

**EXECUTIVE SUMMARY
ACCIDENT INVESTIGATION BOARD
F-16C, SN 83-1164
LUKE AIR FORCE BASE, ARIZONA
11 APRIL 2006**

On 11 April 2006, at 0953L (1653 Zulu), the mishap aircraft (MA), an F-16C, serial number 83-1164, assigned to the 62nd Fighter Squadron, Luke Air Force Base (AFB), Arizona, crashed on privately owned agricultural land approximately three nautical miles southwest of Luke Air Force Base. The MA was part of a Basic Fighter Maneuvers training mission. The mishap pilot (MP) was assigned to the 62nd Fighter Squadron as an F-16 Upgrade Pilot.

Shortly after initial takeoff from a two-ship, afterburner formation takeoff with the mishap instructor pilot (MIP) in the lead, the MP heard a loud bang and felt the MA shudder as he reduced power to maintain formation position. At the same time, the MIP made a radio call that there was a fire coming from the back of the aircraft and directed the MP to turn back towards Luke AFB. As the MP executed a right climbing turn to the west he noticed a decrease in RPM, a loss of thrust and that the engine was not responsive. The MP continued the turn and retarded the throttle to idle and then cutoff twice in unsuccessful attempts to recover engine operation.

The MP, having confirmed that the engine was unresponsive and recognizing that the MA was at too low an altitude and unable to make it back to Luke AFB, safely ejected and sustained no injuries. The MA was destroyed on impact with a loss valued at approximately \$21 million.

The MA impacted on privately owned farmland approximately three miles southwest of Luke Air Force Base. Wreckage recovery was completed at the crash site within a week of the mishap. The 56th Fighter Wing coordinated environmental clean-up of the main crash site and handled claims for crop damage, productivity loss and environmental clean-up.

Clear and convincing evidence establishes that a malfunction in the Rear Compressor Variable Vane (RCVV) system of the MA engine was the root cause of a chain of events that caused the MA to enter a non-recoverable engine stagnation and crash. Although evidence was not conclusive, based on analysis of the available data and expert opinion, the most probable source of the malfunction was the RCVV Electro-Hydraulic Servo Valve. The MP correctly determined that the aircraft could not be recovered and ejected.

Under 10 U.S.C. 2254(d) any opinion of the accident investigators as to the cause of, or the factors contributing to, the accident set forth in the accident investigation report may not be considered as evidence in any civil or criminal proceeding arising from the accident, nor may such information be considered an admission of liability of the United States or by any person referred to in those conclusions or statements.

SUMMARY OF FACTS AND OPINION
ACCIDENT INVESTIGATION BOARD
F-16C, S/N 83-1164
LUKE AIR FORCE BASE, ARIZONA
11 APRIL 2006

TABLE OF CONTENTS

TABLE OF CONTENTS.....	i
COMMONLY USED ACRONYMS & ABBREVIATION.....	iii
SUMMARY OF FACTS	1
1. AUTHORITY, PURPOSE, AND CIRCUMSTANCES.....	1
a. Authority.....	1
b. Purpose.....	1
c. Circumstances.....	1
2. ACCIDENT SUMMARY	2
3. BACKGROUND.....	2
4. SEQUENCE OF EVENTS.....	2
a. Mission.....	2
b. Planning.....	3
c. Preflight.....	3
d. Summary of Accident.....	3
e. Impact.....	4
f. Life Support Equipment, Egress and Survival.....	5
(1) Ejection Sequence.....	5
(2) Pilot Equipment	5
(3) Aircraft Equipment.....	5
g. Search and Rescue.....	5
5. MAINTENANCE.....	6
a. Forms Documentation.....	6
(1) Summary.....	6
(2) Major Maintenance.....	6
(3) Recurring Maintenance Problems.....	6
(4) Open Write-ups.....	6
(5) AFTO 781K Write-ups.....	6
(6) Pre-flight Operational Checks	6
b. Inspections.....	7
(1) Aircraft.....	7
(2) Engine.....	7
c. Maintenance Procedures.....	7
d. Maintenance Personnel and Supervision:.....	7
e. Fuel, Hydraulic and Oil Inspection Analysis.....	8
f. Unscheduled Maintenance.....	8
6. AIRCRAFT AND AIRFRAME.....	8
a. Condition of Systems.....	8
(1) Aircraft and Systems.....	8
(2) Engine History.....	8
b. Testing and Teardown Analyses.....	9
(1) Oklahoma City Air Logistics Center, Fighter Propulsion Division.....	9
(2) Lockheed Martin Aeronautics Company.....	15
(3) Honeywell Aerospace and HR Textron.....	16
(4) Oklahoma City Air Logistics Center, Metallurgical Analysis Section.....	16

