of Patent Disclosures**

Turbine Blade Cooling Method Employing Endothermic Fuel
Decelerators for Parachute Payloads
Fixed Geometry Variable Area Turbine Stage
Thermal Of Characterizing Reaction Wheel Perfommance on Orbiting
Lubrication By Sublimation
Quick Disconnect Valve Stem
New Fluid For Vapor Phase Lubrication
High Temperature Cesium Containing Solid Lubricants
Neutron Computed Tomography
Liquid Core Heat Exchangers For Fiber Optic Sensing And Superconducting Power Transmission

Air Vehicles - Fixed - Avionics **3.2.4.1 - Listing of Patent Disclosures**

Coherent Resolution-Enhancing Imaging Resonator
Finger Mounted Laser Spotlight
Spiral-Mode Microstrip Antenna with Variable Ground Plane Spacing
Off-line Text Recognition without Intra-word Character Segmentation
Spectral Estimation Of Radar Time Of Arrival Periodicities
Algorithm to Resolve Two Folding Frequencies of Complex Signals
IFM Receiver with Two Signals Capabilities
Passive Ranging Through Global Positioning System
Angle-Of-Arrival Measurement Via Time Doppler Shift
Unique Neural Network Signal Processor/Analyzer (UNSPA)
Spectral Estimation of Radar Time-Of-Arrival Periodicities
Television Interface Circuitry For 3-D Viewing
A Flicker Free 3-D Picture On Standard Television Equipment
A Technique For Removing Platform Sensor Using A Pulsed Laser Radar
IR (Infrared) Speech Recognition System
Acoustical/Photomermal Speech Analysis Measurement System
AM (Amplitude Modulated) Photo Speech Analysis Measurement System
DC (Direct Current) Coupled Photo Speech Recognition System
AOA Application Of Digital Channelized Receiver
Digital Channelized IFM Receiver
High Accurate Zero Crossings for Frequency Determination
Approximate Zero Crossings for Frequency Determination
Neural Network Based Adaptive Emitter Tracking And Identification System (NNAETIS)

Restoration of Corrupted/Coincident Staggered Pulse Trains

Air Vehicles - Fixed - Flight Subsystems 3.2.4.1 - Listing of Patent Disclosures

An Integral Cooling System for a Jet Engine Starter/Generator
New Cathode Material for Electrochemical Cells
Novel Cathode Material for Electrolytic Cells
Cathode Material for Electrochemical Cells
Fast Ion Conductors
Shielded-Core Reactor Fault Current Limiter
Improved Diamond Tipped Armor Piercing Projectile
A New Concept for a New Vertical Takeoff and Landing N-VTOL Aircraft
Device to Sense Angle of Attack Alpha and Sideslip Beta of Aircraft
Hypervelocity Heated Frangment Launching Technique Reluctance Motor Using Superconducting Magnetic Flux Switches
Oriented Fiber Compression Test Specimen
Oriented Fiber CompressiveText Fixture/Procedure
Couple/Decouple Mechanism For Electric Auxiliary Power Unit (APU) Power Section
Melt-Processed YBAs CU30X Conductor With Nickel Sheath
Aircraft Windshield System With Frangible Panel For Aircrew Emergency Escape Rotofin
Concept For Cooling Of Rotors In High Power Generators and Motors
Electronic Visual Display Attitude Sensor
Pretreatrnent Process for Diamond Formation and Growth
Process of Transforming Pure Y2BaCuO5 Into A Superconducting Matrix Of Ba2Cu307 With Fine And Homogeneously Dispersed Y2BaCuO5 Inclusions
The Rapid Production of Tubes Containing A Defense Super conducting Matrix of YBa2Cu307-x With Fine And Homogeneously Dispersed Y2BACu05
Ceramic Polymer Composites
Heat Transfer Enhancer For Direct Immersion Cooling of Electronics

Electronic Devices 3.2.4.1 - Listing of Patent Disclosures

Using Silicon Nitride as a Supporting Structure for Thinned Gallium Arsenide Wafers
Improved Computer Input Device
An Improved and Simplified Method of Wheelchair Propulsion by Occupants
Field Emitting Drain Field Effect Transistor
Buried Contact Field Effect Transistor
On-Wafer Hall-Effect Measurement System
Desorption MassSpectrometricControl Of Substrate Temperature During Molecular Beam Epitaxy
Desorption Mass Spectrometric Control Of Alloy Composition Through Substrate Temperature Changes During Molecular Beam Epitaxy
Desorption Mass Spectrometric Control of Substrate Temperature During Molecular Beam Epitaxy Crystal Growth
A Thermal Shunting Technique For Stabilizing Heterojunction Bipolar Transistor
Stable High Power Heterojunction Bipolar Transistor With An Integrated Heat Sink

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.4.1 – Wright Labs, Wright Patterson AFB response to the LJCSG guidance package. The existing 10 Aug 94 submission states that there were 38 disclosures for advanced materials in the table, yet the listing of patent disclosures contained only 37 titles. Correct or clarify this difference. In addition, since patents awarded are based on disclosures, explain why the number of patents awarded for advanced materials (59) is greater than the number of patent disclosures (37 or 38)

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF Date:
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Graphitic Ligament Reticulated Carbon Foams from Mesophase Pitch Precursors
Synthetic Gas Protection System for Carbon Structural Materials in Oxidizing Environments
Multi-System Laser Safety Shutter Controller
Nonlinear Optical Scattering Screen Viewer
High Compressive Strength Liquid Crystalline Polymers and Fibers and Film Thereof
Method to Deposit Hard Coatings with Improved Wear Characteristics
Silahydrocarbon Based Fluids as Coolant Fluids
Highly Transparent ZnGePz Crystals in One to Three Micron Region
Benzobisthiazole Polymers with Thiophene Moieties
Improved Titanium Aluminides and Titanium Aluminide Composites via an In-Situ Ductile/Fracture Resistant Layer
Gamma TiAl Alloys
Reduction of the Standing-Wave Field Profile in the Film of High Reflection Optical Filters
Rigid Rod Benzobisthiazole Copolymers Containing Cyclic Phosphate Esters
Rigid Rod Benzobisthiazole Polymers Containing Cyclic Phosphate Esters
Solid State Physicist High Temperature Insitu Molecular Composites Based On Rigid-Rod Polymides
Insitu Molecular Composites Based on Rigid-Rod Polymides
An Improved Method for Weaving Ceramic Fiber Mats For Continuous Fiber Composites
Secondary Amines Containing Nadic And Benzocyclobutenyl
A Method To Refine The Microstructure To TI3AL Based Cast And Ingot Metallurgy Articles
Controlled Dwell Technique For Extrusion Of Difficult-To-Work Alloys
Smart Forging Of Coarse Grain Alloys
2,2'-Bencothiazolybiphenylene Rigid-Rod Benzobisimidazole
Bencobisazole Copolymer Systems Soluble In Aprotic Solvents
Water-Based Benzobisazole Rigid-Rod Polymers
Spatially Graded Optical Switch
A Hierarchical Control System For Molecular Beam Epitaxy
Virtual Reality Recursive Molding
Self-Lubricating Aluminum Metal-Matrix Composited Containing Tungsten Disulfide And Ceramic Particles
Two-Dimensional Benzobisoxazole Rigid-Rod Polymers
A Method To Produce High Temperature Oxidation Resistant Metal Matrix Composited By Fiber Diameter Grading
A Method To Produce High Temperature Oxidation Resistant Metal Matrix Composited By Fiber Density Grading Materials
Controlled Matrix Temperature Texture Improved Processing and Performance of Titanium Aluminide Metal Matrix
Process For Designing An Optical Filter Using Gradient Index
Nonlinear Optical Scattering Screen Viewer
Inductive-Deductive Process Design For Machined Parts
Automated Process Planning For Quality Control Inspection
Rapid Heat Treatment Of Nonferrous and Metals
Adaptive Lubricant Coati- s

08/13/94 19:52 ☎513 255 1759 WL/POMX,WPAFB OH 021/022

Single Band Optical Detector
Desorption Mass Spectrometric Control of Substrate Temperature During Molecular Beam Epitaxy
Desorption Mass Spectrometric Control of Allov Composition Through Substrate Temperature Changes During Molecular Beam Epitaxy
Desorption Mass Spectrometric Control of Substrate Temperature During Molecular Beam Epitaxy Crystal Growth
Desorption Mass Spectrometric Control Of Alloy Composition Through Arsenic Flux Changes During Molecular Beam Epitaxy
Veiled Work Function Emitter
A Novel DC Bias Scheme For High Gain
Linear Motion Device For Molecular Bean Flux Control
Backside Illuminated OPFET

Advanced Materials **3.2.4.1 - Listing of Patent Disclosures**

Replaced by 59A

Graphitic Ligament Reticulated Carbon Foams from Mesophase Pitch Precursors
Synthetic Gas Protection System for Carbon Structural Materials in Oxidizing Environments
Multi-System Laser Safety Shutter Controller
Nonlinear Optical Scattering Screen Viewer
High Compressive Strength Liquid Crystalline Polymers and Fibers and Film Thereof
Method to Deposit Hard Coatings with Improved Wear Characteristics
Silahydrocarbon Based Fluids as Coolant Fluids
Highly Transparent ZnGeP2 Crystals in One to Three Micron Region
Benzobisthiazole Polymers with Thiophene Moieties
Improved Titanium Aluminides and Titanium Aluminide Composites via an In-Situ Ductile/Fracture Resistant Layer
Gamma TiAl Alloys
Reduction of the Standing-Wave Field Profile in the Film of High Reflection Optical Filters
Rigid Rod Benzobisthiazole Copolymers Containing Cyclic Phosphate Esters
Rigid Rod Benzobisthiazole Polymers Containing Cyclic Phosphate Esters
Solid State Physicist High Temperature Insitu Molecular Composites Based On Rigid-Rod Polymides
An Improved Method for Weaving Ceramic Fiber Mats For Continuous Fiber Composites
Secondary Amines Containing Nadic And Benzocyclobutenyl
A Method To Refine The Microstructure To Tl3AL Based Cast And Ingot Metallurgy Articles
Controlled Dwell Technique For Extrusion Of Difficult-To-Work Alloys
Smart Forging Of Coarse Grain Alloys
2,2'-Bencothiazolybiphenylene Rigid-Rod Benzobisimidazole
Bencobisazole Copolymer Systems Soluble In Aprotic Solvents
Water-Based Benzobisazole Rigid-Rod Polymers
Spatially Graded Optical Switch
A Hierarchical Control System For Molecular Beam Epitaxy
Virtual Reality Recursive Molding
Self-Lubricating Aluminum Metal-Matrix Composited Containing Tungsten Disulfide And Ceramic Particles
Two-Dimensional Benzobisoxazole Rigid-Rod Polymers

A Method To Produce High Temperature Oxidation Resistant Metal Matrix Composited By Fiber Diameter Grading
A Method To Produce High Temperature Oxidation Resistant Metal Matrix Composited By Fiber Density Grading Materials
Controlled Matrix Temperature Texture Improved Processing and Performance of Titanium Aluminide Metal Matrix
Process For Designing An Optical Filter Using Gradient Index
Nonlinear Optical Scattering Screen Viewer
Inductive-Deductive Process Design For Machined Parts
Automated Proeess Planning For Quality Control Inspection
Rapid Heat Treatment Of Nonferrous and Metals
Adaptive Lubricant Coatings

Air Vehicles - Fixed - Structures **3.2.4.1 - Listing of Patent Awards**

Jet Noise Suppression and Method
Programmable Remote Transducer with Filtering, Differentiation, Integration, and Amplification
Dual Beam Complex Modulus Apparatus

Air Vehicles - Fixed - Propulsion **3.2.4.1 - Listing of Patent Awards**

Magnetic Repulsion Supported Ring
Turbine Blade Cooling with Endothermic Fuel
Thrust Vector Control Using Internal Airfoils

Air Vehicles - Fixed - Avionics **3.2.4.1 - Listing of Patent Awards**

Instantaneous Frequency Measurement (IFM) Receiver to Measure Frequency and Angle of Arrival (AOA) of Multiple Signals
Instantaneous Frequency Measurement (IFM) Receiver with Only Two Delay Lines
Radar Warning Receiver Compressed Memory Histogrammer
Digital Frequency Measurement Receiver with Bandwidth Improvement Through Multiple Sampling of Real Signals
Digital Frequency Measurement Receiver with Bandwidth Improvement Through Multiple Sampling of Complex Signals
Instantaneous Frequency Measurement Receiver with Bandwidth Improvement Through Phase Shifted Sampling of Real Signals
Optical Phase-Only Spatial Filter
Laser Imaging and Ranging System Using Two Cameras
Laser Imaging and Ranging System Using One Camera
Multiple Energy Level, Multiple Pulse Rate Laser Source
Passive Ranging Through Global Positioning System
Graphics System for Automatic Computer Code Generation
Frequency Measurement Receiver with Bandwidth Improvement Through Synchronized Phase Shifted Sampling
Frequency Measurement Receiver with Bandwidth Improvement Through Phase Shifted Sampling of Real Signals Using Sampling Rate Selection
Thermal Contrast Detailing for Inflatable Decoy Targets
Angle-of-Arrival Measurement Via Time Doppler Shift

Air Vehicles - Fixed - Flight Subsystems **3.2.4.1 - Listing of Patent Awards**

Ferrofluid Piston Pump for Use With Heat Pipes or the Like
Ferrofluid Piston Pump for Use With Heat Pipes or the Like
Unidirectional Heat Pipe and Wick
Thermionic Fuel Element Pressure Vessel
Electrical Battery Cell Wicking Structure and Method
Control of Unknown Systems Via Deconvolution
Method for Making an Anisotropic Heat Pipe and Wick
Cathode Material for Electrochemical Cells
Electrochemical Cell Cathode Material
Electrochemical Cell Cathode Material
Sealing Member
Cathode Material for Electrochemical Cells
Integral Cooling System for a Jet Engine Integral Starter/Generator and the Like
Aircraft Attitude Indicator Display

Electronic Devices **3.2.4.1 - Listing of Patent Awards**

Method and System for Automated Measurement of Whole-Wafer Etch Pit Density in GAAS
On-Wafer Hall-Effect Measurement System
Making Staggered Complementary Heterostructure FET
Dual Conversion Reflex Receiver

Advanced Materials **3.2.4.1 - Listing of Patent Awards**

High Efficiency Nonlinear Kerr Effect Filter
Method to Produce Superplastically Formed Titanium Alloy Compnents
Method for Refining the Microstructure of Beta Processed Ingot Metallurgy Titanium Alloy Articles
Process for the Fabrication of Rodlike Polymer Reinforced Molecular Composites into Shaped Articles
Thermoset Rigid Rod Molecular Composite System
Graft Copolymers of Poly(P-Phenylene Benzbisimidazole)
Rigid Rod Aromatic Benzthiathiazole/Oxazole Heterocyclic Polymer
Rigid Rod Aromatic Benzthiathiazole/Thiazole Heterocyclic Polymer
Rigid Rod Aromatic Benzoxazole/Thiazole Heterocyclic Copolymers
Rigid Rod Aromatic Benzimidazole/Thiazole Heterocyclic Copolymer
Qualitative Process Automation for Autoclave Cure of Composite Parts
SIR H924
Attachment Structure for Cylindrical Member
Surface Preparation for Adhesive Bonding
Patent Number 5,044,192 (Title not recorded in Public Affairs submittal)
Crosslinkable Rigid-Rod Benzobisazole Copolymer
Crosslinkable Rigid-Rod Benzobisazole Polymers
Method and Titanium Aluminide Matrix Composite
Dihydroxy-Pendant Rigid-Rod Benzobisazole Polymer
Dihydroxy-Pendant Rigid-Rod Benzobisazole Copolymer
High Temperature Hydrogenation of Gamma Titanium Aluminide
Method to Produce Fatigue Resistant Axisymetric Titanium Alloy Components
Dispersion Strengthened Tri-Titanium Aluminum Alloy
Crosslinkable Rigid-Rod Aromatic Heterocyclic Polymer
Low Temperature Hydrogenation of Gamma Titanium Aluminide
Para Ordered Aromatic Diacids containing Benzimidazole Groups
Ionically Blended Molecular Composites
Thermoset Rigid Rod Molecular Composite System
Method for Producing Very Fine Microstructures in Titanium Aluminide Alloy Powder Compacts

Method to Produce Improved Property Titanium Aluminide Articles
Crosslinkable Rigid-Rod Benzobisazole Polymer
Crosslinkable Rigid-Rod Benzobisazole Copolymer
Method to Manufacture Titanium Aluminide Matrix Composites
Dihydroxy-Pendant Rigid-Rod Benzobisazole Polymer
Method to Manufacture Titanium Aluminide Matrix Composites
High Contrast Switchable Target Discriminator
Rigid-Rod Benzimididazole Pendant Benzobisazole Copolymer
Dihydroxy-Pendant Rigid-Rod Benzobisazole Copolymer
Rigid-Rod Benzimididazole Pendant Benzobisazo Polymer
Superconducting Tunable Inorganic Filter
Superconducting Reflection Filter
Superconducting Searching Filter
Comb Optical Interference Filter
Method of Extruding a Single Polymeric Fiber
Thermoset Rigid Rod Molecular Composite System
Process for the Fabrication of High Density Continuous Fiber Preforms
Rigid-Rod Graft Polymers and Copolymers
Lubricity Additive for High-Temperature Gas Turbine Engine Oils
Rigid-Rod Benzobisazole Polymer Containing Cyclic Phosphate Ester
High Temperature Nonflammable Hydraulic Fluid
Coating Apparatus for Continuous Fibers
Comb Optical Interference Filter
Method to Produce Gamma Titanium Aluminide Articles Having Improved Properties
Post-Consolidation Method for Increasing the Fracture Resistance of Titanium Composites
Benzobisthiazole Polymers with Thiophene Moieties
Secondary Amines Containing Nadic and Benzocyclobutenyl Groups
Insitu Molecular Composites Based on Rigid-Rod Polyimides
Radioactively Biased Optical Limiter
Dielectric Optical Switch

94-09-26 18:03 RCVD

CONTROL NUMBER: LJCSWG-AF 023

PURPOSE: To provide SAF/AQX staff corrected answers to Question 3.2.4.2 Papers published in peer reviewed journels, of the (see Distribution List) response to the Laboratory Joint Data Call. For each CSF in which you perform work, provide a list of papers published in peer reviewed journals by your government personnel during FY 1991 through FY 1993. The papers listed must directly support the CSF. For each paper listed provide both the title of the article and the journal in which it was published, and the month and year of publication. Do not list papers prepared by non-government personnel or other personnel who were not employed by your activity, even if the paper was prepared in support of a contractual requirement. Do not list papers published in non-peer reviewed journals; technical, letter, test, and other reports; manuals and handbooks; presentations at symposiums; etc.

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

PAPERS RFC DISTRIBUTION LIST

1. ARMSTRONG LAB, BROOKS AFB
2. ARMSTRONG LAB, WRIGHT-PATTERSON AFB
3. WRIGHT LAB, WRIGHT-PATTERSON AFB
4. WRIGHT LAB, EGLIN AFB
5. PHILLIPS LAB, KIRTLAND AFB
6. PHILLIPS LAB, EDWARDS AFB
7. PHILLIPS LAB, HANSCOM AFB
8. ROME LAB, GRIFFIS AFB
9. ROME LAB, HANSCOM AFB
10. ARMSTRONG LAB, HANSCOM AFB
11. ARMSTRONG LAB, WILLIAMS AFB

WRIGHT LAB - WRIGHT PATT

CONTROL NUMBER: LJCSWG-AF 023

PURPOSE: To provide SAF/AQX staff corrected answers to Question 3.2.4.2 Papers published in peer reviewed journals, of the (see Distribution List) response to the Laboratory Joint Data Call. For each CSF in which you perform work, provide a list of papers published in peer reviewed journals by your government personnel during FY 1991 through FY 1993. The papers listed must directly support the CSF. For each paper listed provide both the title of the article and the journal in which it was published, and the month and year of publication. Do not list papers prepared by non-government personnel or other personnel who were not employed by your activity, even if the paper was prepared in support of a contractual requirement. Do not list papers published in non-peer reviewed journals; technical, letter, test, and other reports; manuals and handbooks; presentations at symposiums; etc.

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concur Does not concur (explain)

See attached. There were 12 papers not published in FY 91-FY93. These were crossed out and correct # of papers were put & linked in the 23Sep94 summary sheet.

MAJCOM REVIEWER: _____
(print name, organization, DSN)
Ling C Kang, Maj, HQ AFMC/ST, 787-5368

BASE: Concur Does not concur (explain)

The Additional information requested is provided in as complete a condition as time has allowed. The listings replace, in total, pages 82 thru 141 of the 23Aug94, WRIGHT LABORATORY SUBMITTAL. WL TOTAL REDUCED DUE TO INSUFFICIENT TIME TO PROPERLY RESEARCH SOURCES.

BASE REVIEWER: _____ John J. Fedon
(print name, organization, DSN) WL/PAME DSN 785-4013

I certify the information above is accurate and complete to the best of my knowledge and belief.

Pearson, Jerome "Press 'Up' for Space", Encyclopedia Brittannica Yearbook of Science & the Future, pp. 42-55, 1991.

Pearson, Jerome "The Moon & SETI", Acta Astronautica, V. 26 No. 3/4, pp. 151-155, 1992.

Pearson, Jerome "High-Intensity Testing of Flight Structures in the U.S. Air Force", DOD 63rd Shock & Vibration Symposium Proceedings, Oct 1992, Vol. II, pp. 547-552.

Pearson, Jerome "High -Temperature Acoustic & Vibration Test Facilities & Methods", AGARD Specialists' Meeting Proceedings, May 1993

"A Numerical Investigation of Benard Convection Problem in Binhgam Plastics" 2ND Pan American Conference in Applied Mechanics Proceedings" Dr. V. D. Murty, C. L. Clay, Dr. D. B. Paul Valparaiso, January 91

"Liquid Hydrogen Fuel Tank Thermal Modeling" Co-authored with F. R. Schauer, Dr. L. L Boehman AIAA 18TH Mini-Symposium on Aerospace Science Proceedings, March 92

"Development Status of the Combined Environment Acoustic Chamber" A. Gerardi, A. B. Pacia, A. Swansen, K. R. Wentz, Capt J. Oliver 1993 National Aero-Space Plane Technology Review Proceedings, April 1993

"Elevated Temperature Acoustic Test Chamber Development and Construction" A. B. Pacia, A. Swanson, K. Wentz, T. Gerardi 15th AIAA Aeroacoustics Conference Proceedings, AIAA 93-4337, Sep 93

"Parallel Unstructured Grid Generation" Unstructured Scientific Computation on Scalable Multiprocessors (MIT 1992) R. Lohner, J. Camberos, & M. Merriam

"Analysis of Internal Ablation for the Thermal Control of Aerospace Vehicles" AIAA 92-0853, J. Camberos & L. Roberts

"Vulnerability Analysis of Aerospace Structures Exposed to Lasers (VAASEL)", published in Aircraft Survivability, Estelle R. Anselmo & Dr. Jay Kudva, Mar 1991

NASP Technical Symposium GWP 78 Proceedings- "Actively Cooled Structures" April 92, C. L. Clay

NASP Technical Symposium GWP 78 Proceedings- "Actively Cooled Structures" April 93, C. L. Clay

Aircraft Flight Loads, AIAA Mini-Symposium Proceedings, Mar 92, W. P. Johnson

"A Methodology for the Evaluation of Runway Roughness for Repair", Seventeenth Annual Mini-Symposium on Aerospace Science and Technology Proceedings, Mar 93, John T. Riechers

"Portable Digital Recording of Test Data", 20th Annual Mini-Symposium on Aerospace Science and Technology Proceedings, Mar 93, John T. Riechers and David L. Banaszak

"Leading Edge Test Techniques", Proc. 7th Structural Testing Technology at High Temperatures (Society of Experimental Mechanics, Inc.) Author Larry Byrd, Nov 1991

"Parametric Study of Combined Boiling and Partial Dryout in Liquid Metal Heat Pipe Wicks", Author Larry Byrd, Proc. 17th AIAA, Mini-Symposium or Aerospace Science and Technology Proceedings, March 91

"View Factor Algebra for Two Arbitrarily Sized Non-Opposing Parallel Rectangle" Author Larry Byrd, ASME J. Heat Transfer, P517, Vol. 115, May 1993

Daniels, J.A., Palazotto, A.N. and Sandhu, R.S., "Failure Characteristics in Thermoplastic Composite Laminates Due to an Eccentric Circular Discontinuity", AIAA Journal Vol. 29 No. 5, May 1991

Demuts, E., Sandhu, R.S., and Maddux, J., "Barely Visible Damage Threshold in Graphite Epoxy", Proceedings of the 8th International Conference on Composite Materials, July 1991

Demuts, E., Daniels, J.A., and Sandhu, R.S., "Post Impact Compressive Strength in Composites", Proceeding of the 9th DOD/NASA/FAA Conference on Fibrous Composites in Structural Design, November 1991

Demuts, E., and Sandhu, R.S., "Barely Visible Damage Threshold in a BMI", 7th Specialists' Meeting of Materials and Structures Panel (AGARD) Proceedings, May 1992

Dolvin, D,J., "Structural Design Optimization with Survivability Dependent Constraints", Ninth NASA/DoD/FAA Conference on Composites in Structural Design Proceedings, October 1991

Dolvin, D,J., "Structural Design for Survivability; Multidisciplinary Optimization Employing Physical Linking", Fourth AIAA/Air Force/NASA/OAI Symposium on Multidisciplinary Analysis and Optimization Proceedings, February 1992

Fisher, Palazotto, A.N. and Sandhu, R.S., "A Study of Failure Characteristics in a Thermoplastic Material at 250●F", ASTM Journal of Composite Technology and Research, Vol. 13, Fall 1991.

Martin, R.J., Sandhu, R.S. and Palazotto, A.N., "The Experimental and Finite Element Comparisons of Failure in Thermoplastic Composites", Experimental Mechanics, 1993.

Paul, C. and Schoeppner, G.A., "Static Test Study of Composites with Embedded Optical Fibers Using Fractional Factorial Methods", proceedings of the 1993 SEM Spring Conference on Experimental Mechanics, July 1993

Perry, Palazotto, A.N. and Sandhu, R.S., "Impact Response of Graphite/Epoxy Cylindrical Panels", AIAA Journal, Vol 30, No. 7, July 1992.

Sandhu, R.S. and Sendeckyj, G.P. "Edge Delamination of (±qm/90n/2)s LaminatAs Subjected to Tenile Loading", ASTM Journal of Composites Technology and Research, Summer 1991.

Sandhu, R.S., Sendeckyj, G.P., Schoeppner, G.A. and Pappas, J.E.",Initiation and Prevention of Edge Delamination with and without Residual Stresses", Proceedings of the 74th meeting of the Structures and Materials Panel AGARD, AGARD-CP-530, May 1992

Sandow, F.A., "Elevated Temperature Verification of the Composite Repair Analysis Program (CREPAIR)", 36th International SAMPE Symposium and Exhibition Proceedings, April 1991.

Schoeppner, G.A., Wolfe, W.E. and Sandhu, R.S., "A Stress Based Elastodynamic Discrete Laminated Plate Theory " AIAA Journal, June 1993

Schoeppner, G.A., Wolfe, W.E. and Sandhu, R.S., "An Elastodynamic Discrete Laminated Plate Theory Based on an Assumed Through-the-thickness Stress Distribution", proceedings of the 34th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, April 1993

Sandow, F.A., "Laser Susceptibility of Generic Aircraft Wingbox Designs Under Structural Load", 8th DoD Conference Proceedings on Directed Energy Weapons, June 1992.

Dodd, Steven M. and Sandow F.A. "Optimum Repair Design for Aircraft Battle Damage Repair", Third DOD/NASA Workshop on Repair Technology Proceedings, Jan 1991.

Sandow, F.A., "Portable Computer Based Expert System for Aircraft Structures Battle Damage Assessment and Repair", 6Th International Symposium on Structural Adhesive Bonding Proceedings, May 1992.

Foos, B.C., Wolfe, W.E. and Sandhu, R.S.",The Effect of Tab Orientation on the Distribution of Strains in Composite Specimens", Composite Materials: Testing and Design (Tenth Volume), ASTM STP 1120, Glenn, C. Grimes, Ed., 1992, pp. 103-113

Daniels, J.A. and Sandhu, R.S.",Evaluation of Compression Specimens and Fixtures for Testing Unidirectional Composite Laminates", Composite Materials: Testing and Design (Eleventh Volume), ASTM STP 1206, E.T. Camponechi, Jr., Ed., 1993, pp. 102-123

Schoeppner, G.A.",Low Velocity Impact Response of Tension Preloaded Composite Laminates", Proceedings of the Tenth DoD/NASA/FAA Conference, November 1993

Kelkar, A.D., Craft, W.J. and Sandhu, R.S.",Low Velocity Impact Behavior of Thin and Thick Graphite/Epoxy Composite Laminates", Proceedings of the Tenth DoD/NASA/FAA Conference, November 1993

Dandy, L.T., Kelkar, A.D. and Sandhu, R.S.",Analysis of Progressive Damage in Thin and Thick Composite Laminates Subjected to Low-Velocity Impact Loadings", Ninth International Conference on Mathematical and Computer Modelling Proceedings, July 1993

Kelkar, A.D., Craft, W.J. and Sandhu, R.S.",Study of Progressive Damage in Thin and Thick Composite Laminates Subjected to Low Velocity Impact Loading", Recent Advances in Structural Mechanics, ASME 1993, PVP-Vol. 269 / NE-Vol. 13, pp. 67-73

Arvind Nagar, "An Equivalent Damage Concept for Fatigue Life Analysis", ASME AD Vol. 36, 1993

Arvind Nagar, "3-D Thermal Stress Analysis of Laminated Panels", ASME AD Vol. 39, 1993

Arvind Nagar, "On Fracture and Damage in Notched Fiber Reinforced Composites", Meet 'N' 93 Proceedings, 1993

Arvind Nagar, "An Approach to Three-Dimensional Analysis of Finite Three Layered Composite Plates with a Thru Crack", SDM Conference Proceedings , 1993

Arvind Nagar, "Fatigue and Fracture of Aerospace Structural Materials", ASME Press, 1993

Arvind Nagar, "Recent Developments in Computational Mechanics", ASME Press, 1993

Arvind Nagar, "Topics in Composite Materials and Structures", ASME Press, 1992

Arvind Nagar, "Fracture and Damage", ASME Press, 1992

Arvind Nagar, "An Integral Formulation of CT for use in Creep Crack Growth Evaluation", Int'l Journal of Fracture, 1992

Arvind Nagar, "Fracture Strength Modeling and Analysis of Notched Composites", ASME Vol. 133, 1992

Arvind Nagar, "Modeling of Time Dependent Fracture", ASME Vol. 27, 1992

Arvind Nagar, "LEFM Analysis of Laminated Panels by p-version FEM", ASME AD Vol. 27, 1992

Arvind Nagar, "Nonlinear Micromechanics Analysis Prediction of Titanium Alloy Matrix Composite Behavior", ASME AD Vol. 27, 1992

Arvind Nagar, "Crack Arrester Layers Technique for Composite Panels", ASME AD Vol. 27, 1992

Arvind Nagar, "Thermo-elastic Analysis of Axisymmetric Laminated Composites Using p-version FEM", Proceedings, Int'l Symposium on Scientific Computing, 1992

Arvind Nagar, "Ion Implantation of Titanium Aluminides for Structural Integrity Improvement under Elevated Temperatures", SDM Conference Proceedings, 1991

Edvins Demuts, "Low Velocity Impact Resistance of Graphite/BMI", Advanced Composites '93 Conference Proceedings, Feb 93

Edvins Demuts, "Low Velocity Impact of a Graphite/PEEK", 34th SDM Conference Proceedings, LaJolla CA, Apr 93

Edvins Demuts, R.S. Sandhu and G.E. Maddux, "Barely Visible Damage Threshold in Graphite/Epoxy", 8th Int'l Conference on Composite Materials (ICCM/8) Proceedings, Jul 91

Edvins Demuts, R.S. Sandhu and J.A. Daniels, "Post Impact Compressive Strength in Composites", The 9th DOD/NASA/FAA Conference on Fibrous Composites in Structural Design Proceedings, Nov 91

Edvins Demuts and R.S. Sandhu, "Barely Visible Damage Threshold in a BMI", 74th Meeting of AGARD's Structures and Materials Panel Proceedings, May 92

G.P. Sendeckyj, M.A. Hamstad, "Acoustic Emission Technology for Smart Structures", Journal of Acoustic Emission, Vol. 10, pp. 33-41, 1993

G.P. Sendeckyj, G.S. Agnes, "Smart Structures Research Direction of the USAF Wright Laboratory", Proceedings of Fourth International Conference on Adaptive Structures, Technomic Publishing, 1993

G.P. Sendeckyj, "Airframe Life Prediction", Computational Structures Technology for Airframes and Propulsion Systems, NASA Conference Proceedings, Publication 3142, pp. 431-445, 1992

G.P. Sendeckyj, D.A. Wagner, S.D. Sheppard, "Verification of Fracture Parameter for Uncoupled Thermoinelasticity", Engineering Fracture mechanics, Vol. 42, No. 3, pp. 461-478, 1992

G.P. Sendeckyj, R.S. Sandhu, G.A Schoeppner, J.E. Pappas, "Initiation and Prevention of Edge Delamination With and Without Residual Stresses", Debonding/Delamination of Composites, AGARD Conference Proceedings No. 530, pp. 3/1 - 3/20, 1992

Sendeckyj, G.P., "Life Prediction for Resin-Matrix Composite Materials", Fatigue of Composite Materials, K.L. Reifsnider, ed., Elsevier Science Publishers, Amsterdam, pp. 431-483, 1991

G.P. Sendeckyj, D.A. Wagner, S.D. Sheppard, J.C. Simo, "Finite Element Calculation of Path Domain Independent Integral for Thermoinelasticity", ASME Paper 91-WA-CIE-4, Interdisciplinary Coupled Problems Proceedings, 1991

G.P. Sendeckyj, R.S. Sandhu, "Edge Delamination of $(\pm 0_m/90_n/2)_s$ Laminate Subjected to Tensile Loading", ASTM Journal Composites Technology and Research, Vol. 13, No. 2, pp. 78-90, 1991

G.P. Sendeckyj, G.P. Carman, "Review of the Mechanics of Embedded Optical Sensors", ASTM Journal of Composites Technology and Research

J.G. Burns, G.H. [redacted] gation [redacted] 13", 1993 ASIP Conference Proceedings, Dec 93

J.G. Burns, J.P. Gallagher, S. Dhar and A.P. Berens, "A Comparison of [redacted] for Crack Coalescence and Other [redacted] ", 1993 [redacted]

K.L. Bearden, S. Mall, "Mechanical Behavior and Failure Mechanisms of SCS-9/β21S Metal Matrix Composite at Room Temperature", American Society for Composites Eighth Technical Conference Proceedings, Oct 93

C.A. Paul, G.A. Schoeppner, "Static Test Study of Composites with Embedded Optical Fibers Using Fractional Factorial Methods", Proceedings of the 1993 SEM "50th Anniversary" Spring Conference on Experimental Mechanics Proceedings, 1993

C.A. Paul, "Optimization of Optical Time Domain Reflectometry (OTDR) Based Strain Sensing", Proceedings of the 1993 SEM "50th Anniversary" Spring Conference on Experimental Mechanics, 1993

C.A. Paul, G.P. Sendeckyj and G.P. Carman, "Detection of the Onset of Damage Using an Extrinsic Fabry-Perot Interferometric Strain Sensor (EFPI-SS)", Smart Sensing, Processing and Instrumentation, SPIE Vol. 1918, pp. 154-164, 1993

C.A. Paul, G.P. Sendeckyj, "Some Smart Structures Concepts", Proceedings of the Fiber Optic Smart Structures & Skins II, SPIE Vol. 1170

C.A. Paul, G.P. Sendeckyj and G.P. Carman, "Transverse Strength of Composites Containing Optical Fibers", Smart Structures and Intelligent Systems, SPIE Vol. 1917, pp. 307-316, 1993

C.A. Paul, "Thinking Smart-Development of a Structural Health Monitoring System - Smart Structures Concept Requirements Definition", ASIAC Current Awareness Bulletin, Published by the Aerospace Structures Information & Analysis Center, 1992

C.A. Paul, "Thinking Smart-Development of a Structural Health Monitoring System - Structural Health Monitoring", ASIAC Current Awareness Bulletin, Published by the Aerospace Structures Information & Analysis Center, 1992

F.A. Opalski, S. Mall and J.J. Pernot, "Investigation of Fatigue Response of a Ceramic Matrix Composite", American Society for Composites Eighth Technical Conference Proceedings, Oct 93

J. Harter, "Damage Tolerance Management of the X-29 Vertical Tail", AGARD Proceedings, Sep 93

J. Harter, D. Harmon and R. Post, "Residual Strength and Life PredictionTechniques for Ti MMC", AGARD Proceedings, Sep 93

J. Harter, D. Harmon, "Differences in Fatigue/Fracture Behavior of Woven Material Acrylic Binder in the SCS-6/Ti-15-3 Composite", Journal of Composites, Technology & Research, Vol. 15, No. 3, 1993

K.A. Hart and S. Mall, "Response of a Quasi-Isotropic Metal Matrix Composite Under Thermo-Mechanical Fatigue", ASME 114th Winter Annual Meeting Proceedings, Nov 93

Kevin Boyd, "Experiences with Graphite Fiber/AFR 700 Resin-Matric Composites in the Ultra-Tomcat Program", Proceedings of the AFR 700 Symposium, Sep 91

Kevin Boyd, "Fatigue and Fracture/Extreme Environment Facility - NASP Phase II Test Facility Modification", Proceedings of the NASP Mid-Term Technology Review, Apr 92

A State-of-the-Art Data Acquisition System, Richard Talmadge,61st Shock & Vibration Symposium Proceedings, 9/93

Critical Evaluation of Complex Modulus Data For a Damping Material Data Base, D.I.G. Jones, 61st Shock & Vibration Symposium, 10/90

A Comparison of a Zero-G Modal Identification with a Ground Test using a Zero-Spring-Rate Mechanism, Joseph J. Hollkamp; Robert Gordon, 61st Shock & Vibration Symposium, 10/90

Time Series Models for Nonlinear Systems, Joseph J. Hollkamp; S.M. Batill, ASCE Journal of Aerospace Engineering, Vol 3, No 4, 10/90

The Acoustic Environment of Cavities of Various Scale, Leonard L. Shaw, 61st Shock & Vibration Symposium Proceedings, 10/90

Radome Ground Vibration Survey, Douglas A. Henderson; Arnel Pacia,61st Shock & Vibration Symposium, 61st Shock & Vibration Symposium Proceedings, 10/90

Zero-Gravity Dynamics of Space Structures in Parabolic Aircraft Flight, Andrew D. Swanson; Wayne Yuen; Jerome Pearson, First Joint US/Japan Conference on Adaptive Structures Proceedings, 11/90

Active Member Vibration Control Experiment in KC-135 Reduced Gravity Environment, C.R. Lawrence; B.J. Lurie; G-S Chen; Andrew D. Swanson, First Joint US/Japan Conference on Adaptive Structures Proceedings, 11/90

Thermo-Acoustic Loads and Fatigue of Hypersonic Vehicle Skin Panels, Kenneth Wentz; R.D. Blevins; I. Holehouse, ASME Winter Annual Meeting Proceedings, 12/90

Decentralized Control Experiments on a Truss-Structure, P. Dix; U. Ozguner; Robert Gordon, 29th IEEE Conference Proceedings, 12/90

Proceedings of the Fourth NASA/DOD Control/Structures Interaction Technology Conference, Andrew D. Swanson, 1/91

Automated Parameter Identification and Order Reduction for Discrete Time Series Models, Joseph J. Hollkamp; S.M. Batill, AIAA Journal, VH29, No 1, 1/91

High Temperature Acoustic Fatigue Test Facility Development, Kenneth Wentz, NASP Acoustics and Sonic Fatigue Workshop, 2/91

An Investigation of Add-on Damping Treatment for Life Extension of the F-15 Upper Outer Wing Skin, Vincent Levraea; M. Parin; Arnel Pacia; L. Rogers, Proceddings of Damping 91 Conference,2/91

An Application of the Active Flexible Wing Concept to an F-16 Derivative Wing Model, E.Pendleton, M.Lee; L.Wasserman, AIAA 32nd SDM Conference Proceedings, 4/91

Impact of Active Controls Technology on Structural Integrity, T.Harris, T.Noll; E.Austin, S.Donley, G.Graham, L.Kaynes, B.Lee, J.Sparrow, AIAA 32nd SAM Confernece Proceedings, 4/91

Experimental Identification of Internally Resonant Nonlinear Systems Possessing , Quadratic Nonlinearity, L.D. Zavodney; Joseph J. Hollkamp, AIAA 32nd SDM Conference Proceedings, 4/91

NASP Acoustics and Sonic Fatigue Research, Kenneth Wentz, NASP Acoustics Workshop Proceedings, 4/91

Multiple-Input Multiple-Output Time-Series Models from Short Data Records, Joseph J. Hollkamp, AIAA 32nd SDM Conference Proceedings ,4/91

Air Vehicles - Fixed - Structures **3.2.4.2 - Listing of Publications (continued)**

A Passive Controller for CSI Evolutionary Model: Design and Experimental Results, A. Bruner; L. Horta; W.K. Blevin; J. Juang, AIAA 32nd SDM Conference Proceedings,4/91

Programmable Transducer Microchip Development, Richard Talmadge; K. Appley, 16th Transducer Workshop Proceedings,6/91

Video Holography and Laser Vibrometry...The Dynamic Duo, Gene E. Maddux, SEM Proceedings,6/91

Multiple Accelerometer Frequency Response Evaluation, Dave L. Banaszak, 16th Transducer Workshop Proceedings, 6/91

Structural Dynamics: Recent Advances, Howard F. Wolfe; M. Petyt; C. Mei, 4th Internation Conference Proceedings, 7/91

Correlation of Complex Modulus Data by Direct Stiffness and Indirect Resonant Beam Techniques, D.I.G. Jones; M. Khoury; T. Lewis, Proceedings of Damping 91 Conference, 8/91

Results of a Round Robin Test Series to Evaluate Complex Moduli of a Selected Damping Material, D.I.G. Jones, Proceedings of Damping 91 Conference,8/91

Application of Video Holography to Aircraft Vibration Testing, Gene E. Maddux, SPIE National Meeting, 8/91

Analytically and Experimentally Determined Cyclic Frequencies of Cantilevered Skew Plates, O. McGee; Gene E. Maddux; M. French, 10th International Symposium on the Unification of FEM Proceedings, 8/91

Video Holography, A View From Inside the Specimen, Gene E. Maddux, 10th International Symposium on the Unification of FEM Proceedings, 8//91

Unsteady Aerodynamics for Aeroelasticity at the Flight Dynamics Directorate, T.Harris, M.Blair, L.Huttsell, W.Sotomayer, AGARD Meeting Proceedings, 10/91

A Vibration Measurement Technique for High Temperature Structures, Gene Maddux, SEM Conference Proceedings, 11/91

Acoustic Testing at Elevated Temperatures, Kenneth R. Wentz; Kevin P. Harris, Arnel Pacia, SEM Conference Proceedings, 11/91

Beam Vibration Control through Strain-Actuation and Bending-torsion Coupling, Greg S. Agnes; S.W. Lee, ADPA Symposium Proceedings, 11/91

Influence of Data Accuracy on Characterization of Polymer Damping Behavior, D.I.G. Jones, ASA 122 Proceedings, 11/91

Structural Identification using Order Overspecified Time-Series Models, J.J. Hollkamp; S.M. Batill, ASME Journal Col 14, No 1, 3/92

Simultaneous Design of Active Vibration Control and Passive Viscoelastic Damping, Michele Gaudreault; Ronald Bagley; Brad Liebst, 2nd International Congress- Air & Structure Borne Sound & Vibration, 1/92

Passive Damping applied to Aircraft Wing Skin, Vincent J. Levraea; Lynn C. Rogers, 2nd International Congress-Air & Structure Borne Sound & Vibration, 3/92

The Local Area Network in the Structural Dynamics Branch, Cynthia Shroyer, Richard Talmadge, Dansen Brown, Dayton AIAA Mimi-Symposium Proceedings, 3/92

The Shaping of a High Temperature Acoustic Test Facility, Arnel B. Pacia, 3/92

The 12-Meter Truss Active Control Experiment Design, Analysis and Open-Loop Testing, Robert W. Gordon, 4/92

The Large Space Structures Technology Program, Robert W. Gordon, 4/92

Identification of Structural Systems from a Short Set of Input-Output Data: A Comparison Study, J.J. Hollkamp, 4/92

Results of a Round Robin Test Program: Complex Modulus Properties of a Polymeric Damping Material, D.I.G. Jones, 5/92

S/N Curve for 3-D Carbon/Carbon, Michael P. Camden; Michael P. Banford; Larry Simmons, 5/92

Adaptive Identification of a Flexible Structure by a New Multichannel Lattice Filter, S.-B. Jiang; J.S. Gibson; J.J. Hollkamp, 5/92

Nonlinear Response of a Clamped Beam and Plate to High Levels of Excitation, Howard Wolfe; R.G. White, 5/92

Pre- and Post-Processing for ASTROS Using PATRAN, G.MosterE; E.Anselmo, S.Pitrof, 6/92

Application of Active Flexible Wing Technology to the Agile Falcon, E.Pendleton, M.Lee; L.Wasserman, 6/92

Dynamics, the Study of Motion, Techniques for Demonstration, Jack Schmermund, 6/92

Space Truss Zero Gravity Dynamics, Andrew D. Swanson; Wayne Yuen, 6/92

Beam Modal Functions, M.Hopkins, 7/92

Recent Advances in Laser Metrology, Gene Maddux, 7/92

Photomechanics Research at the Wright Laboratory, Gene Maddux, 7/92

Using a Scanning Laser Vibrometer to Investigate Vibrating Wire Dynamics, Gene Maddux, 7/92

Add-on Damping Treatment for the F-15 Upper-Outer Wing Skin, Vincent Levraea; Arnel Pacia; Lynn Rogers; Mike Parin, 7/92

Designing a User Interface to Visualize and Manipulate Iterated Function Systems, Cynthia Shroyer, 7/92

Preliminary Results from the Aircraft Response Test Series, Stephen R. Whitehouse, 8/92

Improved Precipitation Static Discharge (PSD) Unit Attachment Method, T.Gerardi; J.Weiher; Lt. Greg Agnes; J.Shaw; C.Hitchcock, 9/92

Solving Dynamics Problems, John Ach; Dave Banaszak; Doug Henderson; Paul Linquist, 9/92

Modal Survey of a Full-Scale F-18 Wind Tunnel Model, Vincent J. Levraea; Douglas Henderson; Arnel Pacia, Michael Banford, 9/92

The Effect of Cutout Positioning on the Dynamic Characteristics of a Curved Composite Panel, Vincent J. Levraea; A.N. Palazotto; Gene E. Maddux, 9/92

Multimodal Passive Vibration Suppression with Piezoelectric Materials and Resonant Shunts, J.J. Hollkamp, 10/92

Aircraft Smart Structures Research in the USAF Wright Laboratory, G.S.Agnes; K.Silva, 10/92

National Aero-Space Plane (NASP), Design 201, Horizontal Lifting Surface Model, E.Pendleton, 12/92

Large-Amplitude Nonlinear Response of Flat Aluminum Beams and Plates, Howard F. Wolfe; Cynthia A. Shroyer, 1/93

Vibration Attenuation of Aircraft Structures Utilizing Active Materials, G.S.Agnes, S.W.Whitehouse, J.R.Mackaman, 2/93

A NASP Stabilator Aeroelastic Model, E.Pendleton, 4/93

An Overview of Aeroelasticity Studies for the National Aero-Space Plane, L.Huttsell, 4/93

Multimodal Passive Vibration Suppression with Piezoelectrics, J.J. Hollkamp, 4/93

Active Constrained Layer Damping, G.S.Agnes, 4/93

Multiple-Input Multiple-Output Time-Series Models from Short Data Records, J.J. Hollkamp, 5/93

A Time Domain Panel Method for Wings, M.Blair; M.Williams, 8/93

Development of Optimization Techniques for Application to the Design of Aeroelastic Wind Tunnel Models, M.French, 8/93

Smart Structures for Health Monitoring, Michael Zeigler and William Baron, Jun 1993

Advanced Technology Redesign of Highly Loaded Structures, Michael Zeigler, Jun 1993

Synergistic Design of Passive Damping and Metal Matrix Composites, Michael Zeigler, Feb 91

Design of a Damped Precision Space Platform, Michael Zeigler, Oct 92

Advanced Metallic Structures New Starts, Verner Johnson, Oct 91

Advanced Technology Redesign of Highly Loaded Structures, Mohan Rativani, David Kane, and Michael Zeigler, Oct 91

Advanced Metallic Structures Program Prioritization, Verner Johnson, May 93

Advanced Technology Redesign of Highly Loaded Structures, Mohan Ratwani, David Kane, Michael Zeigler, May 93

Advanced Metallic Structures Future Programs, Edward Schopler, May 93

Special Operations and Future Transport Structures, Michael Ziegler, May 93

Structural Response Tests of a Commercial Aircraft Fuselage to Internal Blast, Peter Flick and Stephan Whitehouse, Sep 93

Elevated Temperature Aluminum Structures for Advanced Aircraft Applications, Raymond Flores, 1991.

Structural Assessment Vulnerability Evaluation, Raymond Flores, July 92

"Thermal Life Cycle Testing of a Titanium Matrix Composite Panel" - David Hart, Nov 91.

"Practical Applications of Free Filament High Temperature Strain Gages" - Lawrence Kretz, Aug 91.

"Hypervelocity Technology Carbon-Carbon Testing" - John Anselmo and Lawrence Kretz, Aug 91.

"Capacitance Based Strain Gages for High Temperature Testing" - Patricia Majkowski (Foster Miller) and Lawrence Kretz, Mar 93.

"Actively Cooled Panels" - Tim Sikora, Nov 91.

"Simulation of High Heat Flux Levels with Graphite Heating and Arc Lamps" - Tim Sikora, Nov 91.

"High Temperature Testing of a Carbon-Carbon Wing Component" - Ken Leger, Nov 91.

"Elevated Temperature Testing of a TMC Stabilator Structure" - Martin D. Richardson, Nov 91.

"WL Actively Cooled Facility" - Tim Sikora, Apr 92.

"Cryogenic Engineering Review Team (CERT) Report" - Tim Sikora, May 93

M.S. Maurice, "Accuracy and Enhancement of A Laser Velocimeter Particle Sizing Technique, ASME Fluid Measurement and Instrumentation", FED - Vol 161, PP 121-129, 1993

M.S. Maurice, L.G. Smith, G.L. Seibert, C. Tyler, C.D. Miller, "Laser Velocimetry in TheSupersonic Regime: Advancements, Limitations, and Outlook", SAE Aerospace Atlantic Conference Proceedings, SAE Technical Paper 93-1365, Apr 93

M.J. Wagner, "Skin Friction And Heat Transfer Measurements In Mach 6 High Reynolds Number Flows", 15th International Congress Of Instr. Aerospace Simulation Facilities, Sep 93

K.S. Nagarajac, C.Garaja, "Thrust Augmenting Ejectors: A Revisit To Examine The Potentials And Problems", AIAA Atmospheric Flight Mechanics Conference Proceedings, AIAA 93-3672, Aug 93

K.S. Nagaraja, T.M. Weeks, "Unsteady Aerodynamics For Air Force Needs", AIAA Atmospheric Flight Mechanics Conference Proceedings, AIAA 93-3622, Aug 93

K.S. Nagaraja, K.D.Mach, "A Perspective Of Rarefied Gas Flow Problems Relevant To High Altitude Flight", SAE Aerospace Atlantic Conference Proceedings, SAE Technical Paper 93-1366, Apr 93

L.G. Smith, J.D. Schmisseur, M.S. Maurice, D. Miller, C. Tyler, "Laser Based Diagnostics For Wind Tunnels In The Aeromechanics Division: 1993", STA 79th Meeting Proceedings, Mar 93

L.G. Smith, C. Tyler, J.D. Schmisseur, "Advanced Diagnostics Research For High Speed Aerodynamic Testing", SAE, Aerotech 92 Conference Proceedings, Oct 92

T.A. Presdorf, "Construction And Check-Out Of The Subsonic Aerodynamic Research Laboratory", STA 78th Meeting Proceedings, Oct 92

J.R. Martinez, "Automation of Wind Tunnel Facility Subsystems Using Progammable Logic Controllers", STA 78th Meeting Proceedings, Oct 92

K.S. Nagaraja, "Wind Tunnel Acoustics And Impact On Measurements", , AIAA 92-3882, Jul 92

M.S.Maurice, "A Particle Size Distribution Technique Using Conventional Laser Velocimetry Measurements", AIAA 17th Aerospace Ground Testing Conference Proceedings, AIAA 92-3896, Jul 92

J.B.Barlow, K.S. Nagaraja, "The Wind Tunnel, Its Evolution For Aerospace Test Purposes, Perspectives For Cirriculum Development ", AIAA 17th Aerospace Ground Testing Conference Proceedings, AIAA 92-4017, Jul 92

K.S. Nagaraja, "Low Density Heat Transfer Phenomena", AIAA 27th Thermophysics Conference Proceedings, AIAA 92-2899, Jul 92

N.E. Scaggs, "Future Requirements for Hypersonic Aerodynamic and Aerothermodynamic Facilities, AIAA 92-3903, Jun 92

N.E. Scaggs, R. Neumann A. Labanelli, "Hypersonic Wind Tunnel Nozzle Study", AIAA 92-4012, Jun 92

M. Tracy, D. Miller, J. Schmisseur , C. Tyler, M. Wagner, "Initial Tests Of A Laser Doppler Velocimeter For A Hypersonic Wind Tunnel ", STA 77th Meeting Proceedings, Apr 92

M.S. Maurice, "Laser Velocimetry Seed Particles Within Compressible, Vortical Flows", AIAA Journal, Vol. 30, No. 2, Feb 92

M.S. Maurice, "A Method To Quantify And Correct Particle Velocity Bias In Laser Velocimetry Measurements", AIAA 30th Aerospace Sciences Meeting Proceedings, AIAA 92-0764, Jan 92

L. Galassi, N. Scaggs, "Assessment of CFD Projections for Mach 6 Heat Transfer and Skin Friction", AIAA 3rd Intl. Aerospace Planes Conf. Proceedings, AIAA-91-5037, Dec 91

G.L. Seibert, "Noninstrusive Measurements In Fluid Dynamic Flows From Mach .0005 To 14", 14th International Congress Of Intstr. In Aerospace Simulation Facilities, Oct 91

M.S. Maurice, " The Effects Of High Speed Expansion Turns On LV Measurement Bias", First ASME/JSME Fluids Engineering Conference Proceedings, FED-Vol. 108, Jun 91

L.G. Smith, " Real Time Flow Visualization System: Holographic Interferometry Analysis System", First ASME/JSME Fluids Engineer[illegible] Conference Proceedings, FED-Vol. 108, Jun 91

L.G. Smith, M.S. Maurice, G.L. Seibert, C. Tyler, "Laser Velocimetry Measurements Of Supersonic Vortex Flows On A Simple Razor-Edged Delta Wing", Plasma AIAA 22nd Fluid Dynamics, Dynamics & Laser Conference Proceedings, AIAA 91-1684, Jun 91

L. Galassi, N.E. Scaggs, "Mach 6 Heat Transfer And Skin Friction Measurements", Tenth National Aero-Space Plane Symposium Proceedings, Paper No. 127, Apr 91

M.S. Maurice, "The Effects Of Particle Dynamics On LV Measurement Bias On Compressible, Vorticle Flows", AIAA 29th Aerospace Sciences Meeting Proceedings, AIAA 91-0292, Jan 91

N. M. Koon, J.R. Martinez, A. G. Blore, " Control and Automation of Variable Stator Blades for Axial Flow Compressors Trisonic Gasdynamics Facility, STA Proceedings 74th Meeting, Oct 90

Kroll, N., Gaitonde, D., Aftosmis, M.J., "A Systematic Comparative Study of Several High Resolution Schemes for Complex Problems in High Speed Flows", AIAA Paper 91-0636, Jan 1991

Visbal, M.R., "On the Formation and Control of the Dynamic Stall Vortex on a Pitching Airfoil", AIAA Paper 91-0006, Jan 1991

Shang, J.S., "Characteristic-Based Methods for The Time-Domain Maxwell Equations", AIAA Paper 91-0606, Jan 1991

Rizzetta, D.P., "Numerical Simulation of a Supersonic Inlet", AIAA Paper 91-0124, Jan 1991

Aftosmis, M.J., "A Quadrilateral Based Second Order TVD Method for Unstructured Adaptive Meshes", AIAA Paper 91-0124, Jan 1991

Josyula, E., Shang, J.D., "Numerical Study of Hypersonic Dissociated Air Past Blunt Bodies", AIAA Journal, Vol 29, No 5, May 1991, pp 704-711

Gordnier, R.E., Rubin, S.G., "Three-Dimensional Composite Velocity Solutions for Subsonic/Transonic Flow", AIAA Journal, Vol 29, No 5, May 1991, pp 750-757

Josyula, E., Gaitonde, D., Shang, J.S., "Numerical Simulation of Nonequilibrium Hypersonic Flow Using Roe Flux-Difference Splitting Scheme", AIAA Paper 91-1700, Jun 1991

Gordnier, R.E., Visbal, M.R., "Numerical Simulation of the Unsteady Vortex Structure Over a Delta Wing", AIAA Paper 91-1811, Jun 1991

Webster, W.P., Shang, J.S., "Numerical Simulation of Vortex Breakdown Over a Subsonic Delta Wing", AIAA Paper 91-1814, Jun 1991

Visbal, M.R., "The Laminar Horseshoe Vortex Systems Formed at a Cylinder/Plate Juncture", AIAA Paper 91-1826, Jun 1991

Aftosmis, M.J., "Two Compact Cell Vortex Methods for Computational Electromagnetics", AIAA Paper 91-1504, Jun 1991

Hamed, A., Shang, J.S., "Survey of Validation Data Base for Shock Wave Boundary-Layer Interactions in Supersonic Inlets", J. Propulsion and Power, Vol 7, No 4, pp Jul-Aug 1991

Visbal, M.R., "Structure of Laminar Juncture Flows", AIAA Journal, Vol 29, No 8, Aug 1991, pp 1273-1282.

Webster, W.P., Shang, J.S., "Thin-Layer and Full Navier-Stokes Simulations Over a Supersonic Delta Wing", AIAA Journal, Vol 29, No 9, Sep 1991, pp 1363-1369

Stanek, M.J., Visbal, M.R., "Investigation of Vortex Development on Pitching Slender Body of Revolution", AIAA Paper 91-3273, Sep 1991

Gaitonde, D., Knight, D, "A Numerical Investigation of Effect of
Knight, D. Bleed on 3-D Turbulent Interactions Due to Sharp Fins", AIAA Journal, Vol 29, No 11, Nov 1991, pp 1878-1885

Gaitonde, D., Shang, J.S., "The Performance of Flux-Split Algorithms in High-Speed Viscous Flows", AIAA Paper 92-0186, Jan 1992

Shang, J.S., "A Characteristic-Based Algorithm for Solving 3-D Time-Domain Maxwell Equations", AIAA Paper 92-0452, Jan 1992

Rizzetta, D.P., "Numerical Simulation of Slot Injection into a Turbulent Supersonic Stream", AIAA Paper 92-0827, Jan 1992

Josyula, E., Shang, J.S., "Computation of Hypersonic Flowfields in Thermal and Chemical Nonequilibrium", AIAA Paper 92-2874, Jul 1992

Aftosmis, M.J., "Second-Order TVD Method for Solution of the 3-D Euler and Navier-Stokes Equations on Adaptively Refined Meshes", Proceeds of the 13th International Conference on Numerical Methods in Fluid Mechanics, Jul 1992

Rizzetta, D.P., Visbal, M.R., "Comparative Numerical Study of Two Turbulence Models for Airfoil Static and Dynamic Stall", AIAA Paper 92-4649, Aug 1992

Scherr, S., "Implementation of an Explicit Navier-Stokes Algorithm on a Distributed Memory Parallel Computer", AIAA Paper 93-0063, Jan 1993

Visbal, M.R., "Structure of Vortex Breakdown on a Pitching Delta Wing", AIAA Paper 93-0434, Jan 1993

Gendrich, C., Koochesfahani, M., Visbal, M.R., "Initial Acceleration Effects on the Flow Field Development Around Rapidly Pitching Airfoils", AIAA Paper 93-0438, Jan 1993

Gordnier, R.E., Visbal, M.R., "Numerical Simulation of Delta-Wing Roll", AIAA 93-0554, Jan 1993

Gaitonde, D., Shang, J.S., "Numerical Simulation of Turbulent Flow Past the X24C Reentry Vehicle", AIAA Paper 93-0319, Jan 1993

Stecklein, G., Hasen, G., Gaitonde, D., "Numerical Simulation of Inviscid Hypersonic Flow Around a Conically-Derived Waverider", AIAA Paper 93-0320, Jan 1993

Aftosmis, M.J., "Viscous Flow Simulation Using an Upwind Method for Hexahedral Based Adaptive Meshes", AIAA Paper 93-0772,Jan 1993

Shang, J.S., "A Fractional-Step Method for Solving 3-D, Time Domain Maxwell Equation", AIAA Paper 93-0461, Jan 1993

Choudhuri, G., Knight, D., Visbal, M.R., "2-D Unsteady Separation on a Pitching Airfoil", ASME 1993 Fluids Engineering Division Spring Meeting, Forum on Unsteady Flows, FED Vol 157, Jun 1993, pp 1-12

Brown, S., Roberts, Q., Gaitonde, D., "CFD in Escape System Design", SAFE Symposium Proceedings, November 1992

Josyula, E., Gaitonde, D., Shang, J.S., "Hypersonic Equilibrium Flow Computations Using the Roe Flux-Difference Split Scheme",AIAA Journal, Vol 31, No 5, May 1993, pp 812-813

Stanek, M.J., Visbal, M.R., "Investigation of Vortex Development on a Pitching Slend... Body of Revolution", Journal of Aircraft, Vol 30, No 5, Sep-Oct 1993, pp 711-718

Rizzetta, D.P., "Numerical Simulation of Slot Injection into a Turbulent Supersonic Stream", AIAA Journal, Vol 30, No 10, Oct 1992, pp 2434- 2439

Tavares, T.S., McCune, J.E., "Aerodynamics of Maneuvering Slender Wings with Leading-Edge Separation", AIAA Journal, Vol 31, No 6, Jun 1993, pp 977-986

Rizzetta, D.P., Visbal, M.R., "Comparative Numerical Study of Two Turbulence Models for Airfoil Static and Dynamics Stall", AIAA Journal, Vol 31, No 4, Apr 1993, pp 784-786

Josyula, E., Shang, J.S., "Computation of Nonequilibrium Hypersonic Flowfields Around Hemisphere Cylinders", Journal of Thermophysics and Heat Transfer Vol 7, No 4, Oct-Dec 1993, pp 668-679

Rizzetta, D.P., "Numerical Simulation of Turbulent Cylinder Juncture Flowfields", AIAA Paper 93-3038, Jul 1993

Gordnier R.E., "Computation of Delta-Wing Roll Maneuvers", AIAA Paper 93-2975, Jul 1993

Visbal, M.R., "Computational Study of Vortex Breakdown on a Pitching Delta Wing", AIAA Paper 93-2974, Jul 1993

Josyula, E., "Computation of Hypersonic Flow Past Blunt Body for Nonequlibrium Weakly Ionized Air", AIAA Paper 93-2995, Jul 1993

Shang, J.S., Gaitonde, D., "Characteristic-Based, Time-Dependant Maxwell Equations Solver on a General Curvilinear Frame", AIAA Paper 93-3178, Jul 1993

Shang, J.S., Hill, K.C., Calahan, D., "Performance of a Characteristic-Based, 3D, Time-Domain Maxwell Equations Solver on a Massively Parallel Computer", AIAA Paper 93-3179, Jul 1993

Gaitonde, D., Shang, J.S., "Accuracy of Flux-Split Algorithms in High-Speed Flows", AIAA Journal, Vol 31, No 7, Jul 1993, pp 1215-1221

Gaitonde, D., Shang, J.S., Calculations on a Double-Fin Turbulent Interactions at High Speed", AIAA Paper 93-3432, Aug 1993

Stanek, M.J., Visbal, M.R., "Investigation of Vortex Development on a Pitching Slender Body of Revolution", AIAA Journal of Aircraft, Vol 30, No 5 Sep-Oct 1993, pp 711-718

Kinsey, D., Jolly, B., "An Unstructured Approach to the Design of Multiple-Element Airfoils", AIAA-92-2709, June 1992

Mrozinski, D. P., "Flowfield Calculations over a Swept Wing with a Gap in High Enthalpy Air", AIAA-93-3489, 11th Applied Aerodynamics Conference Proceedings, August 1993

Mrozinski, D. P., "Flowfield Calculations over a Swept Wing with a Gap in High Enthalpy Air", Paper No. 16-67, NASP Technology Review, April 1993

Mrozinski, D. P., Hoffman, J. J., "A Full Navier-Stokes Code for Hypersonic, Nonequilibrium Flowfield Analysis", 4th International Symposium on Computational Fluid Dynamics, Sep 1991

Anselmo, E. R., Croop, H. C., Mrozinski, D. P., Neumann, R. D., "Actively Cooled Leading Edge Joints and Seals", AIAA-93-5153, 5th AIAA International Aerospace Planes and Hypersonics Technologies Conference Proceedings, Nov 1993

Liu, J., Nelson, J., Feng, J., Joseph, D. D., "Anomalous Rolling of Spheres Down An Inclined Wall", J. Non-Newtonian Fluid Mech. (1993)

Nelson, J., "A Finite Element Method for the Study of Linear Stability", LaRC Workshop on Transition, Turbulence and Combustion Proceedings, 1993

Nelson, J., Alving, A., Joseph, D. D., "Boundary Layer Flow of Air Over Water On a Flat Plate", J. Fluid Mech, 1993

Joseph, D. D., Nelson, J., Renardy, M., Renardy, Y., "Two-Dimensional Cusped Interfaces", (1991) J. Fluid Mech. 223, 383-409

Wurtzler, K. E., "Numerical Analysis of a Chined Forebody with Asymmetric Strakes", AIAA-93-0051, Jan 1993

Wurtzler, K. E., "Unstructured Numerical Analysis of a Chined Forebody with Axisymmetric Slot Blowing", AIAA-94-0171

Stecklein, G. O., Hansen, G., Gaitonde, D., "Numerical Solution of Inviscid Hypersonic Flow Around a Conically-Derived Waverider", AIAA Paper 93-0320, Jan 1993

AIAA-91-0418	Predicting the Vector	Canon
AIAA 91 J of Prop	Turbulent Scale Effects on Heat Transfer	Galassi
AIAA-91-1762	Mach 6 Turbulent Boundary Layers on Smmoth & Rough Walls	Scaggs
AIAA-91-1639	A Comparison of Planar & Conical B L Stability	Kimmel, Stetson
AIAA-91-0320	Nonlinear Disturbances in a Hypersonic Laminar B L	Kimmel
SAE-TP-91-1184	Two Stage Fully Reusable Space Launch VehiclePerformance Trades	Dahlem, Gord, Langan
AIAA-91-0063	Application of Numerical Techniques toModel Thermal Sensors	Hayes, Rougeux
AIAA-92-5080	Design and Evolution of the Beta Two Stage System	Norris
AAS-92-127	An Investigation of the Family of Figure 8 Orbits about L2	Stringer
AIAA-92-4369	Chaos in the Pitch Equation of Motion for the Gravity Gradient Satellite	Karasopoulos
AGARD May 92	Experimental & Computational Manh 6 Heat Transfer & Skin Friction	Galassi, Scaggs
AIAA Book; 1992	Tactical Missile Aerodynamics	Hayes, Neumann
AIAA-92-0737	On Hypersonic B L Stability	Kimmel
AIAA-92-5086	Perspective on the NASP Instrumentation Development	Erbland
AIAA 92 Journal	Surface Temperature Effects on B L Transition	Kimmel
AIAA 92 Journal	Example of Second Mode Instability Dominance at Mach 5.2	Kimmel
AIAA 92 Journal	Unit Reynolds Number Effects on B L Transition	Kimmel
Aero America 92	Taking the Measure of Aerodynamic Testing	Erbland
ASME paper Jun 93	Experimental Transition Zone Lengths in Pressure Gradient Flow	Kimmel

SAE paper Apr 93	Hypersonic Laminar B L Breakdown	Kimmel
IAF-93-1.3.19	Investigation of Chaotic Motion for a Gravity Gradient Satellite	Karasopoulos
AIAA-93-2481	Incipient Separation For Mach 6 Flows	Galassi, Frew, Stava
AIAA-93-	Numerical & Experimental Study of Hypersonic B L Stability	Kimmel
AAS-93-697	Investigation of a Family of Moon Wrapping Orbits	Stringer
AIAA-93-0896	Breakdown of the Hypersonic Laminar Boundary Layer	Kimmel
AIAA-93-0627	Flight Performance of Hypersonic Minor Circle Turning Maneuver	Johnson
AIAA-93-4016	Configuration Design of a Hypervelocity Cruise Vehicle	Norris
AAS-93-581	Numerical Investigation of Chaos, Attitude Motion, Gravity Gradient Satellite	Karasopoulos

[redacted] Adamczal

L. Small, "Fighter Airframe/Propulsion Integration, A Wright Laboratory Perspective", AIAA 92-3337, Jul 92

D. Moorhouse, "Lessons Learned In Control System Integration And Management From The S/MTD Program", SAE 90-1849 , Oct 90

D. Moorhouse, "Handling Qualities Of The STOL & Maneuver Technology Demonstrator From Specification To Flight Test", AGARD, Oct 90

J. Laughrey, "Use Of Thrust Vectoring And Reversing On The S/MTD" SAE 91-1173, Apr 91

D. Moorhouse, "Design And Flight Test Of On-Board Guidance For Precision Landing", AIAA 91-2641, Aug 91

D. Moorhouse, "Results And Lessons Learned From The STOL And Maneuver Demonstration Program", SAE Intl Conference Proceedings , Oct 91

D. Baumann, "Thrust Vectoring Fighter Aircraft Agility Research Using Remotely Piloted Vehicles", SAE 92-1015, Apr 92

D. Baumann, "Mathematical Phenomenology For Thrust-Vectoring Induced Agility Comparisons", AIAA Journal of Aircraft Vol#30 Number 2, Apr 93

Pinney, Osborn, "Ring Wing Missile for Compressed Carriage on an Aircraft", AIAA 93-3656, Aug 93

Newman, Fulcher, Ray, Pinney, "On the Aerodynamics/Dynamics of Store Separation from a Hypersonic Aircraft", AIAA 92-2722, Jun 92

Galloway, Jefferies, Pinney, "Cost Effectiveness of a Robotic Air-to-Air Combat Vehicle", AIAA Mission Sciences Conference Proceedings, Nov 90

Numbers, "Hypersonic Propulsion System Force Accounting", AGARD CP-498, Sept 93

Cheatham, Walker, and Gridley, "Computation of Vectoring Nozzle Performance", AIAA Journal of Aircraft, Vol 28, No.11, Nov 91

Cheatham, Walker, and Gridley, "Numerical Evaluation of a 2D Pitch and Yaw Nozzle Using an Inviscid Flow Solver", Society of Automotive Engineers, SAE 91-6T-160, Jun 91

Bowers, "Advanced Aerodynamic Airframe/Nozzle Integration", Int. Society Airbreathing Engines, ISABE 93-7099, Sept 93

A Crit. Eval. of a 3-Dimen. Navier-Stokes Method as a Tool to Calculate Transonic Flows	Hah, Puterbaugh	Dec 91	AGARD, CP 510-10
A Computational Fluid Dynamics & Chemistry Model for Jet Fuel Thermal Stability	Krazinski, Pearce, Roquemore	Jan 92	J of Eng. Gas Turbine Power, Vol 114
A Computational Study of a Coherent Wave Structure Behind a 2-D Bluff Body	Pearce	Dec 92	J of Wind Engineering
A Critical Analysis for the Dispersion of a Solute in Wall-Bounded Parallel Shear Flows	Yu, Chang	Jan 91	J of Engineering Mathematics
A Detailed Model for Transient Liquid Flow in Heat Pipe Wicks	Ambrose, Chow	Jul 91	J of Thermophysics & Heat Transfer
A Ducted Rocket Fuel Injector Evaluation with a Gas Generator Simulator	Carreiro	Feb 92	JANNAF
A Finite Element Eigenvalue Method for Solving Transient Heat Conduction Problems	Zhong, Chow, Chang	Apr 92	Intnl J of Num. Mthds. for Heat & Fluid Flow
A Further Review of Kinetic Energy Efficiency Cycle Analysis of High Speed Engine Perf.	Leingang, Carreiro, Petters, et.al.	Jul 92	AIAA 92-3805
A Navier-Stokes Study of Shock Bound. Layer Interaction Inside a Transon. Compressor	Hah, Puterbaugh	Sep 91	Intl. Soc. of Airbreathing Engines, 91-7014
A Note on the Gas Distribution in a Cylindrical Gas-Loaded Heat Pipe	Chang, Yu	Dec 90	ASME, J of Heat Transfer
A Numerical Method for Sim. Fluid Dynamic & Heat Transfer Changes in a Feed Arm	Katta, Roquemore	Jan 92	AIAA 92-0768
A Review of Kinetic Energy Efficiency Cycle Analysis of High Speed Engine Performance	Leingang, Carreiro, et.al.	Sep 91	Intnl Soc of Airbreathing Engines 91-10.5
A Study of Ramburner Efficiency on Turboramjet Engine	Maurice, Ruble	Jan 92	JANNAF

Air Vehicles-Fixed-Propulsion 3.2.4.2 - Listing Of Publications (Continued)

A Technique for Visualizing Vapor Lines Emanating from Water Droplets	Hancock, Jackson, Nejad	Jan 93	J of Optical Technology, Applied Optics
A Thermal Management Assessment Tool for Advanced Hypersonic Aircraft	VanGriethuysen	Oct 92	Soc of Auto Engrs, 92-1941
AF/NASA High Mach Combined Cycle Engine Developments	Summitt	Oct 90	JANNAF
Acoustic Characteristics of a Research Step Combustor	Heneghan, Lesmerises, et.al.	Oct 91	AIAA 90-1851
Active Cooling of MCT Using Venturi Flow	Ponappan, Leland, Beam	Aug 93	Intersociety Energy Conversion Proceedings
Advanced Thermal Stable Jet Fuel Development	Pearce, Harrison, et.al.	Jul 91	ASTM
Advances in Ducted Rocket Technology	Donaldson	Dec 92	AGARD
Advances in All-Hydrocarbon Launch Vehicle Concept	Carreiro, Leingang	Feb 92	JANNAF
Aerospace Plane Applications for Heavy Lift Missions to the Moon and Mars	Leingang, Carreiro	Dec 92	4th Intnl Aerospace Plane Proceedings
Air Breathing Space Boosters Using In-Flight Oxidizer Collection	Maurice, Leingang, Carreiro	Jul 92	AIAA 92-3499
Air Force Perspective on Probabilistic Design	Thomson	Nov 92	ASME
Air Force Primary Battery Programs	Ryan	Jun 93	
Air Force Primary Thermal Battery Program	Ryan	Jun 91	Tri Service Lithium Battery Proceedings
Airbreathing Booster Performance Optimization Using Microcomputer	Oglevie, Carreiro	Oct 90	JANNAF
All Hydrocarbon Orbital Launch Vehicle	Leingang, Carreiro	Oct 90	JANNAF

Alternate Material Heat Exchanger Development	Norbut	Apr 93	NASP Symposium Proceedings
Alternative Pegasus-Type Vehicle with Air Breathing Boosters	Petters, Roble	Feb 92	JANNAF
An Adaptive Quad. Mesh Based Scheme for Viscous Turbomachinery Flow Calculations	Richardson	Jun 93	AIAA-93-1975
An Assess. of the Predictive Pkg. for Improv. the Thermal Stability of Aviation Turbine Fuel	Pearce, Roquemore	Apr 91	J of American Chemical Society
An Engineering Code to Analyze Hypersonic Thermal Management Systems	VanGriethuysen	Aug 93	NASA Thermal & Fluids Proceedings
An Exper. & Numerical Simulation of Mixed Convection in Large Baffled Rect. Chambers	Yerkes, Faghri	Aug 91	Intnl J of Heat & Mass Transfer
An Experimental Investigation of Lithium Dispenser Cathodes in the MPD Thruster	Fillmore	Sep 93	Intnl Electric Propulsion Proceedings
An Integ. Thermal Energy Manag. Assess. Methodology for Advanced Hypersonic Aircraft	VanGriethuysen	Apr 94	Soc of Auto Engrs, 94-1171
Anal. of Sulfur Containing Compounds by Gas Chromat. and Atomic Emmision Detector	Geiger, Steward	Mar 93	Anal. Chem. & Apld. Spectr. Proceedings, # 384P
Analysis and Testing of Heat Pipe in Accelerating Environment	Ponnappan, Yerkes, Chang, Beam	Sep 92	8th Intnl Heat Pipe Proceedings.
Analysis of Oxidative Decomposition Products of Tricresyl Phosphate	Pitzer	Aug 92	J of Chromatographic Sciences, Vol 31
Analysis of the One-Dimensional Transient Compressible Vapor Flow in Heat Pipes	Jang, Faghri, Chang	Mar 91	Intnl J of Heat & Mass Transfer, Vol 34
Anti-Oxidants in Jet Fuels: A New Look	Heneghan, Harrison	Apr 92	Am Chemical Society, Petroleum Chem Div
Application of Sweep to Improve Efficiency of a Transonic Fan: Part II	Rabe, Hoying, Koff	Jun 91	AIAA-91-2544

Air Vehicles-Fixed-Propulsion 3.2.4.2 - Listing Of Publications (Continued)

Application of a Dynamic Compression System Model to a Low Aspect Ratio Fan	Gorrell	Jun 93	AIAA-93-1871
Arterial Heat Pipe Performance in a Transient Heat Flux & Body Force Environment	Yerkes, Beam	Oct 92	Aerotech 92 Proceedings, # 921944
Aspects of Forming Metal Clad Melt Processed YBCO Tapes	Kozlowski, Oberly, et.al.	Dec 91	J of IEEE, Trans. Mag.
Assessment of Electronic Cooling Techniques	Morgan, Chang	May 93	Intl Sym Transport Phenomena
Assessment of Organic Matrix Composites for a Forward Swept Fan Stage	Norden, et.al.	Sep 93	3rd Pacific Rim Forum on Composite Matls
Bi-Based High Temp. Superconducting Tapes by Cold Rolling Method	Kozlowski, Oberly, et.al.	Dec 91	J of IEEE, Trans. Mag.
Boiling from the Top & Sides of a Protruding Simulated Electronic Chip	Leland, Chow	Jul 93	AIAA-93-2834
Brush Seal Leakage Correlations Based on Effective Thickness	Holle, Chupp, Dowler	Apr 92	4th Intnl Sym, Transport Phenomena
CFD in the Propulsion Lab	Davis, Risha	Feb 92	JANNAF
Capillary Flow Properties of Porous Wicks	Ambrose, Chow	Oct 90	J of Thermophysics & Heat Transfer
Characterization of Droplet/Vapor/ Vortex Interactions in a Two-Dimensional Shear Layer	Hancock, Chin	Aug 93	AIAA, J of Propulsion & Power
Characterization of Droplet/Vapor/Vortex Interactions in a 2-D Shear Layer	Hancock, Post, Chin	Jan 93	AIAA 93-0416
Comparison of Exper. & Pred. Based on Max. Entropy for Sprays from a Press. Atomizer	Li, Chen, Jackson, et.al.	Aug 91	J of Comb. & Flame
Comparison of High Heat-Flux Cooling Applications	Morgan, Chang, Pais	Jul 92	Intnl Sym Optical Applied Science

Component and Engine Structural Assessment Research (CAESAR)	Huffman	Jun 93	AIAA-93-2609
Compressor Drum Aerodynamic Exper. & Anal. with Coolant Injected at Selected Locations	Johnson, Martin, et al	Apr 91	ASME J. of Turbomachinery
Computerized Preliminary Design of Turbomachinery	Stricker, Norden	Jun 91	ASME-91-GT-391
Controll Systems for the Next Century's Fighter Engines	Skira, Agnello	Jun 91	ASME91-GT-278
Corona Testing for 270 Volt Direct Current Aircraft Components	Horwath, Schweickart, et.al.	Aug 93	28th IECEC Proceedings
Corona Testing of Prototype Avionics Connectors	Horwath, Schweickart, et.al.	Jun 92	High Voltage Proceedings
Correlation of Transient and Steady-State Compressor Perf. Using Neural Networks	Gustafson, Little, Rattray	Sep 92	AutoTestCon Proceedings
Critical Current Density Enhancement in YbCO-Ag Composite Superconductor	Kozlowski, Spyker, Oberly, et.al.	Dec 91	J of Physical Chemistry
Degradation of Melt Processed YBCO in Presence of Moisture	Spyker, Kozlowski	Dec 91	J of Applied Physics
Demonstration of Remaining Useful Lubricant Life Evaluation Rig	Wright	Feb 93	USCAR, Automotive Technology Exposition Proceedings
Deposition During Vaporization of Jet Fuel in a Heated Tube	Edwards	Jan 92	AIAA 92-0687
Descrip. of a New Adv. Propulsion Test Facility in the Aero Propulsion & Power Directorate	Carreiro	Feb 92	JANNAF
Design and Development of a Research Combustor for Lean Blowout Studies	Sturgess, Lesmerises, et.al.	Dec 92	ASME, J of EGT&P
Design of Experiments	Allen	May 93	Instr. Soc. of America Proceedings.

Air Vehicles-Fixed-Propulsion 3.2.4.2 - Listing Of Publications (Continued)

Design of a Hydrogen Test Facility	Morgan, Chang, Chow	Aug 92	Intersociety Energy Conversion Proceedings
Design of a Hydrogen Test Facility	Morgan, Chow	Aug 92	Soc Auto Engrs, 929479
Dev. in Silicon Carbide for Aircraft Propulsion Systems	Przybylko	Jun 93	AIAA-93-2581
Dev. of an Additive Pkg. for Improving Thermal Stability of Aviation Turbine Fuel	Anderson, Edwards, et.al.	Jun 91	ASTM
Devel. of Eng. Software for Struct. Anal. and Life Assess. of Turb. Blades and Disks	Thomson, Plummer	Nov 92	ASME
Development of Global-Chemistry Model for Jet Fuel Thermal Stability	Katta, Jones, Roquemore	Sep 93	AGARD-CP-538
Development of a Global Chemistry Model for Jet Fuel Thermal Stability	Katta, Jones, Roquemore	Sep 93	AGARD - CP-536
Dispersion & Passive Transport in Rectilinear Shear Flows: A Rational Basis	Yu, Chang	Jul 91	Intnl Sym. Transport Phenomena
Droplet Distributions from the Breakup of Cylindrical Liquid Jet	Chin, Jackson, et.al.	Aug 91	ACS, J of Physics of Fluids
Droplet/Vortex Interaction Studies	Hancock, Jackson, et.al.	Mar 91	AIAA Proceedings
Ducted Rockets	Leingang, Petters	Jun 91	AIAA, Education Series, Text Book
Dynamic Stiffness and Damping of Foil Bearings for Gas Turbine Engines	Durkin, et.al.	Sep 93	SAE 931449
Effect of Fuel Type on the Calibration of a Model for Fuel Thermal Stability	Pearce	A· ·91	J of American Chemical Society

Effect of Mech. Excitation on Ionic Conductivity & Related Prop. of Polymer Electrolytes	Kumar, Marsh, et.al.	Feb 93	J of Electro-Chemical Society
Effect of Polydimethylsiloxene Concentration on Ester Foaming Tendency	Centers	Jan 93	J of Soc. of Tribologists & Lubrication Engrs
Effect of Radius of Curvature on Boiling in a Curved Channel	Leland, Chow	Jan 92	AIAA-92-250
Effect of Tilt on the Operation of an Oxygen Heat Pipe	Brown, Chang	Sep 92	ASME, Heat Pipes & Thermosyphons
Effective Thermal Conductivity of Sintered Metal Fibers	Mantle, Chang	May 91	J of Thermophysics & Heat Transfer
Effects of Back Pressure in a Lean Blowout Research Combustor	Sturgess, Shouse, et.al.	Jun 92	ASME, Intnl Gas Turb. & Aero Eng. Proceedings.
Effects of Back Pressure in a Lean Blowout Research Combustor	Sturgess, Shouse, et.al.	Dec 92	ASME, J of EGT&P
Effects of Nonunity Lewis Number on the Dynamics on a Hydrogen-Air Jet Diffusion Flame	Katta, Roquemore, et.al.	Jan 93	AIAA 93-0454
Effects of Yaw Maneuvers on Ducted Rocket Engine Performance	Carreiro	Sep 93	JANNAF
Efflux Analysis of a Ducted Rocket Gas Generator Simulator	Carreiro	Oct 92	JANNAF
Elect. Resistivity and Differen. Thermal Anal. of CaPbO Doped BSCCO Superconductors	Ho, Oberly, Spyker, et.al.	Dec 92	J of Advanced Cryogenic Engineering
Eliminating LH2 in LOX-Collect Space Launchers	Leingang, Maurice, Carreiro	Jun 93	

Air Vehicles-Fixed-Propulsion 3.2.4.2 - Listing Of Publications (Continued)

Enhanc.of Maverick Perf. with Air-Turborocket (ATR) Engine for Greater A/C Survivability	Mercier, Roble	Feb 92	JANNAF
Enhancement of Flux Pinning by Non-superconducting Precipitates in BSCO System	Kozlowski, Sarkar, Spyker, et.al.	Dec 91	J of Physical Chemistry
Evaluation of Brush Seals for Limited Life Engines	Chupp, Nelson	Jan 93	AIAA, J of Prop & Power, # 90-2140
Evaluation of Doped Polyethylene Oxide as Solid Electrolyte	Sircar, Marsh, et.al.	Dec 92	
Evaluation of Jet Fuel Additives in Static Systems	Locklear, Anderson	Jan 92	AIAA 92-0686
Evaporation from a Porous Wick Heat Pipe for Isothermal Interfacial Conditions	Chebaro, Kim, Chang	Aug 93	ASME 93-HT-6
Evaporation from a Porous Wick Heat Pipe for Isothermal Interfacial Conditions	Chebaro, Kim, Chang	Oct 92	ASME, Heat Pipes & Thermosyphons
Exper. and Comp. Invest. of Isothermal Swirling Flow in Axisymmeteric Dump Combustor	Favaloro, Nejad	May 91	AIAA, J of Propulsion & Power
Experimental Studies of Reactive & Non-Reactive Flows in Dump Combustor	Nejad, Ahmed	Jun 90	ASME, Intnl Gas Turb Cong. # 90-GT-82
Experimental and Numerical Investigations of Vortex Flame Interactions	Hsu, Roquemore, et.al.	Jan 93	AIAA 93-0455
Experimental and Theoretical Studies in a Gas-Fueled Research Combustor	Roquemore, Reddy, et.al.	Jan 91	AIAA 91-0639
Feasibility of Magnetic Bearings for Advanced Gas Turbine Engines	Hibner, Rosado	Apr 92	ASME Bearing Symposium
Film Cooling in High Turbulence Flow	Jumper, Elrod, Rivir	Jul 91	ASME, J of Turbomachinery, Vol 113

Air Vehicles-Fixed-Propulsion 3.2.4.2 - Listing Of Publications (Continued)

Finite Element Eigenvalue Method for Solving Transient Phase-Change Problems	Zhong, Chow, Chang	Jun 91	J of Thermophysics & Heat Transfer
Flame Stability and Lean Blowout in a Research Combustor	Sturgess, Lesmerises, et.al.	Sep 91	J of Intnl Soc of Airbreathing Engines
Flex Cycle Combustor Development and Demonstration	Durkin, et.al.	May 93	ASME 93-GT-320
Flow & Heat Transfer Limitations in Micro Heat Pipes	Gerner, Chang, et al	Aug 92	ASME, Topics in Heat Transfer, Vol 3
Flow Physics Leading to System Instability in a Centrifugal Pump	Wo, Bons	May 93	ASME 93-GT-283
Flow Vis. of Mixed Convec. in Lrg.. Baffled Rect. Cham. with & without Int. Heat Sources	Yerkes, Faghri	Mar 92	Intnl Comm. in Heat & Mass Transfer
Flow-Tagging Velocimetry Using UV-Photodissociation of Water Vapor	Goss, Nejad	Jan 91	AIAA , J of Propulsion & Power
Flowfield Charact. of an Axisym. Sudden Expan. Pipe Flow with Differential Initial Swirl Dist.	Nejad, Ahmed	Dec 92	Intrnl. J of Heat & Fluid Flow
Forced Convection Boiling from a Non-Flush Simulated Electronic Chip	Leland, Chow	Jan 92	AIAA-92-251
Forced Convection Boiling from a Non-Flush Simulated Electronic Chip	Leland, Chow	Feb 93	J of Thermophysics & Heat Transfer
Forced Convection Cooling of Heat Generating Blocks Simulating Electronic Components	Chang, Brown, Jang	Jan 92	AIAA 92-0252
Forced-Convection Cooling of MCT Using Venturi Flow	Bick, Weimer, Leland	Jul 93	AIAA Thermophysics Proceedings
Foreign Object Impact Assessment of a High Mach Engine Inlet	Thomson, Braisted	Apr 93	AIAA-93-1630
Formation of Insolubles in Jet Fuels: Effects of Oxygen	Jones, Balster, Anderson	Apr 92	Am Chemical Society, Petroleum Chem Div

Further Exploration of an Airbreathing Pegasus Alternative	Roble, Petters	Jun 93	AIAA 93-1832
Future Military APU Requirements	Durkin	Sep 91	SAE 912176
GASP 1.1.d Results for the Transverse Air Jet Case	Sekar	Jan 92	AIAA
GASP 1.1.d Results for the Transverse Hydrogen Reacting Jet	Sekar	Oct 92	AIAA
Heat Pipe Performance with Transient Heat Flux & Body Force Effects	Yerkes, Chang, Beam	Sep 92	8th Intnl Heat Pipe Proceedings.
Heat Pipe Transient Simulation Model	Pratt, Chang	May 93	Intl Sym Transport Phenomena
Heat Pipe Turbine Vane Cooling	Gottschlich, Meininger	Jun 93	IECEC Proceedings
Heat Pump Augmented Spacecraft Heat-Rejection Systems	Scaringe, Mahefkey, Leland	Nov 90	J of Spacecraft & Rockets
Heat Transfer in 2D Jet Impingement of a Dielectric Liquid od to a Flat Plate	Gil, Chow	Oct 92	SAE-921943
Heat Transfer in High Turbulence Flows - A 2-D Planar Wall Jet	Rivir, et.al.	Feb 93	AGARD, CP-527
Heat Transfer on a Flat Surface Under a Region of Turbulence Separation	Rivir, Johnson, Eaton	Jun 92	ASME, 92-GT-198
Heat Transfer on a Flat Surface Under a Region of Turbulent Separation	Rivir, Johnston, Eaton	Jan 93	ASME, J of Turbomachinery, Vol 116
High Current Pulse Testing for Grtound Rod Integrity	Walko	Apr 91	NASA CP3106
High Heat Flux Cooling for Spacecraft Electronics	Leland, Chow	Jan 91	Space Nuclear Power Sys Sym.