- c. Expert Opinion.....16
 - (1) Interview with Mr. Pete Chouinard. 17
 - (2) Interview with Mr. Boe I. Green and Mr. Loren R. Lutz..... 18
- 7. WEATHER20
 - a. Forecast Weather. 20
 - b. Observed Weather. 20
 - c. Space Environment..... 20
 - d. Conclusions. 20
- 8. CREW QUALIFICATIONS20
 - a. Mishap Pilot Training..... 20
 - b. MP 30/60/90 breakdown] 21
- 9. MEDICAL.....21
 - a. Qualifications. 21
 - b. Health. 21
 - c. Lifestyle..... 21
 - e. Crew Rest and Crew Duty Time..... 21
- 10. OPERATIONS AND SUPERVISION21
 - a. Operations. 21
 - b. Supervision. 22
- 11. HUMAN FACTORS ANALYSIS22
- 12. GOVERNING DIRECTIVES AND PUBLICATIONS22
 - a. Primary Operations Directives and Publications. 22
 - b. Maintenance Directives and Publications..... 23
 - c. Known or Suspected Deviations from Directives or Publications..... 24
 - (1) Mishap Crew. 24
 - (2) Operations Supervision..... 24
 - (3) Maintenance. 24
- 13. NEWS MEDIA INVOLVEMENT24
- 14. ADDITIONAL AREAS OF CONCERN.....26
- 15. SIGNATURE AND DATE.....26
- STATEMENT OF OPINION27
 - 1. OPINION SUMMARY27
 - 2. DISCUSSION OF OPINION.....27
 - a. Sequence of Events..... 27
 - b. Causal Factor..... 28

COMMONLY USED ACRONYMS AND ABBREVIATION

1CO	Squadron Aviation Resource	CEMS	Comprehensive Engine Management System
AB	Afterburner		
ACES-II	Advanced Concept Ejection System	CETADS	Comprehensive Engine Trend and Diagnostic System
ADCC	Assistant Dedicated Crew Chief	CMM	Coordinate Measuring Machine
ADO	Assistant Operations Officer	CMS	Component Maintenance Squadron
AETC	Air Education and Training Command	Code 1	No Problems Noted
		Col	Colonel
AETCI	AETC Instruction	CSAR	Combat Search and Rescue
AETCM	AETC Manual	CSFDR	Crash Survival Flight Data Recording
AF	Air Force		
AFB	Air Force Base	CSMU	Crash Survivable Memory Unit
AFETS	Air Forces Engineering and Technical services	DCMA	Defense Contract Management Agency
AFI	Air Force Instruction	DEEC	Digital Electronic Engine Control
AFM	Air Force Manual	DME	Distance Measuring Equipment
AFTO	Air Force Technical Order	DNIF	Duty Not Including Flying
AGL	Above Ground Level	DO	Operations Officer
AIB	Accident Investigation Board	DOD	Domestic Object Damage
ALC	Air Logistics Center	DSN	Defense Switching Network
AMD	Acceleration Monitoring Device	DTC	Data Transfer Cartridge
AMU	Aircraft Maintenance Unit	ECS	Engine Control System
AOA	Angle of Attack	EEWS	Engine Emergency Warning Activation System
BFM	Basic Fighter Maneuver		
BINGO	Fuel needed to recover to base	EGI	Environmental Control System
BOP	Basic Post-Flight Inspection	EHSV	Electro-Hydraulic Servo Valve
C	Celsius of Centigrade	ELT	Emergency Locator Transmitter
CAMS	Core Automated Maintenance System	EOR	End of Runway
		EOT	Engine Operating Time
CANN	Cannibalization	EP	Emergency Procedures
CAP	Critical Action Procedures	EPU	Emergency Power Unit
CAPT	Captain	ER	Emergency Room
CAT	Category	ESS	Engine Start System
CATM	Captive Air Training Missile	FCIF	Flight Crew Information File
CC	Commander	FDT	Fan Drive Turbine
CCy	Calculated Cycles	FLT	Flight