Air Vehicles-Fixed-Propulsion 3.2.4.2 - Listing Of Publications (Continued)

High Heat Sink Fuels for Improved Aircraft Thermal Management	Harrison, Anderson, Morris	Jul 93	Soc Auto Engrs, 11E525
High Pressure Viscosity and Density Measurements of Military Lubricants	Given	May 92	Soc of Tribologists & Lubrication Engrs
High Temperature Superconducting Vector Switch	Chelluri, Spyker, et.al.	Dec 91	IECEC 91
High Temperature Superconductor Vector Switch	Chelluri, Spyker, Sarkar, et.al.	Dec 91	J of Applied Physics
High Temperature Thermal Power Loops	Richter, Gottschlich	Jan 92	Space Nuclear Power Sys Symp
High Temperature Thermally Stable JP Fuels	Edwards, Anderson, et.al.	Jan 92	AIAA 92-0683
High Voltage Lithium Thermal Cells	Ryan	Jun 93	Tri-Service Lithium Battery Proceedings
High-Flux Spray Cooling in a Simulated Multichip Module	Tilton, Morgan	Aug 92	ASME Heat Transfer Proceedings
IHPTET Exhaust Nozzle Technology Demonstrator	Hawkes	Jun 93	AIAA-93-2569
Impedance Change Meas. of a Superconducting Shielded Core Reactor	Spyker, Kozlowski, Oberly, et.al.	Dec 91	IECEC 91
Implications of High Temperature Superconductors for Power Generators	Oberly, Kozlowski, Fingers	Dec 92	J of Advanced Croyogenic Engineering
Improved Alternating-Direction Implicit Method for Solving Transient 3D Heat Diffusion Prob.	Chang, Chow	Feb 91	J of Numerical Heat Transfer
In-Line Gas Chromatographic Measurements of Trace Oxygen & Dissolved Gases in Fuel	Rubey, Anderson, et al	Apr 92	Am Chemical Society, Petroleum Chem Div
Influence of Jet-Grid Turbulence of Flat Plate Turb. Boundary Layer Flow & Heat Transfer	Young, Han, Rivir	Feb 91	ASME, J of Heat Transfer, Vol 114

Air Vehicles-Fixed-Propulsion 3.2.4.2 - Listing Of Publications (Continued)

Lean Blowout in a Research Combustor at Simulated Low Pressures	Sturgess, Lesmerises, et.al.	Jun 91	ASME91-GT-359
Liftoff Characteristics of Methane Jet Diffusion Flames	Seaba, Roquemore	Jul 93	AIAA, J of Propulsion & Power
Liquid Metal Heat Pipe Behavior Under Transient Cooling & Heating	Nguyen, Morgan	Jan 92	AIAA Aerospace Sciences Proceedings
Low Aspect Ratio Transonic Rotors: Part I-Baseline Design and Performance	Law, Wadia	Apr 93	ASME, J of Turbomachinery, Vol 115
Low Aspect Ratio Transonic Rotors: Part II - Influence of Location of Maximum Thickness	Wadia, Law	Apr 93	ASME, J of Turbomachinery, Vol 115
Low Cost ATR-Evolving Propulsion for the AGM-130 Missile	Roble	Feb 92	JANNAF
Lubricating Performance of Advanced Complex Chalcogenides	King, Forester, Klenke	May 92	Soc of Tribologists & Lubrication Engrs
Magnetic Properties of Melt Processed Ni-Substituted YBCO	Kozlowski, Oberly, et.al.	Dec 91	J of Physical Chemistry
Manipulation of a Square Jet by Piezoelectric Actuators	Hancock, Roquemore, et.al.	Sep 92	J of Physics & Fluids
Mathematical Modeling and Analysis of Heat Pipe Start-Up from the Frozen State	Jang, Chang, Mahefkey	Nov 90	ASME, J of Heat Transfer
Measures of Goodness of Scramjet Combustors	Sekar, Davis	Jan 93	JANNAF
Melt Processed YBCO/Ag Composite Tapes with Nickel Cladding	Kozlowski, Oberly, et.al.	Dec 92	J of Advanced Cryogenic Engineering
Metal Clad Supercon. Tapes with High Crit. Current Dens. in the YBCO and BPSCCO Sys.	Kozlowski, Oberly, Spyker, et.al.	Dec 91	IECEC 91 Proceedings

Air Vehicles-Fixed-Propulsion 3.2.4.2 - Listing Of Publications (Continued)

Inlet Swirl Effects on Dump Combustor Flows	Nejad, Ahmed	Jan 90	AIAA, J of Experiments in Fluids, # 90-0035
Integrated Power Unit for a More Electric Airplane	Colegrove	Feb 93	AIAA 93-1188
Intelligent Engine Control	Abadhatta, Brown, Gastineau	Jun 93	AIAA-92-3484
Ionic Conductivity and Lithium Electrode Stability in Hydrin LiBF4 Elastomers	Munichandhraiah, Scanlon, et.al.	Dec 92	J of Applied Electro-Chemistry
Ionic Conductivity of Polymer Electrolytes	Kumar, Marsh	Dec 92	J of Solid State Ionics
Isothermal Flowfields in a Research Combustor for Lean Blowout Studies	Sturgess, Lesmerises, et.al.	Jun 91	ASME-91-GT-37
Isothermal Flowfields in a Research Combustor for Lean Blowout Studies	Sturgess, Lesmerises, et.al.	Oct 91	ASME, J for GT&P
JP-7 Thermal Cracking Assessment	Edwards, Anderson	Jan 93	AIAA 93-0806
Jet Fuel Thermal Stability Research at USAF Wright Laboratory	Edwards	Nov 91	Intnl Assoc for Stab. & Hand. of Fuels
Jet Impingement Cooling Using a Jet Fuel	Pais, Leland, Chang	Aug 93	ASME 93-HT-22
Joint Expendable Turbine Engine Concept Demonstrator Program	Jay	Oct 92	Cruise Missile Assoc. Symp
Joint Expendable Turbine Engine Concept Demonstrator Project	Dale, Jay	Sep 92	AGARD
Lean Blowout Research in a Generic Gas Turbine Combustor	Sturgess, Shouse	May 93	ASME Gas Turbine Proceedings
Lean Blowout in a Research Combustor at Simulated Low Pressures	Sturgess, Lesmerises, et.al.	Jun 91	ASME, J for GT&P
Lean Blowout in a Research Combustor at Simulated Low Pressures	Sturgess, Lesmerises, et.al.	Jun 91	ASME, J for GT&P

Mixed Convection Anal. in Large Baffled Rectangular Chambers with Internal Heat Sources	Yerkes, Faghri	Sep 91	Intnl J of Heat & Mass Transfer
Multi-Function Droplet Imaging & Velocimetry System for High Speed Applications	Nejad, Chen, Roe	Jan 93	AIAA, J of Propulsion & Power
Multi-Zone Behavior of Transverse Liquid Jet in High Speed Crossflow	Nejad, Chen	Jan 93	AIAA, J of Propulsion & Power
Multimode Diffusion Approx. for Mass Dispersion & Transport in Rectilinear Shear Flows	Yu, Chang	Nov 92	Am Physical Soc, Div Fluid Dyn.
NASP Engine Materials/Structures Update	Norbut	Jan 93	NASP Pub. 3225
Non-Axisymmetric Instabilities in a Dump Combustor with Swirling Inlet Flow	Samimy, Nejad	Feb 90	AIAA, J of Propulsion & Power
Non-Newtonian Behavior of Lubricant Mixed with Ethylene Glycol	Dayton, Dareing	Sep 91	J of Tribology Transactions, Vol 35
Numerical Analysis of Techniques for Efficient Generation of Vorticity in Supersonic Flows	Davis	Jan 93	AIAA 92-0828
Numerical Method for Simulating Fluid-Dynamic & Heat Transfer Changes	Katta, Roquemore	Sep 93	AIAA, J of Thermophysics & Heat Transfer
Oil-Wetted System Condition Monitoring for Future Gas Turbine Engines	Centers	May 93	J of Soc of Tribologists & Lubrication Engrs
On-Demand Space Launch Systems that use In-Flight Oxidizer Collection	Leingang, Carreiro, Maurice	Apr 93	Soc of Auto Engrs.
Operating Characteristics of a MOS Controlled Thyrister using a Liquid Cooling Approach	Reyes, Weimer, Chow	Aug 92	Sos Auto Engrs, 929477
Overview of Air Force Program Toward IHPTET Goals for Lubrication Systems	Bergsten	Jun 93	AIAA Joint Propulsion Proceedings
Performance Characteristics of Brush Seals for Limited Life Engines	Chupp, Dowler	Apr 93	ASME Transactions, Vol 115

Air Vehicles-Fixed-Propulsion 3.2.4.2 - Listing Of Publications (Continued)

Performance of the Cryogenic Heat Pipe Experiment	Brennan, Morgan	Jul 92	Intnl Proceedings Environ Syst
Pipeline Drag Reduction Additive	Harrison	May 92	'42nd Petroleum Logistics Proceedings
Porosity and Effective Thermal Conductivity of Wire Screens	Chang	Oct 90	ASME, J of Heat Transfer
Potential Neurotoxin Formation in Thermally Degraded Synthetic Lubricants	Centers	Aug 92	International J , Archives of Toxicology
Prediction of Viscsities Using Chemical Graph Theory	Pitzer	Jul 92	J of Tribology Transactions
Preliminary Results of High Temperature JP-7 Cracking Assessment	Edwards, Anderson	Aug 92	American Chemical Society
Preliminary Results of Numerical-Experimental Study of a Buoyant Jet Diffusion Flame	Davis, Roquemore, et.al.	Sep 91	J of Combustion & Flame
Premixed Turbulent Combustion of Axisymmetric Sudden Expansion Flow	Ahmed, Nejad	Oct 90	Intnl. J of Heat & Fluid Flow
Principles of Application of High Temp. Superconductors to Electromagnetic Launch	Oberly, Kozlowski, Gooden, et.al.	Dec 91	J of IEEE, Trans. Mag.
Public Schools ; A Plague on the Nation	Stibich	Jun 92	AIAA-92-3052
Rapid Computer Simulation of Ramjet Performance	Leingang, Petters	Jun 93	AIAA 93-2049
Research & Development of High Thermal Stability Fuels	Edwards, Roquemore, et.al.	May 93	AGARD, CP 536
Results of a Single Phase Venturi Flow Cooling Experiment	Ponnappan, Leland, Beam	May 93	Intl Sym Transport Phenomena

Review of Heat Transfer from Stable, Evaporating Thin Films	Brown, Chang	Aug 93	ASME 93-HT-4
Role of Inner and Outer Structures in a Low Speed Transitional Jet Diffusion Flame	Katta, Roquemore	Jul 92	Intnl Symposium on Combustion
Role of Inner and Outer Structures in a Transitional Diffusion Flame	Katta, Roquemore	Feb 93	J of Combustion & Flame
Rotating Stall Perf. and Recoverability of a High-Speed 10-Stage Axial Flow Compressor	Copenhaver, Okiishi	Mar 93	AIAA, J of Propulsion & Power, Vol 9
Scramjet Fuel Mixing Enhancement by Cross-Stream Pressure Gradients	Davis	Jan 93	AIAA 93-2139
Seed Materials for use in Laser Anemometry	Sabroske	Jan 93	AIAA-93-0006
Shaping the Development of a High Heat Sink Jet Fuel	Ballal, Harrison	Nov 92	Global Gas Turbine News, IGTI
Simple Effective Thickness Model for Circular Brush Seals	Dowler, Chupp, Holle	Jul 92	AIAA-92-3192
Simple Leakage Flow Model for Brush Seals	Chupp, Holle, Dowler	Jun 91	AIAA-91-1913
Space Launch Systems Using Oxidizer Collection and Storage	Leingang, Carreiro, Maurice	Aug 92	Intnl Astronautical Federation Proceedings
Stall Incep. in Single Stge, High Speed Compressors with Straight & Swept Leading Edges	Boyer, King, Copenhaver	Jun 93	AIAA-93-1870
Stall Inceptuon in a Multistage High Speed Axial Compressor	Hoying	Jun 93	AIAA-93-2386
Static Testing of Jet Fuel Thermal and Oxidative Stability	Locklear, Geiger, Anderson	Jun 93	AIAA, J of Propulsion & Power
Studies in Air/Air Supersonic Mixing Layers	Sekar, Risha	Oct 92	JANNAF
Studies of Simple and Complex Diffusion Flames	Roquemore	Apr 92	Combustion Institute Proceedings

Air Vehicles-Fixed-Propulsion 3.2.4.2 - Listing Of Publications (Continued)

Study of Magnetic Flux Trapped in YBCO-5% Ag Superconducting Composite	Spyker, Kozlowski, Oberly, et.al.	Dec 92	J of Advanced Cryogenic Engineering
Study of Relaxation Effects in the Lead Doped BSCCO System	Kozlowski, Oberly, Spyker, et.al.	Dec 92	J of Advanced Cryogenic Engineering
Supercritical Fuel Deposition Mechanisms	Edwards	Nov 92	Am. Institute of Chemical Engineering
Supercritical Fuel Deposition Mechanisms	Edwards, Zabarnick	Nov 93	J of Indust & Engr Chemistry Research
Supersonic Expendable Turbojet Power for Future Tactical and Strategic Missiles	Stricker, Norden, Fredette	May 92	AGARD
Surface Temp. Determination of a Cylinder in Cross Flow with Thermographic Phosphors	Ervin, Murawski, MacArthur, et.al.	Jul 93	NHTC
Swirl Effects on Proceedingsined Flows in Axisymmetric Geometries	Ahmed, Nejad	Mar 92	AIAA, J of Propulsion & Power
Swirl Number Effects on Proceedingsined Flows in a Model of a Dump Combustor	Nejad, Ahmed	Jun 91	Intnl. J of Eng. Fluid Mechanics, Vol 4
Systematic Study of Ni Doping Effect on Melt Processed YBCO	Kozlowski, Oberly, Spyker, et.al.	Dec 92	J of Advanced Cryogenic Engineering
Tech. Review: Utilizing Rotating Thermosyphon Tech. in Aircraft Thermal Mgmt & Control	Yerkes	Oct 90	Aerospace Tech Proceedings, No. 901961
Technique for Visualizing Vaporlines Emanating from Water Droplets	Hancock, Jackson, Nejad	Mar 92	J of Applied Optics
The Air Force Endothermic Fuel Program	Wildes, Eigel	Oct 90	JANNAF, Vol IV, CPIA Pub 550
The Benefits of In-Flight LOX Collection for Airbreathing Space Boosters	Maurice Carreiro, Leingang	Dec 92	4th Intnl. Aerospace Plane Proceedings
The Effect of Evaporation on the Capillary Pressure in Heat Pipes	Hallinan, Chang	Jul 91	AIAA 91-4003

Air Vehicles-Fixed-Propulsion 3.2.4.2 - Listing Of Publications (Continued)

The Effect of Payload Temperature on the Space Radiator Area	Hager, Chang, Field	Jan 93	J of Spacecraft & Rockets
The Effects of Nozzle Geo. Upon Sonic Fuel Inject. as Studied by Flow-Tagging Velocim.	Chen, Nejad	Jan 91	AIAA, J of Propulsion & Power, # 91-0575
The Impact of Computational Zone Interfacing on Calculated Scramjet Performance	Davis	Dec 92	AIAA 92-0390
The Strain Exerted by a Vortex on a Flame Determined from Field Images	Driscoll, Sutkus, et.al.	Jan 93	AIAA 93-0362
The Surge / Rotating Stall Boundary, Comparison of Results	Downey	Jul 93	AIAA Joint Propulsion Proceedings
The USAF Advanced Turbine Aerothermal Research Rig (ATARR)	Haideman, MacArthur, et.al.	Oct 92	AGARD
Thermal Batteries for Aircraft Emergency Power	Ryan	Feb 93	AIAA 93-1189
Thermal Power Loops	Gottschlich, Richter	Apr 91	Soc Auto Engrs, # 911188
Three Component Velocity Meas. in a Can Type Research Combustor for CFD Validation	Ahmed, Nejad	Jun 92	Intnl. Gas Turb & Aero Engine Congress
Three-Dimen. Flow Phenom. in Transonic, High-Throughflow, Axial-Flow Compressor Stg.	Copenhaver, Hah, Puterbaugh	Apr 93	ASME, J of Turbomachinery, Vol 115
ThreeiDimen. Flowfields Inside a Transonic Compressor with Swept Blades	Hah, Wennerstrom	Jul 91	ASME, J of Turbomachinery, Vol 113
Time Evolution of a Buoyant Jet Diffusion Flame	Chen, Roquemore, et.al.	Jul 92	Intnl Symposium on Combustion Proceedings
Tip Shock Structures in Transonic Compressor Rotors	Sellin, Puterbaugh, Copenhaver	Sep 93	AIAA-93-1869

Air Vehicles-Fixed-Propulsion 3.2.4.2 - Listing Of Publications (Continued)

Trans. Behavior of Heat Pipes with Therm. Energy Strg. Under Reversed-Pulsed Heat Loads	Chang, Chow, Morgan	Jun 91	AIAA 91-1404
Trans. Behavior of Heat Pipes with Therm. Energy Strg. Under Reversed-Pulsed Heat Loads	Chang, Chow, Morgan	May 92	J of Thermophysics & Heat Transfer
Transient Analysis of Non-Conventional Heat Pipes	Cao, Faghri, Chang	Dec 91	ASME
Transient Behavior of Axially Grooved Heat Pipes with Thermal Energy Storage	Chang, Chow, Morgan	Jan 92	J of Thermophysics & Heat Transfer
Transient Experimental Investigation of Micro Heat Pipes	Wu, Peterson, Chang	Apr 91	J of Thermophysics & Heat Transfer
Transient Operating Characteristics of an Oxygen Heat Pipe	Brown, Chang, Leland	Jul 91	ASME 91-HT-22
Transient Response of Heat Pipes for Actuator Thermal Management	Yerkes, Hager	Apr 92	Aerospace Atlantic, # 921024
Turbine Engine Lubbricants for USAF Engines	Beane	Apr 92	SAE Propulsion Lubricants Committee Sym Proceedings
Two Point Velocity Correlation Meas. in a Axisymmetric Sudden Expansion Using LDV	Nejad, Ahmed	Jul 92	Intnl Sym. Application of Laser Anemom
Two-Color Particle Imaging Velocimetry Using a Single Argon-Ion Laser	Post, Trump, Hancock	Jul 93	J of Experiments in Fluids
Two-Dimensional Shear-Layer Entrainment Measurements	Hancock, Chen	Jan 92	AIAA, Aerospace Sciences Proceedings
USAF Improved JP-8 Development Program - Overview	Harrison, Edwards, Anderson	May 93	Intnl Symp on Aviation Fuels
USAF Supercritical Hydrocarbon Fuel Interests	Edwards	Jan 93	AIAA 93-0807

Unsteady Aerodynamic Flow Phenomena in a Transonic Compressor Stage	Hah, Puterbaugh, Copenhaver	Jun 93	AIAA-93-1868, J of Prop & Power
Unsteady Wake Over a Linear Turbine Blade Cascade with Air & CO2 Film Injection, Part I	Ou, Han, et.at.	May 93	ASME93-GT-210
Unsteady Wake Over a Linear Turbine Blade Cascade with Air & CO2 Film Injection, Part II	Ou, Han, et.al.	May 93	ASME93-GT-134
Unsteady Wake Over a Linear Turbine Blade Cascade, Part I	Ou, Han, Mehendale	Jun 93	ASME, J of Turbomachinery, # 93-GT-210
Unsteady Wake Over a Linear Turbine Blade Cascade, Part II	Mehendale, Han, Ou	May 93	ASME # 93-GT-134
Use of Magnetic Compression to Support Turbine Engine Rotors	Pomfret	Sep 93	ASC 93-2450
Use of Magnetic Fields to Augment Wicking in Oxygen Heat Pipes	Yerkes	Aug 92	ASME Heat Transfer Proceedings
Use of Membrane Transport in an Absorption Thermal Transfer Cycle	Yu, Chang, Haskins	Feb 92	J of Thermophysics & Heat Transfer
Use of Planetary Atmospheres for Chemical and Fusion Propulsion Flight	Leingang	Sep 92	IEEE
Vane Optimization for Maximum Efficiency using Design of Experiments	Kerney	Jun 93	AIAA-93-1867
Vapor Phase Lubrication of High Temperature Bearings	Graham, Forster, et.al.	Sep 93	J of Lubrication Engineering
Vaporization Behavior of Fuel Droplets in a Hot Air Stream	Aggarwal, Jackson, et.al.	Oct 91	J of Heat & Mass Transfer
[redacted]			
Vehicle Integrated Thermal Management Code: An Update	VanGriethuysen	Apr 93	NASP Symposium

Air Vehicles-Fixed-Propulsion **3.2.4.2 - Listing Of Publications (Continued)**

Velocity Measurement in a Research Combustor Part I; Isothermal Swirling Flow	Nejad, Ahmed	Mar 92	J of Exper. Thermal & Fluid Science, Vol 5
Vibrational Analysis of the Thrust Stand in Test Cell 22	Carreiro	Sep 93	JANNAF
Viscoelastic Effects in Mil-L-7808 Type Lubricant	Gupta, Schrand, et.al.	Dec 92	J of Tribology Transactions, Vol 35
Viscoelastic Effects in Mil-L-7808 Type Lubricant, Part II	Forster, Schrand, et.al.	Dec 92	J of Ttibology Transactions, Vol 35
Visualization of Vapor Lines Emanating from Water Droplets	Hancock	Sep 92	J of Applied Optics
Vorticity Generation in Jet Diffusion Flames	Chen, Roquemore, et.al.	Aug 91	CS&T
Water Diffisivity in Stratum Corneum as Measured by a TGA Technique	Liron, Wright, et.al.	Apr 92	J of Toxicology

"Communication Terminal Loader Evaluation," AIAA Symposium Proceedings, Mar 93

"Diffraction Limited Aperture of the Atmosphere & Its Effects," NAECON 92 Proceedings, May 92

"Self-Optimizing Avionics: A New Concept," AIAA & IEEE 11th Digital Avionics Systems Conference Proceedings, Oct 92

"Integrated Diagnostics for Software," NAECON 92 Proceedings, May 92

"Hardware Issues Associated with Real-Time Embedded Avionics," AIAA & IEEE 11th Digital Avionics Systems Conference Proceedings, Oct 92

"The Maintenance of Operational Flight Programs," AIAA & IEEE 11th Digital Avionics Systems Conference Proceedings, Oct 92

"MILSTAR Remote Interconnect," AIAA Symposium Proceedings, Mar 92

"PAVE PILLAR In-House Research Final Report," NAECON 92 Proceedings, May 92

"Ada Implementation of a System Controller," NAECON 92 Proceedings, May 92

"GPS Exploitation," 21st JSDE for GN&C Conference Proceedings, Oct 92

"Multi-Link Optical Communications System," NAECON 92 Proceedings, May 92

"Holographic Optical Elements and Charge Coupled Device Technology," NAECON 92 Proceedings, May 92

"Management Approach to Satellite Communications Terminal Testing," Program Management Network Magazine, Aug 92

"A General Equilibrium Approach to Distributed Transportation," 10th National Conference on Artificial Intelligence Proceedings, Jun 92

"Designing for Avionics Software Supportability & Maintainability," NAECON 92 Proceedings, May 92

"Coherent 1.06 um Laser Radar for Liquid Crystal Beam Steering," SPIE International Symposium on Lasers (LSS) Proceedings, Jan 92

"Comparison of Free Space & Fiber Mixing," NAECON 92 Proceedings, May 92

"Advanced Strategic and Tactical Expendables," Journal of Electronic Defense, Apr 92

"Aliasing and Blurring in Microscanned Imagery," International Society of Optical Engineering, Apr 92

"Technology Base Work in Integrated Avionics," Journal of Electronic Defense, Apr 92

"Feature Extraction Using Morphological Analysis of Mult...," SPIE 1992 Proceedings Apr 92

"Computational Learning Requirements in Air Force Avionics.....," Government Neural Network Application Workshop Proceedings, Aug 92

"Integrated Tactical MILSTAR for Fighters," MILCOM 92 Proceedings, Oct 92

"Computational Complexity of Synthesizing Target Recognition," SPIE 1992 Proceedings, Apr 92

"Eye Safe LIDAR at 2.09 um," OSA Proceedings, Sep 92

"Atmospheric Effects on Laser Radar Performance at 2 Microns," SPIE Optical & Aerospace Sensing Conference Proceedings, Jul 92

"Management Approach to Airborne Satellite Communications...," Program Management Network Journal, Aug 92

"Instantaneous Frequency Measurement (IFM) Correlators Using Optical Approach," Society of Photo-Optical Instrumentation, Apr 92

"High Temperature Superconductivity for Electronic Warfare," Journal of Electronic Defense, Aug 92

"Synthetic Demodulation of a Direct-Sequence Spread-Spectrum," NAECON 92 Proceedings, May 92

"A Hierarchical Network of control Systems that Learn: .....," MIT Press Journal, Dec 92

"Technologies for Avionics Embedded Computer Systems," Association for Computer Machinery Local Meeting Proceedings, Oct 92

"Project Update: Design of an Airborne Graphics Generator," VHDL International Users Forum Proceedings, Oct 92

"VHDL as a Simulatable Specification Language," VHDL International Users Forum Proceedings, Oct 92

"Extensions of the Associative Control Process (ACP)....," 2nd International Conference on Simulation of Adaptive Behavior Proceedings, Dec 92

"Panoramic Cockpit Displays," AGARD 63rd Avionics Panel Spring Meeting & Symposium Proceedings, May 92

"Validation & Test of Complex Weapon Systems," Advisory Group for Aerospace Research & Development Conference Proceedings, May 93

"GPS Exploitation," 21st JSDE for GN&C Conference Proceedings, Oct 92

"Testing Operational Flight Programs," AGARD Conference Proceedings, May 93

"An Advanced System for the Verification 7 Validation .....," Digital Avionics Systems Conference Proceedings, Jul 92

"Function Minimization for Dynamic Programming Using .....," IEEE International Conference on Systems, Manufacturing & Cybernetics Proceedings, Oct 92

"Self-Optimizing Avionics: The Future of Avionics," IEEE/AIAA Digital Avionics Systems Conference Proceedings, Oct 92

"The Maintenance of Operational Flight Programs," Digital Avionics Systems Conference (DASC) Proceedings, Oct 92

"Multi-Resolution Correlators for Target Recognition," Canadian Conference on Electrical & Computer Engineering Proceedings, Aug 92

"Probabalistic Classification Using Radial Basis .... Networks," Government Conference on Neural Network Proceedingss, Aug 92

"Experimental and Theoretical Investigations on Scattering .....," 1992 IEEE AP-S International Symposium Proceedings, Jul 92

"A Hierarchical network of provably Optimal ... ACP Network," Adaptive Behavior Journal, Sep 92

"Cockpit Avionics," International Commercial Airlines Conference Proceedings, Sep 92

"Pattern Theory in Algorithm Design," NAECON 93 Proceedings, May 93

"Virtual Test Stand," NAECON 93 Proceedings, May 93

"Computer Aided Software ...," NAECON 93 Proceedings, May 93

"Maintainability Measure of Embedded Software," NAECON 93 Proceedings, May 93

"Realization of Dynamically Reconfigurable Preprocessor," NAECON 93 Proceedings, May 93

"Evaluation of Infrared Missile Warning Algorithms," NAECON 93 Proceedings, May 93

"Neural Network Hardware .... ID," NAECON 93 Proceedings, May 93

"Design Consideration of Broadband Beam .... Arrays," NAECON 93 Proceedings, May 93

"Image Deconvolution of Spectral Degradation ... Systems," NAECON 93 Proceedings, May 93

"Avionics Wind Tunnel Lab Interface Development," NAECON 93 Proceedings, May 93

"Cockpit Display Requirements," EUROPTO Series, SPIE Proceedings, Jun 93

"Real-Time Avionics Computer Emulation in Ada," IEEE & AIAA NAECON 93 Proceedings, May 93

"Neural Network Hardware for Emitter ID," NAECON 93 Proceedings, May 93

"Virtual Test Stand (VTS)," NAECON 93 Proceedings, May 93

"Deep Integration of INS, GPS & Other Sensor Information," Aerospace Navigation Sys, Jan 93

"Applying Evolutionary Research to Pattern Recognition ...," NAECON 93 Proceedings, May 93

"Generating Feature Detectors with Discovery Algorithms," NAECON 93 Proceedings, May 93

"Computer Aided Software Engineering ... Engineer's Point of View," NAECON 93 Proceedings, May 93

"Evaluation of Infrared Missile Warning Suites," NAECON 93 Proceedings, May 93

"Multi-Resolution Feature Extraction from Gabor Filtered ...," NAECON 93 Proceedings, May 93

"Technologies for Avionics Embedded Computer Systems," Dayton Area CASE Users Group Proceedings, Feb 93

"Military AMLCD Requirement & Specification," Active Matrix Liquid Crystal Displays Symposium Proceedings, Sep 93

"Pattern Theory in Algorithm Design," NAECON 93 Proceedings, May 93

"Performance Analysis of a Heterodyne LIDAR System ...," NAECON 93 Proceedings, May 93

"Laser Radar Mapping of Aircraft Wake Vortices," Optical Society of America, Jul 93

"Digital Flat Panel Cockpit Displays & Specifications," IEEE/AIAA Digital Avionics Systems Conference Proceedings, Sep 93

"Performance Comparison Between OCCAM-Based Back Propagation," IEEE NNASP 93 Proceedings, Apr 93

"Landing Aid in Fog for Runways," SPIE Aerospace & Remote Sensing 1993 Proceedings, Apr 93

"Application of an Advanced Graphics Processor," SPIE OE/Aerospace Sensing Conference Proceedings, Apr 93

"Remote Wind Sensor for AC-130H Gunship - Sensor Requirements," SPIE's International Symposium on OE/Aero Sensing Proceedings, Apr 93

"Research in Electronic Warfare (EW) Receivers," Military Academy of Technology, Modern Radar Problems, 4th Conference Proceedings, Sep 93

"Introduction to Digital EW Receivers," Digital Receiver Conference Proceedings, Jul 93

"The Reflection & Transmission Properties of Super Dense Tripole Surfaces," ICEAA 3rd International Conference Symposium Proceedings, Sep 93

"Future Trends in Infrared Search & Track (IRST)," SPIE Conference Proceedings, Jul 93

"Experimental & Theoretical Investigations on Scattering ...," IEEE Antenna Propagation Society, May 93

"Capturing the Epoch-by-Epoch Signal Variations in Evoked ...," IEEE Engineering in Medicine & Biology Society, Sep 93

"Design Considerations of Broadband Beamsteering ...," NAECON 93 Proceedings, May 93

"Satellite Communications for Fighters," MILCOM 93 Proceedings, Sep 93

"Cockpit Display Requirements & Specifications," International Symposium on electronic Imaging Device Engineering Proceedings, Jun 93

"Target Detection with Synthetic Aperture Radar ...," IEEE Transaction on Aero & Electronics Systems, Sep 93

"Digital Flat Panel Cockpit Displays and Specifications," IEEE/AIAA Digital Avionics Systems Conference Proceedings, Jul 93

"Advanced Graphics Processor," IEEE/AIAA Digital Avionics Systems Conference Proceedings, Sep 93

"Laser Radar Mapping of Aircraft Wake Vortices," Proceedings on Coherent Laser Radar: Applications & Technology, Jul 93

"Electronic Warfare Future Technology Needs," Dayton Area Graduated Study Institute, Aug 93

"Contributions of CBR to an Integrated Reasoning System," Journal of Intelligent Systems, Sep 93

"Military Flat Panel Display Technology," Conference on "Dual Use Flat Panel Displays" Proceedings, Sep 93

"Military AMLCD Requirement & Specification," Active Matrix Liquid Crystal Displays Symposium Proceedings, Sep 93

"Susceptibility Committee Contributions to Aircraft ...," JTCG/AS Central Office, Sep 93

"GPS-Aided Solution of Height-Above-Target Problems in ...," 22nd JSDE for GN&C Conference Proceedings, Oct 93

"Operational Avionics Smart Instrumentation System," Digital Avionics Systems Conference Proceedings, Oct 93

"A Common Run-Time System for Avionics Software," Ada-Europe 1993 Proceedings, Jun 93

"The Implementation of Asynchronous Entry Calls on Two Different Architectures," NAECON 93 Proceedings, May 93

"Real and Virtual Interrupt Support: The Mapping of a CARTS Feature to Two Different Architectures," Ada-Europe 1993 Proceedings, Jun 93

"Demonstrable Fault tolerance for Distributed Ada," Tri-Ada 1993 Proceedings, 1993

"DSSA-ADAGE: An Environment for Architecture-bases Avonics Development," Proceedings of the 1993 Spring Symposium of the Advisory Group for Aerospace Research and Development, May 93

"Automated Verification and Validation of Avionics Software," NAECON 93 Proceedings, May 93

"Reusable Ada Avionics Software Packages (RAASP)," Soundbyte, May 93

"Neural Network Hardware Implementation for Emitter Identification," NAECON 93 Proceedings, May 93

"Reduction of Aliasing Ambiguities Through Phase Reduction," IEEE Transactions, Oct 92

"Novel Millimeter/Microwave Jammer," 36th Joint Electronic Warfare Conference Proceedings, May 91

"EW/UAV Master Plan," UAV EW Payload Conference Proceedings, Jul 91

"Small Platform EW (SPEW) Test," UAV EW Payload Conference Proceedings, Jul 91

"C3CM Advanced Mini-Drone Payload (CAMP) Advanced Development Model," UAV EW Payload Conference Proceedings, Jul 91

"Distributed Off-Board Jammer," UAV EW Payload Conference Proceedings, Jul 91

"RF Advance Mini-Drone Payload (RAMP)," UAV EW Payload Conference Proceedings, Jul 91

"Superconductivity/Cryoelectronics for EW/Avionics," 13th Annual IEEE/AESS Dayton Chapter Symposium Proceedings, Dec 92

"Direct-Sequence Spread Spectrum System," NAECON 91 Proceedings, May 91

"IRCM Effectiveness of Short Pulse Sources," 31st IRIS Symposium on Infrared Countermeasures Proceedings, Apr 93

"Efficient Modeling Methodology Using CASE Tools for the Bunker IR Seeker," 31st IRIS Symposium on Infrared Countermeasures Proceedings, Apr 93

"Real-Time Missile Tracking and Engagement Generation," 31st IRIS Symposium on Infrared Countermeasure Proceedingss, Apr 93

"A Compact Optical Associative Memory," SPIE International Conference on Applications of Artificial Neural Networks Proceedings, Apr 91

"HAVE TROUT Exploitation," 29th IRIS Symposium on Infrared Countermeasures Proceedings, May 91

Raeth, P. G. "The Affect of Personal and Business Standards on Sustained Research Funding" High Tech Communications for Developers, Jun 93

Raeth, P. G. "A Reading List of Practical Books in Expert Systems and Neural Networks" Neuron Digest, Jan 93

Raeth, P. G., "Standards in Artificial Intelligence from the Technology Users Point of View" Invited Presentations, Proceedings: IEEE National Aerospace & Electronics Conference, Meeting of the Dayton SIGART, Proceedings: World Conference on Expert Systems, Proceedings: American Association for Artificial Intelligence Annual Conference Workshop on Standards in Expert Systems, Proceedings: Annual Conference of the International Association of Knowledge Engineers, May 92, Mar 92, Dec 91, Jul 91, & Oct 90

Raeth, P. G. "Applying Technology with NeuralWorks Professional II", IEEE Computer Magazine, Jan 91

Raeth, P. G. "Expert Systems in Process Observation and Control, Parts I and II" AI Expert Magazine, Dec & Sep 90

Reising, J. M., Liggett, K. K., and Hartsock, D. C. (1993). "Exploring Techniques for Target Designation Using 3-D Stereo Map Displays", The International Journal of Aviation Psychology, 3, 3, 169-187.

Mazur, K. M. and Reising, J. M. (1990). "The Relative Effectiveness of Three Visual Depth Cues in a Dynamic Air Situation Display", Proceedings of the Human Factors Society, 34th Annual Meeting, Human Factors Society.

Barthelemy, K. K., Mazur, K. M., and Reising, J. M. (1990). "Color Coding and Size Enhancements of Switch Symbol Critical Features". Proceedings of the Human Factors Society 34th Annual Meeting. Human Factors Society.

Borowski, R., and Reising, J. (1991). Cockpit Design Considerations for Highly Agile Aircraft. Proceedings of the Sixth Symposium on Aviation Psychology.

Emerson, T. J. and Reising, J. M. (1991). "The Effect of Adaptive Function Allocation on the Cockpit Design Paradigm". Proceedings of the Sixth Symposium on Aviation Psychology.

Reising, J. M., Barthelemy, K. K., and Hartsock, D. C. (1991). "Unusual Attitude Recoveries Using a Pathway in the Sky". Proceedings of the American Institute of Aeronautics and Astronautics Flight Simulation Technologies Conference.

Barthelemy, K. K., Reising, J. M., and Hartsock, D. C. (1991). "Target Designation in a Perspective View, 3-D Map Using a Joystick, Hand Tracker, or Voice". Proceedings of the Human Factors Society 35th Annual Meeting. Human Factors Society.

Reising, J. M., Liggett, K. K., Rate, C. R., and Hartsock, D. C. (1992). "3-D Target Designation Using Two Control Devices and an Aiding Technique". Proceedings of the SPIE/SPSE Symposium on Electronic Imaging Science and Technology. SPIE.

Reising, J. M. and Emerson, T. J. (1992). "Displaying Information in Future Cockpits". Proceedings of the Washington Academy of Science. APA.

Liggett, K. K., Reising, J. M., and Hartsock, D. C. (1992). "The Use of a Background Attitude Indicator to Recover from Unusual Attitudes". Proceedings of the Human Factors Society 36th Annual Meeting. Human Factors Society.

Barry, T. P., Liggett, K. K., Williamson, D. T., and Reising, J. M. (1992). "Enhanced Recognition Accuracy with the Simultaneous Use of Three Automated Speech Recognition Systems". Proceedings of the Human Factors Society 36th Annual Meeting. Human Factors Society.

Liggett, K. K., Reising, J. M., and Hartsock, D. C. (1993). "Failure Indications on a Head-Up Display". Proceedings of the Seventh International Symposium on Aviation Psychology. .

Reising, J. M., Emerson, T. J., and Munns, R. C. (1993). "Automation in Military Aircraft". Proceedings of the Human Computer Interaction 5th International Conference. HCI.

Ayala, A. and Hasting, J. S. (1992). "Low Cost Cockpit Simulators for Evaluating New Control/Display Concepts". Proceedings of the Digital Avionics Systems Conference. DASC.

Barbato and McCracken. (1993). "Tactical Aircraft Cockpit Study: Crew System Design Alternatives for Single Seat Fighters". Proceedings of the Seventh International Symposium On Aviation Psychology.

Barbato. (1992). "Tactical Aircraft Cockpit Studies: The Impact of Advanced Technology on the Pilot-Vehicle Interface". American Institute of Aeronautics and Astronautics.

Williamson, D. T. and Barry, T. P. (1990). "Cockpit Application of Voice Technology". Proceedings of the IEEE/AESS Symposium.

Air Vehicles - Fixed - Flight Subsystems 3.2.4.2 - Listing of Publications (continued)

Corwin, W. H., Probert, A., and Royer, R. (1993). "Synthetic Terrain Imagery for Helmet-Mounted Display". Proceedings of the Seventh International Aviation Psychology Symposium.

The following group of Papers were presented at and published in the proceedings of the Conference on Aerospace Transparent Materials and Enclosures. August 1993.

Titles:

Acquisition Management of Consumable Technology Utilizing a Novel Technology Transition Process. (R. Urzl)

Techniques to Create a Supportable Technology Program. (T. Bennett)

Aircraft Transparency Technology Development and Validation for Transition to DoD Flight Vehicles Systems. (R. McCarty)

Advanced Transparency Development for USAF Aircraft. (J. Davisson)

Integrated Systems Approach to Strategic Transparencies. (J. Coogan)

Evaluation of Hardened B-1B Windshield Materials. (J. Coogan)

Abrasion Resistant Canopy Materials Evaluation Project. (K. Alexander)

F-16 Canopy Technologies: Accomplishments, Challenges, and Opportunities. (J. Davisson)

F-15 Advanced Transparency Development: A Team Approach. (G. Graening)

Fatigue Analysis of Polycarbonate Transparencies. (R. McCarty)

Reliability Analysis and Fatigue Crack Initiation Map for Canopy Grade Polycarbonate. (M. Gran)

Battle Damage Repair of Aircraft Transparencies. (D. Carter)

Quick Fix and Quick Change of Transparencies. (M. Kelley)

Cockpit Solar Shields. (M. Kelley)

Exterior Covers for Cockpits. (M. Kelley)

Mechanical Properties Evaluation of Directly Formed Transparency Materials. (W. Pinnell)

Dimensional Mapping and Shrinkage Characterization of Large, Thick-Walled, Directly Formed, Transparent Panels. (K. Roach)

Analysis of Transparency Panel Shrinkage Characteristics and Their Application to Transparency Mold Design. (K. Roach)

"Landing Gear Improvement for Transport Aircraft" - Jun 91 AGARD Conference Proceeding 484, James Greer McClain, B.M. Crenshaw

"Recent Developments in the Area of Aircraft Rough Field Performance" - Jun 91 AGARD Conference Proceeding 484, David Morris, Tony Gerardi

"Cut Progression During Dynamometer Testing of Foreign Object Damaged Type VII Extra High Pressure Aircraft Tires" - Sep 91, Peter C. Vorum

"Testing of a Titanium Matrix Composite Landing Gear" - Sep 91, Mark A. Shea, William Macy, David L. Morris, SAE # 912175

"Determination of Tire-Wheel Interface Loads for Aircraft Wheels" - Jan 92, S. Kandarpa, B.F. Spencer Jr., D.J. Kirkner, M. Champion, AIAA

"High Speed Aircraft Tire Dynamics/Issues" - Apr 92, John Medzorian, SAE # 921037

"Study of Fracture Behavior of Cord - Rubber Composites for Lab Prediction of Structural Durability of Aircraft Tires II. Fatigue Damage Accumulation of Bias Carcass" - Oct 92, B.L. Lee, J.A. Smith, J.P. Medzorian, M. Chawla, P.C. Ulrich, SAE # 922011

"Fracture Behavior of Fiber - Reinforced Elastomer Composites Under Fatigue Loading" - Jul 93, B.L. Lee, J.A. Smith, J.P. Medzorian, M. Chawla, P.C. Ulrich, Proceedings of the Ninth International Conference on Composite Materials (ICCM/9)

A. Burkhard & C. Leak, "Durability Analysis Using Fracture Mechanics for Avionics Integrity". Journal of Design, Jan-Feb 92, pp. 26-32, 1992.

C. Leak, "Automating Life Cycle Profile Development: Moving Environmental Engineering from The Stone Age into the Computer Age", Proceedings of the 1992 IES ATM, Vol. 2, May 1992, pp 233-238, 1992.

P. Dexter, M. Martinez, G. Maxwell & R. Watts, "Centrifuge Test of an Aircraft Vapor Cycle Environmental Control System", SAE Aerotech 92 Proceedings, Oct. 1992.

C. Leak, "How "MERIT" fits 810, or MIL-STD-810: Next Generation", Proceedings of the 63rd Shock & Vibration Symposium (Vol. 2, pp 595-601), Oct 1992.

D. Brown, S. Squier & Glen Smith, "Integrated Thermal Energy Management (I-TEM)- An Evaluation Tool for Aircraft", SAE Aerotech 93 Proceedings, Sept 1993.

"Significance of Laminate Spallation Generated by High Velocity Spherical Metallic Impactors", Greg Czarnecki

"C-17 Live Fire Test", John Murphy

"API Testing of Composites", Pat Pettit

"Estimation of the V50 Using Semi-Empirical (1 Point) Procedures", Greg Czarnecki

"Robust Control of Uncertain Systems With Combined H_ and LQG Optimizations," Siva S. Banda, Hsi-Han Yeh, and Sharon Heise, 1991. International Journal of Systems Science, Vol. 22, No. 1 , pp. 85-96.

"Computation of the Real Structured Singular Value via Polytopic Polynomials," B.C. Chang, O. Ekdal, H.H. Yeh, S.S. Banda, Jan-Feb 1991. Journal of Guidance, Control, and Dynamics, Vol. 22, No. 1, pp. 140-147.

"Loop Shaping in Mixed H_2 and H_ Optimal Control," H.H. Yeh, S.S. Banda, and A.G. Sparks, 1991. International Journal of Control, Vol. 56, No. 5, pp. 1059-1078.

"H_/LTR: A Loop Shaping Method For H_ Output Feedback Compensation Design," Jenny L. Rawson, Chin S. Hsu, and Hsi-Han Yeh, 1991. American Control Conference Proceedings, June 1991.

"Robust Control Systems Design by H Optimization Theory," B.C. Chang, X.P. Li, S.S. Banda, H.H. Yeh, 1991. Journal of Guidance, Control, and Dynamics, Vol. 15, No. 12, July-Aug 1992, pp. 944-952.

"Control of an Advanced Fighter Aircraft Using Loop Shaping," Andrew Sparks, 1991.

"A Robust H Controller Design with H_2 Consideration," H. Bouguerra, B.C. Chang, H.H. Yeh, S.S. Banda, 1991. IEEE Conference on Decision and Control Proceedings, December 1991.

"A Comparison of Loop Shaping Techniques," Andrew Sparks, Siva Banda, Hsi-Han Yeh, 1991. IEEE Conference on Decision and Control Proceedings, December 1991.

"Simplification of Nonlinear Indicial Response Models - Assessment for the Two-Dimensional Airfoil Case," J.E. Jenkins, Feb 1991. Journal of Aircraft, Vol. 28, No. 2, pp. 131-138, Feb 1991.

"Nonlinear Normal Force Indicial Responses for a 2-D Airfoil," G.M. Graham, M. Islam, J.E. Jenkins, AIAA Atmospheric Flight Mechanics Conference Proceedings, Aug 1991.

"Analysis of the VISTA Longitudinal Simulation Capability for a Cruise Flight Condition," B.T. Nguyen, L.T. Hamilton-Jones, D.B. Leggett, NAECON Proceedings, May 1991.

"A Preliminary Comparison of Flight Test Data Against MIL-STD-1797 Short Term Pitch Response Flying Qualities Criteria," C.E. Robinson, J.T. Browne, NAECON Proceedings, May 1991.

"Design and Man-in-the-Loop Evaluation of a Robust Lateral-Directional Control Law for a STOL F-15 Using LQG/LTR Methodology," J.T. Browne, Mar 1991.

"High Angle-of-Attack Missile Simulation," T. Cord, SAE Atlantic Proceedings, Apr 1991.

"Agility and High Angle-of-Attack: An Air Force Research Perspective," T. Cord, J. Beck, SAE 91-2145, SAE Pacific, Long Beach, CA, Sep 1991.

"Robust Control of a Flexible Space Structure in the Presence of Parameter Variations and Unmodelled Dynamics," S.A. Heise, S.S. Banda, H.H. Yeh, Journal of Computational Mechanics, Springer-Verlag, No. 8, pp. 305-312, Oct 1992.

"Necessary and Sufficient Conditions for Mixed H_2 and H_∞ Optimal Control," Hsi-Han Yeh, Siva S. Banda, Bor-Chin Chang, IEEE Transactions on Automatic Control, vol. 37, No. 3, pp. 355-358, Mar 1992.

"Loop Shaping in Mixed H_2 and H_∞ Control," H.H. Yeh, S.S. Banda, A.G. Sparks, D.B. Ridgely, 1992, International Journal of Control, Vol. 56, No. 5, pp. 1059-1078.

"Robust Control Systems Design Using H_∞ Optimization Theory," X.P. Li, B.C. Chang, S.S. Banda, H.H. Yeh, 1992.

"Combined Linear Quadratic Gaussian and H_∞ Control of a Benchmark Problem," R.J. Adams, S.S. Banda, 1992. Journal of Guidance, Control and Dynamics, Vol. 15, No. 6, Sep-Oct 1992, pp. 1134-1139.

"Application of Structured Singular Value Synthesis to a Fighter Aircraft," Andrew Sparks, Siva Banda, 1992. Journal of Guidance, Control and Dynamics, Vol. 16, No. 5, pp. 940-947, Sep-Oct 1993.

"A H_∞ Constrained Robust H_2 Solution For A Benchmark Problem," Richard J. Adams, Siva S. Banda, American Control Conference Proceedings, June 1992.

"A Comparison of Loop Shaping Techniques," Andrew Sparks, Siva Banda, Hsi-Han Yeh, 1992.

"A Robust H_∞ Controller Design with H2 Consideration," H. Bouguerra, B.C. Chang, H.H. Yeh, S.S. Banda, 1992.

"Combined H_2/H_∞ Optimal Control Design Applied to an Advanced Fighter Aircraft," Kliffton M. Black, Andrew G. Sparks, Siva S. Banda, Hsi-Han Yeh, AIAA Guidance and Control Conference, Hilton Head, SC, Aug 1992.

"Robust Control Design With Real-Parameter Uncertainties," Hsi-Han Yeh, Jenny Rawson, Siva S. Banda, American Control Conference, Chicasgo, IL, June 1992.

"Application of System Identification Techniques to Flight Control," P. Chandler, M. Pachter, M. Mears, S. Sheldon, 1992. IEEE Conference on Control Applications, Dayton, OH, Sep 1992.

"Reduced-Order Robust Compensator Design With Real Parameter Uncertainties," Hsi-Han Yeh, Chin S. Hsu, Siva S. Banda, IEEE Conference on Decision and Control, Tuscon, AZ, Dec 1992.

"Regression Techniques for Aircraft Parameter Identification from Noisy Measurements in Maneuvering Flight," P. Chandler, M. Pachter, M. Mears, S. Sheldon, 1992. IEEE Conference on Decision and Control Proceedings, Dec 1992.

"Reduced-Order Robust Compensator Design With Real Parameter Uncertainties," Hsi-Han Yeh, Chin S. Hsu, Siva S. Banda, Jenny Rawson, 1992.

"Fixed-Order H_ Compensator Design," Hsi-Han Yeh, Chin S. Hsu, Siva S. Banda, IFAC World Congress Proceedings, July 1993.

"An Application of μ-Synthesis to a Robust Flight Control Problem," X.P. Li, J.C. Chen, S.S. Banda, B.C. Chang, IFAC World Congress Proceedings, July 1993.

"H_ Compensator Design with Minimal Order Observers," Chin S. Hsu, Xianggang Yu, Hsi-Han Yeh, Siva S. Banda, American Control Conference Proceedings, June 1993.

"Reduced-Order H_ Compensator Design For an Aircraft Control Problem," Robert C. Osborne, Richard J. Adams, Chin S. Hsu, Siva S. Banda, IEEE Conference on Control Applications Proceedings, Sep 1993.

"Constrained Linear Regression for Flight Control System Failure Identification," P.R. Chandler, M. Pachter, M. Mears, Automatic Control Conference, San Francisco, CA, June 1993.

"Implementation of a Full Envelope PID Controller for a High Performance Fighter Aircraft," Richard J. Adams, James M. Buffington, Siva S. Banda, 1992. Journal of Guidance, Control and Dynamics, Vol. 17, No. 3, pp. 578-583, May-June 1994.

"Robust Control Design for an Aircraft Gust Attentuation Problem," James M. Buffington, Hsi-Han Yeh, Siva S. Banda, IEEE Conference on Decision and Control Proceedings, Dec 1992.

"Gain Scheduled Linear PID Autopilot for the AIAA Controls Design Challenge Aircraft," Richard J. Adams, James M. Buffington, Siva S. Banda, AIAA Guidance and Controls Conference Proceedings, Aug 1992.

"Control Law Development for the Lateral Axis of a Fighter Aircraft," Andrew Sparks, Richard Adams, Siva Banda, IEEE Conference on Control Applications Proceedings, Sep 1993.

"Full Envelope Multivariable Control Law Synthesis for a High Performance Test Aircraft," Richard Adams, Andrew Sparks, Siva Banda, Journal of Guidance, Control and Dynamics, Vol. 16, No. 5, pp. 948-955, Sep-Oct 1993.

"Fighter Aircraft Lateral Axis Full Envelope Control Law Design," Andrew Sparks, James Buffington, Siva Banda, International Journal of Control, Vol. 59, No. 4, pp. 893-924, Apr 1994.

"Full Envelope Longitudinal Axis Control Design for a Fighter Aircraft with Thrust Vectoring," James M. Buffington, Andrew G. Sparks, Siva S. Banda, American Control Conference Proceedings, June 1993.

"Robust Flight Control Design Using Dynamic Inversion and Structured Singular Value Synthesis," Richard J. Adams, Siva S. Banda, IEEE Transactions on Control Systems & Technology, Vol. 1, No.2, pp. 80-92, June 1993

"Non-Linear Airloads Hypersurface Representation - A Time Domain Perspective," J.E. Jenkins, E.S. Hanff, AGARD Meeting on Flight Mechanics Proceedings, Nov 1991.

"X-29 Forebody Blowing Wind Tunnel Results," R. Guyton, W. Gillard, F. Luria, Apr 1992.

"The Effect of a Moving Ground Belt on the Vortex Created by a Jet Impinging on the Ground in a Cross Flow," V.R. Stewart, W.B. Blake, Aircraft Design Conference Proceedings, Aug 1992.

"Dynamic Derivative Data for High Angle of Attack Simulation," J.M. Simon, Atmospheric Flight Mechanics Conference Proceedings, Aug 1992.

"High Angle-of-Attack Control Enhancement on a Forward Swept Wing Aircraft," L.A. Waichli, R.W. Guyton, F. Luria, W.J. Gillard, AIAA-92-4427, Flight Mechanics Conference Proceedings, Aug 1992.

"Development of a High Angle of Attack Stability and Control Prediction Code," W.B. Blake, C.J. Dixon, C.O. Adler, Flight Mechanics Conference Proceedings, Aug 1992.

"NASP Flying Qualities Criteria/Guidelines," B.G. Powers, C.F. Suchomel, April 1992.

"Agility Potential," T. Cord, J. Beck, SAE 92-1016, SAE Atlantic Proceedings, Apr 1992.

"High Angle-of-Attack Missile Launch Feasibility Simulation," T. Cord, May 1992, NAECON Proceedings,

"Loop Shaping In Mixed H_2 and H_∞ Control," H.H. Yeh, S.S. Banda, A.G. Sparks, D.B. Ridgely, International Journal of Control, Vol. 56, No. 5, pp. 109-1078, 1992.

"Autopilot Design Using Mixed H_2 and H_∞ Optimal Control," Andrew Sparks, Hsi-Han Yeh, Siva Banda, Optimal Control Applications and Mehtods, Vol 14, pp. 91-110, 1993.

"Application of Structured Singular Value Synthesis to a Fighter Aircraft," A. Sparks, S.S. Banda, Journal of Guidance, Control and Dynamics, Vol. 16, No. 5, pp. 940-947, Sep-Oct 1993.

"Combined Linear Quadratic Gaussian and H_∞ Control of a Benchmark Problem," R.J. Adams, S.S. Banda, Journal of Guidance, Control and Dynamics, Vol. 15, No. 6 Sept-Oct 1992, pp. 1134-1139.

"Robust Flight Control Design Using Dynamic Inversion and Structured Singular Value Synthesis," Richard J. Adams, Siva S. Banda, American Control Conference Proceedings, June 1993.

"Full Envelope Multivariable Control Law Synthesis for a High Performance Test Aircraft," Richard J. Adams, Andrew Sparks, Siva S. Banda, Journal of Guidance, Control and Dynamics, Vol.16, No. 5, pp. 948-955, Sept-Oct 1993.

"Reduced-Order Robust Compensator Design With Real Parameter Uncertainties," Hsi-Han Yeh, Chin S. Hsu, Siva S. Banda, IEEE Conference on Decision and Control Proceedings, Dec 1992.

"Regression Techniques for Aircraft Parameter Identification from Noisy Measurement in Maneuvering Flight," P. Chandler, M. Pachter, M. Mears, S. Sheldon, Dec 1992.

"Constrained Linear Regression for Flight Control System Failure Identification," P.R. Chandler, M. Pachter, M. Mears, 1993.

"Full Conventional Envelope Longitudinal Axis Flight Control with Thrust Vectoring," James M. Buffington, Andrew G. Sparks, Siva S. Banda, American Control Conference Proceedings, June 1993.

"H_∞ Compensator Design with Minimal Order Observers," C.S. Hsu, X. Yu, H.H. Yeh, S.S. Banda, American Control Conference Proceedings, June 1993.

"An Integrated Approach to Flight Control Design Using Dynamic Inversion and μ-Synthesis," Richard J. Adams, Siva S. Banda, 1993.

"Fixed Order H_ Compensator Design," H.H. Yeh, C.S. Hsu, S.S. Banda, Journal of Robust and Nonlinear Control, Vol. 4, pp. 363-369, 1994.

"An Application of μ-Synthesis to a Robust Flight Control Problem," X.P. Li, J.C. Chen, S.S. Banda, B.C. Chang, 1993.

"A Hopfield Neural Network for Adaptive Control," M.J. Mears, R. Smith, P.R. Chandler, M. Pachter, guidance, Navigation, and Control Conference Proceedings, Aug 1993.

"Robust, Nonlinear, High Angle-of-Attack Control Design for a Supermaneuverable Vehicle," James M. Buffington, Richard J. Adams, Siva S. Banda, AIAA Guidance and Control Conference Proceedings, Aug 1993.

"Minimal-Order Observer Based H_ Control for a Flight Control Problem," Robert C. Osborne, Richard J. Adams, Chin S. Hsu, Siva S. Banda, Sept 1993.

"Fighter Aircraft Lateral Axis Full Envelope Control Law Design," Andrew G. Sparks, James M. Buffington, Siva S. Banda, IEEE Confernce on Control Applications Proceedings, Sept 1993.

"Active Vortex Flow Control For High Angle [redacted] Adams, James M. Buffington, [redacted] Conference on Decision and Control Proceedings, [redacted]

"A Separation Theory of Luenberger Observer [redacted] Controllers," Xianggang Yu, Chin S. Hsu, Hsi-Han Yeh, [redacted] Banda, IEEE Conference on Decision and Control [redacted] 1993.

"On-Line Optimizing Networks for Reconfigurable Control," P. Chandler, M. Mears, M. Pachter, IEEE Conference on Decision and Control Proceedings, Dec 1993.

"Body-Axis Rolling Motion Critical States of a 65-Degree Delta Wing," J.E. Jenkins, J.H. Myatt, AIAA Aerospace Sciences Meeting Proceedings, Jan 1993.

"Modeling Nonlinear Aerodynamic Loads for Aircraft Stability and Control Analysis," J.E. Jenkins, J.H. Myatt, AGARD Meeting on Flight Mechanic Proceedings, Feb 1993.

"Experiments on the Ground Vortex Created by an Impinging Jet in Crossflow," W.B. Blake, V.R. Stewart, AGARD Fluid Dynamics Meeting, Winchester, England, Apr 1993.

"A Study of the Rotary Balance Method for Predicting Pitch Damping," W.B. Blake, Flight Mechanics Conference Proceedings, Aug 1993.

"Nonlinear and Unsteady Aerodynamic Responses of a Rolling 65 Degree Delta Wing," A.H. Hsia, J.H. Myatt, J.E. Jenkins, Atmospheric Flight Mechanics Conference Proceedings, Aug 1993.

"Control Concepts for a Vertical Tailless Fighter," J.M. Simon, W.B. Blake, D. Multhopp, Applied Aerodynamics Conference Proceedings,Aug 1993.

"Flow Visualization of a Rolling Delta Wing and Its Pertinence to the Nonlinear Indicial Response Model," G.A. Addington, J.E. Jenkins, Applied Aerodynamics Conference Proceedings, Aug 1993.

"Flying Quality Evaluation Maneuvers," T. Cord, D. Leggett, D. Wilson, D. Riley, K. [redacted] Symposium Proceedings, Oct 1993.

"Development of Flying Qualities and Agility Evaluation Maneuvers," D. Wilson, D. Riley, K. Citurs, T. Cord, AIAA 93-3645, Flight Mechanics Conference Proceedings, Aug 1993.

"A Perspective on Agility," T. Cord, Industry & Interface Acceleration Colloquim Proceedings, July 1993.

"Initial Results of an In-Flight Investigation of Longitudinal Flying Qualities for Large Augmented Transports in Approach and Landing," K Rossitto, J. Hodgkinson, T. Williams, D. Leggett, R, Bailey, E. Ohmit, Guidance and Control Conference Proceedings, Aug 1993.

"Experimental Study of Pneumatic Vortex Floww Control on a High Angle of Attack Forebody Model", Osborn R., Guyton, B., AIAA-92-0018, Jan 1992

"Results and Lessons Learned from Two Wright Laboratory Flight Research Programs", Moorehouse, Wachli, Krumenaclar, AIAA-93-3361, 1993

"Small Scale Wind Tunnel Investigation of an Advanced Fighter Configuration Semi-Span Wing", Langan, K., Harris, S., AIAA-93-3516, Aug 1992

"Maneuvering Technology for Advanced Fighter Aircraft", Alexander, Harrisi, Byers, SAE-921984

"A Qualitative Assessment of Control Effectors on an Advanced Fighter Configuration", Alexander, AIAA-93-3627

"Ring Wing Missile for Compressed Carriage on an Aircraft", August, Pinney, Osborn, AIAA 93-3656, Aug 93

"On the Aerodynamics/Dynamics of Store Separation from a Hypersonic Aircraft", Newman, Fulcher, Ray, Pinney, AIAA 92-2722, Jun 92

"Cost Effectiveness of a Robotic Air-to-Air Combat Vehicle", Galloway, Jefferies, Pinney, AIAA Mission Sciences Conference Proceedings, Nov 90

"Hypersonic Propulsion System Force Accounting", Numbers, AGARD CP-498, Sept 93

"Computation of Vectoring Nozzle Performance", Cheatham, Walker, and Gridley, AIAA Journal of Aircraft, Vol 28, No.11, Nov 91

"Numerical Evaluation of a 2D Pitch and Yaw Nozzle Using an Inviscid Flow Solver", Cheatham, Walker, and Gridley, Society of Automotive Engineers, SAE 91-6T-160, Jun 91

"Advanced Aerodynamic Airframe/Nozzle Integration", Bowers, Int. Society Airbreathing Engines, ISABE 93-7099, Sept 93

"All Terrain Ground Collision Avoidance & Maneuvering Terrain Following for Automated Low Level Night Attack", Barfield, Probert, Kennedy, Apr 92

"Multidimensional Intelligent Control for Superlight Air Vehicles", Smitchens, DeThomas, Grevstad, Moore, Feb 93

"UAV Patrol: ITAC Project", Smitchens, James, McDowell, Barry, Feb 93

"Advanced Vehicle Management System-Program Update", Thompson, May 92

"Implementation of Non-Dedicated Redundancy in a Fault Tolerant Multiprocessor Testbed", Rottman, Thompson, Oct 91

"Phase I Flight Test of MIAG Advanced Development Model", Robertson, Hartfield, 1992

"URV Multiprocessor Control System and Ground Station Controller Software Design", Rottman, Dermis, Hartfield, May 91

"A Real-Time Hardware-in-the-Loop Simulation of a Unmanned Aerial Research Vehicle", Robertson, Aug 92

"A Common Interface Real-Time Multiprocessor Operating System for Embedded Systems", Rottman, Mar 91

"Advanced Maintenance Diagnostics for Air Force Flight Control", Smith, Schroeder, Jan 91

"Expert System Diagnostic Capabilities for Logistics Supportability", Smith, Schroeder, Jul 90

"Knowledge Based Systems Role in Maintenance Diagnostics", Smith, Schroeder, Mar 91

"An Advanced Maintenance System for Improvements in Supportability", Smith, Schroeder, Aug 91

"Field Test of an Advanced Maintenance System", Smith, Schroeder, Bursch, Meisner, Jan 92

"R&D Logistics: Field Test of an Advanced Maintenance System", Smith, Schroeder, Bursch, Meisner, Aug 92

"Application of Reliability, Maintainability, and Supportability on the More Electric Aircraft (MEA)", Howard, Aug 93

"An Approach to Determining the Vulnerability of Commercial Flight Systems to Internal Blast", Clough, Aug 92

"Flight System Component Vulnerability to Internal Bomb Explosions: B-52 Test Results", Clough, Aug 92

"Flight Control System Vulnerability to Electromagnetic Pulses Produced by Internal Bomb Explosions: Interpretation of B-52 Test Results", Clough, Sep 93

"Microwave Induced Upset of Digital Flight Control Systems", Clough, Cope, Donley, Sep 93

"Model Reference Adaptive Control Using Neural Networks", McGrane, Jul 93

"A Review of Digital Flight Control System Upsets Caused by Electromagnetic Interference", Clough, Oct 90

"On Upsets of Analog Portions of Digital Flight Control Systems Due to Electromagnetic Interference", Clough, 1991

"Microwave Induced Upset of Digital Flight Control Systems", Clough, Oct 92

"Breakaway Maneuver for Missile Gimbal Defeat"Sablan, Pachter, Aug 91

"Techniques for Evaluating the Contributions of Avionic Subsystems to Fighter Aircraft Operational Effectiveness", Whitmoyer, Oct 91

"Development & Demonstration of a Formation Flight System for Helicopter & Fixed Wing Aircraft", Young, Richardson, May 93

"Using GPS for Airborne Formation Control", Kusnierek, Goodwin, Sep 93

"Full Mission Simulation for Research & Development of Air Combat Flight & Attack Management Systems", Goddard, Zeh, Feb 92

"USAF In-Flight Simulation: Creative Management for Flexible Operation", Markman, Jul 91

"USAF In-Flight Simulation: A Cost Effective Operating Approach", Markman, Jul 93

"The USAF's Name of In-Flight Simulation for Aircraft Development and Aeronautical Research", Markman, Aug 93

"Development & Simulation of a 4080 Point Winograd Fast Fourier Transform Processor", Scribner, Mehalic, Sep 92

"An Electronic Visual Display Attitude Sensor (EVDAS) for Analysis of Flight Simulator Displays", Ewart, Slutz, Aug 92

"Using Simulations to Assess Advanced Technology Development", Gum, Sep 93

"Engineering Flight Simulation Capabilities & Future Direction for Wright Laboratory", Gum, Sep 93

"Capabilities and Future Direction of U.S. Air Force Engineering Flight Simulation", Gum, Jun 92

2

Schuermeyer, F., Shur, M., Martinez, E. and Grider, D. "Real Space Transfer of Holes in p-Channel HFETs", Electronics Letters, Oct 92

Schuermeyer, F., Shur, M., Martinez, E. and Grider, D. "Hot Electron and Hot Hole Regime of Complementary Heterostructure Field Effect Transistors", Proceedings: Engineering Foundation, Nov 92

Schepler, K. "Solid-State Lasers and Frequency Conversion to Mid-IR Wavelengths", Proceedings: University of Michigan, Oct 92

Liou, L., L. and Bayraktaroglu, B. "Thermal Stability Analysis of AlGaAs/GaAs Heterojunction Bipolar Transistors with Multiple Emitter Fingers", IEEE Transactions on Electron Devices, Oct 92

Schuermeyer, F. "Electron Mobility and Velocity Studies in HFETs", WOCSEMMAD Proceedings , Feb 92

Look, D., C., Fang, Z-Q., Look, J. W. and Sizelove, J.R. "Hopping Conduction in Molecular Beam Epitaxial GaAs Grown at Very Low Temperatures", Proceedings: Electrochemical Society, May 93

Look, D., C., Robinson, G. D., Sizelove, J., R. and Stutz, C. E. "Electrical Properties of MBE GaAs Grown at 300 and 400 ^{o}C", Proceedings: Materials Research Society, Apr 93

Champagne, E., B. "Position Paper on Electronic System Design and Fabrication for Global Reach - Global Power", Aviation Week, Oct 92

O'Keefe, M. J., Horiuchi, S., Chu, J. P. and Rigsbee, J., M. "Sputter Deposition and Thermally Induced Phase Transformation of Non-BCC Chromium Thin Films", Proceedings: Materials Research Society , Apr 93

O'Keefe, M., J. and Rigsbee, J., M. "Plasma Polymerization of Fluorocarbon Thin Films on Glass and Metal Substrates", Proceedings: Materials Research Society , Apr 93

Evans, K., Kaspi, R. and Jones, C., R. "Arbitrary Composition Profiles by MBE Using Desorption Spectrometric Control", Proceedings: Materials Rearch Society , Apr 93

Yu, P., W. and Stutz, C. E. "Photoluminescence Properties of Broad 0.8 eV Emission Band from GaAs Grown by Low-Temperature Molecular Beam Epitaxy", Proceedings: Materials Research Society, Apr 93

Manasreh, M., O., Kutsche, C., Stutz, C., E. and Szmulowicz, F. "Intersubband Transitions in InGaAs/AlGaAs Multiple Quantum Wells", Proceedings: Materials Research Society, Apr 93

Yu, P., W., Talwar, D., N. and Stutz, C., E. "Effects of Heat Treatment on Sharp-Line Photoluminescence of GaAs Grown by Low-Temperature Molecular Beam Epitaxy", Appl. Phys. Lett., American Institues of Physics, Nov 92

Reynolds, D., C., Talwar, D., N., Manasreh, M. O. and Stutz, C., E. "Phonon Coupling Associated with Free to Bound and Bound to Bound Transitions in Molecular Beam Epitaxial GaAs", Physical Review, Nov 92

Look, D., C., Robinson, G., D., Sizelove, J., R. and Stutz, C., E. "Donor and Acceptor Concentrations in Molecular Beam Epitaxial GaAs Grown at 300 and 400 ^{o}C", Applied Physics Letters, Nov 92

Kaspi, R. and Evans, K. "Desorption Kinetics of Indium at the InAs/GaAs(001) Heterointerface", Proceedings: Materials Research Society Conference, Nov 92

Yu, P., W., Reynolds, D., C., Talwar, D., N., Stutz, C., E. and Sizelove, J., R. "Exciton Bound to the Center Responsible for Broad 0.8 eV Photoluminescence Band in GaAs", Proceedings: American Physical Society, Mar 93

Talwar, D., Loehr, J. and Jogai, B. "InAs/InGaSb Type II Strained Layer Superlattices for Long Wavelength Infrared Detection Applications", Proceedings: Materials Research Society, Apr 93

Reynolds, D. C., Jogai, B., Yu, P. W., Evans, K., R. and Stutz, C., E. "Photoluminescence Study of Symmetric, Coupled, Doubled $In_xGa_{1-x}As$-GaA Quantum Well Structures", American Physical Society, Nov 92

Loehr, J., Evans, K., R., Stutz, C., E., Reynolds., D., C. and Yu, P., W. "Magnetic Field Dependence of Selective Pair Luminescence in GaAs", American Physical Society, Nov 92

Reynolds, D., C., Jogai, B., Yu, P., W. and Stutz, C., E. "Excitation of Optical Transitions in the $In_xGa_{1-x}As$-GaAs Quantum Well System by the Free Exciton in the Barrier", Argonne National Laboratory, Nov 92

Talwar, D., N., Fischer, D., W., Manasreh, M., O., and Matous., F. "Isothermal Annealing of Impurity Modes in Proton and Deuteron Implanted InP: Theory and Experiment", Proceedings: Materials Research Society Fall Meeting, Nov 92

Talwar, D., N., Manasreh, M., O., Stutz, C., E. and Reynolds, D., C. "Phonon Coupling Associated with Free to Bound and Bound to Bound Transitions in Molecular Beam Epitaxial GaAs", American Physical Society, Nov 92

Liou, L., L., Huang, C., I. and Bayraktaroglu, B. "Thermal Stability Analysis of Multiple Emitter Finger Microwave AlGaAs/GaAs Heterojunction Bipolar Transistors". Proceedings: IEEE MTT-S International Microwave Symposium, Jun 93

Mokari, M., E., Ganesan, S., and Blumgold, B. "Systematic Non-Linear Model Parameter Extraction for Microwave HBT Devices", IEEE Midwest Synposium, Aug 93

Evans, K., R., Stutz, C., E., Rajaj, K., K. and Reynolds, D., C. "Landau Level Oscillations in Coupled and Uncoupled $In_xGa_{1-x}As$-GaAs Quantum Wells", American Physical Society, Nov 92

Brown, J. L. "Preparing Samples for Scattering Measurements - A Cleaning Study: Part 2", Proceedings: Symposium on Optical Instrumentation and Applied Science, Jul 93

Schepler, K., L., Smith, B., D., Heine, F. and Huber, G. "Passive Q-Switching and Mode Locking of 2-um Lasers", Proceedings: OE LASE, Jan 93

Martinez, M., J. "Monte Carlo Simulation of Hole Transport in $Al_xGa_{1-x}As$, $In_{1-x}Al_xAs$ and $GaAs_xSb_{1-x}$", American Inst. of Physics, Dec 92

Look, D., C., Stutz, C., E. and Bozada, C., A. "Analytical Two-Layer Hall Analysis: Application to Modulation-Doped Field Effect Transistors", Journal of Applied Physics, Jan 93

Liou, J., J., Ho, C., -S., Liou, L., L. and Huang, C., I. "An Analytical Model for Current Transport in AlGaAs/GaAs Abrupt HBTs with a Setback Layer", Solid-State Electronics, Jan 93

Stutz, C., E., Taylor, E., N., Look, D., C., Yu, P., W. and Robinson, G., D. "A Study on the Transition from High to Low Resistivity in As-Grown GaAs Material", Proceedings: Mineral, Metals and Materials Society, Jun 93

Manasreh, M., O. "Optical Absorption Properties of Defects in Molecular Beam Epitaxial GaAs Grown at Low Temperatures", Proceedings: European Materials Research Society, Feb 93

Kaspi, R., Cooley, W., T., Jones, C., R. and Evans, K., R. "Continuous Control of $GaAs_{1-x}Sb_x$ Composition by Desorption Mass Spectrometry Using Variable Incident Arsenic Flux", Proceedings: TMS Electronic Materials Conference, Jun 93

Evans, K., Kaspi, R., Cooley, W. and Jones, C. "Real-Time Composition Control in III-V MBE by Desorption Mass Spectrometry", Proceedings: Minerals, Metals and Materials Society, Jun 93

Liou, L., L., Huang, C., I. and Bayraktaroglu, B. "Thermal Stability Analysis of Multiple Emitter Finger Microwave AlGaAS/GaAs Heterojunction Bipolar Transistors", Proceedings: IEEE MTT-S International Microwave Symposium, Jun 93

Micheel, L. J. and Taddiken, A. "Multiple-Valued Computation Circuits Using Micro- and Nanoelectronic Devices", Proceedings: Int. Symposium on Multiple-Valued Logic, Feb 93

Reynolds, D. C., Jogai, B., Yu, P. W., Evans, K. R. and Stutz, C., E. "Resonant Coupling of Orbital Angular Momentum Components in the Barrier with Analogous Components in the Well in $In_xGa_{1-x}As$-GaAs Quantum Wells ", Physical Review, Feb 93

Mack, M., Bayraktaroglu, B., Kehias, L., Barrette, J., Neidard, B., Fitch, R., Scherer, R., Davito, D. and West., W. "High Power Microwave Operation of InGaP/GaAs Heterojunction Bipolar Transistors", Proceedings: IEEE Transactions on Electron Devices, Jun 93

Blasingame, J., M. and Kinsella, M., E. "Microelectronics Manufacturing Science & Technology: A University/Government/Industry Cooperative Success Story", Proceedings: IEEE Univ/Gov/Ind Microelectronics Symposium, May 93

O'Keefe, M., J. "Sputter Deposition and Thermally Induced Phase Transformation of Non-BCC Chromium Thin Films", Proceedings: Materials Research Society , Apr 93

O'Keefe, M. J. "Plasma Polymerization of Fluorocarbon Thin Films on Glass and Metal Substrates", Proceedings: Materials Research Society , Apr 93

Wong, S., K. and Schepler, K., L. "Non Steady-state Optical Parametric Oscillator Model", Proceedings: Optical Society of America Meeting, Sep 93

Reitz, L. F. "Gallium Nitride Solid State Ultraviolet Detectors", Proceedings: SPIE, Apr 93

Martinez, E., Schuermeyer, F. and Shur, M. "Heterostructure Insulated Gate Field Effect Transistors Operated in Hot Electron Regime", IEEE Transactions on Electron Devices, Mar 93

Schuermeyer, F. "Hot Carrier Effects in GaAs and InP Based HFETs", Proceedings: MSSG, Aug 93

Martinez, E., Schuermeyer, F. and Shur, M. "Real Space and Intervally Transport in Pseudomorphic InGaAs AlGaAs Structures with a High AlAs Mole Fraction", Proceedings: Device Research Conference, Jun 93

Liou, L., L., Huang, C., L and Bayraktaroglu, B. "Thermal Stability Analysis of High Power AlGaAs/GaAs Heterojunction Bipolar Transistors", Proceedings: IEEE/Cornell University Conference, Aug 93

Bayraktaroglu, B., Barrette, J., Fitch, R., Kehias, L., Huang, C., L, Neidhard, R. and Scherer, R. "Thermally-Stable AlGaAs/GaAs Microwave Power HBTs", Proceedings Device Research Conference, Jun 93

Fitch, R., Barrette, J., Scherer, R., Huang, C., Kehias, L. and Bayraktaroglu, R. "Design and Fabrication of Thermally-stable AlGaAs/GaAs Microwave Power HBTs", Proceedings: IEE/Cornell Univ Conf on Advanced Concepts in High Speed Semiconductor Devices and Circuits, Mar 93

Bayraktaroglu, B., Barrette, J., Kehias, L., Huang, C., L, Fitch, R., Neidhard, R. and Scherer, R. "Very High Power Density CW Operation of GaAs/AlGaAs Microwave Heterojunction Bipolar Transistors", IEEE Electron Device Letters, Mar 93

Mack, M., P., Bayraktaroglu, B., Scherer, R., Kehias, L., Davito, D., Barrette, J., West, W., Neihard, R. and Fitch, R. "Microwave Operation of High Power InGaP/GaAs Heterojunction Bipolar Transistor", Electronics Letters, Mar 93

Yu, P., W. and Stutz, C., E. "Effects of Heat Treatment on the 0.8 eV Photoluminescence Emission in GaAs Grown by Molecular Beam Epitaxy at Low Temperatures", Proceedings: MRS Meeting, Apr 93

Talwar, D., N., Loehr, J., P. and Jogai, B. "Inas/$In_xGa_{1-x}Sb$ Type II Strained Layer Superlattices for Long Wavelength Infrared Detection Applications", Proceedings: Materials Research Society, Apr 93

Look, D., C., Robinson, G., D., Sizelove, J., R. and Stutz, C., E. "Electrical Properties of MBE GaAs Grown at 300 and 440 ^{o}C", Journal of Electronic Materials, Proceedings: Materials Research Society, Apr 93

Talwar, D., N., Manasreh, M., O., Stutz, C., E., Kaspi, R. and Evans, K. R. "Infrared Studies of Be Doped GaAs Grown by MBE at Low Temperature", Journal of Electronic Materials, Materials Research Society , Apr 93

Yu, P., W., Yen, M., Y. and Stutz, C. E. "Photoluminescence of Mg-ion Implantation in Low Temperature Grown GaAs", Journal of Applied Physics, Apr 93

Liou, L., L., Huang, C., I. and Bayraktaroglu, B. "The Effect of Thermal Shunt on the Current Instability of Multiple-emitter-finger Heterojunction Bipolar Transistors", Proceedings: Bipolar/BiCMOS Circuits and Technology Meeting, Sep 93

Evans, K., R., Cooley, W., T., Kaspi, R. and Jones, C., R. "Arbitrary Composition Profiles by MBE Using Desorption Mass Spectrometry", Proceedings: MRS Meeting, Apr 93

Liou, L. "Thermal Stability Analysis of Single- and Multiple-emitter-finger Heterojunction Bipolar Transistors", Proceedings: IEEE MTT-S International Microwave Symposium, Jun 93

Wang, Y., H., Li, S., S., Ho, Pin and Manasreh, M., O. "A Normal Incidence Type II Quantum Well Infrared Photodetector Using an Indirect AlAs/Al0.5Ga0.5As System Grown on [110] GaAs for the Mid- and Long-Wavelength Multispectrum Detection", American Institute of Physics, May 93

Yu, P., W., Robinson, G., D., Sizelove, J., R. and Stutz, C., E. "Deep-center Photoluminescence of GaAs Grown by Molecular Beam Epitax at Low Temperatures with Emphasis on 0.8 eV Emission", Physical Review, Jun 93

Kemerley, R., T. "30 Years of Phased Array Antenna Technology", Proceedings: NAECON, Microwave Theory and Techniques Symposium, Jun 93

Hines, J. "Microelectronics Manufacturing Science and Technology Demonstration Silicon Wafer", Proceedings: IEEE Design Automation Conference, Jun 93

Brown, J., L. "Preparing Samples for Scattering Measurements - A Cleaning Study: Part 2", Proceedings: SPIE, Symposium on Optics, Imaging and Instrumentation, Jul 93

Bayraktaroglu, B., Barrett, J., Fitch, R., Kehias, L., Huang, C., L, Neidhard, R. and Scherer, R. "Thermally-Stable AlGaAs/GaAs Microwave Power HBTs", Proceedings: IEEE Device Research Conference, Jun 93

Stutz, C., E., Look, D., C., Taylor, E., N., Sizelove, J., R. and Yu, P., W. "A Study on the Transition from High to Low Resistivity in As-grown GaAs Material", Proceedings: minerals, Metals and Material Society, Jun 93

Liou, L., L., Huang, C., I. and Bayraktaroglu, B. "Theoretical Thermal Runaway Analysis of Heterojunction Bipolar Transistor: Junction Temperature Rise Threshold", Solid State Electronics, Jun 93

Reynolds, D., C., Look, D., C., Jogai, B. and Stutz, C., E. "Recombination of Two Dimensional Electrons with Free Light and Heavy Holes in $Al_xGa_{1-x}As$-GaAs Single Heterojunctions in a Magnetic Field", Physical Review, Jun 93

Zakharov, N., Lilienta-Weber, Z., Swider, W., Washburn, J. and Stutz, C., E. "The Structure and Compositional Variations in GaAsSb Layers Grown by MVE on InP substrate for Different X-values", American Inst. of Physics, Jun 93

Liou, J., J., Liou, L., L. and Huang, C., I. "The Thermal-avalanche Interacting Behavior of AlGaAs/GaAs HBTs", IEEE Electronics Device Letters, Jun 93

Liou, J., J., Liou, L., L. and Huang, C., J. "An Analytical Model for the AlGaAs/GaAs Multi-emitter-finger HBT Including Self-heating and Thermal Coupling Effects", IEEE Transactions on Electronic Devices, Jun 93

Creech, G., Neidhard, R., Paul, B., Nuteson, T. and Naishadum, K., Whitson, D. "A Versatile Transmission- Line-Theory-Based CAD Model for Spiral Inductors in MMICs", IEEE Microwave and Guided Wave Letters, Jul 93

Liou, J., J. and Huang, C. "On the Surface Recombination Current of HBTs: A Different Perspective", American Institute of Physics, Jul 93

Liou, L., L., Huang, C., L, Barrett, J. and Bayraktaroglu, B. "The Effect of Thermal Shunt on the Current Instability of Multiple-Emitter-Finger Heterojunction Bipolar Transistors", Proceedings: Bipolar/BiCMOS Circuits and Technology Meeting, Sep 93

Liou, J., J. and Huang, C. "Base and Collector Leakage Currents of AlGaAs/GaAs Heterojunction Bipolar Transistors", Institute of Electrical and Electronics Engineers, Jul 93

Liou, L., Huang, C., L and Bayraktaroglu, B. "Thermal Runaway Analysis of High Power AlGaAs/GaAs Heterojunction Bipolar Transistors", Proceedings: IEEE/Cornell Conference on the Advanced Concepts in High Speed Semiconductor Devices and Circuits, Aug 93

Bayraktaroglu, B., Fitch, R., Barrette, J., Scherer, R., Kehias, L. and Huang, C., L. "Design and Fabrication of Thermally-stable AlGaAs/GaAs Microwave Power HBTs", Proceedings: IEEE/Cornell Conference on Advanced Concepts in High Speed Semiconductor Devices and Circuits, Aug 93

Liou, J. J. and Huang, C. "Base and Collector Currents of Pre- and Post-burn-in AlGaAs/GaAs Heterojunction Bipolar Transistors", Institute of Electrical and Electronic Engineers, Jul 93

Huang, C., Liou, J., J. and Williamson, D. "Microwave Power Heterojunction Bipolar Transistor Reliability", Proceedings: GaAs REL Workshop, Sep 93

Yu, P., W. and Stutz, C., E. "Photoluminescence Excitation of the As_I-V_{Ga} 0.8 eV Emission in GaAs Grown by Molecular Beam Epitaxy at Low Temperatures", Solid State Communication, Sep 93

Talwar, D. , N., Loehr, J., P. and Jogai, B. "Comparative Study of Band Structure Calculations for Type II InAs/InGaSb Strained Layer Superlattices", Physical Review, Sep 93

von Bardeleben, H., J., Manasreh, M., O. and Stutz, C., E. "Alloy Dependence of the Carrier Concentration and Negative Persistent Photoconductivity in GaAlSb/InAs/GaAlSb Single Quantum Wells", Materials Science Forum, Sep 93

Look, D., C., Fang, Z-Q. and Sizelove, J., R. "Direct Observation of A Metastable Defect Transition in GaAs", Physical Review Letters, Sep 93

Reynolds, D., C., Look, D., C., Jogai, B., Stutz, C., E. and Jones, R. "Parity Forbidden Landau Level Transitions in $Al_xGa_{1-x}As$-GaAs Single Heterojunctions", Physical Review, Sep 93

Dodd, M., A. and Scheihing, J., E. "Barrier-Doped GaAs/AlGaAs Quantum Well Detector", Proceedings: Electrochemical Society, Sep 93

Scheihing, J., E., and Dodd, M., A. "Optical Gratings for GaAs/AlGaAs Quantum Well Detectors", Proceedings: Electrochemical Society, Sep 93

Huang, C., L., Liou, J., J. and Williamson, D. "Microwave Power AlGaAs/GaAs Heterojunction Bipolar Transistor Reliability", Proceedings: GaAs REL Workshop, Sep 93

Wong, S., K. and Schepler, K. L. "Non Steady-State Optical Parametric Oscillator Model", Proceedings: Optical Society of America Annual Meeting, Sep 93

O'Keefe, M., J. "Effect of Oxygen and Carbon on the Formation and Stability of A-15 Crystal Structure Chromium Thin Films", Thin Solid Films, Sep 93

Sydor, M., Engholm, J., R., Manasreh, M., O., Mitchel, W., C., Evans, K., R. and Stutz, C., E. "Photoreflectance Spectra from Two-dimensional Electron Gas in GaAs/AlGaAs Heterojunctions", Applied Physics Letters, Oct 91

Huang, C., L., Liou, L., L., Trombley, G., J., Merkel, K., G. and Robinson, G., D. "High Temperature Substrate Conduction Consideration for GaAs Metal Semiconductor Field-Effect Transistors", Electronics Letters, Oct 91

Reynolds, D., C., Yu, P., W., Jogai, B., Evans, K., R. and Stutz, C., E. "Heavy-Hole Subband Dispersion in P-type Modulation-Doped $Al_xGa_{1-x}As/GaAs$ Quantum Wells", Proceedings: American Physical Society Meeting, Mar 92

Evans, K., R., Stutz, C., E., Reynolds, D., C., Yu, P., W. and Jogai, B. "Fine Structure Features Due to Wave Function Localization in Coupled $GaAs/Al_xGa_{1-x}As$ Quantum Wells", Proceedings: American Physical Society Meeting, Mar 92

Jogai, B., Reynolds, D., C., Yu, P., W., Evans, K., R. and Stutz, C., E. "Light- and Heavy-Hole Free-Exciton Transitions in Narrow InGaAs/GaAs Quantum Wells", Proceedings: American Physical Society Meeting, Mar 92

Merkel, K., G., Evans, K., R., Stutz, C., E., Reynolds, D., C. and Yu, P., W. "Sensitivity of Resonant and Photoluminescence Excitation Measurements to Excito Localization Effects in GaAs/AlGaAs Quantum Wells", Proceedings: American Physical Society Meeting, Mar 92

Zhang, C., Gumbs, G. and Manasreh, M., O. "Theory of Cyclotron Resonance in Two Dimensional Systems", Proceedings: American Physical Society Meeting, Mar 92

Smith, D., J. "Laser Development in the Air Force", Proceedings: OPTCON, Nov 91

Stutz, C., E., Manasreh, M., O., Evans, K., R. and Hemsky, J. "Localized Vibrational Modes of Silicon and Aluminum in Molecular Beam Epitaxial GaAs Grown at Low Temperatures", Proceedings: American Physical Society Meeting, Mar 92

Manasreh, M., O., Stutz, C., E., Evans, K., R., Gumbs, G., Zhang, C., Lo, I. and Mitchel, W., C. "Effective Mass of the 2-Dimensional Electron Gas in $Al_xGa_{1-x}Sv/InAs$ Single Quantum Wells", Proceedings: American Physical Society Meeting, Mar 92

Romaker, H. and Daniszewski, E. "Air Force Vacuum Electronics Reliability and Maintainability", Microwave Journal, Oct 91

Merkel, K., G., Trombley, G., J., Dettmer, R., W., Huang, C., I., Robinson, G., D., Larau, R., T. and Schauer, S., N. "Refractory GeMoW Ohmic Contacts to p and n GaAs", Proceedings: Electrochemical Society Meeting and State-of-the-Art Program on Semiconductors, Oct 91

Reynolds, D., C., Evans, K., Stutz, C., E., Jogai, B. and Yu, P., W. "Heavy-Hole Subband Dispersion in p-type Modulation-Doped $Al_xGa_{1-x}As/GaAs$ Quantum Wells", Physical Review, Nov 91

Reynolds, D., C., Evans, K., R., Jogai, B., Stutz, C., E. and Yu, P. "Photoluminescence Study of Symmetric, Coupled, Double $In_xGa_{1-x}As/GaAs$ Quantum Well Structures", Physical Review B, Jun 92

Reynolds, D., C. and Evans, K., R. "Optical and Magneto-Optical Properties of Narrow $In_xGa_{1-x}As/GaAs$ Quantum Wells", World Scientific Publishing Co., May 91

Kaspi, R. and Evans, K. "Desorption Kinetics of In During the Early Stages of InAs Heteroepitaxy on GaAs (001)", Proceedings: Materials Research Society Meeting, Nov 92

Stutz, C., E., Manasreh, M., O., Taylor, E., N., Jones, R., and Yu, P., Y. "The Growth and Characterization of High Quality InGaSb on GaAs Substrates by MBE", Proceedings: J. Vac. Sci. and Technol., Jul 92

Look, D., C., Fang, Z-Q., Sizelove, J., R. and Stutz, C., E. "A New As_{Ga} - Related Center in GaAs", Physical Review Letters, Jul 92

Talwar, D., N., Manasreh, M., O., Stutz, C., E., Kaspi, R. and Evans, K., R. "Infrared Studies and Model Calculations of Defects in Molecular Beam Epitaxial GaAs Grown at Low Temperatures", Proceedings: Materials Research Society Meeting, Nov 92

Talwar, D., N., Fischer, D., WE., Manasreh, M., O. and Matous, G. "Isochronal Annealing of Impurity Modes in Proton and Deuteron Implanted InP: Theory and Experiment", Proceedings: Materials Research Society Meeting, Nov 92

Liou, J., J., Liou, L., L. and Huang, C., I. "Kink Effect on the Base Current of Heterojunction Bipolar Transistors", Solid State Electronics, Jul 92

Evans, K., Sherriff, R., Kaspi, R., Jones, C., Jogai, V. and Reynolds, D. "MBE Growth of AlGaAs at High Substrate Temperatures", Proceedings: International MBE Conference, Aug 92

Reynolds, D., C., Yu, P., W., Evans, K., R., Stutz, C., E. and Loehr, J. "Magnetic Field Dependence of Selective Pair Luminescence in GaAs", Applied Physics Letters, Jul 92

Liou, J., J., Liou, L., L., Huang, C., I. and Bayraktaraglu, B. "A Physical-base Heterojunction Bipolar Transistor Model Including High-Current and Thermal Effects", IEEE Transactions on Electron Devices, Jul 92

Martinez, E., Schuermeyer, F., Shur, M., Grider, D. and Bauhahn, P. "Comparative Study of Hot-Electron Gate Currents in Complementary Heterostructure FETs", Proceedings: International Electron Devices Meeting, Dec 92

Evans, K., R. "Molecular Beam Epitaxial Growth of III-V Infrared Detector Structures", Artech House, Aug 92

Strawser, R. and Arch, D. "Integrated Microsensor Technology", Proceedings: Gearing Up Conference, Aug 92

Manasreh, M., O., Jogai, B., Stutz, C., E. and Reynolds, D., C. "Optical Absorption of the Intersubband Transition in GaAs/Il0.4Ga0.6As Multiple Quantum Wells with Superlattice Barriers", Applied Physics Letters, Aug 92

Reitz, L., F. "Gallium Nitride Solid State Ultraviolet Detectors", Proceedings: SPIE, Apr 93

Liou, J., J., Liou, L., L., Huang, C., I. and Bayraktaraglu, B. "Modeling the Avalanche Multiplication Current of AlGaAs/GaAs Hetrojunction Giplolar Transistors", Solid State Electronics, Aug 92

Schuermeyer, F. "Complementary Heterostructure Field Effect Transistor IC Technology for Next Generation Signal Processing Applications", Proceedings: Siemens Research and Development, Oct 92

Martinez, M., J. "$GaAs_xSb_{1-x}/In_yAl_{1-y}As$ p-Channel Heterostructure FETs with High Transconductance and Low Gate Leakage Current", IEEE, Sep 92

A Study of Gate Current in p-HFETs

Dukes, M. and Serafino, K. "VHSIC Hardware Description Language (VHDL) Benchmark Suite", Oct 90

Schreiber, P., Hurst, R., P. and Duvall, T. "Erratum: Helium Momentum-Space Wave Function and Compton Profile", Proceedings: Physical Review A, Oct 90

Schepler, K., L. and Budni, P., A. "High Power $AgGaSe_2$ Optical Parametric Oscillator", Proceedings: Optical Society of America, May 91

Turner, M., D. and Schepler, K. L. "Characterizating $AgGaSe_2$ for Second Harmonic Generation of High Average Power CO_2 Laser Input", Proceedings Optical Society of America, May 91

Evans, K., Stutz, C., E., Ehret, J. and Taylor, E. "Incorporation/Desorption Rate Variation at Heterointerfaces in III-V Molecular Beam Epitaxy", Proceedings: Physics and Chemistry of Semiconductor Interfaces Conference, Jan 91

Reynolds, D., C., Yu, P., W., Evans, K., R. and Stutz, C., E. "The Binding Energy of Excitons to Neutral Donors in InGaAs/GaAs Quantum Wells", Physical Review, Oct 90

Mui, D., Fang, S., Morkoc, H. and Evans, K. "Use of Methane in an Electron Cyclotron Resonance Source for Carbon Doping in GaAs Molecular Beam Epitaxy", Applied Physics Letters, Oct 90

Jogai, B. and Koenig, E., T. "A Parametric Study of Histability in the Current-voltage Curves of Resonant Tunneling Diodes", American Institute of Physics, Oct 90

Manasreh, M., O. "Cyclotron Resonance in GaAs/A1GaAs Heterostructures", Proceedings: Wright State University, Oct 90

Manasreh, M., O., Evans, K., R., Stutz, C., E. and Fischer, D., W. "Cyclotron Resonance in GaAs/AlGaAs HEMT Structure", Proceedings: American Physical Society, Mar 91

Bajaj, K., Reynolds, D., C., Yu, P., W., Stutz, C., E. and Evans, K., R. "The Binding Energy of Residual Donors in a 300A GaAs/AlGaAs Quantum Well Structure Determined by Photoluminescence Spectroscopy", Proceedings: 1991 American Physical Society Meeting, Mar 91

Schuermeyer, F. "Gate Current in Heterostructure FETs", Proceedings: Engineering Foundation, Dec 90

Look, D., C. and Mumford, P., D. "On Wafer Hall-effect Measurement System", Review of Scientific Instruments, Dec 90

Koenig, E., T. and Jogai, B. "Multiple Negative Differential Resistance due to Spacer Layer Effects in AlGaAs/GaAs Resonant Tunneling Diodes", American Institute of Physics, Dec 90

Liou, L., L., Huang, C., I. and Ebel, J. "DC Transistor Characteristics of Mesa-Etched-Emitter Heterojunction Bipolar Transistor Using Two Dimensional Simulation with Current Boundary Condition", Proceedings: 7th International Conference on the Numerical Analysis of Semiconductor Devices & Integrated Circuits, Apr 91

Schuermeyer, F., Grider, D. and Shur, M. "Gate Current in Self Aligned n-channel and p-channel Pseudomorpic Heterostructure Field Effect Transistors", IEEE, Jan 91

Manasreh, M., O., Szmulowicz, F., Vaughan, T., Evans, K., R., Stutz, C., E. and Fischer, D., W. "Origin of the Blue-Shift in the Intersubband Infrared Absorption in GaAs/$A1_{0.3}Ga_{0.7}As$ Multiple Quantum Well", American Institute of Physics, Jan 91

"Growth of High Quality in $Ga_{1-x}As$/InP Quantum Wells with Tertiarybutylarsine and Tertiarybutylphospine"

Look, D., C., Walters, D., C., Stutz, C., E., Evans, K., R., Sizelove, J., S. and Numan, M. "Vanishing of GaAs Surface States", Physical Review Letters, Jan 91

Schuermeyer, F., L., Shur, M., Bobb, R., Martinez, J., Cook, P., Martinez, E., and Grider, D. "A Study of Gate Current in p-HFETs", Proceedings: WOCSEMMAD, Feb 91

Martinez, E., Cook, P., Bobb, R., Martinez, J., Stutz, E., Evans, K., Schuermeyer, F. and Shur, M. "New Approach to Complementary Heterostructure FET (C-HFET) Technology Based on the $Al_{.7}Ga_{.3}As/In_{.2}Ga_{.8}As/GaAs$ Material System", Proceedings: Workshop on Compound Semiconductor Materials and Devices, Feb 91

Evans, K., R., Stutz, C., E., Ehret, J., E. and Taylor, E., N. "Incorporation/Desorption Rate Variation at Heterointerfaces in III-V Molecular Beam Epitaxy", American Vacuum Society, Jan 91

Koenig, E., T. "Investigation of Charge-Quantization Effects on the I-V Characteristics of Double-Barrier Resonant Tunneling Diodes", Proceedings: Workshop on Compound Semiconductor Materials and Devices, Feb 91

Look, D., C., Yamamoto, H. and Nakano, K. "Ohmic Contact Formation on GaAs Layers with Low-Temperature Molecular Beam Epitaxial Caps"IEE Trans. on Elec. Devices, Jan 91

Schepler, K., L., Turner, M., D. and Budni, P., A. "High Average Power Nonlinear Frequency Conversion in $AgGaSe_2$", Proceedings: Advanced Solid State Lasers Conference, Mar 91

von Bardeleben, H., J., Manasreh, M., O., Evans, K., R. and Stutz, C., E. "Electron Paramagnetic Resonance Study of Low Temperature Molecular Beam Epitaxial GaAs". Physical Review B, Mar 91

Liou, L., L., Huang, C., I. and Ebel, J. "Numerical Studies of Thermal Effect on Heterojunction Bipolar Transistor Current-Voltage Characteristics Using One-Dimensional Simulation", Solid State Electronics, Mar 91

Talwar, D., N., Manasreh, M., O., Fischer, D., W., Pearton, S., J. and Matous, G. "Local-mode Spectroscopy and Model Study for Assessing the Role of Light Defects in III-V Compound Semiconductors", Proceedings: 16th International Conference on Defects in Semiconductors, Jul 91

von Bardeleben, H., J., Jia, Y., G., Manasreh, M., O., Evans, K., R. and Stutz, C., E. "Electron Paramagnetic Resonance Studies of Low-Temperature Molecular Beam Epitaxial GaAs Layers", Proceedings: 16th International Conference on Defects in Semiconductors, Jul 91

Kemerley, R., T. and Fayette, D., F. "Affordable MMICs for Air Force Systems", Microwave Journal, Mar 91

Manasreh, M., O., Bozada, C., A., Stutz, C., E. and Evans, K., R. "Far-Infrared Cyclotron Resonance in a InAs/AlSb Single Quantum Well", Physical Review B, Mar 91

Koenig, E., T., Huang, C., I., Jogai, B., Evans, K., R. and Stutz, C., E. "Emitter Structure Influence on the Electron Transport Mechanism in Resonant Tunneling Diodes", Proceedings: IEEE/Cornell Conference on Advanced Concepts In High Speed Semiconductor Devices and Circuits, Aug 91

Koenig, E., T. "Charge Quantization Effects in Resonant Tunneling Diodes", Proceedings: Workshop on Compound Semiconductor Devices & Integrated Circuits, May 91

Liou, L., L., Huang, C., I. and Ebel, J. "DC Transistor Characteristics of Mesa-Etched-Emitter Heterojunction Bipolar Transistor Using Two-Dimensional Simulation with Current Boundary Condition", Proceedings: 7th International Conference on the Numerican Analysis of Semiconductor Devices & Integrated Circuits, Apr 91

Oliver, R., "Tunable Mid-IR Lasers", Proceedings: Diode Laser Technology Program Conference, Apr 91

Dukes, M., Brown, F. and DeGroat, J. "A Prolog System for Converting VHDL-Based Models to GES Extraction Rules", Apr 91

Kinsella, M., E. and Blasingame, J. "Semiconductor Manufacturing: A Strategy for the 90s", Proceedings: Society of Women Engineers National Convention, Jun 91

Liou, L., L., Huang, C., I. and Ebel, J. "The Offset Voltage of Heterojunction Bipolar Transistor Using Two-Dimensional Numerical Simulation with Current Boundary Condition", IEEE Transaction on Electron Devices, Apr 91

Stutz, C., E., Evans, K., R., Taylor, E., N., Ehret, J., E., Martinez, M., J., Yu, P., W. and Wie, C., R. "A Study of GaAsSb/InA1As Interfaces Grown by Molecular Beam Epitaxy", Proceedings: American Institute of Physics, Sep 91

Kinsella, M., E. and Blasingame, J. "1990s Semiconductor Manufacturing Strategy: Progress Report", Sep 91

Manasreh, M., O., Gumbs, G. and Zhang, C. "Theory of the Oscillations of the Cyclotron Resonance Effective Mass for GaAs/A1GaAs Heterostructures", American Physical Society, Sep 91

Reynolds, D., C., Evans, K., R., Stutz, C., E. and Yu, P., W. "Sensitivity of Resonant Excitation and Photoluminescence Excitation Measurements to Exciton Localization Effects in GaAs/A1GaAs Quantum Wells", Physical Review, Sep 91

Evans, K., R., Taylor, E., N., Stevens, D., M., Stutz, C., E., Ehret, J., E., Elsaesser, D., W., Colon, J., E., Yeo, Y., K. and Heng, R., L. "Molecular Beam Epitaxial Growth and Characterization of Erbium-Doped GaAs and A1GaAs", Proceeings: American Institute of Physics, Sep 91

Conference on Advanced Concepts in High Speed Semiconductor Devices and Circuits, Aug 91

Cheney, M., E., Fitch, R., C., Robinson, G., R., Huang, C., I. and Neidhard, R., A. "Electrical and Thermal Characteristics of Heterojunction Bipolar Transistors Fabricated on Peeled Film Epitaxial Layers", Proceedings: IEEE/Cornell Conference on Advanced Concepts in High Speed Semiconductor Devices and Circuits, Aug 91

Liou, L., L., Ebel, J. and Huang, C., I. "High Current Effect on DC Current Gain in Heterojunction Bipolar Transistors", Electronics Letters, Jul 91

Mier, M., G., Beasley, D., L., Look, D., C. and Walters, D., C. "Infrared Transmission Topography for Whole-Wafer Gallium Arsenide Materials Characterization", Solid State Electronics, Aug 91

Manasreh, M., O., Gumbs, G., Zhang, C., Stutz, C., E., Evans, K., R., Bozada, C., Lo, I., Mitchel, W., C. "Effective Mass of the 2-Dimensional Electron Gas in an $Al_{0.6}Ga_{0.4}Sb/InAs$ Single Quantum Well", Physical Review B, Aug 91

Cummins, S., E., Sizelove, J., R. and Mumford, P., D. "GaAs FET Alignment Study Using High Density FET Arrays", Proceedings: Government Microcircuit Applications Conference, Nov. 91

von Bardeleben, J., H., Jia, Y., O., Manasreh, M., O., Evans, K., R. and Stutz, C., E. "Electron Paramagnetic Studies of Low Temperature Molecular Beam Epitaxial GaAs Layers", Proceedings: 16th International Conference on Defects in Semiconductors, Aug 91

Evans, K., R. "Growth Parameter Control by Desorption Mass Spectroscopy", Proceedings: Intevac Users Conference, Sep 91

Talwar, D., N., Manasreh, M., O., Fischer, D., W., Pearton, S., J. and Matous, G. "Local Mode Spectroscopy and Model Study for Assessing the Role of Light Defects in III-V Compound Semiconductors", Proceedings: 16th International Conference on Defects in Semiconductors, Aug 91

Manasreh, M., O., Szmulowicz, F., Vaughan, T., Evans, K., R., Stutz, C., E. and Fischer, D., W. "Intersubband Infrared Absorption in A GaAs/A10.3Ga0.7As Multiple Quantum Well", Proceedings: NATO Advanced Workshop on Intersubband Transitions in Quantum Wells, Sep 91

Yu, P., W., Yen, M., Y., Stutz, C., E. and Evans, K., R. "Photoluminescence of Mg-ion Implantation in Low Temperature Grown GaAs", Proceedings: Materials Research Society Meeting, Dec 91

Mills, M. "VHDL Syntax and Semantics Summary", Jun 91

Merkel, K., G., Robinson, G., D., Trombley, G., J., Dettmer, R., W. and Huang, C., I. "Refractory GemOW Ohmic Contacts to p^+ and n^+ GaAs", Proceedings: Electrochemical Society Meeting, Oct 91

Look, D., C., Lorance, D., K., Sizelove, J., S., Stutz, C., E. and Evans, K., R. "Alloy Scattering in p-type $Al_xGa_{1-x}As$", Journal of Applied Physics, Jun 91

Kim, H., M., Wie, C., R. and Stutz, C., E. "Characterization of Strained Quantum Wells by X-ray Interference", Proceedings: Workshop on Strained-layer Semiconductor Materials and Devices, Aug 91

Huang, Z., C., Choi, Y., W., Wie, C., R., Stutz, C., E. and Johnstone, D. "Electronic Properties of Lattice Mis-matched GaInAs/GaAs Interfaces", Proceedings: Workshop on Strained-layer Semiconductor Materials and Devices, Aug 91

Liou, L., L., Huang, C., I. and Ebel, J. "Thermal Effects on AlGaAs/GaAs Heterojunction Bipolar Transistor's Characteristics Using Two Dimensional Numerical Simulation", Proceedings: IEEE International Electron Device Meeting, Dec 91

Look, D., C., Hoelscher, J., Grant, J., Evans, K., R. and Stutz, C., E. "Photoreflectance and X-ray Photoelectron Spectroscopy in LT-MBE GaAs", Proceedings: Materials Research Society Meeting, Dec 91

von Bardeleben, H., J., Jia, Y., A., Mirtz, J., F., Manasreh, M., O., Stutz, C., E. and Evans, K., R. "Electron Paramagnetic Resonance Study of Low Temperature Molecular Beam Epitaxy Grown GaAs and InP", Proceedings: Materials Research Society Meeting, Dec 91

Manasreh, M., O., Evans, K., R., Look, D., C. and Hemsky, J. "Incorporation of Silicon in Low Temperature Molecular Beam Epitaxial GaAs", Proceedings: Materials Research Society Meeting, Dec 91

Schepler, K. L. "Practical Limitations of Optical Parametric Oscillators", Proceedings: Gordon Research Conferences, Jul 91

Bozada, C., A., Dettmer, R., W., Eppers, C., L., Nakano, K., Stutz, C., E. and Walline, R., E. "Gallium Arsenide Metal-Insulator-Semiconductor Field Effect Transistors (MISFET) with Low Temperature GaAs Insulating Layers", Proceedings: IEEE/Cornell

Agresta, D. "Surface Emitting Pump Arrays", Proceedings: Diode Laser Technology Program Conference, Apr 91

Reynolds, D., C., Evans, K., R., Stutz, C., E. and Bajaj, K., K. "Photoluminescence Determination of the Binding Energy of Residual Donors in 300 A GaAs/A1GaAs Quantum Wells", Physical Review, Apr 91

Reynolds, D., C., Evans, K., Stutz, C., Jogai, B., Wie, C. and Yu, P., W. "Light- and Heavy-Hole Free Excitation Transitions in Narrow InGaAs/GaAs Quantum Wells", Physical Review B, Apr 91

Schepler, K., L. "Practical Limitations of Optical Parametric Oscillators", Proceedings: Gordon Research Conferences, Jul 91

Bozada, C., A., Dettmer, R., W., Eppers, C., L., Nakano, K., Stutz, C., E. and Walline, R., E. "Gallium Arsenide Metal-Insulator-Semiconductor Field Effect Transistors (MISFET) with Low Temperature GaAs Insulating Layers", Proceedings: IEEE/Cornell Conference on Advanced Concepts in High Speed Semiconductor Devices and Circuits, Apr 91

Sewell, J., Bozada, C., Styrcula, H. and Davis, E. "Single-Cycle Lithography Process for Both Large and Sub-Half-Micron Features", Proceedings: IEEE Gallium Arsenide Integrated Circuit Symposium, Apr 91

Cheney, M., E., Fitch, R., C., Huang, C., L, Robinson, G. and Neidhard, R., A. "Electrical and Thermal Characteristics of Heterojunction Bipolar Transistors Fabricated on Peeled Film Epitaxial Layers", Proceedings: IEEE/Cornell Conference, Aug 91

"Optic and Magnetic Optic Properties of InGaAs/GaAs"

Evans, K., R., Stutz, C., E., Taylor, E., Stevens, D., Colon, J., Elsaesser, D., Keo, Y. and Solomon, J. "Molecular Beam Epitaxy Growth and Characterization of Erbium-j Doped GaAs and A1GaAs", Proceedings: Molecular Beam Epitaxy Workshop, Sep 91

Stutz, C., E., Evans, K., R., Martinez, M., J., Taylor, E., N., Ehret, J., E. and Yu, P., W. "A Study of GaAsSb/InA1As Quantum Wells Grown by MBE", Proceedings: MBE Workshop, May 91

Manasreh, M., O., Bozada, C., A., Dettmer, R., W., Stutz, C., E. and Evans, K., R. "Evidence of Spin-Splitting in A1GaSb/InAs/A1GaSb and A1Sb/InAs/A1Sb Single Quantum Wells", Proceedings: Materials Research Society Meeting, Dec 91

Balsone, S. J., Nicholas, T., Maxwell, D. C. and Khobaib, M., "Environment and Frequency Effects on Crack Growth in a Titanium Aluminide Alloy", Elevated Temperature Crack Growth, MD-Vol. 18, S. Mall and T. Nicholas, Eds., American Society of Mechanical Engineers, New York, Dec 1990, pp. 87-91.

Larsen, J. M. and Jira, J. R., "Small-Crack Closure Measurements in Titanium Alloys", Experimental Mechanics, March, 1991, pp. 82-87.

Mall, S., Nicholas, T., Pernot, J. J. and Burgess, D. G., "Crack Growth in a Titanium Aluminide Alloy Under Thermal Mechanical Cycling", Fatigue Fract. Engng Mater. Struct., 14, Jan 1991, pp. 79-87.

Mall, S., Perez, J. A. and Nicholas, T., "Influence of Loading History on Fatigue Threshold Behavior in a Titanium Alloy", Eng. Fracture Mech., 37, Jan 1990, pp. 15-26.

Mall, S., Staubs, E. A. and Nicholas, T., "Investigation of Creep/Fatigue Interaction on Crack Growth in a Titanium Aluminide Alloy", ASME J. Eng. Mat. Tech., 112, Dec 1990, pp. 435-441.

Nicholas, T. and Mall, S., "Elevated Temperature Crack Growth in Aircraft Engine Materials", Advances in Fatigue Lifetime Predictive Techniques, ASTM STP 1122, M. R. Mitchell and R. W. Landgraf, Eds., American Society for Testing and Materials, Philadelphia, Jun 1991, pp. 143-157.

Nicholas, T. and Russ, S. M., "Elevated Temperature Fatigue Behavior of SCS-6/Ti-24Al-11Nb", Sept 1991, ASME J. Mat. Sci. Eng.

Nicholas, T. Haritos, G. K., Hastie, R. L. Jr. and Harms, K., "The Effects of Overloads on Sustained-Load Crack Growth in a Nickel-Base Superalloy: Part I-Experiments", Theor. Appl. Fract. Mech-Fracture Mechanics Technology, pp 51-62, Jan 1991.

Nicholas, T. Haritos, G. K., Hastie, R. L. Jr. and Harms, K., "The Effects of Overloads on Sustained-Load Crack Growth in a Nickel-Base Superalloy: Part II-Analysis", Theor. Appl. Fract. Mech-Fracture Mechanics Technology pp 35-49, Jan 1991.

Nicholas, T., "Fatigue Crack Growth Modeling at Elevated Temperatures Using Fracture Mechanics", Elevated Temperature Crack Growth, MD-Vol. 18, S. Mall and T. Nicholas, Eds., American Society of Mechanical Engineers, New York, Dec 1991, pp. 107-112.

Parida, B. K. and Nicholas, T., "Frequency and Hold-Time Effects on Crack Growth of Ti-24Al-11Nb at High Temperature", Sept 1991, ASME J. Mat. Sci. Eng.

Parida, B. K. and Nicholas, T., "Growth of Fatigue Cracks Emanating from Notches in Titanium Aluminide", Proceedings of the Joint FEFG/ICF International Conference on Fracture of Engineering Materials and Structures, S. H. Teoh and K. H. Lee, Eds., Elsevier, New York, Nov 1991, pp. 685-690.

Coker, D., Ashbaugh, N.E. and Nicholas, T., "Analysis of Thermomechanical Cyclic Behavior of Unidirectional Metal Matrix Composites", Thermomechanical Fatigue Behavior of Materials, ASTM STP, Oct 91

Khobaib, M. and Zawada, L., "Tensile and Creep Behavior of a Silicon Carbide Fiber-Reinforced Alumino-Silicate Composite", Ceram. Eng. Sci, Proc. 12 [7-8], pp. 1537-1555, Jul 1991.

Larsen, J. M., Jira, J. R., and Ravichandran, K. S., "Measurement of Small Cracks by Photomicroscopy: Experiments and Analysis", Small-Crack Test Methods, ASTM STP 1149, J. M. Larsen and J. E. Allison, Eds., American Society for Testing and Materials, Philadelphia, PA, Jun 1992, pp. 57-80.

Larsen, J. M., Revelos, W. C. and M. L. Gambone, "An Overview of Potential Titanium Aluminide Matrix Composites in Aerospace Applications", Intermetallic Composites II, Vol. 273, Aug 1992, Materials Research Society, Pittsburgh, PA.

Nicholas, T. and Mall, S., "Elevated Temperature Crack Growth in Aircraft Engine Materials", Advances in Fatigue Lifetime Predictive Techniques, ASTM STP 1122, M.R. Mitchell and R.W. Landgraf, Eds., American Society for Testing and Materials, Philadelphia, Jul 1992, pp. 143-157.

Nicholas, T. and Russ, S.M., "Elevated Temperature Fatigue Behavior of SCS-6/Ti-24Al-11Nb", Mat. Sci. Eng., A153, Jun 1992, pp. 514-519.

Parida, B.K. and Nicholas, T., "Frequency and Hold-Time Effects on Crack Growth of Ti-24Al-11Nb at High Temperature", Mat. Sci. Eng., A153, Jun 1992, pp. 493-498.

Parida, B.K. and Nicholas, T., "Influence of Crack Closure and Stress Ratio on Near-threshold Fatigue Crack Growth Behavior in Ti-1100", ASTM J. Eng. Mech. Tech, Nov 1992.

Ravichandran, K. S. and Larsen, J. M., "Behavior of Small and Large Fatigue Cracks in Ti-24Al-11Nb: Effects of Crack Shape, Microstructure, and Closure", Fracture Mechanics: Twenty-Second Symposium (Vol. 1), ASTM STP 1131, H. A. Ernst, A. Saxena, and D. L. McDowell, Eds., American Society for Testing and Materials, Philadelphia, May 1992, pp. 727-748.

Ravichandran, K. S. and Larsen, J. M., "Microstructure and Crack-Shape Effects on the Growth Behavior of Small Fatigue Cracks in Ti-24Al-11Nb", Mat. Sci. Eng., A153, Jan 1992, pp. 499-507.

Revelos, W.C. and Smith, P.R., "Effect of Environment on the Thermal Fatigue Response of an SCS-6/Ti-24Al-11Nb Composite", Met Trans., Vol. 23A, Feb. 1992, pp. 587-595.

Sharpe, W. N., Jr., Jira, J. R., and Larsen, J. M., "Real-Time Measurement of Small-Crack Opening Behavior Using an Interferometric Strain/Displacement Gage", Small-Crack Test Methods, ASTM STP 1149, J. M. Larsen and J. E. Allison, Eds., American Society for Testing and Materials, Philadelphia, PA, Jun 1992, pp. 92-115.

Blatt, D., John, R., and Coker, K., "Stress Intensity Factor and Compliance Solutions for a Single Edge Notched Specimen with Clamped Ends", Engineering Fracture Mechanics, Vol. 47, No. 4, pp 521-532, 1993.

Blatt, D., Karpur, P., Stubbs, D. A., and Matikas, T. E., "Observations of Interfacial Damage in the Fiber Bridged Zone of a Titanium Matrix Composite", Scripta Metallurgica et Materialia, Vol. 29, pp 851-856, 1993.

Blatt, P. A., Scheumann, T. D., and Grandt, Jr., A. F., "Evaluation of Smooth and Notched Specimen Fatigue Behavior of Al-2.6Li-0.09Zr", Engineering Fracture Mechanics, Vol. 22, Apr 1993, pp. 51-62.

Jira, J. R. and Larsen, J. M., "Fatigue of Unidirectional SCS-6/Ti-24Al-11Nb Composite Containing a Circular Hole (Part I)", Metallurgical Transactions, Jul 1993.

Ravichandran, K. S. and Larsen, J. M., "An Approach to Measure the Shapes of Three Dimensional Surface Cracks During Fatigue Crack Growth", Fatigue of Engineering Materials and Structures, Aug 1993.

Smith, P.R., Graves, J.A. and Khobaib, M., "Creep Behavior of an Alpha-2 and an Orthorhombic-based Matrix", Scripta Met., Sep 1993.

Smith, P.R., Graves, J.A., and Rhodes, C.G., "Comparison of Orthorhombic and Alpha-2 Matrices for Continuous SiC Reinforced Composites", Metall. Trans. A., Jun 1993.

Stubbs, D.A. and Russ, S., "Examination of the Correlation Between NDE-Detected Manufacturing Abnormalities in MMCs and Ultimate Tensile Strength or Thermomechanical Fatigue Life" published as an STP resulting from the November, 1992 Miami ASTM Second Symposium on Cyclic Deformation, Fracture, and Nondestructive Evaluation of Advanced Materials

Zukas, J.A., Nicholas, T., Swift, H.F., Greszczuk, L.B. and Curran, D.R., "Impact Dynamics", Krieger Publishing Co., Melbourne, FL, May 1992.

"Characterization of the Phases Present in a Ti-45Al-10Nb Alloy", A.G. Jackson and D.S. Lee, Scripta Met. et Mater., 26, 1575-1579 (Jan 1992).

Adams, W.W., Pachter, R., Hasland, P.D., and Crane, R.L., "Ultimate Properties of Polymer Chains", in Materials Research Society Symposium, San Francisco, CA, Apr 1993.

Bunning, T.J., Jiang, H., Adams, W.W., Crane, R.L., Farmer, B.L., and Kaplan, D.L., "Applications of Silk", Silk Polymers: Materials Science and Biotechnology, Washington DC, American Chemical Society, Vol. 544, pp 353-357, Aug 1993.

Bunning, T.J., McNamee, S.G., McHugh, C.M., Patnaik, S.S., Ober, C.K., and Adams, W.W., "Synchrotron X-ray radiation (CHESS) Study of Electric-field Induced Changes in the Structure of Thermotropic Side-Chain Liquid Crystals", in Applications of Synchrotron Radiation Techniques to Materials Science, San Francisco, CA, MRS, Vol. 307, pp 311-316, Mar 1993.

Mahoney, D.V., Vezie, D.L., Eby, R.K., Adams, W.W., and Kaplan, D.L., "Aspects of the morphology of dragline silk of Nephila clavipes", Silk Polymers: Materials Science and Engineering. Washington DC, American Chemical Society, Vol. 544, pp 196-210, Sep 1993.

Baker, K., Fratini, A., Resch, T., Knachel, H., Adams, W., Socci, E., and Farmer, B., "Crystal Structures, Phase Transitions and Energy Calculations of Poly (p-phenylene) Oligomers", Polymer, Vol. 34, 1571-1587, Apr 1993.

Bunning, T.J., Klei, H., Samulski, E., Adams, W., and Crane, R., "Cyclic versus Linear Siloxane Liquid Crystals: Phase Behavior and X-ray Diffraction Results", Molecular Crystals & Liquid Crystals, Vol. 231, 163-174, Jan 1993.

Cooper, T.M., Tondiglia, V., Natarajan, L.V., Shapiro, M., Obermeier, K., and Crane, R.L., "Holographic grating formation in poly(spiropyran l-glutamate)", Applied Optics, Vol. 32, 674-677, Jan 1993.

Haaland, P.D., Pachter, R., Crane, R.L., and Adams, W.W., "Molecular Moduli of Carbon Clusters", Chem. Phys. Lett., , , Jan 1993.

Horn, T., Haaland, P.D., Pachter, R., and Adams, W.W., "Electronic Structure Of Strained Polymers: Scaled Hessians For Polyethylene", Polymer, Vol. 34, 2481, Jun 1993.

Kutsche, C., Targove, J., and Haaland, P., "Microlithographic Patterning of Polythiophene Films", Journal of Applied Physics, Vol. 73(5), 2602-2604, May 1993.

McLean, D.G., Sutherland, R.L., Brant, M.C., Brandelik, D.M., Fleitz, P.A., and Pottenger, T., "Nonlinear Absorption Study of a C60-Toluene Solution", Optics Letters, Vol. 18, 858-860, Jun 1993.

Pachter, R., Bunning, T.J., Socci, E.P., Farmer, B.L., Crane, R.L., and Adams, W.W., "Molecular Mechanics, Dynamics, and X-ray Scattering Calculations for a Cyclic Siloxane Macromolecule", Die Makromolekulare Chemie, Theory and Simulations, Vol. 2, 337-348, Feb 1993.

Sutherland, R., Rea, E., Natarajan, L.V., Pottenger, T., and Fleitz, P., "Two-Photon Absorption and Second Hyperpolarizability Measurement in Diphenylbutadiene by Degenerate Four-Wave Mixing", Journal of Chemical Physics, Vol. 98(4), 2593-2603, Feb 1993.

Pachter, R., Bunning, T.J., Crane, R.L., and Adams, W.W., "Macromolecular Simulation: Siloxane - Based Liquid Crystals", ACS Polymer Preprints, Vol 33, No 1, p 671-672, Mar 1992.

Cooper, T.M., Natarajan, L.V., Strasser, R, Pachter, R., and Crane, R.L., "A Nonlinear Optical Chromophore Containing Polypeptide: Modification of Poly(L-glutamic acid) with 1-docosyl-4-(4-hydroxystryl)pyridinium bromide", ACS Polymer, Vol 33, No 1, p 1018-1019, Aug 1992.

Pachter, R., Coopter, T.M., Natarajan, L.V., K., O., Crane, R.L., and Adams, W.W., "Molecular Dynamics Simulation of Poly(Spiropyran-L-Glutamate): Influence of the Chromophore Isomerisation", Biopolymers, Vol 32, p 1129, Nov 1992.

Shoemaker, J.R., Horn, T.R., Haaland, P.D., Pachter, R., and Adams, W.W., "Electronic Structure and Properties of Strained Polymers. Method for PE", Polymer, Vol 33, p 351, Aug 1992.

Sutherland, R.L., "Bragg Scattering in Permanent Nonlinear Particle Composite Gratings", Journal of the Optical Societyof America B, Vol. 8, No. 7, 1516-1525, Jul 1992.

Kerans, R.J., Parthasarathy, T.A., Jero, P.D., Chatterjec, A. and Pagano, N.J., Br. Ceramic Transactions 92, No. 5, May 1993.
Horn, T., R., Shoemaker, J.R., Haaland, P.D., Pachter, R., Adams, W.W., and Wierschker, S.G., "Polymer Simulation: Prediction of Strain-Dependent Properties", ACS Polymer, Vol 33, No 1, p 669-670, March 1992.

Natarajan, L.V., Sutherland, R.L., Schmitt, M.G., Brant, M.C., McLean, D.G., Bunning, T.J., Crane, R.L., and Fleitz, P.A., "Optical Limiting in Solutions of Dithienyl Polyenes", in Optics & Electro-Optics, Laser Applications in Science and Engineering, Los Angeles, Society of Photoinstrumentation Engineers, May 1993.

Fleitz, P.A., Sutherland, R.L., Natarajan, L.V., Pottenger, T., and Fernelius, N.C., "Effects of two-photon absorption on degenerate four-wave mixing in solutions of diphenyl polyenes", Optics Letters, Vol 17, No 10, p 716 - 718, May 1992.

Cooper, T.M., Obermeier, K.A., Natarajan, L.V., and Crane, R.L., "Kinetic Study of Helix to Coil Dark Reaction of Poly(spiropyran L-glutamate)", Photochemistry & Photobiology, Vol 55, p 1, January 1992.

Bunning, T.J., Klei, H.E., Samulski, E.T., and Crane, R.L., "Bilayer structures in cholesteric, cyclic-siloxane liquid crystals", Liquid Crystals, Vol 10, No 4, p 445-456, April 1991.

Natarajan, L.V., Bunning, T.J., Klei, H.E., Crane, R.L., and Adams, W.W., "A Novel Photochromic Cholestric Liquid Crystal Siloxane", Macromolecules, Vol 24, No 24, p 6554-6556, December 1991.

Haaland, P. and Targove, J., "Flowing Afterglow Synthesis of Polythiophene Films", Applied Physics Letters, Vol. 61, No. 7, p. 34-36, July 1992.

Vezie, D. and Adams W.W., "High Resolution Scanning Electron Microscopy of PAN-Based and Pitch-Based Carbon Fibre", Journal Materials Science Letters, Vol. 9, p. 883-887, October 1990.

Vezie, D., Thomas, E., Hudson, S., and Adams, W., "Application of Low-Voltage, High-Resolution Scanning Electron Microscopy to the Study of High Performance", ACS Polymer, Vol. 33, No. 1, p. 735-736, March 1992.

Farmer, B.L., Wierschke, S.G., and Adams, W.W., "Study of the Conformations of Stiff-Chain, Rigid-Rod and Substituted Rigid-Rod Polymers", Polymer. Vol. 31, p. 1637-1648, September 1991.

Jiang, H., Eby. R.L., and Adams, W.W., "High Temperature Modulus and Structure of Poly(p-phenylene benzobisthiazole) Fibers", Polymer News, Vol. 15, p. 77-80. February 1991.

Kumar, S. and Adams, W.W., "Electron Beam Damage in High-Temperature Poylmers" Polymer, Vol. 31, p. 15-19, January 1991.

Macturk, K.S., Eby, R.K., and Adams, W.W., "Characterization of Compressive Properties of High-Performance Polymer Fibers with a New Microcompression Apparatus", Polymer, Vol. 32, p. 1782-1787, October 1991.

Targrove, J.D. and Murphy, A.R., "Optical and Structural Characterization of Mixed LaF3-BaF2 Thin Films", Thin Solid Films, Vol. 191, p. 47-52, January 1991.

"ASTM Standard for Fatigue Crack Growth Rate Testing-Status Report", ASTM Task Group on Fatigue Crack Growth Testing, Miami FL,November 1992, John Ruschau.

"Fatigue/Creep Crack Growth Rate Characteristics of AL-8.5Fe-1.3V-1.7Si (FVS0812) Sheet", TMS 1991 Publication, Light Weight Alloys for Aerospace Applications II, J. Ruschau and K. Jata, October 1991.

"Theoretical Analysis for the Reflection of a Focused Ultrasonic Beam from a Fluid-Solid Interface", T. E. Matikas, M. Rousseau, P. Gatignol Journal of the Acoustical Society of America 93, 1407-1416 March(1993).

"Split Spectrum Technique as a Preprocessor for Enhanced Reliability in Ultrasonic Signal Analysis", P. Karpur, Materials Evaluation, 50, No. 6, June 1992, pp. 793-797.

"Split Spectrum Processing: a New Filtering Approach for Improved Signal-to-noise Ratio Enhancement of Ultrasonic Signals", P. Karpur and O. J. Canelones, Ultrasonics, 30, No. 6, August, 1992, pp. 351-357.

"Effect of Composition on Density Measurement Using X-Ray Computed Tomography", C.V. Kropas, T.J. Moran and R.N. Yancey, Materials Evaluation, 49, 487, April, 1991.

"Weiner Filtering for Image Enhancement in Ultrasonic Nondestructive Evaluation" Karpur, P., Frock, B.G, Bhagat,.P.K., Materials Evaluation, Vol 48, No 11, November, 1990, pp 1374-1379

Blatt, P. Karpur, D. A. Stubbs, T. E. Matikas, "Observations of Interfacial Damage in the Fiber Bridged Zone of a Titanium Matrix Composite", Scripta Metallugica et Materialia bol. 29, September, 1993, pp:851-856

M. Dotrong, M. H. Dotrong, and R. C. Evers, "Graft Copolymers of Rigid-Rod Polymers as Single-Component Molecular Composites", Polymer, 34 (4), 726 (February 1993).

U. M. Vakil, C. S. Wang, M. H. Dotrong, M. Dotrong, C. Y-C. Lee, and R. C. Evers, "Influence of Molecular Structure on Processing Conditions and Mechanical Properties of Graft Rigid-Rod Copolymers", Polymer, 34 (4), 731, (February 1993).

S. J. Bai, M. Dotrong, and R. C. Evers, "Bulk Rigid-Rod Molecular Composites of Articulated Rod Copolymers with Thermoplastic Pendants", Journal of Polymer Science; Part B: Polymer Physics, 30, 1515 (December 1992).

M. Dotrong, R. Mehta, G. A. Balchin, R. C. Tomlinson, M. Sinsky, C. Y-C. Lee, and R. C. Evers, "Synthesis, Processing, and Third-Order Nonlinear Optical Properties of Benzobisthiazole Polymers Containing Thiophene Moieties", Journal of Polymer Science; Part A: Polymer Chemistry, 31, 723 (March 1993).

S. J. Bai, R. J. Spry, D. E. Zelmon, U. Ramabadran, and J. Jackson, "Optical Anisotropy of Polymeric Films Measured by Wave-guide Propagation Mode Determination", Journal of Polymer Science; Part B: Polymer Physics, 30, 1507 (December 1992).

C. S. Wang, "Properties of Conjugated Ladder Polymers", Trends in Polymer Science, 1, 199 (July 1993).

D. M. Husband, N. Aksel and W. Gleible, "The Existence of Static Yield Stresses in Suspensions Containing Noncolloidal Particles", J. Rheol., 37, 215-235 (March/April 1993).

K. N. Baker, A. V. Fratini, T. Beach, H. C. Knachel, W. W. Adams, E. P. Socci, and B. L. Farmer, "Crystal Structures, Phase Transitions, and Energy Calculations of Poly(p-phenylene) Oligomers", Polymer, 34, 1571 (April 1993).

B. L. Farmer, B. R. Chapman, D. S. Dudis, and W. W. Adams, "Molecular Dynamics of Rigid-Rod Polymers", Polymer, 34, 1588 (April 1993).

S. Trohalaki and D. S. Dudis, "Conformational and Dynamic Effects of Pendant-PEK Chains on Rigid-Rod Polymers by Molecular Dynamics Simulation", Makromol. Chem., Macromol. Symp., 65, 163 (February 1993).

G. P. Das and D. S. Dudis, "(Hyper)polarizabilities in Infinite Polymers: The Saturation Problem", Synthetic Metals, 49, 211 (August 1992).

D. S. Dudis, "Optical Bandgaps from ab initio Methods: An Examination of the Singlet-Triplet Approximation", Synthetic Metals, 49, 353 (August 1992).

J. Medrano and D. S. Dudis, "Semi-empirical SCF Calculations of the Geometrical and Electronic Structures of Quasi-particles in Polyacetylene", Synthetic Metals, 49, 231 (August 1992).

D. Kost, A. T. Yeates, and D. S. Dudis, "Linear Molecular-mass Dependence of Second Hyperpolarizabilities: Lack of Polar Enhancement in Nonconjugated Molecules", J. Chem. Soc., Chem. Commun., 83, January 1993.

J. W. Connolly and D. S. Dudis, "Effects of Simple Substitutions on Conformational and Electronic Properties of Rigid-Rod Polymer Models", Polymer, 34, 1477 (April 1993).

S. G. Wierschke, J. R. Shoemaker, P. D. Haaland, R. Pachter, and W. W. Adams, "Electronic Structure and Properties of Strained Polymers: 2. Rigid-Rod PBI, PBO, and PBZT", Polymer, 33, 3357 (August 1992).

D. M. Husband, N. Aksel and W. Gleible, "Experimental Imprecision in Determining the Extensional Viscosity of High Molecular Weight Polyisobutylene Suspensions", pp. 610-612 in Theoretical and Applied Rheology, edited by P. Moldanaers and R. Keunings, Elsevier Science Publishers, Amsterdam (August 1992).

D. M. Husband, "Use of Dynamic Mechanical Measurements to Determine the Aging Behavior of Solid Propellant", Propellants, Explos., Pyrotech., 17, 196-201 (July 1992).

D. M. Husband, "Technical Note: Comment on Official Nomenclature for Material Functions Describing the Response of a Viscoelastic Fluid to Various Shearing and Extensional Deformations", J. Rheol., 36, 409-410 (February 1992).

B. A. Reinhardt, "The Status of Third-Order Polymeric NLO Materials: Directions and Philosophy of Polymer Research for NLO in the U.S. Air Force Wright Laboratory", Trends in Polymer Science, 1 (1), 4 (January 1993).

T.G. Archibald, A.A. Malik, K. Baum and M.R. Unroe, "Thermally Stable Acetylenic Adamantane Ploymers, "Macromolecuels, 24 (19), 5261 (September 1991).

A.A. Malik, T.G. Archibald, K. Baum and M.R. Unroe, "New High Temperature Polymers based on Diamantane." Macromolecules, 24 (19), 5266 (September 1991).

A.A. Malik, T.G. Archibald, K. Baum and M.R. Unroe, "Thermally Stable Polymers Based on Acetylene Terminated ?Adamantanes", J. Polym. Sci.: Part A: Polym. Chem., 30, 1747 (July 1992).

K.S. Macturk, R.R. Eby, and W.W. Adams, "Characterization of Compressive Properties of High-Performance Polymer Fibers with a New Microcompression Apparatus", Polymer, 32 (10), 1782 (May 1991).

L.A. Hunter, P.J. Dynes and M.R. Unroe, "Novel Fluorinated Polybenzoxazole (PBO) Thermoplastic Composites", 23rd INT. SAMPE Tech. Conf. Proceedings, 23, 104 (October 1991).

M. Shao, Y. Cui, M. Samoc, P.N. Prasad, M.R. Unroe, and B.A. Reinhardt, "Influence of Two-Photon Absorption on Third-Order Nonlinear Optical Processes as Studied by Degenerate Four-Wave Mixing: The Study of Soluble Didecyloxy-Substituted Polyphenyls", J. Chem. Phys., 95 (6), 3991 (September 1991).

B.A. Reinhardt, M.R. Unroe, R.C. Evers, M. Ahao, M. Samoc, and P.N. Prasad, "Studies of the Third-Order Optical Nonlinearities of Model Compounds Containing Benzpbisthiazole, Benzobisoxazole, and Benzbisimidazole Units, "Chem.Mater", 3 (5), 864 (May 1991).

S.G. Wierschke, J./R. Shoemaker, P.D. Haaland, R. Pachter, and W.W. Adams, "Electronic Structure and Properties of Strained Polymers I", Polymer, 33 (16), 3351 (August 1992).

Y. Chen, W.T.K. Stevenson, E.J. Soloskim, C. Y-C. Lee and R.C. Evers, "Degradation of Poly (p-phenylenebenzobisthiazole), (PBT) Poly Poly(etheretherketoneetherketone) (PEEKK) an a Grafted Copolymer Containing PBT and PEEKEK, "Journal of Materials Science, 27, 6171 (November 1992).

M. Dotrong, M.H. Dotrong, S.J. Bai, and R.C. Evers, "A Single component Molecular Composite: Graft Copolymers of Rigid-Rod Polymers", 37th Science of Advanced Materials and Process Engineering International Series, 37, 1004 (April 1992).

C.S. Wang, C.Y.C. Lee and F.E. Arnold, "Mechnaical and Electrical Properties of Heat-Treated Ladder Polymer Fiber", Materials Research Society Symposium Series, 247, 747 (January 1992).

L.S. Tan, F.E. Arnold, and H.H. Chuah, "Rigid-Rod Molecular Composites Via Inoic Interactions", Polymer, 32, 1375 (April/May 1991).

W. Huh, C.Y-C. Lee and S.J. Bai, "Phase Behavior of Rod/Coil/Solvent Ternary Systems with Rod/Coil Interation", Polymer, 33, 789 (February 1992).

M.E. Hunsaker, G.E. Price and S.J. Bai, "Processing, Structure, and Mechanics of Fibers of Heteroaromatic Oxazole Polymers", Polymer, 33, 2128 (May 1992).

R.G. Raptis, J.P. Fackler, Jr., J.D. Basil, and D.S. Dudis, "Ring Opening of the [Au(CH2)2PPh2]2X4 (X = Halogen) Metallacycle. Cleavage of AUIII-CH2 Bonds", Inorg. Chem., 30, 3072 (July 1991).

G.P. Das and S.S. Dudis, "An Approximate Ab Initio Study of the Polarizability and Hyperpolarizabilites of Organic Molecules", Chem. Phys. Lett, 185, 151 (October 1991).

A.T. Yeates, D.S. Dudism, T. Resch and A. V. Fratini, "Benzthiazole and Thiophene Capped Ployenes for Nonlinear Optical Applications: Single Crystal, Semi-empirical and Ab Initio Results", Mat. Res. Soc. Symp. Proc., 247, 259 (June 1992).

D. P. Anderson, P. G. Wapner, and D. B. Curliss, "Physical Property Characteristics of Pitch Materials", Novel Forms of Carbon, C. L. Renschler, J. J. Pouch, and D. M. Cox, editors; Mater. Res. Soc. Symp. Proc., 270 (November 1992) 59.

J. W. Hager, "Idealized Strut Geometries for Open-Celled Foams", Novel Forms of Carbon, C. L. Renschler, J. J. Pouch, and D. M. Cox, editors; Mater. Res. Soc. Symp. Proc., 270 (November 1992) 41.

J. W. Hager and M. L. Lake, "Novel Hybrid Composites Based on Carbon Foams", Novel Forms of Carbon, C. L. Renschler, J. J. Pouch, and D. M. Cox, editors; Mater. Res. Soc. Symp. Proc., 270 (November 1992) 29

S. S.Sandhu and J. W. Hager, "Formulation of a Mathematical Process Model for the Foaming of a Mesophase Carbon Precursor", Novel Forms of Carbon, C. L. Renschler, J. J. Pouch, and D. M. Cox, editors; Mater. Res. Soc. Symp. Proc., 270 (November 1992) 35.

R. Hall, "Effective Moduli of Cellular Materials", Journal of Reinforced Plastics and Composites, February 1993.

Pagano, N. J. and Brown, H. W. III, "The Full-Cell Cracking Mode in Unidirectional Brittle Matrix Composites", Composites, Vol. 24, No. 2, April 1993, pp. 69-83.

Pachter, R., Altman, R.B., Czaplicki, J. and Jardetzky, O., "The NMR Solution Structure of Cyclosporin A. Comparison of Structure Determination by the Probability Filtered Estimate and Other Techniques," J. Magn. Reson. 92, 648 (1991) August

Altman, R., Arrowsmith, C., Pachter, R. and Jardetzky, O., "Determination of Large Protein Structures from NMR Data: Definition of the Solution Structure of the trp Repressor" In: Computational Aspects of the Study of Biological Macromolecules by NMR Spectroscopy (J. C. Hoch, ed.) pp. 375, Plenum Press, New York (1991) Meeting in July 1991

Arrowsmith, C. H., Pachter, R., Altman, R. and Jardetzky, O., "The Solution Structures of E. coli trp Repressor and trp Aporepressor at an Intermediate Resolution," FEBS Eur. J. Biochemistry 202, 53 (1991) June

Pachter, R., Bunning, T.J. and Adams, W.W., "Molecular Structure and X-ray Scattering from Cyclic Siloxane-Based Liquid Crystals, "Computational Polymer Science 1, 179-187 (1991) May

Pachter, R., Arrowsmith, C. H. and Jardetzky, O., "The Effect of Selective Deuteration on Magnetization Transfer in Larger Proteins," J. Biological NMR 2, 183 (1992) October

Shoemaker, J.R., Horn, T.R., Haaland, P.D., Pachter, R. and Adams, W.W., "Electronic Structure and Properties of Strained Polymers. Method for PE," Polymer 33, 351 (1992) March

Wierschke, S.G., Shoemaker, J.R., Pachter, R., Haaland, P.D. and Adams, W.W., "Electronic Structure and Properties of Strained Polymers. Rigid-Rod PBI, PBO, PBZT" Polymer 33, 357(1992) July

Haaland, P.D., Pachter, R., Pachter, M. and Adams, W.W., "Anisotropic Stress and Molecular Moduli of C60," Chemical Phys. Lett. 199, 379 (1992) November

Altman, R.B., Pachter, R. and Jardetzky, O., "Structural Uncertainty of Proteins in Solution by NMR. A Re-evaluation of the Structure of the Lac Repressor Headpiece" J. Appl. Magn. Reson. 4, 441 (1993) September

Pachter, R., Bunning, T.J., Socci, E.P., Farmer, B.L., Crane, R.L. and Adams, W.W., "Molecular Mechanics, Dynamics and X-Ray Scattering Calculations for a Cyclic Siloxane Macromolecule," Die Makromolekulare Chemie, Theory and Simulations, 2, 337 (1993) March

Socci, E.P., Pachter, R., Bunning, T.J., Farmer, B.L. and Adams, W.W., "Molecular Dynamics and X-Ray Scattering Simulations of Cyclic Siloxane-Based Liquid Crystals," Liquid Crystals, 13, 811 (1993) August

Pachter, R., Patnaik, S., Crane, R.L. and Adams, W.W., "New Smart Materials: Molecular Simulation of Nonlinear Optical Chromophore Containing Polypeptides and Liquid Crystalline Siloxanes" Smart Structures and Materials 93' Symposium SPIE Proceedings 1916, 2 (1993) February

Pachter, R., Bunning, T.J., Socci, E.P., Farmer, B.L., Crane, R.L. and Adams, W.W., "Macromolecular Simulation: Siloxane-Based Liquid Crystals," ACS Polymer Preprint 33, 671 (1992) March

Pachter, R., Cooper, T.M., Crane, R.L. and Adams, W.W., "Stability and Molecular structure of Nonlinear Optical Chromophore Containing Polypeptides" Bio/Technology Winter Symposia: Protein Engineering and Beyond, Short Reports 3, 20 (1993) January

Sennett, B., Pachter, R., Cooper, T. M. and Crane, R. L., "Molecular Simulation of an Amphipathic Coiled Coil," ACS Polymer Preprint, 34, 594 (1993) March

Russel, J.D. "Cure Shrinkage of Thermoplastic Composites", SAMPE Quarterly, 24 (2), 28-33 (July 1992)

Russell, J.D. amd Curliss, D.B. "Effects of Thermal History and Jet Fuel Absorption on the Properties of APC-2", J. of Thermoplastic Compoite Materials, 5 (3), 238-255 (July 1992).

Gunderson, S.L. and Hall, R.B "Preformed Holes for Improved Mechanical Properties of Laminated Composites with Unidirectional Plies", Advanced Materials: Perofrmance Through Insertion, Science of Advanced Materials and Process Engineering Volume 38 Book 1, Bailey, V., Janicki, G.C., and Haulik, T., eds SAMPE, Covina, CA, pp. 81-91, June 1993.

Hall, R., "Viscoplasticity Theory for Matrix-Dominated Deformation of Metal Matrix Composites", in Haritos, G.K., Ochoa, O.O (eds), Damage and Oxidation Protection in High Temperature Composites, Vol. 2 A-D-Vol 25-2, ASME, New York, June 1992.

Hall, R., "Effective Moduli of Cellular Materials", J. Reifnorced Plastics and Composites, (12) 2, Technomic, February 1993.

Whitney, J.M. and Kurtz, R.J., "Analysis of Orthrotropic Laminated Plates Subejcted to Torsional Loading", Composites Engineering, (3) 1, pp. 83-97, January 1993.

Kaw, A. K. and Pagano, N. J., "Axisymmetric Thermoelastic Response of a Composite Cylinder Containing an Annular Matrix Crack", Journal of Composite Materials, Vol. 27, No. 6, April 1993, pp. 540-571.

R. D. Kurtz and N. J. Pagano, "Analysis of the Deformation of a Symmetrically-Loaded Fiber Embedded in a Matrix Material", Composites Engineering, Vol 1, No 1 (January 1991).

R. Y. Kim and N. J. Pagano, "Crack Initiation in Unidirectional Brittle Matrix Composites", Journal of American Ceramic Society, v74, n5, May 1991.

P. G. Wapner and J. W. Hager, "The Effect of Additives on the Surface Tension of Mesophase Pitch", Extended Abstracts of the 20th Biennial Conference on Carbon, Santa Barbara, June 1991, pp. 188-189.

R. Hall, "Matrix-Dominated Thermoviscoplasticity in Fibrous Metal-Matrix Composite Materials", in Mechanics of Composites at Elevated and Cryogenic Temperatures, AMD-Vol. 118, ASME, pp. 39-54, December 1991.

"Magnetic-Field-Induced Free Electron and Hole Recombination in Semimetallic AlxGa1-xSb/InAs Quantum Wells"
Ikai Lo, W.C. Mitchel, and J.-P. Cheng
Phys. Rev. B 48, 9118 (September 1993)

"The Wannier-Stark Quantization by Internal Field in the HgTe/CdTe Superlattice"
Ikai Lo, W.C. Mitchel, K.A. Harris, R.W. Yanka, LmM. Mohnkern, A.R. Reisinger, and T.H. Myers
Appl. Phys. Lett. 62, 1533 (March 1993)

"MBE Growth Surface Roughening Kinetics of Ge (001) - A Theoretical Study"
R. Venkatasubramanian and D. L. Dorsey
J. Vacuum Sci. & Technol. B 11, 253 (March/April 1993)

"Infrared Absorption in Proton- and Deuteron-Implanted Semi-Insulating InP:Fe"
D.W. Fischer, M.O. Manasreh, G. Matous, and S.J. Pearton
Semi-insulating III-V Materials, Ixtapa, Mexico 1992, ed. C.J. Miner, W. Ford, and E.R. Wever, Institute of Physics Publ., Philadelphia, p. 259 (May 1993)

"Enhanced and Persistent Photocurrents in Bulk Semi-insulating GaAs at Low Temperatures"
W.C. Mitchel, Laura S. Rea, and Juan Jiménez
Semi-insulating III-V Materials, Ixtapa, Mexico 1992, ed. C.J. Miner, W. Ford, and E.R. Wever, Institute of Physics Publ., Philadelphia, p. 229 (May 1993)

"A Fully Automated Stage for Loss Measurements of Optical Waveguides"
E.T. Kensky and D.E. Zelmon, Rev. Sci. Instru. 64, 1794 (July 1993)

"Deep Level Transient Spectroscopy and Admittance Spectroscopy of Si1-xGex/Si Grown by Gas Source Molecular Beam Epitaxy", S. H. Li, S. R. Smith, P. K. Bhattacharya, S.W. Chung, and W. C. Mitchel, J. Vac. Sci. Technol. B 11, 892 (May/June 1993)

"Nonlinear Optical Characteristics of Binary Organic Systems"
N.B. Singh, T. Henningsen, R.H. Hopkins, R. Mazelsky, R.D. Hamacher, E.Pl Supertzi, F.K. Hopkins, D.E. Zelmon, and O.P. Singh
J. Cryst. Growth 128, 976 (August 1993)

"ZnGeP2 Grown by the Liquid Encapsulated Czochralski Method"
H.M. Hobgood, T. Henningsen, R.N. Thomas, R.H. Hopkins, M.C. Ohmer, W.C. Mitchel, D.W. Fischer, S.M. Hegde, and F.K. Hopkins
J. Appl. Physics 73, 4030 (April 1993)

"Photoluminescence Study of Liquid Phase Electroepitaxially Grown GaInAsSb on (100) GaSb"
S. Iyer, S. Hegde, K.K. Bajaj, Ali Abul-Fadl, and W.C. Mitchel
J. Appl. Phys. 73, 3958 (April 1993)

"Growth and Photoluminescence of GaSb and Ga1-xInxAsySb1-y Grown on GaSb Substrates by Liquid Phase Electroepitaxy"
S. Iyer, S. Hegde, Ali Abul-Fadl, K. K. Bajaj and W. Mitchel
Phys. Rev.B 47, 1329 (July 1993)

"Isochronal Annealing of Local Vibrational Modes in Proton- and Deuteron-Implanted InP", D.W. Fischer, M.O. Manasreh, D.N. Talwar, and G. Matous
J. Appl. Phys. 73, 78 (January 1993)

"Deep Levels in Undoped Si1-xGex Grown by Gas-Source Molecular Beam Epitaxy"
S.H. Li, P.K. Bhattacharya, S.W. Chung, S. R. Smith, and W.C. Mitchel
J. Electronic Mat. 22, 151 (January 1993)

"Optical Anisotropy of Polymeric Films Measured by Waveguide Propagation Mode Determination"
S.J. Bai, R.J. Spry, D.E. Zelmon, U. Ramabadran, and J. Jackson
J. of Polymer Sci.: B: Phys. Sec. 30, 1507 (December 1992)

"A Shubnikov-de Haas Study in the Strained Al0.6Ga0.4Sb/InAs/Al0.6Ga0.4Sb Quantum Wells"
Ikai Lo, W.C. Mitchel, M.O. Manasreh, C.E. Stutz, and K.R. Evans
Fifteenth State-of-the-Art Program on Compound Semiconductors (SOTAPOCS XV), ed. A. Katz, V. Swaminathan, N. Buckley, P. Clechet, and O. Ueda, Vol. 92-19, 162, The Electrochem. Soc., NJ (1992)

"Effects of Two-photon Absorption on Degenerate Four-wave Mixing in Solutions of Diphenyl Polyenes"
P.A. Fleitz, R.L. Sutherland, L.V. Natarajan, T. Pottenger, and N.C. Fernelius
Optics Lett. 17, 716 (May 1992)

Book Review of Contemporary Nonlinear Optics, ed. G.P. Agrawal and R.O. Boyd, Academic Press, 32, 642 (March 1993)
F.K. Hopkins
Optical Engineering 32, 642 (1993)

"Dark Current Analysis of InSb Photodiodes" by F.K. Hopkins and J.T. Boyd, 1984. Selected as one of "74 Significant Articles" from the international infrared literature for inclusion in Selected Papers on Semiconductor Infrared Detectors, Ed. A. Rogalski
Milestone Series MS66, SPIE, Bellingham, WA (1992)

"Thin upper-confining layer AlxGa1-xAs-GaAs quantum well heterostructure"
S.J. Caracci, F.A. Kish, M.R. Krames, M.J. Ries, and N. Holonyak, Jr.
Appl. Phys. Lett. 62, 1006 (March 1993)

"Planer single-facet teardrop-shaped AlxGa1-xAs-GaAs quantum well heterostructure laser"
S.J. Caracci, M.R. Krames, M.J. Ries, and N. Holonyak, Jr.
Appl. Phys. Lett. 63, 1818 (September 1993)

"Indirect Photoreflectance from High-electron-mobility Transistor Structures"
M. Sydor, J.R. Engholm, M.O. Manasreh, K.R. Evans, C.E. Stutz and W.C. Mitchel
Phys. Rev. B 45, 13796 (June 1992)

"Study of GaAs and AlGaAs buried structures by differential photoreflectance spectroscopy"
Ali Badakhshan, M. Sydor and W. C. Mitchel
J. Vac. Sci. Tech. A 10, 1842 (July/August 1992)

"Introduction to Long-Wavelength Infrared Quantum Detectors"
M.O. Manasreh and G.J. Brown
Chapter in the book Semiconductor Quantum Wells and Superlattices for Long-Wavelength Infrared Detectors, Edited by M.O. Manasreh, Artech House, Norwood, MA (1992)

"Negative Persistent Photoconductivity in the Al0.6Ga0.4Sb/InAs Quantum Wells"
I. Lo, W.C. Mitchel, M.O. Manasreh, C.E. Stutz and K.R. Evans
Appl. Phys. Lett. 60, 751 (February 1992)

"Effect of Al composition on the deep level donors of AlxGa1-xSb/InAs single quantum wells", Ikai Lo, W. C. Mitchel, C. E. Stutz, K. R. Evans, and M. O. Manasreh
Defect engineering in semiconductor growth, processing and device technology
Mat. Res. Soc. Proc. 262, 893 (April 1992)

"Effective Mass of the 2-dimensional Electron Gas in an Al0.6Ga0.4Sb/InAs Single Quantum Well" M.O. Manasreh, Godfrey Gumbs, C. Zhang, C.E. Stutz, K.R. Evans, C.A. Bozada, I. Lo, and W.C. Mitchel Superlattices and Microstructures 11, 423 (November 1992)

"Intersubband Infrared Absorption in a GaAs/Al0.3Ga0.7As Multiple Quantum Well"
M. O. Manasreh, F. Szmulowicz, T. Vaughan, K. R. Evans, C. E. Stutz and D. W. Fischer Intersubband Transitions in Quantum Wells, eds. E. Rosencher, B. Vinter, and B. Levine, NATO ASI Series B: Physics 288, 287, Plenum Press, N.Y. (1992)

"Local Mode Spectroscopy of Proton- and Deuteron Implanted InP"
D.W. Fischer, M.O. Manasreh, and G. Matous
J. Appl. Phys. 71, 4805 (May 1992)

"Deep Levels in Undoped Horizontal Bridgman GaAs by Fourier Transform Photoconductivity and Hall Effect"
W.C. Mitchel, Gail J. Brown, Laura S. Rea, and S.R. Smith
J. Appl. Phys. 71, 246 (January 1992)

"Photoluminescence of GaAs-Related 1.32 eV Emission in Bulk GaAs"
P.W. Yu, D.W. Fischer, and J.R. Sizelove
Semicond. Sci. Technol. 7, 556 (May 1992)

"Electro-optic, Piezoelectric and Dielectric Properties of Zinc Tris Thiourea Sulfate"
U.B. Ramabadran, D.E. Zelmon, and G.C. Kennedy
Appl. Phys. Lett. 60, 2589 (May 1992)

"Modal Behavior of the Four-Layer Planar Waveguide"
Angela L. McPherson
Mathematica Journal 2, 75 (Jan, 1992).

"Limit of Superconductivity in Silver/Superconductor Metal-Matrix Composites Prepared with Bi-Pb-Sr-Ca-Cu-O Ceramic Powders"
A.K. Sarkar, I. Maartense, and T.L. Peterson,
J. of Matls. Res., 7, 1672 (July 1992)

"Fabrication and Electrical Properties of Ceramic Superconductor/Polymer Composites"
A.K. Sarkar and T.L. Peterson
Polymer Eng. and Sci. 32, 305 (March 1992)

"Response to "Comment on 'The Effect of Charge State on the Local Vibrational Mode Absorption of the Carbon Acceptor in Semi-insulating GaAs' "", J. Appl. Phys. 68, 2504 (1990)]"
D.W. Fischer and M.O. Manasreh
J. Appl. Phys. 69, 6733 (May 1991)

"Molecular Beam Epitaxial Growth of Epitaxial Barium Silicide, Barium Oxide and Barium Titanate on Silicon"
R.A. McKee, F.J. Walker, J.R. Conner, E.D. Specht, and D.E. Zelmon
Appl. Phys. Lett. 59, 782 (August 1991)

"Anomalous Behavior of Cyclotron Resonance in GaAs/Al0.28Ga0.72As High Electron Mobility Transistor Structures"
M. O. Manasreh, D. W. Fischer, K. R. Evans, and C. E. Stutz
Phys. Rev. B 43, 9772 (April 1991).

"Origin of the Blueshift in the Intersubband Infrared Absorption in GaAs/Al0.3Ga0.7As Multiple Quantum Wells"
M.O. Manasreh, F. Szmulowicz, T. Vaughan, K.R. Evans, C.E. Stutz, and D.W. Fischer
Phys. Rev. B43, 9996 (April 1991).

"Two Dimensional Electron Gas in GaAs/Al1-xGaxAs Heterostructures: Effective Mass".
I. Lo, W.C. Mitchel, R.E. Perrin, R.L. Messham, and M-Y. Yen
Phys. Rev. B43, 11787 (May 1991).

"Light Scattering by Inclusions in Crystals"
F. K. Hopkins and G. J. Brown
Appl. Opt. 30, 384 (February 1991).

"Electrical and Magnetic Analysis of YBa2Cu3O7-x Superconducting Films Grown by Laser Ablation"
D. W. Chung, T. L. Peterson, R. Fletcher, P. M. Hemenger, I. Maartense, and P. T. Murray, Science and Technology of Thin Film Superconductors 2, Ed. by R. McConnell and R. Noufi, Plenum Press, N.Y. (1990).

"Temperature Dependence of the Intersubband Absorption in a Barrier-Doped GaAs/Al0.3Ga0.7As Quantum Well Structure"
F. Szmulowicz, M. O. Manasreh, D. W. Fischer, F. Madarasz, K. R. Evans, E. Stutz, and T. Vaughan, Superlattices and Microstructures 8, 63 (January 1990).

"Modeling the Effect of Operating Parameters on Oxygen Content in Czochralski Growth of Silicon"
P. A. Ramachandran, M. P. Dudukovic, and D. L. Dorsey
J. Electrochem. Soc. 137, 3229 (October 1990).

"Fabrication and Characterization of High Temperature Superconducting Thin Films for Sensors and Electronics"
P. M. Hemenger, T. L. Peterson, R. Fletcher, I. Maartense, P. T. Murray, and D. W. Chung
Applications of Superconductivity to Avionics Proc. NATO/AGARD Conf. 481, 13-1 (October 1990).

"Transport and Magnetic Properties of High-Tc YBa2Cu3O7-x Films"
D. W. Chung, I. Maartense, T. L. Peterson, and P. M. Hemenger
J. Appl. Phys. 68, 3772 (October 1990).

"Intersubband Infrared Absorption in a GaAs/Al0.3Ga0.7As Quantum Well Structure"
M. O. Manasreh, F. Szmulowicz, D. W. Fischer, K. R. Evans, and C. E. Stutz
Appl. Phys. Lett. 57, 1790 (October 1990).

D. Watkins, H.R. Piehler, V. Seetharaman, C.M. Lombard, and S.L. Semiatin, "Effect of Hydrostatic Pressure on the Hot Working Behavior of a Gamma Titanium Aluminide", Metall. Trans. A, September,1992, Vol 23A, p. 2669.

S.L. Semiatin, R.M. Nekkanti, M.K. Alam, and P.A. McQuay, "Homogenization of Near-Gamma Titanium Aluminides: Analysis of Kinetics and Process Scaleup Feasibility", Metall. Trans. A, June, 1993, Vol 24A, p. 1295.

C.M. Lombard, R.L. Goetz, and S.L. Semiatin, "Numerical Analysis of the Hot Tension Test", Metall. Trans. A, September, 1993, Vol 24A, p. 2039.

R.L. Goetz, W.R. Kerr, and S.L. Semiatin, "Modeling of the Consolidation of Continuous-Fiber Metal Matrix Composites via Foil-Fiber-Foil Techniques", J. Mater. Eng. Performance, June, 1993, Vol 2, p. 333.

G. Shen, S.L. Semiatin, E. Kropp, and T. Altan, "A Technique to Compensate for Temperature History Effects in the Simulation of Nonisothermal Forging Processes", J. Mater. Proc. Techn., March, 1992, Vol 33, p. 125.

G. Shen, S.L. Semiatin, and T. Altan, "Investigation of Flow Stress and Microstructure Development in Non-Isothermal Forging of Ti-6242", J. Mater. Proc. Technology, June,1993, Vol 36, p. 303.

G. Shen, R. Shivpuri, S.L. Semiatin, J.Y. Lee, and T. Altan, "Investigation of Microstructure and Thermomechanical History in the Hammer Forging of an Incoloy 901 Disk", Annals CIRP, Feburary, 1993, Vol 42, ip. 343.

R.L. Goetz, V.K. Jain, and C.M. Lombard, "Effect of Core Insulation on the Quality of Extrudate in Canned Extrusion of Gamma Titanium Aluminide", J. Mater. Proc. Techn., March, 1992, Vol 35, p. 37.

S.L. Semiatin and P.A. McQuay, "Segregation and Homogenization of a Near Gamma Titanium Aluminide", Metall. Trans A., January, 1992, Vol 23A, p. 149.

S.L. Semiatin, K.A. Lark, D.R. Barker, V. Seetharaman, and B. Marquardt, "Plastic Flow Behavior and Microstructure Development for a Cast Alpha-Two Titanium Aluminide", Metall. Trans. A, January,1992, Vol 23A, p. 295.

S.L. Semiatin, N. Frey, S.M. El-Soudani, and J.D. Bryant, "Flow Softening and Microstructure Evolution During Hot Working of Wrought Near-Gamma Titanium Aluminides", Metall. Trans. A, June 1992, Vol 23A, p. 1719.

R. M. Nekkanti, P. A. McQuay, and S. L. Semiatin, "Measurement of Homogenization Kinetics for a Near-Gamma Titanium Aluminide", Scripta Metall. et Mater., May,1992, vol. 26, p. 1089.

C. M. Lombard, R. M. Nekkanti, and V. Seetharaman, "Microstructural Development During Thermal Processing of a Gamma Titanium Aluminide", Scripta Metall. et Mater., July, 1992, vol. 26, p.1559.

I. M. Sukonnik, S. L. Semiatin, and M. Haynes, "Effect of Texture on the Cold Rolling Behavior of an Alpha-Two Titanium Aluminide", Scripta Metall. et Mater. , April, 1992, vol. 26, p. 993.

M. J. Haynes, I. M. Sukonnik, and S. L. Semiatin, "Characterization of Plastic and Crystallographic Anisotropy in an Alpha-Two Titanium Aluminide", Scripta Metall. et Mater., August,1992, vol. 26.

J. C. Malas and V. Seetharaman, "Using Material Behavior Models to Develop Process Control Strategies", JOM, June,1992, vol. 44, no. 6, p. 8.

D. Watkins, H. R. Piehler, V. Seetharaman, C. M. Lombard, and S. L. Semiatin, "Effect of Hydrostatic Pressure on the Hot Working Behavior of a Gamma Titanium Aluminide", Metall. Trans. A, September 1992, vol. 23A, p. 2669.

C. M. Lombard, R. L. Goetz, and S. L. Semiatin, "Numerical Analysis of the Hot Tension Test", Acta Metall., September 1992

V.K. Jain, R.L. Goetz, and C.M. Lombard, "Application of the Finite Element Method to the Analysis of Precision Forging Design", J. Advanced Manufacturing Engineering, October, 1992

V.K. Jain, R.L. Goetz, and C.M. Lombard, "Application of Computer Methods to the Design and Analysis of Precision Rib-Web Forgings", J. Mater. Proc. Techn., March, 1992, .

C. G'sell, N. A. Aly-Heal, S. L. Semiatin, and J. J. Jonas, "Influence of Deformation Defects on the Development of Strain Gradients During the Tensile Deformation of Polyethylene", Polymer, June, 1992, vol. 33, p.1244.

V. Seetharaman and C.M. Lombard, "Plastic Flow Behavior of a Ti-Al-Nb-Mn Alloy at High Temperatures", Microstructure/Property Relationships in Titanium and Titanium Aluminides, Y-W. Kim and R.R. Boyer, eds., TMS-AIME, Warrendale, PA, November, 1991, p. 237.

V. Seetharaman, L. Boothe, and C.M. Lombard, "Compressive Deformation Behavior of a Ti- 6Al-4V Alloy at High Temperatures and Strain Rates", Microstructure/Property Relationships in Titanium Alloys and Titanium Aluminides, Y-W. Kim and R.R. Boyer, eds., TMS-AIME, Warrendale, PA, Novermber, 1991, p. 605.

S.L. Semiatin, K.A. Lark, D.R. Barker, V. Seetharaman, and B. Marquardt, "Plastic Flow Behavior and Microstructure Development for a Cast Alpha-Two Titanium Aluminide", Metall. Trans. A, January 1991, Vol 22A.

J.D. Bryant and S.L. Semiatin, "Segregation in Multicomponent Ingot Metallurgy Gamma Titanium Aluminides", Scripta Metall. et Mater., March, 1991, Vol 25, p. 449.

J.D. Bryant, S.L. Semiatin, J.R. Maisano, D.T. Winter, and A.R.H. Barrett, "Effect of Thermomechanical Treatments on Solidification Inhomogeneity in Gamma Titanium Aluminides", Intermetallic Matrix Composites, D.L. Anton, et al., eds., Materials Research Society, Pittsburgh, May, 1990, p. 59.

S.L. Semiatin, P. McQuay, M. Stucke, W.R. Kerr, Y-W. Kim, and S.M. El-Soudani, "Homogenization of Ingot Metallurgy Near-Gamma Titanium Aluminides", High Temperature Ordered Intermetallic Alloys IV, J.O. Stiegler, et al., eds., Materials Research Society, Pittsburgh, February, 1991, p. 883.

V. Seetharaman, J.C. Malas, and C.M. Lombard, "Hot Extrusion of a Ti-Al-Nb-Mn Alloy", High Temperatures Ordered Intermetallic Alloys IV, J.O. Stiegler, et al., eds., Materials Research Society, Pittsburgh, Feb, 1991, p. 889.

V. Seetharaman, R.L. Goetz, and S.L. Semiatin, "Tensile Fracture Behavior of a Cast Gamma Titanium Aluminide", High Temperature Ordered Intermetallic Alloys IV, J.O. Stiegler, et al., eds., Materials Research Society, Pittsburgh, Feb, 1991, p. 895.

V. Seetharaman, L. Dewasurendra, A.B. Chaudhary, J.T. Morgan, and J.C. Malas, "Modeling of Hot Extrusion of a Gamma Titanium Aluminide Alloy", Advances in Finite Deformation Problems in Materials Processing and Structures, N. Chandra and J.N. Reddy, eds., ASME, New York, NY, Nov, 1991.

S.L. Semiatin, S.I. Oh, R.J. Fiorentino, V. Seetharaman, and J.C. Malas, "Hot Working of Titanium Aluminides - An Overview", Proc. First Inter. Conf. on Heat Resistant Materials, K. Natesan, ed., ASM International, Materials Park, Ohio, Sep, 1991.

S.L. Semiatin, M. Ohls, W.R. Kerr, "Temperature Transients During Hot Pack Rolling of High Temperature Alloys", Scripta Metall. et Mater., Aug, 1991, vol. 25, p. 1851.

P.A. McQuay, D.M. Dimiduk, and S.L. Semiatin, "The Decomposition of Alpha Phase During Continuous Cooling and Isothermal Transformation of Gamma Titanium Aluminides", Scripta Metall. et Mater, Jul, 1991, vol. 25, p. 1689.

R.L. Goetz, V.K. Jain, J.T. Morgan, and M.W. Wierschke, "Effects of Material and Processing Conditions Upon Ring Calibration Curves", Wear, Jan, 1991, vol. 143, p. 71.

A.B. Chaudhary and H.L. Gegel, "Continuum Modeling of Ultrafine Particulate Processing", J. of Microstructural Materials, Nov, 1991, .

"Growth And Characterization Of C-N Thin Films", M.Y. Chen, X. Lin, V.P. Dravid, Y.W. Chung, M.S. Wong, and W.D. Sproul, Lubrication Engr - STLE, 5415, pp360 (June 1992).

"Chemical And Tribological Characteristics Of MoS2 - PbO Films Deposited By Pulsed Laser Deposition", J.S. Zabinski, M.S. Donley, V.J. Dyhouse, and N.T. McDevitt, Thin Solid Films 214, 156 (November 1992).

"Pulsed Laser Deposition Of Tungsten Disulphide (WS2) Films On Aluminum Metal-Matrix Composite Substrates", S.V. Prasad, J.S. Zabinski and V.J. Dyhouse, Journal of Materials Science Letters, 11 (November 1992) 1282-1284.

"Uniformity Of GexSi1-X Epitaxial Layers Grown By Ultra-High Vacuum Chemical-Vapor Deposition", D.W.Greve, G. McLaughlin, M. Racanelli and M.A. Capano, Appl. Phys. Lett., 62 (1993) 726-728.

"Photoluminescence And X-Ray Diffraction Study Of Highly Uniform Si And GexSi1-X Epitaxial Layers", D.W.Greve, R. Misra, T.E. Schlesinger, G. McLaughlin and M.A. Capano, Thin Solid Films, 222 (April 1992) 46-51.

"Friction Behavior Of Ceramic Fiber-Reinforced Aluminum Metal-Matrix Composites Against A 440C Steel Counter Face", S.V. Prasad and K.R. Mecklenburg, Wear, 162-164 (September 1993) 47-56.

"Tribological Behavior Of Tic Thin Films Grown By Pulsed Laser Deposition", W.J. Sessler, M.S. Donley, J.S. Zabinski, S.D. Walck, and V.J. Dyhouse, Surface and Coatings Tech., 56 (April 1993) 125-130.

"Long-Duration Exposure Facility: Preliminary Observations Of The Effects Of Low Earth Orbit On MgF2, ThF4, And SiO2 Optical Materials", P.J. John, A.E. Day, T.W. Haas, and T.M. Trumble, Surf. and Interface Analysis, 20, 531 (May 1993).

"Synthesis And Tribological Properties Of Carbon Nitride As A Novel Superhard Coating And Solid Lubricant", M.Y. Chen, X. Lin, V.P. Dravid, Y.W. Chung, M.S. Wong, and W.D. Sproul, Tribology Transactions, STLE, 36 (March 1993) pp491.

"In-Situ Ellipsometric Study Of As Capping And Low Temperature MBE GaAs Growth And Implications For The Low Temperature Critical Thickness "K. G. Eyink, Y. S. Cong, R. Gilbert, M. A. Capano, T. W. Haas, and B. G. Streetman, J. Vac. Sci. Technol. B11, 1423 (July-August 1993).

"Dynamics Of Graphite Photoablation: Kinetic Energy Of The Precursors To Diamond Like Carbon" P.T. Murray and D.T. Peeler, Applied Surf. Sci. 69, 225 (May 1993)

M.A. Capano, "Multiplication of Dislocations in Si1-xGex Layers on Si(001), 'Phys. Rev B, 45 (May 1992) 11768-11774.

J. S. Zabinski, M. S. Donley, P. J. John, V. J. Dyhouse, A. Safriet and N. T. McDevitt, "Crystallization of Molybdenum Disulfide Films Deposited by Pulsed Laser Ablation", Mat. Res. Soc. Symp. Proc., Vol 201, pp 195-200, Materials Research Society, November 1991.

S. V. Prasad and B. D. McConnell, "Tribology of Metal-Matrix Composites: Lubrication by Graphite", in K. C. Ludema (ed.) Proc. Int'l Conf. on Wear of Materials - 1991, Orlando FL, April 1991, ASME, NY pp 149-157.

S. V. Prasad and B. D. McConnell, "Wear of Ceramics", Concise Encyclopedia of Advanced Ceramic Materials, in R. J. Brook (ed.), Pergamon Press, 1991, pp 511-515.

M. A. Capano, M. Y. Yen, K. G. Eyink and T. W. Haas, "X-ray Analysis of Low-Temperature MBE-Grown GaAs Layers on GaAs (001) and GaAs (111)B Surfaces", Appl. Phys. Lett., 58 (April 1991) 1854-1856.

M. A. Capano, L. W. Hobbs, L. Hart, D. Gordon-Smith, D. K. Bowen and C. R. Thomas, "Distribution of Misfit Dislocations in SiGe on Si Measured With Synchrotron-Radiation Topography", Mat. Res. Soc. Symp. Proc., 221 (April 1991).

D. K. Bowen, B. K. Tanner, N. Loxley, L. Cooke, and M. A. Capano, "Principles and Performance of a PC-Based Program for Simulation of Double-Crystal X-ray Rocking Curves of Thin Epitaxial Films", Mat. Res. Soc. Symp. Proc., 208 (November 1990) 113-118.

S. V. Prasad and K. R. Mecklenburg, "Tribology of Metal-Matrix Composites: Formation and Attrition of Third-Body Films", in D. Dowson, C. M. Taylor, and M. Godet (eds.) Wear Particles: From Cradle to the Grave, Elsevier Science, August 1992.

P. J. John, V. J. Dyhouse, N. T. McDevitt, A Safriet, J. S. Zabinski, and M. S. Donley, "Pulsed Laser Deposition of Metal Dichalcogenides on Stainless Steel", Mat. Res. Soc. Symp. Proc., Vol. 201, pp 117-122, Materials Research Society, November 1991.

M. Y. Yen and T. W. Haas, "The Temporal Behavior of RHEED Intensity Oscillations During Molecular Beam Epitaxial Growth of GaAs and AlGaAs on (III)B GaAs Substrates", Proc. Sec. Photo-Opt. Instrum. Eng. 35, 1285 (October 1990).

I. Lo, W. C. Mitchel, R. E. Perrin, R. L. Measham and M. Y. Yen, "A Shubnikov-de Haas Study of Intersubbond Scattering in MOCVD Grown GaAs/AlGaAs Heterostructures", J. Electrochem. Soc. [redacted] Vol 5, 91, 117 ([redacted]

I. Lo, W. C. Mitchel, R. E. Perrin, R. L. Measham and M. Y. Yen, "Two-Dimensional Electron GaS in GaAs/All-xGaxAs Heterostructures: Effective Mass", Phys. Rev. B43, 11787 (May 1991).

"Perfluoroalkylations and Perfluorooxaalkylations. Part 1. Bromoaromatics as Substrates in Copper-Mediated Cross-Coupling", Journal of Fluorine Chemistry, 63, 113 (April 1993).

"Vibrational Studies and Ab Initio Calculations of the Conformers of 1,2-Dichloro-1,1,2-trifluoro-2-iodoethane", Journal of Fluorine Chemistry, 61, 31 (March 1993).

"Ab Initio Study of Molecular Geometry and the Torsional Potential in Perfluoroethylmethyl Ether", Journal of Physical Chemistry, 97, 5901 (June1993).

"Development of a -54oC to 175oC High Temperature Nonflammable Hydraulic Fluid for Air Force Systems", Lubrication Engineering, 49, 621, (August 1993).

"Effect of Viscosity Index Improvers on the Elastohydrodynamic Lubrication Characteristics of a Chlorotrifluoroethylene and a Polyalphaolefin Fluid", Tribology Transactions, 36, (September 1993).

"Tribological Behavior of Some Candidate Advanced Space Lubricants", Tribology Transactions, 36, 321 (April 1993).

"Chlorotrifluoroethylene Oligomer Based Nonflammable Hydraulic Fluid, II, Hydraulic Component Development, Journal of Synthetic Lubrication, 9, 299 (July 1992).

"Tribological Behavior of Some Candidate Advanced Space Lubricants", Tribology Transactions, 36, 2, 321 (April 1993).

"Chlorotrifluoroethylene Oligomer Based Nonflammable Hydraulic Fluid, I Fluid Additive and Elastomer Development", J of Synthetic Lubrication, 9, 188 (July 1992).

"Chlorotrifluorothylene Oligomer Based Nonflammable Hydraulic Fluid, II Hydraulic Component Development" J of Synthetic Lubrication, 9, 4, pp 299-309, (October 1992).

"Effect of Viscosity Index Improvers on the Elastohydrodynamic Lubrication Characteristics of a Chlorotrifluoroethylene and a Polyalphaolefin Fluid", Tribology Transactions, 36, 555, (September 1993).

"Soluble Additives for Perfluoropolyalkylethers Liquid Lubricants", Lubrication Engineering, 49, 702 (September 1993).

"Long-Duration Exposure Facility: Preliminary Observations Of The Effects Of Low Earth Orbit On MgF2, ThF4, And SiO2 Optical Materials", Surf. and Interface Analysis, 20 (May 1993) 531-34.

"Growth And Characterization Of C-N Thin Films", Surface and Coatings Technology, (May 1992) pp 360.

"Synthesis And Tribological Properties Of Carbon Nitride As A Novel Superhard Coating And Solid Lubricant", Tribology Transactions, STLE, 36 (March 1993) pp 491.

"Tribology Of Metal -Matrix Composites: Formation And Attrition Of Third-Body Films", in Wear Particles: From Cradle To The Grave, Elsevier, March 1992, pp. 121-129.

"Aluminum Metal-Matrix Composites Tailored For Anti-Friction Applications", Surface and Coatings Technology (March 1992) 442-446.

"Research and Development of Low Volatility Silahydrocarbon Based Liquid Lubricants for Space", Lubrication Engineering, 48, 325 (April 1992).

"Synthesis and Characterization of a High Temperature, Low Volatility Phosphate Additive for Aerospace Applications", Lubrication Engineering, 47, 935 (November 1991).

"High Temperature Hydraulic Fluids", J of Synthetic Lubrication, 9, 115 (April 1992).

"Perfluoro Tertiary Alcohols I. Synthesis of High Molecular Weight Perfluorinated Mono Ketones and Tertiary Alcohols", J of Fluorine Chemistry, 55, 119 (December 1991).

"Perfluoro Tertiary Alcohols II. Synthesis of High Molecular Weight Perfluorinated Diketones, Keto Alcohols and Tertiary Dialcohols", J of Fluorine Chemistry, 59, 113 (October 1992).

"Formation and Reactions of Carbanions from a-Substituted Perfluoroacyl Fluorides", J of Fluorine Chemistry, 55, 93 (November 1991).

"Synthetic Lubricants and High-Performance Functional Fluids", Book Chapter, Aerospace , published by Marcel Dekker, Inc. New York, NY (1992).

"Ab Initio Study of Conformational Energies and Rotational Barriers in a Chlorofluoroethane", J. Physical Chemistry, 96, 1702 (February 1992).

"Interaction of Alloys with Chlorotrifluoroethylene Fluid at 177°C", Lubrication Engineering, 47, 1028 (July 1991).

"Growth of TiO2 Thin Films by Pulsed Laser Evaporation", Mat. Res. Soc. Symp. Proc. 191, p 43 (November 1991).

"Pulsed Laser Deposition of Tribological Materials", Lectures Notes in Physics, 389, Springer-Verlag, New York, NY p. 271 (January 1993).

"Chemical Reactivity at Burried Interfaces I. Iron on Stoichiometric Molybdenite", Surface Science, 241, 157 (July 1991).

"Chemical Reactivity at Burried Interfaces II. Iron on Nonstoichiometric Molybdenite", Surface Science, 241, 170 (July 1991).

"Tribology of Aluminum Metal-Matrix Composites: Lubrication by Graphite", Wear, 149, 241 (February 1991).

"Chemical and Tribological Characteristics of MoS2-PbO Films Deposited by Pulsed Laser Deposition", Thin Solid Films, 214, 156 (November 1992).

"Low Temperature Synthesis of Carbide Thin Films by Pulsed Laser Deposition (PLD)", in Photons and Low Energy Particles in Surface Processing", Materials Research Society Symposium Proceedings, 236, 461 (November 1992).

"Synthesis and Tribochemistry of PbO Films Grown by Pulsed Laser Deposition", in Photons and Low Energy Particles in Surface Processing, Materials Research Society, 236, 437 (November 1992).

"Hydrolytic Studies of Some Silicon [redacted] Fluids", Lubrication [redacted] (August 1990).

"Correlation of Viscosity-Temperature Properties of Chlorofluoro-Carbons with Molicular Structure", Lubrication Engineering 47, 485 (June 1991).

"Synthesis and Characterization of a High-Temperature, Low-Volatitlity Phosphate Additive for Aerospace Applications", Lubrication Engineering 47, 935 (November 1991).

"Interation of Metals with Chlorotrifluoroetheylene Fluid at Elevated Temperatures", Lubrication Engineering 47, 816 (April 1991).

"Composites for Friction and Wear Applications", in Co[redacted]yclopedia of Composite Materials, [redacted] (May 1990).

"Composites Based on Natural [redacted]", in Concise Encyclopedia of Composite Materials, p[redacted] 1990).

"Advances in Engineering Tribology", Book Chapter, published by Society of Tribologists and Lubrication Engineers, Chicago, IL, (1991).

R.J. Kerans, "Control of Fiber-Matrix Interface Properties in Ceramic Composites", Proceedings of the International Conference on High Temperature Ceramic Matrix Composites, 6th European Conference on Composite Materials, Bordeaux, France, Sept 1993.

C.A. Folsom, F.W. Zok, F.F. Lange and D.B. Marshall, "Mechanical Behavior of a Laminar Ceramic/Fiber-Reinforced Composite", J. Am. Cer Soc., Vol. 75, No. (11), pp2969-2975, Nov 1992.

S. Sambasivan, T.A. Parthasarathy, F.J. Scheltens, and R.J. Kerans, "Tailoring of Interfacial Properties using Segregants", Ceram. Eng. & Sci. Proc., Vol 14, no. 9-10, pp 873-877, Sept-Oct 1993.

P.D. Jero, T.A. Parthasarathy, and R.J. Kerans, "Comparison of Single and Multi-Fiber Push-Out Techniques", Ceram. Eng. & Sci Proc., Vol 14, no 7-8, pp 147-155, July-Aug 1993.

T.A. Parthasarathy, T. Mah, and L.E. Matson, "Deformation Behavior of an A1203-Y3A15012 Eutectic Composite in Comparison with Sapphire and YAG", J. Am. Ceram. Soc., v76, [1] pp29-32, Jan 1993.

T. Mah, T.A. Parthasarathy, M.D. Petry and L.E. Matson, "Processin Microstructure and Properties of A1203-Y3A15012 (YAG) Eutectic Fibers", Ceram. Eng. & Sci. Proc., Vol 14, no. 7-8, pp622-638, July-Aug 1993.

"Deformation and Fracture Behavior of Gamma Titanium Aluminides", Y-W, Kim and D.M. Dimiduk, Procd. of the 7th JIM Int'l Symp. (JIMIS-7) on the Aspects of High Temperature Deformation and Fracture in Crystalline Materials, Nagoya, Japan, 27-31 July (1993), Japan Institute of Metals, pp. 373-382. Jul.

"The Influence of Prestrain on the Flow Stress Anomaly in TiAl Single Crystals", M.A. Stucke , P.M. Hazzledine and D.M. Dimiduk, in High-Temperature Ordered Intermetallic Alloys V, eds. I. Baker, R. Darolia, J. D. Whittenberger and M. H. Yoo, Mater. Res. Soc. Symp. Proc., Boston, MA, 288, (1993), pp 471-476. Jun.

"Molecular Statics Simulations of Single Kinks in NiAl", T.A. Parthasarathy, D.M. Dimiduk, G. Saada, in High-Temperature Ordered Intermetallic Alloys V, eds. I. Baker, R. Darolia, J. D. Whittenberger and M. H. Yoo, Mater. Res. Soc. Symp. Proc., Boston, MA, 288, (1993), pp. 311-316. Jun.

"Internal Stresses in TiAl-Based Lamellar Composites", P.M. Hazzledine, B.K. Kad, H.L. Fraser and D.M. Dimiduk, in High-Temperature Ordered Intermetallic Alloys V, eds. I. Baker, R. Darolia, J. D. Whittenberger and M. H. Yoo, Mater. Res. Soc. Symp. Proc., Boston, MA, 288, (1993), pp 81-86. Jun.

"Dynamic Recrystallization in TiAl Alloys", D.S. Lee, D.M. Dimiduk, S. Krishnamurthy, in High-Temperature Ordered Intermetallic Alloys V, eds. I. Baker, R. Darolia, J.D. Whittenberger and M.H. Yoo, Mater. Res. Soc. Symp. Proc., Boston, MA, 288, (1993), pp. 823-827. Jun.

"Mechanical Properties and Dislocation Structures in TiAl Alloys With Varying Aluminum Content", S. Sriram, V. K. Vasudevan and D. M. Dimiduk, in High-Temperature Ordered Intermetallic Alloys V, eds. I. Baker, R. Darolia, J.D. Whittenberger and M.H. Yoo, Mater. Res. Soc. Symp. Proc., Boston, MA, 288, (1993), pp. 737-742. Jun.

"Segregation and Homogenization of a Near-Gamma Titanium Aluminide", S.L. Semiatin, and P.A. McQuay, Metall.Trans. A, 23A, (1992) p.149 . Jun.

"Phase Equilibria in Niobium Rich Nb-Al-Ti Alloys", E.S.K. Menon, P.R. Subramanian, and D.M. Dimiduk, Scripta Metall. et Mater., 27, (1992) pp. 265-270. Aug.

"Phase Relations in Ti-Al-Nb Alloys at 1200°C", C. Suryanarayana and D.S. Lee, Scripta Metall. et Mater., 26, (1992) p. 919-24. Mar.

"Characterization of the Phases Present in a Ti-45a/oAl-10a/oNb Alloy", A.G. Jackson and D.S. Lee, Scripta Metall. et Mater., 26, (1992) p. 1575-79. May.

"1000 to 1100 K deformation behavior of three TiAl-based particulate composites", J.D. Whittenberger, R. Ray, and D.S. Lee, Materials Letters, 12, (1992) p. 453-58. Dec.

"The Effect of the Salient Microstructural Constituents on Tensile and Creep Deformation of Ti-25Al-10Nb-3V-1Mo", C.H. Ward and S.J. Balsone, in Microstructure/Property Relationships in Titanium Aluminides and Alloys, ed. by Y-W. Kim and R.R. Boyer, TMS Publications, Warrendale, PA (1991) p. 373-386. Jun.

"Acoustic Emission Characterization of the Deformation and Fracture of a Ti3Al Alloy", I. Roman and C.H. Ward, Scripta Metall. et Mater., 27 (1992) p. 413-418. Aug.

"The Decomposition of Alpha Phase During Continuous Cooling and Isothermal Transformation in Gamma Titanium Aluminides", P.A. McQuay, D.M. Dimiduk and S.L. Semiatin, Scripta Metall., 25 (1991) p. 1689-94. Jul.

"Progress in the Understanding of Gamma Titanium Aluminides", Y-W. Kim and D.M. Dimiduk, JOM, 43 (1991) p. 40-47. Jan.

"Dislocation Structures and Anomalous Flow in L12 Compounds", D.M. Dimiduk, J. Phys. III, 1 (1991) p. 1025-53. Jan.

"Phase Relations and Transformation Kinetics in the High Nb Region of the Nb-Si System", M. Mendiratta and D.M. Dimiduk, Scripta Metall., 25 (1991) p. 237-242. Jan.

"Strength and Ductile-Phase Toughening in the Two-Phase Nb/Nb5Si3 Alloys", M. Mendiratta, J.J. Lewandowski and D.M. Dimiduk, Metall. Trans. A, 22A (1991) p. 1573-83. Jul.

"Deformation Mechanisms in TiAl-Based Alloys Containing Low Oxygen", S. Sriram, V.K. Vasudevan and D.M. Dimiduk, in High-Temperature Ordered Intermetallic Materials IV, in High-Temperature Ordered Intermetallic Alloys IV, ed. by J.O. Stiegler, L.A. Johnson and D.P. Pope, Materials Research Society, Pittsburgh, PA, 213 (1991) p.375-83. Jun.

"Homogenization of Ingot Metallurgy Near-Gamma Titanium Aluminides", S.L. Semiatin, P. McQuay, M. Stucke, W.R. Kerr, Y-W. Kim, and S. El-Soudani, in High-Temperature Ordered Intermetallic Alloys IV, ed. by J.O. Stiegler, L.A. Johnson and D.P. Pope, Materials Research Society, Pittsburgh, PA, 213 (1991) pp. 883-888. Jun.

"Deformation Mechanisms and Solid-Solution Strengthening in Intermetallic Alloys", D.M. Dimiduk and S.Rao, in High-Temperature Ordered Intermetallic Materials IV, in High-Temperature Ordered Intermetallic Alloys IV, ed. by J.O. Stiegler, L.A. Johnson and D.P. Pope, Materials Research Society, Pittsburgh, PA, 213 (1991) p.499-513. Jun.

"Loading Rate Effects on Ductile-Phase Toughening in In Situ Niobium Silicide / Niobium Composites", J.D. Rigney, J.J. Lewandowski, L. Matson, M.G. Mendiratta and D.M. Dimiduk, in High-Temperature Ordered Intermetallic Alloys IV, ed. by J.O. Stiegler, L.A. Johnson and D.P. Pope, Materials Research Society, Pittsburgh, PA, 213 (1991) p.1001-1006. Jun.

"Computer Simulation of a0<110> Screw Dislocations in Ni3Al", T.A. Parthasarathy, D.M. Dimiduk, C. Woodward and D. Diller, in High-Temperature Ordered Intermetallic Alloys IV, ed. by J.O. Stiegler, L.A. Johnson and D.P. Pope, Materials Research Society, Pittsburgh, PA, 213 (1991) p.337-42. Jun.

"Microstructures and Mechanical Properties of NiAl-Mo In-Situ Eutectic Composites", P. R. Subramanian, M. G. Mendiratta, D. B. Miracle, and D. M. Dimiduk, in Intermetallic Matrix Composites, eds. D. L. Anton, D. Miracle, P. L. Martin, and R. McMeeking, Mater. Res. Soc. Sym. Proc., Pittsburgh, PA, 194, (1990) pp. 147-154. Jun.

S. Mazdiyasni and D. B. Miracle; "Survey of Eutectic Systems as Potential Intermetallic Matrix Composites for High Temperature Application", in Intermetallic Matrix Composites, (eds. D. L. Anton, D. B. Miracle, P. Martin, and R. McMeeking), MRS Symp. Proc. 194, Pittsburgh, PA, 1990. Nov.

P. R. Subramanian, D. B. Miracle, M. G. Mendiratta, and D. M. Dimiduk; "NiAl-Mo In-Situ Eutectic Composites", in Intermetallic Matrix Composites, (eds. D. L. Anton, D. B. Miracle, P. Martin, and R. McMeeking), MRS Symp. Proc. 194, Pittsburgh, PA, 1990. Nov.

D. B. Miracle; "Deformation in NiAl Bicrystals", Acta Metall. et Mater., 7, 1457 (1991). Jul.

D. K. Patrick, K-M Chang, D. B. Miracle, and H. A. Lipsitt; "Burgers Vector Transition in Fe-Al-Ni Alloys", in High Temperature Ordered Intermetallic Alloys IV, (eds. L. Johnson, J. O. Stiegler, and D. P. Pope), MRS Proceedings, 213, 267 (1991). Jun.

D. Farkas, R. Pasianot, E. J. Savino, and D. B. Miracle; "Correlation of Dislocation Core Structure Calculations with Deformation Behavior in B2 Ordered Compounds", in High Temperature Ordered Intermetallic Alloys IV, (eds. L. Johnson, J. O. Stiegler, and D. P. Pope), MRS Proceedings, 213, 223 (1991). Jun.

D. Dimiduk, D, Miracle, Y-W. Kim, and M. Mendiratta; "Recent Progress on Intermetallic Alloys for Advanced Aerospace Systems", ISIJ International, 31, pp 1223-1234 (1991). Oct.

D. Dimiduk, D. Miracle, and C. Ward; "Intermetallic Materials for Aerospace Systems- An Overview of Development", in High Temperature Intermetallics, The Royal Society, Materials Science Technology, Bol. 8, April, 1992.

Y-W. Kim and J. J. Kleek; "Heat Treatments and Thermal Fatigue of SCS-6/Alpha-2 Titanium Aluminide Composites", in Intermetallic Matrix Composites, (eds. D. L. Anton, D. B. Miracle, P. Martin, and R. McMeeking), MRS Symp. Proc. 194, Pittsburgh, PA, 1990 pp. 315-321. Nov.

D. Dimiduk, D, Miracle, Y-W. Kim, and M. Mendiratta; "Recent Progress on Intermetallic Alloys for Advanced Aerospace Systems", ISIJ International: Special Issue on Advanced High Temperature Intermetallics, 31, (10), 1223 1991. Oct.

D. Dimiduk, D. Miracle, and C. Ward; "Development of Intermetallic Materials for Aerospace Systems", Mat. Sci. and Technology, 8, 367 (1992). Aug.

D. B. Miracle; "The Physical and Mechanical Properties of NiAl", Vol. 41, No. 3, pp. 649-684, Mar, 1993. Acta Metall. Mater.

M. J. Mills and D. B. Miracle; "The Structure of a<100> and a<110> Dislocation Cores in NiAl", Acta Metall. Mater., 41, pp. 85-96 (1993). Jan.

D. B. Miracle; "Overview No. 104: The Physical and Mechanical Properties of NiAl", Acta Metall. Mater., 41, pp. 649-684 (1993). May.

T. Mah, P.R. Subramanian, and L.E. Matson, "Solid State Reactions between Selected Intermetallics and Oxides in the A1-Y-O System", Scripta Metall. et Mater., v28, no.8, 961-966, April 1993.

R.S. Hay, "Phase Transformation and Microstructure Evolution in Sol-Gel Derived Yttrium-Aluminum Garnet", J. Mater. Res. 8 [8]: 578-604, Aug 1993.