FLT/CC	Flight Commander	ME	Mishap Engine
FMC	Fully Mission Capable	MFL	Maintenance Fault List
FO	Foreign Objects	MIL	Military Power (Maximum RPM and thrust without afterburner)
FOD	Foreign Object Damage		
FOHE	Fuel Oil Heat Exchanger	MIN AB	Minimum Afterburner
Form 1042	Medical Recommendation for Flying Duty	MIP	Mishap Instructor Pilot
FPI	Florescent Penetrant Inspection	MOA	Military Operations Area
FS	Fighter Squadron	MOD	Modular
FTIT	Fan Turbine Inlet Temperature	MP	Mishap Pilot
FW	Fighter Wing	MSL	Mean Sea Level
G	Force of Gravity or Gravity	MWS	Major Weapons System
GCU	Generator Control Unit	NDI	Non-Destructive Inspection
GUARD	Emergency radio frequency	NM	Nautical Mile
HHQ	Higher Headquarters	NORDO	No Radio
HPT	High Pressure Turbine	OG	Operations Group
HSI	Horizontal Situation Display	OG/CC	Operations Group Commander
HUD	Heads Up Display	OGRF	Operations Group Read File
IAW	In accordance with	OI	Operating Instruction
IFR	Instrument Flight Rules	Ops	Operations
IFM	Inlet Fan Module	OPSTEMPO	Operations Tempo
IP	Instructor Pilot	ORI	Operational Readiness Inspection
IV	Intravenous	ORM	Operational Risk Assessment
JA	Judge Advocate	OSC	On-Scene Commander
JAG	Judge Advocate General	OSS	Operations Support Commander
JEIM	Jet Engine Intermediate	PCS	Permanent Change of Station
JFS	Jet Fuel Starter	PE	Periodic Inspection
KCAS	Knots Calibrated Airspeed	PFT	Programmed Flying Training
KIAS	Knots Indicated Airspeed	PI	Phase Inspection
KTAS	Knots True Airspeed	PQDR	Product Quality Deficiency
L	Local Time	QA	Quality Assurance
LG	Logistics	QAE	Quality Assurance Evaluator
LGM	Logistics Maintenance	RAPCON	Radar Approach Control
LGSF	Logistics – Fuels Flight	RCM	Reliability Center Maintenance
LOX	Liquid Oxygen	RCVV	Rear Compressor Variable Vanes
LPT	Low Pressure Turbine	REDBALL	Request for expeditious maintenance
LT	Lieutenant	RPM	Revolutions per Minute
LT Col	Lieutenant Colonel	RTB	Return to Base
MA	Mishap Aircraft	SA	Situational Awareness
MAJ	Major	SAR	Search and Rescue
MAX AB	Maximum Afterburner	SAU	Signal Acquisition Unit

SCR	Special Certification Roster
SDR	Seat Data Recorder
SEC	Secondary Engine Control
SEM	Scanning Electron Microscope
SFO	Simulated Flame-out
SIB	Safety Investigation Board
S/N	Serial Number
SOF	Supervisor of Flying
SQ	Squadron
SrA	Senior Airman
Stan/Eval	Standardization/Evaluation
Step	going out to the aircraft
SUU	Suspension Utility Unit
TAC	Tactical or Total Accumulated
TASAMS	Tactical Aircrew Scheduling and Airspace Management System
TCTO	Time Compliance Technical Order
TDY	Temporary Duty
TO	Technical Order
Top 3	Squadron flying operations supervisor
TRS	Training Squadron
TSgt	Technical Sergeant
UHF	Ultra-High Frequency
USAF	United States Air Force
VFR	Visual Flight Rules
VHF	Very-High Frequency
VMC	Visual Meteorological
Z	Zulu or Greenwich Mean Time (GMT)