R.S. Hay, "Fiber-Matrix Interfaces for Alumina Fiber - YAG Matrix Composites", Cer. Eng. & Sci. Proc. 14 [9-10]: 922, Sept - Oct 1993

R.S. Hay, "Sol-Gel Coating of Fiber Tows", Cer. Eng. Sci. Proc. 12 [7-8], 1064, July-Aug 1991.

R.S. Hay, "Fiber-Matrix Interfaces for Oxide Fiber - Oxide Matrix Composites", Proceedings of the International Conference on High Temperature Ceramic Matrix Composites, 6th European Conference on Composite Materials, Bordeaux, France, 385, Sept 1993.

P.D. Jero, T.A. Parthasarathy, and R.J. Kerans, "Interface Properties and their Measurement with Fiber Pushout Tests", Proceedings of the International Conference on High Temperature Ceramic Matrix Composites, 6th European Conference on Composite Materials, Bordeaux, France, Sept 1993.

R.S. Hay, "Coherency Strain Energy and Thermal Strain Energy of Thin Films in any Crystal System", Scripta Metall. et Mater, 26, 535, (Feb 1992).

"Extraction of Interface Properties from a Fiber Push-Out Test", T. A. Parthasarathy, P. D. Jero, and R. J. Kerans, Scripta Met., 25, 2457-2462 (Dec 1991).

"Effect on Interfacial Roughness on the Frictional Stress Measured Using Pushout Tests", P. D. Jero, R. J. Kerans, and T. A. Parthasarathy, J. Am. Cer. Soc., 74 [11], 2793-2801 (Nov 1991).

S-M Sim and R.J. Kerans, "Slurry Infiltration of 3-D Woven Composites", Ceram. Eng. Sci. Proc. V13[7-8], p632 (July-Aug 1992).

"Measurement of Interface Properties from Fiber Push-Out Tests", P. D. Jero, T. A. Parthasarathy, and R. J. Kerans, Cer. Eng. & Sci. Proc., V13, [7-8], p 54-63 (July-Aug 1992).

"Interfacial Roughness in Ceramic Matrix Composites", P. D. Jero, T. A. Parthasarathy, and R. J. Kerans, Cer. Eng. & Sci. Proc., V13, [7-8], p 64-69 (July-Aug 1992).

D.M. Dimiduk, S. Rao, T.A.Parthasarathy, C. Woodward, "Solute-Dislocation Interactions and Solid Solution Strengthening Mechanisms in Ordered Alloys", Ordered Intermetallics-Physical Metallurgy and Mechanical Behavior, eds C.T. Liu et al., Kluwer Academic Publ., Netherlands (Nov 1992) pp237-256.

R.S. Hay, B. Evans, "The Coherency Strain Driving Force for CIGM in Non-Cubic Crystals: Comparison with In-Situ Observations in Calcite", Acta Metall. Mater. 40[10]:2581-2593, Oct 1992.

M. Thirukkonda, B. Cockeram, M. Saqib, L.E. Matson, Srinivasan and I. Weiss, "Flow Softening During High Temperature Deformation of Nb-10a/o Si In-Situ Composite", Scripta Metallurgica et Materialia, Vol 27, pp711-716, Aug 1992.

J.E. Ritter, K. Jakus, M.H. Godin and Robert Ruh. J. "Comparison of High Temperature Crack Growth in SiC Whisker Reinforced Mullite and Si4N3", Am. Ceram. Soc (7), 1760, July 1992.

R. Ruh, M.J. Kerarns, A Zangvil and X.R. Xu, J, "Phase and Property Studies of B4C-BN Composite." Am. Ceram. Soc., (4), 864, April 1992.

A. Zangvil, C.C. Lin and R. Ruh, J., "Microstructural Studies in Alkoxide-Derived Mullite-Zirconia SiC Whisker Composites." Am. Ceram. Soc. (5), 1254, May 1992.

R.S. Hay and L.E. Matson, "Alumin/Yttrium-Aluminum Garnet Crystallographic Orientation Relationships and Interphase Boundaries: Observations and Interpretation by Geometric Criteria", Acta Metall. Mater., Vol. 39, No. (8), pp 1981-1994. (1991).

P.D. Jero and R.J. Kerans, "The Contribution of Interfacial Roughness to Sliding Friction of Ceramic Fibers in a Glass Matrix", Scripta Metall, Mat., Vol, 24 2315-2318 (December 1990)

R.J. Kerans and T.A. Parthasarathy, "Theoretical Analysis of the Fiber Pull-Out and Push-out Test", J. Am. Ceram. Soc., Vol. 74 No. 7, pp 1585-1596 (July 1991).

R.S. Hay and L.E. Matson, "Interpretation of Alumina/Yttrium Aluminum Garnet Orientation Relationships by Geometric Criteria", Defects in Materials, MRS Symposia Proceedings, edited by P.D. Bristowe, J.E. Epperson, J.E. Griffith, and Z. Lilienta-Weber, 209,731 (April 1991).

R.S. Hay, "HRTEM Observations of Sol-Gel Dervied Alumina-Yttria System Thin Films", High Resolution Electron Microscopoy of Defects in Materials, MRS Syposia Proceedings, edited by R. Sinclair, U. Dahmen, and D.J. Smith. 183, 279 (November 1990).

R.S. Hay and B. Evans, "Coherency Strain Energy in any Crystal System: Applications t to In Situ Observatins of CIGM in Calcite", Kinetics of Phase Transformations, MRS Symposia Proceedings, edited by M.O. Thompson, M.J. Aziz, and G.B. Stephenson,205, 245 (November 1990).

R.S. Hay, B. Evans, "The Coherency Strain Driving Force for CIGM in Non-Cubic Crystals: Comparison with In Situ Observations in Calcite", Acta Metall. Mater. 40, (10), 2581 (October 1992).

T.A. Parthasarathy, D.M. Dimiduk, C. Woodward, and D. Diller, "Computer Simulation of a ,110> Screw Dislocation in Ni3Al", MRS Symposium Proc., v 213, pp. 337-342 (October 1990).

Garrett, P. H., Heyob, J. J., Hunt, V. J., LeClair, S. R., & Patterson, O. D., "Decoupled Flux Control for Molecular Beam Epitaxy", IEEE Transactions on Semiconductor Manufacturing, Vol. 6, No. 4, November 1992 ASD Case No. 92-0023

Grandhi, R. V., Kumar, A, Chaudhary, A., & Malas, J.C., "State-Space Representation and Optimal Control of Nonlinear Material Deformation using the Finite Element Method", International Journal for Numerical Methods in Engineering, Wiley Publisher, New York, 30 (12) 30 June1993, pp. 1967-1989. ASD 92-0965

Butler, A.C., Rao, S.S., LeClair, S.R., "Reliability Analysis of Complex Systems using Symbolic Logic", Reliability Engineering and System Safety, Vol., 40, (1) Elsevier Science Publishers Ltd., England, January 1993, pp. 49-60. ASC-93-1607

Pao, Y.H., Komeyli, K., Shei, D., LeClair, S.R., & Winn, A., "The Episodal Associative Memory: Managing Manufacturing Information on the Basis of Simularity and Associativity", Special Issue of Journal of Intelligent Manufacturing on Neural Networks, Chapman & Hall, Ltd. Publishers, NY, NY., Vol 4, No. 1, February 1993, pp 23-32.

Currie, K.R., LeClair, S.R., &, Patterson, O.D., "Self-Improving Process Control for Molecular Beam Epitaxy", International Journal of Advanced Manufacturing Technology, Special Issue on Neural Networks in Design and Manufacturing, Springer-Verlag, London, England, Vol. 8, No. 2, April, 1993, pp 244-251.

Westhoven, T. E., Pao, Y.H., LeClair, S. R., & Chen, C.L.P., "Episodal Associative Memory Approach for Sequencing Interactive Features in ProcessPlanning", Artificial Intelligence for Engineering Design, Analysis and Manufacturing, Academic Press, Harcourt Brace Jovanovich Publishers, New York, NY, Volume 6, Number 4, December 1992, pp 177-197.

Malas, J.C. & Seetharaman, V., "Use of Material Behavior Models in the Development of Process Control Strategies," Journal of Metals, 44(6), June 1992, pp 8-13.

Jackson, A.G., Park, J., Wood, D., & LeClair, S.R., "Development of an Automated Analyzer for TEM Diffraction Patterns", Proceedings of 51st Annual Meeting of the Microscopy Society of America, Cincinnati, OH, Aug 1993.

Ruegsegger, Steven M. "Intelligent Planning for Computer-Controlled Inspection", Proceedings of 1993 International Neural Network Society Annual Meeting, World Congress, Portland, OR, July 1993. ASC-93-0291

LeClair, S.R., Jackson, A.G., King, S., Wood, D., & Park, J., "A Heuristically Guided Genetic Algorithm for Predicting Protein Secondary Structure", Proceedings of American Association of Artificial Intelligence, Washington, D.C., July 1993. ASC-93-0293

Delvalle, Robert B., K. Roumina, S. Ruegsegger, and F. Merat, "Heuristic Planning in Feature-based Inspection for Coordinate Measuring Machines", Proceedings of Eleventh Applications of Artificial Intelligence Conference, AAI-XI: Knowledge-Based Systems in Aerospace Industry. Orlando, FL., pp. 341-355, April 1993. ASC-93-0290

Laube, S.T.P., & Stark, E.F., "Feedback Control of Pulsed Laser Deposition Processes", Proceedings on Laser Ablation, Knoxville, TN, April 1993.

Day, A. E., Laube, S.J.P., Donley, M.S., & Zabinski, J.S., "The Optimization of Niobium Diselenide Thin Films Through Control of Pulsed Laser Deposition Parameters", Fall Material Research Society, November 1992.

Westhoven, T.E., LeClair, S.R., Chen, C.L.P., & Pao, Y.H., "Sequencing Interactive Features in Process", Proceedings of 1992 IEEE International Conference on Systems, Man and Cybernetics, Chicago, IL, October, 1992, pp 700-705.

Currie, K.R., LeClair, S.R., & Patterson, O.D., "Self-Directed, Self-Improving Control of a Molecular Beam Epitaxy Process", Proceedings of International Workshop on Intelligent Manufacturing Systems, International Federation of Automatic Control, Hyatt Regency Hotel, Dearborn, MI, Oct 1992.

LeClair, S.R., Warnock, P.E., & Insley, R.S., "Application of a Self-Directed Process Control System in a Production Environment", Proceedings of Symposium on Metal Processing (The Minerals, Metals, and Materials Society) Proceedings of the 1992 Extraction and Processing Congress, San Diego, CA, March, 1992.

Henghold, W.M., & LeClair, S.R., "Expert Systems Applied to the Economic Justification of Advanced Manufacturing Systems", chapter in Economic Aspects of Advanced Production and Manufacturing Systems, edited by Parsaei, H. R. & Mital, A., Chapman & Hall., New York, NY, May 1992.

LeClair, S.R., "Interactive Learning: A Multiexpert Paradigm for Acquiring New Knowledge", chapter in Readings in Knowledge LeClairAcquisition: Current Practices and Trends, edited by McGraw, K.L. & Westphal, C.R., Ellis Horwood Ltd., West Sussex, England, December 1990.

LeClair, S.R., & Sullivan, W.G., "Justification of Automated Manufacturing Technology Using Expert Systems", chapter in Expert Systems, edited by Botten, N.A., & Raz, T., Industrial Engineering and Management Press, Norcross, Georgia, December 1990.

Henghold, W.M., LeClair, S.R., & Sullivan, "W.G., Expert Systems, AI & Venture Justification", chapter in Expert Systems, edited by Botten, N.A., & Raz, T., Industrial Engineering and Management Press, Norcross, Georgia, December1990.

Gunasekera, J.S. & Malas, J.C., "Conceptual Design of Control Strategy for Hot Rolling", Annals of the CIRP, Vol. 40, No. 1, August 1991, pp 123-126.

LeClair, S.R., "Self-Directed Process Control: Can we build material processing systems that know better how to process a material than we do?", Concurrent Engineering Journal, Auerbach Publishers, New York, NY, Volume 1, Number 2, March 1991.

Chen, C.T. & LeClair, S.R., "A Probability Neural Network (PNN) Estimator For Improved Reliability of 'Noisy' Sensor Data", Jouranl of Reinforced Plastics and Composites, Technomic Publishing Co., Lancaster, PA, Vol 10, Number 4, July 1991, pp 379-390.

Pao, Y.,H., Komeyli, K., Shei, D., LeClair, S.R., & Winn, A., "The Episodal Associative Memory: Managing Manufacturing Information on the Basis of Simularity and Associativity", Special Issue of Journal of Intellignet Manufacturing on Neural Networks, Chapman & Hall Ltd Publishers, NY, NY, February 1993.

Merat, F.L., and G.M. Radack, "Automatic Inspection Planning Within a Feature-Based CAD System", J. Robotics & Computer Integrated Manufacturing, Pergamon Press, Great Britain, Vol 9, No. 1, 1992.

LeClair, S.R., "Self-Directed Process Control: Can we build material processing systems that know better how to process a material than we do?", Concurrent Engineering Journal, Auerbach Publishers, New York, NY, Volume 1, Number 2, March 1991.

Chen, C.T., & LeClair, S.R., "A Probability Neural Network (PNN) Estimator For Improved Reliability of 'Noisy' Sensor Data", Journal of Reinforced Plastics and Composites, Technomic Publishing Co., Lancaster, PA, Vol 10, Number 4, July 1991, pp. 379-390.

Semiatin, S.L., Oh, S.I., Florentino, R.J., Malas, J.C., & Seetharaman, V., "Hot Working Titanium Aluminides -- an Overview", Proc. First Intern. Conf. on Heat Resistant Materials, K. Natesan, ed., ASM International, Metals Park, Ohio, September 1991.

Pao, Y., Komeyli, K., Shei, D., LeClair, S.R., & Winn, A., "The Role of the Episodal Associative Memory in Feature-Based Design", Proceedings IFIP International CAD'91 Conference, Columbus, OH, Oct 1991.

"Molecular Statics Simulations of Cores and Motion of Dislocations in NIAl", T.A. Parthasarathy, S. Rao, D.M. Dimiduk, Phil. Mag. A, 67, 3, (Mar. 1993), pp. 643-662.

"Strength and Toughness of a Nb/Nb5Si3 Composite", M. G. Mendiratta and D. M. Dimiduk, Met. Trans. A, 24A, (February 1993), pp. 501-504.

"Dislocation Dissociation in the Intermetallic Compound MoSi2", D.J. Evans, S.A Court, P.M. Hazzledine and H.L. Fraser, Phil. Mag Letters, 67, (May 1993), pp. 331-341.

"Dynamic Environmental Embrittlement of an Alpha-2 Titanium Aluminide", C.H. Ward, J.C. Williams and A.W. Thompson, Scripta Metall. et Matter., 28, (May 1993), pp. 1017-1021.

"Microstructure Evolution and its Effect on Tensile and Fracture Behavior of Ti-Al-Nb Alpha-2 Intermetallics", C.H. Ward, International Materials Reviews, 38, (1993), pp. 79-101. Jan.

"Energy of Planar Faults as a Function of Composition in Binary and Ternary TiAl Alloys", C. Woodward, J.M. MacLaren and D.M. Dimiduk, in High-Temperature Ordered Intermetallic Alloys V, eds. I. Baker, R. Darolia, J.D. Whittenberger and M.H. Yoo, Mater. Res. Soc. Symp. Proc., Boston, MA, 288, (1993), pp. 171-176. Jun.

"Deformation Mechanisms in the Intermetallic Compound MoSi2", D.J. Evans, S.A. Court, P.M. Hazzledine, and H.L. Fraser, in High-Temperature Ordered Intermetallic Alloys V, eds. I. Baker, R. Darolia, J.D. Whittenberger and M.H. Yoo, Mater. Res. Soc. Symp. Proc., Boston, MA, 288, (1993), pp.567-572. Jun.

3.3 Workload

3.3.1 **FY93 Workload**

3.3.1.1 **Work Year and Lifecycle:** Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

"LAB" CSF Air Vehicles - Fixed - Structures	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA *
Science & Technology	272	44	0	65
Engineering Development	0	0	0	0
In-Service Engineering	0	0	0	0

"LAB" CSF Air Vehicles - Fixed - Propulsion	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA *
Science & Technology	218	25	0	167.7
Engineering Development	0	0	0	0
In-Service Engineering	0	0	0	0

"LAB" CSF Air Vehicles - Fixed - Avionics	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA *
Science & Technology	467	78	0	187.2
Engineering Development	0	0	0	0
In-Service Engineering	0	0	0	0

*** See footnotes regarding SETA in replies to questions 2.1 and 3.2.1**

Answer to Question 3.3.1.1 Continued

"LAB" CSF Air Vehicles - Fixed - Flight Subsystems	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA *
Science & Technology	309	68	0	146
Engineering Development	0	0	0	0
In-Service Engineering	0	0	0	0

"LAB" CSF Electronic Devices	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA *
Science & Technology	116	16	0	35
Engineering Development	0	0	0	0
In-Service Engineering	0	0	0	0

"LAB" CSF Advanced Materials	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA *
Science & Technology	272	43	0	351
Engineering Development	0	0	0	0
In-Service Engineering	0	0	0	0

* See footnotes regarding SETA in replies to questions 2.1 and 3.2.1

3.3.1.2 **Engineering Development By ACAT:** For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:
- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I). - **NOT APPLICABLE TO WRIGHT LABORATORY**

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	(Name)			(Description)
ACAT ID	(Name)			(Description)
ACAT II	(Name)			(Description)
ACAT III/IV	(Number)			(List)
Other	(Number)			(List)

3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)
NOT APPLICABLE TO WRIGHT LABORATORY

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority)	Workyears	

3.3.2 Projected Funding

3.3.2.1 **Direct Funding:** For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

$M

CSF	FY94	FY95	FY96	FY97
Air Vehicles - Fixed - Structures	27	32	34	34
Air Vehicles - Fixed - Propulsion	128	134	126	132
Air Vehicles - Fixed - Avionics	101	139	144	146
Air Vehicles - Fixed - Flight Subsystems	71	91	89	91
Electronic Devices	17	23	23	24
Advanced Materials	94	90	92	94

3.3.2.2 **Other Obligation Authority:** For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

$M

CSF	FY94	FY95	FY96	FY97
Air Vehicles - Fixed - Structures	Included in Flight Subsystems	Included in Flight Subsystems	Included in Flight Subsystems	Included in Flight Subsystems
Air Vehicles - Fixed - Propulsion	15	15	15	16
Air Vehicles - Fixed - Avionics	72	71	71	77
Air Vehicles - Fixed - Flight Subsystems	27	26	26	28
Electronic Devices	52	51	51	55
Advanced Materials	7	6	6	8

94-09-23 18:12 RCVD

CONTROL NUMBER: LJCSWG-AF 018

PURPOSE: To provide SAF/AQX staff corrected answers to Question 3.4.1. of the Wright Lab W-P AFB response to the Laboratory Joint Data Call. In response to question 3.4.1. your table on page 130 identifies 4 Propeller Test Facilities at a facility and equipment cost of $15,069 K and $50,000 respectively. If these facilities are an integrated set of buildings required to perform the intended purpose just confirm and explain. If those facilities are independent and not an integrated complex, provide individual replacement costs.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

WL-WPAFB 018

CONTROL NUMBER: LJCSWG-AF 018

PURPOSE: To provide SAF/AQX staff corrected answers to Question 3.4.1. of the Wright Lab W-P AFB response to the Laboratory Joint Data Call. In response to question 3.4.1. your table on page 130 identifies 4 Propeller Test Facilities at a facility and equipment cost of 212,000 K and 350,000 respectively. If these facilities are an integrated set of buildings required to perform the intended purpose just confirm and explain. If those facilities are independent and not an integrated complex, provide individual replacement costs.

IN THE LATEST WL-WPAFB RESPONSE (page 148, 31AUG94 AND page 186, 23Aug94), IT INDICATES THREE 'RIGS' WHICH COMPRISE THE PROPELLER TEST FACILITIES. THESE 'FACILITIES' ARE LOCATED WITHIN ONE BUILDING (FACILITY 20020) AND UTILIZE COMMON MOTOR-GENERATOR SUPPLY SYSTEMS. THEY ARE THEREFORE INTEGRATED WITHIN A BUILDING AND ARE LISTED WITH A "COLLECTIVE" REPLACEMENT COST

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concur: Does not concur (explain:)

See WL's comment above and the corrected (attached) replacement cost for Propeller Test Facility (Mig #3).

MAJCOM REVIEWER: (print name, organization, DSN)

BASE: Concur: Does not concur (explain:)

Anthony C Kay, HQ, AFMC/SA, 787-5368

ED SEP 1994

BASE REVIEWER: (print name, organization, DSN)

JOHN J. FEDON
WL/PDME 8 Sep 94

I certify the information above is accurate and complete to the best of my knowledge and belief.

FOR OFFICIAL USE ONLY

INSTALLATION WORKSHEET

WRIGHT LABORATORY
WRIGHT-PATTERSON AFB, OHIO

PURPOSE: To document the answer to question 3.4.1

SOURCE: John Fedon, WL/POME DSN 785-4013; Dennis Sedlock, WL/FIM, DSN 785-6156; Bernard George, WL/AAOP, DSN 785-5285; Howard Romaker, WL/ELA, DSN 785-6723; Joseph Daugherty, WL/MLIF, DSN 785-3789 - WL R&D Facilities Handbook (Aug 92), WL Facilities Prioritization Study (21 Jun 94), Real Property Real Estate Records (4 Mar 94), Inventory of R&D Equipment (21 Jun 94)

METHOD: Data extracted from source documents. Where a facility shared space in the same building with other facilities, a proportional real property replacement cast was applied.

CONCLUSION: See attachment

I certify that the above information is accurate and complete to the best of my knowledge and belief.

Preparer: John J. Fedon, WL/POME, DSN 785-4013 **Date:** 23 Aug 94

I certify that the above information is accurate and complete to the best of my knowledge and belief.

MAJCOM Reviewer: **Date:** 7 SEP 1994

Cathy C King, MAJ, HQ AFMC/SE, 787-5568

FOR OFFICIAL USE ONLY

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.4.1 Major Equipment and Facilities of the Wright Lab, Wright Patterson AFB response to the LJCSG guidance package. The existing response indicates that there is no sharing of equipment or facilities with other than common (as defined in appendix C) or unique support functions. Confirm this is correct. If anything is shared within the activity, indicate the other function(s) and the percentage of time the other function(s) uses the equipment or facility. Additionally, complete the matrix box for major equipment and facilities. The 10 Aug 94 version contains text only.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF Date:
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.4.1 Major Equipment and Facilities of the Wright Lab, Wright Patterson AFB response to the LICSG guidance package. The existing response indicates that there is no sharing of equipment or facilities with other than common (as defined in appendix C) or unique support functions. Confirm this is correct. If anything is shared within the activity, indicate the other function(s) and the percentage of time the other function(s) uses the equipment or facility. Additionally, complete the matrix box for major equipment and facilities. The 10 Aug 94 version contains text only.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LICSG Guidance Package instructions

MAJCOM: (Concurs) Does not concur (explain:)

SEE BASE ACTIVITY RESPONSE
NO ATTACHMENTS PROVIDED, i.e. DATA SHEETS
IF REQ'D THEY WILL BE UPDATED AND FORWARDED

14 AUGUST 1994

MAJCOM REVIEWER: TIMOTHY L. DUES, GM-15, AFMC/STP, DSN 787-7850
(print name, organization, DSN)

BASE: (Concurs) Does not concur (explain:)

ALL FACILITIES LISTED IN THE WRIGHT LABORATORY RESPONSE TO QUESTION 3.4.1 ARE UTILIZED 100% FOR THE CSF THEY ARE REPORTED UNDER

13 Aug 94

BASE REVIEWER: JOHN J. FEDON
(print name, organization, DSN) WL/PAME, 785-4013

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

61

3.4 Facilities and Equipment

3.4.1 **Major Equipment and Facilities:** Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Common Support Function	Major Facility or Equipment Description	Unique To			FY94 Replacement Cost ($K) *
		DOD	Federal Gov't	U. S.	
Air Vehicles - Fixed - Structures **	Subsonic Aerodynamic Research Laboratory	X			42,000
	Trisonic Gasdynamic Facility	X			35,000
	Two Foot Hydrodynamic Research Facility		X		2,000
	Vertical Wind Tunnel	X			6,000
	Mach 6 High Reynolds Number Facility	X			10,000
	Mach 3 High Reynolds Number Facility	X			4,000
	Mach 12 to 14 20 Inch Hypersonic Wind Tunnel	X			14,000
	Combined Environment Acoustic Facility			X	120,000
	Structures Research Facility			X	200,000

WL-WP

Answer to Question 3.4.1 Continued

Common Support Function	Major Facility or Equipment Description	Unique To			FY94 Replacement Cost ($K) *
		DOD	Federal Gov't	U. S.	
Air Vehicles - Fixed - Propulsion	Compressor Research Facility			X	55,964 (RP) 44,036 (E)
	Compressor Aero Research Lab			X	4,232 (RP) 7,500 (E)
	CRF Component Research Lab	X			972 (RP) 750 (E)
	Advanced Turbine Aero Thermal Research Rig			X	9,492 (RP) 7,500 (E)
	Turbine Aero Thermal Research Facility	X			1,399 (RP) 250 (E)
	Turbine Engine Structural Analysis Workroom		X		638 (RP) 250 (E)
	High Mach Advanced Propulsion Research Facility			X	1,255 (RP) 5,000 (E)
	Flow Visualization Research Facility		X		473 (RP) 500 (E)
	Ramjet Combustion Research Facility			X	1,364 (RP) 4,000 (E)
	Supersonic Combustion Research Facility			X	1,046 (RP) 3,000 (E)
	Propeller Test Facilities (3)			X	65,069 (RP) — correction 50,000 (E)
	Component Research Air Facility				17,108 (RP) 60,000 (E)
	Diagnostic Development & Combustion Research Facilities			X	1,595 (RP) 8,226 (E)
	Fuel Development Research Facilities			X	1,404 (RP) 6,135 (E)
	Turbine Engine Lubricants Research Facilities			X	18,558 (RP) 8,440 (E)
	Bearings Research Facilities			X	613 (RP) 3,400 (E)

Answer to Question 3.4.1 Continued

Common Support Function	Major Facility or Equipment Description	Unique To			FY94 Replacement Cost ($K) *
		DOD	Federal Gov't	U. S.	
Air Vehicles - Fixed - Avionics	Laser Communications Laboratory	X			413 (RP) 10,000 (E)
	Integrated Avionics Laboratory			X	3,208 (RP) 130,000 (E)
	100 Inch Collimator Facility		X		279 (RP) 25,000 (E)
	Infrared Laboratory			X	239 (RP) 2,000 (E)
	Air Force Sensor Evaluation Facility	X			8,679 (RP) 45,320 (E)
	Optical Research Laboratory				372 (RP) 2,500 (E)
	Laser Radar Research Laboratory			X	115 (RP) 1,500 (E)
	Electro-Optical Sensors Evaluation Range				118 (RP) 1,000 (E)
	Anechoic Chambers and Integrated Circuit Exploitation Facility	X			13,736 (RP) 14,000 (E)
	Laser IRCM Development Range			X	100 (RP) 12,500 (E)
	Electronic Combat Simulation Research Laboratory	X			2,698 (RP) 20,000 (E)
	Integrated Defensive Avionics Laboratory	X			2,350 (RP) 45,000 (E)
	Dynamic Infrared Missile Evaluator Facility	X			2,015 (RP) 20,000 (E)
	Electronic Warfare Anechoic Chamber				3,616 (RP) 7,700 (E)
	Electro-Optical Receiver Laboratory				4,054 (RP) 3,000 (E)
	RF Receiver/Processor Laboratory				1,019 (RP) 2,000 (E)

Answer to Question 3.4.1 Continued

Common Support Function	Major Facility or Equipment Description	Unique To			FY94 Replacement Cost ($K) *
		DOD	Federal Gov't	U. S.	
Air Vehicles - Fixed - Avionics	Infrared Measurement Range			X	4,100 (RP) 1,700 (E)
	Advanced Compact Radar Cross Section & Antenna Measurement			X	6,000 (RP) 12,000 (E)

Answer to Question 3.4.1 Continued

Common Support Function	Major Facility or Equipment Description	Unique To			FY94 Replacement Cost ($K) *
		DOD	Federal Gov't	U. S.	
Air Vehicles - Fixed - Flight Subsystems	Aircraft Electrical Power Laboratories				2,919 (RP) 9,230 (E)
	Battery Electrochemistry Laboratories	X			1,896 (RP) 5,000 (E)
	Power Semiconductor Laboratories			X	1,136 (RP) 3,000 (E)
	Heat Transfer R&D Facilities			X	11,676 (RP) 1,500 (E)
	Plasma Physics Laboratories	X			3,522 (RP) 3,950 (E)
	High Power Laboratory			X	6,441 (RP) 30,000 (E)
	Superconductivity and Cryogenics Labs	X			752 (RP) 3,500 (E)
** applies until next CSF	Crew Systems Integration Laboratory			X	13,000
	Control Systems Architecture Laboratory				1,078
	Unmanned Research Vehicle Laboratory			X	865
	Flight Control Actuation Facility			X	7,500
	Engineering Flight Simulation Facility		X		39,980
	In Flight Simulators (3)			X	190,000
	Landing Gear Development Facility		X		100,000
	Aircraft Survivability Research Facility				75,000
Air Vehicles - Rotary - Propulsion	Helicopter Rotor Facility			X	(RP) 10,000 (E)

Answer to Question 3.4.1 Continued

Common Support Function	Major Facility or Equipment Description	Unique To			FY94 Replacement Cost ($K) *
		DOD	Federal Gov't	U. S.	
Advanced Materials ** ***	Thermal Analysis Facility				2,450
	Rheology Facility				2,172
	Autoclave Facility		X		2,562
	Carbon-Carbon Processing Facility	X			2,183
	Mechanical Test Facility				2,612
	Dielectric Measurements Laboratory			X	3,622
	Mechanical Testing Facility				2,772
	Molecular Beam Epitaxy Facility		X		8,151
	Molecular Modeling Facility	X			2,352
	Polymer Physics Experimental Facility		X		2,257
	Polymer Characterization Facility		X		2,377
	Fiber/Film Fabrication Facility		X		2,322
	Polymer Synthesis Facility	X			2,237
	Morphology Facility	X			2,797
	Space Combined Effects Primary Test and Research Equipment (SCEPTRE) Facility	X			2,632
	Aircraft Hydraulic Fluid Pump Test Laboratory			X	3,422
	Lubricant Traction Apparatus Facility		X		2,647

Answer to Question 3.4.1 Continued

Common Support Function	Major Facility or Equipment Description	Unique To			FY94 Replacement Cost ($K) *
		DOD	Federal Gov't	U. S.	
Electronic Devices	Device Research Laboratory		X		4,024 (RP) 15,872 (E)
	Microwave/Millimeter Wave Laboratory				697 (RP) 3,427 (E)
	Microelectronics Laboratory				766 (RP) 1,668 (E)
	Opto-Electronics Laboratory		X		2,976 (RP) 3,067 (E)

Answer to Question 3.4.1 Continued

Common Support Function	Major Facility or Equipment Description	Unique To			FY94 Replacement Cost ($K) *
		DOD	Federal Gov't	U. S.	
Advanced Materials ** *** (continued)	Elastomer and Seal Test Facility				2,912
	Mass Spectrometry System Facility		X		2,372
	Plasma Spectrometer Systems Facility				2,140
	Optical Measurement Laboratory			X	5,922
	Tribology and Elastomer Lab Facility				3,558
	Laser Deposition Tribology Laboratory			X	4,415
	Ceramic Composite Research Facility	X			5,122
	Experimental Materials Processing Laboratory		X		6,972
	Nondestructive Evaluation Facility (MLLP)			X	7,822
	Microstructural Characterization Laboratory				9,222
	Computational Materials Science Laboratory	X			2,872
	Optical Materials Synthesis Laboratory	X			3,137
	Processing and Morphology Laboratory				6,322
	Optical Characterization Laboratory				6,922
	Laser Hardened Materials Evaluation Laboratory			X	35,322

Answer to Question 3.4.1 Continued

Common Support Function	Major Facility or Equipment Description	Unique To			FY94 Replacement Cost ($K) *
		DOD	Federal Gov't	U. S.	
Advanced Materials ** *** (continued)	One Kilowatt Laser Lab Facility				2,452
	Electronic Transport of Epitaxial Semiconductors Facility				2,137
	Magneto-Optical Semiconductor Analysis Facility	X			2,222
	Near and Far Infrared (IR) Photoconductivity Facility			X	2,197
	Fourier Transform (FTIR) and Grating Photoluminescence Facility				2,147
	Nonlinear Optical Characterization Laboratory			X	2,292
	Pulsed Laser Deposition Facility for Growth of High Temperature Superconductor and Semiconductor Films		X		2,217
	Superconductor Materials Characterization Laboratory			X	2,217
	Analytical Chemistry Laboratory				4,932
	Structural Failure Analysis Laboratory	X			2,767
	Electrical and Electronic Failure Analysis Laboratory		X		2,572
	NDE Laboratory				3,012

Answer to Question 3.4.1 Continued

Common Support Function	Major Facility or Equipment Description	Unique To			FY94 Replacement Cost ($K) *
		DOD	Federal Gov't	U. S.	
Advanced Materials ** *** (continued)	Corrosion Test Laboratory				1,930
	Rain Erosion Facility		X		2,822
	Engineering and Design Data Laboratory			X	5,182
	Composite Supportability Laboratory		X		2,788
	Fluids and Lubes Laboratory	X			2,122

* Key to Replacement Cost : (RP) = Real Property Replacement Cost, (E) = R&D Equipment Replacement Cost
** Replacement Cost of R&D Equipment and Real Property combined as one value.
*** Replacement Cost does not include approx. $40M in support equipment (furnishings, ADP equipment, tools, etc.) that is essential for day-to-day operations within this CSF.

THE FOLLOWING PAGES DESCRIBE THE WRIGHT LABORATORY FACILITIES AND/OR EQUIPMENT SYSTEMS LISTED IN THE ANSWER TO QUESTION 3.4.1

AIR VEHICLES - FIXED - STRUCTURES

FACILITY/EQUIPMENT DESCRIPTIONS

FACILITY TYPE: Wind Tunnel

PURPOSE:

To provide high quality subsonic flow over research articles up through high angles of attack

FACILITY NAME:

Subsonic Aerodynamic Research Laboratory (SARL)

PRIMARY CAPABILITIES:

Mach range from 0.2 to 0.5

Atmospheric tunnel

10 ft by 7 ft test section

SPECIAL/UNIQUE CAPABILITIES:

High angle of attack research capability; very low turbulence

Enhanced flow visualization capability (55% = optical plexiglass); very large force measuring capability

Capable of research power-simulated vehicles; secondary air source

INSTRUMENTATION:

Large force measuring capabilities; laser light sheet; pressure sensitive paint

120 data channels for pressure and force measuring capabilities; automated data system capable of sampling at 100,000 samples/second

Flow field probing

Only facility of its size in DOD with 55% optical access. Highest speed of any DOD facility of its size.

FACILITY TYPE: Wind Tunnel

PURPOSE:

Closed circuit, continuous flow, variable density wind tunnel experiments

FACILITY NAME:

Trisonic Gasdynamics Facility

PRIMARY CAPABILITIES:

Mach range from 0.23 to 1.2, 1.5, 1.9, 2.3, and 3.0

Reynolds Number range from 1 million/foot to 6 million/foot

Two foot square test section (15 inch square for Mach Number 0.85 to 1.2)

Schlieren capability

SPECIAL/UNIQUE CAPABILITIES:

Multi-Mach Number capability; 3D laser velocimeter available; laser light sheet

Dynamic pressures to 1,000 psf supersonic, 1,400 psf transonic

Constant temperature; secondary air system

INSTRUMENTATION:

120 channels available for pressure measuring capability and force measuring capability at speeds up to 100,000 samples/second

Laser flow visualization, flow field probing capability, 3 component laser velocimetry

Fully automated data support

Largest closed-circuit, research facility in DOD

FACILITY TYPE: Water Tunnel

PURPOSE:
Enhanced flow visualization experiments

FACILITY NAME:
Two Foot Hydrodynamic Research Facility

PRIMARY CAPABILITIES:
2 foot by 2 foot test section, 4 feet in length

Velocity range: 0.10 to 0.85 ft/sec continuous

Velocity range of .10 to .30 ft/sec provides optimum flow visualization when using dye-injection method

SPECIAL/UNIQUE CAPABILITIES:
Water medium enhances flow visualization

Three walls of test section are Plexiglas for optimum viewing

INSTRUMENTATION:
Laser Doppler velocitimeter

Laser-light sheet with forward looking photographic system

Multiple colored dye-injection capability; fluorescent dye capability

Only facility of its type in DOD. One of only two in the country. NASA facility is not operational.

FACILITY TYPE: Wind Tunnel

PURPOSE:
Parachute and free-falling body experiments

FACILITY NAME:
Vertical Wind Tunnel

PRIMARY CAPABILITIES:
Mach range: 0 to 0.14; Reynolds Number (x 10exp6/ft): 0 to 0.91; total pressure (psia): atmospheric; run time: continuous

12 foot diameter open jet test section; dynamic pressure (psf): 0 to 26; total temperature (degR): ambient

Atmospheric tunnel

SPECIAL/UNIQUE CAPABILITIES:
Free-fall training capability

Sub-munitions decelerator research

Sting balance capable of 6-component measurements available

INSTRUMENTATION:
Pressure measuring capability

Force measuring capability; drag measuring capability

Motion picture and still photographic coverage available

Currently only operational tunnel of its type in DOD. Addition of spin and rotary balance rig in FY96 will make facility unique in the United States.

FACILITY TYPE: Wind Tunnel

PURPOSE:
High Mach experiments

FACILITY NAME:
Mach 6, High Reynolds Number Facility

PRIMARY CAPABILITIES:
12 inch diameter open jet test section

Uniform Mach 6 flow

Reynolds Number range to 30 million/foot

Simulate flight conditions from 30,000 ft to 130,000 ft

SPECIAL/UNIQUE CAPABILITIES:
Run duration to 15 minutes at low Reynolds Number condition

Run duration of 2 to 3 minutes per day at high Reynolds Number condition

Schlieren and 3 component laser velocimeter systems, pulsed laser Schlieren, laser induced fluorescence, holographic interferometry, and laser light sheet

INSTRUMENTATION:
126 channel pressure measuring system, 120 channel thermocouple reference junction system

Three dimensional flow field probing; two ranges of 6 component force balances available

144 channel data acquisition system capable of sampling all channels up to 500 times/second

Only Mach 6 facility in DOD with this Reynolds number capability.

FACILITY TYPE: Wind Tunnel

PURPOSE:
High Mach experiments

FACILITY NAME:
Mach 3, High Reynolds Number Facility

PRIMARY CAPABILITIES:
Uniform Mach 3 flow

Reynolds Number range to 140 million/foot

8 inch by 8 inch test section

SPECIAL/UNIQUE CAPABILITIES:
High Reynolds Number capability

Run times as long as 3 minutes possible

INSTRUMENTATION:
126 channel pressure measuring system; 32 channel thermocouple reference junction system

Flow field probing; flow field measuring capability; 128 channel data acquisition system capable of sampling all channels 500 times/second

Hot-wire measuring capability; Schlieren and 3 component laser velocimeter available; pulsed laser Schlieren, laser light sheet, copper vapor imaging available

Only Mach 3 facility in DOD with this Reynolds number capability

FACILITY TYPE: Wind Tunnel

PURPOSE:
High Mach experiments

FACILITY NAME:
Mach 12 to 14 Twenty Inch Hypersonic Wind Tunnel

PRIMARY CAPABILITIES:
20 inch open jet test section

Uniform Mach 12 or Mach 14 flow

Reynolds Number range to 1 million/foot

Simulate flight conditions from 120,000 to 150,000 feet

SPECIAL/UNIQUE CAPABILITIES:
Run times from 5 to 8 minutes, several per day

Pulsed laser, Schlieren, chemiluminescent, and laser light sheet available

INSTRUMENTATION:
45 channel pressure measuring system

52 channel thermocouple reference junction system

72 channel data acquisition system capable of sampling channels at 500 times per second

Only continuous running Mach 12 air facility in DOD

FACILITY TYPE: High Temperature Acoustic Research Chamber

PURPOSE:

To conduct combined high temperature and acoustic response and fatigue research of structural components

FACILITY NAME:

Combined Environment Acoustic Facility

PRIMARY CAPABILITIES:

Research specimen size 4x4 feet

Temperatures up to 2500 degF

Overall sound pressure levels up to 180 dB

SPECIAL/UNIQUE CAPABILITIES:

Up to 300 channels of data may be measured and recorded

Transducers and signal conditioning for measurement of temperature, strain, pressure, and vibration

Laser vibrometer for non-contacting dynamics measurement

This is the only facility in the world that can conduct combined extreme temperature and high intensity acoustic research on large test specimens.

FACILITY TYPE: Aircraft Structures Research Facility

PURPOSE:

Experimental investigation and life verification of the fatigue and fracture behavior of structural elements

FACILITY NAME:

Structures Research Facility

PRIMARY CAPABILITIES:

Research for experimental investigation & life validation to ensure structural durability and damage tolerance under a variety of simulated environmental conditions

SPECIAL/UNIQUE CAPABILITIES:

Includes both mechanical (static) and hydraulic (fatigue) machines; element/sub-component research from 10,000-500,000 pounds

Combined thermal/mechanical fatigue research to 100,000 lbs under controlled temperature ranges from -200 to 2300 deg F

Simulated altitude conditions from sea level to 250,000 ft with flexibility to mix up to 4 different gases

INSTRUMENTATION:

Digitally controlled test machines with both visual and automated crack-growth measurement capability

Computer workstation serves as redundant data acquisition system for applied loads

As many as 30 data channels may be used for data acquisition on a given run

This is the only large-scale structures research facility in the world that can perform research under a wide variety of environmental conditions

AIR VEHICLES - FIXED - PROPULSION

FACILITY/EQUIPMENT DESCRIPTIONS

FACILITY TYPE: Turbine Engine

PURPOSE:
To conduct exploratory and advanced development research and evaluations of full-scale, multi-stage, and single shaft fans and compressors

FACILITY NAME:
Compressor Research Facility (CRF)

PRIMARY CAPABILITIES:
Speed/power: 3,000 to 16,000 rpm at 30,000 hp; 16,000 to 30,000 rpm at 15,000hp

Acceleration rate: 10%/second (facility speed); Shop area : 13,325 square feet

Inlet conditions: pressure, 2 psia-ambient; flow (actual), 15-500lbm/sec; temperature, ambient

Discharge conditions: Flow (maximum corrected) in core 500 lbm/sec, in fan discharge system (FDS) 100 lbm/sec; temperature in core 1,490 degF, in FDS 400 deg F

SPECIAL/UNIQUE CAPABILITIES:
Steady-state and transient phenomena on full-size test articles under operating conditions simular to actual flight profiles

Dual discharge, laser anemometry, on-line graphics, automatic strain gage monitoring, near real-time analog data reduction

Facility automated and computer controlled

INSTRUMENTATION:
712 channels, steady-state digital data

164 channels analog data (frequency response up to 100 KHz)

Laser transit and laser Doppler flow measurement

This national facility is unique in that no other facility in the country can match its size and data acquisition capability. It is the most modern facility of this type in the nation.

FACILITY TYPE: Turbine Engine

PURPOSE:
Research advanced fan and compressor concepts

FACILITY NAME:
Compressor Aerodynamic Research Laboratory

PRIMARY CAPABILITIES:
2000 hp, 6,000 to 21,500 RPM

Air flow 20 to 60 lbs/sec

14 to 19 inch rotor tip diameter

6 to 15 psia inlet total pressure

SPECIAL/UNIQUE CAPABILITIES:
Three unique compressor test vehicles for advanced research in single and multistage compressor aerodynamic phenomena

INSTRUMENTATION:
160 channels steady state pressure measurement, 100 channels steady state temperature measurement

12 channels high frequency unsteady pressure, 10 channels dynamic strain, rotating components

10 channels dynamic strain, stationary components, 8 channels rotor tip clearance measurement

The facility is unique in that it can set and hold speed within 1 RPM for precise aerodynamic performance measurements. It permits tests of high risk aerodynamic concepts in a small scale size at lower costs than full scale facilities.

FACILITY TYPE: Turbine Engine

PURPOSE:
Support compressor research test programs

FACILITY NAME:
C R F Component Research Laboratory

PRIMARY CAPABILITIES:
Flow facility for calibration of inlets and probes

Low speed compression system studies for flow measurement development

Holographic interferometry on compressor blades, vanes, and instrumentation probes

SPECIAL/UNIQUE CAPABILITIES:
Development of both laser transit and laser Doppler anemometery systems
Spectral analysis through thermal emissions (SPATE)

INSTRUMENTATION:
Argon laser, optical devices

Analog and digital data acquisition

FACILITY TYPE: Turbine Engines

PURPOSE: Provide analytical and physical research and test capabilities to develop turbine component technology

FACILITY NAME:

(1) Turbine Aero Thermal Research Facility
(2) Advanced Turbine Aero Thermal Research Laboratory

PRIMARY CAPABILITIES:

(1) Turbine Aero/Thermal Basic Research Facility focuses attention on turbulence effects on turbine heat transfer and film cooling; rig test cell 21

(2) Advanced Turbine Aerothermal Research Rig (ATARR) for heat transfer and aerodynamic performance measurement and research on full-scale turbines; J-Bay

ATARR will simulate all relevant engine conditions governing turbine operation

ATARR will incorporate unique nonintrusive instrumentation systems to measure surface heat transfer, velocity and temperature within turbineblade passages

SPECIAL/UNIQUE CAPABILITIES:

(1) Basic Research:ability to take aero/thermal data with/without blowing at turbulence levels of 5 to 25% in a 1-D flow field

(2) ATARR:low cost short duration operation, integrated aerodynamic and heat transfer research in 3-D rotating environment

INSTRUMENTATION:

(1) Laser: 2 focus velocimeter, 3 component off axis laser doppler velocimeter, 8 channel hot wire aneomometer

(2) High frequency on-surface heat flux sensors; temperature and pressure probes

This is the world's only facility capable of measuring integrated aerodynamic and heat transfer performance simultaneously. It can simulate engines with overall pressure ratios in excess of 50:1.

FACILITY TYPE: Advanced Propulsion Combustion

PURPOSE:
Research on air breathing engine components, such as, ramjet, turbo-ramjet and scramjet combustors

FACILITY NAME:
High Mach Advanced Propulsion Research Facility

PRIMARY CAPABILITIES:
Research on engine component (up to 24 inch diameter, 120 inch length) performance at both high and low altitudes

SPECIAL/UNIQUE CAPABILITIES:
Large scale, direct-connect thrust stand with vitiated air heater and liquid oxygen system, capable of measuring up to 20,000 lb of thrust

Continuous flow, 1250 deg F, 30 lb/sec airflow capability

Low pressure exhaust system for high altitude operation

Shielded control room provides ability to process classified data

Subsonic or supersonic combustion experiments using hydrogen or hydrocarbon fuels

High temperature fuel system for endothermic fuels research

INSTRUMENTATION:
On-line data acquisition system
Computers: two Sun 630MP workstaions, three X-terminals

This is the only facility in the nation which has the capability to determine the thrust performance of very large scale air breathing combustors using a continuous high mass flow air system with inlet temperatures in excess of 1200 deg F. This research can also be accomplished with high temperature fuels, including those with endothermic properties, which further makes this facility unique to the nation. Currently, this facility is leading the nation in the application of computer control and data acquisition.

FACILITY TYPE: Water Tunnel

PURPOSE:
Conduct flow visualization experiments on different engine configurations

FACILITY NAME:
Flow Visualization Research Facility

PRIMARY CAPABILITIES:
Closed loop water tunnel holding over 1200 gallons of water

Flow rate from 30 to 1500 gallons/minute continuously

SPECIAL/UNIQUE CAPABILITIES:
Three separate circuits of visualization enhancement

There are no similar facilities in the Federal Government using water to provide high Reynolds number flow conditions for visualization of the internal flow path through air breathing propulsion systems. This facility provides a very cost effective method for gaining an understanding of inlet and combustor operation, particularly when integrated with other facilities testing actual hardware in realistic flight conditions.

FACILITY TYPE: Ramjet combustion

PURPOSE:
Conduct basic and applied research on subsonic ramjet combustors

FACILITY NAME:
Ramjet Combustion Research Facility

PRIMARY CAPABILITIES:
Small scale, direct connect thrust stand (components up to 12 inch diameter and 60 inch length) with vitiated heater and oxygen replenishment system

Inlet temperatures from ambient to 1600 degF and thrust measurements up to 5,000 1bf

Flow capabilities are 15 1bm/sec at 750 psia

SPECIAL/UNIQUE CAPABILITIES:
Fuel injection test stand

Laser Doppler velocimeter

Water cooled test rig for flow field studies

Coherent Anti-Raman Scattering measurement of combustion temperature and species information

INSTRUMENTATION:
Computers: Sun 630MP; Vaxstation 3200 (96 analog inputs); Neff System 470

Lasers: Argon Ion 5 watt; Argon Ion 10 watt

This facility is unique to the nation because of the combination of measurement and diagnostic tools available to determine air breathing combustion performance applicable to aircraft and missile propulsion. This ranges from conventional thrust and pressure performance measurements, to fuel spray analysis, to the most advanced laser diagnostic techniques available today. Nowhere else in the country are these techniques combined in one facility which also provides continuous test conditions fully representative of high speed flight.

FACILITY TYPE: Subsonic and Supersonic Combustion

PURPOSE: Conduct basic and applied research in the field of subsonic and supersonic combustion

FACILITY NAME:
Supersonic Combustion Research Facility

PRIMARY CAPABILITIES:
Medium: air; flow rates: 1-20 lbm/sec; pressure: up to 750 psia; temperature: up to 1460 deg R

Water for spray cooling as well as recirculated N2 and shop air

SPECIAL/UNIQUE CAPABILITIES:
Facility enclosed in a conditioned environment which will maintain temperature to within less than 1/2 degree

All valving are automatically controlled and parameters are modified using terminal keyboard

Up to a Mach of 5.0 in a 5"x 6" test section is attained simply by exchanging nozzles

Continuous flow capability

INSTRUMENTATION:
Controls and computers: Johnson Yokogawa Microxl Distributed Control System with 1 uXL Operator Station

Lasers: ARGON-LDV and flow visualization; XEMER-temperature, species concentration and identification; YAG-temperature measurements and species concentration

This is the only facility in the country today which can provide precisely controlled, continuous test conditions at Mach 5, with stagnation temperatures up to 1000 deg F, and optical access to the flow from three directions simultaneously. This is combined with the broad range of laser diagnostic techniques described above to make this facility truly one of a kind. Flow visualization techniques recently developed in this facility, and unique to its continuous flow capabilities, are providing details of supersonic combustion flows which are not available from other facilities in this country.

FACILITY TYPE: Propeller Research

PURPOSE:

Performance, endurance, and validation research of propellers and other test articles

FACILITY NAME:

Propeller Research Facility

PRIMARY CAPABILITIES:

Whirl Rig #1:hp-10,000; thrust(lb)-60,000; max test article diameter(ft)-44; RPM-7,200

Whirl Rig #2:hp-3,500; thrust(lbs)-40,000; max test article diameter(ft)-44; RPM-9,000

Whirl Rig #3:hp-2,500; thrust(lbs)-20,000; max test article diameter(ft)-44

SPECIAL/UNIQUE CAPABILITIES:

Electrically driven

High horsepower drives

Wide speed range with precise speed control

INSTRUMENTATION

Monitor rotational speed, power, thrust,vibration and bearing temperatures

Only known capability to test high horsepower propellers with precise speed control in the U.S.

FACILITY TYPE: Airbreathing Propulsion System

PURPOSE:

Provides simulated flight conditions for research cells in the turbine engine, advanced propulsion and fuel technology areas

FACILITY NAME:

Component Research Air Facility

PRIMARY CAPABILITIES:

Compressed air available
32 lbs/sec (pps) at 750 psia, from ambient to 1200 deg F; 31 pps at 50 psia, ambient temperature; 7.5 pps at 315 psia, ambient temperature to 1200 def F

Altitude simulation from sea level to 60,000 ft at various flow rates

SPECIAL/UNIQUE CAPABILITIES:

Clean, heated air with altitude simulation for small to moderate scale component research

INSTRUMENTATION:

Monitor pressure, temperature, flow and vibration

Central control room, Fully computer controlled, 2,000 real-time data channels

FACILITY TYPE: Sea Level Engine Stand

PURPOSE:
Performance, endurance and validation research and research of aircraft jet engines and other research articles

FACILITY NAME:
D-Bay Sea Level Engine Stand

PRIMARY CAPABILITIES:
Floor mounted, pedestal type, 60,000 lbs thrust stand

Accepts research articles up to 8'4" diameter, 20' long

Cell air flow capability to 2,300 pounds per second

Fuel system capable of 100,000 pounds per hour flow rate

INSTRUMENTATION:
100 thermocouple channel with ice point reference; 75 pressure taps; 50 undesignated input channels for engine instrumentation

Data acquisition by computer, engine operation in manual mode only

Capability and interface for fully automatic operation exists if control computer is replaced

FACILITY TYPE:
Combustion

PURPOSE:
Develop and evaluate laser-based diagnostics, computer models, and advanced gas turbine engine combustor concepts that operate stablely and provide high heat release with low emissions (e.g., NOx).

FACILITY NAME:
Diagnostics Development and Combustion Research Facility

PRIMARY CAPABILITIES:
Combustor research including measurement of turbulence intensity, transportation and evaporation phenomena.

Fuel injection, mixing, and kinetic studies using non-intrusive laser-based instruments developed in-house.

Air flow rates, temperatures and pressures up to 34 lbm/s, 1100 F and 750 psig, respectively.

SPECIAL/UNIQUE CAPABILITIES:
Laser-based diagnostics and quantitative imaging devices enabling non-intrusive measurements of combustion-related properties in research combustors.

Rigs that vary in size from single-droplet-on-demand to combustor sectors utilizing aircraft hardware. All provide ease of configuration change.

Adaptable to research combustors possessing many characteristics of aviation gas turbine combustors burning a wide variety of gaseous and liquid fuels, including hydrogen.

INSTRUMENTATION:
Non-intrusive laser-based instrumentation for measurement of velocity, temperature, droplet size and distribution, and specie concentration.

Flow visualization using Mie scattering and exhaust gas analysis using extractive probes.

One-of-a-kind combustion rigs along with laser-based non-intrusive diagnostic devices provide a capability not available anywhere else in the world.

FACILITY TYPE: Fuels
PURPOSE: To develop and demonstrate new and/or improved aviation turbine and missile fuels for all current, next generation and future Air Force air-breathing weapon systems. To provide unique state-of-the-art fuel analysis capability to update and maintain all DoD aviation turbine fuel specifications and related products. To support all Air Force customers that need assistance with fuel or fuel system issues.

FACILITY NAME: Fuel Development Research Facility

PRIMARY CAPABILITIES: State-of-the-art fuel analysis using: gas chromatography, mass spectrometry, liquid chromatography, infrared spectroscopy, ultraviolet/visible spectroscopy, nuclear magnetic resonance spectroscopy. Equipment to measure acid number, peroxides, trace metals, carbon, sulfur, nitrogen, oxygen, lubricity and thermal stability. One-of-a-kind aircraft fuel system thermal environment simulators including an augmentor simulator, Extended Duration Thermal Stability Test (fuel nozzles and lube oil heat exchangers, Phoenix rig (fuel nozzles and ram air heat exchangers), and Reduced Scale Fuel System Simulator (F-22/F119).

SPECIAL/UNIQUE CAPABILITIES:

Capabilities for the development and maintenance of fuel specifications
Fuel compositional analysis
Fuel additive performance measurement
Evaluation of fuel behavior under sub-critical and supercritical conditions
Measurement of fuel thermal stability and fuel fouling in aircraft components
One-of-a-kind aircraft component simulators

INSTRUMENTATION:

Gas chromatographs, gas chromatographs with mass spectrometers, gas chromatograph with atom emissions detector, liquid chromatograph, supercritical fluid extraction unit, infrared spectrometer, UV/visible spectrometer, nuclear magnetic resonance spectrometer, elemental analyzers, Ball-on-Cylinder Lubricity Evaluator (BOCLE), Jet Fuel Thermal Oxidation Tester (JFTOT), quartz crystal microbalances, photon correlation spectrometer, Remaining Useful Life Evaluation Rig (RULER), and the Peroxides in Fuel Estimation and Concentration Test (PERFECT).

Fuel system component simulators: Isothermal Corrosion Oxidation Tester (ICOT), augmentor simulator, Extended Duration Thermal Stability Test (EDTST), Phoenix Rig, Near Isothermal Fuel Test Rig (NIFTR), Reduced Scale Fuel System Simulator (RSFSS).

One-of-a-kind fuel system simulators and state-of-the-art fuel analysis and development capability unmatched by DoD or industry. Lead laboratory in DoD for fuels research and development under Project Reliance.

FACILITY TYPE:
Lubricants

PURPOSE:
To determine the performance suitability of lubricants for use in aircraft engine and power generation equipment.

FACILITY NAME:
Turbine Engine Lubricant Research Facility

PRIMARY CAPABILITIES:
Complete chemical and analytical analysis capability to measure lubricant physical properties and performance characteristics. Also capable of conducting full scale engine research and used oil diagnostics to determine lubricant condition, wear mechanisms and engine lube system condition.

SPECIAL/UNIQUE CAPABILITIES:

- T63-A5A turboshaft engine with waterbrake dynamometer
- Lubricant component atomic assay
- Lubricant friction and wear research for liquids and solids
- Phase contrast; bichromatic and polarized light microscope
- Miniaturized turbine engine lube system simulator
- Computer automated system for thermal diagnostic studies to identify lubricant decomposition species up to 1100 C.

INSTRUMENTATION:

- Engine cells with automated data acquisition
- Ferroscope, analytical and direct reading ferrograph
- Automated gas chromatographic atomic emission detector
- Scanning electron microscope with elemental analysis
- Atomic emission/absorption spectrophotometer
- Computer automated infrared and mass selective detector
- Differential scanning calorimeter, differential thermal analysis, thermogravimetric, and thermomechanical analysis

No other DoD or commercial facility is equipped with the comprehensive range of instrumentation and research facilities dedicated to the analysis and evaluation of proprietary lubricant formulations required to provide cost competitive, high performance turbine lubricants. Provides rapid response to field support problems.

FACILITY TYPE:
Lubrication Systems

PURPOSE:
To conduct evaluations related to operational problems with gas turbine engine lubrication systems. To develop and evaluate lubrication system concepts for advanced turbine engines that impose unprecedented temperature and speed requirements.

FACILITY NAME:
Bearings Research Facility

PRIMARY CAPABILITIES:
A complete spectrum of equipment is available for development and evaluation of lubrication system concepts. Capabilities range from determination of film thickness and viscosity in the elastohydrodynamic region between bearing surfaces, through the evaluation of rolling contact fatigue characteristics, to demonstration of bearing dynamics and endurance with full scale flight weight hardware.

SPECIAL/UNIQUE CAPABILITIES:
Capability to evaluate rolling contact fatigue, bearing dynamics, and fluid film thickness at temperatures up to 1500 F. Ability to measure fluid viscosity and density at pressures up to 435,000 psi and temperatures up to 325 F.

INSTRUMENTATION:
Each research rig has unique, state-of-the-art instrumentation, appropriate for the parameters of interest. The rigs include:

- Bearing and gear material fatigue testers, with high temperature load cells and accelerometers for automatic shutdown
- High pressure viscometer with a linear variable differential transformer
- Optical elastohydrodynamic rig with a sapphire window for viewing the bearing contact zones
- Full scale bearing dynamics tester with radial and axial eddy current probes for displacement measurement
- High speed bearing tester with unique tachometer and load cell features

This facility represents the only DoD capability for evaluation of innovative lubrication concepts for advanced gas turbine engines. The temperature capability of the various rigs has been engineered to meet the predicted conditions in those engines. The propinquity of lubricant development efforts to the systems evaluation produces a synergism that is unmatched in the world.

AIR VEHICLES - FIXED - FLIGHT SUBSYSTEMS

FACILITY/EQUIPMENT DESCRIPTIONS

FACILITY TYPE: Aircraft Electrical Power Systems

PURPOSE:
Evaluate state-of-the-art power generation, conversion, and motor drive equipment for aircraft applications

FACILITY NAME:
Aircraft Electrical Power Laboratory

INSTRUMENTATION:
600 HDC vapor light source; dye, air, and hot water injection

Video camera systems for qualitative diagnostics

PRIMARY CAPABILITIES:
Research electrical components and systems from high speed power devices to several hundred kilowatt aircraft power systems

SPECIAL/UNIQUE CAPABILITIES:
Three computer controlled 350 hp drive stands

INSTRUMENTATION:
CAMAC based data acquisition on MicroVAX II GPX

Data acquisition and analysis capability

On wave forms up to 100MHZ

FACILITY TYPE: Battery R&D Laboratory

PURPOSE:
Research and development in electrochemical energy conversion

FACILITY NAME:
Battery Laboratory

PRIMARY CAPABILITIES:
Fabricate, evaluate and life cycle batteries/cells and fuel cells

Electrochemical analysis equipment and facilities for continuous (24 hr/day) research

SPECIAL/UNIQUE CAPABILITIES:
Chemical laboratory

Dry room with 2% or less relative humidity

Explosion-proof isolation chambers

INSTRUMENTATION:
Gas chromatograph; differential scanning calorimeters; Fourier transform infrared spectrophotometer

Inert atmosphere chamber; microcalorimeter; thermogravimetric analyzer; battery automatic analysis equipment; redundant HP 1000 computer control/ data collection

Scanning electron microscope; time-lapse optical microscope; energy dispersive X-ray spectrometer

Only DoD facility capable of electrochemical cell development, assembly, research and evaluation.

FACILITY TYPE: Heat Transfer R&D Facility

PURPOSE:

Conduct basic and applied heat transfer research applicable to aircraft power thermal management

FACILITY NAME:

Thermal Laboratory

PRIMARY CAPABILITIES:

Performance and life research on electronic temperature and high temperature heat pipes

Thermal energy storage and transient heat transfer research

Transient and steady-state thermal research with heat and mass transfer modeling

SPECIAL/UNIQUE CAPABILITIES:

Clean room, dry box, and fabrication area

Electronic temperature and liquid metal heat pipe fill station; cryogenic vacuum chambers for heat pipe research

Heat transfer fluid processing and purification apparatus with a full complement of high vacuum equipment

INSTRUMENTATION:

Vacuum leak detection system, automated data acquisition and high vacuum pumps

Calorimetry and temperature measurements

Environmental and inert gas atmosphere chamber; optical pyrometers (non-contact) temperature sensors

Only DoD facility capable of developing, fabricating, researching, and evaluating heat transfer techniques applicable to aircraft.

FACILITY TYPE: Heat Transfer R&D Facility

PURPOSE:

Conduct basic and applied heat transfer research applicable to aircraft and spacecraft power thermal management

FACILITY NAME:

Ammonia Research Facility

PRIMARY CAPABILITIES:

Transient and steady-state component research

Developmental work on capillary pump loop systems

Performance research of high capacity heat pipes as well as conventional and flat plate heat pipes

Research and analysis of high "g" effects on heat transfer processes

SPECIAL/UNIQUE CAPABILITIES:

Heat pipe fabrication area, heat transfer fluid processing and fill station (low temperature)

Ammonia research capability with ammonia fill station, high vacuum systems and explosion-proof cells

Centrifugal table for low and high "g" research, body force modeling

INSTRUMENTATION:

Vacuum leak detection system, automated data acquisition and high vacuum pumps

Calorimetry and temperature measurements

Environmental and inert gas atmosphere chamber, 100 kW refrigeration system

Only facility in U.S. capable of studying thermal management systems and techniques under high "g" loads.

FACILITY TYPE: Superconductivity

PURPOSE:
Synthesize various compositions of the high temperature superconductors, measure the electrical and magnetic properties, and determine practical uses

FACILITY NAME:
Superconductivity and Cryogenics Laboratory

PRIMARY CAPABILITIES:
Characterization of cryogenic properties of superconductors

SPECIAL/UNIQUE CAPABILITIES:
Two superconducting coils: 3-inch bore, 10 Tesla coil, 20 kilojoule repetitively pulsed coil
7 inch bore, cryogenically cooled 14 Tesla coil

INSTRUMENTATION:
Computer Controlled Variable Temperature (2-400K) and Field (0-5 Tesla) Squid Susceptometer

Variable Temperature (10-80K) and Field (0-10 Tesla) Transport Current Measurement Apparatus

RF Source Sputtering Rig, Optical Microscope, Furnaces

Only DoD facility which develops high temperature superconductors for power generation applications. Superconductors hold world record in current density capability.

FACILITY TYPE: Thermionic Energy Conversion

PURPOSE:
Conduct research on thermionic energy conversion devices for electrical power generation

FACILITY NAME:
Thermionics Laboratory

PRIMARY CAPABILITIES:
Basic and applied research on high temperature thermionic emission through diodes using refractory materials for electrodes

Diagnostic life research capabilities for future diodes

SPECIAL/UNIQUE CAPABILITIES:
Liquid metal processing for thermionic diodes

Fully equipped diode analysis stations with alternating current sweep biasing

INSTRUMENTATION:
High speed data acquisition

High efficiency electron bombardment heating; accurate high temperature measurement

486 compatible data processing

Reynolds, D., Evans, K., Jogai, B., Stutz, C. and Yu, P. "Fine Structure Features Due to Wave Function Localization in Coupled $Al_xGa_{1-x}As/GaAs$ Quantum Wells", Physical Review, Nov 91

Serafino, K. and Dukes, M. "VHDL and WAVES Descriptions for a Pseudo-Random Pattern Generator", Nov 91

Sheriff, R., E., Manasreh, M., O., Stutz, C., E., Evans, K., R., Gumbs, G., and Zhang, C. "Splitting of Cyclotron Resonance Spectra in Alo.5Gao.5Sb/InAs Single Quantum Well", Proceedings: American Physical Society, Mar 91

Martinez, M., J. "Measurement of Valence Band Edge Discontinuity for the InAlAs/GaAsSb Heterojunction Lattice-Matched to InP", Proceedings: IEEE Elect. Dev. Soc., 4th Intl. Conf. Indium Phasphide & Related Materials, Apr 92

Johnstone, D., K., Stutz, C., E. and Evans, K., R. "Defect Levels in MBE GaAs Grown at 200^{0}C", Proceedings: American Physical Society Meeting, Mar 92

Whitson, D., Creech, G., Naishadham, K., Neidhard, R., A. and Nuteson, T., W. "A Versatile Physically Based CAD Model for Spiral Inductors in MMICs", Proceedings: MTT-Symposium, Jun 92

Liou, L., Huang, C., L and Ebel, J. "Thermal Effects on the Characteristics of AlGaAs/GaAs Heterojunction Bipolar Transistors Using Two-Dimensional Numerical Simulation", Proceedings: Int'l Semiconductor Device Research Symposium, Dec 91

Covington, B., C., Schauer, J., Manasreh, M., O., Stutz, C., E. and Evans, K., R. "Persistent Photo-effect in GaAs/AlGaAs Multiple Quantum Well Structures", Proceedings: American Physical Society Meeting, Mar 92

Yu, P., W., Reynolds, D., C., Jogai, V. and Stutz, C., E. "Photoluminescence of GaAsSb/InAlAs Quantum Wells Lattice Matched to InP", Proceedings: American Physical Society Meeting, Mar 92

Loehr, J., P., Evans, K., R., Stutz, C., E., Reynolds, D., C. and Yu, P., W. "Electron and Hole Reduced Effective Mass in GaAs Obtained from Magneto Optical Measurements on $In_xGa_{1-x}As/GaAs$ Quantum Wells", Proceedings: American Physical Society Meeting, Mar 92

Look, D., C., Robinson, G., D., Sizelove, J., R. and Stutz, C., E. "Conductivity and Hall-effect Measurements on Low-Temperature MBE GaAs", Proceedings: Semi-Insulating III-V Materials Conference, Apr 92

Manasreh, M., O., Evans, K., R., Stutz, C., E. and Hemsky, J. "Infrared Absorption of Localized Vibrational Modes of Silicon, Beryllium, and Aluminum in Low Temperature Molecular Beam Epitaxial GaAs", Proceedings: 7th Conference on Semi-Insulating III-V Materials, Apr 92

Look, D., C., Walters, D., C., Mier, M., Stutz, C., E. and Brierley, S., K. "Native Donors and Acceptors in Molecular Beam Epitaxial GaAs Grown at 200°C", Applied Physics Letter, Dec 91

Yu, P., W., Yen, M., Y. and Stutz, C., E. "Photoluminescence of Mg-Ion Implantation in Low Temperature Grown GaAs", Proceedings: Materials Research Society, Dec 91

Manasreh, M., O., Evans, K., R., Stutz, C., E., Look, D., C. and Hemsky, J. "Incorporation of Silicon in Low Temperature Molecular Beam Epitaxial GaAs", Proceedings: Materials Research Society, Dec 91

Manasreh, M., O., Evans, K., R., Stutz, C., E., Look, D., C. and Hemsky, J. "Incorporation of Silicon and Aluminum in Low Temperature Molecular Beam Epitaxial GaAs", Applied Physics Letters, Dec 91

Bardeleben, Jia, Hirtz, Garcia, Manasreh, Stutz, and Evans "Electron Paramagnetic Resonance Study of Low Temperature Molecular Beam Epitaxy Grown GaAs and InP Layers", Materials Research Society, Dec 91

Yu, P., W., Robinson, G., D., and Stutz, C., E. "Deep Center Photoluminescence of Peeled GaAs Layers Grown at Low Temperatures by Molecular Beam Epitaxy", Proceedings: 7th Conf. on Semi-Insulating III-V Mateirals, Apr 92

Brown, J., L. "Preparing Samples for Scattering Measurements - A Cleaning Study", Proceedings: OSA Surface Roughness and Scattering Conference, Jun 92

Martinez, E. "New Gate Current Models for Complementary Heterostructure FETs", Proceedings: 1992 Joint Symposium III - APS, URSI Radio Science Meeting and Nuclear EMP, Jul 92

Schuermeyer, F. "Subthreshold Currents in n-HFETs", Proceedings: WOCSEMMAD, Feb 92

Heine, F., Heumann, E., Huber, G., and Schepler, K. "Mode Locking of Room Temperature CW Thulium and Holmium Lasers", Proceedings: Advanced Solid State Lasers Conference, Feb 92

Martinez, M. J. "Measurement of Valence Band Edge Discontinuity for the InA1As/GaAsSb Heterojunction Lattice-Matched to InP", Proceedings: IEEE 4th Intl Conf Indium Phosphide and Related Materials, Apr 92

Boggan, G. H. "Fault Tolerance Analysis and Applications to Microwave Modules and MMICS", Proceedings: National Aerospace Electronics Conference, May 92

Martinez, M., J. "Sb-based HFETs, Complementary HFETs", Proceedings: Workshop on Compound Semiconductor Materials and Devices, Feb 92

Sewell, J., Bozada, C., Styrcula, M. and Davis, W. "Single-Cycle Lithography Process for Both Large and Sub-Half Micron Features", Proceedings: SPIE's 1992 Symposium on Microlithography, Mar 92

Manasreh, M., O. and Brown, G., J. "Introduction to Infrared Quantum Detectors", Artech House, Inc., May 92

Schuermeyer, F. "Subthreshold and Above Threshold Gate Current on Heterostructure Insulated Gate Field Effect Transtors", Electronics Letters, Feb 92

Micheel, L., J. "Heterojunction Bipolar Technology for Emitter-Coupled Multiple-valued Logic in Gigahertz Adders and Multipliers", Proceedings: 22nd Int. Symposium on Multiple-valued Logic, May 92

Reitz, L., F. "High Responsivity UV Photoconductor Based on GaN Epilayers", Proceedings: Workshop on Widegap Nituides, Apr 92

Martinez, E. "Hot Electron Regime of Heterostructure Field Effect Transistor Operation", Proceedings: IEEE Device Research Conf., Jun 92

Budni, P., A., Knights, M., G., Chicklis, E., P. and Schepler, K., L. "High Repetition Rate $AgGaSe_2$ Optical Parametric Oscillator", Proceedings: Optical Society of America, Sep 92

Schuermeyer, F. "Gate Currents in Complementary HFETs", Proceedings: Device Research Conference, Jun 92

Loehr, J., P., Lam, Y. and Singh, J. "Strained Quantum Well Laser Optimization for 30 Ghz Operation", Proceedings: Device Research Conference, Jun 92

McCoy, J., L. "Technology Transfer Opportunities in the Solid State Electronics Directorate, Wright Laboratory", Proceedings: Sponsored by New Technology Week, Mar 92

Blasingame, J., M. "Computerworld Interview on MMST-CIM", Computerworld, Mar 92

Manasreh, M., O. "Far-Infared Cyclotron Resonance of 2-Dimensional Electron Gas in III-V Semiconductor Heterostructure", Institute of Physics Publishing, Oct 91

Look, D., C., Sizelove, J., R. and Grant, J., T. "Shifted X-ray Photoelectron Peak in Molecular Beam Epitaxial GaAs Grown at 200°C", Applied Physics Letters, Mar 92

Ikossi-Anastasiou, K., Ezis, A., Evans, K. and Stutz, C., E. "Low Temperature Characterization of High Current Gain AlGaAs/GaAs Narrow-Base Heterojunction Bipolar Transistor", IEEE, Mar 92

Liou, L., Huang, C., I. and Ebel, J. "Thermal Effects on the Characterization of AlGaAs/GaAs Heterojunction Bipolar Transistors Using Two-Dimensional Numerical Simulation", IEEE Transactions of Electron Devices, Mar 92

Cederquist, J., N., Angell, K., Seldin, J., H. and Weigand, K., A. "Novel Opto-electronic Neural Network", Proceedings: SPIE Aerospace Sensing Symposium, Apr 92

Reitz, L., F. "High Responsivity UV Photoconductors Based on GaN Epilayers", Proceedings: University of Illinois, Apr 92

Szmulowicz, F., Vaughan, T., Manasreh, M., O. and Stutz, C., E. "Calculation and Measurement of the Electron Density and Temperature Dependence of the Intersubband Absorption in n-type GaAs/$Al_{0.3}Ga_{0.7}As$ Multiple Quantum Wells", Proceedings: 21st International Conference on the Physics of Semiconductors, Aug 92

Mack, M., P., Reaves, C., M., Corvini, P., J., DenBaars, S., P., Leonard, M., S., Mondry, M. and Merz, J., L. "Growth of High Quality $In_xGa_{1-x}As$/InP Quantum Wells with Tertiarybutylarsine and Tertiarybutylphosphine", Proceedings: Minerals, metals and Materials Society, Jun 92

Yu, P., W., Reynolds, D., C., Jogai, B., Loehr, J. and Stutz, C., E. "High Valence-band Offset of GaSvAs-InAlAs Quantum Wells Grown by Molecular Beam Epitaxy", American Institute of Physics, Apr 92

Jones, C., R., Kaspi, R. and Evans, K., R. "In-Situ Control of III-V Molecular Beam Epitaxy via Desorption Mass Spectrometry", Proceedings: Ohio Section of American Physical Society Meeting, May 92

Multiple authors "Solid State Electronics Directorate, FY93 Program Overview", Apr 92

Budni, P., A., Knights, M., G., Chicklis, E., P. and Schepler, K., L. "Kilohertz $AfGaSe_2$ Optical Parametric Oscillator Pumped a 2 um", Optical Society of American/Washington DC, May 92

Ikossi-Anastasiou, K., Johnstone, D., K., Stutz, C., E. and Evans, K., R. "Interface States in Regrown GaAs p-n Junctions by Selective Molecular Beam Epitaxy", Applied Physics Letters, May 92

Wagner, S., E. "Prospects for Military Multichip Modules", May 92

Jogai, B., Manasreh, M., O., Stutz, C., E., Whitney, R., L. and Kinell, D., K. "Intersubband Optical Absorption in Heavily-Doped n-type GaAs/AlGaAs Multiple Quantum Wells", Physical Review B, May 92

Manasreh, M., O., Stutz, C., E., Solomon, J., G., Mier, M., G., Kaspi, R. and Evans, K., R. "Infrared Absorption of Localized Vibrational Modes of Silicon and Beryllium in Low Temperature Molecular Beam Epitaxial GaAs", Proceedings: 7th Conference on III-V Semi-Insulating Materials, Apr 91

Evans, K., R., Kaspi, R., Jones, C., R., Stutz, C., E., Look, D., C. and Yu, P., W. "MBE Growth of InAlAs and AlGaAs at High Substrate Temperatures", Proceedings: North American Conference on Molecular Beam Epitaxy, Apr 92

Alves, E., da Silva, M., F., Evans, K., Jones, C., Melo, A. and Soares, J., C. "Lattice Location of Ef in GaAs:Er and $Al_{.5}Ga_{.5}As$:Er Grown by MBE", Proceedings: Max Planck Institute, Sep 92

von Bardeleben, H., J., Jia, Y., Q., Manasreh, M., O. and Stutz, C., E. "Electron Paramagnetic Resonance Study or the Two-Dimensional Electron Gas in $Ga_{1-x}Al_xSv$/InAs Single Quantum Wells", Applied Physics Letters, May 92

Look, D., C., Robinson, G., D., Sizelove, J., R. and Stutz, C., E. "Conductivity and Hall-effect Measurements on Low-Temperature MBE GaAs", Proceedings: Semi-Insulating III-V Materials Conference, Apr 92

Schreiber, P. "Laser Radar Detector", Proceedings: NAECON, May 92

Stutz, C., E., Gillespie, J. and Sizelove, J., S. "Molecular Beam Epitaxial Growth Variations due to Effusion Cell Filament Design Found using High Density Analysis", Proceedings: IEEE, Oct 92

Reitz, L., F. "High Responsivity UV Photoconductors Based on GaN Epilayers", Proceedings: SPIE, Jul 92

Brown, J., L., Jero, P., D. and Hastings, S. "Surface Topography Measurements of Ceramic Fibers from Centimeter to Nanometer Scale", Proceedings: Applied Surface Science Division-American Vacuum Society, May 92

Sun, H., Davis, L., Bhattacharya, P, and Loehr J. "Piezoelectric and Electro-optic Effects in Tensiley and Compressively Strained $In_xGa_{1-x}As/In_{0.52}Al_{0.48}As$ Quantum Wells Grown on (111)B InP", Proceedings: 19th International Symposium on Gallium Arsenide and Related Compounds, Oct 92

Sun, H., C., Davis, L., Bhattacharya, P. and Loehr, J. "Piezoelectric Effects in Tensiley and Compressively Strained $In_xGa_{1-x}As/In_{0.52}Ga_{0.48}As$ Quantum Wells Grown on (111)B InP", Applied Physics Letters, Jun 92

Schuermeyer, F., Martinez, E., Shur, M. and Grider, C. "Gate Current in Complementary HFETs", Proceedings: IEEE Device Research Conference, Jul 92

Look, D., C., Fang, Z-Q. and Sizelove, J. "Recovery of Quenched Hopping Conduction in Molecular Beam Epitaxial GaAs Grown at 200°C", The Physical Review, Jun 92

Reynolds, D., C. and Evans, K., R. "Optical and Magneto-optical Properties of Narrow $In_xGa_1As/Ga_{1-x}As$ Quantum Wells", World Scientific Publishing Co., Jun 92

Manasreh, M., O., Szmulowicz, F., Vaughan, V., Evans, K., R., Stutz, C., E. and Fischer, D., W. "Intersubband Infrared Absorption in $GaAs/Al_{0.3}Ga_{0.7}As$ Multiple Quantum Well", Proceedings: NaTA Advanced Research Workshop, Sep 91

Reynolds, D., Jogai, B., Yu, P., Evans, K. and Stutz, C., E. "Increased Screening of the Hydrogenic Donor due to Modulation Doping in Quantum Wells", American Institute of Physics, Jun 92

Martinez, M., J. "$GaAs_xSv_{1-x}/In_yAl_{1-y}As$ p-Channel Heterostructure FETs with High Transconductance and Low Gate Leakage Current", Proceedings: IEEE Intl Electron Devices Meeting, Dec 92

Look, D., Walters, D., Robinson, G., Sizelove, J., Mier, M. and Stutz, C. "Annealing Dynamics of MBE GaAs Grown at 200°C", The Physical Review, Jun 92

Yu, P., W., Reynolds, D., C. and Stutz, C., E. "S' 'rp-line Photoluminescence of Low-Temperature GaAs by Molecular Beam Epitaxy", American Institute of Physics, Jun 92

Loehr, J., P. and Manasreh, M., O. "Theoretical Modeling of the Intersubband Transitions in III-V Semiconductor Multiple Quantum Wells", Artech House, Inc., Jun 92

FACILITY TYPE: Power Semiconductor Devices and Materials Evaluation

FACILITY NAME:
Power Semiconductor Laboratory

PRIMARY CAPABILITIES:
Electrical characterization & thermal performance measurement(power semiconductors, transistors, power integrated circuits,application specific ICs, power devices)

Contact evaluation

Circuit assembly and analysis

Photolithography and metal deposition

SPECIAL/UNIQUE CAPABILITIES:
Vacuum chambers for thermal cycling and ultraviolet radiation research

Calorimetry capability to 730 deg C

Fully equipped class 100 clean room for high temperature metallization research

INSTRUMENTATION:
Evaporation and sputtering deposition systems

Ultrasonic cleaner; welder and pull tester

Spectral radiometer; mini VAX; differential scanning calorimeter

Only DoD facility where this type of research is conducted.

FACILITY TYPE: Electrical Power Systems

PURPOSE:

Develop materials, components and systems for very high power pulsed and steady state electrical systems

FACILITY NAME:

High Power Laboratory

PRIMARY CAPABILITIES:

Develop superconductors, inverters, high energy density inductive and capacitive energy storage and switches

Analyze dielectric breakdown

SPECIAL/UNIQUE CAPABILITIES:

5 MegaWatt/1 KiloVolt, 5 MegaWatt/400 Volt, 1 MegaWatt/0-120 Volt DC power supplies
1.5 MV/400 KV high voltage pulsers

80 KiloJoule high current pulser

INSTRUMENTATION:

Partial discharge analysis system

High voltage DC power supplies

This facility has the largest array of power supplies to investigate the effects of high voltages on materials and electrical components.

FACILITY TYPE: Plasma Physics

PURPOSE:
Experimental and theoretical research on low energy plasmas

FACILITY NAME:
Plasma Physics Laboratory

PRIMARY CAPABILITIES:
Plasma investigations for lasers, high power switches and thin film processing

SPECIAL/UNIQUE CAPABILITIES:
200 KV electron gun with closed discharge system

Fourier transform infrared spectrometer; Fourier transform mass spectrometer

RF plasma reactor

INSTRUMENTATION:
Many of above devices controlled by microcomputers

Only DoD facility with state-of-the-art analysis equipment to probe low energy plasmas.

FACILITY TYPE: Pulsed High Voltage

PURPOSE:
Research stand for cathode development

FACILITY NAME:
Cathode Research Stand

PRIMARY CAPABILITIES:
500,000 V pulsed component research

SPECIAL/UNIQUE CAPABILITIES:
500,000 V pulsed in an ultra-high vacuum environment

INSTRUMENTATION:
Optical and laser diagnostics system

FACILITY TYPE: Optics

PURPOSE:
Conduct research to develop advanced optical techniques to explore combustion and plasma environments

FACILITY NAME:
Optical Diagnostics Laboratory

PRIMARY CAPABILITIES:
Laser spectroscopy

Two-dimensional optical imaging

SPECIAL/UNIQUE CAPABILITIES:
CW argon-ion laser for pumping a dye laser

Nd:YAG-pumped dye laser; nitrogen laser-pumped dye laser

High speed 2-D imaging and image analysis system

INSTRUMENTATION:
Tunable UV to near IR pulsed laser source

High speed digitizer and photon detection systems

Only DoD facility with state-of-the-art analysis equipment to study combustion and plasma environments.

FACILITY TYPE: Cockpit Integration

PURPOSE: Design/evaluation of cockpits and flat panel and hologrpahic display architecture

FACILITY NAME:
Control Systems Integration Laboratory (CSIL)

SPECIAL/UNIQUE CAPABILITIES: The high fidelity Tactical Aircraft Cockpit simulator (fig 1) hosts part-task, representative task, and part mission experiments for the evaluation of advanced fighter aircraft PVI controls and displays for air-to-air and air-to-ground missions.

The high fidelity Transport Aircraft Cockpit simulator (fig 2) hosts part and full mission simulations for the evaluation of advanced crew station control/display concepts.

The Reconfigurable Fightier Cockpit simulator (fig 3) supports rapid prototyping of future cockpit designs, displays and controls via to its 21" x 16" display area, touch sensitive overlay, high resolution graphics, and 3-D display capability.

The MAGIC cockpit (fig 4) aids in future cockpit design, supporting the evaluation of advanced technologies and display concepts for cockpit use. It contains computer generated stereoscopic three dimension displays, generic voice input/output capability, touch sensitive overlays, and programmable display pushbottons.

INSTRUMENTATION: $1.5M Silicon Graphics workstation resources are centrally located and distributed throughout CSIL via ethernet and SCRAMnet fiber optic shared memory network and video distribution equipment to CSIL hosted projects/programs.

FACILITIES UNIQUENESS TO THE UNITED STATES: The Crew Systems Laboratory (CSIL) provides capabilities that are unique to the United States. This uniqueness is a combination of the physical environment of the facility and the personnel operating the facility. The physical environment has been designed to support the rapid reconfiguration of both fighter and transport cockpits to provide a quick response to customer needs and problems. High fidelity computing resources can be quickly channeled to any of the cockpits hosted in CSIL providing necessary graphic and modeling capabilities to evaluate cockpit issues in a timely fashion minimizing acquisition risk while facilitating procurement schedules. The personnel supporting the research and development issues conducted in the Crew Systems Integration Laboratory have achieved unique experience and knowledge regarding the domain of fighter/transport cockpit issues; how there issues should be approached and potential solutions should be evaluated.

FACILITY TYPE: Control Systems Architecture

PURPOSE:

Research and develop digital hardware and software systems for use in flight control and vehicle management systems

FACILITY NAME:

Control Systems Architecture Laboratory

PRIMARY CAPABILITIES:

Develop and research capabilities of digital hardware circuits, particularly those based on microprocessor technology

Contains the capabilities to produce laboratory demonstration brassboards and testbeds

Contains software development capabilities, programmable logic support, and limited CAD/CAE

SPECIAL/UNIQUE CAPABILITIES:

Utilize a multi-user software development system and several in-circuit microprocessor emulation systems

Has capabilities for construction of wire-wrap circuitry and capabilities for printed circuit boards

INSTRUMENTATION:

In-circuit emulators (Tek 8560/40 systems, Intel 80960KB); logic analyzers (Tektronix 1240, DAS 9200)

Digital oscilloscope; logic/EPROM programmer (Data I/O Unisite); IBM-AT; Unisys 386, 486

FACILITY TYPE: Unmanned Research Vehicle

PURPOSE:

Low cost/low risk flight analyses of flight control technologies for manned and unmanned vehicle applications

FACILITY NAME:

Unmanned Research Vehicle (URV) Testbed Facility

PRIMARY CAPABILITIES:

Ground station vehicle and electronics; laboratory development and hotbench systems; experienced flight analyses team

Two research vehicles (Lambda, Gamma): Lambda: 14' wingspan; 210 lbs (loaded); 15 lbs payload (fixed electronics bay); 18 Hp engine

Gamma: 18 ' wingspan; 475 lbs (loaded); 150 lbs payload (configurable nose); 33 Hp engine

Both: 10 independently commanded control surfaces; tricycle landing gear with brakes and nose wheel steering

SPECIAL/UNIQUE CAPABILITIES:

Functionally powerful/flexible/configurable computational systems

Programmable datalink protocol and data collection/storage

Nose camera video display overlayed with flight data

INSTRUMENTATION:

ON-BOARD:Nose mounted TV camera with downlink; vertical and rate gyros; air data (alpha, beta, airspeed) probe; altimeter; control surface positions; magnetometer, engine RPM sensors; multiprocessor control system with MIL-STD-1553 interface

GROUND STATION: flight video/data display; ground station/pilot controls; ground station core computer;Mac II data collection workstation w/optical disk storage

The URV research vehicles provide on-board electronics, ground station command/control, and data telemetry/collection systems developed for flight research purposes, enabling flexibility for rapid research reconfiguration. No other known research capability of this type exists within the federal government at this time.

FACILITY TYPE: Actuation Research and Development

PURPOSE:

Flight Control Actuator Research

FACILITY NAME:

Flight Control Actuation Systems Facility

PRIMARY CAPABILITIES:

R&D of flight control actuators and subsystems

Research and evaluation of flight control actuation devices (hydraulically and electrically powered)

Support to other government agencies

SPECIAL/UNIQUE CAPABILITIES:

General Purpose Actuator Research Rig: generate 85,000 lbs output force; evaluate linear actuation devices under simulated static and aerodynamic loading conditions

Multi-Purpose Actuation Test Rig: Research and evaluate linear and rotary actuation systems (including representative control surface) under simulated static and dynamic loads (contains 36 dynamic loading actuators each capable of 3,000 pounds of output force) and thermal environments.

Flight Control Actuation Simulator: Simulate redundant hyromechanical flight control actuation systems including simulated corresponding inertial and aerodynamic load conditions.

INSTRUMENTATION:

Oscilloscopes, signal analyzers, spectrum analyzers, frequency generators, pen and chart recorders, Hewlett-Packard Data Acquisition System

Environmental chamber (-100 degF to + 350 degF)

Hydraulic pumps, hydraulic bench, 270V power supply, pressure gages, miscellaneous equipment and power and hand tools

This facility is unique in its range of dynamic test conditions for actuator loadings, response, and stroke. It has been selected by both government and industry to conduct th tests of specific actuators like those F-22 flapersons and stabilators.

FACILITY TYPE: Real-time, Man-in-the-Loop, Ground Based Simulation

PURPOSE: To provide high fidelity, real-time, man-in-the-loop research simulation for development of air vehicle control technology, air vehicle subsystem integration and assessment particularly flight control, weapon, navigation and targeting subsystems, and improved pilot/vehicle interfaces. Research is conducted in a realistic virtual mission environment.

FACILITY NAME: Engineering Flight Simulation Facility

PRIMARY CAPABILITIES: Visual dome simulator, high fidelity, large amplitude motion base simulator with visual, both with reconfigurable cockpits. Four Manned Combat Stations, two GCI stations and computer driven threats provide up to 2v 8 air/air engagements and equivalent sorties for air-to-ground engagements. Provides realistic and rigorous conditions for emerging technologies. Also includes modeling capability to model

FACILITY TYPE: Convair NC-131H In-Flight Simulator

PURPOSE:

Provide a research and development resource that allows airborne simulation to evaluate flying qualities and flight control characteristics of various aircraft

FACILITY NAME:

Total In-Flight Simulator (TIFS)

PRIMARY CAPABILITIES:

Simulate the flight characteristics and properties of different aircraft, different flight control systems, and cockpit layouts

Aircraft based at Calspan Flight Research Center, Buffalo NY and deployed to operating bases as required

SPECIAL/UNIQUE CAPABILITIES:

Simulation cockpit able to be configured like the cockpit of the simulated aircraft

Silicon graphics display system in evaluation cockpit

Can be configured for avionics system training by replacing simulation cockpit with a radome that houses modern radar, avionics, and IR sensors

INSTRUMENTATION:

Accelerometers for all 6 degrees of freedom; alpha and beta vanes; data recorders; two Rolm Hawk computers; Hewlett-Packard work station

Can be instrumented for any other type of airborne components/system, either for the simulation configuration or the avionics system training

The TIFS/NC-131H is unique in the United States because it is the only operational in-flight simulator aircraft that can duplicate large aircraft flight characteristics in all six degrees of freedom of motion.

FACILITY TYPE: Lockheed NT-33A In-Flight Simulator

PURPOSE:

Provide a research and development resource that allows airborne simulation evaluation of flying qualities & flight control characteristics of various aircraft

FACILITY NAME:

NT-33A In-Flight Simulator

PRIMARY CAPABILITIES:

Simulate the flight characteristics and properties of fighter-type aircraft and evaluate the handling qualities of different flight control systems

Aircraft based at Calspan Flight Research Center, Buffalo NY and deployed to an operating bases as required

SPECIAL/UNIQUE CAPABILITIES:

Programmable HUD with display generator allows quick changes to display formats and provides a computer-generated target

INSTRUMENTATION:

Normal instrumentation for T-33A including alpha and beta vanes; Rolm 1602 computer; accelerometers for all 6 degrees of freedom; data and video recorders

The NT-33A is unique in the United States because it is the only operational in-flight simulator aircraft that can replicate the maneuverability characteristics of another fighter aircraft.

W.T.K. Stevenson and I.J. Goldfarb, "Degrdation of an Acetylene Terminated Sulfone (ATS) Resins in an Oxygen Free Environment", J. of Thermal Analysis, 36, 2643 (November/December 1990).

W.T.K. Stevenson and I.J. Goldfarb, "Degradation of an Acetylene Terminated Sulfone (ATS) Resins. II. Under Partially Anaerobic Condiditons", J. of Thermal Analysis, 36, 2667 (November/December 1990).

J. Medrano and D.S. Dudis, "Quasi Particles in Polymeric Conductors", Organic Superconductivity, Plenum Press, New York, NY (June 1990), pp 275-285.

A. Lachgar, D.S. Dudis, P.K. Dorhant and J.D. Corbett, "Synthesis and Properties of two Novel Line Phases That Contain Linear Scandium Chains, LiScI3 and Na0.5 ScI3", Inorg. Chem., 30, 3321 (August 1991).

G. Du, A. Burns, Z. H. Wang, A. J. Epstein, D. B. Swanson, H. Theophilon, E. M. Scherr, A. G. MacDiarmid, F. Arnold, C. Y-C Lee, and R. Spry, "Anisotropic AC Transport of Oriented, Undoped Polymers", Bulletin Am. Phys. Soc, 36, 477 (March 1991).

W. T. K. Stevenson, I. J. Goldfarb, E. J. Soloski and M. D. Houtz, "Characterization of Acetylene-Terminated Sulfone (ATS) Resin. II. Thermal Analysis of the Resin", Journal of Applied Polymer Science 42, 679 (February 1991).

C. Y-C Lee, J. Swiatkiewiccz, P.N. Prasad, R. Mehta and S.J. Baoi, "Third Order Nonlinear Optical Properties of Poly-p-phenylenebenzobisthiazole and Its Novel Composites with Zytel Processed Via Methane Sulphonic Acid Solution Extrusion", Polymer 32, 1195 (April/May 1991).

D.S. Dudis, C. King and J.P. Fackler, Jr., "Reaction of the Platinum Complex (Ph3P)2PtS4 with MeO2CC:::CCO2Me: Synthesis and Structure of (dimethyldimercaptomaleato(2-)-S,S')bis(triphenylphosphine) platinum(II)", Inorg. Chem. Acta. 181, 99 (March 1991).

D.T. Grubb, K. Prassad and W.W. Adams, "Small Angle x-Ray Diffraction of Kevlar Using Synchotron Radiation", Polymer 32 (7), 1167 (April 1991).

T. E. Saliba, S. R. Quinter, and F. L. Abrams, "Expert Model for Intelligent Control of Composite Materials Processing in a Press", International Journal of Composites Engineering, November 1991.

D. P. Anderson and K. E. Gunnison, and J. W. Hager, "Ligament Structure of Open-Cell Carbon Foams and the Construction of Models Based on that Structure, Novel Forms of Carbon", C. L. Renschler, J. J. Pouch, and D. M. Cox, editors; Mater. Res. Soc. Symp. Proc., 270 (November 1992) 47.

J.B. Ferguson, "Calculation of the photoabsorption Spectrum for Subband to Continuum Transitions in GaAs/AlGaAs Multiple Quantum Wells, "Thesis for Master of Science Degree in Physics, Wright State University (July 1992).

P.N. Prasad, B.A. Reinhardt, "Is There a Role for Materials in Chemistry in Nonlinear Optics and Photonics, "Chem of Materials 2, 660 (June 1990).

P.M. Lindley and B.A. Reinhardt, "Intramolecular Cyclizatin of Pendant Phenylethynyl Groups as a Route to Solvent resistance in Polyphenyquinoxalines", J. Polymer Sci., Polymer Chem. Ed. 29, 1061 (June 1991).

B.A. Reinhardt, "A Simplified Synthesis of Aromatic Thermoplastic Polybenzobisoxazoles", Polymer Commun. 31 (12) 453- (December 1990).

M.R. Unroe and B.A. Reinhardt, "The Preparatin of Aromatic Polyazomethines with Oxydecyl Pendants for Improved Solubility", Polymer Commun., 32 (3), 85 (March 1991).

M. Zhao, M. Samoc, P.N. Prasad, B.A. Reinhardt, Mr. R. Unroe, M. Prazak, R.C. Evers, J. Kane, C. Jariwala and M. Sinsky, "Studies of Third-Order Nonlinearities of Model Compunds Containing Benzothiazole, Benzimidazole and Benzoxazole Units", The Chemistry of Materials, 2, 670 (June 1990).

J.S. Wallace, L.S. Tan and F.E. Arnold, "Synthesis and Characterization of Aromatic Polyisoimides Derived from PMDA and Para-Diamines, An Approach to Insitu Generated Rigid-Rod Molecular Composites", Polymer, 31, 2411 (December 1990).

M. Dotrong and R.C. evers, "Rigid-Rod Ben\zobisthiazoel Polymers wth Reactive Fluorene Moieties", J. of Polymer Sci., Polymer Chem. Ed. 28, 3241 (November 1990).

L.R. Denny, R.C. Evers, B.A. Reinhardt, M.R. Unroe, M. Dotrong and M.D. Houtz, "The Preparation, Thermomechanical Properties and Applications of High Temperatute Thermoplastic Polybenzobisoxazoles Cotaining Hexafluorinated Moieties", 22nd Science of Advanced Materials and Process Engineering Technical Proceedings, 22, 186 (November 1990).

R.C. Evers, T.D. Dang and D.R. Moore, "Synthesis and Characterization of Graft Copolymers of Rigid-Rod Poly (p-phenylenebenzobisimidazole)", J. of Polymer Sci., Polymer Chem. Ed., 28, 121 (January 1991).

E. Soloski, M. Dotrong, S. J. Bai and R.C. Evers, "Characterization, Processing, and Properties of an Aromatic Poly(ether ketone)", J. of Polymer Sci., Polymer Phyusics Ed., 29, 119 (January 1991).

FACILITY NAME: DOD/National Landing Gear Development Facility (LGDF)

PRIMARY CAPABILITIES: The LGDF is a totally customer reimbursed facility actively engaged in RDT&E activities in the Vehicle Subsystems major thrust areas including: aircraft landing gear technologies like, "Extended Life Tire," Lightweight/Corrosion-free "Titanium Matrix Composite" landing gear, "Electric Actuated Brakes;" robotic ground servicing/inspection and cargo handling' reliability, maintainability and supportability technologies. As a National Facility for landing gear system research and development, customers include ASC SPOs, Air Force ALCs, Navy Depots, Defense Logistics Agencies, NASA Space & Research Centers, FAA, Foreign government and Industry. Capabilities include:

1.) (5) research/certification dynamometers with various speed, load, yaw and camber capacities up to 350 mph, 300,000 lbs, ± 20 yaw and camber and 200 million ft-lbs of brake test energy

2.) (2) aircraft wheel/tire - load/deflection applicators with capacities up to 3 million lbs compression/1 million lbs tension

3.) (4) drop towers with hydraulic shaker system which can simulate aircraft operation over rough fields, landing impact and future jump strut operations

4.) (1) tire force machine to measure tire mechanical properties

5.) (1) MTS tire coupon tester and (1) rheometrics tire coupon tester for tire material properties determination

6.) (1) tire "shearographic" non-destruct inspection machine

SPECIAL/UNIQUE CAPABILITIES: Included in the primary capabilities are 8 unique one-of-a-kind research and development capabilities not available elsewhere in the U.S., such as, dynamic yaw and camber mission profiles, bomb damage runway operation, jump strut simulation, high frequency tire coupon analysis to name a few.

INSTRUMENTATION: Advanced state-of-the art data collection system to measure and record landing gear system performance parameters and machine control parameters.

FACILITY TYPE: Aircraft Survivability/Vulnerability Research (ASRF)

PURPOSE: Support the research and development of combat survivable systems; Center of Expertise for Live Fire Tesing

FACILITY NAME: Aircraft Survivability/Vulnerability Research (ASRF)

PRIMARY CAPABILITIES: Gunfire evaluation of full size, "combat loaded" (with all flammables, pyrotechnics, etc., on board aircraft components and assemblies (full size fuselage, wing, etc.,). Perform AAA, Air to Air, and missile warhead fragment impacts, at realistic velocities simulating altitude, on actual aircraft hardware, while maintaining fuel, hydraulic fluids, and electrics at operating conditions including temperatures, pressures, flow rates, voltages, currents, etc. Also used to satisfy requirements of Live Fire Test (LFT) Law.

Generation of over 500kt airflow, with 25 square foot research section, over full-scale aircraft sections, with gunfire, for evaluation of existing and new vulnerability assessment and reduction technologies.

Perform gunfire research-evaluation-retest of new aircraft structural materials and armor, modifying and calibrating projectiles for correct impact velocities in a single explosion-proof facility.

SPECIAL/UNIQUE CAPABILITIES: Only facility in the U.S. (and world) capable of generating over 500kts airflow (with a 25 square foot research section) over a full scale aircraft assembly, while loading the section with up to seven (7) "Gs," while the aircraft contains all dangerous subsystems/materials, for non-nuclear combat survivability research. Example: Ballistic research, using a foreign 30mm High Explosive projectile of full-size F-22 wing fully fueled with 120 degree JP-8, with 500kt airflow over the wing, while loaded to 7 Gs. (Range 3)

Only facility in the U.S. (and world) capable of ammunition storage, ammunition modification, and ballistic research, in one building, for calibration and evaluation of new structural materials and armor. For determining ballistic resistance and tolerance assessment. Capable of 57mm operations indoors. (Range 1)

Only facility in the U.S. which can accurately simulate the fire hazards which exist in the compartment (nacelle) surrounding an aircraft engine, and analyze the effectiveness of methods and materials used to detect, prevent, and/or extinguish these fires. (Aircraft Engine Nacelle Range)

INSTRUMENTATION: Measurement of all pressures, strains, velocities, flow phenomena associated with aircraft response to ballistic impact of real aircraft sections (over 100 channels). High speed video, photo, and Infra Red for fire initiation and propagation studies; flash detectors and x-ray for ballistic response, explosion, and penetration studies. Computer controlled instrumentation, video and experimental control.

AIR VEHICLES - ROTARY - PROPULSION

FACILITY/EQUIPMENT DESCRIPTIONS

FACILITY TYPE: Helicopter Rotor Research

PURPOSE:

Performance, endurance and validation research of helicopter rotors

FACILITY NAME:

Helicopter Rotor Research Facility

SPECIAL/UNIQUE CHARACTERISTICS:

Only large government owned rotor test facility
Precise speed control possible
Electrically driven whirl test stand
Horsepower-4,000; lift-50,000 lbs; maximum rotor diameter(ft)-94; RPM-625

INSTRUMENTATION

Monitor rotational speed, power, lift and several other equipment related parameters

The Helicopter Rotor Research Facility is unique to the U.S. because of its size, capability and drive system. Most of helicopter rotors in the DoD inventory can be opertated in this facility. The electrical drive system affords precise speed control over the entire speed range.

AIR VEHICLES - FIXED - AVIONICS

FACILITY/EQUIPMENT DESCRIPTIONS

FACILITY TYPE: Laser communications

PURPOSE:

Research, development and research of ground, airborne, and space based laser communications systems

FACILITY NAME:

Laser Communications Laboratory

PRIMARY CAPABILITIES:

Atmospheric Turbulence, Laser Characterization, Spectral Characterization of Transparent Materials and System Reliability research

Lasercom link as an adaptive system

SPECIAL/UNIQUE CAPABILITIES:

Real-time measurement of atmospheric conditions to include temperature, pressure, humidity, and diffraction-limited aperture of the atmosphere

Eight inch telescope interfaced with optical detection equipment and MicroVAX for use as a generic optical antenna/receiver in lasercom linkanalysis system

Optical wavefront/coherence analysis system interfaced with MicroVAX for laser beam wavefront characterization

INSTRUMENTATION:

EGG-555 Spectral radiometer capable of wavelength measurements (UV through IR), Photodyne Radiometer, Optical wavefront/coherence analysis system

Eight inch telescope, MicroVAX workstation interfaced with IEEE-488 Data Bus for use as data aquisition equipment

Software for design/analysis of optical systems: Evaluating laser hazards, evaluation/simulation of atmospheric modeling

UNIQUE TO:

The Laser Communications Laboratory (LCL) is unique to the DOD because it provides direct line-of-sight access to remote locations for propagation research and data collection/recording around the clock while maintaining a laboratory environment for development and research purposes.

FACILITY TYPE: Avionics Research

PURPOSE:

Conduct classified/unclassified, realtime/non-realtime, multispectral, multidisciplinary experiments, studies, research, simulations and analyses in the areas of integrated avionics, core processing architecture, information processing, communications, navigation, identification, software, life cycle support and machine intelligence

FACILITY NAME:

Integrated Avionics Laboratory (IAL)

PRIMARY CAPABILITIES:

Real-time simulation of aircraft performing an operational mission allows evaluation of capabilities across entire spectrum of performance requirements

Provides a direct (non-extrapolated) view of real world problems and considerations

Validation of contract research products in a systems context

SPECIAL/UNIQUE CAPABILITIES:

Real-time simulation/stimulation of avionics interface signals

Generalized Avionics and Simulation/Integration System (GENASIS) software configurable simulated aircraft workstations

Real-time interface to defensive and communication avionics facilities

INSTRUMENTATION:

Avionics flight processors with Ada operational flight programs and the avionics multiplex and fiber optic data buses

Models set include multiple aircraft,sensors,weapons and external environment modules;VAX11/785/non-real-time development environment

GENASIS modular cockpit with six-nine inch diagonal color displays coupled with F-15 type stick and throttle, moving map display, fiber optics communications

UNIQUE TO:

The Integrated Avionics Laboratory is unique to the U.S. because it is a combined avionics research, development, modeling and simulation facility that provides the ability to accomplish original research and independent verification of avionics concepts and systems.

FACILITY TYPE: Electro-Optical Sensors

PURPOSE:

Research, development and analysis of tactical and strategic electro-optical and laser radar systems under simulated environmental conditions

FACILITY NAME:

100 Inch Collimator Facility

PRIMARY CAPABILITIES:

Profiling atmosphere to in excess of 100 km

Sub-centimeter space debris experiments

SPECIAL/UNIQUE CAPABILITIES:

100 inch diameter optical collimating mirror housed in vacuum chamber which can be evacuated to simulate a 270,000 ft altitude

INSTRUMENTATION:

Seismometers, 32 channel data logger, 8 channel digital recorder

PC based computer system

UNIQUE TO:

The 100 Inch Collimator Facility is unique to the Federal Government because it contains a 100 inch diameter optical collimating mirror housed in a vacuum chamber which can be evacuated to simulate a 270,000 ft altitude

FACILITY TYPE: Electro-Optical Sensors

PURPOSE:

Characterize both in the laboratory and in the field (via recordings) state-of-the-art electro-optical imaging sensor systems

FACILITY NAME:

Infrared Laboratory

PRIMARY CAPABILITIES:

Provide data for system-to-system comparisons, input to models, development feedback, calibrations, technique development, and acceptance testing

SPECIAL/UNIQUE CAPABILITIES:

Receive (in Bldg 620) real time or recorded video signals from sensors undergoing field evaluations

Anaylze flight accumulated data

INSTRUMENTATION:

Infrared collimator/targets/sources

Image processing system

UNIQUE TO:

The Infrared Laboratory is unique to the U.S. because it can characterize and support development of state-of-the-art Electro-Optical imaging sensor systems both in the laboratory and field for all U.S. government agencies.

FACILITY TYPE: Physical sensor/system flight simulation

PURPOSE:

Evaluate the design integrity and performance of R&D and operational avionics, and sensor/systems under simulated flight conditions

FACILITY NAME:

Air Force Sensor Evaluation Center (AFSEC)

PRIMARY CAPABILITIES:

Facility flexibility permits continual updating to include future advances in research technology, methods, and equipment

Can subject research articles to conditions of temperature, altitude,3-D vibration, roll, pitch and yaw, and angular rates and air flow

Useable research space: equipment frame-rectangular: 6'dia x 8'L or 10'L; round: 6' dia x 12'L with additional 4' dia x 3'L at each end

SPECIAL/UNIQUE CAPABILITIES:

Simultaneous controlled visual, EO, and IR target environments during simulation; 20' collimator all reflective optics w/24" dia aperature; other collimators avail.

Simulated ground motion of target under variable controlled target conditions

Multiple set-up rooms, wide latitude installation and research capability, less than one hour Dynamic Analyzer installation or removal

INSTRUMENTATION:

Computer controlled with manual options, any single or combined environments, thermal recording 200 channels

Full data collection/processing capability

UNIQUE TO:

The Air Force Sensor Evaluation Center (AFSEC) is unique to DOD because it is the only facility in the world with capability to emulate actual flight environments with equipment installed in aircraft.

FACILITY TYPE: Hybrid/real-time digital simulation laboratory

PURPOSE:

To conduct integrated EW system/concept evaluation in support of Air Force Exploratory and Advanced Development programs

FACILITY NAME:

Integrated Defensive Avionics Laboratory (IDAL)

PRIMARY CAPABILITIES:

Real-time, interactive, multispectral EW simulation to drive hardware systems or digital emulations

SPECIAL/UNIQUE CAPABILITIES:

Real-time, interactive implementation of SUPPRESSOR command and control model, digital IR/EO scene generator, real-time digital RWR emulation

Interaction with DEES/CEESIM RF environment generators, interaction with Integrated Test Bed cockpit/avionics simulator

Interaction with Electronic Defense Evaluator threat radar simulator

INSTRUMENTATION:

VAX 11/750, Vaxstation 2, Vaxstation 3, Sun 4, CCC3240, CCC3260 MPS

UNIQUE TO:

The Integrated Defensive Avionics Laboratory (IDAL) is unique to the DOD because it is an evolving development/evaluation center for excellence for radar warning receiver technology, real-time J-MASS technology, mission rehersal simulation technology and integrated defensive avionics.

FACILITY TYPE: Electronic combat simulation

PURPOSE:
Develop requirements for electronic combat equipment; evaluate electronic combat equipment

FACILITY NAME:
Electronic Combat Research Simulation Laboratory (ECSRL)

PRIMARY CAPABILITIES:
Three levels of digital simulation: one-on-one, one-on-many and campaign level (many-on-many)

SPECIAL/UNIQUE CAPABILITIES:
Classified TEMPEST facility

INSTRUMENTATION:
Electronic and data processing hardware

UNIQUE TO:
The Electronic Combat Research Simulation Laboratory (ECSRL) is unique to the DOD because it is the center of expertise for Electronic Warfare digital model research especially technology insertion development for the Joint Modeling and Simulation System (J-MASS)

FACILITY TYPE: Exploitation and Integrated Circuits

PURPOSE:

Radar evaluation of exploitation threat radar systems; conduct ECM evaluation against these threat radars; identify unknown integrated circuits

FACILITY NAME:

Anechoic Chambers and Integrated Circuit Exploitation Facility

PRIMARY CAPABILITIES:

Chambers can accommodate RF systems from 2 GHz to 20 GHz

Connected to a computer facility that simulates the outside EW environment and geometry between the target and the aircraft

Identify undamaged unknown ICs and predict the identity of damaged ICs

SPECIAL/UNIQUE CAPABILITIES:

Basic dimensions: 140 ft long by 50 ft wide by 35 ft high

Chamber is connected to movable hangar door allowing insertion of tactical size USAF fighter aircraft

Classified facility with capability for foreign item exploitation

INSTRUMENTATION:

Equipment on hand can accommodate radar/ECM evaluations

Jet etcher to non-destructively open ICs; temperature-humidity environmental chamber; an X-ray machine

Optical microscopes; a scanning electron microscope; a computerized IC database

UNIQUE TO:

The Anechoic Chambers and Integrated Circuit Exploitation Facility is unique to the DOD because it is the only anechoic facility that performs radar and missile technical exploitation

FACILITY TYPE: Infrared countermeasures

PURPOSE:
Develop and research laser IRCM techniques, system concepts, and integration experiments for countering infrared (IR) threats

FACILITY NAME:
Laser IRCM Development Range

PRIMARY CAPABILITIES:
IRCM development

SPECIAL/UNIQUE CAPABILITIES:
Only short-range, closed-loop IRCM development facility in the world

Most technolgically advanced

INSTRUMENTATION:
Lasers

Pointing and tracking system

Countermeasures processor

UNIQUE TO:
The Laser IRCM Development Range is unique to the U.S. because it is the only short-range, closed loop IRCM development facility in the world

FACILITY TYPE: E-O Devices

PURPOSE:

Research and evaluate IR and laser warning receivers

FACILITY NAME:

Electro-Optical Receiver Laboratory

PRIMARY CAPABILITIES:

Calibrate and evaluate infrared and laser sensors and warning receivers in Bands I, II, and III

SPECIAL/UNIQUE CAPABILITIES:

Classified facility with additional capabilities for foreign equipment exploitation

Capability for both laboratory and field research

Field research utilize outdoor WL turntable facility located on WPAFB, Area C, flight line for rotation of full scale aircraft

INSTRUMENTATION:

Large array of optical, electronic, and data processing hardware in a facility comprising greater than 5000 square feet

Equipment account exceeds a value of $2,000,000

Large optical collimator

FACILITY TYPE: Infrared Target Simulator and Multispectral Signature Generation

PURPOSE:

Research and develop infrared countermeasures (IRCM) techniques and assessment of multispectral signature control techniques for EOCM

FACILITY NAME:

Dynamic Infrared Missile Evaluator (DIME) Facility

PRIMARY CAPABILITIES:

Provides semiphysical simulation of the homing interception of a target by an IR guided missile

Optics and instrumentation for evaluating IRCM effects upon infrared missiles

Interactive image processing system that allows aircraft signature modifications to be designed, modified, and evaluated by use of an image array processor

SPECIAL/UNIQUE CAPABILITIES:

Use actual IR missile optics and guidance electronics along with computer simulated, aerodynamic characteristics and servo controlled IR sources

Can manipulate imagery representing both the aircraft signature and camoflauge treatment of interest

Multi-spectral tool to be used for signature analysis into the year 2000 and beyond

INSTRUMENTATION:

Operational IR missile guidance and control units

Digital aerodynamic computational capability

Servo-controlled IR sources/optics

SPIRITS; generic sensor model

UNIQUE TO:

The Dynamic Infrared Missile Evaluator (DIME) Facility is unique to the DOD because it is the center of excellence in the areas of IR guided weapon exploitation and IRCM technique development.

FACILITY TYPE: Electronic Warfare

PURPOSE:

Develop and evaluate RF electronic countermeasures techniques, devices, and systems

FACILITY NAME:

Electronic Warfare Anechoic Chamber (EWAC)

PRIMARY CAPABILITIES:

39'L x 26'W x 26'H electromagnetically shielded room lined with radio frequency (RF) energy absorbing material

Used for RF measurements, such as antenna polarization patterns, from 250 MHz to 100 MHz

Ability to evaluate perform research on most types of radar ECM hardware/techniques against hardware-in-the-loop simulations of seeker/target interactions

SPECIAL/UNIQUE CAPABILITIES:

Instrumentation system for measuring and printing 3D plots of angle error voltage developed by a monopulse tracking radar in response to polarization jamming

Target Angle Positioning System (TAPS)

TAPS:array of 64 dual polarized antennas (7-11 GHz) to create physical simulation of moving target/jammer;polarization of target and jammer real time controlled

INSTRUMENTATION:

Wide range of microwave instrumentation

FACILITY TYPE: RF Receiver and Processor

PURPOSE:

Evaluation and development of new RF receiver, processor, and software concepts

FACILITY NAME:

RF Receiver/Processor Laboratory

PRIMARY CAPABILITIES:

Calibrate, evaluate, and develop new RF receiver systems in frequency range 2 to 18 GHz

Research, evaluate, develop new threat sorting and identification software techniques

SPECIAL/UNIQUE CAPABILITIES:

Classified facility and screen room

Capability of both laboratory and field research

Capability to collect and analyze special signals of interest

INSTRUMENTATION:

Prototype receivers-superhet, instantaneous frequency measurement, microscan, channelized, optical

Various RF transmission and modulation techniques available

Sorting and identification software prototype available

FACILITY TYPE: Optical and Digital Seeker Processing

PURPOSE:

Design, develop, and evaluate optical and digital processing technology; develop a standard math morphology for image processing; develop seeker algorithms

FACILITY NAME:

Optical Research Laboratory

PRIMARY CAPABILITIES:

Main Lab: (1232 ft2) Vibration isolated optics benches and computer workstations, Laser Polarimeter

Make measurements of the Kerr and Faraday constants of infrared materials

SPECIAL/UNIQUE CAPABILITIES:

Only known achromatic infrared laser polarimeter;computer driven spatial light modulator for evaluating binary-phase-only-spatial filters

Optical/digital integration for image processing capability

INSTRUMENTATION:

Photometers, laser beam cross section analyzer, high speed oscilloscopes, CO2, CO and solid state lasers, long and mid wavelength IR detectors

Spatial light modulators integrated with high speed computers, Sun workstation

FACILITY TYPE: Laser radar systems

PURPOSE:

Research and develop high-performance solid state laser radar and component technology

FACILITY NAME:

Laser Radar Research Lab (LADAR)

PRIMARY CAPABILITIES:

Development of new system integration technologies of laser radar systems

Can perform heterodyne detection and fiber optic mixing

SPECIAL/UNIQUE CAPABILITIES:

Uses non-mechanical beam agility device

Combines beam agility devices in the receiver portion of the laser radar system

INSTRUMENTATION:

Solid state 1.06um Nd:YAG laser, consto-optic modulator, InGaAs detector, Faraday isolator, fiber couplers, digital oscilloscope

Two beam agility devices using liquid crystal phased-array technology

One beam agility device using phase grating concept using acousto-optic deflector modules

UNIQUE TO:

The Laser Radar Research Lab is unique to the U.S. because it allows investigations into novel concepts, research on critical components, system utility studies and risk reduction efforts. This is one of the few facilities in the U.S. doing 2 um laser work.

FACILITY TYPE: Electro-Optical Sensors

PURPOSE:
Simulate air-to-ground environment for evaluation of EO targeting and navigation sensors

FACILITY NAME:
Electro-Optical Sensors Evaluation Range

PRIMARY CAPABILITIES:
Develop/validate sensor performance models

Evaluate passive countermeasure effectiveness

Evaluate operational and developmental EO sensor technology

SPECIAL/UNIQUE CAPABILITIES:
300 ft sensor platform

Optical link to EO sensor evaluation lab for real-time sensor analysis

Wright Field Test Range (Trebein Reservation) containing visual and infrared targets

INSTRUMENTATION:
Fixed and portable meteorological stations

Fixed and portable EO signature (radiometric) measurement system

Fixed system and portable atmospheric transmission measurement systems

FACILITY TYPE: Infrared (IR) Measurement Range

PURPOSE:

This facility measures target contrast within a temperature controlled background

FACILITY NAME:

Wright Laboratory IR Measurement Range

PRIMARY CAPABILITIES:

Measure IR target contrast fot targets ranging from coupon size to full scale parts that have a 2' by 2' area and weigh up to 500 lbs. The measurement chamber is 10' by 6' by 6'. This facility is fully alarmed and can operate as a totally secure operation.

SPECIAL/UNIQUE CAPABILITIES:

The facility can simulate horizon, earth, and sky backgrounds. By using six independent heating/cooling loops the target contrast can be evaluated in any simulated real world environmental thermal condition. Such measurements have never been made in an indoor facility. The range is totally computer controlled, minimizing manpower support requirements.

INSTRUMENTATION:

Range environment is computer controlled

IR cameras and spectroradiometer

UNIQUE TO:

The IR Measurement Range is the only known indoor facility of its kind in the U.S.

FACILITY TYPE: Radar Cross Section (RCS) and Antenna Measurement Range

PURPOSE: This facility is a premier, state-of-the-art radar signature measurement chamber, the largest dual Gregorian Compact Range in the world. Its three-fold mission is: (a) To perfrom basic and applied research into techniques for furthering DoD's national capability to perform extremely low level backscatter RCS measurements; (b) To explore basic scattering phenomology and mechanisms to improve techniques for reducing the RCS of DoD weapon systems; and (c) To evaluate stealth technologies on behalf of DoD agencies by performing quality assessments of selected contractor measurements, to greatly reduce the risk of integrating low observable technologies into present and future generations of "stealth" vehicles.

FACILITY NAME: Wright Laboratory Advanced Compact RCS Measurement Range

PRIMARY CAPABILITIES: Measures RCS from target sizes up to 20' (width) by 15' (height) by 25' (length), weighing up to 6,000 lbs. The facility radar coverage is from 500 MHz to 18 GHz and from 26 to 38 GHz. The facility is fully alarmed, and cleared for unattended classified data acquisition.

SPECIAL/UNIQUE CAPABILITIES: The facility is unique in four main areas: (1) Custom designed "Gregorian" dual chamber - dual composite reflector geometry provides superior "far field" quiet zone qualities and is stable relative to temperture variations. (2) Custom designed wideband radar illumination is achieved with very few feed antenna combinations, allowing very rapid and efficient wideband data collection. (3) Extremely stable mechanical target support systems, with a unique target work platform, which allows target access without disturbing the radar background. (4) Lowest wideband signature backgrounds available.

INSTRUMENTATION:
RADAR: Custom, LINTEK 5000 (Variant) dual coherent channel, stepped frequency RCS measurement radar (0.5 to 18 GHZ and 26 to 38 GHZ). Extremely sensitive (-135 to -145 dBm typical) and stable (better than -40dB subtraction over 24 hours) radar.
TARGET HANDLING SYSTEM: The facility uses a new, custom designed target support system, emphasizing physical stability (no movement) and repeatable positioning (within mils). A sliding linear "bearing" rail system is used to achieve mechanical and repositioning stability. No other RCS facility in the world uses this approach.
RADAR "BACKGROUND" LEVELS: Radar sensitivity is 2 to 3 orders of magnitude lower than "industrial" compact RCS ranges.

UNIQUE TO: The Advanced Compact RCS range is unique not only to U.S., but the world as well. No other facility combines the efficiency, size, frequency coverage, and radar sensitivity available to this facility

AIR VEHICLES - FIXED - ELECTRONIC DEVICES

FACILITY/EQUIPMENT DESCRIPTIONS

FACILITY TYPE: Device and Semiconductor Research

PURPOSE:

Research on compound semiconductors and semiconductor structures, advanced microwave, high speed digital and novel electro-optic devices

FACILITY NAME:

Device Research Laboratory

PRIMARY CAPABILITIES:

Theoretical and experimental research on III-V semiconductor structures and devices; development of advanced electronic and electro-optical devices

Extensive theoretical and experimental growth and characterization of electronic and optical properties of III-V materials and devices

SPECIAL/UNIQUE CAPABILITIES:

Molecular beam epitaxy of components of gallium, indium, aluminum, arsenic and antimony; ion implantation; metal and dielectric deposition

Reactive ion etching; nanometer lithography; modeling of device physics

Conventional and rapid thermal annealing; scanning electron microscopy and electrical research

INSTRUMENTATION:

JEOL 5 DIIU-A e-beam; Varian 360 and GEN II MBE; full complement of conventional semiconductor process equipment

Time resolved high resolution photoluminescence; photoreflectance; Hall measurement apparatus; Fourier transform infrared spectroscopy

UNIQUE TO: The feedback controlled Molecular Beam Epitaxy portion of the Device Research Laboratory is the only Government facility with in-situ sensors for state-of-the-art electron device growth parameter control and monitoring. This unique crystal growth technique provides the capability to accurately control process yeild, throughput, and hence, fabrication cost reduction for a wide range of electron device structures.

FACILITY TYPE: Microwave/Millimeter Wave

PURPOSE:

Design, fabricate and/or analyze microwave and millimeter wave electronic components and integrated circuits

FACILITY NAME:

Microwave/Millimeter Wave Laboratory

PRIMARY CAPABILITIES:

Design and fabricate solid state devices and integrated circuits operating in the 0.1 to 100 GHz range involving III/V compound semiconductor materials

Device correlation analysis; microwave device/process modeling; GaAs material evaluation

Design, fabrication and research of GaAs MIMICs; research of general microwave/millimeter wave components

SPECIAL/UNIQUE CAPABILITIES:

RF on-wafer research of MIMICs using a cascade automatic proberand HP 8510 Vector network analyzer

Overstress research of microwave devices and MIMICs

RF evaluation of high temperature superconductors

INSTRUMENTATION:

PMI scalar network analyzer (1-40 GHz); HP 8510 vector network analyzers (0.1-75 GHz); Cascade on-wafer RF prober

General purpose microwave/millimeter wave test equipment

Computer-aided design workstations

FACILITY TYPE: Microelectronics

PURPOSE:
Design, fabricate and analyze microelectronic devices, integratedcircuits. Maintain a state-of-the-art computer aided design (CAD) facility

FACILITY NAME:
Microelectronics Computer Aided Design (CAD) and Research Facility

PRIMARY CAPABILITIES:
Very Large Scale Integrated Circuit (VHSIC) design

Simulation, logic synthesis, VHSIC Hardware Description Language, layout synthesis, built-in-test synthesis, and automatic place and route

Development of GaAs-based heterojunction field effect transistors, heterojunction bipolar transistors, and resonant tunneling devices

High speed research of devices, circuits, and analog-to-digitalconverters

SPECIAL/UNIQUE CAPABILITIES:
Silicon compilation of integrated circuits

Automated wafer parametric research; automated analog-to-digital converter research

Reverse engineering of IC designs

INSTRUMENTATION:
Networked engineering workstations with design software from Mentor, Compass, Valid, Synopsis, and Analogy

Electroglass 2001X Automatic Prober,Tektronics DAS 9200 Logic Analyzer, HP4192 Impedance Analyzer, HP4085 Switching Matrix, HP8181A Data Generator Extender

Stanford Research Systems SR530 Lock-In Amplifiers, HP 8620C Sweep Oscillator, HP8180A Data Generator, HP8081A Rate Generator, HP8350B Sweep Oscillator

FACILITY TYPE: Coherent and Non-Coherent Optical Device Research

PURPOSE: Exploratory development of lasers, optical processing and control devices, optoelectronic integrated circuits, detectors and detector arrays

FACILITY NAME: Opto-Electronic Research Facilities

PRIMARY CAPABILITIES:

Characterization and evaluation of laser and non-linear optical materials

Optical device evaluation, including surface metrology, optical waveguide elements, optical logic and active optical processing evaluation

Infrared and ultraviolet optical detector characterization, evaluation and optimization, including optical Fourier transform measurement facility

SPECIAL/UNIQUE CAPABILITIES:

Optical excitation spectroscopy, time-resolved, for laser materials from 4 degrees Kelvin through elevated temperatures

Absorption, fluorescence and transmission spectroscopy from UVthrough long wave infrared

Interferometric and scatterometric surface analysis together with topographical surface microscopy for both insulating and conducting/semiconducting samples

INSTRUMENTATION:

Multiple spectrometers and spectrophotometers;laser sources from visible through long wave infrared (10.6 micrometers)

Bidirectional reflectance distribution function measurement instrumentation for 4 inch surfaces at 3 visible wavelengths; Zygo surface interferometer

UNIQUE TO: The Optical Augmentation (OA) portion of the Opto-Electronics Laboratory is the only Government facility to measure extremely high resolution Optical Fourier Transforms needed in the characterization of return radiation from optical components. The multiplicity of wavelengths, level of dynamic range, and most importantly, the frequency resolution capability combine in a one-of-a-kind experimental capability.

AIR VEHICLES - FIXED - ADVANCED MATERIALS FACILITY/EQUIPMENT DESCRIPTIONS

Autoclave Laboratory

The WL/MLBC autoclaves are the only ones within the federal government which are instrumented with intelligent process control hardware and software, and are capable of processing composite materials at 750°F and 200 psi pressure. For example, these are the only federal government autoclaves which can process the new Air Force resin AFR700B using Qualitative Process Automation (QPA) process control.

Carbon-Carbon Processing Laboratory

The WL/MLBC carbon-carbon laboratory is the only DOD carbonization facility which can process carbon-carbon material using intelligent process control, using acoustic emission, multiple temperature monitoring, and infrared in-situ monitoring. The carbonization facility is equipped with an incinerator for environmentally safe operation.

Dielectric Measurements Laboratory

MISSION: Support the research and development of materials and processes for antenna window, radome and other electromagnetic applications..

CAPABILITIES: Coaxial line measurements of complex permittivity and permeability to 9 GHz at room temperature and complex permittivity from 3.3-4.9 GHz at temperatures up to 1800°F in vacuum.

EQUIPMENT: APLASAQ 14 coaxial line; High Temperature Dielectric Systems (includes furnace, waveguide, sample support, and controlling/data collecting computer)

The Nonmetallic Materials Division of Wright Laboratory's Materials Directorate researches and develops new materials and processes for antenna windows and radomes for extreme environments (up to 4000°F). This characterization facility assists in the development by performing accurate dielectric transmission and loss properties for these materials at temperatures up to 1800°F).

This facility is unique to the U.S. The dielectric measurement system described was specifically designed for the evaluation of dielectric materials for use in extreme environments.

Molecular Beam Epitaxy (MBE) Laboratory

MISSION: Supports development of new electronic and electromagnetic materials and their processing technology

EQUIPMENT: Two MBE Machines; Ultra-high Vacuum Chamber; Auger Electron, X-ray Photo-electron, Ion Scattering, and Secondary Ion Mass Spectroscopy; Scanning Tunneling Microscope; In-situ Optical Probes

CAPABILITIES: Grow Single Crystal Films; In-situ Analysis and Control of Film Growth; Contaminant Free Analysis of Film Surface

Wright Laboratory's Materials Directorate is responsible for the development of new electronic and electromagnetic materials and their processing technology for use in a wide range of Air Force applications.

Many of these applications require defect free, single crystals of semiconductor material. Some applications require very thin, multiple layers of different materials grown so that the crystal lattices (the three dimensional array of atoms that form the materials) are perfectly aligned. Molecular beam epitaxy is a very effective method to grow thin films of these materials.

This process grows films of the materials of interest under carefully controlled conditions that achieve near perfect positioning of the atoms. The result is a material that is a single crystal with only a very small number of defects (impurity atoms, misalignment the atom stacking, missing atoms or improper positioning of the atoms in a compound). The materials are grown under ultra high vacuum conditions with pressures as low as 10^{-11} Torr (10 trillionths of one millimeter of mercury).

The Materials Directorate's Molecular Beam Epitaxy facility includes two MBE machines that have unique capabilities. One machine permits the material samples to be moved, under the ultra high vacuum, from the growth chamber to another chamber where the sample can be analyzed. The four surface analysis methods available are: Auger Electron Spectroscopy, X-ray Photo-electron Spectroscopy, Secondary Ion Mass Spectroscopy, and Ion Scattering Spectroscopy. These analysis tools permit scientists to determine the chemical state of elements present on the surface of the material samples. The second machine lets scientists observe the film growth process and determine the film's composition, quality and thickness. It also has a Scanning Tunneling Microscope with very high resolution so that individual atoms can be seen and moved on the surface to achieve a desired arrangement. The second machine's capabilities are tailored to investigate processing science problems and parameters to improve the performance, quality and yield of devices produced by the MBE method.

Molecular Modeling Laboratory

The Polymer Branch computational chemistry/molecular modeling laboratory is unique within the DOD. It provides a well rounded spectrum of methodologies ranging from full blown ab initio codes to semi-empirical and molecular mechanics codes. Large and small chemical systems can be handled. Additionally, several custom capabilities exist including, Hatree-Foch based molecular dynamics and state-of-the-art (probably unique in the U.S.) ab initio correlated post Hatree Foch crystal orbited software.

Polymer Physics Experimental Laboratory

The Polymer Optoelectronics Physics Laboratory contains a unique assortment of experiemental equipment devoted solely to polymer research. While many comparable items are found in the outstanding semiconductor research laboratories, it is extremely rare to see them dedicated in one location for studying the electrical conductivity, photoconductivity, electroluminescence and nonlinear optical properties of polymers alone. This include electronic and ionic conductivity, time-of-flight mobility, photoconductivity action spectra, photoconductive decay time, electroluminescence, photoluminescence and absorption spectra, all as a function of temperature from 40Ok to lOk. In the optics area, there is ellipsometry, Brewster angle, absorption spectroscopy and waveguide coupling for measuring refractive index and optical attentuation losses. For second-order nonlinear coefficient there is 2nd harmonic generation and E-O coefficient from the nonlinear waveguide response. We know of no other government laboratory with such a wide varieety of experiements devoted solely to polymer optoelectronic physics.

Polymer Characterization

The polymer characterization facility consists of a combination of tools and skills unique to DOD. The facility provides the ability to determine the figure of merit for very small, research scale polymers, specifically for high temperature, structural, nonlinear optical or conducting polymer applications.

Fiber/Film Fabrication Laboratory

The Polymer Branch of the Materials Directorate has equipment that provides a unique capability within the DOD for processing high strength, high thermal stability polymers into fibers and films. These polymers are wet spun from solution in highly acidic solvents and the processing equipment has therefore been specially fabricated to resist corrosion. Other laboratory scale facilities for fabricating research quantities of this class of materials are unavailable elsewhere in the DOD.

Polymer Synthesis Laboratory

Synthetic laboratory facilities at WL/MLBP are unique since it is the only DOD laboratory that has equipment to carry out large scale polycondensations in highly corrosive solvents. These solvents, such as polyphosphoric acid and methanesulfonic acid require special reactors fabricated from Hastology C steel, all custom manufactured from MLBP. This equipment is utilized for the preparation of new high performance polymers used in Air Force high temperature applications.

Morphology Laboratory

The Polymer Branch morphology facility is a unique DOD facility. It is well equipped for x-ray characterization of polymer specimens and single crystal and polycrystalline materials and includes numerous standard equipment items and several custom designed capabilities. Three rotating anode x-ray sources, two four-circle diffractomers for polymer work, numerous cameras, an automatic single crystal diffractometer, a scanning electron microscope, and state-of-the-art modeling are available.

Space Combined Effects Primary Test and Research Equipment Facility (SCEPTRE)

MISSION: Evaluate the effects of space exposure on thermal control materials

CAPABILITIES: Vacuum: $5x10^{-7}$ Torr; Electron: 10^{12} e^-/cm/sec @ up to 20 KeVs; Ultraviolet 1 to 3 EUVS; and Temperature: 80° to 150°F

EQUIPMENT: High Vacuum Chamber; Electron and UV Sources; Spectrophotometer

The Nonmetallic Materials Division of Wright Laboratory's Materials Directorate researches and develops new coatings and lubricants to meet varied current and future Air Force requirements. One of those requirements is the need for stable coatings to control the temperature of deployed space system components.

To study the effects of space exposure on thermal control materials, the Directorate established a space simulation facility in the mid-1960s that has evolved into the current Space Combined Effects Primary Test and Research Equipment (SCEPTRE) Facility. It allows in-situ measurements of changes of thermal control materials' solar absorptance during exposure to simulated space environments. Correlation of experimental results from SCEPTRE with operational experience has established the validity of these simulated space environment studies.

Researchers in the facility can subject material samples to controlled combined environments of high vacuum, electron flux, ultraviolet radiation and temperature that simulate operation in space. Sample reflectance, temperature and outgassing can be measured in-situ. Modern automatic control, data collection and analysis equipment are integrated with the facility to enhance its capabilities.

Up to 5 samples can be placed in a sample folder and placed in the facility's vacuum chamber that can be evacuated to pressure in the range 5×10^{-7} to 5×10^{-8} Torr. The sample temperatures can be controlled within the range 80° to 150° F. Two electron guns, each capable of generating fluxes up to 10^{12} electrons per square centimeter per second with energies up to 20 KeV, can be directed upon the samples. Samples can be exposed to equivalent solar ultraviolet radiation with intensity in the range 1 to 3 EUVS. Reflectance measurements in the 200 to 2,500 nanometer range are made using a spectrophotometer coupled to an integrating sphere by a fiber optic link. The integrating sphere captures all of the reflected light and enables measurement of the total amount of reflected radiation. Multiple samples can be evaluated simultaneously.

This facility is unique to the DoD due to the integrated capability to evaluate materials samples in a high vacuum space environments with simulated space radiation (electrons, solar ultraviolet) with analysis of reflected radiation using an integrating sphere spectrophotometer.

Aircraft Hydraulic Fluid Pump Test Laboratory

This laboratory is unique in the U.S. because it has the capabillty to evaluate the performance of hydraulic fluids in a highly instrumented and computerized stand in actual aircraft hydraulic pumps utilizing very small quaniities of experimental fluids. The stand is capable of stressing these fluids under wide ranging conditions of temperature (up to 350 °F) and pressure (up to 8,000 psi) in all important regimes of lubrication.

Lubricant Traction Apparatus Laboratory

The Lubricant Traction Apparatus is unique in the federal government because it has an operating temperature capability up to 370 °C with disc rotational speeds up to 25000 rpm using small lubricant sample sizes >150 ml. The apparatus is currently in the final stages of a >$250,000 upgrade.

FACILITY TYPE: Elastomer Characterization

PURPOSE:

Formulate and evaluate elastomeric materials (seals and sealants) for Air Force applications

FACILITY NAME:

Elastomers Facility

PRIMARY CAPABILITIES:

Elastomer compounding in various sizes (micro, 3x5, 8x12, 8x15 rubber mills)

Elastomer curing and post curing (two 50 ton and one 10 ton presses; four ovens with 600 degF capability)

Fluid aging of elastomers (low temperature and explosion proofovens)

Dynamic research of O-ring and special design seals (8000 psi, 350 degF capability)

SPECIAL/UNIQUE CAPABILITIES:

Only facility currently capable of research candidate seals for chlorotrifluoroethylene hydraulic fluid at 350 degF

Measurement of drag force and correlation with seal designs

Wide frequency range of dynamic seal research (20 Hz to .01 Hz; .01 to 2.50 inch stroke; both rod and piston seal test cells available

INSTRUMENTATION:

Instron Model 1102 and 4201, 1100 and 5000 lb Tensile Testers,computer automated

Two MTS Model 810 test cells for seal research

Mass Spectrometry System Laboratory

The Mass Spectrometer System is unique in the federal government because it has the capability to accurately determine sample masses to 10,000 atomic mass units using a variety of magnetic sector analysis techniques, such as, electron impact, chemical ionization, etc. by being directly coupled to a gas chromatograph for the analysis of volatile samples and to a supercritical fluid chromatograph for the separation and analysis of nonvolatile samples.

Optical Measurements Laboratory

MISSION: Accurately and precisely measure the optical properties of materials as a function of wavelength, angle, temperature and polarization.

CAPABILITIES: Directional Hemispherical Reflectance (0.25-14 microns, -65°F to +450°F, normal to 70° angle of incidence); Bidirectional Reflectance (DRDF) (0.25-14 microns and 5 laser wavelengths (0.325, 0.6328, 1.06, 3.39, and 10.6 microns; full hemispherical coverage, laser retroreflection, -65°F to +450°F broadband, room temperature laser wavelengths); Directional Emitance (3-14 microns, RT to +450°F, grazing angles); and Transmission (0.185-14 microns, room temperature)

EQUIPMENT: Perkin-Elmer Lambda 9 UV-VIS-NIR Spectrometer w/integrating sphere; Bomem DA-3 Fourier Transform Infrared (FTIR) Spectrometer w/integrating sphere; Laser Bidirectional Scatterometer (custom designed and built by TMA Technologies; Broadband Scatterometer (custom designed and built by TMA Technologies; and Directional Emissometer (custom designed by Systems Research Laboratories)

The Nonmetallic Materials Division of Wright Laboratory's Materials Directorate researches and develops new materials and processes to modify the optical characteristics for a variety of AF systems. To develop these materials efficiently, accurate characterization techniques are required to measure ultraviolet, visible, and infrared absorption, reflection, and transmission characteristics.

This facility is unique to the U.S. This is the only optical characterization facility that can perform broad band, accurate optical characterization of materials that have modified optical properties. Please contact the point of contact for additional information.

Laser Deposition Tribology Laboratory

MISSION: Research and develop thin-film coatings for use on surfaces that are susceptible to friction and wear

CAPABILITIES: Laser deposition of thin-film coatings with accurately controlled chemical, mechanical, friction and wear properties; Analyze changes of film properties and behavior during wear analysis.

EQUIPMENT: Pulsed Excimer Laser; High Vacuum Deposition Chamber; X-ray Photoelectron Spectrometer; X-ray Diffraction Spectrometer; Raman Spectrometer

The Nonmetallic Materials Division of Wright Laboratory's Materials Directorate researches and develops new coatings and lubricants to meet varied current and future Air Force requirements. One approach being pursued is the use of a laser and vacuum chamber to make stable thin-film coatings with tailored friction and wear characteristics for use as surfaces on material components that are susceptible to friction and wear.

The Laser Deposition Tribology Facility engineers and designs thin-film coatings with specific properties, makes the films under accurately controlled process conditions and analyzes their chemical, mechanical, friction and wear properties. This ensures the films have the desired properties to meet the application's requirements and that identical high quality films can be reproduced in a manufacturing environment.

In the lab, film coatings are produced on sample surfaces by shining a beam of light pulses produced by an excimer laser on the material to be deposited on the sample surface. Both the deposition material and the surface to be treated are inside a vacuum chamber. The material is vaporized and condenses as a film on the sample surface. Film thickness and a number of other parameters are monitored during the deposition process and used to control the properties of the deposited material. Some of the control parameters include laser energy per pulse, pulse rate, time of exposure, temperature of the sample surface, vacuum and type of gases and the rate they are admitted to the vacuum chamber during the deposition process.

After the films have been deposited, they are analyzed to determine their chemical properties, crystal structure, thermal properties and mechanical properties. The lab uses X-ray photoelectron spectroscopy, X-ray diffraction spectroscopy and Raman spectroscopy to analyze the films. Many other analytical tools are available and used to support the tribology research and development conducted in the laser deposition facility.

After the films have been analyzed they undergo a wear and friction process using a unique tribometer that is operated within the Raman spectrometer. This novel tool permits observation of chemical property changes that occur during wear.

This facility is unique to the U.S. due to the integration of Raman spectrometry to analyze chemical property changes during wear and friction studies.

Ceramic Composite Research Laboratory

MISSION: Research, development and transition of ceramic matrix composites for high temperature applications

CAPABILITIES: Chemical Synthesis of Precursors; Fiber Coating (Sol-gel, CVD, etc.); Specialized Composite Processing, Characterization, Research, and Analysis

This lab performs research and development of ceramic composite materials for high temperature applications on Air Force and commercial systems. Its purpose is to form an understanding of ceramic matrix composites, develop and transition them to high temperature structural, electronic, low observable, and space-based applications.

The lab's wide range of capabilities include: chemical synthesis of ceramic precursors, fiber coating (sol-gel, chemical vapor deposition, and solution), composite processing and fabrication (filament winding, tape casting, hot pressing, pressure/vacuum infiltration, etc.), and powder and composite characterization (thermal analysis, particle size, density, creep, optical and electron microscopy). In addition, specialized composite studies and analyses can be performed, including the determination of interface properties and ambient/high temperature tension and flexure research.

This facility contains a wide range of state-of-the-art equipment. Included is a custom designed interface apparatus for fiber pushout research on monofilament and textile fiber ceramic and metal matrix composites. A patent has been applied for, and a CRADA has been signed, to commercialize this apparatus. The facility contains a custom made sol-gel (solution) fiber coater for coating of monofilaments and fiber tows. Both the apparatus and the tow coating technique are patented and negotiations are pending for commercialization. This facility also has a custom designed CVD (Chemical Vapor Deposition) fiber coating apparatus and an automated Rigaku X-ray diffractometer with high temperature furnaces. There are apparatus for the characterization of ceramic powders (particle size analyzer, pycnometer, BET for surface area measurement), including a combined Thermal Gravimetric Analysis/Differential Thermal Analysis/Mass Spectrometer for thermal characterization of ceramic and preceramic powders. Also available in this facility are tape casting apparatus, numerous furnaces for high temperature processing (room temperature to 2500°C in vacuum or inert atmosphere, to 2000°C in air, and to 1800°C in specialty atmospheres), a spray dryer for preparation of ceramic powders, a cold isostatic press (30,000 psi), two vacuum hot presses with 4" x 4" capacity and temperatures up to 2500°C, an Instron 8562 creep frame with tungsten vacuum furnace for creep analysis to over 2000°C, and several screw driven and servo-hydraulic frames with appropriate tooling and in some cases furnaces and vacuum/atmosphere chambers for tension, compression, and flexure analysis up to 1700°C.

This facility is unique to the DoD due to the integrated ability to characterize the interface between ceramic fibers and matrices.

Experimental Materials Processing Laboratory (EMPL)

MISSION: Provides materials processing expertise and leadership for the large scale introduction of new aerospace materials

FACILITIES: 8,000 Square Feet; Arc and TIG Welding; Heat Treating; Data Acquisition Support; Process Modeling, and Casting

EQUIPMENT: Arc and Induction Melters; 1,000-ton Forging Press; 700-ton Extrusion Press and Rolling Mill

Wright Laboratory's Materials Directorate is responsible for the development of materials and their processing techniques to meet the needs of future Air Force systems and improvements of systems that are currently deployed. An Experimental Materials Processing Laboratory (EMPL) has been established within the Materials Directorate's facilities to accomplish the materials processing portion of the effort.

The EMPL is the only facility of its kind known to exist. It incorporates many beyond state-of-the-art materials processing capabilities. This laboratory is fully committed to materials processing research and the development of advanced materials processing methods and techniques.

The EMPL occupies 8,000 square feet of contiguous space and has equipment to melt, cast, forge, extrude, heat treat, and join materials. The EMPL also includes computer work stations capable of modeling deformation, solidification and densification processes. In addition, the computer modeling work stations can be used to control the parameters used by the equipment during processing experiments.

The processing machinery includes: vacuum arc melters, vacuum induction melter, rolling mill, 1000-ton forge press, 700-ton extrusion press and powder evacuation facility. These processing machines are fully instrumented to provide computer control and automated data collection functions.

Many new materials react adversely with air and moisture at the elevated temperatures required for processing. Support facilities are available to process these materials in sealed containers or under vacuum conditions. After processing, the sealed containers are removed leaving the processed material free from contamination.

This facility is unique to the federal government. The computer controlled and instrumented high temperature forging, pressing, and extrusion capability with "production" size capacity is not replicated within the federal government.

Microstructural Characterization Laboratory

MISSION: Perform microstructural characterization on conventional and advanced aerospace materials

CAPABILITIES: Analytical Electron Microscopy; Quantitative Metallography; Compositional X-ray Analysis; Fractographic Analysis of Metallic and Intermetallic Alloys and Composites

EQUIPMENT: Scanning Transmission Electron Microscopes; Scanning Electron Microscopes; Electron Probe X-ray Microanalyzers; Optical Microscopes, and Spectrophotometers

The Metals and Ceramics Division of Wright Laboratory's Materials Directorate performs microstructural characterization on a variety of conventional and advanced aerospace materials emerging from Air Force exploratory research programs. This research is performed to better understand basic material science phenomena by using analytical electron microscopy and quantitative metallographic techniques.

To characterize microstructures of advanced research materials, the Directorate established the Microstructural Characterization Facility. This facility specializes in analytical electron microscopy for determining the orientation, volume fraction, crystal structure, and chemistry of microscopic phases. It also performs quantitative metallography for determining macroscopic grain size, shape and volume fraction of primary phases. Microscopic analysis capabilities include transmission and scanning imaging and electron diffraction on metallic and intermetallic alloys, metal matrix composites, organic matrix composites, and ceramic matrix composites. This facility is also capable of compositional X-ray analysis, including both energy dispersive and wavelength dispersive spectroscopy, and fractographic analysis to determine the failure mechanisms of research materials.

Researchers working in the Microstructural Characterization Facility have access to a variety of equipment including transmission and scanning electron microscopes, electron probe X-ray microanalyzers, and optical microscopes. The facility includes two JEOL scanning transmission electron microscopes (models 2000FX and 100CX) with accelerating potentials of 200 and 100 kilovolts, respectively, and resolution down to 0.4 nanometers for both. Two 25 kilovolt scanning electron microscopes (Leica Model 360FE and Hitachi Model S900) with resolutions of 1.5 nanometers (Leica) and 0.7 nanometers (Hitachi). This facility also contains two JEOL electron probe X-ray microanalyzers, models 840 and 733, both with a resolution of 7.0 nanometers and accelerating potentials of 40 kilovolts (840) and 50 kilovolts (733). Accessories for analytical electron microscopy include hot and cold stages, energy dispersive X-ray spectrometers, electron energy loss spectrometers, back scatter electron detectors, and computer controlled data collection and analysis equipment. Six optical microscopes are also available (Reichert-Jung, Olympus, Leitz, and Nikon) with polarized light, dark field, and Normarski contrast capabilities.

Computational Materials Science Laboratory

The computational materials science facilities in the ML are unique to the DOD. We do molecular design, not only with a connection to very large computational facilities, but with near real time feedback with a virtual reality visualization system. Soon this capability will be enhanced by the addition of connection to a large massively parallel computation computer from ARPA. No other facility in the world gives the chemical designer the ability to design molecules and watch their interaction in near real time.

Optical Materials Synthesis Laboratory

The optical materials synthesis facility is unique to the DOD in that it houses the ability to design and synthesize unique optical responsive molecules using both traditional chemical and biochemical techniques. We regularly make new molecules for laser hardening by combining the best attributes of polymers and optically labile molecules (chromophores). This results in the ability to develop new classes of optically sensitive materials for laser hardening.

Laser Hardened Materials Evaluation Laboratory

MISSION: Research and evaluate laser effects on advanced materials for future aerospace systems

FACILITIES: 15,000 Square Feet; Machine Shop; Photo/Video Capabilities; Diagnostic and Data Acquisition Support

EQUIPMENT: 15 kW Continuous Wave CO_2 Flat-top Laser; 150 kW Continuous Wave CO_2 Flat-top Laser; Mach 0.05 to 2.0 Wind Tunnels; Space Simulation Chambers; Tensile Test Machine

Wright Laboratory's Materials Directorate is responsible for development of laser-resistant materials and evaluation of laser/material interactions on advanced materials for future aerospace systems. To support these responsibilities, the Laser-Hardened Materials Evaluation Laboratory (LHMEL) Facility was established.

In 1976, a 15 kW continuous wave carbon dioxide Electric Discharge Coaxial Laser (EDCL) was constructed for the Materials Directorate. Since its construction, it has been in constant use for the development of laser-resistant materials and the evaluation of laser/material interactions. The design and construction of a 150 kW continuous wave carbon dioxide EDCL was completed in 1988. It provides materials research capabilities over a dynamic range of laser powers, spot sizes, and material or component sizes.

On-site personnel are assigned to each program based on skills-mix required. The skills available cover the following engineering and technical areas: computer systems, design/drafting, electrical/electronics, electro-optics, optics, materials analysis, mechanical, and design of experiments. There is also an on-site machine shop that fabricates research equipment and an electronics shop that does troubleshooting, simple calibrations, and breadboard design/fabrication. Photographic/video coverage is also available. Wind tunnels are available for the 15 kW and 150 kW lasers. The 15 kW laser wind tunnel simulates Mach 0.05 to 0.9. The 150 kW laser wind tunnel simulates Mach 0.1 to 2.0. Four vacuum chambers are available, ranging from 30" to 22' in diameter. The LHMEL Facility also has tension/compression and beam slewing capabilities. Facility users can be provided with data in the form of one-half inch magnetic tape, 5-1/4" floppy disks, color or black and white plot, tabular data, or RS-232 interface.

This facility is unique to the U.S. This is the only 150 kW continuous wave laser with the ability to evaluate materials performance in an aerodynamic environment..

One Kilowatt Laser Laboratory

MISSION: Research and evaluate laser effects on materials and provide technical demonstrations on laser uses

CAPABILITIES: Laser-Material Interaction; Characterization of IR Optical Materials; Hardening Device Evaluation; Precision Machining; Technical Demonstrations

EQUIPMENT: 1 kW Continuous Wave, CO_2 Gaussian Laser Operating at 10.6 microns; Computer Controlled Machining Table; 4'x8' Optical Table with Enclosed Fume Hood Area; Computer Aided Design Work Station

Wright Laboratory's Materials Directorate is responsible for the development of laser-resistant materials and evaluation of laser effects on advanced materials for future aerospace uses. To help support these responsibilities, the 1 Kilowatt Laser Lab was established in 1975.

The lab consists of a 1 kilowatt carbon dioxide industrial laser, a computer controlled machining table, a 4'x8' optical table with an enclosed fume hood area, and a Computer-Aided Design (CAD) work station. The laser operates in the continuous wave mode with Gaussian spatial intensity distribution.

The lab performs laser-material interaction studies, characterizations of infrared optical materials, hardening device evaluations, precision machining of various materials for use in Air Force research projects and technical demonstrations on laser capabilities.

Each year, more than 1,000 people tour the facility. Demonstrations introduce laser capabilities to school-age groups and help interest them in science related fields. Industry representatives have used the facility to evaluate the use of lasers in machining operations before purchasing expensive production equipment for their factories.

Magneto-Optical Semiconductor Analysis Laboratory

The facility is capable of performing high resolution optical absorption measurements on semiconductors and also infrared cyclotron resonance using an attached superconducting magnet (9T). Wavelengths through the visible to 1,000um are accessible. The sample temperature can be varied from RT to below 4.2K.

Near and Far Infrared Photoconductivity Laboratory

This facility has been totally designed and built in-house for optimum performance to measure the specific photosensitive materials undergoing R&D by the Air Force. It is used to analyze bulk photoconductors, photovoltaic detectors, as well as quantum well and superlattice structures. The spectrometer covers from the near infrared to 50um and the temperature can be varied from 10K to RT.

Nonlinear Optical Characterization Laboratory

The Non-Linear Optical (NLO) characterization laboratory combines the best attributes of classical optical research facility with the ability to analyze prototype laser weapon defense devices. In this way we short circuit the time required to transition from basic research through the engineering development cycle. This lab therefore results in a unique ability to rapidly respond to new materials opportunities and field level demands for laser protection.

Pulsed Laser Deposition Facility for the Growth of HiTemp Superconductivity and Semiconductor Films Laboratory

This facility has been designed and assembled to specifically address AF materials requirements. It consists of a pulsed YAG:Nd laser and two pulsed excimer lasers, several chambers designed for depositing films of different materials, an analysis chamber for in-situ Auger and XPS analyses of depositions, and chambers for plume diagnostics, e.g. time-of-flight mass analyses.

Superconductivity Materials Characterization Laboratory

The AC magnetic susceptibility measurement facility has been designed and built inhouse to maximize the sensitivity and resolution of thin film analyses. It covers temperatures from 4.2K to RT and automatically varies the probe field by two orders of magnitude at each temperature. This is supplemented by high sensitivity transport and microwave measurement facilities.

Analytical Chemistry Laboratory

MISSION: Provide timely solutions through chemical analysis to metallic and nonmetallic materials issues

EQUIPMENT: Mass Spectrometry; IR, Emission Spectroscopy; X-ray Diffraction; Micro Elemental Analysis; and Atomic Absorption

CAPABILITIES: Wide range of analyses supporting research and development, failure analysis and system maintenance

The Analytical Chemistry facility was established to provide timely chemical analysis of a diverse range of materials (metallic and nonmetallic) for the Air Force and other organizations. This facility performs quick reaction, on-site problem solving of unique, complex material compositions. Analytical support is provided primarily to Air Force interests such as fundamental research, materials development, failure analysis, accident investigation and materials maintenance for current systems.

In the past ten years more than 30,000 analyses have been performed in this facility. They have included routine elemental analysis of research polymers and novel metal alloys, identification of residues and analysis of components from aircraft mishaps, analysis and identification of failed materials ranging from plastic face shields to brake pads, qualification of stock metal alloys prior to use in fabrication, identification of unknown materials ranging from deposits on aircraft turbine blades in Saudi Arabia to residues in air handlers for Wright Laboratory facilities maintenance, and analysis of coating materials for foreign and domestic aircraft.

The Analytical Chemistry Facility has multiple research capabilities and a wide range of equipment. In house instrumentation and technologies available are: microscopic Fourier Transform and Dispersive Infrared Spectrometry, X-ray Fluorescence Spectrometry, High Pressure Liquid Chromatography and Gel Permeation Chromatography, Inert Gas Fusion for carbon, sulfur or oxygen and nitrogen in metals, X-ray Diffraction, Atomic Absorption Spectrometry, Wet Chemical analysis methods, Inductively Coupled Argon Plasma Spectrometry, rapid combustion analysis for carbon, hydrogen, nitrogen and oxygen, Gas Chromatography-Mass Spectrometry and UV-Visible Spectrometry. Engineers in the Analytical Chemistry Facility also have access to other facilities and experts in the Materials Directorate and to other Directorates within Wright Laboratory.

Structural Failure Analysis Laboratory

MISSION: Analyze and determine causes of structural failures in operational Air Force systems

CAPABILITIES: Investigate any failure including those related to fatigue, overload, corrosion, high temperature oxidation, stress rupture, process or manufacturing problems

EQUIPMENT: Optical Microscopes; Electron Microscopes; Thermal Testing Devices; Metallographic Equipment

The Systems Support Division at Wright Laboratory's Materials Directorate provides quick-reaction support to Air Force product centers and air logistics centers to help solve materials related problems that occur in operational Air Force systems. The Metallic Structural Failure Analysis Facility was established in 1960 by the Directorate to perform failure analysis and research of structural materials. This facility is used to identify the cause of failure of metallic components. Some specific types of these failures include fatigue, overload, stress corrosion, excessive wear, chemical corrosion, high temperature oxidation, and stress rupture, which are often the result of material, processing or manufacturing problems.

Capabilities of the Metallic Structural Failure Analysis Facility include in-depth failure analysis of metallic structures and expertise in physics of failure and fracture mechanisms in conventional and emerging materials. The primary function of engineers in this facility is to perform structural failure analysis on subsystems and components to determine material and manufacturing process deficiencies. In addition, these engineers provide technical consultation on materials and manufacturing issues for acquisition and logistics programs, conduct research and development programs addressing physics of failure phenomena and materials problems, support technology transition programs, and help Air Force aircraft maintenance depots develop new structural maintenance and repair processes.

The facility's equipment includes state-of-the-art optical microscopes; conventional, large stage and low vacuum scanning electron microscopes; wavelength and energy dispersive spectrometer attachments; a transmission electron microscope; microhardness tester and complete metallographic equipment. Engineers of the Structural Materials Failure Analysis Group also have access to facilities and experts at other areas in the Materials Directorate and at other directorates within Wright Laboratory.

This facility is unique to the DoD due to the integrated capability of photographic, nondestructive, optical and x-ray microscopy, chemical and thermal analysis, and material property evaluation.

Electrical and Electronic Failure Analysis Laboratory

MISSION: Analyze and determine causes of electronic failures and assess electrical/electronic material and their manufacturing processes

CAPABILITIES: Full range of electrical, environmental, surface, and microscopic analyses

EQUIPMENT: Electrical Testing; Electron, Optical and Infrared Microscopes; Surface Analysis; Thermal Analysis

Wright Laboratory's Materials Directorate provides quick-reaction support to Air Force product centers, air logistics centers, other government agencies, and industry to help solve materials related problems that occur in aerospace and ground systems. To provide that support in the areas of electronic hardware and equipment, the Directorate established the Electrical and Electronic Failure Analysis Facility in 1977. Its primary purpose is to characterize failures of electrical and electronic assemblies, evaluate and improve electronic materials, and develop specification requirements.

Engineers at the facility perform failure analysis of sub-systems and components to determine materials and manufacturing process deficiencies; provide technical support on materials and manufacturing issues for acquisition and logistics programs; conduct research and development programs addressing physics of failure phenomena and materials problems; support technology transition programs; and help Air Force aircraft maintenance depots develop new electronic maintenance and repair processes.

The facility's equipment includes analog and digital electrical characterization and research equipment, imaging equipment, a real-time X-ray inspection system, leak detection equipment, and equipment for detecting and characterizing internal flaws in electronic equipment. Detailed inspection equipment includes an optical microscope, infrared microscope, and a scanning electron microscope for elemental X-ray analyses. Environmental evaluation and accelerated life studies are performed using temperature and humidity chambers, salt fog, and a thermal shock machine. Engineers of the Electronic/Electrical Material Failure Analysis Group also have access to facilities and experts at other areas in the Materials Directorate and at other directorates within Wright Laboratory.

This facility is unique to the federal government since the integrated capability of analog and digital electronic characterization and research equipment (many one of a kind); optical, infrared, and scanning electron microscopy; and environmental research is not replicated in the U.S.

NDE Tomography Laboratory

MISSION: Study castings, composites and electronics using a nondestructive evaluation X-ray tool

CAPABILITIES: Conventional CT; Digital Radiography; Laminography; Dual Energy CT and Radiography

EQUIPMENT: Tomoscopy CT System; LAMDE CT System

The X-ray Computed Tomography (CT) Facility represents one of the Materials Directorate's many accomplishments in the research and development of Nondestructive Evaluation (NDE). CT can assist in improving manufacturing processes, extending part life, and reducing maintenance and repair costs. It is an exceptionally useful tool for inspecting castings, composites and electronics and offers the structural failure analyst a unique tool for inspecting service failures or manufacturing defects.

The Wright Laboratory facility consists of two state-of-the-art, one-of-a-kind CT systems. These systems enable the Air Force to image and evaluate assembled components up to 600 mm in diameter, as well as coupon-size samples of new materials.

The larger system Laminography/Dual Energy (LAMDE) generates images with a resolution of 250 microns and provides chemical composition information. It provides four distinct radio-graphic inspection methods: Conventional CT, Digital Radiography, Laminography, Dual Energy CT and Radiography. LAMDE is a second generation translate-rotate CT machine. The LAMDE machine has some one-of-a-kind features that allow multiple capabilities, i.e. all four inspection techniques are on one machine with a detector scheme of unique hardware configuration.

TOMO, short for the Tomoscope, the first microscopic industrial CT machine of the Air Force, is one of the highest resolution production industrial CT systems available today. It was installed in 1990 for the examination of coupon-size samples of new materials. This device has 25 micron spatial resolution, which is an order of magnitude better than the typical CT systems. This resolution allows for analysis of materials that heretofore remained a mystery. It can inspect objects up to 100 mm in diameter. This is a third generation, rotate only, data acquisition machine. TOMO currently can perform Digital Radiography, CT, and Laminography. Dual Energy CT and Radiography will be added in the future.

This facility is unique to the United States. The combination of the "one of a kind", LAMDE and TOMO capabilities are unprecedented in the U.S., if not the world.

FACILITY TYPE: Corrosion/Materials Compatibility/Coatings

PURPOSE:

Corrosion research , materials compatibility, surface pretreatment, surface finishing, process chemicals, and aerospace maintenance chemicals

FACILITY NAME:

Corrosion Test Laboratory

PRIMARY CAPABILITIES:

Standardized research ; specification research

Accelerated environmental simulation

New material/process screening

Multiple research capabilities; corrosion research and evaluation

SPECIAL/UNIQUE CAPABILITIES:

Three different forms of artificial weathering

Accelerated aging capability (humidity, temperature extremes, fluid immersions)

Accelerated corrosion research (salt spray, filiform, stress corrosion)

INSTRUMENTATION:

Extensive monitoring and processing of test parameter data andfinal result presentation

Rain Erosion Facility

MISSION: Determine the susceptibility of advanced materials and coatings to rain erosion damage

FACILITIES: Isolation Cell; Control Room; Variable Speed Whirling Arm; Controlled, Simulated Rainfall; Strobed Video Capability; Data Acquisition and Analysis

CAPABILITIES: Operating speeds up to 650 miles per hour; Simulated rainfall of one inch per hour; Seven specimen configurations

The Wright Laboratory Materials Directorate is responsible for new materials and coatings for all Air Force systems. Many of these materials and coatings are used on exposed flight vehicle (aircraft, missile and weapon) surfaces. Impingement of rain on these surfaces as they move through the air causes erosion damage. Rain erosion damage has been investigated for many years, but as new materials and protective coatings are developed, they must be studied to ensure that they provide the durability necessary to meet system life, reliability and maintainability requirements.

The rain erosion facility can simulate constant rainfall of one inch per hour at speeds ranging from 0 to 650 miles per hour. Seven different sample configurations can be evaluated to simulate surfaces such as aircraft wings, radomes, nose cones, antennas, windshields, canopies, engine inlets, sensor windows and rotor blades.

More than 33,000 samples have been evaluated over the past 30 years to determine their rain erosion characteristics. This large database coupled with long-term, real-time experience has led to excellent correlation between the behavior predicted from the rain erosion studies and that experienced in operational use. The facility has established a high level of technical credibility, data reproducibility and user confidence.

The rain erosion apparatus is a double arm, low drag coefficient, negative lift blade that is 8 feet in diameter and is attached to and spun by a vertical drive shaft connected to a variable speed drive. The specimens are attached to the leading edge tip sections of the rotating arm. A random pattern of water droplets is produced by four curved manifolds that contain 25 capillaries each. Calibrated rainfall, droplet size and rate are controlled by capillary diameter, water temperature and pressure. Rotating the specimen through the simulated rainfield produces an effect that accurately represents flight through falling rain.

Documentation capabilities include strobed video coverage and data - including speed, duration, rainfall rate, droplet impact angle, specimen weight loss; changes in optical transmission properties (if applicable); post sample analysis to define failure type.

This facility is unique to the federal government since this is the only capability to evaluate materials performance in an accurately simulated consistent rain fall environments at speeds up to mach 1.

Engineering and Design Data Laboratory

MISSION: Generate materials engineering data to support failure analyses and transition of new materials to users

CAPABILITIES: Full range of mechanical properties can be measured from -450°F to +2000°F in air, inert atmosphere or vacuum

FACILITIES: 9,000 square feet of laboratory; Wide range of mechanical property testing machines; Environmental control equipment

Wright Laboratory's Materials Directorate is responsible for the development of new materials and the support of fielded systems for materials related problems and issues. The Directorate maintains a full range of modern facilities to rapidly and independently generate materials mechanical and structural data to support these responsibilities. This capability was established over 75 years ago and has constantly been maintained with state-of-the-art equipment and facilities to meet the technical challenges presented by emerging materials and systems technologies.

The Engineering and Design Data Facility has the capability to measure material properties, including tensile, compression, bearing, shear, fatigue, fracture toughness, crack growth, creep, impact, stress rupture, and stress corrosion cracking. Many of these properties can be measured at temperatures as low as -450°F and as high as 2000°F in air. Specialized equipment is available to conduct some of the studies at up to 3000°F under vacuum or inert atmosphere conditions. Complex spectrum loading can also be accomplished for fatigue and crack growth investigation.

The facility has 15 stations and occupies 9,000 square feet. It is staffed by seven government and nine on-site contractor technical personnel. Materials and mechanical engineering personnel are assigned to each evaluation based on the mix of technical skills needed. The facility is managed and operated by the Directorate's System Support Division, Materials Engineering Branch (WL/MLSE).

Documentation includes computer generated engineering and technical reports, still photographic and video coverage, and an indexed data base.

This facility is unique to the U.S. due to the above capabilities.

Composite Structural Failure Analysis Laboratory

MISSION: Analyze and determine causes of nonmetallic failures in operational Air Force systems

EQUIPMENT: Nondestructive Testing; Optical Microscopes; Scanning Electron Microscopes: Chemical/Thermal Analysis; Mechanical Testing

CAPABILITIES: Investigates failures related to material/manufacturing defects, overload, fatigue, impact, wear, moisture, overheating, and more

The Composite Structural Failure Analysis facility was established in 1985 to provide composite and non-metallic materials support to the Air Force and other organizations. The main purpose of this facility is to provide quick reaction response for identifying the cause of non-metallic component and sub-system failures. Analyses are conducted on organic and metal matrix composites, glass, ceramic, and polymer based components, coatings and adhesives. This facility can be used to investigate failures resulting from improper material selection, material/manufacturing defects, overload, fatigue, corrosion, wear, impact, moisture intrusion, overheating and other factors.

Engineers conduct detailed, well documented, thorough investigations, with a final report provided to the customer at the end of the analysis. In addition to failure analysis support, this facility also conducts small in-house research projects to aid various investigative efforts in defining how defects affect material properties. Technical guidance in material and manufacturing processes is also provided to various agencies during system development, repair, and/or transition of new materials into older systems. Engineers in the Composite Structural Failure Analysis Facility also have access to other facilities and experts in the Materials Directorate and to other Directorates within Wright Laboratory.

Facilities include photographic capabilities for documentation purposes; ultrasonics, X-ray and other nondestructive techniques for identification of non-visible damage; optical microscopes for high magnification and microstructural analysis; chemical and surface analysis equipment for identification of materials and contaminants; thermal analysis equipment for determination of material processing history; scanning electron microscopes for fractographic analysis; and environmental chambers and mechanical facilities for material property evaluation.

This facility is unique to the DoD due to the integrated capability of photographic, nondestructive, optical and x-ray microscopy, chemical and thermal analysis, and material property evaluation.

High Temperature Materials Laboratory

MISSION: Research and development of high temperature metallic and intermetallic materials for aerospace applications

CAPABILITIES: Materials synthesis and processing; Heat treating (in excess of 2,000°C); Mechanical and structural characterization (up to 1,500°C)

EQUIPMENT: Crystallox MCGS-5 solidification processing system; Rigaku X-ray diffractometer; Mechanical frames with environmental chambers, furnaces, and tooling

The High Temperature Materials Laboratory of Wright Laboratory's Materials Directorate is responsible for Air Force research and development of high temperature metallic and intermetallic materials for aerospace systems. This facility performs high temperature material synthesis and analysis.

The primary capabilities of the High Temperature Materials Laboratory include materials synthesis, high temperature heat treating, high temperature mechanical characterization, and high temperature structural characterization. High temperature mechanical research can be performed in inert environments to temperatures as high as 1,500°C. Mechanical capability includes tension, compression, bending and creep. Solidification processing can be performed, including directional solidification and crystal growth, of reactive metals from ceramic less levitated melt. Additional capabilities include X-ray diffraction at temperatures up to 1,500°C and heat treating in air or inert environments to temperatures in excess of 2,000°C.

Equipment available to the High Temperature Materials Laboratory includes a Crystallox MCGS-5 multipurpose solidification processing system. The laboratory also includes a Rigaku automated, rotating anode source, high temperature X-ray diffractometer. Mechanical frames are available, outfitted with controlled environmental chambers, furnaces, and tooling for tensile, creep, bending, and compression analysis at 1,500°C. A range of other equipment is also available to this laboratory, including equipment in the Material Directorate's Microstructural Characterization Facility.

Composite Supportability Laboratory

This lab is dedicated to evaluate, develop and transition to the "using" Commands, at both field and depot levels, the latest materials and processes (M&P), and equipment technology supporting advanced composite repairs and maintenance of airframe components.

This facility contains advanced state-of-the-art equipment (prototypes) which will have major impact in future field and depot repair operations. The technology developed is directly transferred to the airframe repair school at Chanute AFB plus support to the Air Logistics Centers (ALCs) and Navy Air Repair Facilities (NARFs). No other lab in the Federal Govemment is designed to do this.

If this facility were to close, R&D composites supportability M&P would essentially cease in the Aif Force. Some repair and critical design functions would continue at other AF sites but application oriented, short term implementation, quick response solutions to current repair problems would not be available to the troops.

Fluids and Lubes Laboratory

This lab is dedicated to evaluating, qualifying and transitioning new and better fluids and lubricants to AMC, ACC and AFMC. Other customers include: other DOD services, the FM, NATO countries and Air Standard Coordinating Committee (ASCC) countries. No other lab exists that is entirely dedicated for this purpose. The facility contains state-of-the-art equipment which assist in timely assessment of fluid and lubricant related field problems. The technology transitioned directly affects Air Logistic Centers, the U.S. Army and Navy and international countries.

If this facility were to close, quick reaction analysis for field problems, qualification authority, referee assistance and technology transfer would essentially cease in the AF. This facility has an unique collection of research equipment which can characterize aircraft fluids and lubricants much more fully and in a shorter time than any other organization.

3.5 Expansion Potential

3.5.1 Laboratory Facilities: Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Air Vehicles - Fixed - Structures	See Facility Descriptions in 3.4.1. This data includes support space associated with this CSF.				
		Administrative	19	18	1
		Technical	342	288	54
		Storage	51	47	4
		Utility	46	42	4
Air Vehicles - Fixed - Propulsion	See Facility Descriptions in 3.4.1. This data includes support space associated with this CSF.				
		Administrative	7	7	0
		Technical	417	402	15
		Storage	55	55	0
		Utility	76	75	1
Air Vehicles - Fixed - Avionics	See Facility Descriptions in 3.4.1. This data includes support space associated with this CSF.				
		Administrative	7	7	0
		Technical	370	370	0
		Storage	15	15	0
		Utility	129	129	0
Air Vehicles - Fixed - Flight Subsystems	See Facility Descriptions in 3.4.1. This data includes support space associated with this CSF.				
		Administrative	16	16	0
		Technical	326	299	27
		Storage	23	21	2
		Utility	48	48	0

* Administrative, Technical, Storage, Utility

Answer to Question 3.5.1 Continued

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Air Vehicles - Rotary - Propulsion	See Facility Description in 3.4.1.				
		Administrative	0	0	0
		Technical	.4	0	.4
		Storage	0	0	0
		Utility	0	0	0
Electronic Devices	See Facility Descriptions in 3.4.1. This data includes support space associated with this CSF.				
		Administrative	3	3	0
		Technical	75	64	11
		Storage	9	5	4
		Utility	6	6	0
Advanced Materials	See Facility Descriptions in 3.4.1. This data includes support space associated with this CSF.				
		Administrative	11	11	0
		Technical	213	213	0
		Storage	2	2	0
		Utility	139	139	0

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Due to the excess capacity anticipated in the FY97 timeframe, along with only minor facility modifications, Wright Laboratory will have the ability to absorb significant workyears (see 3.5.1.1) in the same common support functions reported in this document. This capacity would include the performance of additional research and development in our facilities, with an increased density in the scientific and engineering space.

An additional capacity exists in the ability of many of Wright Laboratory's facilities to operate on a two shift per day basis. A range of 500 to 800 additional workyears could be accommodated on this basis. Scientific and engineering space may require major alteration or construction to accommodate an influx of this many personnel. Further study would be required to definitize the workyear figure and construction/alteration scope, based upon the specific research activity to be performed by common support function. Additional workyears (ranging from 300 to 600) could be accommodated with a three shift per day utilization.

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Air Vehicle - Fixed - Structures: Wright Laboratory has the capacity to absorb 91 workyears of effort through increasing the number/scope of research programs in this CSF.

Air Vehicle - Fixed - Propulsion: Wright Laboratory has the capacity to absorb 50 workyears of effort through increasing the number/scope of research programs in this CSF. Along with the scientific and engineering space available, a 60,000 pounds of thrust Sea Level Engine Research Cell is currently unused and listed under question 3.5.1 as excess.

Air Vehicle - Fixed - Avionics: Wright Laboratory has the capacity to absorb 50 workyears of effort through increasing the number/scope of research programs in this CSF.

Air Vehicle - Fixed - Flight Subsystems: Wright Laboratory has the capacity to absorb 80 workyears of effort through increasing the number/scope of research programs in this CSF.

Air Vehicle - Rotary - Propulsion: Wright Laboratory has the capacity to absorb ten workyears of effort. The nationally unique Helicopter Rotor Stand is currently unused and listed under question 3.5.1 as excess. Scientific and Engineering space would be provided in other existing facilities.

Electronic Devices: Wright Laboratory has the capacity to absorb 85 workyears of effort through increasing the number/scope of research programs in this CSF.

Advanced Materials: Wright Laboratory has the capacity to absorb 30 workyears of effort through increasing the number/scope of research programs in this CSF. Additional workyears could be accommodated if the Manufacturing Technology Directorate obtains a new facility, via internal relocations resulting from completion of a FY95 MILCON (see answer to question 3.5.1.3 - Avionics), and vacates Advanced Materials facilities.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alteration projects programmed in the FY95 PBS. (BRAC Criteria II)

Air Vehicle - Fixed - Structures: There are no MILCON or major alterations projects programmed in the FY95 PBS. As a result, there are no impacts on the answers to questions 3.5.1.1 and 3.5.1.2.

Air Vehicle - Fixed - Propulsion: There are no MILCON or major alterations projects programmed in the FY95 PBS. As a result, there are no impacts on the answers to questions 3.5.1.1 and 3.5.1.2.

Air Vehicle - Fixed - Avionics: Completion of Phase I of a MILCON for this CSF will occur in early FY95. Phase II is in the FY95 PBS. Space gained by these MILCON projects will be offset completely by the space being vacated. Therefore, there will be minimal impact on operations. There will be efficiencies gained by the close proximity of the personnel to their laboratories and integration of lab facilities, but at this time no impact can be quantified.

Air Vehicle - Fixed - Flight Subsystems: There are no MILCON or major alterations projects programmed in the FY95 PBS. As a result, there are no impacts on the answers to questions 3.5.1.1 and 3.5.1.2.

Air Vehicle - Rotary - Propulsion: There are no MILCON or major alterations projects programmed in the FY95 PBS. As a result, there are no impacts on the answers to questions 3.5.1.1 and 3.5.1.2.

Electronic Devices: There are no MILCON or major alterations projects programmed in the FY95 PBS. As a result, there are no impacts on the answers to questions 3.5.1.1 and 3.5.1.2.

Advanced Materials: There are no MILCON or major alterations projects programmed in the FY95 PBS. As a result, there are no impacts on the answers to questions 3.5.1.1 and 3.5.1.2.

3.5.2 **Land Use:** Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

For the most part, Wright Laboratory is sited within Area B of Wright-Patterson AFB. Area B has at least 70 buildable acres that could be utilized for laboratory and/or administrative purposes. Also available at Wright-Patterson AFB are "zones" called Areas A and C. Areas A and C have 30 buildable acres that could also be used for constructing laboratory/administrative facilities.

3.5.3 **Utilities:** Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

The following categories indicate the type of utility, system capacity, percent of current use and excess capacity available for immediate or future use at Wright-Patterson AFB. Additional quantities could be procured or produced if the Base infrastructure were expanded via MILCON, Minor Construction or Equipment Installation. Specific increases, over the current excess capacity, would depend upon facility siting and specific facility utility requirements, which would, in turn, be dependent upon design analyses.

WATER - 6.52 million gallons per day (MG/D) at 57% current usage
- 3.72 MG/D excess capacity

SEWAGE - 5.0 MG/D at 80% current usage
- 1.0 MG/D excess capacity

ELECTRICITY - 140 million watts (MW) at 60% current usage
- 56 MW excess capacity

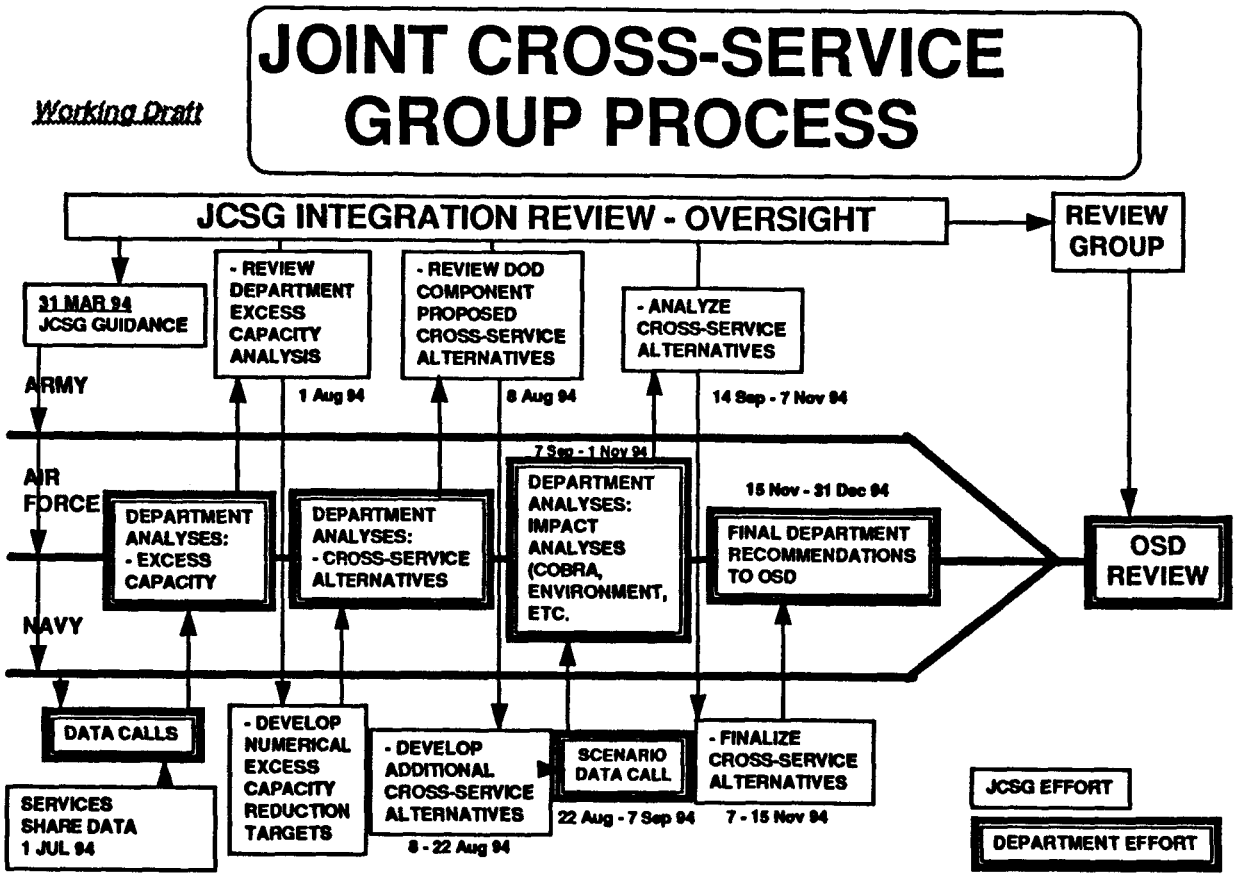
NATURAL GAS - 10.2 million cubic feet per day (MCFD) at 40% current usage
- 3.955 MCFD excess capacity

STEAM - 1.21 million British thermal units per hour (MBTUH) at 53% current usage
- .569 MBTUH excess capacity

SECTION IV: APPENDICES

A. Macro Process/Schedule
B. List of Activities
C. Common Support Functions

APPENDIX A


Working Draft
JOINT CROSS-SERVICE GROUP PROCESS
JCSG INTEGRATION REVIEW - OVERSIGHT
REVIEW GROUP
31 MAR 94 JCSG GUIDANCE
- REVIEW DEPARTMENT EXCESS CAPACITY ANALYSIS
1 Aug 94
- REVIEW DOD COMPONENT PROPOSED CROSS-SERVICE ALTERNATIVES
8 Aug 94
- ANALYZE CROSS-SERVICE ALTERNATIVES
14 Sep - 7 Nov 94
ARMY
AIR FORCE
NAVY
7 Sep - 1 Nov 94
DEPARTMENT ANALYSES: - EXCESS CAPACITY
DEPARTMENT ANALYSES: - CROSS-SERVICE ALTERNATIVES
DEPARTMENT ANALYSES: IMPACT ANALYSES (COBRA, ENVIRONMENT, ETC.
15 Nov - 31 Dec 94
FINAL DEPARTMENT RECOMMENDATIONS TO OSD
OSD REVIEW
DATA CALLS
SERVICES SHARE DATA 1 JUL 94
- DEVELOP NUMERICAL EXCESS CAPACITY REDUCTION TARGETS
- DEVELOP ADDITIONAL CROSS-SERVICE ALTERNATIVES
8 - 22 Aug 94
SCENARIO DATA CALL
22 Aug - 7 Sep 94
- FINALIZE CROSS-SERVICE ALTERNATIVES
7 - 15 Nov 94
JCSG EFFORT
DEPARTMENT EFFORT

APPENDIX B

LIST OF ACTIVITIES

AIR FORCE

1. Armstrong Lab, Brooks AFB
2. Armstrong Lab, Tyndall AFB
3. Armstrong Lab, Wright-Patterson AFB
4. Armstrong Lab, Williams AFB
5. Human Systems Center, Brooks AFB
6. Wright Lab, Wright-Patterson AFB
7. Wright Lab, Eglin AFB
8. Aeronautical Systems Center, Wright-Patterson AFB
9. Aeronautical Systems Center, Eglin AFB
10. Oklahoma City Air Logistics Center, Tinker AFB (In-service engineering)
11. Ogden Air Logistics Center, Hill AFB (In-service engineering)
12. San Antonio Air Logistics Center, Kelly AFB (In-service engineering)
13. Sacramento Air Logistics Center, McClellan AFB (In-service engineering)
14. Warner-Robins Air Logistics Center, Robins AFB (In-service engineering)
15. Phillips Lab, Kirtland AFB
16. Phillips Lab, Hanscom AFB
17. Phillips Lab, Edwards AFB
18. Space & Missile Center, Los Angeles AFB
19. Space & Missile Center, Norton AFB
20. Sacramento Air Logistics Center, Peterson AFB
21. Rome Lab, Griffiss AFB
22. Rome Lab, Hanscom AFB
23. Electronic Systems Center, Hanscom AFB
24. Sacramento Air Logistics Center, Peterson AFB (In-service engineering)

ARMY

1. Army Research Lab (ARL), Adelphi, MD
2. ARL, Aberdeen Proving Grounds (APG), MD
3. ARL, White Sands Missile Range, NM
4. ARL, NASA Langley, VA
5. ARL, NASA Lewis, OH
6. Natick Research, Development and Engineering Center, Natick, MA
7. Aviation Research, Development and Engineering Center, St Louis, MO
8. Aviation Troop Command, Aeroflight Dynamics Directorate, Moffitt Field, CA

9. Aviation Troop Command, Aviation Applied Technology Directorate, Fort Eustis, VA
10. Edgewood Research, Development and Engineering Center, Aberdeen Proving Ground, MD
11. Communications Electronics Command Research, Development and Engineering Center, Ft Mammoth, NJ
12. Communication Electronics Command Research, Development and Engineering Center - Night Vision EO Directorate, Ft Belvoir, VA
13. Missile Research, Development and Engineering Center, Redstone Arsenal, AL
14. Armaments Research, Development and Engineering Center, Picatinny Arsenal, NJ
15. Armaments Research, Development and Engineering Center, Benet Labs, Watervliet Arsenal, NY
16. Tank-Automotive Command Research, Development and Engineering Center, Warren, MI
17. USA Research Institute of Infectious Diseases, Ft Detrick, MD
18. Walter Reed Army Institute of Research, Washington D.C.
19. USA Institute of Surgical Research, Ft Sam Houston, TX
20. USA Aeromedical Research Lab, Ft Rucker, AL
21. Medical Research Institute of Chemical Defense Aberdeen Proving Grounds, MD
22. USA Research Institute of Environmental Medicine, Natick, MA
23. Construction Engineering Research Laboratory, Champaign, IL
24. Cold Regions Research and Engineering Lab, Hanover, NH
25. Topographic Engineering Center, Alexandria, VA
26. Waterways Experiment Station, Vicksburg, MS
27. USA Research Institute for Behavioral & Social Sciences, Alexandria, VA
28. Simulation, Training and Instrumentation Command (STRICOM), Orlando, FL

NAVY

1. Naval Air Warfare Center, Weapons Division, China Lake
2. Naval Air Warfare Center, Weapons Division, Point Mugu
3. Naval Air Warfare Center, Aircraft Division, Patuxent River
4. Naval Air Warfare Center, Aircraft Division, Indianapolis
5. Naval Air Warfare Center, Aircraft Division, Lakehurst
6. Naval Research Lab, Washington D.C.
7. Naval Research Lab Detachment, Bay St Louis
8. Naval Surface Warfare Center, Carderock Division, Bethesda
9. Naval Surface Warfare Center, Carderock Detachment, Annapolis
10. Naval Surface Warfare Center, Crane Division
11. Naval Surface Warfare Center, Crane Detachment, Louisville
12. Naval Surface Warfare Center, Dahlgren Division
13. Naval Surface Warfare Center, Dahlgren Detachment, Panama City
14. Naval Surface Warfare Center, Indian Head Division
15. Naval Surface Warfare Center, Port Hueneme Division

16. Naval Command, Control, and Ocean Surveillance Center, RDT&E Division, San Diego
17. Naval Command, Control, and Ocean Surveillance Center, In-Service Engineering, West Coast Division, San Diego
18. Naval Command, Control, and Ocean Surveillance Center, In-Service Engineering Division, Charleston
19. Naval Aerospace Medical Research Center, Pensacola
20. Naval Biodynamics Lab, New Orleans
21. Naval Dental Research Lab, Great Lakes
22. Naval Health Research Center, San Diego
23. Naval Medical Research Institute, Bethesda
24. Naval Undersea Warfare Center, Keyport Division, WA
25. Naval Surface Warfare Center, Carderock, Philadelphia Detachment
26. Naval Undersea Warfare Center, Newport, RI
27. Naval Undersea Warfare Center (Newport), New London, CT
28. Naval Personnel Research and Development Center, San Diego, CA

DEPARTMENT OF DEFENSE

1. Armed Forces Radiobiology Research Institute (AFRRI), Bethesda, MD

APPENDIX C

COMMON SUPPORT FUNCTIONS
(DEFINITIONS LISTED FOLLOWING PAGES)

Product Functions

1. Air Vehicles
   - Fixed
     - -- Structure
     - -- Propulsion
     - -- Avionics
     - -- Flight Subsystems
   - Rotary
     - -- Structure
     - -- Propulsion
     - -- Avionics
     - -- Flight Subsystems

2. Weapons
   - ICBMs/SLBMs
   - Conventional Missiles/Rockets
   - Cruise Missiles
   - Guided Projectiles
   - Bombs
   - Guns and Ammunition
   - Directed Energy
   - Chemical/Biological

3. Space Systems
   - Launch Vehicles
   - Satellites
   - Ground Control Systems

4. C4I Systems
   - Airborne C4I
   - Fixed Ground-Based C4I
   - Ground Mobile C4I

Pervasive Functions

1. Electronic Devices
2. Environmental Sciences
3. Infectious Diseases
4. Human Systems
5. Manpower and Personnel
6. Training Systems
7. Environmental Quality
8. Advanced Materials

DEFINITIONS

COMMON SUPPORT FUNCTIONS

Product Functions

1. Air Vehicles. Air vehicles are broken out into common support functions for fixed wing and rotary wing. Includes but not limited to all science and technology, demonstration and validation, engineering development, and production activities which support employment and in-service engineering of air vehicles. Included are all air vehicles including their application as UAV's and targets.

- Structures. Includes but not limited to all air vehicles structure technology, engineering and production efforts. Include technology and engineering practices which advance structural design and analysis; advanced structural concepts and fabrication techniques; and structural integrity.

- Propulsion. Includes but not limited to all technology, engineering and production efforts associated with air vehicle propulsion such as turbine engine, rotorcraft power drive, and hypersonic propulsion components. Such components include compressors, inlets and nozzles, turbines, mechanical systems and control, gears, bearings, shafts, and clutches. In addition, include associated subsystems activities such as turborocket, turboramjet and rotorcraft transmissions; and supporting technical and engineering disciplines.

- Avionics. Includes but not limited to all technology, engineering and production efforts associated with the air platform's integrated avionics system. The avionics suite includes but is not limited to weapon delivery systems, electronic warfare, navigation, communications, radar, electro-optic sensors, signal/data processing and associated software system and support. Includes efforts associated with developing the integrated avionics system (i.e. optimizing functional partitioning, distribution and integration of avionics/related functions).

- Flight Subsystems. Includes but not limited to all technology, engineering and production efforts for air vehicle support systems such as landing gear; transparent crew enclosures; egress systems; mechanical equipment integrity; electrical component integrity; subsystem integration; and aircraft power, pressurization, and temperature control systems.

2. Weapons. Includes but not limited to all science and technology, demonstration and validation, engineering development, and production activities which support employment and in-service engineering of ICBMs/SLBMs, conventional missiles and rockets, cruise missiles, guided projectiles, bombs, guns and ammunition, directed energy and chemical/biological munitions. Include with each weapon as appropriate, all related technology, engineering and production

activities such as fusing/safe and arm, missile propulsion, warheads and explosives, and guidance and control.

3. Space. Includes but not limited to all science and technology, demonstration and validation, engineering development, and production activities which support employment and in-service engineering of launch vehicles, satellites and associated ground control systems (satellite control only; ground systems for telemetry of data included in C4I). Include under satellites, all technology, engineering and production activities associated with space communications and space-based surveillance (and associated sensors) and space-based C4I.

4. C4I. Includes but not limited to all science and technology, demonstration and validation, engineering development, and production activities which support employment and in-service engineering of airborne, fixed ground-based and mobile ground based C4I systems. Include all technology, engineering and production activities associated with communications networks, radios and links, distributed information systems, data fusion, decision aids, and associated computer architectures.

Pervasive Functions (6.1, 6.2, and 6.3)

1. Electronic Devices. Includes but not limited to all science and technology activities supporting development of semiconductor and superconductor materials for optoelectronic, acoustic and microwave devices. Include all associated electronic materials/device fabrication and processing.

2. Environmental Sciences. Includes but not limited to all science and technology activities to improve measurement, characterization and modeling of the earth atmosphere and space environment. Examples include global prediction systems, space effects, and celestial backgrounds/astronomical reference sources.

3. Infectious Diseases. Includes but not limited to all science and technology activities which preserve manpower and performance by the prevention and treatment of militarily important infectious diseases that occur naturally worldwide.

4. Human Systems. Includes but not limited to all science and technology activities to enable, protect, sustain and enhance human effectiveness in DOD operations. The focus of this pervasive, multi-disciplinary area is the human and therefore impacts all DOD systems and operations. This area includes: (1) human performance definition, assessment, and aiding; (2) physiologic bioeffects of toxic hazards, ionizing and non-ionizing radiation, biodynamic (bio-mechanical) stress, and extreme environments; (3) military operational medicine; and (4) generic, human-centered design standards/methodologies for crew station subsystems, information management and display, and life support.

5. Manpower and Personnel. Includes but not limited to all science and technology activities which support four broad areas: (1) selection and classification of DOD personnel (including pilots); (2) identification of operational tasks performed and requirements for skills, knowledge, and aptitudes; (3) matching the right people with the jobs they are best suited for according to the needs of DOD, (4) and developing techniques for measuring and enhancing the productivity of the operational force.

6. Training Systems. Includes but not limited to all science and technology which support training of personnel, including training strategies, devices and simulators, and computer aided intelligent tutoring systems.

7. Environmental Quality. Includes but not limited to all science and technology activities which support the development of technologies to reduce the environmental costs of DOD operations while ensuring mission accomplishment is not jeopardized by adverse environmental impacts. Specifically, this area encompasses technologies to: (1) identify and cleanup sites contaminated with hazardous materials as a result of DOD operations (cleanup); (2) ensure DOD compliance with current and anticipated local, national, and international environmental laws and treaties (compliance); (3) minimize DOD use of hazardous materials and reduce DOD hazardous waste generation (pollution prevention); and (4) provide for protection of natural resources under DOD stewardship (conservation).

8. Advanced Materials. Includes but not limited to all science and technology activities related to structural, high temperature, electromagnetic protection, electronic, magnetic, optical, and biomolecular materials. Note: excludes materials areas which were included in DDR&E decision of 18 Mar 94 related to the Army's Materials Research Facility at Aberdeen Proving Ground and the Navy's Materials Facility at Carderock.

COMMON SUPPORT FUNCTIONS (CSF)

WEAPONS:

CONVENTIONAL MISSILES/ROCKETS

BOMBS

GUNS AND AMMUNITION

Activity

Wright Laboratory Eglin AFB FL

for the

1995 Base Realignment and Closure (BRAC)

Laboratories Joint Cross-Service Group

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.4.1 of the Wright Lab, Eglin AFB response to the LJCSG guidance package. The existing 10 Aug 94 submission stated that only bold entries are WL/MN facilities. Confirm that there are only 17 WL/MN facilities. In addition, the use of footnote (4) is confusing. Is it correct, for example, to interpret the table to mean that the classified user area is part of the Advanced Guidance Research Facility, but the Sun MP 690 is not, but are the Sun Workstations - 3, Video Work Station, VAX 8650, VAX 4500, Arc. Devices, Power Conditioner, Talos Sonar Workstation, Algorithm Analysis Workstation, and VAX 64107 Further, since they are not part of the Advanced Guidance Research Facility -- a bold entry -- they are not WL/MN facilities or equipment? Finally, the existing response indicates that there is no sharing of equipment or facilities with other than common (as defined in appendix C) or unique support functions. Confirm this is correct. If anything is shared within the activity, indicate the other function(s) and the percentage of time the other function(s) uses the equipment or facility.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-6850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs (Does not concur (explain:))

SEE BASE ACTIVITY RESPONSE

Timothy L. Dues 18 AUGUST 1994.

MAJCOM REVIEWER: TIMOTHY L. DUES, GM-15, AFMC/STT DSN 787-7850
(print name, organization, DSN)

BASE: Concurs (Does not concur (explain:))

See Attached Explanation.

BASE REVIEWER: 8/17/94
(print name, organization, DSN)

PAUL D. SHIREY
Chief, Techology
Management Div
DSN: 872-2205
WL/MNP

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.4.2 of the Wright Lab, Eglin AFB response to the LJCSG guidance package. The response indicates that only selected papers were published in referred journals based on the entry "referred" in the column "Number Published". Since the question requested only papers published in peer review journals, confirm that the titles without "referred" entry were not published in peer review journals.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: (Concurs) Does not concur (explain:)

SEE BASE ACTIVITY RESPONSE

MAJCOM REVIEWER: Timothy L. Dues 14 AUGUST 1994.
TIMOTHY L. DUES, GM-15, AFMC/STP DSN 787-7850
(print name, organization, DSN)

BASE: (Concurs) Does not concur (explain:)

See Attached Explanation.

BASE REVIEWER: 8/12/94
(print name, organization, DSN)

PAUL D. SHIREY
Chief, Technology
Management Div
DSN: 872-2205
WL/MNP

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.4.1 of the Wright Lab, Eglin AFB response to the LJCSG guidance package. The existing 10 Aug 1994 submission states that there were 7 patent disclosures and 8 patent awards. Since patents awarded are based on disclosures, explain why the number patents awarded for bombs (6) is greater than the number of patent disclosures for bombs (4).

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: (Concurs) Does not concur (explain:)

THE ISSUE IS THAT IF YOU COUNT ALL DISCLOSURES; AWARDS ARE NUMBER OF DISLOSURES AWARDED, THEN THE CORRECT ANSWER IS 15 DISCLOSURES, 8 AWARDS FOR BOMBS: 10 DISCLOSURES AND 6 AWARDS. SEE ATTACHED "A" PARA.

MAJCOM REVIEWER: [signature] 14 August 1994.
TIMOTHY L. [illegible], [illegible] AFMC/STP DSN 787-7850
(print name, organization, DSN)

BASE: Concurs (Does not concur (explain:))

See Attached Explanation.

BASE REVIEWER: [signature] 8/12/94
(print name, organization, DSN)

PAUL D. SHIREY
Chief, Technology
Management Div
DSN: 872-2205
WL/MNP

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

2X

BRU 2GP
ML

CONTROL NUMBER: LJCSWG-AF 010

PURPOSE: To provide SAF/AQX staff corrected answers to Question 3.2.1 (Total Personnel) for the Wright Lab, Eglin AFB response to the Laboratory Joint Data Call. The current certified response for the Types of Personnel table for the "Weapons: Bombs CSP" has a single asterisk (*) next to the "Other" "Civilian/Government" entry. Based upon the footnotes, it appears as if this should be a double asterisk. Please confirm that this should be a double asterisk (includes six matrix employees) or explain why SETA contractor personnel (the single asterisk footnote) are included in the government civilian count.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8250

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: (Concurs) Does not concur (explain:)

MAJCOM REVIEWER: _____ 9 AUG 1994
(print name, organization, DSN)
CHUNG C YANG, MAJ, USA AFMC/57, 787-536

BASE: (Concurs) Does not concur (explain:)

PAGES CORRECTED AND FAXED.

BASE REVIEWER: _____ DALE R. PALMER
(print name, organization, DSN) WL/MNPM
DSN: 872-8237
29 Aug 94

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

"LAB" JOINT CROSS-SERVICE GROUP GUIDANCE PACKAGE

Section I: Taskings
1.1 Guidelines
1.2 Standards
1.3 Assumptions
1.4 Measures of Merit
1.5 Activities
1.6 Common Support Functions

Section II: Capacity of DOD Components
2.1 Workload
2.2 Excess Capacity

Section III: Capability of Activities to Perform Common Support Functions
3.0 Mission
3.1 Location
3.2 Personnel
3.3 Workload
3.4 Facilities & Equipment
3.5 Expansion Potential

Section IV: Appendices
A. Macro Process/Schedule
B. List of Activities
C. Common Support Functions

SECTION I: TASKING

In accordance with the Deputy Secretary of Defense memorandum dated 7 Jan 94, the Laboratory Joint Cross-Service Group (LJCSG) with DOD components should, where operationally and cost effective, strive to: retain in only one Service militarily unique capabilities used by two or more Services; consolidate workload across the Service to reduce capacity; and assign operational units from more than one Service to a single base. Specifically, the purpose of the LJCSG is:

- Determine common support functions and bases to be addressed by LJCSG
- Establish guidelines, standards, assumptions, measures of merit, data elements and milestone schedules for DOD Component conduct of cross-service analysis of common support functions
- Review excess capacity analysis
- Develop closure or realignment alternatives
- Analyze cross-service trade-offs

The following information identifies to the Services common support functions and data element requirements necessary to support the cross-service analysis of these common support functions.

1.1 Guidelines

Because the DOD components are organized differently, "Lab" activities are considered to be those involved in the following life cycle efforts: Science and technology, and/or engineering development, and/or in-service engineering.

Service missions and force structure will be as stipulated in the FY1995-2000 Defense Planning Guidance and Interim Force Structure Plan.

The Military Departments will use the projected funding in the FY95 President's Budget Submission (Future Years Defense Plan -- FYDP) and an estimate of funds that will be received from outside the military department for execution.

If "lab" excess capacity exists, the Military Departments will start to reduce it where operationally and cost effective through a combination of downsizing in place within the departments, internal service consolidation, and cross service alternatives.

The Military Departments will gather, exchange, and analyze data collected per this guidance call for Common Support Functions (Appendix C) at "lab" activities (Appendix B) in accordance with the milestones and schedule dates identified in Appendix A.

Cross-service alternatives will result in an aggregate reduction in the overall "lab" infrastructure across the Military Departments -- personnel/funding/facilities and equipment.

Common cross-service Measures of Merit will be consistently applied for all cross-service alternatives.

Integration of weapon systems/components into operational forces will remain with the individual Military Departments responsible for those forces.

1.2 Standards

Evaluation of cross-service alternatives will be consistent with PL 101-510 (as amended) and the eight BRAC criteria. Only certified data will be used.

The COBRA cost model will be used to calculate estimated costs, estimated savings, and Return on Investment (ROI) of alternatives leading to proposed closures and realignments. Common inputs will be used for Military COBRA runs incorporating cross-service alternatives.

Military value analysis will be conducted by the Military Departments IAW Title 10, USC responsibilities.

1.3 Assumptions

"Lab" Common Support Functions and activities identified herein represent the major opportunities for developing cross-service alternatives. The Military Departments are not precluded from proposing other cross-service alternatives to reduce excess capacity as they assess the full complement of "lab" functions.

Previous BRAC decisions will be factored into cross-service alternatives.

"Lab" capacity will be based on budgeted workyears. A workyear is considered to be 2080 hours adjusted for time not on the job (e.g. sick leave, annual leave, etc.)

1.4 Measures of Merit

The following Measures of Merit represent the outcome from the DOD component final realignment and closure recommendations that are supported by the capabilities data which will be gathered by activity and common support function in Section III of this guidance.

- Reduction of "lab" infrastructure
- Return on investment (COBRA)

- Military value (BRAC criteria 1-4) -- the composite assessment of the quality of the remaining "lab" infrastructure

1.5 Activities

The Military Departments will collect capacity data for each "lab" activity identified in Appendix B. The "lab" activities were selected by considering all individual aggregates of personnel and facilities located at one base, under the same commander, performing predominantly science and technology (S&T), engineering development, and/or in-service engineering work. Small subelements of these "lab" activities were included with the activity. Larger subelements were broken out and defined as separate activities. The list of activities was then narrowed down to the list in Appendix B based on a joint Military Department assessment of common support functions with cross-service potential.

1.6 Common Support Functions

The common support functions (CSFs) were selected as shown in Appendix C based on a joint Military Department assessment of commonalty and cross-servicing potential. Common support functions which were already consolidated and being cross serviced were not included.

Common Support Functions are divided into two categories: product and pervasive. Product functions include all S&T, engineering development, and in-service engineering efforts associated with a product from all funding sources. Pervasive functions only include those efforts that are S&T funded, i.e. Technology Base (6.1)/Exploratory Development (6.2)/Advanced Development (6.3).

SECTION II: CAPACITY OF DOD COMPONENTS

2.1 **Workload.** Use the following table to describe historic and projected workload at each activity in terms of funding and workyears. Assume previous BRAC closures and realignments are implemented on schedule. Projected funding will be derived from FY95 President's Budget Submission (Then year dollars). Past fiscal year data shall begin with FY86 or at the inception of the activity as it existed on 1 Oct 93. (BRAC Criteria I & IV)

Information Required	Fiscal Years											
	86	87	88	89	90	91	92	93	94	95	96	97
Total Funds Programmed ($M)	115.6	134.3	115.3	140.6	135.6	161.4	153.9	150.6	112.2	144.7	143.6	141.3
Total Actual Funds ($M)	115.6	134.3	115.3	140.6	135.6	161.4	153.9	150.6				
Programmed Workyears*	513	563	589	617	599	573	521	498	514	506	501	460
Actual Workyears*	503	566	592	620	579	537	533	507				

* Includes on-site SETA.

- Budgeted workyears are the selected indicator of the "lab" infrastructure's capacity at an aggregate level for each Military Department. They include both workyears funded directly by the Military Department and the workyears funded from organizations outside the Military Department.

Workyears = government personnel and on-site FFRDCs and SETAs

2.2 Excess "Lab" Capacity -- Measured at the DOD Component Level

- Excess "Lab" Capacity = Sum of the Peak Workyears - Sum of the Projected Workyears
  -- Peak at each activity = Highest value between FY86 (or since inception of organization) and FY93
  -- Projected at each activity = Estimated at FY97

Response: 160 Workyears. NOTE: Response calculated by taking the difference of WL/MN Peak Workyears (620 in FY89) and WL/MN Projected Workyears in FY97 (460). These data are extracted from paragraph 2.1 and include on-site SETA.

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

Response: Applies to Common Support Functions:
Weapons: Conventional Missiles/Rockets
Weapons: Bombs
Weapons: Guns and Ammunition

Wright Laboratory Armament Directorate (WL/MN)

- Single Air Force organization providing technology base for future Air Force conventional armament.
- Basic research, exploratory and advanced development of guided and unguided armament and associated equipment.
- Specific technologies being developed include
  - Advanced seekers
  - Guidance and control components and software
  - Warheads
  - Explosives
  - Fuzes
  - Weapon airframes
  - Carriage and release equipment
  - Aircraft guns and ammunition
  - Weapons instrumentation
  - Target vulnerability and technology effectiveness
- Maintains experimental facilities for technology evaluations in
  - Explosives
  - Fuzes
  - Warheads
  - Aeroballistics
  - Signal processing
  - Hardware-in-the-loop simulations
- Lead AF Laboratory organization for integrating and demonstrating advanced tactical munition technologies.

WL/MN consists of product and support divisions which are described below:

Weapon Flight Mechanics Division (WL/MNA): Provides low cost, reliable, and highly maneuverable airframes with advanced subsystem technologies for air-to-surface and air-to-air weapons. Directs and conducts basic research, exploratory, and advanced development for conventional munitions in the areas of weapon/missile airframes, guidance laws, navigation and control systems, computational fluid dynamics, submunition dispensing, aeroballistics testing, and weapon carriage and release concepts. Develops and applies computer simulation for performance evaluation and concept screening of competing aerodynamic designs. Integrates subsystems, performs experiments, and conducts flight demonstrations to prove experimental technology. In-house facilities and capabilities are maintained in the areas of computational fluid dynamics, aeroballistics, inertial navigation, weapon aerodynamic performance, hypervelocity impact testing, and weapon component integration.

Advanced Guidance Division (WL/MNG): Directs/conducts basic, exploratory, and advanced development research in electro-optical, infrared, millimeter-wave, radio frequency, and multi-spectral seekers for affordable air-to-air and air-to-surface conventional weapons and submunitions. Advanced development programs provide seekers for precision guided air-to-air and air-to-ground weapons to improve seeker effectiveness, increase guidance accuracy, decrease counter- measure susceptibility, improve weapon system performance in adverse weather, enhance utility of weapon system, and decrease weapon system cost. Performs computer simulations, laboratory and field experiments, and captive flight tests of seeker concepts. Maintains and operates an electro-optics laboratory, a laser radar evaluation facility, radar and image processing laboratories, a hardware in the loop facility, a signal/data processing laboratory, and a target and background signature generation facility.

Munitions Division (WL/MNM): Plans and directs research, exploratory, and advanced development of fuzes, aerial guns/ammunition, warheads and explosives for conventional munitions. Directs the operation of fuze test facilities, high explosive research and development facilities, and advanced warhead experimentation facilities in support of munition programs. Provides technical analyses and consulting to system application programs, AFMC, other government agencies, and industry concerning munitions technology.

Assessment and Instrumentation Division (WL/MNS): Develops assessments of new component technology used in weapon systems and the instrumentation needed to measure and verify performance data. Serves as the Armament Directorate focal point for instrumentation technology and weapon assessments of lethal effects, flight performance,

mission effectiveness, affordability, and cost/benefit analysis. Performs digital simulations and analysis of the effectiveness and affordability of conventional weapon technologies, including air-to-air and air-to-surface missions. Conducts research and development of test instrumentation technology. Develops and maintains directorate facilities dedicated to telemetry, simulation, and instrumentation development. Supports DoD, AFMC, as well as ASC requirements.

Technology Management Division (WL/MNP): Directs the directorate's investment strategy activities. Provides guidance and support for R&D programming, budgeting, financial management, and technical/management information reporting. Directorate focal point for technology transfer and defense conversion activities. Eglin AFB focal point for independent research and development program (IRAD) and small business innovation research (SBIR).

Operations Division (WL/MNO): Provides management of the MN Environmental Quality Program, supply and logistics, and administrative support. Manages operation of the Environmental Sciences Facility and the Model Fabrication Facility. Administers the MN explosives/ground/system safety, security, and visitor control programs. Manages the scientific and technical information program and provides technical reports, illustrating and technical library capabilities for R&D project work. Coordinates requirements for minor construction, building maintenance and repair, and communications support. OPR for interface with USAF/AFMC IG and GAO. Provides management of the directorate military/civilian manpower and personnel, training, administration and other personnel related resources programs to include studies and analyses to identify issues for management resolution. Conducts quality assurance inspections of the Logistics Support and Library Services contracts.

Relationship And Interconnectivity With Other Functions:

ASC/System Program Offices (YA - Air-To-Air Joint System Program Office, YH - Conventional Munitions Product Support Office, YO - Range and Air Base Systems), Eglin AFB FL: The benefits of having engineering development organizations (SPOs) collocated at the exploratory and advanced development site cannot be overstated. Even though these SPO offices are considered "labs" for BRAC purposes, it is only a convenient ad hoc definition of "lab". It was done because the Navy and Army often are organized so that all the development phases are organizationally integrated but that is not necessarily true for the Air Force. The Air Force ties its early development phases together in a "lab" and ties its later phases together in a "SPO". It is important, therefore, that the relevance be stated of having 6.4 developmental and later activities physically near the 6.1, 6.2, and 6.3 development site (WL/MN in this instance) and vice versa.

In the Integrated Product Development processes associated with Total Quality Management, it is vital to have cooperating teams working on development projects. A synergism is manifested if the members of those teams are within walking distance of each other as is the case at Eglin Air Force Base, FL. In addition, the munitions test agency, AFDTC, is also located at Eglin resulting in the best possible research, development, demonstration, and evaluation environment. The responsiveness of such a collocated organization was clearly demonstrated in Eglin's quick response to develop the GBU-28 that helped bring about the end of Desert Storm. Other examples of this synergism occur on a daily basis at Eglin.

The reasons why collocation are important are easily identified. There is a continuous input of development ideas into the SPO development planning and it continues throughout the munition life cycle including development support and product improvement activity. The lab provides a source of technical expertise easily called upon for SPO technical problems. There is a quick response capability that only proximity can provide. There is a reverse feed into the exploratory development programs by virtue of real time access to SPO and operational capability deficiencies and joint study teams can easily be assembled to develop solutions to problems and work long-term plans. Some examples of this synergism include the initial development and follow-on modifications of the Advanced Medium Range Air-to-Air Missile (AMRAAM) with ASC/YA and the development of instrumentation in the Directorate provided to the test range to support evaluation and testing of the SPO systems. An immeasurable synergism occurs when the researchers are located with the developers and testers to conceive of high speed videography, munition blast instrumentation, and miniaturized instrumentation. These products not only benefit the munitions community but have application in private industry in the commercial segments. Other examples would be found in the quick reaction modifications for developmental/production systems and components.

Another benefit of collocation of all phases of development involve the availability of highly skilled people. Collocation allows inexpensive movement of personnel freely between the various organizations, on exchange or rotational programs, to broaden their experience and make them far more valuable to the total developmental activity. Such synergism is only theoretically possible when organizations are not collocated.

If Air Force munitions SPOs and WL/MN are not collocated, the Air Force loses in many ways. The most obvious is the "out-of-sight, out-of-mind" result. Separated organizations lose sight of each other and lose the synergism and common sense of direction they once had. To try to maintain close contact would require extensive travel not practical in today's budgetary environment. The knowledge flow gained by proximity is lost when organizations are split geographically. The ability to provide a uniform

umbrella of planning activity from component technology to integrate weapon systems is lost and the combined expertise to solve user problems in real-time is lost.

The very existence of the BRAC concept is to be sure that consolidation of activity occurs in recognition of the fact that synergism and efficiency can be gained. Such synergism and efficiency already exist at Eglin AFB for the munitions development community of the Air Force. The fact that Eglin is the free-world's largest air base ensures that continuing growth to meet future challenges can be realized without encroachment on populated areas, and that expansion to encompass other services' activities can also be realized as directed. The extraordinarily large land and water test ranges ensure that testing of developmental and inventory munitions can continue unabated.

ASC/SK - Seek Eagle Office: WL/MN develops Computational Fluid Dynamics (CFD) technologies to support the Air Force Seek Eagle Office (ASC/SK). Through these efforts CFD modeling capabilities have been developed to assist the Seek Eagle Office in the certification of weapons. A computer code to model the aerodynamics of weapons carriage and separation has been developed and transitioned to ASC/SK. The code allows for easy numerical grid generation, aerodynamic analysis, and flow field visualization. WL/MN scientists provide the code and ongoing technical support to ASC/SK. With this new capability ASC/SK has improved their ability to provide quick and efficient flight certification recommendations to the user commands. They have analyzed F-15 and F-16 aircraft with weapon systems such as MK-84, AMRAAM, and GBU-28. CFD was used for example on the GBU-28 to study the aerodynamic effects of a strap on battery pack on the altitude sensor for the GBU-28. This analysis saved a requirement to perform an expensive wind tunnel test. WL/MN has also provided to ASC/SK numerous numerical grids of aircraft with weapons.

AFDTC/46th Test Wing - Testing Facilities: Provides a variety of test ranges and facilities for the development, test and evaluation of nonnuclear armaments including warhead performance, fuzing, aerodynamics, ballistics and air-to-air and air-to-surface guided weapons. Provides facilities for climatic analysis, seeker evaluation, structural testing, electromagnetic testing, and optical sensors testing. The test facilities provided include 724 square miles of land area and 86,500 square miles of water area.

In addition to the above facilities, WL/MN has ready access to all land and water ranges to conduct experiments of non-nuclear armaments, target acquisition and weapon delivery systems, base intrusion and detection systems, electronic systems, aerial targets, and electro-magnetic and electro-optical signatures. The 46th Test Wing has an aircraft fleet which provides a cross section of the operational fighter aircraft inventory. Major 46th Test Wing facilities include the Gulf Range Drone Control Upgrade System, Climatic Laboratory, Seeker Evaluation Test Simulation Facility, Fuze Test Facility, Structural

Dynamics Laboratory, Preflight Integration of Munitions and Electronic Systems Facility, Airborne Seeker Evaluation Test System, Beam Approach Seeker Evaluation System, Gun Test Facilities, Security Systems Test Facility, Damage Potential Sled Track, Electromagnetic Test Environment, Thermal Image Processing System, a variety of static arena test facilities and marine operations to support Gulf testing. These facilities are fully instrumented for time-space-position telemetry, laser ranging, frequency control, data handling, photo, weather, and optical data processing.

WL/MN operates a major portion of the 46th Test Wing's Fuze Test Facility. Several highly instrumented facilities are used to conduct in-house experiments in connection with advanced fuze development. An electronics facility containing state-of-the-art instrumentation and circuit design, fabrication and environmental testing, and diagnostic devices and equipment used in the development of hard target fuzing, exploding foil (SLAPPER) development, target detection and recognition for fuzing. Pulsed laser obscurance algorithm development verification, infrared laser gun (aircraft cannon) director evaluation, and supporting technologies such as high energy density capacitors, very high speed and high voltage recyclable switches, and high frequency/high shock on-board recorders are built and tested in the facility. Major equipment items include vertical high shock tester, pendulum shock tester, Hopkinson pressure bar, eight inch vacuum gun, exploding foil firing bay with timing electronics, circuit board fabrication facility, 105mm Howitzer with high-gravitational instrumentation recorders, and a centrifuge.

AFDTC/96th Communications-Computer Systems Group - COMPUTATIONAL FACILITIES: Provides general purpose scientific processing capability consisting of classified and unclassified networks of computers. Provides the design, system software and consulting services for network computer users. Consulting is provided for all areas of computer science, mathematics, and modeling to develop solutions to physical problems. Systems and programming are also provided for remote facilities, experimentation ranges, and real-time applications. The high-speed Supercomputer facility provides WL/MN with a 200 megaflop multiprocessing system. WL/MN facilities will be connected to the Supercomputer through a fiber optics network with a data transfer rate of 100 million bits per second.

The 96th CCSG provides services to support Management Information Systems and Office Automation including a local area network and electronic mail capabilities. System design, implementation, resources and continuous support are provided. Support is provided for the WL/MN Corporate Database for business computing needs including financial tracking, Job Order Cost Accounting interface, Defense Technical Information Center interface and procurement tracking. Provides support for the WL/MN Executive Information System used by upper management.

AFDTC/96th MDG - BIOENVIRONMENTAL ENGINEERING: Bioenvironmental Engineering supports WL/MN programs in the following areas: (1) Performs ionizing and non-ionizing surveys for X-rays, lasers, microwaves, and electromagnetic radiation for several WL/MN facilities, (2) Supports the High Explosives Research and Development (HERD) facility's State Groundwater Operating Permit by sampling monitoring wells for trichloroethylene, (3) Provides guidance for disposal of chemicals used in WL/MN in-house facilities, (4) Performs annual inspections of radioactive material permits and provides Radiation Safety Officer for WL/MN permits, (5) Performs annual occupational health hazard evaluations to assess Directorate personnel exposures to physical and chemical hazards.

ASC/PK - CONTRACTING: Supports the Armament Directorate with acquisition assistance, planning and strategy in the areas of research and development contracts as well as scientific engineering and technical assistance (SETA) and task ordering contracts (TOCs). Support provided covers the entire acquisition cycle from initial planning through contract award, administration support, and closeout.

ASC/FM - COMPTROLLER: Supports WL/MN through matrixed personnel who provide budgetary, financial, cost estimating, and cost analysis support. Responsibilities include but are not limited to: Preparing budget requests (Directorate Operations Report, Program Objective Memorandum (POM), and Budget Estimate Submission (BES) documentation) and justification documentation (RD-5s, Descriptive Summaries, etc) submitted to HQ AFMC for inclusion into the Presidents Budget Submission. Annually preparing revisions of Program Management Directives (PMDs) for PEO603601F as well as Directorate Program Directives (DPD) for PE0602602F. Develops and tracks progress against financial forecasts for commitment, obligation, and expenditure of funds. Ensures the proper usage of funds and compliance with congressional laws. Assists program managers in the development of work unit cost estimates. Performs analysis of contractor submitted Cost/Schedule Status Reports and conducting in-plant implementation and surveillance reviews of contractor's cost/schedule management systems. Responsible for accounting, disbursing, collecting, and reporting all financial resources used by WL/MN to support its mission.

ASC/AL - ADVANCED DEVELOPMENT LOGISTICS: The Advanced Development Logistics Office (MNL) is matrixed from the Director for Acquisition Logistics (ASC/AL). MNL is responsible to the Director of the Armament Directorate for supportability integration into all programs as required by WL/MN Program Management Directives, Directorate Program Directives and BMDO Supportability Policy. Acquisition logisticians are collocated in each product division to insure that supportability is maximized in the earliest stages of design and development. This is

accomplished through close coordination with the using and support commands, design and program engineers, and contractors. Logisticians transition the users supportability requirements into Statements of Work, Acquisition Plans, and Source Selection Evaluation Plans and follow program development through Source Selection, Program Reviews, and Hardware Experiemnts.

AFDTC/96th Civil Engineering Group - CIVIL ENGINEERING: Provides Civil Engineering support in the form of designs and budget estimates of the Military Construction Program. Provides the same support on facilities modifications to also include 100% design, and either in-house construction or contracting of the work. Provides for facilities maintenance of all WL/MN facilities.

AFDTC/96th Security Police Squadron - SECURITY: The matrixed WL/MN Staff Agency Security Manager provides the following support. Provides advice and assistance to the unit commander, and to personnel assigned to WL/MN. Develops required internal security operating instructions and ensures compliance. Ensures assigned personnel receive security education and develops annual security education training plan. Monitors internal semiannual security inspections. Requests and accounts for controlled and restricted area badges. Reviews challenges to classification decisions. Ensures security classification guides are kept current and reviewed biannually. Ensures proper reporting of all security violations, and ensures required inquiries and investigations are conducted. Monitors personnel security program actions. Manages the COMPUSEC, COMSEC, TEMPEST, and foreign disclosure programs. The Systems Security Engineering Manager provides security management on classified programs of a sensitive nature.

AFDTC/96MSSQ - PERSONNEL: Provides the Directorate with the personnel placement of all civilians in Civil Service. A staffing division provides the appropriate certificate for merit promotions, lateral and new hire employees. The classification division assures the position description is correct and meets the classification standard guidelines. The employee relations division adjudicates any Directorate complaints, employee relation problems, union grievances in addition to handling all of the civilian appraisal program. The training division monitors all training programs administered by the Directorate including the accelerated engineer program, on-site training for Directorate employees, the OJT program, and professional development training programs. Executes the final hiring process of new employees into Civil Service and is responsible for completing the final paperwork covering the hiring of personnel.

3.1 Location

3.1.1 **Geographic/Climatological Features:** Describe any geographic/climatological features in and around your activity that are relevant to each CSF. Indicate and justify those that are required versus those that just serve to enhance accomplishing the mission of the activity. For example, clear air at high altitude that increases quality of atmospheric, ground-based laser experiments in support of the weapons CSF. (BRAC Criteria I)

Response: Applies to Common Support Functions:
Weapons: Conventional Missiles/Rockets
Weapons: Bombs
Weapons: Guns and Ammunition

Land Ranges (Required): Eglin ABF has 724 sq. miles (463,325 acres) of ranges which are made up of a variety of environments including jungle conditions, rolling hills, heavily forested areas, and clear flat areas. The land and water test ranges combined make Eglin the largest air base in the free world. The general purpose test sites/complexes provide general instrumentation support for many test mission responsibilities. The nature and extent of the weapons developed necessitate considerable safety zones which Eglin can provide due to its immense size. For example, WL/MN has four R&D ranges comprising the majority of its 1000 acres. Most of this acreage is safety footprints required for munitions research and storage of explosives. Due to the proximity of the AFDTC test ranges, the safety footprints overlap, requiring much less acreage than would be required if the two organizations were to operate separately. WL/MN has access to the AFDTC test ranges which are often required because of the larger footprints necessary for some experimental weapons. For example, a 2000 pound experimental weapon detonated on the ground would require a 10,000 ft radius safety footprint. Flight tests require much greater safety footprints. For example, the flight test of an AGM-130 (a boosted and guided weapon) requires a safety footprint almost equaling the size of Eglin's test ranges (63,448 acres or approx. 450 sq. miles).

Water Ranges (Required) - Eglin AFB has 86,500 sq. miles of water range used for testing. The land and water test ranges combined make Eglin the largest air base in the free world. On the Gulf Coast, a major advantage of using water test ranges is the lower amount of electronic interference as a result of the area being less populated. Additionally, a big advantage to testing over water is that it can be done without disturbing the local community and with no potential damage to personal property. Testing over water also provides additional privacy during the test. Eglin has a Marine Operations group that performs range and launch corridor clearance through visual and radar surveillance of impact areas, target placement and test item recovery, and transportation of personnel to and from test areas for collecting and recording technical data. WL/MN requires the Gulf of Mexic water ranges to conduct over-water research of newly

developed weapons and to support SPO and Test Wing requests for munitions support. Additionally, if land safety footprints exceed that of the Eglin AFB Reservation, the Gulf of Mexico water ranges are available to provide expanded safety footprints.

Weather Features (Required) - Eglin AFB FL experiences 364 days of temperatures between 32 and 95 degrees F, 358 days of visibility greater than 3 miles, and 355 flying days per year. This allows flight and ground tests and experiments to be conducted practically year round without delays because of weather.

3.1.2 **Licenses & permits:** Describe and list the licenses or permits (e.g., environmental, safety, etc.) that your activity currently holds and justify why they are required to allow tests, experiments, or other special capabilities at your location for each CSF. For example, permit to store and use high explosives. (BRAC Criteria I)

Response: Applies to Weapons: Bombs CSF

Source Material Permit Number 09-30031-2AFP: Source material permits are issued by the USAF Radioisotope Committee under Master Material License Number 42-23539-01AF which is issued to the USAF by the Nuclear Regulatory Commission. This source material permit (09-30031-2AFP) is for the possession, storage, machining and testing of depleted uranium research and development fabricated items produced by the Warheads Branch of the Munitions Division, Wright Laboratory, Armament Directorate (WL/MN). The issuance of a source material permit is by the direction of Air Force Regulation 161-16 and Title 10 Code of Federal Regulation, Parts 30, 32, 33, 35, and 40. Permit 09-30031-2AFP is the second largest source material permit in the USAF.

Advanced Warhead Experimentation Facility (AWEF) Confined Space Permit: The AWEF has a ballistics chamber which by AFOSH Regulation 127-25 is considered a confined space and must be monitored for air quality before personnel are allowed to enter the chamber and perform their individual duties. This permit is issued locally by the Safety Office.

Source Material Permit Number 09-50031-4AFP: This source material permit is issued by the USAF Radioisotope Committee under Master Material License Number 42-23539-01AF to have sealed radioactive sources which are used in analytical instrumentation in the Environmental Sciences Facility of the Armament Directorate.

Explosive Facility Licenses: The following Explosive Facility Licenses are issued to WL/MN Facilities to work with explosives as mandated by Air Force Regulation 127-100:

PERMIT NO.	EXPIRATION DATE	LOCATION
AFATL- 1	NONE	BLDG 984, HERD
AFATL- 2	NONE	BLDG 1217, HERD
AFATL -3	NONE	BLDG 1224, HERD
AFATL- 4	NONE	BLDG 432, FUZE TEST
AFATL- 5	NONE	BLDG 418, FUZE TEST
AFATL-11	NONE	BLDG 1203, HERD
AFATL-12	NONE	BLDG 1213, HERD
AFATL-13	NONE	BLDG 1200, HERD
AFATL-14	NONE	BLDG 1206. HERD
AFATL-21	NONE	BLDG 1281, HERD
AFATL-22	NONE	BLDG 991, HERD
AFATL-23	NONE	BLDG 993, HERD
AFATL-24	NONE	BLDG 994, HERD
AFATL-26	NONE	Connex #1, R-22
AFATL-27	NONE	Connex #2, R-22
AFATL-28	NONE	Igloo 447, ALF
AFATL-29	NONE	Igloo 448, ALF
AFATL-30	NONE	Igloo 449, ALF
AFATL-33	NONE	BLDG 1202, HERD
AFATL-34	NONE	BLDG 423, ARF
AFATL-35	NONE	BLDG 405, R-22
AFATL-36	NONE	Ranges by 419, BEF
AFATL-37	NONE	BLDG 410, R-22
AFATL-38	NONE	BLDG 443, ALF
AFATL-39	NONE	BLDG 12588, SITE A-15
AFATL-40	NONE	BLDG 12521, SITE A-15
AFATL-41	NONE	BLDG 1295, HERD
AFATL-42	NONE	BLDG 1296, HERD
AFATL-43	NONE	BLDG 1297, HERD
AFATL-44	NONE	BLDG 1298, HERD
AFATL-45	NONE	BLDG 1299, HERD
AFATL-46	NONE	BLDG 12553, SITE A-15
AFATL-47	NONE	BLDG 1198, HERD
AFATL-48	NONE	BLDG 1199, HERD
AFATL-49	NONE	BLDG 1239, HERD
AFATL-50	NONE	BLDG 12555, SITE A-15
AFATL-51	NONE	BLDG 1221, HERD
AFATL-52	NONE	BLDG 1227, HERD
LS-94-15	03/10/95	TEST AREA TAC-64A
LS-94-16	03/10/95	BLDG 9624, TAC-64C

LS-94-17	03/10/95	BLDG 9521, TAC-64A
LS-94-18	03/10/95	BLDG 9623, TAC-64C
LS-94-19	03/10/95	BLDG 9584, TAC-64B
LS-93-90	12/28/94	BLDG 614
LS-93-91	12/28/94	Storage Structure #1
LS-93-92	12/28/94	Storage Structure #2
LS-93-93	12/28/94	Storage Structure #3

3.1.3 **Environmental constraints:** Describe and list the environmental or land use constraints present at your activity which limit or restrict your current scope for each CSF, i.e., would not allow increased "volume" or "spectrum" for the CSF. Example -- Volume: frequency of a type of experiment. Example -- Spectrum: Current permit to detonate high explosives will not allow detonation or storage of increased quantity of explosives without legal waiver (state law) or relocation of surrounding (non-govt) buildings. (BRAC Criteria II)

Response: Applies to Weapons: Bombs CSF

a) An AFDTC base wide Environmental Impact Statement (EIS) is being developed which will cover any current or future expansion on Eglin AFB and the Environmental Impact Analysis Process (EIAP) would not be a constraint unless the planned activity or expansion should fall outside the scope of the EIS.

b) If any expansion to current facilities and the land or its use were to occur there would be constraints, such as endangered species habitat, requiring consultation with the United States Fish and Wildlife Service.

c) Cultural resources of Eglin Reservation would have to be considered before any excavation or land clearing could happen.

d) New explosive siting by the Department of Defense Explosive Siting Board would have to occur and the siting approved before expanding any current experimental ranges or creation of a new experimental range.

e) New explosive licensing would also be a part of any planned expansion or creation of any new explosive range.

f) Other constraints which might occur would be licensing or permitting through either federal, state, or USAF environmental organizations.

3.1.4 **Special Support Infrastructure:** List and describe the importance of any mission related special support infrastructure (e.g. utilities) present at your location for your activity. (BRAC Criteria I)

Response: Applies to Common Support Functions:
Weapons: Conventional Missiles/Rockets
Weapons: Bombs
Weapons: Guns and Ammunition

Land Ranges: Eglin AFB has 724 sq. miles (463,325 acres) of ranges which are made up of a variety of environments including jungle conditions, rolling hills, heavily forested areas, and cleared flat areas. On this land, there are 1,434 miles of roads and 400,000 acres of timber. The land is estimated at a value of $5.9 billion. The land and water test ranges combined make Eglin the largest air base in the free world. The general purpose test sites/complexes provide general instrumentation support for many test mission responsibilities. The nature and extent of the weapons developed necessitate considerable safety zones which Eglin can provide due to its immense size.

Water Ranges: Eglin AFB has 86,500 sq. miles of water range used for testing. The land and water test ranges combined make Eglin the largest air base in the free world. On the Gulf Coast, the biggest advantage over other water test ranges is the lower amount of electronic interference as a result of the area being less populated. A big advantage to testing over water is that it can be done without disturbing the local community and with no potential damage to personal property. Testing over water also provides additional privacy during the test. Eglin has a Marine Operations group that performs range and launch corridor clearance through visual and radar surveillance of impact areas, target placement and test item recovery, and transportation of personnel to and from test areas for collecting and recording technical data. Commercial travel by water between New York City and the south eastern border of Texas is made possible via the Intracoastal Waterway which passes between Fort Walton Beach, Okaloosa Island and Eglin AFB FL.

Airfields/Airways: Eglin AFB has eleven (11) air fields of which three (3) are active with the following characteristics:

Air Field Pavements:	5.7 million square yards
Eglin Main:	12,000 and 10,000 foot runways
	44,500 IFR sorties per year
Auxiliary Field 3 (Duke Field):	Single 8,000 foot runway
	2,400 IFR sorties per year
Auxiliary Field 9 (Hurlburt Field):	Single 9,600 foot runway
	6,700 IFR and VFR sorties per year

Eglin Main not only performs in support of the development test mission for the Air Force but also allows airline access through agreements with commercial air carriers. Jet Airway J58-86 and Gulf Route 26 are routes used on a daily basis by commercial air carriers. These air routes may be closed for up to four hours for conduct of test activities.

Intracoastal Waterways And Sea Lanes: Sitting on Choctawhatchee Bay and the Gulf of Mexico, Eglin AFB has direct accessibility to Florida's intracoastal waterway system which connects a chain of rivers, lakes, and lagoons into a continuous waterway and provides access to Florida's deep water ports. Barges on the intracoastal waterway system transport enormous volumes of high tonnage items. Hence, products too tall, long, or deep for trucks or railroads can be carried by barge.

Florida is at the intersection of a number of maritime trade routes. Because of the state's mild climate, Eglin AFB's waterways are accessible year-round. The state has ten major ports and seventeen smaller ports. Eglin AFB is located a short distance from two major ports - Pensacola, FL (40 miles) and Panama City, FL (60 miles). Sea areas are used on a daily basis by commercial and recreational fishermen and commercial ship traffic to ports in the northern Gulf of Mexico. The sea area is sufficiently large to permit positioning of the test activity to avoid surface traffic.

Interstate/State Highway System: Eglin AFB is directly accessible by Interstate 10 (I-10) virtually intersecting the highway at two interchanges. The main complex of Eglin AFB is approximately twenty miles south of these interchanges and is easily accessed through use of a four lane spur (State Highway 85) and a two lane spur (State Highway 285). State Highway 85 and 285 are used on a daily basis but can be closed during the conduct of any test activities. I-10 passes through both Pensacola, Florida (1:00 hr/60 miles from Eglin AFB) and Tallahassee, Florida (2:45 hr/175 miles from Eglin AFB) and intersecting I-75 for connections with points north and south. This extensive highway system has been a boom to Florida's economy, allowing for the rapid transit of goods and people. The limited access interstate system and the relatively unpopulated rural area of northwest Florida has special advantages - direct routes to distant out-of-state locations, savings of time, and increased safety for the transportation of munitions related hardware, equipment supplies, or explosives.

Computational Facilities: Eglin AFB provides general purpose scientific processing capability consisting of classified and unclassified networks of computers. Provides the design, system software and consulting services for network computer users. Consulting is provided for all areas of computer science, mathematics, and modeling to develop solutions to physical problems. Systems and programming are also provided for remote facilities, experimentation ranges, and real-time applications. A high-speed Supercomputer facility provides WL/MN with a 200 megaflop multiprocessing system.

Provides services to support Management Information Systems and Office Automation including local area networking and electronic mail capabilities. System design, implementation, resources and continuous support are provided. Support is provided for the WL/MN Corporate Database for business computing needs including financial tracking, Job Order Cost Accounting interface, Defense Technical Information Center interface and procurement tracking. Support is provided for the WL/MN Executive Information System used by upper management.

Gulf Coast Alliance For Technology Transfer (GCATT): The Gulf Coast Alliance for Technology Transfer (GCATT) is an unprecedented innovative partnership of eleven laboratories/centers, four state universities, and a consortium of five community colleges in the Northwest Florida - South Alabama region. The partnership was formed to leverage individual resources into a comprehensive, "user-friendly" technology access center responsive to the technology needs of small and medium-sized manufacturers, especially those that are defense-dependent. The goal of GCATT, of which the Armament Directorate is a founding member and avid supporter, is to leverage the transfer of technologies developed at the member laboratories to enhance the competitiveness of the state, region, and nation. The diverse group of federal laboratories and state colleges and universities offers unique opportunities for global outreach and synergism in a regional approach for technology transfer. The GCATT member organizations are:

- Navy Education and Training (NETPMSA)
- Okaloosa-Walton Community College (OWCC)
- Wright Laboratory, Air Base Systems Branch (WL/FIVC), Tyndall AFB, FL
- University of West Florida
- University of Florida, College of Engineering
- Wright Laboratory, Armament Directorate (WL/MN)
- Air Force Development Test Center (AFDTC)
- Air Force Civil Engineering Support Agency (AFCESA)
- Army Aeromedical Research Laboratory (AARL)
- Armstrong Laboratory, Environmental Quality (AL/EQ)

- Environmental Protection Agency, Environmental Research Laboratory (EPA/ERL)

- Florida State University

- Florida A&M University

- National High Magnetics Field Laboratory

- Navy Aerospace Medical Research Laboratory (NAMRL)

- Navy Coastal Systems Station (NSWC/CSS)

Seven major benefits are expected from the GCATT's regional approach:

1. Sharing of assets and knowledge to enhance technology transfer capabilities.

2. Exploitation of regional coverage and contacts.

3. Enhanced ability to conduct outreach to regional, national, and international organizations.

4. Serving as a catalyst for focusing/identifying technology transfer opportunities.

5. Central coordination and brokering of technology transfer activities.

6. Data base development and information sharing.

7. Providing a forum to address related issues.

GCATT is governed by a Board of Directors, which is supported by member representatives (working group) and an agent (the University of Florida), who is delegated the daily operational responsibilities. The agent is responsible for preparation of technology transfer agreements, brokering of patent licenses, test facility broker, commercial potential evaluation, marketing/promoting technologies, conducting special projects, conducting training seminars/workshops, and providing technology counseling. Resources to support the GCATT are provided by contributions from individual organizations which may be financial or non-monetary in nature.

The GCATT will benefit from the construction of the University of Florida Graduate Engineering and Research Center (GERC) on USAF property in Ft Walton Beach FL (adjacent to Eglin AFB proper). The facility is currently under construction. The GERC will provide a

source for graduate engineering degrees, continuing college level education, research and technology transfer. The position of permanent director of the GCATT is funded by a line item in the State of Florida budget - through the GERC.

The Armament Directorate as a drawing force in the inauguration of GCATT will have a direct impact on regional and national economic development. As such, the GCATT was awarded a two year, $355,154 Technology Reinvestment Project (TRP) program in conjunction with the Southern Technology Applications Center (STAC), one of the six NASA regional technology transfer centers. This project will significantly enhance the deployment of Armament Directorate technologies, particularly to defense dependent firms and have a significant influence on the regional economy.

3.1.5. **Proximity to Mission-Related organizations:** List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Response:

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
Cnv Mis/Rkt Bombs Guns/Ammo	AFDTC	Land and Water Test Ranges	0	83	16
Cnv Mis/Rkt Bombs Guns/Ammo	AFDTC	Ground Test Facilities	0	22	217
Cnv Mis/Rkt Bombs Guns/Ammo	AFDTC	Scientific Computing Center	0	24	12.7
Bombs Guns/Ammo	AFSOC	Special Operations	12 mi.	4.9	0
Cnv Mis/Rkt Guns/Ammo	SAIC	S&E Tech. Assist.	6 mi.	15	44.6

AFDTC/46th Test Wing, Land and Water Test Ranges: The Eglin AFB test ranges encompass a wide variety of environments including jungle conditions, rolling hills, heavily forested areas, and cleared flat areas of 724 sq. miles (463,325 acres) of land which are fully instrumented for data collection. In addition, Eglin has approximately 86,500 sq. miles of water range which are instrumented with sonabouy data relays. The test areas can be integrated as required for multi-site instrumentation support through a central range control. Land range test sites and test areas are provided communications via cable and microwave and radio frequencies are used extensively to support test missions. Time-Space-Position-Information (TSPI) systems provide a means of observing and precisely recording the behavior of advanced weapon concepts and test vehicles over the water and land test areas by collecting information from radio frequency (RF) multilateration, optical/laser, and radar sources. The reference/control radar systems associated with Eglin ranges produce electronic tracking data for generating TSPI. These radars control the test support aircraft over the prescribed flightpath and collect and deliver TSPI data for real-time tracking and control throughout the entire range. In

addition to precision TSPI, the optical systems at Eglin AFB also include engineering sequential photography, photogrammetric configurations, base-line data for calibration of other TSPI systems and operational aids. Available telemetry allows tracking with high pointing accuracies and provides excellent dynamic capabilities. Another benefit is that Eglin has the capability to modify the instrumentation on test vehicles for specific test requirements.

IMPORTANCE TO WL/MN: WL/MN requires the use of Eglin's land ranges to accomplish its mission. Some of the benefits include safety zones for explosive research, clearance for transportation of explosive materials, access to base safety and environmental expertise for munitions, dedicated CRAY supercomputer support, space to expand operations/facilities, year round outdoors test capabilities supported by excellent weather conditions, and access by land, air and sea. WL/MN is cited to store, research and experiment with up to 45,800 lb. of explosives (2-3 year process) at Eglin AFB and holds the Air Force's second and third largest radioisotopes licenses (3-5 year process) which are only valid for these facilities in Florida. In addition, there is a synergism that results from having all elements of the conventional munition development community located at Eglin AFB where the Air Force can go from concept through complete munition development, fabrication, ground test and flight test at one location.

IMPACT TO WL/MN: Removal of the land and water test ranges would severely hamper WL/MN's ability to conduct explosive ordnance experiments and flight testing of research hardware and would severely hamper the analysis of software in developmental flight vehicles. Safety zones, dedicated computer support, and all the synergism which comes from the collocation of developmental and test and evaluation resources would be non-existent.

AFDTC/46th Test Wing, Ground Test Facilities: The Air Force Development Test Center (AFDTC) possesses world-class test and evaluation facilities that support WL/MN weapons experimentation. Capabilities include fully instrumented land and water ranges, integration laboratories, hardware-in-the-loop simulation, and installed test facilities. This unique combination of numerous individual test areas provide a diverse spectrum of capabilities and a variety of terrain features such as jungle, rolling hills, dense forests, cleared flat expanses, and water creating a leading organization for the development of conventional munitions. The following are some of the major AFDTC facilities used routinely to support WL/MN R&D efforts:

1) Guided Weapons Evaluation Facility (GWEF). The GWEF provides laboratory simulation support for developing precision-guided weapon technology. It is the only facility of its kind that can test the complete spectrum of weapon seekers under one roof including millimeter wave, laser, infrared, radio frequency and electro-optical.

The facility also has the unique ability to use digital, hardware-in-the-loop, midcourse and counter-countermeasure simulations for weapons analysis.

IMPORTANCE TO WL/MN: The GWEF has an extensive array of unique test devices that provides a means of testing the broad spectrum of guided munitions technology components (i.e. seekers, signal processor hardware and software, guidance, navigation and control hardware and software, etc.) being developed by WL/MN. The GWEF provides a means for high fidelity, low cost test and evaluations early in the development process that help quantify the performance capabilities and limitations and provide a means for WL/MN engineers and scientists to make informed low risk technology investment decisions. Of specific interest in the future is the integration of GWEF MMW target modeling and projection capabilities with WL/MN infrared modeling and projection capabilities to perform HWIL analyses of dual mode sensor concepts. There is nowhere else where this can be accomplished with the degree of fidelity represented by a GWEF - WL/MN link.

IMPACT TO WL/MN: The loss of the multi-story, multi-million dollar GWEF facility would eliminate significant evaluation tools that provide a unique means of assessing the value of new guided munitions technologies and of assessing their potential as the munitions component of an integrated weapon system.

2) Preflight Integration of Munitions and Electronics Systems (PRIMES). The PRIMES facility consists of a fighter aircraft-sized anechoic chamber test facility and six shielded laboratories providing secure, realistic testing in a controlled RF environment to support one-on-one and many-on-one tests in static or dynamic flight simulation conditions. PRIMES testing significantly reduces the need and cost of open-air testing.

IMPORTANCE TO WL/MN: The PRIMES facility provides a means to assess guided munition performance in the presence of realistic radio frequency environments including that generated/emitted by the launch aircraft. A fiber-optics link between PRIMES, the GWEF and WL/MN facilities is being designed to provide the capability to link with guided munitions HWIL simulations in WL/MN and the GWEF for integrated system tests of the complete weapon system and the environment in which it will fly.

IMPACT TO WL/MN: The loss of the PRIMES facility would eliminate significant analysis tools that provide a unique means of assessing the value of new guided munitions technologies and of assessing their potential as the munitions component of an integrated weapon system.

3) Damage Potential Sled Track. The sled track is a 200-foot dual rail facility that provides accurately delivered (both in required velocity and impact geometry)

munitions against targets of various sizes, shapes and densities. This controlled environment is used to evaluate warhead and target interactions. The sled track also supports ground test of airborne scoring systems and experimental explosives. Targets are specifically tailored to the item under test and have included reinforced concrete, composite soil-concrete, simulated ship hulls, armored vehicles, and fragment collection arenas. Instrumentation provided includes high-speed cameras, programmable control systems, velocity measuring systems and closed-circuit television. Velocities up to 3,021 feet per second have been reached and items weighing up to 3,000 pounds have been tested.

IMPORTANCE TO WL/MN: The sled track facility located on Range C-74, Eglin AFB FL has been and is continuing to be essential for full scale testing of hard target munition fuzes and warheads being developed by WL/MN. The determination of weapon and fuze response during realistic hard target encounters is critical, particularly in defining the fuzing environment and warhead specific deceleration signals required by fuzes such as the accelerometer based Hard Target Smart Fuze (HTSF). The need for improved hard target munitions including hard target fuzes has been one of the most highly emphasized areas within the Armament Directorate as well as the office of the HQ ACC and SAF. Based on these requirements, the HTSF technology being developed at WL/MN has received particular emphasis in terms of the Counter Proliferation agenda at the OSD level and was identified as one of the top priorities that must be addressed by DOD. The emphasis on hard target fuzing has resulted in still increasing numbers of sled track experiments. During the HTSF program alone, 12 sled experiments of the 350 lb class penetrators, 16 experiments of the 2000 lb BLU-109 and 7 experiments of the 4400 lb BLU-113 were conducted. With continuing focus on hard target defeat, plans are calling for continued utilization of the Eglin sled track facility for hard target fuze and warhead development and experimentation. The close proximity of the facility to the weapon developer and test community has resulted in synergism providing for expedient yet "first try successes". The test turn around time and target capability for penetrating weapons is at a world class level and unrivaled by any other facility.

IMPACT TO WL/MN: Removal of WL/MN from this facility would severely damage the Department of Defense's ability to develop and field penetrating weapons for countering weapons of mass destruction (nuclear, chemical, and biological). Development time lines would require 3 to 4 years extension and development costs would increase by tens of millions of dollars.

4) Fuze Test Facility. This facility is used for extensive testing of prototype and production models of fuzes and associated ordnance. The facility provides both operational and climatic environments. Operational environments simulated by jolt and jumble devices expose tes .ticles to vibrations that realistically occur during handling

and transportation. Climatic environments simulate exposure to extreme conditions and can be accelerated to duplicate actual conditions to which a fuze may be exposed over prolonged periods. Test articles can be exposed to several environments simultaneously providing realistic operational environments. Other categories of testing include relative humidity, altitude, dust, drop, centrifugal acceleration, shock, static ejection, and leak detection.

IMPORTANCE TO WL/MN: The Fuze Test Facility provides invaluable support in the development and testing of munition fuzes and supporting subsystems. This support starts at the early stages of research. A complete line of environmental experimentation capabilities includes: High Temperature, Low Temperature, Temperature and Humidity, 40 Foot Drop, Sand and Dust, Jolt, Jumble, Electrostatic Discharge, and Acceleration. These environmental experiment apparatuses are configured to allow remote, round the clock testing of explosive items. These environmental experiment capabilities are also utilized by the Armament Directorate in early stages of fuze research. In addition the Fuze Test Facility has several unique high shock testers including an accelerated drop tester, and a vacuum gun with a 150 foot long barrel uniquely configured to provide impact shock with low launch acceleration as experienced by impact of free fall bombs and penetrators. Stores activation experiments are accomplished at the static ejection building. Real time fluoroscope equipment is utilized to observe the internal details (e.g. armed or safe) of research fuzes. This capability greatly reduces the hazard of disassembly of live explosive test items. These extensive capabilities are routinely utilized by the Armament Directorate in all phases of fuze research for fuze and fuze component analysis.

IMPACT TO WL/MN: Removal of WL/MN from this facility would delete the Air Force's ability to perform research and experimentation on new conceptual fuzes. Development of advanced fuzing systems would be severely degraded and result in development delays for future fuzes.

5) Static Arenas. AFDTC provides eight instrumented (with data collection) test areas for static munitions testing. Capabilities include fragment velocity, dispersion and recovery, air blast measurements and pressure profiles, high speed photography, temperature measurement, wideband data recording, closed circuit televisions, fragment velocity screens and x-ray systems.

IMPORTANCE TO WL/MN: AFDTC instrumented test areas for static munitions experiments are required in support of a wide range of Armament Directorate programs. These ranges provide support such as iterative experiments of developmental warheads; warhead characterization experiments needed for effectiveness comparisons to justify further development or production of new Air Force munitions; evaluation of

product improvement warhead concepts for existing programs such as AMRAAM and Sensor Fuzed Weapon (SFW); and fragmentation characterization of new munitions required to establish safe separation criteria for aircraft delivery. AFDTC has the facilities, instrumentation and trained personnel to conduct these tests in a timely, efficient and professional manner.

IMPACT TO WL/MN: The impact of not having WL/MN near these facilities would be the added time and cost of locating or configuring an alternate facility to conduct the required experiments, and the probability that experienced personnel would not be available to effectively record, analyze, and utilize the resulting data. Delays in warhead development from exploratory development to full scale production would exceed 4 years with associated costs impacts in the tens of millions of dollars per warhead.

AFDTC/96 CCSG, Scientific Computing Center:

1) General Scientific and Business Computing: AFDTC/96 CSSG provides a wide range of general scientific and business computing services to WL/MN. Among the services provided are: system operation/maintenance of mainframe and mini-computer systems, the Eglin Computer Network (ECONET), customer assistance, management of computer support contracts, management of the computer/software/peripheral acquisition process for both scientific and business computing, establishment of base-wide computing/development standards, requirements analyses, and strategic planning assistance.

IMPORTANCE TO WL/MN: As both a scientific/engineering and a business organization, WL/MN requires signficant amounts of computing power and infrastructure support to accomplish its mission. Every employee uses at least one computer system as an integral part of their work. AFDTC/96 CCSG provides in-house government support, and manages a variety of computer services contracts for WL/MN including hardware and software maintenance, and management information system (MIS) development. AFDTC/96 CCSG also provides an Eglin-wide corporate approach to computing. All organizations, including WL/MN, benefit from this leadership role.

IMPACT TO WL/MN: Without the general scientific and business computing services and support provided by AFDTC/96 CCSG, WL/MN would be forced to use less sophisticated, less efficient techniques for task and services contract accomplishment and/or establish its own in-house centralized computing capability. Neither scenario is desirable, because they do not take advantage of the economy of scale resulting from a centrallized computing infrastructure.

2) Supercomputer Facility: WL/MN develops technologies in several different areas which require the use of supercomputers. AFDTC/96 CCSG owns and operates a supercomputer system consisting of a Cray YMP 2/128, mass storage silos, 128 million

word solid state memory device, and a computer visualization laboratory. WL/MN scientists account for 89 percent of all usage on this system.

IMPORTANCE TO WL/MN: The two major technical areas for which WL/MN require supercomputers are Computational Fluid Dynamics (CFD) and Hydrocodes. Both areas are high fidelity numerical modeling of basic conservation laws of physics. CFD models solve the Navier-Stokes Equations to obtain a characterization of the aerodynamic flow field surrounding an air vehicle(s). Hydrocodes solve the Euler Equations with appropriate material state equations in order to model a weapon penetration and/or explosion event. Each of these techniques require massive computer resources, usually 100+ hours of Cray YMP time per analysis and tens of millions of words of computer memory.

IMPACT TO WL/MN: The displacement of the WL/MN scientist from the AFDTC/96 CCSG computer systems would be very impractical. Currently an ultra-high speed network exist for connectivity to the supercomputer and the mass storage devices. This network allows the scientist to perform his computations and visualize the results, otherwise the scientist would be required to travel to the supercomputer site. Visualization is an extremely important aspect of high fidelity modeling. For example, the computer allows the scientist to "see" the air flowing around a vehicle while in flight or observe an explosion event at ground zero. This is obviously not possible during an actual event.

In addition to the obvious inefficiencies, the displacement of the WL/MN scientist from the AFDTC/96 CCSG computer systems would eliminate the capability for WL/MN scientists to respond to quick reaction problems. The AFDTC/SC computer was specifically purchased and configured to meet WL/MN needs. This provides the scientist with a capability not available elsewhere. Some examples of work which could not have been accomplished without this capability are:

a). GBU-28: A new guided bomb unit weighing almost 5000 lbs was developed for use in Desert Storm. Hardened enemy targets deeply buried under the ground were unreachable by any current weapon system in the Air Force. This new system was designed, fabricated, tested and delivered in less than one month. Thirty- two Hydrocode analyses were provided in 4 days to support this development effort.

b). AGM-130: A new standoff weapon concept under development at ASC/YH required aerodynamic analysis prior to continuing the program. A 6-8 month delay was anticipated due to wind tunnel testing constraints. WL/MN scientists provided aerodynamic stability analyses in only a few weeks.

c). F-16 Flight Certification: Flight Certification for an Electronic Counter Measure (ECM) pod on the F-16 would have required approximately $300K. CFD analysis performed on the AFDTC/96 CCSG supercomputer allowed the certification to be made in a timely and inexpensive manner.

Air Force Special Operations Command (AFSOC), Hurlburt Field FL: As a major player in every low intensity conflict in the past decade from Grenada to Bosnia, AFSOC responds to provide special operations personnel and direct fire support to accomplish its assigned objectives. The close proximity of WL/MN has proven to be extremely beneficial to AFSOC in terms of direct weapon support and weapons requirement planning in support of that mission.

WL/MN provides requested direct support by investigating and solving malfunctions and failures of helicopter and gunship weapons and ammunition. The quick response, sometimes on an emergency basis, is greatly enhanced by the cross-town location. Engineers, armorers, and aircrew can meet quickly on-site as needed to discuss and evaluate problems, and take the appropriate corrective action. WL/MN also provides support to AFSOC through the R&D of enhanced weapons and ammunition. Programs designed to develop improved munitions have been formulated through the close interaction with engineers and the user. On one specific occasion, an improved fuze housing was designed, fabricated, and tested in-house on a reduced schedule to meet specific mission requirements.

WL/MN works directly with AFSOC's requirements and acquisition personnel to provide support for the Special Operations Forces (SOF) Technical Planning Integrated Product Team (TPIPT). Recently held and future Directorate sponsored meetings of the AFSOC Weapon Requirements Workshop clarify near and far-term requirements and facilitate inputs to the AFSOC Weapon System Roadmap and Mission Area Plans. In addition, Directorate engineers and AFSOC planners serve together on Project Reliance subpanels to guide the development of future weapons for AFSOC as well other Air Force MAJCOMs.

IMPORTANCE to WL/MN: The geographical closeness of AFSOC and the Directorate has paid big dividends. The advantages are manifest not only in the obvious time savings of immediate response, but in the invaluable communications link of face-to-face contact with colleagues from the same community.

IMPACT TO WL/MN: The impact of losing this direct coordination would adversely affect the timeliness of the support provided to the AFSOC mission, and perhaps influence the reaction time of AFSOC to meet its objectives.

Science Applications International Corporation (SAIC), Scientific & Engineering Technical Assistance (SETA): SAIC is a locally based company running their technical operations from facilities located in Shalimar FL. SAIC, under a SETA contract, supplies highly specialized engineering and technical personnel to the Armament Directorate. They form an integral part of the Kinetic Kill Vehicle Hardware in the Loop Simulation (KHILS) Facility and the high velocity gun portion of the Hypervelocity Research Facility (HRC).

IMPORTANCE TO WL/MN: SAIC provides an integral portion of the experimental support for KHILS and HRC. Specifically, SAIC provides support in the areas of image generation, scene visualization, hardware integration, and software development and integration for the KHILS systems. At the HRC, SAIC provides integral support for plasma processing, Mahem, ram accelerator, and electromagnetic launcher experimentation.

IMPACT TO WL/MN: KHILS and HRC would either be forced to close or drastically reduce their experimental programs if SETA support was lost. Loss of KHILS would remove a unique facility from the national technical base and would cause the loss of a substantial part of the nation's hardware-in-the-loop capability to analyze tactical and strategic seekers. This would greatly increase the developmental cost of future munitions used in theater defense, strategic defense, and tactical defense programs. Loss of the development work at HRC would deny our armed forces future weapons critical to penetration of future hard targets. The loss of the integral support provided by SAIC would also stop work on a developmental plasma arc process that has demonstrated removal of pollutants from water and holds great promise as a device to decontaminate ground water supplies.

3.2 Personnel:

Definitions for "Types of Personnel" provided in the paragraphs 3.2.1, 3.2.2 and 3.2.3 :

Technical: Includes scientists, engineers, and technicians.

Management: Includes personnel who are designated as supervisors in their approved job position/description.

Other: Includes all organizational personnel not listed in either of the the above two categories.

The above definitions provided as clarifications by Mr. John J. Fedon, WL/POMF, DSN: 785-4013, 11 May 94.

DCD 2C8
ME

CONTROL NUMBER: LJCSWG-AF 010

PURPOSE: To provide SAF/AQX staff corrected answers to Question 3.2.1 (Total Personnel) for the Wright Lab, Eglin AFB response to the Laboratory Joint Data Call The current Certified response for the Types of Personnel table for the "Weapons: Bombs CSF" has a single asterisk (*) next to the "Other" "Civilian/Government" entry. Based upon the footnotes, it appears as if this should be a double asterisk. Please confirm that this should be a double asterisk (includes six matrix employees) or explain why SETA contractor personnel (the single asterisk footnote) are included in the government civilian count

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF Date:
Manufacturing_Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

For [illegible] use only

3.2.1 **Total Personnel:** What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

Response:

Weapons: Conventional Missiles/Rockets CSF

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	15	5	0	6*
Management (Supv)	3	1	0	0
Other	5	0	0	2*

* Includes on-site O&M contractors (RTS & TESCO) and Technical Support (TEAS & TEAMS)

Weapons: Bombs CSF

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	186	63	0	70*
Management (Supv)	43	12	0	5*
Other	57**	3	0	21*

* Includes on-site O&M contractors (RTS & TESCO) and Technical Support (TEAS & TEAMS)

** Include six matrix employees

Weapons: Guns and Ammunition CSF

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	4	1	0	2*
Management (Supv)	1	0	0	0
Other	1	0	0	0

* Includes on-site O&M contractors (RTS & TESCO) and Technical Support (TEAS & TEAMS)

3.2.2 **Education:** What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Response:

Weapons: Conventional Missiles/Rockets CSF

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	1	0	2
Associates	2	0	2
Bachelor	9	1	1
Masters	6	2	0
Doctorate (include Med/Vet/etc.)	2	1	0

Weapons: Bombs CSF

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	17	4	25*
Associates	22	5	23
Bachelor	110	9	9*
Masters	81	26	3
Doctorate (include Med/Vet/etc.)	20	12	0

* Includes six matrix employees.

Weapons: Guns and Ammunition CSF

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	0	0	1
Associates	1	0	1
Bachelor	3	0	0
Masters	2	1	0
Doctorate (include Med/Vet/etc.)	0	0	0

3.2.3 **Experience:** What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Weapons: Conventional Missiles/Rockets CSF

Type of Position*	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	1	10	3	2	3
Management (Supv)	0	0	1	1	3
Total	1	10	4	3	6

* Total line does not include "Other" which is defined as clerical, administrative, secretarial, librarians, graphics, and security specialists. "Other" data is listed below:

Other	1	2	1	0	1

Weapons: Bombs CSF

Type of Position*	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	16	122	40	30	41
Management (Supv)	0	5	8	10	32
Total	16	128	48	40	72

* Total line does not include "Other" which is defined as clerical, administrative, secretarial, librarians, graphics, and security specialists. "Other" data is listed below:

Other	8	27**	6	5	13

** Includes six matrix employees.

Weapons: Guns and Ammunition CSF

Type of Position*	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	3	1	1	1
Management (Supv)	0	0	0	0	1
Total	0	3	1	1	2

* Total line does not include "Other" which is defined as clerical, administrative, secretarial, librarians, graphics, and security specialists. "Other" data is listed below:

Other	0	1	0	0	0

3.2.4 **Accomplishments During FY91-93:** For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.4.1 of the Wright Lab, Eglin AFB response to the LJCSG guidance package. The existing 10 Aug 1994 submission states that there were 7 patent disclosures and 8 patent awards. Since patents awarded are based on disclosures, explain why the number patents awarded for bombs (6) is greater than the number of patent disclosures for bombs (4).

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF Date:
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Response To SAF/AQX Worksheet for Question 3.2.4.1 (How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made?).

- All patent awards are preceded by patent disclosures, but the WL/MN response treats these two categories as mutually exclusive. Therefore, there is no "double-counting" of disclosures and awards for the same patents. Once awarded, the patent was counted as "awarded" and not counted as "disclosed" and "awarded".

- WL/MN originally counted all disclosures, even those that had been awarded. This would provide a result of 15 disclosures and 8 awards. For Bombs, there would have been 10 disclosures and 6 awards.

- The correct response to this question depends on the issue of "double-counting" patents that have been both disclosed and awarded.

Response:

CSF	Disclosures	Awarded	Patent Titles (List)
Bombs	1		Rotating Prism Video Camera
Guns & Ammo	1		High Energy Coaxial Cable for use in Pulsed High Energy Systems
Bombs	1		A Comparator Stack Architecture for Order Statistic Filtering of Digital Imagery
Bombs	1		Identification for a Real-Time Medium Penetrator
Guns & Ammo	1		Hybrid Gun Barrel
Conv Mis/Rkts	1		Proportional Guidance (PROGUIDE) and Augmented Proportional Guidance (Augmented PROGUIDE)
Bombs	1		A High Performance Architecture for Processing Image Algebra Operations
Bombs		1	Infrared Spectro-Polarimeter
Bombs		1	Bomb or Ordnance With Internal Shock Attenuation Barrier
Bombs		1	Supercapacitor
Guns & Ammo		1	High Current Cable Terminations for Pulsed Power Applications
Bombs		1	Tape Type Microstrip Patch Antenna
Conv Mis/Rkts		1	Direct Current Brushless Motor
Bombs		1	Coding Intensity Images As Phase-Only Images For Use in an Optical Correlator
Bombs		1	Infrared Laser Polarimeter
Total	7	8	

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.4.2 of the Wright Lab, Eglin AFB response to the LJCSG guidance package. The response indicates that only selected papers were published in referred journals based on the entry "referred" in the column "Number Published". Since the question requested only papers published in peer review journals, confirm that the titles without "referred" entry were not published in peer review journals.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.4.2 of the Wright Lab, Eglin AFB response to the LJCSG guidance package. The response indicates that only selected papers were published in referred journals based on the entry "referred" in the column "Number Published". Since the question requested only papers published in peer review journals, confirm that the titles without "referred" entry were not published in peer review journals.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: (Concurs) Does not concur (explain:)

SEE BASE ACTIVITY RESPONSE

MAJCOM REVIEWER: Timothy L. Dues 14 AUGUST 1994.
TIMOTHY L. DUES, GM-15, AFMC/STP DSN 787-7850
(print name, organization, DSN)

BASE: (Concurs) Does not concur (explain:)

See Attached Explanation.

BASE REVIEWER: 8/12/94
(print name, organization, DSN)

PAUL D. SHIREY
Chief, Technology
Management Div
DSN: 872-2205
WL/MNP

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

Response To SAF/AQX Worksheet for Question 3.2.4.2 (How many papers were published in peer reviewed journals?).

- The titles without "Refereed" entry were not published in peer review journals. Those papers without "Refereed" were presented at conferences and symposia and were published in the corresponding conference or symposium proceedings.

WL-EGLIN

FOR OFFICIAL USE ONLY

CONTROL NUMBER: LJCSWG-AF 023

PURPOSE: To provide SAF/AQX staff corrected answers to Question 3.2.4.2. Papers published in peer reviewed journals, of the (see Distribution List) response to the Laboratory Joint Data Call. For each CSF in which you perform work, provide a list of papers published in peer reviewed journals by your government personnel during FY 1991 through FY 1993. The papers listed must directly support the CSF. For each paper listed provide both the title of the article and the journal in which it was published, and the month and year of publication. Do not list papers prepared by non-government personnel or other personnel who were not employed by your activity; even if the paper was prepared in support of a contractual requirement. Do not list papers published in non-peer reviewed journals, technical, letter, test, and other reports; manuals and handbooks; presentations at symposiums; etc.

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain):

See Attached updated Response.

MAJCOM REVIEWER: 19 SEP 1994
Chung C Kang, MAJ, HQ AFMC/ST, 787-5368

BASE: Concurs Does not concur (explain):

The updated response and information worksheet are attached.

BASE REVIEWER: 9/19/94
PAUL D. SHIREY, WL/MNP, DSN 872-2205

I certify the information above is accurate and complete to the best of my knowledge and belief.

FOR OFFICIAL USE ONLY

DATE: 22 Sep 94

MEMORANDUM FOR RECORD, SAF/AQT

AIR STAFF CORRECTION WORKSHEET

PURPOSE: To provide corrected answer to Question Number 3.2.4.2 Papers published in peer reviewed journals, Wright Laboratory, Eglin AFB, FL, Data Call.

SOURCE: Installation Worksheets (Paul D. Shirey, WL/MNP, DSN 872-2205).

METHOD: Review of Installation Worksheets (19 Sep 94) submitted for Air Force data call, telecon, and FAX communications with MAJCOM and Base POCs.

CONCLUSION: The corrected papers published in peer reviewed journals data is shown in attached worksheets and tables/lists for Wright Laboratory, Eglin AFB, FL.

MAJCOM CONCURS: (See attached FAX copies)
Major Chung C. Kang, HQ AFMC/STC, Wright-Patterson AFB, DSN 787-5368.

BASE CONCURS: (See attached Installation Worksheets)
Mr. Paul D. Shirey, WL/MNP, Eglin AFB, DSN 872-2205.

I certify that the above/attached information is accurate and complete to the best of my knowledge and belief.

AIR STAFF REVIEWER: Paul D. Copp **DATE:** 22 Sep 94
Paul D. Copp, Lieutenant Colonel, USAF

FOR OFFICIAL USE ONLY

INSTALLATION WORKSHEET
WRIGHT LABORATORY, EGLIN AFB FL
ARMAMENT DIRECTORATE (WL/MN)

PURPOSE: To document the answer to question number 3.2.4.2. How many papers were published in peer reviewed journals?

SOURCE: Dr Samuel C. Lambert, WL/CA-N, DSN: 872-3002. FY91 - FY93 Log for Review and Clearance of papers and Abstracts.

METHOD: Extracted data from source document. The log for all papers, presentations, briefings, articles, and reports that are submitted to AFDTC/PA for clearance for public release was reviewed to determine those papers that are highly likely to be accepted/printed in refereed journals such as AIAA, IEEE, SAME, Journal of Chemistry, etc., for FY91 - FY93 by the Associate Chief Scientist.

Modification, 23 May 94: Duplication found in source document listing and in data file. Corrected and resubmitted. Source documented anotated.

Modification, 28 Jul 94: Broke out data at the lowest level of Common Support Functions and removed one undocumented entry.

Modification to Worksheet, 4 Aug 94: Clarified "METHOD" to reflect use of source data to answer question.

Modification, 19 Sep 94: Response developed by Lt Col Michael L. Delorenzo, WL/CA-N, DSN 872-3002 to provide corrected answer following new guidance from SAF/AQX. See SAF/AQX Correction Worksheet for details (Control Number: LJCSWG-AF023). Data was collected from the source document and WL/MN division records.

CONCLUSION: The method used captures the great majority of papers contributed and accepted by refereed journals, however, this is only a small measure of the technical information generated because of the diversity of methods used to disseminate technical information before it becomes obsolete. See atch.

I certify that the above information is accurate and complete to the best of my knowledge and belief.

Preparer: Michael L. Delorenzo Date: 19 Sep 94
MICHAEL L. DELORENZO, WL/MN
DSN: 872-5341

I certify that the above information is accurate and complete to the best of my knowledge and belief.

MAJCOM Reviewer: [signature] Date: 19 Sep 94

FOR OFFICIAL USE ONLY

Craig C. Long, Maj, HQ AFMC/ST, 787-5368

WL/MN PEER REVIEWED PUBLISHED PAPERS

FY91:

CSF	Number Published	Paper Titles (List)	Journals (Title)	Date Published
Guns/Ammo	1	Mass Sensitivity Studies for an Inductively Driven Railgun	IEEE Transactions on Magnetics	Jan 91
Guns/Ammo	1	Performance Calculations for Battery Power Supplies as Laboratory Research Tools	IEEE Transactions on Magnetics	Jan 91
Guns/Ammo	1	In-bore Instrumentation/Diagnostics for Large Bore EMLs	IEEE Transactions on Magnetics	Jan 91
Guns/Ammo	1	A More General Model for Determination of Plasma Armature Current Distribution from B-Dot Voltage by Method of Least Squares	IEEE Transactions on Magnetics	Jan 91
Guns/Ammo	1	Experimental Determination of Square Bore and Parallel Configuration EML Rail Inductance per Unit Length	IEEE Transactions on Magnetics	Jan 91
Guns/Ammo	1	Post-Shot Analysis of Plasma/Rail Interaction in a Small Bore Load Driving EML	IEEE Transactions on Magnetics	Jan 91
Guns/Ammo	1	The Preliminary Feasibility of Intercalated Graphite Railgun Armatures	IEEE Transactions on Magnetics	Jan 91
Guns/Ammo	1	Experimental Indication of a Buffer Zone Between the Plasma Armature of an EML and the Projectile	IEEE Transactions on Magnetics	Jan 91
Guns/Ammo	1	A Technique to Reduce Plasma Armature Formation Voltage	IEEE Transactions on Magnetics	Jan 91
Guns/Ammo	1	High Energy Cable Development for Pulsed Power Applications	IEEE Transactions on Magnetics	Jan 91
Guns/Ammo	1	Ten Megacoulomb Switching Operation for the Air Force Battery Powered Inductive Storage Launcher Research	IEEE Transactions on Magnetics	Jan 91

Guns/Ammo	1	Principles of Applications of High Temperature Superconductors to Electromagnetic Launch Technology	IEEE Transactions on Magnetics	Jan 91
Cnv Mis/Rkt	1	Vortical Flow Solutions Using a Time-Lagged, Thin-Layer Navier-Stokes Algorithm	AIAA Journal	Jun 91
Cnv Mis/Rkt	1	A Periodically Preconditioned Conjugate Gradient - Restoration Algorithm	Journal of Optimization Theory and Application	Jul 91
Bombs	1	Structural Optimization Including Centrifugal Effects	Journal of Finite Elements in Analysis and Design	Vol 7, 1991
Bombs	1	Toward an Extrapolation of the Simulated Annealing Convergence Theory onto the Simple Genetic Algorithm	Ph.D. Dissertation, Univ of FL	Aug 91
Bombs	1	Electromagnetic Nonlinear Response to Picosecond Pulses	IEEE Transactions On Magnetics	Sep 91
Bombs	1	Transmission Through a Moving Chiral Slab	Journal of Optical Society of America	Sep 91

FY92:

CSF	Number Published	Paper Titles (List)	Source Journal	Date Published
Bombs	1	Structural Optimization Incorporating Centrifugal and Coriolis Effects	AIAA Journal	Oct 91
Bombs	1	Three-Dimensional Solution - Adaptive Grid Generation Composite Configurations	AIAA Journal	Dec 91
Bombs	1	A Flux-Difference Split Algorithm for Unsteady Thin-Layer Navier-Stokes Solutions	AIAA Journal	Apr 92
Cnv Mis/Rkt	1	Eigenstructure Assignment for the Extended Medium Range Air-to-Air Missile	AIAA Journal of Guidance, Control and Dynamics	Apr 92
Bombs	1	Mueller Matrix Dual Rotating Retarder Polarimeter	Applied Optics	May 92
Cnv Mis/Rkt	1	Robust Eigenstructure Assignment with Structural State Space Uncertainty and Unmodelled Dynamics	International Journal of Systems Science	1992 (Vol 23, No 5)
Bombs	1	An Efficient Numerical Implementation of the Bodner-Partom Model in the EPIC-2 Code	Engineering Fracture Mechanics	1992 (Vol 41, No 5)
Bombs	1	An Electro-Optical Image Algebra Processing System for Automatic Target Recognition	Ph.D. Dissertation	Aug 92
Bombs	1	A One-Dimensional Analysis of Rod Penetration	International Journal of Impact Engineering	Vol 12, 1992
Bombs	1	An Improved Method of Modeling Porous Materials Using Finite Elements	Journal of Computers and Structures	Aug 92

FY93:

CSF	Number Published	Paper Titles (List)	Journals (Title)	Date Published
Bombs	1	Control Design for Robust Eigenstructure Assignment in Linear Uncertain Systems	IEEE Control Systems Magazine	Oct 92
Bombs	1	3-D Sound/Synthetic Environment	Teleoperators and Virtual Environments	Oct 92 (Fall)
Guns/Ammo	1	Earth-To-Orbit Railgun Launcher	IEEE Transactions on Magnetics	Jan 93
Guns/Ammo	1	An Investigation of Electromagnetic Launch Repeatability	IEEE Transactions on Magnetics	Jan 93
Guns/Ammo	1	A Multiple Armature Railgun Launcher	IEEE Transactions on Magnetics	Jan 93
Guns/Ammo	1	An Experimental Investigation of Plasma Armature Railgun Performance in the 3.2 to 4.2 km/s regime	IEEE Transactions on Magnetics	Jan 93
Guns/Ammo	1	Analysis of Experimental Data from a 50mm Railgun Driven by a 5MJ Capacitor Power Supply	IEEE Transactions on Magnetics	Jan 93
Guns/Ammo	1	Non-Arcing Commutation in Explosive Opening Switches	IEEE Transactions on Magnetics	Jan 93
Guns/Ammo	1	25kA, 5000V Solid State Opening Switch for Inductive Energy Stores	IEEE Transactions on Magnetics	Jan 93
Guns/Ammo	1	Evolutionary Development of the Multi-Function "RAP" Explosive Operated Switching Cartridge	IEEE Transactions on Magnetics	Jan 93
Guns/Ammo	1	Novel Hybrid XRAM Current Multiplier	IEEE Transactions on Magnetics	Jan 93
Guns/Ammo	1	Electromagnetic Launcher Control Using Finite State Machines	IEEE Transactions on Magnetics	Jan 93
Guns/Ammo	1	Dynamic Behavior of an Explosive Opening Switch	IEEE Transactions on Magnetics	Jan 93
Guns/Ammo	1	A Tool for Force Model Analysis for Plasma Armature Railguns	IEEE Transactions on Magnetics	Jan 93
Guns/Ammo	1	Data Acquisition Applications for Long Duration Electromagnetic Launcher Experiments	IEEE Transactions on Magnetics	Jan 93

Cnv Mis/Rkt	1	Trajectory Scheduled Missile Autopilot Design	AIAA Journal of Guidance, Control, and Dynamics	Feb 93
Bombs	1	Nonlinear Response to Picosecond Pulse Excitations in Magneto-Dielectric Media	IEEE Transactions on Microwave Theory and Techniques	Feb 93
Cnv Mis/Rkt	1	Maneuvering Target Tracking via Smoothing Filtering Through Measurement Concatenation	AIAA Journal of Guidance, Control and Dynamics	Feb 93
Bombs	1	Applications of Neural Network on Passive Millimeter Wave Image Analysis	Applications of Artificial Neural Networks	Apr 93
Bombs	1	Numerical Investigation of Subsonic and Supersonic Asymmetric Vortical Flow	AIAA Journal	Aug 93
Bombs	1	Void Formation in OFE Copper	International Journal of Impact Engineering	Vol 14, 1993
TOTAL	49			

NOTE: The classified nature of much of the Armament Directorate's research restricts publication in refereed journals due to the free public access to those journals.

SEP.21 '94 10:16 HQ AFLC/XRJ WRIGHT-PATTERSON OH P.08

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 **Work Year and Lifecycle:** Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

Weapons: Conventional Missiles/Rockets CSF

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	23.0	6.4	0	7.6
Engineering Development	N/A	N/A	N/A	N/A
In-Service Engineering	N/A	N/A	N/A	N/A

Weapons: Bombs CSF

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	285.8	79.6	0	95.1
Engineering Development	N/A	N/A	N/A	N/A
In-Service Engineering	N/A	N/A	N/A	N/A

Weapons: Guns and Ammunition CSF

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	6.6	1.8	0	2.2
Engineering Development	N/A	N/A	N/A	N/A
In-Service Engineering	N/A	N/A	N/A	N/A

3.3.1.2 **Engineering Development By ACAT:** For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:
- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Response: This paragraph is not applicable to WL/MN.

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	(Name)			(Description)
ACAT ID	(Name)			(Description)
ACAT II	(Name)			(Description)
ACAT III/IV	(Number)			(List)
Other	(Number)			(List)

3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Response: This paragraph is not applicable to WL/MN.

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority)	Workyears	

3.3.2 **Projected Funding**

3.3.2.1 **Direct Funding:** For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Conv Mis/Rkts	5.0	7.3	7.1	7.3
Bombs	57.4	83.5	81.3	83.5
Guns & Ammo	0.0	0.0	0.0	0.0

3.3.2.2 **Other Obligation Authority:** For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Conv Mis/Rkts	3.7	4.3	4.4	4.0
Bombs	42.8	48.9	50.8	46.5
Guns & Ammo	3.3	0.7	0.0	0.0

3.4 Facilities and Equipment

3.4.1 **Major Equipment and Facilities:** Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.4.1 of the Wright Lab, Eglin AFB response to the LJCSG guidance package. The existing 10 Aug 94 submission stated that only bold entries are WL/MN facilities. Confirm that there are only 17 WL/MN facilities. In addition, the use of footnote (4) is confusing. Is it correct, for example, to interpret the table to mean that the classified user area is part of the Advanced Guidance Research Facility, but the Sun MP 690 is not, nor are the Sun WorkStations - 3, Video Work Station, VAX 8650, VAX 4300, Arc. Devices, Power Conditioner, Talon Scene Workstation, Algorithm Analysis Workstation, and VAX 6410? Further, since they are not part of the Advanced Guidance Research Facility -- a bold entry -- they are not WL/MN facilities or equipment? Finally, the existing response indicates that there is no sharing of equipment or facilities with other than common (as defined in appendix C) or unique support functions. Confirm this is correct. If anything is shared within the activity, indicate the other function(s) and the percentage of time the other function(s) uses the equipment or facility.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

R

PURPOSE: To provide SAF/AQX staff generated answers to question 3.4.1 of the Wright Lab, Eglin AFB response to the LJCSG guidance package. The existing 10 Aug 94 submission stated that only bold entries are WL/MN facilities. Confirm that there are only 17 WL/MN facilities. In addition, the use of footnote (4) is confusing. Is it correct, for example, to interpret the table to mean that the classified user area is part of the Advanced Guidance Research Facility, but the Sun MP 690 is not, nor are the Sun Workstations - 3, Video Work Station, VAX 3650, VAX 4000, Aux. Devices, Power Conditioner, Talon Sonar Workstation, Algorithm Analysis Workstation, and VAX 64107 Further, since they are not part of the Advanced Guidance Research Facility -- a bold entry -- they are not WL/MN facilities or equipment? Finally, the existing response indicates that there is no sharing of equipment or facilities with other than common (as defined in appendix C) or unique support functions. Confirm this is correct. If anything is shared within the activity, indicate the other function(s) and the percentage of time the other function(s) uses the equipment or facility.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-4850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs (Does not concur (explain:))

SEE BASE ACTIVITY RESPONSE

Timothy L. Dues 18 AUGUST 1994.

MAJCOM REVIEWER: TIMOTHY L. DUES, GM-15, AFMC/STT DSN 787-7850
(print name, organization, DSN)

BASE: Concurs (Does not concur (explain:))

See Attached Explanation.

BASE REVIEWER: 8/17/94
(print name, organization, DSN)

PAUL D. SHEREY
Chief, Techology
Management Div
DSN: 872-2205
WL/MNP

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

Response To SAF/AQX Worksheet for Question 3.4.1 (Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function...).

- There are only 17 WL/MN facilities. ✓

- Footnote 4 is intended to indicate that this entry is an integral part of the facility (**bold** print) and its replacement cost is included in the replacement cost of the facility (**bold** print). For example, all of the items listed in the SAF/AQX Worksheet "Purpose" paragraph are part of the Advanced Guidance Research Facility. These items are listed separately to show major items within each facility. A photograph was submitted for each of these items. To obtain the total cost of each facility, add the cost of the facility (line in **bold**) and the non-bolded items/equipment listed below it.

- There is no sharing of facilities and equipment with other common or unique support functions, except for the KHILS Facility. The KHILS Facility is shared between two common support functions (Conventional Missiles/Rockets and Bombs). The table shows the percentage split. All other facilities are dedicated 100% to the listed common support function.

equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Response:

NOTE: Replacement cost based on FY94 value. This clarification provided by Mr. John J. Fedon, WL/POMF, DSN: 785-4013, 11 May 94.

Common Support Function	Major Facility[1] or Equipment Description	Unique To			Replacement Cost ($K) FY94 Dollars
		DOD	Federal Gov't	U.S.	
Bombs	**Radio Freq./MMW Facility**				$541
Bombs	Research and Seeker Emulation Radar				$6,000
Bombs	MMW Reflectivity Measurement System				$200
Bombs	Multi-Sensor Integration System				$1,500
Bombs	Multi-Sensor Integration System Pedestal				(3)
Bombs	Multi-Sensor Integration System Equipment				(3)
Bombs	Flaps Sensor				$320
Bombs	Sensor Fusion Data Analysis				$225
Bombs	Datacube System				$60
Bombs	Wiltron Vector Network Analyzer				$200
Bombs	Low Cost Dual Mode Sensor				$285
Bombs	Digital Monopulse Brassboard				$50
Bombs	In-House Radar				$10,000
Bombs	**LADAR Development & Evaluation Research Facility**				$517
Bombs	5 Ton Shop Van - 2				$30 ea.
Bombs	Unmanned Air Vehicle Hangar				(4)
Bombs	LADAR Range				(5)
Bombs	LADAR Optical Diagnostic Lab				(4)
Bombs	LADAR Electronics/Fabrication Lab				(4)
Bombs	Optics Tables - 4				$50 ea.
Bombs	Vanadate Laser - 3				$300 ea.
Bombs	1.06 Micron Laser Radar System				$150
Bombs	Titan-P Laser				$80

Bombs	Beam View Analyzer				$40
Bombs	Tektronix Digital Analysis System 9200				$40
Bombs	Unmanned Air Vehicle				$90
Bombs	**Optical Processing Research Facility**				$244
Bombs	Optical Processing Research Facility				(4)
Bombs	**Neural Network & Signal Processing Facility**				$244
Bombs	**Advanced Guidance Research Facility**				$421
Bombs	Classified User Area				(4)
Bombs	SUN MP 690				$200
Bombs	SUN Work Stations - 3				50 ea.
Bombs	Video Work Station				(3)
Bombs	VAX 8650				$175
Bombs	VAX 4300				$75
Bombs	Archive Devices				(3)
Bombs	Power Conditioner				(4)
Bombs	Talon Scene Workstation				(3)
Bombs	Algorithm Analysis Workstation				(3)
Bombs	VAX 6410				$175
Cnv Mis/Rkt (70%) Bombs (30%)	**Kinetic Kill Vehicle HIL Simulation Facility**			X	$770
Cnv Mis/Rkt and Bombs	Real Time Suite				$250
Cnv Mis/Rkt and Bombs	Data Analysis Suite - Post Analysis				$285
Cnv Mis/Rkt and Bombs	Phenomenology Data Base/Scene Generation Sys.				$60
Cnv Mis/Rkt and Bombs	Scene Generation Random Access Memory				$25
Cnv Mis/Rkt and Bombs	IR Scophony Scan Scene Projector				$10,000

Cnv Mis/Rkt and Bombs	Resistor Array IR Projector & Midwave Sensor				$3,000
Cnv Mis/Rkt and Bombs	Two Color Broadband Imaging IR Seeker System				$3,000
Cnv Mis/Rkt and Bombs	Slow Scan Calibration System				$10
Cnv Mis/Rkt and Bombs	Flight Motion Simulator				$1,000
Bombs	**High Explosives Research & Development Facility**	X			$14,901
Bombs	Properties Laboratory				(4)
Bombs	Dynamics Facility				(4)
Bombs	100 gal. Steam-Heated Melt Kettle				$127
Bombs	30 gal. Steam-Heated Melt Kettle				$83
Bombs	30 gal. High-Shear, Vertical Mixer				$319
Bombs	500-ton Double-Acting, Hydraulic Press				$942
Bombs	100-ton Hydraulic Press				$323
Bombs	10 Cubic Foot Vacuum Tumble Dryer				$280
Bombs	Instron Mechanical Properties Tester				$54
Bombs	Steam-Heated Oven - 10				$69 ea.
Bombs	Remote Control Band Saw				$60
Bombs	Remotely-Controlled Milling Machine				$66
Bombs	Remotely-Controlled Lathe				$54
Bombs	Closed Circuit Television Monitoring System				$38 ea.
Bombs	Linatron 1000A MeV X-Ray System				$863
Bombs	Astrophysics 450 KeV X-Ray System				$115
Bombs	Picker 320 KeV Fluoroscope				$360
Bombs	48-in. Explosive Particle Size Separator				$26
Bombs	Explosive-Proof Electronic Scale				$264
Bombs	Isostatic Press Pump System				$42
Bombs	High Pressure Water Pump				$54
Bombs	Hot Water/Oil Circulator Units - 10				$18 ea.
Bombs	High Volume Pump - 7				$7 ea.
Bombs	Walk-In Curing Oven				$210

Bombs	Explosive-Proof Wet Scrubber Unit				$24
Bombs	Radiograph Film Processor and Film Reader				$12
Bombs	High-Volume Air Compressor				$45
Bombs	Chiller Units - 2				$160 ea
Bombs	Asphalt Melt Kettle				$42
Bombs	Medium Pressure Boiler				$146
Bombs	100 Gallon Melt Kettle Building				(4)
Bombs	500 Ton Press Building				(4)
Bombs	X-Ray Building				(4)
Bombs	Explosive Materials Preparation Building				(4)
Bombs	30-Gallon Melt/Cast and Mixing Building				(4)
Bombs	Explosive Storage Igloos				(4)
Bombs	Inert Storage and Assembly Building				(4)
Bombs	Flammable Solids Storage Building				(4)
Bombs	Explosive Processing and Centralized Control Bldg				(4)
Bombs	Central Utilities Building				(4)
Bombs	Fourier Transform Infrared Spectrometer				$300
Bombs	Gas Chromatography/Mass Spectrometer Data Sys.				$200
Bombs	Electron Microscope with X-Ray Element Analyzer				$150
Bombs	Dupont Thermal Analysis System				$125
Bombs	Accelerating Rate Calorimeter				$100
Bombs	One Dimensional Time to Explosion				$50
Bombs	Mettler RC-1 Reaction Calorimeter				$400
Bombs	Inert Atmosphere Chamber				$115
Bombs	Baker-Perkins High Shear Mixers				$45
Bombs	Haake Rotary Viscometer				$25
Bombs	Environmental Chamber				$81
Bombs	Cryogenic Storage Tank (900 gal.)				$216
Bombs	Optical Comparator				$270
Bombs	Scientific Data Collection and Processing System				$325
Bombs	Streak Camera M75				$270
Bombs	Streak Camera M132				$300
Bombs	Framing Camera M114				$400
Bombs	Chemical Reactor System (10 gal.)				$75

Bombs	Build-up and Assembly Building				(4)
Bombs	Test Fixture Fabrication Building				(4)
Bombs	Solvent Storage Building				(4)
Bombs	Chemical Storage Building				(4)
Bombs	Explosive Test Building				(4)
Bombs	Explosive Storage Building				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	Processing Laboratory				(4)
Bombs	**Advanced Warhead Experimentation Facility**			X	$8,760
Bombs	Administration Building				(4)
Bombs	Machine Shop				(4)
Bombs	Interior - Machine Shop				(4)
Bombs	Interior - Machine Shop				(4)
Bombs	Computer Control Lathe				$250
Bombs	Tool and Cutter Grinder				$80
Bombs	500 Ton Press				$212
Bombs	HEPA Filtering System				(2)
Bombs	Dynamic Properties Lab				(4)
Bombs	Torsional Hopkinson Bar				$100
Bombs	Split Hopkinson Bar Apparatus				$70
Bombs	Charpy Impact Tester				$4

Bombs	Diffractometer, Pole Figure System				$200
Bombs	Low/High Rate Instron Tensile Test System				$125
Bombs	Instron Biaxial Test Machine				$275
Bombs	Specimen Preparation Lab				(4)
Bombs	Nikon Metallograph				$40
Bombs	Micronet Hardness Tester				$23
Bombs	Test Chamber Facility				(4)
Bombs	Vacuum Pump				$150
Bombs	Test Chamber Exterior X-Ray Trailer				$112
Bombs	Test Chamber Control Room				(4)
Bombs	Test Chamber Door				(4)
Bombs	Test Chamber Interior				(4)
Bombs	Warhead Test Stand				$1
Bombs	60mm Launch Tube				$212
Bombs	Test Ranges C-64a (left) and C-64B (right)				(5)
Bombs	C-64A				(5)
Bombs	Instrumentation and Control Room C-64A				$2,500
Bombs	Instrumentation and Control Room C-64A				$2,500
Bombs	Warhead Test Area at C-64A				$30
Bombs	330 High Speed Camera				$230
Bombs	450 kV Flash X-Ray System				$500
Bombs	C-64B				(5)
Bombs	Instrumentation Console				$150
Bombs	Instrumentation Console				$150
Bombs	125mm Launch Tube				$117
Bombs	Tatlor Anvil Test Setup				$260
Bombs	X-Ray Processing Van				$80 ea.
Bombs	Oxidizer Reactive Load Facility				(4)
Bombs	**Fuzes Research and Development Facility**				$1,019
Bombs	Explosive Bay Entrance				(4)
Bombs	Sensor Characterization Area				(4)
Bombs	Printed Circuit Board Area				(4)
Bombs	Fuze Embedded Computer Area				(4)
Bombs	Aerosol Chamber				(4)
Bombs	Versatile Vacuum Deposition System				$70
Bombs	High-G Drop Table Shock Machine				$105
Bombs	High-G Hopkinson Bar Test Machine				$15

Bombs	Very High-G Shock Machine				$30
Bombs	Hard Target Fuze Test Bed Projectiles				$120
Bombs	Hard Target Data Recording and Analysis				$75
Bombs	Explosive Detonator Test Chamber				$300
Bombs	Ultrasonic Wire/Ribbon Bonder				$11
Bombs	Flexible Printed Circuit Laminating Press				$20
Bombs	Hard Target Penetrating Radar Area				$90
Bombs	Fuze Accelerator/Air Gun				$125
Bombs	**Aeroballistics Research Facility**			X	$6,235
Bombs	Aeroballistics Test Range				(5)
Bombs	Instrumentation Bay				(4)
Bombs	Instrumentation Bay				(4)
Bombs	Gun Room				(4)
Bombs	Model Measurement Area				(4)
Bombs	Control Panel				(2)
Bombs	**Ballistics Experimentation Facility**				$4,802
Bombs	Quick Reaction Modification Shop				(4)
Bombs	Quick Reaction Modification Shop				(4)
Bombs	Ammunition Loading/Compaction Building				(4)
Bombs	M136 Gun Truck				$125
Bombs	Launcher Storage Area				(4)
Bombs	Hard Target Impact Area				(4)
Bombs	Hard Target Impact Area				(4)
Bombs	Bomb Swing				$27
Bombs	Model Launch Building				(4)
Bombs	Instrumentation Trailer				$1,200
Bombs	8" Self-Propelled Howitzer				$1,200
Bombs	Air Launcher				$88
Bombs	**Hypervelocity Research Facility**	X			$9,579
Bombs	Engineering Support Facility Number Two				(4)
Bombs	Pulsed Power Research Facility				(4)
Bombs	Multi Shot Pulsed Power Supply				$9,000
Bombs	4.8 Million Joule Capacitor Power Supply				(3)
Bombs	Checmate Electromagnetic Launcher Barrel				(3)
Bombs	In-Bore Instrumentation Diagnostics Barrel				(3)
Bombs	Pulsed Power System Control Center				(4)
Bombs	Machine Shop				(4)

Bombs	Shock-Induced Combustion Research System				$2,500
Bombs	93mm RAM Accelerator				(3)
Bombs	Shock-Induced Combustion System Control Center				(3)
Bombs	Environmental/Disposal Technology Research				$150
Bombs	**Inertial Navigation Facility** - Mobile Inertial Test System				$250
Bombs	Mobile Inertial Test System				(4)
Bombs	Mobile Inertial Test System				(4)
Bombs	Mobile Inertial Test System				(4)
Bombs	**Instrumentation Technology Research Facility**				$676
Bombs	HeNe Laser				$125
Bombs	Rotating Prism Video Camera			X6	$40 total
Bombs	High Speed Imaging Testbed				(3)
Bombs	Video Analysis Suite				(4)
Bombs	Instrumentation Lab				(4)
Bombs	Subminiature Telemetry Workstation				(3)
Bombs	Electronic Design Workstation				(3)
Bombs	Mobile Instrumentation Van				$60
Bombs	Ballistics Holography Lab				(4)
Bombs	Ballistics Holography Lab				(4)
Bombs	Ballistics Holography Lab				(4)
Bombs	**Environmental Sciences Facility**				$718
Bombs	Chemistry Lab				(4)
Bombs	Beta Radiation Counting System				$45
Bombs	Low Background Alpha/Beta Counting System				$50
Bombs	Scanning Electron Microscope				$85
Bombs	X-Ray Energy Spectrophotometer				$80
Bombs	Portable X-Ray Energy Spectrophotometer				$50
Bombs	Image Analysis System				$125
Bombs	Gas Chromatography				$40
Bombs	Inductively Coupled Plasma Spectrophotometer				$150
Bombs	Ultraviolet/visible Light Spectrophotometer				$20
Bombs	Infrared Spectrophotometer System				$30
Bombs	Laboratory Fume Hood				(2)
Bombs	X-Ray Energy Dispersive Spectrometer				$125

MR,B,GA (7)	**Scientific and Technical Information Facility**				$2,375
MR,B,GA	Defense Research On-Line System				$35
MR,B,GA	CD Todd Tower				$75
MR,B,GA	Scientific and Technical Library System				$150
MR,B,GA	Vaulted Area				(4)
Bombs	**Model Fabrication Facility**				$5,617
Bombs	CNC Abrasive Water Jet Cutting System				$235
Bombs	L-Tec Wire Feed Welding System - 3				$7 ea.
Bombs	M-40P Jet Parts Washer				$23
Bombs	Vacuum Gas, Oil Quinch Furnace				$190
Bombs	Nigara 230 Ton Press Brake				$60
Bombs	60 inch by 3/8TK Shear				$21
Bombs	Standard Modern Lathe - 4				$64 ea.
Bombs	Monarc EE Lathe - 5				$80 ea
Bombs	Bridgeport Apollo CNC Mill				$85
Bombs	HURCO BMC-40 Machining Center				$142
Bombs	9" Hollow Spindle 20" X 96cc Lathe				$150
Bombs	WSU-12 CNC Lathe				$150
Bombs	MAHO MH 800E CNC Universal Mill				$90
Bombs	Graphic CNC Programming Work Station - 4				$12 ea.
Bombs	Bridgeport Convention Mill - 4				$21 ea.
Bombs	W/S U-4 Cylindric Grinder				$78
Bombs	Do-all Heavy Duty Contour Saw - 2				$34 ea.
Bombs	Zeiss Computer Measuring System				$86
Bombs	Monarch VMC 75 Machining Center				$130
Bombs	Monarch VMC 150 Machine Center				$300
Bombs	Monarch CNC Metalist Lathe				$130
Bombs	Shop Display				(3)
Bombs	Radial Arm Drill				$90
Bombs	Bridge Crane				$200
Bombs	4000 lb Rotary Crane				$75
Bombs	Graphics CAD/CAM Work Station				$12

(1) Bold entries are WL/MN facilities
(2) This equipment was part of the original facility and is included in the facility cost.
(3) This picture is of the same piece of equipment above except from a different angle or of a major subcomponent of that equipment and its cost is included in the equipment cost above.

(4) This picture is a Bldg/Lab/Bay/Shop/Area/Van that is a part of the facility above (bold print) and its cost is included in the facility cost.
(5) This picture is of a research range for the facility listed above (bold print) and is required to accomplish the facility's mission.
(6) Patent Pending on prism camera.
(7) This facility is shared equally among the following three CSF: Conventional Missiles/Rockets, Bombs, and Guns and Ammunition.

Facilities Descriptions:

RADIO FREQUENCY/ MILLIMETER WAVE FACILITY: The Radio Frequency and Millimeter Wave Facility is chartered to research, develop, and analyze radar and millimeter wave guidance technology through 94 GHZ. To perform this important function, the facility is separated into two sections: the main RF/MMW section, and the Test and Instrumentation Tower section. The facility consists of 119 square meters of working space which contains test benches used for calibration and measurements, main power facilities for support of the test equipment used in the RF/MMW and Tower sections, a test stand for passive countermeasures evaluations, the Sgt. York Radar System, and limited electronic parts bench stock. The test equipment utilized in the facility consists of a vector network analyzer, a scalar network analyzer, a spectrum analyzer, power meters, analog sweep generator, standard gain antennas for Ka and W bands, dual polarized antennas for Ka and W bands, a plastic feed monopulse antenna for Ka band and connector tool kits for building RF cables. The most recent addition to the facility is an F-16 derived 10GHZ search and track radar used to track aerial targets with limited ground tracking capability. The system is used extensively for the research of future designs.

The Radio Frequency and Millimeter Wave Facility is unique within the Air Force. It contains a 10GHZ search and track radar and a 94GHZ monopulse radar. This facility supports the research of radar sensors and seekers used in the guidance units of conventional weapons.

LADAR DEVELOPMENT AND EVALUATION RESEARCH FACILITY (LDERF): The LDERF provides the resources to research, develop, analyze and test sensors and seekers using active LADAR guidance. The facility consists of three functions: (1) The Optics Lab consists of four isolated optical work/test benches in two separate 20 feet by 40 feet rooms; 1064 nm Nd:Yag diode pumped LADAR; Laser Imaging Radar System with five additional lasers; Janis dewar for material characterization; and an 80 feet blacked-out indoor range for LADAR testing; (2) The electronics laboratory provides electronics development areas, LADAR video/data displays and processing stations; (3) An operations area consisting of an air conditioned hanger space for sensor integration, modification and storage of unmanned aerial vehicles (UAV). The LADAR system is capable of collecting imagery at a distance up to 1 km.

OPTICAL CORRELATION RESEARCH FACILITY: The Optical Correlation Research Facility provides unique capabilities to (1) design, develop and analyze optical and digital processing technology; (2) develop standard mathematical morphology for image processing; and (3) develop advanced seeker algorithms. The facility consists of vibration isolated optics benches, an optical correlator, a laser polarimeter and several computer workstations interfaced to optical hardware. The facility can be used to make measurements of electro- and magneto-optic constants of optical and infrared materials, and optical processing experiments and simulation can be performed. Instrumentation includes photometers, high-speed oscilloscopes, CO_2, CO, stabilized HeNe and solid state lasers, long and mid wavelength IR detectors, high

accuracy multimeters, electromagnets, pulse generators, high voltage power supplies, computer controlled stages, and several different types of Spatial light modulators.

The Optical Correlation Research Facility is unique within the Air Force. It contains the only known infrared laser polarimeter; computer driven spatial light modulators for evaluating phase-only spatial filters and a transputer workstation for simulation of optical correlation using parallel processing and Air Force-developed software.

NEURAL NETWORK AND SIGNAL PROCESSING FACILITY. The Neural Network and Signal Processing Facility provides the capability to perform signal processing and neural network development and analyses for guided weapons and supports joint service signal/image/data and processor assessment and development. The facility consists of a medium-speed neural network processor with concomitant software while a second data analysis capability processes the results.. An additional neural network system is implemented on a 80836-based personal computer enhanced with a neural network accelerator board and neural network analysis software. A Sun Sparc 1 computer provides signal processing analysis and software evaluation.

ADVANCED GUIDANCE RESEARCH FACILITY: The Advanced Guidance Research Facility provides the necessary tools to perform in-house exploratory and advanced development for imaging and non-imaging guided weapon systems, image and signal processing techniques and dual use applications. The facility consists of two TEMPEST screen rooms for classified processing, high-speed VAX and SUN computers, state-of-the-art image processing engines, array processors, language compilers and graphical and data analysis software. The mission of the AGRF is to develop and validate target recognition/classification algorithms for brilliant weapons, perform analysis of captive flight test data, and use this information in the development and validation of digital simulations.

KINETIC KILL VEHICLE HIL SIMULATION FACILITY: The Kinetic Kill Vehicle Hardware-In-The-Loop Simulation (KHILS) Facility provides independent simulation and ground experiments for space-based interceptors and conventional air-to-air and air-to-surface weapons. A combination of digital and hardware-in-the-loop simulators is being stepwise developed to simulate the launch-to-impact scenario for spacebased guided interceptors as well as air-to-air and air-to-surface conventional guided munitions. Actual brassboard hardware (seekers, signal processors, guidance processors, IMU's, etc.) will be interfaced into the simulation to provide both component and system level performance data.

This is the only U.S. facility that provides target image synthesis, image injection, inband projection, and remote connectivity at one location. It is the only international facility that can provide real-time interfacing of classified hardware-in-the-loop (closed and open) simulations with remc ·-facilities. It is the only U.S. facility capable of 16 million pixels per second of

throughput with real-time translations and rotation of scenes with no throughput costs. Several industrial contractors are developing different capabilities to be used earlier in the development phase of space-based interceptors.

HIGH EXPLOSIVE RESEARCH AND DEVELOPMENT (HERD) FACILITY: The High Explosive Research and Development (HERD) Facility was established to provide a modern in-house explosive research, development, and experimentation capability and provide the Air Force with an in-house quick reactive explosives loading capability. The HERD Facility consists of three sections: Properties, Processing, and Dynamics. These sections function as an integral unit capable of a complete spectrum of explosive research, development, and experimentation. The mission of the facility is (1) to provide explosives research and development support to organizations within the Air Force, especially to those within the Aeronautical Systems Center, (2) to tailor explosives to meet specific Air Force needs and develop explosive mixing and loading techniques in support of Air Force armament development programs, (3) to characterize and evaluate explosive systems, (4) to provide necessary background data in explosives chemistry and detonation physics, and (5) to support explosives research and development programs of other Government Agencies, when special and unique expertise is required.

The HERD Facility is the only DOD facility where the three sections mentioned below, each with its own capabilities, are collocated. Experimental formulations meeting necessary chemical and physical criteria are developed in the Properties Section. The formulations are mixed, machined, and loaded in the Processing Section and the detonation properties determined in the Dynamics Section. Experimental formulations can be analyzed through the stages of scale up from small scale chemical and physical testing to pilot plan scale mixing and loading through performance testing in an all-up munition.

ADVANCED WARHEADS EXPERIMENTATION FACILITY (AWEF): The AWEF was constructed as a specialized facility for the development of advanced generation warheads and kinetic energy penetrators. The facility is over 10,000 sq ft including machine shop, and test chambers which provide an integrated capability for the design, fabrication and evaluation of warheads for smart munition concepts. Among the unique capabilities in the facility are a series of explosive test chambers licensed for testing depleted uranium warhead materials and are environmentally contained to provide explosive/metal testing with high density metals. These chambers are integrated with advanced state-of-the-art instrumentation and computerized data acquisition systems to provide detailed analysis of design and terminal effects. This facility provides the Air Force, and other DOD agencies, the capability to study warhead and penetrator performance.

The AWEF is the only facility within the U.S. that is licensed to conduct heavy metal, terminal ballistic experiments with gun launched, or explosively formed penetrators (EFP) in an environmentally secure ·fe chamber. Also, the AWEF is adjacent to two outdoor test ranges.

The data generated in these experiments will be assessed by engineers and designers responsible for the development of advanced warheads. Typically, terminal effects experiments are parametric studies to measure weapon effectiveness. The AWEF provides the capability to study warhead performance against various target configurations. It will provide a capability for studying adaptable warhead design consistent with smart sensor fuzed weapons concepts. The experiments can be used to support concept formulation and evaluation studies for evolving threats.

FUZES RESEARCH AND DEVELOPMENT FACILITY: The Fuzes Research and Development Facility provides the Armament Directorate with the capability to develop and evaluate technology for fuzes sensors and signal processing circuitry components for conventional munitions. The facility consists of an electronics laboratory, laser laboratory, aerosol chamber and printed circuit board fabrication capabilities. Unique capabilities include equipment for high "G" testing, 155 mm smooth bore howitzer gun, 152 feet vacuum gun, shock machines, and an explosive test bay. Instrumentation provided includes high-speed computers, shock-hardened data recorders, shock switches, shock-hardened accelerometers and a fully instrumented aerosol chamber.

This world class facility has the equipment, together with well instrumented ranges, to provide an AF-unique end-to-end testing process that includes explosive and environmental evaluations, a full spectrum of shock capabilities, full scale projectile launch facilities and weapon integrated flight test experiments. The hard target penetration fuzing is a DOD-unique capability crucial in the emerging development of multimode initiated fuzes that will provide an air delivered munitions force multiplier. The Fuzes Research and Development Facilities' unique capability was called upon during Desert Storm to develop a GBU-28 fuze modification fielded in less than a month.

AEROBALLISTICS RESEARCH FACILITY (ARF): The ARF is a world-class facility with a 200 meter long diagnostic chamber with distributed data gathering stations. Consisting of (a) a research section; (b) associated model/launcher design capabilities and data reduction and analysis systems and (c) launcher systems evaluation and instrumentation systems development capabilities. It provides an integrated launch and flight technology development tool to support a wide range of munition requirements. A broadly-based launcher and flight system test capability is available to support munition technology development through free-flight studies involving: (a) Static and dynamic aerodynamic parameter measurement, (b) Flowfield visualization and characterization, (c) Telemetry systems development, (d) Free-flight signature and flowfield/radiation interaction, (e) Acceleration-hardened onboard electronics and data recording instrumentation.

Further, to support testing, the facility consists of (a) a fully enclosed firing tunnel, (b) a gun room, test control room, data acquisition room, static test room, loading room, and conditioning room, and (c) a propellant combustion test area.

The Aeroballistics Research Facility is the only U.S. facility that provides the capability to experimentally investigate and validate the dynamic stability of aerodynamic shapes in free-flight; and derive aerodynamic coefficients and stability derivatives simultaneously for below 40mm sized experimental items.

BALLISTICS EXPERIMENTATION FACILITY (BEF): The BEF conducts and supports custom ballistic munitions research, development, and experimentation on munitions, munition warheads, fuzes, and other experimental items ranging in size from 0.177 inches through 8.0 inches in diameter. The facility consists of a 6500 feet by 1500 feet outdoor firing range, 300 feet indoor range, mechanical and electronic shops, munitions and equipment storage areas, and over 450 air and powder launchers. Launch and flight verification development experiments are performed in the BEF and are supported by a variety of data gathering devices including high speed video camera (up to 20M frames per second, 150KV flash x-ray systems, Doppler radar for in-bore, flight, and terminal ballistics (30 fps to 9,000 fps) and instrumentation for in-bore pressures and action time data. The Ballistics Experimentation Facility provides a concentrated capability to determine free-flight position data, velocity, orientation, spin rate, and penetration. Experimental items can be launched by powder guns, compressed gas launchers, two-stage light gas guns, and high performance guns with velocities ranging from subsonic to hypersonic (up to Mach 14).

HYPERVELOCITY RESEARCH FACILITY: The Hypervelocity Research Facility located on Eglin Test Site A-15 incorporates three interrelated research test beds: (1) a pulse-power research system, (2) a shock-induced combustion research system, and (3) an environmental waste disposal research device. This facility is dedicated to supporting the entire munitions research life cycle from exploring the basic physics of shock wave propagation in energetic materials to exploiting pulse power technology for investigating revolutionary warhead topologies and destroying combustion products.

The pulse-power research system incorporates two unique capacitor based pulse power systems which are utilized to support basic research efforts aimed at developing advanced multi-mode warheads. In addition, the pulse power systems are utilized to support basic research into electromagnetic launcher technology. The shock-induced combustion system is comprised of two primary elements: (1) a 93mm ram accelerator device and (2) a shock induced combustion diagnostics research test bed comprised of a 20mm light gas gun and a diagnostics chamber. A common combustion gas handling system is shared between these two systems. Finally, the shock induced combustion research system is the only such system in the world that combines an on-site ram accelerator and a shock dynamics dev[illegible] in the same system. The environmental

waste disposal research device is a spin-off from the plasma physics learned and developed in support of electromagnetic launcher research. This system, called a non-thermal silent discharge device, utilizes a low temperature plasma (an ionized gas) to oxidize hazardous wastes contained in gaseous effluent streams. This technology is applicable not only to waste streams generated during incineration of explosive compounds, but also to all exhaust gases.

The Hypervelocity Research Facility is located on an 80 acre secure site on Santa Rosa Island, FL. This location gives WL/MN direct access to the Air Force Gulf of Mexico test range for munitions experimentation. The engineering support buildings include a tempest screen room for classified data acquisition and analysis beyond the secret level.

INERTIAL NAVIGATION FACILITY: The Inertial Navigation Facility provides experimentation analysis for tactical weapons navigation and control technology including imbedded GPS/inertial systems. The facility provides emulation of aircraft 1553 BUS communications during experimentation and is instrumented with an Acutronic Precision 130-80 rate table in an integrated environmental chamber. A mobile testbed is available to the Directorate consisting of a Rockwell/Collins MAGR GPS receiver, Honeywell H423 INS, Codar ruggedized MicroVAX II computer system and a ruggedized 80486-based personal computer.

INSTRUMENTATION TECHNOLOGY RESEARCH FACILITY: The Instrumentation Technology Research Facility provides the capability for investigating various types of state-of-the-art transducers, sensors, and telemetry used in aircraft and weapon instrumentation. This facility utilizes advanced technologies, i.e., lasers, photonics, velocimetry etc., to assist in the development of specialized sensors and subminiature telemetry to obtain non-intrusive pressure wave front characteristics, non-contact flight dynamic measurements and other parametric measurements associated with high performance weaponry. This facility is investigating the use of high speed, low light level electronic imaging systems to measure weapon and aircraft performance. This system and other optical sensing elements are being evaluated to determine the feasibility of using this technology for accurately characterizing the minute transient moments that occur at "weapon release." Thin film piezo-electric material, manganin resistive devices, optical modulation cubes, and phase conjugation crystals are some of the materials being evaluated for use as parametric measuring devices. This facility incorporates full electronic/optical prototyping, various sensor test beds, darkroom and a highly instrumented projectile launch/impact laboratory used to develop holographic/high speed imaging techniques for Wright Laboratory, the Air Force, and DOD users. A 5-ton shop van has been configured to transport this instrumentation to and from many of the AFDTC and WL/MN facilities to support explosive and warhead experiments.

ENVIRONMENTAL SCIENCES FACILITY: The Environmental Sciences Facility is a general purpose facility equipped for classical wet chemistry and instrumental analyses. This facility also has the resources to perform many nonroutine analyses. The fa''ty consists of general purpose

analytical equipment as well as some of the most sophisticated analytical instrumentation available. This instrumentation is used to quantitatively determine contaminants in chemicals, explosives, fuels, soils, or water. This facility also includes equipment for microscopic research, qualitative and semi-quantitative particle studies, metallurgical analysis and image processing. This facility conducts in-house and field research in support of the Directorate's environmental protection program and monitors test ranges where environmental impacts from test activities could occur.

SCIENTIFIC AND TECHNICAL INFORMATION FACILITY (STINFO): The STINFO facility is the focal point for scientific and technical information and related services required to support the research, development and experimentation functions of the Directorate, the Aeronautical Systems Center, tenant agencies and their contractors. The collection includes books, journals, technical reports (classified, unclassified), studies, documents, and miscellaneous printed and filmed materials. It is composed of approximately 18,000 books, 800 periodical subscriptions (300 of which are in direct support), 40,000 bound periodicals, 10,000 reels/cartridges of microfilmed periodicals, and 500,000 technical reports (hard copy and microfiche). Services include on-line and manual literature searches, reference, referral, bibliographies, and interlibrary loan. The facility's on-line access capability can electronically access other scientific & technical information centers in both classified and unclassified modes.

MODEL FABRICATION FACILITY: The Model Fabrication Facility provides rapid response to scientists and engineers of the Armament Directorate in research, exploratory and advanced development type modeling work. Areas of responsibility include air-to-air and air-to-ground weapon fabrication, aeromechanic shapes for wind tunnel investigations, flight test models, modular weapon interface units, and suspension and release prototype hardware. These models consist of full-scale and reduced-scale sizes. The Model Fabrication Facility can perform extremely accurate work in machining, sheet metal work, welding, fiberglass/plastic work, numerical control machining, and quality control/measuring.

3.5 Expansion Potential

3.5.1 **Laboratory Facilities:** Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space	Space Capacity (KSF)		
			Current	Used	Excess
Bombs	Radio Freq./MMW Facility	Admin	2.1	2.1	
		Technical	9.1	9.1	
		Storage	0.8	0.8	
		Utility	4.2	4.2	
Bombs	LADAR Development and Eval. Res. Facility	Technical	1.9	1.9	
		Storage	0.7	0.7	
Bombs	Optical Correlation Research Facility	Admin	2.1	2.1	
		Technical	8.9	8.9	
		Storage	0.9	0.9	
		Utility	4.2	4.2	
Bombs	Neural Network/Signal Processing Facility	Admin	2.1	2.1	
		Technical	8.2	8.2	
		Storage	0.8	0.8	
		Utility	4.2	4.2	
Bombs	Adv. Guidance Research Facility	Admin	2.1	2.1	
		Technical	9.7	9.7	
		Storage	0.8	0.8	
		Utility	4.2	4.2	
CvMis/Rkt (70%) Guns (30%)	Kinetic Kill Vehicle HIL Simulation Facility	Admin	2.1	2.1	
		Technical	8.2	8.2	
		Storage	0.8	0.8	
		Utility	4.2	4.2	
Bombs	High Explosive R&D Facility	Admin	3.0	3.0	
		Technical	24.5	24.5	
		Storage	16.4	16.4	
		Utility	11.8	11.8	
Bombs	Adv. Warhead Experimentation Facility	Admin	1.1	1.1	
		Technical	21.3	21.3	

		Storage	4.4	4.4	
		Utility	0.8	0.8	
Bombs	Fuzes R&D Facility	Admin	0.8	0.8	
		Technical	5.3	5.3	
		Utility	1.6	1.6	
Bombs	Aeroballistics Research Facility	Technical	26.9	26.9	
		Storage	0.8	0.8	
		Utility	0.2	0.2	
Bombs	Ballistics Experimentation Facility	Admin	0.5	0.5	
		Technical	20.3	20.3	
		Storage	6.3	6.3	
		Utility	1.9	1.9	
Bombs	Hypervelocity Research Facility	Admin	4.9	2.7	2.2
		Technical	60.5	42.0	18.5
		Storage	16.2	10.1	6.1
		Utility	7.3	7.3	
Bombs	Inertial Navigation Facility	Admin	2.1	2.1	
		Technical	8.0	8.0	
		Storage	0.8	0.8	
		Utility	4.2	4.2	
Bombs	Instrumentation Tech. Research Facility	Admin	1.8	1.8	
		Technical	10.3	10.3	
		Storage	0.9	0.9	
		Utility	4.2	4.2	
Bombs	Environmental Sciences Facility	Admin	1.8	1.8	
		Technical	9.1	9.1	
		Storage	0.9	0.9	
		Utility	4.2	4.2	
Bombs	Scientific/Technical Info. Facility	Admin	3.5	3.5	
		Storage	7.9	5.6	2.3
		Utility	1.1	1.1	
Bombs	Model Fabrication Facility	Admin	0.5	0.5	
		Technical	21.0	21.0	
		Storage	4.7	4.7	
		Utility	0.8	0.8	
TOTAL			406.9	377.8	29.1

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Response: Applies to Weapons: Bombs CSF

WL/MN has sustained personnel cuts over the last few years and can therefore absorb several additional similar workyears with minor facility modification. The DMR resulted in the loss of 103 personnel. In addition, losses due to the WL 1996 POM Manpower Exercise will be 75 additional personnel through FY97. There have been other losses due to cutbacks of on-site contractor support of approximately 20 personnel from Science Applications International Corporation at the Hypervelocity Research Facility, and about 10 from Vitro Corp at the Advanced Warheads Experimentation Facility. There have been a few other losses due to attrition over the last few years which can not be replaced due to hiring freezes. Concurrently with these cutbacks, there were some reductions in facility locations in response to facility cutbacks to support downsizing actions and conservation and clean-up efforts. In addition to capacity to absorb similar workyears with minor facility modification, there is potential within the Eglin AFB complex to absorb substantial growth in the Military Construction Program (MCP) with 3,533 buildable acres. This fact is critical because WL/MN can be expanded to encompass substantial portions of Eglin AFB as described in the response to paragraph 3.5.2. Eglin AFB is located in a remote region of the country and is fully supported by land, air, and sea access which enables construction and addition of virtually any type of non-nuclear weapons facility.

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Response: Applies to Weapons: Bombs CSF

Based on the discussion in paragraph 3.5.1.1, WL/MN has office space and technical facilities to support an additional workforce of approximately 200 persons. With additional construction or with revitalization of other Eglin facilities which may be available due to other Eglin organization impacts, our capacity to expand to accommodate others is practically unlimited.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alteration projects programmed in the FY95 PBS. (BRAC Criteria II)

Response: Applies to Common Support Functions:
Weapons: Conventional Missiles/Rockets
Weapons: Bombs
Weapons: Guns and Ammunition

WL/MN has no military construction programs or other alteration projects programmed in the FY95 PBS.

3.5.2 **Land Use:** Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

Response:

Buildable Acres: 3,533 acres (Eglin AFB)

WL/MN is located on Eglin AFB and occupies 1,000 acres of the 724 square miles which comprises Eglin AFB's land mass. The majority of this 1,000 acres is experimental ranges with safety footprints for munitions research. WL/MN is spread out over eight sites. Within the proximity of these sites, approximately 85 acres could be considered as buildable acres as follows:

- Advanced Warheads Experimentation Facility - 25 acres
- High Explosive R&D Facility - 10 acres
- Model Fabrication Facility - 1 acre
- Building 13 Facilities - 0.5 acres
- Fuzes/Aeroballistics Research Facilities - 3 acres
- Ballistics Evaluation Facility - 5 acres
- Site C-3 - 25 acres
- Site A-15 - 15 acres

The above referenced AFDTC Installation Worksheet identified, for Eglin as a whole, 3,533 acres as suitable for new development. This acreage includes only areas where sufficient infrastructure is in place to support expansion. Test ranges are mainly open areas which could be developed, depending on the mission.

3.5.3 **Utilities:** Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

Response: Applies to Weapons: Bombs CSF

Electricity: The base electrical distribution system has a total capacity of 117 MW with a current usage of 49.2%.

Natural Gas: The base gas distribution system has a total capacity of 68.4 MCF/day with a current usage of 7.71%.

Water: The base water distribution system has a total capacity of 22.35 MG/day with a current usage of 34.5%.

(example Air Staff Certification memorandum)

MEMORANDUM FOR HQ USAF/XXXX

SUBJ: Validation of Laboratory Joint Cross Service Group Data Call

TO: HQ USAF/RTR

This letter is to certify the Laboratory Joint Cross Service Group Data Calls listed at attachment 1. All required bases were reviewed except as noted (atch 2); changes or data corrections are itemized by base at attachment 3. The data is certified accurate and complete to the best of my knowledge.

JOE P. ACTION
Lt Col, USAF
Program Analyst, XXXX Section

3 Atch
1. XXXX Data Call
2. Bases Evaluated List
3. Data correction list

1st Ind: XXXX

TO: RTR

Attached is the data required for the 1995 Joint Cross Service Group. I certify it is accurate and complete to the best of my knowledge and belief.

TOP DOG
Colonel, USAF
Division Chief XXXX

3 Atch
1. XXXX data call
2. Bases Evaluated list
3. Data correction list

Labs Joint Cross Service Group Data

Question	OPR
Section II	
2.1	AQX/AQT
2.2	AQX/AQT
Section III	
3.0	AQT
3.1	AQT
3.1.1	AQT
3.1.2	AQT
3.1.3	CEVP
3.1.4	AQT
3.1.5	AQT
3.2.1	AQX
3.2.2	AQX
3.2.3	AQX
3.2.4	AQT
3.2.4.1	AQT
3.2.4.2	AQT
3.3.1.1	AQT
3.3.1.2	AQX/AQT
3.3.1.3	AQT
3.3.2.1	AQX
3.3.2.2	AQX
3.4.1	CEPP
3.5.1	CEPP
3.5.1.1	AQT/CEPP
3.5.1.2	AQT
3.5.1.3	AQT/CEPP
3.5.2	CEPP
3.5.3	CEPP

24

ESC INPUT TO "LAB" JCSWG DATA CALL
20 MAY 94

SECTION II: CAPACITY OF DOD COMPONENTS

2.1 **Workload.** Use the following table to describe historic and projected workload at each activity in terms of funding and workyears. Assume previous BRAC closures and realignments are implemented on schedule. Projected funding will be derived from FY95 President's Budget Submission (Then year dollars). Past fiscal year data shall begin with FY86 or at the inception of the activity as it existed on 1 Oct 93. (BRAC Criteria I & IV)

Information Required	Fiscal Years											
	86*	87	88	89	90	91	92	93	94	95	96	97
Total Funds Programmed ($M)	2591	3047	3039	2828	2598	2444	2411	3842	2827	3530	2968	2794
Total Actual Funds ($M)	2591	3047	3039	2828	2598	2444	2411	3842				
Programmed Workyears	3079	3596	3652	3604	3595	3677	3644	3392	3601	3310	3183	2966
Actual Workyears	2946	3723	3686	3722	3509	3481	3454	3306				

*SETA/TEMS Information not available for 1986

Information Required	Fiscal Years - at MITRE, MITRE Personnel											
	86	87	88	89	90	91	92	93	94	95	96	97
Programmed Workyears	1556	1683	1797	1710	1634	1569	1377	1253	1217	1156	1098	1098
Actual Workyears	1468	1604	1688	1647	1555	1349	1251	1189				

Information Required	Fiscal Years - at MITRE, SETA/TEMS Personnel											
	86*	87	88	89	90	91	92	93	94	95	96	97
Programmed Workyears		806	793	734	724	728	700	612	609	578	553	526

Actual Workyears		806	798	734	724	692	644	612				

* SETA/TEMS Information not available for 1986

- Budgeted workyears are the selected indicator of the "lab" infrastructure's capacity at an aggregate level for each Military Department. They include both workyears funded directly by the Military Department and the workyears funded from organizations outside the Military Department.

Workyears = government personnel and on-site FFRDCs and SETAs

2.2 Excess "Lab" Capacity -- Measured at the DOD Component Level

- Excess "Lab" Capacity = Sum of the Peak Workyears - Sum of the Projected Workyears
  -- Peak at each activity = Highest value between FY86 (or since inception of organization) and FY93
  -- Projected at each activity = Estimated at FY97

Excess On-Site Capacity 3723(FY87) -2966 = 757 Workyears
Excess Off-Site MITRE Capacity 1688(FY88) - 1098 = 590 Workyears
Excess Off-Site SETA/TEMS Capacity 806(FY87) - 526 = 280 Workyears
Total Excess Capacity 1627 Workyears

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.0 for ESC, Hanscom AFB for the Laboratory JCSG guidance package. The Laboratory JCSG guidance package requested the description of relationships and interconnectivities with other functions (common or unique) in support of the overall activity mission. This question was intended to solicit a list of functions which a particular common support function (CSF) (listed in appendix C of the questionnaire) is interconnected. The term "interconnected" is defined as any relationships, connections, and/or synergies that exist among CSFs either common (i.e. listed in appendix C) or unique (i.e. not included in appendix C) by virtue of shared /common scientific or engineering disciplines, shared/common equipment or facilities, joint or common requirements, or any other factors which link or relate the CSFs and/or unique functions to each other. Clearly identify these interconnectivities for each CSF reported by your activity

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF Date:
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.0 for RSC, Hanscom AFB for the Laboratory JCSG guidance package. The Laboratory JCSG guidance package requested the description of relationships and interconnectivities with other functions (common as unique) in support of the overall activity mission. This question was intended to solicit a list of functions which a particular common support function (CSF) (listed in appendix C of the questionnaire) is interconnected. The term "interconnected" is defined as any relationships, connections, and/or synergist linkages among CSFs either common (i.e. listed in appendix C) or unique (i.e. not included in appendix C) by virtue of shared/common scientific or engineering disciplines, shared/common equipment or facilities, joint or common requirements, or any other factors which link or relate the CSFs and/or unique functions to each other. Clearly identify these interconnectivities for each CSF reported by your activity.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package Instructions

MAJCOM: (Concurs) Does not concur (explain:)

SEE ATTACHED

Thomas L. Koepnick

MAJCOM REVIEWER: THOMAS KOEPNICK AFMC/XPX 787-2621
(print name, organization, DSN)

BASE: (Concurs) Does not concur (explain:)

Janet M. Polaneczky

BASEREVIEWER: Capt Janet Polaneczky, ESO/CSB DSN 478-7859.
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

14 Aug 94 Update
"Lab" Joint Cross Service Working Group
Installation Worksheet
HANSCOM AFB, MA

PURPOSE: To document answer to question 3.0

SOURCE: Maj Ken Francois, ESC/CSB, DSN 478-4338. 1) Draft ESC Strategic Plan 1994 and 2) ESC Briefing, "What is C4I" (C4I Mission Brief). 3) ESC CSF Definitions & Program Breakout, 12 May 94, as determined by Lt Gen Franklin. 4) ESC's latest program's list showing 178 programs (as of May 94). Responses to questions 5) 3.1.5, 6) 3.2.2, 7) 3.2.3 and 8) MITRE 1993 Distribution of Technical Skills, Redford Group. Capt Janet Polaneczky, ESC/CSB, DSN 478-7859, personal knowledge of the interconnectivity between CSFs.

METHOD: Maj Ken Francois condensed information in first two sources to clear, concise statement of ESC's C4I mission. Capt Janet Polaneczky inserted information from last 7 sources.

CONCLUSION: Attached.

I certify that the above information is accurate and complete to the best of my knowledge and belief.

Preparer: Janet M. Polaneczky Date: 14 Aug 94

JANET POLANECZKY, CAPT, USAF, ESC/CSB, DSN 478-7859
Typed Name, Rank, Office Symbol, DSN Number

I certify that the above information is accurate and complete to the best of my knowledge and belief.

MAJCOM Reviewer: Thomas L. Koepnick Date: 15 Aug 94

THOMAS KOEPNICK GM-14 HQ AFMC/XPX 787-2622
Typed Name, Rank, Office Symbol, DSN Number

- C4I capitalizes on the natural strengths of our military force - speed, range, flexibility, precision, and lethality - by providing global situational awareness, fusion of data from a variety of sources, and rapid presentation of critical information to decision makers.

- ESC's approach to C4I involves the application of the following elements:

  -- User Involvement;

  -- Collaborative engineering;

  -- Extensible architectures;

  -- Prototyping;

  -- Commercial Products and Standards.

- C4I's value was clearly demonstrated in Desert Storm:

	Losses			
	Iraq	*U.S.*		*Exchange Ratio*
Tanks	**3700**	**4**	**=**	**925:1**
Armored Vehicles	**2400**	**3**	**=**	**800:1**
Fighters (Air-to-Air)	**36**	**0**	**=**	**36:0**
Artillery	**2600**	**0**	**=**	**2600:0**
Troops	**50,000**	**180**	**=**	**275:1**

Our weapon systems were certainly superior to Iraq's, and our troops were much better trained and motivated. But, these factors cannot come close to explaining the huge disparity in the exchange ratios. The only way to explain these large numbers is to note that the Coalition forces had an *excellent view of the battlefield and could take quick advantage of that information*, while the Iraqi forces were operating virtually blindfolded.

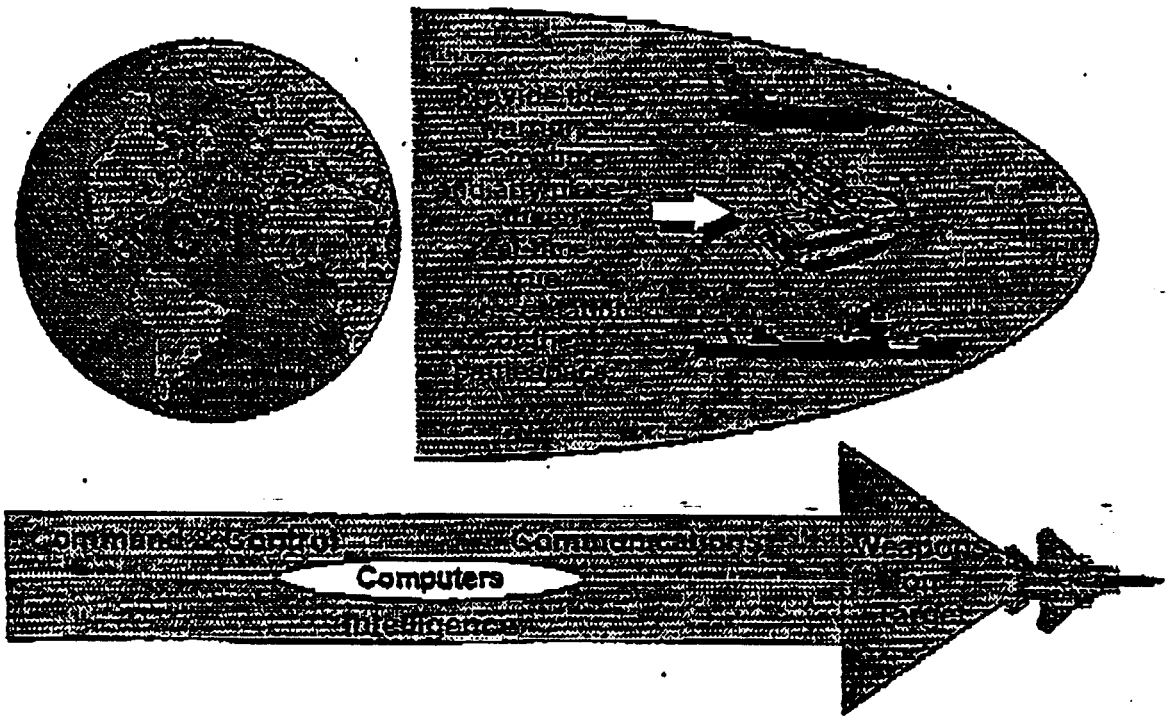
William J. Perry, May 1991

= C4I

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

As part of Air Force Materiel Command, the Electronic Systems Center (ESC) at Hanscom AFB, MA manages the research, development, acquisition, and sustainment of over 160 command, control, communications, computer, and intelligence (C4I) systems. These systems provide the "senses" necessary to direct the muscle of America's air power arsenal to the right target at the right time with a very high degree of accuracy and reliability.



- C4I provides the equipment, facilities and connectivity the warrior needs to gather information, decide what to do and direct forces.

ESC is ideally positioned to carry out the vital C4I mission.

While Aircraft technology moves a generation every 10 to 15 years
Electronics technology leaps a generation every 2 to 3 years

To keep pace, a highly experienced and educated workforce is critical. The complex web of DOD C4I systems presents interoperability challenges not encountered in more stand-alone systems procurement, such as aircraft or satellites. The links to today's systems and those of tomorrow must be known, understood and logically factored into procurement decisions. ESC understands C4I systems - of all services; past, present, and planned.

Our healthy mix of "old hats" and "young hard chargers" blends unsurpassed systems knowledge with the latest in technical thinking. As seen below, 52% of our personnel have more than 16 years experience and 41% have a master's degree or better.

ESC Workforce

Experience		Education	
<3 yrs	4%	H.S. or Less	17%
3-10 yrs	25%	Associates	12%
11-15 yrs	19%	Bachelors	30%
16-20 yrs	13%	Masters	37%
20+ yrs	39%	Doctorate	4%

The thirty year relationship between the parts of our workforce, ESC, MITRE and SETA/TEMS makes premier C4I system procurement happen. Each piece is vital to the whole. The skilled military and civilian personnel could not perform without our outsourced personnel. We outsource 58% of our workforce: the engineering work of MITRE (35%) and the technical assistance provided by the SETA/TEMS (23%).

Our primary technical support and corporate memory is provided by MITRE. MITRE has deep roots in the electronic sciences and a solid core of experience grown through their association with ESC's earliest development efforts, their ties to Army and Navy acquisitions and their link to more than 63 local Universities and electronic high technology companies.

The critical skills of the MITRE workforce are not easily duplicated. Communications and Artificial Intelligence, Computer Science/software development, Human Systems Interfaces, Information Systems, Integrated Electronics, Mathematics and Analysis, Networks and Distribution Processing, Physical Systems, Security Assessment and Engineering, Sensors and Antennas, Signal Processing, Simulation & Modeling and Systems Engineering are some of the critical skills MITRE lends to ESC's successful procurement of C4I systems.

The Airborne, Ground-Fixed and Mobile C4I CSFs require the same knowledge of existing system interfaces and competency. Our workforce can meet the challenge of any C4I CSF and it is most economical to have one unit handle all three.

We have the infrastructure and personnel to get the needed information to the warfighter when and where it is needed. Our more than 25 labs provide interface modeling, simulation, analysis, and other necessary capabilities. Hanscom AFB is ideally located in the heart of the eastern United States computer industry, and ESC uses this location to maintain access to developing commercial technology trends. In return, the industry has recognized ESC as the focal point for government C4I systems acquisition and located key offices near Hanscom AFB.

ESC CSF Interconnections

ESC's business is C4I. The technical software complexities of C4I systems creates to acquisition challenges - once developed, systems can and are being put on all three platforms. Due to the multitude of all three service's system links, the same fast moving technology, the lab facilities, and the extensive expertise required to understand and effectively acquire these systems, splitting C4I in any manner, including by platform, decreases effectiveness.

Airborne C4I, Ground-Fixed C4I and Mobile C4I Relationships:

1. User's only need come to one place, work with the same people and get an integrated product.

2. The equipment and systems with which a C4I system talks and interfaces are in the same set.

3. Extensive interface lab and prototyping insures user requirements met.

4. Technical software and interface challenges vary little.

5. The extensive personnel expertise to understand requirements and acquire software intensive C4I is the same.

6. Commercial products and standards are worked across systems to keep compatibility and usability.

7. ESC's in the center of a high-technology software beltway location, draws the best and brightest to work C4I systems with networking ties to local industry, academia and business - invaluable resources in our fast-paced software business.

8. Having Rome Labs working the pervasive CSF, Electronic Devices, in our backyard benefits our personnel through training, exposure to the latest R&D happenings and future system capabilities.

9. Having C4I in one location is synergistic - interface test labs and personnel checking interface and product results together!

RESULT - INTEGRATED, EFFECTIVE, QUALITY PRODUCTS TO THE USER

3.1 Location

3.1.1 **Geographic/Climatological Features:** Describe any geographic/climatological features in and around your activity that are relevant to each CSF. Indicate and justify those that are required versus those that just serve to enhance accomplishing the mission of the activity. For example, clear air at high altitude that increases quality of atmospheric, ground-based laser experiments in support of the weapons CSF. (BRAC Criteria I)

Special geographic/climatological features are not relevant to the C4I work conducted by ESC at Hanscom AFB.

3.1.2 **Licenses & permits:** Describe and list the licenses or permits (e.g., environmental, safety, etc.) that your activity currently holds and justify why they are required to allow tests, experiments, or other special capabilities at your location for each CSF. For example, permit to store and use high explosives. (BRAC Criteria I)

Hanscom AFB does not currently hold any licenses or environmental permits which are required to allow tests, experiments or other special capabilities for C4I CSF's.

3.1.3 **Environmental constraints:** Describe and list the environmental or land use constraints present at your activity which limit or restrict your current scope for each CSF, i.e., would not allow increased "volume" or "spectrum" for the CSF. Example -- Volume: frequency of a type of experiment. Example -- Spectrum: Current permit to detonate high explosives will not allow detonation or storage of increased quantity of explosives without legal waiver (state law) or relocation of surrounding (non-govt) buildings. (BRAC Criteria II)

There are no known environmental constraints to restrict expansion of our C4I CSFs.
SEE PAGES 5A & 5B & 5C

AIR STAFF CORRECTION WORKSHEET

PURPOSE: To provide corrected answer to **ELECTRONIC SYSTEMS CENTER, HANSCOM AFB, MASS.** (includes Phillips Lab)

SOURCE: **'95 BRAC Questionnaire**

CONCLUSION: **Update needed (~~no change~~)** SEE below

MAJCOM (CONCURS)(NONCONCURS): **CONCURS (Provided info VIA questionnaire)**

BASE (CONCURS) (DOES NOT CONCUR): -same-

I certify the above information is accurate and complete to the best of my knowledge and belief, based upon information provided by identified sources.

AIR STAFF REVIEWER: R. McCann (CEVP) **DATE:** 28 JUL 1994

Hanscom AFB is located in an air quality non-attainment area for ozone. Natural resources associated with Hanscom AFB would have to be considered prior to any related construction activities.

AIR STAFF CORRECTION WORKSHEET

PURPOSE: To provide corrected answer to **HANSCOM AFB, MA.**

SOURCE: **'95 BRAC Questionnaire**

CONCLUSION: **Update needed (~~no change~~ SEE BELOW)**

MAJCOM (CONCURS)(NONCONCURS): **CONCURS (Provided info VIA questionnaire)**

BASE (CONCURS) (DOES NOT CONCUR): -same-

I certify the above information is accurate and complete to the best of my knowledge and belief, based upon information provided by identified sources.

AIR STAFF REVIEWER: J. Bush (CEVP) **DATE:** 19 AUG 1994

Air Quality
-- Area is in non-attainment for Ozone (serious). The base has implemented carpooling; does not restrict on/off-base activities at this time.

Groundwater/IRP
-- Potable groundwater contaminated. 22 IRP sites constrain future activities.

Other
-- 27 Acres of wetlands constrain future construction.
-- Grassland community (habitat), north of base is a verified site for breeding Upland Sand Pipers & Grasshopper Sparrows (both sensitive species).

ESC
015

CONTROL NUMBER: LJCSWG-AF 015

PURPOSE: To provide SAF/AQX staff clarified answers to Question 3.1.3. of the (see Distribution List) response to the Laboratory Joint Data Call. The response indicated you were in a non-attainment area.

1. Can you return to the Peak Programmed Workyears level (Question 2.1 response) without either a Permit modification or a new Permit?

2. If a Permit modification or a new Permit is required, will mitigation be required?

2a. If mitigation is required, describe the nature of the mitigation required.

METHOD: Comparison of answers to questions SEE ATTACHED INSTALLATION WORKSHEET

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain)

Thomas L. Koepnick 9 SEP 1994

MAJCOM REVIEWER: THOMAS L. KOEPNICK HQ AFMC/XPX 787-2622
(print name, organization, DSN)

BASE: Concurs Does not concur (explain)

BASE REVIEWER: Robert Lee, ESC/CSB, 478-4338
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

94-09-21 11:23 RCVD

Data Call for "Lab" Joint Cross Service Working Group
INSTALLATION WORKSHEET
HANSCOM AFB, MA

PURPOSE: To document the answer to question LJCSWG-AF015

SOURCE: Mr. Donald Morriss, 647 ABG/CEEV, DSN 478-4667

METHOD: Compared Peak programmed workyear, 3677/FY91 to 3601/FY94. Meeting with Mr. Morris, Chief of Environmental Planning, 647 ABG/CE reconfirmed no existing environmental permits generated by the ESC CSFS and none would be required even if the peak programmed workyear level manning were considered.

CONCLUSION: There are no known environmental conditions to restrict expansion of our C4I CSFS to the level of our peak programmed workyear.

I certify that the above information is accurate and complete to the best of my knowledge and belief.

Preparer: _____ **Date:** 9 Sep 94

Bob Lee, GS-14, ESC/CSB, DSN 478-4338
Typed Name, Rank, Office Symbol, DSN Number

I certify that the above information is accurate and complete to the best of my knowledge and belief.

MAJCOM Reviewer: Joseph Brafford **Date:** 9 Sep 94

Joe Brafford, GM-14, AFMC/XRMP, 787-5591
Typed Name, Rank, Office Symbol, DSN Number

TOTAL P.06

5c

PURPOSE: To provide SAF/AQX staff coordinated answers to question 3.1.4, Special Support Infrastructure of the ESC – Hanscom AFB response to the LJCSG guidance package. The 10 Aug 1994 version did not provide data at the lowest level CSF per the instruction.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-2350

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

Thomas L. Koepnick

MAJCOM REVIEWER: THOMAS L. KOEPNICK HQ AFMC/XPX 787-2644
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

Action completed in 28 Jul submittal.
– Attached.

Janet M. Polaneczky

BASE REVIEWER: Capt Janet Polaneczky, ESC/CSB, DSN 478-7859
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

Jul 94 Update

"Lab" Joint Cross Service Working Group
INSTALLATION WORKSHEET
HANSCOM AFB, MA

PURPOSE: To document answer to question 3.1.4

SOURCE: 1. Mr. Alfred R. Evans, ESC/SCXM, DSN 478-7539. Apr 1994 BRAC 1995 Base Capacity Analysis Hanscom AFB input. Apr 12, 1994 E-Mail from Mr. Stan Wessell, ESC/SC, DSN 478-5661, to Mr. Evans, DSN 478-5661 concerning the Base Capacity Analysis.

2. 1995 Air Force Base Questionnaire Question 1.2.E.12 Hanscom AFB response from Mr.Steven C. Tibbetts, WS-10, 4647 ABG/LGTF, DSN 478-7907, dated 31 Mar 94.

3. Col Ron Adams, ESC/EN-3, DSN 478-8015, Briefing on ESC Interoperability Initiative, Presented to ESC Program Directors, Apr 94, attached. Teleconference with Col Adams, 23 May 94.

METHOD: 1. Mr. Evans obtained Dial Central Office and trunking information from Mr. Curt Munsell at DMATS. Hanscom AFB Communications Infrastructure diagram is attached. The Apr 94 Hanscom AFB input to the BRAC 1995 Base Capacity Analysis states the Dial Central Office planned expansion (excerpt attached). Mr. Evan's e-mail, Apr 12, 1994 discusses the AF concentrator. I called him 16 May and he elaborated by stating our capability doubles from our current 21 circuits to 42 in Sep 94.

2. Extracted Airport information from response to 1995 Air Force Base Questionnaire, 1977 Deed and Release of Leasehold, page 6, paragraph 6F.

3. Col Adams stated per his professional knowledge as ESC's Program Manager for the System Integration Office, that C4I is a force multiplier due to the information it provides during peace and wartime. Information on Technical Interface Network was condensed from slides 16 and 18 or Col Adams, Apr 94 briefing.

CONCLUSION: The majority of the mission of ESC applies to the Airborne CSF. The three special support infrastructure items listed apply to the Airborne CSF. The Ground Fixed and Mobile CSFs also benefit, but since the bulk of our C4I effort is Airborne, the Airborne CSF is most applicable.

Airborne CSF:

1. Due to the constant communicative nature of acquisition work both telephone and computer connectivity are critical. Hanscom AFB will transition to Centrix with unlimited telephone expansion, 2nd Qtr of FY95. Access to the Defense Data Network will increase with HAFB receiving a second concentrator in Sept 94 an additional 21 circuits, doubling our current DDN capacity.

2. Hanscom AFB is adjacent to the Massport owned and operated Hanscom Field. The airport provides landing and take-off of Air Force aircraft free of charge. AWACS and JSTARS SPO personnel are afforded easy access to aircraft systems facilitating trouble shooting and acquisition. The Air Force does not incur the normal costs associated with runway operations, but has the benefit of runway use.

6A

1995 BRAC DATA
RETAIN THROUGH 2005

3. C4I is a force multiplier due to the critical information provided via interface links. To test several of these links, a Technical Interoperability Network is in phased establishment. The Network uses local area Network (LAN), Metropolitan Area Networks (MANs) and Wide Area Networks (WANs) links to provide a full-time facility for developers to demonstrate and verify interoperability during all phases of procurement. Initial links exist between ESC and MITRE laboratories.

Ground-Fixed CSF: Benefit from 1-3 above, but since one CSF must be chosen: None.

Mobile-Fixed CSF: Benefit from 1-3 above, but since one CSF must be chosen: None.

I certify that the above information is accurate and complete to the best of my knowledge and belief.

Preparer: Janet M. Polaneczky **Date:** 28 Jul 94

JANET POLANECZKY, CAPT, USAF, ESC/CSB, DSN 478-7859
Typed Name, Rank, Office Symbol, DSN Number

I certify that the above information is accurate and complete to the best of my knowledge and belief.

MAJCOM Reviewer: Joe Brafford **Date:** 8 Aug 94

Joe Brafford, GS-14, AFMC/XRMP, 787-5591
Typed Name, Rank, Office Symbol, DSN Number

1995 BRAC DATA
RETAIN THROUGH 2005

2T.

AUG UPDATE 94-09-08 14:11
"Lab" Joint Cross Service Working Group
INSTALLATION WORKSHEET
HANSCOM AFB, MA

PURPOSE: To document answer to question 3.1.5

SOURCE: Mr. Jeffrey H. Thurston, ESC/IS, DSN 478-1186, Ext. 3628 provided information on MITRE, Rome Labs, Phillips Labs, SEI and TEMS/SETA from the ESC/IS data base as of May 94. Mr. Karl A. Klauer, ESC/TNXO, DSN 478-7294, provided information on MITRE, Lincoln Laboratory and the Volpe Center from MITRE TO&P document and Program Manager's and SPO personnel as of May 94. Maj Charles K. Kapaku, ESC/TGX, DSN 478-8910 provided information on MITRE, SETA/TEMS, and MCR from a Survey of TG personnel in May 94. Mr. Louis D. Masiello, AWE, DSN 478-5889 provided information on the MITRE corporation from each projects MTS documents as of May 94. Lt Col Frank A. Horaj, ESC/TD-AF, DSN 478-9224, provided information on Lincoln Labs from inputs from the ESC/TDX (Program Control) and three letter chiefs as of May 94. Major John Horn, ESC/YVC, DSN 478-4612 provided information on MITRE and TEMS from interviews with Senior YV Managers in May 94. Mr. David Minior, ESC/XRL, DSN DSN 478-5980, Ext. 8406, provided information on MITRE, from direct inquiries to XR 3-Ltr Chiefs in May 94. Mr. Tom Schubmehl, ESC/JSA, DSN 478-9651, provided information on MITRE and SETA/TEMS from ESC Almanac, 28 Sep 93. Mr. Peter C. Drevinsky, ESC/IAXO, DSN 478-5980, Ext. 3533, provided information on MITRE and SETA/TEMS, from Program information and analysis as of 6 May 94. Lt Col John H. Gill, ESC/ICO, DSN 478-1186, Ext. 7091, provided information on MITRE and SETA/TEMS from Jan 94 Almanac data base. Dr. Barry Allen, ESC/ZJ, DSN 478-8444, provided information on MITRE and Lincoln Labs from locally Technical Operations and Plans as well as extended Unit Manning Document as of May 94. Mr. Ken Bair, ESC/AV, DSN 478-6002, provided information on MITRE and SETA/TEMS from query of program managers as to benefits of collocation or close proximity as of May 94. Mr. Daniel J. Finn, SREI, DSN 478-1186, Ext. 5003 provided information on SETA/TEMS and ASAT from Lotus FY 93 file and MITRE TO&P as of May 94. Mr. Gerald E. Tuite, ESC/MS, DSN 478-5980, est. 6015 provided information on MITRE from query to 3-Ltr Chiefs, 6 May 94. Ms. Cindy Spaney, MITRE Corporation, DSN 478-5890, ext. 7372 provided information on MITRE personnel, MITRE organizational linkages with Academia, the Computer industry and the Software Engineering Institute (SEI) from A Survey of MITRE Research Interactions with Universities Apr 91 and professional knowledge as of May 94. Mr. Richard T. Momberg, contractor, RL/ER, DSN 478-3932 provided the RL (Hanscom AFB) answer to question 3.1.5. The SPO provided SETA/TEMS contractor counts from question 3.3.1.2, attached, was used for SETA/TEMS number. All source documents attached.

METHOD: ESC/CSB tasked each Systems Program Office and MITRE to provide an input. Sources provided information and rational on separate installation worksheets located in ESC/CSB file for this question. The information from the source installation worksheets was consolidated to attain the top five names, type of organization distance and workyears performed by your activity information. For Lincoln Lab and the Volpe Center, the workyears funded by your activity was taken from the SPO consolidated inputs. The workyears funded by your activity for the other three inputs was attained as follows:

MITRE Corporation - Excerpt from Ms. Cindy Spaney's MITRE answer to question 3.2.1 by CSF. Rome Lab - Mr. Dick Momberg's answer to question 3.1.5 used. SETA/TEMS - Excerpt from Ms. Jamis Paterson's SETA/TEMS answer to question 3.2.1 by CSF.

6D

Tkm 4

CONCLUSION:

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
Airborne	MITRE Corp	FFRDC	6 Miles	0	1524
Airborne	Lincoln Lab	FFRDC	0	0	30.5
Airborne	Rome Lab	Lab	0	0	3
Airborne	SETA/TEMS	Contractor	5-10 Miles	0	881
Airborne	Volpe Center Dept of Trans	Gov't Agency	20	0	4

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
Fixed Ground	MITRE Corp	FFRDC	6 Miles	0	24
Fixed Ground	SETA/TEMS	Contractor	5-10 Miles	0	138

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
Mobile	MITRE Corp	FFRDC	6 Miles	0	9
Mobile	SETA/TEMS	Contractor	5-10 Miles	0	14

MITRE Corporation has unique capabilities in the form of scientific and technical expertise relevant to C4I acquisitions, specialized knowledge of the weapon systems being developed and produced, and of the military environment to which the systems will be applied. MITRE's capabilities are not readily available in the commercial sector. Loss of the MITRE capability in whole or in part would take many years to replace, would present a significant risk to the technical integrity of the ESC programs, and consequently to the delivery of required operational capabilities.

Lincoln Laboratory and the Haystack Radar Facility (under MIT/LL) provide extensive support to our Missile Warning and Space Surveillance Network Programs. Again, their proximity facilitates communication and the team building necessary for IPT concept implementation.

ROME Labs provides ESC Programs with Reliability and Maintenance (R&M) prediction support, Development and Production Test Range Support and Test Management Support.
The proximity of the two organizations allow free and easy access and facilitates joint accomplishment.

SETA/TEMS support contractors provide additional systems engineering expertise needed to successfully integrate a complex system as well as outstanding hand on experience in operating and acquiring military systems. They provide invaluable cost analysis support and directly support surge requirements by providing an independent source for cost estimates.

The Volpe Center in Boston provides critical support to our Joint Surveillance System program office through the processing and interpretation of Flight Data Information. The adjacency of the Volpe Center has enhanced communications and saved significant SPO travel costs. The Volpe Center is under the Dep of Transportation and provides a closer working relationship with our partner, the FAA, in the Joint Program.

It should be noted there are three important organizational links not displayed in the table because the relationship does not involve significant directly funded workyears. They are the MITRE link with New England Industry, Academia, and Laboratories benefitting ESC.

The Academic Community - There is a strong interdependence between expertise of the personnel working on C4I systems and the area's world-class base of colleges and universities offering degree programs, professional seminars and research in a wide variety of C4I and acquisition related fields. ESC's most visible connection to Academia is through its general systems engineering arm, the MITRE FFRDC. MITRE hires local graduates, encourages continuing education (>500 employees enrolled in credit courses), participates in state-of-the-art seminars and colloquia and relies on sustained collaboration with university faculty, graduate students and laboratories in maintaining in-depth knowledge across the enormous breadth of technical specialties that apply in C4I systems.

The Computer Industry - Local industry is the other leg of the stool representing the technical foundation for ESC C4I expertise, not only for the flow of skilled people, but for emerging commercial products, especially important as defense moves to greater dependence on off-the-shelf. MITRE is influential as an alpha and beta tester of new products, an advisor on research and development, and a leader in formulating specifications and standards; ESC benefits in capability and responsiveness in meeting C4I user needs.

The Software Engineering Institute (SEI) - The SEI (Pittsburgh) and SEI FFRDC operated by Carnegie Mellon is a key element of ESC's leadership team in software architecture, engineering, development and production. The availability of convenient transportation and electronic communications diminishes the impact of distance and permits an effective working relationship that bridges between SEI's front-end software metodology efforts and the software-intensive C4I programs being managed by its sponsor, ESC.

The following is a listing of Industry, Academia and Laboratory connections. MITRE personnel either directly exchange professional expertise, do Alpha or Beta testing, and/or keep abreast of technology changes relative to C4I through direct communication and queries.

NAME	LOCATION	CONNECTION
Advanced Visual Systems	Waltham, MA	Software
Air Mouse Remote Controls	Colchester, VT	Air Mouse
Ampro	Woburn, MA	High-resolution projectors
Ascension Technology Corp.	Burlington, VT	Computer Position Trackers
ASEC	Burlington, MA	Systems Contractor
Avid Technology	Billerica, MA	Desktop Video
Boston University	Boston, MA	Part-time Students
Bytex	Southboro, MA	Communication Switches
Cabletron	Rochester, NH	Networking Products
Cayman Systems	Woburn, MA	Computer Comm Products
Chipcom	Marlboro, MA	Broadband LAN Products
Cornell University	Ithaca, NY	Part-Time Students, New

		Hires
Dartmouth College	Hanover, NH	Co-ops, New Hires
Data General	Newton, MA	Computers
Data Translation	Marlboro, MA	Image Processing
Delorme Mapping Corp.	Freeport, ME	Mapping Software
Digital Equipment Corp.	Maynard, MA	Technology, Computers, Software
Draper Laboratory	Cambridge, MA	Non-profit R&D company, Technology
Dynamics Research	Andover, MA	Systems Contractor
Eikonix	Bedford, MA	Optical Imaging Equipment
Exos	Waltham, MA	C4I Systems Contractor;
	Needham, MA	VR Technologies
Harvard University	Cambridge, MA	Students, Seminars, Affiliates
Program		
Hewlett Packard	Burlington, MA	Computer Technology
Interaction Systems, Inc.	Watertown, MA	Touch Screens
Iscan, Inc.	Cambridge, MA	Tracking Devices
Itek	Lexington, MA	High Precision Optical Equipment
Kendall Square Research	Cambridge, MA	Computers
Leep, Inc.	Waltham, MA	VR Technology
Lincoln Laboratory	Lexington, MA	Technology
Lockheed Sanders	Nashua, NH	C4I Contractor
Lotus Development Corp.	Cambridge, MA	Software Technology; Beta Test
M.I.T. Media Laboratory	Cambridge, MA	VR and Media Technologies
MASPAR Computer Corp.	Cambridge, MA	Parallel Processors
Mass. Institute of Technology	Cambridge, MA	Students, Collaborations, Seminars,
Affiliates Program		
Mercury Computers	Chelmsford, MA	Add-in Processing Accelerators
Merrimack College	N. Andover, MA	Co-ops, New Hires
MicroTouch Systems, Inc.	Wilmington, MA	Touch Screens
Northeastern University	Boston, MA	Co-op Students, New Hires, Laboratory
Affiliate		
Open Software Foundation	Cambridge, MA	Integration Concepts, Standards
Phillips Lab Geophysics Direct.	Hanscom AFB, MA	Aerospace Environmental Studies
Picture Tel	Reading, MA	VTC Systems
Polhemus Laboratories	Burlington, VT	VR Technologies
Project Athena	Cambridge, MA	Software, Middleware
Proteon	Southboro, MA	Token Ring Comm

		Products
Racal-Interlan	Boxboro, MA	Networking Products
Raytheon Company	Lexington, MA	C4I Contractor
Reflection Technologies	Waltham, MA	VR Technology
Rome Laboratory	Rome, NY	C4I Technology
Shiva	Burlington, MA	Remote Communication Servers
Sky Computer	Lowell, MA	Add-in Processing Accelerators
Stratus Computer, Inc.	Marlboro, MA	Computer Technology
Tufts University	Medford, MA	New Hires, Seminars
University of Connecticut	Storrs, CT	Co-ops, New Hires
University of Maine	Orono, Maine	Interns
University of Mass. at Lowell	Lowell, MA	Technology Collaboration, Students, Continuing Educ.
Wellfleet Communications	Bedford, MA	Communication Products
WINDATA	Marlboro, MA	Wireless LANs
Worcester Polytechnic	Worcester, MA	Student NASA Experiment
Xylogics	Burlington, MA	Disk Controllers
Xyplex	Boxboro, MA	Terminal Servers

I certify that the above information is accurate and complete to the best of my knowledge and belief.

Preparer: Janet M. Polanoczky Date: 22 Aug 94

JANET POLANSZKY, CAPT, USAF, ESC/CSR, DSN 478-7859
Typed Name, Rank, Office Symbol, DSN Number

I certify that the above information is accurate and complete to the best of my knowledge and belief.

MAJCOM Reviewer: Joe Brafford Date: 24 Aug 94

Typed Name, Rank, Office Symbol, DSN Number

Joe Brafford, GS-14, AFMC/XRMP, 787-5591

Proteon	Southboro, MA	Token Ring Comm Products
Racal-Interlan	Boxboro, MA	Networking Products
Raytheon Company	Lexington, MA	C4I Contractor
Reflection Technologies	Waltham, MA	VR Technology
Rome Laboratory	Rome, NY	C4I Technology
Shiva	Burlington, MA	Remote Communication Servers
Sky Computer	Lowell, MA	Add-in Processing Accelerators
Stratus Computer, Inc.	Marlboro, MA	Computer Technology
Tufts University	Medford, MA	New Hires, Seminars
University of Connecticut	Storrs, CT	Co-ops, New Hires
University of Maine	Orono, Maine	Interns
University of Mass. at Lowell	Lowell, MA	Technology Collaboration, Students, Continuing Educ.
Wellfleet Communications	Bedford, MA	Communication Products
WINDATA	Marlboro, MA	Wireless LANs
Worcester Polytechnic	Worcester, MA	Student NASA Experiment
Xylogics	Burlington, MA	Disk Controllers
Xyplex	Boxboro, MA	Terminal Servers

3.2 Personnel:

3.2.1 **Total Personnel:** What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
CSF: Airborne	Civilian	Military		
Technical	179	268	224	462
Management (Supv)	186	203	53	0
Other	673	318	91	6

Note: Includes only ESC support located within Bedford facility; i.e., excludes support at field operating locations.

Types of personnel	Off-Site Number of Personnel			
	Government		Off-Site FFRDC	Off-Site SETA
CSF: Airborne	Civilian	Military		
Technical			697	421
Management (Supv)			171	0
Other			288	12

Note: Includes only ESC support located within Bedford facility; i.e., excludes support at field operating locations.

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
CSF: Fixed Ground Based	Civilian	Military		
Technical	7	6		113
Management (Supv)	3	6		0
Other	17	17		0

Note: Includes only ESC support located within Bedford facility; i.e., excludes support at field operating locations.

Types of personnel	Off-Site Number of Personnel			
	Government		Off-Site FFRDC	Off-Site SETA
CSF: Fixed Ground Based	Civilian	Military		
Technical			14	7
Management (Supv)			4	0
Other			6	0

Note: Includes only ESC support located within Bedford facility; i.e., excludes support at field operating locations.

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
CSF: Mobile Systems	Civilian	Military		
Technical	1	1		12
Management (Supv)	0	0		0
Other	3	1		1

Note: Includes only ESC support located within Bedford facility; i.e., excludes support at field operating locations.

Types of personnel	Off-Site Number of Personnel			
	Government		Off-Site FFRDC	Off-Site SETA
CSF: Mobile Systems	Civilian	Military		
Technical			5	0
Management (Supv)			1	0
Other			3	0

Note: Includes only ESC support located within Bedford facility; i.e. excludes support at field operating locations.

3.2.2 **Education:** What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Government Only Replaced by Pages 12A-12C

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	0	29	348
Associates	2	8	85
Bachelor	244	107	266
Masters	311	249	227
Doctorate (include Med/Vet/etc.)	4	5	5

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.2 Education – Electronic Systems Center, Hanscom AFB response to the LJCSG guidance package. The existing 10 Aug 94 response does not report by common support function (CSF) as defined in appendix C of the LJCSG guidance. Report this data at the CSF level!

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF Date:
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.2 Education -- Electronic Systems Center, Hanscom AFB response to the LJCSG guidance package. The existing 10 Aug 94 response does not report by common support function (CSF) as defined in appendix C of the LJCSG guidance. Report this data at the CSF level!

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: (Concurs) Does not concur (explain:)

SEE ATTACHED

Thomas L. Koepnick

MAJCOM REVIEWER: THOMAS L. KOEPNICK AFMC/XPX 787-2622
(print name, organization, DSN)

BASE: (Concurs) Does not concur (explain:)

Janet M. Polaneczky

BASE REVIEWER: Capt Janet Polaneczky, ESC/CSF, DSN 478-7859
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

Government Only

AIRBORNE CSF

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	0	27	338
Associates	2	8	84
Bachelor	198	104	301
Masters	243	240	268
Doctorate (include Med/Vet/etc.)	3	5	6

The education of our MITRE workforce is key to successful C4I acquisition. The following table clearly illustrates the high education held by this segment of our workforce.

SETA/TEMS/MITRE

AIRBORNE CSF

Type of Degree/ Diploma	Number of Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	123	1	284
Associates	68	1	400
Bachelor	581	57	119
Masters	603	121	179
Doctorate (include Med/Vet/etc.)	122	45	0

Government Only

GROUND-FIXED CSF

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	0	1	9
Associates	0	0	2
Bachelor	6	3	10
Masters	8	8	9
Doctorate (include Med/Vet/etc.)	0	0	0

SETA/TEMS/MITRE

GROUND-FIXED CSF

Type of Degree/ Diploma	Number of Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	7	0	8
Associates	6	0	10
Bachelor	48	1	13
Masters	39	2	24
Doctorate (include Med/Vet/etc.)	3	1	0

Government Only

MOBILE CSF

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	0	1	1
Associates	0	0	0
Bachelor	1	0	1
Masters	1	1	1
Doctorate (include Med/Vet/etc.)	0	0	0

The education of our MITRE workforce is key to successful C4I acquisition. The following table clearly illustrates the high education held by this segment of our workforce.

SETA/TEMS/MITRE MOBILE CSF

Type of Degree/ Diploma	Number of Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	1	0	2
Associates	1	0	3
Bachelor	5	1	1
Masters	5	1	2
Doctorate (include Med/Vet/etc.)	1	0	0

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.3 Experience – Electronic Systems Center, Hanscom AFB response to the LJCSG guidance package. The existing 10 Aug 94 response does not report by common support function (CSF) as defined in appendix C of the LJCSG guidance. Report this data at the CSF level!

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF Date:
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.2.3 Experience — Electronic Systems Center, Hanscom AFB response to the LJCSG guidance package. The existing 30 Aug 94 response does not report by common support function (CSF) as defined in appendix C of the LJCSG guidance. Report this data at the CSF level!

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-6838

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concur Does not concur (explain:)

SEE ATTACHED

Thom L. Koepnick

MAJCOM REVIEWER: THOMAS KOEPNICK HQ AFMC/XPX 787-2622
(print name, organization, DSN)

BASE: Concur Does not concur (explain:)

Janet M. Polaneczky

BASE REVIEWER: Capt Janet Polaneczky, ESC/OSB, DSN 478-7859
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

OCT 27 '94 14:40 HQ AFMC/XPA 007

3.2.3 **Experience:** What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Government Only **AIRBORNE CSF**

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	67	115	94	74	99
Management (Supv)	1	34	67	84	182
Total	68	149	161	158	281

C4I engineering development requires extensive knowledge of existing and proposed C4I technologies that is gained through years of experience. MITRE as our engineering arm provides a large portion of the experienced personnel required to complete the mission. The SETA/TEMS/MITRE experience presented below must be considered to adequately depict ESC's workforce.

SETA/TEMS/MITRE On-Site and Off-Site **AIRBORNE CSF**

Type of Position	Years of Government and/or SETA/TEMS/MITRE Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	34	389	302	170	595
Management (Supv)	0	19	30	38	140
Total	34	408	332	208	735

Government Only **GROUND-FIXED CSF**

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	2	7	3	2	1
Management (Supv)	0	1	2	3	5
Total	2	8	5	5	6

C4I engineering development requires extensive knowledge of existing and proposed C4I technologies that is gained through years of experience. MITRE as our engineering arm provides a large portion of the experienced personnel required to complete the mission.

The SETA/TEMS/MITRE experience presented below must be considered to adequately depict ESC's workforce.

SETA/TEMS/MITRE On-Site and Off-Site GROUND-FIXED CSF

Type of Position	Years of Government and/or SETA/TEMS/MITRE Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	2	27	19	11	45
Management (Supv)	0	0	0	1	2
Total	2	27	19	12	47

Government Only MOBILE CSF

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	1	1	0	1
Management (Supv)	0	0	0	0	1
Total	0	1	1	0	2

C4I engineering development requires extensive knowledge of existing and proposed C4I technologies that is gained through years of experience. MITRE as our engineering arm provides a large portion of the experienced personnel required to complete the mission. The SETA/TEMS/MITRE experience presented below must be considered to adequately depict ESC's workforce.

SETA/TEMS/MITRE On-Site and Off-Site MOBILE CSF

Type of Position	Years of Government and/or SETA/TEMS/MITRE Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	1	3	3	2	5
Management (Supv)	0	0	0	0	1
Total	1	3	3	2	6

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
C4I Airborne	26 Feb 93 20.807		Air Pump Flying Machine
C4I Airborne	18 Jan 90 18.938		Variable Geometry Airship
Total	2		

CSF	Disclosures	Awarded	MITRE Patent Titles (List)
C4I Systems - Ground Mobile C4I		Dec 1990, U.S. Patent No. 4,974,377	Integrated Enclosure and Adjustable Electronic Equipment Mounting System
C4I Systems - Airborne C4I	Feb 1991, Ser .No. 07/655,056		Programmable Systolic BCH Decoder
C4I Systems - Airborne C4I		Apr 1991, U.S. Patent No. 5,006,855	Ranging and Processing System for Mobile Surveillance and Data Link
C4I Systems - Fixed Ground-Based C4I - Ground Mobile C4I		Jun 1991, U.S. Patent No. 5,025,382	Datalink Controller Interface
C4I Systems - Airborne C4I		Jun 1991, U.S. Patent No. 5.025,491	Dynamic Address Binding in Communication Network
C4I Systems - Fixed Ground-Based C4I		Jul 1991, U.S. Patent No. 5,029,975	Despeckling Screen Utilizing Optical Fibers and Method of Reducing Interference Using Same
C4I Systems - Airborne C4I	Sep 1991, Ser. No. 07/756,615		Radar Processing Method and Apparatus
C4I Systems - Airborne C4I	Sep 1991, Ser. No. 07/767,258		Apparatus and Method for Security Constraint Processing on Multilevel Secure Database Management Systems

C4I Systems - Airborne C4I		Oct 1991, U.S. Patent No. 5,056,053	Algebraic Transform Machine
C4I Systems - Airborne C4I	Dec 1991, Ser. No. 07/807,940		A Logic for Multilevel Secure Databases

CSF (Cont'd)	Disclosures	Awarded	MITRE Patent Titles (List)
C4I Systems - Airborne C4I		Feb 1992, U.S. Patent No. 5,087,913	Short-Record Data Compression and Decompression System
C4I Systems - Airborne C4I	Feb 1992, Ser. No. 07/836,986		Optical Interconnects for High Speed Backplanes Using Spectral Slicing
C4I Systems - Airborne C4I	Feb 1992, Ser. No. 07/843,012		Apparatus and Method for the Detection of Security Violations in Multilevel Secure Databases
C4I Systems - Airborne C4I		Mar 1992, U.S. patent No. 5,097,480	Acoustic Modulation Apparatus for Laser
C4I Systems - Fixed Ground-Based C4I - Ground Mobile C4I		May 1992, U.S. Patent No. 5,117,359	System and Method for Detection of Microbursts by Measuring Various Weather Condition Parameters at Both Spaced Time and Location Intervals
C4I Systems - Airborne C4I		Jul 1992, U.S. Patent No. 5,128,687	Shared Aperture Antenna for Independently Steered, Multiple Simultaneous Beams
C4I Systems - Airborne C4I	Sep 1992, Ser. No. 07/954,432		Optically Controlled Remote By-Pass Switch
C4I Systems - Airborne C4I		Nov 1992, U.S. Patent No. 5,161,191	Encryption System for Time Division Multiplexed Networks

CSF (Cont'd)	Disclosures	Awarded	MITRE Patent Titles (List)
C4I Systems - Airborne C4I		Feb 1993, U.S. Patent No. 5,189,420	Method and Apparatus for Direct Analog to Formatted Digital Number Conversion
C4I Systems - Airborne C4I		Feb 1993, Ser. No. 08/102,562	Pipelined, High-Precision Fast Fourier Transform Process
C4I Systems - Airborne C4I		May 1993, U.S. Patent No. 5,208698	Optically-Neutral Laser Shield
C4I Systems		Sep 1993, U.S. Patent No. 5,248,973	High-Speed High-Resolution A/D Converter Subranging Architecture
C4I Systems - Airborne C4I	Oct 1993, Ser. No. 08/134,399		Electronic Information Network User Authentication and Authorization System
Total	9	14	23

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
C4I Airborne	1	
		Design, Simulation and Operation of an Instrumented HF Digital Network for USAF's Air Mobility Command

Number Published	Paper Titles (List)
118	***Papers Written by MITRE-Bedford Employees in Collaboration with Other Organizations***
1	**A Novel Aperture Isolation Circuit for Use in Phased Array Systems** Booth, Michael S. , Jacomb-Hood, A. W. (General Electric, Syracuse, New York), Houston, D. E. (General Electric, Syracuse, New York), Alcorn, T. (General Electric, Syracuse, New York), IEEE Transactions on Microwave Theory and Techniques, December 1990.
2	**Performance of Adaptive Matched Filter Receivers Over Fading Multipath Channels** Matthews, James W., Kaveh Pahlavan (Worcester Polytechnic Institute), IEEE Transactions on Communications, Vol. 38, No. 12, Dec. 1990, pp. 2106–2113.
3	**Collisional Electrostatic Ion Cyclotron Waves as a Possible Source of Energetic Heavy Ions in the Magnetosphere** Providakes, Jason, Seyler, Charles (Cornell University), J. Geophys. Res., 95, 3, 855, 1990.
4	**Radar Observations of Ion Cyclotron Waves Associated with Two Barium Shaped Charge Releases** Providakes, Jason, Swartz, Wesley E. (Cornell University), Kelley, Michael C. (Cornell University), J. Geophy. Res., 95, A12, 21, 067, December 1990.
5	**Qualitative Monitoring of Time-Varying Physical Systems** Reeves, John J., Kokar, M. (Northeastern University), Proceedings of the 29th IEEE Conference on Decision and Control, December 1990.
6	**An Abstract Version of the Morse Index Theorem and Its Application to Hypersurfaces of Constant Mean Curvature** Thayer, F. Javier, Frid, Hermano (Federal University of Rio de Janeiro), Boletim da Sociedade Brasileira de Matematica, Vol. 20, No. 2, 1990, pp. 59–68.
7	**Artificial Intelligence Applications in Data-base Security** Thayer, F. Javier, Frid, Hermano (Federal University of Rio de Janeiro)," Computer Security Journal, Vol. 6, No. 1, November 1990 (Miller Freeman Publishers).
8	**Interpretation of the Electric Fields Measured in an Ionospheric Critical Ionization Velocity Experiment,** Brenning, Neil (Royal Institute of Technology), Falthammar, Carl G. (Royal Institute of Technology), Haerendel, Gerhard (Max-Planck-Institut fur extraterrestriche Physik), Kelley, Michael C. (Cornell University), Marklund, Goran (Royal Institute of Technology), Pfaff, Robert (NASA Goddard Space Flight Center), Providakes, Jason, Stenbaek-Nielsen, Hans C. (University of Alaska), Swenson, Charles (Cornell University), Torbert, Roy (University of New Hampshire), Wescott, Eugene M. (University of Alaska), Journal Geophys. Res., 96, 9719 1991.

9	**Barium Swarm: An Ionospheric Alternating Current Generator in CRIT 1** Brenning, Neil (Royal Institute of Technology), Kelley, Michael C. (Cornell University), Providakes, Jason, Stenbaek-Nielsen, Hans C. (University of Alaska), Swenson, Charles (Cornell University), Journal Geophys, Res., 96, 9735, 1991.
10	**A Scanning Reflector Using an Offset Space-Fed Phased Array Feed** Cha, Chung (Syracuse Research Corporation), Davis, Richard M., Kamak, Steve (Syracuse Research Corporation), Sadigh, Ali (Syracuse Research Corporation) IEEE Transactions on Antennas and Propagation, Vol. 39, No. 3, March 1991, pp. 391–400.
11	**Ion Cyclotron Harmonics in Auroral Radar Echoes: Real Effect or Analysis Artifact?** Farley, Donald T. (Cornell University), Providakes, Jason, Sahr, John D. (Cornell University), Geophys. Res. Let., 18, 709, 1991.
12	**Radar Observations of Ion Cyclotron Waves Associated with Two Barium Shaped-Charge Releases** Kelley, Michael C. (Cornell University), Providakes,, Swartz, Wesley E. (Cornell University), Journal Geophys. Res., 96, 21, 059, 1991.
13	**Performance of Adaptive Matched Filter Receivers Over Fading Multipath Channels** Matthews, James W., Pahlavan, Kaveh (Worcester Polytechnic Institute), IEEE Journal, December 1990.
14	**The Evolution of the Advanced Space Design Program—An Evolving Program of Technical and Social Analysis Using the NASA Space Shuttle for Engineering Education** Labonté, Robert C., Durgin, William D., (Worcester Polytechnic Institute), Looft, Fred J., (Worcester Polytechnic Institute), IEEE Transactions on Education, Vol. 34, No. 1, February 1991.
15	**Functional Modeling with Goal-Oriented Activities for Analysis of Effects of Failures on Functions and Operations** Leifker, Daniel B., Malin, Jane T. (NASA), Telematics and Informatics, Vol. 8, No. 4, 1991, pp. 353–364.
16	**A Mass Production Technique to Speed Multiple-Query Optimization and Physical Database Design,** Rosenthal, Arnon S., Helman, Paul, (University of New Mexico), ORSA Journal on Computing 3(1), Winter 1991, pp. 33–55.
17	**SQL Extensions for Security Assertions** Thuraisingham, Bhavani M., Stachour, Paul, (Secure Computing Technology Corporation), Computer Standards and Interfaces Journal, Vol. 11, No. 1, January 1991, pp. 5–14.

18	**Radiometric Detection of Spread-Spectrum Signals in Noise of Uncertain Power** Fishman, Philip M., Sonnenschein, Alexander (MIT Lincoln Laboratory), IEEE Transactions on Aerospace and Electronic Systems, Volume 28, July 1992, pp. 654–661.
19	**Line-Monotonic Partitioning for Planar Cubic B-Splines** Grinstein, Georges G., Daniels, Karen M. (University of Massachusetts, Lowell) Bergeron, Daniel R. (University of New Hampshire), Computers & Graphics, Vol. 16, No. 1, 1992, pp. 55–68.
20	**Visualization for Knowledge Discovery** Grinstein, Georges G., Seig, John (University of Massachusetts, Lowell), Smith, Stuart (University of Massachusetts, Lowell), Williams, Marian (University of Massachusetts, Lowell), The International Journal of Intelligent Systems, Special Issue on Discovery in Data and Knowledge Bases, Vol. 7, No. 7, 1992, pp. 637–648.
21	**A Comparative Study of Proximate Time-Optimal Controllers for Type-2 Third-Order Servo-Mechanisms** Pao, Lucy Y., Franklin, Gene F. (Stanford University), ASME Advances in Information Storage Systems, Vol. 4, July–September 1992, pp. 317–328.
22	**Radiation Efficiency and Input Impedance of Monopole Elements with Radial-Wire Ground Planes in Proximity to Earth** Weiner, Melvin M., Zamoscianyk, Stephen, Burke, Gerald T. (Lawrence Livermore National Laboratory), Electronic Letters, Vol. 28, No. 16, 30 July 1992, pp. 1550–1551
23	**Understanding Technical Articles and Their Diagrams** Carriero, Catherine M., Futrelle Robert P. (Northeastern University), IEEE Computer, July 1992.
24	**On the Interaction Between Intelligent Interfaces and Plan Recognition** Goodman, Bradley A., Litman, Diane J. (Department of Computer Science, Columbia University), User Modeling and User-Adapted Interaction: An International Journal, Vol. 2, No. 1-2, pp. 83–115.
25	**A Flexible Framework for Transaction Management in Engineering Environments** Rosenthal, Arnon, Blaustein, Barbara (formerly of Xerox Corporation), Haradhvala, Sara (formerly of Xerox Corporation), Heiler, Sandra (formerly of Xerox Corporation), Zdonik, Stanley (formerly of Xerox Corporation), Transaction Management for Advanced Database Applications, (Ed. A.K. Elmagarmid) Morgan Kaufman, March 1992.
26	**Cloud Data Set for Neural Network Classification Studies** Smotroff, Ira G., Hawkins, Rupert S. (Phillips Laboratory Geophysics Directorate), Heideman, Ken F. (Phillips Laboratory Geophysics Directorate), Phillips Laboratory Directorate of Geophysics, 23 January 1992.
27	**The Use of Conceptual Structures to Handle the Inference Problem** Thuraisingham, Bhavani M., Database Security V: Status and Prospects, North Holland, Amsterdam (Ed: C. Landwehr and S. Jajodia), March 1992.

28	**Security Issues for Federated Database Systems** Thuraisingham, Bhavani M., Morgenstern, Matthew (Xerox Corporation), Lunt, Theresa (SRI), Spooner, David (RPI), Database Security V: Status and Prospects, North Holland, Amsterdam (Ed: C. Landwehr and S. Jajodia), March 1992.
29	**A View of Information Modeling Relative to Data Modeling** Thuraisingham, Bhavani M., Venkat Venkataraman (IBM), Information Systems Management Journal, Vol. 9, #2, Spring 1992.
30	**Distribution of Underdense Meteor Trail Durations and Duty Cycle and Applications to Meteor Scatter Communications System Design** Ralston, William T., and Weitzen, Jay A., University of Massachusetts-Lowell, Radio Science, Vol. 28, No. 5, pp. 747-757, September 1993
31	**Time-Frequency Localization via the Weyl Correspondence** Ramanathan, Jayakumar, University of Michigan, and Topiwala, Pankaj N., Society for Industrial and Applied Mathematics, SIAM, Journal of Mathematical Analysis, Vol. 24, pp. 1378-1393, September 1993.
32	**Evaluating Message Understanding Systems: An Analysis of the Third Message Understanding Conference (MUC-3)** Chinchor, Nancy (SAIC), Hirschman, Lynette, Lewis, David (AT&T), Computational Linguistics, Vol. 19, No. 3, September 1993, pp. 409-450.
33	**Lower Bounds for the Lengths of Refutations** Nadel, Mark E., Ko, Hai-Ping, McAllester, David, Artificial Intelligence Laboratory, M.I.T., The Journal of Logic Programming, 1993:17:31-58, April, 1993.
	Papers Written by MITRE-Bedford Employees
34	**Large-Screen Display Technology Assessment for Military Applications** Blaha, Richard J., Current Overviews in Optical Science and Engineering SPIE Advent Technology Series, Vol. AT 1, Winter/Spring 1990.
35	**SDI Network Connectivity Optimization** Cozzens, John H., Cho, Chien-Ching, Ferguson, Thomas J., Proceedings of the MILCOM 1990 Conference, Monterey, California, October 1990.
36	**A Model for Target Detection with Over-the-Horizon Radar** Dhar, Sachidulal, Fante, Ronald L., IEEE Transactions on Aerospace & Electronic Systems, Vol. 26, 1990, pp. 68–83.
37	**Vernier Scaling in Shortened Optical Correlators** Drake, Marvin D., 1990 Optical Society of America Applied Optics, Vol. 29, No. 29, 10 October 1990, p. 4333.
38	**Inside Euclid's Algorithm, Coding Theory and Design Theory** Eastman, Willard L., Institute for Mathematics and Its Application (IMA) Workshop on Codes and Designs, Springer-Verlag, New York, 1990, pp. 113–127.
39	**Effect of Error Correlations and Systematic Errors on Average Array Sidelobes** Fante, Ronald L., IEEE Transactions on Antennas & Propagation, Vol. 38, 1990, pp. 124–129.

40	**How Big is an N-Sided Voronoi Polygon?** Muder, Douglas J., London Mathematical Society, 1990.
41	**The Gravity Gradiometer as a Verification Tool** Parmentola, John A., Science and Global Security, 1990, Volume 2, pp. 1–15.
43	**Bandwidth Effects on Signal Fading for the Mid-Latitude HF Channel** Perry, Bernard D., Rifkin, Robert, Proceedings of the MILCOM 1990 Conference, Monterey, California, October 1990.
44	**Performance of an Experimental Spread Spectrum High Frequency Link over Several Paths** Perry, Bernard D., Richard, Marc N., Rushanan, Joseph J., Bello, Phillip A., Nissen, Christopher A., Proceedings of the MILCOM 1990 Conference, Monterey, California, October 1990.
45	**A Rotated-Coordinate Gaussian Position Reconstruction Algorithm for the Microwave Landing System** Powell, Frederic D., Journal of the Institute of Navigation, Vol. 37, No. 3, Fall 1990, pp. 273–283.
46	**A New Approach for Analyzing the Visual-Resolution Characteristics of Shadow-Mask CRT Monitor Configurations** Veron, Harry, Proceedings of the Society for Information Display (SID), Reprinted from Volume 30, No. 4, 1989, (published in 1990) pp. 281–285.
47	**A Medical Reasoning Program that Improves with Experience** Koton, Phyllis A., Computer Methods and Programs in Biomedicine, Volume 30, Nos. 2/3. (Also appeared in Causal AI Models: Steps Towards Applications, 1990, Washington D.C.: Hemisphere Publishing Company.)
48	**Parallel Polynomial Arithmetic over Finite Rings** Silverman, Robert D., Journal of Parallel and Distributed Computing, Vol. 10, November 1990, pp. 265–271.
49	**Time Dependent Performance of the MSK, DPSK, and MFSK Waveforms in a Slow-Fading Nuclear Disturbed Channel** Comparetto, Gary M., Space Communications, Vol. 9, No. 1, 1991, pp. 15–23.
50	**Optimum Diversity for the FH/MFSK Waveform in a Slowly Fading Channel** Comparetto, Gary M., Marshall, James W., Space Communications, Vol. 8., 1991, pp. 165–174.
51	**Cancellation of Specular and Diffuse Jammer Multipath Using a Hybrid Adaptive Array** Fante, Ronald L., IEEE Transactions on Aerospace and Electronic Systems, Vol. 27, September 1991, pp. 823–837.
52	**Observation and Explanation of an Unusual Feature of Random Arrays with a Nearest Neighbor Constraint** Fante, Ronald L., Robertshaw, Gregory A., Zamoscianyk, Stephen, IEEE Transactions on Antennas and Propagation, Vol. 39, July 1991, pp. 1047–1049.

53	**A Framework for Estimating the Cost to Build Trusted Computer Systems** Garvey, Paul R., Cost Estimating and Analysis — Shifting U.S. Priorities, New York: Springer-Verlag, June 1991, pp. 1–37.
54	**Filtering of Colored Noise for Speech Enhancement and Coding** Gray, Steven D., IEEE Transactions on Signal Processing, Volume 39, No. 8, August 1991.
55	**Adaptive Antenna Processor Test Results** Hamalainen, John R., Howland, James W., Antennas and Propagation Society Symposium, University of Western Ontario, London, Ontario, Canada, June 24–28, 1991, IEEE Antennas and Propagation Society, IEEE Catalog. No. 91CH3036-1, Library of Congress No. 90-640397, 1991 Digest, Volume 1.
56	**Memory System Reliability Improvement Through Associative Cache Redundancy** Lucente, Michael A., Harris, Clifford H., Muir, Robert M., IEEE Journal of Solid-State Circuits, Volume 26, March 1991, pp. 404–409.
57	**Designing Standards-Compliant Monitors: Where Are the Problems?** Masterman, Hugh C., Society for Information Display, Vol. 7, No. 9, September 1991.
58	**An Overview of Technology for Large Wall Screen Projection Using Lasers as a Light Source** Pease, Richard W., Chapter, Current Overviews in Optical Science and Engineering SPIE Advent Technology Series, Vol. AT1, Winter/Spring 1990.
59	**Microwave Landing System: Multiple Solutions Geometries and Position Reconstruction Algorithms** Powell, Frederic D., D050, RTCA Paper No. 267–91/SC171–24, 5 June 1991.
60	**Comments on Narrow-Band Interference Rejection Using Real-Time Fourier Transforms** Rifkin, Robert , IEEE Transactions on Communications, Vol. 39, No. 9, September 1991, pp. 1292–1294.
61	**Duadic Codes and Difference Sets** Rushanan, Joseph J., Journal of Combinatorial Theory (A), Vol. 59, No. 2, July 1991, pp. 254–261.
62	**Piecewise Planar Surface Models from Sampled Data** Southard, David A., Scientific Visualization of Physical Phenomena, N. M. Patrikalakis (Ed.), Tokyo: Springer-Verlag, 1991.
63	**A Methodology for Assessing Schedule Risk in Software Development Estimates** Stein, William M., R. Kankey and J. Robbins, Eds., Cost Analysis and Estimating — Shifting U.S. Priorities, New York: Springer-Verlag, 1991.
64	**Noise Factor and Antenna Gains in the Signal/Noise Equation for Over-the-Horizon Radar** Weiner, Melvin M., IEEE Transactions on Aerospace and Electronics Systems, AES-27, No. 6, November 1991, pp. 886–890.

65	**Tuning Stability of a Digitally-Tuned, Electrically-Short Monopole Element on Disk Ground Planes of Different Radii** Weiner, Melvin M., Journal of Electromagnetic Waves and Applications, Vol. 5, No. 11, November 1991, pp. 1199–1215.
66	**A Unification-Theoretic Method for Investigating the k-Provability Problem** Farmer, William M., Annals of Pure and Applied Logic, Vol. 51, No. 3, 25 March 1991, pp. 173–214.
67	**Simple Second-Order Languages for Which Unification is Undecidable** Farmer, William M., Theoretical Computer Science, Vol. 87, No. 1, 16 September 1991, pp. 25–41.
68	**Redex Capturing in Term Graph Rewriting** Farmer, William M., Watro, Ronald J., International Journal of the Foundations of Computer Science, Vol. 1., No. 4, December 1990 (appeared in April 1991), pp. 369–386.
69	**Topical Temporal and Spatial Constraints on Linguistic Realization** Maybury, Mark T., Special Issue on Natural Language Generation, Volume 7(4), 1991.
70	**The Requirements Apprentice: Automated Assistance for Requirements Acquisition** Reubenstein, Howard B., IEEE Transactions on Software Engineering, March 1991, pp. 226–240.
71	**Trends in Covert Applications of Electrotechnology** Smith, Chester L., IEEE Technology and Society Magazine, Volume 10, Number 2, Summer 1991, pp. 15–21.
72	**Multilevel Secure Object-Oriented Data Model — Issues on Noncomposite Objects, Composite Objects, and Versioning** Thuraisingham, Bhavani M., Journal of Object-Oriented Programming, Vol. 4, November/December 1991.
73	**Multilevel Security Issues in Distributed Database Management System II** Thuraisingham, Bhavani M., Computers and Security Journal, Vol. 10, No. 8, December 1991.
74	**Automatically Analyzing a Steadily Beating Ventricle's Iterative Behavior Over Time** Yeh, Alexander S., Artificial Intelligence in Medicine, Volume 3, July 1991, pp. 313-323.
75	**Some Limitations on the Effectiveness of Airborne Adaptive Radar** Barile, Edward C., Fante, Ronald L., Torres, Jose A., IEEE Transactions on Aerospace and Electronic Systems, Vol. 28, No. 4, October 1992, pp. 1015–1032.
76	**Market Elasticity of Satellite Communications Terminals** Brandon, William T., International Journal of Satellite Communications, Vol. 10, No. 4, 1992, pp. 279–284.

77	**Adaptation of the MacTaggart and Jack Complex Multiplication Algorithm for Floating Point Operators** Cosentino, Ronald J., Vaccaro, John J., IEEE Transactions on Computers, Vol. 41, No. 10, 1992, pp. 1324–1326.
78	**Maximum Possible Gain for an Arbitrary Ideal Antenna with Specified Quality Factor** Fante, Ronald L., IEEE Transactions on Antennas and Propagation, December 1992.
79	**Multipath Reduction Using Constant Modulus Conjugate Gradient Techniques** Gray, Steven D., IEEE Journal on Selected Areas in Communications, Vol. 10, No. 8, October 1992, pp. 1300–1305.
80	**Algorithm 712: A Normal Random Number Generator** Leva, Joseph L, Association for Computing Machinery (ACM) Transactions on Mathematical Software, Vol. 18, No. 4, December 1992, pp. 454–455.
81	**A Fast Normal Random Number Generator** Leva, Joseph L, Association for Computing Machinery (ACM) Transactions on Mathematical Software, Vol. 18, No. 4, December 1992, 449–553.
82	**Eigenvalues and Troposcatter Multipath Analysis** Matthews, James W., IEEE Journal on Selected Areas in Communications, Volume 10, No. 3, April 1992, pp. 497–505.
83	**System Readiness Analysis for Joint STARS Aircraft** Moynihan, Richard A., Taub, Audrey E., Air Force Journal of Logistics, Vol. XVI, No. 3, Summer 1992.
84	**A Facility for Training Space Station Astronauts** Schmidt, James R., Engineering, Construction and Operations in Space III, Vol. 2, American Society of Civil Engineers, New York, May 1992, pp. 1645–1655.
85	**A Monolithic Six-Port Module** Solomon, Moise N., Weitzman, Peter S., McClay, C. Phillip, Cronson, Harry M., IEEE Microwave and Guided Wave Letters, Vol. 2, No. 8, August 1992, pp. 334–336.
86	**Compression of Digitized Map Images** Southard, David A., Computer & Geosciences, Vol. 18, No. 9, 1992, pp. 1213–1253.
87	**Transformations for Stereoscopic Visual Simulation** Southard, David A., Computers & Graphics, Vol. 16, No. 4, 1992, pp. 401–410.
88	**Analogue-to-Digital Converter Effects on Airborne Radar Performance** Suresh Babu, B. N., Sorrentino, Christopher M., IEEE Proceedings-F, Vol. 139, No. 1, February 1992.
89	**Some Limitations on the Effectiveness of Airborne Adaptive Radar** Torres, Jose A., Barile, Edward C., Fante, Ronald L., IEEE Transactions, AES-28, October 1992, pp. 1015–1032.
90	**Radiation Efficiency and Directivity of Monopole Elements with Disk Ground Planes on Flat Earth** Weiner, Melvin M., Electronic Letters, Vol. 28, No. 25, 3 December 1992, pp. 2282–2283.

91	**Using a Standards Profile to Structure an Architecture for an Enterprise Information System** Anderson, Webster A., Ruh, William A., Sutton, Sheldon C., Information Systems Engineering Journal, Fall 1992, pp. 65–72.
92	**The Kreisel Length-of-Proof Problem** Farmer, William M., special issue on Logic and Combinatorics, Annals of Mathematics and Artificial Intelligence, Vol. 6, Nos. 1–3, pp. 27–56.
93	**A Critique of Text Planning Architectures** Maybury, Mark T., Journal of the International Forum on Information and Documentation (IFID), Vol. 17 (2), pp. 7–12. Special issue on the Bijormi Text Generation Symposium, Bijormi, Georgia, USSR, September 1991, pp. 23–37.
94	**Communicative Acts for Explanation Generation** Maybury, Mark T., International Journal of Man-Machine Studies, 37 (2), July 1992, pp. 135–172.
95	**The AAAI Workshop on Intelligent Multimedia Interfaces** Maybury, Mark T., IEEE Expert 7 (1), February 1992, pp. 75–77.
96	**Multilevel Security Issues for Distributed Database Management III** Rubinovitz, Harvey H., Thuraisingham, Bhavani M., Journal of Computers and Security, Vol. 11, No. 7, November 1992.
97	**Employee Privacy and Intrusion Detection Systems: Monitoring Activities on the Job** Schaefer, Lorrayne, Electronic Data Privacy and Access Control Systems (EDPACS), Vol. 20, No. 6, December 1992, pp. 1–7.
98	**Developments in Trusted Database Management Systems** Thuraisingham, Bhavani M., ACM SIGMOD, Vol. 21, #3, September 1992.
99	**Developing Multimedia Database Management Systems Utilizing the Object-Oriented Approach** Thuraisingham, Bhavani M., Multimedia Review: Journal of Multimedia Computing, Vol. 3, #2, 1992.
100	**Intelligent Database Systems and Multilevel Database Security: Applying One Technology To The Other** Thuraisingham, Bhavani M., Computer Security Journal (Miller Freeman Publishers), July 1992.
101	**Performance of Space-Time Adaptive Airborne Radar** Barile, Edward C., Fante, Ronald L., Guella, Thomas P., Torres, Jose A., Proceedings of the 1993 National Radar Conference, IEEE Catalog No. 93CH3253-2, ISBN No. 0-7803-0934-0, April 1993.
102	**Adaptive Antenna Space-Time Processing Techniques to Suppress Platform Scattered Clutter for Airborne Radar** Barile, Edward C., Guella, Thomas P., Lamensdorf, David, 1993 Antenna Applications Symposium, Allerton Park, Illinois.

103	**Building an Integrated Software Maintenance Environment - from a Maintainer's Perspective** Cherinka, Robert D., IEEE Proceedings of the Conference on Software Maintenance, September 1993, Pages 31-40.
104	**The Impact of Dust and Foliage on Signal Attenuation in the Millimeter Wave Regime** Comparetto, Gary, Journal of Space Communications, Vol. 11, no. 1, pp. 13-20, July 1993.
105	**Impact of Electronics Obsolescence on the Life Cycle Costs of Military Systems** Day, Virginia C., and Lansdowne, Zachary F., Air Force Journal of Logistics, Vol. 17, No. 3, Summer 1993, pp. 29-34.
106	**Fast Algorithm and Architecture for Constrained Adaptive Sidelobe Cancellation** Eastman, Willard L., Games, Richard A., Sousa, Michael J., IEEE Transactions on Antennas and Propagation, May 1993.
107	**Fast Algorithm and Architecture for Constrained Adaptive Sidelobe Cancellation** Games, Richard A., Eastman, Willard L., and Sousa, Michael J., IEEE Transactions on Antennas and Propagation, Vol. 41, No. 5, pp. 683-686, May 1993.
108	**Overcoming Passive Coupling Excess Loss in Fiber Optic Networks by Using a Collective Interface** Georgopoulos, Voula C., Microwave and Optical Technology Letters, Vol. 6 No. 11, September 5, 1993, pp. 634-636.
109	**Effect of Antenna Aircraft Interactions on Phased Array Radar Performance** Guella, Thomas P., Suresh Babu, B. N., Record of the 1993 IEEE National Radar Conference, Boston, MA, April 1993, pp. 102–106.
110	**Track-Before-Detect Processing for a Range-Ambiguous Radar** Kramer, J. David R., Reid, Wallace S., Record of the 1993 IEEE National Radar Conference, April 1993, pp. 113-116.
111	**A Stopping Rule for Link Failure Detection** Lansdowne, Zachary F., IEEE Transactions on Communications, Vol. 41, No. 4, April 1993, pp. 528-530.
112	**A Hypothesis Testing Technique for the Wavelet Transform in the Presence of Noise** Varteresian, Michael G., Noonan, Joseph (Tufts) and Polchlopek, Henry (Tufts), Digital Signal Processing, April 1993.
113	**MARVEL: A System for Recognizing World Locations with Stereo Vision,** Braunegg, David J., IEEE Transactions on Robotics and Automation, Vol. 9, No. 3, pp. 303-308, June 1993
114	**A Simple Type Theory with Partial Functions and Subtypes** Farmer, William M., Annals of Pure and Applied Logic, Vol. 64, No. 3, pp. 211-240, 1993.

115	**IMPS: An Interactive Mathematical Proof System** Farmer, William M., Joshua D. Guttman, F. Javier Thayer, Journal of Automated Reasoning, Vol. 11, No. 2, pp. 213-248, 1993.
116	**A Practical Analysis of the Elliptic Curve Factoring Algorithm** Silverman, Robert D., Mathematics of Compution #61, July 1993, pp. 445-463.
117	**A Software Architecture for Intelligent Tutoring Systems** Warren, Kimberly C., Goodman, Bradley A., Maciorowski, Susan M., Proceedings of AI-ED 93 World Conference on Artificial Intelligence in Education, Edinburgh, Scotland, May 1993.
118	**Two Problems with Generalized Geometric Programming Algorithm (GGP)** Yeh, Alexander S., Communications in Applied Numeric Methods, September 1993, Vol. 9 pp. 767-772.

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 **Work Year and Lifecycle:** Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

"LAB" Airborne	Fiscal Year 1993 Actual On-Site			
	Civilian	Military	FFRDC	SETA
Science & Technology				
Engineering Development	1038	793	368	468
In-Service Engineering				

"LAB" Airborne	FFRDC/SETA Fiscal Year 1993 Actual Off-Site			
	Civilian	Military	FFRDC	SETA
Science & Technology				
Engineering Development			1156	433
In-Service Engineering				

Note: Workyears include only ESC support located within MITRE-Bedford facility; i.e., excludes support at field operating locations.

"LAB" Fixed Ground	Fiscal Year 1993 Actual On-Site			
	Civilian	Military	FFRDC	SETA
Science & Technology				
Engineering Development	27	26	0	113
In-Service Engineering				

"LAB" Fixed Ground	FFRDC/SETA Fiscal Year 1993 Actual Off-Site			
	Civilian	Military	FFRDC	SETA
Science & Technology				
Engineering Development			24	7
In-Service Engineering				

Note: Workyears include only ESC support located within MITRE-Bedford facility; i.e., excludes support at field operating locations.

"LAB" Mobile Systems	Fiscal Year 1993 Actual On-Site			
	Civilian	Military	FFRDC	SETA
Science & Technology				
Engineering Development	4	2	0	13
In-Service Engineering				

"LAB" Mobile Systems	FFRDC/SETA Fiscal Year 1993 Actual Off-Site			
	Civilian	Military	FFRDC	SETA
Science & Technology				
Engineering Development			9	0
In-Service Engineering				

Note: Workyears include only ESC support located within MITRE-Bedford facility; i.e., excludes support at field operating locations.

94-09-23 18:33 RCVD

ESC

CONTROL NUMBER: LJCSWO-AF 024

PURPOSE: To provide SAF/AQX staff corrected answers to Question 3.3.1.2 Engineering Development by ACAT of the (see Distribution List) response to the Laboratory Joint Data Call. When reporting ACAT systems your response should be restricted to hardware or software programs/systems which are listed as ACAT Programs in your Program Management Directives (PMDs) or in other Military Departments ACAT listing for FY 1993. In addition, pay particular attention to your responses in the "OTHER" category. These will not be on the MILDEP ACAT listings. You should list the non-ACAT programs you are working on here. Ensure that these are actual Product Programs (i.e. hardware/software systems, vaccines, etc.) Do not state "various". You must list individual programs. Review your response to Question 3.3.1.2 and make sure it complies with the above guidance or correct it to meet the guidance.

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package Instructions

MAJCOM: Concurs Does not concur (explain:)

20 SEP 1994

MAJCOM REVIEWER: Joe Bradford
(print name, organization, DSN)
Joe Bradford GM-14, AFMC/XPMP, 787-5591

BASE: Concurs Does not concur (explain:)

NO CHANGE REQUIRED

BASE REVIEWER: ROBERT LEE, ESC/CSB, DSN 478-4335
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

3.3.1.2 **Engineering Development By ACAT:** For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development C4I Airborne	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	E-3 Radar System Improve-ment Program	84	$19.5M	Provides the Air Combat Command (ACC) with new and improved capabilities for the E-3 Awacs radar in radar and sensitivity/electronic counter measures (ECCM) performance, radar performance monitoring and control, and reliability/maintainability (R/M).
	Air Mobility Command Command & Control Info Processing Sys	21.5	$40.29M	Provides automated data, message handling, and decision support aids to improve AMC's C2 capability for planning, scheduling and execution of airlift and refueling missions. Provides integral C2 across logistics, operations and transportation functions locally and worldwide for timely, accurate information on the location of aircraft, troops and cargo anywhere within the global AMC system.
	National Airspace System (NAS)	33	$18.34M	Modernization of DoD Radar Approach Control Facilities

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC (cont'd)	JSIPS	32.69	$52.6M	Provides imagery derived, timed sensitive battle management information to the field commanders in near real time. JSIPS is the DoD common mobile ground station for processing & exploiting imagery received from a variety of sources.
	CMU/ ITW/AA	129	$205.9M	The CMU program modernizes and enhances the communications and warning mission processors and correlation center at Cheyenne Mountain Air Force Base (CMAFB), establishes an Alternate Processing and Correlation Center (APCC) at Offutt AFB, provides survivable missile warning connectivity, and provides standardized ITW/AA processing and display of warning data for decision makers and forward user command centers.

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT ID	B-2 Mission Planner	17.1	$40.7M	B-2 Mission Planning System under an MOA with the B-2 SPO and operates as an IPT within ASC/YS. The mission planning team is developing both the legacy system (Strategic Mission Data Preparation System) and the AFMSS interface.
	Joint STARS	344	$946.4M	Joint STARS fulfills the need to provide, from an airborne platform, near-real-time surveillance and targeting information to enable commanders to make and execute decisions for employment of combat forces. The system provides surveillance and targeting information and, where required, attack support functions to delay, disrupt, or destroy enemy forces in all light and near all weather conditions.
	Command Post Dev	22	$135.3M	Supports acquisition of military satellite communications terminals to satisfy strategic, tactical, and general requirements for flexible, worldwide coverage.

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT ID (Cont'd)	Command Post Production	18	$103.9M	Provides military satellite communications at major NCA and CINC command centers.
	Test and Deployment	12	$1.3M	Manages test programs and delivery, and installation of Milstar terminal equipment.
	Advanced EHF Development	15		Technology for a small, lightweight, airborne qualified EHF terminal.
	Joint Tactical Information Distribution System (JTIDS)	219	$98.67M	The Joint Tactical Information Distribution System (JTIDS) Class 2 family of terminals will provide improved combat capability in fighter aircraft, command and control centers, and surface air defense units by providing near real-time, netted, jam-resistant, secure data and voice communications.
ACAT 1M	Global Transporta-tion Network	15	$0.66M	C2 System for USTRANSCOM to manage Global Transportation Mission for all DoD

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT II	E-3 Block 30/35	55	$166.01M	Modifications contains Global Positioning System (GPS), Joint Tactical Information Distribution System (JTIDS), TADIL-J, Computer Memory Upgrade System (CC-2E), Electronic Support Measures (ESM), and the remaining HAVE QUICK production buys and anomaly fixes.
	E-3 HAVE QUICK A-Nets	8	$5.1M	Replaces four AN/ARC-171 UHF radios with a total of four HAVE QUICK A-Net UHF radios.
	North Warning System	52	$3.38M	Unattended radar provides low-level coverage and small target detection. Upgrades long-range radars with modern, cost effective technology. Facilities for Alaskan radars. Communications linking Alaskan radars with command centers.
	Phased Array Radars	5	$13.16M	Manages acquisition and systems engineering for Ballistic Missile Early Warning System (BMEWS), PAVE PAWS radars, COBRA DANE radar, the FPS-85 radar, detection and tracking radars at Pirinclik ASN, TU, and PARCs radar.

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative

ACAT II (Cont'd)	SHF Terminal Development	8	$11.0M	Provides military satellite communications terminals for C2 requirements of unified and specified CINCs, NCA, NATO, US strategic and tactical forces.
	GTACS	38	$120.28M	Ground Theater Air Control System (GTACS) provides the air component commander with a capability to plan, execute and evaluate the air campaign, through the integration of mobile operations centers, tactical sensor systems, communications, and applications programs to be a seamless tactical battle management command, control, communications, computers, and intelligence (C4I) network.
	TBM CORE Sys includes CTAPS and ATBMS	29	$10.81M	TBM Core C2 Sys develops force and wing-level C2 systems which allows the execution of TBM planning, intel and operational functions in support of the Joint Forces Air Component Commander (JFACC). System will provide connectivity horizontally to other services and allies and vertically among standard or composite wings, other elements of the theater air control system, and deployed units and higher headquarters

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT III/IV	60	674	$540.86M	AWDS (Automated Weather Distribution System) AWDS P3I (Pre-Planned Product Improvements) CWS (Combat Weather Systems Weather Software Package) SEON (Solar Electro-Optical Network) E-3 COMM Improvements E-3 Hard Disk Sub-System E-3 Special Projects (Classified) E-3 Wideband Klystron Power Amplifier Automated Message Handling System (AMHS) Common Mapping Tool Kit (CMTK) Intelligence Community Analysis Requirement & Design Support (ICARDS) Modular Architecture for the Exchange of Intelligence (MAXI)

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT III/IV (Cont'd)				Network Capabilities (NETCAP) Program Intelligence Data Handling Systems (IDHS) at Rome Lab AF Client Server Environment-SPT Srvcs (CSE) CSP (formerly CSP PUP & CSP II/III) CATIS Image Product Archive (IPA) Intel Intes Test Fac (IITF) System Integration (SI) XIDB Eagle Vision Mission Verification System (MVS) SENTINEL II (Sentinel Aspen) SENTINEL II (SII CBT Upgrade)

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT III/IV (Cont'd)				SENTINEL II (SLL Integration) Combat Intelligence System (CIS) Multi-Mission Advanced Tactical Terminal (MATT) Electronic Key Management System (EKMS) Anti Satellite Battle Management/C3 Sys (ASAT) Demand Assigned Multiple Access (DAMA) High Power Trans Set (HPTS)/Min RX Ter Dual Frequency MEECN Receiver (DFMR) Advanced Comm Microwave Landing Systems Deployable Comm AVR/HIDAR National Air and Space (Warfare) Model (NASM)

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT III/IV (Cont'd)				Shelter Programs AFMSS (Blk A) Conventional Mission Planning/Prep System Common Mapping Standard AF Mission Support System (AFMSS) Blks B,C) Special Operations Forces Planning & Rehearsal System Mission Data Preparation System Weapons Storage and Security Systems Base and Installation Security Systems Base Recovery Comm System (BRCS) IWSM MIS SUPERMINI Airborne Battlefield CMD and Ctrl Center (ABCCC)

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT III/IV (Cont'd)				FAA/AF Radar Replacement Space Surveillance Improvement Network HAVE STARE Iceland Air Defense System Over-The-Horizon - Backscatter Radar Iceland NATO Radar RADILS Caribbean Basin Radar Network Advanced Interface Control Unit

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
Other	47	660	1,204.18M	E-3 Theater Missile Defense E-3 Security Assistance Admin Fund (FMS) E-3 HAVE QUICK A-Nets (French HQ) (FMS) E-3 UK/FR Technical Support Services (FMS) E-3 AWACS For Saudi Arabia (FMS) Japan 767 AWACS (FMS) E-3 NATO Airborne Early Warning Programs (FMS) E-3 NATO Radar System Improvement Program (FMS) E-3 NATO AEW Program (Modernization) (FMS) PEACE SHIELD (FMS) Saudi C3 Canadian Patrol Frigate (FMS)

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
Other (Cont'd)				Japan BADGE (FMS) Israel Peach Tree (FMS) Colombian Peace Panorama (FMS) Egypt HF Scramblers (FMS) Egypt GATR (FMS) Hungarian High Power Pannon (FMS) United Arab Emirates (FMS) Egyptian Digital Encryption (FMS) Mission Support System/Comp Aided MS Planning @ Arbs level AFMSS (Taiwan) (FMS) AFMSS (Saudi Arabia) (FMS) Computer Aided Logistics Support (CALS) Theater Missile Defense Small Business Innovation Research

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
Other (Cont'd				Air Mobility Command C4I Dev Planning Modeling and Simulation TPIPT Recce/Surveillance/Intel TPIPT Combat Identification Modeling, Analysis and Simulation Center Space C4I Development Planning Strategic Air Defense TPIPT Prodcess USTRANSCOM CIM Process Modeling Support Proof-of-Concept Aerospace Defense Location Domestic Technology Transfer Ballistic Missile Defense Battle Mgmt/C3 Weather Systems Development Planning

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
Other (Cont'd)				Special Projects Portable, Resuable, Integrated Software Module (PRISM) Central Archive for Reusable Defense Software (CARDS) Software Engineering Institute (SEI)

Engineering Development C4I Ground Fixed	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT III/IV	6	140	$77.09M	REACT Ground Wave Emergency Network (GWEN) Weapons Storage and Security Systems Base and Installation Security Systems (BISS) Base Recovery Comm Systems (BRCS) IWSM MIS

Engineering Development C4I Mobile Systems	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT III/IV (Cont'd)	1	10	$24.98M	SCOPE SHIELD

3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Does not apply to ESC.

3.3.2 **Projected Funding**

3.3.2.1 **Direct Funding:** For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94 ($M)	FY95 ($M)	FY96 ($M)	FY97 ($M)
Air	1652	1774	1642	1652
Fixed	29	36	28	24
Mobile	23	13	14	13
Total	1703	1824	1684	1688

3.3.2.2 **Other Obligation Authority:** For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Air	1083	1698	1277	1102
Fixed	40	8	7	4
Mobile	0.14	0.54	0	0
Total	1123	1706	1284	1106

7 C&

94-09-23 18:12 RCVD

CONTROL NUMBER: LJCSWG-AF 017

PURPOSE: To provide SAF/AQX staff corrected answers to Question 3.4.1 of the ESC Hanscom AFB response to the Laboratory Joint Data Call. In your response to question 3.4.1 your table on page 49 identifies 9 buildings at a replacement cost of $55.9 M. For these buildings that are "stand alone", that is, not interrelated with other buildings, a separate identifiable replacement cost should be provided. For those buildings that are integrated to form a cluster or complex that perform a single purpose, a single replacement cost for the complex is acceptable. Explain why the buildings are considered a complex.

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

7C84

ESC 017

CONTROL NUMBER: LICSWG-AF 017

PURPOSE: To provide SAF/AQX staff corrected answers to Question 3.A.1 of the ESC Hanscom AFB response to the Laboratory Joint Data Call. In your response to question 3.A.1 your table on page 49 identifies 9 buildings at a replacement cost of $55.9 M. For these buildings that are "stand alone", that is, not interrelated with other buildings, a separate identifiable replacement cost should be provided. For those buildings that are integrated to form a cluster or complex that perform a single purpose, a single replacement cost for the complex is acceptable. Explain why the buildings are considered a complex.

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete SEE ATTACHED INSTALLATION WORKSHEET

RATIONALE: Response must be in accordance with LICSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

9 SEP 1994

MAJCOM REVIEWER: THOMAS L. KOEPNICK HQ AFMC/XPX 787-2622
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: ROBERT LEE, ESC/CSB, 476-4338
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

Data Call for "Lab" Joint Cross Service Working Group
INSTALLATION WORKSHEET
HANSCOM AFB, MA

PURPOSE: To document the answer to question LJCSWG-AF017

SOURCE: Mr. Lee Munson, GS-12, 647 ABG/CECS, DSN 478-4332
Space Utilization Reports, WIMS Real Property Replacement Cost Report, dtd 23 May 94, attached.

METHOD: Utilizing the WIMS program to generate replacement costs, data was extracted concerning Buildings 1305, 1429, 1520, 1606, 1612, 1614, 1624 and 1630.

The total Replacement Cost was then divided by the total building square feet to ascertain a cost per square foot. This figure was then multiplied by each program component part to develop the Replacement Costs for each Current Support Function by building. Buildings usage of less than 1000SF was consolidated under miscellaneous for costing purposes.

CONCLUSION: Major facilities and Equipment necessary to support each Common Support Area could be replaced for an investment of $61,954,731. See attached Table 1.

I certify that the above information is accurate and complete to the best of my knowledge and belief.

Preparer: _____ **Date:** 9 Sep 94

Bob Lee, GS-14, ESC/CSB, DSN 478-4338
Typed Name, Rank, Office Symbol, DSN Number

I certify that the above information is accurate and complete to the best of my knowledge and belief.

MAJCOM Reviewer: Joseph C. Brafford **Date:** 9 Sep 94

Joe Brafford, GM-14 AFMC/XRMP/ 787-5591
Typed Name, Rank, Office Symbol, DSN Number

3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
	Bldg #/SF/% usage/ Co-located CSF				
C4I Airborne	1305/68,540SF/75%/Fixed Grnd				8,109
	1429/6,102SF				722
	1520/15,131SF/92%/Fixed Grnd				1,790
	1606/1,170SF/3%/HQ Center				138
	1612/119,850SF				14,180
	1614/38,204SF/18%/Base Supply/Commissary				4,520
	1618/24,224SF/54%/Fixed Grnd & Mobile				2,866
	1624/95,896/97%/Fixed Grnd				11,346
	1630/103,668SF				12,226
					55,937
C4I Fixed Ground	1305/23,052SF/25%/Airborne				2,728
	1520/1,233SF/8%/Airborne				146
	1618/10,549SF/23%/Airborne & Mobile				1,248
	1624/3,112SF/3%/Airborne				368
	Misc/592SF				70
					4,560
C4I Mobile Systems	1618/10,341SF/23%/Airborne/ Fixed Grnd				1,223
	Misc/1,984SF				235
					1,458

Four System Management Engineering Facilities (SMEFs) have been constructed at Hanscom AFB between 1981 and 1990 totaling over 414,000 sf. SMEFs were specifically designed to house Engineering Systems Center (ESC) mission deputies and their staff involved in systems acquisition work. These facilities include spaces for management personnel, engineers, liaison officers, procurement specialists, logistics support functions, program management review rooms, conference rooms, SCIFs, laboratories, ADP rooms, and other support space. The existing SMEFs have been designed to accommodate open office planning and office landscape systems utilizing pre-wired work stations.

Common Support Function	MITRE Corp. Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
C4I Airborne Fixed Ground Mobile Systems	System Mgt Engineering 15 Bldgs/ 1,3000,000SF				100.00

The MITRE Corporation complex consists of 103.5 acres and 15 buildings with an assessed value in excess of $82 million. In addition to housing MITRE and ESC staff, the buildings have approximately 80,000 sf of labs/fabrication facilities, 45,500 sf of SCIF, extensive computer networks and state-of-the-art access control. The labs/fabrication facilities provide unique, in some cases state-of-the-art capabilities, required to provide timely responses to ESC programs.

Provided are photographs of representative SMEFs and Laboratories on Hanscom AFB and the MITRE Corporation located 6 miles from Hanscom AFB. Laboratories at both locations are utilized by AF/MITRE/TEMS personnel.

3.5 Expansion Potential

3.5.1 **Laboratory Facilities:** Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Airborne	1305	Technical	69	69	0
	1429	Technical	6	6	0
	1520	Technical	15	15	0
	1606	Technical	1	1	0
	1612	Technical	120	120	0
	1614	Technical	38	38	0
	1618	Technical	24	24	0
	1624	Technical	96	96	0
	1630	Technical	104	104	0
	PRISM	Technical			0
	Mission Planning/ JSTARS/ AWACS Interoperability	Technical			0
			473	473	0
Fixed Ground	1305	Technical	23	23	0
	1429	Technical	1	1	0
	1520	Technical	1	1	0
	1618	Technical	11	11	0
	1624	Techncial	3	3	0
			39	39	0
Mobile Systems	1618	Technical	10	10	0
	1624	Technical	1	1	0
			11	11	0
Totals			523	523	0

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

With a minor modification of Bldg 1605 at a cost of $52,000 and a major modification of Bldg 1607 which would require a MILCON project costing $5.7M, an additional 401 workyears could be absorbed. Bldg 1605 (7,000SF) is presently the Security Police facility and will be vacated upon completion of a replacement building in 3rd Qtr FY95. Bldg 1607 (81,000SF) is planned to be vacated in the 1st Qtr FY95 by the Army Reserves and becomes an Air Force asset.

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Hanscom AFB can absorb 934 additional workyears based on the UMD downsizing of 533 and 401 due to the facility modifications to Bldgs 1605 and 1607.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alteration projects programmed in the FY95 PBS. (BRAC Criteria II)

There would be a $5,751,840 impact if facility modifications to Bldg 1605 and 1607 were inserted into the FY95PB.

3.5.2 **Land Use:** Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

There is approximately 41.32 buildable acres of land for additional laboratory/administrative support construction at Hanscom AFB.

3.5.3 **Utilities:** Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

The base utility systems have the following excess daily capacities:

Electric - 8.9 MW/day
Gas - 202.8 MCF/day
Water - 2,304,188 Gal/day

RL- HANSCOM

CONTROL NUMBER: LJCSWG-AF 023

PURPOSE: To provide SAF/AQX staff corrected answers to Question 3.2.4.2 Papers published in peer reviewed journals, of the (see Distribution List) response to the Laboratory Joint Data Call. For each CSF in which you perform work, provide a list of papers published in peer reviewed journals by your government personnel during FY 1991 through FY 1993. The papers listed must directly support the CSF. For each paper listed provide both the title of the article and the journal in which it was published, and the month and year of publication. Do not list papers prepared by non-government personnel or other personnel who were not employed by your activity, even if the paper was prepared in support of a contractual requirement. Do not list papers published in non-peer reviewed journals; technical, letter, test, and other reports; manuals and handbooks; presentations at symposiums; etc.

METHOD: Comparison of answers to questions

CONCLUSION: Answers must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain)

MAJCOM REVIEWER: [signature] 21 Sep 94
(print name, organization, DSN)
Chung C Kang, HQ, AR Force/ST, 787-5868

BASE: Concurs Does not concur (explain)

Rome Lab Hanscom answer to question 3.2.4.2 has been modified to include name of journal and month & year of journal article publication. Modified answer is attached with 20 Sept 94 as signature date.

Robert V. McGahan

BASE REVIEWER: Robert V. McGahan, RL/ER, DSN 478-3700
(print name, organization, DSN

I certify the information above is accurate and complete to the best of my knowledge and belief.

DATE: 22 Sep 94

MEMORANDUM FOR RECORD, SAF/AQT

AIR STAFF CORRECTION WORKSHEET

PURPOSE: To provide corrected answer to Question Number 3.2.4.2 Papers published in peer reviewed journals, Rome Laboratory, Hanscom AFB, MA, Data Call.

SOURCE: Installation Worksheets (Robert V. McGahan, RL/ER, DSN 478-3700).

METHOD: Review of Installation Worksheets (19 Sep 94) submitted for Air Force data call, telecon, and FAX communications with MAJCOM and Base POCs.

CONCLUSION: The corrected papers published in peer reviewed journals data is shown in attached worksheets and tables/lists for Rome Laboratory, Hanscom AFB, MA.

MAJCOM CONCURS: (See attached FAX copies)
Major Chung C. Kang, HQ AFMC/STC, Wright-Patterson AFB, DSN 787-5368.

BASE CONCURS: (See attached Installation Worksheets)
Mr. Robert V. McGahan, RL/ER, Hanscom AFB, DSN 478-3700.

I certify that the above/attached information is accurate and complete to the best of my knowledge and belief.

AIR STAFF REVIEWER: Paul D. Copp **DATE:** 22 Sep 94
Paul D. Copp, Lieutenant Colonel, USAF

LABORATORY JOINT CROSS-SERVICE GUIDANCE PACKAGE

ROME LABORATORY AT HANSCOM AFB, MA

Purpose: To document the Rome Laboratory (Hanscom) answer to question 3.2.4.2

Source: See preparer's name below. Information obtained from Ms Avrille C. Duprat (RL/ERM, management resources assistant, DSN 478-4088) and Ms Sheila C. Belliveau (RL/ERM, management resources assistant, DSN 478-5210), who keep running logs of publication actions undertaken by Rome Lab Hanscom personnel. These logs show author, article title, journal title, and publication date of all articles published by Rome Lab Hanscom scientists and engineers. Additionally, Dr Robert J. Mailloux (RL/ER, senior scientist, DSN 478-3710) reviewed these logs to ensure that only articles published in journals that are peer-reviewed were being included in this answer.

Method: Data extraction and professional judgement. Data extracted were sorted and tabulated as shown below.

Conclusion:

CSF	Number Published	Paper Titles (List)
Airborne C4I	122	see listing below this table
TOTAL	122	

FY-91

In Situ Synthesis and Magnetically Stabilized Kyropoulos Growth of InP -- Materials Research Society, Oct 90

Investigation of Possible Superconductivity in Titanium Borides -- Materials Research Society, Dec 90

A Comparison of Buried Oxide Characteristics of Single & Multiple Implant Simox & Bond & Etch Back Wafers -- IEEE Transactions on Nuclear Science, Dec 90

MLEK Crystal Growth of (100) Indium Phosphide -- Journal of Electronic Materials, Jul 91

In-Situ Synthesis and Crystal Growth of High Purity InP -- Journal of Electronic Materials, Sep 91

Electron-Acoustic Phonon Scatter in SiO2 Determined from a Pseudo-Potential for Energies of E>EBZ -- Journal of Applied Physics, Aug 91

High Purity InP Grown on Si by Organometallic Vapor Phase Epitaxy -- Applied Physics Letters, Mar 91

The Influence of Dislocation Density on Electron Mobility in InP Films on Si -- Applied Physics Letters, Mar 91

Growth of High Purity InP and Fabrication of High Sensitivity InP/InGaAs Heterojunction Phototransistors on Silicon by OMVPE -- Proc of the 3rd International Conference on InP and Related Materials, Jun 91

High T S-I-S and S-N-S Structures Using RF Sputtered Films -- IEEE Transactions on Magnetics, Mar 91

The Determination of the Oxygen Stoichiometry in High Tc Superconducting Thin Films Using Nuclear Scattering of 3 MeV Protons -- Materials Research Society, Dec 90

Melt Processing of Superconductors in the Bi-Ca-Sr-Cu-O System -- Materials Research Society, Dec 90

Distortion Invariant Pattern Recognition in Photorefractive Media -- Applied Optics, Aug 91

Modified Two-Focal-Length Optical Correlator -- Applied Optics, Oct 90

Direct Excitation of Microwave-Spin Dressed States Using a Laser-Excited Resonance Raman Interaction -- Physical Review Letters, Oct 90

Self Pumped Optical Phase Conjugation with a Sodium Raman Laser -- Optics Letters, Jul 91

Effects of Quadratic Phase Distortion on Correlation Performance -- Applied Optics, Apr 91

Metrics for Assessing Pattern Recognition Performance -- Applied Optics, Apr 91

Theory of the Binary Phase-Only Filters for Optical Pattern Recognition -- Applied Optics, Mar 91

Frank-Read Source Activated Flux Shear in Type II Superconductors -- Physical Review, Feb 1991

Binary Phase Only Filter Associative Memory -- Applied Optics, Jun 91

III-V Dielectric Technology - The Low Temperature Trend -- Journal of the Electrochemical Society, Dec 90

A Patterned and Passivated Organic-Inorganic Semiconductor Heterojunction Diode -- IEEE Photonics Technology Letters, Oct 90

The Impact of Spatial Noise on Infrared Imagery -- Journal of the Optical Society of America, Jan 91

Waveguided Electrooptical Intensity Modulation in a S/GexSil-xSi Heterojunction Bipolar Transistor -- Electronics Letters, Oct 90

Predicted Bandgap of the New Semiconductor SiGeSn -- Applied Physics Letters, Nov 90

Optical Waveguiding in Multiple Silicon-on-Insulator Layers -- Materials Research Society, Oct 90

Optical Waveguides in Simox Structures -- Electronics Letters, Dec 90

Large Single Mode Rib Waveguides in GeSi/Si and Si-on-SiO2 -- IEEE Journal of Quantum Electronics, Mar 91

Optical Waveguiding in Si/Si1-xGex/Si Heterostructures -- Journal of Applied Physics, Aug 91

Optical Bandgap of the Ternary Semiconductor Si(1-x-y)Ge(x)C(y) -- Journal of Applied Physics, Aug 91

The Gibbs Dividing Surface and the Excess Surface Energy -- Molecular Physics, Dec 90

Noise Reduction Using Adaptive Spatial Filtering in Photorefractive Two Beam Coupling -- Optics Letters, Dec 90

Photorefractive Holographic Interference Novelty Filter -- Optics Communications, Dec 90

Photorefractive Optical Lock-In Detector -- Optics Letters, Sep 91

Photorefractive Time Correlation Motion Detection -- Optics Communications, Aug 91

9.6 GHz Shift Register Blazes Trail for Superconducting Logic -- Electronic Design, Sep 91

Full Wave Analysis of Proximity Coupled Rectangular Microstrip Antenna Arrays -- Electromagnetics Journal, Apr 91

Millimeter Wave Mixing with Josephson Weak-Link Using High TC Superconductors -- Applied Physics Letters, Jun 91

Surface Impedance Measurements of Thin Film Superconductors at Millimeterwave Frequencies -- Bulletin of the American Physical Society, Feb 91

FY-92

MLEK Crystal Growth of InP -- Journal of Electronic Materials, Dec 91

Time and Temperature Dependence of Phosphorus Vapor Pressure as Measured by a Pressure-Balanced, Sealed-Ampoule Technique -- IEEE Conference Proceedings on 4th International Conference on InP and Related Materials, Apr 92

Determination of Fe2+ and Fe3+ concentrations in semi-insulating InP:Fe -- IEEE Conference Proceedings on 4th International Conference on InP and Related Materials, Apr 92

Near Infrared Microscopy for the Determination of Dopant Distributions and Segregation in N-type InP -- IEEE Conference Proceedings on 4th International Conference on InP and Related Materials, Apr 92

In-Situ Synthesis and Crystal Growth of High Purity InP -- IEEE Conference Proceedings on 4th International Conference on InP and Related Materials, Apr 92

Structural and Electrical Characterization of Low-Temperature, Low-Pressure SiO2 on Si -- Journal of the Electrochemical Society, Dec 91

Effects of Ytterbium Addition on Liquid Phase Epitaxial Growth of InGaAs/InP Hetero-structures -- Conference Proceedings, 4th International Conference on InP and Related Materials, Apr 92

Low-Defect Colorless Bi12SiO20 Grown by Hydrothermal Technique -- Applied Physics Letters, Apr 92

The Low-Temperature Photochromic Response -- Journal of Applied Physics, Sep 92

First Observation of Forces on Three-Level Atoms in Raman Resonant Standing Wave Optical Fields -- Physical Review Letters, Jul 92

Clarification of "Horner Efficiency" -- Applied Optics, Mar 92

Effects of Quadratic Phase Distortion on Correlator Performance -- Applied Optics, Jul 92

POPART: Partial Optical Implementation of Adaptive Resonance -- Applied Optics, Sep 92

Near Infrared and Visible Photoluminescence Studies of Porous Silicon -- Materials Research Society Abstract Book, Dec 91

Optical Characteristics of Planar Waveguides in SIMOX Structures -- Materials Research Society Abstract Book, Dec 91

Electro-optic Fabry-Perot Pixels for Phase-dominant Spatial-light Modulators -- Applied Optics, Feb 92

Electrooptical and Non-linear Optical Coefficients of Ordered Group IV Semiconductor Alloys -- Applied Physics, Jul 92

Nonlinear Refractive Index of IV-IV Compound Semiconductors -- Applied Optics, Jul 92

Lattice-matched SiGeC/Si Heterostructures for Optics, Electro-optics and Electronics -- IEEE Photonics Technology Letters, Jul 92

Optical Dispersion Technique for Time Delay Beam steering -- Applied Optics, Aug 92

Photoluminescence Spectra from Porous (111) Microstructures' Temperature & Magnetic Field Effects -- Applied Physics Letters, Jun 92

Photoluminescence from Si1-xGex Strained Layers Grown by Atmospheric Pressure Chemical Vapor Deposition -- Journal of Applied Physics, Jun 92

Nonlinear Response to Picosecond Pulse Excitations in Magneto-Dielectric Media -- IEEE Transactions on Microwave Theory & Techniques, Sep 92

18-42 GHz Experimental Version of Microstrip Coupler and Open End Capacitance Models -- IEEE Transactions on Microwave Theory and Techniques, Feb 92

Improvement of RF Performance of GaAs/SI MISFETs -- IEEE Electronic Devices Letters, Jul 92

Monolithic InP HEMT V-Band Low Noise Amplifier -- IEEE Microwave and Guided Wave Letters, Mar 92

The Impact of New Physics on Microwave Applications -- Bulletin of the American Physical Society, Nov 91

Magnetic Tuning of a Microstrip Patch Antenna Fabricated on a Ferrite Film -- Electronics Letters, Dec 91

Gamma Radiation Effects in Breakdown on Bond and Etch Back SOI Capacitors -- Electrochemical Society Abstracts, Oct 91

Forces on Three Level Atoms Including Coherent Population Trapping -- Optics Letters, Nov 91

Video Imagery with IR Cameras -- Scientific American, Mar 92

Frequency Dependent Surface Resistance Measurement Technique Using TE Cylindrical Cavity Modes -- IEEE Microwave and Guided Wave Letters, Apr 92

Process Characterization and Evaluation of Hydride VPE-Grown InGaAs, Using a Ga/In Alloy Source -- Journal of Electronic Materials, Apr 92

FY-93

Critical Current Magnetic Field Dependence of YBa2Cu3O7 -- Superconductivity Science & Technology, Mar 93

Photorefractive De-amplification for Additive Signal Dependant Noise Reduction -- Optical Engineering, Mar 93

A Monopole Antenna Loaded with a Modified Folded Dipole -- IEEE Transactions on Antennas & Propagation, Jul 93

Characterization and Synthesis of Solution-derived high TC Bismuth Cuprate Superconducting Tapes -- Materials Research Society Proceedings, Apr 93

MLEK Crystal Growth of (100) InP -- Journal of Crystal Growth, Mar 93

Phosphorus-Rich InP Grown by a One Step 'In Situ' MLEK Crystal Growth Process -- IEEE Conference Proceedings of 5th International Conference on InP and Related Materials, Apr 93

Evolution and Application of the Kyropoulos Crystal Growth Method -- AACG Newsletter, Jun 93

Snell's Law Applied to Finite Surfaces -- IEEE Transactions on Antennas and Propagation, Feb 93

Evaporated Thin Silicon Interlayers for InP Device Applications -- IEEE Conference Proceedings of 5th International Conference on InP and Related Materials, Apr 93

Effects of Ytterbium Addition on Liquid Phase Epitaxial Growth of InGaAs/InP Heterostructures -- Materials Research Society Symposium Proceedings, Apr 93

Multiple Frequency Surface Resistance Measurement Technique Using a Multimode TE 01n Cylindrical Cavity on a T1BaCaCuO Superconducting Film -- IEEE Microwave and Guided Wave Letters, Nov 92

Vortex Dynamics of YBCO Films Studied Using the Surface Impedance Zs(w,T,H) -- Bulletin of the American Physical Society, Mar 93

Measurements of Anistropic Characteristic Lengths in YBCO Films at Microwave Frequencies -- Journal of Applied Physics, May 93

Advances in Fabrication & Processing of Bulk Optical Transactions -- Solid State Optical Materials, Oct 92

Photorefractive Two-Beam Coupling Joint Transform Correlator -- Journal of the Optical Society of America, Sep 93

The Low-Temperature Photochromic Response of Bismuth Silicon Oxide -- Journal of Applied Physics, Feb 93

Semiconductor Laser Excitation of Ramsey Fringes Using a Raman Transition in a Cesium Atomic Beam -- Journal of the Optical Society of America, Apr 93

Continuous Pol-grad Pre-cooling for Loading a Sub-recoil Temperature Trap -- Bulletin of the American Physical Society, May 93

Critical Current Magnetic Field Dependence of YBa2Cu3O7 -- Superconductivity Science & Technology, Mar 93

Dual-Sided Lithography Accuracy Measurements -- Applied Optics, Dec 92

Edge-Enhancement Techniques for Improving the Performance of BPOF Recognition Devices -- Optical Engineering, Jan 93

Doppler Imaging Based on Target Precession -- IEEE Transactions on Aerospace and Electronic Systems, Jan 93

Hydrothermal Growth of Bismuth Silicate -- Journal of Crystal Growth, Mar 93

Phased Array Correction Scheme -- Electronics Letters, Apr 93

Microwave Imaging of Strongly Scattering Structures Using Cepstral Filtering Techniques -- Progress in Electromagnetics Research Symposium (PIERS) Proceedings, Jul 93

Practical Near Field Measurements -- IEEE Transactions on Antennas and Propagation, Sep 93

Optical Dispersion Technique for Time-Delay Beamsteering -- Applied Optics, Dec 92

Variable Time Delay of Microwave Signals Using High Dispersion Fiber -- Electronics Letters, Mar 93

Intersubband 1.55 um Electro-optical Modulation in SIG Asymmetric Quantum-Well Structures - - Materials Research Society Proceedings, Apr 93

Strain Studies of Silicon-Germanium Epilayers on Silicon Substrates Using Raman Spectroscopy -- Applied Physics Letters, Aug 93

Asymptotic Analysis of Mutual Coupling in Concave Circular Cylindrical Arrays - Part I: Far-Zone -- IEEE Transactions on Antennas & Propagation, Feb 93

Asymptotic Analysis of Mutual Coupling in Concave Circular Cylindrical Arrays - Part II: Near-Zone -- IEEE Transactions on Antennas & Propagation, Feb 93

Investigation of Near Interface Properties in Semi-Insulating InP Substrates with Epitaxial Grown InGaAs and InAlAs by Photoreflectance -- Journal of Applied Physics, Feb 93

Photorefractive Deamplification for Additive Signal Dependent Noise Reduction -- Optical Engineering, Mar 93

Photorefractive Quadratic Processor for Signal Recovery from Multiplicative Complex Noise -- Optical Engineering, Sep 93

Kink Excitations and Fluxon Oscillators in Coupled Long Josephson Junctions -- IEEE Transactions on Applied Superconductors, Mar 93

Vortex Dynamics of YBCO Films Studied Using the Surface Impedance Zs(w,T,H) -- Bulletin of the American Physical Society, Mar 93

Experimental Results on a Scanned Beam Microstrip Antenna Array with a Proximity Coupled YBCO Feed Network -- IEEE Journal of Applied Superconductivity, Mar 93

Measurements of Vehicle Potential During the CHARGE 2B Electron Beam Experiment -- EOS Transactions, Nov 92

Analysis of Arbitrary Planar Microstrip Lines In a Double Grounded Dielectric Layer -- IEEE Transactions on Microwave Theory and Techniques, Apr 93

Second Order Terms of the Effective Complex Dielectric Constants of Foliage Media -- IEEE Transactions in Antennas & Propagation, Nov 92

Determination of InP HEMT Noise Parameters and S-Parameter to 60 GHz -- IEEE Transactions on Microwave Theory and Techniques, Feb 93

An Alternative Amplifier Stability Factor -- IEEE Microwave and Guided Wave Letters, Apr 93

Measurements and Modeling of Linear and Nonlinear Effects in Striplines -- Journal of Superconductivity, Dec 92

Effects of SLM Dead Zones on Optical Correlation -- Applied Optics, Dec 92

SiGeSnC Cubic Alloys for Lattice-Matched Optoelectronic Hetero-structures -- IEEE Journal of Quantum Electronics, Oct 92

Anomalous Built-in Electric Field in Semi-Insulating InP Substrate Near the Interface with InGaAs and InAlAs Epilayers -- Journal of Applied Physics, Feb 93

Monolithic GaAs 36GHz 4-bit Phase Shifter -- IEEE Microwave & Guided Wave Letters, Jan 93

Photorefractive Frequency Converter and Phase Sensitive Detector -- Journal of the Optical Society of America, Jan 93

Common Support Function: Airborne C4I

I certify that the above information is accurate and complete to the best of my knowledge and belief.

Preparer: Robert V. McGahan Date: 20 Sep 94

Robert V. McGahan, GM-15, Rome Laboratory/ER, 478-3700
Typed Name, Rank, Office Symbol, DSN Number

I certify that the above information is accurate and complete to the best of my knowledge and belief.

MAJCOM Reviewer: [illegible] Date: 21 Sep 94

[illegible] MAJ, [illegible]/ST, 787-5318
Typed Name, Rank, Office Symbol, DSN Number

3.3.1 FY93 Workload

3.3.1.1 **Work Year and Lifecycle:** Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	**126**	**22**	**0**	**4**
Engineering Development	**0**	**0**	**0**	**0**
In-Service Engineering	**0**	**0**	**0**	**0**

3.3.1.2 **Engineering Development By ACAT:** For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:
- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	**(Name)**	**None**		**(Description)**

ACAT ID	**(Name)**	**None**		**(Description)**
ACAT II	**(Name)**	**None**		**(Description)**
ACAT III/IV	**(Number)**	**None**		**(List)**
Other	**(Number)**	**None**		**(List)**

3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	**In-Service Engineering Efforts (List)**	**FY93 Actual**		**Weapon System(s) Supported**
		Funds Received (Obligation Authority)	**Workyears**	
	None			

3.3.2 **Projected Funding**

3.3.2.1 **Direct Funding:** For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	**FY94**	**FY95**	**FY96**	**FY97**
Airborne C4I 3600	**12 M**	**11 M**	**13 M**	**12 M**

3.3.2.2 **Other Obligation Authority:** For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

Masters	**1**	**0**	**0**
Doctorate (include Med/Vet/etc.)	**1**	**0**	**0**

3.2.3 **Experience:** What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	**Years of Government and/or Military Service**				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	**10**	**29**	**27**	**5**	**35**
Management (Supv)	**0**	**2**	**2**	**5**	**11**
Total	**10**	**31**	**29**	**10**	**45**

Additionally, the corresponding figures for "other" personnel as defined in 3.2.2 above are
0 for 0 - 3 years
4 for 3 -10 years
6 for 11 -15 years
7 for 16 - 20 years
6 for over 20 years

Also, all 4 SETA personnel have over 20 years of experience.

3.2.4 **Accomplishments During FY91-93:** For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
Airborne C4I	**34**	**38**	see listing below this table
Total	**34**	**38**	

PATENTS: (38)

FY-91

High Temperature Heat Pipe Coracle and Process

Superconductor Switch

Normal Incidence Optical Switches Using Ferroelectric Liquid Crystals

Method for Measuring Large Antenna Arrays

Low Loss Semiconductor Directional Coupler Switches Including Gain Method of Switching Light Using Same

Mechanically Rotated Doppler Frequency Shifter

Lossless Non-Interferometric Electro-Optic III-V Index-Guided-Wave Switches and Switching Arrays

Modified Compact 2F Optical Correlator

Amplitude Encoded Phase-Only Filters for Optical Correlators

Single SLM Joint Transform Correlators

Non-Contact Polishing

Waveguided Electrooptic Switches Using Ferroelectric Liquid Crystals

FY-92

Fiber Optic Calibration Structure Apparatus

Compact 2F Optical Correlator

Alignment-Insensitive Method for Wideband Tuning of an Unmodified Semiconductor Laser

Electromagnetic Stripline Coupler Apparatus

Gas Cylinder Safety Valve & Gas Recovery System

Electrooptic Fabry-Perot Pixels for Phase-Dominant Spatial Light Modulators

Nonlinear Joint Transform Optical Correlator Having Varying Degrees of Non-linearity

Apparatus for Direct Measurement of Dose Enhancement

Actively Cooled Effusion Cell for Chemical Vapor Deposition

Apparatus and Method for Controlling Gradients in Radio Frequency Heating

Heat Pipe Susceptor for Epitaxy

Semiconductor Guided-Wave Programmable Optical Delay Lines Using Electrooptic Fabry-Perot Elements

Average Amplitude Encoded Phase-Only Filters for Use in Fourier Transform Optical Correlators

FY-93

Silicon Spatial Light Modulator

Paraboloidal Reflector Alignment System Using Fringe Pattern

Lattice Mismatched Hetro-structure Optical Waveguide

Platinum Silicide Infrared Diode

Zone Melted Recrystallized Silicon on Diamond

ARC Range Test Facility

Real-Time Automated Scene Display for Infrared Camera

Capillary Pressure Relief for Magnetic Kyropoulos Growth of Semiconductor Crystals

Chemical Vapor Deposition Method Using an Actively Cooled Effuser to Coat a Substrate Having a Heated Surface Layer

Selfmixing Heterodyne System

Technique for Stationary Radar Discrimination

Transmissive Doppler Frequency Shifter

Multi-Speaker Conferencing Over Narrowband Channels

DISCLOSURES (34)

FY-91

Method of Fabricating Low-Loss Crystalline Silicon Waveguides

Twin-Free Crystal Growth of III-V Semiconductor Material

Improved Platinum Silicide Infrared Diodes for Space Applications

Superconducting Radar Decoys and Camouflage

Flat Saw for Semiconductor Wafer Slicing

Application of Heavy Metal Fluoride Glasses Frequency Upconversion for Infrared Detectors and Sensors

FY-92

Multi-Speaker Conferencing Over Narrowband Channels (Foreign International Application)

Heavy-Metal Fluoride Glass Apertures

Binary Encoding of Gray Scale Nonlinear Joint Transform Correlators

Self-Pumped Optical Phase Conjugation with a Sodium Raman Laser

Photorefractive Transient Interferometer and Novelty Filter

Binary Phase-Only Filter Associative Memory

Quadratic Optical Processor for Noise Reduction and Wavefront Metrology

A Multi-Rate STC Speech Compression Technique for Speech Data Storage

An Apparatus for Enhancing Anharmonic Oscillations in Deuterated Palladium Alloys

FY-93

Magnetic Field Operated Superconductor Switch and Method for Switching

Process and Apparatus for Controlled Synthesis and In-Situ Single Crystal Growth of Phosphorus Compounds and the Crystals Therefrom

Concentrators for Image Sensors

Joint Transform Correlator Using a 4-F Lens System to Achieve Virtual Displacement Along the Optical Axis

Method for Two Dimensional Doppler Imaging of Radar Targets

Elliptical Near Field Test Facility

Noise Immune Automated Contrast Control for Infrared Cameras

Optical Pattern Recognition System for Verifying the Authenticity of a Person, Product, or Thing

Patch Antenna with Magnetically Controllable Radiation Polarization

Piezoelectric Superconducting Transistor

Process for Making S10 Layers on Schottky Diodes

Conical Megnetron Sputter Source

Optical Method for Detecting Irregularities in Uniform Flat Surfaces

Photorefractive Nonlinear Joint Fourier Transform Correlator

A Process for Producing Stand-Alone Thin Films

STC Speech Packet Reconstruction Techniques for Heterogeneous Mobile/Packet Network Environments

All Optical Phase Sensitive Detector and Image Demultiplexer

Double-Folded Monopole

Optical Signal Dependent Noise Reduction Using Variable Spectral Thresholding

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
Airborne C4I	142	see listing below this table
TOTAL	142	

FY-91

In Situ Synthesis and Magnetically Stabilized Kyropoulos Growth of InP

Investigation of Possible Superconductivity in Titanium Borides

A Comparison of Buried Oxide Characteristics of Single & Multiple Implant Simox & Bond & Etch Back Wafers

Radiation Response of Diamond Films

Gamma Radiation Effects in Breakdown on Bond and Etch Back SOI Capacitors

MLEK Crystal Growth of (100) Indium Phosphide

In-Situ Synthesis and Crystal Growth of High Purity InP

CSF	FY94	FY95	FY96	FY97
Airborne C4I	20 M	20 M	18 M	17 M

3.4 Facilities and Equipment

3.4.1 **Major Equipment and Facilities:** Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
Airborne C4I	Ipswich Electromagnetic Measurement Facility	X			6,744
	Prospect Hill	X			4,792
	Sudbury Research Facility	X			2,383
	INFOSEC Research Facility	X			1,562
	Semiconductor High Pressure Crystal Growth Facility			X	1,140
	Hydrothermal High Pressure Crystal Growth Facility			X	890
	Semiconductor Epitaxy Thin Film Growth Facility	X			2,464
	Clean Rooms				1,557

IPSWICH ELECTROMAGNETIC MEASUREMENT FACILITY

The Ipswich Electromagnetic Measurement Facility is designed specifically to investigate electromagnetic techniques for novel antenna systems for communications and radar systems; to provide field test support during evaluation of new antenna concepts; and to investigate the monostatic and bistatic radar signal scattering properties of both clutter signals and radar returns from low cross-section (stealthy) targets. The facility is uniquely situated away from interfering sources of man-made electronic noise on a peninsula that provides unobstructed line of sight ranges across a half-mile wide valley or across a bay at the edge of the Atlantic Ocean. Also available are wooded and cleared sections of land to give a variety of environmental conditions to evaluate radar and antenna techniques. An anechoic chamber permits radar reflectivity measurements on scaled models of targets. The facility supports far field (2600 ft) antenna pattern measurements from UHF to 94 GHz; near field antenna measurements (cylindrical & planar) from "S" through "Q" band; indoor radar cross-section measurements on scaled models from 2 to 12 GHz (bistatic) and from 2 to 40 GHz (monostatic); and outdoor radar clutter measurements (both monostatic and bistatic) in "S" and "C" bands. Ipswich is the only facility we know of in DOD capable of far-field antenna testing in these frequency ranges under such well-controlled and variable (over land and over water) environmental and electromagnetic conditions.

PROSPECT HILL

Prospect Hill is a research site located on one of the highest points of land within a 25 miles radius. Its elevated position is necessary to allow line-of-sight radio/radar system experiments over long distances. From Prospect Hill, line-of-sight distances of 50 or 60 miles are possible; without it, trees, buildings, and terrain features limit our line-of-sight testing to a mile or two at best -- totally insufficient. The site contains a building with laboratories, a machine shop, and office space. Additionally, the site has a pedestal-mounted paraboloidal antenna, 29 ft in diameter, with a 35 GHz design frequency, a 0.07 degree beamwidth, and digitally controlled to an accuracy of 0.015 degree. This antenna is suitable for a number of uses, including investigations of the interactions between the troposphere and systems operating at microwave and millimeter wavelengths. A coherent sub-millimeter wave radar range for model target cross-section measurements is installed in the building. The roof over the main laboratory was built to support heavy antenna loads at a height unobstructed by local vegetation.

Additionally, test instrumentation is installed at Prospect Hill to make it work with the Sudbury Research Facility (see below) as part of a bistatic radar test range. The topography and location of Prospect Hill and Sudbury and their location with respect to Boston's Logan Airport make them, to our knowledge, the only fully polarimetric, counter-stealth, large-angle, bistatic radar test facility in DOD.

SUDBURY RESEARCH FACILITY

Like Prospect Hill, the research facility at Sudbury MA is located above the local trees, buildings, and hills and is an excellent location for line-of-sight testing. The Sudbury site is on 60 acres of land. It has two buildings holding office space and computer facilities, and four towers (ranging from 30 feet tall to 70 feet tall) for installation of radar or communications antennas. Using the high-power Sudbury transmitter in conjunction with Prospect Hill, Rome Lab has built a bistatic radar test facility to support research into ways to take the stealth out of stealthy enemy aircraft. The topography and location of Prospect Hill and Sudbury and their location with respect to Boston's Logan Airport make them, to our knowledge, the only fully polarimetric, counter-stealth, wide-angle, bistatic radar test facility in DOD.

INFOSEC RESEARCH FACILITY

The Information Security Research Facility supports research in three disciplines: (a) research on techniques and algorithms for speech compression and voice systems operating in high ambient acoustic noise environments, (b) research to improve C2PROTECT (compromising emanations) testing and analysis systems, and (c) communications security (COMSEC) research. As a leading developer of multi-rate speech coding algorithms in support of AF programs such as the F-22, Rome Lab has the capability to test multi-rate speech coders in real time, using human subjects in realistic acoustic noise environments. As part of this capability, the facility has sound chambers capable of sustaining noise fields up to 115 dB SPL (sound pressure level), along with several other acoustically isolated communications stations, all of which are connected with digital communications links. The nature and quality of these links can be controlled and varied in real time to simulate a complete spectrum of noise and performance environments, including a nuclear environment. Because this was the only site capable of such testing, DCA (now DISA) used the facility to conduct speech testing in a simulated nuclear environment during the Jam Resistant Secure Communications program. The facility can record and reproduce test material with human subjects for in situ noise recordings, considered by experts to

be crucial for realistic testing. The facility has generated all the MOS (mean opinion score) test material for the Department of Defense Digital Voice Processor Consortium (DDVPC) 2400 bit per second speech coder evaluation and was selected by the DDVPC to be the repository of the DDVPC master library, the most complete set of test material in the country. This is the only facility in DOD with the expertise, equipment, and resources to generate this type of material and to conduct this type of testing of digital systems using human subjects and accurately reproduced acoustic and electromagnetic noise.

SEMICONDUCTOR HIGH PRESSURE CRYSTAL GROWTH FACILITY

The major apparatus in this facility is a magnetic-field-assisted crystal growth system, equipped for in-situ synthesis of phosphides (e.g., indium phosphide, zinc germanium diphosphide) by injection synthesis. This growth system, capable of operation at a pressure of 60 atmospheres, and currently used for Rome Lab's celebrated magnetic field encapsulation Kyropoulos indium phosphide bulk crystal growth, is unique in the world because of its in-situ phosphorus injection capability and its use of magnetic fields to improve the purity and quality of crystals grown. Additionally, there are other crystal growth systems and an infrared microscope. The microscope (which we believe to be unique in the world) operates in the near-infrared region of the electromagnetic spectrum and is used to image and quantify micro-imperfections in indium phosphide crystals resulting from growth fluctuations and dopant inhomogeneities.

HYDROTHERMAL HIGH PRESSURE CRYSTAL GROWTH FACILITY

This integrated system of 11 high pressure autoclaves (ranging from one inch to four inches inside diameter and operating at pressures up to 2000 atmospheres) is used to grow advanced photonic crystals by high temperature solution growth which could not be produced by other techniques. The facility is housed in a specially designed high pressure building and includes complete computer and alarm functions. Although some manufacturing capability exists in industry, (in autoclaves four inches to twenty inches in diameter, primarily for quartz growth) and some small-diameter research capability can be found at a very few universities (one half inch to two inch autoclaves), this AF facility has a significantly more advanced data acquisition and control system than any other we know of. Unique in the US, it is the only facility specifically designed to demonstrate how to grow difficult crystal materials initially and then, just as importantly, how to adapt that technology to grow those crystals in commercially viable sizes.

SEMICONDUCTOR EPITAXY THIN FILM GROWTH FACILITY

This facility has two metal-organic chemical vapor deposition (MOCVD) systems, one of which is specifically designed for both atomic layer epitaxy (ALE) and normal MOCVD, for depositing semiconductor epitaxial thin films and ultrastructures on semiconductor substrates. Because of the extreme toxicity of the gases used in the MOCVD process, this facility has a separate one-pass air circulation system, with back-up air handler, that keeps the facility at a negative air pressure, relative to the other nearby labs, to maintain control of the toxic gases in the event of an accident. The ALE/MOCVD system is unique in the DOD, and possibly in the federal government.

CLEAN ROOMS

Rome Lab at Hanscom AFB contains five clean rooms used for research on a wide variety of electronic and photonic devices and semiconductor materials, including monolithic microwave and millimeterwave integrated circuit (MMIC) components, laser diodes, photorefractive crystals and films, magneto-optic materials, superconductors, monolithic phased array antenna components, and infrared phased array detectors. Equipment available within these clean rooms includes mask aligners, photoresist spinners, ultraviolet exposure systems, dopant and annealing furnaces, ultrasonic bonders, surface profilers, vacuum chambers, ultrapure water systems, fume hoods, shock-isolated benches, microscope systems, saws and polishers for processing crystaline materials, ultrasonic cleaners, and a wide variety of other support equipment.

3.5 Expansion Potential

3.5.1 **Laboratory Facilities:** Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

			Space Capacity (KSF)

Common Support Function	Facility or Equipment Description	Type of Space*	Current	Used	Excess
Airborne C4I	Bldg 1105A	Technical	14.8	14.8	0
		Admin	4.6	4.6	0
	Bldg 1108	Technical	0.6	0.6	0
	Bldg 1120	Technical	4.4	4.4	0
		Admin	0.3	0.3	0
		Utilities	0.3	0.3	0
	Bldg 1121	Admin	3.5	3.5	0
		Storage	0.2	0.2	0
		Utilities	0.2	0.2	0
	Bldg 1122	Technical	3.9	3.9	0
		Admin	0.8	0.8	0
		Utilities	0.3	0.3	0
	Bldg 1123	Technical	14.8	14.8	0
		Utilities	2.3	2.3	0
	Bldg 1124	Technical	7.4	7.4	0
		Admin	0.5	0.5	0
		Utilities	0.6	0.6	0
	Bldg 1128	Technical	12.2	12.2	0
		Admin	3.3	3.3	0
		Utilities	2.9	2.9	0
	Bldg 1138	Technical	17.9	17.9	0
		Admin	1.4	1.4	0
		Utilities	2.6	2.6	0
	Bldg 1140	Technical	11.4	11.4	0
		Utilities	0.6	0.6	0
	Bldg 1141	Technical	10.6	10.6	0
		Utilities	0.4	0.4	0
	Bldg 1142	Technical	5.2	5.2	0
		Utilities	1.0	1.0	0
	Q-Hut	Storage	0.9	0.9	0
	Ipswich	Technical	6.9	6.9	0
		Admin	0.6	0.6	0
		Storage	2.6	2.6	0
		Utilities	0.2	0.2	0
	Prospect Hill	Technical	3.3	3.3	0
		Utilities	0.2	0.2	0

*** Administrative, Technical, Storage, Utility**

These numbers do not include 65 acres (2,831 K sq ft) of leased land at the Ipswich site and 6 acres (261 K sq ft) of leased land at the Prospect Hill location. If included, both of these areas would be listed as "technical".

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

The radar clutter testing area at the Ipswich test site can support an additional 5 manyears of radar research with no modifications. Additionally, the bistatic radar test range set up using the Prospect Hill and Sudbury sites can also support an additional 5 manyears of research with little or no modification.

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

An additional 64 workyears can be supported over the projected FY-97 workload.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alteration projects programmed in the FY95 PBS. (BRAC Criteria II)

Rome Lab at Hanscom has no military construction program items in the FY-95 PBS.

3.5.2 Land Use: Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

A total of 41.32 acres are available on Hanscom AFB to accommodate expansion of Rome Lab, Electronic Systems Center, and/or Phillips Lab, all of which currently occupy space on HAFB.

3.5.3 **Utilities:** Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

There is an excess capacity of 2,304,188 gallons per day of water, ~~202.8~~MCF/day of natural gas, and 8.9 MW of electricity available at Hanscom AFB to accommodate expansion of Rome Lab, Electronic Systems Center, and/or Phillips Lab, all of which currently use the HAFB utilities.

SEE CORRECTION DATED 12 July, 1994

DATE: 12 July, 1994

MEMORANDUM FOR RECORD, AF/CEPP

AIR STAFF CORRECTION WORKSHEET

PURPOSE: To provide corrected answer to Question 3.5.3. Utilities. in the Joint Cross Service Data for Hanscom Labs. Hanscom AFB

SOURCE: MAJCOM engineers.

METHOD: Telecon with MAJCOM & Base POCs

CONCLUSION: The capacity and current usage for utilities was misstated for the following:

Utility	Existing Data	Change To
Nat Gas	202.8 MCF	7.368 MCF/D and 37.7% useage

MAJCOM CONCURS: Maj Chang Kang, HQ AFMC/STC, Wright Patterson AFB, DSN: 787-5368.

BASE CONCURS: Mr Chris Perkins, 647 ABG/CEC, Hanscom AFB, DSN: 478-4352.

I certify that the above information is accurate and complete to the best of my knowledge and belief.

AIR STAFF REVIEWER: Steven K. Lillemon DATE: 12 Jul 94
Maj Steven K. Lillemon
AF/CEPP

Requesting clarification on title

94-08-31 08:04 RCVD

23

ROME LABORATORY at HANSCOM AFB
INPUT TO "LAB" JCSWG DATA CALL
5 AUGUST 94

SECTION II: CAPACITY OF DOD COMPONENTS

2.1 **Workload.** Use the following table to describe historic and projected workload at each activity in terms of funding and workyears. Assume previous BRAC closures and realignments are implemented on schedule. Projected funding will be derived from FY95 President's Budget Submission (Then year dollars). Past fiscal year data shall begin with FY86 or at the inception of the activity as it existed on 1 Oct 93. (BRAC Criteria I & IV)

ROME LABORATORY AT HANSCOM AFB MA

Information Required	Fiscal Years											
	86	87	88	89	90	91	92	93	94	95	96	97
Total Funds Programmed ($M)	29	26	32	28	23	24	21	19	32	31	31	29
Total Actual Funds ($M)	29	29	25	24	30	18	12	20				
Programmed Workyears	209	205	202	201	201	184	177	171	164	164	164	164
Actual Workyears	212	218	211	206	192	166	154	152				

- Budgeted workyears are the selected indicator of the "lab" infrastructure's capacity at an aggregate level for each Military Department. They include both workyears funded directly by the Military Department and the workyears funded from organizations outside the Military Department.

Workyears = government personnel and on-site FFRDCs and SETAs

2.2 Excess "Lab" Capacity -- Measured at the DOD Component Level

Excess lab capacity = 218 - 164 = 54 workyears

- Excess "Lab" Capacity = Sum of the Peak Workyears - Sum of the Projected Workyears
  -- Peak at each activity = Highest value between FY86 (or since inception of organization) and FY93
  -- Projected at each activity = Estimated at FY97

94-09-20 12:37 RCVD

CONTROL NUMBER: LJCSWG-AF 013

PURPOSE: To provide SAF/AQX staff corrected answers to Question 3.0 of the Rome Lab Hanscom AFB response to the Laboratory Joint Data Call. In your response to Question 3.0 you state that you perform " Research to design, build, and improve electronic devices..." and you have a "Very strong and extensive working relationship with the following CSFs

- --Fixed Ground-Based C4I
- --Ground Mobile C4I
- --Electronic Devices
- --Environmental Sciences
- --Advanced Materials

If you are doing work in these CSFs you must respond to all Section 3 questions for each of these CSFs.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain:)

MAJCOM REVIEWER: _____
(print name, organization, DSN)

BASE: Concurs Does not concur (explain:)

BASE REVIEWER: _____
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF Date:
Manufacturing_Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Item 3
page 1-2

CONTROL NUMBER: LJCSWG - AF 013

~~SAF/AQX CORRECTION WORKSHEET~~

PURPOSE: To provide SAF/AQX staff corrected answers to question 3.0 of the Rome Lab Hanscom AFB response to the Laboratory Joint Data Call. In your response to Question 3.0 you state that you perform "Research to design, build, and improve electronic devices..." and you have a "Very strong and extensive working relationship with the following CSFs"

- Fixed Ground-Based C4I
- Ground Mobile C4I
- Electronic Devices
- Environmental Sciences
- Advanced Materials

If you are doing work in these CSFs you must respond to all Section 3 questions for each of these CSFs.

SOURCE: Lt Col Hanson, SAF/AQXM, DSN 227-8850

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain)

SEE COMMENTS BELOW

MAJCOM REVIEWER: Thomas L. Koepnick

THOMAS L KOEPNICK HQ AFMC/XPX DSN 787-2622

BASE: Concurs Does not concur (explain)

No corrections are necessary to the most recent version (8 Aug package) of the Laboratory JCSG Data Call for Rome Laboratory-Hanscom AFB MA. We do have a strong working relationship with the above CSFs, however, the predominant work within Rome Lab Hanscom is Airborne C4I. Our personnel draw upon the technologies of the listed CSFs and the results of our work also benefit these other CSFs. For instance, we developed a B-52 infrared camera which could also be mounted on a ship, an airport control tower, or some other observation point. The design of communications systems cannot occur without an understanding of the physics of the atmosphere and the ionosphere. The technology that allows antennas to give satellite communications capability to aircraft can also provide satellite communications in ground installations or ground vehicles. However, even in the presence of these significant and necessary relationships with the other CSFs, the essence of our work is best characterized as airborne C4I.

BASE REVIEWER: William R. Shobert II

WILLIAM R. SHOBERT II, Capt, USAF
Rome Laboratory (APMC), Griffiss AFB NY
DSN 587-7701

I certify the information above is accurate and complete to the best of my knowledge and belief.

CHARLES R. HANSON, Lt Col, USAF
Manufacturing Quality Assurance Division
Dep Asst Sec (Mgt Policy and Prog Integ)
Assistant Secretary (Acquisition)
Base Closure Working Group

Date:

2

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

MAJOR CAPABILITIES AT ROME LAB - HANSCOM AFB

Airborne C4I

- Research to design, build, and improve electronic devices and components made from silicon, silicon-based compounds, indium phosphide, gallium arsenide, and other exotic crystalline materials.
  -- This research results in devices that are smaller, faster, require less power, are more radiation-tolerant, and less expensive to mass-produce.
  -- These devices are valuable for electronic and photonic applications in radar, communications, avionics, and signal-processing systems with both military and commercial uses.

- Research to design, build, and improve devices sensitive to infrared radiation, based primarily on platinum silicide technology
  -- Sensors, processing devices, and focal plane arrays from this technology combine to make infrared surveillance systems of outstanding sensitivity and resolution.

- Research and development of superconducting devices and components
  -- Superconductors will vastly improve efficiency of transmitters, and the sensitivity of receivers
  -- Superconductors will also allow significant increase in frequencies used by radios and radars
  -- Also have application in millimeterwave phased array antennas for radar and communications, signal processors for space-based surveillance systems, and for power transmission systems.

- Research into the radar signatures of various stealthy aircraft shapes and materials
  -- Develop and validate computer codes and programs to improve USAF ability to detect stealthy targets and to design more stealthy USAF aircraft.

-- Several experimental ranges are available for research in this area.

- Research into the nature of electronic noise and clutter in new radar systems.
  -- Several experimental ranges are available for research into polarization characteristics of radar signal and noise returns and the effect of various terrain features on those signals.
  -- Results are used to improve performance of radar systems and to assess the potential usefulness of concepts for new surveillance systems.

- Research into the propagation of radio and radar signals, especially in the high frequency (HF) spectrum
  -- Results are used to improve performance of existing radars and communications systems and to design and evaluate new communications and surveillance techniques.

- Research to design, test, and evaluate new antenna technologies for radio and radar systems
  -- This research extends from HF to microwave and millimeterwave frequencies
  -- Test facilities are available to evaluate a wide variety of antennas both in laboratory and real-world settings.

- High-pressure bulk semiconductor crystal growth expertise and apparatus
  -- Crystals are basic material for electronic and photonic devices and components for high-speed communications, signal processing, radar, avionics, electronic warfare systems, and satellite solar cells.

- Semiconductor metal-organic chemical vapor deposition (MOCVD) expertise and apparatus
  -- MOCVD techniques are used to make crystal material into devices and components for high-speed communications, signal processing, radar, avionics, and electronic warfare systems.

- Nonlinear optical materials fabrication expertise and apparatus
  -- This research supports development of photonic devices and components for high-speed signal processing, target recognition systems, optical computers and computer memories, laser components, and avionics systems.

- Information security research and development
  -- Digital secure voice multi-rate speech compression and applications
  -- Encryption processing, especially software reconfigurable encryption

-- Compromising emanations (C2PROTECT) R&D to develop advanced computer-aided C2PROTECT detection and analysis capabilities

- Very strong and extensive working relationship with the following CSFs
  -- Fixed Ground-Based C4I
  -- Ground Mobile C4I
  -- Electronic Devices
  -- Environmental Sciences
  -- Advanced Materials

3.1 Location

3.1.1 **Geographic/Climatological Features:** Describe any geographic/climatological features in and around your activity that are relevant to each CSF. Indicate and justify those that are required versus those that just serve to enhance accomplishing the mission of the activity. For example, clear air at high altitude that increases quality of atmospheric, ground-based laser experiments in support of the weapons CSF. (BRAC Criteria I)

The Ipswich Electromagnetic Test Site is located on a half-mile long, 65 acre block of land. The land consists of two hills and the valley separating them, plus areas of woods and open fields. Located near the ocean and away from cities and other sources of man-made electromagnetic interference, the site is used to test improvements to radar and communications hardware and techniques. The geography of the site is vital, as it allows controlled experiments against a variety of electronic backgrounds under seasonally varying conditions, provides the land expanse necessary for proper and accurate testing, and minimizes exposure of experiments to the disruptive effects of external interference.

Prospect Hill is a research site located on one of the highest points of land within a 25 miles radius. Its elevated position is necessary to allow line-of-sight radio/radar system experiments over long distances. From Prospect Hill, line-of-sight distances of 50 or 60 miles are possible; without it, trees, buildings, and terrain features limit our line-of-sight testing to a mile or two at best -- totally insufficient.

Like Prospect Hill, the research facility at Sudbury MA is located above the local trees, buildings, and hills and is an excellent location for line-of-sight testing. Using Sudbury in conjunction with Prospect Hill, Rome

Lab has built a bistatic radar test facility to support research into ways to take the stealth out of stealthy enemy aircraft. The geography of Sudbury and its location with respect to Prospect Hill make it an extremely important resource.

3.1.2 **Licenses & permits:** Describe and list the licenses or permits (e.g., environmental, safety, etc.) that your activity currently holds and justify why they are required to allow tests, experiments, or other special capabilities at your location for each CSF. For example, permit to store and use high explosives. (BRAC Criteria I)

Rome Lab has a license to operate a radar at its Sudbury, MA research site. The radar is cleared to operate between 2710 - 2760 MHz at 1 megawatt in any direction at any time of the day or night. This license is vital to the operation of the bistatic radar test range that exists between our Sudbury site and our Prospect Hill research facility.

3.1.3 **Environmental constraints:** Describe and list the environmental or land use constraints present at your activity which limit or restrict your current scope for each CSF, i.e., would not allow increased "volume" or "spectrum" for the CSF. Example -- Volume: frequency of a type of experiment. Example -- Spectrum: Current permit to detonate high explosives will not allow detonation or storage of increased quantity of explosives without legal waiver (state law) or relocation of surrounding (non-govt) buildings. (BRAC Criteria II)

~~No environmental constraints.~~ SEE PAGE 6A and 6B & 6C

3.1.4 **Special Support Infrastructure:** List and describe the importance of any mission related special support infrastructure (e.g. utilities) present at your location for your activity. (BRAC Criteria I)

In addition to 115 volt power, all of our laboratory facilities have 220 volts installed and can have 480 volt power delivered if needed. The labs also have water, compressed air, natural gas, and (in some cases) liquid nitrogen available. The building holding the Semiconductor High Pressure Crystal Growth Facility and the Hydrothermal High Pressure Crystal Growth Facility has an emergency back-up power source and special "blow out" walls. The building housing the Semiconductor Epitaxy Thin Film Growth Facility has a room specially designed safely to contain and use extremely toxic gases. The

AIR STAFF CORRECTION WORKSHEET

PURPOSE: To provide corrected answer to **ROME LAB, HANSCOM AFB, Mass.**

SOURCE: **'95 BRAC Questionnaire**

CONCLUSION: **Update needed (~~no change~~ SEE below)**

MAJCOM (CONCURS)(NONCONCURS): **CONCURS (Provided info VIA questionnaire)**

BASE (CONCURS) (DOES NOT CONCUR): -same-

I certify the above information is accurate and complete to the best of my knowledge and belief, based upon information provided by identified sources.

AIR STAFF REVIEWER: R. McCann (CEVP) **DATE:** 28 JUL 1994

Hanscom AFB is located in an air quality non-attainment area for ozone. Natural resources associated with Hanscom AFB would have to be considered prior to any related construction activities.

AIR STAFF CORRECTION WORKSHEET

PURPOSE: To provide corrected answer to **HANSCOM AFB, MA**.

SOURCE: **'95 BRAC Questionnaire**

CONCLUSION: **Update needed (~~no change~~ SEE BELOW)**

MAJCOM (CONCURS)(NONCONCURS): **CONCURS (Provided info VIA questionnaire)**

BASE (CONCURS) (DOES NOT CONCUR): -same-

I certify the above information is accurate and complete to the best of my knowledge and belief, based upon information provided by identified sources.

AIR STAFF REVIEWER: J. Bush (CEVP) **DATE:** 19 AUG 1994

Air Quality
-- Area is in non-attainment for Ozone (serious). The base has implemented carpooling; does not restrict on/off-base activities at this time.

Groundwater/IRP
-- Potable groundwater contaminated. 22 IRP sites constrain future activities.

Other
-- 27 Acres of wetlands constrain future construction.
-- Grassland community (habitat), north of base is a verified site for breeding Upland Sand Pipers & Grasshopper Sparrows (both sensitive species).

RL-HANSCOM

CONTROL NUMBER: LJCSWG-AF 015 015 94-09-21 11:22 RCVD

PURPOSE: To provide SAF/AQX staff clarified answers to Question 3.1.3 of the (see Distribution List) response to the Laboratory Joint Data Call. The response indicated you were in a non-attainment area.

1. Can you return to the Peak Programmed Workyears level (Question 2.1 response) without either a Permit modification or a new Permit?

2. If a Permit modification or a new Permit is required, will mitigation be required?

2.a. If mitigation is required, describe the nature of the mitigation required.

METHOD: Comparison of answers to questions

CONCLUSION: Answer must be: Complete

RATIONALE: Response must be in accordance with LJCSG Guidance Package instructions

MAJCOM: Concurs Does not concur (explain)

See RL Response below.

MAJCOM REVIEWER: [signature] 0 SEP 1994
(print name, organization, DSN)
Craig C King, MAJ, HQ AFMC/ST, 787-5368

BASE: Concurs Does not concur (explain)

Rome Laboratory Hanscom can return to the peak programmed workyears level as shown in the answer to question 2.1 without any permit modifications and without any new permits.

BASE REVIEWER: Harold F. Barg, Lt Col, RL/ER, DSN 478-3705
(print name, organization, DSN)

I certify the information above is accurate and complete to the best of my knowledge and belief.

6C

runway at Hanscom AFB ensures a constant presence of airborne aircraft in the vicinity, which we use as targets of opportunity for testing of infrared and radar surveillance systems undergoing research at our laboratory.

3.1.5. **Proximity to Mission-Related organizations:** List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
Airborne C4I	Phillips Lab	Government	on base	3	23
	MITRE&LL	FFRDCs	5 miles	7	6
	ESC	Government	on base	3	0
	Colleges	Academic	5-20 miles	5	13
	Companies	Commercial	5-20 miles	5	30

The Geophysics Directorate of the Phillips Lab at Hanscom AFB supplies Rome Lab Hanscom with a variety of support, including logistics material control activity, photo lab, computer resources, and the technical library. Of these, the technical library is probably the most valuable. This is an outstanding technical library that is heavily used by Rome Lab, Phillips Lab, MITRE, and many of the companies and universities in the local area. Additionally, PL and Rome Lab share knowledge and resources on projects that bridge their mutual areas of expertise. The close proximity of Rome and Phillips (a short walk down a building corridor) facilitates frequent and easy meetings and data exchanges among the technical personnel involved.

Massachusetts Institute of Technology's Lincoln Laboratory (LL) works with Rome Lab on research on the creation, study, and use of superconducting materials. LL's facilities and expertise complement our own very well, and both organizations receive benefit from working together. This cooperation is enhanced by the fact that LL is located on Hanscom AFB only a couple hundred yards from the Rome Lab facilities. The MITRE Corporation is the technical engineering arm of ESC, and as such, MITRE and Rome Lab share a common interest in many of the C4I technologies that will ultimately appear in most of the ESC acquisition programs. The presence of Rome Lab, ESC, and MITRE within 5 miles of each other facilitates impromptu meetings and technical data

interchanges. The distance separating other, remote participants frequently impedes their active participation in such meetings.

The Electronic Systems Center (Rome Lab's parent organization) is also located at Hanscom AFB, and this condition improves the working relationship between Rome Lab and ESC. Rome Lab Hanscom works closely with several ESC system program offices, and the proximity of the two organizations allows free and easy access at almost any time. Additionally, the Hanscom contingent of Rome Lab is able to attend ESC/CC staff meetings and other ESC meeting and events and represent the rest of Rome Lab in person at the parent organization. ESC also frequently includes Rome Lab as a "tour stop" to show off Rome Lab's latest technology when dignitaries visit ESC and Hanscom AFB.

Rome Lab Hanscom has contacts and working relationships with many of the local colleges and universities in the Boston area, including Northeastern, MIT, University of Massachusetts at Lowell, Tufts, Worcester Polytechnic Institute, Boston University, and Harvard. In some cases this relationship is contractual, where Rome Lab will contract for specific services. In some cases it is cooperative, where Rome Lab and the colleges will share resources, facilities, and experimental data for the benefit of both organizations. These colleges are sources of technical seminars and are a pool of extremely well-qualified candidates for hiring by Rome Lab. Finally, several Rome Lab personnel serve as professors at local colleges, teaching evening classes in their specialties, and many of Rome Lab's younger personnel attend the local colleges to earn Master's and Doctorate degrees.

There are many high-tech companies in the Boston area, and Rome Lab has a strong working relationship with several of them. These companies supply Rome Lab with technology, equipment, and data necessary for C4I research. Some of these companies are actively investigating cooperative research and development agreements (CRADAs) and small business innovative research (SBIR) contracts with Rome Lab, and their location in the immediate area will enhance such cooperative research by allowing frequent and inexpensive face-to-face interactions among the parties involved.

3.2 Personnel:

3.2.1 **Total Personnel:** What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering

development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	**89**	**17**	0	3
Management (Supv)	**18**	**2**	0	0
Other	**21**	**2**	0	1

3.2.2 **Education:** What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	**Number of Government Personnel by Type of Position**		
	Technical	**Management (Supv)**	**Other**
High School or Less	**10**	**0**	**20**
Associates	**5**	**0**	**3**
Bachelor	**22**	**4**	**0**
Masters	**36**	**5**	**0**
Doctorate (include Med/Vet/etc.)	**33**	**11**	**0**

Corresponding information for SETA personnel:

Type of Degree/ Diploma	**Number of SETA Personnel by Type of Position**		
	Technical	**Management (Supv)**	**Other**
High School or Less	**0**	**0**	**0**
Associates	**0**	**0**	**1**
Bachelor	**1**	**0**	**0**